Communications and Networking (ComNet) Framework Plan

NOTES: This document is approximately 25 pages long.

Introduction

Telecommunications is the infrastructure issue. Just as the roads, waterworks, sewers, electricity and telephones have always been vital to communities, so too is telecommunications infrastructure a community-wide need. The challenge now is to extend this level of universal service throughout the community. (Center for Civic Networking)

ComNet currently provides a variety of communications services to the Bureaus of the City of Portland and approximately 100 government and public service agencies in the region. The Division employs 37 full-time staff, is divided into four functional sections (telecommunications services, engineering, and radio operations shop and customer service), and manages an annual enterprise fund of over $13,000,000. We have two major strategic initiatives running currently along with our day-to-day provision of services. These are the Integrated Regional Network Enterprise (IRNE) program to complete a regional fiber optic network infrastructure for government, and the Public Safety Radio Enhancement Program (PREP), to provide regional coverage improvements and replacement capital for public safety radio (see appendices for project narratives).

ComNet is currently reacting to the fast pace of change in technology and service level expectations in our industry. Our reaction includes a managed reorganization of ComNet and its services begun in 1998, and a commitment to continually update the technologies and services we offer. ComNet has a complete five year business plan which provides an overview of our commitment to move beyond reacting to change—and toward managing change in our communications and networking products and services and in the role we fill in the City government and in the region.

ENVIRONMENT

The Present:

- The current environment in the division is extremely fast-paced, with very high customer expectations.
- Customers are demanding new telecommunications and radio services
- Customers are demanding more data integration with traditional communications services
- We are a partnering player in the region, with partners including PDOT, ODOT, Tri-MET, DAS, PPS, Multnomah County, and City of Gresham.
- We are an expert level organization that provides rather than procures services.
- ComNet has refocused to provide high-level project management across the City for construction, engineering, design and implementation.
- Prior to 1998 ComNet was characterized by "silos" that worked independently and did not coordinate. There was extreme separation between telecommunications, engineering and the shop. This has changed to very integrated departments who project manage, coordinate and strategically develop services and products.
- ComNet has developed responded to the City's need for technical consulting on infrastructure policy. ComNet is working closely with Government Relations, Cable and Franchising, PDOT and PDC on a variety of policy initiatives—from telco hotels, to telecommunications licensing to legislative positions of the City.

SUCCESSFUL TRANSITIONS

{PRIVATE **}FROM**		**TO**
Reactive (fire-fighting "do it now")		Proactive ("planned")
Action		Vision and action
"guerilla" problem-solving		Coordinated problem solving
Competitive success (silos)		Integrated success (team)
Organizational rigidity (focus on: "my job" or "not my job")		Organizational flexibility (focus on "work to be done")
"We provide technology" (quality equals technology)		"We provide service" (quality equals service)
Training and user support separate/one-time		Training and user support integrated/on going

{PRIVATE }**FROM**		**TO**
"We own equipment and systems" (rigid) (in-house)		"We broker equipment and systems" (flexible) (in-house and out-sourced)
Builders		Contract managers
		Application design and support
"Just do what you were hired to do"		Growth/development for staff

THE FUTURE

- The future is recognized as an environment of mega-speed technological change.
- We recognize the need to invest in systems and architectures rather than single purpose solutions
- We place a high value on strategic and tactical planning, project management and forecasting
- We create a flexible organization that can constantly adapt to change
- We strive to become a clearinghouse of technical resources for the City's policymakers
- We emphasize strategic partnerships

{PRIVATE }KEY BUSINESS STRATEGIES:

- We need to manage the convergence of computing and telecommunications in the City of Portland—the IRNE project launched in 1999 is our main strategic tactic.
- Voice, video and data networks will converge onto the same wire facilities (or wireless facilities).
- Our public safety wireless networks (radio and data) must be enhanced, kept reliable and a replacement strategy evolved.
- Mobile computing will demand different wireless infrastructure than traditional mobile radio.
- Telephones, voice mail, email, paging will be provided by a single telecommunications device.
- We need to promote the separation of "networking" from the management of applications, desktops and servers. While the latter can stay in various Bureaus networking needs to be integrated. We have made significant strides in promoting this philosophy by being aggressive and successful in the IRNE design and implementation efforts.

The IRNE initiative is our key strategy to prepare for the dramatic market shift from an analog voice-centric product suite, to a broadband highway for voice, data and video. The IRNE project casts a wide net over the distributed single-purpose data networks currently in place, the future network demand, and the leased voice network, and harnesses these assets and expenses in a combined architecture. The key assumption in the IRNE architecture is that Bureaus will combine their data and voice traffic onto a single managed architecture, must like radio users regionally have done. The great benefits of this agreement are reliability, cost-control, and quality.

The Public Safety Radio Enhancement Project (PREP) is an equally challenging strategic project to address several issues facing the public safety communications system in the region, including system coverage, capacity, reliability, and ultimately the next generation replacement system. The $18 Million dollar system is aging and experiencing interference as the FCC licenses commercial carriers in the same frequency range as public safety systems are licensed in. Moreover, the system is projected to reach its end of useful life in approximately 2010. ComNet is actively engaged with the public safety community to create a replacement strategy for communications systems serving public safety as well as a strategy to enhance and keep reliable the systems we have in place at present.

Administrative Services Review Process -- To assist in the creation of this framework plan, two advisory teams were selected to review ComNet's services, organizational structure and effectiveness, and to recommend cut strategies.

