Telecommunications Study

by Tacoma City Light

Tacoma City Council
Public Utility Board
Joint Study Session
February 18, 1997

Why should a Publicly Owned Electric Utility be involved in Telecommunications?

- Board initiated RFP process in 1995
- Enhanced Telecommunication capability vital to the Utility in order to continue to improve service and provide choice to customers in rapidly changing environment.
- Investment in the community that provides a pathway to choice and competition.
- Over 100 years ago, Tacoma took steps to improve vital infrastructure to better serve our citizens.

Key Operational Advantages to Tacoma City Light

- Electric system control and outage reporting
  - Savings to Tacoma City Light
  - Savings to customers
- Electric system performance monitoring and preventive maintenance
- Providing interactive communication link to customers

Telecommunications Study Team

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Telecommunications Study
Brief Review of Part One

- Telecommunications technology
- Telecommunication companies
- Regulation: Federal, State, and Local
- Other cities and communities
- Local telecommunications history
- Existing telecommunications options in our local communities

Business Market Research

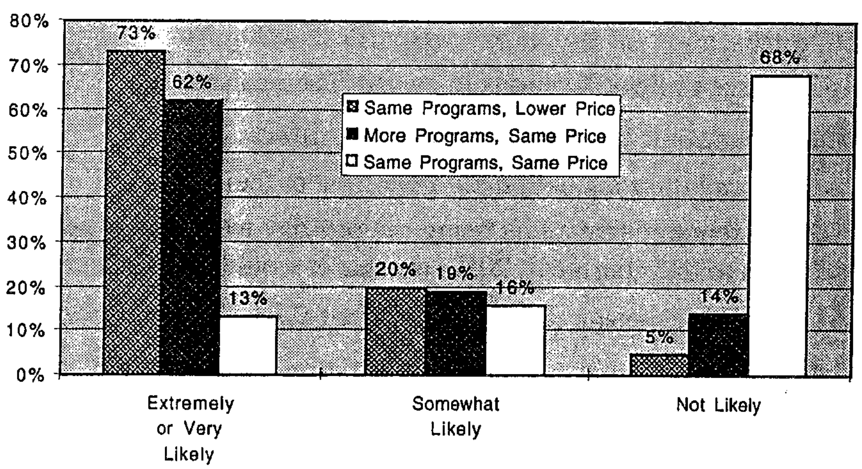
- Survey of 200 businesses:
  - representing $5 billion in revenue & 25,000 jobs
  - average of three locations in greater Tacoma area
- Importance of telecommunications links
  - 74% say links are extremely important to their success
  - 62% reported that a link being out one day would cause serious harm to their business; 20% said that it would shut them down
- 61% of businesses use Internet (but with limited access)
- 14% of employees telecommute (increasing to 18% in 2yr)
- Limited Experience with High Speed Lines
  - Two-thirds were not familiar with ISDN lines or T-1 lines

Residential Market Research

- Accessing the Internet in our community
  - 18% of households were on-line at end on '96
  - an additional 11% of households expect to be on-line by the end of '97
    - a total of 24% of households on-line by the end of '97
- Cable television demand

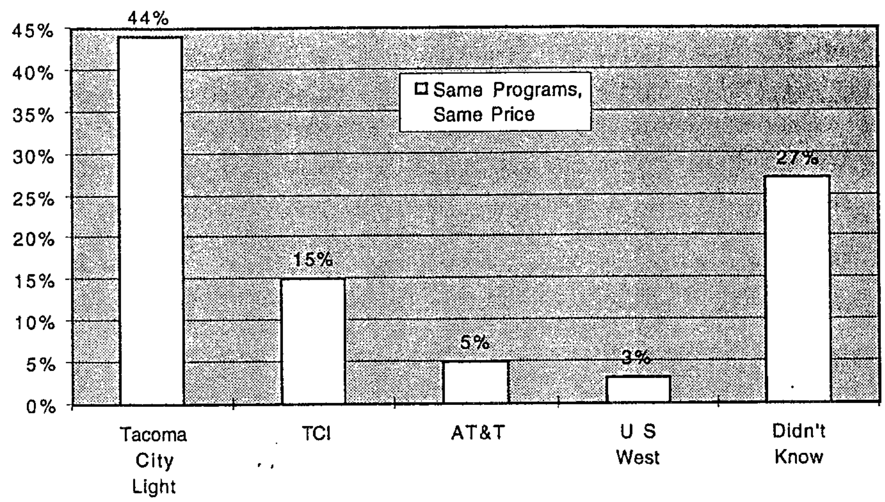
Willingness to Switch Cable Television Providers

If a new cable company offered _____ TV programs at ____ price than your current cable company, how likely would you be to switch to the new company?



Preferred Provider of Cable Television Services

Assuming that each company offered similar services at similar prices, if all of the following companies offered you cable TV service, who would you be most likely to buy it from? Would it be....



Background Information

Only 25% of households recalled hearing or reading any information about this project. So the following information was provided to respondents prior to asking questions about Tacoma City Light involvement in telecommunications:

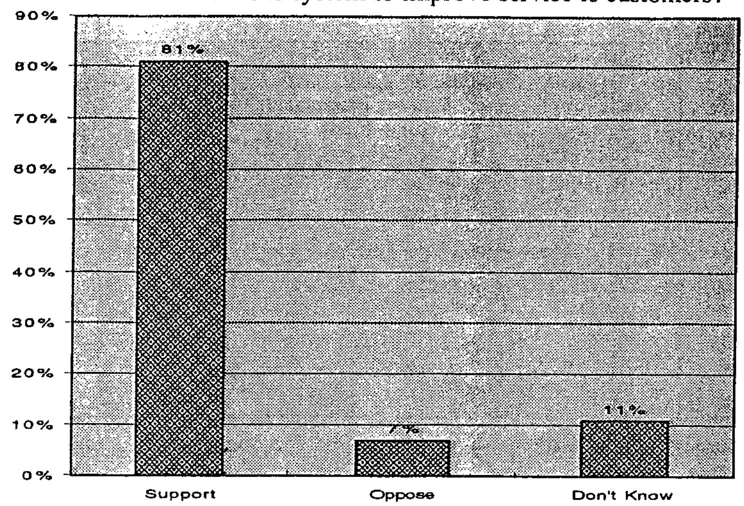
For your information, Tacoma City Light is considering whether or not to install a new communications system to find outages more quickly and to restore power faster if the electricity goes out. This system would be entirely separate from the lines that deliver your electricity and would not affect your electric service.

To pay for this system, City Light would give customers a chance to buy some new services - such as cable TV - that use the same equipment. Only the customers who choose to buy these new services would be charged for them. No tax money would be used and your electric rates would not increase because of this new system being installed.

Given this information, please answer the following question...

Support for Tacoma City Light Telecommunications System

To what degree do you support Tacoma City Light building this new communications system to improve service to customers?



Economic Development Impacts

- Market trends
  - Change in economic base
  - Downtown development activities
- Business Environment
- Telecommunications needs
  - Development activities at military bases
  - The expanding health services industry
  - Professional & financial services
  - Port of Tacoma

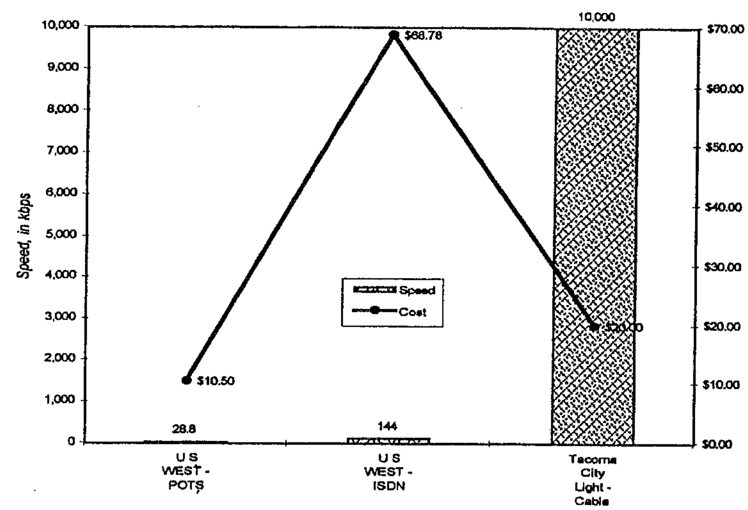
The Telecommunications System

- Multiple fiber optic rings running through out Tacoma City Light's service area
  - Secure and redundant fiber optic system
  - SONET electronics
- Fiber rings support two-way 750MHz Hybrid Fiber Coax system in residential areas reaching all homes

Public-Private Telecommunications Services

- Wholesale data and telephony transport on the fiber optic SONET system
  - Available on a non-discriminatory basis to
    - other carriers (both local and long distance companies)
      - for switched services and dial tone
    - local value added service providers
      - who would customize these high speed lines for businesses that do not maintain a telecommunications staff
    - local businesses that have the technical expertise to use the lines themselves
- High speed Internet data transport for homes and small businesses in partnership with Internet Service Providers (ISPs)
  - Light Division transports the data, the ISPs do all the rest
- Full cable television service direct to local homes by Tacoma City Light

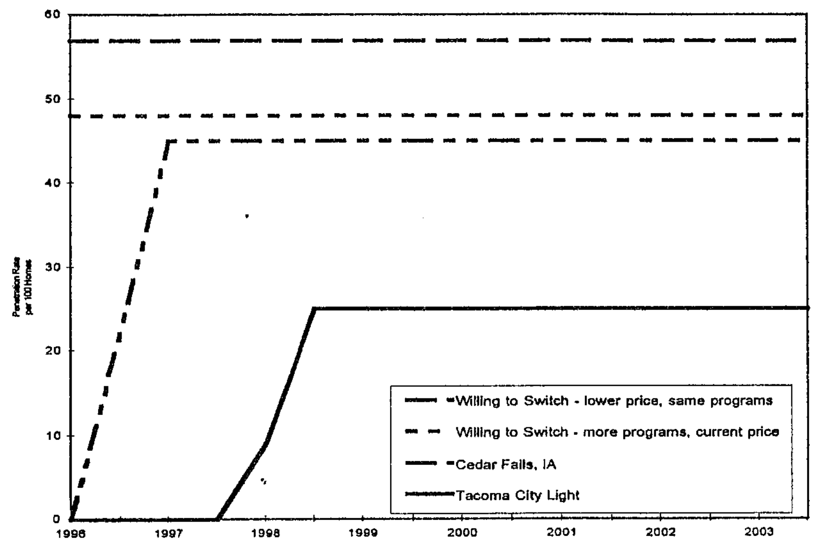
Data Transport for Internet Access



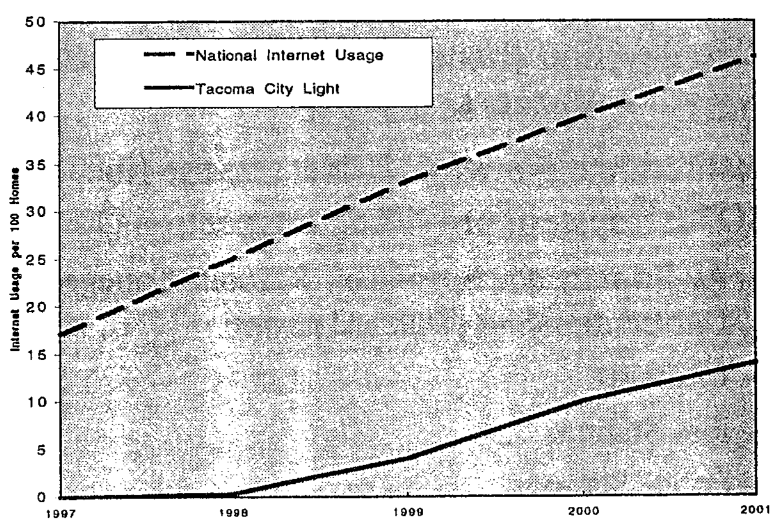
Contacts with Private Service Providers

- Discussions with a number of private service providers about system options
- Video Providers
  - Talks were not particularly productive, the closest was:
    - Private would provide programming, advertising & billing but would not assume any system financial risk
    - Tacoma City Light would provide everything else including maintenance, cable installation, money, and name
- Other providers do want to make use of transport services to facilitate delivering other services
  - Sprint Spectrum

Revenue Projections
Comparison of Cable TV Penetration



Revenue Projection
Comparison of Internet Usage & Transport



Expenses

- Programming
- Pole Contacts and Conduit Use Fees
- Debt Service
- Payroll
- Overhead
- System Upgrades
- Franchise costs

Expenses Continued: Franchise Proposal

- Six television channels for Public, Education, and Government access use
- Institutional Network (I-Net) on the fiber optic SONET system providing connections to:
  - All Primary and Secondary Schools, Colleges, and Universities (both public and private)
  - Libraries
  - Fire Stations
  - Police Stations

Taxes and Fees

Inside Each Franchise Jurisdiction

- Franchise fee (5%) or Institutional Network
- Video gross earnings tax (8.32% in Tacoma)
- Telephone & data transport gross earnings tax (6% in Tacoma)

Outside the City of Tacoma

- Gross Earning Tax of 6% to City of Tacoma on revenues earned outside the Tacoma City Limits

Note: Pricing in financials is inclusive of all taxes and fees

Benefits

- Improves Tacoma City Light's competitive position by providing its utility customers with additional services not available from competitors
- Provides a platform for implementing electric system distribution automation, market access, and real-time communication with customers
- Provides better telecommunications and cable television service sooner and cheaper than other providers will deliver
- Provides high speed, low cost transport between Internet Service Providers and homes & small businesses that can't afford dedicated digital lines
- Significant tool for regional economic development by creating a high-tech telecommunications infrastructure
- Additional revenue to Tacoma City Light and subsequently to the General Fund through expansion of the market for telecommunications services and the 6% gross earnings tax on Light activities outside the City of Tacoma (40% of projected telecommunications revenue)

A Short
Window of Opportunity

- Current conditions are uniquely supportive of the creation of a modern telecommunications infrastructure in the Tacoma area
  - US WEST continues to stall on resale leaving the long distance carriers looking for a way to provide local service (they can not afford to build these local systems quickly themselves)
  - US WEST is pushing Internet Service Providers of access fees for existing system
  - DBS has not yet had time to significantly penetrate the local video market despite TCI's limited local offerings
  - TCI has not yet implemented it digital set top box one-way "quick fix"
- Delay will shrink the residential video market which supports this build
  - Once someone invests in a DBS system they are lost as a significant revenue producer (not only for video sales purposes but also for tax purposes)
- Delay may limit the business market as a small number of large users:
  - Invest in their own single user systems, or
  - Are targeted by CAPs that serve limited geographic areas

RISK FACTORS

- Fail to provide excellent service at a competitive price.
- Fail to operate as a competitive business
- Fail to gain market share
- Fail to move quickly and aggressively
- Incumbent providers competitive response
- Community support disintegrates
- Construction and O&M costs substantially exceed estimates
- Worst Case Scenario

TELECOMMUNICATIONS PROJECT PRINCIPLES

- The primary purposes for the Light Division financing, constructing and operating a broadband telecommunications system shall be as follows:
  - Provide a state-of-the-art fiber optic technology to support enhanced electric system control, reliability and efficiency.
  - Provide capability to meet the expanding telecommunications requirements in an evolving competitive electric market, the most critical of which is real-time, two-way interactive communications with individual energy consumers.
  - Provide greater revenue diversification through new business lines (i.e., Internet transport, cable TV, etc.), enhance traditional products and services and maximize return on Light Division assets.

TELECOMMUNICATIONS PROJECT PRINCIPLES

- Important additional community benefits derived from this project are as follows:
  - Promote economic development and business retention.
  - Insure broad community accessibility to high quality, state-of-the-art telecommunication technology.
- The Telecommunications Project, including all infrastructure, and proposed business lines, shall be an integral Light Division operating responsibility and function.
- The Telecommunications Project business lines shall be operated in a business-like manner similar to electric services which are subject to market forces and are not tax supported.

TELECOMMUNICATIONS PROJECT PRINCIPLES

- In order to avoid and perception of government control of the content of the cable television business line, programming will be determined on the basis of local consumer demand and input.
- The Telecommunications Project construction will reflect the current overhead to underground configuration of the Light Division's electric system. Any significant divergence from this will greatly increase the project costs and jeopardize the viability of the project.
- The Light Division's Telecommunications Project will not proceed unless there is broad and strong policy and community support.

Public Involvement & Decision Making Process

- February 18:
  - Presentation of plan to joint Tacoma City Council & Public Utility Board study session
- February 19 through March 20:
  - Public meetings and presentations including neighborhood councils, business groups, and anyone else who will take their time to talk about the idea
- March 24
  - Resolution to the City Clerk
- March 26
  - Tacoma Public Utility Board Vote
- April 1
  - Tacoma City Council Vote

Historical Overview

Existing Options

Local Regulatory Environment

Light

- Tacoma Public Utilities
- Created in 1893
- Created in response to high rates & poor service
  - Water
  - Power

Telephone

- First telephone on West Coast was installed in Tacoma in 1878
- Second telephone exchange in Washington was installed in Tacoma in 1884
- Two separate firms provided service in Tacoma until 1916

Cable Television

- University Place and Lakewood, 1965
  - "Snow" with antenna
- By early 1966 seven companies had filed for franchises in Tacoma
  - Council favored two local companies
    - local ownership & local control
  - City manager favored two outside firms
    - Higher franchise payment offers

Cable Television (continued)

- Local ownership argument prevailed
  - two franchises were awarded in early 1970
  - third franchise awarded later
  - City Manager raised idea of City entry
- By 1974 only TelePrompTer Corp. remained
  - $4 million investment
  - system with 30 channel capacity

TelePrompTer's President

Spoke of creating a two-way system within 5 years so that "bills will be sent - and perhaps paid - by cable; doctors, lawyers and businessmen can arrange conferences; ...and school officials can arrange vast changes in curricula by using the system."

Existing Options

- Examine the options in place today to meet telecommunications growth in our local communities
- Wired systems
  - US WEST
  - TCI
- Wireless
  - Emerging providers

US WEST

- Incumbent local exchange carrier (LEC)
- Serves 14 states, $11.7 billion revenues
  - Headquartered in Colorado
- Active in out-of-territory ventures
  - Purchased Continental Cable
- Trouble with state regulators
  - Service complaints, new service waits

US WEST

- Operates the switched telephone system in the Tacoma area
  - Multiple central offices
    - Linked together by fiber optics
  - Remainder of system is primarily copper
    - Limited fiber in downtown Tacoma core
    - Fiber in process of being installed to major hospitals
    - Copper reconditioned to provide T-1 service
    - ISDN & T-1 reportedly can take months

US WEST

- WUTC and US WEST have not been seeing eye to eye
  - US WEST wanted raise residential rates from $10.75 to $26.35
  - WUTC ordered them to lower rates
  - US WEST responded that it might no longer be able to invest in the state and service might be jeopardized
  - Resale: the latest battle

LECs & the Internet

- Homes with access
  - 3.1 million today, 27.4 million in 2000
- Average length of time on a phone
  - Voice conversation: 3-5 minutes
  - Internet session: 17-20 mintues
- LECs: Internet threatens phone system
  - dismantel flat rate? Raise Internet fees?
- LECs are also promoting access
  - US WEST and TNT unlimited access for $20

TCI

- Largest Cable operator in U.S.
  - 14 million subscribers
    - added 2.4 million in 1996 alone in purchases
  - $14 billion in debt
    - staff cuts, equipment shipments curtailed
  - Rising rates
    - Hikes averaged 13% in 1996
    - Planned hikes in Jan, July 1997 (6%)
  - CEO is “brightest mind in cable”

TCI Systems Locally

- Tacoma system: 350 Mhz, 36 channels
  - Basically copper coax, trunk and branch
  - Not two-way capable
- Old Viacom system: 450 Mhz, 60 chan
  - Basically copper coax, trunk and branch
  - Could be upgraded to 550 Mhz, 80 chan
  - Not a two-way system

TCI upgrade plans

- Was considering upgrading to HFC
  - 750 Mhz, "125 channels"
  - Tacoma only
- However, John Malone stated that TCI will be "deferring upgrading the balance of the company's cable systems" and will instead focus on deploying set-top boxes "opportunistically."

Wireless and Resale

- Metricom's Ricochet
- Direct Broadcast Satellite
- PCS
- Resale of services

Metricom

- Provides wireless data communications for personal computers & industry
- Ricochet
  - Operates in unlicensed 902-928 MHz band
  - Uses approximately 6 antenna / square mile
  - Radio modems connect to services much like regular modems
    - Throughput of 9.8 - 28.8 kbps
    - Raw speed 100kbps

Direct Broadcast Satellite

- Small dishes, many channels
  - Cannot carry local broadcast channels
    - Technical limits
    - Regulatory limits
  - Relatively high up-front cost
- Dishes equiped to receive broadcast data, but not widely available
  - Data speed of 400 kbps
  - Number of users limited by few satellites

PCS & Resale

- PCS
  - Advanced cellular
  - Data rates similar to Ricochet, phone line
- Resale
  - Must resell use of existing telephone network
  - Installation and network operation remains with the incumbent provider

Local Regulatory Environment

- Regulate some rates & services
- Manage the public rights-of-way
- Enact and collect taxes & fees
- Provide services
  - CATV programming content provider
- Responsible for the public welfare
  - zoning & building codes
  - policies

Local Regulatory Environment

- Traditional roles are changing
  - 1996 Telecommunications Act
    - Reduced local rate & service oversight
    - Prohibited DBS franchise fees
    - Created new business constructs that limit local involvement
    - Authorized FCC to remove state and local "barriers to competition"
  - New technologies and new companies
    - Many of which only wish to serve a few

Local Regulators: Seeking to Balance Needs

- Reduced revenue from taxes and fees as a result of competition verse lower rates and better service to customers
  - Market expansion
- "Dark sky" versus market realities
  - Number of competitors for a limited market
- Revenue needs versus a desire for modern telecommunications infrastructure

The Difficulty in Striking a Balance

- Model Telecommunications Ordinance
  - encouraged the provision of advanced services on the widest possible basis, but
  - charged review and permit fees based on the amount of investment in infrastructure
  - Result: cheaper, less advanced systems that serve few businesses or homes, pay less
  - Incumbent providers unaffected by MTO

The Local Market

- Completing the analysis
- Interesting result
  - 46% of local homes have computers
  - 18% of homes use the Internet
    - projected to increase to 24% by year end
- Next telecommunications study session will begin with a review of the business and residential market (February 18)

The Telecommunications Industry

- Technology Overview
- Key Players
- Regulatory Environment
- Other Cities

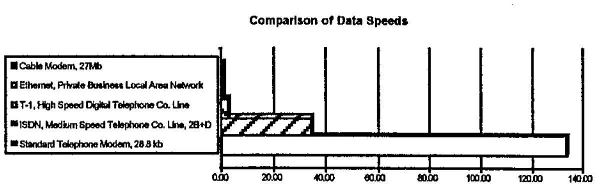
Technologies Overview

The five keys for evaluating telecommunications technologies are:

- Speed
- Bandwidth
- Direction
- Security
- Integrity

Speed

- Voice conversations = 64,000 bits per second (64 kbps) line.
- Leased digital circuits between offices = 1.5 million bits per second (1.5 Mbps)
- Local Area Networks = 10 Mbps
- Large private data networks = 100 Mbps.
- Major ties between cities = 2.4 billion bits per second (2.4 Gbps)

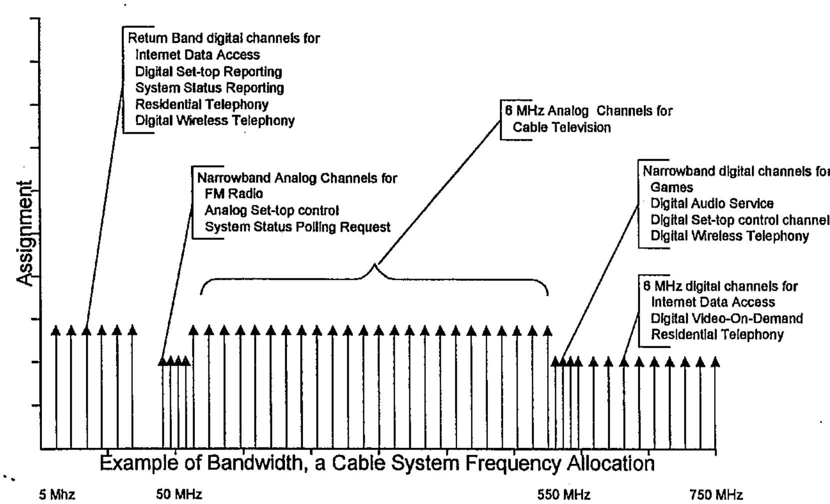


Bandwidth

Bandwidth measures the radio spectrum available

- The available bandwidth cannot be exceeded
- Each application uses some of the bandwidth.
- Channels cannot interfere with the use of adjacent channels

Example of Bandwidth



Example of Bandwidth, a Cable System Frequency Allocation

Direction — One-Way or Two?

- Television is broadcast, one-way
- Telephone lines are two-way
- Voice telephone calls are an example of a symmetrical application
- When the amounts of information depend on the direction, it is asymmetrical
- Internet access is asymmetrical, today

Security

- Encryption: make it unintelligible.
- Physical Control: keep circuits within a controlled area
- Security Monitoring: checking circuits for evidence of security breaches
- Access Control: requiring users to provide passwords when signing onto networks

Integrity

- Noise can cause errors in computers conducting data transactions.
- Noise-free communication circuits encourage efficient communications
- Noise causes connections to fail

Two Types of Systems Prevail

- Wireless Systems
- Wired Systems

Wireless Systems

- Easiest and least expensive networks to construct
- For broadcast, or two-way low speeds
- FCC Regulates use of public airwaves
- Rely on wired infrastructure to complete circuits. Most data and telephone traffic eventually is carried on high-speed land cables

Wired Systems

- Cables carry the signals for most telephone, data, and cable television services
- Information is carried only in the cable, so bandwidth is not shared with all
- Reduce costs by re-using cables and common central electronics for as many services as possible

Cable Types

- Telephone cables have a pair of thin copper wires for each phone serviced
- Cable TV uses one coaxial cable, which carries multiple frequencies to many homes
- Optical systems are used for applications requiring low loss, high bandwidth and high noise immunity

Telecommunications systems in use:

- Cable TV
- Basic Telephone Systems
- Business Office Communications
- Internet and
- Power System Communications

Cable TV

- originated to improve the reception of broadcast television channels.
- Television channels are received at the "headend"
  - Commercials are inserted
  - Some channels are scrambled
- all of the channels are transmitted to all subscribers

Cable TV Program Tiers

- Tiers of service are controlled by blocking reception of certain channels
- Services typically fall into three tiers·
  - Basic, broadcast channels and PEG
  - Expanded Basic, adds "cable only" channels to basic
  - Premium, adds channels for movies or special events. Often available in pay-per-view format

Digital Television

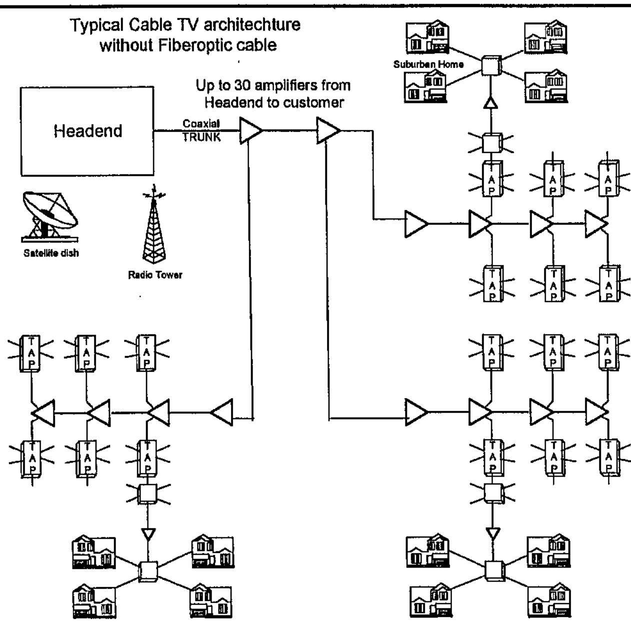
- When TV programs are transmitted digitally, existing television sets will not be able to receive them without additional electronics.
- A set-top converter, with its own channel selector, will be necessary

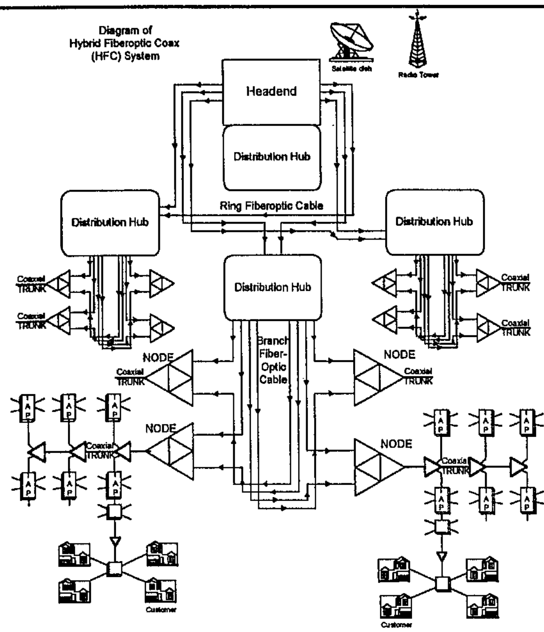
Direct Broadcast Satellite

- Signals are transmitted digitally from the satellite to a home receiver.
- The set-top box converts the signal to a standard analog channel for viewing.
  - Pre-authorization allows a package of channels or limited number of pay-per-view events.
  - Impulse pay-per-view purchases require a return communications circuit

Video On Demand

- Near Video On Demand (NVOD)
  Many programs and staggered starts
- NVOD customers added by providing a digital set-top converter.
- Video On Demand (VOD) is interactive.
  Maximum choice and control
- VOD requires unique transmissions to each subscriber using the service





Basic Telephony

The Public Switched Telephone Network, PSTN

- A telephone call flows on a switched circuit network
- A copper pair of wires is assigned exclusively to each customer.
- Shared equipment in C.O. establish an individual circuit to the called destination

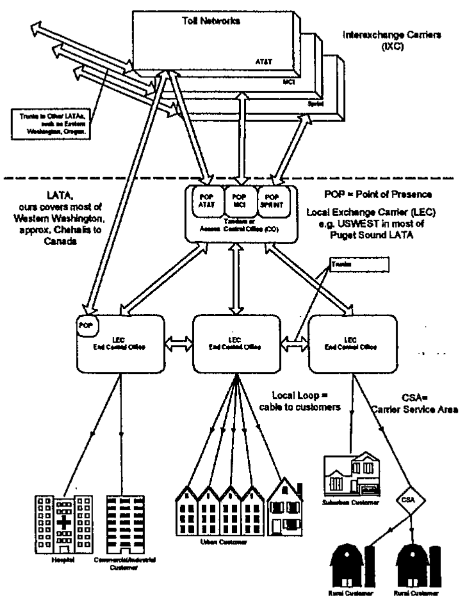
Trunks

- Trunks can be reassigned with each call.
- Optical fibers can carry thousands of trunk circuits
- Long distance carriers are located at points of presence, or POPs

Digital Telephone

- Phones in customers' home are among the last analog devices in the network
- Integrated Services Digital Network (ISDN) brings digital service to homes
- ISDN enables some new services
  - two phones on the same line
  - data speeds two to four times faster than a common computer modem

Example of Public Switched Telephone Network



Business Office Communications

- Digital circuits allow businesses to reduce costs
  - consolidating voice traffic
  - create high speed computer links
- A T-1 circuit groups telephone lines
  - at lower cost and higher quality
- The T-1 circuit links data centers
  - Data traffic is not circuit switched

Business Office Communications

- "Frame relay" is a data service
  - transfers computer data packets among data circuits
  - Circuits must be assigned exclusively to frame relay

The Internet

- Many thousands of Web sites and several million Internet users.
- The Internet remains primarily an informational and entertainment resource
- It is a forum for electronic commerce
  - orders for goods and services.

Cellular Phone Systems

- Current Cellular Systems
- Personnal Communications Service - PCS
- Packet Radio - Richochet

Cellular Phone Systems

- Radio towers serve these phones from cell sites.
- Frequencies are re-used among cell sites.
- Two carriers serve each region.
- Digital Upgrades
- Able to carry computer traffic to mobile computer users

PCS

- Personal Communications Service is a new wireless, cellular service
- Cell sites must be much closer together
- These systems are digital and have extensive digital features designed into them from the start.
- Mini-cells are under construction in the Puget Sound area today

PCS Growth

- As PCS traffic grows, smaller cells will be constructed
- Cells must be served with wired circuits that complete call connections.
  - This portion of the PCS system is referred to as "backhaul."
  - PCS radio channels can be backhauled using two-way cable television systems

Satellites for Video, Telephony, and Computers

- A Wireless system
- For Telephones
- For Television
- For Data
- New Systems

Satellite, A Wireless System

- Geostationary satellite orbits occur at an altitude of 22,800 miles and are coordinated internationally.
- Satellites have transponders for broadcast over a large geographic area
  - a radius of more than 1,000 miles.
- They carry about 24 transponders
  - each carrying about 24 TV channels

Satellites for Telephone

- Long distance telephone across the oceans or across nations.
- The long path to the satellite and back introduced delays into the conversations.
- Most conversations now take place on land-based and undersea cable.

Satellites for Television

- Transmits television channels to more than 1000 "headends"
- Channels are scrambled, and sent to the satellites
- At cable TV headends, channels are decoded and retransmitted to homes.
- Portable television studios can rent satellite time to their broadcast studio

Direct Broadcast Television

- New satellites are in orbit specifically for Direct Broadcast Service (DBS) to home subscribers.
- Higher power transmitters and digital signals from the satellite enable smaller receive dishes at homes for DBS.

Satellites for Data

- Many sites disbursed in a large area can efficiently send and receive data.
- Retail offices send sales data or inventory data to headquarters or warehouses.
- Large electric utilities control their substations and generating plants from an energy management center

DBS for Data?

- DBS satellites broadcast downstream data packets one way from the satellite.
- Standard phone lines carry return data
- Most suitable is subscription service to data broadcasts
  - such as news, magazine, catalogs, or graphics

DBS for Data?

Limiting factors

- A finite number of positions exist for geostationary satellites
- Covers an area with at least 100 million citizens in urban and rural areas
- Each subscriber would expect speeds at least 128 kilobits per second
- A satellite could serve only about 900 Internet users simultaneously

New Satellite Systems

- Teledesic: plans to launch 900 small satellites into 21 low-Earth orbits
- One would be overhead everywhere on the planet at all times.
- Speeds of 16 kbps to 2 Mbps for computer and voice communications
- Capacity to fill in the gaps in more rural areas and to developing nations

Telecommunications Companies

Key Players

- Regional Bell Operating Companies (RBOCs)
- Long Distance (IXCs)
- Competitive Access Providers (CAPs)
- Cable Television Providers

Regional Bell Operating Companies (RBOCs)

- "Born " in 1984
- Resulted in seven RBOCs

Bell Atlantic

- Telephone
  - leader in total ISDN lines installed
  - charges $45 for 30 hours of use
  - offers $15 per customer to ISPs
- Video
  - conducted successful Video on Demand (VOD)
- Fiber-to-the-curb network - 1997

Ameritech

- Cable Overbuilds
  - Instead of buying cable system at $2,000 per subscriber
  - first RBOC to obtain cable franchise
  - most aggressive overbuild strategy
    - plans to pass one million homes
    - currently has 11 franchises
  - joint venture with Walt Disney, BellSouth and Southwestern Bell

GTE

- Fourth largest publicly held telecommunications company in the world
- US-based
- Second largest cellular service provider
- Service area spread across 28 states
  - customers concentrated in rural and suburban areas

Long Distance (IXs)

- Providers
  - AT&T, Sprint, MCI
    - AT&T controls sixty percent of market
- How to reach local markets?

Competitive Access Providers (CAPs)

- Provide local exchange “bypass” service to businesses directly
  - offer direct fiber optic or microwave links to interstate phone networks
- Explosive growth- 100 % - 200 % per year
  - huge leap in demand, competitive environment
  - targeted infrastructure investments
  - small staff, employ subcontractors

Electric Lightwave, Inc.

- Provides telecommunications and information services
- Two target markets
  - corporate customers
  - wholesale customers

GST

- Provide telecommunication products and services
- Focus on business customers in small and medium size cities

Teleport Communications Group (TCG)

- Nation's oldest CAP
- Offers fiber optic cable in 47 markets
- Focus on information-dependent business sector
- Seattle network
  - 270 miles of fiber from Blaine to Kent
  - serves more than 50 buildings

Cable Television Providers

- Key players
  - TCI
  - Time Warner
    - First cable provider to offer phone services
      - began in 1995, 500 customers to date
      - comercial service not yet launched
    - tested cable modems starting in July 1995
    - has ordered 100,000 cable modems
    - plans to offer Internet access services in 1997

Regulatory Environment

- Communications Act of 1934
  - telegraph, AM radio, telephones as luxuries
  - amended in 1992 and 1996
- Three main subdivisions
  - common carrier
  - radio
  - cable television

Regulatory Environment

- How is communication regulated?

1. Who is offering the service?
   - common carrier or private carrier?
2. How is the service transmitted?
   - wired or wireless?

Regulatory Matrix

	Common Carrier (Telecommunications Service Provider)	Non-Common Carrier
Wired	Telephone (land line)	Cable TV
Wireless	Cellular Telephone	Utility Radio Dispatch System

Regulatory Environment

- 1992 Cable Act
  - a response to customer complaints regarding escalating rates and poor service
  - empowered FCC to regulate cable rates and service
  - FCC responds with rules, forms, and interpretive decisions

Regulatory Environment

- Telecommunications Act of 1996
  - deregulatory
  - intended to eliminate barriers to entry and spur competition
  - telephone companies restricted from buying cable systems in their home areas

Regulatory Environment

- Overview of Players
  - Congress
  - Federal Communications Commission (FCC)
  - courts
  - state public utility commissions
    - Washington Utilities & Transportation Commission (WUTC)

Regulatory Environment

- Removal of state and local barriers to competition
- The 1996 Act states that “ no state or local statute or regulation, or local legal requirement, may prohibit the ability of any entity to provide any interstate or intrastate telecommunications service.”

Other Cities

- Anaheim, California
  - SpectraNet International
  - all- fiber optic system
  - to cost between $270 million and $360 million
  - begun in late 1996, ending in 2006
  - uses an existing 50-mile loop that connects utility’s substations and water facilities

Other Cities

- Anaheim requirements for success:
  - thirty-five percent business market penetration
  - access to all homes and businesses based on assumption the cost of fiber optic equipment will plummet

Other Cities

- Cedar Falls, Iowa
  - Municipal communications utility
    - citizens 71 percent in favor
  - hybrid fiber coax system
    - offers video, voice, and data
    - service to 45 percent of homes passed
    - fiber links between businesses

Other Cities

- Glasgow, Kentucky
  - municipally operated
    - cable television
    - telephone service
    - Internet access
  - challenges:
    - combining cable television and data communications on one medium
    - cross-training staff to implement new services

Other Cities

- Grosse Point Communities of Michigan
  - sold community-owned cable system in 1994
  - faced with $7.5 million rebuild investment
  - system was profitable
  - sold for $32 million or $2,000 per subscriber

Other Cities

- Morganton, North Carolina
  - in 1985 decided not to renew franchise of incumbent provider
  - were sued
    - First Amendment, antitrust, interference with subscriber relations, and state constitution
  - suit dismissed in 1989 by state supreme court
  - built HFC system, 50 channels, $23.75

Other Cities

- Orangeburg, South Carolina
  - voters of Orangeburg authorized city to build and operate cable television system
  - state supreme court rules that municipal cable operations recreational, not essential

Other Cities

- Paragould, Arkansas
  - municipally built and operated cable television system
    - $3.2 million raised through municipal bonds
    - homeowners pay $30/year in property taxes to support system
    - as a result, competitor's service improved and rates were cut in half

Other Cities

- Portland, Oregon
  - Portland General Electric
    - plans 135 mile fiber optic network around city
      - cost $10 million
      - voice, data, and multimedia communications

THE TELECOMMUNICATIONS INDUSTRY

SUMMARY

The world of telecommunications is complex. Technology, companies, regulations, and communities are all involved. Some would say that telecommunications is too complex for most people to understand, much less make decisions about. Upon closer examination, this appears to be a false premise. Telecommunications is complex, not because any of the pieces is impossible to understand but because there are so many pieces. Fortunately, just like any childhood puzzle, this puzzle can be put together by anyone willing to take the time to examine the pieces and explore how they fit together. This document is designed to bring the pieces together in one place to allow them to be more easily examined and explored.

The first section begins with an exploration of the technologies that are shaping the world of telecommunications today and the latest technological developments that may affect the future of telecommunications.

The telecommunications companies section examines some of the key players in telecommunications, the business models they have historically operated under, the technologies that they are employing, and both their announced and demonstrated strategies. Perhaps more than the latest technology, the companies that provide telecommunications products will influence the services that our communities are likely to see.

The next section discusses the evolving regulatory construct that telecommunications companies operate under. International, Federal, State, and local regulations all affect the provision of telecommunications services and it is in this area, perhaps even more so than in technology, that the greatest changes are taking place.

The overview of the broader telecommunications environment concludes with a review of what is taking place in selected cities around the United States of America with regards to telecommunications and the local forces in each of those communities that are influencing the direction that each community takes.

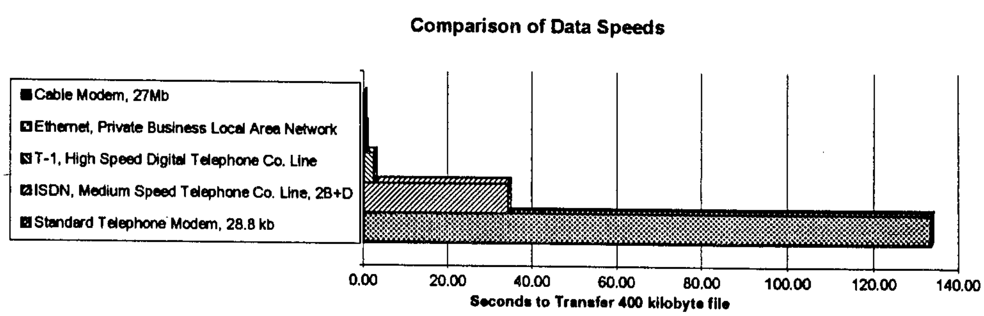
TECHNOLOGY OVERVIEW

The five keys for evaluating telecommunications technologies are:

Speed
Bandwidth
Direction
Security
Integrity

Speed

The speed of a communications path is measured in bits per second. A bit is a 1 or 0, the basic form of digital data. Speed is the measurement of the flow rate of data. The speed of a communications path or circuit must match the needs of the application, or patience of the users. A voice conversation can be carried on a 64,000 bits per second (64 kbps) line. Businesses lease circuits between buildings or cities to tie their computer Local Area Networks together using 1.5 million bits per second (1.5 Mbps) lines. Within businesses, Local Area Networks connect desktop computers using 10 Mbps lines. Businesses build private networks exclusively for their computers carrying 100 Mbps. Long distance companies operate major ties between cities carrying thousands of voice conversations at 2.4 billion bits per second (2.4 Gbps).

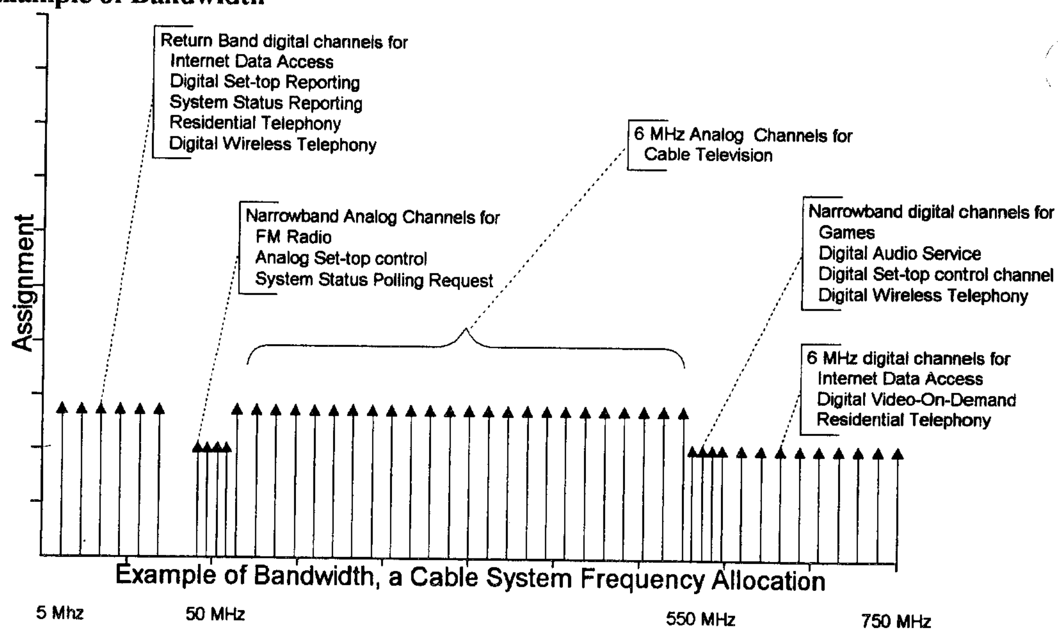


Bandwidth

Bandwidth measures the radio spectrum available to transmit information. It is measured in Hertz (Hz), or cycles per second. A communications path is often referred to as either a circuit or a channel depending on its use. Each individual channel uses some of the available bandwidth. The total bandwidth of the transmission circuit cannot be exceeded. In the design of a typical broadband hybrid fiber optic coaxial (HFC) system, there is 750 MHz of bandwidth available and channels are assigned in 6 MHz increments. Users of each 6 MHz channel can pack as much information into that channel and operate at as high a speed as they can afford. They can not carry any information outside of their assigned channel's bandwidth since that information would interfere with the use of adjacent channels.

New products have developed to make effective use of bandwidth for transmitting digital information. The speed of signals in a bandwidth has been improved to as high as 8 bits per hertz, from 1 bit per hertz in 1970. Data compression removes unnecessary data without affecting meaning, with ratios now as high as 100 to 1.

Example of Bandwidth



Example of Bandwidth, a Cable System Frequency Allocation

Direction — Single or Bi ?

The direction of the flow of information must match the application that the information supports. Television signals are broadcast one-way to all users. Telephone conversations are two-way, carrying the same amount of information in each direction all the time. Because the same amount of information flows in each direction, telephone conversations are said to be symmetrical. Data network connections to homes are expected to be two-way. However, many people in the computer data networking industry believe that the majority of the information will be flowing to homes with relatively little information returning. The ratio of downstream to upstream information is perhaps 10 to 1, decreasing as symetrical applications such as telephone and videoconferencing grow on the Internet.

Connections that send different amounts of information depending on direction are referred to as asymmetrical. Business communications are typically symmetrical since they are primarily made up of telephone conversations, which are symmetrical, and the peer-to-peer transmission of data between offices, which are also symmetrical. Two-way telecommunications systems capable of transmitting and receiving information at the same time are known as "full duplex systems."

Security

Loss of security from eavesdropping on voice or data communications can pose risks for businesses and individuals. As a result, systems offering voice and data privacy have been developed. Some business applications require high security communications to protect the value of their information. Security can be enhanced by:

- Encryption: scrambling the information to make it unintelligible.
- Physical Control: keeping circuits within a controlled area
- Security Monitoring: checking circuits for evidence of security breaches
- Access Control: requiring users to provide passwords when signing onto networks

Radio signals are easy to monitor. Communication that takes place over the public radio spectrum can be monitored. Scrambling, digital encoding and encryption can be used to build in security, but they add cost and complexity to systems and slow the transmission of information.

Copper cables can be penetrated, allowing circuits to be mechanically tapped. This type of intrusion is difficult to detect automatically.

Coaxial systems send the same signal to many customers and create multiple unauthorized monitoring opportunities. The best security measures are the same as for the public radio spectrum — scrambling, digital encoding, and encryption.

Optical fibers can be monitored for intrusion. Signal levels can be checked to detect escaped light resulting from an intrusion. Even so, signals can be made more secure with scrambling or encryption.

Integrity

Errors can occur when transmitting information. A person can often separate the voice of a single speaker from a noisy background but noise makes it difficult to understand all of the words spoken. Similarly, noise can cause errors in computers conducting data transactions. Noise-free communication circuits encourage efficient communications and eliminate time and effort spent correcting errors. Errors in digital communications are measured in Bit Error Rates (BER). Most computer networks require circuits providing a BER of better than 1 errored bit in 1 million bits.

The following sections briefly describe telecommunications systems in use:

Wireless Systems
Wired systems
Cable TV
Basic Telephone Systems
Business Office Communications
Internet and
Power System Communications

Wireless Systems

Wireless communications are carried by radio waves through the atmosphere. The radio spectrum is divided, managed and allocated by the Federal Communications Commission (FCC). Many industries, including television broadcasters, AM and FM radio broadcasters, mobile radio users, satellite up links and downlinks, and the military use the public radio spectrum. Industries are allocated specific frequencies for use. Frequencies are re-used in different geographic areas by limiting transmitter power and range. The higher the frequency of a signal, the more it tends to lose signal strength as it travels through the atmosphere. Higher frequency radio signals also tend to follow line of sight paths and can often be blocked by hills and other similar obstructions. New allocations of frequencies tend to be in bandwidths of 30 MHz or less and use higher frequencies that were previously unallocated. For two-way transmission, two frequency bands are used.

Several new wireless systems are planned or under construction. Personal Communications Services (PCS) are described later in this section. The Ricochet Network, under construction by Metricom, is a wireless data network of small data packet transmitters mounted on streetlights and utility poles. Using six radios per square mile, the service obtains a speed roughly the same as a standard modem on a telephone line, but allows users to be mobile. Ricochet is marketed at users of computers, laptops, and pagers. Satellite services used for data transmission to homes are described later in this section.

Wireless networks are the easiest and least expensive networks to construct for services requiring low bandwidths. Many developing countries are building their first telephone networks using wireless cellular technology because copper telephone cable is more expensive to install and maintain.

Wireless systems usually rely on wired infrastructure to complete circuits. Wireless transmitters and receivers are linked to regional controlling switches with high-speed digital lines. Microwave connections are occasionally used for these point-to-point links. Most data and telephone traffic eventually is carried on high-speed land cables.

Wired Systems

Wired systems use cable to carry the signals that provide most telephone, data and cable television services. Information is carried only in the cable, so no radio spectrum licenses are required. Cable is shielded to prevent interference from wireless systems. Different cable types have different capacities or bandwidth and are capable of carrying varying speeds and amounts of information. Wired systems reduce costs by re-using cables and common central electronics for as many services as possible. Systems can be designed so that signals can travel both downstream and upstream on the same wire. While telephone cables typically have a pair of thin copper wires for each phone serviced, cable television uses a single coaxial cable (one center conductor inside one tubular metallic shield), which carries multiple frequencies to many homes. This allows a single service to use only one frequency band and only one wire yet still be received by many customers.

Fiber Optics Optical fibers carry photons of light; metallic wires carry electrons. Light can travel much farther in an optical fiber than electrons can travel in metal wire before a signal is lost. Light is also immune to interference from electromagnetic waves, common from many sources, including radio transmitters. Since optical fibers cannot carry electrons, highly reliable communications in high voltage areas are possible. Light in optical fibers is a superior medium for communications in cases where long distance, high speed and/or high bandwidth are necessary.

The glass in fiber optic cable is amazingly strong yet very thin. When built into cables using reinforcement and a water-proof sheathing, the material is long-lasting and easy to install on poles and in conduits. Splices and connectors between optical fibers are highly precise compared to metallic connections. Optical transmitters and the electronics required to support them are expensive, compared to their electrical equivalents. To be cost effective, optical systems are best assigned to point-to-point applications requiring low loss, high bandwidth and high noise immunity.

Cable TV

Cable television originated as a one-way retransmission system designed to improve the reception of broadcast television channels. "Cable-only" channels were later added. Television channels are received at one location, called the "headend," from off-air antennas, satellite dishes and/or leased land cables. Commercials are inserted into reserved time slots in each channel. Selected channels are scrambled and all of the channels are transmitted to all subscribers.

Customer access to different tiers of service is controlled by blocking certain channels at the home and/or de-scrambling certain channels. Services typically fall into three tiers:

- **Basic,** which includes off-air broadcast channels from licensed transmitters in the local area and locally produced public access, education or government channels;
- **Expanded Basic,** which adds many satellite and "cable only" channels to basic; and
- **Premium,** which includes channels for movies or special events. Premium services are often available in pay-per-view format.

De-scrambling of premium channels can be automated, using addressable set-top converters that receive de-scrambling instructions from the headend, or it can be done manually, using filters or traps installed by a technician near the customer's location.

Infrastructure The first cable television systems used coaxial cable exclusively, in a tree-like structure of trunks, feeders and drops. Many amplifiers were used in series to extend signals into neighborhoods. While amplifiers boost the signal, they are also costly, require significant maintenance, degrade signal quality, and decrease the effective channel capacity of a cable system. The initial benefit of optical fiber over coaxial cable is it allows signals to be carried much greater distances without the use of amplifiers. Modern hybrid fiber coaxial technology supports two-way telecommunications creating a broadband cable network capable of delivering more and sharper channels as well as high-quality voice and data.

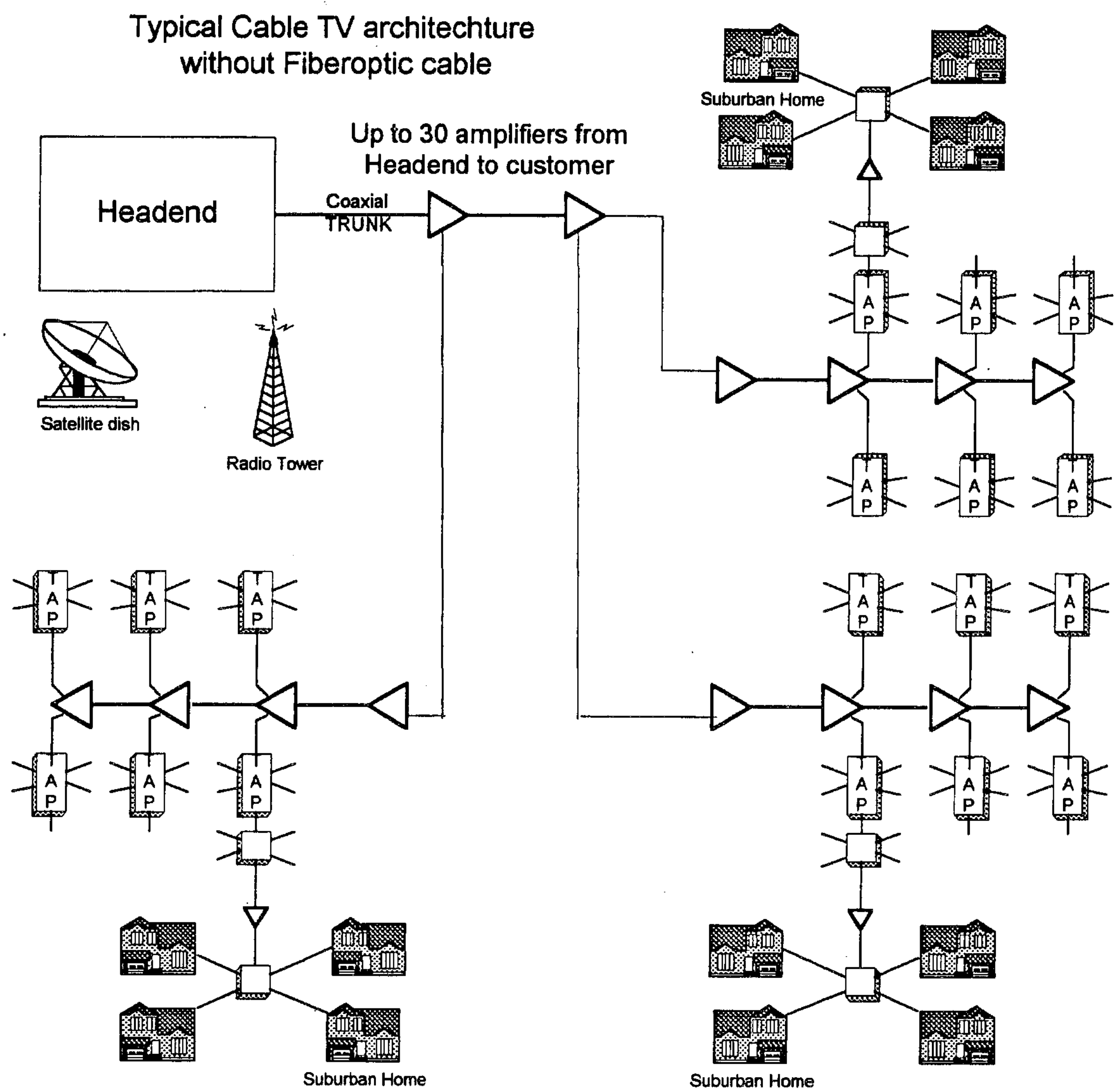
Fiber optics in cable TV Cable television companies began widespread installation of fiber technology into the trunk of the cable architecture about four years ago. This immediately improved signal quality and lowered maintenance costs. Since then, the cable industry has installed "fiber trunk and feeder" architecture in many markets. Fiber is now installed all the way to the feeder in most new construction. This allows system operators to re-use frequencies (or channels) by segmenting an existing system into individual serving areas composed of 500 to 2,000 homes. The resulting hybrid fiber coaxial cable networks are capable of delivering a variety of high-bandwidth, interactive services.

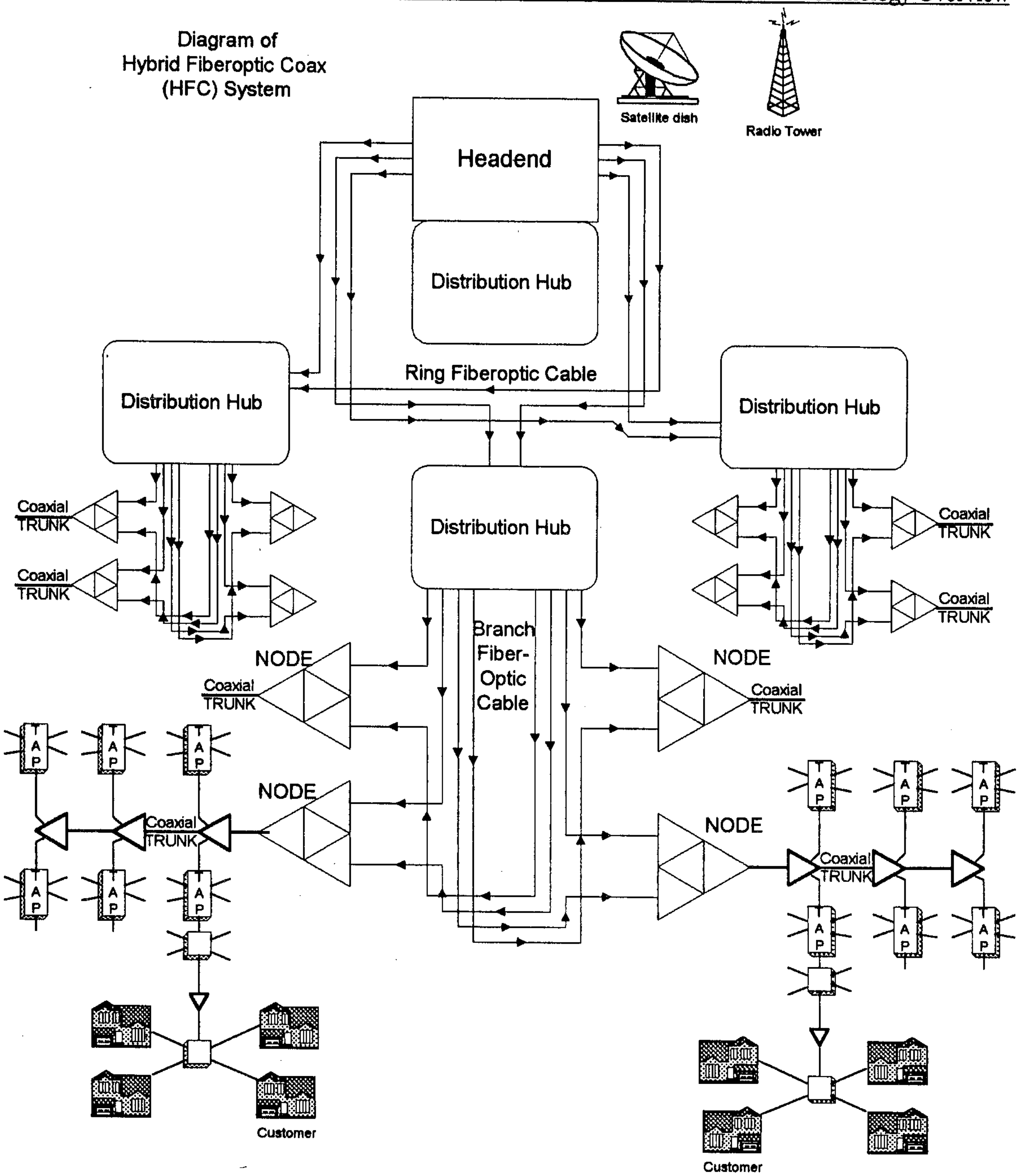
HFC vs. FTTH If replacing copper coaxial cable trunks with optical fiber improves the signal quality and reduces maintenance, why not replace all coaxial cable with fiber optics to each customer? Some people are expecting that communications services will be delivered all the way to the home on an optical fiber pair, or fiber-to-the-home (FTTH).

Unfortunately, fiber optics to each customer would be prohibitively expensive. This is not because the fiber optic cable is much more expensive than coaxial cable. It is because the optical electronics required to convert the light carried by the fiber onto electrical signals understood by televisions, computers and phones are fairly expensive. These residential devices all currently connect directly to copper cable, but not optical fibers. A single coaxial cable has the capacity to meet the telecommunications needs of 500 or more homes.

While it can be cost-effective to have a single optical to coaxial node serving 500 homes, it has not yet been shown to be cost effective to equip each of the 500 homes with new optical-electronic nodes and optical cable drops. Maintenance and operation alone of the fiber optic cable to each home would be expensive and would be a wider-bandwidth duplication of the existing telephone infrastructure, which is twisted-pair copper wire dedicated from the central office (CO) to each home. It has proven to be very costly to maintain and operate even telephone dedicated paths to each home.

Communications technology is applying fiber optics where appropriate, such as long cable lengths of ultra-high quality signaling or in electrically noisy environments.


Typical Cable TV architechture
without Fiberoptic cable
Up to 30 amplifiers from
Headend to customer
Headend
Coaxial
TRUNK
Satellite dish
Radio Tower
Suburban Home
Suburban Home
Suburban Home



Digital Television

Most new TV sets are cable-ready, meaning their channel selectors are able to tune in standard frequencies for 80 to 120 analog channels. When TV programs are transmitted digitally, existing television sets will not be able to receive them without additional electronics. A set-top converter, with its own channel selector will be necessary.

An example of digital television is Direct Broadcast Satellite (DBS) service. Signals are transmitted digitally from the satellite to a home receiver. Channel selection is made from a navigation menu displayed on the television screen by the set-top box. The set-top box converts the digital signal to a standard analog signal and places it on Channel 3 for viewing. Pre-authorization allows a subscriber to receive a package of channels or limited number of pay-per-view events. Since DBS is broadcast only or one-way, impulse pay-per-view purchases require a return communications circuit, like a telephone line or a modern two-way cable television system, to the master billing computer.

Near Video On Demand Near Video On Demand (NVOD) is the continuous broadcast of many channels of programming with many different start times for the same program. Hundreds of programs and start times can be provided in the bandwidth normally assigned to four to eight analog television channels. Once an NVOD system is activated, new NVOD customers can be added by providing each customer with a digital set-top converter. The only effect of adding more customers to the system is a small amount of additional data, describing the customer's purchase of video entertainment, on the return path to the master computer.

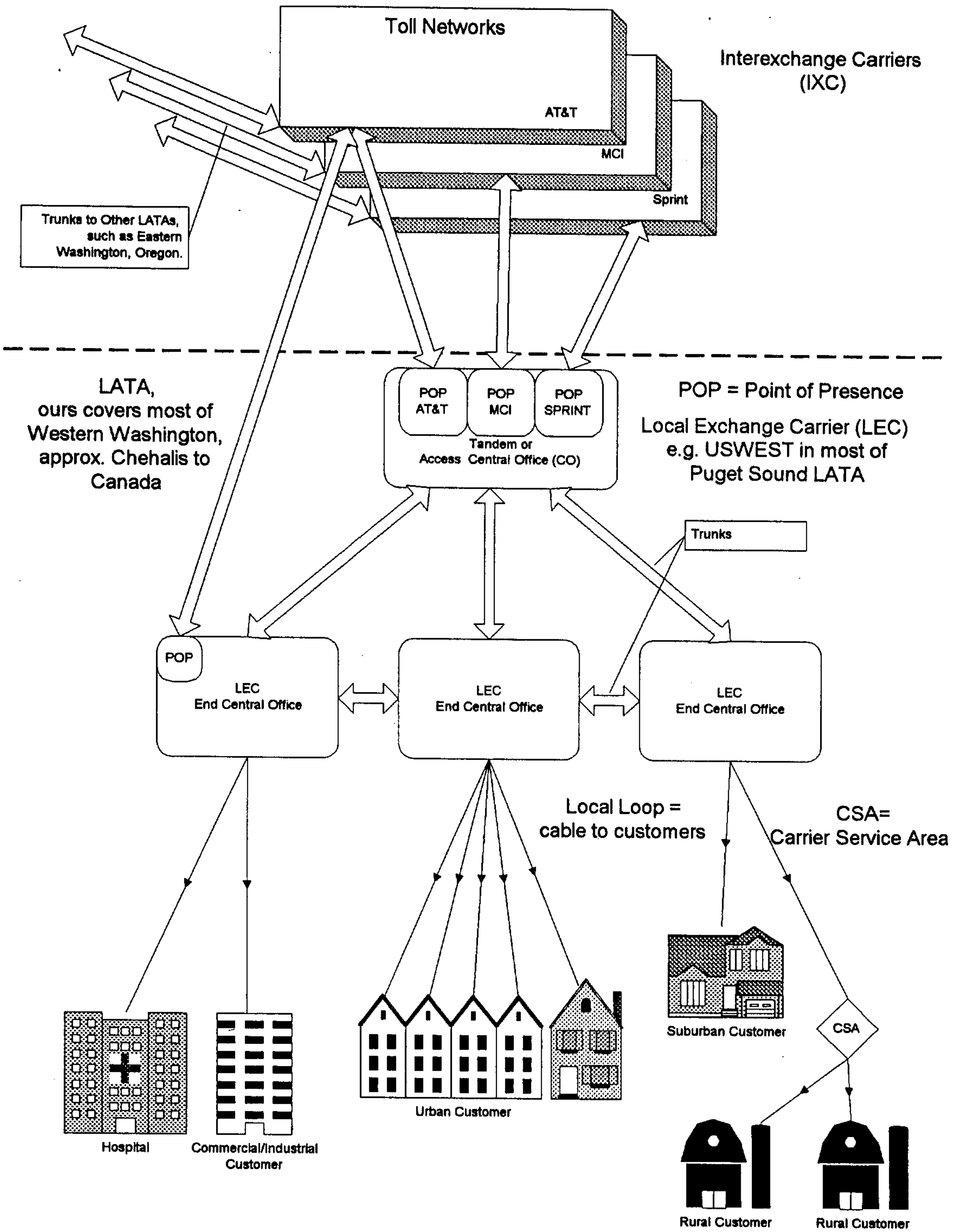
Video On Demand Video On Demand (VOD) is highly interactive. The subscriber selects the program for immediate viewing and can control the program — pause, fast- forward, rewind, etc. — as if using a VCR with a video tape. This means there is no longer a broadcast relationship between the program source and all subscribers. There are unique transmissions from the headend to each subscriber using the service. Growth in the use of VOD will directly effect system capacity and design, since each new subscriber represents more two-way, on-demand traffic.

Basic Telephony, PSTN

The telephone call flows on a switched circuit network, as opposed to the broadcast of television signals or addressed data packets. A copper pair of wires running from a neighborhood central office to the customer is assigned exclusively to each customer. To establish a call, a number is dialed, generating rotary pulses or touch-tones, which are received at the central office. Electronic switches in the Public Switched Telephone Network (PSTN) then establish an individual circuit to the called destination. Much of the PSTN is shared, or common, equipment. Circuits between central offices are called trunks and can be reassigned with each call.

Trunking Central offices are usually tied together with fiber optic cable. High-speed electronics on those optical fibers can carry thousands of trunk circuits. The long distance carriers are located in special central offices, called points of presence, or POPs. Long distance calls are placed on special trunks that terminate at these POPs.

Example of Public Switched Telephone Network



Going digital The telephone network is gradually becoming digital because digital transmission is high-quality, low-cost and fast. Phones in customers' home are among the last analog devices in the network. Integrated Services Digital Network (ISDN) was invented to bring digital service to homes. As home services become digital, the quality and variety of services the telephone network can deliver increases. ISDN enables many new services, including enhanced displays on your phone, two conversations on the same line, and data speeds two to four times faster than possible with a common analog 28.8 kbps computer modem.

Business Office Communications

Businesses that have 20 or more telephone lines in use at one time, or that link computer centers to other computers and to Local Area Networks (LANs) in other buildings or cities, use digital circuits. Digital circuits allow businesses to reduce costs by consolidating voice traffic and to create high speed computer links that are impossible to create using "standard" phone lines. Businesses lease digital circuits to the central office, which can carry either switched telephone traffic or dedicated computer traffic. The basic unit of high speed digital circuits is T-1 service, which is a 1.5 megabits per second, two-way circuit, equal in bandwidth to 24 simultaneous voice conversations. The T-1 circuit can be connected to a business telephone switch for grouping telephone conversations at lower cost and higher quality than individual telephone lines. The T-1 circuit can also be connected to a computer "bridge" or "router." For this use the traffic is no longer switched and the T-1 circuit must be dedicated through the central offices to another business in a point-to-point assignment. This is referred to as a "nailed up" circuit. "Frame relay" is a data service that transfers computer data packets among nailed-up circuits that have been assigned exclusively to frame relay.

Internet

The Internet has emerged as an essential tool for consumers and businesses, providing a variety of entertainment, research, and commercial services. While the Internet remains primarily an informational and entertainment resource, it is also a forum for electronic commerce with orders for goods and services taken on-line and paid for via credit cards or new Internet currencies. As security techniques become more sophisticated and accepted by the public, the Internet may surpass all public markets ever conceived.

The core of the Internet are the Internet Service Providers (ISPs) that own or lease long distance data circuits and manage interconnected data networks on them. Users connect to ISPs using their computer and local telephone circuits. A point-and-click graphical user interface makes access to the services on the WorldWide Web very easy.

Web sites are computers accessible from the Internet containing interesting information or providing services for users. There are now many thousands of Web sites and several million Internet users. Applications on the Internet defy description, as they are rapidly growing and changing to meet the needs of users and business. The Internet, and more specifically the Web, has the potential to be an alternative delivery mechanism for most media today, including music, video, games, news, mail, telephone, advertising, catalog sales, shopping, library, encyclopedia, and software delivery. New applications send ever larger quantities of data between users and depend on high-speed data connections between the users.

Cellular Phone Systems

Cellular phones operate in a licensed radio band at 800 MHz. Radio towers serving these phones are called cell sites. There can be many cell sites per 5-mile radius. Frequencies are re-used among cell sites. A cellular phone notifies the closest cell site that it is there and can take calls. Even though a cellular phone moves from cell to cell, calls can continue by being "handed-off" or passed from cell-to-cell.

Standards Two carriers serve each region. Cellular carriers received radio licenses in a lottery, with one assigned to the local telephone system company in each region. At first, the simplest form of radio transmission, analog frequency modulation (FM), was used. As cellular service gained in popularity, many cell sites became saturated with traffic. More cell sites were added to allow re-use of the cellular frequencies more often. Recently, most carriers have adopted digital transmission standards that allow many callers to use the same frequencies in the same cell at the same time — up to 64 callers per frequency and cell. There are two main standards of digital modulation: Time Division Multiple Access (TDMA) and Code Division Multiple Access (CDMA). These standards are mutually exclusive and new digital cellular phones are built to carry one of the digital standards and the old analog standard.

In addition to mobile voice telephone service, cellular carriers are able to carry computer traffic to mobile computer users. By using modems on the analog system, or by leasing continuous access by the megabyte of use, mobile computer users can keep in contact with company computers for dispatch, customer information, e-mail, etc. The speed of service is about the same as on analog telephone or ISDN lines.

PCS

Personal Communications Service is a new wireless service and a new form of cellular service. PCS is licensed to operate at 1900 MHz, or 1.9 GHz. At this frequency, and with the low power limits of the license, cell sites must be much closer together — as close as every two miles. PCS mini-cells are under construction in the Puget Sound area today. As PCS traffic grows, smaller cells will be constructed. These systems are digital and have extensive digital features designed into them from the start. In addition to voice telephone service, digital services include wireless data, display paging, and broadcast information services.

Airwaves auction Frequency licenses were auctioned to the highest bidders by the FCC in blocks. First was a narrow band of frequencies over the entire nation, primarily for paging. Next was a wide band of 30 MHz of radio spectrum (30 MHz is wide for a radio license) in geographic areas known as Major Trading Areas (MTAs). The entire Puget Sound region is defined as one MTA. Sprint Spectrum and GTE MobilNET successfully bid for the two MTA licenses in the Puget Sound region. Next, auctions will assign wide bands of 30 MHz of spectrum to smaller Business Trading Areas (BTA).

Wireless on cable Like cellular cells, PCS cells must be served with circuits from transmitters to telephone switches that complete call connections. This portion of the PCS system is referred to as "backhaul." T-1 lines are leased, or built privately using point-to-point microwave, to provide mini-cells with circuits linked to the regional telephone and data switches. PCS radio channels can also be backhauled using two-way cable television systems.

Successful field trials of backhaul of PCS traffic have been conducted on a hybrid fiber coaxial coax (HFC) two-way cable television plant in San Diego. Cable television operators have the option of adding wireless transmitters and receivers to their systems and offering delivery of service to PCS operators in their territory. Alternatively, PCS providers can lease transport capacity for two-way bandwidth from the cable TV operator and install their own transmitters and receivers on the cable strand or on towers. In order for PCS to be successfully carried on a cable plant, the plant must be a well constructed, modern, two-way hybrid fiber coaxial system.

Costs The capital costs of providing PCS telephone service with the hybrid fiber coaxial coax cable system to the wireless transmitter is about $90 per subscriber, excluding the cost of the consumer's wireless phone. Capital costs of providing basic telephone service to the home on the cable television drop, with electronics at the home to convert the signal to a basic copper telephone service, is roughly $500 to 600 per subscriber, conservatively estimated.

The large cost difference is primarily because the wireless PCS customers are expected to pay for the portable telephone, either through access fees or direct purchase, while the wired telephone customer will expect electronics to be provided to allow them to use a standard home telephone. Also, portable wireless telephones are self-powered and rechargeable, while wired telephone subscribers expect all the telephone electronics to be powered on the cable drop to the home. As a result, there are significant transmission system cost advantages to serving residential telephone service by wireless. Large PCS systems over hybrid fiber coaxial cable are under construction in San Diego and elsewhere.

Satellites for Video, Telephony, and Computers

Satellites are transmitters and receivers that orbit the Earth. One special class of orbit is called geostationary, meaning that the satellite stays over one spot on the Earth. These satellite orbits occur at an altitude of 22,800 miles and are coordinated internationally. Satellites have receivers for the uplinks from Earth and transmitters for broadcast over a large geographic area — a radius of more than 1,000 miles. The receivers and transmitters together are called transponders. Each satellite carries approximately 24 transponders, each capable of carrying approximately 24 standard video channels.

Satellites for Telephone Satellites first carried long distance telephone conversations across the oceans or across nations. The long path to the satellite and back to Earth introduced delays into the conversations. Most conversations now take place on land-based and undersea cable.

Satellites for Television Satellites are used extensively for video transmission. Because video channels are one-way, delay is acceptable. Channels are scrambled and sent to the satellites for transmission across the country. Satellites are extensively used to transmit television channels to more than 1000 "headends" of cable television systems across the nation. At cable television headends, channels are decoded and retransmitted to homes. Portable television studios can rent satellite time to transmit live video from an event such as a sports arena to their main broadcast studio for mixing in with normal broadcast video content. New satellites are in orbit specifically for Digital Broadcast Service (DBS) to home subscribers. Higher power transmitters and digital signals from the satellite enable smaller receive dishes at homes for DBS.

Satellites for Data Long distance data transmission is also carried on satellites. Computer systems can ignore the delay and use the high volumes of transmission available. Satellites cover large geographic areas on Earth, so both remote sites that cannot be reached with cables and many sites disbursed in a large area can efficiently send and receive data.

Retail offices can send sales data or inventory data from many locations to corporate headquarters or material warehouses. Some large electric utilities use satellites to control their substations and generating plants from a centralized energy management center.

DBS satellites can provide data *broadcast* service, sending downstream data packets one way from the satellite. Standard phone lines provide the return data path. Data ports for connecting to home personal computers are included on many DBS home systems, but are not used today. The application most suitable to DBS satellite data transmission system is subscription service to data broadcasts, such as news, magazine, catalogs, or graphics.

Limiting factors The capacity of DBS to provide *interactive* high-speed data service is limited. A finite number of positions exist for geostationary satellites in the orbit and they are highly valued. The satellite covers an area with at least 100 million citizens in urban and rural areas. The following factors were used to estimate satellite interactive data capacity: most DBS satellites are capable of 128 standard television channels; the digital capacity of these channels is a total of 1536 megabits per second; after overhead data for error correction, encryption and addressing is subtracted, the payload of 1152 Megabits per second is available for digital traffic; 90 percent of this payload is allocated to the broadcast of digital television, which is the major market for the DBS satellite system; and to be competitive with land-based services for Internet access, each subscriber would likely expect at least 128 kilobits per second downstream from the satellite. Using the remaining digital capacity, a satellite could serve only about 900 Internet users simultaneously. Geostationary satellites cannot be expected to provide high-speed data service to the general population.

New systems Many new satellite systems for voice and data are being planned. A company called Teledesic plans to launch 900 small satellites into 21 different low-Earth orbits so that one would be flying overhead everywhere on the planet at all times. They would provide data transmission speeds of 16 kbps to 2 Mbps for computer communications. While fiber optics and coaxial cables will likely support the core data communications needs of developed nations, these satellites could extend broadband capacity to developing nations and fill in the gaps in more rural areas in developed nations.

Power System Communications

The Light Division is a large business telecommunications customer. Telephone lines are leased to conduct business among all customers, suppliers, and employees. Leased data lines interconnect remote offices and are used to exchange information among interconnected electric utilities. Any business with similar revenue, asset valuation, and number of customers would use similar business telecommunications services. The Public Utilities Administration Building is the hub those lines connecting the utility to the business community and the customers.

Electric utilities as a group are second only to telecommunications companies in ownership and operation of communications facilities. Electric utilities require private communication circuits that have a level of reliability and security higher than could be economically provided by others for use in control and protection of power systems. They are made up of microwave point-to-point links, telephone cables, fiber optic cables and circuit electronics. Because electric systems have been built to serve both urban and rural customers, the communications systems that support these electric systems are also large.

Growing Applications Electric companies are now using more circuits than ever before to extend system control to neighborhood substations and distribution lines. These circuits allow increased efficiencies to maintain the electric system and deliver electricity. Continuous monitoring of the local power system allows faster response to outages, and it allows prediction of trouble to prevent outages. Control of the local power system helps electric company crews restore power, and it allows the distribution of power to be optimized for more cost savings. Power system communications into homes enables new forms of energy conservation, as well as enhanced customer service programs.

Overview

TELECOMMUNICATIONS COMPANIES

In the years following the breakup of AT&T in 1984, telecommunications companies were essentially divided into local telephone service providers , long distance service providers, and cable companies. Regional Bell Operating Companies such as US WEST and Ameritech were limited to providing only local telephone services. Firms like AT&T, Sprint, and MCI were restricted to supplying long distance services while cable companies largely focused on delivery of cable television. The Telecommunications Act of 1996 has done much to hasten the elimination of this separation by permitting these different companies to participate in each others' traditional markets. Many who watch the industry believe this removal of barriers will result in competition while others point to increasing company consolidation.

In order to make informed business decisions regarding telecommunications it is vital to identify the key players and review their reactions to changing environments. The section that follows is an overview of each of the major telecommunications industries, including a quick analysis of a few key companies that have the potential to affect the greater Tacoma area.

TELECOMMUNICATIONS COMPANIES

The telecommunications industry is in a period being hailed as the most exciting time in its history. New laws, changes in business practices, competition in markets that did not exist five years ago, and many other factors make the telecommunications industry a fascinating study. The telecommunications companies that exist today are only vaguely similar to those of twenty years ago. Changes within these companies are rapid and drastic, making for company profiles that are continuously in flux.

As an example of the explosive growth of this industry, we can look at a typical American citizen. In 1980, this citizen allocated an average of 20 percent of his or her budget for food and 10 percent for communication and entertainment (telephone, TV, etc.). Twelve years later, only 16 percent of the budget goes to household needs, compared with 12.5 percent for communications and entertainment — a significant budget shift for the family. Modern citizens dedicated an ever greater portion of their income to pay for television, telephone(s), the latest multimedia computer equipment, and network connections. Experts believe that this trend is only going to increase in the coming years.[1]

What follows is an overview of the major telecommunication industries, including a quick analysis of a few companies in each type of industry that either have the potential to affect the greater Tacoma area or that are moving forward into interesting endeavors. The types of companies we will look at include: Regional Bell Operating Companies, long distance providers, Competitive Access Providers, cable television companies, Direct Broadcast Satellite providers, and Internet Service Providers.

Regional Bell Operating Company (RBOC)

Most people receive some telecommunications service through a Regional Bell Operating Company (RBOC). This is the company that, during the past 12 years, has been the primary source of the local telephone service to residential and business customers. The RBOCs were "born" in 1984 with the break-up of AT&T corporation. For much of its history, AT&T had enjoyed a virtual monopoly over long distance service, and over local telephone service through the local Bell operating companies that AT&T owned. This monopolistic environment started to disintegrate in the mid-1970's when the Federal Communications Commission allowed some general long distance competition. An anti-trust suit filed in 1974, was settled in January 1982 with AT&T agreeing, in part, to divest itself of the Bell operating companies that provided local exchange service.

The break-up of AT&T resulted in seven RBOCs, each of which served a region of several states. Each RBOC was approximately the same size in terms of assets, revenues and employees. As part of the divestiture agreement, the seven regional companies were not allowed to enter three lines of business: 1) long distance service across state lines, or across the boundaries of specified calling areas within states; 2) manufacturing telecommunications equipment; or 3) providing "information services," such as electronic Yellow Pages, cable television, etc.

The seven RBOCs and the regions they served included:

- *Ameritech*: Illinois, Indiana, Michigan, Ohio, and Wisconsin.
- *Bell Atlantic*: Delaware, Maryland, New Jersey, Pennsylvania, Virginia, Washington D.C., West Virginia
- *BellSouth*: North Carolina, South Carolina, Georgia, Florida, Alabama, Louisiana, Mississippi, Kentucky, and Tennessee
- *NYNEX*: New York, New Hampshire, Vermont, Maine, Massachusetts, Rhode Island, and parts of Connecticut
- *Pacific Telesis*: California and Nevada
- *Southwestern Bell*: Texas, Oklahoma, Arkansas, Kansas, and Missouri
- *US WEST*: Washington, Oregon, Montana, Wyoming, N. Dakota, S. Dakota, Minnesota, Iowa, Nebraska, Utah, Colorado, Idaho, Arizona, New Mexico

New legislation has since opened the doors of competition for the RBOCs, no longer restricting them to service inside their original territories. When the restriction on information services was lifted in late 1991, the Regional Bell Operating Companies introduced a number of previously restricted services. Federal legislation, passed by Congress as the Telecommunications Act in February, 1996, and signed quickly by President Clinton, removed the remaining restrictions. Each of the RBOCs anticipates taking advantage of new opportunities created by the legislation.

These companies are now experiencing the freedom to grow by offering services previously disallowed. Some RBOCs are venturing into cellular or personal cellular services (PCS), some into Internet service, some into the cable business, and some desiring to become full-service telephony providers, offering a combination of local, long distance, and other services in a single package.

Many independent telephone companies also provide local services, but typically operate on a different scale. Since the majority of the greater Tacoma area is served by US WEST, the following discussion is focused on RBOCs.

Three companies, US WEST, Bell Atlantic, and Ameritech have responded to the changing telecommunications environment in interesting and relevant ways. In addition, GTE, which is not a RBOC but provides service in a similar fashion and is an important anomaly, is instructive.

US WEST

US WEST started business on January 1, 1984 with more than $16 billion in assets, a revenue stream of more than $7 billion, more than 73,000 employees and 1.5 million shareholders. Today US WEST has $23 billion in assets, $11.7 billion in annual revenues, 61,500 employees and more than 1 million shareholders. The company is headquartered in Englewood, Colorado, a suburb of Denver. US WEST, Inc., owns companies involved in domestic and international telecommunications, cable and wireless networks, directory publishing and interactive multimedia services.

On October 31, 1995, US WEST shareholders approved a plan to create two classes of common stock. One stock tracks the performance of the US WEST Communications Group; the other, the performance of the US WEST Media Group. Since creation of the classes, the combined price of the two stocks has increased some 25 percent. The US WEST Communications Group provides telecommunications services to 25 million customers in 14 western and midwestern states: Arizona, Colorado, Idaho, Iowa, Nebraska, Minnesota, Montana, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington and Wyoming. The US WEST Media Group operates domestic and international cable television and wireless telecommunications networks, publishes directories and develops and markets interactive multimedia services.

US WEST has taken a number of steps to become involved in the global communications businesses:

- In 1993, US WEST announced its intention to build combined voice, data, and video networks both inside and outside its 14-state territory. The company said it planned to upgrade its in-region communications network with high-capacity fiber optics and other new technology.
- US WEST and Time Warner announced an alliance to provide information services, entertainment and telephone service over Time Warner cable systems in 29 markets across the United States, but outside US WEST's 14-state operating territory.
- In December 1994, US WEST completed a $1.2 billion acquisition of Wometco Cable television systems serving a large portion of the Atlanta, Georgia metropolitan area.
- In July 1994, US WEST and AirTouch Communications announced a joint venture to combine their domestic cellular telephone operations to create the nation's third largest wireless phone company.

- On October 20, 1994, US WEST / AirTouch Communications joined Bell Atlantic / NYNEX in a wireless consortium representing 15 of the nation's top 20 cellular markets and 100 million potential customers. Through the FCC's auction process, this consortium won licenses for Personal Communications Services (PCS) in 11 major cities including Chicago, Dallas, Miami, New Orleans, Honolulu.
- In February 1996, the US WEST Media Group announced the purchase of Continental Cablevision, making US WEST the nation's third largest cable operator. With its Time Warner properties, the Media Group's domestic cable systems will reach approximately 16.2 million homes. US WEST has access to another 13.9 million homes abroad through cable systems in 10 countries and also has interests in wireless communications services in seven countries.
- The company publishes directories in Poland, Brazil and the United Kingdom and is helping expand the capacity of the telecommunications system in Russia.[2]

(Note: Further details on US WEST and its system in the greater Tacoma area, is in the "Options" section.)

Bell Atlantic

Bell Atlantic was also founded in 1984 with the break-up of the Bell System. Based in Philadelphia, Bell Atlantic has invested heavily in its local network systems to create a foundation for continued growth. It operates several lines of business including: Large Business, Consumer, Small Business, Federal Systems, Public and Operator Services, Directory, Video Services and Bell Atlantic-NYNEX Mobile.

Telephone

Bell Atlantic's core operations are its local networks that provide voice and data services to 11 million households through 18.8 million residential and business access lines in six states and the District of Columbia. Bell Atlantic seems to be diving into almost every other aspect of telecommunications that has been opened to it. In 1995 the company merged with NYNEX Mobile, becoming Bell Atlantic Mobile, the largest cellular carrier on the East Coast, covering 55 million people. Bell Atlantic is also part of an alliance with AirTouch and US WEST whose combined cellular properties cover nearly 110 million people. This alliance also has licenses to develop new personal communications services (PCS) in 11 more major markets.

Bell Atlantic has been vigorously providing services like its Integrated Services Digital Network (ISDN), which allows access to two 64 kbps communication channels into the home or business over the same lines that currently deliver plain old telephone service. One of these channels can be used for voice while the other is used for data, or both can be used for data offering 128 kbps of bandwidth. Bell Atlantic currently leads in the United States in total ISDN installed lines[3], having pioneered widely available ISDN service. The company's ISDN policies have upset some consumer groups that believe the key to acceptance of digital phone lines in not just to make the technology available, but to make it cheap. These groups claim that the company has kept ISDN prices artificially high. Under Bell Atlantic's original filing, 100 hours of ISDN use would

have cost from $150 to $270 per month.[4] Public outcry prompted Bell Atlantic to reexamine its tariff rates. Consumer demand for flat-rate service ensued. Though the company cut ISDN prices, many consumers feel Bell Atlantic's service is still exorbitantly priced. While some telephone companies are offering ISDN with unlimited use for $17 to $30 per month, Bell Atlantic charges $45 for 30 hours of use.[5] Nonetheless, Bell Atlantic presses on with its development of ISDN, even offering Internet and on-line service providers $15 for each residential customer they refer to Bell Atlantic and sign up for ISDN service.[6]

The company also has a merger planned with NYNEX, which is expected to be completed in the first quarter of 1997. The companies hope this will enable them to compete successfully in the long distance market. Together, the two companies cover a lucrative region from Maine to North Carolina — a high density area of residential and corporate customers. Bell Atlantic expects to offer long distance service in some of its states by mid-1997. Its strategy is to package long distance service along with local, video, and wireless service, and offer discounts to customers who buy two or more services.

Video

Bell Atlantic Video Services has focused on the development of linear and interactive multimedia television to offer an alternative to today's cable services. Bell Atlantic has been a leader in the development and testing of a Video on Demand ("VOD") system. VOD gives consumers the ability to call up movies, sports, news, games, and TV shows whenever they want. The FCC approved a technical trial of Bell Atlantic's VOD system to 300 Bell Atlantic employees in Northern Virginia in 1993. This first-phase technical trial lasted through April 1995, when regulators granted Bell Atlantic permission to conduct a second-phase market trial consisting of 1,000 customers in Northern Virginia. The VOD trial, provisionally called "Stargazer" was expected to run into the fourth quarter of 1996. The test participants had access to more than 700 program choices — available whenever participants wanted to watch them. Program choices were divided into four major categories: Entertainment, Kids Zone, Learning and Lifestyles, and Marketplace.

After six months, this "pioneering" market trial achieved subscriber buy rates of 3.3 per month, compared to the pay-per-view industry average buy rate of .26 per month. Participant response indicated that customers will not only choose the "Stargazer" product over video rental, premium cable services and pay-per-view, but that they are also willing to pay competitive prices for it. On the average, 73 percent of all subscribers purchased some programming each month, and "Stargazer" households averaged 3.3 video purchases per month, compared with 3.2 videos rented per month by households with a VCR.

More than 70 percent of all program titles offered were bought each month, reflecting an apparent desire for a variety of programs. One area that customers described as lacking was home shopping.

Reports indicate the company will build a fiber-to-the-curb network in the Philadelphia area and will offer video services on that network beginning in 1997. The construction is part of a plan to offer interactive video services over wired networks within Bell Atlantic's region, in addition to a wireless cable offering. The company plans to add other markets in its region to its fiber network plans in the future.[7]

Partnerships

Bell Atlantic and NYNEX announced in 1996, their intentions to proceed with the largest merger in telecommunications history. This will link most of the East Coast's population under a single phone company. The new entity would have earnings of $3.1 billion, sales of $27.8 billion and would be second in size only to AT&T.[8] Bell Atlantic is also building a wireless presence through its partnerships with NYNEX, AirTouch, and US WEST. The penetration rate for this consortium is projected to grow from today's 10 percent to 35 to 40 percent during the next 10 years.

Ameritech

Ameritech has been providing Illinois, Indiana, Michigan, Ohio, and Wisconsin with local telephone service since the AT&T divestiture in 1984. Since the opening of the telecommunications market, Ameritech has been very aggressive in its plans for the future. In 1994, the five companies were consolidated and then subdivided into 11 business units grouped by consumer category. By telephone company standards, reorganizing Ameritech by product lines was radical thinking.[9]

Unlike many other telephone companies who saw deregulation as being years away, Ameritech began moving forward in March 1993 by proposing a strategy[10] called the "Advanced Universal Access Plan"[11]. Then-Ameritech Chairman William Weiss wanted to "facilitate local competition in return for regulatory reform and the opportunity to enter new businesses." The plan called for opening up the company's lines and switching capabilities to those who want to compete against it in the telephone business. In return, Ameritech asked to be allowed into other businesses, including cable television, long distance service and manufacturing.

Specifically, Ameritech wanted to:

- Lift the ban on offering long distance phone service both within and outside of its service territory.
- Lift the ban on providing cable TV programming within its region.
- Drop rate-of-return regulation, which the company claimed results in high business-area rates that subsidize residential rates. The alternative proposed was flexible pricing that would allow the company to cut prices to match competitors.

