JACKSON COUNTY TELECOMMUNICATIONS STRATEGIC PLAN

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JACKSON COUNTY TELECOMMUNICATIONS STRATEGIC PLAN

EXECUTIVE SUMMARY

Introduction

Telecommunications is the central nervous system of the American economy. It has revolutionized virtually every aspect of our lives and every industry, from education and health care to banking and finance. Between 1995 and 2004, advances in telecommunications and information technology were responsible for as much as 75% of U.S. labor productivity gains.

To remain competitive in the world Jackson County businesses, institutions and residents must have available to them the most advanced telecommunications technologies and services AND the knowledge of how to use them.

Today we find ourselves confronting rapidly changing economic realities as well as the many existing challenges that present themselves to areas such as Jackson County with our mixture of urban and rural. Community discussion of ways to move the region forward frequently turns to the impediments of not having widely available and affordable advanced telecommunications infrastructure (i.e., broadband). However, our research finds that in Jackson County there is a widespread lack of understanding of the actual telecommunications resources available, even as we readily recognize that we have yet to connect the last household.

To ensure a continuing expansion of the supply of telecommunications services we need the participation of current and emerging telecommunications services providers. It is also in their best interests in serving the public needs (i.e., customers) to be engaged in these planning processes. By no means are we finished with our infrastructure growth. New applications are coming on line everyday and these applications require more and more bandwidth.

However, it is critically important that we recognize that having the tools to enable our future as a 21st century knowledge-based economy at our disposal is only one part of the equation. A parallel effort needs to occur on the demand side of the equation. Here we must assist our residents, businesses, educators and others in understanding how to integrate these technologies into their lives, whether for profit, for service, or for entertainment purposes. Lifelong education and workforce development must be addressed for us to succeed with these tools.

Economic diversification is the cornerstone of a healthy, growing community. By taking full advantage of our telecommunications infrastructure, Jackson County is poised to become a world-class destination for a wide variety of businesses, healthcare, retirees and tourism. A 21st century county benefits from leveraging the communication technologies available to it, improving the quality of life and standards of living for all residents. Listed here are just a few of the ways in which we will all benefit:

- Access to world-class telecommunications services that will enable community leaders to actively recruit companies to the county.
- Family wage jobs will become the rule and not the exception due to expanded employment opportunities.
- New options will become available for businesses to establish operations in rural areas as well as providing employees with the choice of working from their homes.

- Educators and students alike will have the opportunities to develop skills and knowledge by employing telecommunication services to work with and learn from people around the world.
- Healthcare options will grow dramatically for communities and their residents in the area. Online consultations, diagnostics, and patient monitoring will be available to those requiring special assistance. Medical staff will have access to state-of-the-art training.
- Public safety, of greater concern than ever before, will operate with improved efficiency and responsiveness.
- Housing will become more affordable due to rising incomes of prospective homebuyers.

Assessment Summaries

We do not exist in a vacuum. What happens at the global, national and state levels have an impact on our county's telecommunications environment. In the Assessment we looked at the global, national and state telecommunications landscape as well as Jackson County's. Our focus is substantially on broadband but we do touch on other telecommunication related topics. The body of this document is extensive and contains considerable detail ranging from technology descriptions to the essays developed as background reading for those seeking additional background on just what constitutes a 21st century economy and county. While it is a somewhat daunting task to read through all of the material, we strongly recommend it.

Broadband Matters

Quantitative studies now confirm that communities in which mass-market broadband is available experience more rapid growth in employment, the number of businesses overall, and businesses in information technology (IT) intensive sectors. The assumed, and oft touted, economic impacts of broadband are both real and measurable. Here is a short list of some of those areas seeing that impact in our county:

- Jobs, jobs, jobs!
- Our children, their futures
- Healthcare
- Access to government
- Public safety
- Not for profits
- Recreation
- Rural communities

Even as we start to see studies touting the impact of broadband on economies, we need to be aware that in many instances the exact value is difficult to ascertain. It may be fairly said that broadband is an "influencer" for increased economic growth. Some parallels exist in the evaluation methodologies applied to rail, highways and airports. While we might add up the immediately available cargoes or loads, the ripple effect throughout the rest of the economy is more difficult to compute. The exact contribution will be similarly argued for years to come, even though we can calculate the value of, for example, eCommerce at Christmas time.

Global Landscape

The growth of the Internet has delivered a parallel and more flexible network that promises ultimately to overtake and to make obsolete the traditional Public Switched Telephone Network. The international long-distance market also has undergone dramatic changes over the past 20 years. By 2004, 92 percent of the world's long distance traffic came from markets with

competition. The status of mobile telephones has changed from an expensive executive toy to a basic necessity for 1.7 billion subscribers worldwide.

National Landscape

In December 2005, broadband penetration in US homes rose to 65.57%. At the current growth rate, broadband penetration among active Internet users in US homes should break 70% by late March of 2006. The US has fallen to 19th overall in household broadband penetration, and is in danger of being passed by Slovenia in early 2007. At its current growth rate of over 90% per year, China will pass the US in total broadband subscribers by late 2006 to become the largest broadband country in the world.

The Federal Telecommunications Commission readily concedes that our work is not done.

Oregon Landscape

Overall we can report continued progress in the roll out and usage of broadband in Oregon. Depending on the source, Oregon ranked either 11th or 24th in the U.S. in broadband subscribers. The available data does not present a clear picture of Oregon's current status beyond indicating that progress is underway. In the 2005 legislative session SB 13 provided an additional reporting requirement to assess the real state of broadband penetration in the state. The first results will be available prior to the 2007 legislative session.

Just as it's been conceded at the national level that the work is not done, so too is the case in Oregon. The Internet Forest (iForest) concept now being developed could have a significant and dramatic effect on Oregon's economy. Eleven undersea cables currently come ashore in Oregon. This is the landing site of choice on the west coast of the US. Currently, most of those undersea cables pass through Oregon on their way to major out-of-state connection points. Oregon has the choice of being passive and becoming a poor neighborhood living "under the freeway" without an on-ramp to this economic opportunity as these highways of the future pass through without leaving much local benefit. Oregon also has the choice of being proactive and arranging its Internet connections so that Oregon becomes a preferred geographic location for organizations doing business in the Pacific Rim. This, too, could have a big impact on business diversification in Jackson County.

Jackson County

<u>Telecommunication Readiness</u>

Jackson County in many ways mirrors the emerging provisioning and utilization of advanced telecommunications capabilities (i.e., broadband) found elsewhere. Indeed, we may be viewed as somewhat blessed with the variety of competitive resources available to us in our county.

Yet, just as in many other areas, we are by no means at the end of the journey to providing access to broadband nor to benefiting from the myriad opportunities afforded by broadband. The more densely populated areas of the county have competitive provision of state of the art resources. Yet many parts of the more rural areas of Jackson County still do not have what many call "reasonably priced" broadband available to them. Perhaps of comparable concern is the challenge we face of how to best use these powerful technologies and how to prepare our workforce for the inevitable rise of the knowledge-based economy.

On a generally used "connectedness and readiness" scale, Jackson County ranks a solid number 3 and is rapidly moving toward the fourth level of readiness:

1. Services are hard to get or expensive; few use the Internet regularly.
2. High-speed services are more widely available; local web sites are limited.
3. General access to high-speed services; web sites support transactions.
4. Universal access to high-speed services; the Internet has changed the way all organizations operate and is fully integrated into everyday life.

In a connected 21st century economy:

- High-speed services are reliable, affordable and everywhere.
- Parents participate more easily in their children's education.
- Public services are on-line 24x7.
- Businesses are dynamic and able to serve the needs of narrower and global markets.
- Work moves to where people want to live.
- Education is more personal and convenient.
- People coordinate with their doctors to practice preventive healthcare.

Telecommunication Technologies in Jackson County

There are at least 636 radio licenses of one type or another issued by the FCC for entities registered in the county.

The FCC has registered at least 60 cellular antennas in the county.

The following telecommunications technologies are currently being used in Jackson County:

Bluetooth	Mobile wireless broadband
Cable modem	Satellite broadband
Cable TV	Satellite radio & TV
Cellular phones	T-1 and DS/3
Digital TV	Plain Old Telephone (POTS)
Digital Subscriber Line (DSL)	Other radio frequency technologies – AM, FM, UHF, VHF
Fiber optics	Voice Over Internet (VoIP)
Low power FM	Webcasts
Low power TV	Wireless broadband – ODFM(A) & WiFi
Microwave	Videoconferencing

The following telecommunications technologies are on the horizon for Jackson County within the next 2 to 5 years:

Broadband Over Powerline (very, very low likelihood)
Datacasting (High likelihood)
Ultra Wideband (Low likelihood)
WiMAX (High likelihood

Jackson County resides at the heart of the Southern Oregon Extended Area of Service Region. This is the second such region to be established in the state. It provides residents, business and myriad other entities with the benefits of a large local long distance region, cutting expenses, promoting communications and improving our ability to pick up the phone and call anywhere in the region without having to dial 1 + 541.

Who knows what will emerge in this rapidly changing landscape? All we can really predict is more change and at an ever increasing rate.

Economic Overview

The Jackson County economy has seen steady growth for over 10 years, as seen by wages and salaries. While many opinions abound as to where the economy is going, we can see where it's been, for example in 2004 (sorted on employment):

Industry	**Units**	***Units***	**Emplymt**	***Emplymt***	**Payroll**	***Payroll***	**Avg Pay**
		%		*%*		*%*	
Trade, Transportation. & Utilities	1,247	*20.5%*	18,540	*23.4%*	$506,030,787	*21.4%*	$27,294
Education & Health Services	626	*10.3%*	11,068	*13.9%*	$395,273,016	*16.7%*	$35,713
Total All Government	202	*3.3%*	10,607	*13.4%*	$394,012,968	*16.7%*	$37,146
Leisure & Hospitality	613	*10.1%*	8,971	*11.3%*	$122,559,310	*5.2%*	$13,662
Professional & Business Services	794	*13.0%*	7,551	*9.5%*	$239,029,774	*10.1%*	$31,655
Manufacturing	328	*5.4%*	6,768	*8.5%*	$238,589,303	*10.1%*	$35,253
Construction	815	*13.4%*	4,617	*5.8%*	$145,625,731	*6.2%*	$31,541
Financial Activities	598	*9.8%*	3,545	*4.5%*	$122,689,962	*5.2%*	$34,609
Other Services	594	*9.7%*	2,990	*3.8%*	$58,413,542	*2.5%*	$19,536
Natural Resources & Mining	144	*2.4%*	2,892	*3.6%*	$74,501,250	*3.2%*	$25,761
Information	118	*1.9%*	1,805	*2.3%*	$66,130,384	*2.8%*	$36,637

If we continue with the current projections for jobs and wages, we will not see much growth in average salaries. Indeed, the likelihood is one of a flattening of growth in per capita wages. This has an impact on the economy as a whole. Merely projecting trends from the past is a limiting way to view the future for our economy. We need to factor in the tectonic shift occurring due to the rapid emergence of knowledge-based economies throughout the world. Jackson County cannot afford to drive into the future solely by looking into the rear-view mirror. We need to take advantage of the many resources available today in our county to craft a future that moves us in directions that address this paradigm shift.

For example, there is a disconnect between the projections for per capita income in the future and the ability for those working families to be homeowners. The high cost of home ownership here also makes it harder for businesses recruiting workers from U.S. regions with lower housing costs. We need to 1) increase the stock of affordable homes and/or 2) increase the per capita wage levels, perhaps both. The latter approach has the most benefit to the economy as a whole.

Transitioning to the 21st Century Economy -- the Knowledge Era

We are now in the process of transitioning to the 21st century economy, the knowledge era. To compete in this emerging economic reality we need to be connected and we need a population that is prepared to take advantage of the opportunities afforded through these technologies. Each era has critical, enabling infrastructures, for example:

- Agriculture (pre 1880's) Roads, Irrigation, Canals, Ocean Navigation
- Industrial (1880's - 1980's) Electric, Rail, Highways, Telephone
- Knowledge (1980's -) Computing, Communications

County leadership has a role to play by ensuring that we are taking all necessary steps to realize our potential in the 21st century knowledge-based economy. This means fostering

- A competitive market place for continuing growth in the provision of high-speed services that are reliable, affordable and everywhere.
- A highly educated workforce
- Respecting and placing value on intellectual property
- Short product lifecycles, quick time to market,
- Lower financial barriers to entry
- Participation in global markets and competition
- A high quality of life

Three broad goals are recommended

Goal 1 – Telecommunication Infrastructure and Services Match 21st Century Demands

Strategy - Encourage and support the continued growth of the Jackson County telecommunications infrastructure so that employees can be as efficient as possible, healthcare providers can provide the highest levels of care for patients, businesses and all organizations can be competitive as they see fit in the global economy, and residents can have every access to information and services.

Goal 2 – Jackson County's Workforce Is 21st Century Ready

Strategy - Ensure that all Jackson County workers have the opportunity to equip themselves with the necessary tools to succeed in their careers and in whatever field they choose in this new and dynamic global economy. Encourage entrepreneurship, provide for life-long learning and promote growth of existing businesses. Build on existing programs and relationships.

Goal 3 – Jackson County Is A Full Participant in the 21st Century Economy

Strategy - A knowledge-based economy will set the tone for the 21st century. Jackson County has much to offer in this regard. Actively promote this aspect of our county's strength through our telecommunications, educational institutions, healthcare organizations and other factors.

Conclusion

Researching and developing this set of recommendations was a great opportunity to discover the many positive attributes of Jackson County, especially its telecommunications infrastructure and service offerings. It was exciting to see the number of telecommunications services available to most in the county. It was also somewhat disappointing to find out that many do not know what is happening here in that respect, often operating with very dated information or what might be described as "mythology." However, the energy and dynamism of the residents is encouraging in that when provided with knowledge of the tools available and how to use them, they will avail

themselves of those opportunities as ways to improve their economic situation as well as their quality of life. Probably one of the most remarkable finding is the degree to which our residents are willing to pitch in and work together. We have the potential for an even greater future!

Achieving the goals identified in this Telecommunications Strategic Plan will result in positive impacts to the economic climate and will also positively impact the quality of life for residents. We may not be able to predict the future but we sure can prepare for it.

OVERVIEW

Preface

In this document you will find a broad assessment of many factors that are tied to or influenced by telecommunications. This is in large part due to the reality that nearly everything we do these days has some component of telecommunications inextricably linked to it. You may have seen the signs along the highway that state, "If you bought it, a truck brought it." Now we can also add to that the realization that the manufacturing, purchase, delivery logistics and selling of that item depended on some form of telecommunications. Our focus in this planning effort predominantly is on broadband. Yet we would be remiss if we did not at least briefly address the other modes of telecommunications as well.

Considerable patient investigation and work effort devoted to understanding the Jackson County telecommunications and technology landscape underlies the analysis leading to the recommendations. Existing research and analysis is employed wherever we could find it. That which is reproduced whole cloth in this document is fully attributed. In the document body you will find a considerable body of information to digest, including many maps, charts and tables. The appendices contain a collection of data as well as essays crafted to provide background used in conjunction with the assessment material to flush out ideas integrated into the final recommendations. The endnotes/bibliography is extensive. We make no apologies for this, as this is a very large subject for which we might easily fill many binders. For that reason we have produced an Executive Summary to transmit the core findings in a more readily digestible fashion.

Note that this Plan is a strategic framework for proceeding. It is not an operational plan in the tactical sense. The timeframes for full realization of the recommendations are somewhere between now, 5 years or longer. Market forces and public good are mated together in the recommended approaches; as such the role of public-private partnerships will be critical. This is a Plan for leveraging technology for economic and community development and NOT a technical plan per say. What started out as a look at our telecommunications infrastructure quickly moved to looking at how we can take advantage of these resources. The intent is to help guide us as we move into the future and not to predict every detail of the unknown, the future.

At the heart of the recommendations is a belief that "working together" makes sense. It especially makes sense when framed in a context similar to other critical economic development infrastructure -- water systems, sewers, roads, electricity, and other shared infrastructure. Here's an opportunity to work together to identify needs here-to-fore not fully documented and to then set about finding ways to fill those needs...together. Taking action on the goals identified by the planning group can result in positive impacts to the economic climate in the region and will also positively impact the quality of life for the region's residents.

The result of this assessment is eye opening as to the number of resources Jackson County enjoys; the need for fostering expanded access to the resources and knowledge of how to take full advantage of these resources; and the realization that what we have today simply will not suffice in the foreseeable future. These findings indicate a need to start today to plan for the future, building on our many successes to date, and to work closely with the private sector to ensure we are not left behind and that they are kept abreast of the demands of the markets they serve.

At the heart of this Strategic Plan is an awareness of the growing need for cooperation and collaboration, public and private. We believe it's important to open the discussion and participation to all who would make the needs of the county to be a priority in determining outcomes related to economic development and quality of life. The development and implementation of this strategic plan will help the county to speed delivery of vital human services, better use existing resources, attract new resources, facilitate neighborhood planning and community organizing, and build learning networks through which people with similar interests can share their diverse experiences. Education, healthcare, governments, businesses, not for profits, myriad other organizations, and individual residents all will be positioned to take advantage of the benefits afforded through expanded opportunities for sharing information and knowledge through access to advanced communications capabilities.

Opening Observations

Telecommunications is the central nervous system of the American economy. It has revolutionized virtually every aspect of our lives and every industry, from education and health care to banking and finance. Between 1995 and 2004, advances in telecommunications and information technology were responsible for as much as 75% of U.S. labor productivity gains. To remain competitive in the world, Jackson County businesses, institutions and residents must have available to them the most advanced telecommunications technologies and services AND the knowledge of how to use them.

Jackson County in many ways mirrors the emerging provisioning and utilization of advanced telecommunications capabilities (i.e., broadband) found elsewhere. Indeed, we may be viewed as somewhat blessed with the variety of competitive resources available to us in our county. Yet, just as in many other areas, we are by no means at the end of the journey to providing access to broadband or to benefiting from the myriad opportunities afforded by broadband. The more densely populated areas of the county have competitive provision of state of the art resources. Yet many parts of the more rural areas of Jackson County still do not have what many call "reasonably priced" broadband available to them. Perhaps of comparable concern is the challenge we face of sharing knowledge of how to exploit the many uses of the overwhelming advance of these technologies.

With regard to continued expansion of the supply of telecommunications services, we need the participation of current and emerging telecommunications services providers. It is also in their best interests in serving the public needs (i.e., customers) to be engaged in these planning processes. This will go a long way to help ensure the solvency and profitability of those service providers by keeping them in touch with their markets. Too often they convey a perception of an almost imperious approach to the market place, dictating what they think customers need versus truly understanding and meeting those needs. We make this strong statement based on facts, not on the publicity promulgated by the industry. This is an industry that invests more in lobbying and lawyers then on competing in the marketplace, R&D or customer service. It is important to note that all services providers are businesses in one form or another (yes, even community owned providers). Their motivation is profit and Return On Investment.

A parallel effort needs to occur on the demand side of the equation. Here we must assist our residents, businesses, educators and others in understanding how to integrate these technologies into their lives, whether for profit, for service, or for entertainment purposes. Provisioning of these advanced telecommunications services and sustaining their availability requires sufficient

demand to generate revenues for their maintenance and operation -- there still is no free lunch. Financing and revenue must come from somewhere. There is a great opportunity for creativity in these financing activities, especially by fostering additional demand with the ability to pay for the services out of expanded revenue streams resulting from the use of such services.

As yet there is no "cookie-cutter" approach to establishing and maintaining these services. The "successful" model or models are still emerging in an ever-shifting landscape of new technology and increased demands from consumers. A scan of available documentation of the many forms taken to provision these services is almost mind-boggling. "Best practices" do reflect some common threads, not the least of which is the use of collaborative models involving the community at large and creating sustainability through solid business practices. Today one of the challenges is in the definition of "community." It now takes on some interesting meaning and approaches in the “connected world” and is no longer bound by neighborhood or city lines. Once again we state that it is a must for inclusion of the services providers in that evolving definition of community. When this has occurred, their profitability increases as well as their ratings for service satisfaction plus there is a continued expansion of services to meet well defined needs.

Broadband Matters and Here’s Why

Quantitative studies conclude that “communities in which mass-market broadband was available experience more rapid growth in employment, the number of businesses overall, and businesses in information technology (IT) intensive sectors. The assumed, and oft touted, economic impacts of broadband are both real and measurable.”[1]

Yet perhaps we should not be too surprised that many are not yet acquainted with the myriad benefits of broadband nor how it impacts the economy and quality of life for a region. After all this has been one of the fasted growing phenomenons of human history. Widespread availability and use of cost-effective, always-on, faster-than-dialup access to the Internet is a relatively recent phenomenon in the U.S., with the first commercial deployments appearing only in the second half of the 1990’s, and about a third of all U.S. households subscribing to broadband by 2004.[2]

The Internet today is the major transportation network for the economy of the 21st century. Each day sees additional recognition of just how essential it has become for business and 21st century society. Too often we forget that even while its dominance grows, it is still in its infancy as the key infrastructure underlying the global economy. We need to remind ourselves that the first major commercial browser permitting easy access to the “World Wide Web,” Netscape, was introduced in 1995, a mere ten years ago. At that time our only access to the Internet was over slow and often unreliable dial-up modems. Now in many locations we have access to faster and more reliable broadband. Since that time of the first commercial browser, the Internet and the World Wide Web has leveled the playing field around the globe. The businesses, institutions, communities, and residents that leverage the Internet will thrive, and those that do not will falter.

Measuring the economic impact of broadband is difficult, as broadband does not act on the economy by itself, but in conjunction with other IT and associated organizational changes. The effects of broadband may be strongest in non-farm, non-manufacturing industries, where productivity improvements are typically less well captured by economic data.[3]

Adoption of broadband-enabled IT applications can affect the economy by changing the behaviors and productivity of both firms and individuals. Studies have focused on changes to

firm behavior, finding that these generally lie on a spectrum, with the highest payoffs in enhanced productivity appearing in the firms that commit most intensively to integration of IT into new business processes. For example, a number of researchers distinguish between "IT using" and "IT enhancing" firms. The former simply adopt existing Internet applications to make current business processes more productive: for example, they use email and web browsing to raise the quality and lower the costs of gathering market intelligence and communicating with suppliers and customers. The latter develop and integrate more complex "e-business" applications, such as Customer Relationship Management (CRM) and Enterprise Resource Planning (ERP), that can enable whole new business processes and models, such as automated online supply chain management and online sales into geographically distant markets. To the extent that the availability and use of broadband fosters either type of IT adoption and usage by firms, productivity improvements and other associated economic impacts follow.[4]

Other studies have focused on the effects of IT on individual workers. IT tends to complement workers that perform non-routine problem solving and complex communication tasks, but substitutes for workers who perform cognitive and manual tasks that can be accomplished by following explicit rules. While both effects could be expected to increase productivity, the overall effect on employment is ambiguous and would depend on the mix of different types of jobs in the economy.[5]

While much of the IT productivity literature has focused on workplace usage, much of the focus of broadband policy has been on residential deployments. Broadband at home may of course be used for leisure pursuits, but it can also be expected to affect the economy both directly and indirectly. For many knowledge workers, a residential broadband connection is a prerequisite for working at home (enabling productive use of non-traditional working hours, flexible work arrangements, or remote employment), or for establishment of a home-based business, such as an individual consultancy (contributing to new business formation). Less directly, expanded broadband availability at home may raise the quality of the labor force, for example through improved access to educational opportunities via distance education programs, thus making a locale more attractive to potential employers. Similarly, home-based access may improve quality of life, for example by enabling more participation in community and civic activities, making a locale more attractive to potential residents. Somewhat more directly, home-based access may enable more effective (i.e. online) job hunting, reducing unemployment by making labor markets more efficient. It may also make workers more productive by reducing the overall time needed for them to fulfill non-work obligations, e.g. via online bill payment, shopping, telemedicine, and so forth. As with firm usage of IT, however, the overall effect of home-based broadband usage on local economic indicators is not obvious *a priori.* While online banking and shopping may make local workers more productive, it is also likely to put competitive pressure on local banks and retail stores, leading to ambiguous effects on the number of local jobs.[6]

> "The present study ["Measuring Broadband's Economic Impact"] has several clear implications for policy-makers. The most obvious and important implication is that broadband *does* matter to the economy. Policy makers who have been spending their time or money promoting broadband should take comfort that their efforts and investments are not in vain. Many significant public policy reforms and programs are in place or under consideration at the federal, state, and local levels to ensure competitive availability of broadband to all U.S. citizens, stimulate ongoing investment in broadband infrastructure, and facilitate the education and training that small business and residential customers need to make effective use of broadband's capabilities. Such policies are indeed aimed at important goals. Broadband is clearly related to economic well-being and is thus a critical component of our national communications infrastructure."[7]

> "The implication for policy makers is that a portfolio of broadband-related policy interventions that is reasonably balanced (i.e., also pays attention to demand-side issues such as training) is more likely to lead to positive economic outcomes than a single-minded focus on availability."[8]

The following list of areas impacted highlights some of the significant driving factors of the added value gained through ubiquitous broadband, why it is no longer a luxury item but now rises to the level of "critical" for daily living. These uses and benefits also point to why broadband is more than ever a matter of public AND private policy.

Jobs, jobs, jobs![9]

The introduction of broadband technologies has enabled traditional and new forms of communication to become a reality throughout the world. One fact that cuts across every region is that broadband technologies enable many applications that provide enormous benefits to citizens, most especially as jobs.

Broadband is an accelerator of economic development. This is because there are significant economic benefits to using broadband technologies for many applications. With broadband access, worker productivity increases, jobs are created, and wages grow. Broadband creates opportunities for bundling services together and enables operators to offer more services to consumers at lower prices, creating added efficiencies in both time and money. In addition, new or offshoot industries are created as a result of broadband. As broadband penetration rates grow, there will be a resulting demand for computer and home networking equipment, as well as wireless handheld devices and other equipment that facilitates broadband use.

The economic benefits of broadband can also be attributed to indirect factors, including increased e-commerce, reductions in commuting, increased consumption of entertainment, Internet telephony (VoIP), and savings in healthcare as a result of sophisticated telemedicine. For the entertainment sector, the economic benefits result from efficiencies in the distribution of goods, services, and information. The economic benefits of broadband arise from both direct and indirect sources.

The ability to telework -- to work either from home or another location, such as a telecenter outside a person's regular office -- is a very significant broadband application. Teleworking can contribute to time and cost savings for both employees and employers as well as to enable persons with disabilities to work. While teleworking is generally thought to be "working from home," it is not limited to this. It also refers to using virtual or satellite offices to work. In a virtual office, employees may share a reduced office space at a nearby employer facility, use the same offices on a rotating basis, or participate in a fee-based telework center arrangement.[10]

Many community banks already offer online banking to help meet the ever-evolving needs of bank customers. Some banks see high-speed access as a way to expand those services. Broadband connectivity allows banks to offer everything from talking ATMs and digital check processing to two-way video interactions with bank personnel. The result is more competitive banks and efficient anytime/anywhere banking.

High-speed connections are as vital to today's transportation companies as railroad tracks, highways, and airports. Broadband-enabled devices help fleet managers monitor the routes of long-haul trailers, track cargo, and protect against security threats at ports, airports, and warehouses. Wireless broadband connections keep truckers in touch with loved ones while on

the road, and help incident commanders provide emergency responders with critical data in the event of a transportation emergency.

Our children, their futures[11]

Based on the data collected over the past decade, there is no doubt that more Oregon children of all incomes and backgrounds are using computers and the Internet than ever before. But it is also clear that some groups of young people -- primarily rural, low income and minority youth -- have poorer access to technology than others.

Since it was coined in the mid-1990s, the term "digital divide" has mostly been used to describe the gap between those who have "ever" and those who have "never" used a computer or the Internet. But as technology and its role in our society evolve, the concept of what constitutes access is evolving, too. Some updates to the definitions are needed, as suggested below:

- *Basic access:* the ability to get to a wired computer somewhere, at some time.
- *Quality of access:* some homes have high-speed of access and some homes have high-speed connections that make it easy to view graphics and download documents, while others have much slower "dial-up" connections; and some schools have wired computers in each classroom, while others have only a few for the whole student body to share.
- *Technological literacy:* the degree to which people know what they are doing online, how many applications they know how to use, and how easily they can learn new ones.
- *Access to useful content:* the information and software they need the information and software they need to do their schoolwork, protect their health, or find a job.

Put these together, and the resulting definition of access is much more meaningful -- but nearly not as easy to turn into a sound bite -- as whether a child has ever used the Internet.

With wired computers in most schools and libraries and rising home connection rates, almost all children have at least the possibility of basic access. Yet many advocates argue that ongoing inequities in *meaningful* access have real implications for children's educational and economic opportunities. These inequities are reflected in the use of terms such as "digital opportunity" and "digital inequality" as alternatives to "digital divide."

Whatever they call the current digital divide, policy experts and advocates generally agree that increasing technology access for disadvantaged children is a worthy policy goal. They also see a natural evolution from policies focused on major infrastructure investments, such as wiring the nation's schools and libraries, towards integrating online access into other policy objectives. Instead of technology goals, there are goals to help children learn, develop, and succeed in the workforce with the help of technology. Where policy and political differences arise is over how to define the significance of the current divide, and what role the government should play in narrowing it.

A great deal of progress has been made in closing the digital divide. Most children from all major income groups and ethnicities have gone online, but significant gaps in both the quantity and quality of access remain: where their access is located, the speed of their connection, and the skills they are taught for making the most of their online experience. These gaps could have real implications for children. Will all young people be prepared to participate in an increasingly

digital economy and culture? Or will those who are already at risk be left farther behind as those with high-quality access -- from better computers at school to high-speed connections at home -- move ahead?

What role can or should government play in closing today's digital divide? The remaining gaps in technology access may well be the most challenging to bridge. They are both less visible and more complex than the gaps we have already closed. As the first generation to grow up with the Internet starts to enter the larger world, we will undoubtedly learn more about the effects of the digital divide and see new directions for public policy.

In the meantime, there appears to be enough information about today's divide, in all its aspects, to inform a county, state and national debate about the educational importance of children's access to technology, what meaningful access looks like, and how much private and public investment is enough. While it may require new language and new approaches, this could be a very fruitful time for policymakers, industry leaders, and advocates to refocus on the digital divide, especially as it relates to the future of our state, our children.

Healthcare

Broadband technologies can eliminate the distance barrier for rural patients by providing access to out-of-area physicians and health care resources. High-speed links let doctors deliver medical care more quickly and efficiently. Broadband-enabled medical devices are currently being used to improve the quality of life for all Americans.

The costs of health care impose an enormous burden on the economy. The latest projections from the Centers for Medicare & Medicaid Services show that annual health-care expenditures are expected to reach $3.1 trillion by 2012, growing at an average annual rate of 7.3% during the forecast period or 17.7% of gross domestic product, up from 14.1% today. Telemedicine will become a multi-billion dollar industry. But just what are the benefits of telemedicine? A recent white paper by the Telehealth Association of Oregon (TAO) examined this from three perspectives.[12] For purposes of this report we only list below the three perspectives and the impact category analyzed.

<u>Economic Development and Quality of Life Perspective:</u>

- Advancements in delivery of services
- Keeps dollars in the local economy
- Aids business recruitment and retention
- Workforce development / jobs
- Quality of life and longevity gains are worth a lot
- Clinical trials – expands opportunity for participation

<u>Patient's Perspective:</u>

- Access to healthcare
- Saves time, travel, and other expenses
- Healthcare at home
- Health provider integration
- Increased comfort-level with the technology

Provider's Perspective:

- Emergency Room "front line" support
- Accuracy of diagnosis / reduction of medical errors
- A multifold increase in efficiency
- Continuing Medical Education / Lifelong learning

The advent of telemedicine brings some very useful technology to the medical community of Oregon and the rest of the U.S.. Yet many challenges remain ahead. Everything about the suggested programs for telemedicine also depends on the hurdle of availability. *Will broadband Internet services be available to all Jackson county residents?* Within the answer to this question lies the answer to whether telemedicine is going to be a beneficial product of the technological age.

Telemedicine, if used to its full extent, has the potential to cause great and far-reaching effects on the field of medicine. That is why it is important to take a look at the possibilities and limitations now. In that way we prepare to make the most of the technology available to us in the 21st Century.

Access to government[13]

The big idea here is "e-the-people." E-government links people not just to each other and the e-commerce marketplace, but also to the public marketplace of ideas, debate, priorities, initiatives, innovation, services, transactions, and results. It has the potential to put ownership of government truly in the hands of all Jackson County residents.

Imagine government truly of, by, and for the people -- where individuals and organizations no longer wait in line between eight and five on weekdays only, but where they can be online at any time or place they wish. A place not only to get information but also to complete transactions with government, get services, talk with elected representatives -- even to vote; a government that organizes and furnishes information and services around the needs of people while protecting their privacy.

Imagine people in government who are excited about using the Internet to make a difference and produce results, answering questions instantly, using secure networks that cross organizational boundaries to serve the public. Imagine people in business enjoying fast and easy interactions with government that produce results in the public interest.

Imagine people in all sectors -- government, business, non-profits, and the research community -- working together to make this happen quickly, creatively, and cost effectively. This is e-government -- *our* government of the future, not *the* government of the past.

But don't stop there. E-government is not just about speed, efficiency, or accessing information online. Individuals according to their preferences and needs can also tailor it. Imagine individual Americans creating customized, one-stop sites for themselves online, where they can choose to get information, conduct transactions, or communicate with their elected representatives. Imagine having your own self-designed, interactive site where you can directly conduct all your business with government whenever you wish. You can pay taxes, check your Social Security earnings, find out whether your building permit has been granted, renew your driver's license after your site has reminded you without being asked that it is coming due. You can also participate in public hearings, create communities of interest with others online, monitor voting

records, and express your views to your representatives. In short, you can choose how and when to connect with government, with the ability to choose appropriate levels of privacy and security.

We do not just advocate substituting electronic for personal communications between people and public servants. Rather, we envision more strategic and satisfying personal communications of higher quality, supported by electronic information, sources, transactions, and interactions.

Public safety[14]

Law enforcement, fire departments, emergency medical technicians, ambulances, emergency rooms, public health departments and even schools are among the entities that are driving toward a more seamless interoperability in their communications. A mixture of broadband communication modalities may be used for a variety of innovative applications, including the delivery of real time video from inside burning buildings, floor plans to police officers entering a hostile environment, and even videos from robots entering a collapsed mineshaft.

Disaster relief and being committed to the relief of suffering people in situations of complex humanitarian emergencies and natural disasters is an enormous task. Not only does this involve technical equipment but also human engagement and methods of communication are important factors to guarantee the safety of people and nature.

A growing demand for mobile broadband services within telemedicine, fire fighting, mobile robotics and law enforcement operations are emerging rapidly. Remote patient monitoring is one of the key aspects of crisis and disaster management is the effectiveness of frontline medical assistance to injured citizens. The concept of remote patient monitoring is the subject of intense study in both the civil and military peacekeeping sectors where the need for a reliable, secure and very high capacity mobile technology has been identified in order to address activities on the scene of incidence.

Capabilities, involving either an ad hoc or day-to-day operational environment, include:

- Wireless mission-critical broadband data
- Secure and interoperable capabilities
- Multiple users with multiple applications
- Self-establishing and -healing network nodes (i.e., route diversity)
- IP-based mobile networking
- Robust management and control systems
- Flexible existing infrastructure dependence
- Dynamic and flexible radio configuration
- Real-time digital voice, video and sensing
- Still photos, complex graphics and drawings files
- Enhanced bio-telemetry information
- Maintain integrity/security of national networks

Not for profits

Foundations and their grantees, no longer solely are at the mercy of the mass media for coverage, have an important new platform of their own from which to express views, exchange ideas, publicize their work, and continue to do what they do best -- touching the lives of millions.

Nowadays, most people expect that all organizations -- including nonprofits -- will be able to connect to the Internet. Internet connectivity allows organizations to perform a wide variety of mission critical tasks: use e-mail, conduct research on the web, post information to the web, create and maintain a web site and use web-based software applications. The question for nonprofit organizations is no longer whether they should have Internet connectivity, but rather what type of connection, and who is the best provider.

Not unlike other sectors non-profit organizations are increasingly taking advantage of video conferencing, distribution of educational videos, Internet telephony (i.e. Voice over Internet Protocol – VoIP), and other large demand bandwidth applications.

Recreation

Many people have used broadband to further personal hobbies, browse the Internet for fun, play games, gamble, and download music, videos and movies. In addition, position location technology, combined with broadband, can allow people to obtain restaurant information, local maps, and museum and tourist information. Broadband will increasingly be used to download on-demand movies and other entertainment content.

Entertainment is one of the fastest growing uses of the Internet, demanding more and more bandwidth for its applications. It is also a large contributor to our economy.

Rural communities

Rural residents need telecommunications as a substitute for transportation even more than urban folks. Telehealth, distance learning, e-government, and e-commerce are more important to rural communities than to urban communities because of they have lower population densities, greater travel distances and fewer local services. Most urban folks do not realize how much “drive time” is required to conduct business and government in rural Oregon. Broadband infrastructure suitable for telecommuting, including from rural Oregon to government offices in Salem and to local government offices, can make a significant difference to the economy and the quality of life in rural communities.

STRATEGIC PLAN RECOMMENDATIONS

Introduction

We present this Strategic Plan to Jackson County with the understanding the work has just begun and we need to continue our efforts together. Fostering development of a 21st century knowledge-based economy means building on our existing strengths while adding additional diversification to the economy. Successful implementation of the recommendations depends on continuing community participation, cooperation and collaboration.

The planning process that got us here is rooted in and modeled after best practices collected from successful ventures throughout the United States. Considerable local research, substantial discussion with county residents, and input from a cross-section of the county's residents lead to these recommendations. Unlike a plan for physical infrastructure (for example, roads or water systems), these recommendations are more policy oriented. Goals, Activities and Tasks are recommended with timeframes and likely responsible entities identified. Yet…in more ways than one, this is just a first step on a path to the future. As such, a number of recommended activities are proposed as a starting point for further collaborative action.

Mission Statement

To connect Jackson County to the future.

Vision Statement – 2010 and beyond

Jackson County is connected to the 21st century… and the world knows it!

For the foreseeable future knowledgeable usage of advanced telecommunication technologies spur economic development and enhance the quality of life of all county residents. Government, businesses, healthcare, not for profits and education all benefit from access to a reasonably priced, robust telecommunications infrastructure that provides maximum flexibility, growth and expandability.

The Jackson County Telecommunications and Technology Advisory Committee (JCTTAC) monitors and reports annually to the Commissioners on the status of telecommunication infrastructure and usage. The JCTTAC is composed of volunteers from a variety of sectors and interests in the county and serves as a liaison between countywide telecommunication stakeholders and service providers, and, through regular community forums, fosters an environment of open communication, cooperation and collaboration with the providers of communications services, ensuring that the area's needs are being adequately communicated and serviced. On-going community forums throughout the county educate and promote the use of a variety of technologies. At these public meetings input received from attendees is compiled by the JCTTAC and shared at least annually with business, education, county and city government, and service providers.

Businesses thrive in Jackson County due to our unique mix of traditional and technical occupations. Redundant telecommunications infrastructure continues to attract high tech firms to the area. Due to the availability and knowledge of how to use advanced telecommunications services even small businesses find it easy to compete in the global market. All businesses meet

and exceed their goals for production and expansion. Family wage jobs, and even higher wage jobs, are plentiful. Residents' income will be such that home ownership is readily attainable.

Residents go on line to obtain local, state and federal government services; they get building permits, pay traffic fines, access property information and pay their taxes. The list of services changes periodically because county and city governments, through surveys, on-line town meetings and other well-publicized programs, seek continuing feedback from the people who live here. Economic development partners jointly are responsible for the ongoing creation and maintenance of a well-published technology profile for the county. These groups actively seek funding through a series of grants and entrepreneurial activities. These funding sources ensure sustainable access to on-line information in public areas; for example, in schools after hours, in public areas of Jackson County communities, and in the county's libraries.

Residents benefit from access to education from the state-of-the-art facilities in the county. All education facilities provide targeted 21st century economy workforce development programs. Development offices work closely with all segments of business, healthcare, not for profits and government to develop workforce goals and set priorities. Continuing interaction among education, businesses, not for profits, healthcare, government groups, and residents makes it easy to determine appropriate training programs and to establish a technically adept workforce. High schools, the community colleges, and education centers provide distance education (DE) opportunities from resources throughout Oregon, the US, and the world. Through DE students of all ages acquire advanced training or degrees where they live and where they work. That workforce is the cornerstone of the county's economy as it includes the best and the brightest of the county's young people. Family members are re-united as they return to their home county to participate and benefit from the opportunities in our growing 21st century economy. They bring their families and skills back to the area because of the unsurpassed quality of life and opportunities for career advancement.

All of the county's healthcare service providers are online and participate as members of a community medical network. Telehealth services are available throughout the county; reaching into the most remote areas of the county, extending the reach of providers for consultations, diagnostics, and emergency services. Patient education and monitoring is everywhere in the county, including in the home. Patients no longer have to drive long distances for pre-surgery education and can obtain quality information to assist them with management of their health. Through remote monitoring and patient interactions residents are afforded the opportunity to remain in their homes for longer periods of time as they age, saving tax payers significant dollars while providing a high quality of life for the residents and providing a new category of employment.

Representatives from the JCTTAC work with Coos, Curry, Douglas, Josephine, Klamath, and northern California counties as well as with area providers to develop regional awareness and approaches for advanced telecommunications services in region.

Goals and Activities and Tasks

Goal 1 – Telecommunication Infrastructure and Services Match 21st Century Demands

Strategy

Encourage and support the continued growth of the Jackson County telecommunications infrastructure so that employees can be as efficient as possible, healthcare providers can provide the highest levels of care for patients, businesses and all organizations can be competitive as they see fit in the global economy, and residents can have every access to information and services.

Activity 1.1 Establish a Standing Jackson County Telecommunications and Technology Advisory Committee (JCTTAC)

One of the first recommended actions is to establish a standing Jackson County Telecommunications and Technology Advisory Committee (JCTTAC). The volunteer group would be populated by representation from both the urban and rural areas of the county as well as from the various sectors of our economy. The JCTTAC would be charged with maintaining the Strategic Plan and monitoring progress on the further evolution of the Plan, and further work will be required. Additional next steps might include the forming of sector-oriented sub-committees, such as healthcare, education, commerce, government, and other sectors, to support the Strategic Plan and to work under the auspices of the committee.

The JCTTAC will meet at least quarterly to monitor and make recommendations on countywide telecommunication and technology activities, reporting to the Commissioners on at least an annual basis. Topics would include, but are not limited to:

- Cellular phone service
- Broadband deployment
- Telephone service and use of lifeline opportunities
- Use of technologies in support of a 21st Century Economy
- County Website (for example, ease of use, content and organization)

Tasks:

1.1.1 Endorse formation of a standing advisory committee composed of 8 – 12 volunteers solicited from throughout the county that are concerned with telecommunications services provision and usage, e.g., business, healthcare, education, government, not for profits, seniors, persons with disabilities and residents. Participation by representatives from existing groups should be encouraged, such as the Southern Oregon Telecommunications and Technology Council, ACES and other similar groups. The committee chair will present its findings to the Commissioners on an annual basis.

When: Formation and organization of the volunteer committee targeted for completion by October 2006. The committee would meet at least quarterly or as needed.
Who: Jackson County Commissioners

1.1.2 Implement the JCTTAC. Elect a JCTTAC chair at the first meeting to serve for a one-year period. The chair will be responsible for managing the meetings, coordinating development of the annual report, conveying committee concerns and recommendations to the Commissioners. The JCTTAC would meet at least quarterly. All meetings will be conducted in accordance with Oregon's Public meeting statutes. The JTTAC chair would meet at least annually with the Commissioners in a public meeting to convey the annual report. At a minimum the report will discuss broadband, cellular phone and usage of telecommunications in the county. The JTTAC annual report will be posted on the county's Website.

When: Chair elected at the first meeting. Meeting dates, frequency, and the annual report date to be set by the JCTTAC.
Who: JCTTAC

Activity 1.2 Support and Facilitate Availability of Broadband

Jackson County has benefited from a great deal of private sector investment in advanced telecommunications technology in the area. Yet the rapidly escalating need for even more bandwidth due to emerging applications means our work is not done.