The Internal Advisory Team included Mort Anoushiravani (Chief Engineer: Water Bureau), Marshall Runkel (Commissioner Sten's Office), Mary Beth Henry (Deputy Director, Cable and Franchise), Madelyn Wessel (Chief Deputy City Attorney), Scott Turpen (Administrator, BES), Michael Palmer (Administrator; Portland Police Bureau), Ed Wilson (Asst. Chief; Fire Bureau), Michael Ogan (PDC) and Richard Gray (PDOT).

The External Advisory Team included Tom Bechtell (Developer; Pittock Block Internet Hotel), Ben Doty (CIO, NoaNet), Manny Ovena (CIO; Portland Public Schools), Mark Gregory (Director of Networking; PSU), Ron White (Director of Networking; Tri-Met), Rich Bader (President; Easystreet Online Services).

Each team met monthly throughout the ASR process timeframe for a half-day meeting. Meetings were facilitated to produce productive discussion, and direction for the ComNet Director to use in proposing a cut strategy. Each team was provided with detailed financial and business strategy information on the ComNet budget and operations. In addition, the ComNet Director met individually with members to discuss strategies and issues in further detail.

Results from Cost Reduction Phase – The target reduction phase of the ASR process was completed for ComNet on December 1, 1999. ComNet met its target figure of $406,000 by proposing the following:

- Elimination of some Fire Liaison personnel in the 911 Dispatch Center: It is noted that the Fire Bureau does not support this cut recommendation.

- Reduction in Long Distance and Cellular Charges. ComNet proposes a 10% rate reduction in long distance and 15% in cellular rates to Bureaus. This will produce combined savings of $ 71,327 in cellular phone rates, and $16,987 in long distance telephone rates.

- Revenue Creation in Franchise Enforcement: This recommendation is expected to provide $150,000 per year in additional revenue to the general fund once it is effectively implemented. However, ongoing new costs associated with this recommendation are expected to be about $90,000 per year. Net revenue after expenses is forecast at $59,986.

- IRNE Rate Reduction: ComNet proposes a $112,396 per year IRNE rate reduction, reflecting a reduction in debt expenses associated with the project. This savings is achieved by applying unanticipated revenue received by ComNet this year (2000) to the IRNE capital start-up costs, and reducing the debt associated with the project.

❑ ***Vision*** –

❑ **To be the preferred regional provider of public safety grade broadband networking for government and educational institutions.**

ComNet has evolved over the last four years from a reactive order-taker and "fixit" shop to an aggressively visionary organization. ComNet's goal is to provide superior quality managed communications technologies to all Bureaus of the City and to the region which are needed to support public safety and public service operations in local government. The main concept of our business vision is to dedicate all our resources to ensuring **reliability** and **quality**. In the telecommunications and networking environment all other values are secondary to these two. A network that is not reliable is a cost that cannot be justified. In the public safety environment it is also a liability that can cost lives as well as millions of dollars.

In order to realize the goals of reliability and quality in all services that we provide, we have a costly reality. Our uptime requirements of "5-nines" (99.999%) remain in effect during all disasters and emergency response. Our personnel are carefully trained. Our equipment is replaced, maintained and tested. Our networks are managed in-house. These values are only affordable through our *focused vision* and our *strategies* to manage cost through leveraging and aggregating partnerships.

To manage cost ComNet has devised a business strategy of leveraging investment. In order to guarantee quality we make the necessary investment to ensure the level of service we are committed to, but we leverage each dollar with efficiencies. The leverage strategy involves several key elements:

1. Strategic Partnerships throughout the region. ComNet currently has inter-agency agreements with over 100 public agencies outside the City government to provide radio services. ComNet helped form the Cooperative Telecommunications Infrastructure Committee (CTIC), a partnership of the City, Tri-Met and ODOT to develop fiber optic infrastructure in the region for public sector communications needs. This project has recently been recognized by the Rudin Center for Transportation Policy and Management at NYU's Graduate School of Public Service as a Benchmark Best in Nation example of intergovernmental cooperation in this area. ComNet has also created partnership agreements with Multnomah County and Portland State University and the State of Oregon to participate in the IRNE project at various levels of infrastructure sharing.

   These partners receive the reliability and quality benefits of ComNet's structure, but pay only an incremental investment to support it. In turn, the City receives revenues through these partnerships to help finance the level of operations necessary to support our value structure. The key to our financial leverage is to maintain these values. Should ComNet fail to deliver either on reliability or quality the strategic partnerships would no longer be possible. The loss of revenue would cause ComNet's financial structure to constrict, and the level of internal investment would have to fall. Once that happens, the City would no longer be able to afford the quality of services it provides itself through ComNet.

   In addition to external partnerships, ComNet's goal is to establish further partnership relationships with City Bureaus. We have had much success in these internal partnerships over the last three years with the Water Bureau (Portland Building Fiber Backbone, Bull Run microwave system, Water EOC), Police Bureau (roll out of MD 520 mobile data system), BOEC (911 switch management, Exchange Server), Cable and Franchise (IRNE construction), Transportation (Cooperative Telecommunications Infrastructure Committee). These "horizontal" trust and business relationships negate the costly practice of "silo" management of resources, in which Bureaus make technology investments based solely on their organization's best business interest rather than participating in co-ownership of technology with other bureaus.