In exchange, Ameritech offered to:

- Unbundle pricing for pieces of its local phone network. A cable TV company, for instance, could offer local phone service using Ameritech's switches.
- Treat competitor's equipment and networks as equal to its own, which would make it possible, for example, for a competitor to install a switch in Ameritech's network. Also, Ameritech would compensate competitors for completing calls.[12]

Ameritech has been especially serious about its long-distance plans. It already has built an "in-region" long distance network and expects to offer service by January 1, 1997, in parts of its territory. The current focus for the company's long distance plans is on its five-state area, with that region's estimated long distance market of $8.5 billion a year. It also plans to expand into other Bell's territories, reselling long distance service from a Mississippi wholesaler.[13]

Cable overbuilds

Another large portion of Ameritech's plan for the future is its move into cable television. Ameritech's "Advanced Universal Plan" was designed with the idea of growth into cable TV in mind. As early as February 1994, the company had filed plans with the Federal Communications Commission (FCC) to build digital video dialtone networks to serve more than 1.2 million customers in Ohio, Michigan, Indiana, and Wisconsin.[14] Ameritech planned to take a course very different from that of other Bell companies. Instead of buying the existing cable company's systems that were priced at $2,000 per subscriber and higher, Ameritech asked for FCC permission to build an interactive video system in its existing telephone markets. This meant Ameritech could use its existing rights-of-way and switching and billing expertise to build a cable system for less than $1,000 per subscriber. The company received its Section 214 Federal Communications Commission approvals in December 1994, with its initial schedule slating construction to begin during the first quarter of 1995, continuing through "mid-1996 or beyond." The plans saw Ameritech offering 70 analog channels, with capacity for 30 additional digital channels and 10 switched digital channels

With the use of video compression at ratios of 10:1, the company planned to be able to deliver up to 470 channels by the end of 1995.[15]

However, Ameritech decided not to act on these approvals until the rules were clear. Instead of acting as a video dialtone operator, the company decided to step into the shoes of a cable operator. In June 1995, Ameritech became the first RBOC to obtain a cable franchise in its own service area, choosing suburban Detroit as the site for competition with an existing cable operator.[16] Ameritech now has the most aggressive cable build strategy of any of the telephone companies, with plans to pass 1 million homes by the end of 1996, and an additional 1 million homes each year after that.[17] So far, Ameritech has 11 franchises in its service area, encompassing 320,000 households. These include franchises in suburban municipalities surrounding Detroit, Chicago, and Columbus. Cable franchises are pending in another 30 municipalities.[18]

Another piece of Ameritech's video strategy involves a joint venture with the Walt Disney and two other RBOC's: BellSouth and Southwestern Bell. Ameritech began talks with Disney as early as the end of 1993, and was joined by the two other phone companies in the spring of 1994. This joint venture plans to develop, market, and deliver traditional and interactive video programming to consumers. Disney made it clear that the company would not simply provide programming, but could supply "movies on demand, interactive home shopping, educational programs, games, travel assistance, and more."[19] The alliance was formalized in April 1995, with the expectation that the four companies would spend a combined $500 million during the next five years to assemble a line-up of programming and deliver it through the companies' evolving video networks.[20]

GTE

GTE's roots extend back to 1918, when the Richland Center Telephone Company, from which GTE evolved, was acquired by John F. O'Connell and two others. O'Connell led the purchase of another telephone company in Long Beach, California called Associated Telephone Utilities Company in 1926. It was from these two companies that General Telephone Corporation was formed. During the same period, three small companies merged to form Hygrade Sylvania Corporation, whose products included light bulbs and radio tubes. In 1959, Sylvania Electric Products and General Telephone merged, changing their name to General Telephone & Electronics Corporation (GTE). The next decade marked a period of growth and acquisitions with many telephone company's around the nation being acquired. By 1969, GTE had installed their 10 millionth telephone.

With the advent of the information age, GTE was positioning for the explosion in technology and new telecommunications services. In 1977

GTE developed the world's first fiber optic communications system to provide regular telephone service between Long Beach and Artesia, California. Wireless services were offered with the formation of GTE Mobilnet in 1982 with the acquisition of Airfone following two years later.

In 1994, GTE announced it would realign its Telephone Operations structure around three key customer segments — consumer, business, and carrier — as a transformation from a geographic, function-based organization to one that is market-based. GTE hoped this would bring it into a position to compete in the "new" telecommunications industry of the next century.[21]

By mid-1996, GTE had established itself as the fourth-largest publicly held telecommunications company in the world. It is also the largest U.S.-based local telephone company and the second largest cellular service provider in the United States. As a result, it is often compared with the seven Regional Bell Operating Companies. There are a number of differences however: the company has its own research facility, GTE Laboratories; it has a large international position (approximately 15 percent of its assets); and it has a larger cellular/wireless holding in terms of the population served. Another difference is GTE's service area, which is spread across 28 states instead of being located in a single region of the country. RBOCs generally have large customer concentrations in central cities, whereas GTE has its largest concentration of customers in suburban and rural areas.

GTE is composed of 16 divisions throughout the United States. These divisions include:

GTE Airfone

The division provides airborne telecommunications systems serving passengers on more than 2,000 commercial aircraft representing 25 U.S. domestic and international carriers.

GTE Directories

One of the world's largest telephone directory companies, annually publishing or providing sales and other directory related services for more than 1,000 directory titles in 47 U.S. states and 15 countries, with a total circulation of 47 million copies.

GTE Laboratories

The central research and development facility for GTE Corp.

GTE Mobilnet

One of the largest providers of cellular service in North America. It offers a range of products and services, including voice cellular services, flexible paging services, fax and computer data transfer and cellular voice mail. GTE Mobilnet operates in 74 metropolitan areas and 52 rural areas throughout the United States.

GTE Telephone Operations

The largest U.S.-based local telephone company, providing voice, video and data products and services through more than 23 million access lines in portions of the United States, Canada, South America, the Caribbean, and the Pacific. GTE owns and operates in more than 16 million local access lines — more than NYNEX, Southwestern Bell, Pacific Telesis, or US WEST. GTE began offering long distance service to some customers on March 4, 1996. The company now offers service to customers in Michigan, Minnesota, Illinois, Florida, Washington, and Kentucky. GTE plans to offer long distance service, by the end of the year, to customers to which it provides local phone service in a total of 28 states.

Long Distance (IXCs)

Advertising and telemarketing encouraging customers to switch companies is the aspect of the long distance business that most of the public recognizes.

The issues swirling around the fight for your phone service displays the gap between the atmosphere of the RBOCs and the conditions of the long distance companies or Interexchange Carriers. Unlike the RBOCs, AT&T, MCI, and Sprint have worked in a fiercely competitive environment for a number of years.[22] Where the Regional Bell Operating Companies were restricted to their monopoly regions, the Interexchange Carriers were able to provide long distance service between Local Access Transport Areas and have competed with other Interexchange Carriers for that market. As a result of this fierce competition, the long distance providers have been forced to invest in sophisticated systems and outstanding customer service in order to wrestle customers away from one another. This has set a standard of operations above that of most of the RBOCs. Where some RBOCs struggle with stiff fines for service penalties into the millions each year, the Interexchange Carriers shine a "good-guy" image with phone calls during which you can "hear a pin drop."

While there are a large number of Interexchange Carriers if resellers are included, we will look at the three largest Interexchange Carriers: AT&T (controlling more than 60 percent of the market), MCI (second) and Sprint (third).

AT&T

Background

The American Telephone and Telegraph Company (AT&T) was incorporated in 1885. In 1900, AT&T became the parent company of the Bell System and was organized to build long distance facilities to establish telephone communications throughout the American continent and around the world.[23] AT&T and the Bell Company began attacking the independent, non-Bell telephone companies by purchasing some and causing others to go out of business. The advantages of dealing with AT&T became obvious and a monopoly was formed.

AT&T's achievements in communications are notable. In 1915, engineers first experimentally transmitted the human voice across the Atlantic Ocean by radio, and connected the first transatlantic telephone service to London in 1927. Service to Europe was transferred to transatlantic submarine cable in 1956.[24] Alternatives to copper wire began to appear in the late 1940s, and by 1950 AT&T had opened its first microwave relay system between Chicago and New York. The company also placed the first commercial communications satellite, Telstar I, in orbit in 1962.

Throughout this long period, AT&T maintained a legally sanctioned, regulated monopoly. In 1956, an anti trust suit led to a consent decree between AT&T and the Department of Justice that restricted AT&T's activities to the regulated business of the national telephone system and government work. Following this action, the FCC slowly began to allow some competition at the edges of the AT&T network. By the mid-1970s, competition had advanced to general long distance.

Divestiture

The changes in telecommunications eventually led to an antitrust suit by the U.S. government against AT&T. The suit began in 1974 and was settled in 1982 when AT&T agreed to divest itself of the wholly owned Bell operating companies that provided local exchange service. In return, the Department of Justice agreed to lift the 1956 decree. Divestiture officially took place on January 1, 1984. The company retained $34 billion in assets and 373,000 employees.

Changes and Reorganization

Since the divestiture, long distance prices in the United States have dropped 60 percent, driven down by the growing number of long distance companies, which now number more than 400. Competition forced many changes upon AT&T. The company underwent a multi-billion-dollar digitalization of its entire network in order to remain technologically in step with the likes of Sprint and MCI.

AT&T also entered new markets and participated in major mergers and acquisitions. In 1991, AT&T and NCR joined in a $7.3 billion deal that gave AT&T the ability to meet its needs for global network computing.

A $11.5 billion agreement with McCaw Cellular in 1993 strengthened AT&T's position in the growing cellular market.

In 1995, AT&T announced that it would split into three companies. These companies are AT&T, which provides communication services; Lucent Technologies, a systems and technology company; and NCR Corp., in the computer business.

Cellular and Digital PCS

AT&T Cellular is currently available in portions of 20 states across the U.S. The company is now marketing a "Digital PCS" service developed by McCaw. This service is currently available in most AT&T Wireless service markets. While not technically true PCS, since it does not operate in the FCC's PCS frequencies, the service offers many of the features planned for inclusion in PCS, including Caller ID, Messaging, and improved battery performance.

Local Telephone Service

AT&T is eager to enter the local telephone market, but is having difficulty doing so. Much of the reason lies with AT&T's demands regarding interconnection agreements with the Regional Bell Operating Companies. To reach local businesses and homes, AT&T must rent nearly all its local facilities from the RBOCs. AT&T's key demands of the RBOCs involve telephone number portability and accounting systems that prevent the RBOCs from charging fees based on past investments in network plant and equipment.[25]

Services Available

AT&T currently offers:

- Residential Long Distance
- Business Long Distance
- Internet connection
- Teleconferencing
- Network Solutions
- Wireless Communications
- Software
- DBS Services

Sprint

Background

Sprint can trace its beginnings back to Abilene, Kansas, in 1899. It was there that two Abilene brothers began the Brown Telephone Company, which continued to grow and consolidate with other independents. After gaining control of seven major telephone exchanges, the company eventually formed a large holding company, United Telephone and Electric (UT&E) in 1925.

Losses suffered during the Great Depression led to a reorganization of the company into United Utilities in 1939. By the 1950s, United Utilities had become the nation's third largest independent telephone company, conducting business across five states. It was at this time that the company decided to forego future acquisitions and concentrate on modernizing its old equipment and converting its exchanges to rotary dial operation to match the Bell companies.

In 1972, United Utilities became United Telecommunications, Inc. also known as United Telecom. United Telecom laid seven miles of experimental fiber optic cable in 1978 in Pennsylvania, and in 1979, installed the first digital switch. By 1983, the company had fiber optic cables in 17 locations and digital switches controlling 710,000 lines. By the end of 1985, United Telecom had more than 4,700 miles of fiber optic network in place, with lines in reach of 30 percent of the nation. The nation's first coast-to-coast fiber optic transmission a video conference linking New York to Los Angeles was conducted. The conversion to fiber optics continued, with 100 percent of the company's traffic traveling on the fiber optic network by the summer of 1988. United Telecom completed its 100 percent acquisition of Sprint in 1991, and the company changed its name from United Telecommunications to Sprint Corporation.

Sprint now has $12.6 billion in annual revenues and serves more than 15 million business and residential customers, with more than 50,000 employees worldwide and total assets of more than $14 billion. In 1991, Sprint became the first major long distance carrier to offer frame relay service, a high-speed data transmission service that supports a variety of data networking applications. Following its merger with Centel Corporation in 1993, Sprint became the only major U.S. telecommunications company providing long distance, local and wireless services. This merger also made Sprint the eighth-largest cellular company in the U.S. Sprint announced plans to deploy SONET technology throughout its long distance network in 1993. By 1994, Sprint had activated the world's first four-fiber, bi-directional, line-switching ring.

Sprint Spectrum

Sprint Spectrum, a venture involving three cable television companies, TCI, Comcast Corp., and Cox Communications and Sprint have joined together to build a nationwide network for Personal Communications Services (PCS). This nationwide network will package local telephone, long distance, wireless communications and entertainment services into a single offering[26]. The partners invested $2.1 billion to acquire PCS licenses in 32 Major Trading Areas. Sprint Spectrum's goal is to offer Personal Communication Services to 182 million people in the United States (70 percent of the entire population). The company hopes that the PCS product will replace cellular phone as the wireless communications of choice. The company currently has 1,600 employees nationwide, and is expected to grow to a staff of 5,000 within the next few months.

MCI

Background

MCI was created in 1963 in Joliet, Illinois, by a group of mobile radio equipment salesmen. Their idea was to build a telecommunications system between Chicago and St. Louis using microwave repeaters, and sell phone service on the system. AT&T opposed the idea because of questions about whether it had the right to connect to the AT&T system, even though the group had FCC permission. In 1972, MCI completed its system between Chicago and St. Louis and formulated plans for a nationwide network. MCI was incorporated in February 1973. During the following years, AT&T fought to limit interconnection including using its monopoly control to triple MCI's interconnection fees at one point.

In the 1980s, MCI decided to provide new products and services for the future — such as personal computing, fiber optic infrastructure, facsimile transmission, and electronic mail. MCI began putting money into laying fiber optic cable, beginning with more than 240 miles of cable along railroad rights-of-way between New York and Washington D.C. in 1984.

With the breakup of AT&T in 1984, residential customers were free to choose their long distance provider; however, many people stayed with AT&T out of sheer inertia. MCI faced a competitor that controlled 95 percent of the market. MCI's plan was to offer lower prices, reliable service, and good customer support. It allied with major companies to win their accounts and by 1988, MCI had gained about 10 percent of the total long distance market and had more than doubled its revenues. Access to commercial and residential customers will be a key battlefield for MCI in the coming years.[27] MCI's strategy is to create and market new services that grow their core long distance business while entering ventures and alliances with businesses in contiguous markets.

Competitive Access Provider (CAP)

A Competitive Access Provider (CAP) provides local exchange "bypass" service to businesses directly from their long distance carrier of choice, "bypassing" the need for the local telephone company to provide the connection. They compete for high-volume business customers by offering direct fiber optic or microwave links from business areas to the interstate phone networks. These networks are usually built with modern technology, since they are built from the ground up. This puts many CAPs in a technically and operationally superior position compared to the current network technology of the RBOCs. The RBOCs are attempting to construct the same advanced networks, but they operate under strong cost regulations, and must re-build their existing infrastructure, which works to the advantage of the CAPs. In addition, CAPs have the freedom to charge "access fees" to complete long distance calls that are less than the RBOCs charge.

It is not uncommon to see CAPs grow at rates of 100 percent to 200 percent a year, with infrastructure investments in the multi-million-dollar range. Generally they have a small staff, and employ subcontractors to accomplish the work left unstaffed. A number of these CAPs have been in business for more than 10 years. Their explosive growth is attributed to a huge leap in demand and an environment which, as of late, is more conducive to competition. Despite this, CAPs are not yet know in the telecommunications industry for returning a profit.

As one telecommunications analyst stated: "The CAPs are nibbling at the local telephone companies, building modern, reliable, all-fiber plants aimed at the heart of the most profitable business markets. This will slowly destabilize the universal service subsidies that keep the telephone companies fat, dumb and happy. If the CAPs can continue to fly under the radar of greasy politicians and regulators, they have a definite win just putting one foot in front of the other."[28]

We will examine four of the operating CAPs: Electric Lightwave, Inc., GST, TCG, and MFS.

Electric Lightwave, Inc.

Electric Lightwave, Inc. (ELI) builds and operates all-digital, SONET-based fiber optic networks throughout the Western United States. The company is a competitive provider of telecommunications and information services to the corporate and wholesale business customer. Electric Lightwave, Inc. (ELI) is headquartered in Vancouver, Washington, and operates fiber optic metropolitan area networks (MANs) in Seattle, Portland, Sacramento, Salt Lake City, and Phoenix.

ELI has two target markets: corporate customers and wholesale customers. The corporate customer business targets communications and information intensive businesses and organizations whose operations depend upon the reliable movement of information. These generally are medium-to-large organizations, often with multiple locations, representing a broad range of industries, including financial services, health care, education and legal services. The wholesale customer business is aimed at national and local interexchange carriers as well as wireless providers who value the diversity, flexibility and security offered by the CAPs.

ELI is a Delaware corporation founded in 1990, and is a wholly owned subsidiary of Citizens Utilities Company, headquartered in Stamford, Connecticut The parent company, incorporated in 1935, is a utility providing electric, water, natural gas, telecommunications, and wastewater services throughout the United States. ELI has operated in Seattle since 1990 as an interstate carrier, and was granted authority to provide local dialtone service by the Washington Utilities and Transportation Commission in 1994. They are currently providing local switched service under interconnection agreements with US WEST, GTE, and Pacific Telecom.

Electric Lightwave, Inc. (ELI) became the first telecommunications company west of the Mississippi authorized as an alternative local telephone service provider. In addition to its metropolitan area networks, the company also built and operates Southwest FiberNet, a connection between Las Vegas and Phoenix that provides fiber optic transport services. ELI offers a range of telephone services in Seattle including local service, switched and dedicated long distance, private networks and data service.

GST

GST Telecommunications, Inc., a Vancouver, Washington-based CAP, provides a range of telecommunication products and services, focused on business customers located in small and medium-sized cities. GST currently operates networks in 14 cities in the western U.S. and Hawaii, with additional cities under construction. Services are provided through the development and operation of competitive access and other telecommunication networks.

Business customers have always been the “bread-and-butter” for competitive entrants into the telecommunications market. GST is, however, exploring ways to provide residential services. In April 1996, the company entered a 15-year agreement to wire a low-income housing development in Albuquerque, New Mexico.[29] In June 1996, GST signed a second residential agreement to wire a 492-unit luxury apartment complex that is currently under construction in Salt Lake City.[30]

GST has struck an interconnection agreement with Intermedia Communications. Both companies deploy the same type of switching infrastructure and both target business customers in small and medium-sized cities. The intention is to link their networks in order to broaden their reach across the country, using the agreement to provide other services[31], such as Internet access, long distance and local service.[32]

In addition, GST manufactures telecommunication switching equipment and provides network management and billing systems through its wholly owned subsidiary National Applies Computer Technologies, Inc. of Orem, Utah.[33]

TCG

Teleport Communications Group (TCG) is the nation's oldest and perhaps most experienced competitive access provider. The company was founded in 1984 as Teleport Communications - New York, and one year later began providing private line and other dedicated access services. In 1987, TCG was formed as the parent organization to manage nationwide expansion. The current TCG network encompasses more than 5,000 route miles of fiber-optic cable in 47 markets. TCG focuses on providing service to the businesses — especially information-dependent companies such as banks, financial services, and media companies as well as long distance carriers.

TCG boasts that security is its strength. Since TCG serves information-sensitive businesses which rely upon access to long distance carriers, and data services, security is a key issue. The company advertises an advanced network architecture, diverse routes and redundant electronics to provide operational security, all of which is monitored 24 hours a day, seven days a week. Teleport also promises strategic security by not competing with its customers; for instance, by not offering credit card services.

TCG experienced rough waters shortly after its creation. In 1989, disputes with NYNEX, and the high costs of expansion led its creator and chief executive to shop TCG to other "wealthier" companies. Four cable TV firms were interested in providing phone service and by late 1992, Teleport had been split up among four of the U.S.' biggest cable companies : Cox Enterprises (30 percent interest), TCI (30 percent), Comcast (20 percent), and Continental Cablevision (20 percent).

Local Teleport operates in the Seattle area, advertising itself as "The *Other* Local Phone Company." The Seattle network includes more than 270 route miles of fiber, and serves more than 50 buildings located from Blaine in the north, through Seattle, to Kent in the south. TCG has also installed an OC-48 SONET (Synchronous Optical Network) ring around Lake Washington.

MFS

Metropolitan Fiber Systems is a relatively large competitive access provider (CAP) that began in 1987 by offering high speed Metropolitan Area Network (MAN) service between clumps of strategically located buildings in roughly 20 U.S cities. In 1993 MFS established a national backbone and became a purveyor of bandwidth on a national scale when it linked its MAN services together into a national Wide Area Network (WAN).

This Omaha, Nebraska, based company is a leading CAP providers of communication services for business and government. MFS offers integrated local and long distance services as well as a range of voice, data, and other enhanced services and systems designed to meet the requirements of business and government customers.

MFS' has two types of operating groups:

1. *Telecommunications Services,* which includes MFS Telecom Companies (serving large business and government organizations), MFS Intelenet Companies (full-service, facilities-based companies designed for medium and small businesses), MFS International (MFS's large multinational customer base), and the Global Network Services Company (managing the international network platform).
2. *Network Systems Integration Services* through MFS Network Technologies (design, development, and management of the installation of MFS's fiber optic networks and expansions).

MFS has been very aggressive in pursuing its full and complete "rights" under the Telecommunications Act of 1996. In fact, MFS planned to cause the presidents of the RBOCs and the other local exchange carriers in 22 states and the District of Columbia to receive letters from MFS on the same day the 1996 Act was passed. The contents of these letters in effect demanded "equal rights" by requesting the start of negotiations to initiate or improve the existing network connection duties as described in the 1996 Act. MFS included a copy of a model agreement with the expectation of a written response within two weeks leading to a satisfactory agreement between the parties.

Cable Television

Until recently cable TV providers could be defined as operating a "wired distribution system that crosses public rights-of-way and is used to deliver multiple channels of video programming to multiple subscribers in a community."

But what began as a solution to the problems of poor reception and limited news and weather information has been transformed into an industry offering video entertainment, advertising, and motion picture production, and even telephone and data services in some areas.

Tele-Communications, Inc. (TCI)

Tele-Communciations, Inc. (TCI) is the largest cable TV provider in the United States. TCI has nearly $2 billion in revenues, an operating cash flow of $533 million, 14 million subscribers in the United States and approximately 32,000 employees.

TCI's size and great influence in the cable TV industry was achieved through its push for growth, acquiring more and more cable systems, and increasing its subscriber base and revenues. In 1996 alone, the cable operator added more than 2.4 million subscribers[34]. However, this acquisition strategy has left the company in a relatively poor financial position. TCI has more than $14 billion in debt — roughly $1,000 of debt per subscriber. TCI faces elevated expenses due to its entry into new services, and is attempting to resolve its money crunch by raising rates, cutting capital expenditures, and eliminating 2,500 jobs.

These cutbacks reveal a change in TCI's telecommunications strategy. The company's properties consist mainly of one-way, coaxial cable systems operating at 350 MHz using 20-year-old technology. The company has announced that upgrades to these systems will be deferred, and the focus instead will shift to the deployment of digital set-top boxes. These boxes will deliver more channels using a new compression technology, but will not allow deployment of advanced telecommunications services such as high speed, two-way Internet access or telephony.

Before refocusing on cable TV, TCI was attempting to gain a foothold in other markets besides traditional cable TV service. A commercial telephone network was launched in Hartford, Connecticut, with two other cities scheduled for the service in Illinois and California under the name PeopleLink. The company also has a large stake in the Digital Broadcast Satellite market. In 1994, TCI joined five other cable operators to form Primestar Partners. This DBS service now reaches more than 1.1 million subscribers, and contributed $200 million to TCI in 1995, with revenues expected to double in 1996. Personal Communications Services are another market TCI has entered. Sprint Spectrum was created by a partnership between Sprint, TCI, Comcast, and Cox Cable. The partnership has licenses to provide Personal Communications Service in 33 Major Trading Areas with a total population of 190 million.

Following the explosive growth of the Internet, TCI set up an on-line service with the help of Microsoft called @Home. The @Home Network provides Internet service to a customer's personal computer through cable lines. Customers receive 24-hour unlimited access to the Internet, a high-speed cable modem, e-mail, Netscape Web browser and community content for $39.95 a month. This service is currently available in limited areas of California, Connecticut, Florida, Illinois, and Maryland.

Time Warner

Time Warner Cable is one of the divisions of Time Warner, Inc., which also has divisions involved in music (Warner Music Group), publishing (Time Inc.), film (Warner Bros.), and cable movies (HBO).

Time Warner Cable is the world's second-largest owner and operator of cable systems. It boasts a clustered system, with three-quarters of its 11.5 million subscribers in 34 groups of 100,000 or more.. This clustering is intended to position Time Warner Cable for both expanded cable revenues and entry into telephony. The company has been one of the leading forces in the introduction of advanced telecommunications businesses. Time Warner is subscribed to by approximately 60 percent of all homes passed in its system

In December 1994, Time Warner introduced the Full Service Network (FSN) in suburban Orlando, Florida. Digital switching and storage technologies were added to the company's fiber optic and coaxial cable plant in Orlando, to provide consumers with services such as video-on-demand, interactive shopping, and games. Future plans include distance learning, connection to long distance telephone service and personal communications services (PCS).[35] An estimated $100 million was spent on the debut of this trial service, but the network has not been introduced anywhere else.[36]

Time Warner began providing the cable industry's first switched business and residential telephone services in June 1995 in Rochester, New York. To date it has an estimated 500 customers and has not yet launched telephone service commercially in other markets.

In 1995, CEO Gerald M. Levin spent $5 billion to acquire cable systems with about 4 million subscribers. Due to the company's huge debt load, Levin is considering selling off some of these cable assets.

Time Warner Cable and Time, Inc. started a market test in July 1995 of cable modems called LineRunner in Elmira, New York.[37] Although it currently has just 200 participants, Time Warner has ordered about 100,000 cable modems from Motorola and Toshiba. Time Warner's plan is to offer similar Internet access services in other parts of the country by fall 1997[38]. A launch of another cable-modem service named Roadrunner occurred in September 1996. This high-speed broadband online service will begin in Akron, Ohio, with expansion into Portland, Maine, and San Diego, California.

US WEST is also seeking control of Time Warner's 11.5 million cable subscribers, in which the RBOC has a 25.5 percent stake.[39] CEO Levin has been against handing over control of the systems to US WEST, but this move would boost Time Warner's long-depressed stock price.

Time Warner's biggest move yet is its $7.5 million merger with Turner Broadcasting System, creating the world's largest media concern.

Viacom

Until the purchase of Viacom's cable properties by TCI in July 1996, this company provided cable TV in most of Pierce County. The $2.3 billion transaction included selling cable systems serving 1.2 million subscribers in San Francisco-Bay Area; Seattle-Tacoma; Salem, Oregon, and Dayton, Ohio.[40] Viacom had been attempting to sell its cable systems for more than a year to focus on programming. A midsize cable operator in an industry dominated by a handful of larger players, Viacom viewed selling its cable systems as a prudent strategy.

DBS[41]

This relatively new service allows households to receive television programming directly from satellites on small (18-inch to 3-foot) satellite dishes that are aimed at a fixed point in the sky. This class of television service is called Direct Broadcast Satellite (DBS). For this purpose, the FCC designated a portion of broadcast spectrum and several satellite orbital locations. These satellite locations are different from conventional satellites in that they are spaced 9 degrees apart from others broadcasting in the same frequency range. This allows for interference-free reception on small satellite dishes from most locations within the continental U.S. and most of Canada.

The signals from these satellites are digitally compressed, which allows up to 200 channels to be broadcast from a single orbital position. Programming on most DBS services includes major cable services, sports, pay-per-view movies, audio services, and specialized "niche" programming aimed at smaller audiences. The FCC has specifically licensed several companies to provide DBS services. Companies that are not licensed DBS broadcasters can offer direct to home services from conventional satellites using a somewhat larger dish. As a result, the definition used for DBS is any direct to home service using a small satellite dish from a fixed satellite position.

Equipment

Equipment needed for this service generally comes in a package including decoder, dish, remote, and a cable to connect the decoder to a single TV or VCR. An additional coaxial cable is required to connect the dish to the decoder and usually must be purchased separately. Each manufacturer differentiates its product by providing a unique user interface including its own on-line program guide and different remote controls.

The hardware is relatively easy to install with little or no professional equipment required. The dish can be installed anywhere there is a direct line of sight to the south with no trees or buildings in the way. The satellites operate from 22,300 miles above the equator in the Ku-band spectrum. This is above a north-south line running through western Nebraska.

Disadvantages

There are some disadvantages to the DBS system. The quality of DBS seems to be open to debate. Many DBS customers report that the video and audio quality are excellent and the system works extremely well. Others report poor quality images and noticeable digital artifacts on at least some channels. The quality seems to vary across channels. However, nearly everyone thinks DBS sound quality is excellent.

Total service outages can occur as a result of severe thunderstorms. The satellites are focused to send more power to rainier areas to help minimize this problem, but it does exist. One DBS company, DIRECTV claims the signal will be receivable 99.7 percent of the time everywhere within the coverage area.

Cable TV customers with cable-ready VCRs and TVs are used to being able to watch one channel and record another or set their VCRs to record two different cable channels while they are out. The DBS system can only decode one channel at a time. If access to two channels at once is desired, additional equipment must be purchased. Some West Coast viewers are disappointed to find that programs appear earlier than they are used to since the programmers use East Coast feeds for most of their programming.

DBS Services

There are a number of DBS services in operation today, with more planned in the coming months.

PRIMESTAR is offered by a group of Cable TV Multi System Operators (MSOs), and is not an FCC-defined DBS service since it operates from conventional satellites using 36-inch to 40-inch dishes. This larger dish is not typically purchased by the customer, but instead leased (as is the decoder) and must be professionally installed. For about $40 a month, viewers can get 28 video channels, six CD-quality music channels, and 14 regional sports channels. Premium channels are available from $5 to $20 per month each.

DIRECTV (a subsidiary of Hughes Communications) is a licensed DBS provider and operates High Powered DBS satellites receivable with 18 inch dishes. DIRECTV offers four cable packages - ranging from $6 (one channel) to $30 (45 channels), with approximately 150 available channels. Various programs can be added to a package for $3 to $10 a month. This service also makes available a range of sports options, including "season tickets" for NFL, NBA, or NHL games for between $100 to $150 per season.

USSB (United States Broadcasting Company) is a licensed DBS provider. Broadcasts about 20 channels, and features HBO and Showtime as the foundation upon which it bases its business. Its packages range from $7.95 to $34.95 a month.

DIRECTV and USSB are competing companies whose programming is receivable with a common dish and decoder. These two companies offer different programming and compete vigorously for each customer's programming subscriptions.

ECHOSTAR COMMUNICATIONS offers the DISH Network and is a DBS system with more than 200 channels of video, audio, and data services.

Subscribers

As of September 30,1996, the DBS industry had captured about 3.5 million subscribers, forecasted to climb to 5 million by the end of 1996.[42] DIRECTV and USSB claim more than a million authorized decoders to date with that number climbing by thousands every day. DIRECTV has forecasted 10 million to 12 million systems sold within six years, while USSB expects to sell 40 million units within 10 years.

Cost

The cost of a DBS system is $400 to $500 dollars. As additional manufacturers enter the market, discounting is expected to continue. DIRECTV and DISH both have $199 equipment promotions, and Primestar is selling its installation for $149, and even for $99 in some competitive markets.[43] While prices seem low now, they will likely go down even further. "The satellite business is just now starting to boom because of the lower prices," said Jim Pistol, VP-Choice Entertainment in Denver. "Some day they'll be free. This is the next cell phone business."

Direct Broadcast Satellite Companies as of Sept. 30, 1996)

Company	Start-Up Date	No. of Subscribers (Approximate)
DirecTV*	June 17,	2 million
Primestar	Mid-March	1.5 million
U.S.S.B.*	June 17,	950,000
Echostar	March 3,	185,000
Alphastar	July 1, 1996	8,500

**Some viewers subscribe to both USSB and DirecTV*

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Overview

REGULATORY ENVIRONMENT

Federal regulation has been streamlined under the 1996 Telecommunications Act. State laws that in the past could have limited access to certain markets have been federally pre-empted or limited. The regulatory environment has greatly improved the ability to enter the telecommunications market. However, some regulatory hurdles remain.

Many provisions of the Telecommunications Act of 1996 direct the Federal Communications Commission (FCC) to come up with regulations that will open local telecommunications markets to competition and remove barriers to entry. These provisions were written in broad strokes, leaving the FCC to fill in the details. In 1997, the FCC must implement the Act's crucial universal service sections, which will determine how telecommunications companies guarantee phone service to poor and rural areas. In addition, the Act requires all telecommunications carriers to interconnect directly or indirectly with the facilities and equipment of other carriers.

The Regional Bell Operating Companies (RBOCs) and local exchange carriers contend that the FCC has already gone to far, providing discounts for competitors that would undermine their entrenched businesses[1].

Given the enormous financial interests at stake, many industry interests are not willing to wait for all the details before taking action. As a result, deals are being negotiated that in some cases, are between former competitors.

One thing is clear, municipally owned electric utilities, electric cooperatives and other utilities may enter the communications business *without* obtaining FCC certification or any other prior FCC approval. State requirements vary, but cannot limit utility participation in telecommunications ventures[2].

This section provides an overview of pertinent Federal laws and regulations related to telecommunications as well as a summary of state legal and regulatory issues that must be considered before entering the telecommunications market.

REGULATORY ENVIRONMENT

The Communications Act of 1934, The 1992 Cable Act and The Telecommunications Act of 1996

The Communications Act of 1934

Though Congress has amended the Communications Act of 1934 several times since its enactment, today's high-tech communications companies are regulated to some extent by statutory language from the 19^{th} century. When the Act of 1934 was adopted, the telegraph was the principle means of electrical communication, mass media meant AM radio, and telephones were considered luxuries. Considering the many new communications technologies that have emerged, the Communications Act has proven a versatile, evolving statute.

The Communications Act of 1934 was first amended in 1992 to reform the monopolistic practices of the cable industry. The Act was again amended when the Telecommunications Act of 1996 was signed into law. This Act of 1996 is regarded as landmark legislation and its implications will be discussed later in this section.

The Act of 1934 and its amendments are divided into three major regulatory subdivisions: **common carrier**, **radio**, and **cable television**. From a regulatory perspective, every form of electronic communication must fit into one of these statutory subdivisions or fall completely outside the scope of the Act. How a new form of communication is regulated depends in part on how it works and how its purveyors choose to have it regulated.[3] From a regulatory view, a communications service usually fits into two basic categories:

1. Who is offering the service?
2. How is the service being transmitted?

Who is offering the service? The answer starts with a definition of "**common carrier**" as one who serves all potential users without favoring one over another. The customers of a common carrier transmit information of their own design and choosing[4]. On the other hand, private carriers do not allow customers to transmit information of their own design and choosing.

How is the service being transmitted? Does it move through a wire or through the air (wireless)?[5] From a regulatory point of view, the result is a two-by-two matrix:[6]

	Common Carrier (Telecommunications Service Provider)	**Non-Common Carrier**
Wired	Telephone (land line)	Cable TV
Wireless	Cellular Telephone	Utility Radio Dispatch System

When a new service approaches the market, it must fit into one of the four boxes. Because the rules in one box may be more advantageous to a particular firm, an operator in one box may try to relocate to another box.

Though the fundamentals remain basically the same, the regulatory aspects of each box can, and do change. For example, the two amendments to the Communications Act of 1934 have had a profound affect on various communications industries.

Cable Television Consumer Protection and Competition Act of 1992

By 1984, Congress had basically deregulated the cable television industry. The 1984 amendments prompted expansion of cable television service throughout the country. Though millions gained access to cable access, customer complaints about escalating rates and poor quality of service attracted Congressional attention. Television stations argued that cable operators must carry their broadcast channels and then argued that operators "stole" their signals by re-transmitting them without paying for them. The Courts resolved this issue by ruling that cable systems were not obligated to carry local TV signals, but if they did, they must pay for the right.

Over time, the cable industry became increasingly concentrated: a relatively small group of executives controlled programming, production and distribution. In effect, cable had become a monopoly and exercised monopolistic power[7]. After several unsuccessful attempts to enact reform, Congress passed the Cable Television Consumer Protection and Competition Act of 1992, commonly referred to as the 1992 Cable Act.

The 1992 Cable Act empowered the FCC to regulate cable rates and service. The FCC responded with thousands of pages of rules, forms, and interpretive decisions that addressed the cable business in minute detail. These rules were adopted in 1993, and are still being fine-tuned in 1997[8].

In summary, the 1992 Cable Act sought to re-regulate an industry that had begun as an adjunct of broadcast TV and had evolved into an independent, distinct and powerful medium of communications[9].

Telecommunications Act of 1996

On February 8, 1996, President Clinton signed into law the Telecommunications Act of 1996 (P.L. 1040104) the most significant and far-reaching amendment to the 1934 Communications Act.

Unlike the 1992 Cable Act, the basic thrust of the 1996 Act is **deregulatory**. Its intent was to eliminate barriers to entry and spur competition. A number of provisions to the 1996 Act will also have a great effect on companies deciding to enter the telecommunications business. For example, if a company decided to provide a "telecommunications service" it would be subject to certain **common carrier** regulations including:

- **Interconnection** The Act of 1996 requires all telecommunications carriers to interconnect directly or indirectly with the facilities and equipment of other carriers.

- **Universal Service** The Act of 1996 requires that all interstate telecommunications service providers contribute, on an equitable and non-discriminatory basis, to a universal service fund. The 1996 Act codifies, for the first time in the history of the regulation of communications, the concept of "universal service." Universal service is generally understood to mean basic telephone service for all Americans at affordable prices.

Some of the major **deregulatory** aspects Act 1996 include:

- The FCC is empowered to refrain from applying or enforcing any communications statute or rule against any telecommunications carrier or service, or class of telecommunications carriers or services. For this to happen, the FCC must first determine that enforcement is unnecessary to ensure that charges or practices are just and reasonable or to protect consumer interest, and is consistent with the public interest.

- The FCC's tariff filing and review process are streamlined.

- The FCC is authorized to exempt individual carriers from complying with the requirements of Section 214. Under Section 214 of the 1996 Communications Act all carriers are required to seek and obtain FCC approval before building or extending a telecommunications linehead.

The 1996 Act defines "telecommunications service" as:

> *The offering of telecommunications for a fee directly to the public, or to such classes of users as to be effectively available to the public, regardless of the facilities used*

Interstate Access Charges

In January of 1997, the FCC adopted a Notice of Proposed Rulemaking to reform its system of interstate access charges to make that system compatible with the pro-competitive deregulatory framework established by the 1996 Act. Two possible approaches have been outlined for addressing reform. The first approach is a market-based approach under which the FCC would rely on potential and actual competition from new facilities-based providers and entrants purchasing unbundled network elements to drive down prices. The second approach is a prescriptive one under which the FCC would specify the nature and timing of changes to the existing rate levels. In addition, the Commission tentatively concluded that information service providers should not be subject to interstate access charges as currently constituted.

Local Exchange Telephone Service

The 1996 Act eliminates the consent decree that governed the breakup of AT&T. The 1996 Act opens up the local telephone market to new competitors, including long-distance carriers, cable operators and electric utilities. Local exchange telephone service is regulated by state public service commissions and long distance is the FCC's domain.

Long Distance Telephone Service

The 1996 Act allows Regional Bell Operating Companies (RBOCs) to provide long distance service to customers in their local exchange service areas once they have opened the local exchange market to competitors. They may immediately enter the long distance telephone market outside their local exchange service areas. The RBOC's may also provide telecommunications equipment and manufacture customer equipment.

Video Programming Services by Telephone Companies

The 1996 Act repeals the statutory ban against telephone companies becoming cable television operators. (Several courts had already ruled this ban unconstitutional.) However, the new law prohibits telephone companies from buying existing cable systems in their home areas - and vice versa, except in certain rural markets and in other limited circumstances[10]. Telephone companies now have four video entry options, each of which has different regulatory consequence and structure, and each of which is treated differently for payment of cable television franchise fees.

The four video options are:

1. Over a radio based system in which case it is regulated under Title III of the Communications Act and not as a cable operator. (A radio based system cannot be charged a cable television franchise fee.)

2. As a common carrier subject to Title II. (A common carrier cannot be charged a franchise fee.)

3. As a cable television operator. (A cable television system can be charged a cable television franchise fee.)

4. As an "open video system" operator subject to limited regulation. An open video system operator must make channel capacity available to unaffiliated programmers without discrimination. Though an open video system operator cannot be charged a cable television franchise fee, it may be required to pay fees based on gross revenues in lieu of franchise fees; it may also have to pay other state and local fees.

Though designed to promote video competition by telephone companies, these video entry options are not limited to telephony companies. Open video systems are of particular interest to companies that are experiencing difficulty obtaining franchises as a result of the long relationship between franchise authorities and incumbent cable television operators. A number of electric utilities are considering becoming open video system operators.

Overview of Players

Congress

Congress passes laws, such as the Communications Act, and exercises oversight of executive agencies that carry out those laws. Congress does this by gathering information, holding hearings, conducting investigations, passing resolutions, and expressing opinions about a wide variety of matters.

The House Commerce Committee and Senate Commerce Committee are the primary committees that investigate and recommend communications policy.

The Federal Communications Commission (FCC)

The Federal Communications Commission (FCC) is charged with implementing the Telecommunications Act of 1996. The FCC is a board of commissioners appointed by the President of the United States under the authority of the Communications Act of 1934, having the power to regulate radio, telephone, cable television and all other interstate communication systems.

The FCC exercises its jurisdiction over communications matters through regulations that fall into two broad categories:

1. Regulations Congress expressly directed the FCC to adopt to carry out specific provisions of the Communications Act.

2. Regulations the FCC generated to further its actions in pursuit of the public interest.

Before adopting a rule, the FCC, like most Federal agencies, must initiate a formal rule-making procedure that entails publishing the proposed regulations and soliciting public comments. The FCC fleshes out the particulars of a Congressional enactment through its rule-making process. Interested parties try to alter or temper statutory provisions while the agency is drafting and revising its proposed regulations. If resulting regulations are not to their liking, they may challenge them in court.

The FCC cannot arbitrarily waive any provision of the law. However, the agency may initiate, or consider a request for, waiving rules and regulations based on just cause. By arbitrating individual cases, the FCC establishes precedents for dealing with similar issues. The FCC can also adopt policy statements to deal with situations that are likely to recur. Though less formal rule-making, this method still requires the FCC to explain any variation or deviation from the policy.

On August 8, 1996, the FCC issued its First Report and Order implementing the local competition provisions of the 1996 Act. The Order sets forth the basic regulatory framework for competition in telecommunications. Disputes over various provisions have resulted in court challenges and delayed its implementation. The FCC has also commenced additional rule making to address issues related to state and local authority, pole attachments and access to public rights-of-way.

Courts

The role of the courts is to determine the legality, particularly the constitutionality, of provisions of the Communications Act and actions by the FCC. When telecommunications issues come before the courts, it is usually because a party appeals an FCC decision or policy. The United States District Court of Appeals for the District of Columbia hears the majority of FCC cases.

State Public Utility Commissions

Public utility commissions regulate investor owned electric, gas, water and telephone utilities. They regulate telephone rates as well as terms and conditions of service of local exchange carriers. State commissions often coordinate their activities with the FCC by participating in joint activities, such as the federal-state board currently reviewing the concept of universal service (covered earlier in this section).

Washington Utilities and Transportation Commission (WUTC) Requirements

To do business as a telecommunications company in Washington state, a company must register with the Washington State Utilities and Transportation Commission (WUTC). An applicant must demonstrate its financial and technical competency and provide its proposed tariff package. An attorney usually prepares the necessary documents, with the approval process generally taking 30 days. If a company shows that it is subject to effective competition, it can avoid many of the regulations on rates and services that apply to monopoly providers. According to Tony Cooke, spokesperson for the WUTC, a municipally owned utility is not subject to state rate regulation for the provision of voice and data service, nor is it subject to regulation if it acts as a transport provider or "carrier's carrier" per chapter 80.04.500 of the RCW (Application to Municipal Utilities). This same non-regulation applies to both voice and data transmission. Whether a municipal utility builds a competing network or re-sells another company's service, rate issues are handled at the local level.

City Councils and Municipal Legislative Bodies

State and local authorities have some jurisdiction over telecommunications, but it varies depending on the industry and issues involved. The federal government exercises little jurisdiction over fiber-optic cables. However, if the system meets the definition of a "cable television system," then it will be regulated as a cable television system. If the system operates as a common carrier, it is subject to regulation as a common carrier.

Cities have traditionally exercised jurisdiction over public rights-of-way, most prominently in franchising cable television operators. The 1996 Act grants local authorities primary jurisdiction over basic cable television rates in the absence of effective competition. In addition, the 1996 Act specifically affirmed local jurisdiction over wireless mobile services such as cellular telephones. However, the 1996 Act also limited local jurisdiction over satellite Earth stations and receiving antennas for TV and Multichannel Multipoint Distribution Service, sometimes referred to as "wireless cable."

The 1996 Act also reaffirmed the FCC's authority to preempt any state or local law, regulation or policy that constitutes a barrier to entry into the telecommunications market. This power is apt to be tested "repeatedly and aggressively."[11]

Federal - State Joint Board Recommendations

Universal Service
In November of 1996, the Federal-State Joint Board on Universal Service released a 422-page Recommended Decision on new universal service support mechanisms required by the 1996 Act. The FCC has until June 1997 to adopt universal service rules based on the Joint Board recommendations and public comments[12].

Private Internal Networks
Applying this definition, the Federal-State Joint Board recognized that private networks dedicated exclusively to internal communications are not telecommunications providers and are not subject to the 1996 Act's mandatory universal service contribution requirement.

Carrier's Carrier Networks
The Joint Board has not made a recommendation with regard to treatment of fiber that is provided to a third-party telecommunications carrier. There is a strong argument that the provision of fiber alone does not constitute the offering of telecommunications. As unpowered glass, dark fiber would appear to fall outside of the Act's definition of telecommunications as the transmission of information.

Information Services
The Joint Board concluded that information service providers and enhanced service providers are not telecommunications services and are not subject to universal service obligations. Under this interpretation utility automatic meter reading and other energy management systems using telecommunications networks would not be subject to federal universal service requirements. In addition, the provision of Internet services would also appear to be outside of universal service obligations.

Removal of State and Local Barriers to Competition

The 1996 Act provides that "no State or local statue or regulation, or other State or local legal requirement, may prohibit or have the effect of prohibiting the ability of any entity to provide any interstate or intrastate telecommunications service." The FCC is required to preempt the enforcement of any such statute, regulation or legal requirement. This provision contains two important exceptions:

a. A state may impose, on a comparatively neutral basis, requirements necessary to preserve and advance universal service, protect the public safety and welfare, ensure the continued quality of telecommunications services and safeguard the rights of consumers.

b. State and local governments may manage the public rights-of-way and require fair and reasonable compensation from telecommunications providers, on a comparatively neutral and nondiscriminatory basis, as long as the compensation required is publicly disclosed.

Cable Television Regulations

A variety of laws and regulations for cable television exist at the local level. Jurisdiction over cable television is generally split: the FCC focuses on access to content and other national issues while local agencies concentrate on residential service, access, and rates.

The local regulatory agency is called the "franchise authority." Local franchise authorities have adopted laws and/or regulations for subscriber service requirements, technical standards, public access requirements and franchise renewal standards for *basic* cable service. The 1992 Cable Act codified a regulatory plan allowing local and/or state authorities to select a cable franchisee and to regulate it. In addition, state laws deal with subjects such as franchising, theft of service, pole attachments, rate regulation and taxation.

The 1996 Act requires that no new cable operator may provide service without a franchise and establishes several policies for franchising requirements and franchise fees. The 1996 Act authorizes local franchising authorities to grant more than one franchise within their jurisdiction. However, a local franchising authority may not grant an exclusive franchise, and may not unreasonably withhold its consent from new service providers. Included in the grant of a franchise to a cable system are rights relating to the construction of the system, including use of public rights-of-way, easements, and areas to be served. In addition, the 1996 Act requires compensation to property owners who have suffered damages as a result of the cable operator's construction, operation, installation, or removal of cable television facilities.

Moreover, franchising authorities are required to ensure that access to cable service is not denied to any group of potential residential cable subscribers on the basis of income class. Although the 1996 Act also generally precludes the regulation of cable systems as common carriers, it authorizes the FCC, to require, if it chooses, filing of international tariffs for intrastate communications systems, other than cable service, that are provided by a cable system.

FCC Cable Television Requirements

Registration of a Cable System: Before beginning operation, a cable operator must send the following information to the Secretary of the Commission for each community to be served:

(1) The legal name of the operator, the entity identification, whether the operator is an individual, private association, partnership or corporation.
(2) The assumed name (if any) used for doing business in the community.
(3) Mailing address and telephone number to which communications are to be directed.
(4) The date the system provided services to 50 or more subscribers.
(5) The name of the community or area served and the county in which it is located.
(6) The television broadcast signals to be carried.
(7) A certification that the applicant is not subject to denial of federal benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988.
(8) For a cable system (or employment unit) with five or more full-time employees, statement of the proposed community unit's equal employment opportunity program.

An attorney is usually retained to prepare these federal applications.

Cable Rates for Service

Before the passage of the 1992 Cable Act, the FCC did not regulate rates for cable television service. Rates for basic cable service were regulated by local franchising authorities. In passing the 1992 Cable Act, Congress found rates for cable services had increased significantly following the 1984 Cable Act. Congress then directed the FCC to establish rules to govern rate regulation of cable service tiers offered by cable systems that are not subject to effective competition.

Tiers
Each service tier is regulated in a slightly different manner. Local franchising authorities are responsible for regulating the basic service tier. Until March 21, 1999, the FCC is responsible for regulating the cable programming tier. Both follow rules set by the FCC, which established a "benchmark" rate based on a number of factors, including the number of subscribers and number of channels. Pay-per-view and pay-per-program services are not regulated.

Exemptions
Small cable operators are partially or wholly exempt from rate regulation. A "small cable operator" includes any operator that serves fewer than 1 percent of all subscribers in the United States and that is not affiliated with entities that have gross annual revenues exceeding $250 million. In any franchise area where a "small cable operator" serves fewer than 50,000 subscribers, rate regulation does not apply to the operator's cable programming tier or to its basic tier if it was the only tier subject to regulation as of December 31, 1994.

Cable System Ownership
The FCC restricts the ability of television broadcast stations, national television networks, and wireless cable system operators to own or control interests in cable systems. These rules also restrict the ownership interest of cable operators and their ability to own or control video programming services. While there are no prohibitions on foreign ownership of cable television systems, foreign governments or their representatives may not own cable television relay stations.

Cable/Telephone Cross-Ownership Restrictions
The 1996 Act established various options for local exchange carriers to provide video programming to subscribers: common carrier transport, wireless cable, and open video systems. Before 1996, telephone companies were generally restricted from providing cable television service.

Cable/Wireless Cable (MMDS) Cross-Ownership
Commission rules and the 1996 Communications Act provisions generally preclude common ownership of a cable television system and a wireless (MMDS) system that serves the same area. Following passage of the 1996 Act, this restriction does not apply to cable systems subject to effective competition in the relevant franchise area.

Vertical Ownership Restrictions
To prevent large, vertically integrated cable systems from unduly favoring their affiliated programmers over non-affiliated program providers, the Commission imposes a 40 percent limit on the number of channels that can be occupied by video programmers affiliated with the particular cable system. In this context, vertical integration refers to common ownership

of both cable systems and program networks, channels, services or production companies. For purposes of determining common ownership, all interest of 5 percent or greater is recognized unless there is no possibility of such interest exerting control or influence over the system.

Technical Requirements
Horizontal concentration in the cable industry is based on the share of subscribers served by an individual cable operator through its ownership or control of local cable systems. The FCC adopted a 30 percent subscriber limit on the number of homes-passed nationwide that any one Multiple System Operator (MSO) can reach through cable systems in which that MSO has an attributable interest. A limit of 35 percent can be permitted provided that the systems are minority-controlled. These limitations were placed in order to prevent the control of local cable systems in the hands of only a few large operators and to limit the ability of MSOs to exercise undue influence in the program acquisition market. However, the District Court for the District of Columbia ruled in *Daniels Cablevision, Inc. v. United States,* 835 F. Supp. 1 (1993) that government mandated subscriber limits are unconstitutional under the First Amendment. In light of this ruling, the FCC has stayed the effective date of the subscriber limit rules until judicial resolution[13].

Technical Standards
In addition to establishing new standards for the delivery of color signals and of closed caption data, the FCC has generally preempted conflicting local standards regarding signal quality. Cable systems with fewer than 1,000 subscribers, as well as those serving rural areas may negotiate with their franchising authorities for certain lower standards.

Prohibited Frequencies
No cable television system may use a frequency at power levels equal to or exceeding 10 microwatts within 100 kHz plus tolerance of the emergency aircraft locator frequency 121.5 MHz or within 50 kHz plus tolerance of the distress signal frequencies 156.8 MHz and 243.0 MHz.

Use of Aeronautical Frequencies
The FCC's technical rules include standards to control signal leakage from cable systems. Any cable system, regardless of its size, which intends to use a frequency in the band 108 to 137 MHz or 225 to 400MHz above a power level of 100 microwatts, must first notify the FCC of its intention to do so before using these frequencies. Logging and leakage monitoring obligations are also imposed on operators using frequencies within the above bands. Cable systems using aeronautical frequencies must file a yearly report demonstrating compliance with these rules.

Microwave Frequencies
Cable systems sometimes transport signals over distances impractical to cross by coaxial cable through the use of microwave relay stations. Microwave systems are also used by cable operators for distribution of

signals within the cable system where it is impractical to run cable due to its cost or due to potential signal deterioration. Cable operators may purchase microwave relay service from companies providing such common carrier services, or they may operate their own relay stations licensed by the FCC as cable television relay service (CARS) stations. A license is necessary to operate a CARS station. FCC Form 327 must be filed for a license.

The rules for CARS stations also authorize licensing of mobile remote pick-up stations for the transmission of programming from the scenes of events outside a studio back to the cable studio or headend. In addition, they provide for studio-to-headend link stations.

Home Wiring

The FCC is currently considering how to harmonize its telephone and cable inside wiring rules in light of the evolving telecommunications marketplace the FCC will adopt rules in early 1997. Home wiring rules are intended to encourage competition between multichannel video services by allowing consumers who voluntarily terminate cable service to use the existing in-home wiring to receive a competing multichannel video delivery service such as direct broadcast satellite or cable service from a different company without the expense and inconvenience of installing new in-home wiring.

Under current FCC rules, when subscribers do not own the cable wiring within their homes voluntarily terminates cable service, the cable operator may leave the wiring in place and forfeit all right to the wiring, or may notify subscribers that it will remove the home wiring unless subscribers purchase the wire from the operator. If consumers decline to purchase the wiring, the cable operator may remove the wiring at no charge within seven business days. If the cable operator fails to remove the wiring within the seven day period, it forfeits its right to remove the wiring or restrict its use at any future time. The cable company must also pay for any damage done to subscriber homes while removing wire.

Compatibility Between Cable Systems and Consumer Equipment

Televisions and videocassette recorders have special features and functions that may not work when consumers are connected to cable services. The FCC has established rules to assure compatibility between home electronic equipment and cable television systems. These rules require cable systems that use scrambling technology to offer their subscribers supplemental electronic equipment that enables subscribers to use extended features such as "picture-in-picture" and timed recording. To meet such a requirement, the operator can offer to provide subscribers: (1) a single integrated device with dual descramblers, decoders, or timers and bypass switches or (2) two independent set-top devices that support similar functionalities.

The rules further provide that cable operators must offer subscribers the option of having all signals delivered directly to the subscriber's TV or VCR, without passing through a set-top device. Cable operators are required to provide supplemental equipment on the request of individual subscribers and may charge for equipment provided under these requirements.

Moreover, the rules prohibit cable operators from scrambling signals on the basic tier of cable service. This ensures that customers who have TVs and VCRs capable of tuning basic service channels are able to continue to receive service on those channels without a set-top device. Cable operators that employ set-top devices that incorporate remote control capability must permit such operation with commercially available remote control units. Upon a subscriber's request, a cable operator is allowed to disable the remote control functions of a subscriber's set-top box.

Additionally, the rules require that cable operators provide a consumer education program on compatibility matters to their subscribers. This information must be presented in writing and provided to consumers at least annually and when they first subscribe. This education program must alert subscribers that where a set-top device is used to receive service, subscribers may be prevented from using some of the special features and functions of their TVs. Subscribers must also be informed that certain TVs and VCRs simply may not be able to receive all of the channels offered by the cable system once they are connected. Information concerning compatible remote control units from other sources must also be provided as well as a list of compatible models of set-top devices.

Complaints, Investigations and Inquiries
Under the dual jurisdictional approach to cable television regulation, several important areas of regulation are administered by local franchising authorities rather than by the FCC. These include:

- Rates for basic cable service
- Installation fees
- Equipment and customer service (where the local authority has decided to regulate)
- Bills and billing practices
- Extension of cable service to individual homes and businesses
- Repairs
- Improper wiring
- Theft of service
- False or misleading advertising concerning the cable system's capabilities

Customers are urged to make their complaints by letter, directed to the local officials responsible for regulation of their cable system. All complaints regarding cable programming service rates must be filed with the FCC by a local franchising authority.

Requests for Special Relief

A cable system operator, broadcaster, franchising authority, and, under certain circumstances, individuals, may seek special relief or waiver of any rule relating to cable television. Requests are made by petition, including a filing fee, filed with the FCC. Requests for declaratory orders seeking FCC interpretation of a disputed question about the rules may be treated as petitions for special relief or rulemaking. Neither complaints related to mandatory carriage provisions, nor petitions for declaratory ruling are subject to a filing fee.

Show Cause Orders and Forfeiture Actions

In response to a petition or on its own motion, the FCC may issue and order to show cause or initiate a forfeiture proceeding. This action begins a proceeding similar to a civil suit or injunction. If the complainant prevails at the hearing, the FCC issues a cease and desist order, or a forfeiture.

Such petitions usually seek to remedy an alleged violation of the FCC's rules. A copy of the petition should be sent to the cable system operator and to other interested parties. It is possible, however, for an individual or group to join a cable system in opposing request for an order to show cause. Once all of the pleadings have been submitted, the FCC reviews the arguments and determines whether an order to show cause should be issued or a forfeiture proceeding should be initiated.

Rulemaking Proceedings

The FCC is continually is in the process adopting new rules or amending existing ones to ensure its regulations serve the public interest. Anyone may petition the FCC to adopt a rule at any time. If the FCC initiates a rule making proceeding, it issues a Notice of Proposed Rulemaking that invites public comment for a period of (usually) 30 days or more. A summary of the notice is published in the Federal Register.

Cable Customer Service Guidelines

Federal guidelines adopted by the FCC set minimum levels of service to provided by a cable operator. These guidelines address issues such as the cable operator's communications with customers over the telephone, installations, service problems, changes in rates or service, billing practices and information that must be provided to all customers.

Although the standards were issued by the FCC, local franchising authorities are responsible for adopting and enforcing customer service standards. Franchising authorities may also adopt stricter or additional standards with the consent of the cable operator or through state or municipal law.

The guideline summaries that follow are federal standards.

Subscriber Calls
Each cable system must maintain a local, toll-free or collect-call telephone line available 24 hours a day, seven days a week. During normal business hours, company representatives must be available to respond to customer inquires. After normal business hours, an answering machine may be used, but messages must be answered the next day. A call to a cable system must be answered, including the time the caller is put on hold, within 30 seconds after the connection is made. Also, cable system customers may receive a busy signal no more than 3 percent of the time. These requirements must be met 90 percent of the time, measured quarterly, under normal operating conditions.

Installation, Service Interruptions and Service Calls
Standard installations, which are those located up to 125 feet from the existing distribution system, must be performed within seven days after an order has been placed.

Except in situations beyond its control, the cable operator must begin working on a service interruption no later than 24 hours after being notified of a problem. A service interruption has occurred if picture or sound on one or more channels has been lost.

These requirements must be met 95 percent of the time, measured quarterly, under normal operating conditions.

Changes in Rates or Services and Billing Practices
Thirty days advance written notice must be given to subscribers and local franchising authorities of any changes in rates, programming services or channel positions, *if* the change is within control of the cable operator. Cable operators are not required to provide prior notice of any rate change that is the result of a regulatory fee, franchise fee, or any other fee, tax assessment, or charge of any kind imposed by a federal agency, state , or franchising authority on the transaction between the operator and the subscriber.

Cable system bills must be clear, concise and understandable, and fully itemized. Cable operators must respond to written complaints about billing matters within 30 days. Refunds must be issued no later than either the customer's next billing cycle or 30 days following resolution of the request, or upon the return of equipment when service is terminated.

Credits must be issued in the billing cycle following the determination that a credit is warranted.

Customer Information
Information that must be provided to customers at the time of installation and at least annually to all subscribers and at any time upon request includes:

- Products and services offered
- Prices and options of programming services
- Conditions of subscription to programming and other services
- Installation and service maintenance policies
- Instructions on how to use cable service
- Channel positions of programming carried on the system
- Billing and complaint procedures, including the address and phone number of the local franchise authority's office

Protection of Subscriber Privacy
Cable operators are generally prohibited from using their cable systems to collect personally identifiable information concerning any subscriber without the prior written or electronic consent of the subscriber. Cable operators may collect this information if necessary to provide cable television or other service to the subscriber or to detect unauthorized reception of cable communications.

Cable operators are generally prohibited form disclosing personally identifiable information without the prior written or electronic consent of the subscriber. Under certain circumstances, a cable operator may disclose information if necessary to provide a legitimate business activity related to cable television or other service provided to the subscriber. The operator may also disclose information pursuant to a court order authorizing the disclosure. Finally, the cable operator may disclose the names and addresses of subscribers, but the operator must first provide the subscriber the opportunity to prohibit such disclosure. Moreover, the cable operator must ensure the disclosure does not reveal, directly or indirectly, the extent of any viewing or other use by the subscriber.

Cable operators must provide subscribers access to all of their own personally identifiable information it must be made available at reasonable times and at a convenient place designated by the cable operator. Subscribers must have reasonable opportunities to correct errors in their information. Any person aggrieved by a cable operator's violation of these provisions may bring a civil action in a United States District Court.

Cable Signal Carriage Requirements

Every three years, each local commercial television broadcast station is given the option of selecting either: mandatory carriage: "must-carry" or Retransmission: "may-carry" for each cable system serving the same market. A must-carry station has a statutory right to a channel position.

Must-Carry Status
Generally, if a local commercial television station selects a must-carry status, it must be carried by every cable system serving that market. Each cable system with more than 12 channels must set aside up to one-third of its channel capacity for must-carry stations. For example, if a cable system has 60 channels, it must set aside up to 20 of those channels for must-carry stations.

May-Carry Status
If the local commercial television station has chosen retransmission content, the cable system may not carry the signal of that station without the station's prior consent.

Noncommercial Educational Television Stations
Each cable system must carry at least one local noncommercial educational station. Cable systems with more than 36 channels may be required to carry all local noncommercial educational television stations that request carriage.

Cable Access and Origination Channels

Access channels typically provide community-oriented programming, such as local news, public announcements and government meetings. They are usually programmed by the local franchising authority or local groups. These channels are often referred to as PEG channels for public, educational or governmental access channels or on commercial leased access channels.

Origination channels are usually programmed by the cable system and may include many types of specialized program packages. The FCC does not require cable operators to originate programming. Those who do are required to comply with program content rules.

Channels for Public, Educational, or Governmental Use
Under the 1984 Cable Act, local franchising authorities may require cable operators set aside channels for public, educational, or governmental (PEG) use. In addition, many franchising authorities may require cable operators to provide services, facilities, and equipment for use of these channels. In general, cable operators are not permitted to control the programming on PEG channels.

Cable operators may impose non-content-based requirements, such as minimum production standards and may also mandate equipment user training.

PEG channel capacity that is not in use for its designated purpose may be used to provide other services. Under certain conditions, a franchising authority may authorize the use of unused PEG channels to carry low-power television stations and local noncommercial educational stations that are required by law.

Leased Commercial Access

The statutory framework for commercial leased access was established by the 1984 Act and amended by the 1992 Cable Act. The 1984 Cable Act established leased access to assure access to the channel capacity of cable systems by parties unaffiliated with the cable operator who want to distribute video programming free of the editorial control of the cable operator. Channel set-aside requirements were established in proportion to a system's total activated channel capacity. Each system operator subject to this requirement was to establish the "price, terms, and conditions of such use which are at least sufficient to assure that such use will not adversely affect the operation, financial condition, or market development of the cable system."

The only exception to this set-aside provides that up to 33 percent of a system's designated leased commercial access channel capacity may be used for qualified minority or educational programming from sources that may or may not be affiliated with the cable operator.

Any person aggrieved by the failure or the refusal of a cable operator to make commercial channel capacity available or to charge rates as required by Commission rules may file a petition for relief with the Commission within 60 days of the alleged violation. The 1992 Cable Act provides for both judicial and Commission review of such disputes.

Program Content Regulations

Cable system operators generally make their own selection of channels and programs in response to consumer demand. The 1996 Act contains provisions designed to provide parents with increased control over programming coming into their homes. Section 504 requires a cable operator to fully scramble or block programming at a subscribers request at no charge. As a result of a June 1996 Supreme Court decision, cable operators may ban sexually explicit programming on leased access channels, but cannot ban such programming on public access channels.

Political Cablecasting

Once a cable system allows a legally qualified candidate for public office to use its facilities, it must afford "equal opportunities" to all other candidates for that office to use its facilities. Cable systems may not censor the candidates' material in any way, and may not discriminate between candidates. Cable systems may charge political candidates only the "lowest unit charge" of the system during the 45 days preceding a primary and the 60 days preceding a general or special election.

Personal Attacks
When an attack is made upon the honesty, integrity, or personal qualities of an identified person or group during origination cablecasting concerning controversial issues of public importance, the cable system must give the following to the person or group attacked within one week:

1. Notification and identification of the cablecast
2. A script, tape, or accurate summary of the attack
3. An offer of reasonable opportunity to respond over the cable facilities

Exempt are: attacks by political candidates and their associates on other candidates, including attacks made during bona fide newscasts, interviews and on-the-spot news coverage are exempt and attacks on foreign groups or foreign public figures are also exempt.

Public Editorials
Once a cable system carries an editorial endorsing or opposing a legally qualified political candidate, it must give opposing candidates the opportunity to respond. Within 24 hours after the political editorial, the cable system must give the opposing candidate(s) the following:

1. Notification and identification of the editorial
2. A script or tape of the editorial
3. An offer of reasonable opportunity to respond of the cable facilities

Lottery Information
Cable systems are generally prohibited from transmitting information or advertisements concerning lotteries. However, information about state lotteries is exempt.

Sponsorship Identification
This rule requires identification of the sponsor of any origination cablecasting that is presented in exchange for money, service or other "valuable consideration." All political spots must contain a visual sponsorship identification in letters equal to at least 4 percent of the screen height.

Commercial Limits in Children's Programs
Regulations in the Children's Television Act of 1990 restrict the amount of commercial matter that cable operators may cablecast on programs originally produced and broadcast primarily for children 12 years old and younger. No more than 10.5 minutes of commercial matter per hour during weekends and no more than 12 minutes per hour on weekdays is

allowed. Cable systems must maintain records available for public inspection that document compliance with this rule.

Cigarette Advertising
Advertisements for cigarettes, little cigars and smokeless tobacco are prohibited on any medium of electronic communication subject to the jurisdiction of the FCC.

Equal Employment Opportunity
The Communications Act of 1934 and the Commission's rules prohibit cable operators, satellite master antenna television systems serving 50 or more subscribers and multichannel video programming distributors (including wireless cable operators and certain satellite distributors) from discriminating against any job applicant or employee because of the person's race, color, religion, national origin, age or gender. The law also requires that these entities establish, maintain, and execute a continuing program to assure equal employment opportunity.

The FCC monitors compliance with equal employment opportunity rules on a yearly basis. Entities are subject to annual certification review that begins when six or more full-time employees are working. Form 395-A or 395M) are filed with the Commission by May 1st of each year.. In addition, the Commission conducts random on-site audits. These audits usually consist of interviews and a review of documents and employment practices at the main office or work site.

Cable Television Rules and Regulations
Every cable operator serving 1,000 or more subscribers is required by the FCC to have an up-to date copy of the Cable Television Rules and Regulations (47 C.F.R. Part 76 and 78) and to keep track of Commission actions that might alter the rules.

Cable Record Retention
The FCC requires cable operators to maintain various documents and records of their operations for inspection by the Commission, local franchising authorities and/or the public. These include a political file, sponsorship identification records, equal employment opportunity records, commercial records for children's programming, records demonstrating compliance with the FCC's leased access provisions, ownership records, the designation and location of the cable system's principal headend, and a list of broadcast television stations carried in fulfillment of the FCC's must-carry provisions.

Records required to be maintained primarily for inspection by the FCC or local franchising authorities include evidence of compliance with the FCC's technical standards, a current list of channels offered to subscribers, proof-of-performance test data, signal leakage logs and repair records, a copy of the FCC's cable television regulations, records of subscribers (aggregate information used for assessing fees), and records of subscriber complaints on signal quality

Public Inspection File

In addition to the above listed files, cable systems with 1,000 or more subscribers must maintain a public inspection file. This file must contain a copy of records to be maintained as part of the political file, sponsorship identification records, equal employment opportunity documents, commercial records for children's programming, leased access records, ownership records, required proof of performance test data, and required signal leakage and repair logs.

This file must be kept at the office that the system operator maintains for business purposes, such as the place where the operator ordinarily collects subscriber charges, or at any accessible place in the community served by the system (such as the public registry for documents or an attorney's office). The public inspection file must be available for public inspection at any time during regular business hours. Cable operators must also make copies of any materials in this file at the time of an in-person request. Operators are not required to honor requests by mail. A reasonable fee may be charged for photocopying, and requests must be fulfilled within a reasonable time not to exceed seven days.

FCC Cable Reports and Forms

The FCC uses a variety of forms for specific purposes. The following is a list of the most frequently used forms relating to cable television. Included in the appendix A are examples of three of these forms and a reference chart for fee payments.

Form 159 — FCC Remittance Advice Form: Accompanies any payment to the FCC (e.g. Regulatory Fees, Processing Fees, Fines, Forfeitures, Freedom of Information Act Billings). See appendix. A

Form 320 — Basic Signal Leakage Performance Report: Annual report of the results of signal leakage tests conducted by the operator. See appendix A.

Form 395A — Employment Report: Filed annually. See appendix. A.

Form 325A — Annual Report: Filed annually. To verify the accuracy of the information in a company's annual report.

Form 1200 — Setting Maximum Initial Permitted Rates for Regulated Cable Services Pursuant to Rules Adopted February 22,1994 - "First Time Filers Form": Used by operators the first time they file to calculate maximum permissible rate under the rules.

Form 1205 — Determining Regulated Equipment and Installation Costs "Equipment Form": Used to calculate allowable equipment costs. Generally, this form is filed with a Form 1200 and then on a regular basis.

Form 1210 — Updating Maximum Permitted Rates for Regulated Cable Services and Equipment –"Update Form": Updates the maximum permissible rate calculated using From 1200.

Form 1215 — Channel Offerings: Filed with Form 1200 and each Form 1210 to provide information on "a-la-carte" channel offerings.

Form 1220 — Cost of Service Filing for Regulated Cable Services: Used by operators who believe their costs exceed the rates they would be permitted to charge under Form 1200 or 1210.

FCC Reports and Forms (continued)

Form 1225 — Cost of Service Filing for Regulated Cable Services for Small Systems: Shows a streamlined cost of service by a small system, as defined in the Form, whose costs exceed maximum permissible rates.

Form 1230 — Establishing Maximum Permitted Rates for Regulated Cable Services on Small Cable Systems: Used by qualifying small cable systems owned by a small cable company form to set maximum permitted rates.

Form 1235 — Abbreviated Cost-of Service Filing for Cable Network Upgrades: Used to justify rate increases for significant network upgrades to improve services to regulated cable subscribers.

Form 1240 — Annual Updating of Maximum Permitted Rates for Regulated Cable Services: Used to adjust rates once a year to reflect reasonably certain and quantifiable changes in external costs, inflation, and the number of regulated channels that are projected for the 12 months following the rate change.

Additional Reporting Requirements (No Form Required)
Whenever a change occurs in a system's mailing address, operator legal name or operational status, the operator must notify the FCC within 30 days. The operator's legal name, type of operator, Employment Identity Number, mailing address, the nature of the operational status change, and the names of the communities affected and their FCC community unit identifier numbers must be included.

Endnotes

[1] Eric Glick, "What's up at the FCC?", *Cable World,* December 1996, p. 96.
[2] Harold K. McCombs, Jr. Esquire, *Current Legal Issues,* American Public Power Association (APPA), Orlando Florida, November 7-8, 1996.
[3] APPA, *Utilities Telecommunications Guidebook,* 1996. p. 65
[4] APPA, *Utilities Telecommunications Guidebook,* 1996. p. 66
[5] APPA, *Utilities Telecommunications Guidebook,* 1996. p. 66
[6] APPA, *Utilities Telecommunications Guidebook,* 1996. p. 66
[7] APPA, *Utilities Telecommunications Guidebook,* 1996. p. 67
[8] APPA, *Utilities Telecommunications Guidebook,* 1996. p. 67
[9] APPA, *Utilities Telecommunications Guidebook,* 1996. p. 68
[10] APPA, *Utilities Telecommunications Guidebook,* 1996. p. 121
[11] APPA, *Utilities Telecommunications Guidebook,* 1996. p. 75
[12] *UTC Information Bulletin,* UTC Legal/Government Affairs Department, November 18, 1996, p.1.
[13] *Cable Television Information Bulletin,* Federal Communications Commission Fact Sheet, October 1996, p. 21.

Overview

TELECOMMUNICATIONS ACTIVITY IN OTHER CITIES

A number of cities across the country have made efforts to create modern telecommunications infrastructures. Some have succeeded, some have recently begun to investigate their options, and others have withdrawn. None appear to be outright failures. Five themes have emerged from an examination of these cities:

1. *Smaller communities with experience in operating municipal utilities appear to be more likely to enter the telecommunications field than other communities.* The desire to facilitate new economic growth, keep money in local circulation, and provide alternative services at lower costs are common threads in Glasgow, Kentucky; Paragould, Arkansas; and Morganton, North Carolina. The strong influence of universities in Cedar Falls, Iowa and Blacksburg, Virginia was a significant force as well.

2. *A relative lack of local competition amongst telecommunications providers often prompts community telecommunications efforts.* With no one willing to voluntarily make the significant investment to serve them, many of these cities have taken on the task of soliciting infrastructure builders or creating infrastructure themselves. Harlan, Iowa, and Glasgow, Kentucky, are two small communities willing to take the risks and make the investment in a telecommunications infrastructure with the goal of attracting new business and enhancing the existing community.

3. *Determination and tenacity is a requirement.* Some of these communities have had to face large incumbent telecommunications corporations in protracted legal battles. Perhaps smaller communities have fewer distractions, allowing them to focus on telecommunications and there by compensate for their somewhat limited resources. Morganton, North Carolina had to fight a long court battle with a local cable provider before it could build its own system. On the other hand, fear of court battles caused Jefferson City, Missouri, to abandon its plans for a system.

4. *Public dissatisfaction with local incumbent telecommunications providers often prods communities to actively consider owning and operating their own system.* In both Morganton, Paragould, and Cedar Falls, strong citizen voter support for cities to own and operate their own telecommunications systems prevailed despite aggressive advertising campaigns by incumbents. Even when a community dropped out of the race with a competitor, customers still appeared to have often benefited through reduced rates, improved customer service, and additional cable channels from the incumbent operator.

5. *"First tier" cities are seeing some telecommunications competition.* First tier cities are likely to already be experiencing competition for services targeted at major business users, i.e., those taking service at T-1 levels or higher with a minimum monthly telecommunications expenditure of approximately $5,000. Even first tier cities are not yet experiencing significant competition targeted at small business or residential users located outside of the business core. Tacoma is viewed as a second tier city by telecommunications providers.

TELECOMMUNICATIONS ACTIVITY IN OTHER CITIES

Anaheim, California

Summary: The City of Anaheim Public Utilities Department is entering an agreement with SpectraNet International (SNI), a San Diego-based telecommunications network provider, to develop a public-private telecommunications system. This all-fiber optic system will be constructed by SpectraNet and financed through a private debt placement of between $270 million and $360 million beginning in late 1996, ending between 2002 and 2006.

Background: On January 9, 1996, following staff review of 19 responses to requests for proposals, Anaheim began negotiations with SNI to develop a public-private fiber optics "backbone" loop. This 50-mile loop[1] connects the utility's 10 electric substations and four water facilities. SNI plans to install new fiber from city facilities on the loop to neighborhood nodes, from which individual connections will be made to each customer[2].

Vital Statistics

Population:	290,712
Location:	Located in Orange County, 28 miles south of downtown Los Angeles.
Top industries:	Tourism and convention (Disneyland + 42 miles of coastline and beaches.)
Electric utility:	City of Anaheim, Public Utilities Department
Utility total no. of customers:	103,576
Telecommunications providers:	Pacific Bell
Cable TV providers:	Century Cable (formerly Multivision)

Key Elements:

- Creation of SpectraNet Anaheim, a wholly owned subsidiary of SNI, will construct, operate and manage a $200 million all-fiber telecommunications system.
- Funding would occur through private placements with institutional investors.
- Debt would be paid from system revenues and would not be an obligation of the city[3].
- Requirement for success: a 35 percent market penetration[4]. A preliminary survey indicates 65 percent of Anaheim businesses are interested in a new telecommunications system[5].

Anaheim, California (continued)

- New tax revenues resulting from the loop have been projected by SNI at about $114.1 million over the next 10 years. (Present value in 1995 dollars $78 million[6].)
- The SNI proposal includes plans for aggressive strategic marketing aimed at attracting and retaining customers.

Construction: SNI has proposed two separate construction phases with a projected completion date between 2002 and 2006:

PHASE IA, December 1996 - March 1997: Will serve up to 20 users, including some city users. Estimated private debt placement: $10 million[7].

PHASE IB, March 1997 - September 1998: Will provide service to approximately 6,000 government, commercial and industrial users within concentrated commercial areas of the city. Estimated private debt placement: $60 million - $100 million.

PHASE II, September 1998 - March 2002: Will provide service to the remainder of the city, including residential users and all remaining government users. Estimated private debt placement: $200 million - 250 million.

A spokesman said that the utility could only afford the cost of bringing fiber optics to all Anaheim homes and businesses because "SpectraNet believes that the cost of equipment is coming down."

It appears that Anaheim has created an environment that has encouraged a single competitive access provider to build the maximum amount of services possible. Providing service to the residences and small businesses in Phase II relies on SNI's aggressive assumption that the cost of optical equipment will plummet.

Austin, Texas

Summary: After two years of evaluating proposals, Austin chose CSWC (Central & Southwest Communications, Inc.) to build and operate a new municipal telecommunications network. Franchise negotiations and legislation developments are under way. The vendor will finance construction of the entire network.

Background: Because Austin is also negotiating new franchises with other providers, the city staff plans to develop ordinances for enhanced services that apply to all franchises, postponing completion of contract negotiations until the end of 1996.

Austin, Texas (continued)

Vital Statistics

Population:	514,000
Location:	Austin is the state capital of Texas, located 225 miles from the Mexican border, within 200 miles of San Antonio, Houston & Dallas.
Top industries:	University of Texas, Motorola, Austin Independent School District, City of Austin, IBM Corporation, and Dell Computer Corporation.
Electric utility:	City of Austin, Electric Utility Department
Utility total no. of customers:	291,421
Telecommunications providers:	Southwestern Bell
Cable TV providers:	Austin Cable Vision

The proposed network:

- A hybrid fiber-coax configuration with fiber rings branching off into neighborhood nodes initially serving 500 homes per node.
- Nodes are designed to be split as demand increases.
- CSWC's proposal is the least cost to Austin because CSWC will bear all costs of building, managing and operating the network.
- CSWC would operate under a franchise agreement with the city as Southwestern Bell and Austin Cable Vision currently do.
- CSWC will allow access to the network by Internet Service Providers.
- CSWC has committed to finance the construction of the entire communications network.

Blacksburg, Virginia

Summary: The Town of Blacksburg has joined with Bell Atlantic and Virginia Tech to create the Blacksburg Electronic Village (BEV). BEV is a non-profit organization that developed and administers a computer network over Bell Atlantic's infrastructure, linking businesses and residents to the Internet. Startup costs were essentially donated by Bell Atlantic and Virginia Tech.

Blacksburg, Virginia (continued)

Vital Statistics

Population:	35,000
Location:	In the heart of the Appalachian mountains in Southwestern Virginia, 40 miles south of Roanoke.
Top industries:	Virginia Tech University and manufacturing. 23,000 plus Virginia Tech students make up a large segment of the population. Major corporations include: Tetra Sales, Federal Mogul Corporation, and Cupp Tool
Telecommunications providers:	Bell Atlantic
Cable TV Providers:	Blacksburg Cable

BEV Details*:

- Total estimated number of users:17,000
- Schools with World Wide Web pages: all 20
- Businesses on BEV: 200
- Web "hits" per day: 120,000

* all numbers approximate

Purpose: BEV's purpose is to link the entire town with a 21st century telecommunication infrastructure. Those who do not own computers can have an electronic address with access provided through public library terminals. Education is the primary goal of the project: educating the community about what it means to be connected, educating the telecommunications provider about how best to offer data connectivity and educating the services provider (BEV staff) on the best way to offer Internet services. The next major goal of the project is to begin replicating the commercially proven parts of the project so they can be implemented in other locations within Bell Atlantic's service area.

Cedar Falls, Iowa

Summary: Cedar Falls has built a system that will allow it to reach every resident and business in the city with voice, video and data services. The city offers cable TV, business fiber optic links, and cable modem services.

Cedar Falls, Iowa (continued)

Vital Statistics

Population:	34,000
Location:	North Central Iowa, primarily a rural and university population. Adjacent to Waterloo, Iowa (population 60,000).
Top Industries:	John Deere Mfg., University of Northern Iowa, health care, school district and various government agencies.
Electric Utility:	Cedar Falls Utilities
Utility total no. of customers:	14,891
Telecommunications providers:	U S WEST
Cable TV Providers:	TCI, Cedar Falls Utilities

Background: In October 1994 the citizens of Cedar Falls voted 71 percent in favor of forming a municipal communications utility in addition to its existing electric, gas and water utilities. The utility has since built a hybrid fiber coax system that enables it to provide video, voice, and data services to every resident and business in Cedar Falls. The hybrid fiber coax system currently provides service to 45 percent of the homes it passes.

Key elements:

- The system extends fiber optic cable from a control center to neighborhood nodes, from which coaxial cable is extended to 500 to 800 homes per node.
- For larger customers, the city has started providing links between remote facilities, enabling customers to interconnect their networked office and home computers. For example, the utility has built a fiber span of some 12 miles to provide an interconnection between the National Guard armory and the Iowa Communications Network.
- In January 1996, the utility added cable TV service and currently has 4,000 subscribers despite the presence of a TCI system serving the same area.
- The Cedar Falls Utility system also has sufficient capacity for telephone service, though the exact type of service is still under consideration. Data transmission is also a top priority. The city has plans to examine these two priorities in detail after the first of the year (1997).

SPECIAL NOTE – Iowa State-Owned Network: Iowa is already broadcasting college courses on a state-owned fiber network designed and built by MFS Network Technologies ($73.7 million bid in 1987[8]). Iowa was concerned about declining farm employment and thought the network would encourage technological development. The existing long-distance and local telephone providers apparently had little interest in providing such services to sparsely populated regions. The next phase is to tie the network to every county, Iowa's three universities, 15 community colleges, 11 private colleges, eight public television stations, all major state government offices, 351 high schools, and more than 500 public libraries.

Glasgow, Kentucky

Summary: Glasgow has operated its own coaxial cable telecommunications system for about six years and today has 2,500 Cable TV subscribers — a 60 % market share — despite intense competition from Scripps Howard Cable, the incumbent local provider[9].

Vital Statistics

Population:	14,000
Location:	A rural community in South Central Kentucky, west of the southern Bluegrass section of the state.
Top industries:	Primarily agricultural and lumber-based industries.
Electric utility:	City of Glasgow, Glasgow Electric Plant
Utility total no. of customers:	6,282
Telecommunications providers:	Glasgow Electric Plant, GTE
Cable TeV Providers:	Glasgow Electric Plant, Scripps Howard Cable (Telescripps)

Background: Glasgow was taken to court repeatedly by the incumbent cable operator, Scripps Howard Cable, but prevailed in each case. Failing to prevent competition with legal means, Scripps Howard Cable then lowered rates in Glasgow to $5.95 per month at a time when nationwide cable rates averaged about $20 per month. Glasgow Electric Plant countered by positioning their service as the "Cadillac of cable vs. their Yugo" and by pricing its basic cable service at $13.50, according to William J. Ray, chief executive officer. Today, the public utility serves 2,500 subscribers — a 60% market penetration. The system includes phone service, cable TV and access to the city-wide Novell Network (which includes residential and business access to the Internet.)

Costs:

Initial construction of the high-speed data (broadband) network — $1.5 million.

Construction of 120 miles of high-speed data (broadband) plant cost $12,000 per mile.

Adding cable television service -- $1.3 million. This included:

- A cable TV control center (headend)
- Antenna towers and earth stations
- Purchase of cable television computers, converters, and other hardware and software. The telephone initiative required an expenditure of approximately $500 per telephone line served.
- The community-wide computer network requires purchasing a $300 card to go into a home PC or file server linked to the network.

Glasgow, Kentucky (continued)

Project Goals:

1. Keep money in local circulation to support the retail economy.
2. Provide the citizens of Glasgow with modern, sophisticated cable television service controlled locally and operated on a not-for-profit basis.
3. Provide alternative telephone service with low-cost access to long distance lines for business and industry in Glasgow.
4. Facilitate new economic growth by enabling commerce to take place through the movement of information instead of the movement of automobiles.
5. Reinvent the municipal electric utility in the form of a "technology utility."

Challenges:

- *Combining* cable television and data communications on one medium.
- *Cross-training* staff to implement new services after a 30-year history of providing only one service.
- *Anti-competitive practices of other local cable operators.* According to CEO Ray: "The largest obstacle, by far, we have faced has been the greed of the cable television operators. Our local incumbent cable operator, in concert with other cable operators nationwide, declared war on this project from the first time it was mentioned in 1987. The weapons they brought to bear included litigation and a willingness to spend any amount of money necessary to make Glasgow's project unsuccessful so they could use it as an example for the many other communities that might be interested in replicating the project."

Grosse Point Communities of Michigan

Summary: Grosse Point had its own cable system but, faced with increasing competition and an expensive rebuild, sold the system in 1994.

Vital Statistics

Population:	50,000 (total of all communities)
Location:	A Great Lakes suburban community located northeast of downtown Detroit, it covers about 11 square miles. The entire eastern boundary is Lake St. Claire, a 400-square-mile body of water that forms a link in the waterway between Lake Huron and Lake Erie.
Top industries:	None - This is a long-established, upper-income suburban cluster of communities.
Telecommunications providers:	Ameritech
Cable TV providers:	Comcast

Grosse Point Communities of Michigan (continued)

Background: Grosse Point is actually five separate municipalities with five separate governments but one central school district. The communities are:

Grosse Point Shores pop. 2,955
Grosse Point Woods pop. 17,715
Grosse Point Farms pop. 10,092
Grosse Point City pop. 5,681
Grosse Point Park pop. 12,857

The Grosse Point communities decided to sell their municipally owned cable system to Comcast in 1994 primarily because they did not want to make the $7.5 million investment ($460 per subscriber) required to upgrade the 10-year-old system. A spokesperson made it clear that the system was *not* a financial burden. In fact, it was "profitable — not a big impact on revenues, but sufficient." Looming competition plus the increasing complexity of the cable business as it pushes into telephone and data-based services prompted municipal officials to reconsider their involvement in the business[10]. When sold, the system offered only basic cable. The communities also found it difficult to get programming upgrades (adding channels), making the system much less competitive and generating subscriber complaints. The system was sold for approximately $32 million, or roughly $2,000 per subscriber.

Note: Grosse Point municipalities were mentioned in a TCI letter to the Tacoma City Manager as an example of a municipally owned cable television system sold because capital requirements and operating burdens have far exceeded projections. See appendix.

Harlan, Iowa

Summary: Harlan Municipal Utilities (HMU) is developing a hybrid fiber/coax broadband communications network. The system was designed by Stanley Consultants, Inc., of Muscatine, Iowa[11]. The system will allow HMU to offer a broad range of sophisticated services such as satellite and local television programming, pay-per-view and on-demand programming. The system will also offer Internet access, computer networking, interruptible utility rates and demand-side management, telephone, telemedicine and distance learning[12]. Harlan hopes to attract and retain industries by offering the telecommunications and cable services necessary to compete in the global marketplace.

Harlan, Iowa (continued)

Vital Statistics

Population:	6,827
Location:	A small, rural community, the county seat of Shelby County in Western Iowa. Characterized by declining population and little growth in personal income.
Top Industry:	Primarily agriculture
Electric Utility:	Harlan Municipal Utilities
Utility total no. of customers:	2,701
Telecommunications providers:	U S WEST
Cable TV Providers:	Farmers Mutual Coop Tele Co.

System goals:

- Significantly defer peak load demand for electric service with a residential load management system.
- Develop a municipal communications utility to provide Cable TV service.
- Use remote diagnostic and programming capabilities of substation distribution relays and Supervisory Control and Data Acquisition (SCADA) to improve utility efficiency.
- Develop a metropolitan area network to provide "last-mile" connectivity at an affordable cost.

System details: Harlan's city-wide network supports high-speed connectivity between multiple individual users and local area networks. Harlan Municipal Utilities would also like to provide customers with quick access to the Internet and World Wide Web.

Funding: The city has chosen a three-pronged approach to fund the project. Developing the fiber backbone, Supervisory Control and Data Acquisition (SCADA), substation integration and demand-side management was undertaken as improvements to Harlan's electric department facilities and operations. A combination of Harlan Municipal Utilities cash on hand and loans from a local bank funded the Cable TV control center and communications utility development. The development of the Metropolitan Area Network was made possible through a coalition of community partners committed to securing the future of Harlan.

Jefferson City, Missouri

Summary: In 1990, Jefferson City appointed a task force to explore building a $2 million cable TV system to compete with the incumbent cable television provider, TCI. The task force stressed that the city should be a facilitator rather than an operator[13]. Fearful of court battles and financing problems, Jefferson City abandoned its plans.

Jefferson City, Missouri (continued)

Vital Statistics

Population:	37,000
Location:	Primarily a rural community—the closest metropolitan area is St. Louis (100 miles).
Top industries:	Agriculture, state and county government.
Electric utility:	Union Electric
Telecommunications providers:	Southwestern Bell
Cable TV Providers:	TCI

Morganton, North Carolina

Summary: Morganton built its own cable system after refusing to renew the franchise of a local provider. A court action arguing that the city should be prohibited from entering the cable market went to federal district court which ruled for Morganton. Today the city serves about 5,800 subscribers.

Vital Statistics

Population:	15,085
Location:	A small, primarily rural community
Top industries:	Agriculture
Electric utility:	City of Morganton, Department of Electric Utilities
Utility total no. of customers:	7,343
Telecommunications providers:	BellSouth
Cable TV Providers:	TCI (although franchise has not been renewed)

Background: In 1985, Morganton refused to renew the cable television franchise of Madison Cablevision, a subsidiary of TCI. In addition, area residents voted by more than 2 to 1 to allow the city to own and operate a local cable system[14]. A court battle ensued in 1995 when Morganton concluded that Madison/TCI's past performance did not warrant renewal and their plans would not meet Morganton's future needs[15]. Morganton then ordered the cable TV operator to remove its cable television system from the public rights-of-way[16].

Morganton, North Carolina (continued)

Madison's Suit: Madison/TCI Cablevision filed a lawsuit in federal court arguing that Morganton's actions violated:

- The first amendment, equal protection and due process clauses of the U.S. Constitution.
- Federal and state antitrust laws.
- The existing franchise and interfered with the company's contractual relations with subscribers.
- The North Carolina Constitution, which the company claimed prohibited the city from entering the cable business, because cable does not serve a "public purpose"[17].

Court Findings: In December 1989, the North Carolina Supreme Court ruled that Morganton's actions **did not** violate any state antitrust laws and that the city could enter the cable television business.

The case then went to federal court and a federal district judge rejected all Madison/TCI's claims — *Madison Cablevison v. City of Morganton SH-C-86-5 (W.D.N.C. May 11, 1990).* Court documents showed that Madison/TCI had spent more than $140,000 on lobbying efforts, which seemed excessive since the franchise served only 4,500 households and had revenues of about $1.3 million annually[18]. The federal court:

- Refused Madison/TCI's demand that the city issue more than one franchise based on evidence showing that the rights-of-way could not support two cable systems.

- Refused Madison/TCI's claim that the city was required to renew its franchise. The judge ruled that the city had the right to deny renewal in order to obtain a system with the channel capacity to provide the services it needed[19].