Tasks:

1.2.1 Establish a broadband goal stating that 90% of county residents who want it will have access to broadband services by 2010. This non-binding leadership statement from the Commissioners sets a tone for continued investment and growth of the telecommunications infrastructure in the county. The JCTTAC will utilize the Strategic Plan as a beginning resource in its efforts to monitor and promote expansion of broadband services to meet the goal. The bi-annual Oregon Public Utilities Commission report on broadband penetration, FCC reports, reports from the PEW Foundation, other published indices, and feedback obtained from the public will be used by the JCTTAC to determine progress toward meeting the goal. The JCTTAC will determine the course of action to be pursued based on a majority vote of the committee members. These efforts will include:

- Broadband education (helps stimulate demand and usage of services)
- Identification of projects that accelerate broadband in rural areas (One possible immediate project could be support for closing the gap between Rogue River schools and the rest of the Valley school districts).
- Encourage use of broadband aggregation in areas not served
- Encourage public-private partnerships
- Identification of possible funding sources

When: Goal established by July 2006. On going with JCTTAC findings reported in the annual report to the Commissioners as well as sent to each of the broadband providers in the county.
Who: Jackson County Commissioners and JCTTAC

Activity 1.3 Support and Facilitate Availability of Quality Cellular Phone Service

Cellular phone reception is a critical for public safety and is conducive to supporting tourism. Today there are a number of well-traveled areas, and less well-traveled areas, in the county where cellular phone calls are dropped.

1.3.1 Establish a cellular services goal of 100% coverage on the major travel corridors by 2010. These routes would include the interstate system (I-5) as well major travel corridors in the county (e.g., highways -- 140, 62 and 238, Old Stage Road, etc.). This non-binding leadership statement from the Commissioners sets a tone for continued investment and growth of the telecommunications infrastructure in the county. The JCTTAC will work with the public to document areas of "dropped" coverage and publish the results. Several methods might be employed (e.g. surveys, Web surveys, call-in lines, requests for in placed in newspapers, etc.). Aslso, the JCTTAC could monitor cell tower siting and encourage tower "stealthing," collocation on existing structures (such as silos), and fast track permitting for structures. Promote use of shared facilities agreements among cellular providers to reduce antenna proliferation and increase coverage. The JCTTAC will determine the best course of action to conduct these task. The results presented to each of the cellular phone companies serving the county with a request for a formal response.

When: Goal established by July 2006. On going with JCTTAC findings reported in the annual report to the Commissioners as well as sent to each of the cellular providers in the county.
Who: Jackson County Commissioners and JCTTAC

Goal 2 – Jackson County's Workforce Is 21st Century Ready

Strategy

Ensure that all Jackson County workers have the opportunity to equip themselves with the necessary tools to succeed in their careers and in whatever field they choose in this new and dynamic global economy. Encourage entrepreneurship, provide for life-long learning and promote growth of existing businesses. Build on existing programs and relationships.

Activity 2.1 Ensure development of a 21st Century Prepared Workforce

During the transition from the Old Economy to the 21st century knowledge-based economy (also referred to as the New Information Economy or the Knowledge Economy), the fate of specific industrial sectors and particular companies is uncertain. However, any status report on the American economy would reveal that there is an ever-growing need for a workforce that is skilled, knowledgeable, and adaptable to a rapidly changing global landscape. 21st century workforce preparation requires strong academics, thinking, reasoning, and teamwork skills, and proficiency in using technology.

Tasks:

2.1.1 Deliver a coordinated 21st Century Literacy Readiness campaign with outreach to all county youth -- develop (where none exist) and strengthen (where they do exist). Foster

an understanding of the importance of increasing the acquisition of critical IT skills and knowledge needed to succeed in today's workplace. Such activities would include: classroom speakers, field/trips/business tours, career interest interviews, job shadows, mock employment interviews, mentors, career fairs/career days and other similar activities. Use public service announcements on radio and TV as well as Websites and print media. (Note: some outreach is underway and deserves an expanded level of promotion and coordination -- for example, the Community Business Economic Center located at South Medford High School, Junior Achievement Programs, the 4-H technology project at OSU Extension, and other similar approaches underway.).

When: Q1 2007 and on going
Who: JCTTAC (facilitator), Southern Oregon Regional Economic Development, Inc. (SOREDI), Southern Oregon High Performance Enterprise Consortium (SOHPEC), chambers of commerce, Workforce and Job Councils, OSU Extension 4-H, schools and members of the public in periodic planning meetings.

2.1.2 Provide enhanced career pathway information and resources for adults and youth. A number of these resources exist today but deserve greater promotion and development. This could take the form of posting of such information on a prominent and well promoted website [note: apparently underway].

When: Q1 2007 and on going
Who: Workforce/Job Council

2.1.3 Promote expanded opportunities for continuous learning using online offerings (distance education), onsite delivery and use of videoconferencing. Support and promote efforts by RCC, SOU, OSU Extension and other similar efforts.

When: Q1 2007 and on going
Who: JCTTAC and partners

Activity 2.2 Promote and Support Small Business Growth

Small businesses are the heart and soul of the Jackson County economic engine.

Tasks:

2.2.1 Widen the target population for entrepreneurship programs to attract the participation of women, the young and minorities. Use public service announcements on radio and TV as well as Websites and print media. Explore funding opportunities through workforce initiative grants.

When: Q1 2007 and on going
Who: JCTTAC and partners

2.2.2 Establish an Entrepreneurship Institute to develop, promote and support entrepreneurship in the county. Increase opportunities for county residents to create their own jobs and businesses through self-employment schemes. Examine and report on the role the education system could play in developing entrepreneurial skills and attitudes [note: excellent models for use of the web exist -- for example, www.thebeehive.org]. Facilitate

networking among firms in order to foster a culture of mutual cooperation and risk-taking.

When: Q2 2007 and on going
Who: JCTTAC and partners (in particular the workforce/Job Councils)

2.2.3 Review and simplify registration procedures required to create a business. Ensure that firms are able to open quickly, should they wish to do so.

When: Q3 2007 and on going
Who: JCTTAC and partners

Activity 2.3 Develop Programs to Ensure Adequate Supply of Trades Workforce

Even as we look to add the absolutely critical dimension of the knowledge-based 21st Century Economy to our county and region, there will continue to be a large demand for qualified trades persons. No economy can exist without these qualified members of the workforce.

Tasks:

2.3.1 Expand online 24 x 7 course offerings in support of the trades and support a seamless transition for high school students to achieve associate degrees or certifications. Provide leadership to high schools, RCC and unions to identify and evaluate expansion of online education and support for these areas of rapidly growing employment opportunities:

- Advanced Electronics Technology (Avionics)
- Refrigeration & Major Appliance Service Technology
- Aircraft Mechanic
- Applied Service Management
- Auto Parts & Warehousing
- Building Construction Technician
- Building Maintenance and Management
- Carpentry
- Commercial Truck Driving
- Certified Automotive Technician
- Certified Truck & Diesel Technician
- Commercial and Residential Heating, Ventilation, & Air Conditioning (HVAC)
- Construction - Home Remodeling and Repair
- Electrician
- Electronic Systems Technician
- Locksmith Training
- Marine & Watercraft Mechanic
- Maritime Education
- Motorcycle Technician
- Plumbing Technology
- Small Engine Repair
- Transport Refrigeration & Air Conditioning

When: Q3 2007 and on going
Who: JCTTAC, SOREDI, SOHPEC, chambers of commerce, Workforce and Job Councils, higher education and members of the public in a planning meeting.

Activity 2.4 Evaluate the Potential for Community Development Resource Centers

A Community Development Resource Center (CDRC) is a community service, social action, and/or educational facility where computers, related communications

technologies, education programs and business mentoring are available to people. Each CDRC has its own unique qualities, yet all share a commitment to using technology, promoting access to education and providing business development support with a belief that a CDRC can be a means for participants to increase their self-sufficiency. This could be especially critical for the more rural communities of the county.

Tasks:

2.4.1 Support the development of a full range of business incubator facilities from early initial concept to production and graduation. These include "incubation in place" wherein existing businesses are supported in creating new business lines. Incentives will include grants, low interest loans, relationships with research institutions and general business services.

When: Q1 2007 and on going
Who: JCTTAC and partners (in particular the Workforce/Job Council and the Shine the Light Foundation, Rogue River)

Goal 3 – Jackson County Is A Full Participant in the 21st Century Economy

Strategy

A knowledge-based economy will set the tone for the 21st century. Jackson County has much to offer in this regard. Actively promote this aspect of our county's strength through our telecommunications, educational institutions, healthcare organizations and other factors.

Activity 3.1 Include 21st Century Factors In Economic Development Policy

Globalization of markets for goods, services, capital, and labor accelerated in the 1990s and proved to be the undoing of both industrial recruiting and cost cutting. Regions were forced to move away from old industries and to search for new market opportunities, thereby ushering in our current era of global competitiveness. This represents a fundamental change from previous eras. This shift requires a workforce with 21st century knowledge-based skills and the opportunity for continuous learning to keep pace with the demand rapidly evolving skill sets. Jackson County not only needs to focus on what happens at home but must also understand and prepare for its role in the global economy.

Tasks:

3.1.1 Integrate 21st century economic development policies into existing approaches. Such policies need to foster continual increased diversification of our economy and need to go beyond attracting and fostering light manufacturing, an area of significant risk for outsourcing today and in the foreseeable future.

When: Q4 2006
Who: Jackson County commissioners through Economic Development Department Director and in conjunction with the JCTTAC and its partners

Activity 3.2 Continue the Regional Approach to Economic Development

While each community in the region has unique challenges and opportunities, industries, transportation, land uses, natural resources, and other key elements of a healthy economy are regional in scope. Communities and the private sector need to cooperate to create regional wealth in a manner that promotes a coherent collaboration, respecting local character and identity.

Tasks:

3.2.1 Support and promote regional economic development activities. Add increased awareness of the need to further diversify the economy by adding increased knowledge-based businesses to ensure our participation in the global knowledge-based economy.

When: Commence by Q4 2006, on going
Who: Jackson County commissioners through Economic Development Department Director and in conjunction with the JCTTAC and its partners

Activity 3.3 Develop an "Independent Living" Pilot Project

New technology solutions offer great promise to improve quality of care while reducing healthcare costs. It is time now for technology to transform the experience of aging as well as improving the lives of those persons with disabilities. This project would bring together builders, information technology workers, healthcare providers and other components required to produce the pilot project. The potential exists to improve the quality of lives, to save taxpayers money, and to create new opportunities for employment. It's also a great way to demonstrate our county's capabilities, both in telecommunications infrastructure and our ability to collaborate.

Tasks:

3.3.1 Develop a Project Independence pilot project. A countywide task force will plan for meeting the housing and home healthcare needs of low-income seniors and people with disabilities by first developing a pilot project. This is a separate group from the JCTTF, but possibly with some overlapping membership. The group would have representatives from a variety of sectors -- seniors and persons with disabilities, architects, contractors, healthcare, financial services, housing administration and other parties required for such a collaborative effort. The Project Independence task force will review currently available technologies and identify infrastructure deficits that act as barriers to effective technology integration into housing for seniors and people with disabilities. The Project Independence task force will oversee implementation of recommended infrastructure improvements and demonstration projects, and develop information resources and training materials for consumers, housing developers, case managers, families, contractors and others. Tasks will include at a minimum:

- A review of available technology for enhancement of affordable housing and supports.
- Conduct a Needs and Awareness Survey to provide a picture of assistive technology awareness, experience, and barriers to use among seniors and people with disabilities. This information will help shape training activities, demonstration projects, and recommendations for systems change.

- Determine the extent to which current policies address assistive technology.
- Identify key policies that may be modified to effectively expand the integration of assistive technology.
- Develop a plan to promote and provide assistive technologies.

When: Commence by Q4 2006, target completion for Q4 2008 or before
Who: An alliance of concerned parties -- Asante, Seniors and Disabled Services, Hunter Communications, J. Irwin Community Informatics, Intel, and others as yet to be named (for example, local construction entities).

Activity 3.4 Support the development of the Internet Forest

Oregon has an opportunity to build upon the success of the Silicon Forest and actively recruit and create the Internet businesses that will be the engine for the next wave of economic growth. Jackson County is poised as an ideal location for these businesses. The iForest has the potential to improve broadband communications within the state as well as to make Oregon the premiere tier 1 access site on the West Coast. This vastly improves our opportunity to compete in the global economy.

Tasks:

3.4.1 Endorse the development of a southern Oregon Internet exchange and the Internet Forest concept as recommended by the Oregon Telecommunications Coordinating Council (ORTCC).

When: Q4 2006, target completion by Q4 2009
Who: Jackson County Commissioners

Activity 3.5 Telework/Telecommuting

Encourage use of telecommunications as a means to reduce transportation impacts, which can improve air quality, personal convenience and reduce dependency on non-renewable resources

Tasks:

3.5.1 Promote telecommuting to businesses and institutions in the county as a way to save our air, fuel and commute time. Details to be developed by the JJTAC and partners. Possibilities include educational seminars on how to do it (e.g., SOTTC forums), PSAs on radio and TC, RVTC programs, etc.

When: Q1 2007 and on going
Who: JCTTAC and partners

Activity 3.6 Promote Jackson County's Telecommunication Assets

We need to let the world know about our telecommunications readiness. Actively engage in a public awareness campaign to tout the variety and depth of telecommunications service available in the county.

Tasks:

3.6.1 Develop a marketing campaign using the results of the Strategic Plan assessment and inventory to promote Jackson County as a place to do business in the 21st Century. Create promotional materials touting the county's array of telecommunications capabilities and 21st century preparedness for inclusion in marketing campaigns by SOREDI, presentation on Websites, etc. Use volunteer copywriters, students, etc. Explore opportunities in existing budgets and/or seek economic development related grants. Create a one-stop promotional Website for the county that includes original content as well as links to other existing online resources in the county.

When: Q1 2007 and on going
Who: JCTTAC and partners

Our assessment begins with a look at factors outside of the region. This is important, as we do not exist in a vacuum. What happens at the global, national and state levels have an impact on our county's telecommunications environment. Subsequently, we then dig deeper into the Jackson County telecommunications landscape.

Global Telecommunications Landscape

International Telephony

The international long-distance market has undergone dramatic changes over the past 20 years. While the majority of countries maintained monopoly ILD markets in 1985, by 2004, 92 percent of the world's traffic came from markets with competition. The status of mobile telephones has changed from expensive executive toy to basic necessity for 1.7 billion subscribers worldwide. Perhaps most fundamentally, the growth of the Internet has delivered a parallel and more flexible network that promises ultimately to subsume the traditional PSTN. Despite this turmoil, one feature of the international long-distance market has remained remarkably constant. For 16 of the past 20 years, aggregate international voice traffic has grown between 11 and 16 percent, reflecting the fundamental human need for communication.[15]

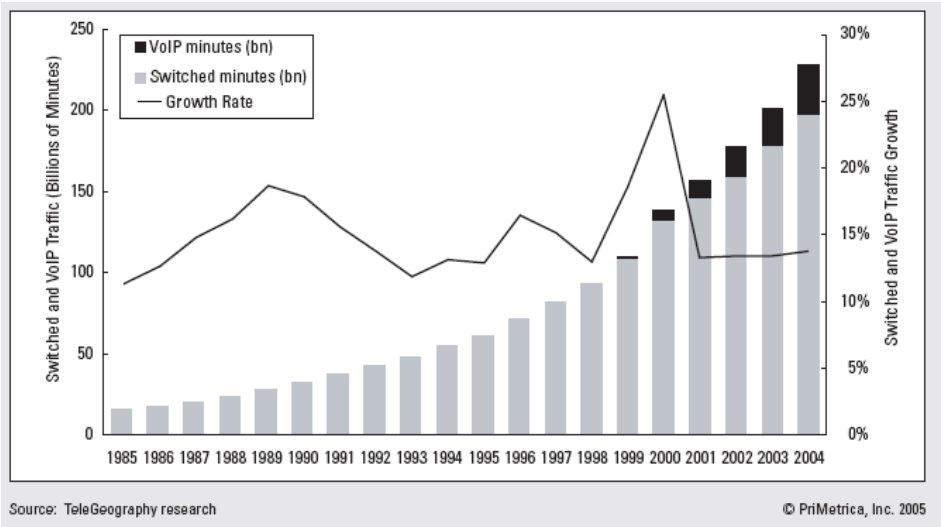


Chart 1 International Call Volumes and Growth Rates, 1985-2004

Switched international traffic grew 11 percent in 2004 to 197.8 billion minutes. Aggregate worldwide trends primarily reflect developments in a surprisingly small number of countries. The 20 largest traffic-originating countries generated nearly 82 percent of total switched telephone traffic in 2004 (see Top 20 Countries, Outgoing International Traffic). Between 1997 and 2001, international VoIP traffic skyrocketed, growing at a triple-digit clip every year. Not surprisingly, growth has moderated in recent years. VoIP traffic grew 35 percent in 2004, and is on track to grow 38 percent in 2005. While this pace is modest by historical standards, VoIP traffic is increasing three times faster than switched telephone traffic and accounts for a steadily growing share of the international long distance market. While incumbent and competitive carriers have both embraced VoIP, the key destinations for VoIP traffic suggest that international termination-rate arbitrage remains a key driver. The majority of VoIP traffic is bound for developing countries in Latin America, Asia, Eastern Europe, and Africa.

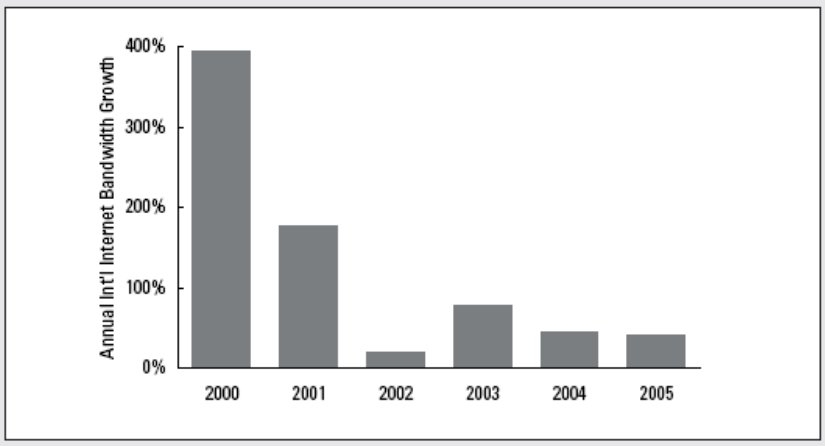
Rank	Country	Outgoing Minutes (bn)	Percent of Worldwide Traffic
1	United States	62,326	31.5%
2	United Kingdom	16,096	8.1%
3	Germany	11,900	6.0%
4	France	9,870	5.0%
5	Canada	9,035	4.6%
6	Italy	7,280	3.7%
7	Spain	5,435	2.7%
8	Hong Kong	4,937	2.5%
9	Switzerland	4,313	2.2%
10	Netherlands	3,725	1.9%
11	Australia	3,690	1.9%
12	United Arab Emirates	2,885	1.5%
13	China	2,807	1.4%
14	Japan	2,725	1.4%
15	Taiwan	2,694	1.4%
16	Belgium	2,688	1.3%
17	Saudi Arabia	2,550	1.3%
18	Singapore	2,295	1.2%
19	Mexico	2,256	1.1%
20	Sweden	2,095	1.1%
	Total	161,581	81.7%

Note: Data are for switched traffic only.
Source: TeleGeography research
© PriMetrica, Inc. 2005

Table 1 Top 20 Countries, Outgoing International Traffic

International Internet Traffic

The international IP backbone industry has experienced spectacular demand growth and precipitous price declines in recent years. During 2005, these wild fluctuations in demand and prices began to abate in many parts of the world. Average Internet traffic grew 49 percent on international routes in 2005, after growing 109 percent in the previous year. While IP transit prices continued to fall, they did so at a more moderate rate than in previous years. Overall, the maturation of the Internet has led to more predictable traffic patterns, which has allowed for more rational IP capacity deployments.[16]



Notes: Data as of mid-year.
Source: TeleGeography research
© PriMetrica, Inc. 2005

Chart 2 International Internet Bandwidth Growth, 2000-2005[17]

The rate of global Internet bandwidth expansion remained stable in 2005, increasing 42 percent compared to 45 percent in 2004. However, the pace of traffic growth in 2005 slowed substantially compared to 2004. Based on data collected directly from providers during 2005, aggregate average international Internet traffic increased 49 percent, significantly slower than the 103 percent growth rate in 2004. Since traffic grew at a similar rate as the underlying IP capacity between 2004 and 2005, network utilization levels were remarkably stable.

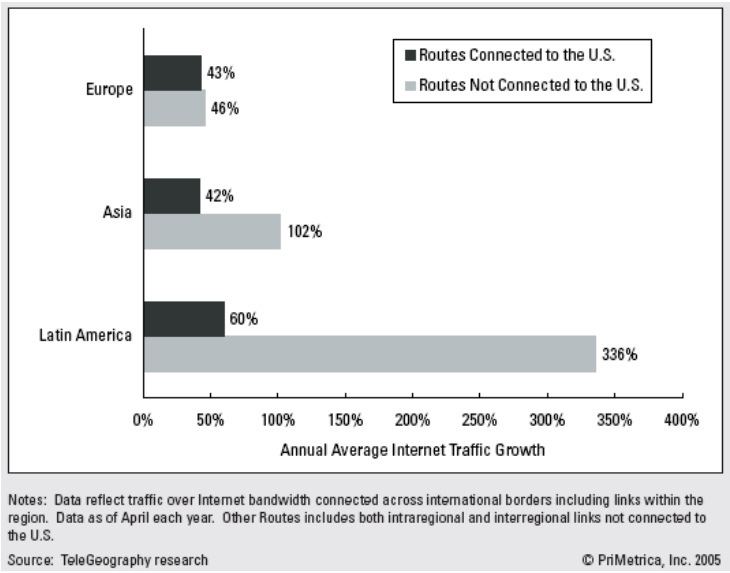


Chart 3 Traffic Growth on U.S. and Non-U.S. Routes, 2004-2005[18]

Traffic growth was hardly consistent around the world (see Traffic Growth on U.S. and Non-U.S. Routes, 2004 – 2005 and Relative Traffic Schematic). The most rapid traffic growth came on intraregional routes within Asia and within Latin America. Traffic within these regions increased 95 percent and 336 percent, respectively. After more than doubling between 2003 and 2004, average trans-Pacific and trans-Atlantic Internet traffic slowed substantially in 2005, with both routes expanding only 42 percent. Overall, the slowest traffic growth occurred on routes connected to the U.S. Despite the deceleration of traffic growth on U.S. routes, 94 percent of interregional traffic is still hubbed through the U.S.

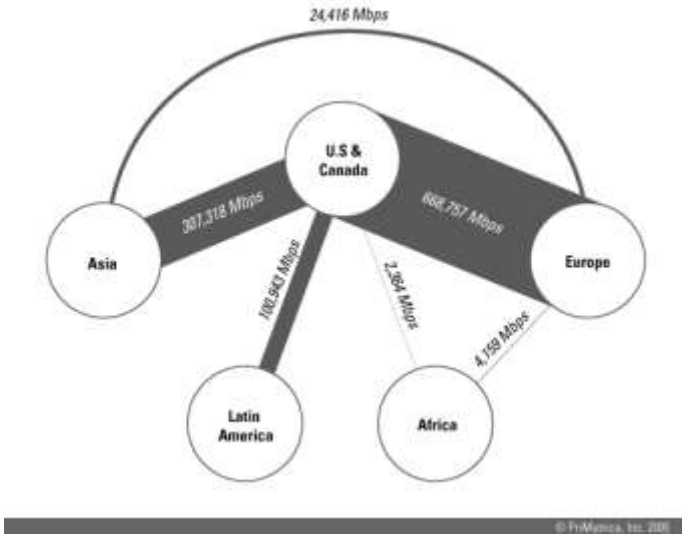


Chart 4 Relative Traffic Schematic

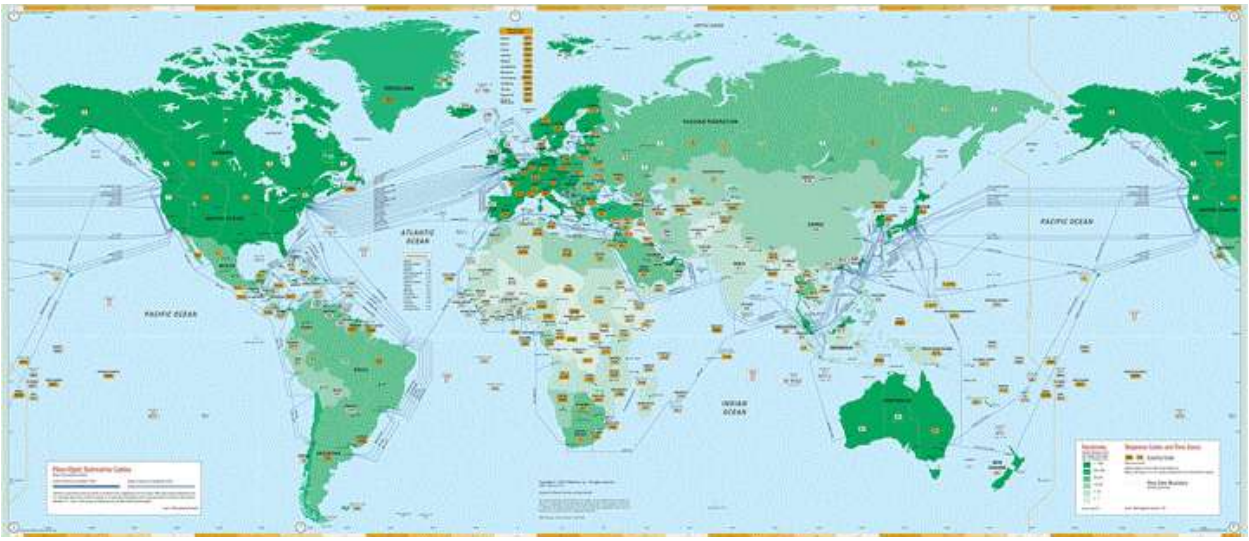
International Growth Projections

After a brutal five-year downturn, the international bandwidth market is showing renewed signs of life. Demand for long-haul capacity grew briskly in 2004, and circuit prices, while not exactly stable, have been declining at a more moderate pace in many regions of the world. Steady traffic growth and a freeze in network construction have been whittling away at the persistent overhang

of excess capacity. The pace of industry consolidation has accelerated thanks to a spate of mergers and the departure of several competitors from the wholesale bandwidth market.[19]

While it is too early to say the bandwidth glut is over, it is not getting any worse. Most of the networks that entered service after the late-1990s did so with initial lit bandwidth far below their potential capacity. This relative restraint on the part of network builders has allowed demand for bandwidth to catch up to the enormous supply of lit capacity on the most competitive routes. Although data traffic has not grown at the astronomical rates forecast during the late 1990s, companies' appetites for bandwidth has been immense by any other standard. Aggregate demand for international bandwidth grew 42 percent in 2004.

Yet even relatively modest growth in bandwidth demand will soon deplete the current inventory of unsold circuits on many submarine cables (see Global Communications Submarine Cable Map 2004) and on some terrestrial network segments. However, this demand growth (see Global Broadband Growth Between Regions) will not necessarily require additional network construction. Indeed, this matter will be of great interest to Oregon due to the number of transpacific landings in the state. Thanks to abundant unlit supply on existing networks, most suppliers can respond to demand increases by lighting wavelengths and fiber pairs on an as-needed basis (see Dwindling Trans-Atlantic and Trans-Pacific Bandwidth Inventories). This incremental approach to regulating spare circuit inventories will contribute to something the bandwidth industry has not seen in over a decade: lit supply and demand coming into balance.



Map 1 Global Communications Submarine Cable Map 2004

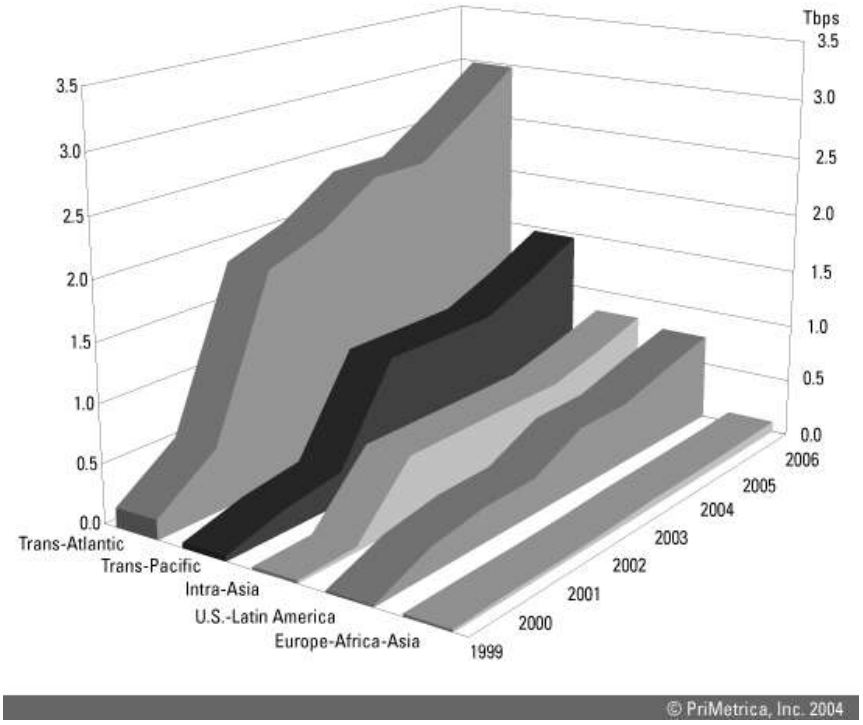


Chart 5 Global Broadband Growth Between Regions

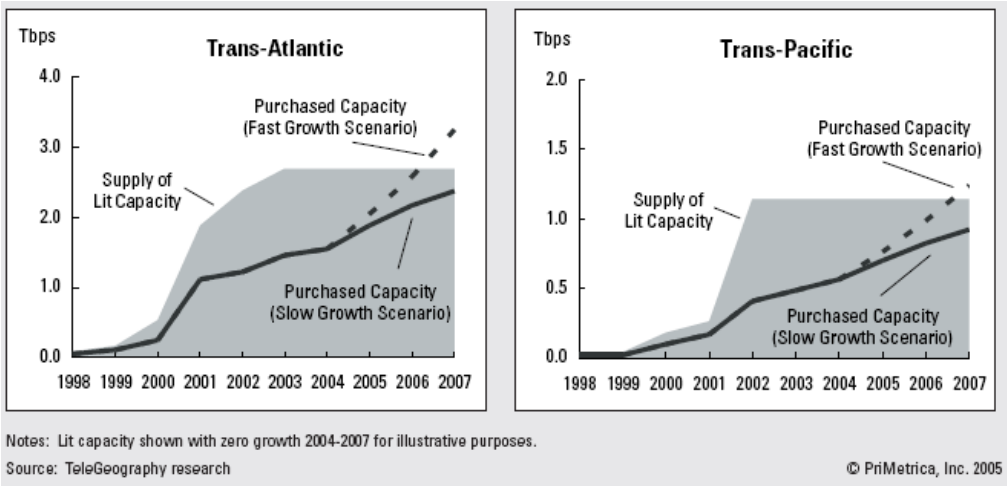


Chart 6 Dwindling Trans-Atlantic and Trans-Pacific Bandwidth Inventories[20]

Mobile (cellular) Phones

Mobile phones have outnumbered fixed line phones since 2002 and rapid subscribership advances continue. Mobile subscribers now account for 59 percent of worldwide phone lines. However, they only account for 24 percent of outgoing international calls, and 35 percent of incoming international calls are completed to mobile phones.

Mobile operators have emerged as something of a mixed blessing for international carriers. Few mobile operators maintain their own international networks; most rely on international wholesale providers to connect their calls. However, a significant amount of mobile subscriber and traffic increases has come at the expense of traditional fixed-line business.

Furthermore, most wholesale long-distance service providers are, themselves, divisions of traditional fixed-line phone companies. Thus, while mobile operators are contributing to international carriers' wholesale revenues, they are simultaneously eroding higher revenue retail traffic.

Due to persistently high mobile termination rates, traffic *to* mobile subscribers has taken on even greater significance than traffic *from* mobiles. For example, while Western European mobile subscribers received 13 percent of all international calls, these calls accounted for 18 percent of international carriers' termination costs.

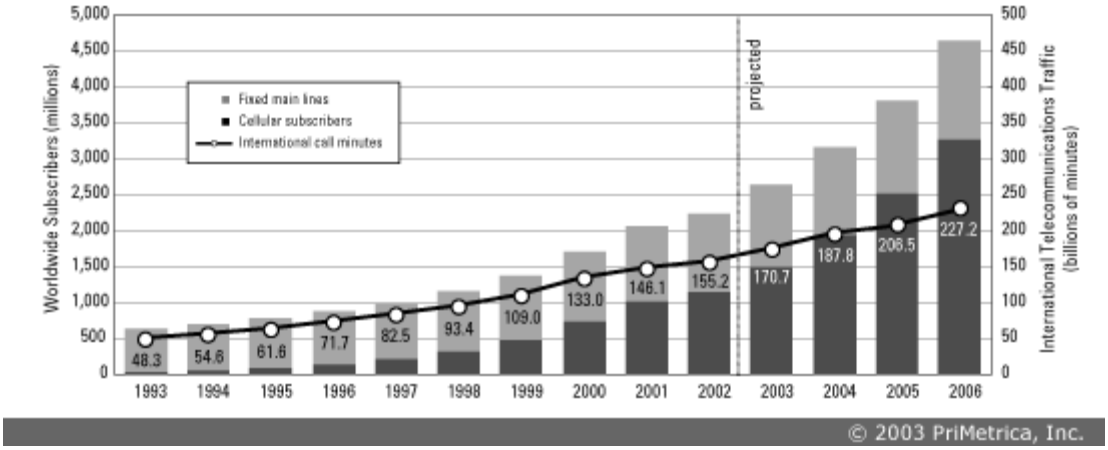
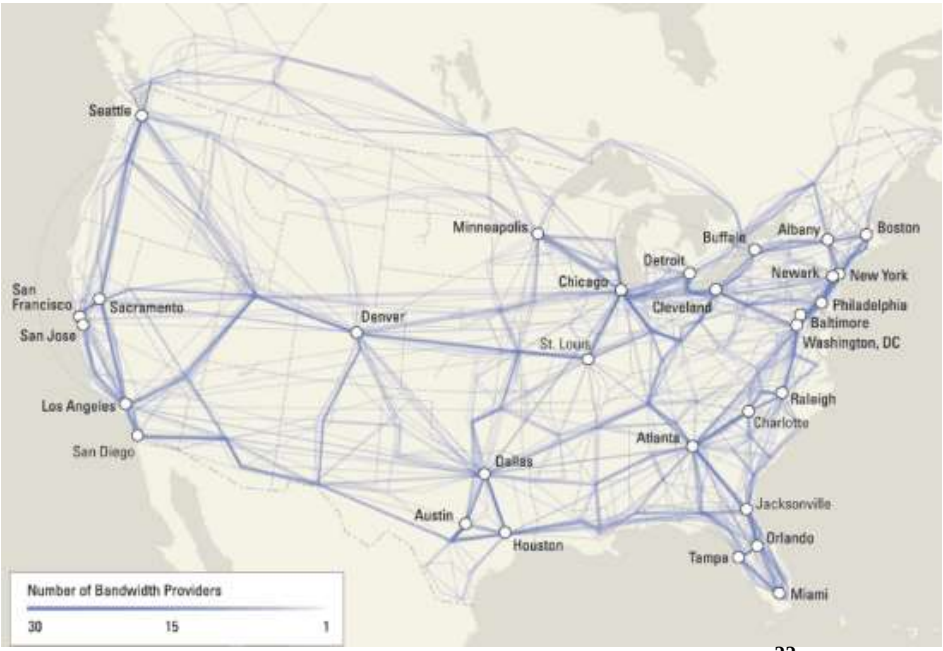


Chart 7 International Cellular Subscribership

National Telecommunications Landscape[21]



Map 2 Map of U.S. City Internet Connectivity[22]

The Federal Communications Commission reports progress

A just released report by the FCC updates the federal view of telecommunications services in the U.S. [23]

Advanced Services Lines

- Advanced services lines, which deliver services at speeds exceeding 200 kbps in both directions, increased by 31% during the first half of 2005, from 28.9 million to 37.7 million, compared to a 23% increase, from 23.5 million to 28.9 million lines, during the second half of 2004. For the full twelve-month period ending June 30, 2005, advanced services lines increased 60% (or 14.2 million lines).

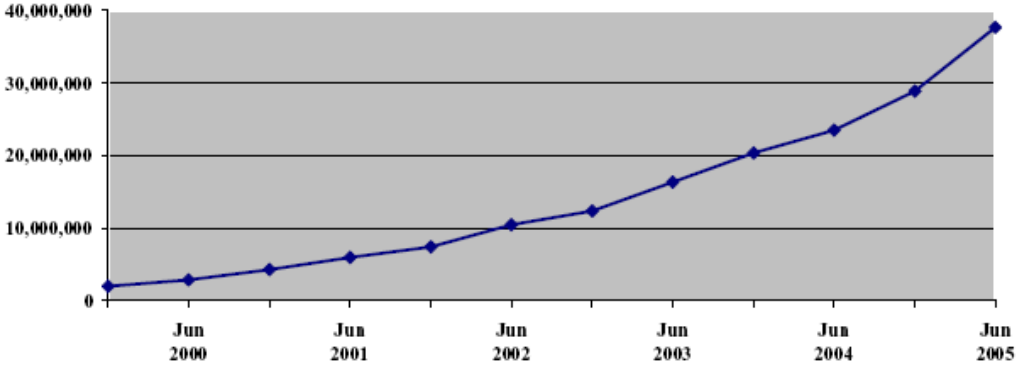


Chart 8 Advanced Services Lines

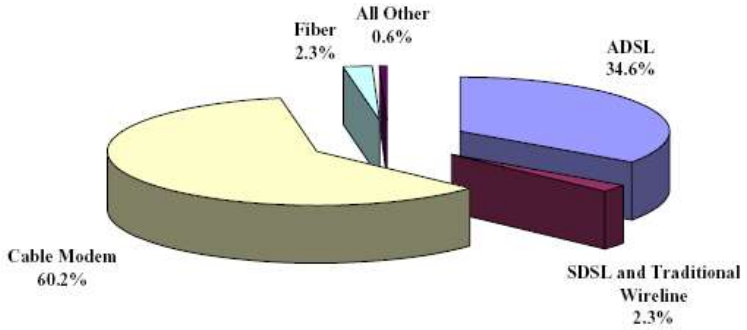


Chart 9 Advanced Services Lines By Technology

- Of the 37.7 million advanced services lines reported as of June 30, 2005, 61.8% were at least 2.5 mbps in the faster direction and 38.2% were slower than 2.5 mbps in the faster direction.

- Of the 37.7 million advanced services lines, 34.3 million served primarily residential end users. Cable modem service represented 64.9% of these lines while 33.9% were asymmetric DSL (ADSL) connections, 0.5% were symmetric DSL (SDSL) or traditional wireline connections, 0.2% were fiber connections to the end user premises, and 0.5% used other types of technology including satellite, terrestrial fixed or mobile wireless (on a licensed or unlicensed basis), and electric power line.

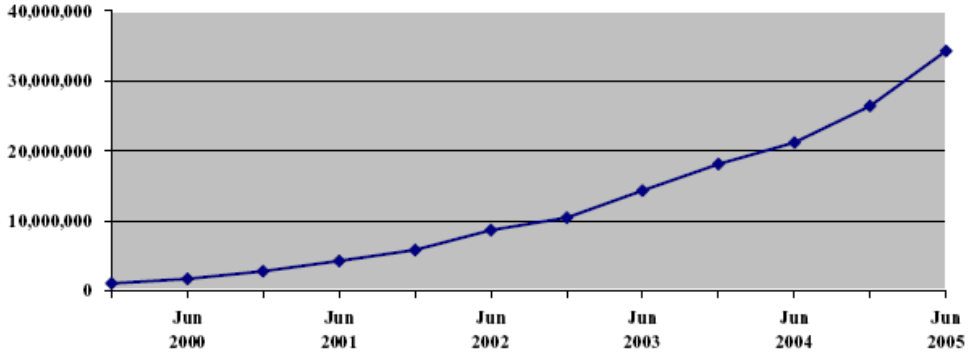


Chart 10 Residential Advanced Services Lines

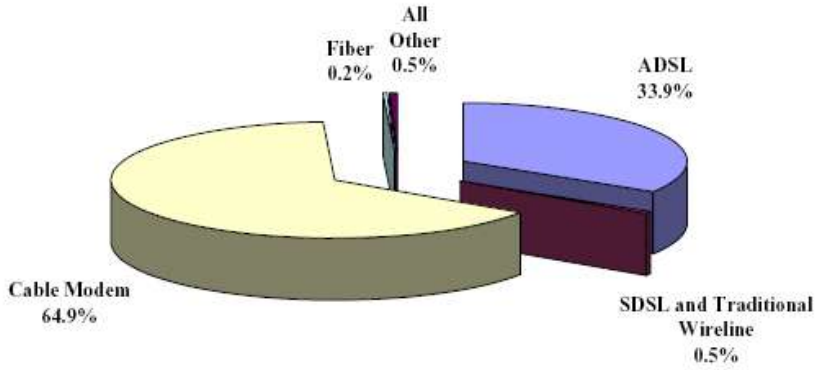


Chart 11 Residential Advanced Services Lines By Technology

High-Speed Lines

- High-speed lines, which encompass advanced services lines and also lines that deliver services at speeds exceeding 200 kbps in one, but not both, directions, increased by 13% during the first half of 2005, from 37.9 million to 42.9 million lines in service, compared to a 17% increase, from 32.5 million to 37.9 million lines, during the second half of 2004. For the full twelve month period ending June 30, 2005, high-speed lines increased by 32% (or 10.4 million lines).

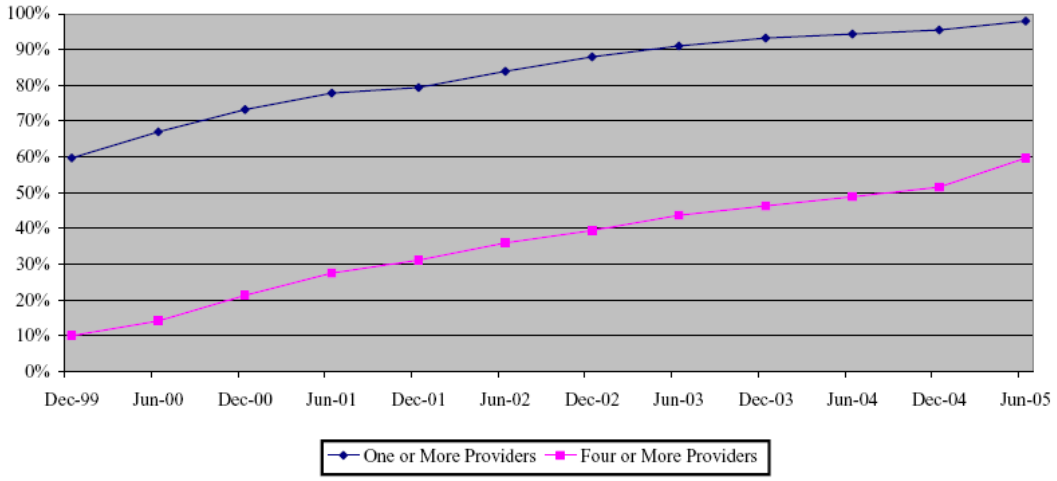


Chart 12 Per Cent of Zip Codes With High-speed Providers

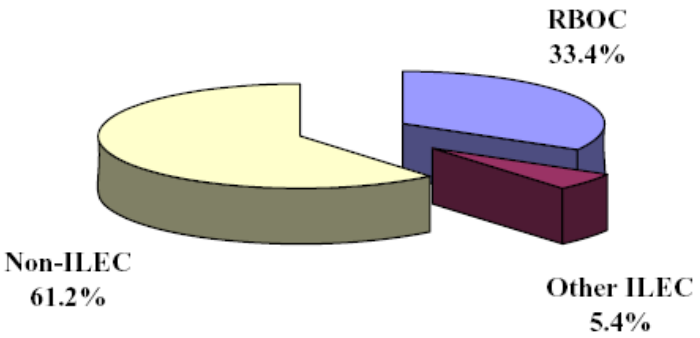


Chart 13 Share of High-speed lines by Provider

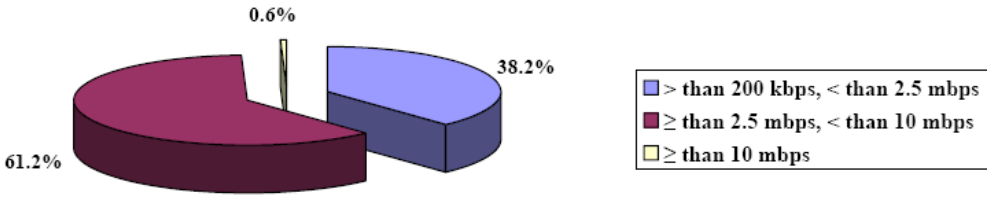


Chart 14 High-speed Lines By Information Transfer Rates in the Faster Direction
(Includes only lines exceeding 200 kbps in both directions)

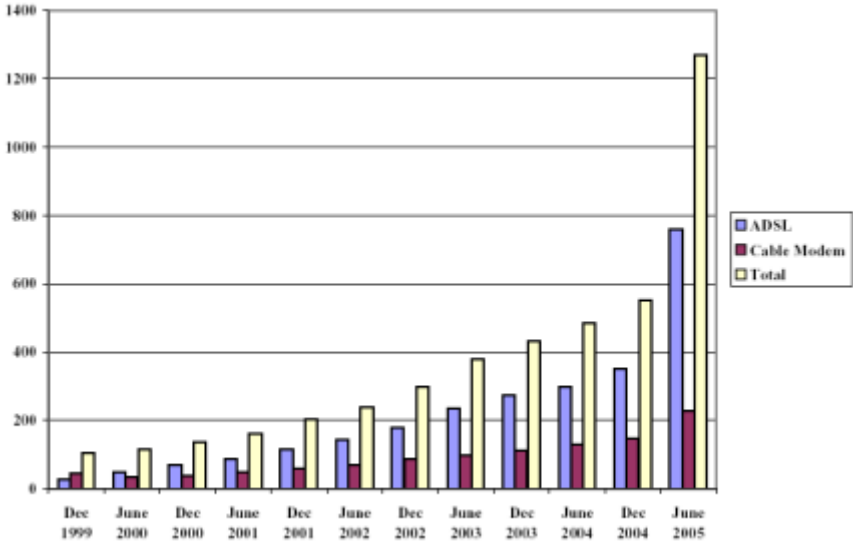


Chart 15 Historical Number of Providers of High-speed Lines By Technology

- Of the 42.9 million total high-speed lines reported as of June 30, 2005, 38.5 million served primarily residential end users. Cable modem service represented 61.0% of these lines while 37.2% were ADSL connections, 0.4% were SDSL or traditional wireline connections, 0.2% were fiber connections to the end user premises, and 1.1% used other types of technology including satellite, terrestrial fixed or mobile wireless (on a licensed or unlicensed basis), and electric power line.