2. Volume: ComNet is committed to "scalability." The network services we offer require ubiquitous coverage and availability *throughout the region in which the City of Portland and its partners operate.* This large area contains hundreds of scattered government locations, and thousands of public safety employees and providers. Each must inter-act and communicate with the other using a seamless set of network services, which ComNet provides. Volume makes the networks scalable to these demands. ComNet aggregates multiple users and multiple applications onto reliable, high capacity networks of the highest possible quality. Without aggregation, several smaller, single purpose networks would drain capital and operating revenues from each other.

3. Competence: ComNet strives to achieve excellent results through clear business goals, defined products and meeting deliverables: ComNet has achieved its success and customer satisfaction because it maintains a very clear vision of its mission and purpose. This vision is articulated in business goals, a clear set of products and services, and in excellent project management and delivery. This attention to business principles has created an organization which is known for competence. Our reputation for competence creates trust relationships, and these create opportunity for partnerships, for volume and for revenue.

4. Accountability: The final leg of our strategy is to remain accountable to our partners and City Bureaus for results. ComNet is implementing a 5-year business plan (created in 1998) and creates and implements a work plan annually. We maintain accurate inventories of all equipment and end user devices on our networks. We perform annual audits on every part piece we own. Every network site is documented and preventative maintenance is performed. Our rates our published in advance. Every user organization has a written agreement with ComNet. Our personnel are evaluated annually against their workplan goals and responsibilities.

ComNet is organized into four business units: engineering, operations, telecommunications and customer service. Following is a description of each business unit:

ENGINEERING

ComNet's engineering department provides expert design services, project management, construction management and consulting to our internal service organizations, and on a project basis, to our clients. Areas of expertise include IP Networking, Telecom circuit design, logical architectures, tower construction and design, microwave network design, infrastructure engineering, radio network design, quality assurance, construction management and LAN/WAN engineering. ComNet has an extremely talented engineering staff, which is augmented by strategic relationships with BEST consulting, W&H Pacific design and engineering, and other expert services firms. Projects for design and engineering can be handled for our clients on a project or hourly basis.

In addition, have the following long-term development projects in the engineering section:

1. IP interface into the mobile data backbone
2. Public Safety Enhancement Project (PREP) to enhance and expand the public safety radio and mobile data communications systems
3. Design of integrated voice mail, paging, email
4. IRNE network and services engineering
5. Development of Web-based ordering and repair requests

Engineering: Financial Overview

The engineering section accounts for approximately $2.6 million per year in expenses or about 20 % of the total budget of the division. Currently, about 15 % of that expense is in personnel-related expenses, 13 % in consulting (materials and services) and the majority of the remainder is debt service on capital equipment expenditures, or current year capital expenses.

OPERATIONS AND SERVICE SECTION

Operations and Services provides full service and support to all radio users, either on a contract or billable rate structure, making sure all devices are maintained and replaced, installing devices, maintaining dispatch centers, tower locations and any technology services need a radio user may have. Operations and Services also provides full turn-key services for data users as well as radio users—from ordering your equipment, to installing it, to maintaining and testing, to repair and replacement.

Operations and Services has three sections including radio and data installation and maintenance, radio backbone services (for tower and microwave services) and our video services unit. Video services provides a full menu of image technologies, whether your application is security, surveillance, remote monitoring, or training, teleconferencing or presentation uses. Video services can design systems, purchase and install them, maintain systems, repair and replace equipment….any level of service needed. We have two trained video technicians in house, and several contractual relationships that can be leveraged to support our client's video needs.

We must continually evolve our operations and customer service organizations to efficiently handle the demands of a large public safety customer base. Finally, we must continue to resource our organization in the areas of business expansion opportunities that we have identified, including security systems, video-conferencing, video distribution systems, fiber networks, etc.

Our strategy to accomplish the goal of efficient technical support and customer service has been to migrate the radio shop, which has been primarily and "electronics shop" to a full service organization for the support of our critical systems.

As our technology investment in infrastructure ages, it is critical to proactively manage and maintain public safety systems to reduce and manage the failures of hardware and software.

Besides the growth and maturation of the 800 MHz radio service, other factors are placing pressure on us to expand our operations services.

Devices such as radios and MDT's will become items that are replaced rather than repaired. As electronic equipment becomes more disposable, the need for technicians trained to repair user equipment will decline. The types of technician requirements that will increase are for technicians trained in system level maintenance and repair; supporting the backbone networks and devices rather than the user devices.

Systems-level technicians will require more training and are higher cost employees to the city than component level technicians.

As our organization expands the types of services and products it offers, our support and customer service organizations are even more important. Our volume of business has already increased to the point where we can no longer assume transactions will be completed correctly unless they are documented into a work-order and project management process. These processes in the process of being refined. We can no longer have customers who expect to "talk to Joel," or "talk to Bob" about their needs. Substantial investment in customer information systems has been made over the last two years and continues (Telesoft, ComAnywhere, SystemWatch, L2R)

Operations: Financial Overview

Currently the Operations and Services section accounts for approximately $1.9 Million per year in expenses or about 13% of the total budget of the division. Currently, about 36% are in personnel-related expenses, 19% is in overhead expenses, and 45% is in equipment and supplies (primarily external).

Operations is currently funded through equipment maintenance contracts (primarily for radio equipment, and primarily equipment under contract internally within the City) and billable work orders. Non-city contract maintenance accounts for less than $1/10^{th}$ of contract maintenance revenue. However, the shop receives a sizeable amount of billable work orders for maintenance from non-city agencies, as well as city agencies. Billable work for the shop is growing. Currently it amounts to approximately 1/3 of all revenue.