- Rejected Madison/TCI's claim to have a right to investigate the motives of city council members. That decision is significant for other cities, experts say, because such an investigation can add significantly to the cost of defending a lawsuit[20].

Morganton's System: According to Morganton City Manager Mike Cronk 1996 was the first year the system was profitable since its completion in 1993. It is a fiber-to-the-feeder system, with some fiber direct (to eight major government buildings) and fiber-to-nodes for residential areas. Fifty channels are included in basic cable at a cost of $23.75 per month.

Omaha, Nebraska

Summary: In December 1993 the Federal Communications Commission granted US WEST permission to deliver interactive multimedia to 2,500 subscribers with plans to reach more than 50,000. US WEST also planned similar multimedia networks in parts of Denver, Minneapolis-St. Paul, Salt Lake City, Boise and Portland, Oregon, but later backed away from those cities until the conclusion of Omaha's market trial. In March 1996, US WEST canceled the Omaha trial because it was too expensive and did not work. It was not "...quite ready for prime time,"[21] said a US WEST spokesperson. US WEST would not reveal costs or go into detail on any "technical snafus."[22]

Vital Statistics

Population:	342,465
Location:	Metropolitan area with 37,100 people employed in manufacturing.
Top industries:	AT & T Network Systems, First Data Resources (credit card processing), Mutual of Omaha, Methodist Health Systems, Union Pacific Railroad.
Electric utility:	Omaha Public Power District (OPPD)
Telecommunications providers:	US WEST
Cable TV Providers:	Cox Communications

The Internet in Omaha: Omaha has a corporate-sponsored Internet Community Network called Omaha Free-Net. It is actually a service of KVNO-FM, at the University of Nebraska in Omaha. Other financial sponsors include MFS, The Corporation for Public Broadcasting, Digital Equipment Corporation, and US WEST. Access to the World Wide Web is available free of charge for a 30-minute session to anyone accessing Omaha Free-Net by modem.

Orangeburg, South Carolina

Summary: In 1992 the voters of Orangeburg voted to authorize the city to build and operate a cable television system. After a lengthy court battle, the South Carolina Supreme Court ruled that the city did not have the authority to engage in cable operations, saying that such operations were *recreational* and not *essential*. Orangeburg did build a fiber optic network to serve utility substations. The city does not consider the cable TV issue closed and may pursue it again in the near future.

Orangeburg, South Carolina (continued)

Vital Statistics

Population:	13,179
Location:	Rural community, the closest metropolitan area is Columbia (47 miles).
Top Employers:	Agriculture, Orangeburg County, United Parcel Service.
Electric Utility:	City of Orangeburg, Department of Public Utilities
Utility total no. of customers:	21,472
Telecommunications providers:	BellSouth
Cable Television Providers:	Jones InterCable

Note: Orangeburg, South Carolina was mentioned in a TCI letter to the Tacoma City Manager as an example of a completely inadequate cable "overbuild" plan. See appendix

Palo Alto, California

Summary: In May 1995 Palo Alto authorized a consulting firm, ICT Group, to begin a five-phase study to create a city telecommunications strategy. The overall recommendation was for the electric utility to develop a fiber optic ring around the city.

Vital Statistics

Population:	56,000
Location:	San Francisco Bay region (Silicon Valley).
Top industries:	Stanford University, high technology firms.
Electric utility:	City of Palo Alto Electric Utility
Utility total no. of customers:	27,383
Telecommunications providers:	Pacific Telesis

Background. The first three phases of the ICT Group's study have been completed. Some $91,000 had been spent on the study as of the fall of 1996. City staff recently recommended a telecommunications strategy to the city council that requires the electric utility to develop a fiber optic ring around Palo Alto. The recommendations include:

Palo Alto, California (continued)

1. Amending a budget ordinance to use almost $2.1 million from the Electric Rate Stabilization Reserve to fund Electric Utility development of a fiber optic ring co-located in conduit and on poles with existing utilities' communications lines.

2. Keeping commercial telecommunications assets separate from the Electric Fund rate base on which General Fund Transfers are calculated.

3. City staff is currently developing policy guidelines for the use of public rights-of -way for telecommunications infrastructure development[23]..

Paragould, Arkansas

Summary: Paragould built its cable system in 1991 and weathered a court challenge by the incumbent cable operator after the incumbent began losing subscribers. The court case went as far as the U. S. Court of Appeals, which affirmed Paragould's right to operate its service. Today, the system has 4,600 subscribers.

Vital Statistics

Population:	18,540
Location:	Northeast corner of the state, 90 miles from Memphis.
Top industries:	A mixture of agriculture (primarily rice cultivation) and industry (principally light manufacturing).
Electric utility:	Paragould City Light, Water & Cable Commission
Telecommunications providers:	Southwestern Bell
Cable TV Providers:	Paragould City Light, Water & Cable Commission, Paragould CableVision Inc.

Background: In 1991, the city of Paragould built and began operating its cable system with $3.2 million raised through municipal bonds. With 3,000 subscribers, the system was in direct competition with the privately owned system, Paragould Cablevision Inc., owned by New York-based Cablevision Systems. When Paragould Cablevision Inc. subscriptions fell from about 6,200 to 5,000, PCI sued the city in federal district court[24].

Paragould, Arkansas (continued)

PCI alleged the city was trying to monopolize the cable market by subsidizing its system with revenues from the city-owned electric utility — a violation of anti-trust law. PCI also said the city had violated its First Amendment rights. The district court dismissed the claims and the U.S. Court of Appeals affirmed.

System Specifics:
Subscribers: 4,600 subscribers with up to four new subscribers each month.

Costs: Homeowners pay approximately $30 per year in property taxes to support programming costs and improvements to the system. The cost of basic cable is $12.50 a month and there are no installation charges.

Other Details (Provided by Ronda Davis of Paragould Water & Cable):

- Paragould's mayor and city council were very strong supporters of the municipal system.
- At the last minute, financing was almost withdrawn due to the lawsuit filed by PCI.
- The project would have failed if the underwriter had not taken a risk and bought the bonds pending litigation.
- Local TV stations and newspapers, also owned by New York - based Cablevison Systems ran editorials and articles opposing the city system.
- As a result of competition, the incumbent's customer service improved substantially and rates were cut *by more than half.*

Note: Paragould, Arkansas, was mentioned in a TCI letter to the Tacoma City Manager as an example of a city that did not "generate the number of customers it had hoped." See appendix

Portland, Oregon

Summary: The local electric utility plans to build a fiber-optic telecommunications network. No evidence of direct municipal involvement in telecommunications infrastructure activities was found.

Vital Statistics

Population:	1.7 million
Location:	Northwestern Oregon, where the Columbia and Willamette rivers meet.
Utility companies:	Portland General Electric, Northwest Natural Gas Co., Pacificorp
Telecommunications providers:	U S WEST, Electric Lightwave, Inc., MCI Metro, TCG
Cable TV providers:	Paragon, TCI

Portland, Oregon (continued)

Background: Portland General Electric Corp. (PGE) plans to build a $10 million, 135-mile fiber optic telecommunications network around Portland and its suburbs. A loop to suburban Beaverton has already been installed with two additional loops to be built in 1997 with a third to follow later. PGE plans to offer voice, data, and multimedia communications. PGE has formed a subsidiary, FirstPoint Communications, for the venture. PGE's chief financial officer, Joe Herko, stated that "to be the best in competitive energy services will involve sophisticated telecommunications capability."[25]

Before PGE can begin outright competition, permission from the Federal Communications Commission and the Oregon Public Utilities Commission must be granted. Until then, PGE will lease capacity to wholesale clients, potentially including rival telecommunications companies such as ELI that already offer local phone service.

San Antonio, Texas

Summary: City Public Service , a municipal electric and gas utility has constructed 60 miles of a 306-mile fiber optic utility backbone network. City Public Service plans to lease dark fiber to IntelCom Group, a competitive access provider. City Public Service and IntelCom Group must first face a legal battle with Southwestern Bell, which claims this project violates a Texas state law preventing cities from providing telecommunications systems, either directly or indirectly. The Texas Utilities and Transportation Commission has appealed to the Federal Communications Commission on the city's behalf[26]. The legal action has not stopped City Public Service from continuing to build out fiber. City Public Service is also leasing radio tower space to personal cellular system providers. City Public Service's additional future plans are on hold pending a decision from the Federal Communications Commission.

Vital Statistics

Population:	999,000
Location:	San Antonio is the ninth largest city in the United States. Located in South Central Texas, it is rated number one for tourism in Texas. Five military installations: Fort Sam Houston and Kelly Lackland, Randolph and Brooks Air Force bases.
Top industries:	United Service Automobile Association (Insurance), H.E.B. Food Stores (supermarket chain), West Telemarketing, SBC Communications Headquarters (Southwestern Bell).
Electric Utility:	City of San Antonio Public Service
Utility total no. of customers:	501,981
Telecommunications providers:	SBC (Southwestern Bell), IntelCom

San Bruno, California

Summary: The City of San Bruno has successfully operated a municipal cable television system since 1970. San Bruno's most recent major system upgrade was in 1985. Following a recent study performed by SRI International, San Bruno is planning to upgrade its system to an hybrid fiber coax system by the end of 1997, adding fiber optics and new coaxial cable. San Bruno is exploring potential partnerships that would enable it introduce new services such as Internet access and telephone service.

Vital Statistics

Population:	41,000
Location:	Bay-area city.
Top industries:	12 manufacturing plants, the GAP (headquarters), Sears & Roebuck, Skyline Community College, US Postal Service, Artichoke Enterprises (gambling establishment).
Electric & gas utility:	Pacific Gas & Electric
Telecommunications providers:	Pacific Telesis
Cable TV providers:	San Bruno Municipal Cable Television since 1971. 11,970 current subscribers.

San Diego, California

Summary: The City of San Diego, through its data processing and telecommunications systems non-profit subsidiary, the San Diego Data Processing Corporation, recently requested proposals for a strategic partnership to design, construct, implement and operate an advanced telecommunications network. Eight proposals were received in January 1996 and after review it appeared that none of the proposals was fully responsive to the request. The evaluation team has recommended that a new request be issued for a community services network interconnecting city, county and other governmental entities, including educational institutions.

San Diego, California (continued)

Vital Statistics

Population:	1,152,000
Location:	San Diego is the sixth largest city in the nation. Since 1980, the population has increased by approximately 23,000 annually.
Top industries:	San Diego's population and employment growth rates are correlated to national economic cycles and are sensitive to military spending. Consequently, in the past few years employment in defense-related industries decreased rapidly. Tourism (service sector employment) remains strong.
Electric utility:	San Diego Gas & Electric
Telecommunications providers:	Pacific Telesis, MCI Metro
Cable TV providers:	Cox Communications

Background — why proposals were rejected: The following organizations responded to the request for proposals: Cox Communications, IBM Corporation, IDM Satellite Division, InfoStructure, International Communications Services , Inc., Pacific Telesis, Siemens Rolm Corporation, and SpectraNet International.

Some proposals called for a private virtual network. These proposals focused on providing the services needed to support a wide area network but did not include details on infrastructure within city facilities and day-to-day operational support for the entire network.

Other proposals called for a regional telecommunications network[27]. Two of the proposals were eliminated after the initial oral presentations. According to the evaluation team, none of the three remaining proposals fully satisfied the objectives of creating partnerships to establish a region-wide, open, switched, digital broadband network that would provide full connection to all residences, businesses and institutions within the San Diego region.

Pacific Telesis and SpectraNet International's proposals did not offer sufficient partnership opportunities with the city[28]. The proposal by SNI came closer but posed potential risk to the city and would have taken a long time to deploy. Also, full deployment was not assured, since the build-out after the initial phase depended on the financial success of the project's early stages. This is also SpectraNet International's strategy in Anaheim.

San Diego, California (continued)

Starting Over: The evaluation committee finally recommended that the city, in conjunction with the County of San Diego issue a new request for proposals for a community services network to interconnect city, county and other governmental entities, including educational institutions.

An environment of intense competition exists in San Diego, which faces the same problems of many other cities its size — a need to interconnect government, educational and community facilities with its citizens and businesses. In evaluating the proposals, it became apparent to the city that the incumbent telecommunications providers are not willing to meet this need. Although verbal commitments have been made by these carriers and cable providers, without a substantial financial commitment from the city, the commercial providers are not likely to invest in comprehensive public interconnection.

Seattle, Washington

Summary: The City of Seattle and TCI have signed a 10-year, non-exclusive franchise agreement for renewal of TCI's cable television franchise, which calls for a $43 million rebuild of TCI's cable system. Seattle has also signed a 10-year cable television franchise agreement with Summit Cable, a much smaller company.

Vital Statistics

Population:	531,400
Location:	Seattle is located on the Puget Sound, 113 miles from the U.S. - Canadian border.
Top industries:	Aircraft manufacturing (Boeing), advanced technology biotechnology, wood products, transportation equipment, food products, fish processing and apparel design.
Electric utility:	Seattle City Light
Utility total no. of customers:	333,625
Telecommunications providers:	US WEST, MFS, Electric Lightwave Inc., MCI Metro
Cable TV Providers:	TCI (138,000 subscribers) and Summit Cable

Seattle, Washington (continued)

Key Elements of the Agreement

TCI Will:

- Rebuild the system, estimated by TCI to take up to 36 months and cost more than $43 million.
- Expand programming ability with an initial bandwidth of 750 megahertz, nearly doubling the number of channels available.
- Configure the system so it can also be upgraded through digital compression technology to 500 channels with interactive capability.
- Provide cable subscribers access to the Internet through the cable system. Seattle will be one of the first test sites for high-speed Internet access by cable. A trial involving up to 300 homes, schools and libraries is expected in late 1996 — early 1997. If successful, TCI will offer the service within its Seattle franchise areas. TCI will continue providing free cable hook-ups, cable programming and educational services to all schools in its Seattle service areas.
- Provide up to 10 public access channels, more than three times what is available today. At least six of those channels will be for educational access purposes.
- Pay the maximum 5 percent franchise fee allowed by federal law.

The new franchise agreement is expected to result in a rate increase of about 19 cents per month for basic service subscribers and about 56 cents per month for the average subscriber.

The City of Seattle and Summit cable also signed a 10-year non-exclusive franchise agreement closely resembling TCI's. However, Summit's service area is much smaller — serving only Beacon Hill and the Central District. This agreement also covers Internet access, although there is no mention of providing high-speed access or any trial period. It simply states that if Internet access is offered, it will be as a "premium service."

Seattle is served by a number of competitive access providers that target service to business in its economically vibrant downtown.

Tacoma, Washington

Summary: Once associated with heavy industry, Tacoma is now developing its traditional commercial market center and its international cultural and trading connections throughout the Pacific Rim. The landmark effort to rebuild the urban shoreline along the Thea Foss waterway will influence how the city's neighborhoods and commercial areas will be defined. Tacoma possesses a strong tradition of local ownership of utilities and a need for economic development. Tacoma is a large community, but a second-tier city in the eyes of telecommunications providers.

Tacoma, Washington (continued)

Vital Statistics

Population:	184,500
Location:	A Pacific Northwest port city located on Puget Sound. Two thirds of Tacoma's city limits are shaped by shoreline.
Top industries:	Primarily timber-based and manufacturing industries, the city is shifting to a local economy based on trade, services and information.
Electric utility:	Tacoma Public Utilities
Utility total no. of customers:	135,855
Telecommunications providers:	US WEST
Cable TV Providers:	TCI

Tallahassee, Florida

Summary: Tallahassee has a unique community-wide electronic information system called "Tallahassee Free-Net." It is a non-profit organization that administers a community-wide computer network. It exists because of donations of computer equipment and money from sponsors and users. Basically an Internet access service, Tallahassee Free-Net offers both local information and global networking services via the Internet.

Vital Statistics

Population:	250,000
Location:	Tallahassee is the capital of Florida, located in North Florida, 30 miles inland from the Gulf of Mexico. Tallahassee is a metropolitan area with a largely professional and white collar work force.
Top industries:	State government and education
Electric utility:	City of Tallahassee, Electric Department
Utility total no. of customers:	84,233
Telecommunications providers:	BellSouth, Sprint-Centel Florida
Cable TV Providers:	Comcast Cablevision

Endnotes

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[2] Telecommunications Policy Advisory Committee, p. 5.

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[26] *UTC Information Bulletin*, UTC Legal/Government Affairs Department, October 8, 1996. p. 2.

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[28] *Findings and Recommendations of the Evaluation Committee for the Telecommunications Infrastructure RFP*, p. 5.

Telecommunications in the Greater Tacoma/Pierce County Area

Summary

Building on background information about the broader telecommunications industry, this study turns its focus upon the local telecommunications environment. To put today's events in perspective, the first section provides a quick review of the history of telecommunications and utilities in this area.

The study then reviews in more detail the existing telecommunications providers that serve our communities, the telecommunications infrastructures that they employ, and their latest announcements of future plans for this area.

The next section provides a quick overview of the changing local regulatory picture and some of the difficult problems faced by local jurisdictions as they participate in the evolving telecommunications environment.

A review of telecommunications in our local communities analyzes both the residential and business markets for telecommunications services as they stand today. A discussion of how different economic futures are impacted by telecommunications concludes the section.

The role of telecommunications infrastructure and services in economic development is a topic of considerable interest. In order to put the local situation in perspective, the following pages discuss some of the economic development ramifications of telecommunications. This piece was authored by Professor Bruce Mann, Ph.D. with the Department of Economics at the University of Puget Sound; and Peggy sue Heath, A.B.D., with APEX Business Solutions. They conduct an interesting examination of the key role that telecommunications has begun to play in economic development, and what the future might hold for communities that create a communications infrastructure.

Telecommunications and Economic Development

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The Railroad of the 21st Century

There was a time when the simple act of drawing a line on a map could either create a community or force a town into obsolescence. Those were the days of railroad planning. To have access to the rail line meant a chance at prosperity as a "railroad town." Without access, a town would have an uphill battle to be involved in the growing network of trade. Many businesses needed the railway to send their products off to other buyers; other local businesses needed the people traffic the railroad brought to create demand for their products or services. Economic development was synonymous with rail development, and the decisions made on those planning maps fundamentally shaped the face of the entire nation.

Since the first rail tracks were laid, people have continued to improve the transport of physical goods. The last century has seen incredible developments in aeronautics with design and material breakthroughs leading to planes that can take people and products around the world overnight. Even more dramatic, however, have been the developments that allow people to overcome vast geographic differences without needing to leave the room. As we draw near the close of the 20th century, many signs indicate that the new railroad towns are "Tele-Communities", communities with a strong communications infrastructure supported by both information technology and telecommunications systems.

Why Does Telecommunications Play a Role in Economic Development?

Urban planning experts have long emphasized the role of infrastructure to support economic development and an increasing standard of living. As time goes on, telecommunications is key to creating a foundation for economic growth and health. But if telephone has been in existence since Bell's fateful afternoon in 1876, why has it become such a focus now? The answer lies in the changing nature of industry and competition.

The 21st century is being characterized as the time of bytes, rather than atoms. While historically trade has been focused on buying, selling, and transferring atoms — physical things — from one geographic area to another, many emerging and changing industries are being driven by the need to transfer "bytes" of information. Some of those industries, such as financial services and medical administration, represent the growing service-based sector in the United States. In most industries competition is driving companies to utilize information technology and telecommunications to compete more effectively.

Ironically, even industries whose focus is on transporting physical goods have begun to incorporate information management as part of their value-added services. For example, some transport companies offer services that track goods with Global Positioning Satellite (GPS) technology. Others use the Internet to provide services that identify the least costly route or shipping method. So even "atom" companies are using "bytes."

Investments in infrastructure ensure that local communities attract and retain businesses that keep residents in jobs, homes, and with a healthy standard of living. As the industrial base in communities undergoes change, the infrastructure necessary to support that base must change. Telecommunications investments can serve the needs of companies and can also provide tools for local government and the community. Some of the ways telecommunications are already being used are reviewed below.

For companies
Companies use telecommunications in several ways. For many organizations, telecommunication is used as a link to their markets. One example of this is a 1-800 number used for sales or customer service. Telecommunications can also serve as part of core production process, as when a financial service organization transfers money or transaction information from one location to another. Another key use for telecommunications is as an internal communication device to coordinate work across a number of locations.

For local governments
Local governments benefit from increased telecommunications by keeping their communities better informed about government activities and issues that affect community members. Improvements in telecommunications can increase economic development by allowing local governments to provide the kind of information necessary for companies and developers to decide to invest in a community. Improvements also meet the needs of current residents through enhanced services, including better fire and police protection.

For local communities
In the last decade in particular, communities have climbed on the bandwagon through public access networks, community-based web pages, wired libraries and schools, both public and private. Schools in particular

benefit from enhanced telecommunications, through access to remote sources of information. Telecommunications has served as a conduit for courses offered to those who are far from a major university. It has also been used to provide health care between facilities, in particular to those who don't have full access. Local business and economic development groups in California, Illinois, and elsewhere have taken the initiative to use telecommunications to provide communities with information helpful to retain or attract businesses. This information has included local land use and availability, numbers about local markets for certain goods and services, and information on local support services for siting businesses.

What Happens If Communities Aren't *Wired*?

The emphasis on getting wired has been punctuated by stories of successful telecommunications investments. In Dublin, Ireland, early investment in telecommunication supported a growth plan that brought in advanced technology industries and reduced Ireland's reliance on low-skilled labor industries they were likely to lose to nations with lower labor costs. When it comes to preemptive telecommunications investments, Singapore's plan to place "fiber in every home" is pointed to as one of the more progressive moves a country has made in this decade. Singapore's plan is predicted to have a positive long-term impact on their ability to compete for business, even though they have higher costs compared to some of their Southeast Asian rivals. Successes like these have begun to slowly raise awareness of the role of telecommunications in sustaining economic health.

A weak telecommunications infrastructure will first impact a community's ability to retain and attract commerce, including technology intensive businesses and those companies that co-locate to sell to them. These include primarily financial services, transportation and distribution, and medical administration and provision. Also affected are businesses whose success or failure lies primarily in beating the competitor to the market. These companies often use collaborative work arrangements with individuals all over the world to increase the chances of beating the competitor to market — examples include software development, biotechnology, and other advanced research companies. Additionally, each of these businesses mentioned find themselves a part of a growing group of firms who must compete aggressively for talented people to fill key positions. As more employees focus on the quality of life issues that a career choice represents, information access in their homes and their children's schools may play a larger role in their decisions to locate in one community or another.

In addition to the fundamental inability to sustain an economic base for technology companies, the lack of a modern telecommunications infrastructure can also impact a community on a more social level. Access to information has often been lauded as one equalizer in the disparity between poor and rich. Whereas some communities will have access to a wealth of knowledge with wired libraries, public access networks, and technology support for individual Internet access, those communities without such a base may be left behind in a widening cultural evolution toward the information age.

What Is The Future World Of Tele-Communities?

Whether or not it chooses to be actively involved in the revolution, a community is impacted by developments in telecommunications. How the revolution will impact each community is part of the mystique surrounding the future of Tele-Communities. Two forces surround telecommunication advances, dispersion and relocation. On one hand, experts have predicted more dispersion or spread in communities as people move away from urban centers, since telecommunications allows individuals to overcome geographic distance without the need for physical proximity. The forces of relocation, however, are more complex. As people relocate to other areas, there are two opposing arguments as to whether this physical distance will be accompanied by social distance as interaction changes. At the heart of matter is whether the forces of telecommunications advances will drive society farther apart or closer together. Further, what role can Tele-Communities play in this revolution?

Dispersion

First, let us explore some of the basic economic premises to understand why physical dispersion may occur. One of the main reasons for the economic vitality of cities is that highly concentrated, dense, proximate locations reduce the costs of transportation for businesses and households. Lower costs of travel led to more profitable operations and higher real standards of living. Firms locate near suppliers and/or their consumers. Households locate near work, shopping, and/or recreational activities. This packing together of economic activity produces the traditional patterns seen in the urban landscape. However, as the costs of overcoming the "friction" of distance fall, the economic need for individuals or businesses to be in a city declines. One of the most important impacts of the telecommunications revolution will be the change in the urban landscape.

By and large, the ability to conduct business, shop for goods, and visit with other people is significantly enhanced with modern telecommunications. The cost of meeting clients has declined as the telephone, pager, fax, and Internet have emerged as viable communication media. Many find that shopping takes less time with the telephone, fax, and Internet in comparison to the traditional automobile trip. Getting information, reaching the market, and putting the deal together can be done without the physical act of travel in many cases — just use the modem, surf the net, or fax the document. All of these newer technologies lower the cost of doing business, for the buyer and the seller, the client and the service provider, and the employer and employee.

Households Household activities have also been the beneficiary of the modern telecommunications revolution. Television is easier to access and provides more choices. The assumed advantages of traveling to the museum, the theater, or the opera hall have diminished, as improvements in voice and picture have brought these experiences dramatically into the home. Even the activity of just visiting can be done in chat rooms, with a computer e-mail system, or using teleconferencing systems. Accessibility is increased while the need to travel with its attendant costs is reduced.

Structure Of Cities The result of reduced travel costs will have profound impacts on the structure of cities. The need to reduce distance is diminished. Telecommuting, long distance meetings, and shopping from home all have implications which suggest the decline of the traditional city landscape. One can live far from the job and still work in the city. One can live far from the shopping center and still buy goods from the city. One can reside miles away from the city and still enjoy urban entertainment. Thus, the economic value of face to face contact and actual presence in physical space is considerably less than it was ten or twenty years ago. Most importantly, these changes are not merely *predicted* to happen. These new methods of interacting have been adopted and embraced by the critical mass of consumers, businesses, and agencies necessary to make a real difference in accepted social norms.

Relocation

If it is true that the need for physical proximity has declined and people can live and work at a considerable distance from each other, the next question is whether we will draw farther apart socially as well. Will there be any relocation of "community"? There are two arguments about how relocation will occur.

The first argument rests on the assumption that the traditional economic reasons for urban life are becoming less and less important. As more people, both as workers and consumers, become comfortable and adopt new telecommunications systems they will move out of the cities of today. The result will not be just suburbanization, but a new urban structure — the city-village, edge cities, or even complete dispersion to non-urban areas. Subsequently, the need for face-to-face contact and more traditional social interaction may lessen as well.

A second argument is more optimistic for cities. This argument has the same basic set of changes. The telecommunications revolution will and does lower the costs of transactions by reducing the need for and expense of travel. By itself, as the first argument has it, this will lead to geographic dispersion. However, a *second effect* also arises due to the lower cost for communications. As the costs of communications fall, people will undertake more communications and this will lead to more total activity. The lower cost of reaching interested consumers over the Internet means that sellers will make more use of the Internet and reach more consumers. Reduced commuting and travel time means that more business can be done during the work day. Lower cost entertainment in the home means more entertainment programs will be consumed. Just as the telephone increased voice contacts and reduced mail volume, just as the railroad expanded land-based shipping and reduced shipments via wagons and barges, and just as the jet plane led to more individual contacts, so the new telecommunications technology will lead to more activity, more network contacts, and quicker delivery of information, some shifting from current forms and some being new to this technology.

This second argument says the social and economic need that cities traditionally fulfilled will continue to exist, but the way in which these needs are fulfilled will change. True, physical activity does not disappear as a place bound reality — only the communications activities "disappear." The need for location, buildings, face to face contact, and human interaction will still exist. Some of this economic activity will disappear from cities, as the concept of dispersion suggests. But, the second relocation argument recognizes that the need to be somewhere physically will change as overall activity levels increase. The importance of this second argument is that it suggests how economic relocation will occur. Survival and success will ultimately go to those areas which have adapted to the new environment by incorporating successfully the new forms of telecommunications. Successful locations will be where businesses can serve their markets cost effectively using the new forms of telecommunications. Still, labor costs will matter, proximity to natural resources will matter, land based transportation will matter, traditional infrastructure will matter, but now the accessibility and quality of modern telecommunications will also matter. Those places which adopt new approaches to telecommunications and media will be able to capture the expanded activity and benefit from the shifting patterns of behavior.

The forces of dispersion and relocation suggest a pattern of urban change. On the one hand, dispersion implies the existence of fewer densely settled cities. More of the urban landscape will be made up of scattered, fragmented, edge cities. Each of these will be smaller replicas of cities -- predominantly residential and personal service oriented with telecommuting workers. On the other hand, the relocation implies the need for some highly technological urban centers where there is some value in proximity. In the most optimistic case, these urban centers will be catalysts in the new telecommunications revolution. They will be cost competitive for telecommunications as well as the traditional needs of businesses and households. They will also offer a complete set of urban amenities, both technological and traditional. They will move away from the historical emphasis on being near raw materials or markets and more sensitive to the quality of the overall infrastructure base — telecommunications, education, water, sewer, and electricity. While business services and information processing will be the growth sectors in these new centers, the centers could still capture much of the manufacturing and regional service functions which exist in cities today.

Conclusion

John Mayo, the President of AT & T Bell Laboratories, spoke on the technology changes that are driving our evolution:

> When I reflect on the future of information technology, I am reminded of the story about the test run of Robert Fulton's strange-looking steamboat, the Clermont. For a few hours the craft kept making a terrible racket, belching smoke and sparks as the engineers tried to get it started. Skeptics in the crowd kept yelling, "She'll never start! She'll never start!" Finally, after a lot of huffing and puffing, the boat began moving up the river. The scoffers were astonished and remained silent for a few moments, and then they started yelling again: "She'll never stop! She'll never stop!"[1]

Like the skeptics reacting to the steamboat that represented a drastic change, we face our own seemingly unstoppable force: the need for advanced telecommunications. In responding to the railroad and other technology shifts, communities have always had the opportunity to be part of the revolution, or to be dragged into the evolution that will naturally follow. The difference may be a choice between mastering one's own destiny or waiting for the train to arrive.

[1] John S. Mayo, "R & D in the Third Millenium," Research Technology Management, Vol. 35 No. 6 November-December 1992.

HISTORICAL OVERVIEW

Electricity and Water Supplies

Tacoma City Light was founded on the entrepreneurial spirit of individuals such as Charles B. Wright, the "father of Tacoma." Wright arrived in Tacoma in July 1883 as one of seven men responsible for choosing the terminus of the Northern Pacific Railroad. Tacoma had a population of 4,000, was ideally situated on a deep-water bay, and was surrounded by abundant timber and other natural resources. The arrival of the first railroad terminus in the Northwest seemed to assure Tacoma's importance in the commerce of the region and the nation.

At that time, the town's main drawback was the lack of a dependable water supply. It was obvious that the spring-fed, gravity-flow water system would be inadequate to meet the needs of the rapidly growing community. This came to Wright's attention soon after his arrival. Within two weeks he had outmaneuvered the existing water supply companies and persuaded the City Council to pass an ordinance granting him the "privilege to supply the city of New Tacoma and its inhabitants with pure and fresh water."

By June 10, 1884, Charles Wright and General John W. Sprague had incorporated the Tacoma Light & Water Company. By November 1886, the Tacoma Light & Water Company was about ready to enter the streetlighting business. Poles had been placed, wire was being strung and "electric dynamos" were nearly ready for operation. The company generated electricity from a small powerhouse in Galliher's Gulch, near South 26th Street and Pacific Avenue. Service extended three-quarters of a mile along Pacific Avenue by January 1887. Rates were high and generating capacity inadequate.

By 1889, Tacoma needed more than just streetlighting. People were asking for electricity in their homes. Complaints against the company were growing, and even with a new powerhouse completed in 1889 and equipped with a "modern" generator capable of lighting 1,500 lamps, the tide of criticism could not be stemmed.

The lights weren't bright enough, there weren't enough of them, and the company was poor in responding to outages and other service issues, customers complained. Support for a municipally owned system was increasing.

By 1892, the idea of a municipally owned light and water system had become *the* political issue of the day. The following year, after extensive study, the City decided the quickest way to own a light and power plant was to purchase Tacoma Light & Water. Wright, tiring of his investment, was interested in selling — for a sum of $2.1 million. The City Council, however, had calculated the value at $1.52 million. This fostered a fierce debate over whether or not to buy the company. Finally, a small committee traveled to Philadelphia to bargain with Wright face-to-face. This meeting led to an agreement for the City of Tacoma to purchase the Tacoma Light & Water Company for $1.75 million.[1]

In March 1893, the Council passed "an ordinance to provide for the purchase of the water works and electric light plant, and all such water supplies, riparian rights, rights of way, lands, lots, personal property and franchises as are now owned and operated by the Tacoma Light & Water Company." The issue passed the public election, and in July 1893 the the City of Tacoma became the proud owner of a municipal utility.[2]

Telephone Services

The first telephone on the West Coast was installed in Tacoma in April 1878, connecting the Telegraph Operator's Wharf on Second Street and Lighter's Foundry on Pacific Avenue and 17th Street. Tacoma's first permanent telephone, installed in 1880, connected the Tacoma Mill in Old Tacoma and the Western Union office. The next line linked Dr. Harvey's home with Bonney's Drug Store. Tacoma's first exchange, the second in the Washington Territory, was established in Rebard's Cigar Store by E.W. Melse and the Sunset Telephone and Telegraph Company in 1884.

By the turn of the century, Tacoma and its telephone service were expanding at a rapid rate. Sunset, however, began to experience competition from its rival, the Telephone Company of Puget Sound. During the next few years, the two firms struggled for customers. Customers wrestled with two separate telephones if they wanted to connect with the rival company's instruments. Finally, in 1916 the two operations were reassigned to the Pacific Telephone and Telegraph Company.[3]

Telephone service expanded over the next 50 years until it reached virtually every home in the city. Service under Pacific Telephone & Telegraph continued until 1964, when a split in its parent company led to the formation of Pacific Northwest Bell Telephone Company.

With the approval of the State Public Service Commission, Pacific Telephone & Telegraph holdings in Washington, Oregon, and parts of northern Idaho were turned over to Pacific Northwest Bell and more than 30 million shares of common stock in Pacific Northwest Bell were given to Pacific Telephone & Telegraph shareholders. At that time, 90 percent of Pacific Telephone & Telegraph shares were controlled by AT&T.[4] In addition, Pacific Northwest Bell agreed to not pass on the expenses accrued by its formation to their customers, but would maintain current rates for a period of 10 years.[5]

Cable Television Services

The year 1965 was important for both the local and national cable movement. The FCC assumed jurisdiction over Community Antenna Television (CATV) systems and began to impose its own regulations. The State Utilities and Transportation Commission called for a legislative investigation to determine whether the monopolistic nature of the industry required the state to regulate rates and services.[6] In addition, Pierce County commissioners began considering franchise applications for providing CATV to the University Place and Lakewood areas where 2,500 potential customers were anxious for the "fix" that would eliminate the "snow" the existed on their screens when using an antenna.[7]

The following year, the county approved the first franchise, but deliberations continued in Tacoma. By the spring of 1966, seven companies had filed requests for franchises within the city limits. Criteria for selection included the company's financial resources, intended scope of service, proposed rates and franchise payments, and the number of free channels provided for public use.[8] Representatives of the only two locally owned companies among the seven applicants urged the awards be made to Tacoma firms. The council also believed that the city "should do business with local people so that you can talk to the local ownership and not rely on information from attorneys representing outside companies," and felt the earnings made by Tacoma companies would remain to support the local economy. City Manager David Rowlands, however, said it was the Finance Department's opinion that two outside companies proposed franchise tax payments that offered the greatest return to the city.[9]

Arguments for local ownership eventually prevailed, and the City Council named Tacoma Cable Company and Cable TV Puget Sound in the initial franchise ordinance of September 1969.[10]

Subsequently, City Manager David Rowlands raised the possibility of the city forming its own utility for CATV. He recommended that "all previous proposals be rejected and that the city manager and his staff be directed to explore the possibility of either accepting new franchise

proposals or investigating in depth the desirability of establishing a city-owned and operated cable television antenna system."
In response to concerns expressed by officials in the cable industry, he stated: "If the state law is somewhat obscure on the right of a city to engage in a CATV utility, then I am sure that revisions could be passed by the legislature. With Tacoma … facing a financial crisis in the years ahead, it appears that this could be another source of revenue … while at the same time keeping the rates for the subscribers to a minimum."[11]

In January 1970 the two franchises were awarded as initially granted, although the Cable TV Puget Sound franchise was rescinded after only one week. As a result, Tacoma Cable Company was the sole cable television franchise to begin operations in Tacoma, with the second franchise once again open for discussion.[12] A few months later, TelePrompTer Corp. was granted the second franchise, with a third franchise subsequently given to Community Tele-Communication, Inc.[13] Excited about its new opportunity, TelePrompTer Corp. said work on its cable television system would begin soon. The president of the company painted a bright picture of the following five years, which included a two-way cable system which would allow every home on the system to have what amounted to a computer in its living room. He said that "bills will be sent — and perhaps paid — by cable; doctors, lawyers and businessmen can arrange conferences; housewives can browse through a market and shop by television; and school officials can arrange vast changes in curricula by using the systems."[14] By May 1971, Tacoma Cable Company was taking over the area to the north and west of South 35th Street while TelePrompTer took over the south and east. Community Tele-Communications, having only recently received its franchise, had not yet begun hanging cable.[15]

Within two years, the only remaining cable company provider in Tacoma was TelePrompTer. With 480 miles of cable and 7,300 subscribers representing 22,000 viewers, TelePrompTer offered cable service to almost every section of the city. At that time, its $4 million investment included a system with a 30-channel capacity.

Internet Services

The Advanced Research Projects Agency (ARPA)'s Information Processing Technology Office was the initial funding source for computer facilities at 17 sites across the country. Key researchers needed to access these computer resources directly from their offices. The ARPA commissioned construction of an experimental computer network based on a packet-switching technology. This was installed at UCLA in September 1969. After being hooked up to phone lines, the packet switches at four university sites began to exchange information packets long distance. This was the beginning of the ARPANET.

Growth of the APRANET, particularly for military-related traffic, led the Defense Department to take it over in 1975. Connections were made available only to organizations doing work that fell within Defense Department guidelines. Although many universities, government agencies, and even some computer vendors were qualified, others were not. These outside sources decided to form computer networks of their own. The two most notable were CSNET and BITNET, which were formed by education and research sites.

The growth of the networks outside of the ARPANET created new challenges, in particular they had difficulty connecting to each other because of incompatible communication protocols. As a result, Transmission Control Protocol/Internet Protocol (TCP/IP) was develop to allow the different networks to interconnect and "communicate." On January 1, 1983, ARPANET and the Defense Department began using TCP/IP and this "network of networks" soon began to be referred to as the "Internet."

The Internet remained virtually unknown outside research and defense circles until the late 1980s when the growth of personal computers fueled consumer interest. By 1990, many metropolitan area residents owned a computer, modem, and telephone and were using Internet Service Providers to get online. Companies like Software Tool and Die, Panix, Digital Express, and NetCom offered individuals affordable "Internet accounts." As the number of sites and users grew, the Internet came to resemble an overgrown information jungle — one without signposts or maps. In the late 1980s and early 1990s, bewildered users created tools to locate and index resources. These guideposts helped others in the Internet community find their way, and transformed the Internet into a more user-friendly network.

"archie" was the first to cut through the information undergrowth. Created in 1990, archie enabled users to scan a lists of the Internet's holdings with a single query. archie was followed by Gopher in 1991 as the first widely-popular "Internet navigator." It let "information owners" organize data into hierarchical menus. Users could then view, scroll through, and make selections from these menus. But the question was now how to find something in "gopherspace," since the original Gopher plan did not include a general index.

The answer was called VERONICA. This database held over one million entries from Gopher menus by 1993. VERONICA servers were kept busy performing searches for Internet users around the world. Meanwhile in 1992, in Switzerland, a physicist devised a way to organize the Internet-based information and resources he needed for his physics research. He dubbed his system the World Wide Web. To connect individual pieces of information, he made use of "hypertext," which allows document owners to include names and pointers — addresses — to other relevant items. By clicking on a hypertext link, users tell their computers to "get the address associated with this link, and go there."

An Internet browser called Mosaic, developed in 1993, made the Web and the Internet more user-friendly and accessible. Mosaic let users retrieve and display graphics, images, and sounds with a single mouse click. The combination of the Web and Mosaic — and similar programs such as Netscape Navigator — transformed the look and feel of the Internet. Formerly a world of largely text-based, hard-to-find resources, the Internet became an inviting multimedia information system.

During the past three years, the Internet has become increasingly accessible. Most visibly, the Internet has become a new venue for business. Companies are trying to determine just how this online, "cyberworld" will shape the business products and players of tomorrow. The Internet has become more than an wildly new information exchange; it's an overwhelming cultural phenomenon.[16]

Access costs, however, are still prohibitive for some segments of society. The issue of universal access has been one of the most controversial issues surrounding the Internet. For communities such as Tacoma, how to make lines, equipment, and services equally available to residential users in all neighborhoods — including homes, schools, and libraries — is an issue that has not been resolved.

Endnotes

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Overview

EXISTING TELECOMMUNICATIONS OPTIONS IN TACOMA

Is the greater Tacoma area prepared for growth in the area of communications? Do we have the telecommunications resources necessary for businesses that may want to locate in this area? What about growth in telecommuting? How will the explosion of the Internet be accommodated?

US WEST and Tele-Communications, Inc. (TCI) control the only existing wired systems currently available for the telecommunications infrastructure needs of the greater Tacoma area. By examining these companies, the infrastructures they control, and some of the emerging wireless providers, an understanding of the existing options available to meet the needs of an economically vibrant greater Tacoma area can be achieved.

US WEST

US WEST is the incumbent provider of local telephone service in the greater Tacoma area. Currently, all requests for new services, installation of advanced or large capacity equipment, and additional phone lines must be completed through US WEST. While the central offices in Tacoma are interconnected with fiber optic cable, the majority of Tacoma's telephone system consists of twisted copper pairs. A limited amount of fiber optic cable has been placed to businesses with large telecommunications budgets. Local businesses have experienced waits of four to five months for digital lines, and some have considered completing the installation of necessary fiber links themselves.

US WEST's residential customers have experienced similar frustrations. A service request for the installation of a second phone line may take more than a month to complete. US WEST's service reputation was a leading factor in Washington regulators' decision to deny US WEST's request to more than double its monthly residential phone rate. Regulators instead ordered the company to *lower* its rates. US WEST officials have responded that without the rate increase, investment in upgrading the local telephone network will not continue and customers may continue to struggle with service.

US WEST is also facing a growing demand placed on its system from increasing numbers made through modems for Internet connections. An average Internet connection lasts approximately 14 times longer than the average voice call that the system is designed for, leading to potential disruption of vital functions such as emergency 911 services.

TCI

A second candidate to develop an advanced communications infrastructure is the existing cable television operator, Tele-Communications, Inc. TCI maintains a cable plant serving all of Tacoma and a large portion of Pierce County. This cable operator provides residences of the City of Tacoma with 36 channels at 350 MHz, and serves portions of Pierce County with 60 channels through the recent purchase of Viacom's local cable properties. TCI customers are often unhappy with the customer service they receive from TCI, and express frustration about the limited selection of channels and programming. However, the main complaint has been rising cable rates.

The company's increasing rates point to TCI's poor financial position and a need to raise revenue while curbing expenses. In November 1996, TCI announced that it would be "deferring the rebuilding of the balance of the company's cable systems" in most areas and instead would install digital set-top boxes. These boxes deliver more channels and an improved picture quality, but do *not* usually require upgrading the network from coaxial to fiber optic cable. Without an upgrade, the network will not have the capability for two-way communication and will not be able to provide telephony, two-way Internet access, or other advanced telecommunications features. Additionally, set-top boxes require an additional phone line for any pay-per-view ordering, only adding to the demand pressure on the telephone network.

The City of Tacoma is currently undergoing franchise renewal negotiations with TCI. During these negotiations, the City has looked for a commitment from TCI that the upgrades performed on the system will be with fiber optic technology, and not a "quick-fix" solution using the existing coaxial cable network. Before TCI announced a halt to system rebuilds, it had estimated that rebuilding its Tacoma System would take an estimated three to four years.

EXISTING TELECOMMUNICATIONS OPTIONS IN TACOMA

US WEST

Summary

US WEST's subsidiary, US WEST Communications, is the main provider of local telephone service in the Tacoma area. Although a major player in the telecommunications industry with $11.7 billion in annual revenues, US WEST Communications has a poor service reputation. This was a key factor behind Washington regulators' decision to deny the company's request for a large rate increase. Further, regulators required the company to reduce its rates. In response, US WEST declared that the company will no longer be able to invest as much money into improving its Washington network, causing service and the important state-wide network to be in danger.

While US WEST's main business suffers, the company has been rapidly diversifying and developing new markets. US WEST has a major stake in the cellular market, recently joining with AirTouch Communications to form the nation's third largest wireless phone company. Another alliance with Bell Atlantic and NYNEX could provide cellular service to as many as 100 million customers. In 1993 it launched a high-profile digital video trial in Omaha, with plans to expand to other major cities. After a year-long market trial, the promised digital television never was introduced, and the project was ended due to technical and financial difficulties. US WEST has also entered into the video market through its recent purchase of Continental Cablevision. It also owns 25 percent of Time Warner Entertainment, controlling the majority of Time Warner Cable, HBO, and Warner Bros.

US WEST's central offices in Tacoma are interconnected with fiber optic cable, but the rest of Tacoma's distribution plant is *not* state-of-the art. A limited number of fiber optic cables have been placed to a few select businesses and waits of four to five months for a high-capacity line are not uncommon. Growing Internet use, which keeps lines in use longer than planned, is making carriers like US WEST nervous. They claim it could lead to the disruption of vital public safety services like 911. This suggests a need for an upgraded public data network.

Background

US WEST is the incumbent Local Exchange Carrier (LEC) providing local telephone service in the metropolitan areas of Puget Sound. The company has had a near-monopoly with 25 million customers in 14 western and midwestern states since the establishment of the Regional Bell Operating Companies (RBOCs) at the breakup of AT&T in 1984. Today

US WEST has $23 billion in assets, $11.7 billion in annual revenues, 61,500 employees and more than a million shareholders. The company is headquartered in Englewood, Colorado, a Denver suburb.

No RBOC has ventured farther from its basic regulated telephone business than US WEST. This diversification was meant to provide a brighter future for US WEST as deregulation and competition slashed its monopoly telephone profits. However, this diversification is clouding its future and may have been a factor leading to deteriorating phone service.

Service Reputation

US WEST's service reputation has suffered due to the company's record of poor telephone service. US WEST struggles with the largest service territory of all RBOCs, responsible for a 14-state western region However, customers have little patience with a company incapable of installing a new line within week or sometimes even months — no matter how impressed they might be with how many states US WEST serves.

Federal and state regulators have been requiring US WEST to improve service, especially regarding the installation of new or second phone lines. Emergency rules have been proposed in at least five states in US WEST's territory, establishing voucher systems of $150 a month for customers waiting for new phone lines. The reason for the ruling in Colorado, according to that state's public utilities director, was that "little, if any, apparent progress is being made toward resolving this problem."[1] The costs of the vouchers are small for US WEST, but they are symptomatic of a growing ill will in state legislatures. In Washington, Governor Mike Lowry vetoed a 1995 US WEST-backed bill that would have maintained a ban on competition from the likes of AT&T and MCI on in-state long distance calls.

Rate Reductions

Poor service was the leading factor behind a rate reduction ordered by Washington regulators in 1996. US WEST had asked for permission to raise average monthly residential phone rates from $10.75 a month up to $26.35. Instead, the regulators ordered US WEST to *lower* its rates on residential, business, and long distance service. Further, regulators criticized the company for taking profits outside the state and paying too much in employee bonuses — all at the expense of customer service. After the company requested the rate increase in February 1995, the commission received overwhelming response from US WEST customers opposing the increase. The commissioners said that ordering US WEST to reduce its revenues by about $91.5 million "gives the company what it needs — fair rates based on the company's actual costs, greatly increased flexibility to lower prices to meet market requirements and meaningful incentives to improve service quality."[2]

Investment Jeopardized?

US WEST's vice president for Washington, Dennis Okamoto, warned that because of the decision the company no longer could invest as much money in the state and that service quality may be jeopardized. Okamoto said US WEST had been investing about a million dollars a day in its local telephone network and, without better earnings, work would not continue. While the commission's order was made in response to poor service and long waits for phone installations, company manger Kathi Willis said the order "could cause service delays to be even greater."[3] US WEST argues the commission has erred in its ruling in three areas: direct costs, laying spare capacity, and calculating depreciation.[4]

Cellular

US WEST is attempting to enter new markets other than local service within its territory. It is building a significant cellular presence, making a number of strategic moves in the last few years toward that goal. In July 1994, US WEST and AirTouch Communications announced a joint venture that combined their domestic cellular operations to create the nation's third largest wireless phone company. Together, US WEST and AirTouch serve more than 1.7 million cellular customers in coverage areas reaching 53 million people

US WEST's 30 percent commitment to this venture was likely sparked by two events. The first was AT&T's $12.6 billion acquisition of Bellevue, Washington-based McCaw Cellular Communications Inc., the nation's largest cellular company. The second was the auction in December 1994 by the FCC of wireless phone licenses for "personal communications services" which was meant, in part, to bring significant competition to the wireless services industry.

Wanting more clout in the auction, US WEST/AirTouch entered another alliance in October 1994 with Bell Atlantic Corp., and NYNEX Corp. This alliance could provide wireless service to nearly 4 million cellular users and the possibility of up to 100 million customers.[5] Under the name PCS Primeco L.P., the four companies won licenses for communications services in 11 major cities[6], including Chicago, Dallas, Miami, New Orleans, and Honolulu.

Video Trials

Another of US WEST's new ventures was in the interactive market. In 1993, US WEST announced plans to build combined voice, data, and video networks both outside and within its 14-state territory. In a highly publicized move, US WEST received FCC permission to launch a "video dial-tone" trial in Omaha consisting of a six-month technical trial, followed by a 12-month market trial.[7] One month into construction, US WEST said it would pursue a multi-market rollout of the video dial tone service in Denver, Minneapolis-St. Paul, Portland, and Boise when FCC approval was obtained.[8]

The company launched its 12-month market test in Omaha on August 31, 1995. Marketed as TeleChoice, the service passed nearly 50,000 homes using a hybrid fiber coaxial network.[9] Contrary to its initial announcements, the system began with only analog services and customers had to purchase set-top boxes unless they already owned cable-ready TVs and VCRs. Digital services, such as movies-on-demand and interactive shopping were promised.[10] The basic rate was $5.95 a month, which included many popular cable channels. Additional packages for sports, family, and news were also to be offered.[11]

By January 1996, US WEST was still "moving closer" to its near-video-on-demand model. The package of analog channels now had more than 8,000 subscribers and testing was "well ahead of schedule." The prospect of a digital system was delayed to a vague "later this year" when the system was working to US WEST's satisfaction.[12]

Less than two months later, US WEST dropped its plans for a digital rollout in Omaha. Essentially the trial was too expensive and did not work.[13] The market trial was officially ended on August 31, 1996. The company says it will continue to offer the analog cable services in Omaha. US WEST's remaining video dial tone market rollouts never moved beyond the planning stage.

Cable TV

Following the conclusion of the digital video market trial in Omaha, US WEST decided to enter the video market by purchasing cable systems in other regions. US WEST's newly formed subsidiary, the US WEST Media Group, was to manage these properties.

In February 1996, US WEST announced the purchase of Continental Cablevision with its 4.2 million cable subscribers for $11.8 billion. US WEST purchased Continental's stock for $5.3 billion and assumed its debt, valued at $6.5 billion.[14]

This deal made US WEST the nation's third largest cable operator. With its Time Warner properties, US WEST Media Group's domestic cable market potential is about 16.2 million homes.[15]

US WEST also owns 25 percent of Time Warner Entertainment, a partnership controlling most of Time Warner's 12 million cable subscribers, HBO and Warner Brothers film studio. Time Warner is seeking to regain control of Warner Brothers and HBO in exchange for shifting much of its capital-intensive cable business to US WEST, along with a significant portion of Time Warner's $17.5 billion debt load. Talks were expected to accelerate after the completion of the US WEST - Continental merger.[17]

Investment Profile

US WEST Media Group's third-quarter 1996 profits fell 38% from the previous year's quarter to $18 million — which the company tied to heavy investments in cable and wireless operations.[18] Fitch Investors Service put US WEST Media Group on the ratings agency's credit watch.[19]

US WEST in Tacoma

US WEST operates the switched telephone network in the Tacoma area. This network is based around central offices, each serving 10,000 to 50,000 customers. The central office is the wire center from which all telephone services are provided. It houses the switching center where telephone dialing information is registered and calls are switched to trunks leading to other central offices or long distance providers. All the switches and traffic between offices are digital — to maintain the quality, speed of switching and efficiency of the common network.

Seven central offices serve the Tacoma area. The central office in downtown Tacoma is the largest and most important. It has interconnecting cable to all other central offices in the area and interconnections to other large offices and long distance carriers in the region.

Central offices are interconnected with fiber optic cables. Each cable contains about 144 fibers. High speed digital communications are maintained on the cable, providing DS0, and higher capacity DS1 and DS3 circuits.

While much of the common electronics are dedicated to switched telephone traffic, other equipment is used for leased, point-to-point digital circuits for private telephone and data use. When a circuit is "nailed-up" through the central offices, it is assigned for point-to-point use. Many of the "nailed-up" circuits in Tacoma are routed through the downtown central office, because this office has the tools to provision circuits.

Basically Copper

Each phone customer has at least one pair of copper wires running from his or her telephone to a central office. These wires are wrapped around one another and are referred to as a "twisted pair." The wires start as large bundled cables that branch out from the central offices. Most of this cable in Tacoma is copper for basic telephone service. The typical maximum distance for a telephone circuit is 12,000 to 18,000 feet, depending on the gauge of wire in the cable. For services greater than this distance, Carrier Service Areas (CSAs) are defined. Within these CSAs, compact electronics cabinets are placed to serve cable plant up to another 12,000 cable feet away from the central office. DS1 circuits carry the telephone traffic back to the central office for switching. Business DS1 leased circuits can be nailed-up through the CSAs as well as the central offices. In recent construction, fiber optic cable has been used in cables from the CSAs to the central office.

A limited amount of fiber optic cable has been placed to business buildings in Tacoma. New buildings expected to have three or more DS1 leased circuits, or existing large buildings showing significant growth of high-speed digital communications, have been provided with service on fiber optic cable. However, most business service is delivered on copper telephone cable and little upgrading has been performed to replace copper telephone cable with fiber optics. The business community reports that waits of four to five months for DS1 circuits are not uncommon as US WEST attempts to recondition copper telephone cable to provide the service.

MONTHLY RATES:+	Residential	Business
DS0	$10.50	$25.00
DS1	$200.00*	$200.00*
ISDN	$68.58	$68.58[20]

*plus a $616.50 installation charge

+not inclusive of all required fees

Internet Use and the Public Switched Network

Internet data traffic has exploded and is projected to continue growing at exponential rates. Households with Internet access are expected to grow from 3.1 million today to 27.4 million by the year 2000.[21] Internet business transactions are predicted to grow to $250 billion in 2000.[22] The public switched telephone network is experiencing traffic growth from data users accessing the Internet. The switched telephone network includes common equipment shared and re-used among all users. The common equipment is expected to be available for re-use based on the average length of a telephone call.

Residential users typically have had two typical methods of connecting to the Internet — standard analog telephone lines and digital ISDN lines, both leased from US WEST. NYNEX, an East Coast RBOC, is reporting 10 percent growth per month (300 percent per year) in Internet access lines. The RBOC provides the circuit from the user to the Internet Service Provider (ISP). The ISP similarly leases business lines to receive those Internet access calls.

Longer connect times a threat?

While selling more lines may seem like good news to the RBOCs, they say the new traffic generates calls that last, on an average of 14 times longer than an average business call.[23] During the Internet session, a circuit is tied-up from the user to an ISP. The RBOCs have built the switched network so circuits are re-used among all telephone users, including voice conversations, faxes, and emergency telephone calls. The average connect time of a call is a key design parameter used to equip the switched telephone network with the proper number of re-usable circuits. Now, with longer connect times, congestion is occurring in the switched network and more common equipment is needed to serve the traffic. A study done by Pacific Telesis in Central California's Silicon Valley found that 16 percent of local calls did not connect, mainly because of high Internet use in that region. Normally, the RBOCs claim that fewer than 1 percent of calls do not connect. The growth in Internet use, with its implications for requiring a re-engineering of the network has the local switched network has the local exchange carriers concerned.

The RBOCs have told state commissions and the FCC that the rapid expansion of Internet traffic threatens network access and could lead to the potential disruption of vital public safety services such as 911 emergency call service.

The RBOCs ask questions such as:

- How about dismantling the existing flat rate phone charge structure?
- Who will fund the expansion?
- Should all telephone users pay more for each telephone line they lease?
- Should the Internet access provider pay a large access fee to receive calls from the local switched network, since the traffic results from a service they are providing?
- Is the local switched network obsolete for growing public *data* traffic? Even though the RBOCs have been extremely vocal about the dangers of overloading the switched telephone network with heavy Internet use, and the potential threat to emergency 911 services, the RBOCs have actively teamed up with others to provide dial-up access. A local example is in the alliance formed between US WEST and the Tacoma News Tribune to provide Internet to consumers and businesses in the South Puget Sound. This service offers access speeds up to 28.8 Kbps, at a price of $19.95 per month for unlimited access, or $8.95 for 10 hours of access time.[24]

FCC Chairman Reed Hundt has said that his agency should not regulate Internet telephone or subject it to access charges — at least for now. "We shouldn't be looking for ways to subject new technologies to old rules," he said. "Instead, we should be trying to fix old rules so that if those new technologies really are better, they will flourish in the marketplace." The FCC may resolve the issue through access charge reform which the agency expects to complete in 1997.

RBOCs can upgrade their transmission systems in many ways. The circuits can be monitored for clues that each is carrying data traffic and switched to special facilities for data. Or, the data traffic can be "compressed" to free the circuit while there is silence or idle data between bursts of use.

Tele-Communications, Inc. (TCI)

Summary

TCI is the largest cable TV provider in the United States with 14 million subscribers, it also has a reputation for poor service. Customers complain about the company's continuing rate increases — including a 13 percent jump in 1996. The increases fuel TCI's acquisition strategy, a near-frenzy of purchasing designed to keep TCI larger than others in the cable industry. TCI added 2.4 million subscribers in 1996 alone. John Malone heads TCI and is also widely considered the best and brightest mind in the cable industry.

TCI's Tacoma system carries 36 TV channels at 350 MHz; while the recently acquired Pierce County system carries 60 channels. TCI had announced plans to upgrade its networks to hybrid fiber-coax systems, but has instead decided to deploy digital set-top boxes which could make it possible to offer digital TV without upgrading to fiber. This decision stems from TCI's struggling financial position and its huge debt load. The company has halted many equipment deliveries, and is in the midst of trimming expenses, eliminating jobs, and initiating another round of rate increases. TCI's financial troubles have not stopped the company from entering a number of alliances, which have vaulted it into the telephone, digital satellite and on-line businesses.

TCI has nearly $2 billion in revenues, an operating cash flow of $533 million, 14 million subscribers in the United States, and 32,000 employees in 49 states.

Customer Service

TCI has a reputation for poor customer service. TCI's own research has concluded that "subscribers are generally pleased with the technical quality and programming offered and the price they pay for it, but they are unhappy in dealing with the cable system when a problem arises — getting through on the telephone and finding a sympathetic customer service representative."

John Malone, TCI's chairman, acknowledges that TCI has a long way to go and he keeps one particular incident as a reminder: In 1994, when a Connecticut local phone company began offering cable service to TCI subscribers, as many as 20 percent defected at one time.[25] Malone does not want to see that happen again, especially on a nationwide scale.

Rate Hikes

All the programs in the world do not change the main customer complaint — cable rates. The company has a history of steady rate increases -- including a 13 percent across-the-board increase in 1996. TCI is planning another round of rate increases for January, 1997 and July, 1997.[26] These planned increases will average 6 percent on the basic tiers, and "modest" increases in the cost of premium services and equipment.[27] Malone attempted to quell analyst reaction by saying the impact of the increases would be softened by adding new networks. In many of TCI's systems, however, TCI cannot add a new network without removing an existing one from the system. A TCI spokesman could not explain how the company will add services in systems with no extra capacity.[28] The chief reason behind previous rate hikes has been TCI's drive to acquire other systems. "Our mission in our first 25 years of existence was to become big enough to survive in the marketplace that [TCI founder Magness], Malone and others saw clearly on the horizon," said one management official.

Real Estate

TCI's focus has historically been clear — prime for more growth. Its acquisitions have ranged from mid-sized cable operators serving 740,000 customers[29], to the relatively small operators serving 31,000 customers.[30]

TCI's purchasing has left it composed of a patchwork of companies and cable systems that have only recently been woven into a corporate whole. Clustering has become a central strategy for large multiple system operators such as TCI as they prepare to compete with telephone companies, direct broadcast satellite providers and wireless cable operators.

Financial gymnastics are TCI's trademark. A basic strategy seems to be to use stock — even if the price is depressed — to continue acquiring more systems and to use leverage creatively to do everything else. When asked in a *Business Week* interview how big Malone intended to grow TCI, he responded in part by saying, "The object is not to be the biggest, it's to be the richest. The biggest is the one that gets investigated by the federal government."

TCI, already the nation's largest cable system operator, added more than 2.4 million subscribers to its existing subscribers[31] in 1996, including systems owned by TeleCable, Chronicle, Columbia, and Viacom.[32]

TCI's Chief Executive Officer

While TCI has grown to be a very large company, it remains very tightly controlled by its Chief Executive Office, John Malone. TCI's corporate culture, approach to problems, and activities are so intimately linked with John Malone that attempting to understand TCI without learning something about its CEO becomes a meaningless exercise. Even Vice-president Al Gore has called him a number of imaginative names."[33] But, the 55-year old man who has built the nation's largest cable TV network has been characterized as either "unemotional, cold or motivated by pure logic". Others in the cable industry have labeled him as a ruthless monopolist."[34]

Malone is widely considered the best and brightest mind in the cable industry and perhaps the telecommunications industry as a whole.

Malone earned a Ph.D. in Operations Research from Johns Hopkins University in 1967. He began at TCI in 1972 and one year later became president and chief executive officer. By 1982, TCI had grown into the nation's largest cable company due to his aggressive acquisition drive. His empire controls video services to one in four households in America.

Malone seems to have a knack for tough negotiations. For example, he turned off cable service in Vail, Colorado during a franchise dispute with city officials. He also removed HBO from some Texas systems during a renegotiation process with the network. Another Malone ploy used to deny competition in "his" markets involved the Learning Channel in 1990. Lifetime Television Network had offered to buy the Learning Channel. After the sale was negotiated, Malone told Lifetime he planned to drop the Learning Channel from most of TCI's cable systems. Lifetime then withdrew its bid. Four months later, the Discovery Channel, partly owned by TCI, bought the Learning Channel.

When asked, TCI says that it guarantees equal opportunities for all programmers. However, some programmers appear to be more equal than others. In October 1995, TCI raised the leased access rates for The 90's Channel, a progressive network, forcing it off the air. Meanwhile, NET, a conservative network, has maintained easy access and low rates from TCI.

An unusually low profile during 1996 fed rumors that Malone had grown disinterested in the cable business and was distancing himself from TCI. However, in the fall of 1996, Malone resumed his 14-hour workday schedule and active involvement in TCI's operations. "Contrary to rumors, I am not dead, terminally ill, or disinterested in my core business," Malone said.

Current Architecture

For the Tacoma service area, TCI operates a cableTV system carrying 36 television channels at 350 MHz. The headend is in a building on Martin Luther King Ave, near 12th Sreet. in the Hilltop area of Tacoma. The majority of television signals are distributed on coaxial cable from this headend. Amplifiers are operated on a trunk and branch architecture with many amplifiers in cascade. TCI has approximately 45,000 subscribers in the City of Tacoma, and passes roughly 78,000 homes.

In Pierce County, TCI operates the former Viacom cable TV system carrying 60 channels. There is capacity on the system to carry 80 channels. Two-way traffic cannot be carried without a major system upgrade. The headend for this system is on 19th Sreet near Sprague Avenue in Tacoma. The distribution of television signals from the headend to regions of the Pierce County service territory is most likely by point-to-point microwave radio. Coaxial cable delivers the signals from regional facilities to the customers in a trunk and branch coaxial architecture.

Build-Up Plans

In the Tacoma - Pierce County area, negotiations for a new franchise between the City of Tacoma and TCI Cable of Tacoma are currently under way. TCI's Tacoma franchise expired in April 1995 but has been extended multiple times during the negotiations. In Tacoma, TCI had announced that it was in the process of shaping its networks into 300-home nodes that eventually would be served by hybrid fiber coax networking at 750 MHz.[35] If undertaken, TCI said the rebuild would be completed in approximately four years.

However, John Malone stated that TCI has suspended equipment shipments from suppliers and will be "deferring upgrading the balance of the company's cable systems." It will focus instead on deploying digital set-top boxes "opportunistically".[36] TCI feels set-top boxes can deliver improved pictures and more channels using compression technology that make it possible to offer digital television service without changing the company's older systems from coaxial wire to fiber.[37] This digital cable service will be deployed once General Instruments Corporation can build enough set-top boxes and digital deployment integration issues are settled.[38]

There are a number of potential problems deploying set-top boxes, as well as a number of benefits for TCI.

Potential problems:

- Each TV that receives premium services needs a new set-top box.
- TCI's cost per set-top box would be roughly $400.
- Any premium ordering by a customer requires an additional phone line or ties up an existing phone line.
- No improvement in existing analog picture quality is provided.
- The trunk and branch architecture remains susceptible to outages.
- No two-way communication, such as Internet access is available.

Benefits for TCI:

- It could be priced at an additional $20 per month, as an-add on to basic cable service.[39]
- Using eight current channels at a 24:1 ratio would allow up to 192 new digital channels in a system.[40]
- New set-top boxes would be needed for premium subscribers only.
- Set-top box could be funded by the subscribers as a lease charge. (The current box rental averages $2 to $3 dollars per month, where the new set-top boxes would be rented for approximately $6 per month).

In addition, the Telecommunications Act of 1996 allows a company like TCI to include expenditures on new set-top boxes in its rate calculations for its lowest tier of service even if subscribers paying for that service do not get the set-top boxes. Essentially, TCI can get paid twice for the new set-top boxes: once through rates and again through lease payments.

The City of Tacoma is trying to get a commitment from TCI that the cable company will perform upgrades using high-quality fiber optics instead of maintaining the current coaxial cable.[41]

The TCI (former Viacom) properties in Pierce County are currently operating as a 450 MHz system. The architecture is somewhat more advanced than the Tacoma properties. The electronics are operated at a 450 MHz capacity, though the amplifiers are spaced at 550 Mhz operation. Upgrading the Pierce County properties would generally involve only the replacement of the electronics to make the system capable of two-way communication.

TCI is also implementing a DBS strategy with Primestar. This strategy would allow TCI to offer a 140-channel, mid-power service and a separate high-power, 80-channel sports and pay-per-view offering compatible with existing cable offerings. This package (named TSAT) will act as a "wireless digital" upgrade and will be marketed as a complement to cable service, giving TCI systems which can not afford digital upgrades a chance to compete with the other DBS providers for subscribers. Another attractive feature of this service, scheduled to begin in February, 1997, will be its 13-inch dishes, which will be the smallest on the market.[42]

Investment Profile

TCI's credit status has been in a downward spiral and its stock price has fallen. Rating agencies such as Moody's and Standard & Poor's have been considering lowering TCI's debt ratings to junk-bond status – currently just one notch above it. TCI has approximately $14 billion in debt and interest alone, which more than wipes out its operating income[43], so a further downgrade would be enormously expensive for TCI.

This pressure on TCI has made it tougher for the company to raise money — either through new equity or debt placements — for continued growth. With competition looming from telephone companies, electric utilities, and direct broadcast satellite services, restraints on TCI's ability to grow come at an inopportune time.

TCI agreed that its expenses were "temporarily elevated" in the third quarter of 1996, citing costs from the company's venture into the cable modem and digital television business. John Malone said that in 1997, TCI's capital cable expenditures would be "substantially lower than in the past three or four years." In order to resolve its money crunch, TCI has decided to raise rates and reduce programming costs, capital expenditures, and its debt-to-cash-flow ratio next year. TCI said it is looking at every expense item to trim costs[44], which was the driving force behind the company's early December 1996 elimination of 2,500 jobs and freezing salaries.[45] TCI also said that its key subscriber count fell by 70,000 during the third quarter of 1996, raising more questions about the company's ability to survive in a more competitive market.

Having watched TCI miss a number of financial goals, some media analysts say they are going to wait until TCI's plans bear fruit before investing in the company. One investment firm executive said, "They haven't met any targets. It's like the emperor has no clothes." In typical John Malone fashion, the reply from the chief executive was: "If shareholders are really discouraged, I'd be happy to put together a few friends and buy (TCI shares) back from them."[46]

Other Services Offered

TCI Telephony launched its first commercial network in Hartford, Connecticut. Telephony projects in Arlington Heights, Illinois, and Fremont, California, were scheduled to be launched by the end of 1996.[47] The company probably will not move beyond these three markets for some time, and then will consider other locations on a case-by-case basis. These telephony services can be offered by systems running at 450 MHz, but the systems must have two-way capability.

TCI also plans to offer advertising space on its network. TCI is experimenting with a plan to develop home pages on the World Wide Web for local advertisers. The advertisers would then promote the home pages on a TV commercial bought from the local TCI cable system. Local advertising looks promising to TCI. It foresees a shift in the way local advertisers think about advertising — perhaps re-evaluating newspaper and radio advertising.[48] Some of the more popular segments are aimed at real estate sales, automotive sales, classified listings, personal classifieds and even info-mercial programming.[49]

Monthly Rates⁺

	Basic	Enhanced	Editor's Choice	Premium
TCI (Tacoma)	$9.97	$23.12	$40.07	$57.07
TCI (Pierce County)	$11.56	$32.33	$44.50	$56.28

(approximate - depends on area)

⁺additional fees including equipment, taxes, etc. apply. (Addressable converters cost $3.10 per month for example).

Alliances

In 1994, TCI and five other cable operators (Time Warner, Continental Cablevision, Cox, Comcast and GE Americom) entered the digital satellite business with Primestar Partners. Primestar has grown since 1994 to 1.1 million subscribers, half of whom get bills from TCI, the other half from the other partners. Primestar contributed $200 million to TCI's revenues last year which could easily double that this year.[50]

TCI joined with Comcast, Cox Cable and Sprint to create a venture to package long distance, local telephone, wireless and cable services. This venture (named Sprint Spectrum L.P.) includes an all-new, all-digital, nationwide network for Personal Communications Services (PCS).[51]

Microsoft, TCI, and venture capitalists Kleiner Perkins Caufield & Byers have set up a high-speed multimedia on-line service called @Home. @Home would function as the "Internet channel," offering its programming to users over TCI's two-way coaxial cable systems for roughly $35 a month. The @Home service entered testing in March 1996 in Freemont, California.[52]

Other Plans

TCI had planned to merge with Bell Atlantic in 1994 to get into the telephony market.[53] However, the $33 billion merger was called off in March, 1994 due to FCC cable rate rollbacks, TCI's weakening cash flow position, Bell Atlantic's declining stock price and the unwillingness of either company to budge on the pricing issues.[54]

TCI and Microsoft are currently engaged in a cable-based, interactive, utility services trial program in Northern California with Pacific Gas & Electric. This trial started in 1994, is testing application software, hardware, and network components of a system that can read water, gas, and electric meters and provide homeowners with hourly energy consumption reports by device.[55]

TCI owns 49 percent of Teleport, a competitive access provider that links private business networks to long distance carriers.

TCI is experimenting with McCaw Cellular on personal cellular networks in Ashland, Oregon.

Metricom

Summary

Metricom provides wireless data communications and network solutions for personal computers and industrial applications. It has two main divisions, Ricochet and Utilinet. Ricochet provides wide area access to computers and applications using small radios instead of telephone lines. Metricom launched the service in 1996 in the Seattle area and plans to expand coverage to include Tacoma. Utilinet offers wireless network data communications such as automatic meter reading to the electric, oil, gas and waste management industries. Utilinet is currently working with Puget Power to develop such systems throughout Puget Power's service territory.

Both of these divisions use small radios that are generally installed on pole tops and streetlights. The City of Tacoma has been approached by Metricom requesting permission to use City rights of way and has started planning installation of such devices in this area.

Background

Metricom, Inc. is a telecommunications company founded in December 1985 and based in Los Gatos, California. Its stated mission is "to connect people to the net ... anywhere." The company currently has more than 150 employees in Los Gatos, California; Houston, Texas; Vancouver, British Columbia, and satellite sales offices. They provide wireless data communications and network solutions for personal computer and industrial applications. Metricom develops license-free radio services that send data across a network of radio nodes.[56] The company has two major divisions: Ricochet and Utilinet.

Ricochet

The Ricochet system is a wireless network that enables high-speed, low-cost, wide area access to other computers, on-line services, the Internet, LAN applications, and peer devices. Used in conjunction with a computer, the Ricochet subscriber has remote access to these applications without the direct use of a telephone line.

Ricochet uses fixed, shoe-box sized radios placed roughly one-half mile apart from each other. The system requires approximately six radios per square mile. These radio repeaters are deployed on streetlights, utility pole tops or roof tops, and operate in the unlicensed 902-928 MHz band.[57] To connect to the system, a special lightweight, portable Ricochet modem is needed. This modem connects with networks and on-line services much like a conventional phone modem. The rates are $29.95 a month (including Internet access) with a $45 one-time activation fee.

In addition, subscribers can either rent a Ricochet modem for $10 a month or purchase one for $299.95. The speed is comparable to a conventional phone modem. Raw data speed is 100 kbps, while throughput is typically 9.8 - 28.8 kbps (depending on hardware, location, and application).

Ricochet asks for a non-exclusive Franchise Agreement or a right-of-way consent agreement from each city in which it intends to operate. Metricom pays up to $2,000 to reimburse each city for the city's administrative costs of approving the plan in addition to an annual 3 percent franchise fee. Metricom also pays a $60 per pole per year attachment fee for all city-owned poles that it uses.

Ricochet Launch

In August 1996, Metricom announced the launch of the Ricochet wireless communications network in Seattle, SeaTac Airport and nearly two dozen surrounding communities, with coverage planned to include all of Seattle and Tacoma. Metricom has an attachment agreement with Puget Power and Seattle City Light to use streetlights in the Seattle-King County area. The city of Federal Way recently received a request from Metricom for a right-of-way consent agreement on its streetlight poles and the City of Tacoma was approached in late 1996 regarding attachment space on street lights. Metricom also has right-of-way approvals in California, Washington, Maryland, Oregon, Georgia, Virginia, Massachusetts, and Washington D.C.[58]

The company has also teamed with KN Energy, Inc., DISH Network, Frontier HomeSaver Long Distance Service, MaxServ and DQE Energy Services to introduce "Simple Choice" in Scottsbluff, Nebraska. This service provides a range of energy, home-oriented, communications and "info-tainment" services combined in a single package, paid for with a single bill and served through one toll-free customer service telephone number.[59]

Utilinet

The Utilinet division of Metricom offers wireless network data communications to the electric, oil, gas and waste management industries nationwide. Utilinet radios are used for distributed monitoring and control system applications, such as automatic meter reading. Automatic meter reading requires radio equipment attached to the existing meters, pole units to transmit the data to office computers, and related software. Metricom joined Itron and Puget Sound Power & Light in a 1995 venture to develop this type of system.

This venture is operating in Spokane with Washington Water Power, and in a test program on Mercer Island with Puget Power and Washington Natural Gas.[60] This technology is expected to be implemented throughout the rest of Puget Power's nine-county area in Washington. The Puget Power project manager for its automatic meter reading test program on Mercer Island said "Once installed on Mercer Island, the system will stay forever. We'll expand from there."

The system costs an estimated $70 to $100 per meter, but Metricom expects the price to fall as the market grows and production increases. The system can be used in a "mobile" environment where the information is collected by someone on the street with a hand-held computer or in a van. It also can be deployed as a "fixed network," which requires hundreds of small boxes mounted on utility poles and streetlights, each containing a transceiver, antenna, and computer, to process and store the information for the utility.[61]

Utilinet Customers include: Lee County Electric Coop (Phoenix, Arizona), Anadarko Georgia Power (Warren, Michigan), SoCal Gas Pacific Gas & Electric (White House, Tenessee), River Gas Southern California Edison MSDGC (Cincinnati, Ohio), Williams Natural Gas Wisconsin Power & Light (Oakland County, Michigan).[62]

Direct Broadcast Satellite (DBS)

Summary

Direct Broadcast Satellite (DBS) delivers programming direct to homes using small 18-inch to 3-foot satellite dishes. Up to 200 channels can be delivered, including sports, pay-per-view, audio services, and specialty programming. DBS has grown dramatically since its inception in 1994, counting more than 3.5 million subscribers at the end of 1996. With customer equipment costs as low as $199, DBS is siphoning off cable customers. But the DBS systems have a number of shortcomings, including "hidden" costs and the inability to receive local broadcast signals.

Background

The DBS industry already has 3.5 million subscribers, and sales continue to be strong even as systems get ready to deploy digital set-top boxes. A key to growth has been large discounts on satellite dishes. Equipment costs as little as $199 are driving sales. Growing interest is also fueled by extensive programming offerings, clear digital reception, and perhaps most important, satisfied customers.

Some of those customers are former cable subscribers. In Colorado, TCI's home state, up to 1,000 subscribers per month in Denver are dropping off TCI cable and switching to DBS. In Boulder, Echostar has played off TCI's public image problems by offering free satellite dishes to TCI customers.[64] Though the cable industry continues to add new customers, DBS is having a definite effect on cable companies. [65]

DBS is not without its shortcomings. As highlighted by the cable industry, these shortcomings include:

- DBS cannot carry local broadcast television stations. The DBS solution: rabbit ears. Prospective DBS subscribers are not supposed to take the DBS package of national broadcast network feeds if they can receive local television signals off-air.
- The high cost of electronics may not allow consumers to hook up all the television sets in a house.
- The $199 DBS dish deals have hidden costs. Subscribers often must pay for a year's worth of programming up front in order to qualify, requiring a $600 initial outlay for DBS service.[66]
- DBS does not allow unlimited access to the Internet or other interactive services, which some cable companies are starting to provide with cable modems and two-way hybrid fiber coaxial systems.[67]

DBS in Tacoma

A number of DBS options are available in Tacoma. Operators include Primestar, DIRECTV, and EchoStar, with dish costs as low as $199, and yearly rates averaging approximately $300 to 400. DBS service can be purchased from a number of electronic outlet stores.

Personal Communication Service (PCS)

Summary

Personal Communication Service (PCS) combines portable telephone service with data transmission services. The advantages of PCS include smaller and lighter handsets, longer battery life, and lower cost. Sprint Spectrum and GTE MobilNet are the two PCS license holders that will provide service in the greater Tacoma area.

Background

The FCC has defined PCS as "a family of mobile or portable radio communications services which could provide services to individuals and businesses and be integrated with a variety of competing networks ... the primary focus of PCS will be to meet communications requirements of people on the move."

PCS combines cellular and cordless telephone services with data transmission services. To provide voice, electronic mail and data. This "go-anywhere phone" will use small handsets with integrated PCS cards for desktop and portable PCs. The portable handsets communicate with antennas in a microcell configuration. The microcells are as small as a few hundred meters in diameter.

The FCC allocated 160 MHz for PCS in the 2 GHz band. Unfortunately the 2 GHz band already has numerous tenants. This band is used by thousands of fixed microwave stations operated by electric utilities, petroleum companies, transportation companies and the government. Under existing rules, new users of this spectrum will have to share with existing tenants or pay for the cost of moving them to higher frequencies. This may add to the cost and slow the deployment of future PCS products and services in certain areas.

Sprint Spectrum is one of the few PCS operators that has some networks up and running. This operation is a joint venture of Sprint Corporation, TCI, Cox Communications and Comcast Corporation. The partnership has licenses to provide PCS service in 33 Major Trading Areas (MTAs) with a population of 190 million. It planned to launch service in 15 to 20 markets by the end of 1996,[68] but instead managed to launch service in only four markets.[69]

Resale

Summary

Many large telephone companies are beginning to resell a variety of services. Small independents are also rushing to do so, particularly in the long distance market. There has been lots of talk, but little action in the reselling of local service. Resale does not, however, solve the need for telecommunications network upgrades, as resellers carry their service on the existing infrastructure, with changes noticeable only in rates and from whom the bill is received.

Background

A "reseller" is a company that purchases from a telephone network operator the use of unbundled telephone network elements in bulk at a discount. The reseller then rebundles these elements in small service packages for sale to end users.

The long distance telephone market is an example of resale in action. Only a handful of companies, including AT&T, MCI, Sprint, and WorldCom own physical, long distance infrastructure,. The hundreds of remaining long distance companies are resellers that buy long distance capacity in bulk in order to resell it to end users.

In late 1996, the FCC issued rules allowing local resale. These rules were theoretically designed to be used as a guide by the state utility commissions that have the final authority regarding local resale. The RBOCs and GTE insist that the FCC's rules for the sale of unbundled network elements will make it too easy for newcomers to enter local markets. They say "resellers" could do the following:

- "Pick off" their lucrative business and urban residential customers;
- Jointly market local and long distance services; and
- Leave the incumbents with high-cost, low-volume subscribers that not only will not earn them any profits but also will not enable them to cover the costs of universal service.

According to the RBOCs, resellers are companies that buy a package of unbundled network elements and offer their own local service "without doing anything but billing." BellSouth Corp. recently calculated that in some of its states, resellers would get a 74 percent discount for "rebundling" local multi-line business service. US WEST, Pacific Telesis Group, and Sprint Corp. are working on data to show that the FCC's prices set for the local loop will lead to serious problems for universal service.[70]

Resale in Tacoma

There are opportunities in Tacoma for companies such as AT&T to resell local service using US WEST's current infrastructure. Customers purchasing resold service would still access US WEST's copper pair lines, but would receive bills from the reseller. However, in view of US WEST's current feelings toward resale, getting local service from another provider does not seem likely anytime soon.

Even after the passage of the Telecommunications Act of 1996, substantive local exchange resale agreements still are hard to find. While companies have announced agreements in principle, many of the contracts leave significant details (such as the incumbent's wholesale service rate) undefined. Carriers fear that high-growth resellers will enter the market, make fortunes for their top executives quickly, and contribute nothing to the nation's telecom infrastructure."[72]

A "typical" switchless reseller of long distance services has certain requirements to fulfill, which vary by state. Washington seems to be one of the easiest in which to obtain certification. There is no requirement to attend a hearing, or obtain an attorney. There are no filing fees and the processing time is estimated at 45 days, compared to four to nine months in California.[73]

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Overview

LOCAL REGULATORY ENVIRONMENT

Cities and counties confront one of the most difficult challenges faced by any of the players in the telecommunications environment created with the enactment of the Telecommunications Act of 1996. While other entities have been freed by the 1996 Act to enter new lines of business, change their rates, or create entirely new business enterprises, the 1996 Act placed fairly strong limits on the ability of local governments to regulate the new businesses, review rates, or control the conduct of new business enterprises. These regulatory limits combined with the emergence of verbal, if not actual, competition among companies has only complicated the difficult balancing act that local jurisdictions face as they attempt to meet community needs, enhance economic development opportunities, and meet their own revenue needs.

Traditional Roles of Cities and Counties

Cities and counties have a number of traditional roles that impact telecommunications. They act as *regulators* of some rates and services. They *manage the public rights-of-way* for public safety, collect compensation for use, coordinate the construction of facilities, and ensure access for the maintenance of public facilities. Counties and cities *enact and collect taxes* from telecommunications service providers. They *provide services*, most notably programming content for distribution through cable television systems in the form of public, educational, and government (PEG) channels. Finally, cities and counties are *responsible for the public welfare* through the enactment and enforcement of zoning and building codes, economic development initiatives, as well as careful consideration of policies and actions that will affect the quality of the community.

From this, it is clear that local authorities have some jurisdiction over telecommunications, but it varies depending on the industry and issues involved. Cities and counties have traditionally focused their exercise of authority through jurisdiction over public rights-of-way, most prominently through franchising.

Franchises are an indirect way of regulating telecommunications that worked fairly well for regulating large, vertically integrated, single service providers operating as effective monopolies. Franchises operate through a city's authority to regulate the public rights-of-way. Indeed, a franchise is essentially nothing more than a contract permitting a business to use public property in exchange for paying fees and meeting certain public service obligations.

Services that do not require the use of or cross the public rights-of-way with physical infrastructure have historically been exempt, for the most part, from franchise requirements[1]. At their most basic, franchises are meant to properly reimburse the public for the use of public lands by businesses and to regulate that such uses of the public lands are proper.

Cable television franchises are unique from others in that cities, faced with the de-facto monopolies and blatantly monopolistic ways of cable companies, began to use their franchises to regulate both the prices of cable services and the misbehavior of cable companies. While various amendments to the Telecommunications Act have first disallowed and then allowed franchise regulation of pricing, the fundamental construct of using franchise authority to reimburse the public for the use of the public rights-of-way by cable companies has remained a relative constant.

Telephone franchises are different from cable franchises in that telephone rate regulation has historically occurred at the state and federal levels of government on a rate of return basis. Additionally, compensation for the use of the public rights-of-way by the phone companies through franchise fees was either severely limited or prohibited outright[2]. Indeed, the last "franchise" that the City of Tacoma entered into with a local telephone service provider appears to have expired on January 1, 1950 without renewal.

The Evolving Role of Cities and Counties

The regulatory constructs that grew up around cable and telephony actually acted to ensure that the various telecommunications companies were restricted to providing their particular historical service — that changed with the Telecommunications Act of 1996. The 1996 Act tore down many of the historical regulatory barriers between telecommunications companies, created new categories of service, and recognized new business models.

Open Video Systems or OVS is one such new model that is now available to telecommunications providers. Like cable television, an OVS delivers video programming to customers. Unlike cable television where the owner of a cable system can effectively prohibit all others from delivering video content for sale over that cable system, an OVS operator is required to allow other companies to use the OVS infrastructure for the delivery of its for profit programming.

The 1996 Act also limited local jurisdiction over satellite Earth stations, receiving antennas for TV, and Multichannel Multipoint Distribution Service leaving cities and counties with very limited regulatory control over private communications facilities that are not located in the public rights-of-way. Additionally, 1996 Act further limited regulation of telecommunications services and facilities and did nothing to create a local role in the regulation of the resale of telecommunications services.

Cable Television Regulations

A variety of laws and regulations for cable television exist at the local level. Jurisdiction over cable television is generally split: the FCC focuses on access to content and other national issues while local agencies concentrate on residential service, access, and rates.

The local regulatory agency is called the "franchise authority." Local franchise authorities have adopted laws and regulations for subscriber service requirements, technical standards, public access requirements and franchise renewal standards for *basic* cable service. The 1992 Cable Act codified a regulatory plan allowing local and state authorities to select a cable franchisee and to regulate it. In addition, state laws deal with subjects such as franchising, theft of service, pole attachments, rate regulation and taxation.

The 1996 Act requires that no new cable operator may provide service without a franchise and establishes several policies for franchising requirements and franchise fees. The 1996 Act authorizes local franchising authorities to grant more than one franchise within their jurisdiction. However, a local franchising authority may not grant an exclusive franchise, and may not unreasonably withhold its consent from new service providers. Included in the grant of a franchise to a cable system are rights relating to the construction of the system, including use of public rights-of-way, easements, and areas to be served. In addition, the 1996 Act requires compensation to property owners who have suffered damages as a result of the cable operator's construction, operation, installation, or removal of cable television facilities.

Moreover, franchising authorities are required to ensure that access to cable service is not denied to any group of potential residential cable subscribers on the basis of income class. Although the 1996 Act also generally precludes the regulation of cable systems as common carriers, it authorizes the FCC to require, if it chooses, filing of international tariffs for intrastate communications systems, other than cable service, that are provided by a cable system.

Removal of State and Local Barriers to Competition

The 1996 Act provides that "no State or local statue or regulation, or other State or local legal requirement, may prohibit or have the effect of prohibiting the ability of any entity to provide any interstate or intrastate telecommunications service." The FCC is required to preempt the enforcement of any such statute, regulation or legal requirement. This provision contains two important exceptions:

- A state may impose, on a comparatively neutral basis, requirements necessary to preserve and advance universal service, protect the public safety and welfare, ensure the continued quality of telecommunications services and safeguard the rights of consumers.
- State and local governments may manage the public rights-of-way and require fair and reasonable compensation from telecommunications providers, on a comparatively neutral and nondiscriminatory basis, as long as the compensation required is publicly disclosed.

The Response of Local Jurisdictions

Locally, the cities and county have been active in preparing for, and dealing with, the changing telecommunications environment. In 1992, local jurisdictions created a forum for the discussion of telecommunications issues. The Rainier Cable Commission was established through inter-local cable television and communications services cooperative agreement to identify telecommunications issues and advise local governmental jurisdictions. Pierce County as well as the majority of cities and towns in Pierce County are members.

In response to the Telecommunications Act of 1996, the Rainier Cable Commission directed the preparation of a Model Telecommunications Ordinance in the fall of 1996. Appendix C contains an early version of this Model Telecommunications Ordinance. This model is being used as a guide by various local jurisdictions in creating telecommunications ordinances that meet their individual needs in the face of the emerging competitive environment. The creation of the Model Telecommunications Ordinance demonstrates the proactive response of local jurisdictions to this new environment.

A Difficult Balancing Act

But competition is still a wish, not a reality, for most of the basic telecommunication services that local communities receive. Each of the local jurisdictions will have to struggle with balancing a desire to encourage the introduction of advanced telecommunications services in their communities with the desire to maximize revenue.

Incumbent providers often prey on the understandable fear of local governments that competition will decrease the franchise fees received from cable providers and taxes received from cable and other telecommunications providers through lower prices to customers. This concern must be weighed against the benefits competition brings to a community through service improvements, lower costs for service, and the market expanding effects that competition often delivers.

The difficulty in striking a balance between these conflicting requirements is illustrated by the Model Telecommunications Ordinance. One early version of the model ordinance spoke of a desire to "encourage the provision of advanced and competitive telecommunications services on the widest possible basis to businesses, institutions and residents." At the same time it set application, review and permit fees at 1.75 percent of "the estimated cost of constructing the proposed telecommunications facilities." The result was that new providers interested in building advanced telecommunications systems that reached the whole community would pay more than providers putting together cheaper, less advanced systems that reached only a small segment of the community. Incumbent providers were, notably, to be unaffected by the ordinance until their franchises expired allowing them to rebuild their systems, if they so chose, without payment of these fees.

Finally, each of the local jurisdictions will have also have to balance the need to attract telecommunications investments to their communities with the public concerns that follow. Concerns stem primarily from the perception that competing telecommunications companies will place possibly hundreds of wires in a community, causing aesthetic and other impacts. Before creating solutions that limit or penalize infrastructure, it will be critical to assess whether a local market is attractive enough to telecommunications providers to realistically expect all of those wires to appear.

Endnotes

[1] Examples of un-franchised telecommunications services include: Direct Broadcast Satellite services, cellular telephones, and pagers
[2] RCW 35.21.860 in the case of Washington State Law

Overview

THE LOCAL TELECOMMUNICATIONS MARKET

Understanding the local telecommunications market is critical to gaining an understanding of the environment in which telecommunications decisions must be made. This review of the telecommunications market in our local community analyzes both the residential and business markets for telecommunications services as they stand today. A discussion of how different economic futures are impacted by telecommunications concludes the section.

Market research and analysis is a proven method for taking the pulse of the marketplace. The following documents, Current Residential Market, Current Business Market, and Future Markets, faithfully capture the pulse of the telecommunications market in this region, and also relate how a new telecommunications business would impact the economic future of the community.

The future market analysis relates the a telecommunications infrastructure to the regional evolution of economies, in this case from the industrial age to the information age. Being at such a juncture offers communities an opportunity to step back and ask questions such as: What direction is our economic engine heading? What direction do we want it to head? Are we building a base so tracks can be laid in that direction? Based on the answers to those types of questions, communities like ours will make decisions that influence the direction the economic engine heads.

The Residential Market

Research performed by
Market Data Research Corporation
Gene Starr, Senior Principal
and
Dethman & Associates
Linda Dethman

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Summary

The Current Market

To help assess current market support for advanced telecommunications services in the greater Tacoma area, Tacoma City Light pursued two avenues of customer research:

- A random sample survey of 606 residential households (+/- 4% error at 95% confidence), and
- A survey of [+/- 200] businesses with over 25 employees selected from the Tacoma-Pierce County Chamber of Commerce membership and other sources.

Each piece of research addressed two major questions about Tacoma City Light's potential plan to build a broadband communications system to serve its customers:

- How strong is the market demand for services which could be offered through this system?
- How strong is customer support for Tacoma City Light building such a system?

Market and Policy Support - Residential Market

How Strong Is Market Demand?

Tacoma area households have characteristics which suggest they would be receptive to Tacoma City Light offering them cable TV and other telecommunications services.

Demographics such as a strong base of technical and professional people (29%), as well as retirees (25%), higher educational levels (68% with at least some college), and adequate income are consonant with both types of services.

Over three-quarters of households (78%) already have cable TV, and over half say they need cable to get television reception at all. In addition, many households have all or part of the experience and technology (e.g., 46% with computers, 32% with a modem, 18% using the Internet) to take advantage of other capabilities of an advanced communications system (e.g., data transmission, Internet access).

If a new cable TV provider were to offer lower prices and/or improved programming, three-quarters (73%) of customers say they would be extremely or very likely to switch to that new company. Customers are looking for the best *value, both in terms of cost and programming,* and would welcome the benefits of competition.

Customers also value Tacoma City Light: when asked which of four companies they would choose for cable TV, even if all offered similar services and prices, Tacoma City Light was the leader by far (44%), with the current provider a distant second (15%).