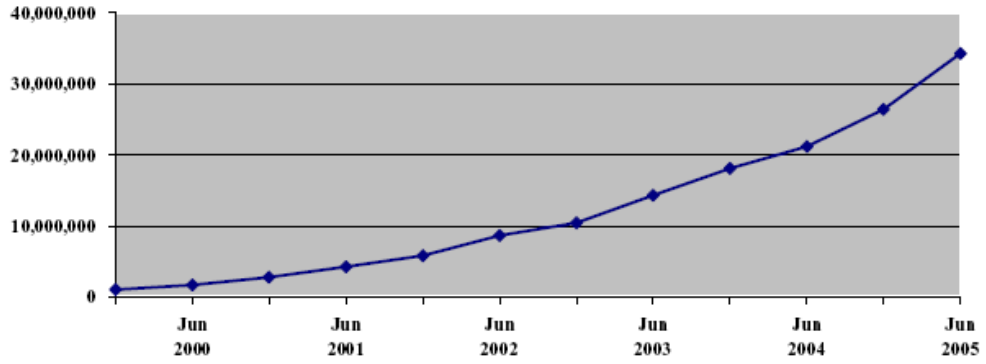


Chart 16 Residential High-speed Lines

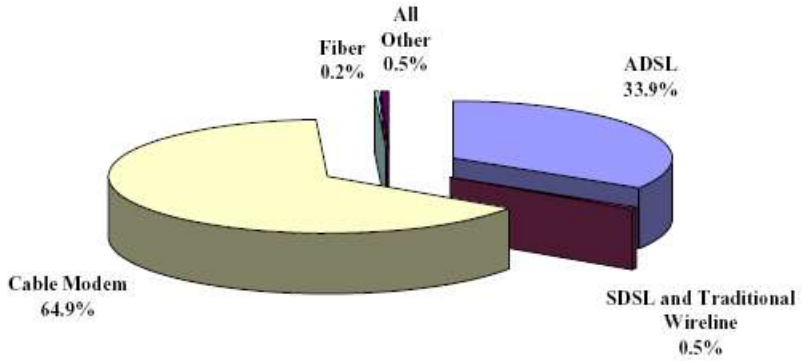
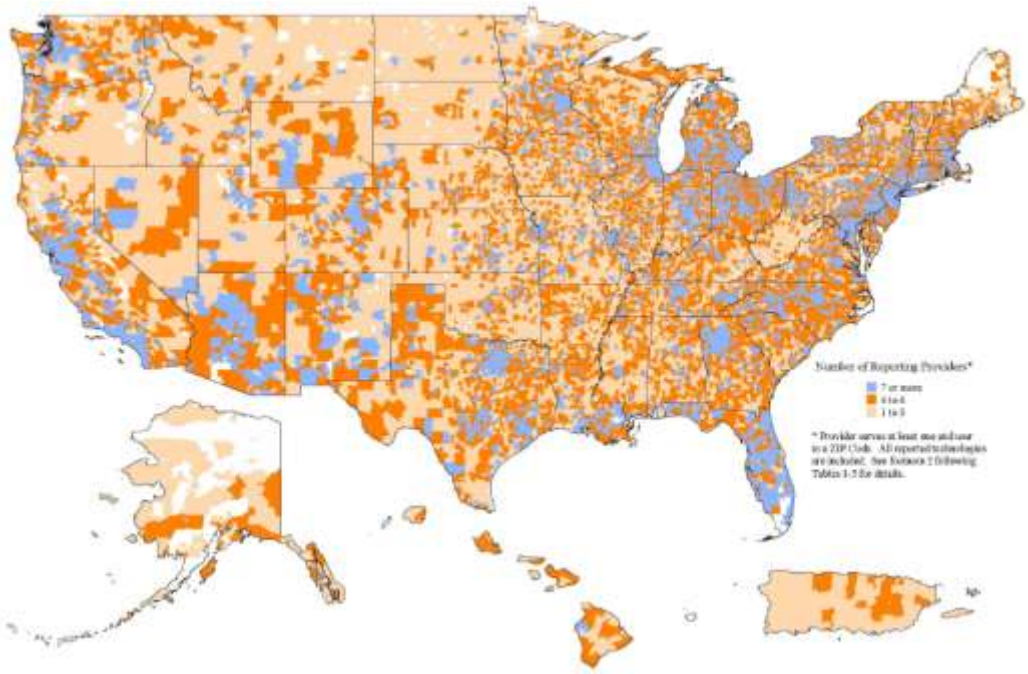


Chart 17 Residential High-speed Lines By Technology

Geographic Coverage

- As a nationwide average, we estimate that high-speed DSL connections were available to 76% of the households to whom ILECs could provide local telephone service as of June 30, 2005, and that high-speed cable modem service was available to 91% of the households to whom cable system operators could provide cable TV service.

- Providers list the Zip Codes in which they have at least one high-speed connection in service to an end user, and 98% of Zip Codes were on the list of at least one provider. Our analysis indicates that more than 99% of the nation's population lives in those Zip Codes. The most widely reported technologies by this measure were satellite (with at least some presence reported in 86% of Zip Codes), ADSL (in 78% of Zip Codes), and cable modem (in 62% of Zip Codes). ADSL and/or cable modem connections were reported to be present in 85% of Zip Codes.

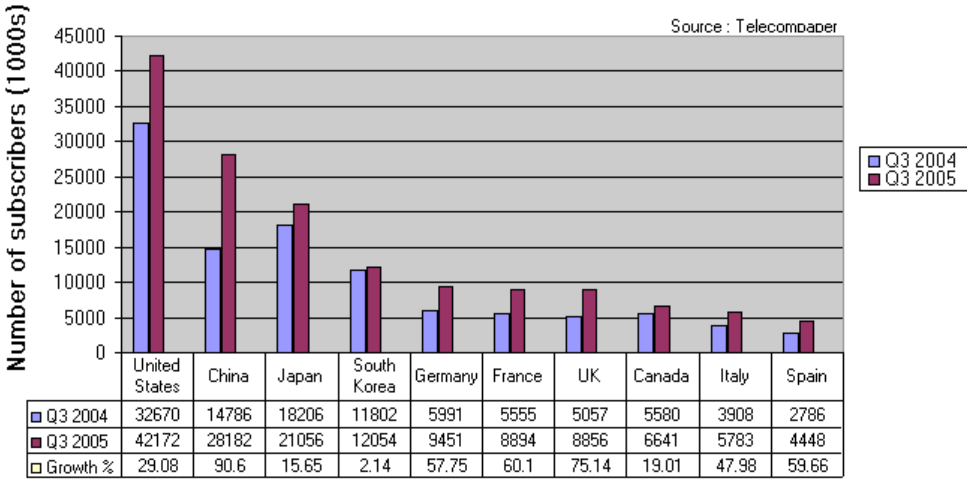


Map 3 National High-Speed Providers by ZIP Code[24][25]

U.S. broadband vs. the rest of the world[26]

At its current growth rate of over 90% per year, China will pass the US in total broadband subscribers by late 2006 to become the largest broadband country in the world. *The US has fallen to 19th overall in household broadband penetration, and is in danger of being passed by Slovenia in early 2007*. Israel leads all Middle Eastern and African countries, and is the third country overall in broadband penetration. Hong Kong leads the Pacific Rim, with a broadband penetration rate of over 73%. Meanwhile, in December 2005 the US passed 65% in broadband penetration among active Internet users.

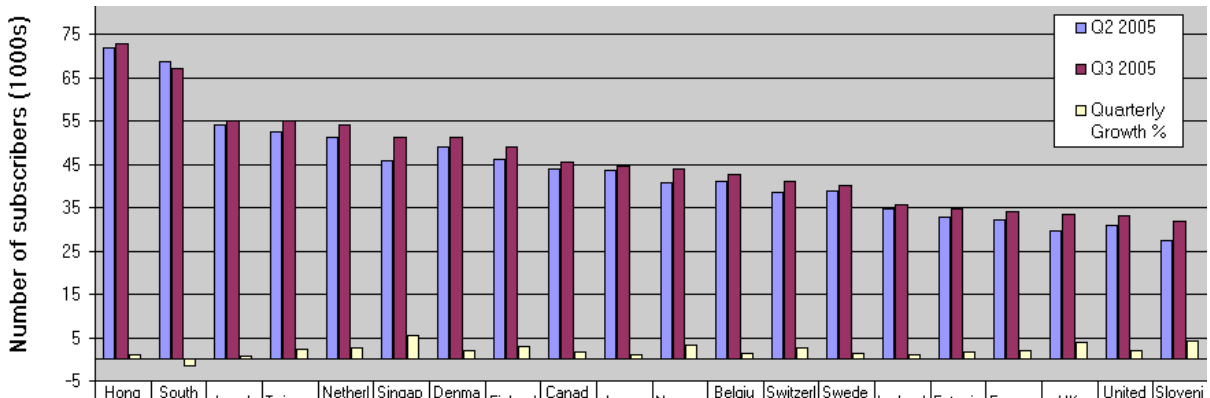
The US leads all countries with 42,172,000 total broadband subscribers (29.08% yearly growth), followed by China (28,182,000 subscribers), and Japan (21,056,000 subscribers). However, at its current growth rate of over 90% a year, China should overtake the US in total broadband subscribers by the end of 2006 (see chart of Top 10 Largest Broadband Countries). China has a long way to go to match its neighbors in broadband penetration, however. China has a household penetration rate of 8.62% while the overall broadband penetration rate in Hong Kong is over 73%, South Korea is over 67%, and the US is 33.09%, as of Q3 2005.



	United States	China	Japan	South Korea	Germany	France	UK	Canada	Italy	Spain
Q3 2004	32670	14786	18206	11802	5991	5555	5057	5580	3908	2786
Q3 2005	42172	28182	21056	12054	9451	8894	8856	6641	5783	4448
Growth %	29.08	90.6	15.65	2.14	57.75	60.1	75.14	19.01	47.98	59.66

Chart 18 Ten Largest Broadband Countries

Hong Kong leads all countries in household broadband penetration at 73.03% (see chart of Top 20 Countries in Broadband Penetration). South Korea follows at 67.32% but decreased for the first time, losing 1.42 percentage points from Q3 2004 to Q3 2005. Israel comes in third at 55.06% penetration and leads all countries in the Middle East and Africa for broadband penetration and usage. Of those countries in the top 20, Singapore leads in year-over-year growth at 5.63%, followed by Slovenia (4.28%), Finland (2.86%), Switzerland (2.53%), and the Netherlands (2.49%). At its current growth rate of 4.28%, *Slovenia should pass the US in broadband penetration by early 2007, bringing the US down to 20th overall*.



	Hong Kong	South Korea	Israel	Taiwan	Netherlands	Singapore	Denmark	Finland	Canada	Japan	Norway	Belgium	Switzerland	Sweden	Iceland	Estonia	France	UK	United States	Slovenia
Q2 2005	71.95	68.75	54.26	52.67	51.4	45.75	49.13	46.19	44.01	43.57	40.81	41.23	38.45	38.82	34.82	32.9	32.1	29.72	31.02	27.56
Q3 2005	73.03	67.32	55.06	55.05	54.2	51.38	51.15	49.05	45.72	44.46	44.12	42.74	40.98	40.25	35.77	34.68	34.12	33.52	33.09	31.84
Quarterly Growth %	1.08	-1.42	0.8	2.37	2.49	5.63	2.03	2.86	1.71	0.9	3.3	1.51	2.53	1.43	0.95	1.77	2.02	3.8	2.07	4.28

Chart 19 Top 20 Countries in Broadband Penetration (connections per 100 households)

US broadband penetration grew to 65.57% in December. Narrowband users (56Kbps or less) now comprise 34.43% of active Internet users, down 0.68 percentage points from 35.11% in November 2005 (see chart showing Web Connection Speed Trends -- Home (US).

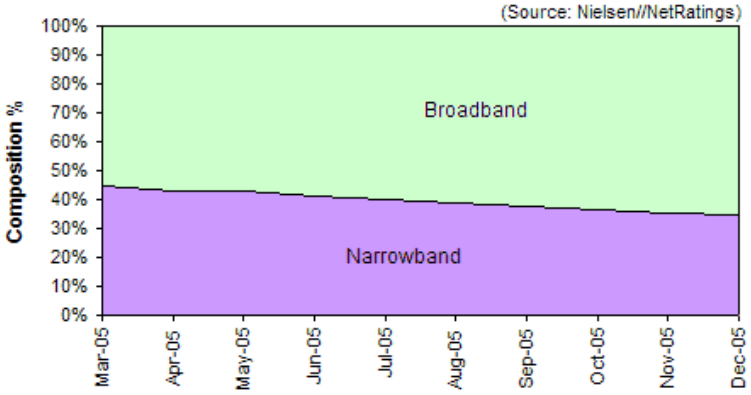


Chart 20 Web Connection Speed Trends -- Home (US)

In December 2005, broadband penetration in US homes rose 0.68 percentage points to 65.57%, up from 64.89% in November. This increase of 0.68 points is less than half the average monthly increase of 1.28 points in broadband penetration over the last six months. At the current growth rate, broadband penetration among active Internet users in US homes should break 70% by late March of 2006 (see chart showing Broadband Growth Trend – US Home Users). Note that with the recent slowdown in growth, this projection has been pushed further into the future with each passing month.

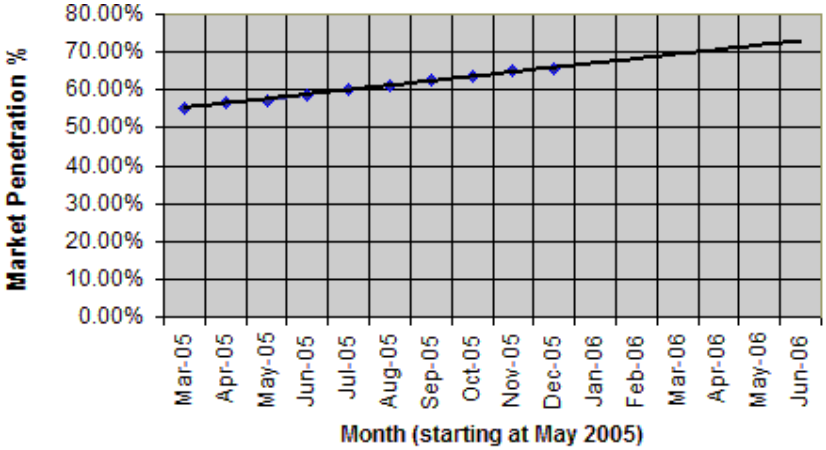


Chart 21 Broadband Growth Trend – US Home Users

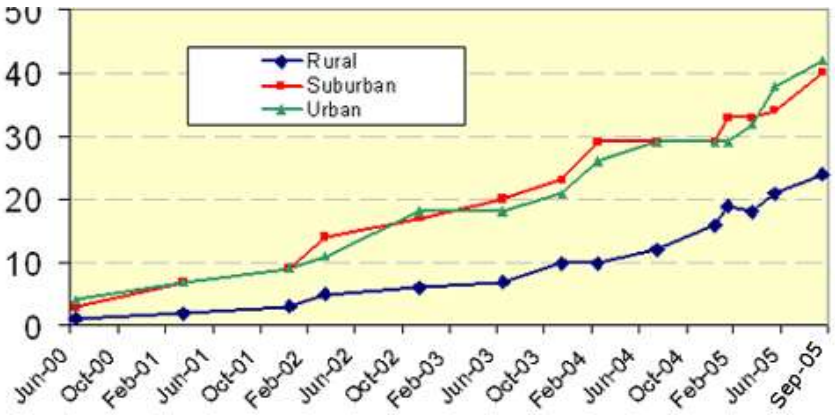


Chart 22 Percent of Adult Americans with Broadband at Home By Community Type

Most workers in the US enjoy high-speed connections to the Internet. Most use a high-speed line such as a T1 connection, and share bandwidth between computers connected to an Ethernet

network. The speed of each connection decreases as more employees hook up to the LAN. As of December of 2005, of those connected to the Internet, 87.53% of US users at work enjoy a high-speed connection, up 0.18 percentage points from the 87.35% share in November. At work, 12.47% connect at 56Kbps or less (see chart showing Web Connection Speed Trends -- Work US).

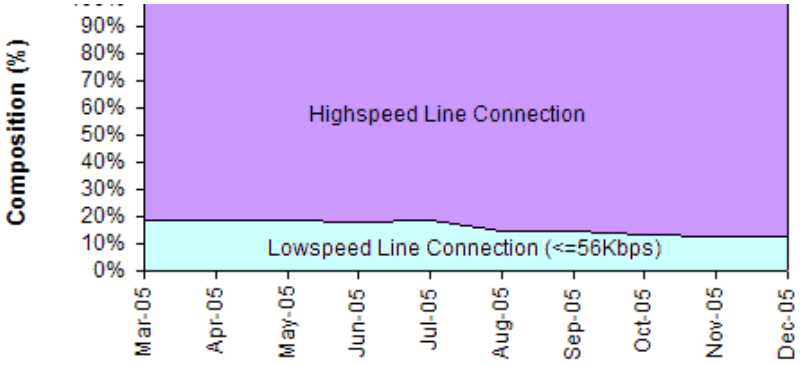


Chart 23 Web Connection Speed Trends – Work (US)

Issues – the definition of broadband and the value of reported statistics

A number of analysts view this effort at statistical analysis as "lacking precision" and borders on being useless for decision-makers in education, government, public safety, healthcare, business and other critical sectors of the economic and quality of life for Americans. Further, defining broadband as "200 kilobits per second (kbps) or greater transmission speed in at least one direction" falls seriously short of being adequate in even today's broadband applications world. They believe the FCC has set the bar too low.

On balance we note that the June 30, 2005 data provide more information about the "speeds" of advanced services lines and finer distinctions among technologies than previously reported. They also enable, for the first time in this data collection, estimation of the extent to which high-speed Digital Subscriber Line (DSL) connections are available to households residing in the areas served by incumbent local exchange carriers (ILECs) and the extent to which high-speed cable modem service is available to households residing in the areas served by cable TV systems.

Generally speaking it's difficult to find data sets from different sources that agree. As such one needs view the data over time and note trends more then the level of precision from any one data source.

There is disagreement on certain facets of broadband policy and deployment at the federal level and between different reporting sources. Yet we note that even in their disagreement, which could be argued as "healthy," there is considerable progress and recognition that we have much work ahead of us. Not surprisingly some of that same "healthy" discussion is at play in Oregon.

Oregon Telecommunications Landscape

The Oregon legislature recognizes the importance of broadband[27]

Over the past few legislative sessions Oregon has been moving forward and positioning the state for a future with broadband by placing key concepts into Oregon statute.

Oregon has a broadband goal

> "…it is the goal of this state to promote access to broadband services for all Oregonians in order to improve the economy in Oregon, improve the quality of life in Oregon communities and reduce the economic gap between Oregon communities that have access to broadband digital applications and services and those that do not, for both present and future generations…"[28]

Guidelines for broadband goal implementation for Oregon are established

> "That the goal set forth in subsection (1) of this section may be achieved by:
> (a) Expanding broadband and other telecommunications services;
> (b) Creating incentives to establish and expand broadband and other telecommunications services;
> (c) Undertaking telecommunications planning at the local, regional and state levels that includes participants from both the public and the private sectors;
> (d) Removing barriers to the full deployment of broadband digital applications and services and providing incentives for the removal of those barriers; and
> (e) Removing barriers to public-private partnerships in areas where the private sector cannot justify investments."[29]

Telecommunications is public works infrastructure

> "The improvement, expansion and new construction of the state's sewage treatment works, water supply works, telecommunications infrastructure, roads and public transportation provide the basic framework for continuing and expanding economic activity in this state, thereby providing jobs and economic opportunity for the people of Oregon"[30]

Telecommunications has a key role to play in the state's economy

> "Focus on strategies and investments that maximize the economic benefit to the state of the global shift to an information, science and technology driven economy and on industries and companies that make significant use of the high-capacity telecommunications, science and technology-related manufacturing processes or knowledge transfer typical of these emerging economic sectors[31]

Telecommunications has a role in public safety

> "It is the policy of the State of Oregon to encourage and support the rapid deployment of broadband telecommunications services in areas of the state where such services do not exist, to support redundancy of critical telecommunications assets in order to ensure homeland security protections in the state and to ensure that a secure conduit is available for emergency communications and public safety networks in all Oregon communities."[32]

Oregon broadband today -- progress continues

Overall we can report continued progress in the roll out and usage of broadband in Oregon (see following charts based on the April, 2006 report from the FCC).[33] One source shows by June of 2002 Oregon ranked 24th in the U.S. in broadband subscribers.[34] Yet another report shows Oregon ranked as 11th using a broadband index approach that is based on the extent to which policies spur or impede broadband deployment or demand.[35] As of October in 2003 in the US as a whole, 2.8% of households added high-speed Internet service in the second half of 2002 -- with Connecticut, Oregon and New Jersey leading the nation in incremental broadband growth.[36] The available data does not present a clear picture of Oregon's current status beyond indicating that encouraging progress continues.

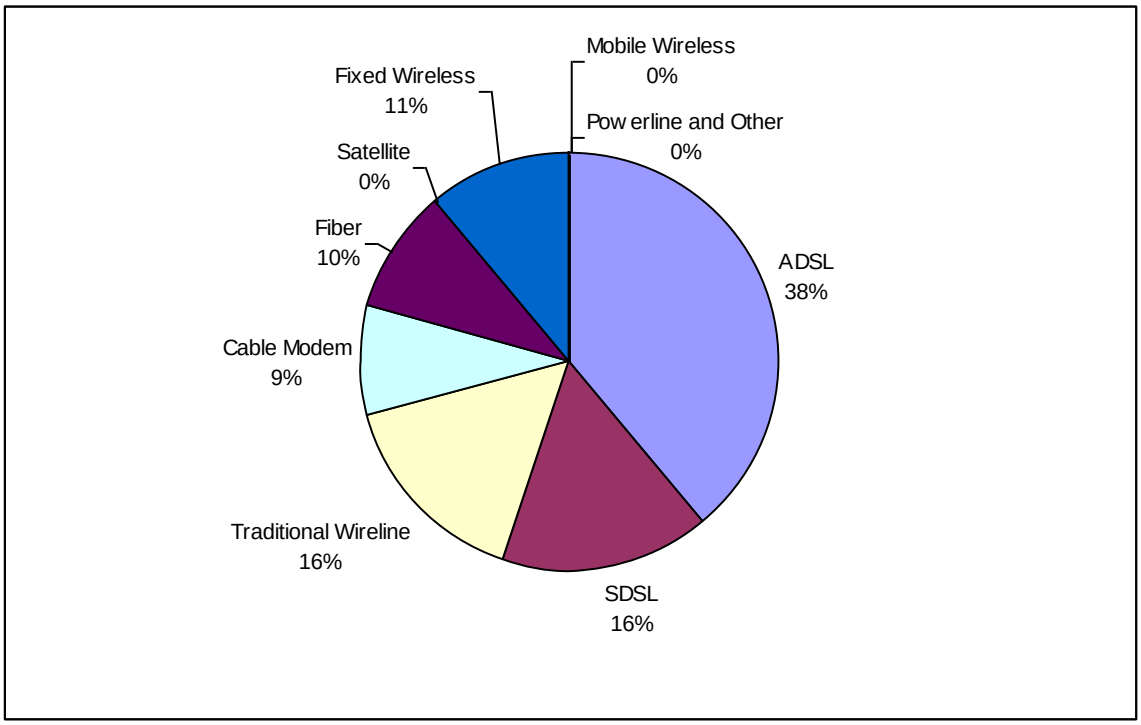


Chart 24 Providers of High-Speed Lines by Technology as of June 30, 2005
(over 200 kbps in at least one direction)

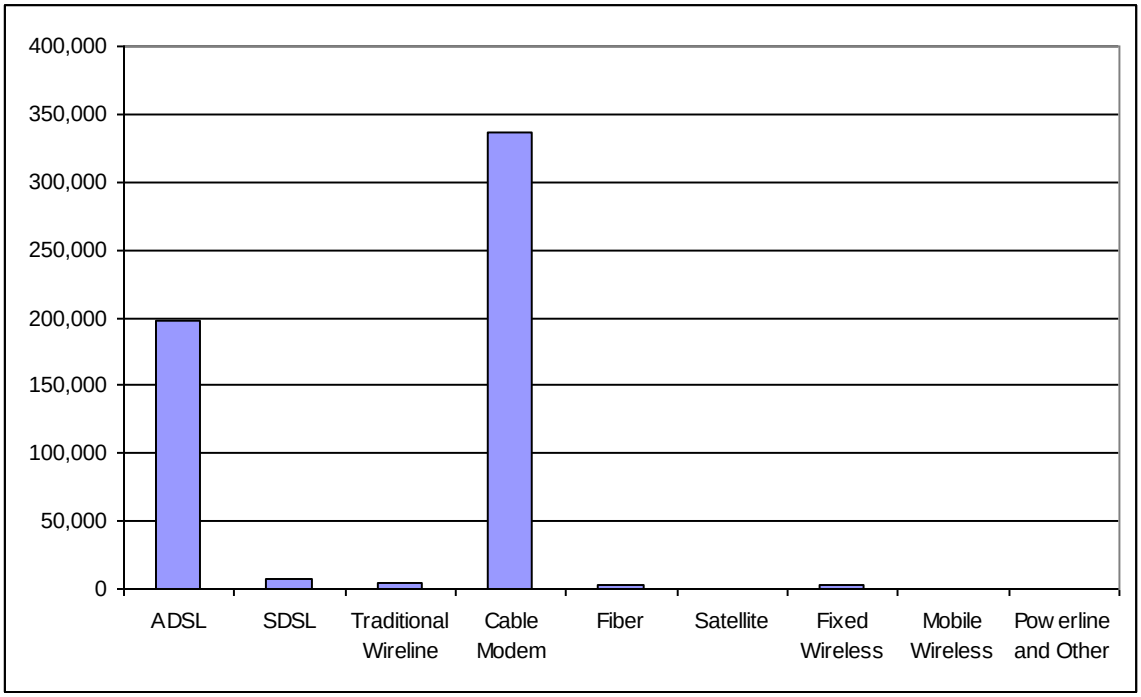


Chart 25 High-Speed Lines by Technology as of June 30, 2005
(over 200 kbps in at least one direction)

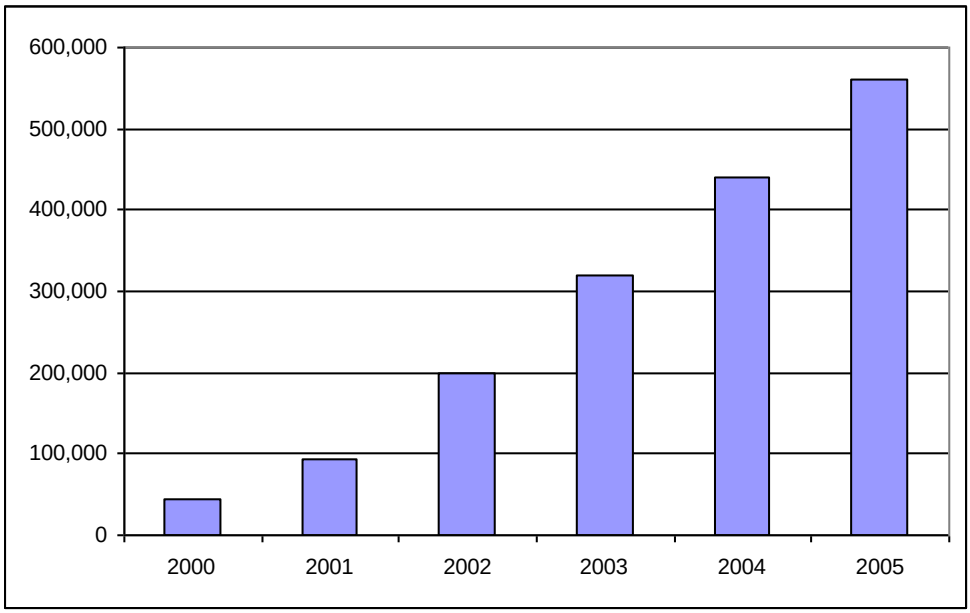


Chart 26 High-Speed Lines by State
(over 200 kbps in at least one direction)

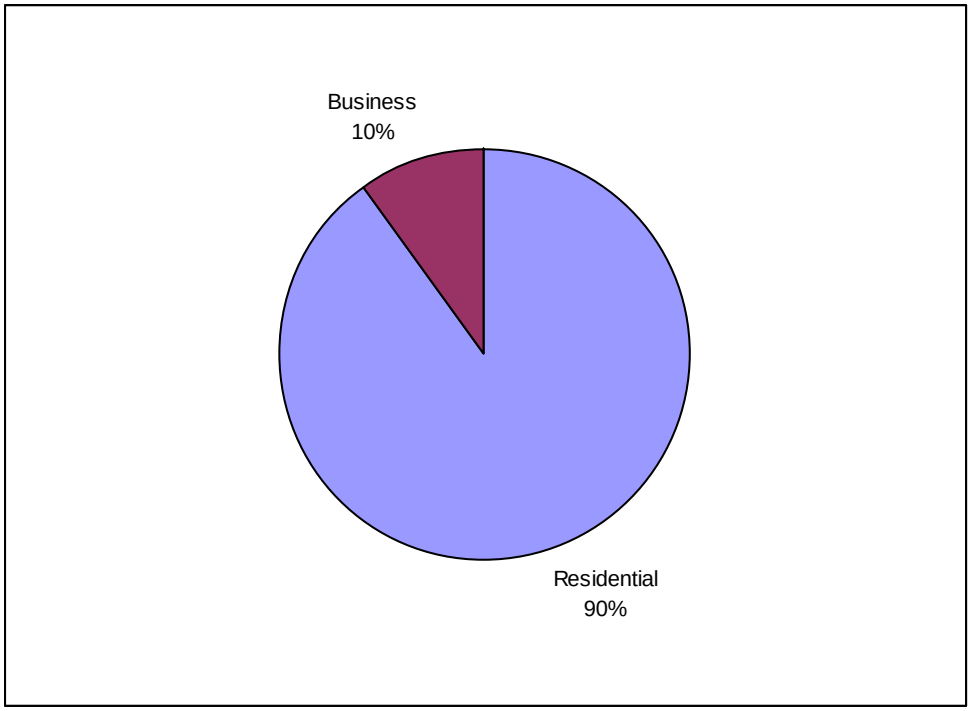


Chart 27 High-Speed Lines by Type of User as of June, 2005
(over 200 kbps in at least one direction)

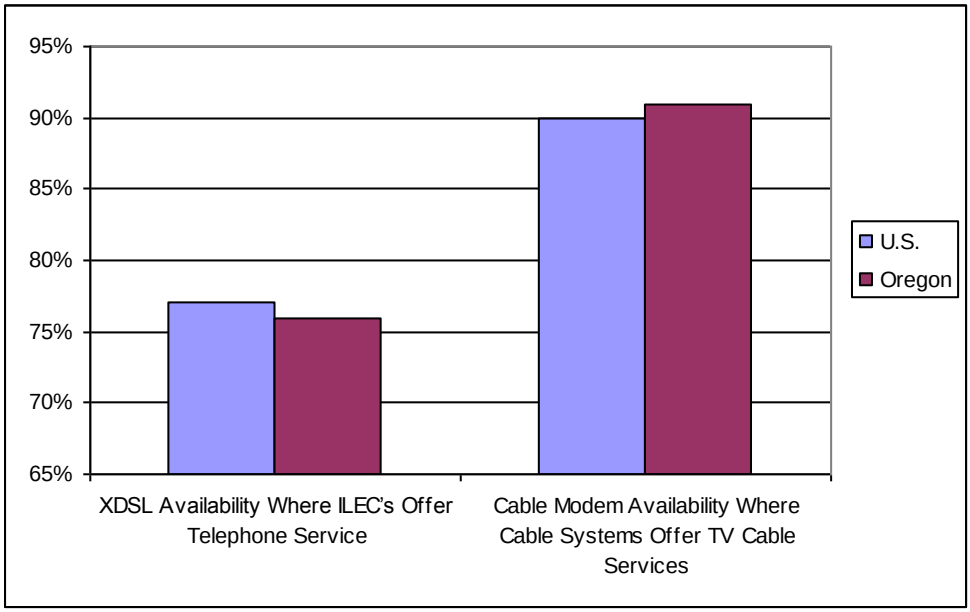


Chart 28 % Residential End-User Premises with Access to High-Speed Services
(over 200 kbps in at least one direction)

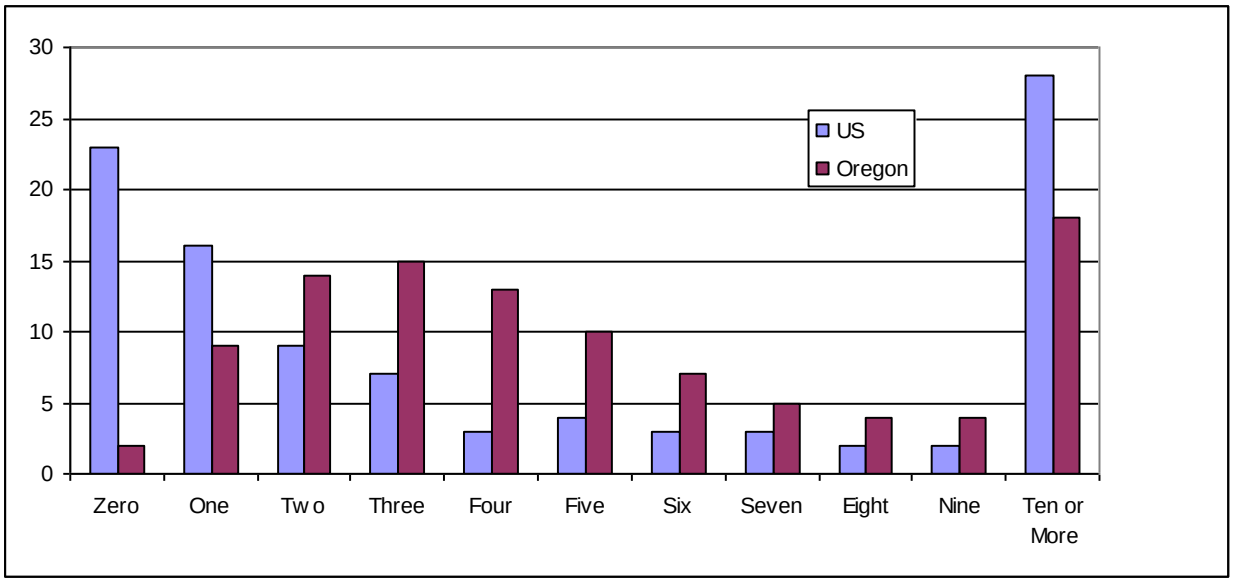
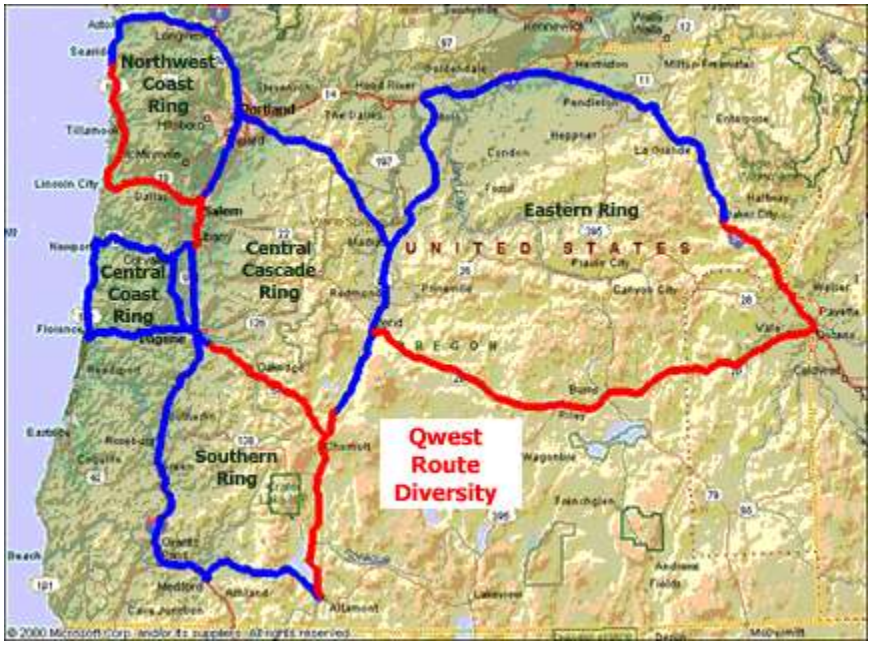


Chart 29 % Zip Codes with High-Speed Lines in Service as of June 39, 2005
(over 200 kbps in at least one direction)

Most rural Oregon cities now have better telecommunications infrastructure, thanks in large part to the infrastructure investment Qwest made as a result of Senate Bill 622 in the 1999 legislative session.



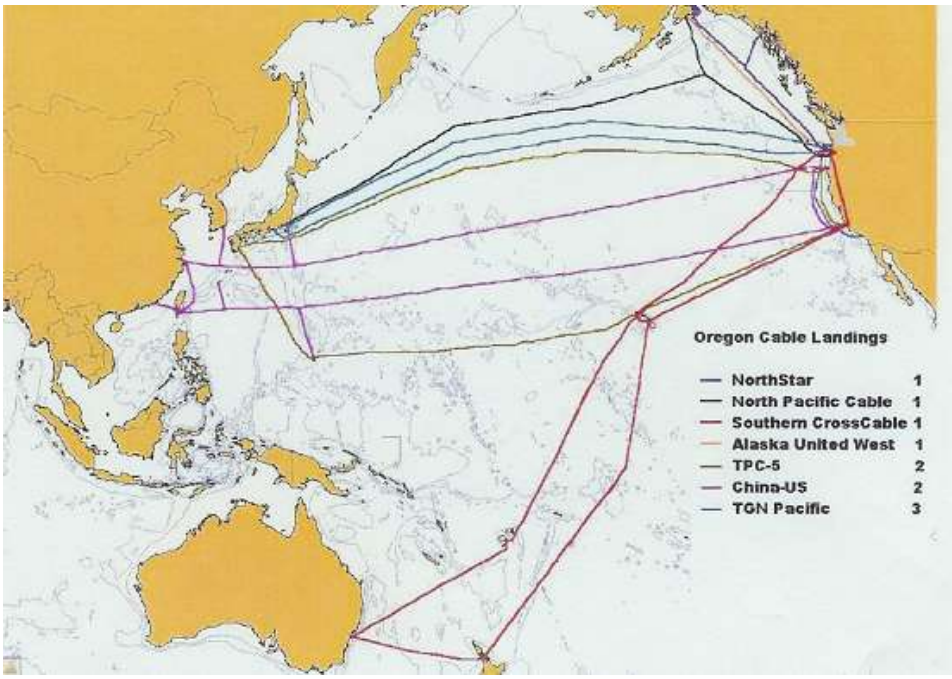
Map 4 Oregon Qwest Rings /Route Diversity

There is more broadband service availability and more reliable network capacity as a result of the five self-healing fiber optic rings serving different parts of Oregon. For these areas of the state, the current focus should be on how best to use that economic competitive advantage to recruit new businesses, to grow existing businesses and develop the applications that will utilize the technology to improve quality of life. In particular we need to work on public sector applications in health care, education, public safety, and government as well as electronic commerce and other business applications.

Oregon has seen significant fiber network infrastructure deployment in addition to the SB622 SONET Rings. The LS Networks, formerly Northwest Open Access Network of Oregon (NoaNet Oregon) is a nonprofit cooperative corporation that has licensed fiber optic facilities from the Bonneville Power Administration and other sources. LS Networks is unique in the nation for creating a cooperative to provide a competitive, open access fiber optic backbone in the state with local members to build out the middle and last mile. LS Networks has also been turning up its backbone network over the past several years along with the fiber distribution networks of its members, providing communities with additional capacity and route diversity in a fiber network completely separate from the incumbent Telco's. Several municipalities and organizations have built out fiber and deployed wireless to push broadband into rural areas. Primarily these are electric co-operatives along with some municipalities and an Indian Tribe are building the local fiber distribution networks. LS Networks has announced an extension of its network backbone to Southern Oregon and California with plans to connect with its eastside network completing yet another major backbone serving the state.

Additionally, other businesses and consortiums have built or created competitive fiber networks in a number of areas of the state.