TELECOMMUNICATIONS

Telecomm provides the following services to all City Bureaus and several outside agencies:

- ***{PRIVATE}Telephony.*** **Citywide managed telephone systems. Our staff of telecommunications analysts provide complete move and changes management, order and installation of circuits, services and wiring, voice-mail management, call center installation and design, call tracking, individual billing, expense monitoring, and other value added services to help you manage your telephone expenses.**
- ***Cellular Phone Service.*** **Telecomm has one of the most competitive cellular phone contracts in the state, due to our large customer base. Telecom currently supplies the City and its non-city customers with over2500 cellular devices. Our value-added services allow you to track and inventory every device, track usage and abuse patterns, control costs.**
- ***Paging Service.*** **As with our cellular phone contract, Telecomm has used ComNet's regional aggregate buying power to negotiate a highly competitive paging contract that we extend to the regions public service agencies. Telecomm currently provides and supports over 2000 paging devices to its customer base. These range from typical "beepers" to fully integrated devices. Services range from page-only service to alphanumeric, group and secure paging applications.**
- **D*ata Networking.*** **ComNet has advanced capability in designing, installing and documenting data communications network facilities. Managed Frame Relay. ComNet offers circuit management and network health diagnostics for frame relay networks at an extremely low rate. Managed Data Service (MDS) Complete 7 x 24 network monitoring and network health checks**

In addition we have the following long-term projects within the Telecommunications Department:

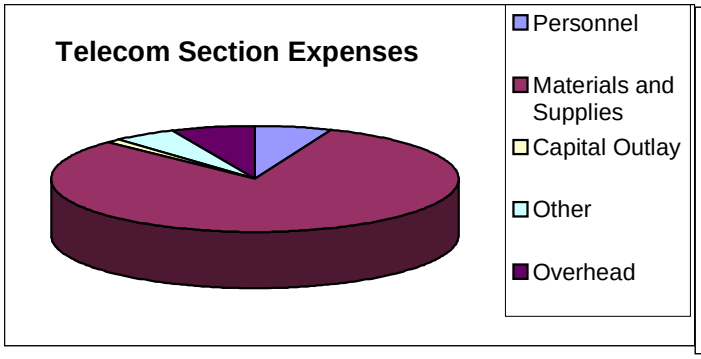
1. The IRNE network implementation of a broadband converged voice, data, video platform for communications.
2. Support of all 911 telephone switching, recording and interfaces
3. 911 system maintenance
4. Wiring design, structured cabling
5. Regional voice and data planning and service
6. Technical Advisory services to PDC, Cable, City Council, regional bodies
7. Policy Advisory services

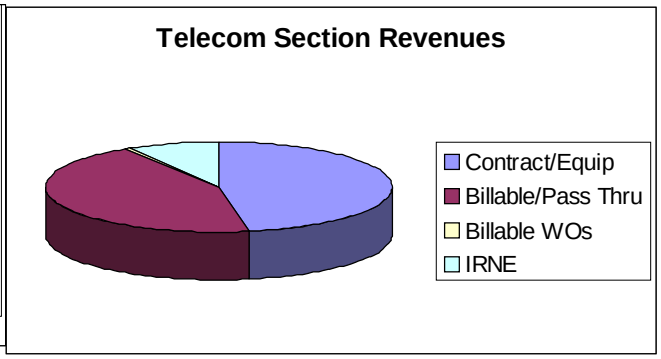
Telecommunications: Financial Overview

The Telecommunications section accounts for approximately 5$ million per year in expenses or about 31% of the total budget of the division. Currently, about 6.1% is in personnel-related expenses, 81% in vending (materials and services), and the majority of the remainder is internal subsidies of other divisions or internal sections. The vast majority of the external services budget (close to $3.2 million annually) supports the Centrex contract and wiring vending for the City's telephone services (dial tone). This will change drastically between 2000-2 as the IRNE project moves expenses from vended dial tone to dial tone and data "dial tone" produced on the IRNE network.

Telecommunications is primarily funded through inter-agency transfers related to the telephone network cost pass-through. Revenue is primarily earned through costs added to telephone equipment.

The financial picture of the telecommunications section is expected to change dramatically





over the forecast period, due primarily to technological innovation. The IRNE initiative will increase expenses in the capital outlay and personnel categories. On the revenue side, we will retain revenues from line costs and maintenance by offering networking services packages that combine voice, video and data on the same infrastructure; the IRNE.

We must actively pursue offering integrated products, like cell phones that have integrated paging and radio, palm-pilots that integrate email and wireless data, and mobile PC/LAN connections. Failure to act aggressively on this front will encourage bureau specific purchasing choices that will make it impossible for the City Council to finance the backbone architecture necessary to support these devices. These practices will also cause grave security risks to the City's data and voice networks in the future.

The IRNE initiative is our key strategy to prepare for the dramatic market shift from an analog voice-centric product suite, to a broadband highway for voice, data and video. The IRNE project casts a wide net over the distributed single-purpose data networks currently in place, the future network demand, and the leased voice network, and harnesses these assets and expenses in a combined architecture. The key assumption in the IRNE architecture is that Bureaus will combine their data and voice traffic onto a single managed architecture, must like radio users regionally have done. The great benefits of this agreement are reliability, cost-control, and quality.

CUSTOMER SERVICE

The Customer Service Department supports direct customer interface, billing, audits, inventory and stores for radio, paging, cell phones, telephones, and all other ComNet provided services. It also manages leases, customer accounts and customer contracts. Customer service also provides IT support to the Division. Desktop and LAN support is outsourced (to BIT). CIS systems support is managed internally.