How Strong is Customer Support?
Most customers have not heard of Tacoma City Light's potential plan to build a new communications infrastructure. Still, when told the basics about the system — including how it would improve electrical service and how it would be financed — the large majority, 81%, supported the venture. Customers cited the benefits of competition, but a notable number also specifically mentioned that Tacoma City Light is a good company and would provide better service, perhaps at a lower cost.

Overview and Methods

Residential Customer Survey
The goals of the residential customer survey on telecommunications were to:

- Assess the demand for an alternative cable television (cable TV) provider in the greater Tacoma area
- Assess market readiness for other telecommunications products and services
- Assess support for Tacoma City Light constructing a broadband communications system

Survey Methods

Questionnaire Development. A draft survey was developed and then reviewed during a focus group discussion with 11 residential customers. Results of this focus group revealed that residential customers, while quite sophisticated about cable TV needs and concerns, were less able to discuss other telecommunications services (i.e., the need for Internet access.) Thus, the survey was revised to focus on cable TV issues and support for building the system, and to gather baseline information about household technologies which might signal readiness for other telecommunications services.

Sample Size and Reliability. From all indications, the results from this survey provide very reliable data for Tacoma City Light. This sample of 606 randomly selected households reflects Tacoma City Light's entire residential customer base within **a + or - 4%** margin of error, with 95% confidence.

Data Gathering. Survey data were collected through telephone interviews conducted at Market Data Research in Tacoma, Washington, during October and November 1996. Each interview lasted about 15 minutes.

Data Notes. Due to rounding, percentages may not total 100%.

Caveat. While the greatest care has been taken in all stages of this study, the survey data reflect Tacoma City Light customers at one point in time. Decision-makers should bear in mind that people can and do change their minds and may act differently than survey results indicate.

Key Findings

Residential Market

Household Demographics. Demographically, Tacoma area households have characteristics which suggest receptivity to cable TV and other telecommunications services, including:

- Substantial percentages of households with professional and technical workers (29%) or retirees (25%);
- Many households with higher educational levels (68% with at least some college); and
- A third of households with incomes of $40,000 per year or more.

Cable TV Penetration and Stability. Most Tacoma area households have cable TV and demand appears to be quite stable. Findings which support these conclusions include:

- 78% of households subscribe to cable TV.
- Over half of cable subscribers (52%) say they need cable to get adequate reception.
- Over half of subscribers (53%) report they like the better and wider program choices that comes with cable, and another 27% say they want to receive specific types of programming or channels.
- Small percentages of respondents currently have mini (2%) or large (1%) satellite dishes .
- A fairly small percentage (6%) say they *intend* to buy a mini dish in the next 12 months.
- Further market penetration (6-12%) might be gained if various changes were made to existing cable services, including lower cost, installing lines to currently unserved areas, and improving programming and customer service.

Cable TV Program Preferences. Local broadcast stations are clearly the most watched stations among all customers, with cable stations watched much less .

- KING is at the top of the local station list (68% mentioned it as one of their 5 *most watched* stations), with KOMO at 61%, KISW and KIRO each at 39%, KCPQ at 37%, and KCTS at 27%.
- The most watched cable TV channels are the Discovery Channel (16% of all customers), ESPN (15%), HBO (11%), CNN (9%), Nickelodeon (7%), and A&E (7%).
- While over a third of customers (37%) could not name a TV channel they wanted but did not have, two cable channels - History and Sci-Fi - were at the top of the list of wanted but unavailable channels (13% and 9% respectively), with small percentages mentioning a wide variety of other channels.

Current Cable TV Subscriptions. Due to a recent merger, almost all cable subscribers receive their service from TCI. Of these:

- Most subscribe to more than a "basic" cable service.
- On average, respondents reported they spent $31.55 per month on their cable TV subscription.

Switching Cable TV Providers. If a new cable provider were to offer lower prices and/or improved programming, substantial percentages of customers say they would be likely to switch. Customers appear to be looking for the best *value* and would welcome competition, even if the competition did not have past experience running a cable TV company. Tacoma City Light emerged as the preferred provider compared to TCI. Findings show:

- Only a small percent of current subscribers (13%) would be likely to switch to a new (unnamed) cable TV company if price and programming were similar between the two.
- However, many say they would switch if a new cable TV company offered a lower price than their current company: 73% of respondents say they would be *extremely likely* (40%) or *very likely* (33%) to switch.
- With a 10% drop in price, about a third (36%) say they would switch; another 36% say they would switch if prices were 20% lower.
- Many subscribers (62%) also report they would be *extremely likely* (32%) or *very likely* (30%) to switch if the price remained the same but more TV programs were offered.
- Tacoma City Light far outstripped other choices (44%) as the preferred cable TV provider, if services were similar, when compared with TCI (15%), AT&T (5%), and US West (3%). Another quarter of respondents (27%) didn't know what company they would choose, suggesting they are a persuadable group.

- Information throughout the survey shows many respondents want competition and trust Tacoma City Light to provide better *value.*

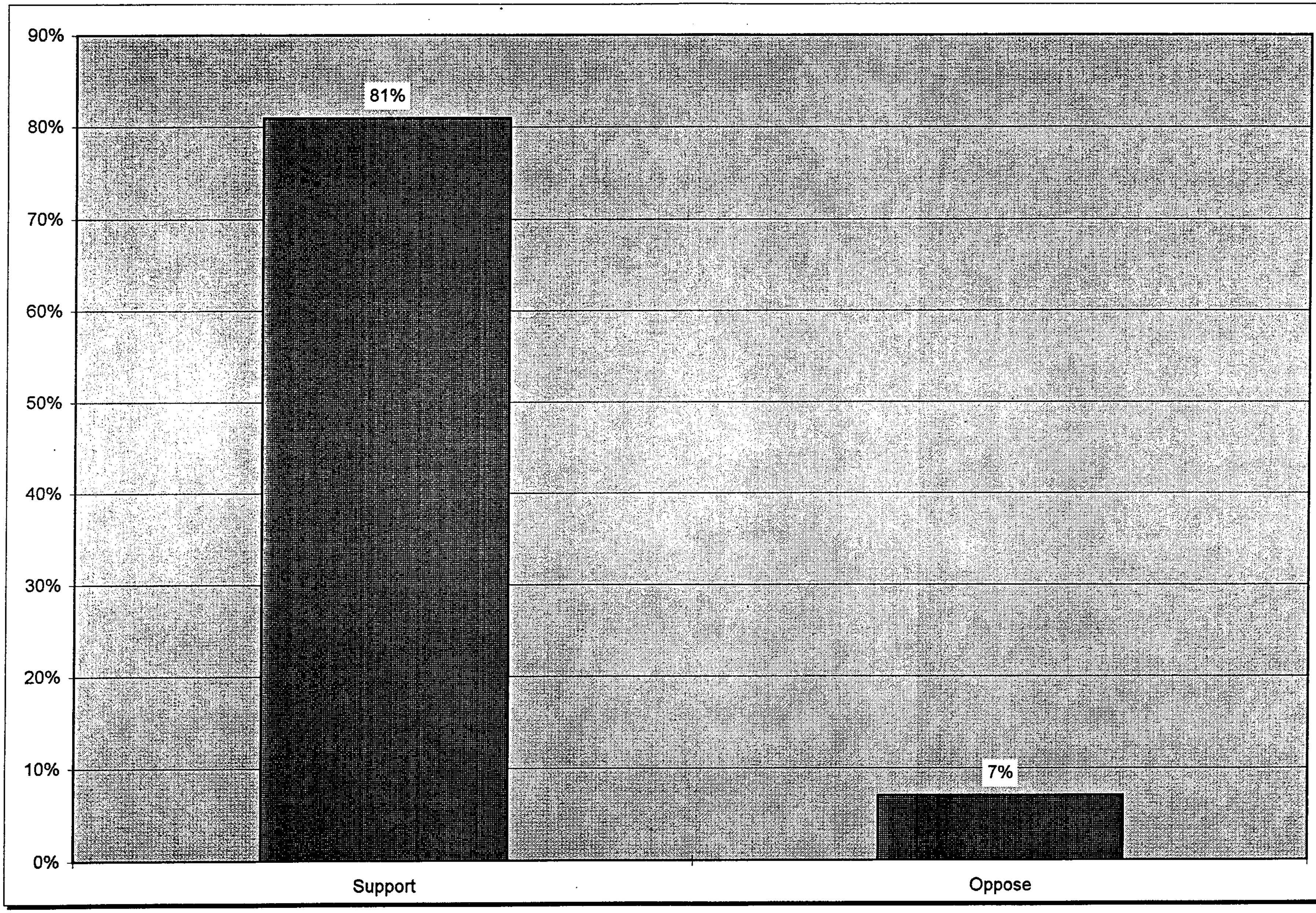
Readiness for Other Telecommunications Services. Many Tacoma City Light customers have joined — or appear ready to join — the information highway from home. Technology already in their homes, including computers and modems, make them a strong potential market for other telecommunications services which Tacoma City Light could offer through its broadband communications system. Key statistics show:

- Almost half (46%) of all households report they have a personal computer.
- 55% believe it's important to have a computer at home, with a notable minority (14%) saying they need a computer at home for work reasons (e.g., home offices).
- 32% of all households contain a computer which is equipped with a modem.
- 18% of all households have someone using the Internet (most for at least an hour each week), and another 11% report they intend to begin using the Internet within the next year.

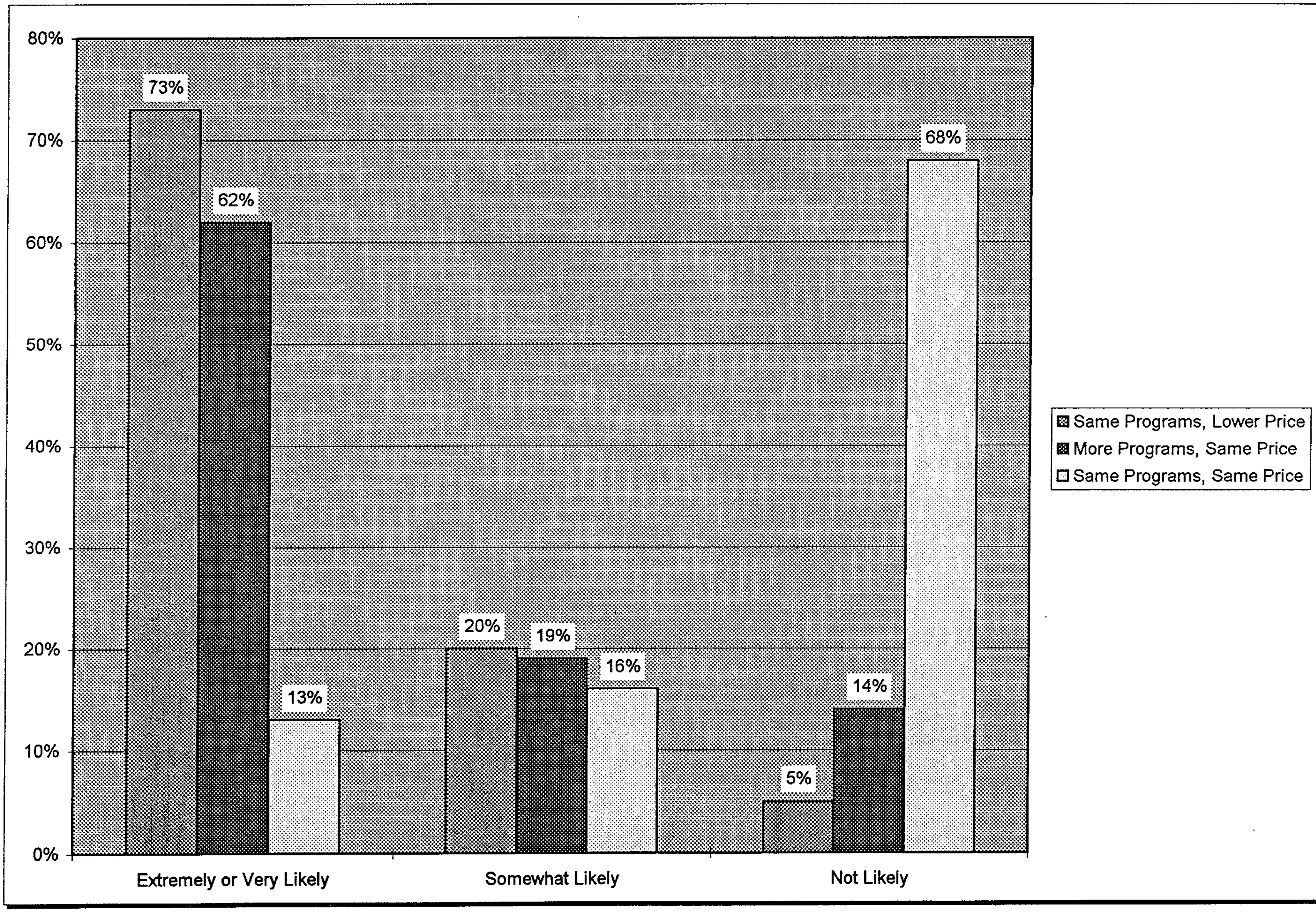
Support for Building the System. Most customers have not heard of Tacoma City Light's potential plan to build a new communications infrastructure. Still, when told the basics about the system — including how it would improve electrical service and how it would be financed — the large majority supported the venture. Customers most frequently voiced support because they think competition benefits customers, but a notable number also specifically mentioned that Tacoma City Light is a good company and would provide better service, perhaps at a lower cost. Surveys findings reveal that:

- Only 25% have heard or read any information about Tacoma City Light offering cable TV and other telecommunications services to customers.
- 81% said they strongly support (40%) or somewhat support (41%) Tacoma City Light building a new communications system; only 7% opposed it, with another 11% saying they "don't know" to what degree they would support such a venture.
- Even those who thought taxes would finance the project (21%), support it (74% - very or somewhat).
- 41% of customers (not including "don't knows") support the venture because it would create competition and eliminate a monopoly. 13% noted that Tacoma City Light is a good company and 9% thought they would get better service.

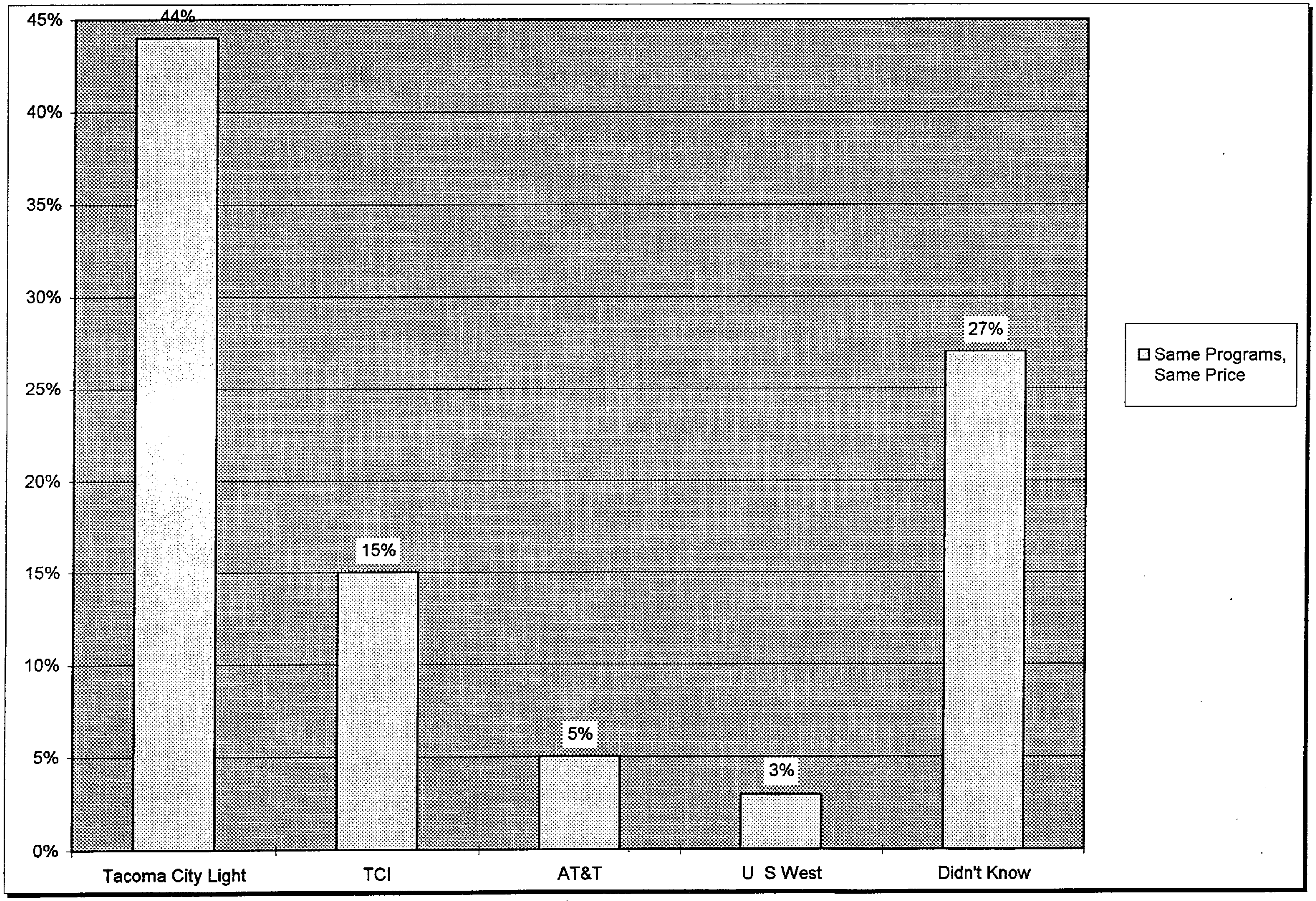
Support for Having Tacoma City Light Build a Modern Telecommunications System



Willingness to Switch to a New but Unidentified Cable Television Provider



Preferred Provider of Cable Television Services



The Current Business Market

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Summary

The Current Business Market

To help assess current business market support for advanced telecommunications services in the greater Tacoma area, Tacoma City Light pursued two avenues of consumer research:

1. An in-depth survey, personalized mail survey of 40 businesses, hand picked as *"Key Customers"* for City Light's telecommunications services. The results of this survey are not discussed in this report.

2. A telephone survey of 200 businesses, with 25 or more employees, selected from the Tacoma-Pierce County Chamber of Commerce membership. This group represents a pool of *"Potential Customers."* The results of this survey are summarized in this report.

Each piece of research addressed this question about Tacoma City Light's potential plan to build a broadband communications system to serve its customers:

> **How strong is the market demand for services which could be offered through this system?**

Market Demand Summary - *Potential Customer* Business Market

Based upon the results of 200 telephone interviews with medium to large Tacoma area businesses, the Potential Customer business market is on the brink of being ready for advanced telecommunications technologies. The money is there, the needs are forming and increasing, but the familiarity with choices of more advanced telecommunications technologies (i.e., ISDN) and the use of such technologies are fairly low.

On the bright side of the horizon, key findings show these customers account for more than $5 billion dollars in annual revenues and 25,000 jobs. What's more, they currently spend over $10 million dollars annually on telecommunications services. They perceive telecommunications links are extremely important to the success of their businesses, and many believe their telecommunications needs will increase rapidly, particularly for Internet access and local data networks. They are more concerned about reliability than price for their local phone service, and this concern, while not at the top of the list for telecommunications services, is certainly important. They are also very concerned about getting quick response from any telecommunications vendor.

On the more hazy side, however, most are not familiar with, nor do they use, more advanced telecommunications linkages such as ISDN and T-1 lines. They don't necessarily appear to have a wealth of employees with computers or Internet access. They spend the good portion of their communications dollars on local phone service and long distance, not data communications.

Thus, it appears the market will need considerable preparation to make it more receptive to the type of telecommunications services Tacoma City Light is considering for development. Preparing the market means working with customers to accurately inform them about the technologies available and how they can reliably and cost-effectively work for their business applications. Preparing the market also implies significant up-front costs in marketing to increase awareness, interest in, and acceptance of new providers, products, and services.

Overview and Methods

Business Market Surveys

The goals of the business market surveys on telecommunications were to:

- Assess market use of, and readiness for, business telecommunications products and services;
- Assess market need and receptivity to a new telecommunications provider; and
- Assess support for Tacoma City Light constructing a broadband communications system.

Survey Methods

Two survey approaches were used to assess the business telecommunications market, as follows:

***Key Customer* Survey.** An in-depth survey was developed for about 40 key companies in the Tacoma area with a strong potential to become telecommunications customers if Tacoma City Light were to install its broadband communications system. These businesses either had substantial telecommunications needs and sophistication and/or were large employers. The instrument was pre-tested in-house at Tacoma City Light, and hand-delivered to respondents during December 1996 with a personal request that they complete the survey and return it by mail to Tacoma City Light. (At the time of this writing, these surveys were still being completed, returned, and analyzed; thus, these results are not discussed below.)

***Potential Customer* Survey.** The same in-depth survey used for Key Customers was then reviewed during a focus group discussion with eight businesses which had 25 or more employees and which used telecommunications, but were not among the Key Customer group. Results of this focus group revealed that businesses of this size, while quite dependent on advanced telecommunications for business success, would probably not be able or willing to complete the in-depth survey. Thus, the survey was simplified and rewritten as a telephone survey.

The Tacoma-Pierce County Chamber of Commerce supplied a list of about 400 businesses which were Chamber members and which had 25 or more employees. Survey data were collected from 200 businesses through telephone interviews conducted at Market Data Research in Tacoma, Washington, during January 1996. Each interview lasted 10 to 15 minutes.

Key Findings

Potential Customer Market

Business Characteristics. While businesses in this sample of 200 companies in the greater Tacoma area vary considerably in both type and size, their annual revenues and number of employees suggest that many are likely to have significant telecommunications needs, either now or in the near future. Taken together, these businesses represent, at a minimum, $5 billion dollars in annual revenues and 25,000 jobs. In addition, over half serve a statewide or a wider geographic market and, on average, have more than one location in the Tacoma area. Notable characteristics are:

One-third (31%) of businesses surveyed are fairly small in terms of gross annual revenues (less than $5 million); however, 12% are in the 5-10 million dollar range, 17% in the 10 to 50 million dollar range, and 9% in the over 50 million dollar range. (Note: 31% of business respondents did not give their company's gross revenues.)

On average, each these Tacoma area businesses employ 129 people. A minority of these businesses have fewer than 25 employees (11%), while 37% have 25 to 50 employees, 26% have 51 to 100 employees, and 26% have more than 100 employees.

While just over one-quarter of businesses (28%) defined their primary geographic market area as the Pierce County area, the remainder had wider market horizons. Twenty-one percent defined their market area as western Washington; 22% as Washington or the Pacific Northwest, 8% as the West Coast, 13% as national; and 10% as international.

On average, the businesses surveyed each had just over 3 locations (3.45) in the greater Tacoma area. While two-thirds (69%) have only one business location in the greater Tacoma area, 12% have two locations, 5% have three, and 11% have 4 or more. Only 3% of businesses surveyed did not have a location in the greater Tacoma area.

Based upon length of time in operation, Tacoma area businesses appear to be quite stable: on average, they've each been in business 41 years.

Almost all the businesses interviewed (86%) already are customers of Tacoma City Light.

Importance of Telecommunications Products and Services. Qualitative perceptions of the importance of telecommunications services, and the amount of money these companies already spend each year on such services, indicate telecommunications are a mainstay of most of these businesses. Results show that among the 118 businesses which could supply a figure, $50,000 on average was spent in 1996 on telecommunications. If this average is used for all 200 businesses, these companies spent about $10 million dollars on telecommunications services last year. Key results include:

Almost three-quarters (74%) say that telecommunications links are *extremely important* to the success of their business, with another 17% saying that such links are *very important.*

When asked "If your telecommunications services were out for one day, how would this impact your business?" 62% replied *it would cause serious harm to business operations,* and another 20% said it *would shut down business operations.*

Of the 118 businesses estimating 1996 telecommunications costs, 29% reported the bill was in excess of $30,000, 31% said the bill was between $10,000 and $30,000, and 40% said the bill was between $500 and $10,000 per year. The average yearly bill was about $50,000.

Current Telecommunications Characteristics and Decisions. While the 200 businesses surveyed appear to spend quite a lot on telecommunications, it is probably not being spent on data communications, nor do they tend to rely on advanced telecommunications links such as ISDN and T-1 lines. However, many are encountering new telecommunications needs and review those needs on at least a yearly basis; many are making use of the Internet; and a sizable group say are considering more sophisticated telecommunications links. The following data support these conclusions:

Every business surveyed has at least one computer. However, about half of businesses had less than 25 computers, even though only 11% had 25 or fewer employees. Thus, many businesses do not have computers for every employee.

The majority of businesses have at least one employee with access to the Internet (61%), but usually the proportion of employees with Internet access is small.

Although most companies spend money on each of four types of telecommunications services — local voice telephone lines, long distance lines, cellular phones, and data communication — most telecommunications dollars go toward local telephone service. Long distance services are second, followed by cellular phone and data communications services.

The most frequently used Internet service is e-mail (68% of companies), followed by dial-up access (41%), Web Page hosting (41%), dedicated access (28%), electronic product and service delivery (21%), and electronic customer service (19%).

Two-thirds of business respondents were not familiar with ISDN lines or T-1 lines. Only a handful have an ISDN line (13%), with somewhat more having T-1 lines (23%). However, about 10% of all customers without these lines say they have considered installing them.

Only 11% of these businesses are currently served by fiber optics from U.S. West, although 41% didn't know if their company had this service.

Businesses report that several factors are important when they decide to acquire new telecommunications services, with price (35%), reliability (20%), and customer service (15%) heading the list.

Response time is very important to these businesses when choosing a telecommunications provider: 48% defined "good customer service" as quick response.

Choosing a Local Phone Company. Businesses report that reliability is by far the most important consideration among price, reliability, and customer service, if they were choosing between their current local phone company and a new company. No doubt this point of view is influenced by that fact that almost half (48%) report their phone service has been out at least once during the past year. Notably, only 41% would choose their current company (U.S. West) if they had a choice, but few were willing to choose Tacoma City Light as their local phone service provider. Specific findings show:

Almost two-thirds (63%) chose reliability as the most important factor in their choice, compared to 32% choosing price, and 6 % choosing customer service.

94% chose reliability as one of their top two deciding factors, compared to 70% choosing price, and 38% choosing customer service.

Less than half (41%) would choose U.S. West as their local phone service provider, 26% would choose AT&T, 5% would choose Tacoma City Light, and 4% would choose Sprint. Notably, however, one-quarter said they didn't know who they would choose.

Almost one-third of businesses report "fair, poor, or terrible" response time from U.S. West in solving problems with their phone lines.

Future Trends. Across a series of questions, these 200 companies reported that telecommunications needs were likely to change quite dramatically over the next 2 to 5 years. Telecommuting will increase, and many identify cellular phones, local data network interconnections, and Internet access as essential, fast growing telecommunications needs for the future. In particular:

These businesses report that, on average, 14% of their employees telecommute on a regular basis; they expect this average to increase to 18% of employees over the next 2 years.

The large majority of companies think that cellular phones (71%), local data networks (68%), and Internet access (63%) will be very or somewhat essential to their companies communications needs in the future.

49% of businesses think their company's use of the Internet will double (32%) or more than double (17%) over the next five years.

Almost all of these businesses (85%) think that the amount of time employees spend on the Internet will increase some (45%) or a lot (40%) in the next two years. They also believe the number of employees with Internet access will increase (43% somewhat, 22% a lot).

36% of businesses think their company's use of local data networks will double (27%) or more than double (9%) over the next 5 years.

26% of businesses think their company's use of cellular phones will double (21%) or more than double (5%) over the next five years.

1% or less of these businesses think their use of the Internet, local data networks, and cellular phones will decrease over the next five years.

Future Market to Serve
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Purpose

Tacoma, like other communities, has evolved in response to changing economic, social, political, and technical dynamics at work not only in the local area, but in the region, the country, and even the world. Understanding this change process for a given community is critical due to the reciprocal relationship between these dynamics and the community's economic base.

Over time, existing businesses contract, expand, or change focus in response to these dynamics—for example, the depletion of an area's natural resources, the building of a rail line, or the encroachment of competitors can each lead to change in the community's economic base. In other cases, certain conditions may lead new businesses or whole new industries to relocate in an area—for example, aluminum smelters' need for cheap power. The entrance of these new industries and fundamental changes in existing ones, in turn, contribute to and alter the original dynamics. As a result, reciprocal effects of the choices these businesses make are felt in a community's job mix, education system, infrastructure investments, and more. Based on this evolution, an area's economic base is built with tracks laid for its economic engine to take one route rather than another.

These periods of steady evolution, however, are occasionally punctuated by intervals of rapid revolution, where societies undergo more fundamental changes. We are in one such period now as we move from the industrial age to the information age. Being at such a juncture offers communities an opportunity to step back and ask questions such as: What direction is our economic engine heading? What direction do we want it to head? Are we building a base so tracks can be laid in that direction? Based on the answers to those questions, communities like Tacoma can make changes to influence the direction their economic engine heads.

One of the most significant ways a community and its economic base are intertwined is through an area's infrastructure. As a result, the evolution of a community's economy often depends upon the investments it makes in its transportation system, power system, and—given the shift to the information age—its telecommunication system. To plan for infrastructure needs to support an evolving community requires attention to its possible future states. This study was therefore commissioned to investigate Tacoma's potential economic futures and the inter-relationship between its economic development and telecommunication system investment decisions.

To help ensure Tacoma's telecommunication needs were assessed comprehensively, scenarios are based on information about the current context as well as potential future developments. Information was gathered from a variety of sources. Interviews with key business and civic leaders focused on the goals and efforts of various development activities. Data from published and unpublished sources were examined for insight into economic trends in each of the major sectors.

Economic engine. We identified the local economic engine, describing the relationships between sectors that drive economic health, growth and changes in a region. It is not unusual for a community's economic engine to evolve over time. Understanding how and why the engine is changing provides important insights into opportunities and threats that could affect the economic health of a region. Exploring this economic engine requires a historical understanding of a community's development, along with comprehensive review of how each industry sector is evolving in response to local and national pressures.

Economic interventions. Most communities have examples of economic development interventions, or deliberate action taken to change or impact economic activity. These interventions can take the form of programs, projects, and initiatives. Interventions often involve the forming of specific groups whose purpose is to design or implement these programs. These groups typically dissolve after the program is implemented. In other cases, long-standing groups have an ongoing purpose of economic intervention and may develop and manage multiple programs.

Interventions can focus on education or training, taxation/regulatory relief, business retention/expansion/recruitment; small business startup/jobs, international trade, government/military, transportation, telecommunications, energy, public safety, housing, culture, tourism/entertainment, investment confidence/image, and various industry sectors.

Each intervention represents a potential change in the economic engine. They either support or enhance the current trajectory, or represent attempts to alter the track a community is on. Each intervention has its own set of assumptions that influence the design of the program, implementation plans, and desired outcomes. The actual outcomes of the program interventions, however, depend on how the program characteristics interact with the local context. Analyzing the intervention requires understanding the local participation in the program, the program's overall purpose, and the validity of the program's assumptions. In this way, we can assess the potential outcomes of the intervention on the economic base in a community.

Scenario building. Not all economic interventions have the same impact. Not all evolution in industries will affect each community the same. Scenario generation involves analyzing each possible trajectory in a community and combining these individual plans into combinations of possible future states in the community. Through scenario analysis, inconsistencies or conflict between economic development activities can be identified. Competing projects or industries can be assessed to determine the more likely candidate for success and survival. Changes in the base of export jobs are assessed against other support industries to ensure that each is evolving in a way that will increase chances of mutual survival. Infrastructure issues around housing, education, transportation, etc. are all analyzed to determine the support for various future states. This complex analysis, when successful, usually yields scenarios that are relatively simple and elegant. In this study, we were fortunate enough to find little direct competition for resources among industries or projects. As such, we were able to filter our analysis down to three key scenarios that we discuss.

Implications of scenarios. Each scenario has an implication for the volume and type of growth in the community. Using the Puget Sound Governmental Council and State Office of Financial Management reports as a baseline, adjusted for recent changes in the local economy, growth rates for each scenario were generated from economic modeling. The scenarios also represent a potentially different set of telecommunication needs and may have implications for system architecture design. The study provides a brief overview of telecommunication needs.

In this section we provide an overview of the key outcomes of this study. You will find a more detailed, comprehensive review in Appendix D.

Changes in the Economy

Tacoma's Current Economic Base

The basic economic structure of the Tacoma/Pierce County economy is relatively well defined and easy to characterize. The most important economic sector of the economy is related to *government and military activity*. The major military installations in the county (McChord, Fort Lewis, and Madigan) support almost one half of the basic economic structure. Added to this are significant amounts of employment from state, county, and city as well as federal agencies and offices. Indeed, thirteen of the twenty largest employers in the county are governmental agencies. In addition to this governmental activity, employment related to *health care* and *professional business services* is also important to the local economy. These businesses reflect Pierce County's role as a regional service center for the southwestern portion of the state. Included in this set of activities are hospital and medical facilities, regional financial services, and the supporting commercial businesses. The third important sector of the local economy revolves around the *Port of Tacoma* and its related activities. This sector includes businesses directly related to the movement of ships and cargo through the port, as well as warehousing, materials handling, and transshipment activities.

Tacoma's Historic Economic Base

Tacoma's current economic environment emerged as a result of the substantial changes that have occurred over the last 25 years. A quarter of a century ago the Tacoma/Pierce County economy was much more dependent on manufacturing activities than it is today. Such businesses were tied to the natural resources base of agriculture, lumber, and fishing. Declines in those industries have been due to a combination of factors including: cost issues, environmental changes, and shifting patterns of world production. As these historically important economic activities decreased, the area could have suffered severe economic problems. Instead, the local economy was resilient enough that these changes caused only moderate problems and adjustments. This suggests the local economy is flexible and adaptable.

In Support of Development

The flexibility and adaptability demonstrated through this 25-year restructuring was the result of a number of forces. Two of the most important factors were the *physical environment* and *the business environment*. Over time, the natural beauty of the area's mountains, water, and open spaces as well as the moderate climate have become more important to businesses and individuals for "lifestyle" reasons. In a recent survey on business climate, the overall quality of life and opportunities for cultural experiences are considered to be two of the strongest factors that encourage businesses to locate or remain in Tacoma[1]. Second, the community's business environment has also been a positive draw. Again, the recent survey revealed that half of the businesses (50%) think the City of Tacoma regulations and codes are being fairly enforced[2]. Public-private cooperative initiatives, a healthy labor-management working relationship, attractive infrastructure, and available sites for development all have contributed to a positive atmosphere that was attractive to many firms. A growing population in a large metropolitan region has created a productive and adequate labor force that reduced location costs. Finally, relatively non-restrictive land-use regulations have provided an incentive for development in the Pierce County area. Significantly, some of these forces remain in place today.

Growth prospects for the areas, therefore, continue to remain strong. Tacoma has been recognized nationally as one of the best places for small business start-ups, based on cost structures in the area. The new University of Washington Tacoma campus has enhanced the educational offerings for local residents. Cooperation among local colleges, technical schools, and employers is strong. Recent initiatives in the urban core have improved the art, cultural, and entertainment offerings in the county. To a large extent these types of activities and advantages were important in the decision of Intel to move into the area, for Boeing to establish a new production facility at Fredrickson, and for Frank Russell to expand downtown operations.

Barriers to Development

In a recent survey of business climate in Tacoma, half (51%) of the businesses believed the current business environment in Tacoma causes companies to be reluctant to locate or remain in Tacoma[3]. The survey identified the most frequently mentioned 'significant factors contributing to this situation' were all taxes (29%), specifically the B & O tax (21%), regulations (13%), taxes too high for small business (10%), poor image of Tacoma (8%), and crime (8%). Factors that clearly discourage businesses to locate or remain in Tacoma are the crime rate, business and occupation tax rate, and the permitting and land use regulations.

Although amenities and infrastructure are adequate, transportation infrastructure is a problem. Additional road and rail capacity is the most problematic issue. Rail links and road access from the Port will likely be a short term issue that will be resolved with route suggestions posed in a study completed recently by the Port. Longer term solutions are under study for handling freight movement out of the area. Expansion of SeaTac airport is also of concern. Without a third runway, it may be difficult for the airport to compete with Vancouver and San Francisco in securing more international flights. The lack of such flights may impact the Northwest region's ability to attract global businesses.

DESCRIPTION OF SCENARIOS

During our analysis two key trends were identified that shaped the scenarios we developed:

- As discussed in the last few pages, Tacoma has been and is still experiencing *change in its economic base* as a consequence of industrial changes throughout the United States and globally; and

- The outcome of *downtown Tacoma development* activities will have a significant impact on Tacoma's future economic mix as a whole.

As a result of these two key trends, we used comprehensive analysis to construct three possible scenarios for Tacoma's economic future.

- The first scenario is what will likely occur under the *current economic trajectory*, with few or none of the planned development activities succeeding.

- The second scenario describes a world that enjoys not only the benefits from the first scenario, but also *accelerated growth* from the successful implementation of the International Services Zone.

- The third scenario experiences the benefits of the previous two, along with an *expanded, diversified base* from enhancements in tourism, culture, and entertainment from a "culture cluster."

These scenarios will be briefly reviewed below, including some of the economic development projects and growth impacts linked to each scenario. This is followed by a brief assessment of telecommunication needs.

Scenario One: Current Trajectory

Each of the specific economic development activities currently underway in Tacoma face barriers to be successfully implemented. Our first scenario examines the prospect that the current activities to enhance economic development (like the International Services Development Zone effort discussed later in this report) are not implemented, and the financial service sector evolves along its current trajectory without aid of tax benefits and other direct interventions.

The three drivers of the economy, Government Services, Transportation and Distribution (the Port) and Medical Services would play a major role in this scenario's development.
The Port of Tacoma and military bases at Fort Lewis and McChord Air Force Base would remain the drivers of the economy. The military bases presently contribute to roughly 50% of the economic activity in the Pierce County, employing over 32,000 military and civilian workers without taking Washington State National Guard employees at Camp Murray and elsewhere into consideration.

Services to Tacoma's growing medical services industry, including back office support for physician provider groups and insurance operations, are also expected to grow as a result of the criteria described above. Back offices allow service organizations such as hospitals, banks, and brokerage houses to outsource the administrative and record-keeping tasks of doing business. Such services are typically cheaper for companies than doing them in-house, and they allow firms to concentrate on those aspects of the business that make them money. Back offices may be attracted to Tacoma due to lower real estate costs and salary scales.

It is anticipated that intra-state, regional and national transportation services will remain an important component of the local economy, fueled by population growth, increased trade with the Far East, and the trend to consolidate cargo handling at large mega-ports. With its modern port facilities, rail links, proximity to a major interstate and an international airport, Tacoma is an important hub in the state's transportation system. As a result, the transportation sector will continue to provide Tacoma with a source of competitive advantage, if congestion can be controlled. In addition to distribution centers and major shipping lines, Port of Tacoma officials expect light industrial companies to locate more facilities in its service area due to the commercial zoning available.

At the same time, a modest number of computer-related manufacturing units as well as research and development units could arrive in the wake of successful operations at Intel and Matsushita. Some of these would likely provide support to the established computer companies in a technology corridor from Bellevue to Bothell in King County. Quebecor Integrated Media, a major Microsoft supplier, is an example of such a firm. Large tracts of relatively inexpensive land where custom facilities can be built, easy access to most modes of transportation, and an available work force make this prospect likely.

Implications for Growth

The three scenarios must be compared to a basis. For this report the basis is the Puget Sound Governmental Council and State Office of Financial Management reports, adjusted for recent changes in the local economy. Their forecast for population growth in Pierce County is 1.8% per year from 1995 through 2005 and then declines slightly to an annual rate of 1.5% for the subsequent fifteen years. For Tacoma, population growth is predicted to average 1.25% per year through 2005, and then slow to 1.0% annually through 2020. These growth forecasts assume that the current state of the economy remains unchanged. Housing unit growth will increase by the same percentage amounts as per the population. In Pierce County, over the long term, housing units tend to increase at about the same rate as population.

It is reasonable (but not certain) to assume that the basic economic structure will remain unchanged over the medium term horizon (through the year 2020). However, at least two forces will impact the nature of the local area economy. One is the effect of the Growth Management Act requirements. The other is the provision of adequate infrastructure, including telecommunication support. Each of these will be addressed following the scenario descriptions.

Scenario Two: Accelerated Growth

In addition to the growth occurring naturally from the evolution of different industrial sectors, a second scenario portrays Tacoma/Pierce County as a center for professional services including financial services aimed at an export market. The redevelopment of Tacoma's downtown is a second major trend influencing the economic future of the city. There are several economic development groups with specific projects underway designed to enhance downtown Tacoma. Major projects are reviewed below. Downtown development could take one of several directions, depending on the outcome of these projects.

This scenario would also include a higher rise in advanced technology companies to follow the upgrade in the downtown corridor that would accompany a financial service center. This prospect could result in the greatest change in the nature of the employment base in the Tacoma/Pierce Country area. This vision of the area's economic future rests on the passage of the International Services Development Zone, which would provide tax advantages at the federal and state level to attract international services companies (especially financial services firms) to Tacoma. In addition to financial services firms, the types of businesses attracted under this scenario include professional services such as law and accounting, architecture and engineering, and environmental consulting firms.

Support for Professional Business Services
The "Zone". In 1994, Tacoma was awarded a $ 3 million federal Enterprise Community grant, and was designated a state Empowerment Zone. In addition to the funding, the EZ/EC designation carries a number of tax and regulatory advantages. The primary purpose of the EZ/EC programs are to create jobs in distressed urban areas. The TEC has underway a number of significant programs to achieve this goal, including an employment initiative, the Tacoma Business Assistance Center, the Micro Loan program, and the International Services Development Zone (ISDZ). The ISDZ has the potential to significantly change the face of downtown Tacoma.

The strategic mission for the establishment of an ***International Services Development Zone*** is to contribute to the economic prosperity of Tacoma by bringing financial service and related firms into a state designated empowerment zone within the city. The International Services Development Zone Committee is modeling its ideas on the successful International Financial Services Centre in Dublin, Ireland. The Irish venture has created training opportunities, jobs, and community redevelopment. The ISDZ Committee has the active help of the Irish government in obtaining information on how its program and its technological, educational, and administrative support are structured. The ISDZ initiative hope to achieve similar success in Tacoma, through a three-pronged program: (a) tax relief at the federal, state, and local level, (b) appropriate investment in technology (especially telecommunications) infrastructure, and (c) coordination of education resources to provide adequately trained employees for sophisticated international service businesses. The primary focus at present is the promotion of tax incentive legislation at the federal, state, and local level.

The organizing committee, consisting of local business leaders, city officials, and other concerned parties, has already contributed toward drafting federal and state legislation. If successfully passed, the legislation will create multiple tax benefits designed to attract businesses. The group has also created committees to ensure completion of plans for facilities, infrastructure, and education to support companies locating to the zone. It is anticipated that state and federal legislation will be passed during the 1997 session. The ISDZ is part of a larger effort by the Tacoma Empowerment Consortium (TEC) designed to provide training and jobs to zone residents and improve the overall economic health of the area within the zone. Other efforts by TEC include a one-stop-shop for capital investments in cooperation with the Small Business Association, a micro-loan program, and a technical assistance center.

Support for an Urban Retail Core
City Beautification If there is to be significant change in the base of professional service businesses, additional retail support will be required. As such, the *Thea Foss Waterway Redevelopment* could be a fundamental part of any downtown renaissance. The City of Tacoma purchased the waterway with the intent to clean-up and revitalize the area. Recently, the City created a Public Development Authority which will issue bonds to underwrite the creation of an Esplanade, walkways, and public parks that should help move the project forward.

The Foss Waterway development could add by the year 2020 between 125,000 and 400,000 sq.ft. of new office space and 100 to 500 new residential units in the redevelopment area. New employment in the area would range from 1,100 to 3,500 over this time period. In addition, the visual appearance of the downtown core will be dramatically enhanced by such a project. This would provide an added attraction both to organizations working on Tacoma's economic development as well as to private developers. Other proposed mixed-used buildings in the redevelopment area could support the growth of professional business services. Possibilities include: class "A" office for ISDZ companies and other firms; government office space; retail and condominium space; as well as a museum complex, public park, and marina.

Enterprises that locate in the ISDZ would blend well with existing financial services firms in the area. They would also provide employment for a highly educated, well-compensated work force. In doing so, they create an upward employment path for workers in existing businesses such as the medical insurance industry, the banking industry, as well as for retiring military personnel who typically have extensive management and/or technical training.

In addition to the growth of computer-related technology companies envisioned under Scenario One, the migration of biosciences firms to the area is also possible. Several factors make this likely. The greater Seattle area is already the sixth largest life sciences center in the country, with growth fed by research at the Fred Hutchinson Cancer Research Center and the University of Washington. Many of these biosciences companies are reaching the end of their research and development cycle and are moving on to the manufacturing and marketing phase. In doing so, they will be in search of custom built laboratory and manufacturing space. Again, available land at a relatively low cost and the prospect of retrofitting existing office or warehouse space make Tacoma/Pierce County a contender. Research institutions and those potential headquarters operations that remain in the Seattle area are located under an hour away by car. The existing medical centers in Tacoma could provide controlled patient testing opportunities. In addition, the new research facility at Madigan Army Medical Center could provide a stream of trained employees as military personnel leave the service. Under this scenario, universities would need to work with new employers to ensure they graduate an appropriately prepared work force. For example, the University of Washington's nursing program plans to expand its public health management program at the downtown campus would support this scenario.

The impact of one large advanced technology company or a few international professional services firms could have a significant impact on the economic growth of the area. The arrival of such firms would encourage more high and middle income housing to locate in or near the Central Business District, followed by the development of additional retail opportunities. Smaller business districts such as Proctor, Lincoln, Stadium and Sixth Avenue would provide retail support for the newly arrived professionals as they visit restaurants, use local services, and shop for goods. In addition, executive housing in North Tacoma, University Place, Lakewood, Puyallup and the Key Peninsula would also be in greater demand, with concurrent impact on the retail core in those communities.

Implications for Growth

The location of another large technology company (following the Intel example) or the successful development of the ISDZ would produce a major employment gain. In this case, growth within Tacoma would increase by 0.75% annually in the early time frame (1995-2005) and by 0.25% in the later frame (2005-2020). A slow down in the acceleration of growth would be due to more attractive non-Tacoma locations. This type of scenario would initially increase annual growth in Pierce County by 0.5% annually, and then slow to 0.75% over the longer time frame. Again, this would reflect better siting opportunities outside of Tacoma.

A recently produced consultant report[4] indicates that if as fully developed as the Dublin project, this could produce about 10,000 jobs in the city — 3,500 for the ISDZ and 7,000 for indirect jobs. The earnings would be $130 million for the 3,500 direct and $200 million for the indirect, or total new earnings of $330 million. The jobs would also provide a large number of entry level, high school education positions with, of course, a mix of higher level professional service type jobs. The site would include about 27 acres, 8 on the water. This would produce about 1,565,000 square feet of new office and commercial space — 20,000 for retail, 1,500,000 for class A office, and 45,000 other.

Scenario Three: Accelerated Growth with Culture Cluster

Adding to the conditions that built scenarios one and two, a third scenario considers the enhancement of tourism, entertainment, and culture industries in Tacoma. If Tacoma makes some significant facilities improvements it would become eligible to bid on larger national and international conventions. Minimally, these include the construction of a second "Business Class" hotel and the expansion of the existing Convention Center. Benefits would reach private convention facilities, such as the Landmark Convention Center and the Sheraton, public facilities like the Tacoma Dome and Cheney Stadium, and retail businesses. For example, the proximity of several large performing stages to one another in the Broadway Theater District creates the opportunity for Tacoma to become an important center for performing arts conferences such as the recent "World Harp Congress."

Support for Increased Tourism and Convention Trade
In further attempts to bring business into downtown Tacoma, opportunities and venues for new entertainment and cultural locales are being pursued by several interested parties. Such projects could increase visits by tourists and/or conventioneers.

Conventions The Sheraton Hotel currently provides business accommodations downtown. Tacoma cannot be considered, however, for a specific "class" of convention because it lacks enough space to qualify. To host such conventions requires larger convention center space and more business hotel rooms. Plans to rectify this situation are underway. The Planning and Development Department has already proposed an expansion of the Convention Center and the construction of a second business class hotel within walking distance of the Convention Center

Museum Complex Plans are also underway to create a Museum Complex within a larger "culture cluster." This complex will center on a portion of the Thea Foss Waterway and an adjacent portion of Pacific Avenue between 15th and 21st Avenues. The Washington State Historical Museum on Pacific Avenue anchors this complex and is already open for business. The University of Washington-Tacoma campus, which includes several renovated historical buildings, is located across from the museum and has allocated the Pacific Avenue level for commercial use. The International Museum of Modern Glass is scheduled to open in the year 2000. Other possible tenants in such a "culture cluster" include a relocated Maritime Museum, a Puyallup Tribal Culture Museum, and the Tacoma Art Museum. The recently formed Public Development Authority for the Thea Foss Waterway will undertake long term planning for this area.

Movie Theaters To encourage more traffic into the downtown area, the City of Tacoma recently rewrote its theater ordinance to encourage the development of a large, *multiplex movie theater* in downtown Tacoma. Such cineplexes typically include eating and drinking establishments as well as video games complexes and would attract people downtown during evening hours. This would have the added benefit of improving the perception of safety, in that people walking to their transportation say they feel safer when others are around.

Casino The Puyallup Tribe of Indians recently opened a *gambling casino*, eventually to be relocated on a riverboat docked on the Blair Waterway. The success of such development efforts should increase the number of evening visitors to the downtown area and have a positive impact on existing retail establishments.

Rail Connections The *Train to the Mountain - Park Junction Resort* project is designed to create passenger train service between downtown Tacoma and the entrance to Mount Rainier National Park. Organizers expect the project to eventually include a second spur down to Morton, Washington. The City of Tacoma already owns the tracks from Tacoma to Morton. Park Junction Resort, a private convention and hotel center to be located near the park entrance, will serve as the track's mountain terminus. Tourists will be able to board a train in downtown Tacoma and a short time later step outside to enjoy recreational opportunities in and around the mountain. Transportation plans include shuttle bus service from the terminus to Paradise Lodge and other significant sites inside the park. Board members are proposing to provide service by 1999. The *Three Mountain Tourism Council* has also secured assistance from Microsoft to provide interactive historical and geological information at several sites in the area. This assistance may be coordinated with the Train to the Mountain project as it becomes more developed.

Second, if a "culture cluster" was created in Tacoma's Central Business District, Tacoma could become a tourist destination in its own right. It is anticipated that as tourists explore traditional attractions in the area, such as Point Defiance Park and Mount Rainier National Park, they will learn of the community's cultural attractions located downtown. The Washington State Historical Museum, Tacoma Art Museum, the Broadway Theater District and a possible multiplex movie theater in combination with the International Museum of Modern Glass and other prospective developments on the Thea Foss Waterway would create a downtown destination of interest. Increased tourist traffic would then support the development of additional attractions, for example a maritime museum developed from the existing Maritime Center on Dock Street, an aquarium, a Puyallup Indian Tribal Museum, and additional public parks.

Linkage between these tourist attractions and existing business districts which have developed their own personalities, such as Proctor, Lincoln, Old Town, Stadium and Sixth Avenue, could provide a significant business boost for these neighborhoods. In addition, increased tourism would lead to opportunities for new and existing Bed & Breakfast and other lodgings.

At minimum, however, a modest expansion of employment in the professional services sector as described under Scenario One would be required for this scenario. Local people with disposable income are needed to support these facilities during the low point in the tourist season. That fact also makes facilities in this scenario more likely to thrive if Scenario Two comes to pass. In addition, Scenario Three would be helped by a well-orchestrated approach to cross-promotional marketing by the various tourist locales.

Implications for Growth
This scenario would have a significant impact on the moderate term growth outlook for the area would come from the development of an expanded art/cultural and tourist industry. This could happen if the "culture cluster" generates the critical mass of activity needed to attract travelers and put the area on the "map" of destination stops. The effect will be to raise Tacoma's annual growth by 0.1% and Pierce County by 0.2% in the 1995-2005 time frame. Greater growth will occur during the 2005-2020 time frame as infrastructure is developed and earlier impacts are felt, with increases by 0.25% for Tacoma and 0.3% for the county.

Impact of the Growth Management Act

An issue that will influence where and how population growth will occur is the impact of the Growth Management Act based on its Under new regulations, the emphasis is on concentrating growth in the existing urban areas, curbing growth in the unincorporated areas, and avoiding growth in rural areas. As a result, more growth will be channeled into the Tacoma and Puyallup vicinity than in the past. Areas with clear development plans and the ability to provide traditional infrastructure will also see steeper growth. This factor favors areas such as Browns Point, Dash Point, DuPont, and Thun Field.

New housing types will change. Within urban areas, including the central business district, there will be a growth in multi-family housing. The density in the main existing residential areas (e.g., Proctor and Stadium, Lincoln, University Place, Steilacoom) will increase — with a strong possibility of more high rise (two to six story) units. In the county, the expansion will be primarily accommodated through single-family, detached units. Even in the county, however, the pressure will be to consolidate growth into those areas that already have traditional infrastructure.

Growth on the Key Peninsula will be more problematic. Transportation is obviously a problem, and this will favor location there by non-commuters, generating more demand for local retail goods in Gig Harbor. Infrastructure In that area, such as water and sewer will be more expensive and will push up housing prices.

To the extent that the employment growth occurs closer to DuPont than to the current Tacoma boundaries, some housing growth (and population) will occur in Thurston rather than Pierce County. One estimate, by the Thurston County Economic Development Board, expects that almost 70% of the non-DuPont residences of Northwest Landing employees to be in Thurston and only 30% in Pierce. As Thurston grows, however, people will travel to Pierce County for shopping and entertainment. Although a second spill over area could be Auburn in south King County, residential neighborhoods located there are not as attractive as in Thurston County nor is the economic base as diverse.

TELECOMMUNICATION NEEDS

Our findings suggest that with appropriate investments in infrastructure and a supportive business climate, growth patterns should continue into the future. As a result, Pierce County will continue to be an attractive location for new forms of economic activity. In this section we briefly describe the relationship between each scenario and its telecommunication needs.

Impact of Telecommunications Infrastructure

Patterns of growth in the major sectors of the local economy are, and will be more so in the future, dependent on the community's telecommunications infrastructure. Many established sectors will also require continued technology investments to remain competitive.

Government activity at military installations will continue to be the a significant sector in the local area economy. However, as the size of the public sector in the national economy continues to get smaller (moving toward the promised balanced budget), reductions in the defense budget will become increasingly important. The existing facilities in Pierce County have survived two rounds of base closures, due in part to the fact that they were technologically sound. The future is always uncertain, however. Access to the most modern telecommunications technology will help assure their survival in the local area.

Up-to-date communication and information services are essential to the survival of *health services.* Commercial data management in support of medical services also require a substantial and increasing telecommunications infrastructure. The health care industry is a primary industry in Tacoma Pierce-County and a rich source of potential applications and associated technology drivers. Not only are there a variety of applications driving both applied and fundamental research, but the spectrum of actual operating modes in health care provision systems span a wide range. Provision ranges from elective, non-emergency, monitoring where the patient and provider are together in a well equipped office, to emergency diagnostic and treatment situations where the diagnostic expertise is geographically remote from the patient and the treatment expertise. Remote diagnosis requires high bandwidth, real time connection oriented services which support multiple video and data streams as well as voice communication. The precise telecommunications capability required to support this activity is application specific, but can be analyzed within a distributed communication framework since in general health care providers may be geographically dispersed in multiple locations.

The increasing telecommunications need is also true of other *professional services*, especially in the area of *financial services.*
The financial services are not communications limited in the same sense as remote medical diagnostic services, or shipment status monitoring. While financial service providers at both the institutional level and the consumer level are sophisticated users of information, the financial services industry does not place heavy demand on the design of the telecommunications technology. This somewhat curious situation results from several factors:

1. Most financial information is coded in alphanumeric formats. These formats are very efficient to transmit using a variety of existing telecommunications technology.
2. Humans utilize financial information and services in alphanumeric or rudimentary graphical formats (trend charts).
3. Financial information is semantically "dense", the simple statement "DOW off %5" contains a wealth of information, but is amazingly compact (eight bytes).

So it is clear that need for increased bandwidth is usually not instigated by their need to support more volume. However, the financial services sector in the Tacoma area does have unmet telecommunications needs, as evidenced by the Frank Russell Company, one example of a professional services firm experiencing increased telecommunication needs in order to link its headquarters with its international offices and clients. For these kinds of clients overall bandwidth may not be an issue, but security of the line, speed and direction, and responsiveness of the vendor may be. This is an industry sector where telecommunications is part of the production process — a breakdown in the system can cause the organization itself to cease to function until the system is back on-line. Failure to invest in new technologies, especially communications technologies, would therefore limit the growth potential of the area. Companies like Frank Russell would be forced to continue to privately construct work around solutions or utilize a remote service center that could supply desired access and services. Other areas looking to attract these types of companies would need to provide access to a sound telecommunication infrastructure. The success of the international services district and the ability to attract new businesses to the redeveloped Foss will depend, to a great degree, on access to low cost, full service telecommunications technologies.

More uncertain, and equally important, will be the information and communication needs of shipping and support activities in the *Port of Tacoma* area. Increase in direct competition to Tacoma's container trade, competition for new shipping lines, just-in-time inventory requirements, and lower labor costs all suggest the provision of telecommunications technologies will be important for this sector of the economy as well. Distribution centers in the Port of Tacoma, with SuperValu as another example, are becoming increasingly dependent on telecommunications for the transfer of data between regional distribution centers, vendors, and the parent company. . Customers frequently desire to know the status of shipments which they have sent or are waiting to receive. These shipment status services are often effective differentiators for shipment service providers. In the small package shipment service business competitive pressure drove both FedEx and UPS to offer shipment status services. With the small package shippers, status generally provides pickup time, expected or actual delivery time and other information. With integrated shipment services providers such as the typical port authority, the cargo may be at sea, in the air or with some common carrier trucking firm which makes an accurate and reliable determination of shipment location problems. A possible solution entail utilizing global positioning systems (GPS) and wireless telecommunications technology to update port authority databases on the location and condition of shipments in transit.

In the *retail sector*, increased reliance on computer usage in stores is likely, as inventory costs can more effectively be controlled with timely ordering and control, use of fax and modem transactions is increasing, and the use of things like fingerprint recognition for credit cards or check writing. Successful merchants will need to adapt to these new demands -- a potential large increase in data transmission needs from many small and scattered sites.

The *advanced technology* businesses also can have telecommunication needs. A research based organization will often desire high-speed access to other researchers or their works. In fact, it is the ability to telecommute and connect regionally-located Universities that has fueled some of the dispersion in advanced technology companies to smaller communities.

Culture-based organizations in this scenario are not as technology-dependent as professional and health services, but telecommunications does play an increasing useful role in the tourist/convention category. The Visitor and Convention Bureau anticipates the use of smart cards to allow tourists access to a variety of services from transportation to tickets to shows. That idea would require a well developed communications network in the city and adjacent points of interest. For the conventioneer, satellite conferencing and digital information transfers are of growing importance. In addition, many business travelers expect a computer modem in their hotel rooms to connect with their home office. Museums increasingly use interactive media as an educational tool.

It is not merely the business applications themselves that require infrastructure access. Sophisticated, technology oriented employees of many of these types of firms would expect to have access to their workplace computer system from their home, access to the Internet, high quality cable systems, and eventually new technologies which are only on the drawing board at this time. A failure to invest in the appropriate infrastructure may leave Tacoma out of the running as a location for these types of firms and the employees who work for them.

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Overview

A Local Telecommunications Business Plan

This study has reviewed the telecommunications industry both nationally and locally. In reviewing the local situation it is clear that the local market has a growing need for better telecommunications access. Something significant is clearly underway when 18% of the homes in the greater Tacoma area report that they are using the Internet and that use is projected to grow to 24% by the end of 1997. Despite this growth in demand, the incumbent wire line service providers have stated that their investments in the local infrastructure will either slow without significant rate increases or be halted all together. One could hope that other companies would step forward and create a modern telecommunications system through out our community but the prospects for that occurring anytime soon appear dim. While Competitive Access Providers will eventually enter the local market, their focus is almost exclusively on large business users. Other potential systems are either of low capacity or not scheduled to be fully deployed until the next century.

Could Tacoma City Light create an advanced telecommunications system to meet the telecommunications needs of the communities it serves in addition to its own internal communication needs? And, if Tacoma City Light were to create such a system and operate it in a business like manner, would the system generate sufficient revenues to make the system self sustaining? As this section demonstrates, the answer to both questions is yes.

A viable business would be created by:

1. offering products and services that meet customer needs directly and by providing a pathway through which the private sector can meet additional needs,
2. pricing those products and services competitively, and
3. delivering them over a modern, high-speed, high-reliability telecommunications system, a business is created that is viable using conservative revenue projections.

The following subsections outline how such a business could look by providing a review of the Products and Services, the Technology Architecture, the Operating Plan, the Organization, and the pro forma Financials of such a business.

Products and Services

Three types of telecommunications services would be offered by Tacoma City Light — wholesale high-speed telephony and data transport, Internet data transport, and cable television. Each of these services meet the growing telecommunications needs in the greater Tacoma area and are explored in the following sections.

High-Speed Telephony and Data Transport

High-speed telephony and data transport on a fiber optic SONET system would be offered by Tacoma City Light on a wholesale basis to the business community. These high-speed digital lines would be offered from point-to-point in standard DS1, DS3, and higher capacity connections, at an estimated cost of less than half the existing comparable high-speed copper lines. The lines would be open on a non-discriminatory basis to local and long distance carriers, local value-added service providers, and local businesses. The availability of these lines would bring choice and price competition to the greater Tacoma business community.

The network of fiber optic cables would be constructed throughout the area Tacoma City Light serves. The system would interconnect with the offices of major telecommunications providers in the region. The diverse routing of cables in a multi-ring architecture would be used to enhance reliability.

Business Applications

Lines between offices would be used for teleconferencing, data networking, image transfer, or telephones. New leased lines would be quickly provided to customers. Customers would have low-cost access to new telephone service providers. Competition would exist for transport of telephone and data applications. Individual businesses would benefit from competitive prices and prompt service. Redundant fiber optic paths would be utilized to provide the transport service.

Private Data Networks Data network applications are likely to be the most common application on the system, meeting the performance and growth expectations driven by business computer use. The system would meet the reliability and security needs of this critical business application. These lines would support private data networks, which could include Intranet and Extranet links. An Intranet link improves the features of network service among buildings within one company; an Extranet link extends the ease of private information exchange among a few businesses.

Telephone Access Access to new telephone service providers is likely to be the second most common application. Lines would be extended directly to inter exchange carriers allowing them to competitively reach customers without using the local exchange carrier. Long distance carriers would have the ability to offer local telephone service directly to customers by providing dial-tome and switching service over the fiber SONET system. These interconnections with regional communications companies would provide more choices to customers. Access to alternate central offices, alternate POPs and other issues of reliability that are of importance to businesses who rely heavily on their phone lines would be met by this system's design.

Value - Added Services A provider of a value-added service would be able to obtain transport on high-speed lines and provide custom telecommunications applications. For example, a value-added service provider can design, install and configure a business wide area network, composed of several local area networks linked with routers, which convert local area network signals for transmission on the SONET system.

High-Speed Transport Service for Local Schools and Public Safety

The high speed telephony and data transport network would be constructed to meet the transport needs of schools, public safety offices, and libraries, if franchise authorities so desire. These offices could use the transport facilities to substantially improve their internal communications and their services to the community. Also, the needs of the electrical transmission and distribution sections of Tacoma City Light would also be addressed with transport services to all substations.

Internet Data Transport

Internet data transport would be offered on the hybrid fiber coax system. Cable modems would be used to provide high-speed Internet access for homes and small businesses, in partnership with Internet service providers. Transport service for cable modems would be provided by Tacoma City Light between customers and Internet service providers.

Customers would use Internet services for entertainment, education, and shopping for other products and services. The delivery of information would be in the form of multimedia text, images, animation, sound and video. Use of this service would reduce reliance on traditional telephone lines for access to the Internet.

Cable Modems vs. Standard Telephone Lines

Cable modems deliver data up to 1000 times the speed of standard telephone lines. Customers would be able to quickly search and retrieve information such as stock quotes, weather reports, and headline news. Providing high-speed capability removes restrictions of telephone lines on size and complexity of Internet features. Sound, images and better full-motion video can easily be delivered from the Internet on cable modems.

The use of the cable modem frees the telephone line and network for telephone calls. Internet service providers transfer *data packets* which can be individually switched and routed, without the inefficiencies of using switched *circuits*. Increased Internet traffic will eventually force telephone system operators to upgrade their local switched telephone systems in order to maintain its availability for emergency and other telephone use. Cable modems, a new HFC cable plant, and direct transmission to Internet service providers would relieve telephone system operators of this burden. Home computers could be continuously connected to the Internet, performing work without impacting telephone use. Returning the household telephone for traditional use would also preserve the current flat-rate local telephone billing system.

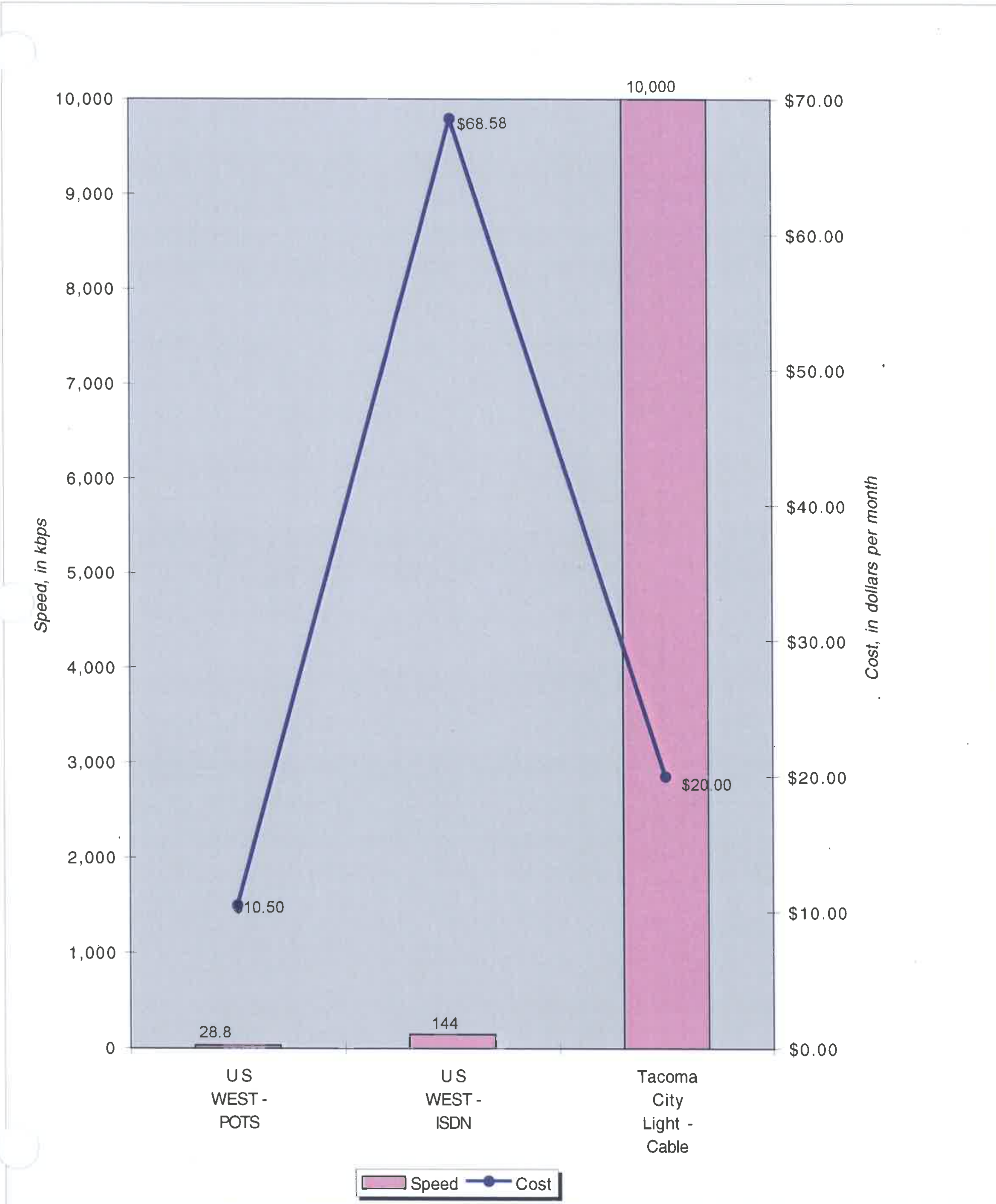
Cable Modems vs. ISDN

Integrated Services Digital Network (ISDN) was invented to make digital service available in the telephone network to homes. As home services become digital, the quality and variety of services the telephone network can deliver increases. ISDN enables many new telephone services, as well as data speeds of 144 kbps, two to four times the speed of standard telephone modems. As with common telephone lines, ISDN lines are switched circuits, tying-up capacity while the line is in use. ISDN lines have the same inherent impacts that standard telephone lines have on telephone network availability when used for Internet access.

Cable modems provide a data connection directly to an Internet Service Provider, bypassing the telephone network. Cable modems provide approximately 100 times the speed of an ISDN line used for data. Cable modems provide the speeds that should allow new forms of service to prosper on the Internet.

The following graph illustrates the comparable services and costs between a standard telephone line, an ISDN line, and a cable modem.

Transport for Internet Access



One - Way Cable Systems

Competing products which deliver high speed data, such as Direct Broadcast Satellite or Cable Data on one-way cable systems, continue to use telephone lines for the return path. Use of such products only exacerbates the already overloaded telephone system.

Cable Television

Offering full service cable television directly to local homes would bring price, programming, picture quality, and service-level competition to the greater Tacoma area.

The system that delivers Internet data transport service also provides cable television. The use of fiber optics optimizes system operation and performance. Tacoma City Light would offer a wide range of programming, including local broadcast, news and information, sports, arts and entertainment, movies, family, as well as public access, education, and government (PEG channels).

Initially, digital television would not be offered, since the system would offer a multitude of clean and sharp analog channels. Since the channels would be viewable on a cable-ready television without a set-top box, problems that set-top boxes cause with television features like picture-in-picture and VCR functions would be avoided. An 80 channel lineup of television programs provides significant value to the large majority of customers. The digital television business in not yet mature. The risk of offering digital television right now is great, as the digital set-top boxes are not generally available and are expensive, and most program content is available in forms which are expensive to convert for compressed digital transmission to homes. As digital television on cable systems matures, then simple revisions can be made to offer many digital programs.

Channel Line-Up and Cost

The following tables provide an example of the types of programming the system would carry and the cost for such programming. The actual channels that the system would carry would be determined by the local subscribers market demand for particular programming and franchise requirements.

In the following examples, Tacoma City Light prices include all taxes and fees, while TCI pricing is current as of January 1997 and does not include all taxes.

Basic Channels

The basic tier offers channels normally received in the greater Tacoma area from local commercial broadcasters, community access programs, municipal television, and C-SPAN. The approximate cost would be $10.00 per month. TCI's similar offering in Tacoma costs $9.97 per month, and includes 14 channels.

BASIC CABLE CHANNEL LINE-UP	
Tacoma City Light	
Program	**Program Type**
ABC, KOMO	Local
C-SPAN	News
CBS, KSTW	Local
FOX, KCPQ	Local
KTBW, Tacoma	Local
NBC, KING	Local
KCNS, Pacific Lutheran	Local
KTZZ, Warner Brothers	Local
PBS, KBTS	Local
PBS, KCTS	Local
Public Access, Pierce County	PEG
Public Access, 3	PEG
Public Access, 4	PEG
Public Access 5	PEG
Public Access 6	PEG
Sneak Preview, Pay-per-View	Movies
Tacoma Muni TV	PEG
UPN, KIRO	Local

Expanded Basic Channels

The total price for this package would be approximately $20.00 per month for the 38 channels including the basic cable channels. This compares with TCI's Tacoma charge of $23.12 for 30 channels.

EXPANDED BASIC CABLE CHANNEL LINE-UP	
Tacoma City Light	
Program	**Program Type**
A&E - Arts & Entertainment	Entertainment
AMC - American Movie Classics	Movies
BET - Black Entertainment TV	Entertainment
CNBC	News
CNN - Cable News Network	News
Discovery Channel	Family
ESPN	Sports
Family Channel	Family
FX	Entertainment
Headline News - CNN	News
Lifetime Television	Family
MTV - Music Television	Entertainment
Nickelodeon	Family
Northwest Cable News	News
Prime Sports Northwest	Sports
TBS	General
TCL - The Learning Channel	Family
TNN - The Nashville Network	General
TNT	General
USA Network	General

Super Expanded Basic Channels

Super Expanded Basic channels would also include basic and expanded basic channels, for a total of 58 channels at a total price of $25.00 per month. This compares with TCI's Pierce County offering of $26.72 for 43 channels. TCI's Tacoma system does not have a comparable offering.

SUPER EXPANDED BASIC CABLE CHANNEL LINE-UP	
Tacoma City Light	
Program	**Program Type**
Animal Planet	Family
BET - JAZZ Black Entertainment TV	Entertainment
Bravo	Movies
C-SPAN 2	News
Cartoon Network	Family
CBUT - Vancouver B.C.	General
Classic Sports	Sports
Comedy Central	Entertainment
Court TV	News
ESPN 2	Sports
Faith & Values Channel	Religious
FX Movies	Movies
Gala	Family
History Channel	Family
Home and Garden	Family
Home Shopping Network	Family
Much Music	Entertainment
QVC	Family
Sci-Fi Channel	Family
Travel Channel	Family

Premium Channels

The complete Movie and Premium channel package (seven channels), plus the 58 channel Super package, would cost a total of $52.95 per month. The four movie channels, plus the 58 channel Super package, would cost an estimated $37.95 per month. Cost of pay-per-view movies and events varies.

MOVIE CHANNEL LINE-UP	
Tacoma City Light	
Program	**Program Type**
Disney Channel	Family
Encore/Encore +	Movies
FLIX	Movies
Starz	Movies

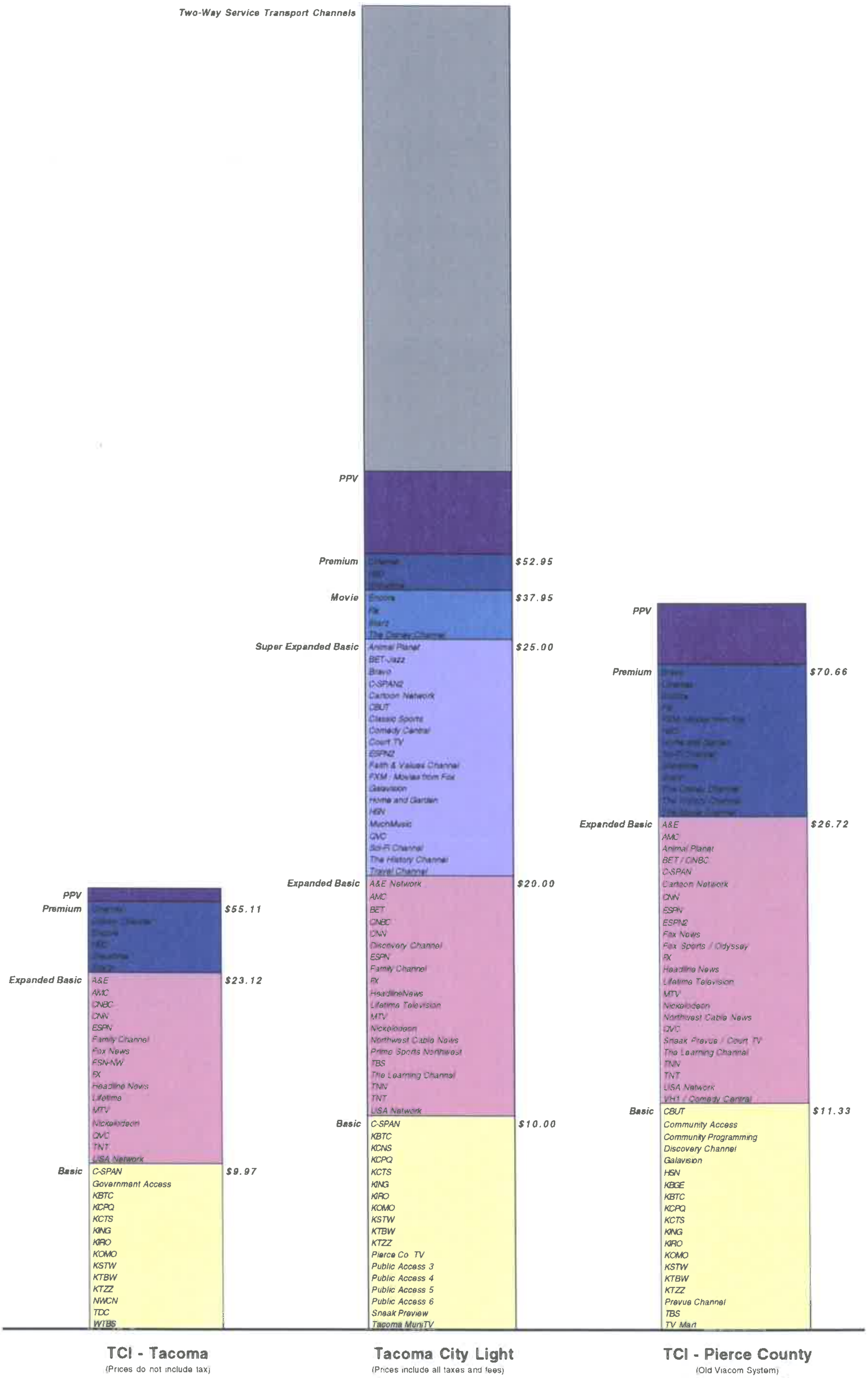
PREMIUM CHANNEL LINE-UP	
Tacoma City Light	
Program	**Program Type**
Cinemax	Movies
HBO - Home Box Office	Movies
Showtime	Movies

PAY-PER-VIEW CHANNEL LINE-UP	
Tacoma City Light	
Program	**Program Type**
Cable Video Store	Movies
Hot Choice	Movies
Playboy Movies	Movies
Pay-per-view	Events
Pay-per-view	Movies
Pay-per-view	Movies
Viewer's Choice	Movies

The graph on the following page illustrates Tacoma City Light's sample cable offerings and compares it to TCI's Tacoma and Pierce County channel line-ups.

Sample Cable Offerings

For Illustration Only



Local Customers Choose Channels

The market demands of local customers will determine final channel line-ups. "Early-bird" customers will be asked about their preferences. Ballots may also be used to poll customers likes and dislikes. Opportunities for direct customer input would be pursued.

Value

Prices, channel line-up, and picture quality on all tiers would be extremely competitive. The extensive use of fiber optics in the transmission of these television signals would ensure delivery of high quality pictures, regardless of distance. Redundant electronics and optical fibers would help minimize possible outages.

TECHNOLOGY ARCHITECTURE

The following key areas are considered in telecommunications architecture decisions:

- Adaptability to easily serve future needs
- Efficiency in serving telecommunications requirements
- Compatibility with other systems
- Future capacity for growth
- Integration of electronic components
- Maintenance and Operations standards and procedures

Telecommunications System Design

Hybrid Fiber Optic Coaxial (HFC)

The basis of many modern, cost effective telecommunications architectures is the hybrid fiber optic coaxial (HFC) structure carrying many radio frequency (RF) channels. Fiber optic cable is used to carry signals from the communication system facilities to the vicinity of subscriber homes, with final delivery on coaxial cable.

HFC systems are the most economical way of transporting vast amounts of information to homes for the following reasons:

- HFC systems make use of commercially proven electronic transmitters and amplifiers in both the optical and coaxial cable transmission of information.
- HFC systems are compatible with communication devices already present in customer homes.
- HFC systems allow new customers to tap into the same main cable used by other customers on the same street, minimizing the cost of providing each customer service.

SONET

Wholesale telephony and data transport services differ from residential services. Businesses often require large volumes of transport, which is mostly two-way and concentrated. The fiber optic cables in the HFC infrastructure can be used to transport business telecommunications traffic independently on dedicated optical fibers in the same cables with optical fibers for two-way cable television and Internet data transport. The key to serving business telecommunications is providing high-speed digital transport based on common transmission and connection standards. SONET is a highly standardized system of providing transmission of digital telephone and data circuits. SONET systems are in broad use today by local exchange carriers, long distance companies, and competitive access providers.

System Basics

The headend, distribution hubs, and serving area nodes are the three major categories of communications system facilities. Each of these categories correlates to system equipment and geographic areas served.

Headend

The headend is the control center where incoming television, radio, and satellite signals are amplified, converted, processed and combined for transmission to customers. In advanced systems, the content from other service providers such as video on demand, telephone, and data are also received and inserted into the HFC system. Program content that is broadcast to all subscribers is inserted into the HFC system at the headend. Program content unique to each hub service area can also be inserted into the HFC system at the headend.

SONET digital transmission can be used to bring the advanced services from other facilities, such as telephone switching centers and Internet access centers to the headend for insertion into the HFC cable system.

Distribution Hubs

Distribution hubs are necessary to provide an insertion point for subscriber specific or narrowcast program content. Without a hub, fibers to neighborhood nodes would have to be cabled directly from the headend. By using as few fibers as possible to transmit common or "broadcast" channels from the headend to the hub, other fibers can be loaded with narrowcast channels. Most growth would likely take place in narrowcast channels which would determine the assignment of the fibers and new hub equipment.

Hubs are also necessary for high-speed telephone and data transport for businesses. The transported signals from customers premises are concentrated at the hubs onto higher speed SONET transport systems for transmission to service providers.

Nodes

Nodes are terminals in the HFC communication network where signals are combined or re-transmitted. Nodes are also the transition point from optical fibers to coaxial cable. Coaxial cable is the final distribution link to subscriber homes. From nodes, coaxial cable trunks branch out to distribute signals and trunk amplifiers are used to boost signals as distance increases. Node size is chosen to match the number of narrowcast channels used by subscribers — node serving areas would be divided into smaller areas as customer demand grows.

Within the node serving area are the power supplies with battery backup, trunk amplifiers, branch amplifiers, service taps and coaxial service drops to subscriber homes. All services to subscribers are provisioned from passive electrical devices (taps) to the coaxial cable. The largest portion of overall system cost is in the outside coaxial plant from the node to the customer.

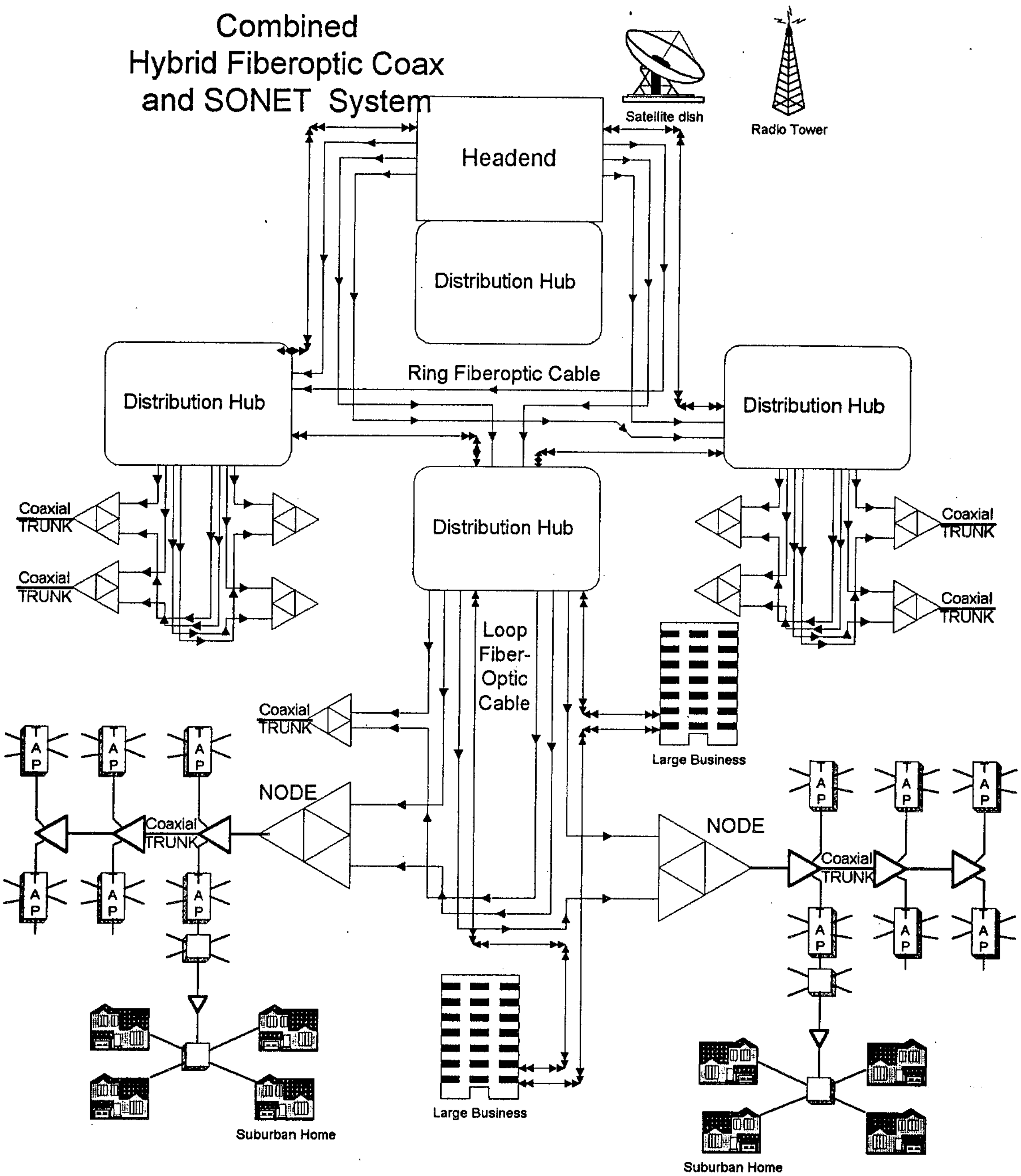
The diagram labeled "Combined Hybrid Fiberoptic Coax and SONET System" outlines the relationship between headend, distribution hubs, and nodes.

High-speed data and telephone transport for businesses are delivered directly on fiber to the business premises. Cables are shared from the distribution hub, using separate fibers for SONET and for HFC nodes. Nodes are not needed for high-speed data and telephone transport, as the services are carried on fiber optics to the customer. Electronics for the conversion of signals from SONET optical transmission to standard electrical signals are installed for each customer.

Redundancy

Redundancy ensures that services are not interrupted due to preventative maintenance or component failures. This is particularly important in regard to telephone and data services. Telephone customers have grown accustomed to high reliability, and telephony has earned the distinction of being a "lifeline" service, especially in case of emergency. Redundancy also benefits residential customers of entertainment video. While not as threatened with hardship, loss of video service is annoying. Traditionally, cable television systems have not used redundancy in their services.

Hybrid fiber optic coax (HFC) systems can be constructed with considerable redundancy. The benefits and risks of operating a "bulletproof" telecommunications transmission system must be compared to prevent spending too much on the infrastructure, charging too much for transport on the infrastructure, and to meet the requirements regarding system integrity of each of the services transported.


Combined
Hybrid Fiberoptic Coax
and SONET System
Satellite dish
Radio Tower
Headend
Distribution Hub
Distribution Hub
Ring Fiberoptic Cable
Distribution Hub
Distribution Hub
Coaxial TRUNK
Coaxial TRUNK
Coaxial TRUNK
Coaxial TRUNK
Loop Fiber-Optic Cable
Coaxial TRUNK
A P
NODE
Coaxial TRUNK
Large Business
NODE
Coaxial TRUNK
Large Business
Suburban Home
Suburban Home

Matching Channels to Service Territory

HFC systems carry radio frequency (RF) signals. All applications are carried within one or more 6 MHz bandwidth RF channels. The allocation of these channels both in frequency assignment and physical coverage area must be managed carefully, because the ability to carry new applications depends on the availability of channels. The capacity of an HFC system to carry unique content to each customer depends on the re-use of frequencies among nodes.

Some channels are identical and are broadcast to all customers, such as basic and enhanced basic cable television. Some channels are broadcast to a smaller geographic area, like the hub serving area. Examples of these channels are public access, education and government (PEG) television channels, or television channels with localized advertising. The remaining channels are those unique to one node, serving 500 to 2,000 customers each.

Each time a channel is assigned to a limited area, the channel frequency assigned can be re-used in other areas. This re-use of frequencies is very important in the conservation of capacity of the HFC system. Advanced digital services are narrowcast. Examples include telephony, cable data networks or Internet access, and video on demand. Advanced services contain two-way information unique for each customer, and must be available on demand.

The Return Path

New applications for cable television systems are often two-way and therefore use the return communications path. The return path enables billing management, telephone transport, and data network connections. Possible electric utility applications are: remote meter reading, outage notifications, interactive customer communication, and active energy conservation measures.

A Final System Design

The final system architecture is a tradeoff of technical and economic choices. One architecture is described here, with reasons for recommendation, limitations, and estimated costs. Some alternatives are described, with their benefits, limitations and costs.

Several assumptions were made in order to be able to select a system architecture. First, the system must initially be able to support 50 percent of the cable television subscribers market. Second, the population and residential density in 2010 was the basis for planning the common infrastructure. The initial number of optical nodes is based on 2,000 homes per node, resulting in 82 nodes. Using 1996 residential figures, this results in approximately 1,500 homes per node.

Headend Program Reception

Six satellite dishes are needed to receive enhanced basic, premium and pay-per-view programs, covering all the satellites serving the west coast of the United States. The headend and satellite dishes work best if co-located at the same facility. The initial recommendation for headend location is Southwest Substation, with alternates at the Tacoma City Light Administrative complex or Cowlitz Substation.

There are ten broadcast television stations, requiring antennas and receiving equipment. This equipment must be located in a prime receiving spot and can be placed in a location remote from the headend facility. Broadcast studios can provide direct feeds to the headend of higher quality than off-air antennas, but unfortunately, most studios are located in Seattle.

Franchise obligations include carrying public access, education and government access (PEG) channels. Content for PEG broadcasts can be delivered to the headend in tape format, or transmitted to the headend on optical fibers from production studios.

Commercial advertising is inserted at the headend. A storage and playback device holds all the commercials to be used in one week, and they are played automatically on queue. Schedules are set and signals are sent within regularly scheduled programs to queue the insertion of commercials.

A major system alternative that could have significant impact on system capacity is the development of digital television. Programming could be delivered as digital channels. Some of the six headend satellite dishes could then be re-used for reception of digital channels, greatly increasing their channel capacity.

Some channels are identical for all customers, such as basic and enhanced basic cable television. Level 1 channels originate at the headend and are broadcast to all hubs, nodes and customers. They will be assigned from 50 to 550 MHz. There are a maximum of 80 channels to allocate to Level 1.

Level 2 channels are targeted to a smaller geographic area, the hub serving area. Each of the five distribution hubs serves an area of 30,000 to 45,000 homes. Examples of Level 2 channels are Public Access, Education and Government (PEG) television channels, or television channels with localized advertising. Each Level 2 channel can re-use the frequency assigned in other hubs. This re-use of frequencies is very important in the conservation of capacity of the HFC system. There are no channels currently allocated to Level 2.

Hub Quantity and Locations

There will be one hub co-located with headend. This headend and hub location is recommended to be Southwest Substation, due to optical performance, service to a major electrical substation, and property availability.