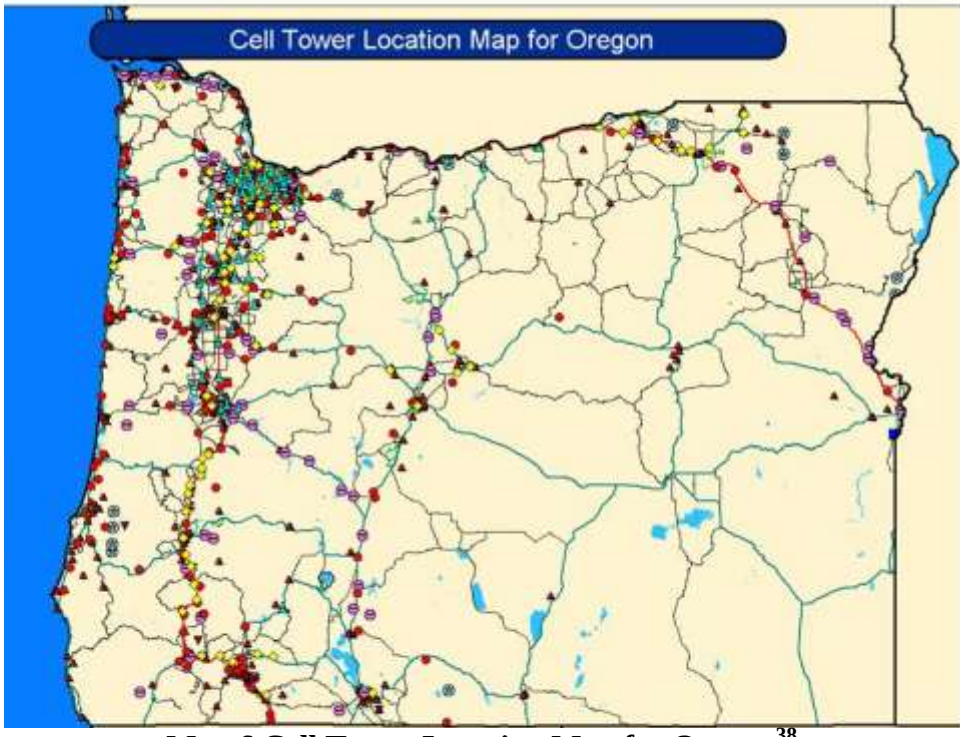
Eleven undersea cables currently come ashore in Oregon (see Transpacific Cable Landings on the Oregon Coast). Oregon has a competitive advantage over Washington and California in attracting future west coast cable landings due to established "fast track" permitting polices and a mature cooperative relationship between the undersea cable industry, the fishing industry and the state. Currently, most of those undersea cables pass through Oregon on their way to major out-of-state connection points. Oregon has the choice of being passive and becoming a poor neighborhood living "under the freeway" without an on-ramp to this economic opportunity as these highways of the future pass through without leaving much local benefit. Oregon also has the choice of being proactive and arranging its Internet connections so that Oregon becomes a preferred geographic location for organizations doing business in the Pacific Rim.[37]



Map 5 Transpacific Cable Landings on the Oregon Coast

Cellular Towers in Oregon

Cellular phone service is available in most of the more densely populated areas and along many of the major highway corridors (see Cell Tower Location Map for Oregon).



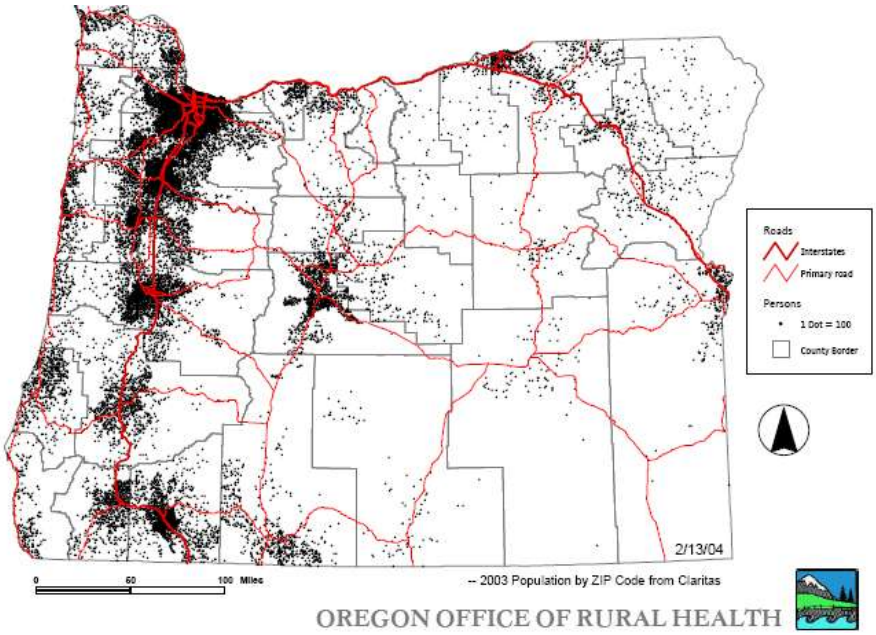
Map 6 Cell Tower Location Map for Oregon[38]

Many areas of rural Oregon remain "broadband-challenged"

Oregon has a telecommunications infrastructure extending throughout the state that is world class. Fiber optic backbone networks with diverse routing together with extensive broadband access provide excellent network reliability and connectivity throughout the state for both voice and data traffic. Oregon should continue to build on these strengths and work to improve the Internet infrastructure that will be the key to the state's future economic development.

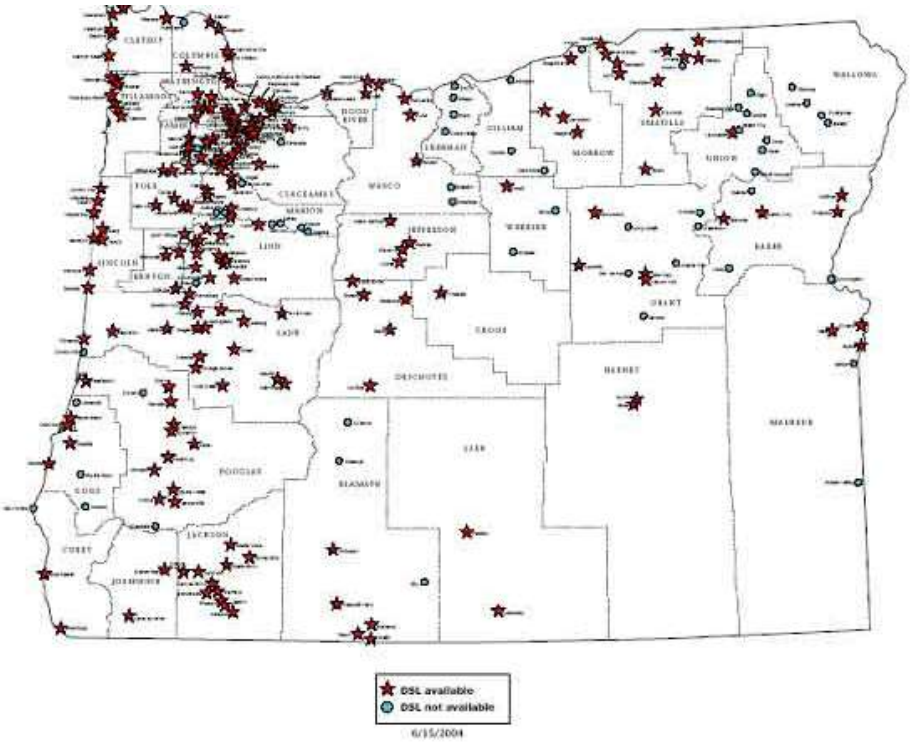
Yet we honestly must report, based on the preponderance of anecdotal evidence that not all areas of the state are served with the benefits of broadband. Just as it's been conceded at the national level that the work is not done, so too is the case in Oregon. Cities remain without access to broadband services and there continue to be areas without the benefit of route diversity. Even in those places in Oregon with the best current infrastructure and services the current advantage will be short-lived as other states catch up and as the rapid changes in information technology continue. We will need to run fast to avoid falling behind other states and regions and to maintain our economic competitive advantage.

As illustrated by the following map, Oregon's population density accrues to a few modest sized cities. Most of the state remains sparsely populated.[39]

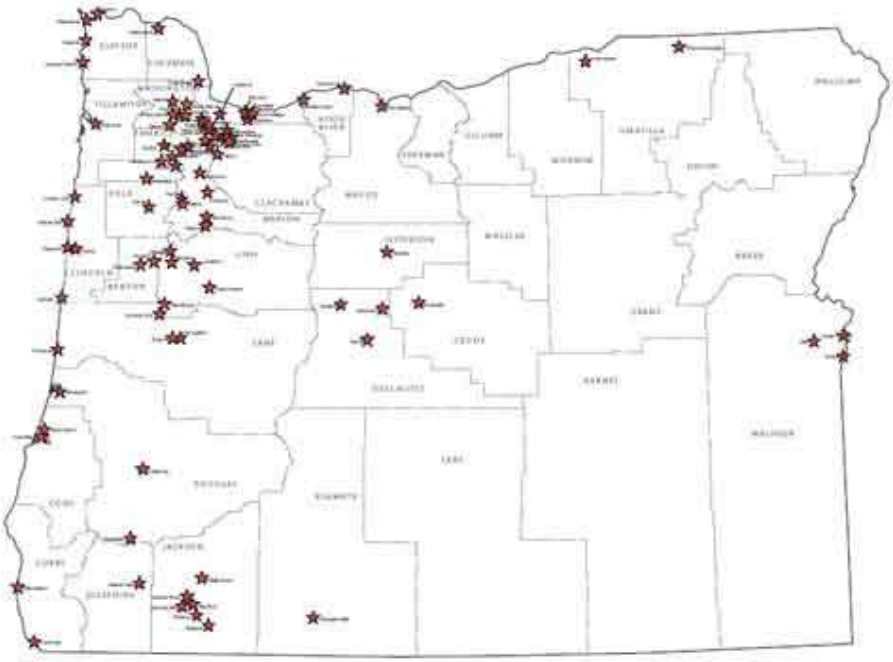


Map 7 Population Density in Oregon

The growth in availability of broadband is primarily seen in cities or areas demonstrating significant demographic clustering (see following map).



Map 8 DSL Access in Oregon[40]



Map 9 Cable Modem Access[41]

One only need cross just outside the city centers or be slightly off the path of a cable run to discover this fact. One Oregon city in Jackson County serves to illustrate this issue.

The city of Rogue River in southern Oregon is on the I-5 corridor and benefits from Charter's cable modem service and Qwest's DSL service (note: at time of this writing Qwest has been expanding DSLAMs in some areas near the outer boundaries of the city's footprint). The footprint for the city of Rogue River contains approximately 1,800 residents. Within a 10-mile radius of the downtown area, and living outside the city limits, are an estimated additional 8,000 resident without access to broadband, except for satellite (see the section on Satellite access later in this report).

The Rogue River scenario is replayed throughout rural Oregon. Solutions to provide broadband to these folks, who indicate they want it and are willing to pay cable and DSL–like rates for it, need to be pursued in the interest of leaving no community behind. Just because you don't live in a city doesn't mean you're not a part of a community.

Oregonians need jobs!

The Oregon economy has taken a substantial hit in recent years. Only now are we starting to see some daylight. Job recovery appears to be underway as reported in the Oregon Office of Economic Analysis September 2004 Oregon economic forecast[42]:

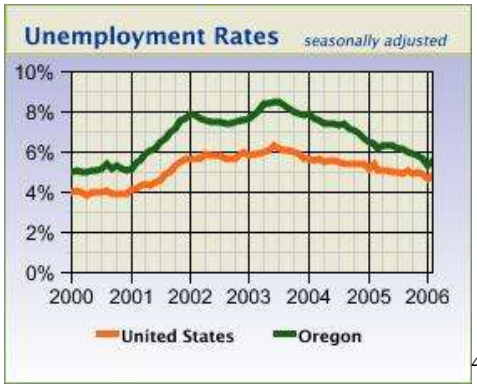
> "The Employment Department reports that we have regained two-thirds of the lost jobs as of June of this year. The national economy is projected to continue its growth path into 2005 and the Oregon economy will be pulled along for the ride. The questions of uncertainty that now loom are: How strong and how long?"

OEA also predicts:

> "Oregon will be pulled along with a stronger U.S. economy, but Oregon's slower growth may try the patience of those who desire much faster relief to the unemployment situation in the state."

Oregon's economy experienced strong growth in 2005. Revised employment data showed that growth was slightly lower than previously estimated. Data originally placed the difference in annual average employment from 2004 to 2005 at 3.4 percent. Revised data showed that it was 3.1 percent. The revised trend for 2005 was about the same as the original; it was steadier with fewer bumps along the way. Record levels of employment were reported in some sectors. The state unemployment rate was revised, but remained essentially unchanged. [43]

	Feb 2006	Jan 2006	Feb 2005
Oregon	5.6%	5.3%	6.4%
United States	4.8%	4.7%	5.4%

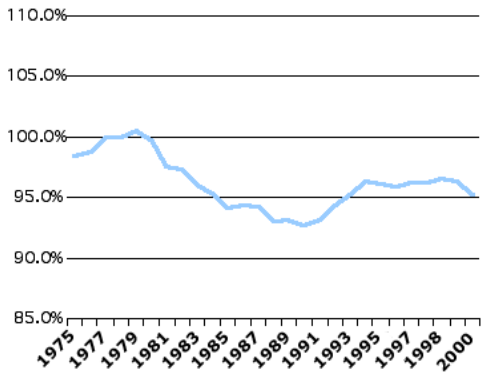


[44]

Chart 30 Unemployment Rates

The Oregon Business Plan (OBP) makes this evaluation: [45]

> "For some time, Oregon's overriding economic goal has been to increase and maintain high-wage jobs that support families and maintain strong communities. Key measures of success are per capita income relative to the national average, reduction in poverty, and statewide job stability."



Since the early 1980s, Oregon per capita income has fallen as a percentage of the national average.

Chart 31 Oregon Per Capita Income

All sources would seem to agree that the nature of the Oregon economy has changed.

> "Natural resource industries, particularly forest products, were once Oregon's dominant traded-sector employers, and they had a large role in supporting family-wage jobs and strong communities. That changed in the early 1980s when the forest products industry in Oregon encountered tougher out-of-state competition, market demand for lower cost substitute products, and supply constraints that forced it to drastically downsize and restructure. Although still important, natural resources are no longer a mainstay of Oregon's economy."

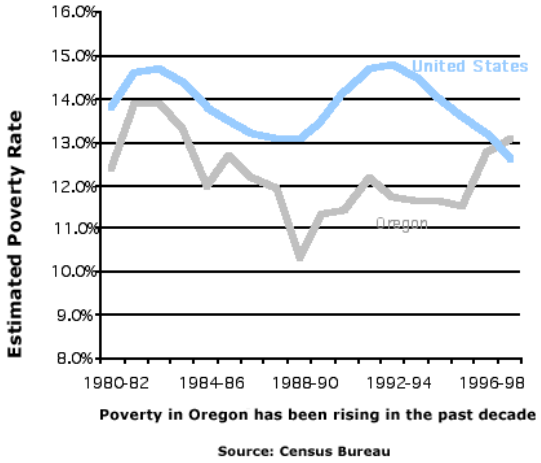


Chart 32 Oregon Poverty

Oregon is now a set of regional economies, not a single statewide economy. Oregon can now be seen as nine distinct regions, each with its own values, economic approach and political outlook.[46]

It's the OBP view that four factors characterize a regional view of Oregon[47]:

- Different parts of Oregon have distinctive economies reflecting the locational preferences of various industry clusters.
- Declining pay is the chief economic problem of rural regions. All of the regions outside the Willamette Valley have lower average wage levels today, adjusted for inflation, than in 1976. Northwest Oregon wages are up 20 percent.
- Regional pay differentials closely correlate with variations in educational attainment -- rural areas have far fewer highly educated workers as a fraction of their population than does the Portland metropolitan area.
- No region has failed to create jobs. Every region has more jobs than in 1976; growth rates in lagging regions (Eastern Oregon, Coos-Curry-Douglas) have been a third to 40 percent of the state average. Southern and Central Oregon are growing faster than the rest of the state.

Across the state we are seeing evidence of these dramatic changes occurring in Oregon. In every sector there are substantial and continuing changes in technology, markets, and competition. Firms that have been most successful in Oregon, indeed across America, have been those that have developed new and more efficient production techniques and better products. Telecommunications plays a significant and growing role in these successes.

Jackson County Overview

History

Jackson County is located in the state of Oregon. The county was named for the seventh President of the United States, Andrew Jackson. The county seat is located in Medford.

Modoc, Shasta, Takelma, Latgawas, and Umpqua Indian tribes lived within the present boundaries of Jackson County. Moreover, in the early 1850s, both the Klickitats from the north and the Deschutes from the south raided and settled the area. Gold discoveries in the Rogue and Illinois River valleys in the 1850s and completion of a wagon road connecting the county with California to the south and Douglas County to the north led to an influx of non-native settlers.

The Territorial Legislature created Jackson County on January 12, 1852, from the southwestern portion of Lane County and the unorganized area south of Douglas and Umpqua Counties. It included lands that now lie in Coos, Curry, Josephine, Klamath and Lake Counties. The discovery of gold near Jacksonville in 1852 and completion of a wagon road, which joined the county with California to the south and Douglas County to the north, brought many pioneers.

Conflict between the miners and Native Americans led to war in 1853, which continued intermittently until the final defeat of the last band under chiefs John and George by a combined force of regular army and civilians May 29, 1856 at Big Bend on the Illinois River. The Native Americans had received the worse of the fighting throughout this conflict, and as they began to surrender, they were herded to existing reservations, beginning in January, 1856 when one group was marched to the Grande Ronde Indian Reservation west of Salem. Over the following months, other groups were forced to leave until by May, 1857 almost all of the Shasta, Takelma, and Latgawas tribes had been located on the Siletz Reservation, where they remained.

Jacksonville was designated as the first county seat in 1853. However, the city declined due to diminishing returns in the local goldfields and the construction in the 1880s of the Oregon and California Railroad, which bypassed the city. Medford, located five miles east of Jacksonville, benefited from the location of the railroad and the accompanying commerce and development. Jacksonville fended off suggestions to move the county seat until 1927 when Medford was finally selected as the county seat.

Geography

According to the U.S. Census Bureau, the county has a total area of 7,257 km² (2,802 mi²). 7,214 km² (2,785 mi²) of it is land and 43 km² (17 mi²) of it is water. The total area is 0.59% water.

Adjacent Counties:

Josephine County, Oregon - (west)
Klamath County, Oregon - (east)
Douglas County, Oregon - (north)

Many still refer to it as the State of Jefferson for its failed attempt to secede from Oregon more than 60 years ago. Perched almost midpoint on Interstate 5, it has always looked south to California as much as north to Portland.

Nestled between the Siskiyou and Cascade mountains, the Rogue Valley is home to most of the area's residents. The heavily forested region once was among the nation's top timber producers. Pear orchards are still plentiful in the area with a recent large investment in vineyards. Even so it might be argued that housing developments are the more dominant "crop."

Several rivers course through the county, including the Rogue River and the Applegate River. Numerous smaller waterways drain the landscape, for example Bear Creek and the Little Butte River. The Siskyou National Forest and the Bureau of Land Management both own sizeable portions of the county's geography.

The terrain ranges from valleys to hills, making some areas of the county very rugged and sparsely populated. Some prominently visible geographic sites in the area are the Table Rocks, Mount McLoughlin, Mount Ashland and Roxyann.

View toward Mt. McLoughlin and Roxyann from Old Stage Road

Demographics

Jackson is one of 36 counties in Oregon. It is part of the Medford, OR (MSA). Incorporated Cities and towns have a population of 129,133. The unincorporated area population is 63,859.[48]

Area/City	Population	%
Unincorporated	63,859	33.1%
Ashland	20,755	10.8%
Butte Falls	436	0.2%
Central Point	15,152	7.9%
Eagle Point	6,959	3.6%
Gold Hill	1,069	0.6%
Jacksonville	2,242	1.2%
Medford	68,099	35.3%
Phoenix	4,379	2.3%
Rogue River	1,915	1.0%
Shady Cove	2,314	1.2%
Talent	5,813	3.0%
	192,992	

Table 2 Jackson county Population by City

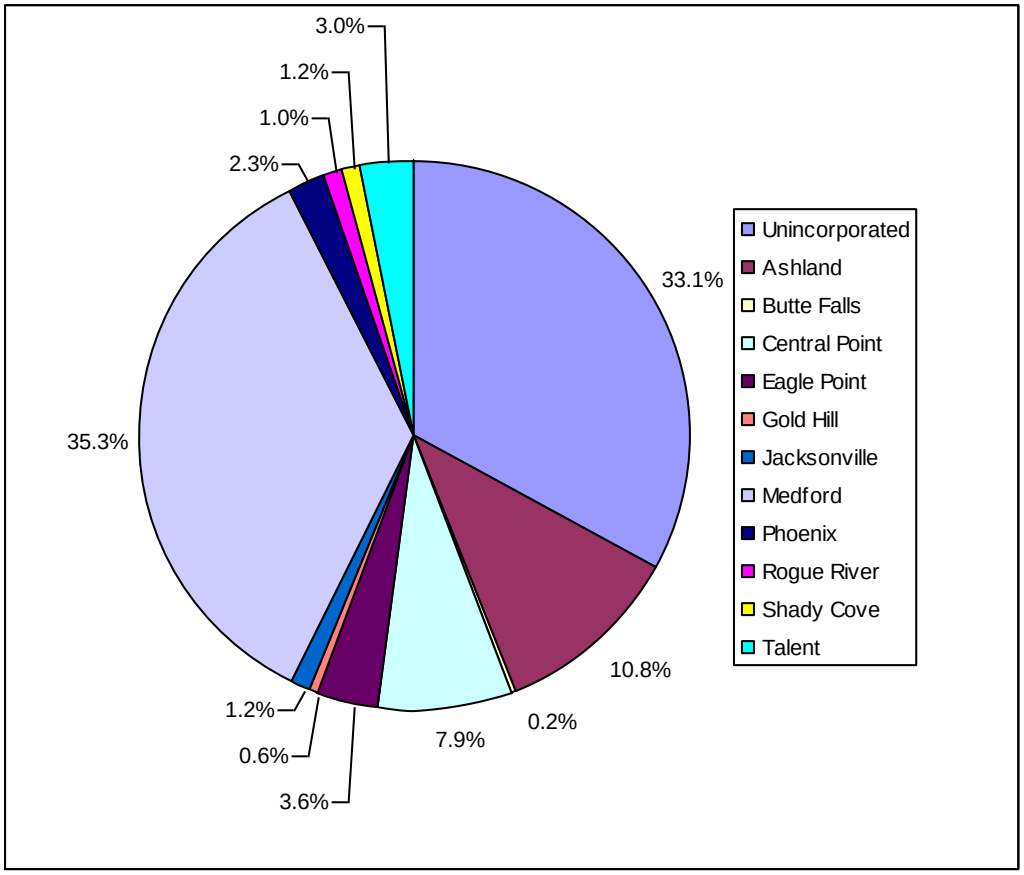


Chart 33 Jackson County Population by City

Medford, population estimated at 68,099, is the largest city within Jackson County and serves as its county seat. Medford is known throughout the country and the world for its pear orchards and is home to Harry & David's and Jackson Perkins, one of the world's largest shippers of fruit, food gifts, and roses. Medford is a popular location for visitors who wish to access the nearby recreation areas.

The second largest city in Jackson County, Ashland (population 20,755), is home of the internationally famous Oregon Shakespeare Festival which runs from mid-February through October and sells more than 350,000 tickets a year. Ashland is also the location of Southern Oregon University.

Another Jackson County town known for tourism is Jacksonville, located just 5 miles west of Medford. The entire city is on the National Historic Registry and is home to the Peter Britt Festivals, one of the largest summer music festivals in the United States.

Table 3 Jackson County QuickFacts[49]

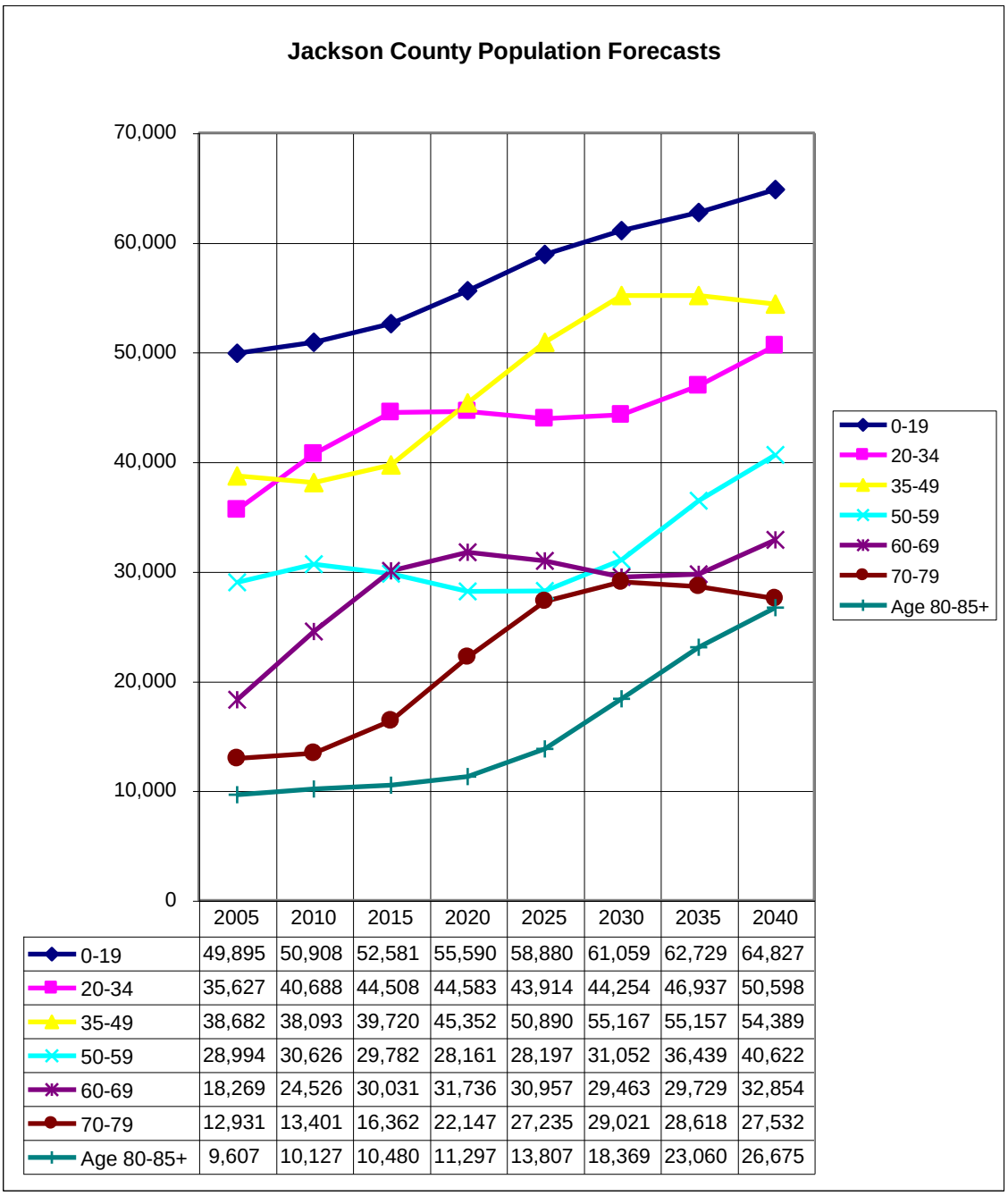
People QuickFacts	**Jackson County**	**Oregon**
Population, 2004 estimate	192,992	3,594,586
Population, percent change, April 1, 2000 to July 1, 2004	6.5%	5.1%
Population, 2000	181,269	3,421,399
Population, percent change, 1990 to 2000	23.8%	20.4%
Persons under 5 years old, percent, 2000	6.0%	6.5%
Persons under 18 years old, percent, 2000	24.4%	24.7%

People QuickFacts	Jackson County	Oregon
Persons 65 years old and over, percent, 2000	16.0%	12.8%
Female persons, percent, 2000	51.4%	50.4%
White persons, percent, 2000 (a)	91.6%	86.6%
Black or African American persons, percent, 2000 (a)	0.4%	1.6%
American Indian and Alaska Native persons, percent, 2000 (a)	1.1%	1.3%
Asian persons, percent, 2000 (a)	0.9%	3.0%
Native Hawaiian and Other Pacific Islander, percent, 2000 (a)	0.2%	0.2%
Persons reporting some other race, percent, 2000 (a)	2.9%	4.2%
Persons reporting two or more races, percent, 2000	2.9%	3.1%
White persons, not of Hispanic/Latino origin, percent, 2000	88.7%	83.5%
Persons of Hispanic or Latino origin, percent, 2000 (b)	6.7%	8.0%
Living in same house in 1995 and 2000', pct age 5+, 2000	46.5%	46.8%
Foreign born persons, percent, 2000	4.9%	8.5%
Language other than English spoken at home, pct age 5+, 2000	7.7%	12.1%
High school graduates, percent of persons age 25+, 2000	85.0%	85.1%
Bachelor's degree or higher, pct of persons age 25+, 2000	22.3%	25.1%
Persons with a disability, age 5+, 2000	34,031	593,301
Mean travel time to work (minutes), workers age 16+, 2000	18.9	22.2
Housing units, 2002	79,009	1,495,582
Homeownership rate, 2000	66.5%	64.3%
Housing units in multi-unit structures, percent, 2000	18.0%	23.1%
Median value of owner-occupied housing units, 2000	$140,000	$152,100
Households, 2000	71,532	1,333,723
Persons per household, 2000	2.48	2.51
Median household income, 1999	$36,461	$40,916
Per capita money income, 1999	$19,498	$20,940
Persons below poverty, percent, 1999	12.5%	11.6%
Business QuickFacts		
Private nonfarm establishments with paid employees, 2001	5,442	101,003
Private nonfarm employment, 2001	62,806	1,364,924
Private nonfarm employment, percent change 2000-2001	0.9%	0.7%
Nonemployer establishments, 2000	12,966	212,165
Manufacturers shipments, 1997 ($1000)	1,424,011	47,665,990
Retail sales, 1997 ($1000)	2,075,344	33,396,849
Retail sales per capita, 1997	$12,167	$10,297
Minority-owned firms, percent of total, 1997	5.5%	6.2%
Women-owned firms, percent of total, 1997	26.3%	27.6%
Housing units authorized by building permits, 2002	1,548	22,186
Federal funds and grants, 2002 ($1000)	958,948	19,839,214
Geography QuickFacts		
Land area, 2000 (square miles)	2,785	95,997
Persons per square mile, 2000	65.1	35.6
FIPS Code	29	41

Metropolitan or Micropolitan Statistical Area — Medford, OR Metro Area

(a) Includes persons reporting only one race.

(b) Hispanics may be of any race, so also are included in applicable race categories.
FN: Footnote on this item for this area in place of data
NA: Not available
D: Suppressed to avoid disclosure of confidential information
X: Not applicable
S: Suppressed; does not meet publication standards
Z: Value greater than zero but less than half unit of measure shown
F: Fewer than 100 firms
Source: US Census Bureau State & County QuickFacts



	2005	2010	2015	2020	2025	2030	2035	2040
0-19	49,895	50,908	52,581	55,590	58,880	61,059	62,729	64,827
20-34	35,627	40,688	44,508	44,583	43,914	44,254	46,937	50,598
35-49	38,682	38,093	39,720	45,352	50,890	55,167	55,157	54,389
50-59	28,994	30,626	29,782	28,161	28,197	31,052	36,439	40,622
60-69	18,269	24,526	30,031	31,736	30,957	29,463	29,729	32,854
70-79	12,931	13,401	16,362	22,147	27,235	29,021	28,618	27,532
Age 80-85+	9,607	10,127	10,480	11,297	13,807	18,369	23,060	26,675

Chart 34 Forecasts of Jackson County Populations by Age, 2005 - 2035[50]

Economy and Jobs

The county's principal industries are healthcare, agriculture, lumber, manufacturing, and tourism. Jackson County has over 10,000 acres (40 km²) of orchards and shares with Josephine County the Rogue Valley and Applegate wine appellations.

> "Southern Oregon has always had a penchant for setting its own course, a characteristic that has become more evident in recent years. Pragmatism may now be the best way to describe this region, which is economically -- and even politically and culturally -- about a lot of things and carries no simple identity. … The region has become part retirement haven, part retail center. Tourism is also a big draw, and health care in 2002 provided more than 15 percent of the local payroll, compared with a state average of 10 percent."[51]

Employment Rates

The economy of the Rogue River Valley continued to exhibit signs of robust times at the end of 2005. Payroll employment rose by more than 2,500 jobs in Jackson County. Jackson County's unemployment rate fell from 6.3 percent in November 2004 to 5.0 percent in November 2005. Estimates from Portland State University's Population Research Center show Jackson and Josephine counties' population increased by 4,360 between the July 1, 2004 and July 1, 2005, for a gain of about 1.6 percent. The two-county region has nearly 275,000 residents. This population growth contributed to job creation in retail trade, construction, financial activities, health care and other services.

The region's rapidly escalating property prices have made tapping into home equity relatively pain free for homeowners. But they've made buying a first home difficult. The high cost of home ownership here also makes it harder for businesses recruiting workers from U.S. regions with lower housing costs."[52]

	Jan 2006	Dec 2005	Jan 2005
Oregon (Seasonally Adjusted)	5.3%	5.7%	6.5%
Oregon (Unadjusted)	6.0%	5.4%	7.1%
Medford MSA (Jackson County)	6.4%	4.9%	7.5%

Source: *Oregon Employment Department*

Table 4 Jackson County Unemployment Rates

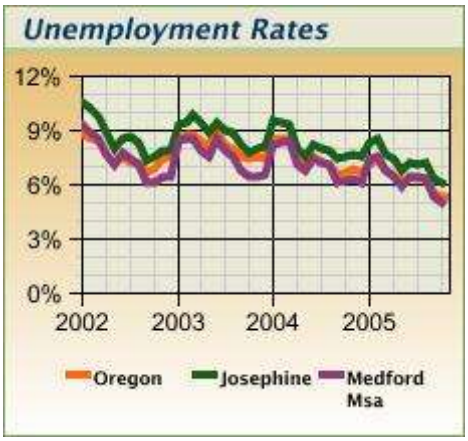


Chart 35 Unemployment Rates

TOTAL NONFARM PAYROLL EMPLOYMENT				*Change from*		*% Change from*	
	Jan 2006	**Dec 2005**	**Jan 2005**	**Dec 2005**	**Jan 2005**	**Dec 2005**	**Jan 2005**
Oregon	1,664,000	1,697,200	1,600,200	-33,200	63,800	-2.0%	4.0%
Medford MSA (Jackson County)	81,190	86,060	78,070	-4,870	3,120	-5.7%	4.0%

Table 5 Total Nonfarm Payroll Employment[53]

Nobody knows really for sure what the future holds. The Oregon Employment Department forecasts occupations that are expected to grow or decline over a 10-year period. Region 8 is expected to add jobs from 2004 to 2014. The Region 8 payroll employment is forecast to grow by 19.5 percent, according to occupational employment estimates and projections for the period (Table 1). This is slightly faster than the 15.0 percent projected for Oregon statewide. Not every occupation is expected to grow from 2004 to 2014 and only a few are expected to decline.[54]

	2004 Employment	**2014 Employment**	**Percent Growth**
Management, Business, and Financial	7,300	8,695	19.1%
Professional and Related	12,988	15,030	15.7%
Health Care	7,992	10,563	32.2%
Services	17,406	21,360	22.7%
Sales and Related	11,968	14,176	18.4%
Office and Administrative Support	18,255	21,574	18.2%
Farming, Fishing, and Forestry	2,197	2,567	16.8%
Construction and Extraction	5,233	6,370	17.3%
Installation, Maintenance, and Repair	4,134	4,847	17.2%
Production	7,437	8,253	6.3%
Transportation and Material Moving	8,809	10,394	18.0%
Nonclassifiable	431	596	38.3%
Total Employment	**104,150**	**124,425**	**19.5%**

Table 6 Region 8 Will Add Jobs Across All Major Occupational Categories

NOTE: Region 8 data is available only at the combined level for Josephine and Jackson Counties from the state of Oregon via the OLMIS Website.

Three occupational categories --services, office and administrative support, and sales and related -- are expected to account for almost half of the new jobs.

Services

The county continues to see demand for service related jobs as the economy grows. Most service occupations do not require education beyond high school. Nearly all call for only on-the-job training or related work experience. Only 3 percent mandate postsecondary education. The dining-out trend helped the food-service sector account for five of the top 20 occupations adding the most jobs: combined food preparation and service workers, cooks, waiters and waitresses, food preparation workers and counter attendants. Healthcare jobs at the low-end of the pay scale also continue to see growth opportunities.[55]

Office and Administrative Support

Use of personal computers running office productivity software, such as word processors has led to a decline in demand for word processors and typists – the only office occupation forecast to decline. Openings for general office clerks are expected to add the most jobs. Bill and account collector positions are expected to be the faster growing service occupation, increasing by 40.3 percent. Coming in second is customer service representatives (+32%). Telephone communication, banks, insurance, and business services employ a large share of these workers.[56]

Professional and Related

The top occupations adding the most jobs in this category are linked to healthcare and education. Elementary teachers, secondary teachers and educational assistants are the top professional jobs expected to add the greatest number of new jobs. These employment projections do not take looming budget shortfalls into account. They attempt to gauge demand for workers in each occupation based on past trends, population increases among school-age children, and the resulting increase in expected enrollment. Educational services -- forecast to grow by 24 percent -- is among Oregon's industries expected to expand the fastest.

Demand for healthcare workforce is growing, in part due to the aging of the area's population. Growth in the number of retirees moving to the area contributes to this demand.

Workers are needed to develop software and support computer systems given the use of technology in nearly every industry in the county. It's no surprise there is a growing demand for these occupations. This is particularly true as tectonic shifts continue to occur in the economy due to increasing use of technology, global communications and increased global competition.

Growth and Replacement Openings

Growth openings occur when a business starts or expands, and they represent about four in 10 expected between 2004 and 2014. Other job openings are due to workers leaving their occupations, whether that be to retire, change occupations or leave the labor force to take care of their family. Whatever the underlying reason, new workers are needed. They must have the appropriate skills and be available for work in the area. Production workers and sales and related workers likely will have the largest share of job openings due to replacement, with 70.3 percent and 64.3 percent, respectively.

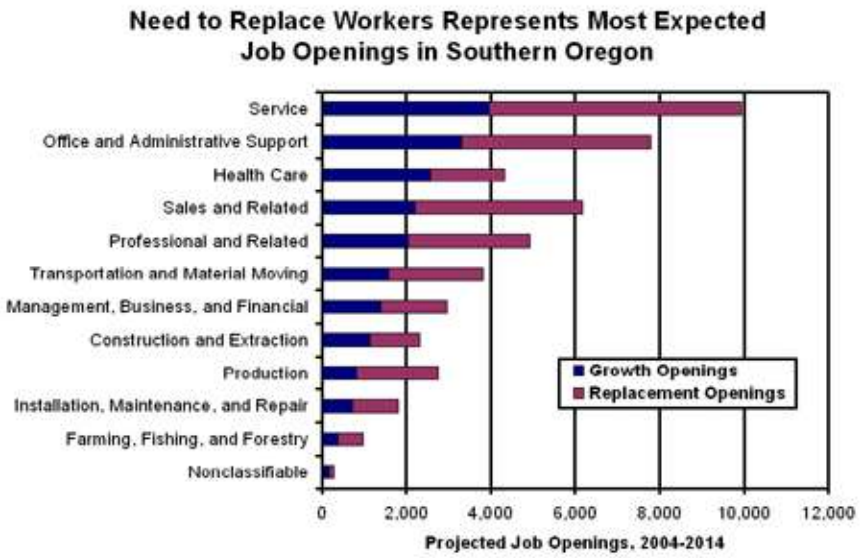


Chart 36 Replacement Jobs[57]

The top 20 occupations with the most projected job openings from 2004 to 2014 represent more than one-quarter of the total employment and about one-third of the projected total openings. Service, retail and related, and office and administrative support occupations dominate Region 8's list of occupations expected to have the greatest number of total openings.

Growth rates for the top 20 occupations range from about 4 percent to nearly 32 percent. Several occupations show growth rates below the overall average of 19.5 percent, yet they are among those adding the most jobs. These are very large occupations with employment of at least 500 in 2004. Slower growth rates do not necessarily mean fewer job opportunities. Healthcare remains the fastest-growing occupational group, adding 32 percent in 10 years. Healthcare occupations dominate the fastest-growing occupations list in terms of percent growth.

The declining occupations are concentrated in production. None are in health care. Occupations with the expected greatest risk of decline include travel agents and wood sawing machine operators.

Continuing with recent trends, most jobs do not require postsecondary education.

	2004 Emp	2014 EMP	Percent Growth	Total Openings	Minimum Ed Required
Retail Salespersons	3,750	4,520	20.5%	2,208	Short term OJT
Waiters and Waitresses	2,039	2,639	29.4%	1,738	Short term OJT
Cashiers	2,521	2,989	18.6%	1,632	Short term OJT
Combined Food Preparation and Serving Workers, Including Fast Food	2,000	2,381	19.1%	1,233	Short term OJT
Office Clerks, General	2,677	3,253	21.5%	1,232	Short term OJT
Registered Nurses	1,972	2,530	28.3%	1,051	Associate
Laborers and Freight, Stock, and Material Movers, Hand	1,678	2,057	22.6%	952	Short term OJT
Customer Service Representatives	1,524	2,012	32.0%	754	Moderate term OJT
Janitors and Cleaners	1,530	1,879	22.8%	674	Short term OJT
Truck Drivers, Heavy and Tractor-Trailer	1,841	2,163	17.5%	660	Moderate term OJT
Bookkeeping, Accounting, and Auditing Clerks	1,639	1,936	18.1%	640	Moderate term OJT
Cooks, Restaurant	886	1,144	29.1%	537	Long term OJT
General and Operations Managers	1,256	1,509	20.1%	525	Bachelor's
Receptionists and Information Clerks	939	1,188	26.5%	505	Short term OJT
Nursing Aides, Orderlies, and Attendants	1,063	1,381	29.9%	484	Short term OJT
Elementary School Teachers, Except Special Education	1,302	1,463	12.4%	480	Bachelor's
Food Preparation Workers	822	1,008	22.6%	473	Short term OJT
Stock Clerks and Order Fillers	1,236	1,284	3.9%	449	Short term OJT
Counter Attendants in Cafeterias, Food Concessions, and Coffee Shops	583	710	21.8%	446	Short term OJT
Farmworkers and Laborers for Crops, Nurseries, and Greenhouses	986	1,141	15.7%	446	Short term OJT

Table 7 Occupations With Most Openings are Characterized by On-the-job Training[58]

NOTE: OJT = On the job training

Nearly three out of four jobs in 2004 require only on-the-job training or work experience in a related field. For example, training beyond high school is not necessary to get a job as a service station attendant. New workers are taught how the nozzles and pumps work, how to take payments, and other duties once they are hired.