Customer Service has seven employees including the Stores personnel, where about $2-5 million of physical inventory is stored and deployed every year. Other personnel are responsible for customer inventory and customer information systems, billing systems and customer interface. This Department's budget is about $500,000 per year, and is funded through rates from telecom, operations and engineering services.

As the Division has grown over the last three years in both numbers of users, units supported and services offered, the Customer Service organization has had to grow to meet the challenges. As of this year (2000) this organization has been tasked with creating a highly efficient service strategy that ensures customers get the right answer and the best level of service that can be provided with one-call. We are still in transition and development in improving the customer service aspect of our business.

Key Projects Include:

1. Web based ordering and order status for telecom, engineering and radio products
2. Improved web site
3. Improved billing system with on-line account status
4. Quarterly newsletter

SUMMARY

ComNet is an organization dedicated to the success. We have extremely dedicated and expert employees in a culture of "best of breed." We have successfully migrated to an entrepreneurial form of government entity where every employee understands that our work must be productive, and our ability to stay successful is dependent on customer revenues and customer satisfaction.

We are also an organization dedicated to reliability and serving the public safety community as a first priority. We value this niche of work and our ability to serve these entities and dedicate our resources to their special needs.

Finally, we are dedicated to wise innovation for the City and the region with technology. We have no interest in "bleeding edge" risks. Yet we constantly strive to be flexible enough to make sound but bold steps in technological innovation to promote better public service to citizens. Every police car contains about $10,000 of communications technologies. These are our major law enforcement tools, besides our staff. Communications technologies are essential tools to providing every kind of public service, and becoming more critical every year. We view our role to advise, implement and enhance technology as a critical underpinning of successful government.

Roles and Responsibilities –

> Leadership is influencing a group to accomplish mutually agreed upon goals and tasks while advancing the group's integrity and morale. Even more simply put: Leadership is getting the job done and keeping the team together. (Don Mazziotti, State of Oregon CIO)

There are several organizational aspects of ComNet's structure, which deserve discussion in this document.

First, although ComNet is organized as a City Bureau, it's regional role as a public safety communications utility for government is its primary mission. Thus, it has several characteristics of an enterprise Bureau:

1. **ComNet is not centralized within a customer or user bureau, such as Police, Fire or 911 dispatch, but serves all operating bureaus of the City and external partners.**

   ComNet's structure allows it to produce maximum value for the region as well as the City as a whole by specializing in delivering communications infrastructure and services necessary to support all the functions of local government. Unlike the majority of radio operations organizations around the Country, ComNet is funded through rates, and is able to sell services to other public safety organizations. ComNet is also able to leverage its expertise to provide important communications infrastructure to the City's utilities and is a very large provider of services to the Water bureau and Environmental Services Bureau. ComNet is also a very important provider to Tri-met, ODOT, City of Gresham, Troutdale, Milwaukee, Multnomah County, Washington County, Clark County, the FBI, OHSU and others.

2. **ComNet is organized to provide networks and network infrastructure and services, and NOT network applications.**

   Rather than being housed inside a public utility such as Water, or a public safety organization, such as BOEC, or a centralized IT department where the focus is on delivering applications using networks, ComNet focuses on delivering government networks. ComNet is able to make sure that connectivity exists, it works, and is maintained. This focus is common in the communications business sector but

unusual in government where connectivity tends to be purchased almost exclusively from the Incumbent Local Exchange Carrier (ILEC) to create circuit based networks to support specific applications, often at a very large incremental cost.

This structure has also made it possible for ComNet to provide aggregated, shared networks regionally, instead of in support of a single organization or application. We are advancing in this operational structure and network architecture well ahead of most other local governments around the Country who are just developing the concepts of regional networking "utilities" to support government services. Many of these are still dedicated simply to "transportation" or "public safety." Other local governments have made significant investments in publicly owned power utilities, which have begun to diversify into telecommunications businesses. Unlike Portland's vision, these networks are primarily created to serve the public residential and business users in competition with local exchange carriers such as Qwest and Verizon.

The ComNet ASR external advisory team is recommending that the Council complete code modifications necessary to name ComNet a Bureau rather than a division of OMF. Its structure as a division is an artifact of the reorganization of the Bureau of General Services in May 2000. At that time the Bureau of General Services was centralized into the OMF organization, and ComNet was made a separate Bureau-level entity under OMF and distinct from the BGS divisions. No cost is associated with the completion of this structural change. ComNet is already functioning under this de-facto structure, and no service or cost issues are expected as a result. However, it will assist ComNet to be efficient and effective to be included in Bureau level communications, meetings and other "corporate" activities to have this reorganization completed.

This structural change will also help clarify ComNet's operational mission as a communications provider, both for City Bureaus and our external partners. A key to ComNet's ability to deliver on the IRNE and PREP projects is its ability to function as a regional player and as an entrepreneurial organization empowered by Council and the CAO. Our current organizational status as a former division of BGS, but not yet an independent bureau under OMF is ambiguous.