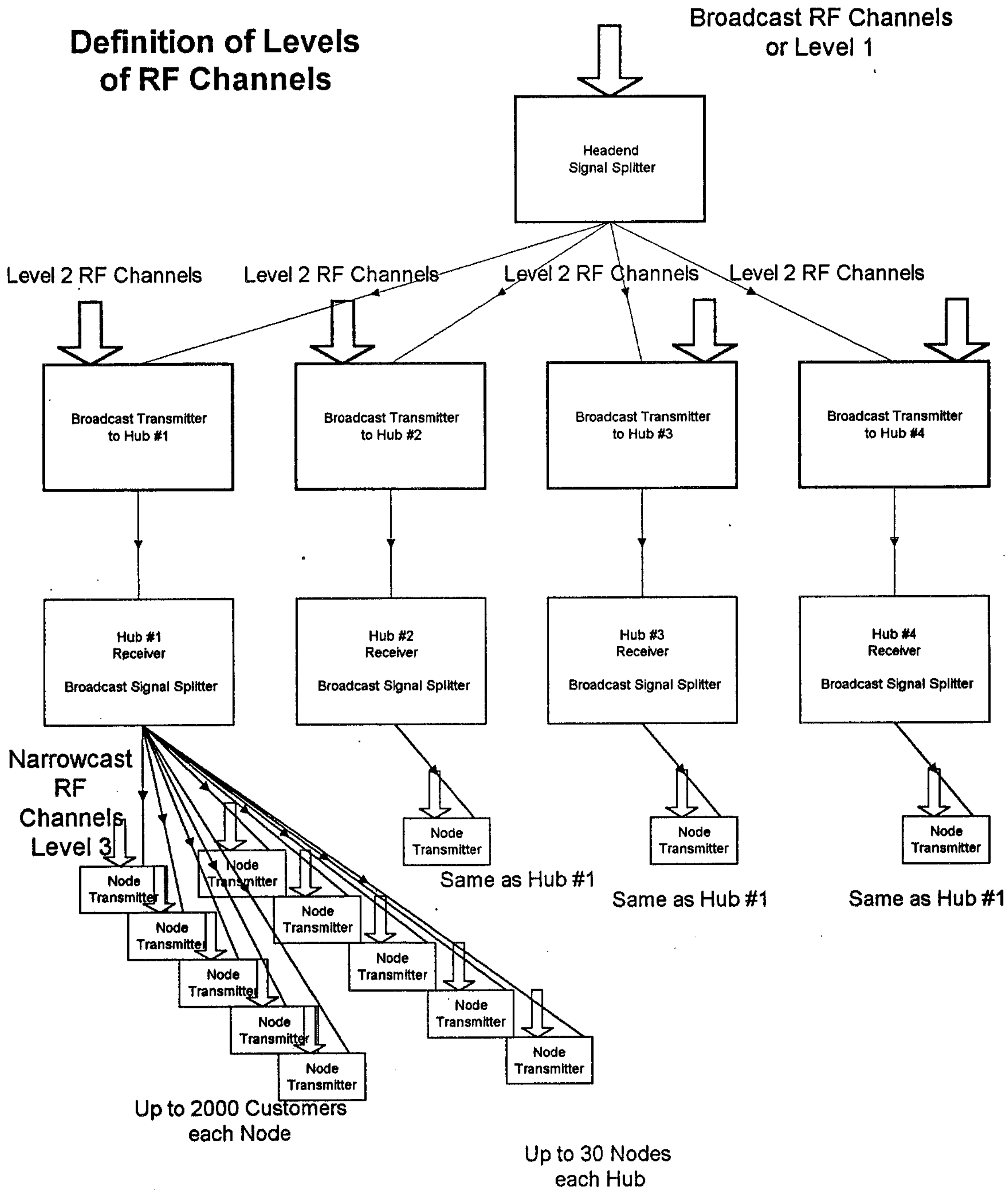
Four remote hubs will each serve within physical boundaries, growing to seven remote hubs if needed. The hubs are initially recommended to be Pearl Substation (with Adams as alternate), Northeast Substation (with Tideflats as alternate), Cowlitz Substation (with Roosevelt as alternate) and Elk Plain Substation. Buildings for hubs must be sized and powered to house future electronics, even if underutilized in the early years of operation.

Transmission From Headend to Hubs

Transmission to distribution hubs will be through optical fibers. Initially concentrating electronics at the headend in order to minimize electronics at the hubs is desirable. Growth in advanced services, such as residential telephony and Internet data transport will eventually increase the electronics at each hub.

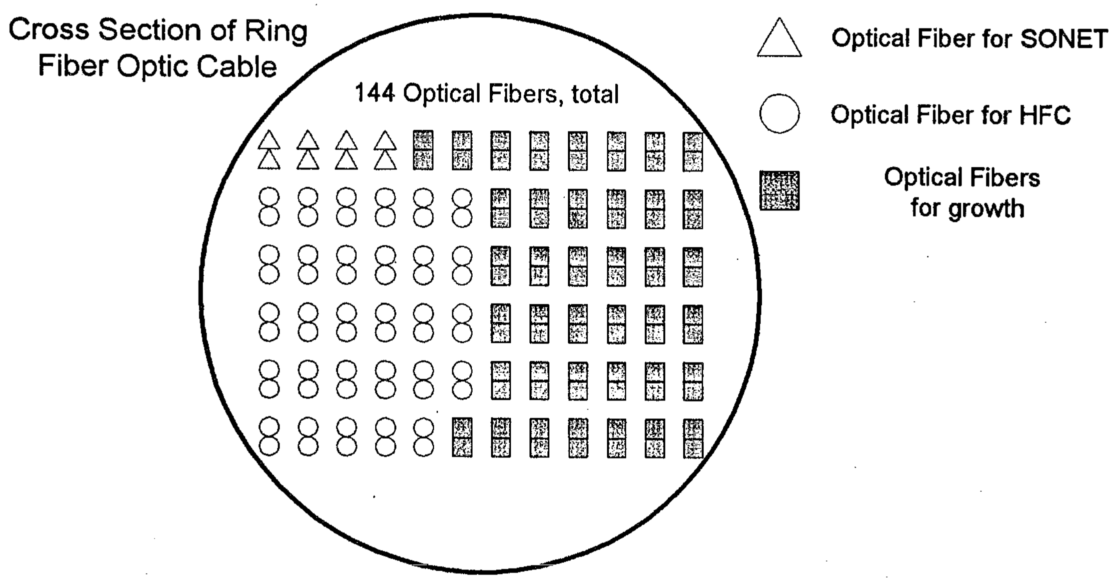
The number of fibers in the ring cable between remote hubs must be large enough to accommodate growth. All optical transmitters chosen for transmission from the headend to the hubs must be of the highest quality (54 dBc carrier to noise ratio) to make up for any signal degradation in the transmission from the hub to node and node to customer.

Transmitters and optical fibers are associated with broadcast and narrowcast of channels. From the headend to the hubs, transmission of RF channels takes place on optical transmitters and optical fibers. Redundant optical transmitters would be used and redundant optical fibers would be routed in diverse paths ensuring continuation of service in the event of fiber cable cuts. See diagram labeled "Ring and Loop Optical Cable" for an example of route redundancy.



Hub Fiber Optic Ring Cable Plan

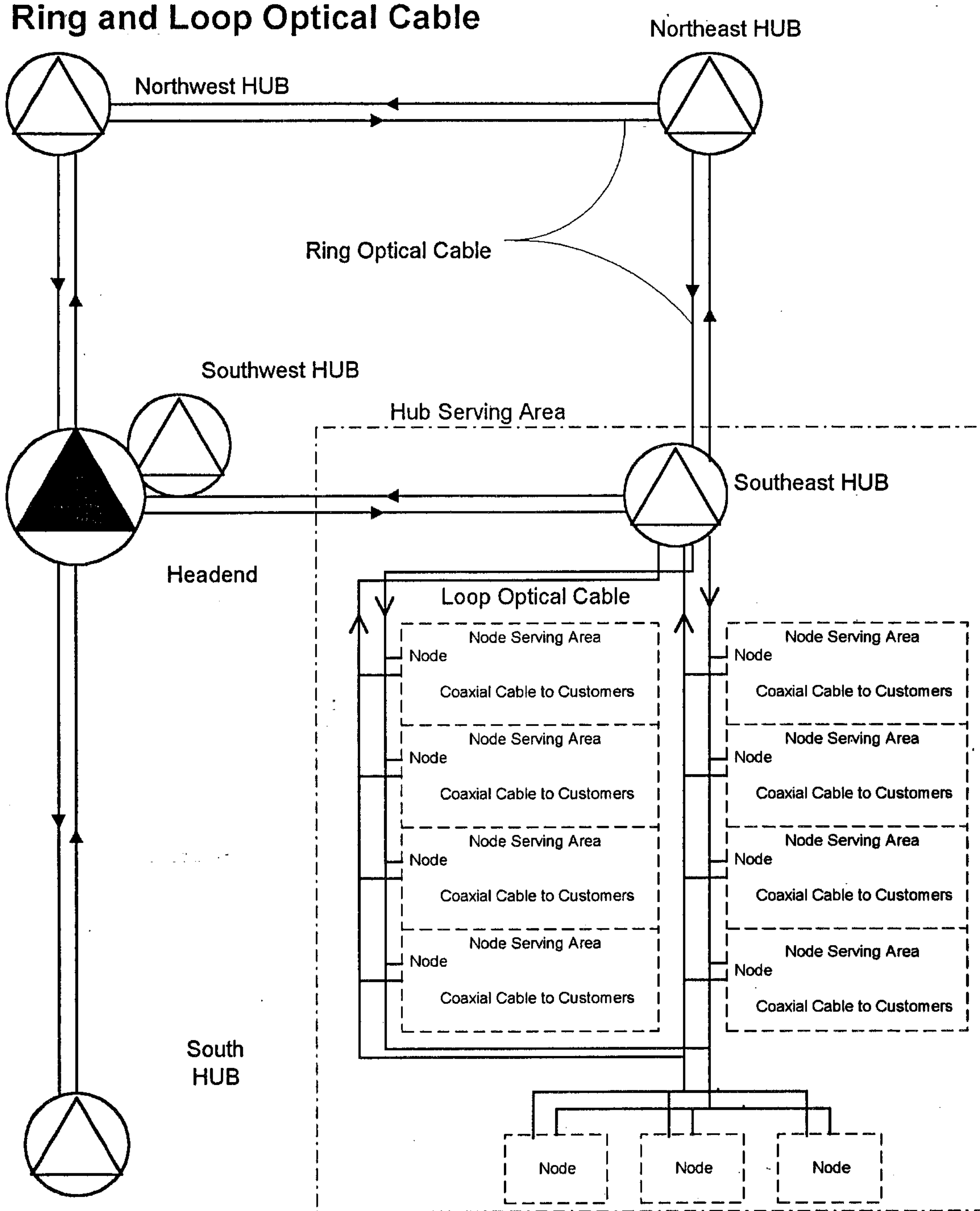
In summary, there are ten optical fibers needed in the ring for Level 1 and Level 2 RF channels, eight for SONET, 28 for Level 3 RF channels, and 20 for return RF channels. The minimum quantity to operate the initial system is 66. Tacoma City Light would build a ring cable plant supporting transmission among hubs for a lifetime of 30 years, which is beyond the traffic predictions trusted today. Optical cables are built in loose tubes of twelve fibers each, with twelve tubes, therefore, the fiber count to be installed would be 144 fibers.



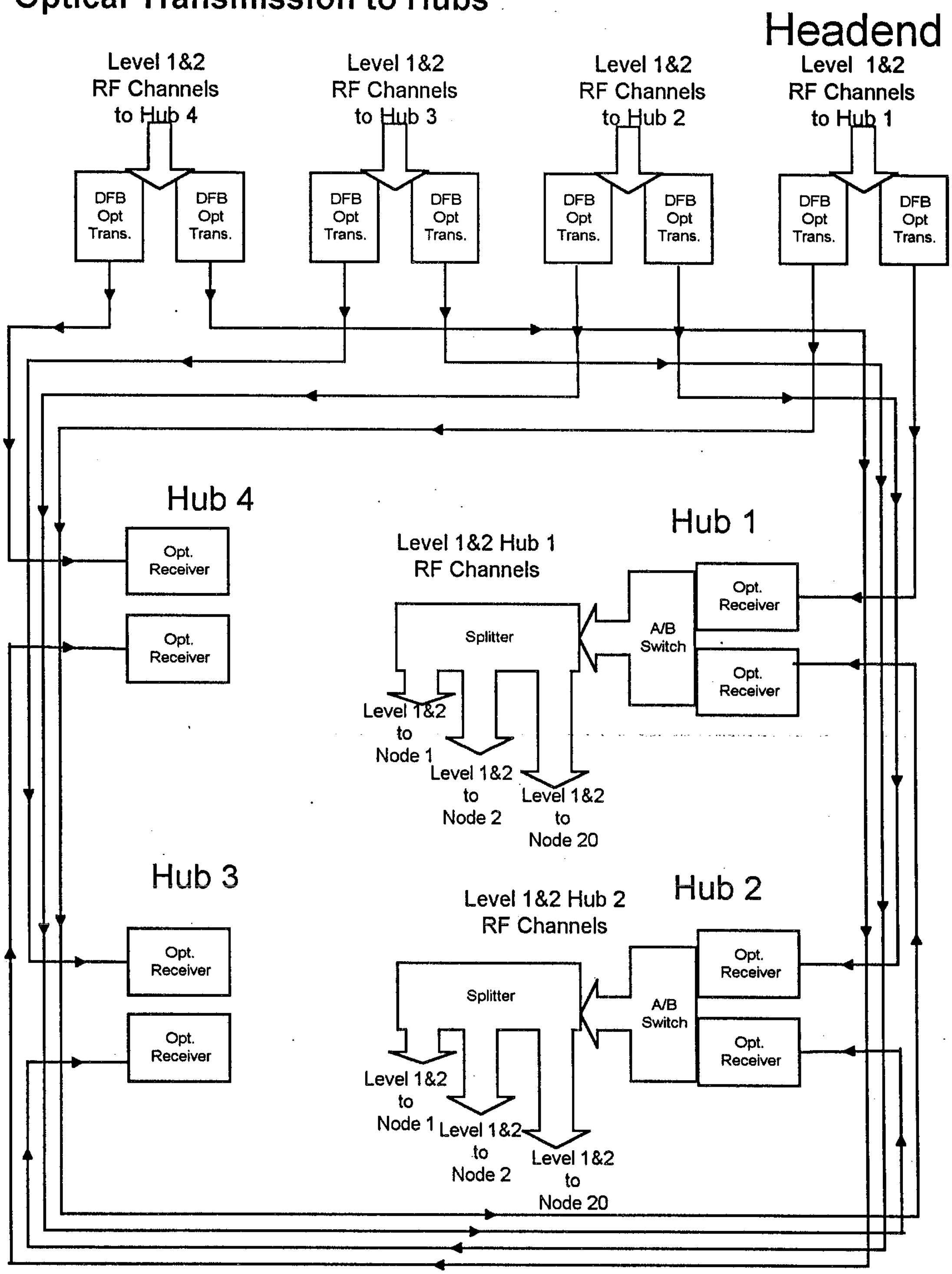
The optical fibers in the ring would support the following design:

- All Level 1 (those reaching all customers), Level 2 (those reaching all customers in a hub only), and Level 3 (those reaching individual nodes only) RF channel modulators are concentrated at the headend.
- Level 1 and Level 2 RF channels can be transported redundantly to each of the four initial hubs using four fibers in the ring and eight each Distributed Feedback lasers at the headend.
- The minimum ring optical fibers reserved to carry Level 1 and Level 2 RF channels to four initial and seven maximum remote hubs is seven fibers. See diagram labeled "Broadcast Optical Transmission to Hubs."

Ring and Loop Optical Cable



Broadcast Optical Transmission to Hubs



Level 3 channels are those unique to one node, serving 500 to 2,000 customers each. Level 3 is commonly referred to as narrowcast. Advanced digital services such as telephony, cable data, Internet access, and video-on-demand are assigned to Level 3. These advanced services use RF channels to serve the customers in an area of 500 to 2,000 homes. The channels assigned to Level 3 in one node can be re-assigned in all other nodes. The capacity of an HFC system to carry unique content to each customer depends on the re-use of frequencies among nodes.

Even with re-use of frequencies, HFC systems cannot meet all applications. Business communication systems are concentrated geographically and are high-volume. Such systems cannot share coaxial cable with residences. One solution is to assign extra optical fibers in the cable plant exclusively to business data and telephony transport, and use digital SONET transmission standards.

The maximum HFC allocation is for 34 narrowcast Level 3 RF channels to each node. They will be assigned from 550 to 754 MHz. The initial allocation is eight RF channels to Level 3.

- To minimize electronics at the hubs the Level 3 RF channels can originate at the headend. This significantly increases the optical fibers in the ring and optical transmitters/receivers between the hubs. Maintenance and diagnostics of the electronics and transmission system is simplified, however the cost of installation and restoration of fiber optical cable in the ring increases. With a ring of 35 miles circumference and optical fiber expense of $500 per mile, extra fiber costs $17,500 each.

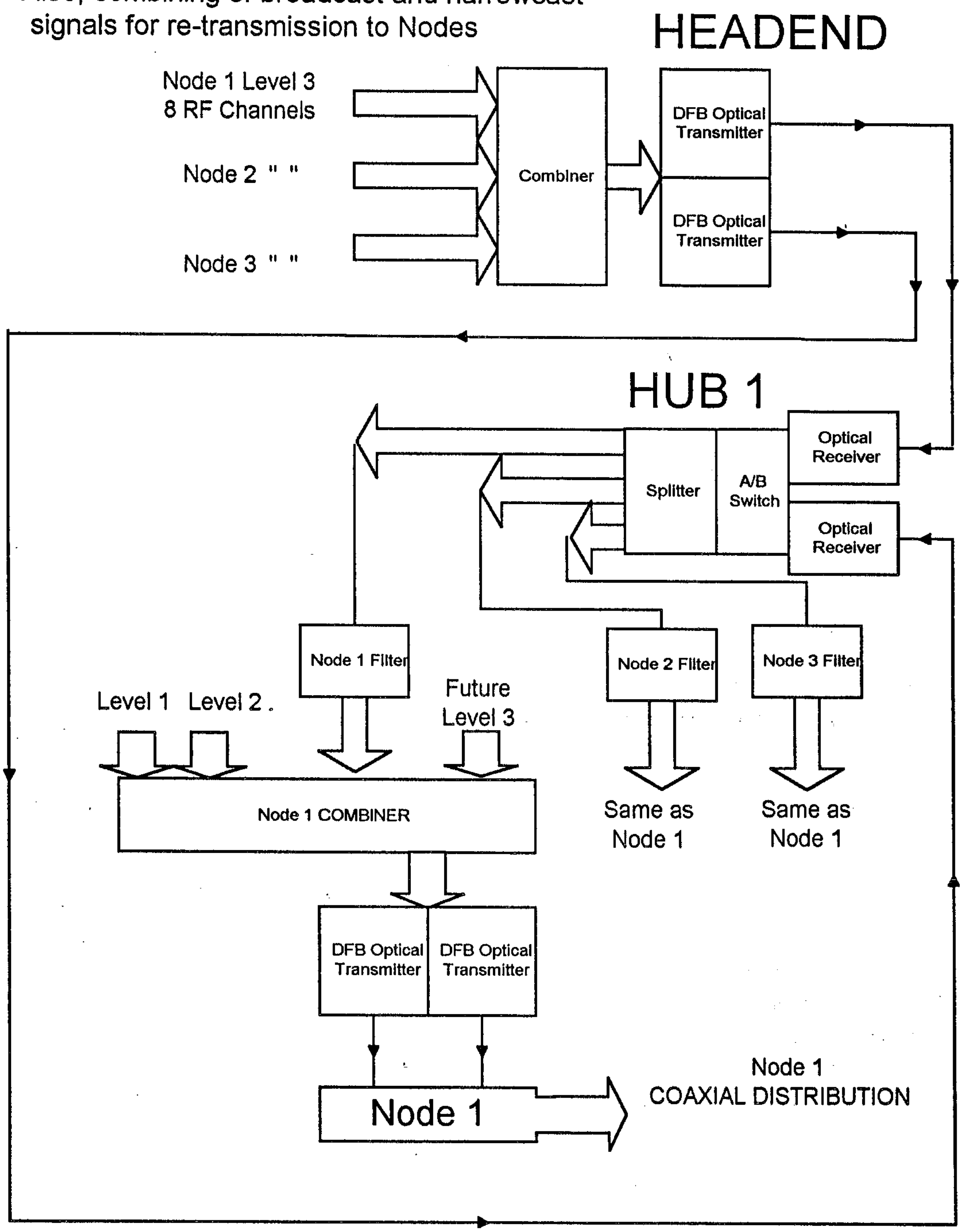
- To establish the optimum fiber count, it is assumed that, at start-up, 8 each Level 3 RF channels are transmitted from the headend to the HUB for each node.

- RF channels for multiple nodes can be combined at the headend, transmitted on one optical fiber, and separated at the hub. See the diagram labeled "Narrowcast Optical Transmission to Hubs." The direct savings are $7,500 for each transmitter and $17,500 for each fiber, for a total savings of $25,000. A balancing expense of $3,000 is for filters to separate the signals, for a net savings of $22,000 for each fiber saved.

Using this approach, Level 3 RF channels can be transmitted to the hubs using 28 fibers added to the ring.

Narrowcast Optical Transmission to the Hubs,

Also, combining of broadcast and narrowcast signals for re-transmission to Nodes



Return optical fibers complete the two-way path for services like telephone, data, near video-on-demand, video-on-demand, and utility applications. Each node transmits to the hub on six RF return channels. These can be frequency block converted at least five to one at the hub for retransmission to the headend. Return Level 3 and Level 2 information can be transported redundantly on 20 optical fibers in the ring.

Limitations

This option cannot effectively carry the full capacity of Level 3 traffic of 34 RF channels each to more than 320 nodes of 500 customers each. It is an economical method of entering into the business, but cannot grow to meet full utilization of HFC capabilities.

Alternative approaches to Level 3 transmission expected to be available to meet growth in advanced services are to use block frequency conversion, optical wavelength division multiplexing, or digital transmission.

SONET will transport digital information for business telephone and data traffic to the hubs efficiently. The final delivery to businesses will share the same cable but remain on separate optical fibers from those used for residential services. Two optical fibers are needed in the ring for each SONET system. Once two or three systems are in operation, if a fourth is needed, all four systems can be combined to operate on a single optical fiber pair. A minimum of four optical pairs, or eight optical fibers are needed for high-speed SONET traffic.

Optional System Architectures

- Dedicating optical fibers for use in transmitting Level 3 signals from the headend for each node will result in 82 optical fibers used in the ring for Level 3. The direct cost is $1.4M to add these fibers and optical transmitters. As the system changes from 2,000 homes passed per node to 500 homes passed, the optical fibers needed would grow by four to one, to over 320 fibers from hubs to the headend.

- Additional Level 3 RF channels can be combined onto each fiber and block frequency conversion can re-position each channel to correctly place it in the channel line-up. This adds electronics at the hub and the quality of frequency conversion is not high. This option is not yet priced, but does not meet criteria for simple hub electronics and known high quality.

- Wavelength Division Multiplexing places several light signals on the same optical fiber. While this is applied today for digital transmission networks of high-speed data and telephone, the optical sources for direct application to HFC AM lightwave transmission are not yet available.

- A final Level 3 transmission alternative is to use digital transmission such as SONET to the hubs, and move all Level 3 RF channel modulators to the hubs. This takes advantage of the point that the most Level 3 RF channels carry digital information. Modern high-speed digital transmission schemes can move the data efficiently to and from the hubs. SONET carries standard digital traffic in the same formats businesses predominantly use today. Telephone and data service provider equipment would be installed at the hub, converting the digital traffic from the SONET formats to the cable television format. To allow final combination with Level 2 and Level 1 RF channels at the hubs requires RF channel modulators. This strategy distributes the electronics from the headend to the hubs and does not serve digital television signals well. This approach could be necessary to accommodate growth as nodes are split four to one to reach 500 homes per node, and as Level 3 RF channels increase beyond eight per node.

- Remote hubs could be located following substation service area boundaries. The initial selection of these hubs could be the distribution substations of Union, Adams, Pearl, University, Bridgeport, Custer, Clement, Roosevelt, Polk, Portland, and Tideflats. The site of the headend could be the Administration complex. The beneficial impact is to reduce the branch optical cable length and expense. However, it complicates delivery of Level 2 programming when the hub service area boundaries are not close to the political, school district, library, or city boundaries.

Node Cable Plan

Each node is planned to require four optical fibers each. Two fibers downstream and two fibers upstream provide redundancy for television, telephone and data services. The number of nodes would grow from 82 to more than 320 as the nodes are split from 2,000 homes per node into four each, 500 homes per node. Node optical cables are planned in loops to allow redundant paths to hubs. To allow digital data and telephone traffic to be transported independently from the hub on SONET branches to businesses, schools, libraries or substations requires many extra fibers.

From hub to node, redundancy is expensive due to the quantities of optical transmitters, fibers and receivers. Whether the predominant failure mode is electronic failure or optical cable cut has not been resolved. Either type will take significant numbers of customers from service and require emergency restoration.

The redundant optical fibers to the nodes, as well as reserves for growth and business communications services, must be planned for and installed in the initial plan — costs associated with adding redundant fibers later are extremely high.

Future services to be offered on HFC systems are telephony and Internet transport services. Data and Internet residential applications have become integral especially to home-based businesses. The economic impact of service interruptions to home-based and other businesses will grow as the data applications on the HFC systems grow.

Finally, the HFC system will carry several applications simultaneously. The need for reliability is compounded when thousands of customers are receiving all of their telecommunications services on one common system.

Given the importance of redundancy, redundant fiber paths to nodes and fibers for growth have been included in the preliminary system design and supporting financials.

Business Telecommunications

The telephony and data services typically provided to large businesses differ from residential services. Business traffic predominantly travels on high-speed digital lines, the most common of which are T-1 circuits. T-1 circuits carry 1.5 megabits per second (1.5 Mbps) two-way, symmetrically. They are used for efficient transport of business telephone traffic and corporate data traffic. Some large corporate offices use *many* T-1 circuits for telephone access to the Public Switched Telephone Network (PSTN), or for point-to-point data transport.

The fiber optic cables in the HFC infrastructure can be used to carry business telecommunications traffic independently, with the business traffic on dedicated optical fibers in the same cables with optical fibers for two-way residential services. Optical fibers in the ring between hubs can provide high-speed transport of digital business traffic to the telephone and data switching centers found in the greater Tacoma area, such as national or regional Internet access providers, the long distance carriers, and the local exchange carriers. Optical fibers in the same branch cables from the hubs to the nodes can be extended to businesses. Laying the branch cable out in rings enhances the reliability of the SONET system through the use of redundant optical fibers.

The key to serving business telecommunications is providing high-speed digital transport based on common transmission and connection standards, and doing so in a reliable and efficient manner. SONET is a highly standardized system for providing transport of digital telephone and data circuits. Many manufacturers provide compatible SONET electronics in high volumes, which may be upgraded in speed and capacity. The majority of long distance telecommunications transmission capacity today is provided on SONET systems. SONET multiplexing shelves would be placed in the hubs and at end-user premises. Small SONET shelves at the customer site deliver standardized high-speed digital lines which can be connected to their digital telephone and data network systems.

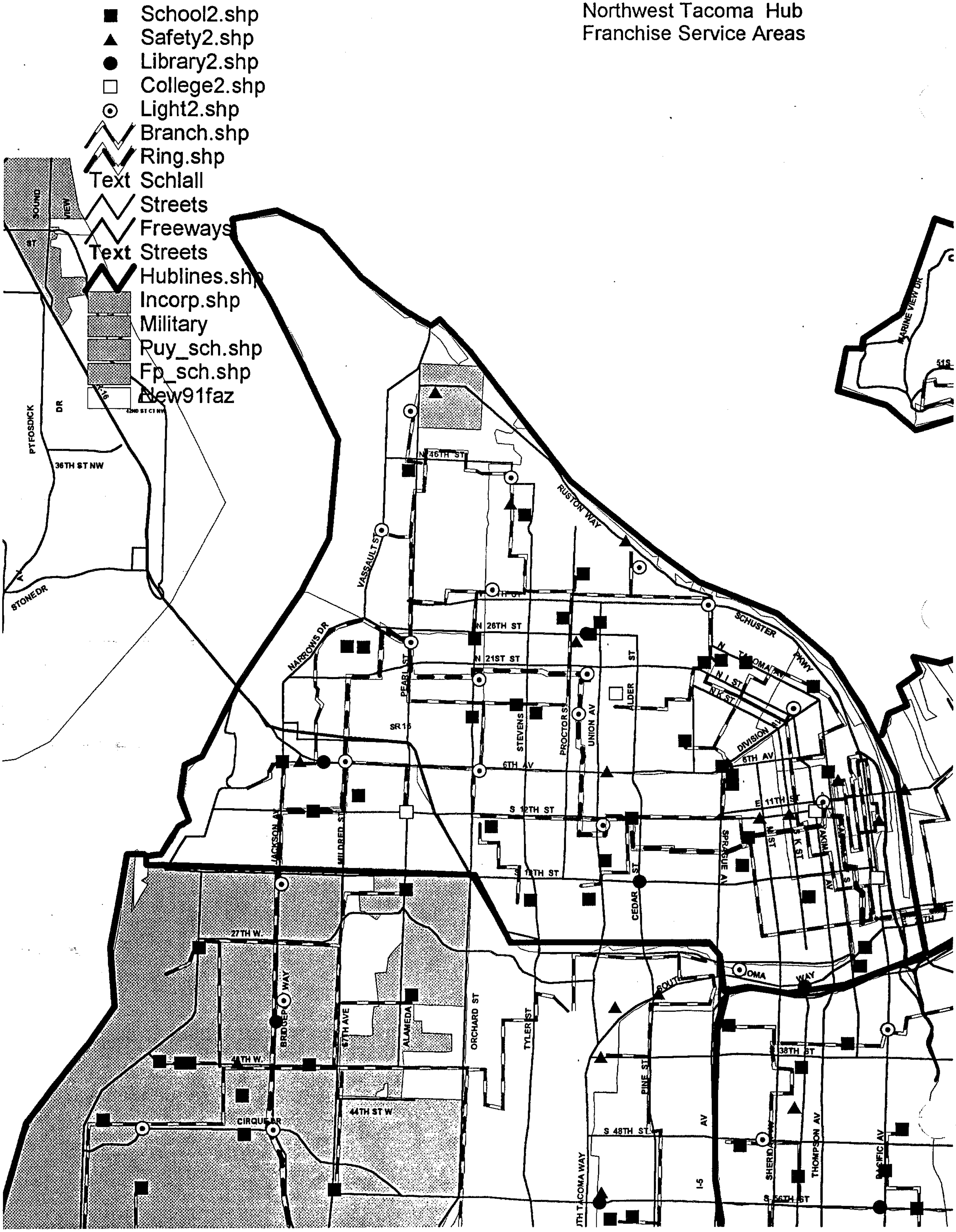
Planned Changes in System Operation

Changes are to be expected in system operation during the first ten to fifteen years of operation. The changes would be driven by marketing success, penetration of services, new services added, and population growth and may include the following:

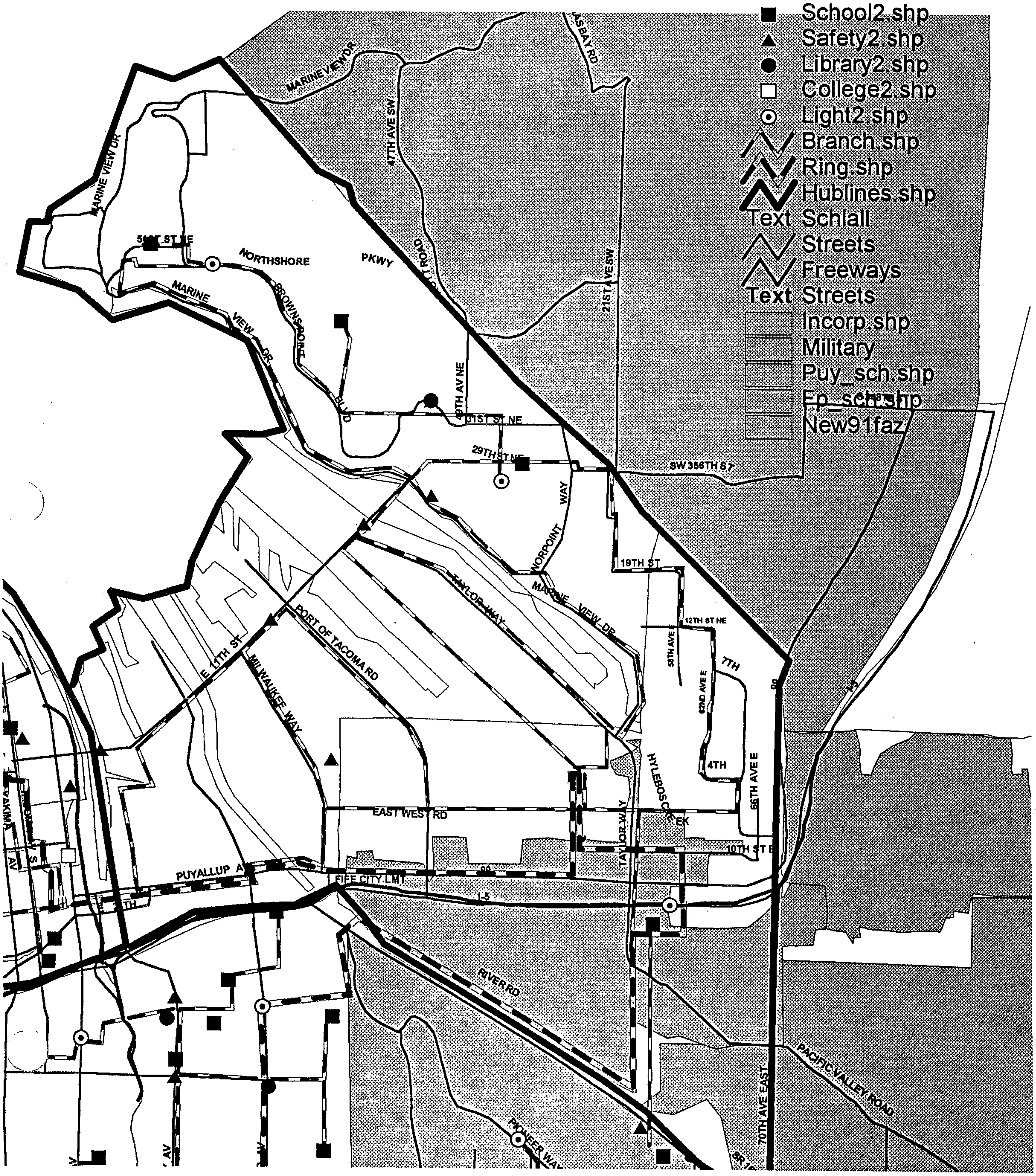
- Migrate Level 3 telephony and data RF channels to SONET transmission and hub video modulation.
- Migrate to 500 home nodes as needed.
- Offer PCS carriage using strand-mounted transmitters and receivers.
- Install SONET electronics and optical cables to business as needed
- Build additional hubs as optical cables to nodes become filled, or as expansion into neighboring communities is requested by franchise authorities.

The following maps provide an overview of the fiber optic design of the proposed Hybrid Fiber Coax plant. These maps are divided to display the service areas of four hubs.

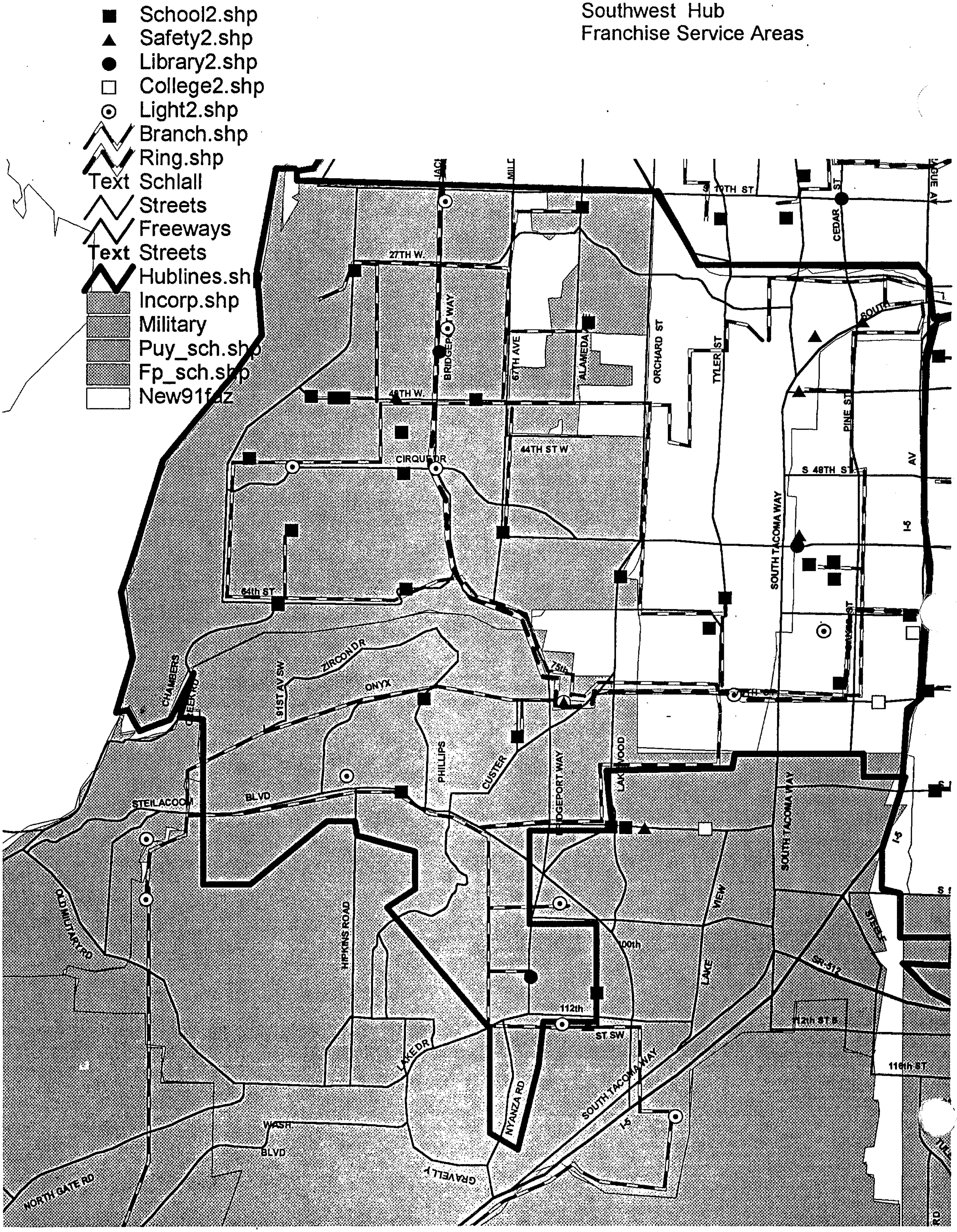
Northwest Tacoma Hub
Franchise Service Areas



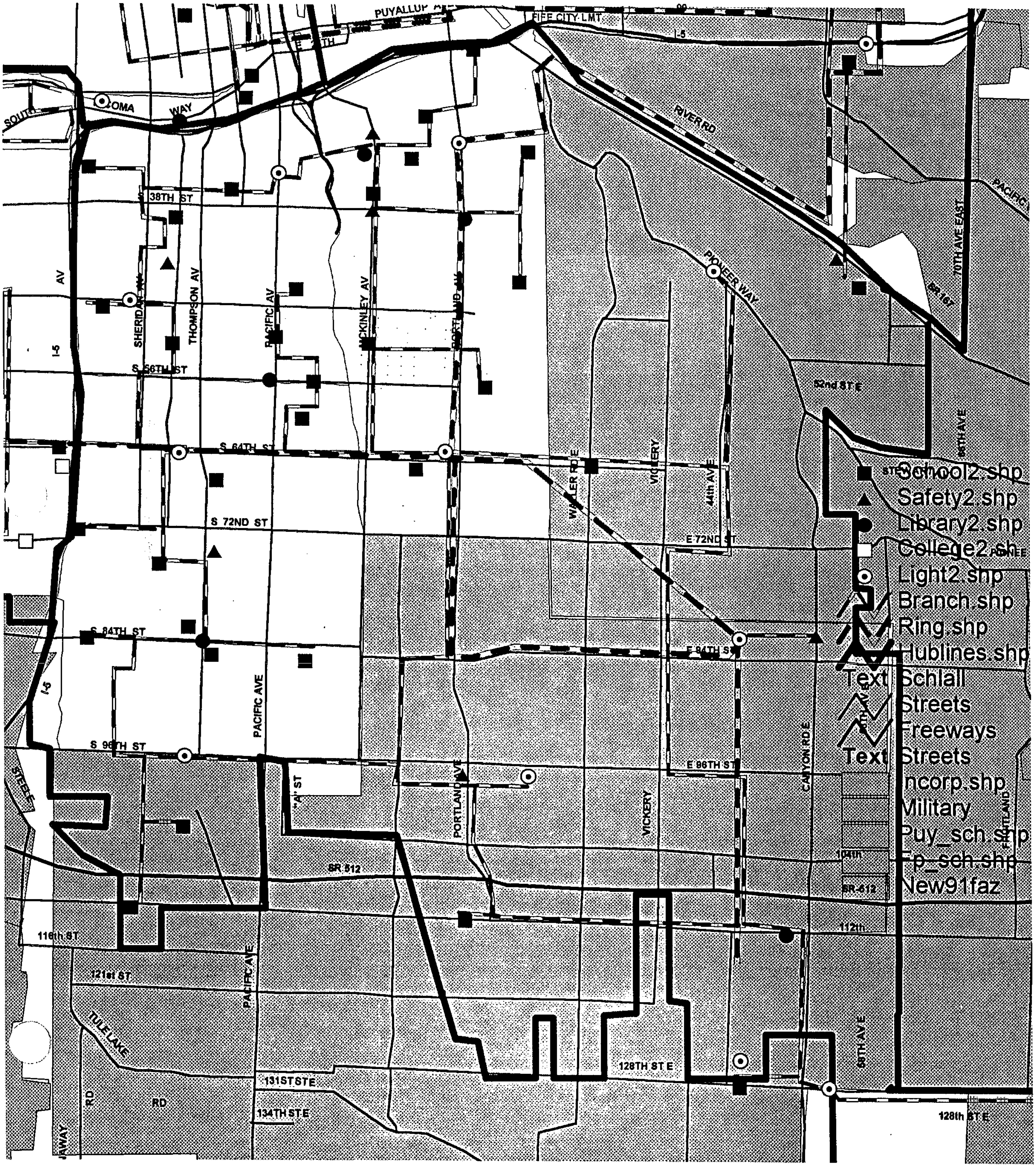
Northeast Tacoma Hub
Franchise Service Areas



Southwest Hub
Franchise Service Areas



Southeast Tacoma Hub
Franchise Service Areas



Hybrid Fiber Coax vs. Fiber to the Home (FTTH)

There are expectations that some day communications services will be delivered to the home on a fiber optic pair, or fiber to the home (FTTH.)

FTTH is a wider-bandwidth duplication of the local exchange carrier's existing infrastructure, which is twisted-pair copper wire dedicated from the central office to each home. It has proven to be very costly to maintain and operate dedicated paths to each home.

Delivery of services via coaxial cable is relatively inexpensive for several reasons:

- Costs are shared when many customers are served by common coaxial cables.
- Coaxial cable capacity is very high, allowing service to several customers over the short distance from a single node.
- Physical connections are simple, using standard electrician's tools, hardware, and methods.
- Connections within the home are familiar to most customers who have purchased installation of cable television service.
- Radio frequency amplifiers are common designs, perfected over 40 years of radio and television transmission experience.
- Inexpensive, simple radio-type return transmitters will be used verses relatively expensive and sensitive optical transmitters.
- Intelligent devices are moving into the customer homes, such as MPEG2 digital television compression, cable modems, and customer-premise network interface units (NIU), which allows higher efficiency of the available RF bandwidth in the coaxial cable plant.

Communications technology applies fiber optics where appropriate, such as long cable runs in electrically noisy environments. Optimum communications design today uses a mix of fiber optic and coaxial cables.

Interdiction

Interdiction is commonly known as scrambling or blocking, where a specific television signal is rendered unusable. There are two common, current forms of interdicting specific services at the home; traps or filters, and analog set-top boxes.

Traps and Filters:

The preliminary telecommunications study described operating a cable television business carrying basic, expanded basic, and premium channels without set-top video boxes. The expanded basic channels would be blocked at the home using a low pass filter. Each of the highest-value channels would have an interfering frequency added at the head-end, and the trap at the home would filter-out the interference. This method of interdiction requires a technician to drive to individual homes for each programming change.

Capital Cost: \$5 to \$15 per subscriber, or average of \$500,000 to 70,000 customers.
Operational Cost: \$50 minimum per truck roll. Average one per subscriber per year, at \$3.5M annual cost.

Advantage:
- Low capital cost.

Disadvantages:
- Degrades picture quality of premium channels
- Multiple technician service calls
- Telephone requests, possible delays before complete installation
- Theft can occur

Standard Set-Top:

This method has been the standard used by cable television operators since premium channels and pay-per-view were introduced. Many different forms of scrambling can be inserted at the headend, which then require a set-top box to de-scramble and view on the customers' television. The box includes a tuner to select the channel to be de-scrambled. Addressable boxes can be remotely provisioned with an allowance to view certain channels. Features have been added to increase the value of the box, such as VCR recorder control, and universal remote.

Advantages:
- Proven operation
- New features
- Rental revenue from set-top

Disadvantages:
- Complex setup
- Obsolescence
- Increasing cost with new features
- One set-top required for each television set
- Customer resistance
- Subject to program theft

In addition to the two most common forms of interdiction, new types of interdiction have emerged: addressable interdiction and the digital set-top.

Addressable Interdiction:

In this system, all television channels leave the headend without any form of scrambling. An electronic unit is mounted on the pole strand or in the underground pedestal, providing four to eight taps to the subscribers. It is addressable, from a central computer which sends and receives set-up information continuously. Tones are generated and inserted on channels to interfere with reception of channels not purchased. The entire downstream and the return path can be turned off and on.

Capital Cost: $200 per tap managed, or $14M for 70,000 subscribers
Operational Cost: Very low, since it provisions each service quickly and remotely

Advantages:
- No set-tops
- All outlets enabled
- Low operation cost due to remote control of service change
- Selective levels of jamming
- Manages all program tiers
- Differentiates from existing providers
- Software database link to billing
- Manages return path at optimum location: the tap
- Also manages On/Off of digital telephone and data, downstream or return

Disadvantages:
- High capital cost
- Interdicts standard analog TV channels only
- Telephone request for service necessary
- Unable to offer different service on different outlets within household

Digital Set-top:

As a service provider comes on line for premium near video-on-demand, video-on-demand or digital video, set-tops would be necessary in the home for receiving the digital television channels and conversion for display by a standard television. Digital interdiction will be included in set-top units, with two-way signaling and instant provisioning of digital premium or pay-per-view. Traps would be removed if all premium and pay-per-view became digital, leaving filters to manage basic, expanded basic, or return channels.

Capital Cost: approximately $400 per set-top, depending on market penetration.
Operational Cost: Low, depends on filters for remaining services.

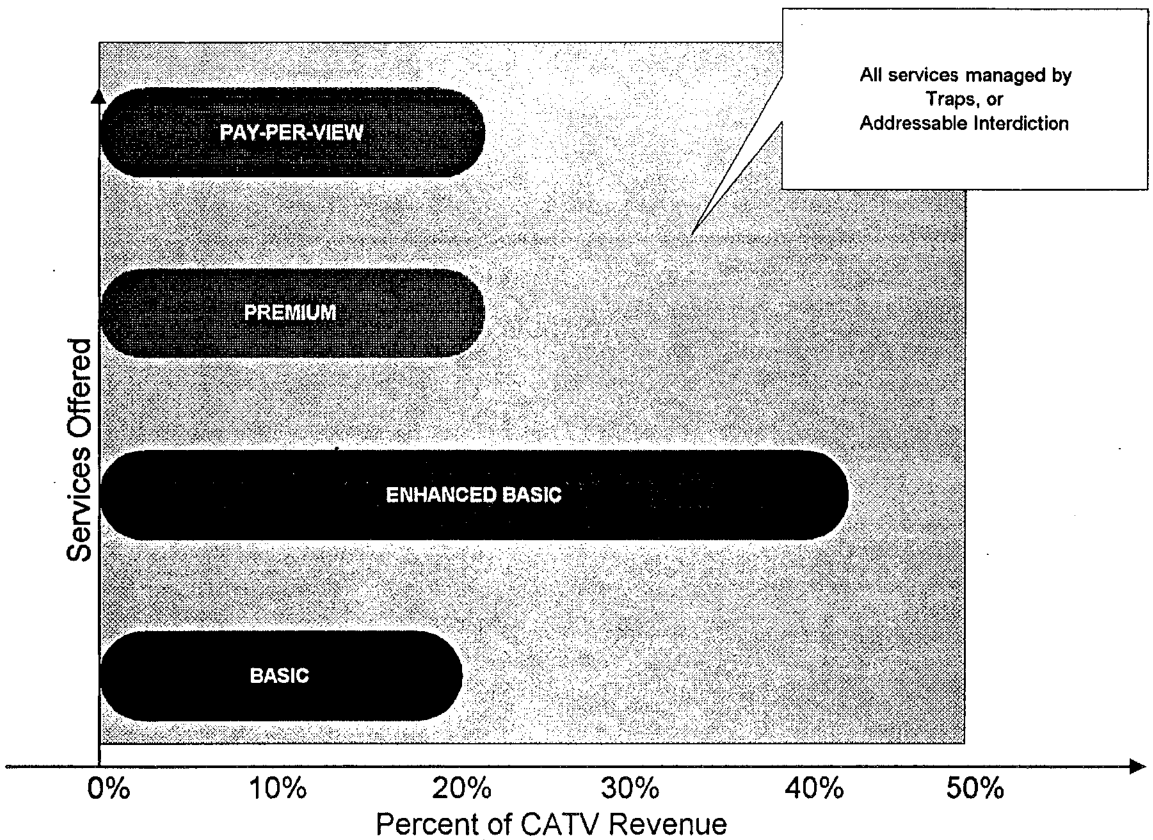
Advantages:
- High quality picture
- Instant program choice
- High security
- Navigation features for channel selection
- Analog de-scrambling can be added as option
- Increases transmission system capacity

Disadvantages:
- Set-top required for each television
- High cost
- Cannot manage lower tiers or return

Interdiction Analysis

Traps vs. Addressable Interdiction

The following diagram is an example breakdown of television programming revenue tiers. All of the programming tiers must initially be managed for service delivery, using either traps or addressable interdiction. The light background behind all services indicates that all tiers, and therefore all cable television revenue, are controlled initially with traps or addressable interdiction. Compare this diagram to the second diagram.



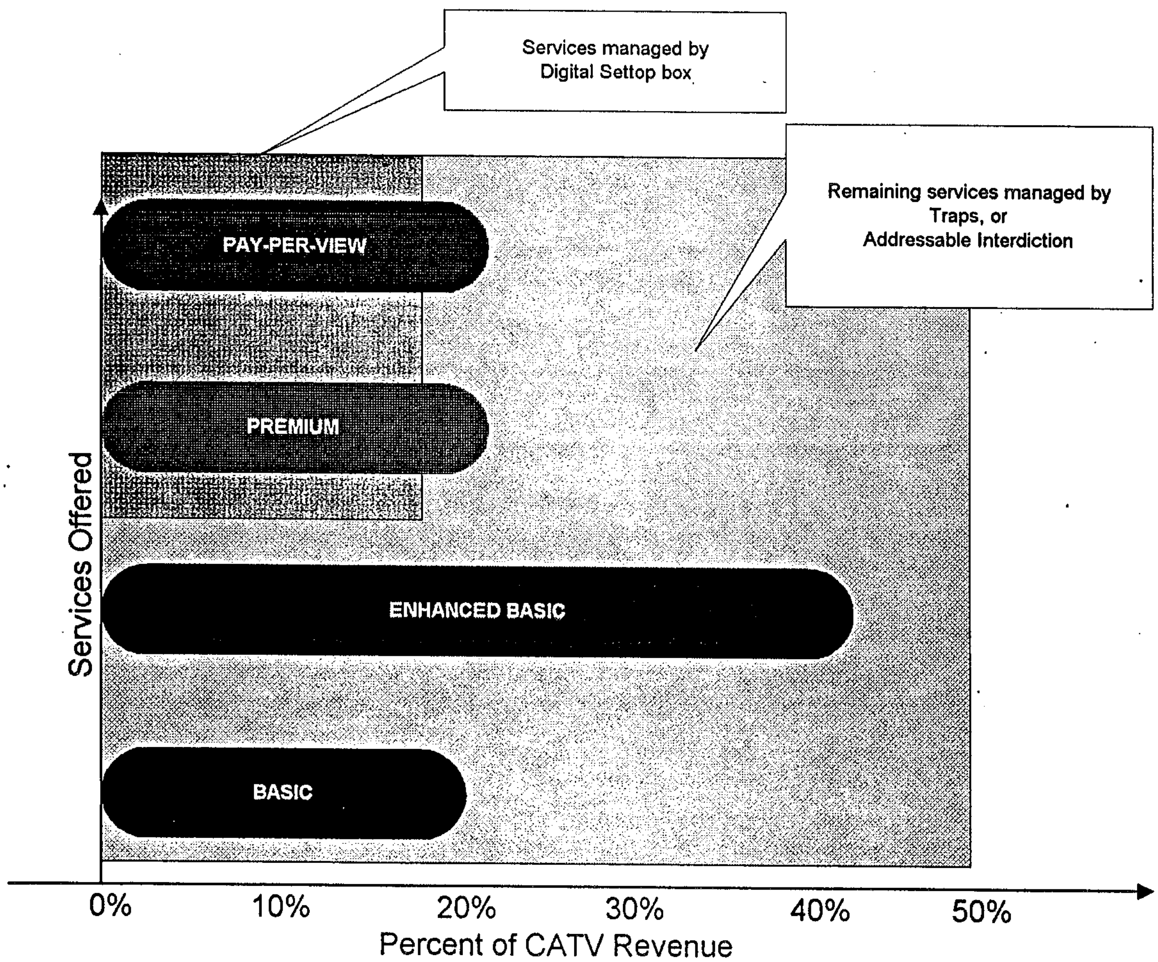
The second diagram uses the same tiers, but digital television has been introduced for some tiers. The least predictable factor is the amount of market penetration of digital television.

Digital Set-tops with Traps:

If digital television penetration is high, then no premium and pay-per-view programs remain transported as analog television channels. The dark gray background, indicating digital set-top tier management, would cover all premium and pay-per-view. The remaining basic and expanded basic tiers would be managed manually, with low pass filters and physical disconnects of service.

Digital Set-tops with Addressable Interdiction:

If digital television penetration is low, then more premium and pay-per-view programs remain transported as analog television channels; these must be managed by other means, and there would be more operational savings incurred by addressable interdiction than with traps.



Market Penetration Questions:

Will customers have a choice between digital and analog premium channels? Will digital television be marketed as providing more choice, as well as a high quality version of analog programs, and co-exist with the analog equivalents? Or, if any subscriber wants any premium channel, will they be carried only by the digital video provider?

Conclusion:

Given that digital television is rapidly maturing, install traps and filters initially, and migrate to digital television for premium tiers when feasible. (See Implications of Digital Television, below.)

The Return Path

New applications for cable television systems are often two-way, and use the return communications path. The return path enables system monitoring, billing management, telephone transport, and data network connections.
Operating the return path on coaxial cable is a great challenge. Noise can penetrate the system at every customer and tap, it is amplified and combined along the return path, and could mask the actual signals desired. The term used to summarize the problem is "ingress." The return path funnels all returning signals to the node. One noise source, whether a babbling transmitter in a home or a failing coaxial amplifier, can interfere with many customers.

In the 5 to 42 MHz return frequency range, the ingress is higher from 5 to 15 MHz than above, because of noise from electric appliances, motor controls and amateur radio operators. The techniques to minimize ingress are simple and effective, but must be performed throughout the coaxial system. The best materials must be used and installed properly to minimize ingress. The skill of construction technicians must be high to install the cable and tune the amplifiers properly. Each outlet must be filtered to eliminate unwanted return path noise. In-home filtering techniques cannot be expected to be performed by the customer. The cable television technician can install filters to block unwanted return path noise outside the home, either at the pole mounted "tap" or the "demarcation" where the signal splits to each of the outlets.

Implications of Digital Television for HFC Business

All of the subscribers to basic cable television programs would be served with standard analog channels. Analog delivery of expanded basic and premium channels will require some form of interdiction, or scrambling. This business is mature and the electronic devices are standardized.

Compressed digital television technology allows a much higher utilization of the cable television system. A single analog television channel can be re-used for ten or more compressed digital television programs, with the same or better picture quality. The programs are digitized at the source, and compressed for transmission. The HFC system transports the signals as if they were a standard television signal. The programs are not de-compressed and converted from digital back to analog until the viewer selects the program, maintaining high quality throughout the transmission media. The compression technique is standardized, allowing the decompression capability to be placed into many electronic devices.

Near video-on demand and true video-on-demand will offer many choices to customers and will be a valuable service.

The digital set-top is a computerized electronic device. It is addressable, in order to receive a unique setup from a centralized controller. It allows the customer to change what they want to pay for, without expensive visits by cable television technicians.

Other Applications of Digital Television Transmission

Amplitude Modulated (AM) lightwave transmission on fiber optics has performance limits, where the quality of signal is difficult to maintain, especially over long distances combined with wide bandwidths. In particular, when AM lightwave transmission is cascaded, one transmitter and receiver after another, then higher cost laser optical transmitters are used to maintain performance quality of each RF channel within acceptable limits. Since the design for this system does not require long cascades, this is the recommended method for the Tacoma City Light system.

Digital lightwave fiber optic transmission products were considered. At the headend, the RF channels can be converted into digital form and transmitted to the hubs, with or without compression. The transmission via digital lightwave is very high quality, and could be applied for transmission from the headend to the distribution hubs to achieve performance goals. Simplicity and flexibility is sacrificed to gain this quality, however.

These digital lightwave systems for television are typically expensive. The competing digital systems are based on SONET, Fibre Channel, or are proprietary. Only 16 to 32 channels of video can be carried on one digital transmission system, requiring more electronics to carry the same signal as AM lightwave. Only single vendor systems are available for digital transport, reducing competition for upgrades and component replacements (unless SONET broadcast transmission is used). Video modulation of broadcast channels is duplicated in each distribution hub, instead of concentrated at the headend.

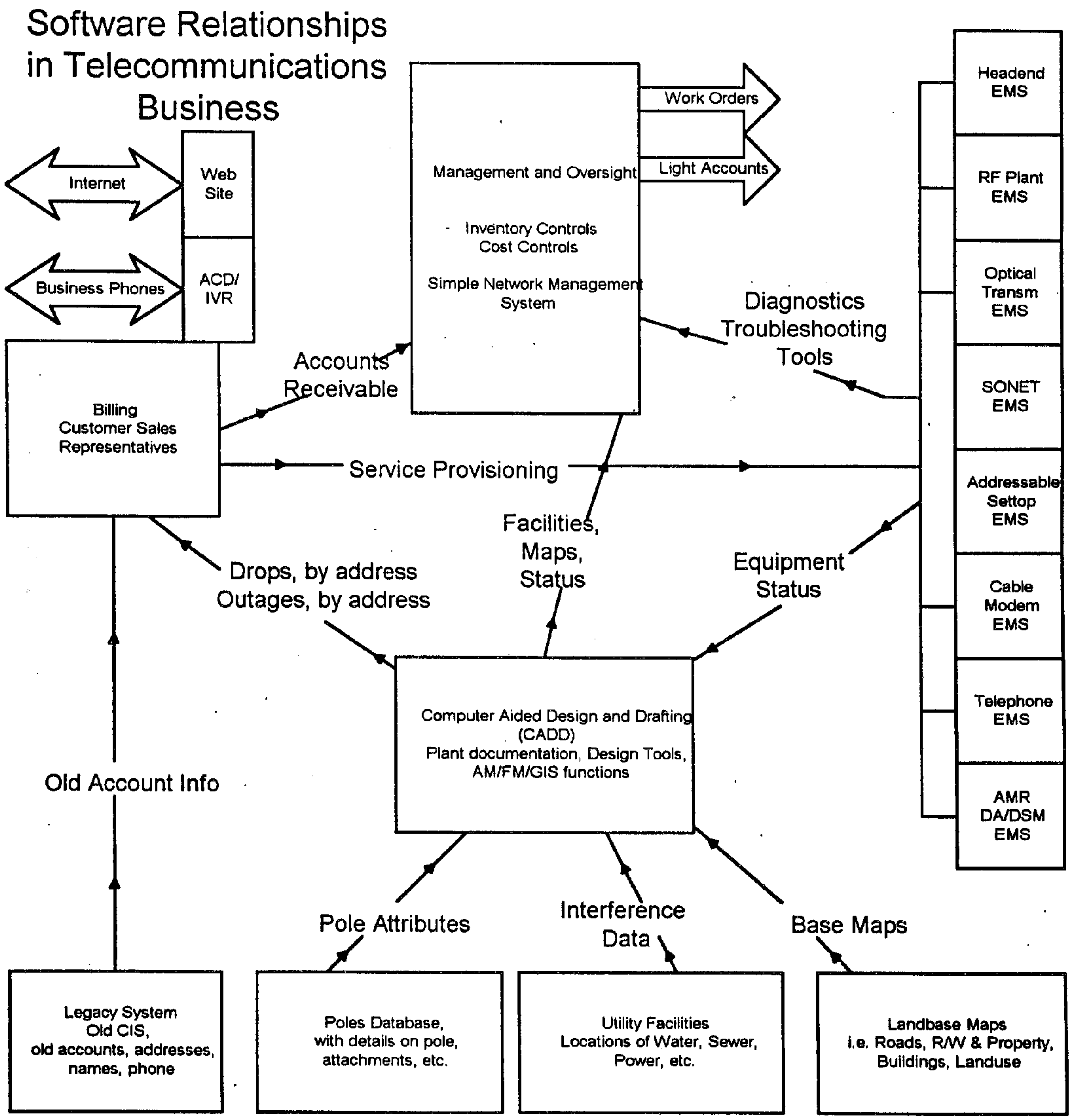
Network Management

With the construction of a new system, the opportunity will never be better to install high quality tools, diagnostics, equipment and software. Computers and network control systems are necessary to meet these goals. The diagram "Software Relationships in Telecommunications Business" shows their interactivity.

Cable television has not required the sophisticated system monitoring and customer accounting systems that have been necessary in the electrical or telephone business. Telephone companies use sophisticated monitoring and automation systems in providing basic telephone service, and in their operation and maintenance functions. As cable televisions systems begin to deliver advanced telecommunications services, the necessity grows for system monitoring, automation, and sophisticated customer-supporting software systems.

Fortunately, other industries have forced the development of many standardized tools that can be directly applied to a new business operation and infrastructure. Element Management Systems are computers that gather data from a specific group of field devices, and provide information and controls to the operating staff. Several Element Management Systems computers are diagrammed on the right of the following sketch. Higher level software and computers can use this information for their own purposes, and pass commands to field devices through the Element Management System. The higher level software can perform mapping, assist customer sales representatives, or generate operational reports using real and accurate information from the field devices. All of these are based on "Open Systems" which allow them to exchange information through relational databases and standard physical interconnections.

Tacoma City Light has developed a "data model" that defines the relationships among many data files, necessary to create data warehouses. The existence of accurate computerized maps and pole locations will be helpful in the design and construction of all the outside facilities. The new Automated Mapping/Facilities Management/Geographic Information System (AM/FM/GIS) will provide many more tools for efficient operation and management of a telecommunications system.



OPERATING PLAN

In the provision of telecommunications services, Tacoma City Light would interact with many parties to ensure the cost effective delivery of advanced telecommunication services to the local business and residential market. Some parties will be familiar, such as the electric system operating sections of Tacoma City Light. Others will be new to Tacoma City Light but mature in their own markets, such as the video production and telephone industries. Finally, there will be interaction with companies that are relatively new and growing such as Internet service providers and competitive access providers.

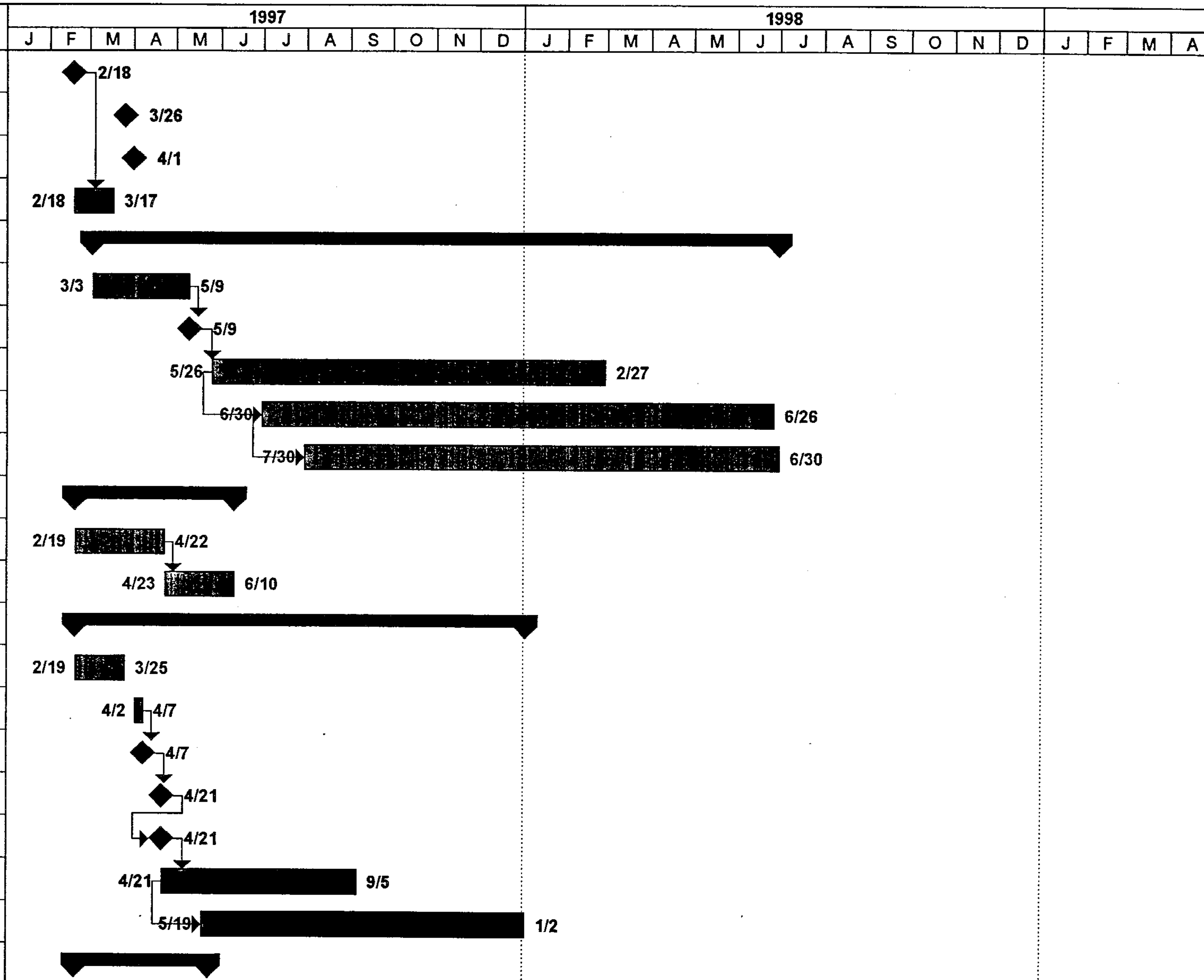
Diagrams have been developed to represent the possible relationships and responsibilities between the parties. There are diagrams representing the businesses of wholesale high-speed digital transport, Internet data transport, and the cable television businesses.

There are many milestones to pass before there is an operational system, before the first customer can be satisfied. Only then does the daily operational plan takes effect to sustain and grow the business.

- The final team of experienced employees must be on the job and in control of the process of creating and developing this business.
- Contracts must be negotiated and signed, to provide the content, design, procurement, and installation that becomes the "system". All contracts must be closely managed and performance of those contracts must be under constant scrutiny.
- The permanent staff of marketing, technicians, sales and engineering must become familiar with the new system, trained on specialized equipment operation, and be trained in the ways they will need to perform in the highly competitive environment of telecommunications.
- Installation must proceed in an economical but swift manner, culminating in high performance two-way connections to residences, small businesses, and large telecommunications users and suppliers.

Telecommunication Project Schedule

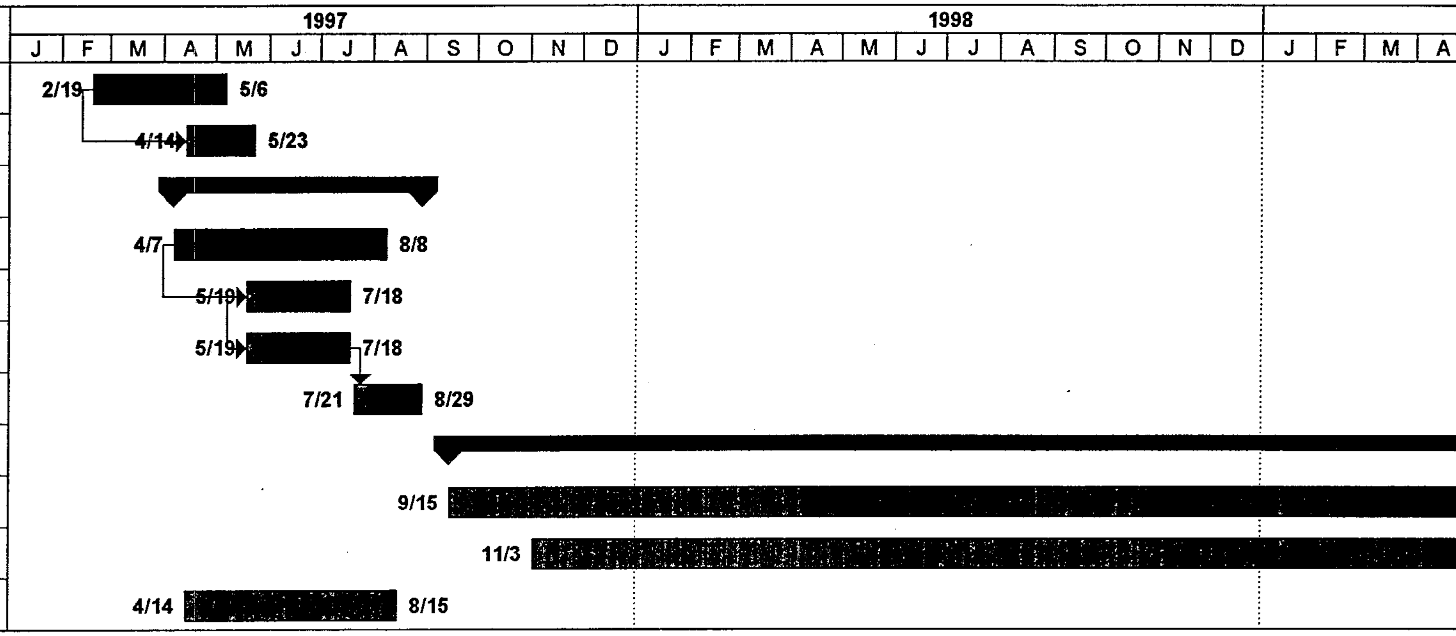
ID	Task Name
1	PUB/Council Study Session
2	Public Utility Board vote on business entry
3	City Council vote on business entry
4	Public Meetings
5	**Construction Period**
6	Prepare RFPs
7	Approve bid and authorize construction
8	Design Phase
9	Build Phase
10	Perform system acceptance
11	**Arrange and Secure System Financing**
12	Bond Preparation
13	Bond Issues
14	**Hire Operational Staff**
15	Advertising for top 3 positions
16	System Manager Interviews
17	Hire System Manager
18	System Manager Onboard
19	Hire Marketing Manager
20	Hire Operations Staff
21	Training
22	**Franchises**

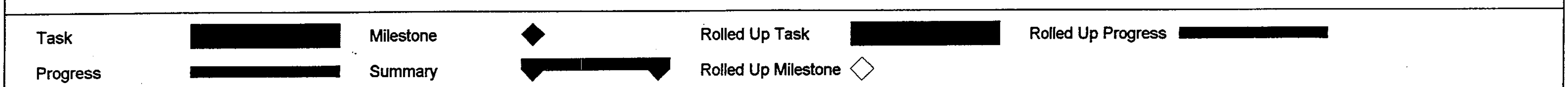


Task | Milestone | Rolled Up Task | Rolled Up Progress
Progress | Summary | Rolled Up Milestone

Telecommunication Project Schedule

ID	Task Name
23	Discussions with Local Jurisdictions
24	Sign Franchises
25	**Marketing Development**
26	Write Marketing Plan
27	Early Bird Sign Up
28	Community Programming Selection
29	Arrange for programming packages
30	**Commence Operations**
31	Begin operations of the CATV service
32	Add new services from service providers
33	Arrange Billing System





General Operations

A common telecommunications infrastructure will be used for all three of the major lines of business: high speed telephone and data transport, Internet data transport, and cable television. The cost of common operation and maintenance of the plant will be shared.

There are key interactions with telecommunications service providers, directly supporting this business, which must be managed with special contracts, physical standards, and technical relationships. Tacoma City Light would transport content which originates in a few points on the network, supporting all three lines of business. Satellites dishes would receive cable television programs from orbiting satellites. Internet traffic would flow to and from the electronic facilities of Internet Service Providers. Long distance telephone traffic would flow to and from POP facilities.

That content, which originates in a few points, would be distributed throughout the Tacoma City Light service territory to wholesale and end-use customers. These customers would to some degree associate all the delivered products with Tacoma City Light, whether or not all the responsibilities of service are Tacoma City Light's. In admitting that, then there would be a role for Tacoma City Light staff in ensuring new systems are installed correctly, and service is prompt and extraordinary.

The aggressive marketing of services and products will determine the success of this new telecommunications system more than any other single factor. Staff would be assigned directly to this activity. Advertising and promotional programs would be the norm and would be performed by ensuring that current information about products and services is always available to the customer/owner.

Operational Support Systems would be in place, providing the tools and information needed by staff to perform their duties efficiently and promptly. As services delivered by the telecommunications system are based on electronics, the facilities themselves would provide information about their own health and status. Computer systems today allow the system support staff to have information and responsibilities that were diversified only a few years ago. Continuous performance monitoring of the communications facilities allows crews to respond quickly to trouble, even before the trouble affects service.

Continuous attention must be paid to developments in communications technology, to continue to serve a changing market. Management and engineering staff will seek to introduce devices on the fiber-optic transmission network that meet the developing needs of new applications for sound, data, images, and television.

Emergency Restoration

While the telecommunications system would be highly redundant and self-healing to the extent practical, some outages are inevitable. Roughly the same percentage of the telecommunications system distribution would be overhead as in the electric power distribution. Large efforts are required to restore services after a wind or ice storm. While Tacoma City Light crews would work together to best effect possible, it should be recognized that electrical power crews and telecommunications technicians would have separate but overlapping responsibilities. When trees are laying in the lines, one crew may move through an area just to clear them, while another follows doing only restoration of service. The certification of power crews, tree trimming crews and communications technicians are separate and specialized, as are some of the knowledge, skills and abilities. Power crews will always believe restoration of power service (heating and cooking) is most important, and communications technician will always believe restoration of advanced communications (telephone, two-way data, news and information) is a higher public service. But, storm damage and overhead cable restoration is one area that their work would overlap and close coordination would provide significant benefits to both systems.

Customer Service

In the telecommunications business, customer service is much more than establishing and managing accounts and receivables. Customer sales representatives would not only take requests, but would become extensions of marketing and would work closely with technical field personnel. The success and failure of penetrating new markets depends greatly on these sales staff and their ability to effectively communicate the range of services available to customers. New software tools will provide information to the sales representatives about outages, the network facilities servicing their neighborhood, and promotional activities of Tacoma City Light and service providers transported on the system.

Billing

Due to the rapidly evolving nature of telecommunications services, the billing for new services cannot effectively take place on the current billing system as serves Electricity, Water, Sewer, Storm Drain and Refuse charges. Bills would not initially be combined with current utility fees. The current system is unable to be quickly or efficiently modified for numerous new charges and services. The new telecommunications services would require a new, modern computer billing system, integrated with other telecommunications operational support systems. The new system would interact with other systems including address databases, cable plant status systems, and the Element Management System.

Regular Operations

The Regular Operations must be discussed in the context of each business line: high-speed digital transport, Internet data transport and cable television.

High Speed Telephone and Data Transport

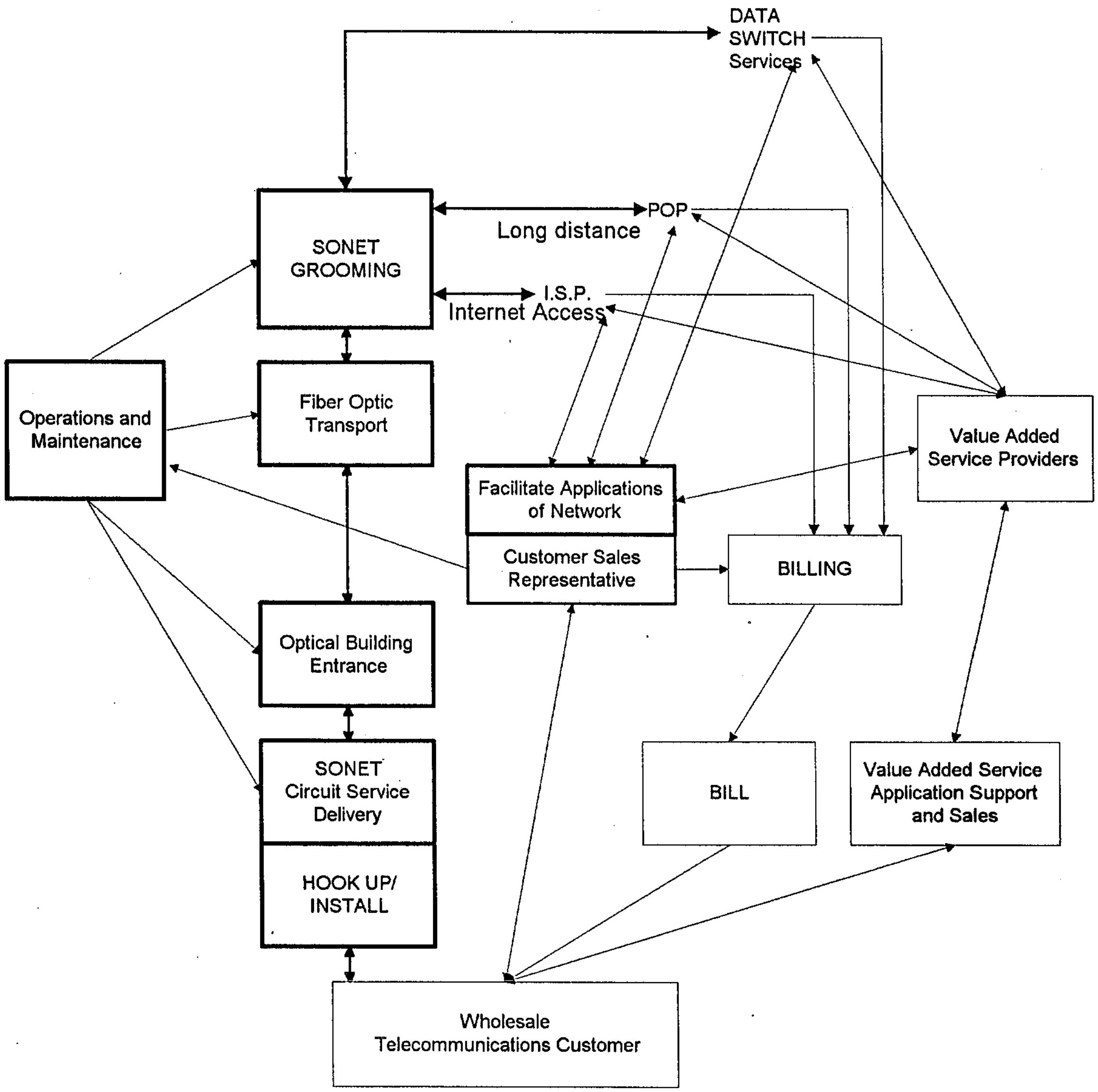
Tacoma City Light would own and operate a communications transmission system, capable of providing wholesale high-speed digital transport circuits for telephone and data transport from point to point throughout its service area. This service would be offered on a non-discriminatory basis for the use by others. This service would be limited to transport only: Staff would not be dedicated to application-specific customer support. That duty would be filled by the private sector value added service providers or individual customers.

Tacoma City Light would sponsor and participate in user groups and forums, in which users can exchange experiences in applying the high-speed data transport, and can be introduced to value-added service providers. Market research indicated that most customers expect a high level of specialization in applying high-speed digital transport for use in the customer's business. Local service providers would craft solutions for the users and would utilize Tacoma City Light's wholesale transport. Forums would likely be held on a bi-monthly schedule. Tacoma City Light would host the forums by arranging for convenient meeting space, publishing meeting notices and agendas, and participating in the discussions as a transport provider and end-user.

Tacoma City Light would install electronics in the users buildings, to create the high-speed pathways. By distributing the electronics, redundancy and reliability of the entire network is increased compared to a centralized office structure. Fiber optic cable would enter buildings, with redundant cable routes available if requested by the customer. Tacoma City Light would operate and maintain all the fiber optic cables and transport electronics.

The high-speed transport circuits would terminate either in the customers buildings, or at the facilities of one of the following: long distance providers, local telephone service providers, or data network service providers. Developing strong and effective business relationships with these providers would be a critical factor in the success of the telecommunications system.

High Speed Telephone and Data Transport



BOLD = Tacoma City Light functions and facilities

High-Speed Internet Data Transport

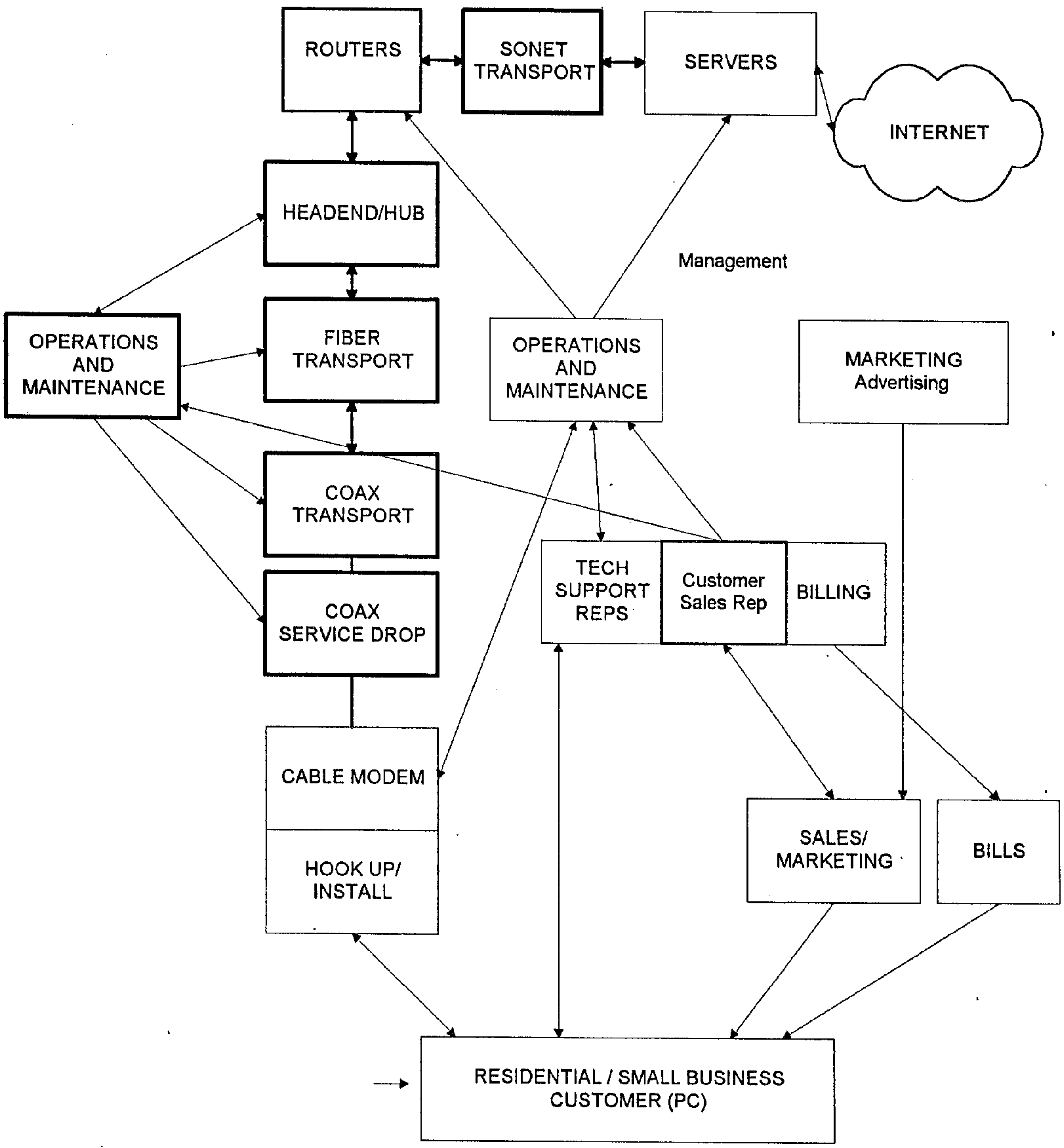
Tacoma City Light would own and operate a hybrid fiber optic - coaxial cable telecommunications system, distributing connectivity throughout the Tacoma City Light service territory. Tacoma City Light would provide transport service for use by Internet Service Providers to provide cable modem - based Internet access to all residents and small businesses.

Internet Service Providers would use Tacoma City Light's digital, fiber optic transport from their centralized facility to the data network routers which convert digital signals into RF channels. Internet Service Providers would be provided transport using Tacoma City Light's RF channels to deliver cable modem signals to and from end-use customers, including both residential and small business users.

Internet Service Providers would partner with Tacoma City Light to ensure the delivery of the highest quality products and services to end-users. Key issues to consider in partnering with Internet Service Providers to deliver the growing Internet traffic are: Internet Service Provider investment in caching computers to serve the common Internet information requests locally; leasing of highest speed interconnections to the national Internet infrastructure; choice of cable modems for efficient use of RF channels in data networking; and the history of responsiveness to customers service and trouble calls.

High-speed Internet data transport is a relatively new application of the Hybrid Fiber Coax cable television infrastructure, providing two-way service on the cable to the home. Extreme care would be placed on the installation of the cable serving end-users. All cable in the home used for two-way services must be of top-quality materials. Electrical noise infiltrating into the return path could affect the service of others and would be eliminated with careful installation and material choices.

Cable Internet Transport



BOLD = Tacoma City Light functions and facilities

Cable Television

To provide this service, Tacoma City Light would operate the headend reception of cable programs, the transmission system to the homes, and the service drop into the homes. Technicians would be in the field, hooking up new services to homes, changing existing services, and installing equipment to facilitate tiers of programming. In support of this business, Tacoma City Light would have customer sales representatives accepting orders from customers for new or revised services. Tacoma City Light would have communications technicians and designers responsible for the overall operation of the reception, transmission and delivery of television programming.

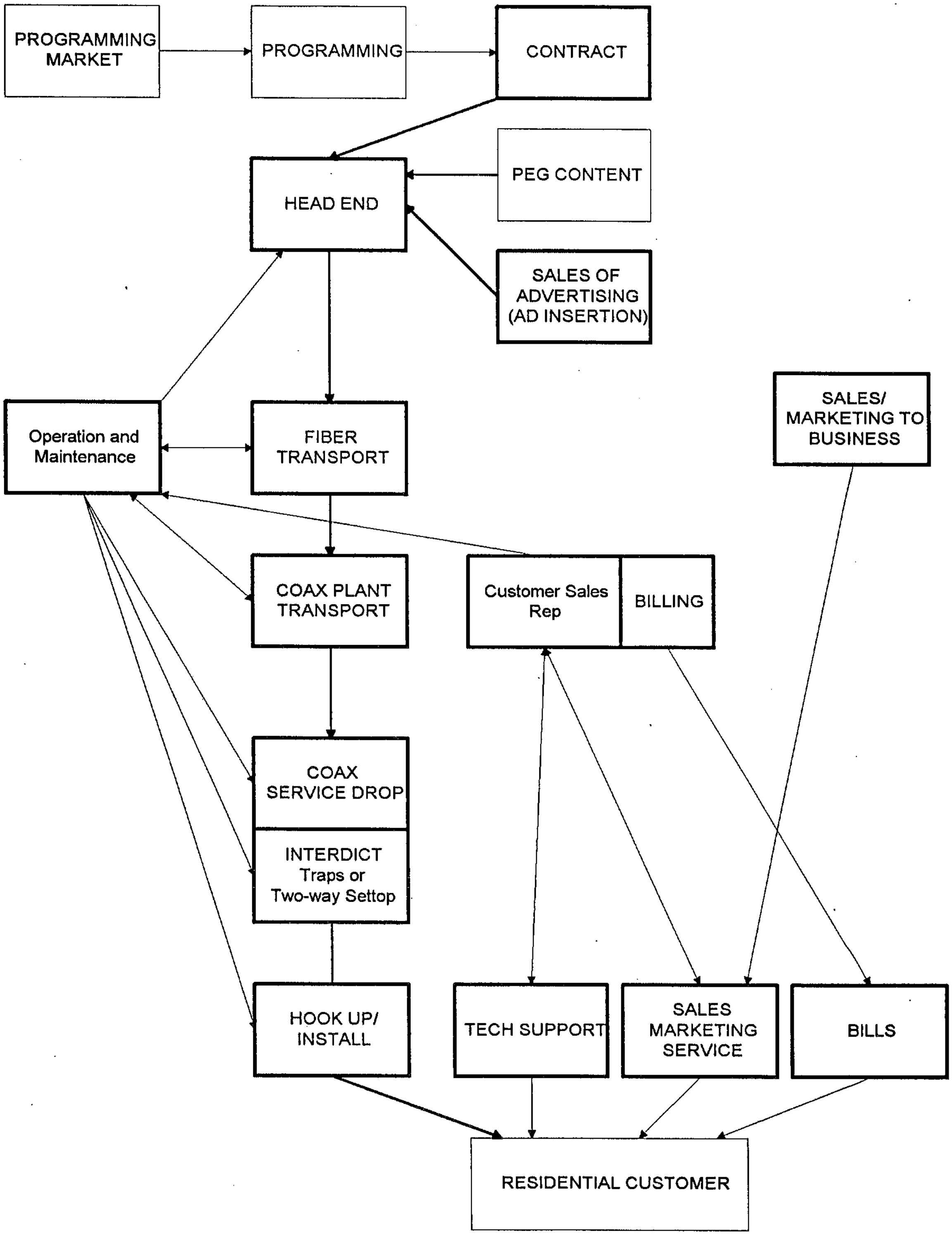
Marketing staff would keep a pulse of the interests and desires of local customers and would arrange for delivery of programs to match those expected by customers.

Headend operators would receive and retransmit programs from local sources, such as public access, education, and government (PEG), for narrowcast to subscribers. Narrowcasting allows the PEG channels to be localized to each franchise area, at the discretion of franchise authorities.

Video-On-Demand (VOD) service providers would be sought, to operate sophisticated digital video storage and retrieval computers in the headend. VOD requires digital set-top boxes to receive the programs and convert them for viewing on a standard television. Tacoma City Light technicians would install these digital set-tops, which are also a two-way device using the return path for control of the program selection, and for billing information from pay-per-view viewing.

FCC compliance tests and reports are required for all cable television systems. Tests would be conducted and reports submitted on issues including the following: signal leakage, end-of line performance, employment and operations.

Cable Television

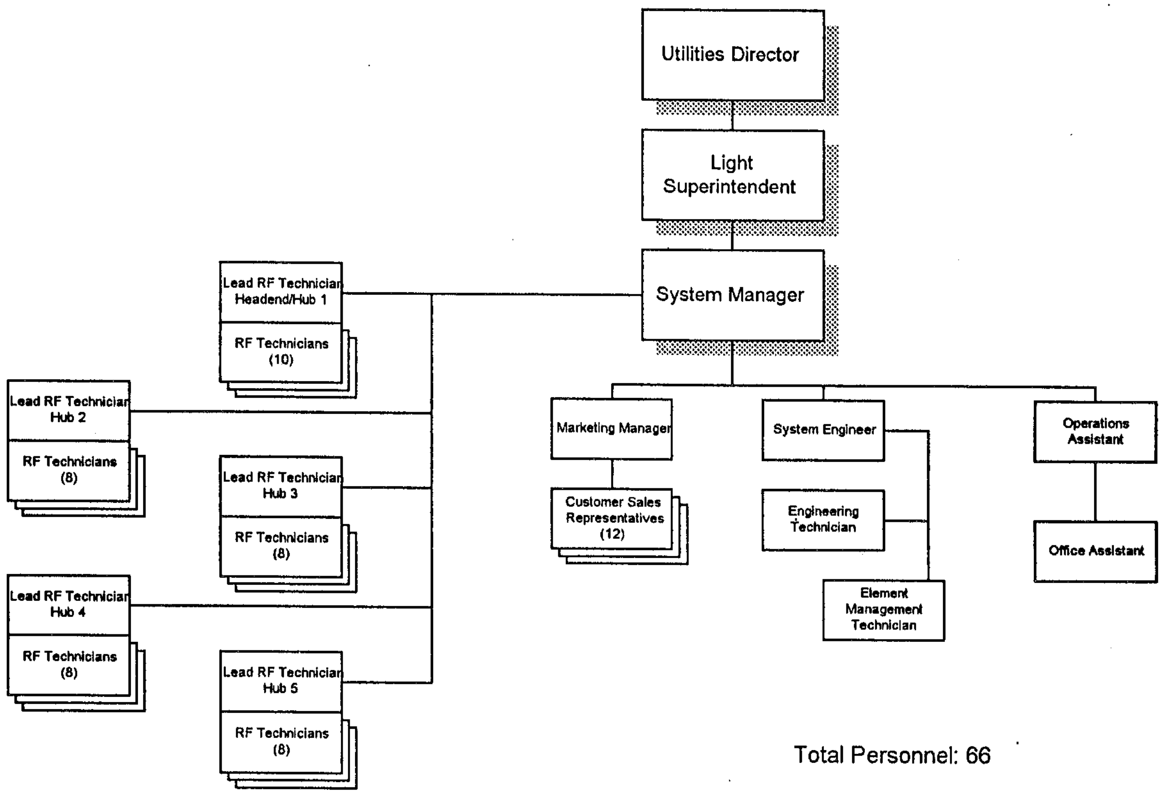


BOLD = Tacoma City Light functions and facilities

ORGANIZATION

Staffing for the Communications Section would include both reallocation of existing personnel and the recruitment of new employees with communications, technical and marketing experience. The Section will also rely on the support of other departments within Tacoma City Light and the City of Tacoma, such as Legal, Fleet, and Accounting.