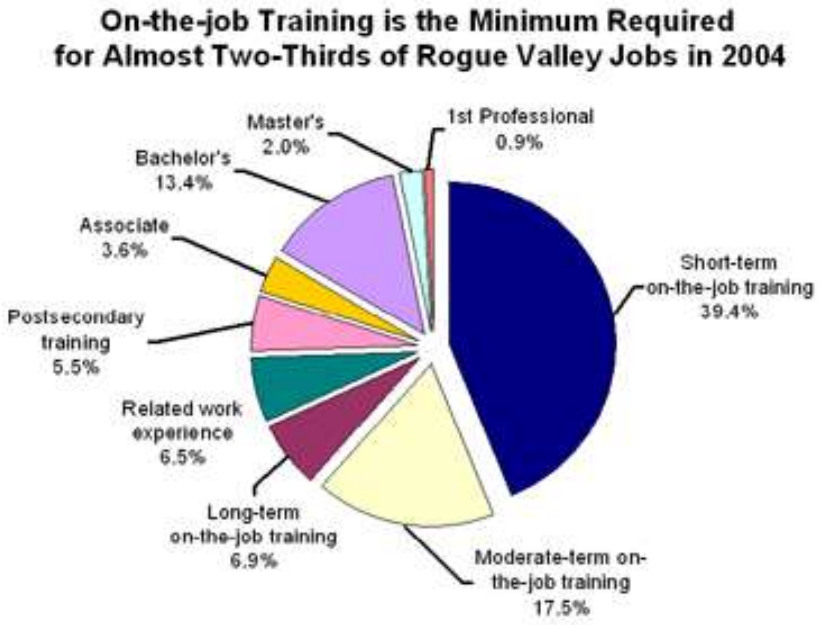


Chart 37 On-the-job Training[59]

Employers continue to change how they view required education levels as the business cycle moves. When employers do not find enough qualified applicants with the preferred education level, they lessen requirements to draw more applicants to their job openings. This generally occurs during an economic expansion. The opposite is true during economic downturns -- when unemployment is higher and employers can be choosier. Because there are more job applicants, some of whom may be considered more highly qualified because of that education, employers may choose to interview only those with education and training above their normally required level. About half of the jobs in 2004 and 2014 list some postsecondary training to help people compete in the labor market. The rest list related work experience as the competitive level. Clearly, postsecondary education increases a job seeker's chances for finding work in many occupations.[60]

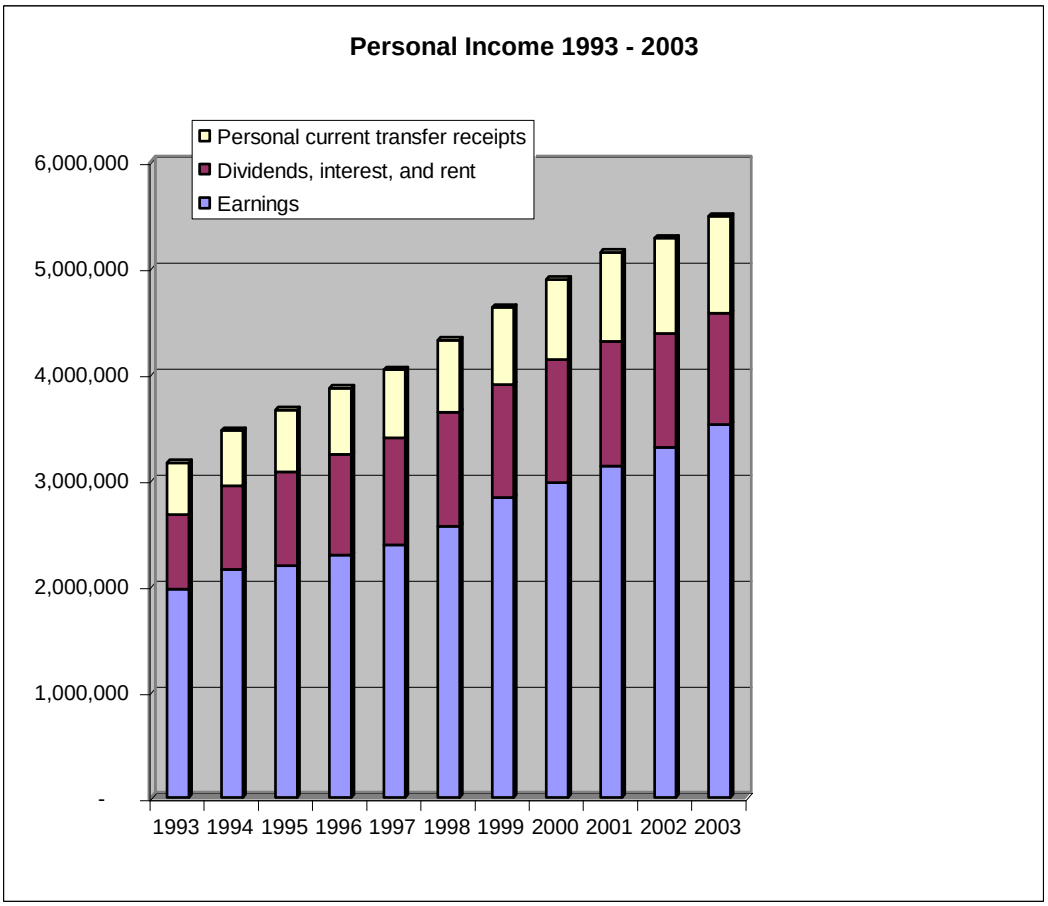
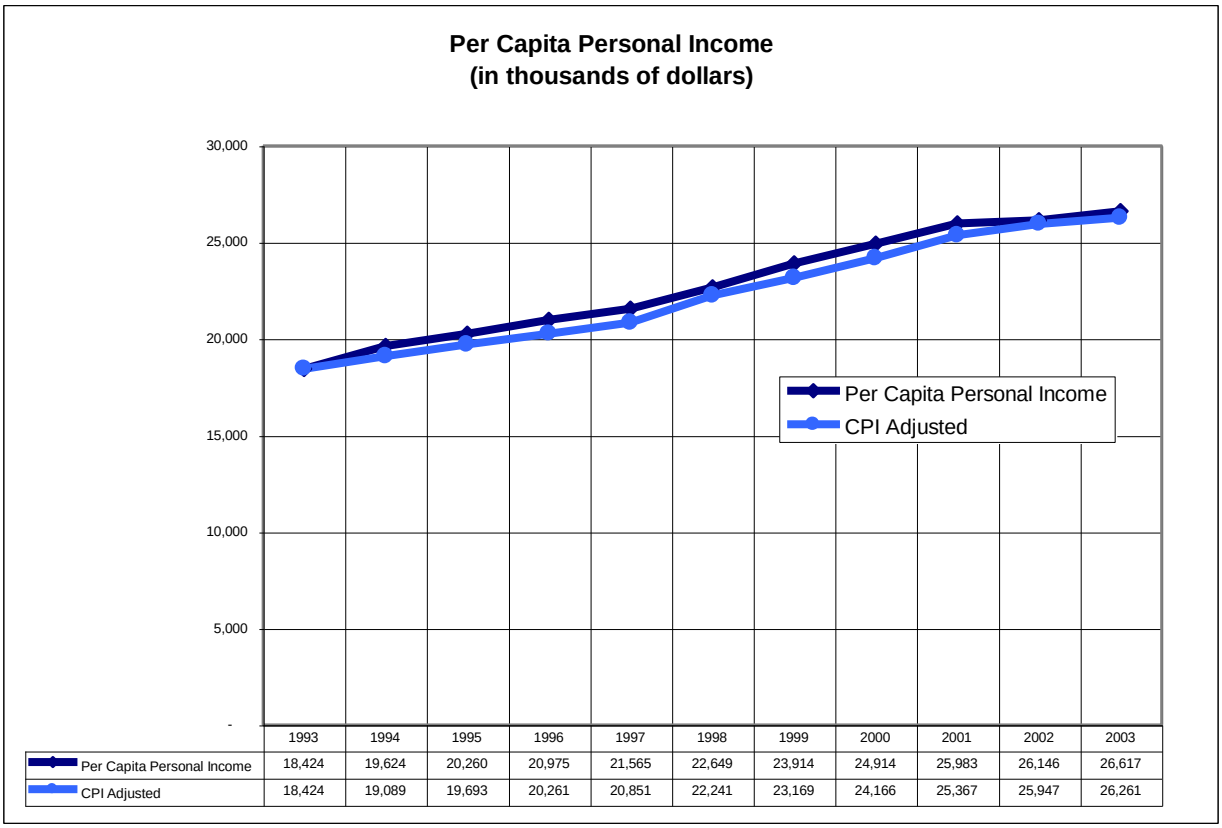


Chart 38 Personal Income 1993 to 2003[61]



	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Per Capita Personal Income	18,424	19,624	20,260	20,975	21,565	22,649	23,914	24,914	25,983	26,146	26,617
CPI Adjusted	18,424	19,089	19,693	20,261	20,851	22,241	23,169	24,166	25,367	25,947	26,261

Chart 39 Per Capita Personal Income (thousands of dollars)[62]

Industry	Units	*Units*	Emplymt	*Emplymt*	Payroll	*Payroll*	Avg Pay
		%		*%*		*%*	
Total All Ownerships	6,095		79,373		$2,363,416,160		$29,776
Total Private Coverage	5,893	*96.7%*	68,767	*86.6%*	$1,969,403,192	*83.3%*	$28,639
Natural Resources & Mining	144	*2.4%*	2,892	*3.6%*	$74,501,250	*3.2%*	$25,761
Agriculture, Forestry, Fish., Hunting	137	*2.2%*	2,738	*3.4%*	$69,068,239	*2.9%*	$25,226
Crop production	23	*0.4%*	869	*1.1%*	$15,464,774	*0.7%*	$17,796
Animal production	20	*0.3%*	123	*0.2%*	$2,874,813	*0.1%*	$23,372
Forestry and logging	49	*0.8%*	772	*1.0%*	$34,775,931	*1.5%*	$45,047
Agriculture and forestry support activity	45	*0.7%*	975	*1.2%*	$15,952,721	*0.7%*	$16,362
Mining	7	*0.1%*	154	*0.2%*	$5,433,011	*0.2%*	$35,279
Construction	815	*13.4%*	4,617	*5.8%*	$145,625,731	*6.2%*	$31,541
Construction of buildings	270	*4.4%*	1,128	*1.4%*	$34,840,264	*1.5%*	$30,887
Heavy and civil engineering construction	60	*1.0%*	530	*0.7%*	$19,215,399	*0.8%*	$36,255
Specialty trade contractors	485	*8.0%*	2,960	*3.7%*	$91,570,068	*3.9%*	$30,936
Manufacturing	328	*5.4%*	6,768	*8.5%*	$238,589,303	*10.1%*	$35,253
Food manufacturing	26	*0.4%*	475	*0.6%*	$14,223,663	*0.6%*	$29,945
Beverage and tobacco product manufacturing	10	*0.2%*	118	*0.1%*	$3,393,139	*0.1%*	$28,755
Textile product mills	10	*0.2%*	50	*0.1%*	$1,070,514	*0.0%*	$21,410
Apparel manufacturing	7	*0.1%*	37	*0.0%*	$856,557	*0.0%*	$23,150
Wood product manufacturing	38	*0.6%*	2,392	*3.0%*	$84,909,440	*3.6%*	$35,497
Printing and related support activities	25	*0.4%*	442	*0.6%*	$14,145,603	*0.6%*	$32,004
Chemical manufacturing	13	*0.2%*	593	*0.7%*	$30,540,821	*1.3%*	$51,502
Plastics and rubber products manufacturing	9	*0.1%*	54	*0.1%*	$1,426,084	*0.1%*	$26,409
Nonmetallic mineral product manufacturing	14	*0.2%*	515	*0.6%*	$20,914,650	*0.9%*	$40,611
Fabricated metal product manufacturing	42	*0.7%*	418	*0.5%*	$13,009,767	*0.6%*	$31,124
Machinery manufacturing	21	*0.3%*	281	*0.4%*	$10,116,780	*0.4%*	$36,003
Computer and electronic product manufacturing	9	*0.1%*	250	*0.3%*	$8,157,896	*0.3%*	$32,632
Transportation equipment manufacturing	25	*0.4%*	309	*0.4%*	$11,633,186	*0.5%*	$37,648
Furniture and related product manufacturing	28	*0.5%*	293	*0.4%*	$8,609,936	*0.4%*	$29,385
Miscellaneous manufacturing	45	*0.7%*	428	*0.5%*	$11,584,655	*0.5%*	$27,067
Other Manufacturing	7	*0.1%*	116	*0.1%*	$3,996,612	*0.2%*	$34,454
Trade, Transportation. & Utilities	1,247	*20.5%*	18,540	*23.4%*	$506,030,787	*21.4%*	$27,294
Utilities	8	*0.1%*	267	*0.3%*	$16,960,035	*0.7%*	$63,521
Wholesale	285	*4.7%*	2,339	*2.9%*	$85,019,748	*3.6%*	$36,349
Merchant wholesalers, durable goods	137	*2.2%*	1,338	*1.7%*	$50,458,526	*2.1%*	$37,712
Merchant wholesalers,	67	*1.1%*	840	*1.1%*	$27,817,301	*1.2%*	$33,116

Industry	Units	*Units*	Emplymt	*Emplymt*	Payroll	*Payroll*	Avg Pay
nondurable goods							
Electronic markets and agents and broker	81	*1.3%*	161	*0.2%*	$6,743,921	*0.3%*	$41,888
Retail	781	*12.8%*	13,591	*17.1%*	$327,592,779	*13.9%*	$24,104
Motor vehicle and parts dealers	105	*1.7%*	1,753	*2.2%*	$63,045,333	*2.7%*	$35,964
Furniture and home furnishings stores	51	*0.8%*	359	*0.5%*	$9,723,483	*0.4%*	$27,085
Electronics and appliance stores	36	*0.6%*	309	*0.4%*	$7,365,400	*0.3%*	$23,836
Building material and garden supply stores	58	*1.0%*	709	*0.9%*	$19,177,829	*0.8%*	$27,049
Food and beverage stores	77	*1.3%*	2,107	*2.7%*	$43,990,588	*1.9%*	$20,878
Health and personal care stores	38	*0.6%*	303	*0.4%*	$7,142,902	*0.3%*	$23,574
Gasoline stations	56	*0.9%*	702	*0.9%*	$10,397,026	*0.4%*	$14,811
Clothing and clothing accessories stores	96	*1.6%*	831	*1.0%*	$12,050,323	*0.5%*	$14,501
Sporting goods, hobby, book and music stores	73	*1.2%*	581	*0.7%*	$8,644,207	*0.4%*	$14,878
General merchandise stores	29	*0.5%*	2,206	*2.8%*	$48,174,495	*2.0%*	$21,838
Miscellaneous store retailers	111	*1.8%*	587	*0.7%*	$11,082,167	*0.5%*	$18,879
Other Retail	52	*0.9%*	3,145	*4.0%*	$86,799,026	*3.7%*	$27,599
Transportation & Warehousing	174	*2.9%*	2,343	*3.0%*	$76,458,225	*3.2%*	$32,633
Truck transportation	86	*1.4%*	1,183	*1.5%*	$43,383,371	*1.8%*	$36,672
Transit and ground passenger transportat	19	*0.3%*	204	*0.3%*	$2,499,777	*0.1%*	$12,254
Support activities for transportation	40	*0.7%*	449	*0.6%*	$17,036,358	*0.7%*	$37,943
Couriers and messengers	15	*0.2%*	293	*0.4%*	$8,085,571	*0.3%*	$27,596
Warehousing and storage	8	*0.1%*	84	*0.1%*	$2,904,860	*0.1%*	$34,582
Other Transportation & Warehousing	7	*0.1%*	130	*0.2%*	$2,548,288	*0.1%*	$19,602
Information	118	*1.9%*	1,805	*2.3%*	$66,130,384	*2.8%*	$36,637
Publishing industries, except Internet	44	*0.7%*	444	*0.6%*	$17,041,880	*0.7%*	$38,383
Motion picture and sound recording industries	15	*0.2%*	162	*0.2%*	$3,483,556	*0.1%*	$21,503
Broadcasting, except Internet	12	*0.2%*	377	*0.5%*	$12,571,377	*0.5%*	$33,346
Internet publishing and broadcasting	5	*0.1%*	8	*0.0%*	$377,454	*0.0%*	$47,182
Telecommunications	30	*0.5%*	754	*0.9%*	$30,794,845	*1.3%*	$40,842
ISPs, search portals, and data processing	12	*0.2%*	61	*0.1%*	$1,861,272	*0.1%*	$30,513
Financial Activities	598	*9.8%*	3,545	*4.5%*	$122,689,962	*5.2%*	$34,609
Finance & Insurance	315	*5.2%*	2,200	*2.8%*	$93,218,296	*3.9%*	$42,372
Credit intermediation and related activities	141	*2.3%*	1,198	*1.5%*	$47,295,115	*2.0%*	$39,478
Securities, commodity	52	*0.9%*	211	*0.3%*	$15,845,482	*0.7%*	$75,097

Industry	Units	*Units*	Emplymt	*Emplymt*	Payroll	*Payroll*	Avg Pay
contracts, investm							
Insurance carriers and related activitie	121	*2.0%*	788	*1.0%*	$29,224,343	*1.2%*	$37,087
Other Finance & Insurance	6	*0.1%*	8	*0.0%*	$1,143,074	*0.0%*	$142,884
Real Estate Rental & Leasing	283	*4.6%*	1,345	*1.7%*	$29,471,666	*1.2%*	$21,912
Real estate	229	*3.8%*	748	*0.9%*	$16,056,960	*0.7%*	$21,467
Rental and leasing services	49	*0.8%*	593	*0.7%*	$13,124,988	*0.6%*	$22,133
Professional & Business Services	794	*13.0%*	7,551	*9.5%*	$239,029,774	*10.1%*	$31,655
Professional, Scientific & Technical Svcs	453	*7.4%*	1,932	*2.4%*	$65,399,855	*2.8%*	$33,851
Management of Companies	41	*0.7%*	1,801	*2.3%*	$95,968,115	*4.1%*	$53,286
Admin. & Support, Waste Mgmt & Remediation Svcs	300	*4.9%*	3,818	*4.8%*	$77,661,804	*3.3%*	$20,341
Administrative and support services	288	*4.7%*	3,608	*4.5%*	$69,920,502	*3.0%*	$19,379
Waste management and remediation service	12	*0.2%*	210	*0.3%*	$7,741,302	*0.3%*	$36,863
Education & Health Services	626	*10.3%*	11,068	*13.9%*	$395,273,016	*16.7%*	$35,713
Education	59	*1.0%*	538	*0.7%*	$10,758,363	*0.5%*	$19,997
Health & Social Assistance	567	*9.3%*	10,530	*13.3%*	$384,514,653	*16.3%*	$36,516
Ambulatory health care services	367	*6.0%*	3,964	*5.0%*	$184,224,713	*7.8%*	$46,474
Hospitals	6	*0.1%*	3,432	*4.3%*	$141,706,843	*6.0%*	$41,290
Nursing and residential care facilities	100	*1.6%*	2,049	*2.6%*	$39,451,005	*1.7%*	$19,254
Social assistance	94	*1.5%*	1,085	*1.4%*	$19,132,092	*0.8%*	$17,633
Leisure & Hospitality	613	*10.1%*	8,971	*11.3%*	$122,559,310	*5.2%*	$13,662
Arts, Entertainment & Recreation	98	*1.6%*	1,379	*1.7%*	$26,243,026	*1.1%*	$19,030
Museums, historical sites, zoos, and par	9	*0.1%*	28	*0.0%*	$438,590	*0.0%*	$15,664
Amusements, gambling, and recreation	61	*1.0%*	834	*1.1%*	$10,652,870	*0.5%*	$12,773
Other Arts, Entertainment & Recreation	29	*0.5%*	517	*0.7%*	$15,151,566	*0.6%*	$29,307
Accomodations & Food Services	515	*8.4%*	7,592	*9.6%*	$96,316,284	*4.1%*	$12,687
Accommodation	91	*1.5%*	1,081	*1.4%*	$16,292,888	*0.7%*	$15,072
Food services and drinking places	424	*7.0%*	6,510	*8.2%*	$80,023,396	*3.4%*	$12,292
Other Services	594	*9.7%*	2,990	*3.8%*	$58,413,542	*2.5%*	$19,536
Repair and maintenance	160	*2.6%*	770	*1.0%*	$19,894,718	*0.8%*	$25,837
Personal and laundry services	82	*1.3%*	671	*0.8%*	$13,071,039	*0.6%*	$19,480
Membership associations and organization	217	*3.6%*	1,318	*1.7%*	$22,665,202	*1.0%*	$17,197
Private households	135	*2.2%*	231	*0.3%*	$2,782,583	*0.1%*	$12,046
Private Non-Classified	17	*0.3%*	20	*0.0%*	$560,133	*0.0%*	$28,007
Total All Government	202	*3.3%*	10,607	*13.4%*	$394,012,968	*16.7%*	$37,146
Total Federal Government	46	*0.8%*	1,685	*2.1%*	$89,499,433	*3.8%*	$53,115
Total State Government	40	*0.7%*	1,686	*2.1%*	$60,276,619	*2.6%*	$35,751

Industry	Units	*Units*	Emplymt	*Emplymt*	Payroll	*Payroll*	Avg Pay
Total Local Government	116	*1.9%*	7,236	*9.1%*	$244,236,916	*10.3%*	$33,753

Table 8 Jackson County 2004 Covered Employment and Wages Summary Report[63]

Industry	Units	*Units %*	Emplymt	*Emplymt %*	Payroll	*Payroll %*	Avg Pay
Total All Government	202	*3.3%*	10,607	*13.4%*	$394,012,968	*16.7%*	$37,146
Information	118	*1.9%*	1,805	*2.3%*	$66,130,384	*2.8%*	$36,637
Education & Health Services	626	*10.3%*	11,068	*13.9%*	$395,273,016	*16.7%*	$35,713
Manufacturing	328	*5.4%*	6,768	*8.5%*	$238,589,303	*10.1%*	$35,253
Financial Activities	598	*9.8%*	3,545	*4.5%*	$122,689,962	*5.2%*	$34,609
Professional & Business Services	794	*13.0%*	7,551	*9.5%*	$239,029,774	*10.1%*	$31,655
Construction	815	*13.4%*	4,617	*5.8%*	$145,625,731	*6.2%*	$31,541
Trade, Transportation. & Utilities	1,247	*20.5%*	18,540	*23.4%*	$506,030,787	*21.4%*	$27,294
Natural Resources & Mining	144	*2.4%*	2,892	*3.6%*	$74,501,250	*3.2%*	$25,761
Other Services	594	*9.7%*	2,990	*3.8%*	$58,413,542	*2.5%*	$19,536
Leisure & Hospitality	613	*10.1%*	8,971	*11.3%*	$122,559,310	*5.2%*	$13,662

Table 9 Covered Employment and Wages Summary Report Sorted on Average Pay

Industry	Units	*Units %*	Emplymt	*Emplymt %*	Payroll	*Payroll %*	Avg Pay
Trade, Transportation. & Utilities	1,247	*20.5%*	18,540	*23.4%*	$506,030,787	*21.4%*	$27,294
Education & Health Services	626	*10.3%*	11,068	*13.9%*	$395,273,016	*16.7%*	$35,713
Total All Government	202	*3.3%*	10,607	*13.4%*	$394,012,968	*16.7%*	$37,146
Professional & Business Services	794	*13.0%*	7,551	*9.5%*	$239,029,774	*10.1%*	$31,655
Manufacturing	328	*5.4%*	6,768	*8.5%*	$238,589,303	*10.1%*	$35,253
Construction	815	*13.4%*	4,617	*5.8%*	$145,625,731	*6.2%*	$31,541
Financial Activities	598	*9.8%*	3,545	*4.5%*	$122,689,962	*5.2%*	$34,609
Leisure & Hospitality	613	*10.1%*	8,971	*11.3%*	$122,559,310	*5.2%*	$13,662
Natural Resources & Mining	144	*2.4%*	2,892	*3.6%*	$74,501,250	*3.2%*	$25,761
Information	118	*1.9%*	1,805	*2.3%*	$66,130,384	*2.8%*	$36,637
Other Services	594	*9.7%*	2,990	*3.8%*	$58,413,542	*2.5%*	$19,536

Table 10 Covered Employment and Wages Summary Report Sorted on Payroll

Industry	Units	*Units %*	Emplymt	*Emplymt %*	Payroll	*Payroll %*	Avg Pay
Trade, Transportation. & Utilities	1,247	*20.5%*	18,540	*23.4%*	$506,030,787	*21.4%*	$27,294
Education & Health Services	626	*10.3%*	11,068	*13.9%*	$395,273,016	*16.7%*	$35,713
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Natural Resources & Mining	144	*2.4%*	2,892	*3.6%*	$74,501,250	*3.2%*	$25,761
Information	118	*1.9%*	1,805	*2.3%*	$66,130,384	*2.8%*	$36,637

Table 11 Covered Employment and Wages Summary Report Sorted on Employment

Industry	Units	*Units %*	Emplymt	*Emplymt %*	Payroll	*Payroll %*	Avg Pay
Trade, Transportation. & Utilities	1,247	*20.5%*	18,540	*23.4%*	$506,030,787	*21.4%*	$27,294
Construction	815	*13.4%*	4,617	*5.8%*	$145,625,731	*6.2%*	$31,541
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Natural Resources & Mining	144	*2.4%*	2,892	*3.6%*	$74,501,250	*3.2%*	$25,761
Information	118	*1.9%*	1,805	*2.3%*	$66,130,384	*2.8%*	$36,637

Table 12 Covered Employment and Wages Summary Report Sorted on Units

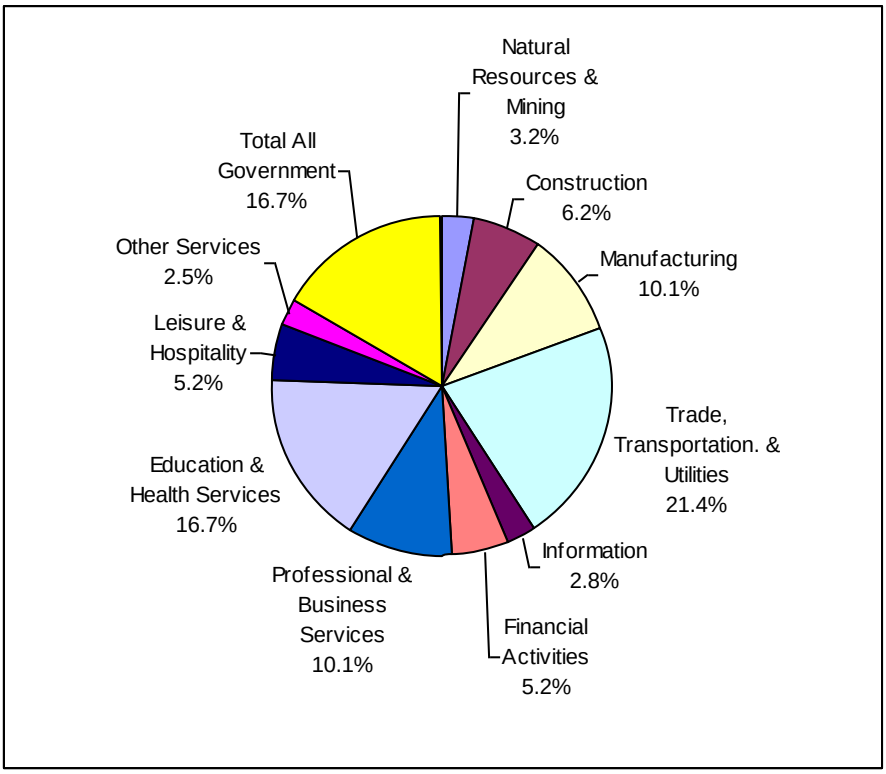


Chart 40 2004 Payroll[64]

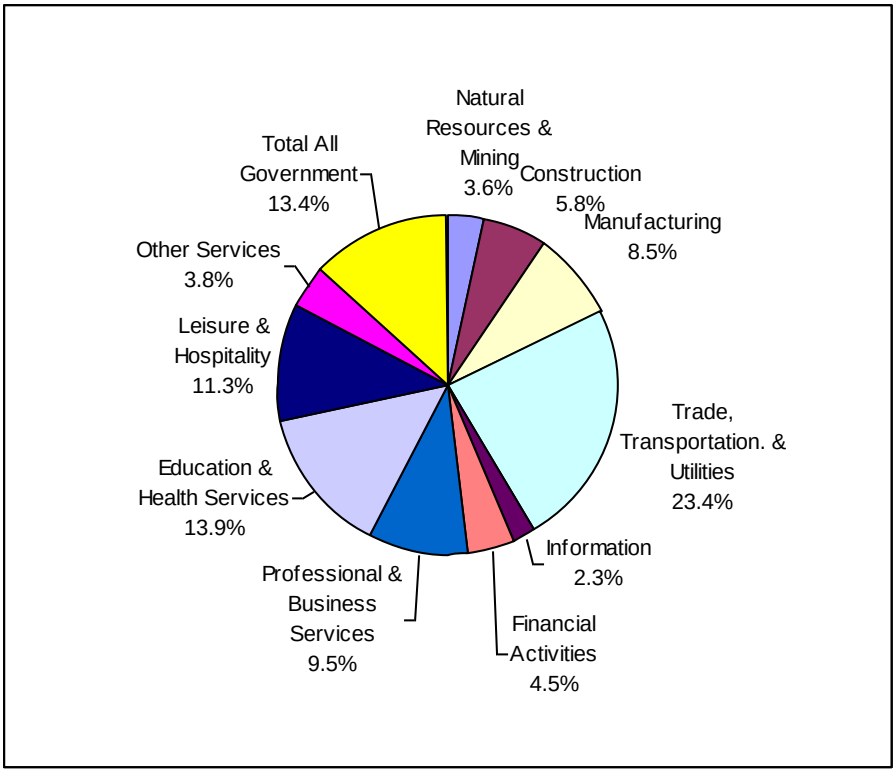


Chart 41 2004 Employment[65]

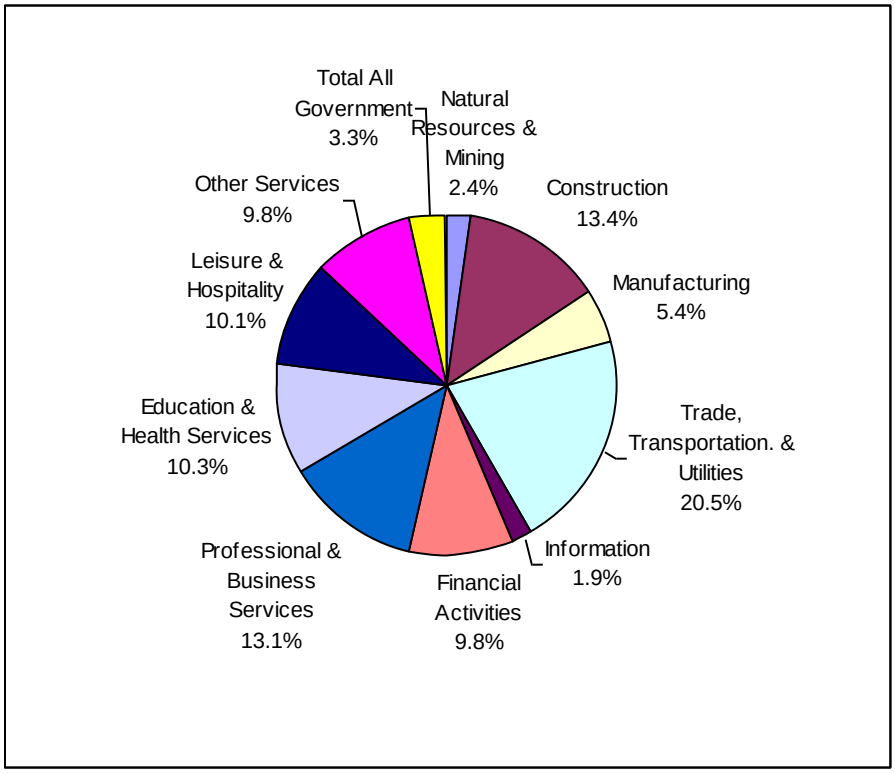


Chart 42 2004 Units[66]

Bluetooth[67]

Find Bluetooth in many of the newer mobile phones (that's where you will most likely see it's use in our county), handheld computers, laptops, printers, handheld organizers, as well as in all sorts of products. It uses a common protocol, so transmission of data (and voice) between two Bluetooth devices from different manufacturers should be straightforward. Uses of Bluetooth include: exchanging business cards, sending data over a modem, sending voice from a headset to a mobile phone, and real-time satellite navigation using GPS.

Bluetooth wireless technology is a short-range communications technology intended to replace the cables connecting portable and/or fixed devices while maintaining high levels of security. The key features of *Bluetooth* technology are robustness, low power, and low cost. The *Bluetooth* specification defines a uniform structure for a wide range of devices to connect and communicate with each other.

Bluetooth technology has achieved global acceptance such that any *Bluetooth* enabled device, almost everywhere in the world, can connect to other *Bluetooth* enabled devices in proximity. *Bluetooth* enabled electronic devices connect and communicate wirelessly through short-range, ad hoc networks known as piconets. Each device can simultaneously communicate with up to seven other devices within a single piconet. Each device can also belong to several piconets simultaneously. Piconets are established dynamically and automatically as *Bluetooth* enabled devices enter and leave radio proximity.

A fundamental *Bluetooth* wireless technology strength is the ability to simultaneously handle both data and voice transmissions. This enables users to enjoy variety of innovative solutions such as a hands-free headset for voice calls, printing and fax capabilities, and synchronizing PDA, laptop, and mobile phone applications to name a few.

Core Specification Versions

Version 2.0 + Enhanced Data Rate (EDR), adopted November, 2004
Version 1.2, adopted November, 2003

Spectrum

Bluetooth technology operates in the unlicensed industrial, scientific and medical (ISM) band at 2.4 to 2.485 GHz, using a spread spectrum, frequency hopping, full-duplex signal at a nominal rate of 1600 hops/sec. The 2.4 GHz ISM band is available and unlicensed in most countries.

Interference

Bluetooth technology's adaptive frequency hopping (AFH) capability was designed to reduce interference between wireless technologies sharing the 2.4 GHz spectrum. AFH works within the spectrum to take advantage of the available frequency. This is done by detecting other devices in the spectrum and avoiding the frequencies they are using. This adaptive hopping allows for more efficient transmission within the spectrum, providing users with greater performance even if using other technologies along with *Bluetooth* technology. The signal hops among 79 frequencies at 1 MHz intervals to give a high degree of interference immunity.

Range

The operating range depends on the device class:

- Class 3 radios – have a range of up to 1 meter or 3 feet
- Class 2 radios – most commonly found in mobile devices – have a range of 10 meters or 30 feet
- Class 1 radios – used primarily in industrial use cases – have a range of 100 meters or 300 feet

Power
The most commonly used radio is Class 2 and uses 2.5 mW of power. *Bluetooth* technology is designed to have very low power consumption. This is reinforced in the specification by allowing radios to be powered down when inactive.

Data Rate
1 Mbps for Version 1.2; Up to 3 Mbps supported for Version 2.0 + EDR.

Broadband Over Powerline

Another mechanism for delivering broadband services that made its commercial debut in 2003 is broadband over power lines (BPL). BPL systems use existing electrical power lines as a transmission medium to provide high-speed communications capabilities by coupling radio frequency energy onto the power line. The United Power Line Council notes that BPL can currently provide symmetric speeds of 3 Mbps, and next-generation chipsets are being developed to provide 100 Mbps. BPL travels over medium-voltage (up to 40,000 volts) transmission lines. Initial trials of BPL have begun in Manassas, Va.; Allentown, Penn.; and Cincinnati, Ohio. While some challenges to the implementation of BPL remain, the technology has the potential to take advantage of the large-scale deployed infrastructure of the power grid to provide broadband services to some customers not yet served by DSL or cable modem services.

One of the issues cited by many ham operators is the potential for interference in these radio operations. This could be a source of interference during emergencies when ham operators are the only source of communication outside of an area.

There is no commercially available BPL in Jackson County today. Given the level of competition from other sources of broadband, especially the growth in wireless services, the market potential for BPL is small. BPL seems to have its greatest potential in areas where there is little or no other established form of broadband available.

Cable[68]

Cable television began using coaxial cables for one-way distribution of analog television signals, and are now well into the process of converting to multipurpose bi-directional broadband digital transmission. All segments of television distribution are converting to digital media. Cable companies offer digital video through cable converter boxes that support both standard analog television signals (converted back from digital to analog so people with analog TV receivers can view them) or for direct transmission to digital TVs that can receive either standard or high definition digital TV signals. They also offer broadband data transmission through data modems in selected locations in Oregon.

There are two known cable operators in Jackson County today:

Almega Cable[69]
www.almegacable.com
A very low-tech (330 megahertz) cable provider serving Shady Cove, Trail and Prospect. They do not offer broadband. They have no one local and list a Texas address. Almega Cable, 4001 W. Airport Freeway, Ste. 530, Bedford, TX 76201, 878-3247 (Shady Cove number that rings through to "Texas.").

Charter Cable
www.charter.com
Provides Subscriber TV as well as residential and commercial broadband.
926 S. Grape Street, Medford, OR 97501

Many of the major cable providers have either begun providing digital telephone service or have announced plans to start such services later this year, using "voice over Internet protocol" (VoIP) technology.

Cable modem[70,71]

Cable modems allow subscribers to access high-speed data services over cable systems that are generally designed with hybrid fiber-coaxial (HFC) architecture. Cable modem service is primarily residential service, but may also include some small business service. Sample prices for cable modem service range from $35 to $80 a month, including the lease of the modem.

Overall, the cable industry has maintained the course outlined in the FCC's *Third Report* by continuing to upgrade and improve cable systems and broadband service offerings and by extending the offering of such broadband services to at least 90 percent of homes passed by cable systems.

At the same time that the cable industry has expanded the reach of upgraded broadband facilities, cable operators have increased download transmission speeds from 200 kbps to as much as 6 Mbps.

A cable modem is designed to operate over cable TV lines. Because the coaxial cable used by cable TV provides much greater bandwidth than telephone lines, a cable modem can be used to achieve extremely fast access to the World Wide Web. This, combined with the fact that millions of homes are already wired for cable TV, has made the cable modem something of a holy grail for Internet and cable TV companies. There are a number of technical difficulties, however. One is that it is still unknown whether the cable TV networks can handle the traffic that would ensue if millions of users began using the system for Internet access. Despite these problems, cable modems that offer residential download speeds up to 3 - 5 Mbps are already available in many areas. The upload capability for residential services ranges up to 256 Kbps, reflecting the retrofitting of a subscription TV delivery model and not one designed to provide symmetrical transmissions of data. As a result high quality videoconferencing is not readily implemented as this requires a symmetric capability averaging 356 kbps.

Like voiceband modems, cable modems **mo**dulate and **dem**odulate data signals. However, cable modems incorporate more functionality suitable for today's high-speed Internet services. In a cable network, data from the network to the user is referred to as downstream, whereas data from the user to the network is referred to as upstream. From a user perspective, a cable modem is a RF receiver capable of delivering up to 30 to 40 Mbps of data in one 6-MHz cable channel. This

is approximately 500 times faster than a 56 kbps modem. Data from a user to the network is sent in a flexible and programmable system under control of the headend. The data is modulated using a QPSK/16 QAM transmitter with data rates from 320 kbps up to 10 Mbps. The upstream and downstream data rates may be flexibly configured using cable modems to match subscriber needs. For instance, a business service can be programmed to receive as well as transmit higher bandwidth. A residential user, however, may be configured to receive higher bandwidth access to the Internet while limited to low bandwidth transmission to the network.

A subscriber can continue to receive cable television service while simultaneously receiving data on cable modems to be delivered to a personal computer (PC) with the help of a simple one-to-two splitter. The data service offered by a cable modem may be shared by up to sixteen users in a local-area network (LAN) configuration.

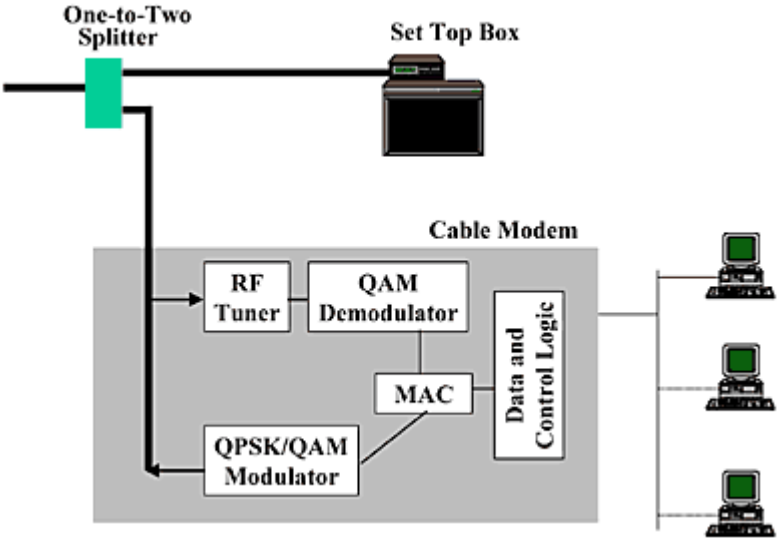


Chart 43 Cable Modem at the Subscriber Location

Because some cable networks are suited for broadcast television services, cable modems may use either a standard telephone line or a QPSK/16 QAM modem over a two-way cable system to transmit data upstream from a user location to the network. When a telephone line is used in conjunction with a one-way broadcast network, the cable data system is referred to as a telephony return interface (TRI) system. In this mode, a satellite or wireless cable television network can also function as a data network.

At the cable headend, data from individual users is filtered by upstream demodulators (or telephone-return systems, as appropriate) for further processing by a cable modem termination system (CMTS). A CMTS is a data switching system specifically designed to route data from many cable modem users over a multiplexed network interface. Likewise, a CMTS receives data from the Internet and provides data switching necessary to route data to the cable modem users. Data from the network to a user group is sent to a 64/256 QAM modulator. The result is user data modulated into one 6-MHz channel, which is the spectrum allocated for a cable television channel such as ABC, NBC, or TBS for broadcast to all users.

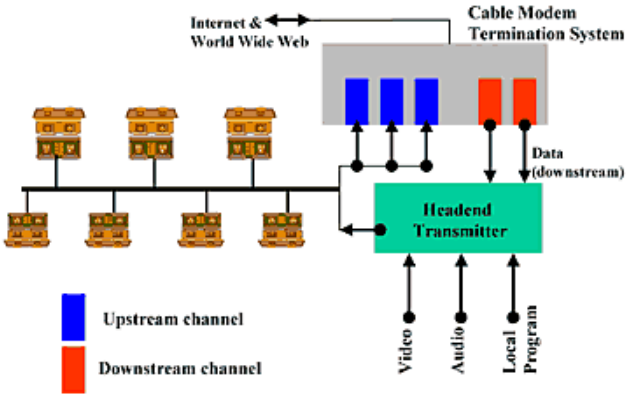


Chart 44 Cable Modem Termination System and Cable Headend Transmission

A cable headend combines the downstream data channels with the video, pay-per-view, audio, and local advertiser programs that are received by television subscribers. The combined signal is then transmitted throughout the cable distribution network. At the user location, the television signal is received by a set-top box, while user data is separately received by a cable modem box and sent to a PC.

A CMTS is an important element for support of data services that integrates upstream and downstream communication over a cable data network. The number of upstream and downstream channels in a given CMTS can be engineered based on serving area, number of users, data rates offered to each user, and available spectrum.

Another important element in the operations and day-to-day management of a cable data system is an element management system (EMS). An EMS is an operations system designed specifically to configure and manage a CMTS and associated cable modem subscribers. The operations tasks include provisioning, day-to-day administration, monitoring, alarms, and testing of various components of a CMTS. From a central network operations center (NOC), a single EMS can support many CMTS systems in the geographic region.

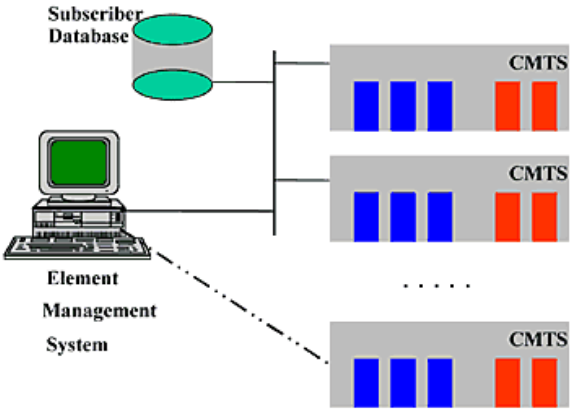


Chart 45 Operations and Management of Cable Data Systems

Pros	*Cons*
Proven Technology	High Fixed Cost
Present CATV	Heavy on OSP electronics
Industry Standard	Shared data bandwidth
Relatively inexpensive	Inadequate future bandwidth?
Adequate present-day bandwidth	Same "Mousetrap" as Incumbent/Some Stranded Costs if migration to FTTH is migration is required

Table 13 Cable System Pros and Cons

Network Design:	• Fiber from the cable headend to neighborhood fiber/(power) nodes that typically feed 50 to 500 homes using coax cable.
Standards/CPE:	• Use of cable set top boxes for MPEG2 digital video, DOCSIS 1.0 or 1.1 (standard) cable modems for data
Spectrum Use:	• Telephony -- 5 to 45 MHz • Analog Video -- 55 to 550 MHz • Digital Video-- 550 to 750 MHz • Data -- 750 to 860 MHz
Typical Service Offering:	• POTS where telephone capable (very small %) • Shared 10BT Ethernet across a fiber node (50 to 500 homes) • 75 Analog video channels, Digital tier with PPV, Premium packages (100 channels)
Strengths:	• Upgraded bi-directional systems can offer full suite of services (voice, analog and digital video, data, and telephony) • Coax distribution network to residential customers is already in place. • Can leverage cost curves of DOCSIS cable modem standard which will provide lower data CPE costs • Packet cable standards will make it possible to add IP telephony services.
Weaknesses:	• Very costly to upgrade the video distribution network to support bi-directional voice and data High cost of maintaining an active RF (amplifier) system. • Nodes must be split and fiber added as penetration increases and as bandwidth demand for advanced services are needed. • Data users experience degraded performance as more users are added to the network (shared 10BT LAN environment). • Low upstream data rate makes current HFC design primarily a residential offering. • Lifeline telephony requires battery backup systems installed in the network.

Table 14 HFC System Overview

Cable Access Television (Public, Educational and Government Access)

Cable access television is a general term covering a number of special services provided by cable television companies to communities in the United States. There are several other names for this, including local origination, community access, and PEG access (short for public, educational,

and government access). Cable companies are required to provide these services at a certain level, though the amount of locally produced programming varies from area to area.