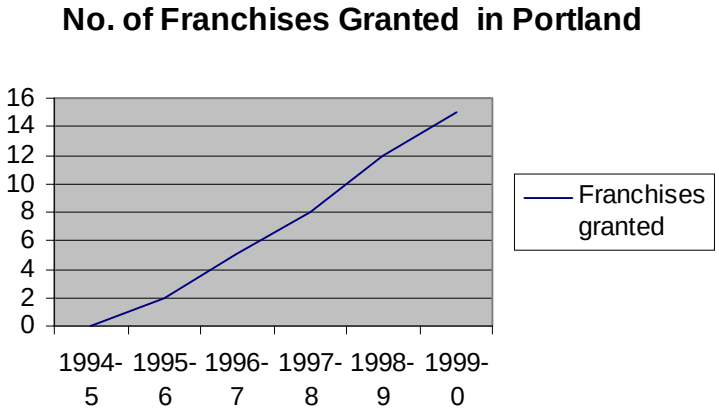
ComNet is not an IT organization. We do not provide help desk services, computers, software, local area networking, server administration, application support, data warehousing, database maintenance, information systems, web applications, or Internet services. ComNet is a radio, wireless communications, telephone and networking services provider and as such is unique within the City's organizational structure.

Technology

In networking, IT and Telecommunications technology changes are propelling convergence of systems. For ComNet, technology changes, demand changes and industry economic changes are paramount indicators to which our business strategy must respond.

In the last five years, since 1995, massive change has occurred in the telecommunications industry. The Telecommunications Act of 1996 deregulated many aspects of the telecommunications industry, and released the monopoly stranglehold of the Incumbent Local Exchange Carriers (ILECs) on what is known as the local loop. (The local loop refers to the copper wiring to every residence and business that emanates from the telephone company central offices) The intent of Congress was to foster competition in the local loop for providing voice and data services to end-users.

Innovations in data communications and voice and video technologies and software has spurred unprecedented demand for telecommunications bandwidth. In Portland, over 30 companies have applied for and received franchises to create fiber networks to serve business telecommunications demand for bandwidth.

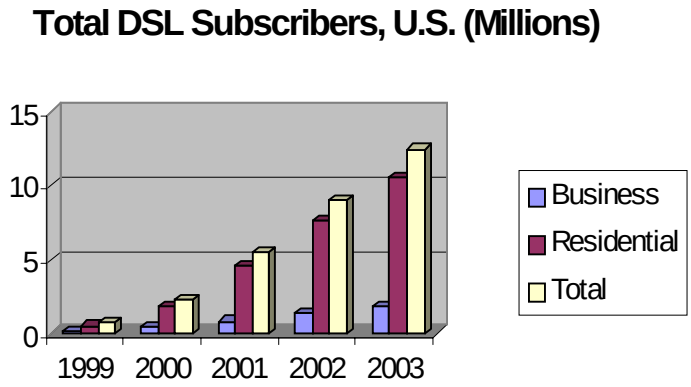


Bandwidth demand is fueled by three trends:

Trend One: Government and Business applications are growing. E-Mail, management information systems, automation of manufacturing and service delivery functions, geographical information systems, and the use of network computing have fueled the need for higher bandwidth in corporate and government networks.

Trend Two: Electronic Commerce is necessary to conduct transactions. Business and government are using e-commerce applications to deliver goods and services to the public.

Trend Three: Telecommuting and remote access to corporate and government networks. The workplace is changing from the desk to the desktop, and from the phone to the mobile phone. Corporations and government understand the value of enabling workers to access, retrieve and manipulate information from remote locations, including hotel rooms, home and secondary office locations. The crisis in traffic and air pollution contributes to the attractiveness of allowing work to occur where the employee is, rather than the employee traveling to where the work is.



E-Commerce and Telecommunications

According to Gartner Group, the cost to an e-commerce company of network downtime averages about $10,000 per minute. This is exacerbated when network technologies allow twenty-four hour transactions, because network outages can never occur when business is "closed" for the day. They generalize that the average data network has been engineered for 99.7% reliability, which will produce average downtime of 26 hours per year. At $10,000 per minute, we are talking about an engineered loss of $15,600,000 per year in productivity and revenue generation.

Network Infrastructure has become as essential to the public and the economy as power, water and roads. The state and local highway system is a wonderful analogy for the regional infrastructure importance of telecommunications in the economy and the delivery of government services.

Who is an e-commerce company? Any enterprise using on-line technologies to deliver goods and services and receive revenue. Under this definition, the City of Portland, is unquestionably an e-commerce enterprise.

For instance, the City of Portland uses on-line technology (wireless and wire line) to dispatch and communicate with all public safety responders, including police, fire and ambulances. The City uses voice mail and call center technology to receive trouble calls from Citizens 24-hours per day. The City uses data communications controlled technology to monitor the status of water and sewer plant throughout the region. The City is developing on-line permitting, licensing and other services to Citizens, which will rely on networked technologies twenty-four hours per day. GIS is an application necessary to all of these services, which must be available to process citizen requests for services. 911 technology cannot fail. The water and sewer services, like transportation rely on networked technology to keep operations running. They cannot tolerate service outages in their network engineering. Neither can fire or police services. The City is an e-commerce company, at least on the service delivery side, and has extensive plans to become an e-commerce revenue transaction enterprise over the next five years. Recognition of this trend is vital to release the necessary investment by government in reliability and rock-solid network architectures.

Tri-Met, PDOT, ODOT and ComNet have recognized the requirement to engineer and control network bandwidth services to provide redundancy and reliability and control the costs of these network resources. Our investment in fiber infrastructure is specifically targeted to ensure network up-time, control network costs, and provide managed network platforms to keep other services running as they become increasingly reliant on automation. As the City moves more of its services to customers from walk-up counters to e-gov platforms depending on communications networks, our architecture has to be able to support 100% reliability. While this level of reliability exists in the public safety communications systems today, it does not exist in the majority of our networks, because of the perceived expense.