Telecommunications
Organization Chart



Position Descriptions

Communications System Manager (1)

General Statement of Duties: Manages the daily operations of the community hybrid fiber-optic coax communications system including the direction of marketing activities and related studies, programming content negotiations, supply negotiations, partnership development, interconnection agreements, as well as coordination with other sections and divisions of TPU, interface with regulators and franchise authorities, and special duties as assigned. Reports to the Light Division Superintendent.

Knowledge and Abilities: Comprehensive knowledge of Communication Utility operations and its related equipment plus a demonstrated proficiency in administering communications marketing programs. Needs accomplished computer skills, must have excellent organizational skills and be able to effectively coordinate the work of other employees.

Education and Experience: A minimum of five years of managerial experience in Communications Utility operations with a special emphasis on marketing activities and programs. Graduation from an accredited college or university with a major in business administration, marketing, operations research, engineering or a related field; or any equivalent combination of experience and training which provides the ability to superbly perform the job functions as defined.

Communications Marketing Manager (1)

General Statement of Duties: Responsible for the planning, development and coordination of various utility marketing programs with particular emphasis in the marketing of telecommunications services as well as the overall management of the Communications Sales Representatives Team. Performs market research work, makes direct customer contacts as required, and duties as assigned. Reports to the Communications System Manager.

Representative Duties: Develop system marketing goals. Monitor and analyze system marketing performance. Develop local campaigns and media plans. Budget subscribership in all programming tiers. Train sales representatives to market products.

Knowledge and Abilities: Comprehensive knowledge of marketing principles and techniques plus a working knowledge of advanced communications technology. Accomplished computer skills and abilities are essential. Must be able to communicate effectively with customers in a selling environment, have good organizational skills and be able to effectively coordinate the work of other marketing personnel.

Education and Experience: Three to five years of marketing management experience in the telecommunications industry. Demonstrated ability to develop and execute strategic and tactical marketing plans. Strong verbal and written communications skills. Related college degree preferred.

Communications Engineering Manager (1)

General Statement of Duties: Responsible for overall broadband, two-way hybrid fiberoptic coaxial system design and operation. Performs advanced planning and specifications of system improvements. Designs and procures cable television and transport system improvements and expansions. Performs budgeting, cost controls of capital and operational activities, and duties as assigned. Reports to the Communications System Manager.

Representative Duties: Maintain system to exceed industry and franchise standards. Conduct annual FCC tests. Maintain and improve telecommunications plant. Oversee all installation activities.

Knowledge, Skills and Abilities: Comprehensive knowledge of integrated communications systems including broadcast television, digital television, data networks, telephone networks, and network management systems. Recognizes and adapts to industry changes in efficient communications structure. Recognizes and assigns priority of installation and maintenance work. Skill and ability to operate computer aided design and documentation software. Produces designs, specifications, instructions, and drawings of complex systems. Uses PC software for reports, work orders, procurement, and documentation. Skill and abilities to interact effectively with managers, technicians, suppliers and service providers.

Education and Experience: Bachelor of Science degree from accredited engineering college. 10 years experience in the planning, design and implementation of integrated communications systems.

Communications Operations Assistant (1)

General Statement of Duties: Assists in the daily functions of the Communications Section primarily in the areas of operations assistance and customer sales activities, and performs other duties as assigned. Reports to Communications System Manager.

Representative Duties: Manage traffic, accounting, and financial activities. Perform liaison activities between the Section and various departments, committees and the general public. Develop budgets, business plans, and financial analysis. Collect information concerning established policies, procedures and programs. Attend various meetings including Council and/or Board meetings. Assist in directing and coordinating administrative programs; provide information and guidance to administrative support staff; coordinate and resolve personnel related matters.

Knowledge and Abilities: Functions, principles and practices of public administration. Budget preparation and control. City organization, operations, policies and objectives. Research methods and techniques. Applicable federal, state, and local laws and codes. Prepare policy and procedural recommendations. Present ideas and concepts persuasively.

Education and Experience: Bachelor's degree in public or business administration. Two year's experience performing business management and administrative staff work.

Office Assistant (1)

General Statement of Duties: Performs a variety of clerical support activities which may include: providing information and assistance to the public, preparing and processing forms and documents, maintaining records and files, operating a multi-line phone system and a personal computer, and other duties as assigned. Reports to the Communications Operations Assistant.

Representative Duties: Schedule and coordinate appointments and meetings. Prepare, organize, and maintain records and files. Prepare correspondence, requisitions, purchases orders and other documents as required. Receive and distribute mail.

Knowledge and Abilities: Comprehensive knowledge of office practices, procedures, and equipment. Correct usage of English grammar, spelling, punctuation, and vocabulary. Operation of a personal computer and standard software. Meet schedules and time lines. Plan and organize work. Oral and written communication skills. Establish and maintain cooperative and effective working relationships with others.

Education and Experience: High School graduation. Four years of general clerical or secretarial experience.

Engineering Technician (1)

General Statement of Duties: Performs routine fiber optic and coaxial cable plant design, and other duties as assigned. Documents all plant installations and configurations. Reports to Communications Engineering Manager.

Representative Duties: Operates computer aided design and drafting software. Maintains records of cable television and transport plant installations. Refers to design standards. Orders standard materials for plant installations. Inspects the deliverables from design contracts.

Knowledge and Abilities: Knowledge of two-way telecommunications system design principles and basic cable television operation principles. Knowledge of Personal Computer and Local Area Network operations. Skills and ability to operate and maintain complex software for the design and documentation of two-way cable television and high-speed data and telephone transport plant. Uses other software tools such as word processing and database reporting. Ability to follow procedures for material procurement. Skills and ability to interact with specialists, engineers, and material suppliers.

Education and Experience: High School graduation. Two years experience in the drafting and computer aided design of Hybrid fiber-coax communications systems.

Element Management System Assistant (1)

General Statement of Duties: Operates and maintains the Element Management Systems (EMS) software, electronics, and relational databases of the cable television and high-speed data and telephone transport systems. Responsible for performance, updates, configuration and documentation of several EMS systems and office PC system. Performs these and other duties as assigned. Reports to Communications Engineering Manager.

Representative Duties: Maintains networked PC computer systems for software releases, configuration changes, hardware upgrades and component failure. Configures operator interfaces for ease of use and for clear display of information. Configures data storage and processing in a distributed data and distributed processing environment. Advises staff on use and operation of EMS software. Advises staff on use and operation of all PC application software.

Knowledge and Abilities: Knowledge of relational database modeling and design. Knowledge of Local Area Network functions, design and configuration. Ability to specify application software features. Ability to customize application interfaces to display and represent customer sales, plant operation, and financial information. Meet schedules and time lines. Plan and organize work. Oral and written communication skills. Establish and maintain cooperative and effective working relationships with others.

Education and Experience: High School graduation. Two years experience in the element management systems, network management application software, and relational database design and configuration. Bachelors degree in computer science, engineering, or related field is desirable.

Lead Communications Sales Representative (1)

General Statement of Duties: Serve as a principal representative for the Communications Section and coordinate customer interaction and the delivery of all services to meet customer needs. Instrumental in coaching, training, and motivating customer contact personnel in sales skills and product knowledge. Facilitate discussions and resolve problems that address the interests of both the customer and the Communications Section. Coordinate work distribution and provide direction and guidance to customer sales staff. Performs these and other duties as assigned. Reports to Communications Marketing Manager.

Representative Duties: Serve in a lead capacity within the department, provide work direction and guidance to others. Resource to other staff in all sales promotions, new product introductions, market research studies, and public relations promotions. Provide assistance in solving unusual and difficult problems. Interview customers in person or by telephone regarding sales of telecommunications service, and requests for information or assistance. Resolve complex questions or complaints concerning programming or billing.

Knowledge and Abilities: Strong interpersonal communication, organization, and teamwork skills required. Comprehensive knowledge and application of principles of sales methods, training, supervision and work direction. Comprehensive knowledge and application of accounting and collection operations, as well as City codes, policies and operations governing assigned activities. Must have ability to supervise, coach, and manage a group of workers.

Education and Experience: High School graduation. Two years of increasingly responsible experience as a Sales Representative. An associate degree or college course study in business, management or communications is desirable.

Communications Sales Representatives (11, increases in relation to the number of customers)

General Statement of Duties: Perform telecommunications sales duties including assisting customers in person and by telephone. Assist customers in the selection, options and configuration of telecommunications services. Advertise all sales promotions, product introductions, and public relations promotions. Receive and provide customer information. Prepare and process billings. Receive moneys from the public and maintain related records and files. Reports to Lead Communications Sales Representative.

Representative Duties: Interview customers in person or by telephone. Reply to requests for new services, discontinued service, or changes in service options or features. Schedule service appointments and demonstrations. Respond to questions or complaints concerning billings, payments, rate schedules, or changes in policies and regulations. Use personal computers in a distributed data environment to determine status and conditions of service to customers. Compute and process billings according to established procedures, check balances, correct billing errors and adjust as necessary. Receive money from the public for payment of bills, calculate and issue change and receipts, record transactions, balance and maintain records relating to moneys received and disbursed.

Knowledge and Abilities: Exceptional skills in sales opportunities and interaction with customers. Applies basic principles and practices of customer service, accounting, and collection operations. Communicate effectively both orally and in writing. Apply codes, regulations, policies and procedures as appropriate to the customer's situation.

Education and Experience: High School graduation. Two years general office experience of increasing responsibility and complexity involving telephone duties, computer usage, sales, and personal contact with the public.

Lead RF Communications Technician (5)

General Statement of Duties: Coordinates activities of RF communications technicians. Responsible for overall plant performance of one Distribution Hub serving area. Monitors traffic and utilization of RF plant. Acquires materials and supplies for plant construction. Performs RF communications technician duties. Reports to Communications System Manager.

Representative Duties: Trains, schedules, assigns and coordinates RF communications technicians. Arranges for material availability for installation and repair of cable television and high-speed data and telephone transport systems. Performs employee performance evaluations and other duties as assigned. Performs the duties of RF communications technician, as appropriate.

Knowledge and Abilities: Knowledge of standards and procedures for installation and maintenance of all outdoor HFC plant. Knowledge of personnel rules and assignment procedures. Skill and ability to coordinate the work of many technicians. Skill and ability to interact with persons of diverse backgrounds, skills, experience and responsibilities.

Education and Experience: SCTE certification. 5 years experience as RF communications technician, or equivalent.

RF Communications Technician (42)

The RF communications technician is a broad classification, covering several specialties. Qualifications training and tests will be established for each specialty. The specialties include customer premise coaxial cable and electronics; trunk coaxial cable; fiber optic cable; hybrid fiber-coax electronics and AM optical transmitter - receiver; and cable television headend electronics, SONET digital transmission and power.

General Statement of Duties: In a specialized crew environment, an RF communications technician performs operations, installation and maintenance of the components comprising a broadband, two-way cable television or high-speed data and telephone transport system. These duties are performed in an efficient, timely and professional manner. Reports to Lead RF Communications Technician.

Representative Duties: Performs operation, installation and maintenance of the following broadband two-way cable television system components: customer premise coaxial cable and electronics; trunk coaxial cable; fiber optic cable; hybrid fiber-coax electronics and AM optical transmitter - receiver; and cable television headend electronics, SONET digital transmission, element management systems, and power. Develops and uses as-built information of the telecommunications system documentation. Performs headend operations, during normal workday hours and 24 hour on-call. Interacts with other communications system staff for training, job assignment and definition, and teamwork. Performs helpful and responsive customer service and sales in all interactions with customers. These duties are performed in accordance with regulations, rules and procedures.

Knowledge and Abilities: The RF communications technician is a broad classification, covering several specialties. Qualifications training and tests will be established to define each of the specialties of operation, installation and maintenance, as defined below.

> **Customer Premise Coaxial Cable and Electronics:** Knowledge of installation practices and standards from the trunk tap, to the demarcation cabinet outside the customer premise, and within the customer premise. Knowledge of configuration of set-top devices, and the customer owned VCR's TV's, PC's and telephones. Skills and abilities to successfully complete the above installations and configurations without immediate supervision, in a safe and professional manner. Knowledgeable of current cable television program tiers and service offerings. Skill and ability to interact with customers to meet the customer satisfaction and service goals of the company. Operates motor vehicles, moves and climbs ladders, uses tools and has strength and stamina to perform the above work. Performs the above work in all outdoor weather conditions.

Trunk Coaxial Cable: Knowledge of installation practices and standards of cable television trunk coaxial cable, including pole contacts, strands, stringing, lashing, splices, connectors, active electronics enclosures, taps, pedestals, trenching and surface restoration. Performs work with adherence to the requirements of other utilities. Skills and abilities to successfully complete the above installations without immediate supervision. Operates motor vehicles, lifts, machinery and tools. Has strength and stamina to perform this work. Performs this work in all weather conditions.

Fiber Optic Cable: Knowledge of installation practices and standards for fiber optic cable, including pole contacts, strands, stringing, lashing, splicing, terminating, trenching, conduits, vaults and pedestals. Knowledge of restoration practices and standards. Knowledge of performance testing procedures and standards. Skill and ability to perform the above installations, restorations and testing with minimal immediate supervision.

Hybrid Fiber-Coax Electronics and AM Optical Transmitter - Receiver: Knowledge of standards and procedures for installation, adjustment, repair and testing of amplitude modulated laser transmitters and optical receivers. Knowledge of standards and procedures for installation, adjustment, repair and testing of outside plant active electronics, including HFC nodes, trunk amplifiers, line extenders, and interdiction of return path and program tiers. Skills and ability to build and adjust performance of the coaxial branches to meet performance standards and goals. Operates motor vehicles, lifts, tools and test equipment. Has strength and stamina to perform this work. Performs this work in all weather conditions.

Cable Television Headend Electronics, SONET Digital Transmission, Element Management Systems, and Power: Comprehensive knowledge of broadband, two-way cable television system and SONET system operation principles. Knowledge of installation practices and standards for satellite dishes, low noise amplifiers, satellite receivers, video switchers, add insertion, video modulators, audio modulators, patch panels, combiners, splitters, directional couplers, and amplifiers. Skills and ability to construct and adjust performance of all headend components to meet performance standards, goals, and schedules. Skills and ability to use network and element management system software to operate, configure, and diagnose all components of the cable television system. Able to respond during 24 hour on-call status, and implement emergency response to outages and system trouble. Operates motor vehicles, lifts, tools and test equipment.

Education and Experience: High School graduation, and two years continued education in electronics, communication systems, or equivalent. SCTE certification, as appropriate to specialization. Two years additional experience in installation and maintenance of electronic or communications systems.

Cross Training and Crew Flexibility Goals: The goals of a technician qualification system are to build a fully cross-trained, flexibly assigned, knowledgeable, and productive technician staff. Both efficiency and employee satisfaction would be improved. Responsibilities can be varied to provide employees with weekly or monthly variety. The financial rewards of qualifications will be clear incentives to improvement. Hourly compensation would be based on the total number of specialties in which each technician is qualified; technicians qualified to perform work in each specialty would be assigned to do so in a rotation; and any technician who is not qualified in a specialty may be assigned to assist the work of another technician who is qualified.

One technician would be assigned, on a rotating basis with other qualified technicians, to headend operator. The headend operator would be responsible for first response to any system component outage that is affecting services, and will be authorized to take appropriate actions. When assigned, this technician will be on-call 24 hours a day. The headend operator on duty must remain within range of and respond to a digital display pager.

The Communications Section will be a section within the Light Division and hence the Tacoma Public Utilities structure. The Communications Section will purchase various services from support services groups, such as:

- **Legal**

The Legal department would be available to assist in the development and review of all legal documents, contracts, franchise agreements, and other legal issues.

- **Fleet**

Vehicle purchases, maintenance, repairs, and inventory would be conducted through coordination with the Fleet section.

- **Accounting**

The Accounting department would be responsible for all accounts receivable, purchases, R&I's, accounts payable and employee payroll processing.

- **Community and Media Services**

The Communications Marketing Manager would coordinate with this group to address public and community questions, concerns, and representation.

- **Information Systems**

Information Systems would be available as a resource in the installation, interconnections, and networking of the computer systems needed for the Communications Staff as well as the Element Management System and related databases.

- **Human Resources**

Human Resources would be involved in the recruitment, advertising, selection, and coordination of new employees, as well as maintaining employee records and benefit programs throughout the employment of each individual.

NOTES TO FINANCIAL STATEMENTS

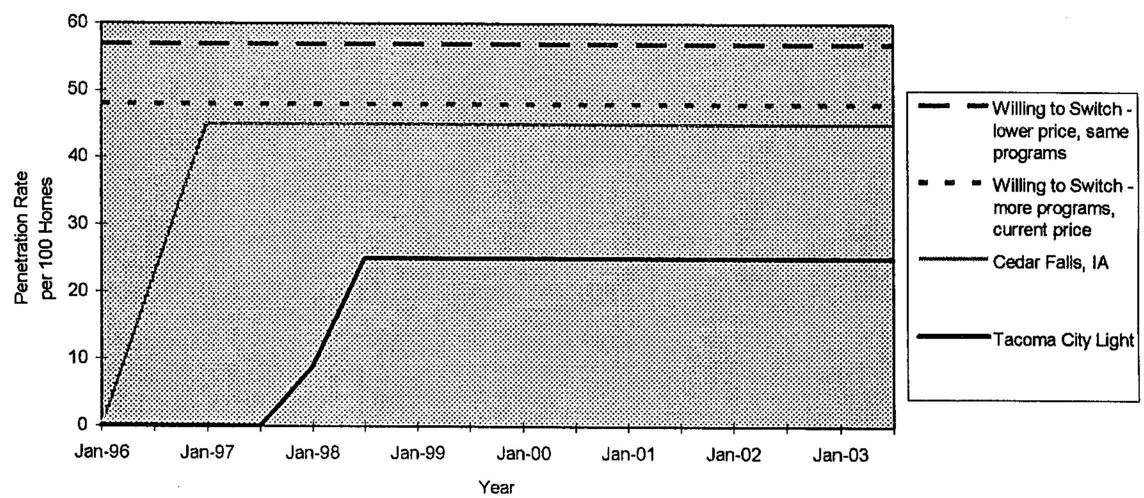
The Light Division (Tacoma City Light) is a division of the City of Tacoma, Department of Public Utilities, which also operates the Water and Belt Line Railroad Divisions. The Telecommunications Project would be a section of the Light Division.

The following is a summary of significant financial notes and is intended to assist the reader in understanding and interpreting the financial statements and other data in this report.

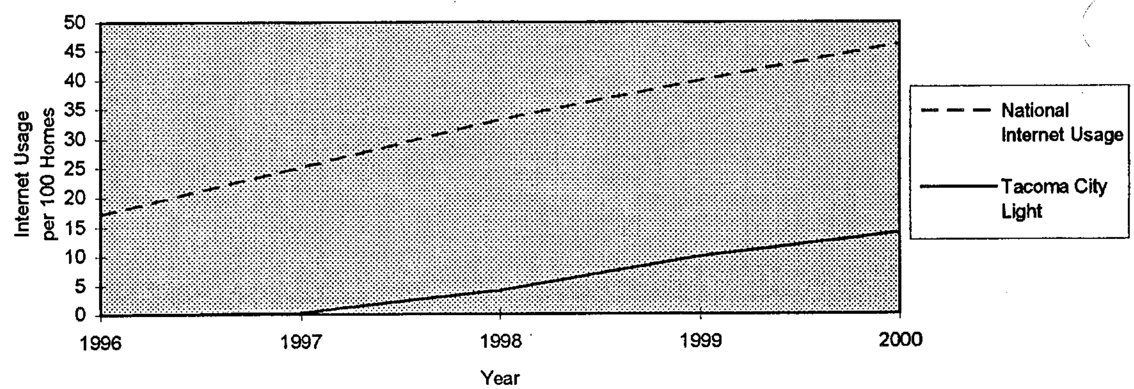
NOTE 1
Financial Analyses

Tacoma City Light's financial analyses for the Telecommunications Project are summarized in the Income Statement and Cash Budget. The analysis deliberately understates revenues to give a conservative view. The analyses show that the proposal to build the system is economically feasible if pursued in a business like manner. All amounts are shown in constant 1997 dollars.

Comparison of Cable TV Penetration As seen in the graph below, cable television penetration rates have been conservatively estimated at 25 subscribers per 100 homes.



Comparison of Internet Usage Compared with the forecasted growth in the national Internet usage rate, Tacoma City Light's projected Internet transport rates are also conservative.



NOTE 2
Cost Estimates

Cost estimates are based on unit costs collected in the telecommunications study and from existing telecommunications companies reports and operating statements. The estimates are given in unadjusted Year 1 dollars and should be used only for determining the feasibility of this proposal. Certain costs, including programming and payroll & benefits, have been inflated to account for historic increases above the rate of inflation.

NOTE 3
Services Offered To City and Terms

The franchise jurisdictions have goals, interests and needs related to the proposed Telecommunications Project. Tacoma City Light's development plan makes provisions for these goals and interests. These needs are proposed to be addressed through the provision of Public, Educational, and Governmental (PEG) video channels, taxes and fees, and through the construction of an Institutional Network which will provide fiber links to all primary and secondary schools, colleges, universities (both public and private), fire stations and police stations, including SONET electronics to enable the links to be used as soon as possible.

NOTE 4
Infrastructure

The infrastructure would be built with a regional headend, 5 hubs, and 82 nodes. Also included are SONET electronics supporting an initial 176 business sites, 8 central offices, and 3 Points of Presence. The system supports optical coupling, switches and amplifiers. SONET shelves are also included for Tacoma City Light substations and the Institutional Network. The construction total incorporates hardware discounts off list offered on large quantity orders.

NOTE 5
Financing

This project would be funded through the use of insured taxable municipal bonds with interest rates based on U.S. Treasury yields plus a spread of between 35 and 70 basis points depending on term, and capital available from the Light Division. The total financing amount includes operating capital and incurred start-up costs. The bonds would be issued with a range of terms, the maximum of which is calculated at 10 years for the purpose of this analysis.

NOTE 6
Revenues Generated

Tacoma City Light would be the service provider of cable television services. Subscriptions would be offered in a multi-tier selection. Tacoma City Light would charge an installation fee, however, for purposes of this analysis, that charge has been waived until 1999. These financial statements are based on conservation penetration rates in the cable television market.

The telecommunications system would make transport available to service providers of other services including telephony, data transport, and video on demand. These features would be available through partnerships between Tacoma City Light and other service providers. Since Tacoma City Light would only be the transport provider, it would not be involved in rate schedules set by providers for these services. Tacoma City Light would, however, receive revenues from the service provider for carriage on the telecommunications network.

The telecommunications system would also service the needs of the Tacoma City Light. Functions such as distribution automation, substation monitoring, real-time pricing, and customer billing information would be available to the Light Division through the use of this system.

NOTE 7
Operating Expenses

Programming - Expenses calculated per subscriber from the programming rate cards, programming cooperative pricing, and published reports.

Marketing - The marketing expenses were estimated higher during the first two years of operation, after which these expenses are estimated at a standard percentage of the net revenues.

Payroll and Benefits - Estimated payroll and benefits package for approximately 66 employees, including: a system manager, marketing manager, engineering manager, network management technician, customer sales representatives, technicians, and operations administration staff.

Utility and General Government - Funds established by the utility and general government to maintain non-revenue supported departments. These funds include: CFAS, Administrative Offices, TPU Support Services, GIS, Self Insurance, Fleet Services, and Information Systems.

Lease - Based on commercial business space rental rates per square foot.

Fleet - The estimate for fleet costs are based on the operational expenses supplied by Fleet Services for standard purchase aerial and cargo vans.

Repairs and Maintenance - Annual expenses based on a percentage of the total system cost.

Training and Education - Costs associated with the training of employees, as well as costs for publications and market information.

NOTE 8
Municipal Obligations

Taxes and Fees - There would be a number of taxes and fees imposed upon the gross revenues of the proposed system in this analysis, including: video related revenue tax (8.32%), advanced services related revenue tax (6.00%), state utility tax (3.60%), and a Cable TV franchise fee. For purposes of this analysis, the Cable TV franchise fee of the first 15 years has been covered through the creation of an Institutional telecommunications network serving all primary and secondary schools, colleges, universities (both public and private), fire stations and police stations, including all SONET electronics. In addition to the estimated taxes and fees, an additional 6.00% gross earnings tax has been included on all revenue received from services rendered outside the city limits of Tacoma.

Pole Attachment Fees - The standard pole attachment rate of approximately $5 per pole applied to the total number of poles in the Tacoma City Light service territory has been included.

Conduit Fees - A conduit use rate of $2.50 per foot has been applied to all leased conduit space.

NOTE 9
Additions and Betterments

Expenses accounted for in the annual construction costs include the incremental costs of adding new cable television subscribers, converting portions of the system to underground each year, and continuous upgrade expenses.

NOTE 10
System Rebuild Fund

As technology and the health of the system demand, rebuilds would be performed on the system. The monies for this work would be maintained in a System Rebuild Fund, deducted from the revenues as a disbursement.

NOTE 11
Depreciation

For purposes of this analysis, the telecommunications system has been calculated to depreciate over a 20 year period based on total construction costs.

PRO FORMA INCOME STATEMENT
(in constant 1997 dollars)

	1997	1998	1999	2000	2001	2002	2003	2004
Number of CATV Subscribers	11,712	33,116	33,709	34,312	34,998	35,698	36,412	37,140
Sales								
CATV (RESIDENTIAL)	$1,012,644	$9,660,803	$13,897,213	$14,145,939	$14,415,351	$14,837,017	$15,133,774	$15,436,454
Advertising (BUSINESS)	$29,276	$278,928	$401,242	$408,423	$416,202	$428,376	$436,944	$445,683
VOD (RESIDENTIAL)	$0	$0	$130,757	$289,420	$378,186	$428,376	$436,944	$445,683
Magazine Resale (RESIDENTIAL)	$9,506	$92,291	$132,410	$134,780	$137,347	$141,364	$144,192	$147,075
GROSS VIDEO RELATED REVENUES	$1,051,426	$10,032,022	$14,561,621	$14,978,561	$15,347,086	$15,835,133	$16,151,853	$16,474,895
Telephony & Data Transport (BUSINESS)	$94,980	$1,878,892	$3,973,206	$5,636,700	$7,366,466	$8,336,400	$8,496,600	$8,659,800
Data Transport (RESIDENTIAL)	$19,517	$728,327	$2,330,028	$3,977,235	$5,023,257	$5,825,914	$6,291,994	$6,596,108
GROSS ADVANCED SRVS REVENUES	$114,497	$2,607,220	$6,303,234	$9,613,935	$12,389,722	$14,162,314	$14,788,594	$15,255,908
Light Division	$210,342	$1,020,902	$1,039,110	$1,057,738	$1,077,899	$1,109,337	$1,131,448	$1,153,998
GROSS LIGHT DIVISION REVENUES	$210,342	$1,020,902	$1,039,110	$1,057,738	$1,077,899	$1,109,337	$1,131,448	$1,153,998
GROSS REVENUES	**$1,376,265**	**$13,660,143**	**$21,903,966**	**$25,650,235**	**$28,814,707**	**$31,106,784**	**$32,071,895**	**$32,884,801**
Programming Expenses	$330,912	$3,364,396	$4,981,985	$5,151,744	$5,328,608	$5,566,743	$5,763,255	$5,966,700
*Franchise Fee (I-Net expense)****	$288,921	$867,540	$868,321	$869,106	$869,895	$870,688	$871,485	$872,286
Pole Attach Fees	$455,116	$139,438	$199,197	$199,197	$199,197	$199,197	$199,197	$199,197
Conduit Fees	$22,500	$67,500	$67,500	$67,500	$67,500	$67,500	$67,500	$67,500
COST OF GOODS SOLD	**$808,528**	**$3,571,334**	**$5,248,682**	**$5,418,441**	**$5,595,305**	**$5,833,440**	**$6,029,952**	**$6,233,397**
NET REVENUES	**$567,737**	**$10,088,809**	**$16,655,284**	**$20,231,793**	**$23,219,402**	**$25,273,344**	**$26,041,942**	**$26,651,404**
Expenses								
Lease	$326,732	$392,078	$392,078	$392,078	$392,078	$392,078	$392,078	$392,078
Payroll & Benefits	$2,712,390	$3,711,764	$3,748,881	$3,786,370	$3,824,234	$3,862,476	$3,901,101	$3,940,112
Training & Education	$300,000	$250,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000
Marketing	$737,190	$885,702	$509,639	$518,760	$528,640	$544,103	$554,986	$566,086
Utility & General Government	$292,269	$889,960	$903,309	$916,859	$930,612	$944,571	$958,739	$973,120
Repairs & Maintenance	$414,405	$832,955	$837,119	$841,305	$845,512	$849,739	$853,988	$858,258
Additions & Betterments	$213,058	$1,231,742	$1,935,989	$1,042,509	$1,090,675	$346,520	$350,412	$354,919
TOTAL EXPENSES	**$4,996,044**	**$8,194,201**	**$8,487,015**	**$7,657,881**	**$7,771,750**	**$7,099,488**	**$7,171,304**	**$7,244,573**
OPERATING PROFIT (EBITDA)	($4,428,307)	$1,894,608	$8,168,268	$12,573,913	$15,447,653	$18,173,856	$18,870,638	$19,406,831

NET PROFIT	($4,428,307)	$1,894,608	$8,168,268	$12,573,913	$15,447,653	$18,173,856	$18,870,638	$19,406,831
TAXES								
Video Tax at 8.32%	$87,479	$834,664	$1,211,527	$1,246,216	$1,276,878	$1,317,483	$1,343,834	$1,370,711
Advanced Srv. Tax at 6%	$6,870	$156,433	$378,194	$576,836	$743,383	$849,739	$887,316	$915,355
State Tax at 3.6%	$41,973	$455,013	$751,135	$885,330	$998,525	$1,079,908	$1,113,856	$1,142,309
Tax on Outside Gross Earnings at 6%	$27,982	$303,342	$500,757	$590,220	$665,683	$719,939	$742,571	$761,539
INTEREST	$1,039,318	$1,247,181	$1,150,853	$1,032,987	$911,485	$839,709	$715,618	$589,891
DEPRECIATION	$0	$2,762,702	$2,762,702	$2,762,702	$2,762,702	$2,762,702	$2,762,702	$2,762,702
Income Available for Plant Service, Debt Retirements	($5,631,929)	($3,864,727)	$1,413,101	$5,479,622	$8,088,995	$10,604,376	$11,304,742	$11,864,324

*** *Franchise Fee during the initial franchise period not included in the Cost of Goods Sold since the I-net is capitalized and included in the bonds*

PRO FORMA INCOME STATEMENT
(in constant 1997 dollars)

	2005	2006	2007	2008	2009	2010	2011	2012
Number of CATV Subscribers	37,883	38,641	39,414	40,202	41,006	41,826	42,202	42,582
Sales								
CATV (RESIDENTIAL)	$15,745,160	$16,060,100	$16,381,275	$16,708,893	$17,043,056	$17,383,973	$17,540,352	$17,698,290
Advertising (BUSINESS)	$454,596	$463,689	$472,962	$482,421	$492,069	$501,912	$506,427	$510,987
VOD (RESIDENTIAL)	$454,596	$463,689	$472,962	$482,421	$492,069	$501,912	$506,427	$510,987
Magazine Resale (RESIDENTIAL)	$150,017	$153,017	$156,077	$159,199	$162,383	$165,631	$167,121	$168,626
GROSS VIDEO RELATED REVENUES	$16,804,368	$17,140,496	$17,483,277	$17,832,933	$18,189,577	$18,553,428	$18,720,327	$18,888,890
Telephony & Data Transport (BUSINESS)	$8,827,200	$8,997,000	$9,171,000	$9,348,000	$9,528,600	$9,705,600	$9,796,800	$9,887,400
Data Transport (RESIDENTIAL)	$6,909,859	$7,233,548	$7,567,392	$7,718,736	$7,873,104	$8,030,592	$8,102,832	$8,175,792
GROSS ADVANCED SRVS REVENUES	$15,737,059	$16,230,548	$16,738,392	$17,066,736	$17,401,704	$17,736,192	$17,899,632	$18,063,192
Light Division	$1,177,008	$1,200,471	$1,224,408	$1,248,820	$1,273,720	$1,299,038	$1,310,770	$1,322,601
GROSS LIGHT DIVISION REVENUES	$1,177,008	$1,200,471	$1,224,408	$1,248,820	$1,273,720	$1,299,038	$1,310,770	$1,322,601
GROSS REVENUES	**$33,718,435**	**$34,571,515**	**$35,446,077**	**$36,148,489**	**$36,865,001**	**$37,588,658**	**$37,930,729**	**$38,274,683**
Programming Expenses	$6,177,315	$6,395,390	$6,621,136	$6,854,859	$7,096,829	$7,347,371	$7,524,667	$7,706,307
*Franchise Fee (I-Net expense)*** *	$873,091	$873,900	$874,713	$875,530	$876,351	$877,177	$878,006	$944,444
Pole Attach Fees	$199,197	$199,197	$199,197	$199,197	$199,197	$199,197	$199,197	$199,197
Conduit Fees	$67,500	$67,500	$67,500	$67,500	$67,500	$67,500	$67,500	$67,500
COST OF GOODS SOLD	**$6,444,012**	**$6,662,087**	**$6,887,833**	**$7,121,556**	**$7,363,526**	**$7,614,068**	**$7,791,364**	**$8,917,449**
NET REVENUES	**$27,274,423**	**$27,909,428**	**$28,558,244**	**$29,026,934**	**$29,501,475**	**$29,974,591**	**$30,139,365**	**$29,357,234**
Expenses								
Lease	$392,078	$392,078	$392,078	$392,078	$392,078	$392,078	$392,078	$392,078
Payroll & Benefits	$3,979,513	$4,019,308	$4,059,501	$4,158,689	$4,200,276	$4,242,279	$4,284,702	$4,327,549
Training & Education	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000
Marketing	$577,406	$588,956	$600,734	$612,749	$625,003	$637,505	$643,240	$649,032
Utility & General Government	$987,717	$1,002,533	$1,017,571	$1,032,835	$1,048,327	$1,064,052	$1,080,013	$1,096,213
Repairs & Maintenance	$862,549	$866,862	$871,196	$875,552	$879,930	$884,330	$888,751	$893,195
Additions & Betterments	$360,040	$364,430	$369,660	$374,439	$379,552	$381,415	$244,583	$245,120
TOTAL EXPENSES	**$7,319,304**	**$7,394,167**	**$7,470,740**	**$7,606,341**	**$7,685,166**	**$7,761,658**	**$7,693,366**	**$7,763,187**
OPERATING PROFIT (EBITDA)	$19,955,119	$20,515,261	$21,087,504	$21,420,593	$21,816,309	$22,212,932	$22,445,999	$21,594,047

NET PROFIT	$19,955,119	$20,515,261	$21,087,504	$21,420,593	$21,816,309	$22,212,932	$22,445,999	$21,594,047
TAXES								
Video Tax at 8.32%	$1,398,123	$1,426,089	$1,454,609	$1,483,700	$1,513,373	$1,543,645	$1,557,531	$1,571,556
Advanced Srv. Tax at 6%	$944,224	$973,833	$1,004,304	$1,024,004	$1,044,102	$1,064,172	$1,073,978	$1,083,792
State Tax at 3.6%	$1,171,491	$1,201,358	$1,231,980	$1,256,388	$1,281,286	$1,306,426	$1,318,319	$1,330,275
Tax on Outside Gross Earnings at 6%	$780,994	$800,905	$821,320	$837,592	$854,191	$870,951	$878,879	$886,850
INTEREST	$462,831	$334,863	$205,985	$76,124	$0	$0	$0	$0
DEPRECIATION	$2,762,702	$2,762,702	$2,762,702	$2,762,702	$2,762,702	$2,762,702	$2,762,702	$2,762,702
Income Available for Plant Service, Debt Retirements	$12,434,753	$13,015,512	$13,606,604	$13,980,082	$14,360,655	$14,665,036	$14,854,590	$13,958,873

**** Franchise Fee during the initial franchise period not included in the Cost of Goods Sold since the I-net is capitalized and included in the bonds*

PRO FORMA INCOME STATEMENT
(in constant 1997 dollars)

	2013	2014	2015	2016	2017
Number of CATV Subscribers	42,966	43,352	43,742	44,136	44,533
Sales					
CATV (RESIDENTIAL)	$17,857,579	$18,018,218	$18,180,416	$18,344,069	$18,509,177
Advertising (BUSINESS)	$515,586	$520,224	$524,907	$529,632	$534,399
VOD (RESIDENTIAL)	$515,586	$520,224	$524,907	$529,632	$534,399
Magazine Resale (RESIDENTIAL)	$170,143	$171,674	$173,219	$174,779	$176,352
GROSS VIDEO RELATED REVENUES	$19,058,894	$19,230,340	$19,403,450	$19,578,112	$19,754,326
Telephony & Data Transport (BUSINESS)	$9,981,000	$10,073,400	$10,167,600	$10,263,000	$10,358,400
Data Transport (RESIDENTIAL)	$8,249,376	$8,323,584	$8,398,512	$8,474,112	$8,550,384
GROSS ADVANCED SRVS REVENUES	$18,230,376	$18,396,984	$18,566,112	$18,737,112	$18,908,784
Light Division	$1,334,559	$1,346,595	$1,358,758	$1,371,035	$1,383,411
GROSS LIGHT DIVISION REVENUES	$1,334,559	$1,346,595	$1,358,758	$1,371,035	$1,383,411
GROSS REVENUES	**$38,623,829**	**$38,973,919**	**$39,328,320**	**$39,686,259**	**$40,046,521**
Programming Expenses	$7,892,301	$8,082,746	$8,277,839	$8,477,638	$8,682,251
*Franchise Fee (I-Net expense)****	$952,945	$961,517	$970,172	$978,906	$987,716
Pole Attach Fees	$199,197	$199,197	$199,197	$199,197	$199,197
Conduit Fees	$67,500	$67,500	$67,500	$67,500	$67,500
COST OF GOODS SOLD	**$9,111,942**	**$9,310,960**	**$9,514,708**	**$9,723,240**	**$9,936,664**
NET REVENUES	**$29,511,887**	**$29,662,959**	**$29,813,612**	**$29,963,018**	**$30,109,857**
Expenses					
Lease	$392,078	$392,078	$392,078	$392,078	$392,078
Payroll & Benefits	$4,370,824	$4,414,532	$4,458,678	$4,503,264	$4,548,297
Training & Education	$160,000	$160,000	$160,000	$160,000	$160,000
Marketing	$654,873	$660,764	$666,712	$672,714	$678,769
Utility & General Government	$1,112,656	$1,129,346	$1,146,286	$1,163,480	$1,180,933
Repairs & Maintenance	$897,661	$902,149	$906,660	$911,193	$915,749
Additions & Betterments	$247,229	$247,377	$249,035	$250,358	$251,121
TOTAL EXPENSES	**$7,835,321**	**$7,906,247**	**$7,979,449**	**$8,053,088**	**$8,126,946**
OPERATING PROFIT (EBITDA)	$21,676,565	$21,756,712	$21,834,163	$21,909,931	$21,982,911

NET PROFIT	$21,676,565	$21,756,712	$21,834,163	$21,909,931	$21,982,911
TAXES					
Video Tax at 8.32%	$1,585,700	$1,599,964	$1,614,367	$1,628,899	$1,643,560
Advanced Srv. Tax at 6%	$1,093,823	$1,103,819	$1,113,967	$1,124,227	$1,134,527
State Tax at 3.6%	$1,342,414	$1,354,584	$1,366,904	$1,379,348	$1,391,872
Tax on Outside Gross Earnings at 6%	$894,942	$903,056	$911,269	$919,565	$927,915
INTEREST	$0	$0	$0	$0	$0
DEPRECIATION	$2,762,702	$2,762,702	$2,762,702	$2,762,702	$2,762,702
Income Available for Plant Service, Debt Retirements	$13,996,985	$14,032,587	$14,064,953	$14,095,189	$14,122,335

**** Franchise Fee during the initial franchise period not included in the Cost of Goods Sold since the I-net is capitalized and included in the bonds*

PRO FORMA CASH BUDGET
(in constant 1997 dollars)

	1997	1998	1999	2000	2001	2002	2003	2004
Number of CATV Subscribers	11,712	33,116	33,709	34,312	34,998	35,698	36,412	37,140
CASH BALANCE	$66,350,368	$10,726,811	$2,143,705	$2,830,763	$5,663,094	$5,773,886	$5,891,130	$6,020,023
Receipts								
CATV (RESIDENTIAL)	$1,012,644	$9,660,803	$13,897,213	$14,145,939	$14,415,351	$14,837,017	$15,133,774	$15,436,454
Advertising (BUSINESS)	$29,276	$278,928	$401,242	$408,423	$416,202	$428,376	$436,944	$445,683
VOD (RESIDENTIAL)	$0	$0	$130,757	$289,420	$378,186	$428,376	$436,944	$445,683
Magazine Resale (RESIDENTIAL)	$9,506	$92,291	$132,410	$134,780	$137,347	$141,364	$144,192	$147,075
Telephony & Data Trans. (BUSINESS)	$94,980	$1,878,892	$3,973,206	$5,636,700	$7,366,466	$8,336,400	$8,496,600	$8,659,800
Data Transport (RESIDENTIAL)	$19,517	$728,327	$2,330,028	$3,977,235	$5,023,257	$5,825,914	$6,291,994	$6,596,108
Light Division	$210,342	$1,020,902	$1,039,110	$1,057,738	$1,077,899	$1,109,337	$1,131,448	$1,153,998
TOTAL RECEIPTS	**$1,376,265**	**$13,660,143**	**$21,903,966**	**$25,650,235**	**$28,814,707**	**$31,106,784**	**$32,071,895**	**$32,884,801**
Disbursements								
Programming	$330,912	$3,313,927	$4,835,694	$4,926,700	$5,020,530	$5,167,387	$5,270,740	$5,376,156
*Franchise Fee (I-net expense)****	$288,921	$867,540	$868,321	$869,106	$869,895	$870,688	$871,485	$872,286
Pole Attach Fees	$455,116	$139,438	$199,197	$199,197	$199,197	$199,197	$199,197	$199,197
Conduit Fees	$22,500	$67,500	$67,500	$67,500	$67,500	$67,500	$67,500	$67,500
Taxes	$164,304	$1,749,452	$2,841,612	$3,298,602	$3,684,469	$3,967,069	$4,087,577	$4,189,914
Bond Interest	$1,039,318	$1,247,181	$1,150,853	$1,032,987	$911,485	$839,709	$715,618	$589,891
Bond Principal	$0	$1,211,679	$3,635,037	$3,635,037	$3,635,037	$3,635,037	$3,635,037	$3,635,037
Lease Expense	$294,059	$392,078	$392,078	$392,078	$392,078	$392,078	$392,078	$392,078
Payroll & Benefits	$1,706,195	$3,711,764	$3,748,881	$3,786,370	$3,824,234	$3,862,476	$3,901,101	$3,940,112
Training & Education	$300,000	$250,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000
Marketing	$737,190	$885,702	$509,639	$518,760	$528,640	$544,103	$554,986	$566,086
Utility & General Government	$292,269	$889,960	$903,309	$916,859	$930,612	$876,808	$876,808	$876,808
Repairs & Maintenance	$414,405	$832,955	$837,119	$841,305	$845,512	$849,739	$853,988	$858,258
Construction Costs	$50,772,030	$7,551,614	$1,935,989	$1,042,509	$1,090,675	$346,520	$350,412	$354,919
Bond Expense	$471,524	$0	$0	$0	$0	$0	$0	$0
System Rebuild Fund	$0	$0	$0	$2,000,000	$7,413,946	$10,081,917	$10,877,961	$11,553,772
TOTAL DISBURSEMENTS	**$56,999,822**	**$22,243,249**	**$21,216,908**	**$22,817,904**	**$28,703,915**	**$30,989,540**	**$31,943,002**	**$32,759,727**
NET CASH GAIN (LOSS)	($55,623,557)	($8,583,106)	$687,058	$2,832,331	$110,792	$117,244	$128,893	$125,074
CUMULATIVE CASH BALANCE	$10,726,811	$2,143,705	$2,830,763	$5,663,094	$5,773,886	$5,891,130	$6,020,023	$6,145,097
ENDING CASH BALANCE	**$10,726,811**	**$2,143,705**	**$2,830,763**	**$5,663,094**	**$5,773,886**	**$5,891,130**	**$6,020,023**	**$6,145,097**

****Franchise Fee during the initial franchise period not included in the Total Disbursements since the I-net is capitalized and included in the bonds*

PRO FORMA CASH BUDGET
(in constant 1997 dollars)

	2005	2006	2007	2008	2009	2010	2011	2012
Number of CATV Subscribers	37,883	38,641	39,414	40,202	41,006	41,826	42,202	42,582
CASH BALANCE	$6,145,097	$6,263,893	$6,378,831	$6,499,630	$6,621,403	$6,733,138	$6,848,807	$6,958,529
Receipts								
CATV (RESIDENTIAL)	$15,745,160	$16,060,100	$16,381,275	$16,708,893	$17,043,056	$17,383,973	$17,540,352	$17,698,290
Advertising (BUSINESS)	$454,596	$463,689	$472,962	$482,421	$492,069	$501,912	$506,427	$510,987
VOD (RESIDENTIAL)	$454,596	$463,689	$472,962	$482,421	$492,069	$501,912	$506,427	$510,987
Magazine Resale (RESIDENTIAL)	$150,017	$153,017	$156,077	$159,199	$162,383	$165,631	$167,121	$168,626
Telephony & Data Trans. (BUSINESS)	$8,827,200	$8,997,000	$9,171,000	$9,348,000	$9,528,600	$9,705,600	$9,796,800	$9,887,400
Data Transport (RESIDENTIAL)	$6,909,859	$7,233,548	$7,567,392	$7,718,736	$7,873,104	$8,030,592	$8,102,832	$8,175,792
Light Division	$1,177,008	$1,200,471	$1,224,408	$1,248,820	$1,273,720	$1,299,038	$1,310,770	$1,322,601
TOTAL RECEIPTS	**$33,718,435**	**$34,571,515**	**$35,446,077**	**$36,148,489**	**$36,865,001**	**$37,588,658**	**$37,930,729**	**$38,274,683**
Disbursements								
Programming	$5,483,672	$5,593,358	$5,705,216	$5,819,317	$5,935,699	$6,054,432	$6,108,895	$6,163,901
*Franchise Fee (I-net expense)***	$873,091	$873,900	$874,713	$875,530	$876,351	$877,177	$878,006	$944,444
Pole Attach Fees	$199,197	$199,197	$199,197	$199,197	$199,197	$199,197	$199,197	$199,197
Conduit Fees	$67,500	$67,500	$67,500	$67,500	$67,500	$67,500	$67,500	$67,500
Taxes	$4,294,833	$4,402,185	$4,512,212	$4,601,684	$4,692,952	$4,785,194	$4,828,707	$4,872,472
Bond Interest	$462,831	$334,863	$205,985	$76,124	$0	$0	$0	$0
Bond Principal	$3,635,037	$3,635,037	$3,635,037	$3,635,037	$0	$0	$0	$0
Lease Expense	$392,078	$392,078	$392,078	$392,078	$392,078	$392,078	$392,078	$392,078
Payroll & Benefits	$3,979,513	$4,019,308	$4,059,501	$4,158,689	$4,200,276	$4,242,279	$4,284,702	$4,327,549
Training & Education	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000	$160,000
Marketing	$577,406	$588,956	$600,734	$612,749	$625,003	$637,505	$643,240	$649,032
Utility & General Government	$876,808	$876,808	$876,808	$876,808	$876,808	$876,808	$876,808	$876,808
Repairs & Maintenance	$862,549	$866,862	$871,196	$875,552	$879,930	$884,330	$888,751	$893,195
Construction Costs	$360,040	$364,430	$369,660	$374,439	$379,552	$381,415	$244,583	$245,120
Bond Expense	$0	$0	$0	$0	$0	$0	$0	$0
System Rebuild Fund	$12,248,176	$12,955,996	$13,670,154	$14,177,543	$18,344,272	$18,792,253	$19,126,547	$18,376,065
TOTAL DISBURSEMENTS	**$33,599,639**	**$34,456,577**	**$35,325,278**	**$36,026,716**	**$36,753,266**	**$37,472,989**	**$37,821,007**	**$38,167,362**
NET CASH GAIN (LOSS)	$118,796	$114,938	$120,799	$121,773	$111,735	$115,669	$109,722	$107,321
CUMULATIVE CASH BALANCE	$6,263,893	$6,378,831	$6,499,630	$6,621,403	$6,733,138	$6,848,807	$6,958,529	$7,065,850
ENDING CASH BALANCE	**$6,263,893**	**$6,378,831**	**$6,499,630**	**$6,621,403**	**$6,733,138**	**$6,848,807**	**$6,958,529**	**$7,065,850**

****Franchise Fee during the initial franchise period not included in the Total Disbursements since the I-net is capitalized and included in the bonds*

PRO FORMA CASH BUDGET
(in constant 1997 dollars)

	2013	2014	2015	2016	2017
Number of CATV Subscribers	42,966	43,352	43,742	44,136	44,533
CASH BALANCE	$7,065,850	$7,175,899	$7,292,746	$7,412,784	$7,526,995
Receipts					
CATV (RESIDENTIAL)	$17,857,579	$18,018,218	$18,180,416	$18,344,069	$18,509,177
Advertising (BUSINESS)	$515,586	$520,224	$524,907	$529,632	$534,399
VOD (RESIDENTIAL)	$515,586	$520,224	$524,907	$529,632	$534,399
Magazine Resale (RESIDENTIAL)	$170,143	$171,674	$173,219	$174,779	$176,352
Telephony & Data Trans. (BUSINESS)	$9,981,000	$10,073,400	$10,167,600	$10,263,000	$10,358,400
Data Transport (RESIDENTIAL)	$8,249,376	$8,323,584	$8,398,512	$8,474,112	$8,550,384
Light Division	$1,334,559	$1,346,595	$1,358,758	$1,371,035	$1,383,411
TOTAL RECEIPTS	**$38,623,829**	**$38,973,919**	**$39,328,320**	**$39,686,259**	**$40,046,521**
Disbursements					
Programming	$6,219,378	$6,275,325	$6,331,815	$6,388,811	$6,446,314
*Franchise Fee (I-net expense)****	$952,945	$961,517	$970,172	$978,906	$987,716
Pole Attach Fees	$199,197	$199,197	$199,197	$199,197	$199,197
Conduit Fees	$67,500	$67,500	$67,500	$67,500	$67,500
Taxes	$4,916,879	$4,961,423	$5,006,507	$5,052,039	$5,097,874
Bond Interest	$0	$0	$0	$0	$0
Bond Principal	$0	$0	$0	$0	$0
Lease Expense	$392,078	$392,078	$392,078	$392,078	$392,078
Payroll & Benefits	$4,370,824	$4,414,532	$4,458,678	$4,503,264	$4,548,297
Training & Education	$160,000	$160,000	$160,000	$160,000	$160,000
Marketing	$654,873	$660,764	$666,712	$672,714	$678,769
Utility & General Government	$876,808	$876,808	$876,808	$876,808	$876,808
Repairs & Maintenance	$897,661	$902,149	$906,660	$911,193	$915,749
Construction Costs	$247,229	$247,377	$249,035	$250,358	$251,121
Bond Expense	$0	$0	$0	$0	$0
System Rebuild Fund	$18,558,409	$18,738,402	$18,923,120	$19,119,180	$19,315,002
TOTAL DISBURSEMENTS	**$38,513,780**	**$38,857,072**	**$39,208,282**	**$39,572,048**	**$39,936,424**
NET CASH GAIN (LOSS)	$110,049	$116,847	$120,038	$114,211	$110,097
CUMULATIVE CASH BALANCE	$7,175,899	$7,292,746	$7,412,784	$7,526,995	$7,637,092
ENDING CASH BALANCE	**$7,175,899**	**$7,292,746**	**$7,412,784**	**$7,526,995**	**$7,637,092**

****Franchise Fee during the initial franchise period not included in the Total Disbursements since the I-net is capitalized and included in the bonds*

Conclusions

The study team set out to answer a number of questions at the outset of this project:

- What is happening on the technological front?
- Who are the major telecommunications players, what have they done in the past, and what are they doing now?
- What is happening in the regulatory environment?
- What have other communities done with regard to telecommunications?
- What has happened historically in our community?
- What do the existing telecommunications options look like?
- What kind of market demand for telecommunications exists in our community?
- What are the economic development implications for our community if an advanced telecommunications system is built or fails to be built?
- And finally, could Tacoma City Light build and operate such a system and how would it look?

This study of telecommunications has answered those questions. But there is a final question that must be asked. Should Tacoma City Light create a modern telecommunications infrastructure to serve the local community? The answers to the previous questions are critical to understanding and answering this question.

This study has reviewed telecommunications both nationally and locally. In reviewing the local situation it is clear that the local market has a growing need for better telecommunications access. Despite growing local demand, the incumbent wire line service providers have stated that their investments in the local infrastructure will either slow without significant rate increases or be halted all together. One could hope that other companies would step forward and create a modern telecommunications system through out our community but the prospects for that occurring appear dim. While Competitive Access Providers will eventually enter the local market, their focus is almost exclusively on large business users. Other potential systems are either of low capacity or not scheduled to be fully deployed until the next century.

Tacoma City Light could create an advanced telecommunications system to meet the telecommunications needs of the communities it serves in addition to its own internal communication needs. If Tacoma City Light were to create such a system and operate it in a business like manner, the system would generate sufficient revenues to make the system self sustaining. By offering products and services that either meet customer needs directly and providing a pathway through which the private sector can meet additional needs, pricing those products and services competitively, and delivering them over a modern, high-speed, high-reliability telecommunications system, a business is created that is viable using conservative revenue projections.

The following principles provide a framework for considering whether Tacoma City Light should enter the telecommunications arena in our community.

1. The primary purposes for Tacoma City Light financing, constructing and operating a broadband telecommunications system shall be as follows:
   - Provide a state-of-the-art fiber optic technology to support enhanced electric system control, reliability and efficiency.
   - Provide capability to meet the expanding telecommunications requirements in an evolving competitive electric market, the most critical of which is real-time, two-way interactive communications with individual energy consumers.
   - Provide greater revenue diversification through new business lines (i.e., Internet transport, cable TV, etc.), enhance traditional products and services and maximize return on Tacoma City Light assets.
2. Important additional community benefits derived from this project are as follows:
   - Promote economic development and business retention.
   - Insure broad community accessibility to high quality, state-of-the-art telecommunication technology.
3. The Telecommunication Project, including all infrastructure, and proposed business lines, shall be an integral Tacoma City Light operating responsibility and function.
4. The Telecommunication Project business lines shall be operated in a business-like manner similar to electric services which are subject to market forces and are not tax supported.
5. In order to avoid the perception of government control of the content of the cable television business line, programming will be determined on the basis of local consumer demand and input.
6. The Telecommunication Project construction will reflect the current overhead to underground configuration of Tacoma City Light's electric system. Any significant divergence from this will greatly increase the project costs and jeopardize the viability of the project.
7. Tacoma City Light's Telecommunication Project will not proceed unless there is broad and strong policy and community support.

Ultimately, the question of whether Tacoma City Light should create a modern telecommunications infrastructure is one that policy makers must answer with the informed input of the community they represent. It is our sincere hope that the communities that Tacoma City Light serves will find the background information contained in this study useful.

Acknowledgments

The Telecommunications Study Team was a multidisciplinary group made up of both Tacoma City Light staff and outside consultants. There is always a concern when approaching a study of this magnitude, that a single view of the industry and market in question will prevail without rigorously examining alternative viewpoints. In the case of telecommunications, many industry experts have a tendency to view the world with either a telephone or cable perspective. Rather than hire a single consultant under a large contract to work with staff in the development of this report, the decision was made early in the project to hire multiple consultants with diverse perspectives and areas of expertise under small individual contracts. This allowed the team to examine and weigh a wide variety of ideas and perspectives and thereby ensure that the final study incorporated the best ideas and knowledge possible. This approach is not the easiest way of conducting a study of this sort since the discussions that ensue can become quite lively and challenging. Staff would like to thank the following consultants that willingly and vigorously participated in those discussions and the work of preparing this report.

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Their dedication, hard work, willingness to dig beyond the easy answer, and ability to present complex material in a clear and understandable form was the key to this study.

Jon Athow
Telecommunications Project Manager

GLOSSARY

Word or Abbreviation	Definition
Addressable	A type of receiving equipment in a customers' home, such as a set-top converter, which can be remotely set to allow new services.
ATM	Asynchronous Transfer Mode. A standard to combine the transmission of voice, data and video; ATM allows efficient use of a single high-speed-digital circuits.
ADSL	Asymmetrical Digital Subscriber Loop. A high-speed digital service (up to 6 Mbps) over twisted copper pair, capable of delivering one digital television channel as well as voice services. The speed of transmission is much higher to the customer than returning to the central office.
Analog Signal	A signal carrying information, where the information is directly represented by continuously varying some component of the signal. For example, music can be sent on a radio carrier by varying the frequency of a radio carrier in direct relationship to the sound of music. As opposed to a Digital Signal.
Backbone	A main cable transporting information within a city.
Backhaul	To offer transmission service to a wireless service provider, to transport the information on cables from the wireless transmitter (cell) to the centralized traffic switching center.
Bandwidth	The range between the lowest and highest frequency in a channel. The greater the bandwidth, the more information that can be transmitted per second.

Word or Abbreviation	Definition
Basic Trading Area (BTA)	Geographic areas in the United States established by Rand McNally which are based on population and economic statistics. There are 493 BTAs in the U.S., grouped into Major Trading Areas (MTAs). The FCC sometimes uses BTAs as boundaries to allocate radio frequencies sold by auction.
Bit	A contraction of the phrase *bi*nary digi*t*. The smallest unit of computer information in a code using the binary numbering system
Bridge	A data network device connecting network segments together to repeat data packets.
Broadband	A communications channel having a bandwidth greater than that of a voice-grade channel, providing capacity for high-speed data or other kinds of information. A synonym for the word *wideband.*
Bursty	A description of data traffic where the data circuits are very busy at times, and idle at other times.
Bypass	To interconnect a subscriber to a long distance carrier without using the local telephone company's wires.
Byte	An 8-bit quantity of information, used mainly in reference to computer storage and data transmission. Often seen as Megabytes (Mb, one million bytes) or Gigabytes (Gb, one billion bytes).
Cable Modem	A device in customers' homes that converts signals carried on a cable television system into data network signals for home personnal computers. Some cable modems require connection to a telephone line to complete the two-way connection, while others use the two-way capabilities of a modern cable television system.

Word or Abbreviation	Definition
CAPs	Competitive Access Provider. A company whose primary business is performing bypass for large businesses, connecting subscribers to the long distance carriers without using the local telephone company's lines.
Carrier	A high frequency signal suitable for modulation by another signal representing information to be transmitted. OR A company providing circuits for transmission of telecommunications services.
CATV	Community Antenna Television. A term used to describe "cable TV."
Cell	A subdivision of a mobile telephone service area, containing one low-powered radio transmitter-receiver system connected to the local telephone network.
Central Office	The local facility of the telephone company, that switches traffic and connects telephone cables to about 10,000 customers.
Channel	A communication path for the electrical transmission of information, such as voice or data, or a single information stream, carried with other streams in a high capacity carrier.
Circuit	The complete path between two end-terminals over which communications can be provided. A circuit may consist of one or more channels connected together to form one end-to-end communications path.
Coax/coaxial cable	A cable used to carry high-frequency electrical signals in which there is a single center conductor, a ring of insulation, and an outer metal shield.
CLEC	Competitive Local Exchange Carrier.

Word or Abbreviation	Definition
Common Carrier	An organization that provides communications services for hire to the general public and is subject to regulation by state and Federal agencies.
Compression	The reduction in the amount if information to represent a picture, full motion video , or other images that must be transmitted from one location to another.
Data	Digital words and symbols representing voice, text, facsimile and video.
Data Communications	The movement of coded information by electronic transmission systems.
DBS	Direct Broadcast Satellite A video delivery means that allows direct satellite signal reception with a small antenna dish. Signal format is typically digital.
Digital Signal	A signal carrying information, where the information is represented by varying some component of the signal in discrete steps. For example, data is sent on a radio carrier by varying the frequency of a radio carrier in steps corresponding to the value of each byte of data. As opposed to an Analog Signal.
Downlink	The communications link from a satellite transmitter to all the receivers on Earth.
Downstream	The direction of signals in a CATV system from the central headend to the customer.
Drop	The small coaxial cable from the street to the customer's residence, including a small cabinet "demarcation" from the customer's house wiring.

Word or Abbreviation	Definition
DS-0	Digital Signal, Level 0. A digital signal transmitting 64 thousand bits of information per second. A DS-0 is equivalent to a single voice conversation.
DS-1	Digital Signal, Level 1. A digital signal transmitting 1.544 million bits of information per second. When transported over a telephone wire, it is commonly referred to as T-1. A DS-1 is equivalent to the capacity to carry 24 simultaneous voice conversations.
DSS	Digital Satellite Service. See DBS, Direct Broadcast Service.
DVD	Digital Video Disk. A product that allows a feature length movie to be digitally stored and played from a CD-ROM sized optical disk; a serious competitive threat to the VCR format.
EMS	Element Management Systems. The computer software systems to manage elements of a larger communications system, OR Energy Management System A computer software system to control, exchange and manage electrical power in interconnected transmission systems.
Encrypt	To transform data to conceal the content and meaning of the data. A "key" set of data is needed to transform the encrypted data into usable form. It is used to enhance security of premium digital television signals.
FCC	Federal Communications Commission. A board of commissioners appointed by the President to regulate radio, telephone, cable television and all other interstate communications systems.

Word or Abbreviation	Definition
FEC	Forward Error Correction. A means to detect and correct errors in data packets by sending extra data in each packet.
Fiber Optics	Hair-thin filaments of transparent glass or plastic that carry light to transmit voice, video or data signals. Fiber optic cables typically include 12 to 144 optical fibers.
Filter	A device that blocks some frequencies from passing through it, while allowing other frequencies to pass through.
FM	Frequency Modulation. A process in which the information in a carrier is represented by variations in the frequency of the carrier.
Frequency	The number of cycles or events per unit of time, usually a second. Expressed in Hertz, or one cycle per second.
FTTF	Fiber-to-the-Feeder. A term that describes the architecture in modern CATV systems, where the coaxial cable is used to deliver service to independent groups of 2000 to 300 customers.
FTTH	Fiber-to-the-Home. A term that describes the architecture where fiber optics are brought to the home, and electronics are placed at the home to convert the optical signal into an electrical signal.
Geostationary Orbit	The orbit where communications satellites rotate at the same rate as the surface of the Earth rotates, and appear stationary in the sky. This orbit occurs roughly 22,500 miles above the equator.
HDSL	Highspeed Digital Subscriber Loop. A high speed digital subscriber line, which carries a 1.544 Mbps DS-1 signal the typical distance from the Central Office to customers.

Word or Abbreviation	Definition
Headend	The control center of a cable television system where incoming television, radio and satellite signals are amplified, converted, processed and combined into a common cable for transmission to customers.
HFC	Hybrid Fiber Coax. The use of both fiber optics and coaxial cable in the delivery of two-way, broadband communication to residential and small business communities.
Interexchange Carriers	IXC, A company engaged in telecommunications transmission services crossing local access and transport area boundaries (e.g., AT&T, Sprint, MCI).
ISDN	Integrated Services Digital Network. A facility for delivering digital voice and data services over twisted copper pair wires, at 128 kbps, out to 12,000 feet from a Central Office.
Interdict	To preventing the unauthorized reception of high value television channels, through the use of traps, filters, scrambling, or encryption.
Internet	The world's largest network of computer users, a collection of thousands of separate but interconnected computer networks located worldwide.
Intranet	An internal computer network that allows employees of a company to access company data using software tools that are similar to those used on the "public" Internet.
Kbps	Kilo-bits per second, or one thousand bits per second.
LAN	Local Area Network. The interconnection system between computers within a building or office complex.

Word or Abbreviation	Definition
LATA	Local Access Transport Area. One of 161 local telephone servicing areas in the United States, distinguishing local from long distance service. Circuits with both ends inside a LATA are generally the sole responsibility of the local exchange carrier (LEC). Circuits that cross the LATA boundaries are generally the responsibility of interexchange carriers (IXC).
LEC	Local Exchange Carrier. A company that provides telephone service for subscribers in a geographical area encompassing one or more LATAs.
Line extenders	Small amplifiers used to "boost" the signal strength in a coaxial cable.
Local Loop	The twisted pair of copper wires between the Central Office and the customer, originally placed for telephone service.
Major Trading Area (MTA)	Geographic areas established by Rand McNally that are based on population and economic factors. Each of the 51 MTAs in the United States are subdivided into Basic Trading Areas (BTAs). The FCC sometimes uses MTAs as boundaries allocate radio frequencies sold by auction.
MHz	Million Hertz, or one million cycles per second.
MMDS	Multichannel Multipoint Distribution Service. A form of wireless CATV, where analog or digital CATV channels are broadcast to homes in a relatively small geographic area. Homes are equipped with small antennas and set-top receivers.
Modem	A device which converts digital data into an signal suitable for transmission on a telephone line or other analog circuits.
Modulation	The process of varying certain characteristics (amplitude, frequency, or phase) of a carrier signal to transmit information.

Word or Abbreviation	Definition
MPEG	Motion Picture Experts Group. A standards body that defines video compression standards. The MPEG 2 standard allows up to 100:1 compression of digital video programming.
MSO	Multiple System Operator. A company operating more than one cable television system.
Multimedia	The integration of at least two of five information media for presentation on a television, computer screen, or other display. Multimedia information can include printed text, still images, animation, sound, and/or video.
Multiplexer	A devices that combines a number of low-speed digital channels into one higher speed channel, and divides it into low-speed digital channels in the other direction.
Network	A series of points, nodes or stations connected by communications channels.
Node	A terminal in a communications network where circuits are combined or re-transmitted. In a CATV system, a node converts optical signals into electrical signals.
Narrowcasting	The ability to deliver customer-specific programming. The opposite is broadcasting in which all customers receive the same programming.
NVOD	Near Video On Demand. The offering of many movies or other video entertainment, at staggered start times. NVOD allows customers choices of the same programs at almost any time of day. It encourages impulse purchase of pay-per-view. It does not allow the VCR-like features of full Video On Demand.
Optical Fiber	see Fiber Optics.

Word or Abbreviation	Definition
Overbuild	To construct a new communications system, in the same area as an existing competitor's system. This term is used in the cable television industry, when a new operator builds in one or more of the areas served by a Multiple System Operator (MSO).
Packet	A bundle of data, carried over a data transmission network. A packet averages 1,500 bytes in size, but can be much smaller or larger, depending on the transmission protocol.
Passing	A home that is passed by a cable operator's system, whether or not the occupants of the house are customers.
Passings/node	Homes passed within the serving area of a cable system's facility for unique programming.
PPV	Pay Per View. Programming for which the customer is charged for each individual program viewed.
PBX	Private Branch Exchange. A private telephone switch located on a customer's premise and connected to the public switched telephone network.
PCS	Personal Communications Services. A new form of cellular communications using frequencies near 2000 MHz. Proposed systems will provide voice and data communications to portable telephone and computing devices.
PEG	Public access, Education and Government. Television channels typically used for local content provided by local agencies or studios.
Peer-to-Peer	The relationship among interconnected computers where the processing hierarchy is eliminated, and each computer is capable of communications, storage and processing.

Word or Abbreviation	Definition
PKVE	Public Key Video Encryption. A technique to scramble digital video signals that is very secure.
POP	Point Of Presence. The location of a telephone switch operated by a long distance carrier at which the calls are passed to and from the local exchange carrier's network.
POTS	Plain Old Telephone Service. Telephone industry term meaning use of twisted-copper pairs for analog telephone service.
Protocol	Data communications rules that must be followed for a successful transmission to take place.
PSTN	Public Switched Telephone Network. Traditional telephone network carrying telephone calls to any telephone customer.
PUC	Public Utilities Commission. A regulatory and rate setting body for utilities and telephone service.
RBOCs	Regional Bell Operating Companies. Local phone companies from the dissolution of AT&T. USWest is the RBOC in our serving territory.
RF	Radio Frequency. The range of radio frequencies commonly used for radio and television transmission.
Router	A device to redirect data traffic between many Local Area Networks.
RTU	Remote Terminal Unit. A remote data gathering and control device in electrical substations and plants. A component of a SCADA system.
SCADA	Supervisory Control and Data Acquisition. Systems that allow for remote administration of electric power facilities.

Word or Abbreviation	Definition
SONET	Synchronous Optical Network. An optical transmission standard that allows for "drop and insert multiplexers" and very high speed digital communications, whose primary use is in large communications systems for high volume applications.
SS-7	Signaling System 7. A telephone industry standard to establish a circuit through many interconnected telephone networks.
T-1	See DS-1. T-1 is a common reference to DS-1, a high-speed digital line.
Taps	Passive electrical devices that permit the connection of subscribers to the coax distribution cable.
TCP/IP	Transmission Control Protocol/Internet Protocol. The standard communications protocol required for computers that seek access to the Internet.
Telcos	Telephone companies.
Telecommunications	Transmission, emission, or reception of information of any kind (sound, voice, images, or data) over a distance.
Telecommunications Act of 1996	A far reaching amendment to the Communications Act of 1934, which eliminates barriers to telecommunications market entry for many different types of companies, including utilities.
Telecommunications Service Provider	An entity that offers telecommunications services for a fee to the public.

Word or Abbreviation	Definition
Transponder	A small module in each CATV device that reports the health and status of the device to the headend. OR A combination receiver-transmitter on a satellite, which receives a signal, amplifies it, and retransmits it at a different frequency to the Earth.
Trap	A passive electrical device to block a television channel from reception by an unauthorized CATV customer.
Trunk	Coaxial cable in a CATV system that carries signals to smaller distribution cables.
UHF	Ultra High Frequency. The portion of the radio spectrum where television channels 13-69 exist.
Universal Service	The availability of basic telephone service to all customers in an area at affordable prices.
Uplink	The communications link used to transmit information from Earth to an orbiting satellite.
Upstream	The direction of signals in a CATV system from the customer to the headend.
VHF	Very High Frequency. The portion of the radio spectrum in which television channels 2-12 exist.
Video conferencing	Ability to "see" the person to whom you are speaking in a telephone call.
Video transport	Delivery of television signals to a subscriber's residence.

Word or Abbreviation	Definition
VOD	Video on Demand. A video service in which viewers request and receive programming that they select, at the time that they select it, including the ability to pause, rewind, stop, and fast forward the program material.
Voice Channel	A channel on an electronic communications system that is capable of transmitting voice communications.
WAN	Wide Area Network. A data network configuration that links computers or LANS that may be geographically distant.
World Wide Web	A graphical Internet service. It enables the user to work with text, images and audio to establish a "multimedia" presentation. Software called a "Browser" is used to access the Web.
Wideband	A communications channel offering bandwidth greater than a voice-grade channel. There is no specific definition of wideband in terms of rates but typically speeds in excess of 28.8 kbps are considered wideband data rates.
WUTC	Washington Utilities and Transportation Commission. The state regulatory commission charged with regulating telecommunications services.

FEDERAL COMMUNICATIONS COMMISSION
QUICK REFERENCE CHART

FILING APPLICATIONS and PAYMENT OF FEES
for
CABLE TELEVISION SERVICES

TYPE OF APPLICATION	FORM #	FEE AMOUNT	FEE CODE	MAILING ADDRESS
CARS Construction Permit	327	$190.00/ application	TIC	Federal Communications Commission Cable Services Bureau P.O. Box 358205 Pittsburgh, PA 15251-5205
CARS Modification	327	$190.00/ application	TIC	Federal Communications Commission Cable Services Bureau P.O. Box 358205 Pittsburgh, PA 15251-5205
CARS License Renewal	327	$190.00/ application	TIC	Federal Communications Commission Cable Services Bureau P.O. Box 358205 Pittsburgh, PA 15251-5205
CARS License Agreement	327	$190.00/ application	TIC	Federal Communications Commission Cable Services Bureau P.O. Box 358205 Pittsburgh, PA 15251-5205
CARS Transfer of Control	327	$190.00/ application	TIC	Federal Communications Commission Cable Services Bureau P.O. Box 358205 Pittsburgh, PA 15251-5205
Special Temporary 3 Authorization	159 & Corres.	$125.00/ application	TGC	Federal Communications Commission Cable Services Bureau P.O. Box 358205 Pittsburgh, PA 15251-5205
Cable Special Relief Petition	159 & Corres.	$960.00/ application	TQC	Federal Communications Commission Cable Services Bureau P.O. Box 358205 Pittsburgh, PA 15251-5205
76.12 Registration Statement 19	159 & Corres.	$45.00/ statement	TAC	Federal Communications Commission Cable Services Bureau P.O. Box 358205 Pittsburgh, PA 15251-5205

Aeronautical Frequency Usage Notification 20	159 & Corres.	$45.00/ notification	TAC	Federal Communications Commission Cable Services Bureau P.O. Box 358205 Pittsburgh, PA 15251-5205
Aeronautical Frequency Usage Waiver	159 & Corres.	$45.00/ waiver	TAC	Federal Communications Commission Cable Services Bureau P.O. Box 358205 Pittsburgh, PA 15251-5205
Pole Attachment . Complaint	159 & written request	$150.00/ complaint	TPC	Federal Communications Commission Cable Services Bureau P.O. Box 358205 Pittsburgh, PA 15251-5205

FEDERAL COMMUNICATIONS COMMISSION
INSTRUCTIONS FOR USING FCC FORM 159 (REMITTANCE ADVICE)
AND FCC FORM 159-C (Continuation Sheet)

FCC FORM 159 — FCC Remittance Advice Form

The FCC Form 159, "Remittance Advice" is a multi-purpose form that generally accompanies (see chart below for specific instructions) any payment to the Federal Communications Commission (e.g., Regulatory Fees, Processing Fees, Fines, Forfeitures, Freedom of Information Act (FOIA) Billings, or any other debt due to the FCC). The information on this form is collected to ensure credit for full payment, to expedite any refunds due and to service public inquiries.

What Form Do I File?

If you are:	Then:
Paying a Regulatory Fee to the Private Radio Bureau,	You **do not need** to submit FCC Remittance Advice, FCC Form 159. However, you must pay your regulatory fee along with your processing fee, at the time of renewal or at the time of original license application.
Paying a Processing Fee by money order or credit card to any FCC Bureau,	You must submit FCC Remittance Advice, FCC Form 159.
Paying a Processing Fee and paying for more than one action with a single payment,	You must submit FCC Remittance Advice, FCC Form 159.
Paying a Processing Fee for a service that does not require a specific FCC Form, (e.g. Request for Special Temporary Authority),	You must submit FCC Remittance Advice, FCC Form 159.
Paying a Processing Fee to the Private Radio Bureau for a service that requires FCC Form 155,	You must submit FCC Remittance Advice, FCC Form 159 instead of Form 155.
Paying a Regulatory Fee to any one of the Mass Media, Common Carrier or Cable Services Bureau,	You must submit FCC Remittance Advice, FCC Form 159.
Paying for Fines/Forfeitures, Freedom of Information Act Fees or any other debts.	All customers paying for any of these categories must submit a FCC Remittance Advice, FCC Form 159 and a copy of their notice or invoice to the appropriate lockbox. Please refer to the specific instructions accompanying your billing document.
Paying for an Auction,	You must submit FCC Remittance Advice, FCC Form 159. Consult the FCC's Public Notice for specific instructions.
Paying by wire transfer,	You must submit FCC Remittance Advice, FCC Form 159.
Paying by Western Union Quick Collect,	You must submit FCC Remittance Advice, FCC Form 159.

Specific Form Instructions

(1) **FCC Account No.** — This is a self-assigned personal identification number that consists of ten digits. You **must** use your taxpayer identification number (TIN) with a prefix of "0" (e.g., 0123456789). **Only if you do not have a TIN**, you may use your ten-digit telephone number (e.g., 3012224567). **There are no other options available to you to create your FCC Account No.** This number will eventually be all you will need to file an application with the FCC, so once you have determined your FCC account number you must be sure to use this same number every time you send a payment to the FCC.

(2) **Total Amount Paid** — Enter the total amount of your remittance.

(3) **Payor Name** — Enter the name of the person or company (i.e., maker of the check) responsible for payment. Enter an individual name (last, first, middle initial). If a company, enter the name which is used commercially. If paying by credit card, complete this section with the full name of the cardholder.

(4) **Street Address (Line 1)** — The street address or post office box number to which correspondence should be sent.

(5) **Street Address (Line 2)** — This line may be used if further identification of the address is required.

(6) **City** — The name of the city associated with the street address given in (4).

(7) **State** — If the payor has a United States mailing address enter the appropriate two-digit state abbreviation as prescribed by the U.S. Post Office. If the payor has a mailing address outside the United States, leave this section blank.

(8) **ZIP Code** — Enter the appropriate five or nine-digit ZIP code prescribed by the U.S. Post Office. If address is foreign, enter the appropriate ZIP (postal) code.

(9) **Daytime Telephone Number** — Enter the payor's ten-digit daytime telephone number, including area code. For foreign telephone numbers include the appropriate country dialing access code, as if you were calling from the United States. [For example a United Kingdom number would have the prefix (011-44) followed by the number within the UK.] This daytime telephone number should tell us where you can be reached during normal business hours if necessary. If we cannot reach you at this number during normal business hours to resolve a problem, your filing may be returned.

(10) **Country Code** — This section is for those payors who have an address outside the United States of America. Enter the appropriate code here. To o[illegible]n country code information contact the Mailing Requirements Dept. of the U.S. Postal Service.

Read this before proceeding — IT MAY SAVE YOU TIME

If the Applicant, Licensee, Regulatee or Debtor is the same as the Payor, it is not necessary to reenter your name and address in blocks 11, 13, 19, 20, & 21. However, you must complete all information in blocks 12, 14, 15, & 16. (FCC codes in blocks 17 & 18 will only be completed in special circumstances as described in a Public Notice or in your Fee Filing Guide).

(11) **Name of Applicant, Licensee, Regulatee or Debtor** — Enter the name (last, first, middle initial) as it appears on the original application or filing being submitted. If this is a company, enter name which is used commercially. Each unique applicant, licensee, regulatee or debtor must be listed separately if multiple applications or filings are submitted. If this name is the same as the payor, (block 3), it is not necessary to fill out this section.

(12) **FCC Call Sign/Other Identifier** — E[illegible] an applicable call sign or unique FCC identifier, if any, as prescribed by the appropriate FCC Fee Filing Guide or Public Notice that applies to you.

(13) **ZIP Code** — It is not necessary to complete this section if the Payor, (block 3), is the same as the Applicant, Licensee, Regulatee or Debtor, (block 11). Enter the five or nine-digit ZIP code prescribed by the U.S. Post Office. If address is foreign, enter the appropriate country code here.

(14) **Payment Type Code** — This section tells us what you are paying for. Beginning with the first box, enter the correct 3 or 4 character alphabetic Payment Type Code. This code can be found in the FCC Fee Filing Guide or Public Notice appropriate to your payment. **Incorrect Payment Type Codes may result in your application or filing, if applicable, being returned to you without further processing**. You are allowed to file multiple actions. There are three ways "multiple actions" are defined. The following examples provide instructions on how multiple actions should be filed when using FCC Forms 159 & 159-C:

(i) If a single service allows for a quanti[illegible] more than one of the same action, as defined in the appropriate Fee Filing Guide or Public Notice, complete only blocks 12, 13, 14, 15 & 16. Only enter your name and address if different than "Payor Name" (block 3). Blocks 17 & 18 are only to be completed when required by Public Notice.

(ii) If you are filing concurrent actions (not the same actions) in the same lockbox, on the same application, refer to the Fee Filing Guide or Public Notice for specific instructions as to the number of quantities allowed. Complete only blocks 12, 13, 14, 15, & 16. Complete a separate "Item Information" section for each additional action required. Only enter your name and address if different than the "Payor Name" (block 3). Blocks 17 & 18 are only to be completed when required by public notice.

(iii) If a single Remittance Advice is used to pay for more than one applicant, licensee, regulatee or debtor, and action to the same lockbox, then a separate "Item Information" section must be completed for each one. For each "Item Information" section all blocks must be completed, except Blocks 17 & 18 which are only to be completed when required by Public Notice. **Remember, if any of these applications fall into category (i) or (ii) above, you must follow those instructions as well.**

(15) **Quantity** — Enter the number of actions required with this submission. Refer to the FCC Fee Filing Guide or Public Notice for information concerning multiple requests.

(16) **Amount Due** — Enter the amount of the fee required for the Payment Type Code used in (14) above.

(17) **FCC Code 1** — This section is used for special filing codes as required by the Bureau/Office you are filing your application with. Applicant will receive specific instructions from the Bureau/Office if this block is to be used. Do not complete this block unless instructed to do so.

(18) **FCC Code 2** — (See instructions for item 17).

(19, 20, 21) **Address** — If the same as Payor address, in blocks (4) and (5), leave blank. If multiple payment codes have been used for the same Applicant, Licensee, Regulatee or Debtor, only fill out this section one time. If different from Payor Address, in blocks (4) and (5), complete these lines with the appropriate street address.

(22) **Credit Card Data** — If remitting payment by credit card place an "x" in the appropriate block for the type of credit card being used — MasterCard or Visa only. Enter your credit card number and expiration date. **If any area required for credit card approval is incomplete, the application will be returned unprocessed.**

(23) **Authorized Signature** — Sign and date the Remittance Advice Form to authorize all credit card payments. **The action will not be processed if it is not signed and dated here.**

FCC Remittance Advice Continuation Sheet (FCC Form 159-C) — Use this form for any additional services pertaining to this filing.

Checks must be denominated in U.S. currency and deposited in a U.S. financial institution. No checks drawn on a foreign bank will be accepted.

Where Do I File?

If you are paying a:	Then:
Regulatory Fee or Processing Fee	Consult the specific FCC Bureau Fee Filing Guide (i.e., Common Carrier Bureau Fee Filing Guide, Private Radio Bureau Fee Filing Guide, Mass Media Bureau Fee Filing Guide, Cable Services Bureau Fee Filing Guide, Field Operations Bureau Fee Filing Guide, Office of Engineering and Technology Fee Filing Guide)
Fine or Forfeiture	Pay to the address designated on the notice or invoice you received
Freedom of Information Act Fee	Pay to the address designated on the invoice you received
Other Debts	Pay to the address designated in the correspondence you received

Note: Fee Filing Guides can be obtained by calling Forms Distribution — 202/632-FORM

(RESERVED)

(Read instructions carefully BEFORE proceeding.)

FEDERAL COMMUNICATIONS COMMISSION

FCC REMITTANCE ADVICE

Approved by OMB 3060-0589 Expires 2/28/97

PAGE NO. 1 OF ______

SPECIAL USE

FCC USE ONLY

PAYOR INFORMATION

(1) FCC ACCOUNT NUMBER

Did you have a number prior to this? Enter it.

(2) TOTAL AMOUNT PAID (dollars and cents) $.

(3) PAYOR NAME (If paying by credit card, enter name exactly as it appears on your card)

(4) STREET ADDRESS LINE NO. 1

(5) STREET ADDRESS LINE NO. 2

(6) CITY | (7) STATE | (8) ZIP CODE

(9) DAYTIME TELEPHONE NUMBER (Include area code) | (10) COUNTRY CODE (if not U.S.A.)

ITEM #1 INFORMATION

(11A) NAME OF APPLICANT, LICENSEE, REGULATEE, OR DEBTOR | FCC USE ONLY

FCC CALL SIGN/OTHER ID | (13A) ZIP CODE | (14A) PAYMENT TYPE CODE | (15A) QUANTITY | (16A) FEE DUE FOR PAYMENT TYPE CODE IN BLOCK 14 $

(17A) FCC CODE 1 | (18A) FCC CODE 2

(19A) ADDRESS LINE NO. 1 | (20A) ADDRESS LINE NO. 2) | (21A) CITY/STATE OR COUNTRY CODE

ITEM #2 INFORMATION

(11B) NAME OF APPLICANT, LICENSEE, REGULATEE, OR DEBTOR | FCC USE ONLY

(12B) FCC CALL SIGN/OTHER ID | (13B) ZIP CODE | (14B) PAYMENT TYPE CODE | (15B) QUANTITY | (16B) FEE DUE FOR PAYMENT TYPE CODE IN BLOCK 14 $

(17B) FCC CODE 1 | (18B) FCC CODE 2

(19B) ADDRESS LINE NO. 1 | (20B) ADDRESS LINE NO. 2 | (21B) CITY/STATE OR COUNTRY CODE

CREDIT CARD PAYMENT INFORMATION

(22) MASTERCARD/VISA ACCOUNT NUMBER:

☐ Mastercard

EXPIRATION DATE: Month Year

☐ Visa

(23) **I hereby authorize the FCC to charge my VISA or Mastercard for the service(s)/authorization(s) herein describe.** ☞

AUTHORIZED SIGNATURE | DATE

See public burden estimate on reverse.

NOTICE TO INDIVIDUALS REQUIRED BY THE PRIVACY ACT OF 1974 AND THE PAPERWORK REDUCTION ACT

Section 9 of the Communications Act authorizes the FCC to request the information on this form. The information requested is required to recover costs incurred in carrying out its enforcement activities, policy and rulemaking activities, user information services, and international activities. The form will be used primarily to capture paper information in order to speed the refund process and maintain required accounts receivable information. It will also be used to collect fines and debts due the Commission.

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to the Federal Communications Commission, Records Management Division, AMD-PIRS, Washington, DC 20554, and to the Office of Management and Budget, Office of Information and Regulatory Affairs, Paperwork Reduction Project (3060-0589), Washington, DC 20503.

FEDERAL COMMUNICATIONS COMMISSION

Approved by OMB
3060-0589
Expires 2/28/97

ADVICE (CONTINUATION SHEET)

PAGE NO. _______ OF _______

ITEM #____ INFORMATION

FCC ACCOUNT #	NAME OF APPLICANT, LICENSEE, REGULATEE, OR DEBTOR	FCC USE ONLY
FCC CALL SIGN/OTHER ID	ZIP CODE	PAYMENT TYPE CODE
QUANTITY	FEE DUE FOR PAYMENT TYPE CODE $	
FCC CODE 1	FCC CODE 2	
ADDRESS LINE NO. 1	ADDRESS LINE NO. 2)	CITY/STATE OR COUNTRY CODE

ITEM #____ INFORMATION

FCC ACCOUNT #	NAME OF APPLICANT, LICENSEE, REGULATEE, OR DEBTOR	FCC USE ONLY
FCC CALL SIGN/OTHER ID	ZIP CODE	PAYMENT TYPE CODE
QUANTITY	FEE DUE FOR PAYMENT TYPE CODE $	
FCC CODE 1	FCC CODE 2	
ADDRESS LINE NO. 1	ADDRESS LINE NO. 2)	CITY/STATE OR COUNTRY CODE

ITEM #____ INFORMATION

FCC ACCOUNT #	NAME OF APPLICANT, LICENSEE, REGULATEE, OR DEBTOR	FCC USE ONLY
FCC CALL SIGN/OTHER ID	ZIP CODE	PAYMENT TYPE CODE
QUANTITY	FEE DUE FOR PAYMENT TYPE CODE $	
FCC CODE 1	FCC CODE 2	
ADDRESS LINE NO. 1	ADDRESS LINE NO. 2)	CITY/STATE OR COUNTRY CODE

ITEM #____ INFORMATION

FCC ACCOUNT #	NAME OF APPLICANT, LICENSEE, REGULATEE, OR DEBTOR	FCC USE ONLY
FCC CALL SIGN/OTHER ID	ZIP CODE	PAYMENT TYPE CODE
QUANTITY	FEE DUE FOR PAYMENT TYPE CODE $	
FCC CODE 1	FCC CODE 2	
ADDRESS LINE NO. 1	ADDRESS LINE NO. 2)	CITY/STATE OR COUNTRY CODE

FCC 320

Approved by OMB
3060-0433
Expires 1/31/99

BASIC SIGNAL LEAKAGE PERFORMANCE REPORT

INSTRUCTIONS

At least once each calendar year, each cable television system utilizing aeronautical frequencies must conduct measurements of its signal leakage. A performance report (FCC 320), which demonstrates the results of its tests, must be filed each calendar year in accordance with 47 C.F.R. Section 76.615. Completed forms should be returned to the FEDERAL COMMUNICATIONS COMMISSION, CABLE SERVICES BUREAU, WASHINGTON, D.C. 20554.

Section I - General Information

The information in this Section is preprinted based on the most current data on file with the Commission. The information should be reviewed and revised, if not accurate and complete.

Section II - Local System Information

1. Provide the name, address and telephone number of the person(s) at the local system by whom or under whose direction the report was prepared.

2. Where the reporting cable television system does not utilize the aeronautical frequency bands (i.e., 108-137 or 225-400 MHz), the system owner should so indicate in response to Question 2 of Section II, complete Section IV, and return this form to the Commission.

3. Include as an attachment and identify as **Exhibit A**, a list of all the precisely offsetted aeronautical frequencies used by this community unit.

4. Test Results - Show compliance with one of the following basic signal leakage criteria:

   a) For ground-based measurements, the determination of 10Log Ioo and 10Log I3000 shall be based upon methods, parameters and formulae as prescribed in 47 C.F.R. Section 76.611(a)(1). Provide the results here.
   Note: If 10Log Ioo is equal to or less than 64 or if 10Log I3000 is equal to or less than -7, the system has passed the signal leakage test.

   b) If airspace measurements are used, use calibration methods, parameters and techniques as prescribed in 47 C.F.R. Section 76.611(a)(2). Indicate whether the system passed or failed the signal leakage test.

Section III - Leakage Performance Criteria

For operators electing to conduct measurements on geographical areas that contain more than one community unit, fill in the requested measurement information on this form. However, the submission of the accompanying exhibits, either B or C, may be incorporated by reference to the filing of another community unit that had undergone the same measurement tests as this community unit, that community unit is identified by its community unit code number in response to Question (2) or (4) of Section III.

1. Ground-Based Measurements (if used)

   a) Provide the name and telephone number of person(s), who is responsible for conducting the ground-based measurements.

   b) Indicate the number of miles of cable plant tested for signal leakage and calculate the percentage of overall cable plant that was tested for signal leakage.
   Note: A minimum of 75% of cable plant, which includes oldest portion of the system, must be sampled for this test.

   c) Show the time period of the test, including the actual starting and ending dates.

   d) Provide the name and make of the leakage measurement equipment used and the test frequency used. As an alternative, provide information as to the sensitivity and accuracy of the leakage measurement equipment and the test frequency used.
   Note: The equipment used must be capable of measuring leaks of 20 uV/m @ 3 m or its equivalent, and the test frequency must be within the VHF aeronautical band 108-137 MHz or a frequency in which the results can be correlated to that band. Additionally, the test signal used shall have an average power equal to the average power level of the strongest carrier on the system.

e) Attach as **Exhibit B**, the actual calculations performed in accordance with 47 C.F.R. Section 76.611(a)(1) for the entire geographical area tested. Identify in this Exhibit **all** leaks 50 uV/m or greater that were detected during the test and include their repair dates, if any. The geographical area tested may include more than one community unit. Use the same information and results for each community unit.

2. Airspace Measurements (if used)

a) Provide the name and telephone number of person/ company performing the airspace measurements.

b) Indicate the date(s) that the airspace tests were performed and the test frequency used during these airspace measurements.

c) Attach as **Exhibit C**, a full description of the airspace measurement procedure, a list of the equipment used and a detailed description of the geographical area covered by these airspace measurements. Additionally, include the graph or chart of the data points collected and the associated technical analysis for these measurements. Use the same results for each community unit included in this test. For all leaks detected during the airspace measurements that were subsequently repaired, specify the date of repair.

d) Recorded data and its analysis.

(i) If analog recordings are used, include a graph of the curves and the result (in uV/m) of the analysis of the peak values of these curves when smoothed out, in accordance with good engineering practices.
Note: This smoothed curve must be below 10 uV/m.

(ii) If **digitized data is used**, indicate the percentage of these digitized points below 10 uV/m.
Note: 90% of data points must be below 10 uV/m.

Section I V - Certification

This report must be certified by the individual owning the reporting cable system, if individually owned; by a partner, if a partnership; by an officer of the corporation, if a corporation; or by a member who is an officer, if an unincorporated association. It may also be signed by the cable system owner's attorney in case of the owner's physical disability or absence from the United States. The attorney shall, in that event, separately set forth the reasons why the report was not signed by the owner. In addition, if any matter is stated on the basis of the attorney's belief only (rather than personal knowledge), the attorney shall separately set forth the reasons for believing that such statements are true.

FCC NOTICE TO INDIVIDUALS REQUIRED BY THE PRIVACY ACT AND THE PAPERWORK REDUCTION ACT

The solicitation of personal information required in this Report is authorized by the Communications Act of 1934, as amended. The Commission will use this information to determine eligibility to use the aeronautical frequency spectrum in the provision of Cable Television Service. In reaching that determination, or for law enforcement purposes, it may become necessary to refer personal information contained in the form to another government agency. In addition, all information provided on this form is available for public inspection. If information requested on this form is not provided, processing of the Report may be delayed while a request is made to provide the missing information. Your response is required to obtain the requested benefit. Respondents are not required to respond to this collection of information unless it displays a currently valid OMB control number.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 95-579, DECEMBER 31, 1974, 5 U.S.C. 552(e)(3) AND THE PAPERWORK REDUCTION ACT OF 1995, P.L. 104-13, MAY 22, 1995, 47 U.S.C. 3507.