Public-access television is a cable television service that allows members of the public to use a cable company's facilities and equipment to create and broadcast their own content. This service is provided to the public free of charge on a first-come, first-served, non-discriminatory basis, and there are very lax censorship rules. However, funding for public access is typically very limited, so the content and production value of material broadcast on such channels is often of very low quality. Even so, public access TV can be an important outlet for the interests of underserved groups within a community. Occasionally, terrestrial (over-the-air) broadcasters also provide time for public-access programming.

Public access is one of the main types of local origination services from cable TV providers. Related to public access are government and educational access, and also leased access television, which allows for programming of a more commercial nature.

Local governments, educational institutions, and, to a certain extent, commercial entities have rights to the cable system along with the general public. Educational access is used for providing educational material while also allowing area schools to broadcast special events ranging from concerts to school board meetings. Government access is used to broadcast city council meetings and other municipal events and activities. Across the U.S., more than 20,000 hours of public, educational, and government access programming is produced each week.

Leased access is used largely for advertising. Time on those channels can often be purchased by businesses outside of the local area.

Different municipalities have varying contracts with the local cable companies. Depending on the size of the community being served and the contractual agreement between a municipality and the cable provider, these different access types may all be combined into a single channel, or they may be split across several. There have been some controversial moves made in certain areas across the country, where local programming is outsourced to an entity other than the cable provider. Often, this squeezes the amount of time available for public access programming.

Charter Communications provides public access TV under francise agreements in Jackson County. The main usage is for government access. There is a video production studio in the county located at Southern Oregon University for use by Rogue Valley TV.[72]

This is an area of no small concern due to pending legislation at the federal level. Proposals for state-level fanchising would seem to eliminate the availability of the PEG channels as well as to severely curtail revenue streams sourced from franchise agreements. As of this writing we do not know the outcome of the pending legislation.

Cellular[73,74]

Cellular telephone is a type of short-wave analog or digital telecommunication in which a subscriber has a wireless connection from a mobile telephone to a relatively nearby transmitter. The transmitter's span of coverage is called a cell. Generally, cellular telephone service is available in urban areas and along major highways. As the cellular telephone user moves from one cell or area of coverage to another, the telephone is effectively passed on to the local cell transmitter.

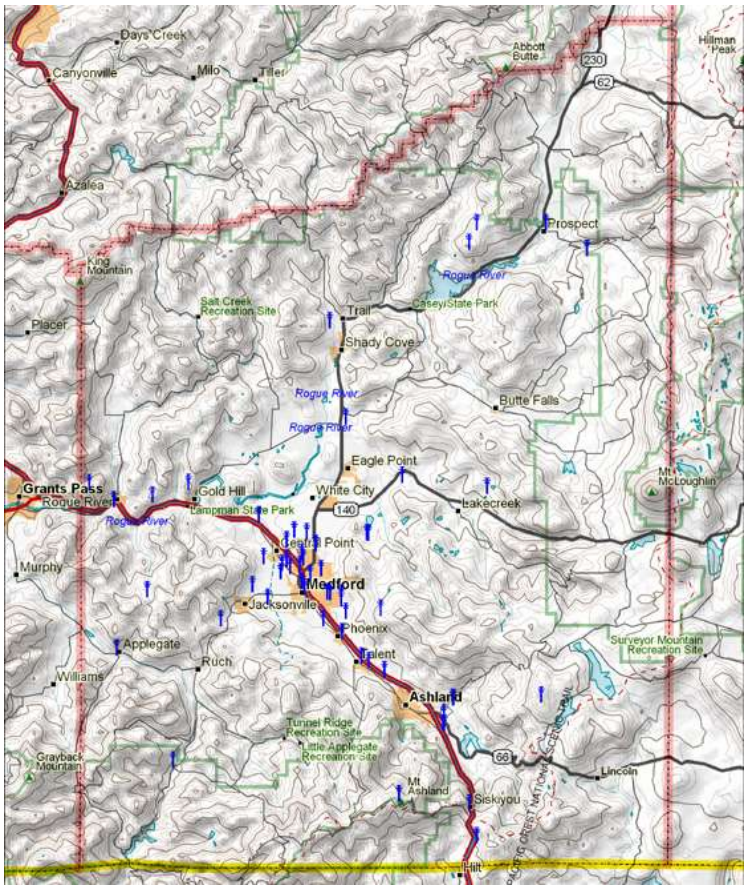
A cellular telephone is not to be confused with a cordless telephone (which is simply a phone with a very short wireless connection to a local phone outlet). A newer service similar to cellular is personal communications services (PCS).

Cellular refers to communications systems, especially the *Advance Mobile Phone Service (AMPS)*, that divides a geographic region into sections, called *cells*. The purpose of this division is to make the most use out of a limited number of transmission frequencies. Each connection, or conversation, requires its own dedicated frequency, and the total number of available frequencies is about 1,000. To support more than 1,000 simultaneous conversations, cellular systems allocate a set number of frequencies for each cell. Two cells can use the same frequency for different conversations so long as the cells are not adjacent to each other.

Cellular phone technology deployed in the U.S. falls into the following categories: GSM-800/1900, CDMA-1900/800, TDMA-800/1900, iDEN-800, AMPS-800.[75]

Cellular Towers in Jackson County

The FCC does not require every antenna structure to be registered. As such and the map may or may not list all the cellular towers in the area. Additionally, many carriers have sold their tower assets to third party companies, and leasing agreements are unknown. This also means that the FCC does not have location data for every wireless broadband site. This would be particularly true for users of unlicensed spectrum who might be, for example, on top of a building, such as the Manor where other antennas may reside.



Map 10 Jackson County Cellular towers

PCS[76]

PCS (personal communications services) is a wireless phone service somewhat similar to cellular telephone service but emphasizing personal service and extended mobility. It's sometimes referred to as *digital cellular* (although cellular systems can also be digital). Like cellular, PCS is for mobile users and requires a number of antennas to blanket an area of coverage. As a user moves around, the user's phone signal is picked up by the nearest antenna and then forwarded to a base station that connects to the wired network. The phone itself is slightly smaller than a cellular phone. According to Sprint, PCS is now available to 230 million people.

The "personal" in PCS distinguishes this service from cellular by emphasizing that, unlike cellular, which was designed for car phone use with transmitters emphasizing coverage of highways and roads, PCS is designed for greater user mobility. It generally requires more cell transmitters for coverage, but has the advantage of fewer blind spots. Technically, cellular systems in the United States operate in the 824-849 megahertz (MHz) frequency bands; PCS operates in the1850-1990 MHz bands.

Several technologies are used for PCS in the United States, including Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA), and Global System for Mobile (GSM) communication. GSM is more commonly used in Europe and elsewhere.

Time Division Multiple Access (TDMA)

TDMA is a technology for delivering digital wireless service using time-division multiplexing (TDM). TDMA works by dividing a radio frequency into time slots and then allocating slots to multiple calls. In this way, a single frequency can support multiple, simultaneous data channels. TDMA is used by the GSM digital cellular system. The users transmit in rapid succession, one after the other, each using their own timeslot. This allows multiple users to share the same transmission medium (e.g. radio frequency) whilst using only the part of its bandwidth they require. TDMA is also used extensively in satellite systems, local area networks, physical security systems, and combat-net radio systems.

The name "TDMA" is also *commonly* used in America to refer to a specific second generation (2G) mobile phone standard, more *properly* referred to as IS-136 or D-AMPS, which uses the TDMA technique to timeshare the bandwidth of the carrier wave.

The two different uses of this term can be confusing. TDMA (the technique) is used in the GSM standard. However, TDMA (the standard, i.e. IS-136) has been competing against GSM and systems based on CDMA for adoption by the network carriers, although it is now being phased out in favor of GSM technology.

TDMA is a type of Time-division multiplexing, with the special point that instead of having one transmitter connected to one receiver, there are multiple transmitters. In the case of the *uplink* from a mobile phone to a base station this becomes particularly difficult because the mobile phone can move around and vary the *timing advance* required to make its transmission match the gap in transmission from its peers.

In the GSM system, the synchronisation of the mobile phones is achieved by sending timing advance commands from the base station which instructs the mobile phone to transmit earlier

and by how much. This compensates for propagation delay as the speed of radio waves are the same as light (finite). The mobile phone is not allowed to transmit for its entire timeslot, but there is a guard period at the end of each timeslot. As the transmission moves into the guard period, the mobile network adjusts the timing advance to sycnhronise the transmission.

Initial synchronisation of a phone requires even more care. Before a mobile transmits there is no way to actually know the offset required. For this reason, an entire timeslot has to be dedicated to mobiles attempting to contact the network (known as the RACH in *GSM*). The mobile attempts to broadcast at the beginning of the timeslot, as received from the network. If the mobile is located next to the base station, there will be no time delay and this will succeed. If, however, the mobile phone is at just less than 35km from the base station, the time delay will mean the mobile's broadcast arrives at the very end of the timeslot. In that case, the mobile will be instructed to broadcast its messages starting nearly a whole timeslot earlier than would be expected otherwise. Finally, if the mobile is beyond the 35 km cell range in GSM, then the RACH will arrive in a neighboring timeslot and be ignored. It is this feature, rather than limitations of power which limits the range of a GSM cell to 35 kilometers when no special extension techniques are used. By changing the synchronisation between the uplink and downlink at the base station, however, this limitation can be overcome.

In radio systems, TDMA is almost always used alongside FDMA (Frequency division multiple access) and FDD (Frequency division duplex); the combination is referred to as FDMA/TDMA/FDD. This is the case in both GSM and IS-136 for example. The exceptions to this rule include WCDMA-TDD which combines FDMA/CDMA/TDMA and TDD instead.

A major advantage of TDMA is that the radio part of the mobile only needs to listen and broadcast for its own timeslot. For the rest of the time, the mobile can carry out measurements on the network, detecting surrounding transmitters on different frequencies. This allows safe inter frequency handovers, something which is difficult in CDMA systems, not supported at all in IS-95 and supported through complex system additions in Universal Mobile Telecommunications System (UMTS). This in turn allows for co-existence of microcell layers with macrocell layers. But, CDMA supports "soft hand-off" which allows a mobile phone to be in communication with up to 6 base stations simultaneously, a type of "same-frequency handover". The incoming packets are compared for quality, and the best one is selected. This enables CDMA to perform in areas where TDMA calls would be dropped.

A disadvantage of TDMA systems is that they create interference at a frequency which is directly connected to the timeslot length. This is the irritating buzz which can sometimes be heard if a GSM phone is left next to a radio or speakers. Another disadvantage is that the "dead time" between timeslots limits the potential bandwidth of a TDMA channel. This is why early efforts to incorporate timeslots into UMTS failed, leaving UMTS as a purely CDMA technology. The only country to continue pursuing TD-SCDMA (time division synchronous CDMA) is mainland China, perhaps because the government does not want to pay patent royalties to Qualcomm of the USA or licensing fees to the mainly European UMTS consortium.

Code division multiple access (CDMA)

CDMA is a form of multiplexing (not a modulation scheme) and a method of multiple access that does not divide up the channel by time (as in TDMA), or frequency (as in FDMA), but instead encodes data with a special code associated with each channel and uses the constructive interference properties of the special codes to perform the multiplexing. CDMA also refers to

digital cellular telephony systems that make use of this multiple access scheme, such as those pioneered by Qualcomm, or W-CDMA.

CDMA is a military technology first used during World War II by English allies to foil German attempts at jamming transmissions. The allies decided to transmit over several frequencies, instead of one, making it difficult for the Germans to pick up the complete signal.

CDMA has since been used in many communications systems, including the Global Positioning System (GPS) and in the OmniTRACS satellite system for transportation logistics. The latter system was designed and built by Qualcomm, and became the seed which helped Qualcomm engineers to invent Soft Handoff and fast power control, the necessary technologies that made CDMA practical and efficient for terrestrial cellular communications.

Universal Mobile Telecommunications System (UMTS)

UMTS is one of the third-generation (3G) mobile phone technologies. It uses W-CDMA as the underlying standard, is standardized by the 3GPP, and represents the European/Japanese answer to the ITU IMT-2000 requirements for 3G Cellular radio systems.

To differentiate UMTS from competing network technologies, UMTS is sometimes marketed as 3GSM, emphasizing the combination of the 3G nature of the technology and the GSM standard which it was designed to succeed.

UMTS supports up to 1920 kbit/s data transfer rates (and not 2 Mbit/s as frequently seen), although at the moment users in the real networks can expect performance up to 384 kbit/s - in Japan upgrades to 3 Mbit/s are in preparation. However, this is still much greater than the 14.4 kbit/s of a single GSM error-corrected circuit switched data channel or multiple 14.4 kbit/s channels in High-Speed Circuit Switched Data (HSCSD), and - in competition to other network technologies such as CDMA-2000, PHS or wLAN - offers access to the World Wide Web and other data services on mobile devices.

Precursors to 3G are 2G mobile telephony systems, such as GSM, CDMA, Personal digital Cellular (PDC), Personal Handy Phone system (PHS) and other 2G technologies deployed in different countries. In the case of GSM, there is an evolution path from 2G, called GPRS, also known as 2.5G. GPRS supports a much better data rate (up to a theoretical maximum of 140.8kbit/s, though typical rates are closer to 56kbit/s) and is packet switched rather than connection oriented (circuit switched). It is deployed in many places where GSM is used. E-GPRS, or EDGE, is a further evolution of GPRS and is based on new "coding schemes". With EDGE the actual packet data rates can reach around 180 kbit/s (effective). EDGE systems are often referred as "2.75G Systems".

In 2006, UMTS networks in Japan will be upgraded with High Speed Downlink Packet Access (HSDPA), sometimes known as 3.5G. This will make a downlink transfer speed of up to 14.4 Mbit/s possible. Work is also progressing on improving the uplink transfer speed with the High-Speed Uplink Packet Access (HSUPA)

Until regulators allocate new spectrum specifically for 3G, there will be no firm answer to what frequencies UMTS will operate on in North America. AT&T Wireless launched UMTS services in the United States by the end of 2004 strictly using the existing 1900 MHz spectrum allocated for 2G PCS services. Cingular acquired AT&T Wireless in 2004 and has since then launched

UMTS in select US cities. Initial rollout of UMTS in Canada will also be handled exclusively by the 1900 MHz band.

Global System for Mobile (GSM)

GSM is one of the leading digital cellular systems. GSM uses narrowband TDMA, which allows eight simultaneous calls on the same radio frequency. GSM was first introduced in 1991. As of the end of 1997, GSM service was available in more than 100 countries and has become the *de facto* standard in Europe and Asia.

GSM is the most popular standard for mobile phones in the world. GSM service is used by over 1.5 billion people across more than 210 countries and territories. The ubiquity of the GSM standard makes international roaming very common between mobile phone operators, enabling subscribers to use their phones in many parts of the world. GSM differs significantly from its predecessors in that both signaling and speech channels are digital, which means that it is considered a *second generation* (2G) mobile phone system. This fact has also meant that data communication was built into the system from very early on. GSM is an open standard which is currently developed by the 3GPP.

From the point of view of the consumer, the key advantage of GSM systems has been higher digital voice quality and low cost alternatives to making calls such as text messaging. The advantage for network operators has been the ability to deploy equipment from different vendors because the open standard allows easy inter-operability. Also, the standards have allowed network operators to offer roaming services which mean subscribers can use their phone all over the world.

GSM retained backward-compatibility with the original GSM phones as the GSM standard continued to develop, for example packet data capabilities were added in the Release '97 version of the standard, by means of General Packet Radio Service (GPRS). Higher speed data transmission has also been introduced with EDGE in the Release '99 version of the standard.

GPRS is a mobile data service available to users of GSM mobile phones. It is often described as "2.5G", that is, a technology between the second (2G) and third (3G) generations of mobile telephony. It provides moderate speed data transfer, by using unused TDMA channels in the GSM network. Originally there was some thought to extend GPRS to cover other standards, but instead those networks are being converted to use the GSM standard, so that is the only kind of network where GPRS is in use. GPRS is integrated into GSM standards releases starting with Release 97 and onwards.

GPRS is different from the older Circuit Switched Data (or CSD) connection included in GSM standards releases before Release 97. In CSD, a data connection establishes a circuit, and reserves the full bandwidth of that circuit during the lifetime of the connection. GPRS is packet-switched which means that multiple users share the same transmission channel, only transmitting when they have data to send. This means that the total available bandwidth can be immediately dedicated to those users who are actually sending at any given moment, providing higher utilization where users only send or receive data intermittently. Web browsing, receiving e-mails as they arrive and instant messaging are examples of uses that require intermittent data transfers, which benefit from sharing the available bandwidth.

Usually, GPRS data are billed per kilobytes of information transceived while circuit-switched data connections are billed per second. The latter is to reflect the fact that even during times when no data are being transferred, the bandwidth is unavailable to other potential users. GPRS originally supported (in theory) IP, PPP and X.25 connections. The latter has been typically used for applications like wireless payment terminals although it has been removed as a requirement from the standard. X.25 can still be supported over PPP, or even over IP, but doing this requires either a router to do encapsulation or intelligence built into the end terminal.

Packet-switched data under GPRS is achieved by allocating unused cell bandwidth to transmit data. As dedicated voice (or data) channels are setup by phones, the bandwidth available for packet switched data shrinks. A consequence of this is that packet switched data has a poor bit rate in busy cells. The theoretical limit for packet switched data is approx. 160.0 kbit/s (using 8 time slots and CS-4). A realistic bit rate is 30–80 kbit/s, because it is possible to use max 4 time slots for downlink. A change to the radio part of GPRS called EDGE (sometimes called *EGPRS* or *Enhanced GPRS*) allows higher bit rates of between 160 and 236.8 kbit/s. The maximum data rates are achieved only by allocation of more than one time slot in the TDMA frame. Also, the higher the data rate, the lower the error correction capability. Generally, the connection speed drops logarithmically with distance from the base station. This is not an issue in heavily populated areas with high cell density, but may become an issue in sparsely populated/rural areas.

Enhanced Data rates for GSM Evolution, or EDGE, is a digital mobile phone technology which acts as a bolt-on enhancement to 2G and 2.5G *General Packet Radio Service* (GPRS) networks. This technology works in GSM networks. EDGE (also known as EGPRS) is a superset to GPRS and can function on any network with GPRS deployed on it, provided the carrier implements the necessary upgrades.

EDGE provides Enhanced GPRS (EGPRS), which can be used for any packet switched applications such as an Internet connection. High-speed data applications such as video services and other multimedia benefit from EGPRS' increased data capacity. EDGE Circuit Switched is a possible future development.

In addition to GMSK (Gaussian minimum-shift keying) EDGE uses 8PSK (8 Phase Shift Keying) for the upper five of its nine modulation and coding schemes. EDGE produces a 3-bit word for every change in carrier phase. This effectively triples the gross data rate offered by GSM. EDGE, like GPRS, uses a rate adaptation algorithm that adapts the modulation and coding scheme (MCS) according to the quality of the radio channel, and thus the bit rate and robustness of data transmission. It introduces a new technology not found in GPRS, Incremental Redundancy, which, instead of retransmitting disturbed packets, sends more redundancy information to be combined in the receiver. This increases the probability of correct decoding.

EDGE can carry data speeds up to 236.8 kbit/s for 4 timeslots (theoretical maximum is 473.6 kbit/s for 8 timeslots) in packet mode and will therefore meet the International Telecommunications Union's requirement for a 3G network, and has been accepted by the ITU as part of the IMT-2000 family of 3G standards. It also enhances the circuit data mode called HSCSD, increasing the data rate of this service. EDGE has been introduced into GSM networks around the world since 2003, initially in North America.

EDGE is actively supported by GSM operators in North America. Some GSM operators elsewhere view UMTS as the ultimate upgrade path and either plan to skip EDGE altogether or

use it outside the UMTS coverage area. However, the high cost and slow uptake of UMTS have resulted in fairly common support for EDGE in the global GSM/GPRS market.

Although EDGE requires no hardware changes to be made in GSM core networks, base stations must be modified. EDGE compatible transceiver units must be installed and the base station subsystem (BSS) needs to be upgraded to support EDGE. New mobile terminal hardware and software is also required to decode/encode the new modulation and coding schemes and carry the higher user data rates to implement new services.

Whether EDGE is 2G or 3G depends on implementation. While Class 3 and below EDGE devices clearly are not 3G, class 4 and above devices perform at a higher bandwidth than other technologies conventionally considered as 3G (such as 1xRTT).

UMTS TDD-CDMA[77]

The acronym is a mouthful, but it basically is a unifying technology that welds together the two major cellular wireless platforms -- the GSM-centric UMTS and CDMA. The UMTS TDD Mobile Broadband is a packet data implementation of the international 3GPP Universal Mobile Telecommunications System (UMTS) standard. This standard is primarily meant to support convergence - Multimedia, Voice, Data and Video applications. The new standard has been widely adopted universally and is becoming the first truly acceptable standard for Mobile Broadband solutions.

3GPP specifications are based on evolved GSM specifications, now generally known as the UMTS system.

The 3rd Generation Partnership Project (3GPP) is a collaboration agreement that was established in December 1998. The collaboration agreement brings together a number of telecommunications standards bodies, which are known as “Organizational Partners.”

The term "*3GPP specification*" covers all GSM (including GPRS and EDGE) and W-CDMA specifications. The following terms are also used to describe networks using the 3G specifications: UTRAN, UMTS (in Europe) and FOMA (in Japan).

UMTS TDD is built to support high-speed data rates in the excess 2Mbps, whereas CDMA 2000 1X networks are primarily for voice and can only support up to 153Kbps of data. Thus performance in data applications is more superior on UMTS TDD and it is also possible to leverage on VoIP technologies that are supported by the UMTS TDD system.

Cingular Wireless LLC is the largest United States mobile phone company, with headquarters in Atlanta, Georgia, United States. Cingular operates a network of multiple technologies. The most widely used of these technologies is called Global System for Mobile Communications, or GSM. On top of their GSM network they run a data network called GPRS (General Packet Radio Service) and an upgrade for faster speeds called EDGE (Enhanced Data rates for GSM Evolution). Cingular supports their legacy TDMA and analog networks. Former networks include various paging services and the Cingular Interactive division that became Velocita Wireless.

Cingular's current network uses GSM/GPRS technology, with a legacy TDMA/AMPS network. The company uses both the cellular (800 / 850 MHz) and PCS (1900 MHz) bands. Cingular also

offers EDGE high-speed data over most of their network, and is deploying WCDMA (UMTS) technology as their 3G upgrade path, to be followed by HSDPA upgrades in 2006.

Sprint/Nextel Sprint operates a nationwide, all-digital, all-CDMA, all-PCS (1900 MHz) network, in addition to a nationwide iDEN network acquired during Sprint's merger with Nextel in August 2005. Sprint recently launched 1xEV-DO high-speed data technology.

Nextel merged with Sprint in August 2005, and Nextel currently operates as a sub-brand under Sprint. Nextel caters mostly to business users, and offers unique services such as the "walkie-talkie" Direct Connect push-to-talk feature. Nextel uses Motorola's iDEN technology. They use an unusual set of small "SMR" frequency bands near 800-900 MHz, which are separate from the 800/850 and 900 MHz cellular bands. They offer Motorola phones exclusively, since Motorola is the only manufacturer of iDEN phones.

Qwest is a regional CDMA carrier, offering service in Montana, Colorado, Wyoming, Arizona, New Mexico, Washington, Oregon, Idaho, Minnesota, Nebraska, Iowa, North and South Dakota, and Utah. The company currently is transitioning customers from its own network to the Sprint PCS network, although it will continue to offer Qwest-branded service and phones.

Jackson County has 2G - IS-95A PCS at 1900 MHz plus Motorola's iDEN technology.

T-Mobile is a group of mobile phone corporate subsidiaries (all under the ownership of Deutsche Telekom) that operate GSM networks in Europe and the United States. The "T" stands for "Telekom." T-Mobile exclusively uses the GSM 1900 MHz frequency to build out its native network. Most roaming coverage, however, is provided by affiliate carriers using GSM 850 MHz frequency (some is GSM 1900 MHz frequency). T-Mobile also launched an EDGE (Enhanced Data Rates for GSM Evolution) network in 75% of its GSM footprint in September 2005. In 2006, T-Mobile plans to spend more time improving coverage and filling gaps in suburban areas, as their network is already well built out in urban areas. Also, T-Mobile USA will bid for 3G spectrum (in the 2100 and 1700 MHz bands) in the upcoming FCC auctions, to be held in June 2006. The 3G network will be based on a UMTS/HSDPA solution and will be launched either in Q4 2006 or Q1 2007.

Jackson County has GSM at 1900 MHz. Most roaming coverage, however, is provided by affiliate carriers using GSM 850 MHz frequency.

U. S. Cellular is a large multi-regional carrier offering service in 155 markets - in 26 states - across the country. The company primarily uses CDMA technology, and also provides legacy TDMA service. Most coverage is cellular-band (800 MHz), with some PCS (1900 MHz) areas in the Central region.

Jackson County has 2G - IS-95A, Cellular at 800 MHz

Verizon Wireless owns and operates a nationwide wireless network. Headquartered in Bedminster, NJ, Verizon Wireless is a joint venture of Verizon Communications (NYSE:VZ) and Vodafone (NYSE and LSE: VOD). A leader in wireless voice and data services, the company:

- built the nation’s first wide-area wireless broadband network
- delivered the nation’s first wireless consumer 3G multimedia service

- launched the most comprehensive mobile music service in the world
- has the highest customer loyalty in the industry based on lowest-in-industry churn

Verizon Wireless invests more than $5 billion annually to maintain and expand its high-quality network nationwide. Verizon Wireless currently serves 51.3 million customers, operating approximately 169 switching facilities and more than 24,000 cell sites. Most of their territory employs CDMA 1xRTT digital technology, in both the cellular and PCS bands. They also own significant analog networks. They recently deployed 1xEV-DO technology in many areas.

Jackson County has 3G - CDMA2000 1X, Cellular at 800 MHz.

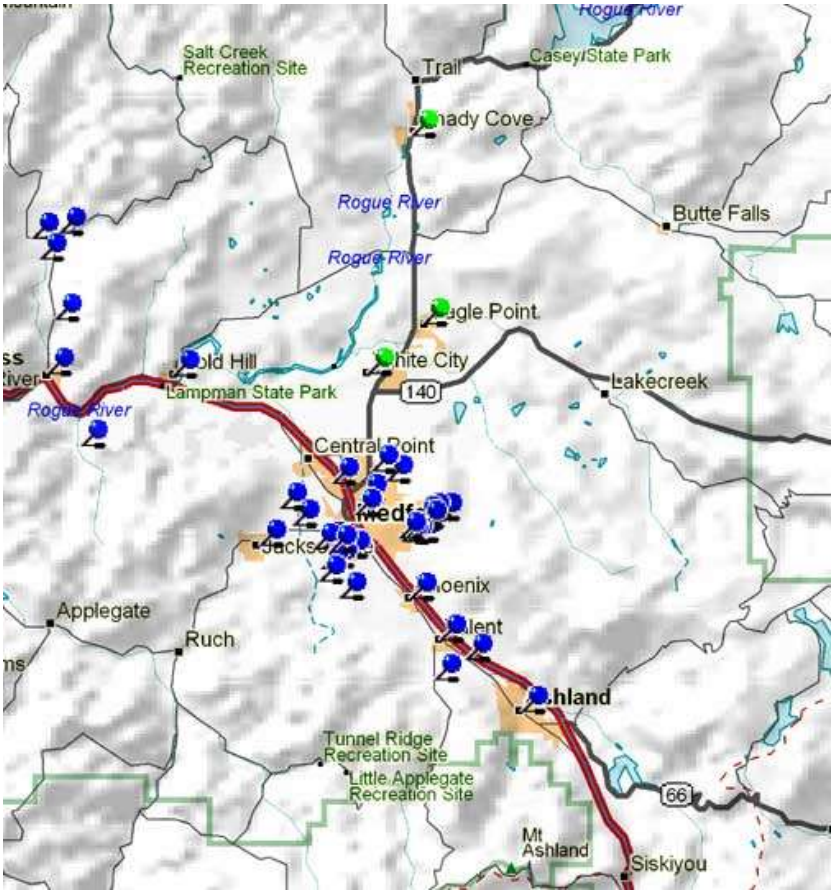
Digital Subscriber Line (DSL)[78,79]

The technology that local telephone carriers predominantly use for providing high-speed data services is the digital subscriber line (DSL) service offering. DSL is a copper-based service that allows the telephone carrier to add certain electronics to the telephone line to enhance the copper loop that provides the customer voice service so that it serves as a conduit for both voice and high-speed data traffic.

Telephone companies now offer DSL services in selected locations in Jackson County over the same copper wires as the analog telephone transmission, using a higher frequency. Current DSL technology is at best a stop-gap interim technology because it is restricted to limited distances from the central office and has too little capacity for many of the new broadband applications that consumers will want, including high quality digital video transmission. To complete the transition, we will need to convert all our special-purpose analog circuit-switched voice networks to multi-purpose digital broadband packet-switched networks. And, we will need to provide quality of service capabilities on our digital networks to support voice and video applications with the quality we have come to expect.

Qwest has deployed DSL into all of the cities in its exchanges. The SB 622 project got the ball rolling. Subsequently Qwest has deployed DSL beyond the footprint of a number of cities. In some areas residents have worked with Qwest to obtain DSL in their neighborhood. This has been especially true in the Rogue River area.

Sprint has deployed DSL to all of our Jackson County exchanges, with the exception of Crater Lake. They could deploy DSL to Crater Lake over the Digital Microwave Radio if there becomes sufficient demand. DSL may not be available to some customers within the exchanges, however. They are continuing to expand the DSL service footprint.



Map 11 DSL Switches in Jackson County
Blue = Qwest, Green = Sprint

There are a number of variations of DSL service. The DSL service primarily used by residential customers is asymmetric DSL (ADSL). ADSL provides speeds in one direction (usually downstream) that are greater than the speeds in the other direction. Since the FCC's *Third Report*, carriers have increased the speeds typically offered in their ADSL services. For instance, a number of carriers are now offering download speeds of 1.5 Mbps and 3.0 Mbps and upload speeds as high as 768 kbps. Sample prices for 1.5 Mbps/384 kbps service range from $34.95 a month with certain promotions to $64.95 per month for a service that can serve multiple computers in a house. Prices for an even faster download speed of 3.0 Mbps range from $44.95 to $99.95 depending upon the upload speed, which ranges from 384 kbps to 768 kbps. Installation for ADSL services typically range from free to $99.95, because many carriers are using self-installation kits themselves. Recently there have been reports of DSL at up to 25 Mbps.

DSL is a very high-speed connection that uses the same wires as a regular telephone line. Most homes and small business users are connected to an asymmetric DSL (ADSL) line. ADSL divides up the available frequencies in a line on the assumption that most Internet users look at, or download, much more information than they send, or upload. Under this assumption, if the connection speed from the Internet to the user is three to four times faster than the connection from the user back to the Internet, then the user will see the most benefit (most of the time).

Precisely how much benefit you see will greatly depend on how far you are from the central office of the company providing the ADSL service. ADSL is a distance-sensitive technology: As the connection's length increases, the signal quality decreases and the connection speed goes

down. The limit for ADSL service is 18,000 feet (5,460 meters), though for speed and quality of service reasons many ADSL providers place a lower limit on the distances for the service. At the extremes of the distance limits, ADSL customers may see speeds far below the promised maximums, while customers nearer the central office have faster connections and may see extremely high speeds in the future. ADSL technology can provide maximum downstream (Internet to customer) speeds of up to 8 megabits per second (Mbps) at a distance of about 6,000 feet (1,820 meters), and upstream speeds of up to 640 kilobits per second (Kbps). In practice, the best speeds widely offered today are 256 Kbps to 1.5 Mbps downstream, with upstream speeds varying between 64 and 640 Kbps.

ADSL uses two pieces of equipment, one on the customer end and one at the Internet service provider, telephone company or other provider of DSL services. At the customer's location there is a DSL transceiver, which may also provide other services. The DSL service provider has a DSL Access Multiplexer (DSLAM) to receive customer connections.

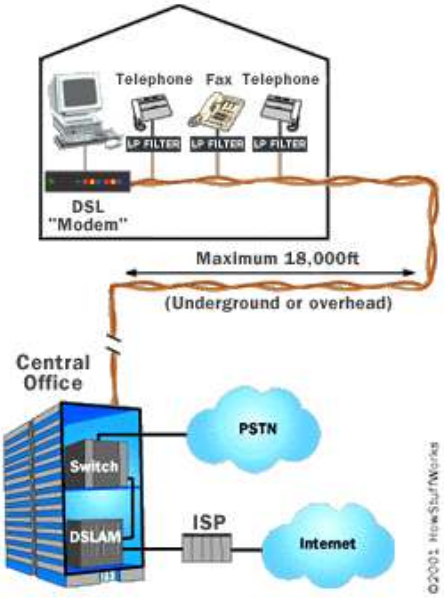


Chart 46 DSL

Most residential customers call their DSL transceiver a "DSL modem." The engineers at the telephone company or ISP call it an **ATU-R**. Regardless of what it's called, it's the point where data from the user's computer or network is connected to the DSL line. The transceiver can connect to a customer's equipment in several ways, though most residential installation uses USB or 10 base-T Ethernet connections. While most of the ADSL transceivers sold by ISPs and telephone companies are simply transceivers, the devices used by businesses may combine network routers, network switches or other networking equipment in the same platform.

The DSLAM at the access provider is the equipment that really allows DSL to happen. A DSLAM takes connections from many customers and aggregates them onto a single, high-capacity connection to the Internet. DSLAMs are generally flexible and able to support multiple types of DSL in a single central office, and different varieties of protocol and modulation in the same type of DSL. In addition, the DSLAM may provide additional functions including routing or dynamic IP address assignment for the customers.

The DSLAM provides one of the main differences between user service through ADSL and through cable modems. Because cable-modem users generally share a network loop that runs through a neighborhood, adding users means lowering performance in many instances. ADSL provides a dedicated connection from each user back to the DSLAM, meaning that users won't see a performance decrease as new users are added -- until the total number of users begins to saturate the single, high-speed connection to the Internet. At that point, an upgrade by the service provider can provide additional performance for all the users connected to the DSLAM.

ADSL is competing with technologies such as cable-modem access and satellite Internet access for high-speed connections from consumers to the Internet. According to IDC, a market-analysis firm based in Framingham, MA, approximately 330,000 households in the United States were connected to the Internet via DSL in 1999, compared to 1,350,000 households with cable modems. By 2003, IDC estimates that the number of households with cable modems will have risen to 8,980,000, while DSL will have raced into the broadband lead with 9,300,000 households.

Current technology can provide a theoretical maximum of up to 7 megabits per second, and research promises even greater performance in the future with protocols like G.Lite and VDSL.

Advantages of DSL:

- You can leave your Internet connection open and still use the phone line for voice calls.
- The speed is much higher than a regular modem (256 Kbps - 1.5 Mbps vs. 56 Kbps)
- DSL doesn't necessarily require new wiring; it can use the phone line you already have.
- The company that offers DSL will usually provide the modem as part of the installation.

Disadvantages:

- A DSL connection works better when you are closer to the provider's central office.
- The connection is faster for receiving data than it is for sending data over the Internet.
- The service is not available everywhere, especially in rural areas.

Telephone companies are now starting to offer Internet telephony (i.e., Voice over Internet Protocol – VoIP) using their DSL capabilities. One example is Qwest's OneFlex™ Hosted VoIP[80], referred to as "naked DSL"[81] in some quarters, because an analog phone line is not required.

Digital TV[82]

What makes digital television so special? A digital image isn't inherently better than an analog image, and in some cases it can be worse. An HDTV picture doesn't have to be digital either; Japanese HDTV is broadcast over an analog signal. There has to be another reason why the United States is choosing to go through the pain of switching from analog to digital.

In fact, there are several good reasons to go digital, including: how much data it can transmit, how consistent the data stays over distance, and what type of data the signal can carry. For the same amount of bandwidth, you can stuff a lot more information into a digital signal than an analog signal. A digital signal doesn't produce the same problems with the picture we see on a distant analog television, either. And television in the digital age won't be limited to video and audio; our televisions will become truly interactive. Combined with HDTV and digital sound, this means a better picture, better sound, and digital data. But how are we going to fit all this into the same amount of frequency?

Unlike many other countries, the United States is converting to both digital signals and high-definition pictures at the same time. Some countries are already broadcasting high-definition pictures, but they're using an analog signal. To send more picture detail, they just expanded the amount of frequency bandwidth for each. Broadcasters in the United States won't have the option to expand the size of their signal. They'll have to squeeze more picture detail into the same bandwidth they were using for analog television.

An advantage digital has over analog is that analog signals can't be compressed as well as a digital signal can. To transmit an image on analog television, every pixel is included in the signal. A standard NTSC screen includes 525 lines of 720 pixels, for a total of 378,000 pixels per frame. That's a lot, but it fits into the 6MHz bandwidth of a television channel. Japanese HDTV takes 20 MHz of bandwidth to send pictures with over 675,000 pixels. That's over two times as much signal to send a high definition picture and higher quality sound, but no other data.
In the United States, a standard ATSC (Advanced Television Systems Committee) screen can have up to 1080 lines of 1920 pixels each, or 2,073,600 pixels per frame. Somehow, more than five times as much information will need to squeeze into the same bandwidth of 6Mhz. That doesn't include the compressed audio or data. So how are they going to do that? The same way the compression software on your computer squeezes your files. Well, almost the same way.

Video on digital TV will be compressed using a scheme called MPEG-2. It takes advantage of how the eye perceives color variations and motion. Inside each frame, an MPEG-2 encoder records just enough detail to make it look like nothing is missing. The encoder also compares adjacent frames and only records the sections of the picture that have moved or changed. If only a small section of the picture changes, the MPEG-2 encoder only changes that area and leaves the rest of the picture unchanged. On the next frame in the video, only that section of the picture is changed.

MPEG-2 has some problems, but it's a good compression scheme and it's already an industry standard for digital video for DVD-Videos and some satellite television services. One problem with MPEG-2 is that it's a "lossy" compression method. That means that a higher compression rate gives a poorer picture. There's some loss in picture quality between the digital video camera and what you'll see on your television. However, the quality is still a lot better than an average NTSC image. And using these compression schemes, MPEG-2 can reduce the amount of bits by about 55 to 1 (MPEG-4 is coming)!

With that ratio, there's a lot of information that is thrown away, but there's still enough to look like everything is still there. The human ear isn't as easy to fool, though. It's much more sensitive to subtle changes in sound. Digital TV is going to improve the sound over today's television using advances in digital sound developed over the last two decades.

When CD's appeared on the market, most people were skeptical about the silver discs, but the sound was great. Digital audio recordings on CD have a wider frequency range, finer sampling, and they won't wear down with age (it stays perfect until something like a scratch damages the data). Almost everyone can hear an obvious improvement. Eventually they have taken over the commercial music industry, but television is still low-range analog.

Taking the next logical step, HDTV will broadcast sound using the Dolby Digital/AC-3 audio encoding system. It's the same digital sound used in most movie theaters, DVDs, and many home theater systems since the early 1990's. It can include up to 5.1 channels of sound: three in front (left, center, and right), two in back (left and right), and a subwoofer bass for a sound you can feel (that's the .1 channel). Sound on digital TV will be "CD quality" with a range of frequencies lower and higher than most of us can even hear.

Digital broadcasters are not restricted to just sending a high-definition picture. They can still broadcast a standard-definition picture, but why would they want to do that? There's a very good reason. In the same amount of signal they can "multi-cast" four standard-definition pictures instead of only one high-definition picture.

Some broadcasters, including many PBS stations, are already planning to multi-cast four choices of programming during the day, and then switch to high-definition for prime-time. When you tune to your local Public Broadcasting station during the day, you may have a choice between children's programming, do-it-yourself shows, adult education, popular documentaries, or other programming. All from the same broadcaster! Digital TV is going to offer us more choice, and it's going to make our viewing experience more interactive.

Many people may think it's the best use of the technology, but interactive TV (or ITV) isn't limited to ordering pizzas or flying biplane dogfights on your television. Digital television is heading toward a convergence with computers -- and students, sports fans, news junkies, and anybody with an interest in anything will get more out of television. Nobody really knows how we'll interact with our televisions in the next few years, but TV is never going to be the same.

Digital TV broadcasts are just long streams of bits that can contain any data the broadcaster wants to add to their signal. Each channel has about 19.2 Mbs (that's megabits per second) of data they can add to their broadcast. Most of it will be video and audio, but some of the signal can be other forms of data. Imagine a very fast network connection sending pictures, sounds, multimedia games, and illustrated articles, all related to the television program you're watching. You can still passively watch TV, but you can also customize the experience and make it your own.

Interactive television isn't really a new idea. Almost every television station sends data with their signals already. Closed captioning and descriptive audio are sent to millions of televisions everyday, but only a small percentage of the viewers actually see (or hear) any of it. These are a great benefit to those who can't hear or see the television, but they are very limited in their interactivity. For many households, the television is the most popular appliance. So, why is it less interactive than a $10 video game?

In the 1980's, TCI and Time Warner tested out their own versions of interactive television on some test markets. Subscribers to their services could shop online, play games with people across town, and do a lot of the things we dreamed an interactive TV should offer. Most of the testers

found the service very useful, but neither TCI nor Time Warner could cover the costs of operating the service while keeping the prices reasonable for the consumer.

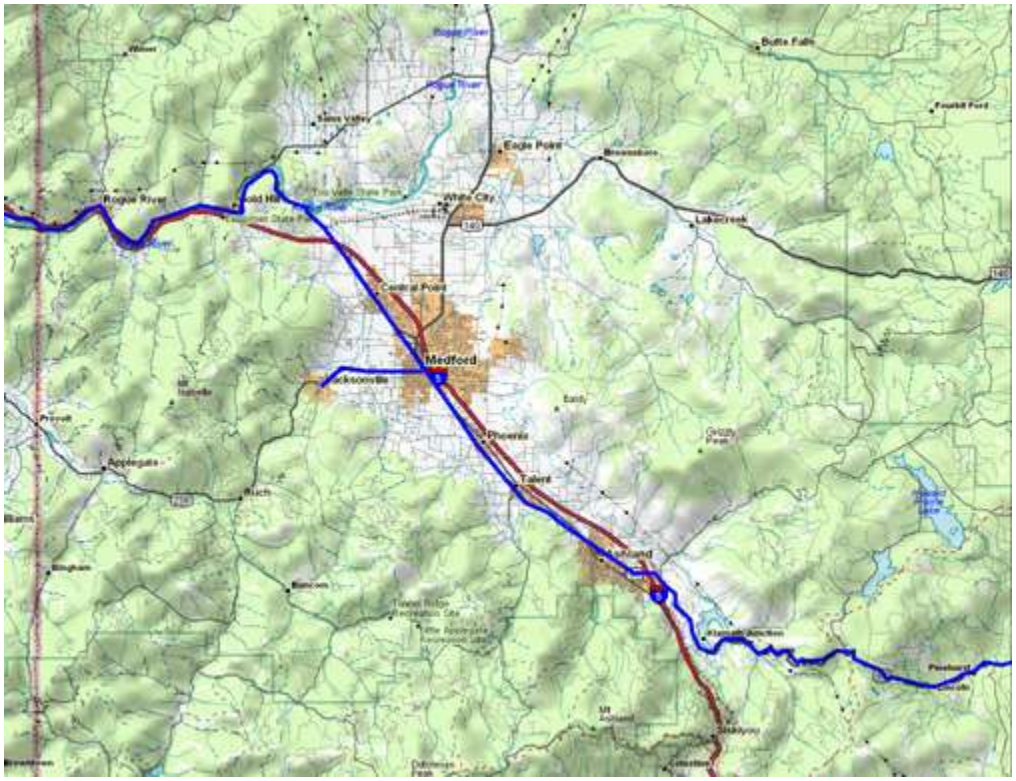
Instead of using an external network connection, as these experiments used, digital TV is going to embed interactivity inside the broadcast signal. There is little cost in sending the interactive data out to every viewer with a digital television. (see also Datacasting in this section)

The convergence of television and computers is going to take a major step with digital broadcasts.

Fiber[83]

There is substantial fiber running through the county, especially along I-5. Ownership is not all that clear as these larger providers are somewhat loath to disclose details. Hunter Communications publishes their fiber maps on their Website (see map under Hunter Communications in this document).

Qwest now has fiber between all of their Central Offices in Jackson County. Most of their infrastructure remains copper-based, especially as you move away from the CO.



Map 12 Qwest Fiber

Sprint has fiber to all Jackson County exchanges (White City (including Eagle Point), Shady Cove, Butte Falls and Prospect) with the exception of Crater Lake, which is served by Digital Microwave Radio. Dual fiber routes protect the transport between White City and Medford.