The Gartner Group advises enterprises to take initial steps to improve network design—such investments typically have less than a one-year payback and can reduce network costs 5 to 10% on an ongoing basis.

ComNet will take these steps in fiscal year 2000-1 by re-bidding its voice and data network services contracts. By lowering leased costs in the Communications Fund, the Bureau will retain funds for IRNE investments in network hardware, software, and operations and maintenance. **This will allow ComNet to shift voice and data services from public switched networks to the IRNE.**

Real benefits to users will include unlimited available bandwidth, better performance and reliability, especially on the data side, and the ability to build in redundancy and reliability at no additional aggregate cost. We also expect to increase bandwidth to smaller, "low bandwidth" data sites, by providing DSL or cable modem I-Net connections (128kpbs-5Mbps). One connection will be able to carry both voice and data traffic. Rates for voice and data lines are not projected to drop, but to stabilize, while offering much higher speed and reliability. Features, computer/telephone integration and data circuit reliability are expected to increase.

Converged Network Services (CNS) Definition –Gartner Group
CNS is defined as the delivery of voice, data and video from a single customer-premises-based access concentrator and delivers services via one means of access (e.g. digital subscriber line), via one transmission facility (e.g. Synchronous Optical Network, or SONET) and via one switching infrastructure (e.g. asynchronous transfer mode ATM) along with the professional services of network planning, design, implementation or operations.

The IRNE project combines the investments of the CTIC partners for multi-agency, multi-use, high bandwidth fiber infrastructure with the needs of ComNet customers for affordable, managed telephone, video and data communications. IRNE will be a carrier-grade converged (CNS) network for the use of transportation, public safety and government entities. The purpose of the IRNE will be to provide extremely high bandwidth transport to carry voice data and video. It will also be able to carry data traffic (and generate revenue) from the customers such as the City of Gresham, State of Oregon, Multnomah County, Portland Statue University, Oregon Health Sciences University and other organizations within the region who may elect to participate as customers or partners over time.

Advances in broadband telephone technologies have resolved the last mile technology problem for remote sites. BGS will be able to acquire low cost, high reliability bandwidth from carriers to connect any location to the City's IRNE via DSL, cable or other fast-packet services.

Fiber will connect the following locations in the first turn-up phase, and as CTIC expands their fiber build, more sites will become economically justified.

IRNE Phase I Sites

Justice Center City hall Portland Building Development Building Fire Logistics Center Interstate Water Facility Portland State Campus	Portland Communications Center (911) **North Ring Sites** Water Pollution Control Lab Archives North Precinct

Future Build-Out Sites:

Police Precincts
Fire Stations
Tri-Met Locations
State Office Buildings
Portland Public School Locations
OHSU Campus
Multnomah County Locations

Voice and data networks which were entirely separate until very recently, are merging onto a shared broadband backbone. Carriers are addressing this convergence in the core of their networks, including switching centers. The IRNE network currently in the first phases of implementation, will converge the City's voice and data traffic in the IRNE carrier network. This opportunity will save the City the costs of supporting a separate infrastructure for both voice and data services. These savings will produce the funds needed to expand our data networking services to the levels Bureaus will require for e-gov services without raising their overall networking costs.

The IRNE begins the consolidation and convergence of network traffic onto a single network by converging the network transport used for telephone and data between buildings. Ultimately, to achieve the maximum performance and cost efficiencies, the network will need to be converged throughout each building and all the way to the user connection.

❑ *Financial Issues –*

ComNet has been bringing in external revenues to support operations for seven years, since the inception of the current public safety radio system. We do this by providing essential communications services to the public safety and public service sector within the metropolitan region through intergovernmental agreements with other jurisdictions and service agencies (such as ambulance companies, hospitals and transportation agencies)

Public Safety Radio Enhancement Project (PREP)

ComNet is responsible for maintaining and operating communications systems for the City. We operate a state-of-the-art mobile radio and mobile data system. These systems are known collectively as the "800 MHz Public Safety Radio System." The system now serves a majority of public safety providers in the region, including 100 outside agencies

such as local governments, counties, hospitals, ambulance companies, utilities, Tri-Met, school districts and others with a need for public safety grade communications. Significant investment in the system is necessary to continue to offer reliable service to public safety users in the region including our own public safety agencies (Police, Fire, BOEC).

The radio system uses Motorola's SmartZone technology, which is also used by neighboring Clark, Washington and Clackamas counties. We operate on 28 separate radio frequencies, re-used throughout the various antenna locations. We operate four simulcast sites and ten intelligent repeater sites to provide coverage from Forest Grove to Mt. Hood and from Clark County to Wilsonville. The estimated value of the system is $18 million.

The system has been in operation for seven years of a twenty-year lifespan. It is aging. The system's maintenance needs are increasing, as is the need to upgrade software and hardware to meet current standards of performance, vendor support issues and additional traffic on the system. Reliance on communications technology has grown in public safety over the last decade, and it is now unthinkable to place an officer on the street or in a vehicle without radio communications. This increase in technology demands for law enforcement has created much tighter requirements on the radio system for performance and coverage than have historically been necessary, or that were foreseen in the original system design and financial plan. Additionally, two simulcast towers originally designed into the system architecture have not been built (Prune Hill and Downtown). This has created coverage "holes" that have become more and more intolerable to law enforcement as radio usage increases.