Approved by OMB
3060-0433
Expires 1/31/99

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

BASIC SIGNAL LEAKAGE PERFORMANCE REPORT
FCC FORM 320

Public reporting burden for this collection of information is estimated to average 20 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to the Federal Communications Commission, Office of Managing Director, Paperwork Reduction Project (3060-0433), Washington, D.C. 20554. Do not send completed forms to this address.

SECTION I -- GENERAL INFORMATION

(1) Cable System Owner: ______________________________
Phone Number: (____)______________
Address: ______________________________
______________________ ________ ________-____
(City) (State) (ZIP)

(2) Community Served : ______________________________

(3) Community Unit No.: ______ (4) Physical System Id: ______

SECTION II -- LOCAL SYSTEM INFORMATION

(1) Person(s) Responsible for report:
Name: ______________________ ______________________ ____
(Last) (First) (M)
Phone Number: (____)______________
Address: ______________________________
______________________ ________ ________-____
(City) (State) (ZIP)

(2) Are aeronautical frequencies (i.e., 108-137 or 225-400 MHz) used by this cable television system? Yes ____ No ____

(a) If No, complete Section IV below and return to FCC.

(b) If Yes, attach as Exhibit A all precisely offsetted aeronautical frequencies used by this Community Unit.

(3) TEST RESULTS: CLI: 10LogIoo: ________.____; 10LogI3000: ________.____
Airspace: Passed: ___ Failed: ___

SECTION III -- LEAKAGE PERFORMANCE CRITERIA

For operators conducting measurements on geographical areas that contain more than one Community Unit, (e.g., headends that serve more than one community unit) fill in the measurement information below. NOTE: The submission of the accompanying exhibits, either B or C, may be incorporated by reference to another Community Unit filing that had undergone the same measurement tests as this Community Unit. That Community Unit must be identified by its Community Unit Code Number in response to Question (2) or (4) below.

(1) GROUND-BASED MEASUREMENTS: (if used)

(a) Person(s) Responsible for test:
Name: ______________________ ______________________ ____
(Last) (First) (M)
Phone Number: (____)______________

(b) Miles of plant tested & % of total plant tested: __________m;________.___%

BASIC SIGNAL LEAKAGE PERFORMANCE REPORT

SECTION III -- LEAKAGE PERFORMANCE CRITERIA

(Continued)

(c) Time period of test: From: ____/____/____ TO: ____/____/____
(MM DD YR) (MM DD YR)

(d) Equipment Used: ______________ ______________ ________.________ (MHz)
(Make) (Model) (Test Frequency)

(e) Attach as Exhibit B, the CLI calculation & result including all parameters used. (Identify in this Exhibit all leaks ≥ 50 uV/m, and show their repaired dates, if any.)

(2) If Exhibit B is incorporated by reference, provide the Community Unit No. ______________ of the Form 320 with which Exhibit B was filed.

(3) AIRSPACE MEASUREMENTS: (if used)

(a) Person/Company Responsible for test:

Name: ________________________________
(Last, First, M, or Company Name)

Phone Number: (____)__________

(b) Dates of Test-From: ____/____/____ To: ____/____/____
(MM DD YR) (MM DD YR)

Test Freq.: ________.________ (MHz)

(c) Attach as Exhibit C, a full description of the test procedure, a list of the equipment used for the airspace measurements and a detailed description of the area covered by these airspace measurements. (Set forth in this Exhibit all leaks detected during these airspace measurements that were subsequently repaired and their repair dates, if any.)

(d) Recorded data and its analysis:

(i) If analog recordings, include in Exhibit C, a graph of the results and indicate the value of the smoothed out peak values ______________ uV/m.

(ii) If digitized recordings, include in Exhibit C, a plot of the results and indicate % of points recorded digitally below 10 uV/m: ______.______ %

(4) If Exhibit C is incorporated by reference, provide the Comunity Unit No. ______________ of the Form 320 with which Exhibit C was filed.

SECTION IV -- CERTIFICATION

By signing below, the operator certifies that in the case of an individual operator, he or she is not subject to a denial of federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862, or in the case of a non-individual operator (e.g. corporation, partnership, or other unincorporated association), no party to the operator is subject to a denial of federal benefits that includes FCC benefits pursuant to that section. For the definition of a "party" for these purposes, see 47 CFR, Section 1.2002(b).

I certify that I am ______________________________ (Official Title), of ______________________________ (Legal Name of Cable System Owner), that I have examined this Report and that, to the best of my knowledge and belief, all statements in the Report are true, correct and complete, and are made in good faith.

______________________________ (Signature) ______________________, 19____ (Date)

WILLFUL FALSE STATEMENTS ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, §1001) AND/OR REVOCATION OF ANY STATION LICENSE (U.S. CODE, TITLE 47, §312(a)(1)), AND/OR FORFEITURE (U.S. CODE, TITLE 47, SECTION 503).

Approved by OMB
3060-0076
Expires 12/31/96
Est. Avg. Burden Hrs.
Per Response: 1 Hr.

INSTRUCTIONS FOR COMPLETION OF FCC FORM 395
COMMON CARRIER ANNUAL EMPLOYMENT REPORT

A. **Who Must File**: The FCC Form 395, Common Carrier Annual Employment Report, is to be filed by all licensees and permittees of common carrier stations with sixteen (16) or more full-time employees, as required by 47 C.F.R. 1.815 (see item D below).

B. **Number of Copies to File**: Respondents must submit one (1) copy of each FCC Form 395, Common Carrier Annual Employment Report, to: **FEDERAL COMMUNICATIONS COMMISSION, Common Carrier Bureau Enforcement Division, Washington, D.C. 20554.** The completed report must be filed by May 31 of each year.

C. **Reporting Period (Item 3 of FCC Form 395)**: The employment data filed on FCC Form 395 must reflect the employment figures from any one payroll period in January, February, or March. The same payroll period should be used in each year's report.

D. **Number of Full-Time Employees (Item 4 of FCC Form 395)**: (1) If the filing concerns a reporting unit that had fewer than sixteen (16) full-time employees during the selected payroll period (see item C, above), no Form 395 filing is required. However, such a reporting unit may fill in Sections I, V, and VI of Form 395 and submit it to comply with its reporting obligations under 47 C.F.R. Sections 21.307, 22.307, or 23.55.

(2) If the filing concerns a reporting unit that had 16 or more full-time employees during the selected payroll period, complete all sections (i.e., Sections I, II, III, IV, V, and VI).

E. **Minority Group Identification**:

1. Minority group information necessary for this section may be obtained either by visual surveys of the work force, or from post-employment records as to the identity of employees. An employee may be included in the minority group to which she or he appears to belong, or is regarded in the community as belonging.

2. Since visual surveys are permitted, the fact that minority group identifications are not present on company records is not an excuse for failure to provide the data called for.

3. Conducting a visual survey and keeping post-employment records of the race or ethnic origin of employees is legal in all jurisdictions and under all Federal and State laws. State laws prohibiting inquiries and recordkeeping as to race, etc., relate only to applicants for jobs, not to employees.

4. FCC Form 395 provides for reporting Native American, Asians or Pacific Islanders, blacks (non-Hispanic), Hispanics, and whites (non-Hispanic), whenever such persons are employed. The category that most closely reflects the individual's recognition in his/her community should be used to report persons of mixed racial and/or ethnic origins.

F. **Race/Ethnic Categories**:

1. Black, not of Hispanic Origin - A person descended from any of the black racial groups of Africa.

2. Hispanic - A person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.

3. Asian or Pacific Islander - A person descended from any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific islands. This area includes, for example, China, Japan, Korea, the Philippines, Vietnam, and Hawaii.

4. Native American - A person descended from any of the original peoples of North America, and who maintains cultural identification through tribal affiliation or community recognition.

5. White, not of Hispanic Origin - A person descended from any of the original peoples of Europe, North Africa, or the Middle East.

G. **Job Categories**:

The following job category definitions are provided for your guidance and may be used in completing FCC Form 395. A person who works in more than one job category is to be included in the one that represents the most important work done by that individual and is to be listed only once. Specific job titles below are not all inclusive or rigid. The proper categorization of any employee depends on the kind and level of the employee's responsibilities.

1. Officials and Managers - Occupations requiring administrative personnel who set broad policies, exercise overall responsibility for execution of these policies, and direct individual departments or special phases of a firm's operations. Includes: officials, executives, middle management, plant managers, department managers and superintendents, salaried supervisors who are members of management, purchasing agents and buyers.

2. Professional - Occupations requiring either college graduation or experience of such kind and amount as to provide a comparable background. Includes: accountants and auditors, airplane pilots, architects, artists, designers, writers and editors, engineers, lawyers, librarians, mathematicians,

natural scientists, registered nurses, personnel and labor relations specialists, computer scientists, physicians, social scientists, and kindred workers.

3. Technicians - Occupations requiring a combination of basic scientific knowledge and manual skill that can be obtained through about two years of post-high-school education, such as is offered in many technical institutes and junior colleges, or through equivalent on-the-job training. Includes: computer programmers and operators, drafting technicians, engineering aides, junior engineers, mathematical aides, photographers, radio operators, scientific assistants, surveyors, technical illustrators, electronic technicians, and kindred workers.

4. Sales - Occupations engaged wholly or primarily in direct selling. Includes: advertising salespersons, marketing assistants, sales representatives, technical salesworkers, demonstrators and sales promoters.

5. Office and Clerical - Comprises all clerical-type work regardless of the level of difficulty, where the activities are predominantly non-manual, though some manual work not directly involved with altering or transporting the product is included. Includes: bookkeepers, cashiers, collectors (bill and account), messengers and office clerks, office machine operators, shipping and receiving clerks, stenographers, typists and secretaries, telephone and telegraph operators, and kindred workers.

6. Craftworkers (skilled) - Manual workers of relatively high skill level who have a thorough and comprehensive knowledge of the process involved in their work, exercise considerable independent judgment, and usually receive an extensive period of training. Includes: hourly paid supervisors who are not members of management, skilled mechanics, telephone installers and repairers, line and cable workers, machinists, printing craftworkers, electricians, pattern and model makers, stationary engineers, and kindred workers.

7. Operatives (semiskilled) - Workers who operate machine or processing equipment or perform other factory-type duties of intermediate skill level that can be mastered in a few weeks and require only limited training. Includes: apprentices (electricians, machinists, mechanics, etc.), machine operatives, assemblers, welders, attendants (auto service and parking), chauffeurs, truck drivers, delivery and routeworkers. (Persons who are employed in a program including work training and related instruction to learn a trade or craft that is traditionally considered an apprenticeship, regardless of whether the program is registered with a Federal or State agency, should be regarded as apprentices for this report.)

8. Laborers (unskilled) - Workers in manual occupations who require no special training and perform elementary duties that may be learned in a few days and requir application of little or no independent judgment. Includes: garage laborers, vehicle washers and equipment cleaners, stock handlers, groundskeepers, laborers performing lifting, digging, mixing, loading and pulling operations.

9. Service Workers - Workers in both protective and nonprotective service occupations. Includes: personal service attendants, health service aides, janitors and cleaners, food service workers, elevator operators, fire protection workers, security guards and doorkeepers.

H. **On-the-Job Trainees:**

Report only employees enrolled in formal on-the-job training programs. The data provided for this section should also be included in the figures for the appropriate occupational categories in Sections II and III.

1. White Collar - Persons engaged in formal training for: Officials and Managers, Professionals, Technicians, Sales, Office and Clerical.

2. Production - Persons engaged in formal training for: Craftworkers (skilled)--when not trained under apprenticeship programs, Operatives (semiskilled), Laborers (unskilled), and Service Workers.

I. **Report of Discrimination Complaints:**

All common carrier licensees and permittees are required by 47 C.F.R. Sections 21.307, 22.307, or 23.55 to file a report of equal employment opportunity discrimination complaints brought against them. Section V makes this complaint report a part of the annual employment report for those reporting units filing Form 395 (see item D above).

J. **Certification**: FCC Form 395 must be certified: by the licensee or permittee, if an individual; by a partner, if a partnership; by an officer, if a corporation or association; or by an attorney of the licensee or permittee, in case of his/her physical disability or absence from the United States.

NOTICE: Public reporting burden for this collection of information is estimated to average one hour per response including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to the Federal Communications Commission, Office of Managing Director, Washington, DC 20554, and to the Office of Manageme and Budget, Office of Information and Regulatory Affai Washington, DC 20503.

FCC 395

FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

Approved by OMB
3060-0076
Expires 12/31/96
Est. Avg. Burden Hrs.
Per Response: 1 Hr.

COMMON CARRIER ANNUAL EMPLOYMENT REPORT

Please Read Instructions Before Completing and For Notice Regarding Public Burden

SECTION I – General Information

1. Name and Mailing Address of Respondent

☐ Check here if this is a change of address.

2. Year Report Filed

3. Reporting Period (Pay Period Ending Covered by This Report)

4. Number of Full-Time Employees during Selected Reporting Period (check one)

a. ☐ Fewer than 16 (Complete Sections I, V, and VI only)

b. ☐ 16 or more (Complete Sections I, II, III, IV, V and VI)

SECTION II – Full-Time Paid Employees. Consider as full-time employees, all employees working 30 hours or more a week.

JOB CATEGORIES	ALL EMPLOYEES			MALE					FEMALE				
				MINORITY GROUP EMPLOYEES					MINORITY GROUP EMPLOYEES				
	Total Columns 2 + 3	Male	Female	Black, not of Hispanic Origin	Asian or Pacific Islander	Native American	Hispanic	White, not of Hispanic Origin	Black, not of Hispanic Origin	Asian or Pacific Islander	Native American	Hispanic	White, not of Hispanic Origin
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Officials and Managers													
Professionals													
Technicians													
Sales													
Office and Clerical													
Craftworkers (skilled)													
Operatives (semiskilled)													
Laborers (unskilled)													
Service Workers													
TOTAL													
Total Employment from Previous Report (if any)													

SECTION III – Part-Time Paid Employees.

JOB CATEGORIES	ALL EMPLOYEES			MALE					FEMALE				
				MINORITY GROUP EMPLOYEES					MINORITY GROUP EMPLOYEES				
	Total Columns 2 + 3 (1)	Male (2)	Female (3)	Black, not of Hispanic Origin (4)	Asian or Pacific Islander (5)	Native American (6)	Hispanic (7)	White, not of Hispanic Origin (8)	Black, not of Hispanic Origin (9)	Asian or Pacific Islander (10)	Native American (11)	Hispanic (12)	White, not of Hispanic Origin (13)
Officials and Managers													
Professionals													
Technicians													
Sales													
Office and Clerical													
Craftworkers (skilled)													
Operatives (semiskilled)													
Laborers (unskilled)													
Service Workers													
TOTAL													
Total Employment from Previous Report (If any)													

SECTION IV. On-the-Job Trainees. Report only employees enrolled in formal on-the-job training programs. The data below shall also be included in the figures for the appropriate occupational categories in Sections II and III.

JOB CATEGORIES	ALL EMPLOYEES			MALE					FEMALE				
				MINORITY GROUP EMPLOYEES					MINORITY GROUP EMPLOYEES				
	Total Columns 2 + 3 (1)	Male (2)	Female (3)	Black, not of Hispanic Origin (4)	Asian or Pacific Islander (5)	Native American (6)	Hispanic (7)	White, not of Hispanic Origin (8)	Black, not of Hispanic Origin (9)	Asian or Pacific Islander (10)	Native American (11)	Hispanic (12)	White, not of Hispanic Origin (13)
White Collar													
Production													

SECTION V. Report of Discrimination Complaints Pursuant to 47 C.F.R. Sections 21.307, 22.307, and 23.55.

☐ This is to advise the Commission that no complaints regarding violations of equal employment provisions of Federal, State, Territorial, or local statutes have been filed against this company before any body having competent jurisdiction in such matters during the calendar year covered by this report.

☐ This is to advise the Commission that the following complaints alleging violations of the provisions of any equal employment opportunity statute have been filed against this company. (Attach a list indicating parties, date filed, courts or agencies before which the matter has been heard, file number or other designation, and disposition or current status).

Section VI – Certification

I certify that to the best of my knowledge, information and belief, all statements contained in this report are true and correct.

Date	Typed or Printed Name of Person Signing	Signature	(Area Code) Telephone No.

Title of Person Signing	WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001) AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION PERMIT (U.S. CODE, TITLE 47, SECTION 312(A)(1) AND/OR FORFEITURE (U.S. CODE, TITLE 47, SECTION 503).

NOTICE: The solicitation of personal information requested in this report is authorized by the Communications Act of 1934, as amended. The data collected will be used to assess compliance with FCC Rules and Regulations pertaining to EEO requirements. Your response is mandatory. This Notice is required by the Privacy Act of 1974, P.L. 93-579, December 31, 1974, 5 U.S.C. 552a(e)(3) and the Paperwork Reduction Act of 1980, P.L. 96-511, December 11, 1980, 44 U.S.C. 3507.

Tacoma Public Utilities

MEMORANDUM

DATE: August 22, 1996

TO: Mark Crisson, Director of Utilities

FROM: Steve Klein, Light Superintendent

SUBJECT: Letter from TCI to the Tacoma City Manager Regarding Municipal Ownership of Telecommunication Systems

In 1992, Cedar Falls Utilities began investigating the possibility of installing a broadband communications network throughout the City of Cedar Falls, Iowa. TCI of Northern Iowa, the incumbent cable television provider in the City of Cedar Falls, sent a letter to the Board Chair of Cedar Falls Utilities to help point out all the reasons why the City of Cedar Falls should stay out of the telecommunications business. As the city and utility moved forward with their research, TCI also pursued an aggressive advertising campaign using billboards to convince the community of the drawbacks of municipal telecommunication.

We anticipated a similar response by TCI to the Light Division's investigation of cable services. The letter from TCI to Mr. Corpuz has not changed substantially from their standard campaign letter. It has not been updated to reflect the positive changes wrought by the Telecommunications Act of 1996 (which was signed into law on February 8). It has not been updated to reflect that our exploration of telecommunications is the initiative of a revenue based utility business not a tax funded government. It has not been updated to reflect the fact that if TCI is to upgrade their own system in four years - as repeatedly promised - that they will have to "dig up streets, trench through people's yards and landscaping." It has not even been updated to reflect that what is really being discussed is a telecommunications infrastructure with the ability to deliver multiple advanced telecommunications services provided by many parties not just a cable television system.

Many of the issues TCI raised and the cases they cite become increasingly dated with each passing year, however, some valid issues raised by the letter will be addressed in our business plan as we explore how to best serve the needs of our customers and greater community. TCI has reportedly sent variations of this letter to officials in other communities upon learning that those communities were exploring their telecommunications options.

The attached document is the letter from TCI to Mr. Corpuz with all of the text that is new since the 1992 TCI/Cedar Falls letter italicized so that what new information exists in the letter can be easily identified.

Attachment

Ray Corpuz, Jr.
Tacoma City Manager
747 Market Street, Room 1244
Tacoma, WA 98402

RE: Cable Television Service in the *City of Tacoma*

Dear Mr. *Corpuz*:

The City of *Tacoma* has stated that it is considering owning and operating its own cable television system. Before the City acts, TCI of *Tacoma, Inc*. would like to discuss several important issues which the City of *Tacoma* should carefully consider before embarking on this major business venture.

First and foremost, cable television is a competitive entertainment business offered to customers on a monthly subscription basis. Unlike telephone or other public utility services, it is not considered an essential "public service". Unlike telephone and other public utility service, it is rarely the case that it is taken by most, if not all, of the citizens within your community.

Moreover, cable television is far more than a mere hardware business. It is a service and entertainment business marked by exceptionally high expectations and by changing tastes in what programming should be delivered. It requires skills and resources not typically cultivated by government. Survival in the cable business requires retail and marketing savvy. Given the rapidly changing market environment in which cable television competes, the number and range of these skills are certain to increase in the future.

These simple facts have far-reaching implications concerning the practical and political ability of the City of *Tacoma* to operate such a business over the long haul. The City of *Tacoma's* system would duplicate and compete with TCI of *Tacoma's* existing system, both for present and future subscribers. Available studies, including those commissioned by cities considering municipal ownership, show that such "overbuild"[1] systems generally do not work, *prove to be more costly than expected*, and rarely survive for long.

These are complicated legal questions about how the City of *Tacoma* must avoid censorship or political abuse of its system, and how the City of *Tacoma* can compete with the cable industry and regulate it at the same time. *Finally, any consideration the City of Tacoma has given to competing against TCI of Tacoma, Inc. in order to provide better service and rates should have been mooted by federal regulations. In 1992, Congress adopted extensive new regulation of cable television rates, customer service, channels carried, ownership and other matters. Cable Television Consumer Protection and Competition Act of 1992, Pub. Law 102-385, 106 Stat. 1460 (hereinafter "1992 Cable Act"). Under the FCC's implementing rules, local franchising authorities have the right to apply federal rate standards to cable service. Even prior to the 1992 Cable Act, many franchising authorities have had such rate regulatory authority. This is because in 1991 the Federal Communication Commission reregulated rates in many cable systems in the country. In Reexamination of the Effective Competition Standard for the Regulation of Cable Television Basic Service Rates, 6 F.C.C. Rcd. 4545 (1991), the FCC restored rate control to local governments unless six different channels were available off-the-air -- a test which regulated all but a few major metropolitan systems. Thus, both rates and customer service are regulated, and the concerns motivating municipal overbuilds have been mooted.*

Hence, while TCI of Tacoma, Inc. acknowledges the non-exclusive nature of its franchise, and does not shy away from competing with others on a level playing field for its valued customers, after considering the complex questions and issues discussed in this letter, TCI of Tacoma, Inc. is confident the City of Tacoma will agree that cable and other entertainment services are best provided by private enterprise.

I. PRACTICAL PROBLEMS OF A CITY-OWNED CABLE SYSTEM

To fully appreciate the political consequences of a City-owned cable system, you must first understand the practical consequences. The City of *Tacoma* is about to

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[1] An overbuild is considered to occur when one cable operator constructs its cable system alongside the existing cable operator's cable system, with the result that residents in the area have the option to subscribe to either cable operators' cable service

join TCI of *Tacoma, Inc*. in the free-enterprise competitive home-entertainment industry. The City of *Tacoma* must spend millions of tax dollars to build and operate its system. City of *Tacoma* officials may be placing their political futures on the line since they must keep their customers and non-customers happy. They may also be the direct recipient of criticisms from customers and non-customers alike relating to rates, programming, customer service, and the costs associated with owning and operating a cable system. The City of *Tacoma* faces an expensive long-term commitment to continue to ensure quality, state-of-the-art services and facilities. Finally, you must do all of this facing fierce and fast-developing competition, and not just from us, since the entertainment industry in one of the most competitive in the country.

The one fact above all others which must guide your decision is that a cable system is not a public utility, like electricity or water. Cable television is a business. Sophisticated marketing and operations are essential for a modern cable system to survive. As we have already suggested, this fact has far-reaching implications, as the experience of other cities has shown. Many public officials are leery of operating a cable system because they do not wish to be responsible for a non-essential, entertainment oriented service. Cable television is a highly visible target for customer criticism *and the nature of the cable*

product spurs ongoing consumer inquiries. It is likely the City of Tacoma will lose significant time and resources responding to customer complaints. It is also unlikely that public officials responsible for building and operating a cable system will bear the full brunt of their dissatisfied customers and non-customers' ire.

Despite dedicating significant resources to building and operating a cable system, cities that have undertaken such an endeavor have not fared well. A respected cable industry analyst, John Mansell of Paul Kagan Associates, Inc. has noted that no municipally-owned overbuilds make money. Moreover, Mansell says on average, they tend to have fewer channels and are slower to add service than the average cable system.[2] It is easy to see that a municipal cable system could prove to be an economic and political albatross.

[2] K.C. Neel and Bob Diddlebock, "Rate Complaints Prompt Florida Cities to Mull Overbuilds," Cable World, May 3, 1993 at 33.

A. Construction and Maintenance of a Cable System

Start-up costs for cable television are significant. Before the City of Tacoma can give even more of its citizens cable service, it will have to spend millions of tax dollars or otherwise raise capital in a time of clear economic contraction. *In most cases where a municipality has undertaken cable operation, capital requirements and operating burdens have far exceeded projections. A few examples illustrate this point.*

The City of Paragould, Arkansas turned on its municipality-built system in 1991. The town's 18,500 residents were then required to pay higher taxes two years in a row to pay off the $3.2 million in bonds issued to fund the project as well as to subsidize the City's cable system. According to the City, it simply did not generate the number of customers it had hoped.[3]

In Morgantown, North Carolina an election was held by the City paving the way for a municipally-owned cable system. By early 1994, the costs and burdens of operating such a system set in:

> *Morganton residents are paying more than they think for cable TV, whether they receive the service or not. The Morganton City Council voted in June to subsidize the new cable television system with $1 million - or 5.7 percent -- of the revenues from the city's electric system. At the same time the city is using Electric Fund dollars to underwrite its cable television system. It has raised city electric rates by more than 9 percent in the past four years. For the average residential electric customers with a monthly bill of $65.32, the subsidy meant $3.72 if its goes toward paying for a city-owned cable system which in fiscal year 1992-1993 ran up a deficit of $600,000. Thus, even Morganton residents who don't subscribe to the city's cable system still help pay for it through their electric bills.*

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3 Larry Young "Paragould Cable to Drive Taxes Higher Once Again," Arkansas Democrat Gazette, July 31, 1993 at 2D. "Paragould, AR to Lose Millions on Overbuild," Cable TV Regulation, July 30, 1993 at 9.

Morganton New Herald, January 9, 1994 as reprinted by Thomas P. Southwick, "Morganton Update," Cable World, January 24, 1994 at 16.

Even with the subsidy from electric fund payers, it was reported that Morganton was forced to raise cable rates $2.00 per month higher than the local private operator and $3.00 a month more than the City had promised it would charge when the voters approved the municipally-owned system in 1993.

In Michigan, a number of cities have simply wanted out of the cable business. Five exclusive Detroit suburbs decided recently that potholes on asphalt highways are easier to face than those on the information highway. The exclusive towns of Grosse Pointe, Grosse Pointe Park, Grosse Pointe Woods, Grosse Pointe Farms and Harper Woods agreed to sell their 16,600-subscriber system to Comcast Corp. in late 1994. The president of the municipal system said that looming competition plus the increasing complexity of the cable business as it moves into telephone and date-based services prompted municipal officials to reconsider their involvement in the business. The system currently needs a $7.5 million rebuild, equivalent to about a $460 per subscriber cost.[4]

In Orangeburg, South Carolina,[5] *the City decided in 1991 that it would overbuild the local operator. A feasibility study performed by Malarkey-Taylor Associates found that the City's plan to spend $3.7 million to build 160 miles of cable plant was completely inadequate. Instead the City would have to spend upwards of $10 million a year to build a 300-mile system -- a project that the City would lose from $8 million to $10 million a year on for the next 10 years.*[6]

Moreover, if the City of *Tacoma* decides to overbuild the *TCI of Tacoma, Inc*. it may have to spend even more money than *TCI of Tacoma, Inc*. has spent. As a "single system" operator, the City of *Tacoma* will likely *be unable to take advantage of any quantity or volume discounts, and thus may be forced to purchase all equipment at top*

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4 John M Higgins, "Michigan Cities Sell Out to Comcast," Multichannel News, October 10, 1994 at 41.

5 The cable system in Orangeburg was never built. The Supreme Court of South Carolina determined after protracted litigation that the City had not been granted the requisite authority by the legislature under the State's constitution to engage in cable operations. Sheppard v. City of Orangeburg, 44 S.E. 2d 601 (1994).

6 K.C. Neel and Bob Diddlebock, "Rate Complaints Prompt Florida Cities to ull Overbuilds," Cable World, May 3, 1993 at 1, 33.

dollar. As a necessary part of providing service to its customers, the City of *Tacoma* will have to dig up streets, trench through people's yards and landscaping and restore them to their original condition. Such construction is a very costly proposition both in dollars and in lost goodwill for the City of *Tacoma's* cable business.

It is almost impossible to overbuild a cable system without causing some cuts and outages to others present on the poles and in the trenches. The City of *Tacoma*, as must any other cable operator, will be required to compensate the utilities and incumbent cable operator for cuts and outages to their operations during the construction of this new system. The City of *Tacoma* must bear the costs of restoring service and of keeping the citizens aware of what is happening so that they may expect the problem and know that someone is taking care of it.

In addition, the City of *Tacoma* will likely have to hire outside persons or companies to construct, supervise and/or maintain the cable system since, of course, the City of *Tacoma* is not in the business of constructing or maintaining cable systems. It must ensure that the system is properly built and maintained -- once again, a very costly proposition. Cable systems must be operated in compliance with numerous governmental agencies' rules and regulations. Most significantly, the City of *Tacoma* must stay constantly vigilant of these rules as a failure to comply may result in fines, loss of operating licenses, or a complete forced interruption of service. Cable operators have years of experience meeting regarding such requirements which cannot be easily duplicated overnight by the City of *Tacoma*.

B. Customer Service

Effective customer service is the lifeblood of a cable operator. While City of *Tacoma* officials deal with citizens on a host of problems each and every day, the City of *Tacoma* may not understand the enormity of the job it faces in serving its citizens as cable subscribers. Citizens dealing with government or with utilities resign themselves to the fact that there is only one agency or company to deal with, and that they must accept the service they get. Cable customers, in contrast, are a tougher group to satisfy. They are paying for entertainment and information and demand performance. If they are not satisfied, they can do to competitor, *such as direct broadcast satellite (DBS) services or multi-point multi-districts (MMDS) services*, use their VCR or watch broadcast TV. One brief outage or fuzzy picture often triggers complaints and require a service call. In addition, cable customers have a choice of service levels, and are constantly adding or subtracting services, resulting in service calls. It is extremely expensive to maintain the full-time customer service representatives and repair people necessary to keep customers satisfied. *[For example, TCI of Tacoma, Inc. has at least 102 people doing a variety of jobs including installing, fixing trouble calls, and responding to customer service complaints.]*

Again, our experience shows what the City of Tacoma may expect. TCI of Tacoma, Inc. constantly receives telephone calls from customers concerning everything from programming questions, to cable connections and disconnections, to change of service, to questions rates, to of course, service problems.

Additionally, it is reasonable to assume that City of Tacoma staff also have numerous other responsibilities that may compete with the time they may devote to cable problems and complaints. This could result in unhappy subscribers who may decide that the grass was greener on the other side, and return to the competing, private cable system *or to other competitors, such as DBS or MMDS. DBS providers now can offer customers virtually identical programming service as those offered by the cable operator -- and do so at a very competitive price. To prevent this loss, the City of Tacoma* may have to incur the expense of hiring additional employees who devote their time solely to cable, or of retaining an independent company to handle customer service.

C. Marketing

If the service is the sustaining lifeblood, marketing is the food which fuels the growth of the system. A cable system must attract customers and take step to retain existing ones, and can only do so through aggressive marketing -- especially when faced with head-to-head competition from various sources. The City of *Tacoma* may not be aware of how costly these marketing efforts are since it does not have to market its governmental or utility services, as they are necessities which people must use.

The City of *Tacoma*, moreover, may have to spend substantially more than *TCI of Tacoma, Inc*. for marketing. The City of *Tacoma* will have the added burden of attracting customers away from *TCI of Tacoma, Inc*. and overcoming the loss of goodwill caused by its disruption of streets and yards during construction. Finally, the City of *Tacoma's (and TCI of Tacoma, Inc.'s)* advertising and marketing expenses in an environment of direct cable competition may likely be higher than what *TCI of Tacoma, Inc*. has been spending thus far.

D. Programming

The City of *Tacoma*, like all cable operators, must purchase much of the programming which is most desirable to its customers. A single municipally owned system may not be able to obtain the volume based discounts for premium and satellite services which multiple system operators such as *TCI of Tacoma, Inc*. enjoy. *Any such higher operating costs* may turn the tables against the economic viability of a municipal cable system.

E. Competition

The City of *Tacoma* may think that it will only be competing with *TCI of Tacoma, Inc*., but rest assured this is not the case. One reason *TCI of Tacoma, Inc*. presently spends so much for marketing and customer service even without direct cable competition is that cable television is only one part of the consumer-entertainment industry. Cable television vigorously competes on a daily basis with over-the-air broadcast television, *DBS* low power television, subscription television, satellite master antenna television, *MMDS*, video cassette recorders, videodisc players, newspapers, radio and theaters for the consumers' entertainment dollars. The reality is sobering. According to one source, only 66% of all households in the United States that are able to receive cable television do indeed subscribe to cable service. *[TCI of Tacoma, Inc.'s present average in the City of Tacoma is 60% of the households which TCI of Tacoma, Inc. has passed with its cable system.] Our penetrations range from 45% to 100% in varying economic and demographic areas of the City*. The City of *Tacoma* is, of course, aware that telephone companies have been given authority by the courts to enter the cable business, which not only would add another competitor to the list, but a competitor that already has *equipment placed throughout the City and already has a* "business relationship" with every resident already receiving telephone service. *Thus, the City of Tacoma will not only need to complete with TCI of Tacoma, Inc. for the residents' entertainment dollars, but also will have to compete with other providers of home entertainment. Given the large number of likely competitors, the City of Tacoma may face not only greater costs to increase the attractiveness of its service to potential subscribers, but also lower revenues as it is forced to reduce prices to meet competitors' offerings.*

Finally, no other City-operated service must compete with the scope and variety of businesses we have described. The City of *Tacoma* may not appreciate the costs and risks of such competition since the City of *Tacoma's* traditional services, such as public utilities that, because of their status as utilities, do not compete, can raise rates to make up for inefficiency, and do not face the prospect of economic failure. A cable system will have no such luxury.

II. POLITICAL CONSIDERATIONS

A city-owned and operated cable system will be a political adventure as well as a commercial venture. The City of *Tacoma* will face not only the commercial pressure of surviving in the marketplace, but the political pressure of justifying the use of millions of tax dollars or other generated capital of such a risky venture. This pressure will be enormous and will be a constant distraction of City of *Tacoma* officials. If the City of *Tacoma's* system fails, the public outcry will be deafening. In addition to this obvious political risk, there are several less evident risks.

A. A Cable System Would Be Financed By all For the Benefit of a Few At the Expense of Public Services

In this time of economic retraction, there may be only one realistic way for a municipality to finance a cable system: tax increases, the most politically unpopular act government can do. The citizens are quite naturally going to wonder where these tax dollars are going. *We have already pointed out that only 60% of homes who have access to cable actually subscribe*. Even if the City of *Tacoma* succeeds in obtaining customers equal to half of *TCI of Tacoma, Inc.'s* existing subscribers (which may be an extremely optimistic view), the fact remains that millions of tax dollars will have gone to give a small portion of City of *Tacoma* residents a luxury entertainment service. In these days of rising crime, increasing economic hardship and decreasing social services, the citizens may well question, raucously, use of tax money for cable service already available. Assurances that the system will be self-supporting or even profitable may not be enough to quell the criticism. The simple fact is that "break even", let alone profitability, is years down the road, and, as studies have shown in an overbuild system, may <u>never</u> come.

Of course, for these years of losses, the City of *Tacoma* will have no subsidize the system with tax dollars. One observer has noted that in the few examples of municipal ownership available, the inability of the municipal system to turn a profit led to a decrease in other city services in order to cover the losses of the cable system.

B. Tougher Restraints to Follow

One "political" consequence which may be unexpected is the fact that, simply because the City of *Tacoma* is a governmental body, it must operate under restraints which do not bind private businesses. The City of *Tacoma* must comply with civil service employment requirements, government contracting procedures and other bureaucratic programs. Thus, the City of *Tacoma* may take longer and possibly spend more money to build and operate a cable system as a result of the various bidding processes and public hearings required. In addition, the City of *Tacoma* may face civil service statutes or other legal obstacles not faced by private enterprise when terminating, counseling, or disciplining unproductive employees. All of these considerations may make for good government, but may not be good business practices. In a service-oriented, competitive business, these restraints may stop the City of *Tacoma's* cable system from effectively reacting to changing competitive conditions.

C. Is Running a Media Enterprise a Proper Role of Government?

Cable systems are, after all, media enterprises. They deliver electronic information and entertainment, which is quite a different business from utility service. The First Amendment made a very deliberate choice to keep government out of controlling the media. When Congress established broadcasting, it carefully placed ownership of broadcasting facilities in private hands, subject to FCC licensing. PBS is government owned, but it usually occupies no more than one channel per region. Cable has followed the same model, with ownership of media left in private hands (subject to municipal franchising) and typically, one channel provided for government access. These separations between government and media were established to ensure active criticism of government actions by the media. Against such a tradition, local citizens may question whether they really want to turn over control of their cable channels to the City of Tacoma. With limited channel capacity, will the City of Tacoma feel comfortable choosing between a Hispanic channel like Galavision, Black Entertainment Television, Asian American Satellite TV, the Playboy Channel and the Family & Values Channel? Is the City of Tacoma willing to withstand the pressure of protests from a minority of subscribers over programming that the majority of subscribers enjoy? The First Amendment counsels that the risks of such inevitable abuses must be minimized by keeping media in private hands.[7] *Not only must an operator make programming decisions in choosing among the plethora of optional satellite services -- the operator must also provide fill-in substitute programming for syndicated exclusivity "blackout" periods on many broadcast signals; and provide local origination programming. Governmental control of the sole source of programming to a subscribing home is*

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[7] Recently, New York City made the decision to divest its municipally owned radio stations. The Mayor stated that the sale enabled the City to shed "the distorted role" that government plays when it acts as a media owner, saying that [b]roadcasting is not at the core of the business of city government. Cities don't belong and don't do well in the broadcasting business. It fits a different form of government than a democratic one." Donna Petrozzello, "New York City to Sell WNYC-AM-FM," Broadcasting and Cable, March 27, 1995 at 48.

contrary to the nation's tradition of free speech.

Moreover, a cable television system's decision to carry and not carry certain signals may increasingly subject the system to litigation. Residents in New York and elsewhere have successfully sued a cable television system for failure to carry all of the desired pay services. Carriage of adult programming has caused citizens to file obscenity charges against the cable system. As competing shopping channels, music channels, new channels, and other channels develop, operators, including the City of Tacoma, can anticipate charges to be filed when one is selected over another.

A separate question arises with respect t what the City of Tacoma can contribute to the viability of the cable industry whose core product is discretionary. Over the last few years, there has been a 70% increase in investment by cable television operators into new programming sources. Many satellite services which were on the verge of failure or which could not obtain the necessary capital have survived through infusions of cash by cable operators. The wealth of satellite programming today is a product of this "free enterprise" system. A municipal cable system is comparable to municipal competition with other private enterprises such as theaters, supermarkets, or newspapers. We would question whether the government should extend its control of streets or electrical utility services into competition with discretionary services such as cable television that need a constant infusion of creativity and cash to survive.

III. EXPERIENCE SHOWS THAT OVERBUILDS DO NOT ENDURE

So far we have only discussed the problems, costs and risks to the City of *Tacoma* in the "ideal world" where the systems are equally competing head-to-head for subscribers. In reality, however, the City of *Tacoma* is going to overbuild *TCI of Tacoma, Inc.'s* system and then try to take away customers who have been committed to *TCI of Tacoma, Inc*. for years as well as encourage new customers from those that historically may have chosen to not take cable service. While competition, of course, is generally necessary in our economic system, studies have shown that cable competition through overbuilds is typically a costly failure for both the overbuild system and for customers.

The City of *Tacoma* does not have to take just our word for it. One observer has noted:

> Analysts have reached the general consensus that unless a market

> has a high housing density -- at least 90 to 120 homes per mile -- and high penetration, it cannot sustain two competing cable systems. The capital costs of erecting duplicate plants simply cannot be recovered if the pie is split in half. There may be temporary rate wars, but several analyst -- including Touche Ross, Booz Allen and Malarkey-Taylor -- have reported how the technical quality of plant suffers, how maintenance is neglected and how programming funds are diverted to the war as operating revenues dry up.[8]

In another instance -- Jefferson City, Missouri -- the city appointed a task force to find ways to increase competition. Instead, the task force found that '[d]ue to the small market size of Jefferson City, the size of TCI (the current franchise holder), and the capital investment required, it is unlikely that a purely private enterprise will choose to risk its dollars and assets in head to head competition in Jefferson City."[9] The task force also found that "[t]he cost to overbuild the system is as great as to build the system originally," which was estimated to be "$2 million dollars."[10] Finally, the task force reported that two cable operators were interested in the city; however, "[n]either operator expressed interest in competing with TCI on a head-to-head city-wide basis. When informed of franchise requirements[11] for city-wide plans, both operators withdrew their expression of interest."[12]

A. Historically Overbuilds Have Not Succeeded

Studies show that overbuilds do not endure, make financial stability of the companies questionable, restrict service expansion and system improvements and do not

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8 Glist, Exploring the Hidden Costs of Overbuilds, Cable T.V. and News Media, Vol VI, Number 11 (Jan., 1989).

9 Report of Cable TV Task Force, City of Jefferson City, Missouri ("Task Force Report'), December 5, 1990, at 1.

10 Id. at 4.

11 In accordance with [Florida] statutory requirements, any second operator, even a City-owned system, would have to obtain a franchise which is not less burdensome or more favorable than the franchise that Operator received from the City. [See Section 166.046(2) (a)-(h) Florida Statutes].

12 Id. at 6.

foster different programming offerings.[13]

One consultant on overbuilds has stated that the history of overbuilding shows that generally only one company survives an overbuild.[14] In fact, the existence of "only a handful of over 7,000 cable systems in the U.S." shows that there is "little if any economic incentive for a cable operator to consider an overbuild seriously."[15] The economic drain on both operators in an overbuild may cause them to reduce construction and expansion of their system, causing their long term service to suffer. In fact, applying that observation to the situation in the county at the time, TMC found that permitting overbuilds would slow-down current construction efforts in which the incumbent operator was engaged.[16] Furthermore, as one analyst has written:

> It is generally assumed that cutthroat competition results in both companies operating at a loss because of low prices. Soon, one or both companies are not able to sustain the loss, so attempts are made to reduce expenses by cutting back on system maintenance, subscriber services, etc. Eventually, the strongest company dominates and seeks to purchase the weaker company. Then, according to the scenario, the remaining company [raises its rates].[17]

Thus, even though the City of *Tacoma* may hope its overbuild will bring the benefits of competition, studies suggest that it more likely will bring a failed system, a damaged incumbent, and higher rates to make up for the harm.

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13 See Touche Ross and Co., "Financial Analysis of Potential Addtional Cable Television Franchise Awards" for the Sacramento Metropolitan Cable Television Commission, July 30, 1986; Touche Ross & Co., Financial Economic Analysis of the Cable Television Permit Policy of the City and County of Denver," December 23, 1983, plus the other reports referred to herein.

14 Telecommunications Management Corporation Report on Overlapping Cable Television Franchiscs and Overbuilding of Cable System to Hillsborough County, Florida ("TMC Report"), at 53. "The long-term impact of an overbuild depends, therefore, as to whether the overbuilt areas can be self-sufficient or even profitable on its own, or must be subsidized. If the latter, and if the subsidy is large, the overbuild generally will be unstable, with the weakest operator eventually bought out or driven out." Id. at 110 (emphasis in original).

15 Id. at 93.

16 Id. at 50.

17 John Mansel of Paul Kagan and Associates.

Before the City of *Tacoma* takes such a risk, it must carefully examine whether its proposed system has any realistic chase of success.

B. Financial Feasibility

The City of *Tacoma* must begin by not only studying the present situation, but also by getting financial projections concerning all aspects of future cable operations. If the City of *Tacoma* does not have in-house cable experts and economists to do these projections, it will have to hire them, as do many private cable companies.

One analyst who has done many feasibility studies for cities considering going into the cable television business has cautioned against such a venture, stating that "no cable investment is without risk. In an overbuild situation, there is less certainty, for a variety of reasons, over expected cash flows which are largely driven by overall subscriber levels and service rates."[18] Feasibility studies or financial projections must be extremely detailed and account for all possible variables. They must also contain enough specific information to let you understand the proposed operation. The assumptions and projection techniques used must make sense in the context of cable operations. Finally, projections may be worthless unless they are based on realistic information and an assessment of whether the City of *Tacoma* has the ability to carry out the plans on which the projections are based. For example, one critique of a feasibility study done by Rice Associates for the City of Cambridge, Massachusetts, Communication Strategies Incorporated found that "[s]everal capital expenditure items have been understated or omitted," which amounted to an underestimated capital expenditure of several million dollars.[19]

Additionally, the City of *Tacoma* must consider the economic outlook for the coming years. Presently, as we all are well aware, the economic condition in this country is not very good. In hard times, luxuries such as entertainment may be the first to go. Moreover, considering the problems that Savings and Loans and other banks are experiencing, such institutions may not be very anxious to lend such substantial amounts of money for the construction and the other start-up costs of a risky venture such as a second cable television system. Thus, the City of *Tacoma* may not be able to obtain such

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18 Cable Television Feasibility Study for the City of Tallahassee, Florida, Rice Associates, December 31, 1987, at II-18.

19 MUNICIPAL OWNERSHIP OF CABLE TELEVISION IN CAMBRIDGE, How Much Will It Cost And How Will It Operate? ("Cambridge Report") Communication Strategies Incorporated, Executive Summary, February, 1893, at 22.

financing without securing it with tax increases or bonds.

C. Capacity and Disruption in
Rights-of-Way and Private Property

The City of *Tacoma* must carefully study the use and capacity of easements and rights-of-way in the City. The City of *Tacoma* must address how the additional installation of cables and construction of the City-owned system will affect the utilities -- electric, telephone and water companies -- serving the City of *Tacoma*. The City of *Tacoma* will need information from the utilities concerning capacity on existing poles, projected uses of poles, whether poles would have to be changed, cost of such change, use of underground easements and the capacity of such easements. Finally, the City of *Tacoma* should determine how much of its proposed system will be installed underground since such installation is not only much more costly, see Rice reports, but also causes the greatest disruption to public and private property.

The potential disruption makes it imperative that the City of Tacoma conduct such an overbuild study[20] prior to deciding to go forward with the construction of a second system. One consultant has stated that cable television is a disruptive force at installation and causes inconvenience to the County's citizens.[21] The disruptive impact in an overbuild cannot be minimized. "Because overbuilds represent a more dense and complex use of rights-of-way and may require new digging in areas dug up previously they are likely to cause somewhat more disruption than a 'new build'."[22] For example, in its report to Dade County, Florida, Touche Ross reported that to install cable underground, the second operator would have to lift and replace sidewalks, acquire new easements from private owners, retrench and repair the road service, or in some instances, build on the opposite side of the road of the present operator. Touche Ross found the following possible additional disruptions:

In both aerial and underground construction (assuming

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20 For example, when Hillsborough County, Florida, was considering granting additional cable television franchises which would have resulted in an overbuild situation, the County hired Telecommunications Management Corportation ("TMC") as its consultant to advise the County on whether to grant such additional franchises and to review the applications submitted by those seeking the franchises.

21 TMC Report ("TMC Report"), at 97, 121.

22 TMC Report at 123.

> coexistence in the right-of-way or easements) the additional CATV cable is to be placed close to the existing CATV cable, thereby leaving it vulnerable to be damaged or cut.
>
> The similarities between the physical properties of the existing CATV plant and the new CATV plant may cause confusion to the cable construction crews unless the two systems are marked correctly.[23]

The City of *Tacoma* has a duty to insure that its citizens do not needlessly bear this inconvenience. If the City of *Tacoma* did not have a cable operator already providing service, but was about to seek an initial installation, the competing duty to provide cable service might override the interest in avoiding disruption. This is not the case, however, because the City of *Tacoma* already has a cable operator whose franchise insures that all of the City's residents have cable service available to them.

Not only must the City of Tacoma be concerned with physical disruption during an overbuild, it must also be wary of exhausting the utilities' capacity for accommodating additional cable television systems. One county was cautioned to avoid exhausting this capacity in order that the capacity will be available for future use.[24] In addition, it was reported to the county that to install just one additional cable system, at least 50% of all of the poles in the county would have to be changed.[25] The Jefferson City task force made a similar observation when it found that "[t]he ability to attach additional wire to the poles [within Jefferson City] is limited by regulation on spacing. If a pole is not available, the cost to place a taller pole at the same location is approximately $500.00 per pole. Given the number of poles that are at capacity, this would be significant cost to the new competitor.[26]

D. Other Problems

In addition to the disruption discussed above, Touche Ross reported to Dade County that there are day-to-day operation problems with second cable system,

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23 Touch Ross Report to Dade County, Florida at 19.
24 TMC Report at 121.
25 Id at 51.
26 Task Force Report at 4.

including:

> Customer confusion -- Not knowing whom to call for installation and trying to understand the rate and tiering structures of two different companies can be difficult for some new subscribers.
>
> Drops and Installations -- . . . The entire subscriber tap to back-of-set is subject to incorrect hook-ups, theft of facilities, etc., and therefore can be a source of customer confusion and frustration.
>
> Service -- Customers not familiar with the cable TV provider can c call the wrong cable company for service. If it is caught before a truck is dispatched, the inconvenience is that of the clerk's time ant the phone traffic. However, if the truck is dispatched, the customer is inconvenienced as they wait for a repairman that is not authorized to work on their system and then wait further for the proper repairman to arrive.[27]

Other problems identified by Touche Ross include:

> The side effects of construction, such as traffic detours, trenching and lawn/garden restoration, cable crews in backyards, etc., are in themselves a nuisance, and are compounded by the fact that the residents will have to go through this process again with a second operator.
>
> A review of the County's complaint log over the past five years indicated that underground cable trenching and pedestal placement issues are common complaints among Dade County residents. Placements of a second pedestal can cause additional objections in many areas.
>
> After an additional CATV company is in operation, it is likely that some subscribers will have switched service to the second operator.
> When this occurs, their homes may have multiple aerial drops installed which could result in a negative aesthetic effect.

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[27] Touche Ross Report to Dade County, Florida at 20.

> Each attachee to a utility pole is required to place a separate anchor and guy wire at specified locations as opposed to attaching to existing Telco or CATV anchors. The additional anchor will be placed and may be an eyesore.[28]

All of these problems create public irritation and therefore have political consequences. Given the dismal success of overbuilds generally, the City of Tacoma would be well advised to reevaluate any plans for an overbuild.

IV. LEGAL CONSIDERATIONS

The City of Tacoma, like the City of Paragould, Arkansas, must face the fact that "a number of legal questions must be resolved in any government owned and operated system. The legality of competing, questions of antitrust, anticompetitive behavior by the City must be guarded against."[29] Although a municipality may own and operate a cable system, that is only the beginning -- not the end -- of the inquiry.

For Example, some of the potential legal issues include:

1. Violation of Constitutional Due Process and Equal Protection Rights

How can you regulate us and compete with us at the same time? This simple and fundamental question raises a host of constitutional issues.

The City of Tacoma is going to face the twin pressures of still competition and the enormous financial and other challenges which face any overbuilder. At the same time, the City of Tacoma is the authority which regulates us. There will be a strong temptation for the City of Tacoma to overcome its disadvantages by increasing our regulatory burden. Because of the conflict arising from the City of Tacoma's dual role as our regulator and competitor, all regulatory actions taken by the City of Tacoma which may fall with a heavier hand on us then on the City of Tacoma, are open to a constitutional due process claim. This claim can be asserted regardless of the procedures used to take such actions.

Next, the City of Tacoma cannot give itself an unfair advantage

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28 Id. at 19-20.

29 Jefferson city Task Force Report at 11.

over Company. Any franchise granted to the City of *Tacoma* must ensure that the City is treated equally with the private cable operator. The City of *Tacoma* cannot franchise itself on terms and conditions more favorable, or less burdensome, than those required by *TCI of Tacoma's* franchise. There must, at all times, be a "level playing field" for competition. This principle requires the City of *Tacoma* to go through the exact same franchise application process, including, if applicable, competitive bidding.

If the City of *Tacoma* is obligated to give itself a franchise under state or local laws, the provisions of that franchise agreement must be at least the same as those of *TCI of Tacoma, Inc.'s* franchise. This may include the following: the same channel capacity; the same service area; construction, installation, maintenance of the system in the same manner as *TCI of Tacoma, Inc.*, consistent with all laws, ordinances, construction, safety, and FCC technical standards; the same requirements as to location and maintenance of poles, wires and appurtenances so as to cause minimal interference with the proper use of the streets and public ways; equal treatment as to payment and use of the poles with other utilities and cable operators; the same responsibilities for restoring all sidewalks, driveways, landscaping and street surfaces; the same operational standards, including provision of customer services, repair services and maintenance of the technical and quality standards which *TCI of Tacoma, Inc.* is required to maintain; some mechanism for maintaining the fees which *TCI of Tacoma, Inc.* is obligated to pay; and the same required services, including at least the same special access channels, production facilities for local origination programming and the like.

As you can see, this is quite a list.

2. <u>Control Over Content Under the U.S. Constitution and the Federal Cable Act</u>

A city-owned cable system makes an inviting target for political abuse on two levels. First, incumbent elected officials would be tempted to use their access to the system to gain a "free" advertising edge over challengers. Second, politicians may be tempted to control the content of programming on the system (i.e. nudity in R-rated movies or restrictions on politically unpopular groups on ideas having access to the system) to advance their personal political agendas.

In order to avoid challenges by citizens or public interest groups under both constitutional and federal law, accompanied by cries of "censorship" in the media, the City of *Tacoma* must ensure that it will not exercise control over the cable system's

4. Federal and State Antitrust Violations

The City of *Tacoma* may not, of course, compete unfairly with TCI of *Tacoma, Inc.* and use its regulatory authority with a heavier hand upon TCI of *Tacoma, Inc.* so as to threaten to drive TCI of *Tacoma, Inc.* out of business. In such circumstances, the City of Tacoma may not be immune from federal or state antitrust claims and may be subject to pay treble damages, attorneys' fees and other costs. The City of *Tacoma* also can be enjoined from any unfair competition by the court order.

The issues outlined above are but a brief summary of the possible legal pitfalls facing a City planning to build and operate a cable system in order to compete with private cable operators. These legal factors and possibly many others, must be considered along with the economic, managerial and political factors raised earlier before any decision is made by the City of *Tacoma* to enter into the cable television business.

In short, the City of *Tacoma* has a lot to think about before it decides to embark on this course. TCI of *Tacoma, Inc.* hopes that this letter will give the City of *Tacoma* a chance to pause and let the euphoria of the benefits you may now expect to be replaced by a realistic appreciation of the pitfalls and risks associated with municipal ownership of what is traditionally an entertainment service provided by private enterprise.

Sincerely,

Barbara J. Wyatt
General Manager

BJW/lkb

EXHIBIT "A" TO ORDINANCE NO. 96-124

Sections:

ARTICLE VII - CONSTRUCTION

ARTICLE VIII - FEES

ARTICLE IX - MISCELLANEOUS

ARTICLE I - TELECOMMUNICATIONS

12.34.010 Purpose.

The purpose of this Chapter is to:

A. establish a local policy concerning telecommunications providers and services;

B. establish clear and nondiscriminatory local guidelines, standards and time frames for the exercise of local authority with respect to the regulation of the use of public rights-of-way and/or public property by telecommunications providers and for telecommunications services;

C. promote competition in telecommunications;

D. minimize unnecessary local regulation of telecommunications providers and services;

E. encourage the provision of advanced and competitive telecommunications services on the widest possible basis to the businesses, institutions and residents of the County;

F. permit and manage reasonable access to the public rights-of-way of the County for telecommunications purposes on a competitively neutral basis;

G. conserve the limited physical capacity of the public rights-of-way held in public trust by the County;

H. assure that the County's current and ongoing costs of granting and regulating private access to and use of the public rights-of-way are fully paid by the persons seeking such access and causing such costs;

I. secure fair and reasonable compensation to the County and the residents of the County, in a non-discriminatory manner, for permitting private use of the public rights-of-way and/ public property;

J. assure that all telecommunications carriers providing facilities or services within the County comply with the ordinances, rules and regulations of the County;

K. assure that the County can continue to fairly and responsibly protect the public health, safety and welfare; and

L. enable the County to discharge its public trust consistent with rapidly evolving federal and state regulatory policies, industry competition and technological development.

12.34.020 Definitions.

Terms used in this Chapter shall have the following meanings:

A. Affiliate: A Person that (directly or indirectly) owns or controls, is owned or controlled by, or is under common ownership or control with another person.

B. Cable Acts: The Cable Communications Policy Act of 1984, as amended by the Cable Television Consumer Protection and Competition Act of 1992, as amended by portions of The Telecommunications Act of 1996 and as hereafter amended.

C. Cable Operator: A Telecommunications Carrier providing or offering to provide "Cable Service" within the County as that term is defined in the Cable Acts.

D. Cable Service: Shall have the same meaning as defined in the Cable Acts.

E. County: The County of Pierce, State of Washington.

F. County Property: Any real property owned by County, whether in fee or other ownership estate of interest.

G. Excess Capacity: The volume or capacity in any existing or future duct, conduit, manhole, handhole or other utility facility within the right-of-way that is or will be available for use for additional Telecommunications Facilities.

H. FCC or Federal Communications Commission: The federal administrative agency, or lawful successor, authorized to regulate and oversee Telecommunications Carriers, Services and providers on a national level.

I. Grantee: Encompasses those franchisees granted certain rights and obligations as more fully described herein.

J. Washington Utilities and Transportation Commission or WUTC: The state administrative agency, or lawful successor, authorized to regulate and oversee Telecommunications Carriers, Services and Providers in the State of Washington to the extent prescribed by law.

K. Overhead Facilities: Utility Facilities and Telecommunications Facilities located above the surface of the ground, including the underground supports and foundations for such facilities.

L. Person: Includes corporations, companies, associations, joint stock companies, firms, partnerships, limited liability companies, other entities and individuals.

M. Public Ways: Includes the surface of and space above and below any real property in County in which County has a regulatory interest, or interest as a trustee for the public, including but not limited to all public streets, highways, roads, alleys, sidewalks, tunnels, viaducts, bridges, skyways, or any other public place, area, or property under control of

County and any public or utility easements established, dedicated or devoted for public utility purposes.

N. Rights-of-Way: All property in which the County has any form of ownership or title and which is held for public road purposes, regardless of whether or not any road exists thereon or whether or not it is used, improved or maintained for public travel.

O. State: The State of Washington.

P. Surplus Space: That portion of the usable space on a utility pole which has the necessary clearance from other pole users, as required by the orders and regulations of the WUTC, to allow its use by a Telecommunications Carrier for a pole attachment.

Q. Telecommunications Carrier: Includes every Person that directly or indirectly owns, controls, operates or manages plant, equipment or property within the County, used or to be used for the purpose of offering Telecommunications Service.

R. Telecommunications Facilities: The plant, equipment and property including, but not limited to, cables, wires, conduits, ducts, pedestals, antennae, electronics and other appurtenances used or to be used to transmit, receive, distribute, provide or offer Telecommunications Service.

S. Telecommunications Provider: Includes every Person who provides Telecommunications Service over Telecommunications Facilities.

T. Telecommunications Service: The providing or offering for rent, sale or lease, or in exchange for other value received, of the transmittal of voice, data, image, graphic and video programming information between or among points by wire, cable, fiber optics, laser, microwave, radio, satellite or similar facilities, with or without benefit of any closed transmission medium.

U. Underground Facilities: Utility and Telecommunications Facilities located under the surface of the ground, excluding the underground foundations or supports for Overhead Facilities.

V. Usable Space: The total distance between the top of a utility pole and the lowest possible attachment point that provides the minimum allowable vertical clearance as specified in the orders and regulations of the WUTC.

W. Utility Facilities: The plant, equipment and property including, but not limited to, the poles, pipes, mains, conduits, ducts, cables, wires, plant and equipment located under, on or above the surface of the ground within Rights-of-Way and used or to be used for the purpose of providing utility services or Telecommunications Services including Telecommunication Facilities.

12.34.030 Registration and Fees.

Except as otherwise provided herein, all Telecommunications Carriers or Providers engaged in the business of transmitting, supplying or furnishing of Telecommunications Service originating, terminating or existing within the County shall register with the County pursuant to this Chapter and pay all the fees as provided herein.

12.34.040 Restricted Franchise and Fees.

Except as otherwise provided herein, any Telecommunications Carrier who desires to construct, install, operate, maintain or otherwise locate Telecommunications Facilities in Rights-of-Way for the purpose of providing Telecommunications Service to persons and areas outside the County shall first obtain a restricted franchise granting the use of such public Rights-of-Way from the County pursuant to this Chapter and pay all the fees as provided herein.

12.34.050 Franchise and Fees.

Except as otherwise provided herein, any Telecommunications Carrier who desires to construct, install, operate, maintain or otherwise locate Telecommunications Facilities in Rights-of-Way and to also provide Telecommunications Service to persons or areas in the County, shall first obtain a franchise granting the use of such Rights-of-Way from the County pursuant to this Chapter and pay all the fees as provided herein.

12.34.060 Cable Franchise and Fees.

Except as otherwise provided herein, any Telecommunications Carrier who desires to construct, install, operate, maintain or locate Telecommunications Facilities in Rights-of-Way for the purpose of providing Cable Services shall first obtain a cable franchise from the County pursuant to this Chapter and pay all the fees as provided herein and in the cable franchise.

12.34.070 Application to Existing Franchise Ordinances and Agreements.

This Chapter shall have no effect on any existing franchise agreement until:

A. the expiration of said franchise agreement; and

B. an amendment to an unexpired franchise agreement, unless both parties agree to defer full compliance to a specific date not later than the present expiration date.

12.34.080 Penalties.

Any Person found violating, disobeying, omitting, neglecting or refusing to comply with any of the provisions of this Chapter shall be fined not less than One Hundred Dollars ($100.00) nor more than Seven Hundred Fifty Dollars ($750.00) for each offense. A separate and distinct offense shall be deemed committed each day on which a violation occurs or continues.

12.34.090 Other Remedies.

Nothing in this Ordinance shall be construed as limiting any judicial remedies that the County may have, at law or in equity, for enforcement of this Chapter.

12.34.100 Severability.

If any section, subsection, sentence, clause, phrase, or other portion of this Chapter, or its application to any Person is, for any reason, declared invalid, in whole or in part by any court or agency of competent jurisdiction, said decision shall not affect the validity of the remaining portions hereof.

ARTICLE II - REGISTRATION

12.34.200 Registration Required.

All Telecommunications Carriers having Telecommunications Facilities within the unincorporated County, or all Telecommunications Carriers or Providers that offer or provide Telecommunications Service originating, terminating or existing within the County shall register with the County hereunder on forms provided by the County Engineer which shall include the following:

A. The identity and legal status of the registrant, including any Affiliates.

B. The name, address and telephone number of the officer, agent or employee responsible for the accuracy of the registration statement.

C. A description of registrant's existing or proposed Telecommunications Facilities within the County.

D. A description of the Telecommunications Service that the registrant intends to offer or provide, or is currently offering or providing, to Persons, firms, businesses or institutions within the County.

E. Information sufficient for County to determine whether the registrant is subject to franchising under this Chapter.

F. Information sufficient for County to determine whether the transmission, origination or receipt of the Telecommunications Services provided or to be provided by the registrant constitutes an occupation or privilege subject to any municipal permit, license, or franchise fee.

G. Copies of the applicant's registration filed with the WUTC pursuant to WAC 480-121, and any tariff or price list or other authorization or related filings as may be required by the WUTC to provide Telecommunications Services.

Alternatively, the applicant shall submit a statement detailing the reasons that registration and related filings with the WUTC are not required.

H. Information sufficient for County to determine that the applicant has applied for and received any utility right-of-way permit, operating license or other approvals required by the Federal Communications Commission to provide Telecommunications services or facilities within the County.

I. Such other information as the County may require.

12.34.210 Purpose of Registration.

The purpose of registration is to:

A. provide the County with accurate and current information concerning the Telecommunications Carriers and Providers who offer or provide Telecommunications Services within the County, or that own or operate Telecommunication Facilities within the County;

B. assist the County in enforcement of this Chapter;

C. assist the County in the collection and enforcement of any franchise fees, license fees or charges that may be due the County; and

D. assist the County in monitoring compliance with local, state and federal laws.

12.34.220 Exception to Registration.

The following Telecommunications Carriers and Providers are excepted from registration under this Chapter:

A. A company or Person which provides Telecommunications Services solely to itself, its Affiliates or members between points in the same building, or between closely located buildings under common ownership or control, provided that such company or Person does not use or occupy any Rights-of-Way.

ARTICLE III - RESTRICTED FRANCHISE

12.34.300 Restricted Franchise.

A restricted franchise shall be required of any Telecommunications Provider who desires to make use of Telecommunication Facilities which occupy any Rights-of-Way for the purpose of providing Telecommunications Services to persons or areas outside the County.

12.34.305 Restricted Franchise Application.

Any Person that desires a restricted franchise hereunder shall file an application in accordance with Pierce County Code Chapter 12.32, which shall include the applicable portions of the required restricted franchise application information.

12.34.310 Determination by the County.

Within 90 days after receiving a complete application hereunder, the County Engineer shall make a recommendation to the County Council on whether to grant or deny the application in whole or in part. Denial of an application may be based on any of the following:

A. The financial and technical ability of the applicant.
B. The legal ability of the applicant.
C. The capacity of the Rights-of-Way to accommodate the applicant's facilities.
D. The capacity of the Rights-of-Way to accommodate additional utility and Telecommunications Facilities if the application is granted.
E. The damage or disruption, if any, of public or private facilities, improvements, service, travel or landscaping if the application is granted, giving consideration to an applicant's willingness and ability to mitigate and/or repair same.
F. The public interest in minimizing the cost and disruption of construction within the Rights-of-Way.
G. The service that applicant will provide to the region.
H. The effect, if any, on general public health, safety and welfare in County's sole opinion if the application is granted.
I. The availability of alternate routes or locations for the proposed facilities.
J. Applicable federal, state and local laws, regulations, rules and policies.
K. Such other factors as may demonstrate that the grant to use the Rights-of-Way will serve the community interest.

12.34.315 Agreement.

No restricted franchise granted hereunder shall be effective until the applicant and the County have executed a written agreement setting forth the particular items and provisions under which the restricted franchise to occupy and use Rights-of-Way will be granted. All restricted franchises granted pursuant to this Article shall contain substantially similar terms and conditions, which, taken as a whole and considering relevant characteristics of the applicants, do not provide more or less favorable terms and conditions than those required of other restricted franchisees.

12.34.320 Nonexclusive Grant.

No restricted franchise granted hereunder shall confer any exclusive right, or authorization to occupy or use the Rights-of-Way for delivery of Telecommunications Services or any other purposes.

12.34.325 Rights Granted.

A. No restricted franchise granted hereunder shall convey any right, title or interest in the Rights-of-Way but shall be deemed an authorization only to use and occupy the Rights-of-Way for the limited purposes and term stated in the grant.

B. No restricted franchise granted hereunder shall authorize or excuse a restricted franchisee from securing such further easements, leases, permits or other approvals as may be required to lawfully occupy and use Rights-of-Way Excess Capacity in an Underground Facility or Surplus Space in an Overhead Facility.

C. No restricted franchise granted hereunder shall be construed as any warranty of title.

12.34.330 Term of Grant.

Unless otherwise specified in the restricted franchise, or unless otherwise renewed, a restricted franchise granted hereunder shall be in effect for a term of not more than five (5) years.

12.34.335 Restricted Franchise Route.

A restricted franchise granted hereunder shall be limited to a grant of specific Rights-of-Way and defined portions thereof.

12.34.340 Location of Facilities.

Unless otherwise specified in a restricted franchise, all facilities shall be constructed, installed and located in accordance with the following terms and conditions:

A. Telecommunications Facilities shall be installed within an existing underground duct or conduit whenever Excess Capacity exists within such Utility Facility.

B. A restricted franchisee with written authorization to install Overhead Facilities shall install its Telecommunications Facilities on pole attachments to existing utility poles only, and then only if Surplus Space is available.

C. Whenever any existing telephone, electric utilities, cable facilities or Telecommunications Facilities are located underground within Rights-of-Way a restricted franchisee with written authorization to occupy the same Rights-of-Way must also locate its Telecommunications Facilities underground.

D. Whenever any new or existing telephone, electric utilitie cable facilities or Telecommunications Facilities are locat or relocated underground within Rights-of-Way, a restricted franchisee that currently occupies the same Rights-of-Way shall concurrently relocate its facilities underground at its expense. It is the responsibility of the restricted franchisee to obtain written authorization from the owner of the facility.

E. Whenever new Telecommunications Facilities will exhaust the capacity of a given Right-of-Way to reasonably accommodate future Telecommunications Carriers or Facilities, the restricted franchisee shall provide additional ducts, conduits, manholes and other facilities for nondiscriminatory access to future Telecommunications Carriers at its expense, provided however, the County shall require each subsequent entrant to contribute a pro rata share to this expense. As each subsequent entrant seeks use of Rights-of-Way, these contributions shall be apportioned among each such subsequent entrant.

12.34.345 Utility Right-of-Way Permits.

All restricted franchisees are required to obtain utility right-of-way permits and pay all fees as required in Pierce County Code Chapter 12.32.

12.34.350 Compensation to County.

Each restricted franchise granted hereunder is subject to t County's right, which is expressly reserved, to annually fix a fair a reasonable compensation for use of property pursuant to a restricted franchise, provided nothing in this Chapter shall prohibit the County and a restricted franchisee from agreeing to the compensation to be paid.

12.34.355 Service to County Users.

A restricted franchisee may be permitted to offer or provide Telecommunications Services to persons or areas within the County upon submitting an application for franchise approval pursuant to this Chapter.

12.34.360 Amendment of Grant.

A. A new restricted franchise application and grant shall be required of any Telecommunications Carrier that desires to extend or locate its Telecommunications Facilities in Rights-of-Way of the County which are not included in a restricted franchise previously granted hereunder.

B. A new restricted franchise application and grant shall be required of any Telecommunications Provider that desires to add to or modify the Telecommunications Services provided pursuant to a restricted franchise previously granted.

C. If ordered by the County to locate or relocate its Telecommunications Facilities in Rights-of-Way not included in a previously granted restricted franchise, the County shall grant a restricted franchise amendment without furth application.

12.34.365 Renewal Applications.

A restricted franchisee that desires to renew its restricted franchise hereunder shall, not more than 180 days nor less than 90 days before expiration of the current restricted franchise, file an application with the County for renewal of its restricted franchise which shall include the following information:

A. The applicable information required pursuant to the restricted franchise.

B. Any other information required by the County.

12.34.370 Renewal Determinations.

Within 90 days after receiving a complete application hereunder, the County Engineer shall make a recommendation to the County Council on whether to grant or deny the renewal application in whole or in part. If the renewal recommendation is to deny, the recommendation shall include the reasons for non-renewal. The standards enumerated in Section 12.34.310 shall apply when determining to grant or deny the application, plus a determination of the applicant's compliance with the requirements of this Chapter and the restricted franchise.

12.34.375 Obligation to Cure As a Condition of Renewal.

No restricted franchise shall be renewed until any ongoing violations or defaults in the restricted franchisee's performance of the restricted franchise, of the requirements of this Chapter, and all applicable laws, statutes, codes, ordinances, rules and regulations have been cured, or a plan detailing the corrective action to be taken by the restricted franchisee has been approved by the County Engineer.

ARTICLE IV - FRANCHISE

12.34.400 Franchise.

A franchise shall be required of any Telecommunications Provider who desires to make use of Telecommunications Facilities which occupy Rights-of-Way and to provide Telecommunications Services to any Person or area in the County.

12.34.405 Franchise Application.

Any Person that desires a franchise hereunder shall file an application in accordance with Pierce County Code 12.32, which shall include the applicable portions of the required franchise application information.

12.34.410 Determination by the County.

Within 120 days after receiving a complete application hereunder, the County Engineer shall make a recommendation to the County Council on whether to grant or deny the application in whole or in part. If the recommendation is to deny, the recommendation shall include the reasons for denial. The standards enumerated in Section 12.34.310 shall apply when determining to grant or deny the application.

12.34.415 Agreement.

No franchise shall be granted hereunder unless the applicant and the County have executed a written agreement setting forth the particular terms and provisions under which the franchise to occupy and use Rights-of-Way will be granted. All franchises granted pursuant to this Article shall contain substantially similar terms and condition which, taken as a whole and considering relevant characteristics of t applicants, do not provide more or less favorable terms and conditions than those required of other franchisees.

12.34.420 Nonexclusive Grant.

No franchise granted hereunder shall confer any exclusive right, privilege or franchise to occupy or use the Rights-of-Way for delivery of Telecommunications Services or any other purposes.

12.34.425 Rights Granted.

A. No franchise granted hereunder shall convey any right, title or interest in the Rights-of-Way but shall be deemed a franchise only to use and occupy the Rights-of-Way for the limited purposes and term stated in the grant.

B. No franchise granted hereunder shall authorize or excuse a franchisee from securing such further easements, leases, permits or other approvals as may be required to lawfully occupy and use Rights-of-Way Excess Capacity in an Underground Facility or Surplus Space in an Overhead Facility.

C. No franchise granted hereunder shall be construed as any warranty of title.

12.34.430 Term of Grant.

Unless otherwise specified in a franchise or unless otherwise renewed, a franchise granted hereunder shall be valid for a term of not more than ten (10) years.

12.34.435 Franchise Territory.

A franchise granted hereunder shall be limited to the specific geographic area of the County to be served by the franchisee, and the specific Rights-of-Way necessary to serve such areas.

12.34.440 Location of Facilities.

Unless otherwise specified in a franchise, all facilities shall be constructed, installed and located in accordance with the following terms and conditions:

A. Telecommunications Facilities shall be installed within an existing underground duct or conduit whenever Excess Capacity exists within such Utility Facility.

B. A franchisee with written authorization to install Overhead Facilities shall install its Telecommunications Facilities on pole attachments to existing utility poles only, and then only if Surplus Space is available.

C. Whenever any existing telephone, electric utilities, cable facilities or Telecommunications Facilities are located underground within Rights-of-Way a franchisee with written authorization to occupy the same Rights-of-Way must also locate its Telecommunications Facilities underground.

D. Whenever any new or existing telephone, electric utilities, cable facilities or Telecommunications Facilities are located or relocated underground within a Rights-of-Way a franchisee that currently occupies the same Rights-of-Way sha concurrently relocate its facilities underground at i expense. It is the responsibility of the franchisee to obtain written authorization from the owner of the facility.

E. Whenever new Telecommunications Facilities will exhaust the capacity of a given Right-of-Way to reasonably accommodate future Telecommunications Carriers or Facilities, the franchisee shall provide additional ducts, conduits, manholes and other facilities for nondiscriminatory access to future Telecommunications Carriers at its expense.

12.34.445 Utility Right-of-Way Permits.

All franchisees are required to obtain utility right-of-way permits and pay all fees for Telecommunications Facilities as required in Pierce County Code Chapter 12.32.

12.34.450 Compensation to County.

Each franchise granted hereunder is subject to the County's right, which is expressly reserved, to annually fix a fair and reasonable compensation for use of property pursuant to a franchise, provided nothing in this Chapter shall prohibit the County and a franchisee from agreeing to the compensation to be paid.

12.34.455 Nondiscrimination.

A franchisee shall make its Telecommunications Services available to any customer within its franchise area who shall request such service, without discrimination as to the terms, conditions, rates or charges for franchisee's services, provided, however, that nothing in this Chapter shall prohibit a franchisee from making any reasonable classifications among differently situated customers.

12.34.460 Service to the County.

A franchisee shall make its Telecommunications Services available to the County at its most favorable rate for similarly situated users, provided, however, the County may negotiate more favorable rates or free service in lieu of other obligations of franchisee.

12.34.465 Amendment of Grant.

A. A new franchise application and grant shall be required of any Telecommunications Carrier that desires to extend its franchise territory or to locate its Telecommunications Facilities in Rights-of-Way which are not included in a franchise previously granted hereunder.

B. A new franchise application and grant shall be required of any Telecommunications Provider that desires to add to or modify the Telecommunications Services provided pursuant to a franchise previously granted.

C. If ordered by the County to locate or relocate its Telecommunications Facilities in Rights-of-Way not included in a previously granted franchise, the County shall grant a franchise amendment without further application.

12.34.470 Renewal Applications.

A franchisee that desires to renew its franchise hereunder shall, not more than 180 days nor less than 90 days before expiration of the current franchise, file an application with the County for renewal of its franchise which shall include the following information:

A. The applicable information required pursuant to the franchis
B. Any other information required by the County.

12.34.475 Renewal Determinations.

Within 120 days after receiving a complete application hereunder, the County Engineer shall make a recommendation to the County Council on whether the County should grant or deny the renewal application in whole or in part. If the renewal recommendation is to deny, the recommendation shall include the reasons for non-renewal. The standards enumerated in Section 12.34.310 shall apply when determining to grant or deny the application, plus a determination of the applicant's compliance with the requirements of this Chapter and the franchise agreement.

12.34.480 Obligation to Cure As a Condition of Renewal.

No franchise shall be renewed until any ongoing violations or defaults in the franchisee's obligations under the franchise, or the requirements of this Chapter, and all applicable laws, statutes, codes, ordinances, rules and regulations have been cured, or a plan detailing the corrective action to be taken by the franchisee has been approved by the County.

ARTICLE V - CABLE FRANCHISE

12.34.500 Grant of Cable Franchise.

The County may grant one or more cable franchises containing such provisions as are reasonably necessary to protect the public interest and each such cable franchise shall be awarded in accordance with a subject to the provisions of this Ordinance. This Ordinance may be amended from time to time, and in no event shall this Ordinance be considered a contract between the County and a cable franchisee such that the County would be prohibited from amending any provision hereof, provided no such amendment shall in any way impair any contract right or increase obligations of a cable franchisee under an outstanding and effective cable franchise except in the lawful exercise of the County's police power.

12.34.505 Cable Franchise Required.

No Person may construct, operate or maintain a cable system or provide Cable Service over a cable system within the County without a cable franchise granted by the County authorizing such activity. No Person may be granted a cable franchise without having entered into a cable franchise agreement with the County pursuant to this Ordinance. For the purpose of this provision, the operation of part or all of a cable system within the County means the use or occupancy of Rights-of-Way by facilities used to provide Cable Service. Telecommunications Facilities used to provide telephone service which are also used to provide Cable Service shall be subject to this Ordinance and shall also require a cable franchise. Use of such facilities to provide services similar to Cable Service, such as Open Video Service, shall be subject to this Ordinance to the extent provided by law. A system shall not be deemed as operating within the County even though service is offered or rendered to one or more subscribers within the County, if no Rights-of Way by facilities used to provide Cable Service are used or occupie All cable franchises granted pursuant to this Article shall contain substantially similar terms and conditions, which, taken as a whole and considering relevant characteristics of the applicants, do not provide more or less favorable terms and conditions than those required of other cable franchisees.

12.34.510 Length of Cable Franchise.

Unless otherwise specified in a cable franchise, or unless otherwise renewed, no cable franchise shall be granted for a period of more than ten (10) years.

12.34.515 Cable Franchise Characteristics.

A. A cable franchise authorizes use of Rights-of-Way for installing, operating and maintaining cables, wires, lines, optical fiber, underground conduit and other devices necessary and appurtenant to the operation of a cable system to provide Cable Services within the County, but does not expressly or implicitly authorize a cable franchisee to provide service to, or install a cable system on private property without owner consent, or to use publicly or privately owned poles, ducts or conduits without a separate agreement with the owners.

B. A cable franchise shall not mean or include any exclusive right or authorization for the privilege of transacting and carrying on a business within the County as generally required by the ordinances and laws of the County. A cable franchise shall not confer any authority to provide Telecommunications Services or any other communications services besides Cable Services. A cable franchise shall not confer any implicit rights other than those mandated by federal, state or local law.

C. A cable franchise is nonexclusive and will not explicitly or implicitly: preclude the issuance of other cable franchises to operate cable systems within the County; affect the County's right to authorize use of Rights-of-Way by other persons to operate cable systems or for other purposes as it determines appropriate; or affect the County's right to itself construct, operate or maintain a cable system, with or without a cable franchise.

D. Once a cable franchise has been accepted and executed by the County and a cable franchisee, such cable franchise shall constitute a valid and enforceable agreement between the cable franchisee and the County, and the terms, conditions and provisions of such franchise, subject to this Ordinance and all other duly enacted and applicable laws and regulations shall define the rights and obligations of the cable franchisee and the County relating to the cable franchise.

E. All privileges prescribed by a cable franchise shall be subordinate to any prior lawful occupancy of the Rights-of-Way and the County reserves the right to reasonably designate where a cable franchisee's facilities are to be placed within the Rights-of-Way through its generally applicable permit procedures.

F. A cable franchise shall be a privilege that is in the public trust and personal to the original cable franchisee. No cable franchise transfer shall occur without the prior written consent of the County upon application made by the cable franchisee pursuant to this Ordinance and the cable franchise which consent shall not be unreasonably withheld, and an purported cable franchise transfer made without application and prior written consent shall be void and shall be cause for the County to revoke the cable franchise.

12.34.520 Cable Franchisee Subject to Other Laws, Police Powers.

A. A cable franchisee shall at all times be subject to and shall comply with all applicable federal, state and local laws and regulations, including this Ordinance. A cable franchisee shall at all times be subject to all lawful exercise of the police power of the County including, but not limited to, all rights the County may have under the Cable Acts, all powers regarding zoning, supervision of construction, control of Rights-of-Way and consumer protection.

B. The County shall have full authority to regulate cable systems, cable franchisees and cable franchises as may now or hereafter be lawfully permissible.

12.34.525 Interpretation of Cable Franchise Terms.

A. In the event of a conflict between this Ordinance and a cable franchise, the provisions of the Ordinance control except where the conflict arises from the lawful exercise of the County's police power.

B. The provisions of this Ordinance and a cable franchise will be liberally construed in accordance with generally accepted rules of construction to promote the public interest.

12.34.530 Operation of a Cable System Without a Cable Franchise.

Any Person who occupies Rights-of-Way for the purpose of operating or constructing a cable system or provides Cable Service over a cable system and who does not hold a valid cable franchise from the County shall be subject to all requirements of this Ordinance. In its discretion, the County at any time may by ordinance: require such Person to enter into a cable franchise within thirty (30) days of receipt of a written notice to such Person from the County that a cable franchise is required; require such Person to remove its property and restore the affected area to a condition satisfactory to the County; direct County personnel to remove the property and restore the affected area to a condition satisfactory to the County and charge the Person the costs therefor, including by placing a lien on the Person's property; or take any other action it is entitled to take under applicable law. In no event shall a cable franchise be created unless it is issued by the County pursuant to this Ordinance and subject to a written cable franchise.

12.34.535 Acts at Cable Franchisee's Expense.

Any act that a cable franchisee is or may be required to perform under this Ordinance, a cable franchise or applicable law shall be performed at the cable franchisee's expense.

12.34.540 Eminent Domain.

Nothing herein shall be deemed or construed to impair or affect in any way or to any extent, the County's power of eminent domain.

12.34.545 Exclusive Contracts and Anti-Competitive Acts Prohibited.

A. No cable franchisee or other multichannel video programming distributor shall enter into or enforce an exclusive contract for the provision of Cable Service or other multichannel video programming with any person, or demand the exclusive right to serve a Person or location, as a condition of extending service to that or any other Person or location.

B. No cable franchisee or other multichannel video programming distributor shall engage in acts that have the purpose or effect of limiting competition for the provision of Cable Services or services similar to Cable Service in the County.

12.34.550 Cable Franchise Fees.

Cable franchisees shall be subject to the cable franchise fees, payments and costs provided in their cable franchise and herein.

ARTICLE VI - CONDITIONS OF GRANT OF RESTRICTED FRANCHISE, FRANCHISE OR CABLE FRANCHISE

12.34.600 General Duties.

A. All Grantees, before commencing any construction in the Rights-of-Way shall comply with all requirements of Pierce County Code Chapters 12.04 and 12.32.

B. All Grantees shall provide written confirmation sufficient for customary land survey and land title insurance purposes concerning the location of its facilities in Rights-of-Way and disclaiming any interest in Rights-of-Way where it has no franchise to construct or operate its facilities.

12.34.602 Interference with the Rights-of-Way.

No Grantee may locate or maintain its Telecommunications Facilities so as to unreasonably interfere with the use of the Rights-of-Way by the County, by the general public or other persons authorized to use or be present in or upon the Rights-of-Way. All such facilities shall be moved by and at the expense of the Grantee, temporarily or permanently, as determined by the County.

12.34.604 Damage to Property.

No Grantee or any Person acting on a Grantee's behalf shall take any action or permit any action to be done which may impair or damage any Rights-of-Way, including specifically County Property, real or personal, or Public Ways or other property located in, on or adjacent thereto except in accordance with Pierce County Code 12.34.622.

12.34.606 Notice of Work.

Unless otherwise provided in a limited franchise agreement or franchise agreement, no grantee, or any Person acting on the Grantee's behalf, shall commence any non-emergency work in or about Rights-of-Way in accordance with Pierce County Code 12.32.080. Any private property owner whose property will be affected by a Grantee's work shall be afforded ten (10) working days advance written notice of such work.

12.34.608 Repair and Emergency Work.

In the event of an emergency or an emergency repair necessary to protect the public, restore service or mitigate further damage to the system, a Grantee may commence such repair and emergency response wor as required under the circumstances, provided the Grantee shall noti the County Engineer as promptly as possible, before such repair or emergency work or as soon thereafter as possible if advance notice is not practicable, in accordance with Pierce County Code 12.04.030.

12.34.610 Maintenance of Facilities.

Each Grantee shall maintain its facilities in good and safe condition and in a manner that complies with all applicable federal, state and local requirements.

12.34.612 Relocation or Removal of Facilities.

Within thirty (30) days following written notice from the County, a Grantee shall, at its own expense, temporarily or permanently remove, relocate, change or alter the position of any Telecommunications Facilities within the Rights-of-Way whenever the County Engineer shall have determined that such removal, relocation, change or alteration is reasonably necessary for:

A. The construction, repair, maintenance or installation of any County or other public improvement in or upon the Rights-of-Way.
B. The operations of the County or other governmental entity in or upon the Rights-of-Way.
C. The vacation of a street or the release of a utility easement.

12.34.614 Removal of Unauthorized Facilities.

Within thirty (30) days following written notice from the Coun Engineer, any Grantee, Telecommunications Carrier, or other Person th owns, controls or maintains any unauthorized Telecommunications System, Facility or related appurtenances within the Rights-of-Way shall, at its own expense, remove such facilities or appurtenances from the Rights-of-Way. If such Grantee fails to remove such facilities or appurtenances, the County may cause the removal and charge the Grantee for the costs incurred. A Telecommunications System or Facility is unauthorized and subject to removal in the following circumstances:

A. Upon expiration or termination of the Grantee's franchise.
B. Upon abandonment of a facility within the Rights-of-Way.
C. If the system or facility was constructed or installed without the prior grant of a franchise.
D. If the system or facility was constructed or installed without the prior issuance of a required utility right-of-way.
E. If the system or facility was constructed or installed at a location not permitted by the Grantee's franchise.
F. Any such other reasonable circumstances deemed necessary by the County Engineer.

12.34.616 Failure to Relocate.

If a Grantee is required to relocate, change or alter the Telecommunications Facilities constructed, operated and/or maintained hereunder and fails to do so, the County may cause such to occur and charge the Grantee for the costs incurred.

12.34.618 Emergency Removal or Relocation of Facilities.

The County retains the right and privilege to cut or move a Telecommunications Facilities located within the Rights-of-Way as the

County may determine to be necessary, appropriate or useful in response to any public health or safety emergency.

12.34.620 Damage to Grantee's Facilities.

Unless directly and proximately caused by the willful, intentional or malicious acts of the County, the County shall not be liable for any damage to or loss of any Telecommunications Facility within Rights-of-Way as a result of or in connection with any public works, public improvements, construction, excavation, grading, filling, or work of any kind in the Rights-of-Way by or on behalf of the County.

12.34.622 Restoration of Rights-of-Way or Other Property.

Restoration shall comply with the requirements outlined in Pierce County Code 12.04.030. Additionally:

A. When a Grantee, or any Person acting on its behalf, does any work in or affecting any Rights-of-Way, or any other property, it shall, at its own expense, promptly remove any obstructions therefrom and restore such ways or property to the same condition which existed before the work was undertaken.

B. If weather or other conditions do not permit the complete restoration required hereunder, the Grantee shall temporarily restore the affected Rights-of-Way or other property. Such temporary restoration shall be at the Grantee's sole expense and the Grantee shall promptly undertake and complete the required permanent restoration when the weather or other conditions no longer prevent such permanent restoration.

C. A Grantee or other Person acting on its behalf shall use suitable barricades, flags, flagmen, lights, flares and other measures as required for the safety of all members of the general public and to prevent injury or damage to any Person, vehicle or property by reason of such work in or affecting Rights-of-Way or any other property.

12.34.624 Facilities Maps.

Each Grantee shall provide the County with an accurate as-built map or maps certifying the location of all Telecommunications Facilities within the County and particularly within Rights-of-Way. Each Grantee shall provide updated as-built maps annually.

12.34.626 Duty to Provide Information.

Within ten (10) days of a written request from the County Engineer, each Grantee shall furnish the County Engineer with information sufficient to demonstrate:

A. That Grantee has complied with all requirements of this Chapter.

B. That all fees due the County in connection with the Telecommunications Services and Facilities provided by the Grantee have been properly collected and paid by the Grantee.

C. That all books, records, maps and other documents maintained by the Grantee with respect to its facilities within Rights-of-Way shall be made available for inspection by the County Engineer at reasonable times and intervals.

12.34.628 Leased Capacity.

Subject to the provisions of 6.21 herein, a Grantee shall have th right to offer or provide capacity or bandwidth to another Telecommunications Provider, with prior County approval, provided that:

A. Grantee shall furnish the County in advance with a copy of any such proposed lease or agreement.

B. The proposed lessee or Person shall comply with all of the requirements of this Chapter.

12.34.630 Grantee Insurance.

Unless otherwise provided, each Grantee shall, as a condition of the grant, secure and maintain the following liability insurance policies insuring both the Grantee and the County, and its elected and appointed officers, officials, agents, representatives and employees as additional insureds:

A. Comprehensive general liability insurance with limits not less than:

1. Five Million Dollars ($5,000,000) for bodily injury or death to each person;
2. Five Million Dollars ($5,000,000) for property damage resulting from any one accident; and
3. Five Million Dollars ($5,000,000) for all other types of liability.

B. Automobile liability for owned, non-owned and hired vehicles with a limit of Three Million Dollars ($3,000,000) for each Person and Three Million Dollars ($3,000,000) for each accident.

C. Worker's compensation within statutory limits and employer liability insurance with limits of not less than One Million Dollars ($1,000,000).

D. Comprehensive form premises-operations, explosions and collapse hazard, underground hazard and products completed hazard policies with limits of not less than Three Million Dollars ($3,000,000).

E. The liability insurance policies required by this section shall be maintained at all times by the Grantee. Each such insurance policy shall contain the following endorsement:

"It is hereby understood and agreed that this policy may not be canceled nor the intention not to renew be stated until 90 days after receipt by the County, by registered mail, of a written notice addressed to the City Attorney of such intent to cancel or not to renew."

F. Within sixty (60) days after receipt by the County of said notice, and in no event later than thirty (30) days prior to said cancellation, the Grantee shall obtain and furnish to the County replacement insurance policies meeting the requirements of this Chapter.

12.34.632 General Indemnification.

In addition to and distinct from the insurance requirements of this Chapter, each Grantee hereby agrees to defend, indemnify and hold the County and its officers, officials, employees, agents and representatives harmless from and against any and all damages, losses a expenses, including reasonable attorneys' fees and costs of suit defense, arising out of, resulting from or alleged to arise out of or result from the acts, omissions, failure to act or misconduct of the Grantee or its affiliates, officers, employees, agents, contractors or subcontractors in the construction, operation, maintenance, repair or removal of its Telecommunications Facilities, and in providing or offering Telecommunications Services over the facilities or network, whether such acts or omissions are authorized, allowed or prohibited by this Chapter or by a grant agreement made or entered into pursuant to this Chapter.

12.34.634 Performance and Construction Surety.

Before a franchise granted pursuant to this Chapter is effective, and as necessary thereafter, the Grantee shall provide and deposit such monies, bonds, letters of credit or other instruments in form and substance acceptable to the County as may be required by this Chapter, or by an applicable franchise or other applicable code, ordinance or rules and regulations of the County.

12.34.636 Security Fund.

Each Grantee shall establish a permanent security fund with the County by depositing an amount not to exceed $50,000 with the County in cash, an unconditional letter of credit, or other instrument acceptable to the County, which fund shall be maintained at the sole expense of Grantee so long as any of Grantee's Telecommunications Facilities are located within Rights-of-Way. This security fund shall be separate and distinct from any other bond or deposit required.

A. The fund shall serve as security for the full and complete performance of Grantee's obligations under this Chapter, including any costs, expenses, damages or loss the County pays or incurs because of any failure attributable to the Grantee to comply with the codes, ordinances, rules, regulations or permits of the County.

B. Before any sums are withdrawn from the security fund, the County Engineer shall give written notice to the Grantee:
   1. describing the act, default or failure to be remedied, or the damages, cost or expenses which the County has incurred by reason of the Grantee's act or default;
   2. providing a reasonable opportunity for the Grantee to first remedy the existing or ongoing default or failure, if applicable;
   3. providing a reasonable opportunity for the Grantee to pay any monies due the County before the County withdraws the amount thereof from the security fund, if applicable; and
   4. that the Grantee will be given an opportunity to review the act, default or failure described in the notice with the County Engineer.