Map 13 Sprint Fiber

In the last several years, carriers have begun constructing entirely fiber optic cable transmission facilities that run from a distribution frame (or its equivalent) in an incumbent local exchange carrier's (LEC's) central office to the loop demarcation point at an end-user customer premise. These loops are referred to as fiber-to-the-home (FTTH) loops. FTTH technology offers substantially more capacity than any copper-based technology.

There are three basic types of architectures being used to provide FTTH. The most common architecture used is Passive Optical Network (PON) technology. This technology allows multiple homes to share a passive fiber network. In this type of network, the plant between the customer premises and the headend at the central office consists entirely of passive components—no electronics are needed in the field. The other architectures being used are home run fiber or point-to-point fiber, in which subscribers have a dedicated fiber strand, and active or powered nodes are used to manage signal distribution, and hybrid PONs, which are a combination of home run and PON architecture. [Note: The FCC reporting totally ignores municipal or other similar ownership models for fiber deployments.]

The infrastructure that has dominated most of the recent CATV system installations has been Hybrid-Fiber-Coax (HFC). This system is usually configured with a fiber "feeder" cable, which terminates at a community node. At the community node, optical signals are converted to electrical signals for transport over the copper cabling, which circles the neighborhood and drops off at each home. This system was intended for an entirely different purpose than high-speed data access. It was designed to deliver high-density CATV service. Fiber optic cable replaced the coaxial cable trunks of the past in order to deliver the Radio Frequency (RF) modulated signals more efficiently to the neighborhood coax system. This system suffers from the innate limitation of copper: bandwidth ceilings, electromagnetic interference and asymmetrical communication speeds — resulting in a limited lifespan. While in the short term this represents a usable (at best) cable plant, the much shorter amortization timeline requires higher customer charges. While seen as the easiest sell to developers and homebuyers, the HFC model doesn't provide much more than an all-copper solution because a bottleneck of shared infrastructure still exists.

Service	*Required Bandwidth*
Collaborative remote studio video editing	45 Mbps symmetrical
Broadcast quality video per channel	6 Mbps asymmetrical
Full motion video conferencing	6 Mbps symmetrical
Lower quality video conferencing	128 to 512 Kbps symmetrical
Application hosting/delivery	128 Kbps desktop symmetrical
HDTV per channel	18 to 20 Mbps asymmetrical
VoIP / POTS (voice telephony)	64 to 256 Kbps per phone
Interactive remote learning - online university	128 to 512 Kbps symmetrical
Interactive Gaming	5 Mbps symmetrical
Business inventory and remote management	128 to 512 Kbps symmetrical
Electronic investment and banking	56 to 128 Kbps
Telemedicine	1 to 6 Mbps symmetrical

Table 15 Why HFC Won't Serve the Needs of Tomorrow

Bandwidth: *Will only increase*
Revenue: *More bandwidth, more revenue*
Infrastructure: *Must be scalable*

3 DTV MPEG Video Streams (VOD)	15.00 Mbps
Telecommuting/VPN	2.00 Mbps
Video Conferencing	1.00 Mbps
Web Surfing	1.50 Mbps
Interactive Gaming	1.00 Mbps
High Definition TV	19.20 Mbps
4 Phone Conversations	0.26 Mbps
Total	**39.96 Mbps**

Network	***Distance Limit for Bandwidth Ranges***
Fiber Optic	9-12 miles for 1 Gbps symmetrical
Hybrid Fiber Coax	1,400 ft for 1 Gbps asymmetrical
Asymmetric VDSL (Copper)	1,000 ft for up to 52 Mbps downstream

Table 16 Only Fiber Can Scale

The installation of fiber throughout the network, from the provider to the subscriber premises, is the only future-proof, lay-it-and-leave-it, infrastructure design. The industry has embraced the term FTTP to denote an all fiber network. But, the fiber can reach a variety of customer premises, such as businesses, schools, hospitals and other institutions.

Since fiber technologies are being innovated to make installation, connectorizing and splicing easier, combined with a rapid decline in the cost of materials and labor, fiber is quickly becoming the most cost-efficient media. In addition, to quote the International Telecommunications Union's (ITU) G.983 recommendation, "Maintenance is easy… all fiber systems are regarded as more reliable than hybrid fiber-metallic ones." As of yet, we haven't even begun to tap the potential of fiber optic cable in transporting digital information. This virtually unlimited potential means that the fiber laid today can be used for decades. With such long lifecycles, subscriber costs decrease since a much shorter schedule of return on investment is possible.

The issue of ownership is also much more flexible in a FTTP infrastructure. The model can be anything from a single community service provider to an open access, "come one, come all" approach to service provisioning. Fiber can support a multitude of technologies and converged applications. Rather than limiting the technology that can be deployed, fiber creates an environment of innovation and unlimited possibilities. Simply put, by implementing fiber everywhere in the network -- end-to-end -- network infrastructure is able to support whatever technologies emerge over the next 20 years and beyond.

Service	Details	RBOCs	DSL Headends	Digital Cable Headends	Cable Headends	ISP	Satellite	Fiber.TV Fiber Optic Head End
Digital Packet Television	IP Digital Packets	Partially Supported Today or in Near Future	Not Supported Today. Possible in Future Supported Poor Quality	Not Supported Today. Possible in Future Supported Poor Quality	Network Cannot Support This Feature	Support in Future is Doubtful	Partially Supported Today or in Near Future	Supported Today
High Definition Television	1080i & 1080p	Network Cannot Support This Feature	Support in Future is Doubtful	Not Supported Today. Possible in Future Supported Poor Quality	Network Cannot Support This Feature	Network Cannot Support This Feature	Partially Supported Today or in Near Future	Supported Today
Ready Interactive Television	Two-Way Video	Support in Future is Doubtful	Support in Future is Doubtful	Not Supported Today. Possible in Future Supported Poor Quality	Network Cannot Support This Feature	Network Cannot Support This Feature	Support in Future is Doubtful	Supported Today
DVD Television	DVD Quality Video	Support in Future is Doubtful	Support in Future is Doubtful	Support in Future is Doubtful	Network Cannot Support This Feature	Network Cannot Support This Feature	Support in Future is Doubtful	Supported Today
Interactive Music Programming	Interactive Controls	Partially Supported Today or in Near Future	Partially Supported Today or in Near Future	Partially Supported Today or in Near Future	Partially Supported Today or in Near Future	Partially Supported Today or in Near Future	Support in Future is Doubtful	Supported Today
Music Programming	Pre Programmed	Supported Today	Supported Today	Supported Today	Supported Today	Supported Today	Supported Today	Supported Today
High Speed Internet on TV	1 to 10 mb/s	Support in Future is Doubtful	Partially Supported Today or in Near Future	Partially Supported Today or in Near Future	Support in Future is Doubtful	Not Supported Today. Possible in Future Supported Poor Quality	Partially Supported Today or in Near Future	Supported Today
2 Way Ultra High Speed Internet	100 Mb/s to 1 Gbs+	Network Cannot Support This Feature	Network Cannot Support This Feature	Not Supported Today. Possible in Future Supported Poor Quality	Network Cannot Support This Feature	Network Cannot Support This Feature	Network Cannot Support This Feature	Supported Today
High Performance Online Games	High speed 5 mb/s games	Network Cannot Support This Feature	Not Supported Today. Possible in Future Supported Poor Quality	Not Supported Today. Possible in Future Supported Poor Quality	Network Cannot Support This Feature	Network Cannot Support This Feature	Network Cannot Support This Feature	Supported Today
IP Phone Service	Multiple IP phones	Partially Supported Today or in Near Future	Partially Supported Today or in Near Future	Partially Supported Today or in Near Future	Network Cannot Support This Feature	Not Supported Today. Possible in Future Supported Poor Quality	Network Cannot Support This Feature	Supported Today
Fiber-To-The-Home/Business	SM/MM Fiber Optic Cable	Partially Supported Today or in Near Future	Support in Future is Doubtful	Partially Supported Today or in Near Future	Partially Supported Today or in Near Future	Network Cannot Support This Feature	Network Cannot Support This Feature	Supported Today
	A Single Architecture & Protocol All Services	Support in Future is Doubtful	Not Supported Today. Possible in Future Supported Poor Quality	Not Supported Today. Possible in Future Supported Poor Quality	Network Cannot Support This Feature	Network Cannot Support This Feature	Network Cannot Support This Feature	Supported Today

Supported Today | Partially Supported Today or in Near Future | Not Supported Today. Possible in Future Supported Poor Quality | Support in Future is Doubtful | Network Cannot Support This Feature

Table 17 Is your home fiber ready?

Low Power Television[84]

The Federal Communications Commission (FCC) created the Low Power Television (LPTV) service in 1982 to provide opportunities for locally oriented television service in small communities. These communities may be in rural areas or may be individual communities within larger urban areas. LPTV service presents a less expensive and more flexible means of delivering programming tailored to the interests of viewers in small, localized areas than traditional full service/power TV stations. It has created opportunities for new entry into television broadcasting, provided a means of local self-expression, and permitted fuller use of the broadcast spectrum.

LPTV stations have "secondary spectrum priority" to full-service stations. This means LPTV stations must not cause interference to the reception of existing or future full-service television stations, must accept interference from full-service stations, and must yield to new full-service stations, where interference occurs.

When there is interference between cable systems and LPTV stations, a "first in time, first in right" policy applies. Under the "first in time, first in right" policy, the cable system or LPTV

station that had initial use of the channel has first priority and is not responsible for correcting the interference.

LPTV stations are operated by diverse groups and organizations -- high schools and colleges, churches and religious groups, local governments, large and small businesses and individual citizens. LPTV modes of operation and programming vary widely. These include satellite-delivered programming services, syndicated programs, movies and a wide range of locally produced programs. LPTV stations sometimes tailor program segments or entire schedules to specific viewer groups (on the basis of age, language or particular interest).

On the technical side, LPTV stations transmit on one of the standard VHF or UHF television channels. The distance at which a station can be viewed depends on a variety of factors - antenna height, transmitter power, transmitting antenna and the nature of the environment (rural or urban, hilly or flat terrain).

New applications for LPTV and TV translator stations are only accepted during designated filing window periods. The FCC announces these window periods at least 30 days before the opening of the window. The announcement provides details on how to file. Interested applicants should periodically check the FCC's Media Bureau (MB) Web site at www.fcc.gov/mb/video for window announcements.

There is no limit on the number of LPTV stations that may be owned by any one entity. Current broadcast licensees, cable operators and newspapers may own LPTV stations. LPTV stations may operate on any available VHF (2-13) or UHF (14-51) channel provided that they do not cause objectionable interference.

The FCC does not allocate channels for LPTV service. Applicants select channels and apply during a given time period.

LPTV stations are subject to a minimum of program-related regulations. There are no prescribed amounts of non-entertainment programming or local programming, and there are no limits on commercials, and no minimum hours of operation. However, the broadcast of obscene and indecent material between 6 A.M. and 10 P.M. is prohibited.

LPTV stations are limited to an effective radiated power of 3 kilowatts (VHF) and 150 kilowatts (UHF). There are no limits on transmitter output power and on antenna height, as long as the tower structure has been registered with the FCC.

City	Call Sign	Licensee
Ashland	K39EF	WATCHTV, INC.
Butte Falls	K02JF	SOUTHERN OREGON PUBLIC TELEVISION
	K04JQ	FREEDOM BROADCASTING OF OREGON LICENSEE, L.L.C.
Gold Hill	K02FT	CALIFORNIA OREGON BROADCASTING, INC.
	K04JZ	FREEDOM BROADCASTING OF OREGON LICENSEE, L.L.C.
	K46CH	SODA MOUNTAIN BROADCASTING, INC.
Jacksonville	K02IC	FREEDOM BROADCASTING OF OREGON LICENSEE, L.L.C.
	K07RQ	SOUTHERN OREGON PUBLIC TELEVISION
	K21BG	SODA MOUNTAIN BROADCASTING, INC.
Medford	K18GB	BETTER LIFE TELEVISION
	K25IM	BETTER LIFE TELEVISION
	K28GG	WATCHTV, INC.
	K57EK	TRINITY BROADCASTING NETWORK
Prospect	K02JG	SOUTHERN OREGON PUBLIC TELEVISION
	K07GI	PROSPECT LIONS CLUB, INC.
	K13KO	CALIFORNIA OREGON BROADCASTING, INC.
Rogue River	22583	FREEDOM BROADCASTING OF OREGON LICENSEE, L.L.C.
	5004	BETTER LIFE TELEVISION
Shady Cove	K13PE	SOUTHERN OREGON PUBLIC TELEVISION

Table 18 FCC records Show 19 Licensed LPTV Stations in Jackson County[85]

Low Power FM[86,87]

Low-power radio stations are the most local form of community radio and are often run by volunteers producing their own unique shows. Broadcasting at 100 watts or less, stations usually only have a radius of about 3.5 miles.

The Low Power FM (LPFM) radio service, which was created by the Commission in January 2000. These stations are authorized for noncommercial educational broadcasting only (no commercial operation) and operate with an effective radiated power (ERP) of 100 watts (0.1 kilowatts) or less, with maximum facilities of 100 watts ERP at 30 meters (100 feet) antenna height above average terrain (HAAT). The approximate service range of a 100 watt LPFM station is 5.6 kilometers (3.5 miles radius). LPFM stations are not protected from interference that may be received from other classes of FM stations. A construction permit is required before a LPFM station can be constructed or operated.

LPFM stations are available to noncommercial educational entities and public safety and transportation organizations, but are not available to individuals or for commercial operations. Current broadcast licensees with interests in other media (broadcast or newspapers) are not eligible to obtain LPFM stations.

LPFM stations must protect authorized radio broadcast stations on the same channel or frequency (cochannel), as well as broadcast stations on first, second, or third-adjacent channels above or below the LPFM station's frequency.

LPFM in 2000 promised to open up hundreds of frequencies in urban, suburban, and rural areas alike. It was at this point that a number of major players -- most notably the National Association of Broadcasters (NAB) and National Public Radio (NPR) -- went to Congress claiming that the

some of the new stations would sit too closely on the dial to full-power stations and would thus cause interference.

Despite opposition from media-reform advocates and the FCC, Congress decided to restrict the number of frequencies open to the stations. The new regulations still allowed low-power stations to apply for FCC licenses, but they were prohibited from broadcasting on any frequency three clicks or fewer away from another station on the dial.

The decision eliminated about two-thirds of the frequencies formerly available to low-power stations. This move basically shut LPFM out of urban markets, most of which already have crowded dials, making it a largely rural phenomenon. Hundreds of new stations got the go-ahead, but most groups living in the top 150 radio markets got left behind.

Yet over the past several years, LPFM has managed to grow tremendously, both as a radio service and as a lobby, and this fall supporters are back on Capitol Hill, touting a new congressionally mandated study from the nonprofit MITRE Corporation -- which regularly conducts technical studies for the government -- that they claim shows that Congress can expand low-power stations to the third adjacent frequency without harming existing full-power stations. John McCain, Patrick Leahy, and Maria Cantwell have introduced a Senate bill into committee, and this fall, Representative Louise Slaughter is expected to present a House measure that would not only open up new frequencies for LPFM stations but also protect them from encroachment by full-power stations nearby, according to Hannah Sassaman of the Prometheus Radio Project. Right now, LPFM stations are not classified as “primary stations”; consequently, a full-power station that moves closer to an LPFM’s broadcast area can legally use its signal. Full-power stations thus threaten a number of LPFMs.

City	Call Sign	Licensee
Ashland	NEW	TALENT UNITED METHODIST CHURCH
	NEW	PEACE HOUSE
Medford	NEW	ALAN E. STITT
	NEW	ALAN E. STITT
Eagle Point	KSKQ-LP	MULTICULTURAL ASSOCIATION OF SOUTHERN OREGON
	NEW	EAGLE POINT HISTORICAL SOCIETY & MUSEUM
Shady Cove	NEW	CITY OF SHADY COVE, OR

Table 19 Per FCC records there are 7 LPFM stations in Jackson County.

In general, LPFM applicants may only apply for a single station. However, on reconsideration, the Commission clarified that government public safety and transportation organizations may apply for multiple LPFM stations for disseminating traffic, safety, and other information where the additional applications are not subject to competing applications. Similarly, where there are no conflicting applications, LPFM applications will be accepted for university student-run LPFM stations from universities holding LPFM licenses that are not student-run. Separate college campuses within a university system, or individual high schools under a single school board, could each individually apply for LPFM construction permits. ITFS (Instructional Television Fixed Service) stations run by universities and colleges that only transmit educational programming are not considered a "broadcast service" under the FCC ownership rules.

Microwave[88]

Microwaves are electromagnetic waves with wavelengths longer than those of infrared light, but relatively short for radio waves. Microwaves have wavelengths approximately in the range of 30

cm (frequency = 1 GHz) to 1 mm (300 GHz). However, the boundaries between far infrared light, microwaves, and ultra-high-frequency radio waves are fairly arbitrary and are used variously between different fields of study. A credible definition comes from Pozar's text "*Microwave Engineering*", which states that the term microwave "refers to alternating current signals with frequencies between 300 MHz (3×10^8 Hz) and 300 GHz (3×10^{11} Hz)." The microwave range includes ultra-high frequency (UHF) (0.3-3 GHz), super high frequency (SHF) (3-30 GHz), and extremely high frequency (EHF) (30-300 GHz) signals.
Above 300 GHz, the absorption of electromagnetic radiation by Earth's atmosphere is so great that it is effectively opaque , until the atmosphere becomes transparent again in the so-called infrared and optical window frequency ranges.

Uses of microwave are myriad:

- A microwave oven uses a magnetron microwave generator to produce microwaves at a frequency of approximately 2.45 GHz for the purpose of cooking food. Microwaves cook food by causing molecules of water and other compounds to vibrate or rotate. The vibration creates heat which warms the food. Since organic matter is made up primarily of water, food is easily cooked by this method.
- Microwaves are used in broadcasting transmissions because microwaves pass easily through the earth's atmosphere with less interference than longer wavelengths. There is also much more bandwidth in the microwave spectrum than in the rest of the radio spectrum. Typically, microwaves are used in television news to transmit a signal from a remote location to a television station from a specially equipped van.
- Radar also uses microwave radiation to detect the range, speed, and other characteristics of remote objects.
- Wireless LAN protocols, such as Bluetooth and the IEEE 802.11g and b (Wi-Fi) specifications, also use microwaves in the 2.4 GHz ISM band, although 802.11a uses an ISM band in the 5 GHz range. Licensed long-range (up to about 25 km) Wireless Internet Access services can be found in many countries (but not the USA) in the 3.5 - 4.0 GHz range.
- Metropolitan Area Networks - MAN protocols, such as WiMAX (Worldwide Interoperability for Microwave Access) based in the IEEE 802.16 specification. The IEEE 802.16 specification was designed to operate between 2 to 11 GHz. The commercial implementations are in the 2.5 GHz, 3.5 GHz and 5.8G Hz ranges.
- Cable TV and Internet access on coax cable as well as broadcast television use some of the lower microwave frequencies. Some mobile phone networks also use the lower microwave frequencies.
- Many semiconductor processing techniques use microwaves to generate plasma for such purposes as reactive ion etching and plasma-enhanced chemical vapor deposition (PECVD).
- Microwaves can be used to transmit power over long distances, and post-World War II research was done to examine possibilities. NASA worked in the 1970s and early 1980s to research the possibilities of using Solar power satellite (SPS) systems with large solar arrays that would beam power down to the Earth's surface via microwaves.
- A maser is a device similar to a laser, except that it works at microwave frequencies.

Microwave frequency bands

The microwave spectrum is usually defined as electromagnetic energy ranging from approximately 1 GHz to 1000 GHz in frequency, but older usage includes lower frequencies. Most common applications are within the 1 to 40 GHz range.

ELF	*SLF*	*ULF*	*VLF*	*LF*	*MF*	*HF*	*VHF*	*UHF*	*SHF*	*EHF*
3 Hz	30 Hz	300 Hz	3 kHz	30 kHz	300 kHz	3 MHz	30 MHz	300 MHz	3 GHz	30 GHz
30 Hz	300 Hz	3 kHz	30 kHz	300 kHz	3 MHz	30 MHz	300 MHz	3 GHz	30 GHz	300 GHz

Table 20 Radio Spectrum

ELF = Extremely low frequency
SLF = Super low frequency
ULF = Ultra low frequency
VLF = Very low frequency
LF = Low frequency
MF = Medium wave
HF = High frequency
VHF = Very High Frequency
UHF = Ultra high frequency
EHF = Extremely high frequency
SHF = Super high frequency

Mobile Wireless Broadband

Mobile wireless broadband services allow consumers to access the Internet and other data services at high speeds from a cell phone, a PDA, or a wireless modem card connected to a laptop computer. Mobile broadband services are also commonly referred to as third generation, or "3G," services or advanced wireless services. Several mobile wireless carriers have begun to deploy high-speed mobile Internet access technologies, and many have announced plans to launch or expand these technologies further in the future.

While the mobile data services discussed above are offered using a cellular network architecture, fixed wireless broadband services have traditionally been deployed using a point-to-point or point-to-multipoint network architecture that requires a direct line-of-sight between the transmitter and the receiver. However, since the FCC's *Third Report*, many wireless carriers have begun to deploy Orthogonal Frequency Division Multiplexing (OFDM) technology, which allows carriers to offer wireless broadband services without a direct line-of-sight between the transmitter and the receiver. Many of the wireless broadband services offered using OFDM technology also eliminate the need for subscribers to attach an antenna to their rooftop and instead allow them to access the Internet with "plug-and-play" modem devices connected to a personal or laptop computer. Customers can transport these devices to other locations where the network is available. Another advantage of such services is that they often eliminate the need for a carrier to send technicians to install equipment at an end user's house or building. The monthly prices for these services vary by carrier and range from $24.95 to $129.99, with the more expensive plans typically offering download speeds up to 3 Mbps.

Satellite Broadband

Direct broadcast satellite television has been digital for some time. Broadband over satellite is available in Oregon and may be the only option for many rural locations today. Initial investment and monthly costs present a barrier to many in rural areas of Oregon, locations where the annual take home pay is substantially less than in urban areas.

Current satellite-based broadband providers include Starband[89] and DIRECWAY®[90], now HughesNet[91]. Pricing ranges with an initial setup fee of approximately $600 and a $60 per month fee.

HughesNet

Max. Download Speed	700 Kbps[(a)]
Max. Upload Speed	128 Kbps[(b)]
IP Address	Dynamic[(c)]
Email Accounts (2GB of storage per account)	5
Email Defense (Spam & Virus filtering)	Included
24/7 Live Technical Support	Included
Term Commitment	15 months
Limited warranty	15 months
Add-on options:	
- Dial-up/Mobility Account	
- Service Assurance	
- Service Assurance Plus	$15/month
$5.95/month	
$12.95/month	

Table 21 HughesNet HOME service plan - Key Features

PROFESSIONAL service plan is designed for home-based business owners who use personal and business applications, who need to support up to two users at a time, and frequently download large files from the Internet.

Max. Download Speed	1.0 Mbps[(a)]
Max. Upload Speed	200 Kbps[(b)]
IP Address	Dynamic[(c)]
Email Accounts (2GB of storage per account)	5
Email Defense (Spam & Virus filtering)	Included
24/7 Live Technical Support	Included
Term Commitment	15 months
Limited warranty	15 months
Add-on options:	
- Dial-up/Mobility Account	
- Static IP Address (1)	
- Service Assurance	
- Service Assurance Plus	$15/month
$20/month	
$5.95/month	
$12.95/month	

Table 22 HughesNet PROFESSIONAL service plan

a-b	Stated speeds are not guaranteed. Actual upload speed will likely be lower than speed indicated during peak hours. Download speeds may also be temporarily slowed in cases when patterns of system usage exceed the download threshold for an extended period of time. See the HughesNet Fair Access Policy for more information. If you choose to run VPN over satellite, your data speeds may be reduced by as much as 50-75%. Despite the high speeds, time-sensitive applications, such as multi-player "twitch" games, are also not recommended over HughesNet. See the HughesNet Subscriber Agreement.
c	Enables dynamic assignment of private IPs to devices, keeping them private from users outside of the network.

SMALL OFFICE Plan >>			BUSINESS INTERNET Plan >>	
$99.99/month			$199.99/month	
-FAST- Internet access for your small office			***-FASTER-*** High-speed Internet for your business	
Max download speeds	Max upload speeds		Max download speeds	Max upload speeds
1.5 Mbps*	300 Kbps*		2 Mbps*	500 Kbps*
Key features: Designed for up to 5 concurrent users 24/7 live technical support 5 email addresses with 2 GB of storage per account Anti-Spam and Anti-Virus Protection Equipment and standard installation included			Key features: Designed for up to 10 concurrent users 24/7 live technical support 10 email accounts with 2 GB of storage per account Anti-Spam and Anti-Virus Protection Equipment and standard installation included	

Table 23 HughesNet Business Service Plans

*Stated speeds are not guaranteed. Actual upload speed will likely be lower than speed indicated during peak hours. Download speeds may also be temporarily slowed in cases when patterns of system usage exceed the download threshold for an extended period of time. See the HughesNet Fair Access Policy for more information. If you choose to run VPN over satellite, your data speeds may be reduced by as much as 50-75%. Despite the high speeds, time sensitive applications, such as multi-player "twitch" games, are also not recommended over HughesNet.

The *upfront option* lets you pay $599.98 now, and then just $59.99 for Home service or $69.99 for Professional service per month for 15 months.

Or select the *promotional option*. Simply pay $99.99 up front, and $99.99 for Home service or $109.99 for Professional service per month for the first 15 months. Both plans include 15 months of Service Assurance, HughesNet's service protection plan. After the 15th month, the monthly service fee will revert back to the standard monthly rate, currently $59.99 a month for Home or $69.99 a month for Professional. Both promotional options for Home and Professional service include equipment, delivery, and standard installation of your satellite dish and modem by a certified professional installer.

Small Business

Small Office

Monthly Price	$99.99
Equipment and Standard Installation	$999.98
Term Commitment	24 Months
Hardware Warranty	24 Months

Business Internet

Monthly Fee	$199.99
Equipment and Standard Installation	$999.98
Term Commitment	24 Months
Hardware Warranty	24 Months

Enterprise and Government

Pricing and plan information in these categories require contacting HughesNet directly.

WildBlue

WildBlue[92] in 2005 launched a new satellite service. WildBlue's always-on broadband Internet connection provides speeds that are comparable to DSL and cable modem service (up to 1.5 Mbps and upstream speeds of up to 256K). Pricing ranges from $49.95 per month plus a $299 equipment fee.

	Value Pak	**Select Pak**	**Pro Pak**
Key Features	Lowest price!	Great speed, great price!	Fastest speed for your home!
Price	$49.95 per month	$69.95 per month	$79.95 per month
Download Speed	up to 512Kbps	up to 1.0Mbps	up to 1.5Mbps
Upload Speed	up to 128Kbps	up to 200Kbps	up to 256Kbps
Email Addresses	5 email addresses *25MB capacity per address*	5 email addresses *25MB capacity per address*	10 email addresses *25MB capacity per address*
Spam & Virus Filtering	Included	Included	Included
Anti-Virus Software	1 Year Free	1 Year Free	1 Year Free
Web Space	10MB	10MB	20MB
Dial-up Access (10 hours / Month)	Optional - $7.95 / Month	Optional - $7.95 / Month	Included
Newsgroups	Included	Included	Included
WildBlue Portal The latest news, information and entertainment	Included	Included	Included
24 / 7 Technical Support	Included	Included	Included
Standard Installation Price (MSRP)	$179.95 -$179.95 (promo offer) **FREE**	$179.95 -$179.95 (promo offer) **FREE**	$179.95 -$179.95 (promo offer) **FREE**
Equipment Price (MSRP)	$299.00	$299.00	$299.00
Equipment Limited Warranty	Included	Included	Included
Additional Offerings:	• 5 email accounts with 25MB storage for $4.95 / month • 10MB additional storage for each email account for $4.95 / month • 10 hour package of remote-access dial-up for $7.95 / month 10 MB additional Web space (Select & Pro Packages only) for $4.95 / month		

Table 24 WildBlue Service Plans

Satellite Radio[93]

Satellite radio is an idea over a decade in the making. In 1992, the U.S. Federal Communications Commission (FCC) allocated a spectrum in the "S" band (2.3 GHz) for nationwide broadcasting of satellite-based Digital Audio Radio Service (DARS). Only four companies applied for a license to broadcast over that band. The FCC gave licenses to two of these companies in 1997. CD Radio (now Sirius Satellite Radio) and American Mobile Radio (now XM Satellite Radio) paid more than $80 million each to use space in the S-band for digital satellite transmission.

At this time, there are three space-based radio broadcasters:

Sirius Satellite Radio
XM Satellite Radio
WorldSpace

Satellite radio companies are comparing the significance of their service to the impact that cable TV had on television 30 years ago. Listeners won't be able to pick up local stations using satellite radio services, but they will have access to hundreds of stations offering a variety of music genres. Each company has a different plan for its broadcasting system, but the systems do share similarities. Here are the key components of the three satellite radio systems:

Satellites
Ground repeaters
Radio receivers

XM Radio uses two Boeing HS 702 satellites, appropriately dubbed "Rock" and "Roll," placed in parallel geostationary orbit, one at 85 degrees west longitude and the other at 115 degrees west longitude. Geostationary Earth orbit (GEO) is about 22,223 miles (35,764 km) above Earth, and is the type of orbit most commonly used for communications satellites. The first XM satellite, "Rock," was launched on March 18, 2001, with "Roll" following on May 8. XM Radio has a third HS-702 satellite on the ground ready to be launched in case one of the two orbiting satellites fails.

XM Radio's ground station transmits a signal to its two GEO satellites, which bounce the signals back down to radio receivers on the ground. The radio receivers are programmed to receive and unscramble the digital data signal, which contains up to 100 channels of digital audio. In addition to the encoded sound, the signal contains additional information about the broadcast. The song title, artist and genre of music are all displayed on the radio. In urban areas, where buildings can block out the satellite signal, XM's broadcasting system is supplemented by ground transmitters.

Each receiver contains a proprietary chipset. XM began delivering chipsets to its XM radio manufacturing partners in October 2000. The chipset consists of two custom integrated circuits designed by STMicroelectronics. XM has partnered with Pioneer, Alpine, Clarion, Delphi Delco, Sony and Motorola to manufacture XM car radios. Each satellite radio receiver uses a small, car-phone-sized antenna to receive the XM signal. General Motors has invested about $100 million in XM, and Honda has also signed an agreement to use XM radios in its cars. GM began installing XM satellite radio receivers in selected models in early 2001.

For $12.95 per month, subscribers can receive the XM signal. For that price, listeners get up to 100 channels of music, talk and news. They also get access to XM Radio online, a streaming audio service with over 70 channels. Many of the channels have no commercials, with none of the channels having more than seven minutes of ads per hour. XM's content providers include USA Today, BBC, CNN/Sports Illustrated and The Weather Channel. The service bolsters that lineup with its own music channels.

Unlike XM, Sirius does not use GEO satellites. Instead, its three SS/L-1300 satellites form an inclined elliptical satellite constellation. Sirius says the elliptical path of its satellite constellation ensures that each satellite spends about 16 hours a day over the continental United States, with at least one satellite over the country at all times. Sirius completed its three-satellite constellation on November 30, 2000. A fourth satellite will remain on the ground, ready to be launched if any of the three active satellites encounter transmission problems.

The Sirius system is similar to that of XM. Programs are beamed to one of the three Sirius satellites, which then transmits the signal to the ground, where your radio receiver picks up one of the channels within the signal. Signals are also be beamed to ground repeaters for listeners in urban areas where the satellite signal can be interrupted.

Sirius offers car radios and home entertainment systems, as well as car and home kits for portable use. The Sirius receiver includes two parts -- the antenna module and the receiver module. The antenna module picks up signals from the ground repeaters or the satellite, amplifies the signal and filters out any interference. The signal is then passed on to the receiver module. Inside the receiver module is a chipset consisting of eight chips. The chipset converts the signals from 2.3 gigahertz (GHz) to a lower intermediate frequency. Sirius also offers an adapter that allows conventional car radios to receive satellite signals.

So far, WorldSpace has been the leader in the satellite radio industry. It put two of its three satellites, AfriStar and AsiaStar, in geostationary orbit before either of the other two companies launched one. AfriStar and AsiaStar were launched in October 1998 and March 2000, respectively. AmeriStar, which will offer service to South America and parts of Mexico, has not yet been launched. Each satellite transmits three signal beams, carrying more than 40 channels of programming, to three overlapping coverage areas of about 5.4 million square miles (14 million square km) each. Each of the WorldSpace satellites' three beams can deliver over 50 channels of crystal clear audio and multimedia programming via the 1,467- to 1,492-megahertz (MHz) segment of the L-Band spectrum, which is allocated for digital audio broadcasting.

The United States is not currently part of WorldSpace's coverage area. The company has invested in XM Radio and has an agreement with XM to share any technological developments. WorldSpace is going beyond one nation and eyeing world domination of the radio market. That might be overstating the company's intent a bit, but WorldSpace does plan to reach the corners of our world that most radio stations cannot. There are millions of people living in WorldSpace's projected listening area who cannot pick up a signal from a conventional radio station. WorldSpace says it has a potential audience of about 4.6 billion listeners spanning five continents.

WorldSpace broadcasters uplink their signal to one of the three satellites through a centralized hub site or an individual feeder link station located within the global uplink beam. The satellite then transmits the signal in one, two or all three beams on each satellite. Receivers on the ground then pick up the signal and provide CD-quality sound through a detachable antenna.

WorldSpace satellite receivers are capable of receiving data at a rate of 128 kilobits per second (Kbps). The receivers use the proprietary StarMan chipset, manufactured by STMicroelectronics, to receive digital signals from the satellites.

Satellite TV[94]

Conceptually, satellite television is a lot like broadcast television. It's a wireless system for delivering television programming directly to a viewer's house. Both broadcast television and satellite stations transmit programming via a radio signal.

Broadcast stations use a powerful antenna to transmit radio waves to the surrounding area. Viewers can pick up the signal with a much smaller antenna. The main limitation of broadcast television is range. The radio signals used to broadcast television shoot out from the broadcast antenna in a straight line. In order to receive these signals, you have to be in the direct "line of sight" of the antenna. Small obstacles like trees or small buildings aren't a problem; but a big obstacle, such as the Earth, will reflect these radio waves.

If the Earth were perfectly flat, you could pick up broadcast television thousands of miles from the source. But because the planet is curved, it eventually breaks the signal's line of site. The other problem with broadcast television is that the signal is often distorted even in the viewing area. To get a perfectly clear signal like you find on cable, you have to be pretty close to the broadcast antenna without too many obstacles in the way.

Satellite television solves the problems of range and distortion by transmitting broadcast signals from satellites orbiting the Earth. Since satellites are high in the sky, there are a lot more customers in the line of site. Satellite television systems transmit and receive radio signals using specialized antennas called satellite dishes.

The television satellites are all in geosynchronous orbit, meaning that they stay in one place in the sky relative to the Earth. Each satellite is launched into space at about 7,000 mph (11,000 kph), reaching approximately 22,200 miles (35,700 km) above the Earth. At this speed and altitude, the satellite will revolve around the planet once every 24 hours -- the same period of time it takes the Earth to make one full rotation. In other words, the satellite keeps pace with our moving planet exactly. This way, you only have to direct the dish at the satellite once, and from then on it picks up the signal without adjustment, at least when everything works right. At the core, this is all there is to satellite television.

Most satellite TV customers get their programming through a direct broadcast satellite (DBS) provider, such as DirecTV or the Dish Network. The provider selects programs and broadcasts them to subscribers as a set package. Basically, the provider's goal is to bring dozens or even hundreds of channels to your television in a form that approximates the competition, cable TV. Unlike earlier programming, the provider's broadcast is completely digital, which means it has much better picture and sound quality. Early satellite television was broadcast in C-band radio -- radio in the 3.4-gigahertz (GHz) to 7-GHz frequency range. Digital broadcast satellite transmits programming in the Ku frequency range (12 GHz to 14 GHz).

There are five major components involved in a direct to home (DTH) satellite system: the programming source, the broadcast center, the satellite, the satellite dish and the receiver.

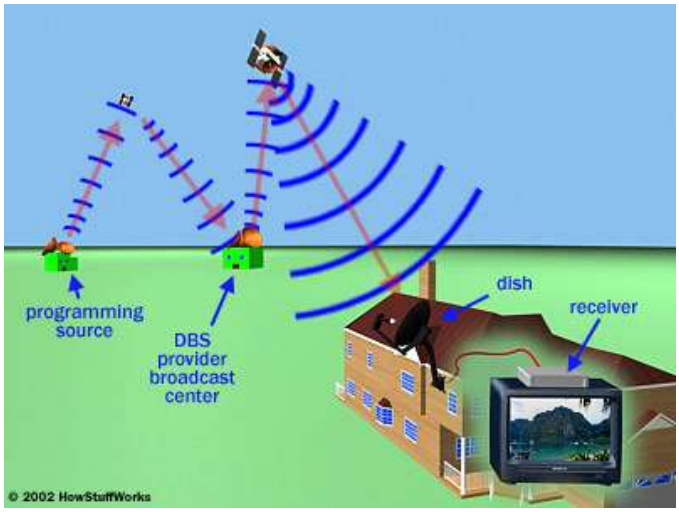


Chart 47 Satellite System Components

- **Programming sources** are simply the channels that provide programming for broadcast. The provider doesn't create original programming itself; it pays other companies (HBO, for example, or ESPN) for the right to broadcast their content via satellite. In this way, the provider is kind of like a broker between you and the actual programming sources. (Cable television companies work on the same principle.)
- The **broadcast center** is the central hub of the system. At the broadcast center, the television provider receives signals from various programming sources and beams a broadcast signal to satellites in geostationary orbit.
- The **satellites** receive the signals from the broadcast station and rebroadcast them to the ground.
- The viewer's **dish** picks up the signal from the satellite (or multiple satellites in the same part of the sky) and passes it on to the receiver in the viewer's house.
- The **receiver** processes the signal and passes it on to a standard television.

T-Carriers[95]

T-1's are a dedicated phone connection supporting data rates of 1.544 Mbits per second. A T-1 line actually consists of 24 individual channels, each of which supports 64Kbits per second. Each 64Kbit/second channel can be configured to carry voice or data traffic. When T-1 capacity is carried over fiber, it is referred to as a *DS1* line. Most telephone companies allow you to buy just some of these individual channels, known as *fractional T-1* access.

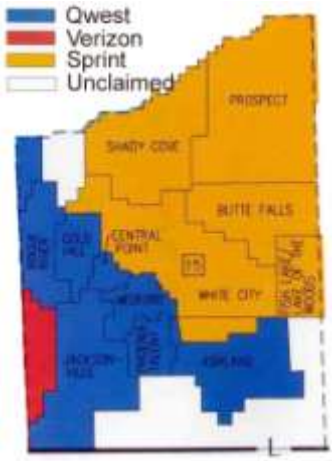
T-1 lines are a popular leased line option for businesses connecting to the Internet and for Internet Service Providers (ISPs) connecting to the Internet backbone. The Internet backbone itself consists of faster T-3 connections.

T-3 lines are a dedicated phone connection supporting data rates of about 43 - 45 Mbps. A T-3 line actually consists of 672 individual channels, each of which supports 64 Kbps. T-3 lines are used mainly by Internet Service Providers (ISPs) connecting to the Internet backbone and for the backbone itself. T-3 lines are now generally referred to as *DS3* lines.

Telephone Exchanges

A telephone exchange or central office houses equipment that is commonly known as a switch, which is a piece of equipment that connects phone calls. It is what makes phone calls "work" in the sense of making connections and relaying the speech information.

The term exchange can also be used to refer to an area served by a particular switch. More narrowly, it can refer to the first three digits of the local number. In the three-digit sense of the word, other obsolete Bell System terms include *office code* and *NNX*. In the United States, the word *exchange* can also have the technical meaning of a local access and transport area under the Modification of Final Judgment (MFJ – Exchange boundaries were in part established under the 1982 antitrust suit settlement agreement (consent decree) entered into by the United States Department of Justice and the American Telephone and Telegraph Company (AT&T) that, after modification and upon approval of the United States District Court for the District of Columbia, required the divestiture of the Bell Operating Companies from AT&T.)).[96]



Map 14 Exchanges in Jackson County

Voice over Internet Protocol (VoIP)

Because the Internet employs an open network architecture using a common protocol—the Internet Protocol, or IP—to transmit data across multiple interconnected packet networks in a manner fundamentally different from how signals transit in a circuit-switched network. As opposed to the end-to-end path that is required for a circuit-switched network, an IP network segments data into packets, which are individually addressed and then transmitted over a series of physical networks which may be comprised of copper, fiber, coaxial cable, or wireless facilities. When transmitting packets between two points, the IP network does not establish a permanent or exclusive path between the points, but rather routes the packets individually and decides which route to use for each packet.

The growth of the Internet has been accompanied by an explosion in consumer access to new services and applications. One of the most exciting new developments is the transmission of voice communications over a network using IP—also referred to Voice over IP or VoIP. Although early attempts to offer IP telephony were unsuccessful due to limited reliability and voice quality, today technology has improved sufficiently to permit IP networks to carry voice communications. Indeed, cable operators, wireline carriers, and wireless providers have

announced that they have begun to deploy, or intend to deploy, IP networks to transmit IP telephony services to their subscribers.

Companies now offer IP telephony services that permit a subscriber with a broadband connection to place telephone calls to, and receive calls from, both other broadband subscribers and end users relying on traditional public switched telephone networks (PSTN) facilities. The VoIP provider supplies software and a multimedia terminal adapter (MTA) that permits its customers to use analog phones to place calls using their broadband Internet connections. When a VoIP customer communicates with a subscriber of ordinary telephone service, the VoIP provider converts its customer's IP packets into a digital format for transfer through a media gateway to the PSTN and vice versa. The price of Vonage's IP telephony service currently ranges from $14.99 for 500 minutes anywhere in the United States and Canada for residential customers to $49 for unlimited calling within the United States and Canada for small businesses. AT&T's CallVantage includes unlimited local and long distance for $19.99 a month for the first six months and $34.99 a month when the promotional period ends.

Webcast

A webcast is similar in intent to a broadcast television program but designed for internet transmission. Webcast clients allow a user to connect to a server, which is distributing (webcasting) the webcast, and displays the televisual content to the user. A live webcast is sometimes conducted in conjunction with a teleconference call that allows for participants to engage the webcaster.

Initially webcasts were non interactive, in other words, the user was not able to alter the content of the webcast or to interact with the subjects of the webcast. For the most part they were also hosted live (with recordings retained for later dissemination), however more recently there has been greater overlap between videoconferencing and webcasting such that webcasts have been generally consigned to being recordings of videoconferences and training material where there is much less demand for an interactive session.

Google "webcast" to see the large variety of offerings and technologies. Webcasts require broadband connections to be effective.

Wireless Broadband Technologies

This rapidly emerging technology is truly exciting and holds great promise for rural Oregon. Two technologies are emerging in the Oregon landscape.

Wireless deployments in Oregon are underway. Wireless broadband is seeing rapid growth in Oregon. A few Oregon communities have had access to one form of wireless for several years now. Protocols other than WiMax and WiFi, such as ODFM and ODFMA, are deployed throughout the state (e.g., Clearwire)

Map 15 Clearwire

CTURN (www.cturn.com) and. Open Range Venture Capital are slated to deliver WiMax in multiple locations throughout the state commencing in early 2007.

Among its advantages, wireless broadband does not require extensive tearing up of streets or hanging of fiber in the "eye space." As such it is growing in popularity among community planning circles. Utility companies like it too as there are no requirement for use of poles.

ODFM/ODFMA[97] vs. WiMAX

In the last few years, orthogonal frequency division multiplexing access made quite a splash, promising high-capacity, mobile broadband access quite well ahead of when mobile broadband access WiMAX and 3G services were expected to be available. However, more recently, that hype has died off. After Qualcomm announced its acquisition of OFDMA's biggest booster -- the former Bell Labs spinoff Flarion Technologies -- in August 2005, the relentless push to commercialize OFDMA as a proprietary technology has ceased.