Moreover, the commercial landscape of wireless communications services has changed dramatically in the last decade. Where ten years ago, hardly anyone used a laptop or cell-phone today the penetration of these devices makes them common not only for every office worker, but also for most family members. There are more than ten wireless providers in the Portland marketplace, and they come with a proliferation of tower locations and cell sites that emit potentially interfering transmissions. One vendor in particular, Nextel, has been granted frequency licenses in the same band as public safety across the country. As they have filled in transmitter locations in our coverage area, their RF output has wreaked havoc with the coverage of our transmitters. Effectively, every Nextel tower has taken a bite out of public safety coverage on the 800 MHz system. This "crowding" of the frequency spectrum can be mitigated, but only with additional capital investment.

In summary, the system has expanded to serve a regional customer base and regional geography, and it is aging. The system is in need of maintenance and enhancements to keep it reliable and performing for its intended purposes. The City must enact a financial strategy to provide funding for the ongoing performance of the radio system, or expect failures in its reliability and functionality over time.

The Financial Picture

The 800 MHz radio system operations budget is approximately $2 million per year. This covers day-to-day operations. No funding is collected for maintenance of the radio system, or for replacement of the system. Up until now, occasional maintenance issues have been met by reallocating funds from the operating budget to smaller capital projects. Last year a 25% rate increase was approved by City Council to cover a software maintenance contract. The fact that the City is setting aside no funding for major maintenance and enhancement of the system is completely inadequate to support the reliability requirements of a public safety and disaster response system. Since 1998 the number of units in service on the system has doubled, and the equipment supporting them has aged. Demands on the system have grown, interference has been introduced, and the user community, particularly law enforcement, is transmitting more and more seconds per unit than ever before.

ComNet has identified three financial issues for development of an 800 MHz Public Safety Radio System Capital Improvement Plan fiscal strategy. They are:

1. Funds must be appropriated for major maintenance of the system. This is an ongoing need. Major maintenance projects include maintenance of radio towers and cabling to OSHA standards, maintenance of radio site buildings, periodic maintenance of software and hardware installed in the backbone, replacement of worn or broken parts, etc. Funds must be appropriated for system enhancements. System enhancements would introduce greater coverage, greater capacity and greater performance or features than were not originally funded in the system design. This is also an ongoing need. An example is our current need to complete the upgrade the system from 22 channels to 28 channels to accommodate greater traffic from each unit, the need to add IP traffic to the mobile data system, the need to replace channel banks that are no longer supported by vendors, and the need to upgrade every subscriber unit to mitigate Nextel interference. These types of investments are a fact of life in a communications utility, which must be kept state-of-the-art during its life-span.

   Because expenditure requirements will fluctuate over time between maintenance and enhancement projects, we recommend that the correct investment for both major maintenance and system enhancements to be 5% of system value or $900,000 annually. This will allow large maintenance projects in years where they are needed, and expenditures for enhancements in years where maintenance requirements are smaller.

2. Funding is required for additional transmission tower locations to address coverage issues and to enhance system reliability. These projects require one-time investments to build additional radio tower locations and to overbuild out T-1 landline sites with microwave. Currently we are missing a tower location in Clark County (Prune Hill), and we may need to add another one downtown; as well as a Northwest Portland IR

site (Dixie Mountain). Costs associated with these 1-time expenditures are estimated to be:

- Prune Hill Simulcast Site: $3.2 Million
- Downtown Simulcast Site:* $2.0 Million
- Dixie Mountain IR Site $ .5 Million
- Microwave T-1 Overbuild $1.8 Million

*(The need for this tower location is under review in ComNet engineering and is included until engineering determines that there is an alternative)

3. Funding is required for next-generation system upgrades. We expect that this will be a major investment, but hesitate to forecast its exact magnitude. New technology is just being introduced in this area. However, we can say that we expect the investment to be approximately $18 million. The two identified projects associated with next-generation upgrades are a next generation wireless data system and an upgrade to the existing 800 MHz voice system. Costs associated with these 1-time expenditures are estimated to be:

- Channel Banks Replacement $ 6 Million
- Next Generation Wireless Data System $12 Million

Financial Recommendations

1. ComNet recommends that the City allocate five percent of asset value (currently at $900,000) annually to the Communication Services fund for major maintenance and system enhancements. The 800 MHz radio system has never had a stable funding source for major maintenance and upgrade projects. As the system has aged the number of major maintenance and upgrade projects required have increased. The system needs a stable funding source for these important projects. We recommend that this amount not be factored into rates, but be a direct allocation. We feel that if this amount is factored into rates, it should not be factored into rates to external customers or enterprise bureaus. Our concern is that raising this amount in rate increases will deter external users and enterprise bureaus from participating as ratepayers in the system. Since fully half of the ComNet's current rate revenue comes from external customers, we would expect to lose funds rather than raise revenues. The external customers who use the 800 MHz system subsidize the system for Portland's public safety agencies. We would expect to lose a substantial amount of units if the rates were increased to the level necessary to generate this amount of revenue.

2. A GO bond measure is proposed for 2002 for the new 800 MHz radio system towers in the Communications Services program. The total cost of $7.9 million is beyond the City's ability to cash finance. We would hope to be part of a larger public safety bond measure.

3. A second GO bond measure is proposed for 2004 for the 800 MHz radio system next-generation upgrades. Again the total cost of $18 million is beyond the City's ability to cash finance. We would hope that this would also be part of a larger public safety bond measure.