C. Grantee shall replenish the security fund within fourteen (14) days after written notice from the County Engineer that there is a deficiency in the amount of the fund.

12.34.638 Construction and Completion Bond.

Unless otherwise provided in a franchise, a bond written by a surety acceptable to the County equal to at least 100% of the estimated cost of constructing the Grantee's Telecommunications facilities within Rights-of-Way shall be deposited before construction is commenced.

A. The construction bond shall remain in force until sixty (6(days after substantial completion of the work, as determin(by the County Engineer, including restoration of all Rights-of-Way and other property affected by the construction.

B. The construction bond shall guarantee, to the satisfaction of the County:

1. timely completion of construction;
2. construction in compliance with applicable plans, permits, technical codes and standards;
3. proper location of the facilities as specified by the County;
4. restoration of the Rights-of-Way and any other property affected by the construction;
5. the submission of "as-built" drawings after completion of the work as required by this Chapter;
6. timely payment and satisfaction of all claims, demands or liens for labor, material or services provided in connection with the work.

12.34.640 Coordination of Construction Activities.

All Grantees are required to cooperate with the County and with each other.

A. By February 1 of each year, Grantee shall provide the County Engineer with a schedule of their proposed construction activities which may affect the Rights-of-Way.

B. Each Grantee shall meet with the County, other Grantees and users of the Rights-of-Way annually or as determined by th County to schedule and coordinate construction in Rights-o Way.

C. All construction locations, activities and schedules shall be coordinated, as ordered by the County Engineer, to minimize public inconvenience, disruption or damages.

12.34.642 Assignments or Transfers of Grant.

Ownership or control of a Telecommunications System or franchise or any part of transmission capacity may not directly or indirectly, be transferred, assigned or disposed of by sale, lease, merger, consolidation or other act of the Grantee, by operation of law or otherwise, nor may there be a transfer of working control (which includes not only actual control, but also the ability to affect or influence decisions) without the prior written consent of the County, which consent shall not be unreasonably withheld or delayed, as expressed by ordinance and then on such conditions as may be prescribed therein and:

A. No grant shall be assigned or transferred in any manner within twelve (12) months after the initial grant of the franchise, unless otherwise provided by law.

B. Absent extraordinary and unforeseeable circumstances, no grant, system or integral part of a system shall be assigned or transferred before construction of the Telecommunications System has been completed.

C. The Grantee and the proposed assignee or transferee of the grant or system shall provide and certify the followi information to the County Engineer.

1. Complete information setting forth the nature, terms and condition of the proposed transfer or assignment;
2. All information required of a franchise applicant pursuant to this Chapter with respect to the proposed transferee or assignee;
3. All information required by federal, state and local law or regulation [i.e., FCC 394's];
4. Any other information reasonably required by the County Engineer.

D. No transfer shall be approved unless the assignee or transferee has the legal, technical, financial and other qualifications in County's sole discretion to own, hold and operate the Telecommunications System pursuant to this Chapter.

E. The Grantee shall reimburse the County for all direct and indirect fees, costs and expenses incurred by the County in considering a request to transfer ownership in or assign a franchise.

F. Any transfer of ownership in or assignment of a franchise, system or integral part of a system without prior approval of the County under this Chapter shall be void and is cause for revocation of the grant.

G. Upon receipt of all information required herein, and any other information required by the County, the County shall have one hundred and twenty (120) days to review and approve or deny the requested assignment or transfer, unless such period is extended by agreement of the County and Grantee.

12.34.644 Transactions Affecting Control of Grant.

Any transaction which results in any change of the ownership or in any manner the working control of the Grantee, of the ownership or working control of a franchise, of the ownership or working control of affiliated entities having ownership or working control of the Grantee or of a Telecommunications System, or of control of the capacity or bandwidth or any part of the transmission capacity of the Grantee's Telecommunications System, Facilities or any parts thereof, all defined as 5% or more ownership or control, shall be considered an assignment or transfer requiring County approval hereunder. Transactions between affiliated entities are not exempt from County approval.

12.34.646 Revocation or Termination of Grant.

A franchise granted by the County to use or occupy Rights-of-Way may be revoked for any one or more of the following reasons:

A. Construction or operation at an unauthorized location.

B. Unauthorized transfer of control of the Grantee.

C. Unauthorized assignment of a franchise.

D. Unauthorized sale, assignment or transfer of the Grantee's franchise assets or an interest therein.

E. Misrepresentation or lack of candor by or on behalf of a Grantee in any application to the County.

F. Abandonment of Telecommunications Facilities in the Rights-of-Way.

G. Failure to relocate or remove facilities as required in this Chapter.

H. Failure to pay taxes, compensation, fees or costs when and as due the County.
I. Insolvency or bankruptcy of the Grantee.
J. Violation of a material provision of this Chapter.
K. Violation of a material term of a franchise.

12.34.648 Notice and Duty to Cure.

In the event that the County Engineer believes that grounds exist for revocation of a franchise, the Grantee shall be given written notice of the apparent violation or noncompliance, be provided a short and concise statement of the nature and general facts of the violation or noncompliance, and be given a reasonable period of time not exceeding thirty (30) days to furnish evidence:

A. That corrective action has been, or is being actively and expeditiously pursued, to remedy the violation or noncompliance.
B. That rebuts the alleged violation or noncompliance.
C. That it would be in the public interest to impose some monetary damages, penalty or sanction less than revocation.

12.34.650 Hearing.

In the event that a Grantee fails to provide evidence reasonably satisfactory to the County Engineer as provided hereunder, the County Engineer shall refer the apparent violation or noncompliance County Council. The County Council shall provide the Grantee with notice and a reasonable opportunity to be heard concerning the matter.

12.34.652 Standards for Revocation or Lesser Sanctions.

If persuaded that the Grantee has violated or failed to comply with a material provision of this Chapter or of a franchise or applicable codes, ordinances, or statutes the County Council shall determine whether to revoke the franchise, and issue a written decision relating thereto, or to establish some monetary damages, penalty, lesser sanction and cure, considering the nature, circumstances, extent and gravity of the violation as reflected by one or more of the following factors:

A. Whether the misconduct was egregious.
B. Whether substantial harm resulted.
C. Whether the violation was intentional.
D. Whether there is a history of prior violations of the same or other requirements.
E. Whether there is a history of overall compliance.
F. Whether the violation was voluntarily disclosed, admitted or cured.

ARTICLE VII - CONSTRUCTION

12.34.700 Construction Standards.

No Person shall commence or continue with the construction, installation or operation of Telecommunications Facilities within the County except as provided in Pierce County Code Chapter 12.32.

12.34.705 Construction Codes.

Telecommunications Facilities shall be constructed, installed operated and maintained in accordance with all applicable federal, state and local codes, rules and regulations including, but not limited to, the National Electrical Safety Code.

12.34.710 Utility Right-of-Way Permits.

No Person shall construct or install any Telecommunications Facilities within the County without first obtaining a utility right-of-way therefore, provided, however:

A. No permit shall be issued for the construction or installation of Telecommunications Facilities within the County unless the Telecommunications Carrier has filed a registration statement with the County pursuant to this Chapter.

B. No permit shall be issued for the construction or installation of Telecommunications Facilities in Rights-of-Way unless the Telecommunications Carrier has applied for and received a franchise pursuant to this Chapter.

C. No permit shall be issued for the construction or installation of Telecommunications Facilities without payment of all fees pursuant to this Chapter.

12.34.715 Applications.

Applications for permits to construct Telecommunications Facilities shall be submitted in accordance with Pierce County Code Chapter 12.32. The applicant shall pay all associated fees and shall include any additional information as requested by the County Engineer. The application shall be accompanied by drawings, plans and specifications in sufficient detail to demonstrate:

A. That the facilities will be constructed in accordance with all applicable codes, rules and regulations.

B. The location and route of all facilities to be installed on existing utility poles.

C. The location and route of all facilities to be located under the surface of the ground, including the line and grade proposed for the burial at all points along the route which are within the Rights-of-Way.

D. The location of all existing underground utilities, conduits, ducts, pipes, mains and installations which are within the Rights-of-Way along the underground route proposed by the applicant.

E. The location of all other facilities to be constructed within the County, but not within Rights-of-Way.

F. The construction methods to be employed for protection of existing structures, fixtures and facilities within or adjacent to Rights-of-Way.

G. The location, dimension and types of all trees within or adjacent to Rights-of-Way along the route proposed by the applicant, together with a landscape plan for protecting, trimming, removing, replacing and restoring any trees or areas to be disturbed during construction.

12.34.720 Engineer's Certification.

All permit applications shall be accompanied by the certification of a registered professional engineer that the drawings, plans and specifications submitted with the application comply with applicable technical codes, rules and regulations.

12.34.725 Construction Surety.

Prior to issuance of a utility right-of-way permit, the permitt shall provide a construction bond, as provided in this Chapter.

ARTICLE VIII - FEES

12.34.800 Registration Fee.

Each application for registration as a Telecommunications carrier or provider shall be accompanied by a fee of two hundred fifty dollars ($250) or other amount County determines is required to cover actual costs.

12.34.810 Deposit Fee.

All franchisee applicants shall deposit a fee in the amount of $10,000 in escrow with the County. This deposit fee shall be deposited with the County as part of the application filed pursuant to this Chapter, and shall be credited towards other fees or deposits due County hereunder, less any ascertainable costs and expenses incurred by the County in connection with the application.

12.34.820 Application and Review Fee.

Any applicant for a franchise pursuant to this Chapter shall pay an application and review fee of $2,000 or 1 percent (1%) of the estimated cost of applicant's proposed Telecommunications Facilities, certified by the applicant's professional engineer, whichever is greater. This fee covers, but is not limited to, the costs associated with the County's review. This application and review fee shall b deposited with the County as part of the application filed pursuant this Chapter.

12.34.830 Refund.

An applicant whose franchise application has been withdrawn, abandoned or denied shall, within sixty (60) days of its application and review fee payment, be refunded the balance of its deposit under this section, less:

A. The application and review fee; and

B. All ascertainable costs and expenses incurred by the County in connection with the application.

12.34.840 Other County Costs.

All Grantees shall, within thirty (30) days after written demand therefor, reimburse the County for all direct and indirect costs and expenses incurred by the County in connection with any grant, modification, amendment, renewal or transfer of any franchise.

12.34.850 Reserved Compensation for Use of Rights-of-Way.

The County reserves its right to fix a fair, reasonable compensation to be paid for the authorization granted to a Grantee. Nothing in this Chapter shall prohibit the County and a Grantee from agreeing to said compensation.

12.34.860 Compensation for County Property.

If the right is granted, by lease, franchise or other manner, use and occupy County Property for the installation or use

Telecommunications Facilities, the compensation to be paid shall be fixed solely by the County.

12.34.870 Utility Right-of-Way Permit Fee.

Prior to issuance of a utility right-of-way permit, the permittee shall pay a permit fee equal to $1,000 or .75 percent of the estimated cost of constructing the Telecommunications Facilities, as certified by the applicant's engineer and approved by the County Engineer, whichever is greater. This fee replaces the fee prescribed in Pierce County Code Chapter 12.32 and is not subject to the exemption prescribed in Pierce County Code 12.32.130.

12.34.880 Annual Fees.

Each Grantee shall pay an annual fee to the County equal to the County's costs in connection with reviewing, inspecting and supervising the use and occupancy of Rights-of-Way by Grantee.

12.34.890 Regulatory Fees and Compensation Not a Tax.

The regulatory fees and costs provided for in this Chapter, and any compensation charged and paid for use of Rights-of-Way provided for herein, are to the extent provided by law, separate from, and additional to, any and all federal, state, local and County taxes as may be levied, imposed or due from a Telecommunications Carrier or Provider, its customers or subscribers, or on account of the lease, sale, delivery or transmission of Telecommunications Services.

ARTICLE IX - MISCELLANEOUS

12.34.900 Context.

When not inconsistent with the context, words used in the present tense include the future tense, words in the plural number include the singular number, and words in the singular number include the plural number.

That this Ordinance shall be in full force and effect from and after its passage, approval and publication in form as provided by law.

F:\WPFILES\PROP\96124.EXA

ECONOMIC DEVELOPMENT IN THE GREATER TACOMA/PIERCE COUNTY AREA
1997 Report

Produced for
Tacoma Public Utilities
Telecommunication Study

APEX Business Solutions
Project Team

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ECONOMIC DEVELOPMENT IN THE GREATER TACOMA/PIERCE COUNTY AREA

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ECONOMIC DEVELOPMENT IN THE GREATER TACOMA/PIERCE COUNTY AREA

PURPOSE

Tacoma, like other communities, has evolved in response to changing economic, social, political, and technical dynamics at work not only in the local area, but in the region, the country, and even the world. Understanding this change process for a given community is critical due to the reciprocal relationship between these dynamics and the community's economic base.

Over time, existing businesses contract, expand, or change focus in response to these dynamics — for example, the depletion of an area's natural resources, the building of a rail line, or the encroachment of competitors can each lead to change in the community's economic base. In other cases, certain conditions may lead new businesses or whole new industries to relocate in an area — for example, aluminum smelters' need for cheap power. The entrance of these new industries and fundamental changes in existing ones, in turn, contribute to and alter the original dynamics. As a result, reciprocal effects of the choices these businesses make are felt in a community's job mix, education system, infrastructure investments, and more. Based on this evolution, an area's economic base is built with tracks laid for its economic engine to take one route rather than another.

These periods of steady evolution, however, are occasionally punctuated by intervals of rapid revolution, where societies undergo more fundamental changes. We are in one such period now as we move from the industrial age to the information age. Being at such a juncture offers communities an opportunity to step back and ask questions such as: What direction is our economic engine heading? What direction do we want it to head? Are we building a base so tracks can be laid in that direction? Based on the answers to those questions, communities like Tacoma can make changes to influence the direction their economic engine heads.

One of the most significant ways a community and its economic base are intertwined is through an area's infrastructure. As a result, the evolution of a community's economy often depends upon the investments it makes in its transportation system, power system, and—given the shift to the information age—its telecommunication system. This study was therefore commissioned to investigate Tacoma's potential economic futures and the inter-relationship between its economic development and potential telecommunication system investments.

To help ensure Tacoma's telecommunication needs were assessed comprehensively, scenarios are based on information about the current context as well as potential future developments.

Out of our analysis, two key trends emerged that influenced our scenario building. Three scenarios were identified along with their implications for growth and for future telecommunications needs. Each of these will be examined after a discussion of the study's methodology and assumptions.

METHODOLOGY

This study was accomplished through a combination of primary and secondary research. Key business and civic leaders were interviewed to generate information about planned projects, programs and initiatives. Others were interviewed to understand the changes occurring in a particular industrial sector from the vantage point of a member of that sector. In addition, we drew on knowledge of individuals in the project team who had done previous economic modeling of Tacoma and the Pierce-County area.

This research was supported and expanded through an exhaustive review of newspaper articles and reports produced from other research projects. Materials from industry associations were also used to generate statistics and information about certain industry sectors.

All of this information was incorporated into a process that focused analysis to accomplish four key tasks:

Identifying Economic Engine
An economic engine describes the relationships between sectors that drive economic health, growth and changes in a region. It is not unusual for a community's economic engine to evolve over time. Understanding how and why the engine is changing provides important insights into opportunities and threats that could affect the economic health of a region. Exploring this economic engine requires a historical understanding of a community's development, along with comprehensive review of how each industry sector is evolving in response to local and national pressures.

Analyzing Economic Interventions
Most communities have examples of economic development interventions, or deliberate action taken to change or impact economic activity. These interventions can take the form of programs, projects, and initiatives. Interventions often involve the forming of specific groups whose purpose is to design or implement these programs. These groups typically dissolve after the program is implemented. In other cases, long-standing groups have an ongoing purpose of economic intervention and may develop and manage multiple programs.

Interventions can focus on education or training, taxation/regulatory relief, business retention/expansion/recruitment; small business startup/jobs, international trade, government/military, transportation, telecommunications, energy, public safety, housing, culture, tourism/entertainment, investment confidence/image, and various industry sectors.

Each intervention represents a potential change in the economic engine. They either support or enhance the current trajectory, or represent attempts to alter the track a community is on. Each intervention has its own set of assumptions that influence the design of the program, implementation plans, and desired outcomes. The actual outcomes of the program interventions, however, depend on how the program characteristics interact with the local context. Analyzing the intervention requires understanding the local participation in the program, the program's overall purpose, and the validity of the program's assumptions. In this way, we can assess the potential outcomes of the intervention on the economic base in a community.

Generate Scenarios

Not all economic interventions have the same impact. Not all evolution in industries will affect each community the same. Scenario generation involves analyzing each possible trajectory in a community and combining these individual plans into combinations of possible future states in the community. Through scenario analysis, inconsistencies or conflict between economic development activities can be identified. Competing projects or industries can be assessed to determine the more likely candidate for success and survival. Changes in the base of export jobs are assessed against other support industries to ensure that each is evolving in a way that will increase chances of mutual survival. Infrastructure issues around housing, education, transportation, etc. are all analyzed to determine the support for various future states. This complex analysis, when successful, usually yields scenarios that relatively simple and elegant. In this study, we were fortunate enough to find little direct competition for resources among industries or projects. As such, we were able to filter our analysis down to three key scenarios that we discuss.

Evaluate Needs and Implications of Scenarios

Each scenario has an implication for the volume and type of growth in the community. Using the Puget Sound Governmental Council and State Office of Financial Management reports as a baseline, adjusted for recent changes in the local economy, growth rates for each scenario were generated from economic modeling.

The scenarios also represent a potentially different set of telecommunication needs and may have implications for system architecture design. The study provides a brief overview of telecommunication needs in the three scenarios. More important for system design, however, is a technology driver, or that application in the industry that will have impact on how the telecommunication needs evolve in the future. The study identifies the key technology driver in the three industries most technology-dependent — transportation and distribution, healthcare, and financial services.

KEY TRENDS

During our analysis two key trends were identified that shaped the scenarios we developed:

- Tacoma has been and is still experiencing *change in its economic base* as a consequence of industrial changes throughout the United States and globally; and

- The outcome of *downtown Tacoma development* activities will have a significant impact on Tacoma's future economic mix as a whole.

As a result of these two key trends, we identified three possible scenarios for Tacoma's economic future. The following section will explore these two issues. Subsequent sections will discuss these three potential future for Tacoma and describe their implications for growth in the area.

Changes in the Economy

Tacoma's Current Economic Base
The basic economic structure of the Tacoma/Pierce County economy is relatively well defined and easy to characterize. The most important economic sector of the economy is related to *government and military activity*. The major military installations in the county (McChord, Fort Lewis, and Madigan) support almost one half of the basic economic structure. Added to this are significant amounts of employment from state, county, and city as well as federal agencies and offices. Indeed, thirteen of the twenty largest employers in the county are governmental agencies. In addition to this governmental activity, employment related to *health care* and *professional business services* is also important to the local economy. These businesses reflect Pierce County's role as a regional service center for the southwestern portion of the state. Included in this set of activities are hospital and medical facilities, regional financial services, and the supporting commercial businesses. The third important sector of the local economy revolves around the *Port of Tacoma* and its related activities. This sector includes businesses directly related to the movement of ships and cargo through the port, as well as warehousing, materials handling, and transshipment activities.

Tacoma's Historic Economic Base

Tacoma's current economic environment emerged as a result of the substantial changes that have occurred over the last 25 years. A quarter of a century ago the Tacoma/Pierce County economy was much more dependent on manufacturing activities than it is today. Such businesses were tied to the natural resources base of agriculture, lumber, and fishing. Declines in those industries have been due to a combination of factors including: cost issues, environmental changes, and shifting patterns of world production. As these historically important economic activities decreased, the area could have suffered severe economic problems. Instead, the local economy was resilient enough that these changes caused only moderate problems and adjustments. This suggests the local economy is flexible and adaptable.

In Support of Development

The flexibility and adaptability demonstrated through this 25-year restructuring was the result of a number of forces. Two of the most important factors were the *physical environment* and *the business environment*. Over time, the natural beauty of the area's mountains, water, and open spaces as well as the moderate climate have become more important to businesses and individuals for "lifestyle" reasons. Second, the community's business environment has also been a positive draw. Public-private cooperative initiatives, a healthy labor-management working relationship, attractive infrastructure, and available sites for development all have contributed to a positive atmosphere that was attractive to many firms. A growing population in a large metropolitan region has created a productive and adequate labor force that reduced location costs. Finally, relatively non-restrictive land-use regulations have provided an incentive for development in the Pierce County area. Significantly, some of these forces remain in place today.

Growth prospects for the areas, therefore, continue to remain strong. Tacoma has been recognized nationally as one of the best places for small business start-ups, based on cost structures in the area. The new University of Washington Tacoma campus has enhanced the educational offerings for local residents. Cooperation among local colleges, technical schools, and employers is strong. Recent initiatives in the urban core have improved the art, cultural, and entertainment offerings in the county. To a large extent these types of activities and advantages were important in the decision of Intel to move into the area, for Boeing to establish a new production facility at Fredrickson, and for Frank Russell to expand downtown operations.

Barriers to Development

In a recent survey of business climate in Tacoma, half (51%) of the businesses believed the current business environment in

Tacoma causes companies to be reluctant to locate or remain in Tacoma[1]. The survey identified the most frequently mentioned 'significant factors contributing to this situation' were all taxes (29%), specifically the B & O tax (21%), regulations (13%), taxes too high for small business (10%), poor image of Tacoma (8%), and crime (8%). Factors that clearly discourage businesses to locate or remain in Tacoma are the crime rate, business and occupation tax rate, and the permitting and land use regulations.

Although amenities and infrastructure are adequate, transportation infrastructure is a problem. Additional road and rail capacity is the most problematic issue. Rail links and road access from the Port will likely be a short term issue that will be resolved with route suggestions posed in a study completed recently by the Port. Longer term solutions are under study for handling freight movement out of the area. Expansion of SeaTac airport is also of concern. Without a third runway, it may be difficult for the airport to compete with Vancouver and San Francisco in securing more international flights. The lack of such flights may impact the Northwest region's ability to attract global businesses.

Downtown Tacoma Development

The redevelopment of Tacoma's downtown is a second major trend influencing the economic future of the city. There are several economic development groups with specific projects underway designed to enhance downtown Tacoma. Major projects are reviewed below. Downtown development could take one of several directions, depending on the outcome of these projects.

Support for Professional Business Services
The "Zone". In 1994, Tacoma was awarded a $ 3 million federal Enterprise Community grant, and was designated a state Empowerment Zone. In addition to the funding, the EZ/EC designation carries a number of tax and regulatory advantages. The primary purpose of the EZ/EC programs are to create jobs in distressed urban areas. The TEC has underway a number of significant programs to achieve this goal, including an employment initiative, the Tacoma Business Assistance Center, the Micro Loan program, and the International Services Development Zone (ISDZ). The ISDZ has the potential to significantly change the face of downtown Tacoma.

The strategic mission for the establishment of an ***International Services Development Zone*** is to contribute to the economic prosperity of Tacoma by bringing financial service and related firms into a state designated empowerment zone within the city. The International Services Development Zone Committee is modeling its ideas on the successful International Financial Services Centre in Dublin, Ireland. The Irish venture has created training opportunities, jobs, and community redevelopment. The ISDZ Committee has the active help of the Irish government in obtaining information on how its program and its technological, educational, and administrative support are structured. The ISDZ initiative hope to achieve similar success in Tacoma, through a three-pronged program: (a) tax relief at the federal, state, and local level, (b) appropriate investment in technology (especially telecommunications) infrastructure, and (c) coordination of education resources to provide adequately trained employees for sophisticated international service businesses. The primary focus at present is the promotion of tax incentive legislation at the federal, state, and local level.

The organizing committee, consisting of local business leaders, city officials, and other concerned parties, has already contributed toward drafting federal and state legislation. If successfully passed, the legislation will create multiple tax benefits designed to attract businesses. The group has also created committees to ensure completion of plans for facilities, infrastructure, and education to support companies locating to the zone. It is anticipated that state and federal legislation will be passed during the 1997 session. The ISDZ is part of a larger effort by the Tacoma Empowerment Consortium (TEC) designed to provide training and jobs to zone residents and improve the overall economic health of the area within the zone. Other efforts by TEC include a one-stop-shop for capital investments in cooperation with the Small Business Association, a micro-loan program, and a technical assistance center.

education, positions with, of course a mix of higher level professional service type jobs. The site would include about 27 acres, 8 on the water. This would produce about 1,565,000 square feet of new office and commercial space -- 20,000 for retail, 1,500,000 for class A office, and 45,000 other.

Support for an Urban Retail Core
City Beautification If there is to be significant change in the base of professional service businesses, additional retail support will be required. As such, the *Thea Foss Waterway Redevelopment* could be a fundamental part of any downtown renaissance. The City of Tacoma purchased the waterway with the intent to clean-up and revitalize the area. Recently, the City created a Public Development Authority which will issue bonds to underwrite the creation of an Esplanade, walkways, and public parks that should help move the project forward.

The Foss Waterway development could add by the year 2020 between 125,000 and 400,000 sq.ft. of new office space and 100 to 500 new residential units in the redevelopment area. New employment in the area would range from 1,100 to 3,500 over this time period. In addition, the visual appearance of the downtown core will be dramatically enhanced by such a project. This would provide an added attraction both to organizations working on Tacoma's economic development as well as to private developers.

Retail Space Proposed mixed-used buildings in the redevelopment area could support the growth of professional business services. Possibilities include: class "A" office for ISDZ companies and other firms; government office space; retail and condominium space; as well as a museum complex, public park, and marina.

Support for Increased Tourism and Convention Trade
In further attempts to bring business into downtown Tacoma, opportunities and venues for new entertainment and cultural locales are being pursued by several interested parties. Such projects could increase visits by tourists and/or conventioneers.

Conventions The Sheraton Hotel currently provides business accommodations downtown. Tacoma cannot be considered, however, for a specific "class" of convention because it lacks enough space to qualify. To host such conventions requires larger convention center space and more business hotel rooms. Plans to rectify this situation are underway. The Planning and Development Department has already proposed an expansion of the Convention Center and the construction of a second business class hotel within walking distance of the Convention Center

Museum Complex Plans are also underway to create a Museum Complex within a larger "culture cluster." This complex will center on a portion of the Thea Foss Waterway and an adjacent portion of Pacific Avenue between 15th and 21st Avenues. The Washington State Historical Museum on Pacific Avenue anchors this complex and is already open for business. The University of Washington-Tacoma campus, which includes several renovated historical buildings, is located across from the museum and has allocated the Pacific Avenue level for commercial use. The International Museum of Modern Glass is scheduled to open in the year 2000. Other possible tenants in such a "culture cluster" include a relocated Maritime Museum, a Puyallup Tribal Culture Museum, and the Tacoma Art Museum. The recently formed Public Development Authority for the Thea Foss Waterway will undertake long term planning for this area.

Movie Theaters To encourage more traffic into the downtown area, the City of Tacoma recently rewrote its theater ordinance to encourage the development of a large, *multiplex movie theater* in downtown Tacoma. Such cineplexes typically include eating and drinking establishments as well as video games complexes and would attract people downtown during evening hours. This would have the added benefit of improving the perception of safety, in that people walking to their transportation say they feel safer when others are around.

Casino The Puyallup Tribe of Indians recently opened a *gambling casino*, eventually to be relocated on a riverboat docked on the Blair Waterway. The success of such development efforts should increase the number of evening visitors to the downtown area and have a positive impact on existing retail establishments..

Rail Connections The *Train to the Mountain - Park Junction Resort* project is designed to create passenger train service between downtown Tacoma and the entrance to Mount Rainier National Park. Organizers expect the project to eventually include a second spur down to Morton, Washington. The City of Tacoma already owns the tracks from Tacoma to Morton.. Park Junction Resort, a private convention and hotel center to be located near the park entrance, will serve as the track's mountain terminus. Tourists will be able to board a train in downtown Tacoma and a short time later step outside to enjoy recreational opportunities in and around the mountain. Transportation plans include shuttle bus service from the terminus to Paradise Lodge and other significant sites inside the park. Board members are proposing to provide service by 1999. The *Three Mountain*

Tourism Council has also secured assistance from Microsoft to provide interactive historical and geological information at several sites in the area. This assistance may be coordinated with the Train to the Mountain project as it becomes more developed.

ECONOMIC OVERVIEW BY INDUSTRY SECTOR

Although Tacoma-Pierce County's economic reliance on the government and military sector remains strong, evidence suggests that other areas are growing in importance. This section provides an overview of the principle economic sectors in Tacoma and, where applicable, Pierce County. Information is organized to provide a context for decision making by describing the sector as it exists today followed by our analysis of what direction each sector appears to be moving. Sectors are presented as follows:

- Government and Military
- Financial Services
- Healthcare Services
- Transportation and Distribution
- Tourism, Entertainment, and Recreation
- Retail
- Industrial
- Advanced Technology and Research
- Higher Education

In our analysis, we have attempted to remain true to the standardized industry codes, where possible. However, in order to clarify what subsectors or categories comprise these sectors, we begin each section with a list that guided our research. Our description of each sector is informed by a variety of government publications and applicable newspaper reports, some of which were verified through interviews with organization representatives. We have referenced all statistics in the text and provided full citations in the endnotes. This is followed by a list of additional resources consulted for this section of the report.

Government and Military Sector

This sector includes: state, county and city governments; local public safety and emergency management such as the police and fire departments; corrections; local public school districts; federal government including military bases and camps, headquarters operations, and veteran support service providers.

Context for Development (Government and Military)
The total government 1996 employment figure for Pierce County (excluding military personnel) is 56,300, making it the largest workforce among economic sectors. Of those numbers, 17,900 are federal employees (includes 7300 in defense), 10,000 are state employees, 26,800 are local government employees, and 16,000 work in the public education system.[2]

Military institutions are the single largest employer in Pierce County and include McChord Air Force Base and Fort Lewis. These federal installations have survived the base closure process for the foreseeable future. A significant number of active duty personnel have been transferred into the Fort Lewis command from bases that have been closed, such as Fort Ord in California. Taken together, these installations employ approximately 30,800 people (6,700 civilians and 24,100 active duty personnel). Pierce County is also headquarters for the Washington National Guard at Camp Murray (8183 full- and part-time guardsmen), Madigan Army Medical Center (1,400 civilians and 1,500 military), a Veteran's Affairs Medical Center (800 employees), and a modest-sized US Marine Reserve facility located at the Port of Tacoma.[3]

Although in absolute numbers the impact of the military on the Pierce County employment has decreased over the last 15 years, the economy remains heavily dependent on the military's presence. In addition, 26,000 retired military personnel have settled in the area due, in part, to the comfortable setting as well as to the support services provided by the military.[4]

Several major construction projects are underway or have recently been completed on the bases that have implications for other sectors discussed in this report. Completed projects include: 1) A 70,000 sq.ft. education center where Army personnel attend classes offered in conjunction with local colleges and universities; 2) A 160,000 sq.ft. joint Army-Air Force shopping center for military personnel; 3) a child development center; and 4) a 1 million sq.ft. expansion of Madigan Army Medical Center.

Within Tacoma, the General Services Administration has established Federal Courts and the US Marshal's service in the restored Union Station. The Federal Bureau of Investigation has an office in the Tacoma Financial Center. State services, such as licensing and social & health services, operate at sites scattered throughout the area. A move to consolidate state offices at the former University of Puget Sound law school building is moving forward. Local government operates out of the County-City Building as well as through off-site locations such as the Tacoma City Light buildings, the Port of Tacoma (discussed in more depth in the Transportation Sector) and the Emergency Management Facility. Local services, such as police and fire departments, libraries, and schools, are also provided throughout the area at neighborhood locations.

Development Activities (Government and Military)

Military installations will remain an important economic sector for the Tacoma-Pierce County area into the foreseeable future, and no major changes in their status are anticipated in the near future. Construction at the installations continue. A $56 million project, for example, is under way at Fort Lewis that involves construction of company operation buildings and administrative offices, barracks, and supply buildings as well as the laying of a significant amount of fiber optic cable. Because of their importance to the economic health of the area, local governments should continually be identifying ways they can support the vitality of the bases. Infrastructure upgrades in the surrounding area, for example, would help these bases maintain their strategic importance within the military system as a whole.

In addition, local governments should identify creative ways to use the presence of the bases to support and enhance other industry sectors. Madigan Army Medical Center, for example, has recently completed development of a sophisticated research center. Such a facility might attract biotechnology and bioscience companies to the area through the support services it could provide. Former military personal would be an asset to advanced technology companies due to their sophisticated training in communication and computer technology. A clearinghouse for advertising their availability might help that connection. Promoting Tacoma as a retirement community to military personnel enhances the housing industry as well as the health care, retail, and financial services sectors. Retirees also bring outside revenue into the community. In addition, bases and base museums provide unique destination points for tourists. The marketing of conventions, conferences, and meetings for military and retired military personnel would be another logical development opportunity in this regard.

In addition to the consolidation of state offices, the county is anticipating building a new office in the near future. This will probably take place in the central business district within the next ten years. Some consideration was initially being given to a site around 15^{th} to 17th and Pacific. This is now on hold. There is also the need for a new permanent jail to be sited somewhere in the area.

Further examination of the interplay between the city's economic development and the state of its schools is warranted given that one of the factors in company site selection is the quality of a location's school system. The recent passage of the school levy aimed at improving facilities (including technology) is a hopeful sign for the local school district. Without a doubt, improving the Tacoma Public Schools enhances the community's economic prospects. The area of government facing the greatest change at this point in time is Tacoma Public Utilities in light of the upcoming deregulation of the industry. Information about these changes, however, is provided elsewhere in this report.

Financial Sector

Financial services include: commerical banks and credit unions; international banking; investment banking; insurance companies; pension funds; financial asset managers, security brokers and dealers; and others dealing in securities, derivative financial instruments, commodities futures and foreign currency. For the purposes of this analysis, real estate investment and brokerage is included as well.

Context for Development (Financial Services)
At the end of 1996, 11,400 people were employed in financial services, insurance, or real estate in Pierce County. This was a one-year increase of 100 employees.[5]

Frank Russell Company, an international investment management firm, employs 1000 people at its headquarters office in downtown Tacoma.[6] The firm is growing and has leased space in the US West Building for its data services department. This department produces stock indexes and other analytic tools used by money managers and pension-plan sponsors. A combination of commitment to downtown Tacoma and its advanced technology needs drove the selection of the US West site. This sector has become highly dependent on information exchange and analysis at a global level. As a result, Russell has been investing heavily in improving its technological capabilities in order to remain competitive.

A spate of mergers and acquisitions due to deregulation of interstate banking has led to major changes in ownership of Washington state banks. The biggest impact to Tacoma was the loss of Puget Sound Bancorp's headquarters as a result of the KeyCorp buyout several years ago. Today KeyBank, with 40% of the market share, remains the largest local employer in the industry with 1696 personnel countywide. In addition, several area banks have branch offices in Pierce County: Seafirst Bank (345 employees at 21 branches), US Bank (206 employees at 14 branches), Wells Fargo (198 employees at 20 branches). Locally owned Washington Mutual (with 159 employees at 14 branches) also has a presence.[7]

As a result of these consolidations, a handful of community banks have emerged in recent years to compete against these large out-of-state banks. Their target market is the small business customer looking for more personalized customer service. In Tacoma, the Columbia Banking System is the largest of these, with 217 employees[8] at half a dozen branches and $200 million in assets in 1994.[9]

Another major employer is State Farm Insurance with 511employees countywide. The company has a 360,000 sq.ft. regional office at Northwest Landing.[10]

Development Activities (Financial Services)
KeyBank is currently undergoing major changes as it reorganizes in the wake of its regional consolidation. The former state headquarters in downtown Tacoma is being transformed into a one of four district offices in the state that will oversee business office support for a five-county area. Consolidation will take place during 1997, as four branches combine into two KeyCenters. The company is hoping to avoid lay-offs by reducing

staff primarily through attrition. Although slow to substitute ATMs for traditional branches, the bank has been moving to the forefront of providing financial services using technology. They anticipate that 1997 will be the first year that over 50% of their transactions will be connected electronically (on-line or ATM).[11] In substituting electronic transactions and telebanking for branch transactions, the company hopes to substantially reduce overhead costs.

If successful, the International Services Development Zone (described elsewhere in this report) could have a major impact on this sector. The goal of the project is to attract major international financial service firms in subsectors such as banking/asset financing, securities, mutual funds, and insurance. A direct workforce of 3,500 persons is anticipated with an indirect workforce of 7,103 estimated.[12] Moreover, the creation of a large commercial center can attract and sustain a stable urban retail core.

The possibility of the Thea Foss Waterway redevelopment also figures prominently into opportunities for growth within this sector. Proposed office buildings in the redevelopment mix could serve as locations for ISDZ companies and other businesses. In addition, the improved visual appearance of the downtown core created by this project would help to attract new service and retail into the area.

Service employment is forecast to increase by 85% between 1990 and 2020 for Pierce County as a whole.[13] Tacoma employment in this sector is projected to increase by 57% over this same time frame.[14] As indicated above, financial services firms are increasingly dependent on advanced technology to conduct business and remain profitable. Fulfilling forecasted projections of growth may depend on finding ways to support their technological needs.

Health Care Service Sector

The Health Care Service sector includes: hospitals, the private offices and clinics of healthcare providers, nursing homes and personal care providers, and medical insurance providers.

Context for Development (Health Care Services)
In the early 1990s, the Health Care Service was the largest and fastest growing private sector industry in Pierce County's economic base, increasing even more rapidly than the national average. This was attributed to advantageous cost conditions and an expanding market due, in part, to the attraction the county has to military retirees. Moreover, health care facilities have been some of the county's largest employers, employing 20,500 county-wide and reflecting Pierce County's role as a service provider throughout the southern Puget Sound region.[15]

The largest private employer in the county is MultiCare Medical Center, with three hospitals and several other patient care facilities it employs 2,457 people. MultiCare recently constructed a new 160,000 sq.ft. hospital wing. St. Joseph Hospital, with 1,150 employees, has recently completed a $15.8 million expansion project. St. Joseph is affiliated with two outlying hospitals: St. Clare in Lakewood and St. Francis of Federal Way. Group Health employs 1,300 and has completed a new out-patient facility near Tacoma General Hospital, although it now contracts with St. Joseph for its in-patient needs. Puget Sound Hospital employs 350 personnel. Madigan Hospital Medical center and the Veteran's Affairs Medical Center are federal facilities and add a combined 3,700 military and civilian to the Health Care Sector totals.[16]

Although hospitals account for the largest number of employees in the county's Health Care Sector, several other major types of employers have a significant presence as well. Quad-C Health Care Centers employ 1,150 at their seven area nursing home facilities. Tacoma Lutheran Home and Retirement Community is another major employer with 320 personnel. Valley Terrace Nursing Center employs 250.[17] In addition, insurance providers are important members of this sector.

With the current emphasis on decreased medical care costs, however, this sector has been undergoing rapid change. In Pierce County, and elsewhere, the most marked shift has been the move from a traditional "fee-for-service" payment structure to a capitated system. Under such an arrangement, insurance companies give doctors a set monthly fee for each patient in their system in exchange for providing medical services as needed.

Capitation has had a major impact on doctors' practices by making the small, independent medical practice less viable. This is because a capitated system requires that doctors find a way to share the risks of covering an individual's care through large patient pools. Three types of organizations are addressing this need in Pierce County: physician-hospital organizations (PHOs), independent practice associations (IPAs), and health maintenance organizations (HMOs). HMOs, typically the most well known of the three, provide services using a managed care system. A managed care system relies on general practioners to provide all primary care and serve as "gatekeepers" to any specialty care the patient needs. Group Health is the area's long-standing provider of managed care. Northwest Physicians Alliance, a local IPA, allows doctors to retain their independent practices and avoid this need for gatekeepers while still offering capitated contracts to insurance companies. Finally, area hospitals and physicians are forming alliances which structure services in a way that creates profitable coverage pools. Medalia—a PHO created out the region's two largest Catholic hospital systems—is headquartered in Tacoma. Estimates from 1996 suggest roughly 670 out of the county's 1000 physicians are currently practicing under some type of alliance.[18]

Development Activities (Health Care Services)
In an effort to deal with these changes and improve economies of scale, this sector has experienced a number of mergers, alliances, and partnerships during recent years. Benchmark Network, for example, was formed early last year by several Blue Cross and Blue Shield located around the Northwest with the goal of becoming a regional service provider. Two of the network's members, Pierce County Medical and King County Medical, subsequently announced that they would combine some services in an effort to save money and improve customer service. They will be operating out of downtown Tacoma and have purchased the former Hillhaven headquarters. Another joint action is to purchase a software system that is tracking subscribers and medical claims.

MultiCare Health System of Tacoma and Swedish Health Services of Seattle also formed an alliance several years ago and followed that with purchasing Cigna HealthCare, a small HMO with about 3000 members. This purchase allowed them to enter the insurance industry as a certified health plan. MultiCare has been at the forefront of redesigning patient care in an effort to reduce costs and achieve measurable improvements in patient-care delivery. Redesigning work processes has involved changing the roles personnel play in the delivery of care.

Another important change, however, has been the introduction of new information technologies that improved the access to and capabilities of their data repository system. Advanced computer systems have allowed MultiCare to not only access patient information, but collect measurements on a variety of internal processes, as well as conduct sophisticated financial, staffing, and service provision modeling. Success has come in the form of reduced operating costs and a total managed-care approach to patients. They have, in fact, been so successful that they are marketing this software to other hospitals. As these examples suggest, Information Systems are becoming an increasingly important component of providing cost-effective health care. This suggests that just as with financial services companies, health care services can compete on the basis of technology.

These needs are also fueling the growth of "back offices." Back offices allow service organizations such as hospitals, banks, and brokerage houses to outsource the administrative and record-keeping tasks of doing business. Such services are typically cheaper for companies than doing them in-house, and they allow firms to concentrate on those aspects of the business that make them money. Back offices may be attracted to Tacoma due to lower real estate costs and salary scales.

Transportation and Distribution Sector

Transportation-related activities include: direct shipping, cargo handling, forwarding and storage, ship servicing and repair, warehousing, trucking and delivery, and freight rail.

Context for Development (Transportation and Distribution)
In 1995, one in five state jobs was linked to international trade.[19] That year, Washington producers exported $4.1 billion of goods through the combined ports of Seattle and Tacoma, making Puget Sound ports the second largest load center in the United States. Over 24,000 jobs in Pierce County are related to the Port of Tacoma through its direct shipping and associated activities.[20] While overall, U.S. West Coast ports have recently experienced a decrease in shipping traffic, Tacoma registered a roughly 3.5% increase for the year ending June 30, 1996.[21]

Yet Puget Sound ports have steadily been losing market share to Vancouver, B.C. and California. Southern California, for example, is currently investing up to $2 billion to improve rail access through the Alameda Corridor. Both Tacoma and Seattle are at risk of losing market share to ports in Southern California without improvements in dockside facilities and better land access to the terminal. The efficiency of the port is directly dependent on its inland transportation network. Currently, the rail system is under increasing strain to keep up with the amount of cargo moving through Puget Sound ports, which has a direct impact on the costs associated with moving that cargo.

Moreover, the Port of Olympia has recently expanded its facility to allow for the movement of containers by direct off loading. While small in scale, this is a new form of direct competition to Tacoma's container trade. In the future, as equipment costs fall, other west coast ports could also enter the shipping market. Thus, the need to provide other types of technological advantages will become more important.

Changes in the freight hauling industry are also taking place. In the past, freight hauling was a highly regulated, highly unionized industry. Companies secured authority to operate on certain routes, prices varied little, and carriers competed based on service. However, when federal law removed regulatory authority from state transportation commissions, this all changed. Deregulation has opened up routes and created discount pricing. In response, large, out-of-state carriers have moved into local markets, offering more efficient routes and cheaper prices. The spread of these non-unionized carriers has put pressure on the union drivers. As a result, the small, local carriers have had to cooperate more with one another to compete with the large carriers and are trying to find ways to expand their routes.

Development Activities (Transportation and Distribution)
The recent *Tideflats Circulation Study* of the Port found that the growth in the Port's containerized cargo traffic is rapidly exceeding the ability of the surface infrastructure to maintain the flow of goods. With foreign trade projected to grow at an annual rate of 2.8% over the next 20 years, this situation could worsen.[22] Compounding this trend, the next generation of super-cargo ship (post-Panamax ships) is nearly double the size of current vessels, requiring that a huge volume of cargo be unloaded and distributed quickly. Because these ships cannot fit through the Panama Canal, they support the trend toward mega-ports that can speed unloading and provide direct access to cross-country intermodal rail systems. Currently, up to 75% of the containers unloaded in Tacoma are shipped by rail to the Midwest or East Coast.[23]

In response to these trends, the Port of Tacoma has developed a 20-year plan to guide its growth. As part of this plan, the Port will develop nearly 500 acres on the Upper Blair Waterway. This development will include intermodal rail yards, auto handling facilities, additional container facilities, and terminals for non-containerized cargo. Technological improvements to the handling and delivery of freight, container methods and inter-modal networks will also improve efficiency and lower costs. Three cranes, capable of unloading post-Panamax ships, have been installed.

Local infrastructure issues have been examined in a recent circulation study of rail and traffic flow patterns across the Port. This study produced $299.3 million of recommendations for rail and road improvements, $57 million of which focus on immediate needs to maintain cargo flow.[24] Improvements in surface transportation routes, notably a Port of Tacoma interchange and completion of Route 167, are actively being discussed as ways to improve circulation into and out of the Port. Travel over the passes has been helped by Burlington Northern Santa Fe's reopening of a rail link to Eastern Washington through Stampede Pass in December, 1996. Kent Valley surface routes, however, have worsened with the addition of the at grade rail traffic through Auburn.

In 1996, the RTA received a mandate to improve area passenger systems with passage of the $3.9 billion regional transit measure. Over the next ten years, infrastructure improvements will be made to electric light rail, commuter rail, and express bus service. For example, Pierce Transit, which serves a 275 square mile area covering Tacoma and Puyallup, is building a regional transit facility just north of the Tacoma Dome. Dome Station, as it is called, will provide connections between regional and local bus service. The station's development as a rail stop will be funded under this measure. Eventually, the RTA will run 16 daily commuter trains between Tacoma and Everett. The Washington Department of Transportation (DOT) has proposed that within the next 20 years, 32 runs will be made daily between Portland and Seattle.[25]

At the same time, however, these proposed Amtrak and commuter rail expansions are expected to create additional strains both on the rail and road systems that must be successfully managed. The regional inadequacies of inland freight transportation are being addressed by the formation of the Freight Action Strategy for the Seattle-Tacoma corridor (FAST-Corridor). At the same time, several state-funded rail congestion studies are providing decision makers with information about congestion.[26] Part the solution rests in a proposed $1.5 billion project that would eliminate grade crossings on rail lines between Everett and Olympia. Funding is currently being sought, and will be coordinated by DOT and the Puget Sound Regional Council of Governments.

Truck traffic is important for moving cargo between source and distribution points. Tacoma area warehouse and distribution facilities have traditionally been centered at or near the Port. Recently, new facilities have been built along the Cascade corridor between the Fife and Puyallup city limits. The Fife area has attracted development due to its proximity to I-5, the availability of large tracts of land, and its pro-business climate. During the last year, half a dozen speculative or custom built warehouse projects have been built. In response, a variety of warehouse operators and distributors have moved into the area or switched locations within Fife. Regal Distribution, for example, moved down from Auburn, while Atlas Trucking and Airvan Lines moved into facilities built by Simpson-Tacoma Land Co.

The ability to track shipments as they move from point of origin to destination is becoming a source of competitive advantage for all manner of transport. Integrated electronic data-handling and sophisticated communication systems are used to determine the location of a shipment at any point in-route, who handled it last, when it will arrive at its destination, as well as providing that information to the customer "with the touch of a button."

It is anticipated that intra-state, regional and national transportation services will remain an important component of the local economy, fueled by population growth, increased trade with the Far East, and the trend to consolidate cargo handling at large mega-ports. With its modern port facilities, rail links, proximity to a major interstate and an international airport, Tacoma is an important hub in the state's transportation system. As a result, the transportation sector will continue to provide Tacoma with a source of competitive advantage, if congestion can be controlled.

Tourism, Entertainment, & Recreation Sectors

The tourism sector includes those locations, events, activities, or businesses designed to attract and entertain visitors from outside the immediate area. Most of these sites provide recreation and entertainment opportunities for the local population as well. In addition to recreation and entertainment, tourism support provides services such as lodging, food, transportation, and retail outlets primarily designed for visitors.

Context for Development (T, E, & R)
The Tacoma-Pierce County area receives an estimated 2.1 million visitors a year.[27] Mount Rainier and Olympic National Parks are the area's largest draw with both day trip and overnight facilities available. Nature and sporting enthusiasts have available Snoqualmie Summit and Crystal Mountain Ski Resort, Nisqually Wildlife Preserve, Northwest Trek Wildlife Park (in Eatonville), Emerald Downs Horse Track (in Auburn), Vashon Island and Lake Cushman. In the immediate vicinity are PII's Gambling Casino, Cheney Stadium (home of the Tacoma Rainiers baseball team), and a half dozen golf courses. Visitors with interests in the armed forces can visit the Fort Lewis Military Museum and the McChord Air Force Base Museum.

Within Tacoma proper, Point Defiance Park is a popular attraction, offering a variety of family-oriented activities including a restored Hudson's Bay fort as well as a zoo and an aquarium. Seymour Conservatory, located in Wright Park, houses an extensive permanent collection of trees, ferns, cacti, and orchids in its 12-sided dome. Puget Sound can be accessed through the Tacoma Harbor Tours, and by way of marinas located along the Thea Foss Waterway, Marine View Drive and at Point Defiance, near the Point Defiance—Tahlequah Ferry Dock.

The central business district is undergoing somewhat of a renaissance and is becoming an increasing important focus for tourist-related activities. Evidence of this includes the opening of the Washington State Historical Museum (home to the largest collection of pioneer and Native American artifacts on the West Coast), the siting of the University of Washington Tacoma branch (currently under construction), and the restoration of Union Station (home to a permanent Dale Chihuly glass display), the arrival of the Children's Museum (recently re-opened in the Theater District), as well as the possibility of a relocated and expanded Tacoma Art Museum (home to a design center, art library, and Children's Gallery in addition to visiting and permanent collections). Additional projects are under development and will be described in the next section.

The Tacoma Dome (30,000 seats), publicly-owned Convention Center (5000 capacity), and the Temple Theater at the privately-owned Landmark Convention Center (1700 seats) comprise the city's largest event venues. In addition, the there are several performance theaters primarily associated with the Broadway Center for the Performing Arts. Tacoma has an innovative, professional/ semi-professional set of fine arts companies, including Tacoma Actors Guild Theater (which seats 300), Tacoma Opera, Northwest Sinfonietta, Tacoma Symphony. Tacoma Opera is one of the few companies in the nation which is commissioning new work. Performances are held in the Pantages Theater (which seats

1200 and is home to the Tacoma's Ballet, Symphony, Philharmonic, and Opera), the Theater on the Square (home to the Tacoma Actors Guild), and the Rialto Theater (which seats 700 and is home to the Tacoma Youth Symphony and Northwest Sinfonietta). The Commencement Art Gallery is located there as well.

Existing business class hotel stock is somewhat limited. The Sheraton Tacoma, the 10th largest hotel in the state, currently stands alone as the city's top-flight, business class hotel with 319 guest rooms and 11 suites.[28] La Quinta also serves business clients. In addition, Tacoma has several bed & breakfast establishments that supplement the moderately price tourist class offerings. Of note, the restaurant industry is one of the top two private sector industries bringing income into the county, illustrating the county's importance as a regional service provider.

Development Activities (T, E, & R)

The City of Tacoma and its business leaders is taking a variety of steps to strengthen this area tourism, entertainment, and recreation. Activities include new tourist destinations, new lodgings, improved transportation, and beautification activities.

Enhancements proposed along the Thea Foss Waterway, in addition to promoting commercial development, are designed to make the central business district more attractive to tourists as well. As the birthplace of Dale Chihuly, the world reknown artist, Tacoma seemed a fitting place to house the world's preeminent modern glass museum. As a result, breaking ground soon will be the International Museum of Modern Glass, located on the west bank of the Thea Foss across from the Union Station area. Pedestrians will be able to reach the museum from Pacific Avenue via the Chihuly Bridge, which will span Dock Street, I-705, and the railroad tracks. In a separate project, a private donor has pledge $1 million for a new aquarium on condition that it be built along the waterway. The aquarium would complement the one housed at Point Defiance Zoo by focusing on Northwest marine life. Community leaders are currently studying the feasibility of such an attraction. Other possible developments include a maritime museum, a Puyallup Tribal cultural museum, as well as new or expanded marine-based recreational activities.

The city also plans to expand the existing convention center and site a second business class hotel within walking distance of the center. Tacoma has been out of the running for large conventions because it lacks enough space to qualify. With its easy access to SeaTac International Airport, expanded convention and hotel space would make Tacoma a viable option for national and international conferences and conventions.

The city's theater ordinance has been rewritten to encourage the development of a large, multiplex movie theater in downtown Tacoma. These types of entertainment venues typically include built-in retail, video game arcades, and restaurants and have supported the revitalization of central business districts in other similarly-sized U.S. cities. We discuss the latest proposal for such a complex under the "Retail Sector."

Development along Ruston Way is guided by a very restrictive shoreline land use plan. Only one hotel, for example, will be constructed. Currently the locally-based Silver Cloud chain has applied for a construction permit on the waterfront near Old Town. Approval of plan will not given until the developer has resolved local concerns over the size and bulk of the building to the city's satisfaction.

Trolley service has been proposed as a way to circulate pedestrians—both workers and tourists between the Commerce Street Transit Station (next to the museum complex) and the Regional Transit Center adjoining the Freighthouse Square Complex. Funds from the recent RTA measure have also been earmarked for 1.5 miles of light rail to connect the downtown with the transit station. There are also on-going discussions over a regular shuttle service between the two areas.

Another important development will connect Tacoma to Pierce County's biggest tourist attraction. The Train to the Mountain project proposes to provide rail service from downtown Tacoma to a location just outside the boundaries of Mount Rainier National Park on a rail line the city owns. Current plans are for Park Junction Resort, a private convention and hotel center, to be constructed near the park entrance. This resort would serve as the terminus of the line with shuttle connections to locations inside the park. Service is slated in begin operation in 1999. Organizers expect the project to eventually include a spur line south from Park Junction to Morton, Washington.

Several other developments will be taking place around Tacoma. In March, the Puyallup Tribe will be launching the Emerald Queen, a riverboat casino docked on the Blair Waterway. The Point Defiance Zoo may expand its role as a learning and entertainment center. Some Disneyland-style options are being considered.

Tourism is an important source of revenue for Washington State and its local communities. For the state as a whole, it was a $7.2 billion industry in 1993. At that time, local tax revenue from tourism totaled $97.3 million for cities and counties, up by 9.7 % over the previous year. These figures have increased steadily over the course of the decade.[29] Last year, two out of every five dollars tourists spent were in rural and medium-sized urban areas. As recently as 1995, however, the state ranked 47th in the amount of money spent on tourist promotion.[30] This suggests that for the Tacoma-Pierce County area to develop an image as a tourist destination and convention venue, it will likely have to develop its own marketing strategy and then adequately fund it. Doing so, not only produces tax revenues, but provides direct benefits to the economy in the form of jobs that averaged $10.21/hour in 1996.[31] Growth in this sector can also offset loses in other sectors.

Retail Sector

The retail sector includes: eating & drinking establishments; general & specialized retail stores providing personal as well as household goods & services; automotive & service stations; and building & garden supply centers.

Context for Development (Retail)
The local retail sector posted steady growth over 1996, employing 46,600 people at the end of 1996, an increase of 700.[32] Just as regional incomes and population grew more rapidly than they did nationally, consumers' needs for retail and shopping services expanded at a rate above the national average. Finally, major restructuring and store closures (for example, Ernst) were completed by the end of the year, leaving the remaining establishments well-positioned within Pierce County's growing economy.[33]

The area's retail base is anchored by two of the largest shopping centers in the Puget Sound region, the Tacoma and the Lakewood Mall, which attract shoppers from a 25-30 mile radius. Lakewood Mall consists of 1.4 million sq.ft. of retail space on a 99 acre site. Redevelopment is currently underway, guided by a Master Plan that has seen a doubling of its cineplex to 12 theaters, the addition of a supermarket as well as several new outside buildings housing national tenants. While there is a high percentage of inside space available for lease, all but one of its outside spaces are occupied. As part of its remodeling project, Tacoma Mall is also making improvements—adding a food court, more visible entrances, natural skylights, and improved landscaping.

Large, discount chains such as Price-Costco, Home Depot, Home Base, and Eagle Hardware have developed stores in outlying areas that attract customers from a large radius due to selection and price. In addition to these retail destinations, commercially-zoned strip malls located on major arterials, house smaller establishments that offer limited selection but added convenience to customers within a few mile radius. Supermarkets, service stations, and convenience stores are widely dispersed and readily available throughout the city, with the exception of the central business district.

Tacoma's neighborhood business districts—such as Sixth Avenue, Old Tacoma, Lincoln, Proctor, and Stadium—attract shoppers to specialty stores and restaurants located there and provide convenience to residents in those neighborhoods. Seven districts are currently promoted on Tacoma's web page through descriptions, maps, and categorized lists of attractions and businesses within each. These districts typically have active neighborhood business associations that support local development activities. The Mainstreet Project along Martin Luther King Way, for example, has used grant money for business facade improvements as well as to recruit new retail businesses into the neighborhood. Freighthouse Square, located across from the transit station in the Dome District, is an example of successful private development where Milwaukee Railroad freighthouses were converted into an appealing retail establishment. Around Antique Row in the Theater District, a popular Farmers' Market setups and conducts business every Thursday during the summer months.

The exit of Schoenfelds on Pacific Avenue late last year was area of concern for some. At the same time, however, the store's closing has opened up a piece of real estate well-situated in relation to many of the redevelopment projects underway. A application is now under way for the American Institute of Architects to send a Regional/Urban Design Assistance Team (RUDAT) to design a development strategy for the area. between 13th and 19th. If they accept this project, community leaders hope that in the course of this process, issues surrounding the multiple needs of the downtown community—cultural, economic, social, and educational—can be addressed within a broader context.

Development efforts in the central business district have included strengthening the urban retail core. The success of these efforts, however, is still not assured. A paid promotional campaign, funded through a special 10-year tax assessment on owners of property within the 80-block downtown area, has been underway to lure national retailers into the core, funds have gone to pay for the services of a nationally-known retail recruiter. This has netted dozens of on-site visits from national retailers, but only one such tenant. Jillian's Billiard Club, a "pioneer retailer," opened an $25,000 entertainment and restaurant establishment towards the end of 1996. Several other restaurants have opened in the area as well, but additional national tenants have not yet committed. Expansion of existing businesses (such as Frank Russell) and the establishment of new ones (such as Columbia Banking Systems) contribute to the health of Tacoma's downtown retail core as well.

Development Activities (Retail)
Population growth in the outlying areas around Tacoma is fueling the development of retail and commercial space in many parts of Pierce County. Retail employment is projected to increase by 80% between 1990 and 2020 for Pierce County as a whole.[34] with an increase of 52% forecast for Tacoma over this same time frame.[35]

Within the county, for example, the development of Northwest Landing and the opening of the Intel facility at DuPont are fueling increased traffic and a growing residential community. This has led to the development of a new shopping center on eight acres across I-5 from Fort Lewis. Called Barksdale Station, this complex will consist of 30,000 sq.ft. of retail and restaurant space and include a hotel as well. "Mini-malls," such as this one, are convenient for near-by residents and may lure travelers off near-by highways.

The development of new, large shopping malls, on the other hand, has given way to the redevelopment of existing, older malls. Lakewood Mall, for example, plans to attract new tenants by redeveloping its inside space. An undetermined amount of new, outside construction is also planned between now and the end of the decade. Retailers are also exploring new methods of attracting customers. In connection with the Lakewood Chamber of Commerce, Lakewood management is considering how it might use the Internet or World Wide Web to reach new customers.

Within Tacoma proper, healthy local shopping districts offer convenience to area residents, create job opportunities, and generate tax revenues for the city and state. As new businesses open, such as an ethnic restaurant or an art gallery, they bring potential shoppers into a district. In addition, development in conjunction with existing or new attractions can create new retail opportunities.

A strong urban retail core depends on creating an attractive destination for weekend shoppers and keeping office workers downtown after hours. Whether this will become a reality for Tacoma is still uncertain. With the opening of Jillian's and a downtown multiplex moving closer to reality, Tacoma retail is reaching an important turning point. A California developer has expressed interest in building a 50-100,000 sq.ft. retail space in co-tenancy with a 16-screen multiplex theater. It is seeking interest from retailers and looking for support from the city, for example, in the form of infrastructure improvements like parking. Several smaller retail projects are in the feasibility stage. The non-profit organization that oversees the seasonal Farmers' Market is hoping to develop a permanent all-weather facility for a Farmers' Market somewhere in the downtown corridor. ARTSPACE, a group contracted by the Theater District Associates, has been hired to assess the possibility of complimentary, art-related development (such as artist housing, studio space, retail outlets, and galleries) that could reinforce the district's identity. An International Retail District (along the line's of Seattle's International District), proposed by Tacoma's mayor, would support Tacoma's growing global perspective and reflect the large Korean-American community.

Creating both destination spots and downtown residential development would support the urban retail core. New condominiums developed along the Thea Foss Waterway, as discussed elsewhere, would also provide an evening crowd for upscale establishments. An internationally renown glass museum and a world class aquarium along the waterway would enhance the area's attractiveness as a place to live, work, and visit. A "culture campus" located roughly between 15th and 21st that built on the theaters, museums, and education facilities already in place would offer a destination for office workers, students, and Pierce County residents, thereby increasing evening and weekend foot traffic. Such facilities would also increase tourist traffic, another important source of retail spending.

Attracting one major national retailer into the core, however, remains a critical but unfulfilled goal at this time. The fate of the Sandberg Building (former home to Schoenfelds)—surrounded by the Tacoma Financial District, the museum complex, the University of Washington's Tacoma branch and the Thea Foss Waterway—may be a key ingredient in Tacoma's future redevelopment efforts. Another issue relates to use of technology in the retail sector. Increased reliance on computer usage is likely, as inventory costs can more effectively be controlled with timely ordering and control, use of fax and modem transactions is increasing, and the use of things like fingerprint recognition for credit cards or check writing. Successful merchants will need to adapt to these new demands—a potential large increase in data transmission needs from many small and scattered sites.

Industrial Sector

The industrial sector includes: manufacturing and fabrication; the production of building & construction materials; printing & publishing; and the processing of food products and raw materials, such as forest products and metals.

Context for Development (Industrial)
There are approximately 700 manufacturing firms located in Tacoma and surrounding communities.[36] The Port Industrial Area is a primary location for Industrial Sector businesses. The two major industrial districts are the Commencement Bay Industrial Development District (1,900 acres) and the Fredrickson Industrial Development District (350 acres). Within the Commencement Bay district, the Port has designated over 900 acres as a foreign trade zone where importers may defer or, in certain instances, avoid import duties altogether. Other fully developed industrial zones in the area include the Burlington Northern Industrial Park (200 acres) and the Lakewood Industrial Park (170 acres).

Major manufactured products in the Tacoma area include: wood products (furniture, doors, millwork, and plywood), chemicals, machinery, metal fabricators and foundries, food products, textiles & apparel, and paper & allied products (pulp wood, paper bags, and newsprint). Tacoma is also one of the largest commercial and pleasure boat building centers on the West Coast with 16 boat-building yards. Major heavy industries include Kaiser's aluminum smelter—which recently returned to full production—Petroleum Reclaiming and U.S. Oil, Concrete Technology, and several chemical plants described in the Advanced Technology section.

Forest products, including paper and allied products, continue to be an important component of this sector with a combined 1996 employment figure of 5400, up by 300 employees over 1995.[37] Simpson Tacoma Kraft Co. has been making capital improvements at their Port of Tacoma site. The company has 550 employees. Weyerhauser is another major employer in this subsector with 568 employees. Both Simpson and Weyerhauser have completed construction on and are operating local recycling plants. Manke Lumber Co. has 256 working at its sawmill and planing mill while Buffelen Woodworking has 275 employees producing milled wood and wood products. West Coast Door employs 165. Y.C.A. Timber employs 190 people, finishing hardwood and softwood for its South Korean piano plant.[38] An adjacent acoustical guitar factory—Tacoma Guitar—and drying kiln opened over a year ago and are steadily increasing. In total, 220 businesses were involved in lumber production, furniture manufacturing, and paper production in 1994.[39]

Food processing is another important industrial subsector within the community with 2,800 employees working for approximately 44 businesses.[40] SuperValue International is the 14th largest food retailer in the U.S. and employs at its Tacoma offices. Nalley's Fine Foods, with 753 employees, is another large employer in the area. Pederson Fryer Farms employs 430 in its meat processing plant, although its financial future is uncertain. Brown & Haley operates its candy making plant with 250 employees. Wilcox Family Farm, a dairy processing operation, also employs 250. Nichirei Foods America operates its food processing plant with 240 employees. Interbake foods, a cookie and cracker producer, has 178 employees.[41]

Employment figures for 1996 for the other industrial subsectors are included here. Figures are either unchanged or vary by 100 employees from the previous year, unless noted. Printing and publishing employs 2,400. Major metal foundries and fabricators employ 2,000 countywide with two major employers being Milgard Manufacturing (at 680 employees) and Atlas Foundry (360 employees).[42] Plastics and rubber employ 2,000, up 300 over 1995. Concrete products employ 1,300. Textiles and apparel employ 1,300. Finally, durable manufacturing employs 1000 people.[43]

Development Activities (Industrial)

The Port of Tacoma continues to expand its industrial and international trade potential through development of its properties for light industry, capital improvements in its transportation and technological infrastructure, and environmental cleanup. The Port's facilities offer industrial tenants flat, fully improved sites that include all utilities and a well developed transportation and distribution system. As a result, these areas continue to attract new tenants. A flour mill producing noodles for export to Japan, for example, has recently contracted for facilities at the Fredrickson site.

Development by existing industries at the Port continues as well. Simpson Tacoma Craft has undertaken a $10 million development near its mill, including their new recycling facility. Kaiser Aluminum has been increasing capital investments in their plant, spending approximately $6 million to improve facilities. With the deregulation of the electric industry, access to alternative sources of electricity has reduced their operating costs, making the plant more profitable. Boeing, as will be discussed, has developed two plants at its Fredrickson facility.

Northwest Landing, Weyerhauser's 3000-acre community of residential, commercial, industrial, and retail development at DuPont, is rapidly becoming an important focal point for industrial development. As discussed in the next section, Intel has located its production facilities there and will be steadily expanding capacity over the next few years. Y.C.A. Timber, one of the world's largest piano makers, will be consolidating its North American operations at a $10 million, 40,000 sq.ft. facility it is building at Northwest Landing. The plant will employ 125 to 150 people in the production, research, sales, marketing, and distribution of Kurzweil brand electronic keyboard and synthesizers. A sister company's research and development operation will also locate in the area but it is unclear whether it will be sited at the DuPont facility or at the company's acoustic guitar plant in Fredrickson.

Fife has become another area undergoing rapid development. Warehouse and distribution facilities have sprung up, as described under the Transportation Sector. Fred Meyer has built a 600,000 sq.ft. distribution facility there as well. Northwest Metal Products recently built at 320,000 sq.ft. manufacturing plant. Milgard Windows has also expanded their facilities.

These decisions to locate in DuPont and Fife are reflected in forecasts that manufacturing employment will increase by 9% between 1990 and 2020 for Pierce County as a whole.[44] Tacoma employment in this sector, however, is projected to decrease by 27% over this same time frame.[45] Although the Port area is particularly well suited for heavy industry, improvements could ensure that light industry does not by-pass Tacoma for outlying areas. Plans by the Port of Tacoma to improve its transportation, utilities, and telecommunications are an important means of maintaining a flourishing industrial base within Tacoma proper.

Advanced Technology and Research Sector

The Advanced Technology sector has traditionally included: chemical and allied products; industrial and commercial machinery (including computer equipment); electronic and electrical equipment & components;

transportation equipment; advanced instruments. Subsectors within this industry that have developed over the last decade and a half include: bio-technology and bio-medical products, software-related products and services, and environmental services. This sector also includes businesses involved in the consulting, training, sales, repair, testing, as well as research and development of advanced technology.

Context for Development (Advanced Technology & Research)
The Puget Sound region is considered one of the most influential areas for advanced technology in the world. Traditionally, due to Boeing presence, the production of transportation equipment was one of the dominant subsectors in the region. The Boeing Company, alone, is the largest technology company in the state, accounting for 22% of all technology jobs.[46] Although it remains a strong economic force in the region, the importance of relatively new technology is creating new areas for growth as well. As a result, advanced technology employment in Washington is growing at a rate faster than the general employment rate. Given the growth of this sector in the Puget Sound area, there has been a significant lack of advanced technology firms in the Tacoma-Pierce County area.

This trend, however, may be in the process of changing. In 1993, for example, the county experienced a 3.4% increase in total employment while undergoing a 9.8% increase in advanced technology employment.[47] In 1996, fueled by the arrival of the Intel manufacturing plant, employment in the machinery/computer/electronic sector virtually doubled (up 94%) from 1700 to 3300 employees. During this same time period, employees involved in the manufacturing of transportation equipment increased 20% from 2000 to 2400 workers. Employment figures for chemical and petroleum manufacturing, another traditional employer in this sector, increased 11% in Pierce County to 1000.[48]

Boeing also remains an important presence in the Pierce County economy, with 9888 residents working at Boeing facilities outside the county. Within Tacoma, Boeing employs 988 people at its Fredrickson facility. Two manufacturing facilities are located there: the Composite Manufacturing Center and the skin-and-spar plant. Toray Composites, a Japan-based company, employs 100 people at a Fredrickson Industrial area manufacturing plant to supply Boeing with composite material for producing the 777.[49] A research and development facility was added last year that will develop new carbon fiber products. As recently as 1994, there were 55 businesses involved in the manufacturing of transportation equipment in Pierce County.[50]

Of the computer related technology firms, the largest employer in Tacoma is CBM Systems. Employing a work force of 250 to 500 people, CBM designs, implements, and oversees the maintenance of clean room environments. North American Morpho is Tacoma's second largest computer related company with 250 employees in the area. Their Tacoma-based headquarters primarily employs professional workers who provide sales and support for the automated fingerprint identification systems sold in North America. Based on 1995 revenues it was ranked the 16th largest software developer in the state.[51]

Within Pierce County, advanced technology firms are playing an increasingly important role in the economy. Intel employs approximately 1000 at its new DuPont facility. Intel uses this facility to build computers for other electronic manufacturers that want to incorporate Intel's most advanced technologies in their own name-brand computers. The NEC laptop assembly plant in Fife is a lesser known but growing facility that falls within this sector. Several years ago they evolved from a distribution center to a manufacturing and assembly plant ended 1996 with 360 employees. Matsushita, located in Puyallup, is a growing facility designed to make computer chips and electronic microprocessors for Panasonic products. These examples suggest that, while the production of transportation equipment remains the state's leading export at pegged at $10 million in 1995,[52] new technologies are leading to growth in other areas of this sector.

Employers in the chemical and allied products industry, having once a larger presence in the area, have undergone some downsizing. Elf Atochem North America, a local chemical plant whose headquarters today is in Philadelphia, went through a major reengineering that involved laying-off over half of its workforce. Atlanta-based Georgia Pacific is in the process of closing its chemical production facility in Tacoma and either laying-off or deploying its workforce in another example of corporate cost-cutting. The county had 17 chemical companies in 1994.[53]

Different forces are at play in the layoffs and mergers of environmental services firms who are experiencing the effects of their own success. Most hazardous waste sites have now been evaluated and government money for clean-up allocated. At the same time, private employers are waiting to assess the regulatory atmosphere before proceeding with cleanup efforts. This has required environmental services firms to create better economies of scale through merger, to seek work internationally, or to expand their offering of services. The future of environmental services firms in Pierce County is therefore uncertain at this time.

Although only 1.4% of all technology firms in Washington state have over 1000 employees, they provide 75% of all technology jobs. At the other end, 48% of all firms have fewer than 10 employees and provide 1.9% of all jobs. Washington's bio-technology firms follow this pattern as well. With less than 10,000 employees statewide, 63% work for firms of 50 or fewer employees.[54] Such firms develop consumer products or diagnostic devices from living organisms and biological research. This segment of the industry is primarily concentrated in the Seattle area, although in Pierce County, Weyerhaeuser and W.S.U. research on plants falls within these parameters. It has been predicted that this segment of the industry will experience increased growth during the next ten years as research and development successes lead to consumer products.

Development Activities (Advanced Technology & Research)
Intel plans to hire approximately 1,200 employees during each of the next four years, with most of the positions in marketing, administration as well as engineering for research and development purposes. Out of a slated plant population of 6,000, approximately 1800 employees will likely be involved in manufacturing and assembly. In addition to the impact this growth will have on other sector's of the economy, Intel's selection of Pierce County for its plant location has brought positive media attention to the area. Lesser publicized has been Matsushita Semiconductor's $600 million, 281,000 sq.ft. expansion of its production facilities in Puyallup. Construction of phase one is underway and slated to be completed by the end of 1997. Current plans are to increase their 400 person work force by 75% to roughly 700 employees by the end of the decade. NEC remains a growing presence with the possibility of increasing its Fife workforce by 10% during 1997.

Growth in the newer advanced technology subsectors such as bio-technology and bio-medical research and production; and hardware and software-related production and services could potentially offset losses in the more traditional industries that are occurring as a result of corporate downsizing and mergers. The Economic Development Board of Tacoma-Pierce County has been responding to numerous inquiries from software developers and computer related businesses about locating in Tacoma. Low overhead costs and easy access to transportation as well as the presence of Intel have tended to motivate inquiries. North Gig Harbor, Cascadia (near Bonney Lake), Sunrise (south of Puyallup), and Northwest Landing have been identified as areas within Pierce County where high quality office and business parks could accommodate these growing advanced technology subsectors.

Identifying appropriate locations in Tacoma proper and supporting those areas with the required infrastructure is a necessary next step. One such site is the former Asarco site. Asarco, the EPA, and the others involved in negotiations have reached an agreement that rehabilitates and develops the company's waterfront property in Ruston. Approximately half of the 80 acres will be turned into a public park. The other half of the acreage will be developed as commercial space for offices and corporate headquarters. Although the site is somewhat removed from major transportation routes, the unparalleled scenic beauty should make it one of the most desirable commercial locations on the West Coast. As clean-up and development of the site has proceeded property values in the area, particularly above the site in Ruston, have increased. There is a need now to identify advantages of locating in the Tacoma-Pierce County area and then actively recruit advanced technology businesses based on those.

Higher Education Sector

The Higher Education Sector includes all technical, two-year, four-year and advanced degree granting institutions.

Context for Development (Higher Education)
Two private, liberal arts colleges operate in the Tacoma area: Pacific Lutheran University (enrollment: 3400), the University of Puget Sound (enrollment: 3100). The area is also served by a set of community colleges and vocational schools: Bates Technical College (enrollment: NA), Clover Park Technical College (enrollment: 2000), Pierce College (enrollment: 13,200), Tacoma Community College (enrollment: 8000). In addition, branch campuses of the University of Washington, Evergreen State College, Washington State University, St. Martin's College and City University are located in Tacoma.[55]

Development Activities (Higher Education)
The downtown location of the University of Washington's Tacoma branch has had a positive impact on real estate activity in the Hilltop district, an area that overlooks the campus. According to a briefing paper by the Martin Luther King Housing Development, property values, percentage of owner occupancy as well as the curbside appearance of houses in the neighborhood have improved since the university was established. Efforts by PLU's School of Business Administration to locate its Technology and Innovation Management Master's program and its Financial Services Certificate Program in the central business district should further support these trends. This development may include an international conferencing center.

Furthermore, the influx of students into the area should fuel the growth of retail establishments in the vicinity which would support further economic development in the surrounding areas. At the same time, the Seattle University's Law School will likely vacate its facilities by the end of the decade and relocate to Seattle.

In addition to the impact changes in the physical plant of these institutions can have on a community, program developments can influence the local economy as well. More than a year prior to announcing the opening of its DuPont plant, for example, Intel selected Pierce College for one of eight educational partnerships it established in the region. The chip manufacturer was attracted to a program started over 15 years ago to train electronics technicians for a chip-making plant in Puyallup. The program graduates students who have two-year associate degrees in electronic engineering technology. In addition to hiring these graduates, Intel has contributed to the program through curriculum development, teacher training, marketing of the program to potential students, and equipment donations. Last year, Intel donated $40,000 worth of equipment involved in the manufacturing of microprocessors. Once the

DuPont plant was announced, Intel also set up relationships with seven area technical and community colleges to prepare entry level workers for assembly jobs. The development of DuPont plant combined with Matsushita's expansion of its Puyallup plant will likely lead enrollment in Pierce College's electronic engineering-related program to double or triple its 1995-6 figure of 65 students.

The availability of a skilled work force is an important selection criterion for advanced technology companies. Institutions of higher education can therefore be a valuable selling point as communities seek to attract such firms. The presence of variety of educational opportunities available in the Tacoma area--ranging from certification programs and technical degree programs, to liberal arts and professional degree offerings--is an advantage not available in all communities of this size. In addition, Pierce County benefits from skilled military personnel moving into the civilian sector. Teaming up with local employers, such as the Pierce College's partnership with Intel, is one way that institutions learn how they can adjust to the changing needs of the community's economy. At the same time, to prepare a work force for these fast growing sectors of the economy, a community must meet the infrastructure needs of these institutions as they grow physically and technologically.

DESCRIPTION OF SCENARIOS

Three potential scenarios emerge for the community, based on the analysis of the changing economic base in relation to the community's various economic development projects.

- The first scenario is what will likely occur under the *current economic trajectory*, with few or none of the planned development activities succeeding.
- The second scenario describes a world that enjoys not only the benefits from the first scenario, but also *accelerated growth* from the successful implementation of the International Services Zone.
- The third scenario experiences the benefits of the previous two, along with enhancements in tourism, culture, and entertainment from a "*culture cluster*."

These scenarios will be briefly reviewed below, followed by an assessment of telecommunication needs and growth impacts of each scenario.

Scenario One: Current Trajectory
Each of the specific economic development activities faces barriers to be successfully implemented. Our first scenario examines the prospect that the current activities to enhance economic development (like the ISDZ effort) are not implemented, and the financial service sector evolves along its current trajectory without aid of tax benefits and other direct interventions. The Port of Tacoma and military bases at Fort Lewis and McChord Air Force Base would remain the drivers of the economy. The military bases presently contribute to roughly 50% of the economic activity in the Pierce County, employing over 32,000 military and civilian workers without taking Washington State National Guard employees at Camp Murray and elsewhere into consideration.

At the same time, a modest number of computer-related manufacturing units as well as research and development units could arrive in the wake of successful operations at Intel and Matsushita. Some of these would likely provide support to the established computer companies in a technology corridor from Bellevue to Bothell in King County. Quebecor Integrated Media, a major Microsoft supplier, is an example of such a firm. Large tracts of relatively inexpensive land where custom facilities can be built, easy access to most modes of transportation, and an available work force make this prospect likely.

Services to Tacoma's growing medical services industry, including back office support for physician provider groups and insurance operations, are also expected to grow as a result of the criteria described above. In addition, Port of Tacoma officials expect light industrial companies, distribution centers, and major shipping lines will continue to locate more facilities in its service area.

Scenario Two: Accelerated Growth
In addition to the growth occurring naturally from the evolution of different industrial sectors, a second scenario portrays Tacoma/Pierce County as a center for professional services including financial services aimed at an export market. This scenario would also include a higher rise in advanced technology companies to follow the upgrade in the downtown corridor that would accompany a financial service center. This prospect could result in the greatest change in the nature of the employment base in the Tacoma/Pierce Country area. This vision of the area's economic future rests on the passage of the International Services Development Zone, which would provide tax advantages at the federal and state level to attract international services companies (especially financial services firms) to Tacoma. In addition to financial services firms, the types of businesses attracted under this scenario include professional services such as law and accounting, architecture and engineering, and environmental consulting firms.

The coordinating group anticipates businesses will arrive in the zone toward the end of 1997 or early 1998, with an increase in firm locations during 2001-2002. The consultant report indicates that, if fully developed as the Dublin project, this program could produce about 10,000 jobs in the city -- 3,500 for the ISDZ and 7,000 for indirect jobs. the earnings would be $130 million for the 3,500 direct and $200 million for the indirect, or total new earnings of 330 million. The jobs would also provide a large number of entry level, high school

Enterprises that locate in the ISDZ would blend well with existing financial services firms in the area. They would also provide employment for a highly educated, well-compensated work force. In doing so, they create an upward employment path for workers in existing businesses such as the medical insurance industry, the banking industry, as well as for retiring military personnel who typically have extensive management and/or technical training.

In addition to the growth of computer-related technology companies envisioned under Scenario One, the migration of biosciences firms to the area is also possible. Several factors make this likely. The greater Seattle area is already the sixth largest life sciences center in the country, with growth fed by research at the Fred Hutchinson Cancer Research Center and the University of Washington. Many of these biosciences companies are reaching the end of their research and development cycle and are moving on to the manufacturing and marketing phase. In doing so, they will be in search of custom built laboratory and manufacturing space. Again, available land at a relatively low cost and the prospect of retrofitting existing office or warehouse space make Tacoma/Pierce County a contender. Research institutions and those potential headquarters operations that remain in the Seattle area are located under an hour away by car. The existing medical centers in Tacoma could provide controlled patient testing opportunities. In addition, the new research facility at Madigan Army Medical Center could provide a stream of trained employees as military personnel leave the service. Under this scenario, universities would need to work with new employers to ensure they graduate an appropriately prepared work force. For example, the University of Washington's nursing program plans to expand its public health management program at the downtown campus would support this scenario.

The impact of one large advanced technology company or a few international professional services firms could have a significant impact on the economic growth of the area. The arrival of such firms would encourage more high and middle income housing to locate in or near the Central Business District, followed by the development of additional retail opportunities. Smaller business districts such as Proctor, Lincoln, Stadium and Sixth Avenue would provide retail support for the newly arrived professionals as they visit restaurants, use local services, and shop for goods. In addition, executive housing in North Tacoma, University Place, Lakewood, Puyallup and the Key Peninsula would also be in greater demand, with concurrent impact on the retail core in those communities.

Scenario Three: Accelerated Growth with Culture Cluster
Adding to the conditions that built scenarios one and two, a third scenario considers the enhancement of tourism, entertainment, and culture industries in Tacoma. If Tacoma makes some significant facilities improvements it would become eligible to bid on larger

national and international conventions. Minimally, these include the construction of a second "Business Class" hotel and the expansion of the existing Convention Center. Benefits would reach private convention facilities, such as the Landmark Convention Center and the Sheraton, public facilities like the Tacoma Dome and Cheney Stadium, and retail businesses. For example, the proximity of several large performing stages to one another in the Broadway Theater District creates the opportunity for Tacoma to become an important center for performing arts conferences such as the recent "World Harp Congress." An organized, targeted marketing effort and follow-through would make this prospect more likely.

Second, if a "culture cluster" was created in Tacoma's Central Business District, Tacoma could become a tourist destination in its own right. It is anticipated that as tourists explore traditional attractions in the area, such as Point Defiance Park and Mount Rainier National Park, they will learn of the community's cultural attractions located downtown. The Washington State Historical Museum, Tacoma Art Museum, the Broadway Theater District and a possible multiplex movie theater in combination with the International Museum of Modern Glass and other prospective developments on the Thea Foss Waterway would create a downtown destination of interest. Increased tourist traffic would then support the development of additional attractions, for example a maritime museum developed from the existing Maritime Center on Dock Street, an aquarium, a Puyallup Indian Tribal Museum, and additional public parks.

Linkage between these tourist attractions and existing business districts which have developed their own personalities, such as Proctor, Lincoln, Old Town, Stadium and Sixth Avenue, could provide a significant business boost for these neighborhoods. In addition, increased tourism would lead to opportunities for new and existing Bed & Breakfast and other lodgings.

At minimum, however, a modest expansion of employment in the professional services sector as described under Scenario One would be required for this scenario. Local people with disposable income are needed to support these facilities during the low point in the tourist season. That fact also makes facilities in this scenario more likely to thrive if Scenario Two comes to pass. In addition, Scenario Three would be helped by a well-orchestrated approach to cross-promotional marketing by the various tourist locales.

IMPLICATIONS FOR GROWTH RATE

The three scenarios must be compared to a basis. For this report the basis is the Puget Sound Governmental Council and State Office of Financial Management reports, adjusted for recent changes in the local economy. Their forecast for population growth in Pierce County is 1.8% per year from 1995 through 2005 and then declines slightly to an annual rate of 1.5% for the subsequent fifteen years. For Tacoma, population growth is predicted to average 1.25% per year through 2005, and then slow to 1.0% annually through 2020. These growth forecasts assume that the current state of the economy remains unchanged. Housing unit growth will increase by the same percentage amounts as per the population. In Pierce County, over the long term, housing units tend to increase at about the same rate as population.

It is reasonable (but not certain) to assume that the basic economic structure will remain unchanged over the medium term horizon (through the year 2020). However, at least two forces will impact the nature of the local area economy. One is the effect of the Growth Management Act requirements. The other is the provision of adequate infrastructure, including telecommunication support.

Impact of the Growth Management Act

A second issue is the impact of the Growth Management Act based on its influence over where and how population growth will occur. Under new regulations, the emphasis is on concentrating growth in the existing urban areas, curbing growth in the unincorporated areas, and avoiding growth in rural areas. As a result, more growth will be channeled into the Tacoma and Puyallup vicinity than in the past. Areas with clear development plans and the ability to provide traditional infrastructure will also see steeper growth. This factor favors areas such as Browns Point, Dash Point, DuPont, and Thun Field.

New housing types will change. Within urban areas, including the central business district, there will be a growth in multi-family housing. The density in the main existing residential areas (e.g., Proctor and Stadium, Lincoln, University Place, Steilacoom) will increase -- with a strong possibility of more high rise (two to six story) units. In the county, the expansion will be primarily accommodated through single-family, detached units. Even in the county, however, the pressure will be to consolidate growth into those areas that already have traditional infrastructure.

Growth on the Key Peninsula will be more problematic. Transportation is obviously a problem, and this will favor location there by non-commuters, generating more demand for local retail goods in Gig Harbor. Infrastructure In that area, such as water and sewer will be more expensive and will push up housing prices.

To the extent that the employment growth occurs closer to DuPont than to the current Tacoma boundaries, some housing growth (and population) will occur in Thurston rather than Pierce County. One estimate, by the Thurston County Economic Development Board, expects that almost 70% of the non-DuPont residences of Northwest Landing employees to be in Thurston and only 30% in Pierce. As Thurston grows, however, people will travel to Pierce County for shopping and entertainment. Although a second spill over area could be Auburn in south King County, residential neighborhoods located there are not as attractive as in Thurston County nor is the economic base as diverse.

Growth Impact of Scenarios

Scenario Two The location of another large technology company (following the Intel example) or the successful development of the ISDZ would produce a major employment gain. In this case, growth within Tacoma would increase by 0.75% annually in the early time frame (1995-2005) and by 0.25% in the later frame (2005-2020). A slow down in the acceleration of growth would be due to more attractive non-Tacoma locations. This type of scenario would initially increase annual growth in Pierce County by 0.5% annually, and then slow to 0.75% over the longer time frame. Again, this would reflect better siting opportunities outside of Tacoma.

Scenario Three Another change that would have a significant impact on the moderate term growth outlook for the area would come from the development of an expanded art/cultural and tourist industry. This could happen if the "culture cluster" generates the critical mass of activity needed to attract travelers and put the area on the "map" of destination stops. The effect will be to raise Tacoma's annual growth by 0.1% and Pierce County by 0.2% in the 1995-2005 time frame. Greater growth will occur during the 2005-2020 time frame as infrastructure is developed and earlier impacts are felt, with increases by 0.25% for Tacoma and 0.3% for the county.

IMPACT OF TELECOMMUNICATIONS INFRASTRUCTURE

Patterns of growth in the major sectors of the local economy are, and will be more so in the future, dependent on the community's telecommunications infrastructure. Many established sectors will also require continued technology investments to remain competitive.

Government activity at military installations will continue to be the a significant sector in the local area economy. However, as the size of the public sector in the national economy continues to get smaller (moving toward the promised balanced budget), reductions in the defense budget will become increasingly important. The existing facilities in Pierce County have survived two rounds of base closures, due in part to the fact that they were technologically sound. The future is always uncertain, however. Access to the most modern telecommunications technology will help assure their survival in the local area.

Up-to-date communication and information services are essential to the survival of *health services.* Commercial data management in support of medical services also require a substantial and increasing telecommunications infrastructure. The health care industry is a primary industry in Tacoma Pierce-County and a rich source of potential applications and associated technology drivers. Not only are there a variety of applications driving both applied and fundamental research, but the spectrum of actual operating modes in health care provision systems span a wide range. Provision ranges from elective, non-emergency, monitoring where the patient and provider are together in a well equipped office, to emergency diagnostic and treatment situations where the diagnostic expertise is geographically remote from the patient and the treatment expertise. Remote diagnosis requires high bandwidth, real time connection oriented services which support multiple video and data streams as well as voice communication. The precise telecommunications capability required to support this activity is application specific, but can be analyzed within a distributed communication framework since in general health care providers may be geographically dispersed in multiple locations.

The increasing telecommunications need is also true of other *professional services*, especially in the area of *financial services.* The financial services are not communications limited in the same sense as remote medical diagnostic services, or shipment status monitoring. While financial service providers at both the institutional level and the consumer level are sophisticated users of information, the financial services industry does not place heavy demand on the design of the telecommunications technology. This somewhat curious situation results from several factors:

1. Most financial information is coded in alphanumeric formats. These formats are very efficient to transmit using a variety of existing telecommunications technology.
2. Humans utilize financial information and services in alphanumeric or rudimentary graphical formats (trend charts).
3. Financial information is semantically "dense", the simple statement "DOW off %5" contains a wealth of information, but is amazingly compact (eight bytes).

So it is clear that need for increased bandwidth is usually not instigated by their need to support more volume. However, the financial services sector in the Tacoma area does have unmet telecommunications needs, as evidenced by the Frank Russell Company, one example of a professional services firm experiencing increased telecommunication needs in order to link its headquarters with its international offices and clients. For these kinds of clients overall bandwidth may not be an issue, but security of the line, speed and direction, and responsiveness of the vendor may be. This is an industry sector where telecommunications is part of the production process — a breakdown in the system can cause the organization itself to cease to function until the system is back on-line. Failure to invest in new technologies, especially communications technologies, would therefore limit the growth potential of the area. Companies like Frank Russell would be forced to continue to privately construct work around solutions or utilize a remote service center that could supply desired access and services. Other areas looking to attract these types of companies would need to provide access to a sound telecommunication infrastructure. The success of the international services district and the ability to attract new businesses to the redeveloped Foss will depend, to a great degree, on access to low cost, full service telecommunications technologies.

More uncertain, and equally important, will be the information and communication needs of shipping and support activities in the *Port of Tacoma* area. Increase in direct competition to Tacoma's container trade, competition for new shipping lines, just-in-time inventory requirements, and lower labor costs all suggest the provision of telecommunications technologies will be important for this sector of the economy as well. Distribution centers in the Port of Tacoma, with SuperValu as another example, are becoming increasingly dependent on telecommunications for the transfer of data between regional distribution centers, vendors, and the parent company. . Customers frequently desire to know the status of shipments which they have sent or are waiting to receive. These shipment status services are often effective differentiators for shipment service providers. In the small package shipment service business competitive pressure drove both FedEx and UPS to offer shipment status services. With the small package shippers, status generally provides pickup time, expected or actual delivery time and other information. With integrated shipment services providers such as the typical port authority, the cargo may be at sea, in the air or with some common carrier trucking firm which makes an accurate and reliable determination of shipment location problems. A possible solution entail utilizing global positioning systems (GPS) and wireless telecommunications technology to update port authority databases on the location and condition of shipments in transit.

In the *retail sector*, increased reliance on computer usage in stores is likely, as inventory costs can more effectively be controlled with timely ordering and control, use of fax and modem transactions is increasing, and the use of things like fingerprint recognition for credit cards or check writing. Successful merchants will need to adapt to these new demands -- a potential large increase in data transmission needs from many small and scattered sites.

The *advanced technology* businesses also can have telecommunication needs. A research based organization will often desire high-speed access to other researchers or their works. In fact, it is the ability to telecommute and connect regionally-located Universities that has fueled some of the dispersion in advanced technology companies to smaller communities.

Culture-based organizations in this scenario are not as technology-dependent as professional and health services, but telecommunications does play an increasing useful role in the tourist/convention category. The Visitor and Convention Bureau anticipates the use of smart cards to allow tourists access to a variety of services from transportation to tickets to shows. That idea would require a well developed communications network in the city and adjacent points of interest. For the conventioneer, satellite conferencing and digital information transfers are of growing importance. In addition, many business travelers expect a computer modem in their hotel rooms to connect with their home office. Museums increasingly use interactive media as an educational tool.

It is not merely the business applications themselves that require infrastructure access. Sophisticated, technology oriented employees of many of these types of firms would expect to have access to their workplace computer system from their home, access to the Internet, high quality cable systems, and eventually new technologies which are only on the drawing board at this time. A failure to invest in the appropriate infrastructure may leave Tacoma out of the running as a location for these types of firms and the employees who work for them.

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