Why? OFDM technologies have been so readily embraced by the standards bodies for both the broadband wireless access industry and the cellular industry, that pursuing the technology independently of the WiMAX Forum or the two major 3G standards bodies -- 3GPP and 3GPP2 – became seemingly pointless. OFDM was implicit in the 802.16-2004 standard that created the foundation for Fixed WiMAX, and OFDMA was written into the 802.16e specification ratified last December by the IEEE and will pave the way for Mobile WiMAX solutions. OFDMA is mandatory in the 802.16e standard -- it's actually S-OFDMA, or scalable OFDMA. So many are doing it today and it is also one of the reasons why 802.16e is not directly backward compatible to 802.16-2004.

Although many products based on the 802.16e standard are still in the developmental phases, third-generation technology designed to meet the guidelines that have been laid out for Mobile WiMAX and the IEEE's 802.16e standard. The potential for Mobile WiMAX is simply enormous, with potential profiles from the WiMAX Forum targeting the 2.5 GHz and 3.5 GHz frequencies that are available and in use in many countries worldwide, as well as 2.3 GHz and other frequencies. Those initial WiMAX Forum profiles also will cover a wide range of bandwidth channel specifications, including 5 MHz, 7 MHz, 8.75 MHz and 10 MHz. To continue to target niche markets with proprietary technology makes little sense, if a standardized version of that technology would grab the mass markets as well as niches, too. If a vendor is comfortable with a non-standard technology and a small customer base, that's fine. But the industry as a whole is moving toward standardization."

Though often mistaken for one another, OFDM and OFDMA are actually two different variants of the same technology. Both divide one extremely "fast" signal into numerous "slow" signals, each spaced apart at precise frequencies. The advantage here is that those individual slow signals, or subcarriers, aren't subject to the same intensity of multipath distortion faced by a single-carrier transmission -- the data is traveling slowly enough that the effects of the distortion become negligible. The numerous subcarriers are then collected at the receiver and recombined to form one high-speed transmission.

The difference between OFDM and OFDMA is that OFDMA has the ability to dynamically assign a subset of those subcarriers to individual users, attuning the technology to the particular demands of mobility. Thus, OFDM technologies occupy nomadic, fixed and one-way transmission standards, ranging from TV transmission to Wi-Fi as well as well as Fixed WiMAX and newer multicast wireless systems like Qualcomm's Forward Link Only (FLO). OFDMA, however, adds true mobility to the mix, forming the backbone of Mobile WiMAX and the 3GPP's new standards for 3G long-term evolution (LTE). Furthermore, S-OFDMA allows for an increase in range of channel bandwidths from 1.25 MHz up to 20 MHz.

Mobile WiMAX, or 802.16-2005, is really misnamed. 802.16-2005 is an ideal solution for mobile, portable and fixed implementations of WiMAX, and it is essentially a superset of 802.16-2004, with significant performance advances like MIMO and scalable OFDMA.

On the 3G side, the 3GPP recently finalized the initial list of requirements for 3G mobility and coined the term LTE. The preliminary specs call for a complete shift in 3G standards away from wideband-CDMA to OFDM, meaning the future of wireless technology and its billions of users is headed in OFDMA's direction. Cellular system vendors have jumped all over the new specifications, shoehorning years of research in OFDM and related technologies like multiple input/multiple output (MIMO) and smart beam forming into the new standards track. Where conventional smart antenna systems deliver performance gains by adding complex, costly and bulky equipment to the tower top, MIMO takes advantage of smaller and simpler changes in both the devices and the infrastructure to deliver performance improvements well beyond what even the most complicated smart antennas can deliver.

The evolution of and competition for wireless equipment market share is reflected in Nortel's recent unveiling of its LTE product line, called high-speed OFDM packet access (HSOPA) at the 3GSM World Congress in Cannes, France in February. The platform is intended to pick up where the latest UMTS uplink and downlink upgrades leave off. Nortel already plans to have a prototype built by the end of the year, ready for lab tests, and carrier trial equipment ready by 2007. Qualcomm is pursuing both OFDM and OFDMA, using OFDM for its multicast

technologies and in its pursuit of the 802.11n standard for the evolution of wireless LAN. And with its $600 million acquisition of Flarion completed in January, Qualcomm is lending the weight of its $1 billion annual R&D budget to further development of Flarion's OFDMA technology toward the IEEE 802.20 standard, a broadband wireless technology that not only has mobility but really fast mobility (the typical example is that of a user maintaining a constant data connection while riding a bullet train).

Wi-Fi[98]

Wi-Fi, short for Wireless Fidelity, is a term that is used generically to refer to any product or service using the 802.11 series standards developed by the Institute of Electrical and Electronics Engineers (IEEE) for wireless local area network connections. Wi-Fi networks operate on an unlicensed basis in the 2.4 and 5 GHz radio bands and provide multiple data rates up to a maximum of 54 Mbps. The bandwidth is shared among multiple users. Wi- Fi enabled wireless devices, such as laptop computers or personal digital assistants (PDAs), can send and receive data from any location within signal reach of a Wi-Fi equipped base station or access point (AP). Typically, mobile devices must be within approximately 300 feet of a base station.

The expansion of Wi-Fi access to the Internet has recently seen the explosive growth of hotspots on a commercial and noncommercial basis. A public wireless "hotspot" is an area where a computer or PDA equipped with a wireless local area network card can connect to the Internet through wireless access points. Networks of hotspots consisting of a number of access points have also been constructed to cover larger areas such as entire airports. Driven by low cost devices operating on an unlicensed basis, the expansion of hotspot access points has become rampant as build-out continues with the assistance of numerous entities including small- and large-scale businesses, public institutions, and individual entrepreneurs. Providers use the technology for everything from enterprise networks to purely ad hoc provision of access points for either non-commercial use or for their potential to attract customers. For instance, both Starbucks and McDonald's are using Internet access to attract patrons, and some colleges and universities are deploying ubiquitous Wi-Fi networks. Even entire municipalities -- from large metropolitan areas such as Seattle to smaller communities such as Chaska, Minn. -- are providing Wi-Fi access on either a no-fee basis or on a modest fee-for-service basis.

Videoconference

A videoconference is a live connection between people in separate locations for the purpose of communication, usually involving audio and often text as well as video. At its simplest, videoconferencing provides transmission of static images and text between two locations. At its most sophisticated, it provides transmission of full-motion video images and high-quality audio between multiple locations.

Videoconferencing software is quickly becoming standard computer equipment. For example, Microsoft's NetMeeting is included in Windows 2000 and is also available for free download from the NetMeeting homepage. For personal use, free or inexpensive videoconference software and a digital camera afford the user easy -- and cheap -- live connections to distant friends and family. Although the audio and video quality of such a minimal setup is not high, the combined benefits of a video link and long-distance savings may be quite persuasive.

The tangible benefits for businesses using videoconferencing include lower travel costs and profits gained from offering videoconferencing as an aspect of customer service. The intangible

benefits include the facilitation of group work among geographically distant teammates and a stronger sense of community among business contacts, both within and between companies. In terms of group work, users can chat, transfer files, share programs, send and receive graphic data, and operate computers from remote locations. On a more personal level, the face-to-face connection adds non-verbal communication to the exchange and allows participants to develop a stronger sense of familiarity with individuals they may never actually meet in the same place.

A videoconference can be thought of as a phone call with pictures -- Microsoft refers to that aspect of its NetMeeting package as a "web phone" -- and indications suggest that videoconferencing will some day become the primary mode of distance communication.

Telecommunications Technologies and Infrastructure Coming To Jackson County

Datacasting

This term has been visible in the technical literature since about 1995, but is only now starting to become known to non-specialists (*The New York Times* on 2 November had a headline "Silicon Valley says datacasting is hot") and as yet seems not to have been listed in any general dictionary. It's an obvious enough blend of *data* and *broadcasting*, and it's a cover-all term for the transmission of various kinds of data as a secondary service on digital broadcasting networks. The networks can be terrestrial, satellite or cable, and the data can be information, interactive multimedia (including video), or Internet downloads. Although European broadcasters have been active in digital television and radio broadcasting for some years, it is doubtful whether the term is any better known in Europe than in the US.[99]

DTV Datacasting offers the potential to deliver massive quantities of data to millions of simultaneous computers at very low cost. Typical DTV video transmissions include 1,000,000 bits each second of empty "null" packets that can be utilized for "opportunistic" datacasting. Additional bandwidth from the ATSC 19.4 Mbps stream can be dedicated to datacasting if desired. The potential of datacasting will be realized when the amount of compelling content and the number of computers with DTV reception capability reach critical mass.[100]

The logical application for datacasting is for delivery of large video and audio files, where alternative delivery is too expensive or simply unavailable.

Content appears to the user instantly since it is pre-cached. Wireless delivery is especially valuable in areas un-served by broadband. Content is safe for children since it is pre-selected by a trusted agent. Potentially no monthly costs since there are no incremental costs to add users.

Millions of users can be served without increased server or network costs. The system cannot be overloaded by demand, providing robust delivery. Datacasting provides a backup to Internet delivery for critical applications.

Whether very simple or highly complex, entirely manual or highly automated, a system must be provided to manage the content to be delivered and organize it into a useful and searchable form for users and providers. It may require a back-channel to provide the desired functionality.

A suitable receiver must be attached to either an off-air antenna or cable feed. It can be a stand-alone device with USB connection to a PC or an internal card. It is shipped with software drivers that equip the PC to de-multiplex the data from the ATSC stream and un-encapsulate the IP

packets from the MPEG wrapper. Software from the same vendor as the File Transmission above is installed in each receiving PC. It provides some combination of error correction (with or without back-channel) conditional access, addressing, rights management, subscription, content deletion and disk storage management.

By combining the two reception functions above into a single robust "edge server", received content can be served to many PCs sharing a fast LAN or WiFi connection within a given facility. This dramatically lowers the per-PC installation costs while providing the speed, security and economy described in the "value" section above.

Unlike the Internet, which is ideal for mini and micro-audiences, datacasting achieves its economies when serving a large audience desiring a common set of content. Datacasting also requires the installation of unfamiliar reception equipment that is less likely to be successfully installed by casual users. These factors support the careful selection of defined groups of users with common interests and an organized infrastructure to assure a successful deployment. Many distinct groups can be supported, as datacasting content can be sent to individual groups and sub-groups of recipients that can easily redefined at any time.

Datacasting would seem to be the perfect solution, as it requires only minor upgrades to existing broadcast facilities at a cost of several million dollars, as opposed to the billions required to build new wireless and broadband infrastructure, and to purchase spectrum licenses.

In essence, the technology involves inserting a data stream into a TV or radio broadcast and receiving it in a way that does not interfere with the primary audio-visual signal. The data can be combined with the audiovisual signal or sent along as a separate part of the spectrum, then transmitted to a special receiver tuned to capture the bits.

The economics seem irresistible: Transmissions can reach millions of people as easily as one, and provide steadily increasing margins as the viewership grows. Internet and cellular phone technologies, by contrast, create additional costs for every new connection.

If datacasting is easy, however, finding a killer application for it has been a conundrum. The technology has been available in the United States for at least 15 years through such PBS services as closed-caption broadcasts for the hearing impaired, but no large-scale commercial applications have ever been built around it.

One reason, according to some industry veterans, is that datacasting can carry hidden costs for equipment such as special receivers. In addition, as a one-way form of communication, it lacks the interactivity and flexibility of today's wireless technologies.
John Abel, former chief executive of failed datacasting start-up Geocast Network Systems and now a senior vice president at lobby group the U.S. Telecom Association, said the technology's lures are dangerously misleading. "I don't think it's much of a technology issue; it's a business issue and a consumer acceptance issue," he said.

He and others note that datacasting's advantages of scale are fast being eclipsed in the mass market by competing technologies, namely the high-speed Internet. In recent months, the number of broadband Net connections to the home have grown quickly in the United States, fueling new, instant information services and high-bandwidth offers such as video.

It is helpful to begin by summarizing the current communications infrastructures and their bandwidth limitations. They are primarily designed for two-way voice traffic, have limited support for rich media transport, and rely upon networks that can be overtaxed during emergency situations. Information exchange across agencies is limited on account of a lack of interoperability which prevents them from sharing hierarchical information in real time.

By contrast, datacasting, as part of an integrated approach to content management and distribution, can be applied to enable rich media transport and interoperability at the local, state, and federal levels. An example of a need for datacasting would be a customer who already has a complete content management and distribution system in place across multiple data centers but needs a better way to communicate that information to remote units. An example of a need for content management would be a customer with an efficient system of communicating data to remote units from a local municipal communications center, but no way to search and retrieve data from distributed county, state and national data centers. This sort of environment would require a separate content management and distribution software system that would seek out and retrieve requested data and prepare it for delivery to one or a group of vehicles.

One example comes from the mock hotel fire/hazardous materials spill situation. Several law enforcement agencies would conceivably be involved in the management of the situation, with one taking the role of lead coordinating agency. That organization would be responsible for disseminating the information from its back office data storage to all responding vehicles.

To provide further description, datacasting, or data broadcasting, is the transmission of rich media content over digital television channels at broadband data rates to remote receiving units, such as emergency vehicles. It provides the ability to target one single receiver, a group of receivers or all receivers and is similar to a mobile radio system's "talk groups" without frequency availability being an issue. This technology provides a high bandwidth feed from an agency's communications center, through a backhaul connection (usually a third party service provider such as a VPN over Internet link or a leased line) to one or more television broadcast facilities, and then transmission of a data stream and television signal for broadcasting to the remote units. These units have broadcast receivers and are connected to a customer-provided terminal such as a laptop or display monitor – typically in the law enforcement vehicle. It can also use a low bandwidth return path (if any return path) via digital radio or telephone links, for search requests and status feedback (see figure at the end of the paper).

In addition to feeding data to individual responding units, the possibility exists to erect a temporary secure wireless 802.11 hot spot where data could be broadcast to one mobile communications center vehicle and then fed wirelessly to other responding vehicles.

Public safety personnel in responding vehicles would utilize this system by accessing a content guide that provides a list of potential downloads that can be selected by a click or radio call. Remote sites can request push of content by category and ID number via their backhaul circuit (radio, cellular, Wi-Fi etc.). In addition, requests can be made to retrieve any missed data packets for any user who doesn't receive a complete data package.

Examples of data that can be data broadcast include driver license scans, police unit location maps, and regularly updated information such as traffic maps, Amber Alerts, and notifications of hazardous materials in transit. The ability to send photos, video clips, audio clips, schematics, manuals and detailed building plans also exist. These can be streamed or sent by FTP. Responders can also use this system by making text requests to the communications center for

research and return requests for information. The other method is requesting content via voice from a network operations center that would schedule delivery to the responding unit. In addition, the capability exists for responding officers to do a web page fetch by putting the URL in via laptop and accessing the Internet.

Harris Corporation proposes to leverage the existing national footprint of Advanced Television Systems Committee (ATSC) broadcast facilities, all of which use eight vestigial sideband modulation (8-VSB) and have available bandwidth, to support emergency messaging. Those familiar with single sideband modulation will find many similarities with 8-VSB, except that the carrier frequency is preserved and the sideband energy is eliminated through filtering. Simply put, 8-VSB is the RF modulation format utilized by the (ATSC) digital television standard to transmit digital bits over the airwaves to a receiver. In the case of ATSC broadcast, there are two key components which make up the system: 8-VSB modulation and MPEG-II transport streams. 8-VSB is the RF modulation format and MPEG-II is the video compression/ packetization format. To convert video, audio or data into a form suitable for over-the-air broadcast, by DTV standards, two stages of processing are needed: MPEG-II encoding and 8-VSB modulation. Accordingly, two major pieces of equipment are required: an MPEG-II encoder/multiplexer and an 8-VSB exciter.

The emerging Digital Video Broadcast – Handheld (DVB-H) standard is taking the DVB-T standard a step further by also making possible mobile reception of digital broadcasting with small, handheld devices. In IP Datacast over DVB-H, the DVB-H radio transmission technology is combined with Internet Protocol (IP). This combination makes it possible to broadcast any kind of digital content as IP packets, which is the same format used to transfer digital content on the Internet. IP Datacast offers the advantage that all existing IP-based digital content like video streams, web pages, music files or game software, can be easily distributed over mobile broadcast.

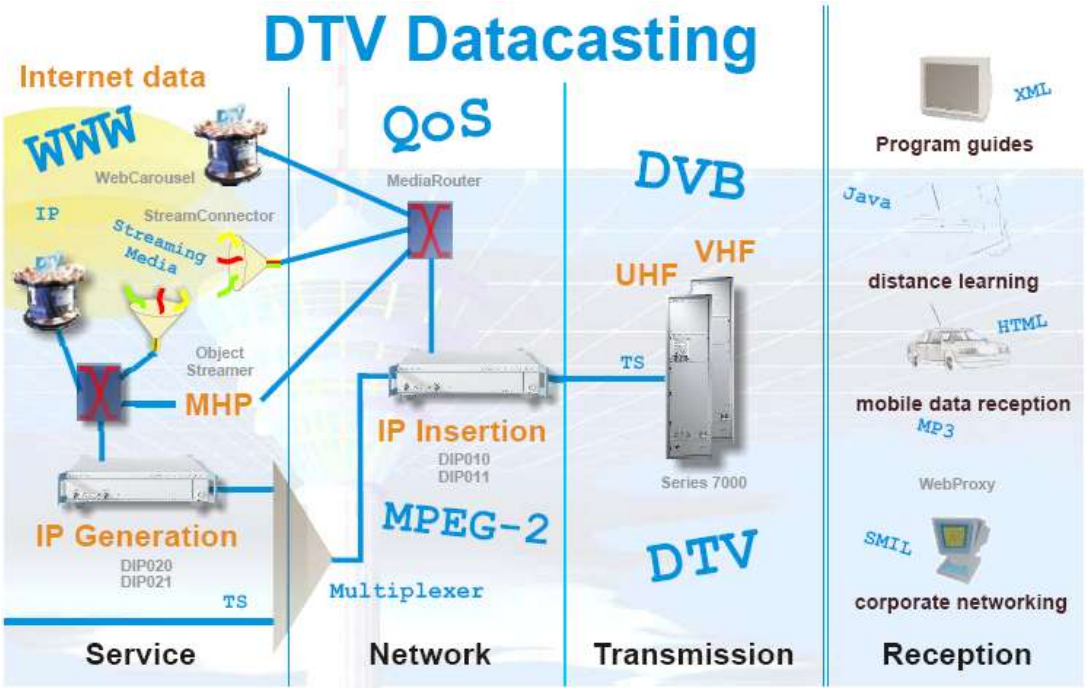


Chart 48 Datacasting

In summary, the approach proposed for datacasting and enhanced VSB modulation overcomes existing bandwidth limitations at a fraction of the cost of building a new infrastructure because

towers, transmitters and licenses already exist. It also complements the existing infrastructure to ensure interoperable capability (e.g. LMR, VPN, Internet). In addition, backhaul connectivity is typically already available. This is especially important to cities and public safety agencies that have limited budgets but face the growing need to overhaul their existing communications systems.[101]

Steven Bass, new CEO/President of Oregon Public Broadcasting (OPB), has implemented this capability in his previous job and seeks to bring the concept to Oregon. View short video clip at www.wnpt.net/datacast. There is an opportunity here to expand the offerings of distance education, improve content for public safety workers and to provide additional opportunities for access to government.

Laser Optical Wireless[102]

Laser Optical Wireless (LOW) is an optical wireless, point-to-point, line-of-sight broadband solution. Originally developed 30 years ago by the military, laser can be the best wireless solution where fiber optical cable is not available, high bandwidth (anywhere from 1 Mbps up to 1.25 Gbps) is required, and line-of-sight can be obtained to a target within a couple of miles or less. The growth and convergence of telecommunications and datacom have accelerated last-mile access needs for high-speed links. With tens of thousands of successful deployments worldwide, LOW is now a viable choice for connecting the LAN, WAN, and MAN; and carrying voice, video and data at the speed of light (10 Mbps-1.25 Gbps Ethernet, ATM, Sonet, T-1, T-3, DS3, OC3, OC12, OC24).

Some advantages of LOW:

- **High Speed Broadband Access** LOW utilizes advanced wireless optical technologies to bridge the last-mile in carrier networks and makes high-speed broadband access a reality. Based on optical technology, it provides levels of bandwidth comparable to fiber optic cable. With current availability of up to 1.25 Gbps, throughputs of hundreds of Gbps are possible in the future.
- **Low Cost Bypass of Copper Infrastructure** LOW solutions enable service providers to dramatically lower their cost of providing high-speed broadband access to end-users compared to other commercially available last-mile solutions. This is because it does not involve the expensive process of obtaining rights-of-way, licenses, or permits from governments, digging the ground to lay cable, or charges for spectrum rights. All that while maintaining costs that are lower than traditional infrastructure. LOW offers a return on investment of weeks or a couple of months, versus the years it takes for other solutions.
- **Rapid Deployment and Service Provisioning** laser optical wireless products enable service providers to avoid time-consuming processes, such as obtaining rights-of-way, and other governmental licenses, or the labor-intensive process of digging and installing cables in the ground. As a result, LOWs can be installed and made operational in a few hours. Using available Network Management Systems, service providers can efficiently and cost-effectively perform provisioning from a central location through a point-and-click graphical user interface, thus eliminating time-consuming onsite service calls or "truck-rolls".
- **Improved Availability and Reliability** LOW can be deployed to operate over an optical mesh architecture that allows transmission between any two points on the network and enables full traffic re-routing around a failed link. The short mesh

configuration enables the wireless link to remain connected in all types of weather.

- **Improved Scalability and Flexibility** A LOW solution can be designed to scale efficiently as demand for bandwidth and new services grow, therefore initial deployment is also cost effective.
- **Creation of New Revenue Opportunities for Service Providers and Carriers** Service providers and carriers are able to rapidly introduce new upgrades thanks to available software and system based products. Features include new service level agreements, Quality Of Service enhancements, dedicated wavelengths to the end-user, and bandwidth on demand, without significant hardware changes or additions.

WiMax[103]

WiMax, short for "Worldwide Interoperability for Microwave Access" refers to any broadband wireless access network based on the IEEE 802.16 standard. WiMax includes fixed systems employing a point-to-multipoint architecture operating between 2 GHz and 66 GHz. WiMax is capable of transmitting network signals covering in excess of 30 miles of linear service area, which is much greater than Wi-Fi's coverage area. It provides multiple shared data rates of up to 75 Mbps.

At the same time that Wi-Fi networks are reaching a more mature state, WiMax has the potential to alter and further accelerate the evolution of broadband services. Coincident with the integration of Wi-Fi into devices, Intel has announced the integration of WiMax into its next generation chipsets for mobile devices. Analysts suggest that WiMax, although still in an early state, could complement or even supplant the development of Wi-Fi networks in the long run. It is anticipated that new standards for wireless networks will incorporate both roaming and handoff capabilities, which will further enhance the potential for broadband fixed and mobile applications in both licensed and license-exempt spectrum. WiMax announcements from Intel indicate availability of certified products in late 2006 with a more likely emergence in 2007.[104]

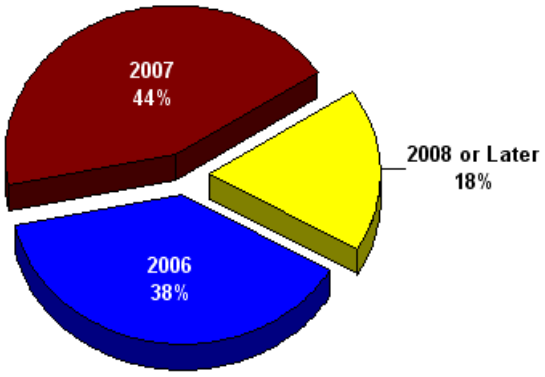


Chart 49 Expected Commercial Launch for WiMax Service

Ultra Wideband (UWB) Technology[105]

One Step Closer to Wireless Freedom

Ultra-Wideband (UWB) technology brings the convenience and mobility of wireless communications to high-speed interconnects in devices throughout the digital home and office. Designed for short-range, wireless personal area networks (WPANs), UWB is the leading

technology for freeing people from wires, enabling wireless connection of multiple devices for transmission of video, audio and other high-bandwidth data.

UWB, short-range radio technology, complements other longer range radio technologies such as Wi-Fi, WiMAX, and cellular wide area communications. It is used to relay data from a host device to other devices in the immediate area (up to 10 meters, or 30 feet).

How UWB Works

A traditional UWB transmitter works by sending billions of pulses across a very wide spectrum of frequencies several GHz in bandwidth. The corresponding receiver then translates the pulses into data by listening for a familiar pulse sequence sent by the transmitter. Specifically, UWB is defined as any radio technology having a spectrum that occupies a bandwidth greater than 20 percent of the center frequency, or a bandwidth of at least 500 MHz.

Modern UWB systems use other modulation techniques, such as Orthogonal Frequency Division Multiplexing (OFDM), to occupy these extremely wide bandwidths. In addition, the use of multiple bands in combination with OFDM modulation can provide significant advantages to traditional UWB systems.

UWB's combination of broader spectrum and lower power improves speed and reduces interference with other wireless spectra. In the United States, the Federal Communications Commission (FCC) has mandated that UWB radio transmissions can legally operate in the range from 3.1 GHz up to 10.6 GHz, at a limited transmit power of -41dBm/MHz. Consequently, UWB provides dramatic channel capacity at short range that limits interference.

A World Without Wires

Today, most computer and consumer electronic devices -- everything from a digital camcorder and DVD player to a mobile PC and a high-definition TV (HDTV) -- require wires to record, play or exchange data. UWB could eliminate these wires, allowing people to "unwire" their lives in new and unexpected ways. Through UWB:

- An office worker could put a mobile PC on a desk and instantly be connected to a printer, scanner and Voice over IP (VoIP) headset.
- All the components for an entire home entertainment center could be set up and connected to each other without a single wire.
- A digital camcorder could play a just-recorded video on a friend's HDTV without anyone having to fiddle with wires.
- A portable MP3 player could stream audio to high-quality surround-sound speakers anywhere in the room.
- A mobile computer user could wirelessly connect to a digital projector in a conference room to deliver a presentation.
- Digital pictures could be transferred to a photo print kiosk for instant printing without the need of a cable.

Speeding the Development of UWB Through MBOA

In June 2003, Intel helped form the MultiBand OFDM Alliance (MBOA), with many of the most influential players in the consumer electronics, personal computing, home entertainment, semiconductor, and digital imaging market segments.

The goal of this organization is to develop the best technical solution for the emerging UWB (IEEE 802.15.3a) Phy and MAC specification for a diverse set of applications. To date, MBOA has more than 60 participants that support a single technical proposal for UWB.

The MBOA favors a Multi-Band Orthogonal Frequency Division Multiplexing (OFDM) approach. The benefits of this approach include:

- Peaceful coexistence with flexible spectral coverage
- Easier adoption to different worldwide regulatory environments
- Future scalability and backward compatibility
- Use of standard CMOS technology to take advantage of the principles of Moore's Law, speeding development and advancing performance
- Excellent robustness in multipath environments

What's Ahead

One vision of UWB radio is of a "Common UWB Radio Platform" spanning many different applications and industries (see graphic). UWB radio, along with the convergence layer, becomes the underlying transport mechanism for different applications. Some of the more notable applications that could potentially operate on top of the Common UWB Radio Platform would be Universal Serial Bus (USB), IEEE 1394/FireWire, next generation of Bluetooth, and Universal Plug and Play (UPnP).

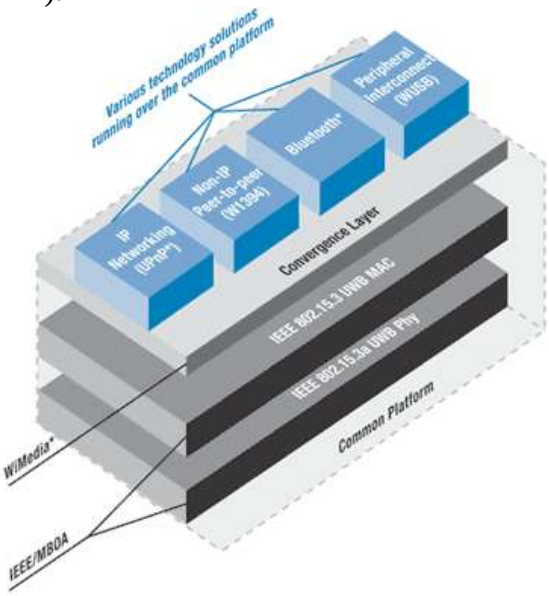


Chart 50 Ultra Wideband

With the standardization of a common UWB development platform, device manufacturers in the PC, mobile, and consumer electronics markets will be able to easily use UWB as the radio or transport mechanism, taking advantage of the low power and high bandwidth this technology provides. Intel believes the broadly supported MBOA, WiMedia Alliance and Wireless USB Promoter Group will enable commercial development of UWB standards-based products soon.

Other Network Infrastructures of Interest in Jackson County

Ashland Fiber Network (AFN)

Many proponents and opponents of municipalities entering the telecommunications business monitor AFN very closely. Long-term viability of the network remains an open question.

Ashland, Oregon, owns and operates an electric utility through the Ashland Department of Electric Utilities. In the late 1990s, the Department engaged in an evaluation process and determined that a more advanced telecommunications network would enable it to manage its electrical system more effectively and at lower cost. There also appeared to be an opportunity to generate higher revenues for the community through the provision of CATV and data services, as well as the occasion to create a more attractive social environment. The incumbent cable operator was Charter Communications.

Ashland started its buildout of Ashland Fiber Network (AFN) in February 2000, with $5.2 million that was financed through a bank loan secured by the municipal electric utility. The preliminary estimate was that the capital requirement would be $6 million, but the network eventually required approximately $8 million.

AFN reported that it was serving approximately 2,680 subscribers during the last quarter of fiscal year 2001. However, in the 2001 Budget Committee presentation, it was apparent that AFN was not achieving the goals identified in the original business plan. Revenues were well short of projections, capital requirements exceeded the initial plan, construction was taking longer than anticipated and there were some management problems. As a result, at the request of the Mayor and City Council, the Department's staff selected an advisory committee to help review and revise the business plan for AFN with a goal to develop a reporting format to help keep the Council updated as AFN improved its performance. The City also hired a consultant, Navigant, which submitted operating suggestions that AFN subsequently implemented. While the division has improved, AFN's reports to the Ashland City Council reflect the ongoing difficulty in meeting targets.

To the credit of the Ashland City Council and of the mayor, the town's leadership took strong and immediate constructive action to cope with shortfalls. Still, even after restructuring, AFN has found its targets high and the negative cash flows persisting. As a result, in June 2005, the Ashland City Council unanimously agreed to form a task force to investigate options for the Ashland Fiber Network, including a potential sale. The Council became particularly concerned because the city's finance department estimated that, even if AFN were to achieve 10 percent annual growth in revenues, the operation would be $3.8 million short in 2011 when it was time to pay its 15-year $15.5 million loan that had been assumed by the city in 2004. The local newspaper suggested that, even if the city were to sell AFN today, few experts believe that the sale price would cover the city's $15.5 million loan, which has interest-only payments until July 2007. Also of note, in May 2005, the city council voted to subsidize AFN's deficits using the city's electric department revenues. Subsequently, the Council tabled its decision about whether to raise electric rates.

While AFN has fallen short of projections, it has achieved a high estimated penetration rate of the community's nearly 9,000 households. Still, the operation remains negative in terms of operating cash, while making some progress on closing the deficit in the most recent six months.

Achieving the ability to achieve any payback on the on the initial capital investment of approximately $8 million is further made complicated by the need to make additional capital expenditures.[106]

In March of 2006 the City Council adopted an Open Carrier approach before. With this option Ashland would retain the infrastructure and the City would provide Internet and basic television. ISPs and outside cable companies could offer elevated service to any household that is interested in more than the basic connections offered by the City. Everyone would be charged a flat fee, with the exception of low-income households and those that cannot receive service, however the City would expand the service so that all households could hook up to AFN within 2 two years. The Model proposes a fee of $10 per household, which would cover AFN's operating costs, debt payments, and system improvements.

After a period of having no direct manager for AFN, Joe Franell, 44, started work from Florida as Ashland's new Information Technology Director on March 13. He will begin work on site on April 3 according to Ashland Human Resources Director Tina Gray.

AFN is a hybrid coaxial fiber network offering three service categories: subscriber TV, Internet access and data transport.

AFN Television offers the latest in advanced digital set-top technology. Through this box, viewers can interact with their TV in many unique, new ways. Scroll through channels and programming with their on-screen Interactive TV Guide, order your favorite Pay Per View movies and events with the press of a button, and enjoy 45 commercial free digital Music Choice channels. Their technology gives parents the capability to lockout objectionable programming or channels with the interactive guide and remote control functions.

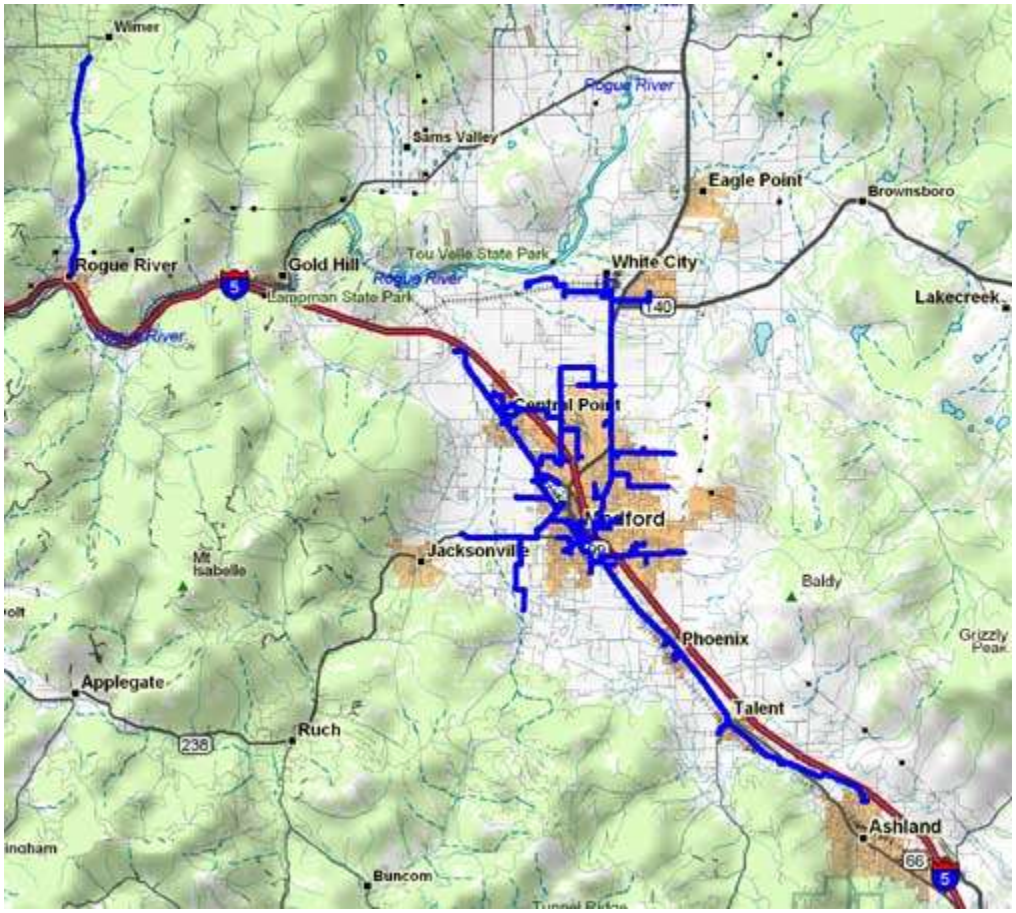
AFN Internet is designed for businesses and households that are looking for higher Internet connection speeds and the ability to download more information quickly, efficiently and affordably. AFN Internet does not use a phone line. Instead, information and data travel through their advanced fiber optic system. By using a cable modem, rather than a phone modem, they can provide Internet connections at speeds of 3-5 Mbps. And, because you're not working off a phone line, you'll never get a busy signal and you can stay on-line day and night if you choose - and not be charged extra.

The Ashland Fiber Network was designed to handle a large amount of user traffic. By designing redundant fiber optic rings and redundant Internet connections, they've made certain the system won't get bogged down. So, no matter how many people are using AFN Internet, you can rely on the same fast connections.

AFN Data is currently available to businesses and institutions in Ashland that require a large amount of bandwidth. The backbone of the system consists of redundant Gigabit Ethernet links with drops to businesses. The connections run at Full Duplex Ethernet and are connected to layer 3 Routing Switches. AFN Data offers high-speed data connections at either 10 Mbps or 100 Mbps, depending on the level of service you request, utilizing a direct fiber link. AFN Data is fast, reliable, easy to install and maintain, at competitive prices.

Hunter Communications[107]

Hunter Communications was founded in 1992 providing service for local area networks, wide area networks, and everything in between. In 2000 Hunter started building an all-fiber network throughout Medford with the vision of a Metropolitan Area Network (MAN) right here in rural Southern Oregon. Mr. Richard Ryan, President and owner, Hunter Communications and Core Digital Services has deployed roughly 600 miles of fiber to create southern Oregon's only all fiber network. This sole proprietor broadband provider continues to grow this network at a rate of 1 mile per week. After successfully completing the construction and deployment of the Ashland Fiber Network, Mr. Ryan observed that Jackson and Klamath counties could profit from the introduction of similar services.



Map 16 Hunter Communications

This broadband service grew out of a creative public-private partnership model using telecommunications funds already committed in school budgets. The infrastructure is composed of 2 rings that serve the Rogue Valley and the Klamath Basin. It replaces point-to-point T-1 lines and allows school districts to share resources at 100 mbps and above while actually reducing their telecommunications costs in the out years. Some of the districts now are taking advantage of this service to deploy VOIP to further contain costs for internal communications between sites.

In addition to the region's schools the network also now benefits business, healthcare and government clients who previously were limited to T-1 or traditional dial up services. Among those benefiting is La Clinica del Valle, a southern Oregon safety net healthcare clinic. The

network offers a world-class telecommunications capacity to businesses and organizations throughout Jackson and Klamath counties, including backbone access via multiple long haul providers. Some of the cities covered include: Klamath Falls, Rogue River, Medford, Central Point, White City, Jacksonville, Talent and Phoenix.

Other projects include enabling a dedicated fiber feed to all local broadcasters from the Ashland fiber network as well as providing services for Jackson County, Erickson Air Crane, Boise Cascade, Rogue Credit Union and others.

Hunter continues to actively pursue planning of additional public–private partnerships for delivering comparable services in other rural communities of Southern Oregon. Hunter's long-term vision has been to create an infrastructure which would not only keep Southern Oregon competitive by leveling the technical playing field, but would also stimulate local and statewide economic growth by attracting and enabling new companies and businesses to take advantage of making Oregon a choice location from which to conduct business. The ability of businesses to connect to their 100Mbps/1Gbps pure fiber backbone allows them the flexibility to remain highly competitive in today's global marketplace and removes the barriers which previously existed with regard to making the Rogue Valley a true communications hub and future model for facilitating local economic growth and global commerce.

Medford MESH Wireless Network

The city of Medford, Oregon selected a wireless-mesh network over a WLAN to give public safety and public works agencies mobile access to voice, video, data and position-location services. Medford spans 22 square miles. Approximately 100 city workers will initially utilize Medford's mesh network, which is the first deployed in the state.

They deployed the mesh network primarily to replace its public-safety department's CDPD network. Police wanted transmission of video and remote access to databases. Firefighters wanted mapping and floor plans to find the best route to a call, and to get remote access to hazardous material data.

But when project leaders evaluated the potential benefit to all city departments, what they discovered surprised them. Public works crews, code enforcement officers, and building inspectors would also benefit. The network would enable locates and work-order access in the field, saving 20 crews about an hour a day each -- or $64 an hour, resulting in a $333,000 annual savings. By analyzing all the needs within its mobile workforce, Medford has been able to deliver a more robust ROI for itself and community it serves.[108]

In 1997 the Defense Advanced Research Projects Agency (DARPA) began work to ensure better, more powerful, secure and dependable battlefield communications. DARPA engineers created a network that requires no infrastructure, but rather exists via user-devices, such as handheld computers and mobile phones, which act as transmitters. In theory, these "mesh networks" could instantly form between as few as two users via nodes embedded in system devices, which act as relay points for any other node. This allows signals to "hop" from one device to the next instead of being routed through a central device.

In January 2002, MeshNetworks Inc. was formed to commercialize the new mesh technology for the nonmilitary sector. The company now holds the exclusive license, patents, software and design that resulted from the DARPA and ITT Industries research.

MeshNetworks reduced the technology to a single chip, which took more than two years and $20 million. But the investment seems to be paying off as the first several citywide deployments of its technology nears completion. Motorola has now acquired MeshNetworks (Q4, 2005).[109]

Motorola will integrate components of MeshNetworks, including the MeshNetworks Positioning System and MeshConnex software suites, into future data products such as those in the recently allocated 4.9GHz FCC licensed band allocated to the public safety infrastructure. Each node is licensed to operate with a maximum Effective Radiated Power (ERP) of up 16W at 4.9 GHz. Currently, the Motorola-Mesh Networks products utilize the 2.4GHz band. The MeshNetworks system optimizes bandwidth due to the ad-hoc nature and provides QOS management system that can support 6 Mbps burst/2Mbps sustained, Geo-location data, support of virtually any RF frequency and operate at speeds up to 250 MPH.[110]

Mesh networks are ad hoc wireless networks made up of special nodes that automatically communicate with each other to create a single, scalable wireless network. A node can send and receive data, while also serving as a router to relay information to any other node within its area of coverage. A mesh network is intelligent and self-organizing, automatically adjusting and updating the most efficient routing patterns through the network, as nodes or Internet gateways are added or removed. In a mesh network, signals hop between nodes to find the best routes, so there is no single point of failure. If one node, or several nodes, suddenly becomes unavailable, the network automatically reroutes signals through other fixed and/or mobile nodes.

Another plus for law enforcement officials is that instead of becoming sluggish or completely inoperable when bombarded with an unusually high network traffic, the capacity and efficiency of a mesh network increases as users are added. A mesh network is weakest when there is only one user. A cellular network is best when only one person is using it. As users are added, a mesh network only gets better, but cellular networks get worse.

The Medford mesh network architecture has four components:

- A client modem, either a PC card or vehicle-mounted modem, connects to a mobile data terminal or laptop.
- Wireless routers, the size of a small shoebox, act as the network's permanent hopping points and can be attached to light poles, traffic lights or other structures. They also serve as geolocation reference points to triangulate the position of vehicles or users.
- Intelligence access points bridge the wired and the wireless systems.
- Network management software runs the system.

The peer-to-peer technology lets each user's machine act as a router, allowing the network to cover great distances.

> "Most 802.11 wireless networks require the client to disassociate and re-associate with access points as you travel through a coverage area," says Doug Townsend, Medford's technology services director. "With a [wireless] mesh, there is no drop or delay typical in systems that require re-associating. Mesh [networks] also avoid the latency effect and decrease in bandwidth usually seen with most 802.11 wireless systems as you travel away from access points."[111]

Initial funding for the project came from $500,000 from the Department of Homeland Security with an additional $200,000 of city monies. Additional funding will be required to grow the network. Initially there appears to have been some consideration for expanding the network to cover the county.

> "As we identify funding we're going to continue to expand the program until we have truly countywide interoperability," said Ron Norris, the Medford police deputy chief.[112]

To date these efforts for countywide expansion have not gone forward. At least two factors might be viewed as inhibiting factors: 1) capacity of the network to expand without creating another "cloud" and 2) cost to add the number of routers/nodes it would take to cover the county. In this assessment we have not addressed some underlying political issues at play. An additional factor to consider is that the MeshNetworks implementation has been absorbed into the Motorola product line with the expectation stated by Motorola that as they enhance the product, current users will also migrate to the newer product line. While this may involve no more than card swaps, this adds to the total cost of ownership for the product. This product line is in flux and will see additional enhancements. As such, one might view the product-line with a certain amount of inherent risk for increasing costs or see it as a state-of-the-art opportunity to bring creative approaches to service.

Medford was an early pioneer in adoption of the MeshNetwork proprietary technology (only 2 other implementations had previously occurred -- one in England and one in Florida) and Medford was the most ambitious of the implementations contemplated at the time. Subsequently a couple of other communities have installed the product (one in Texas and another in China). The process Medford used to evaluate the offering was quite thorough and well researched. They did the appropriate due diligence based on the technology. As such the risk was mitigated to a degree. Yet being the "first" (or among the first) can be risky business. Medford did experience a rather typical shake down period and likely they will continue to see some continuing aspect of this as they continue to adapt to the evolving opportunities of the product line. Time will tell (over at least a 5-year period of ownership) whether or not this was the appropriate business decision. At this point in time Medford is quite pleased with the results.

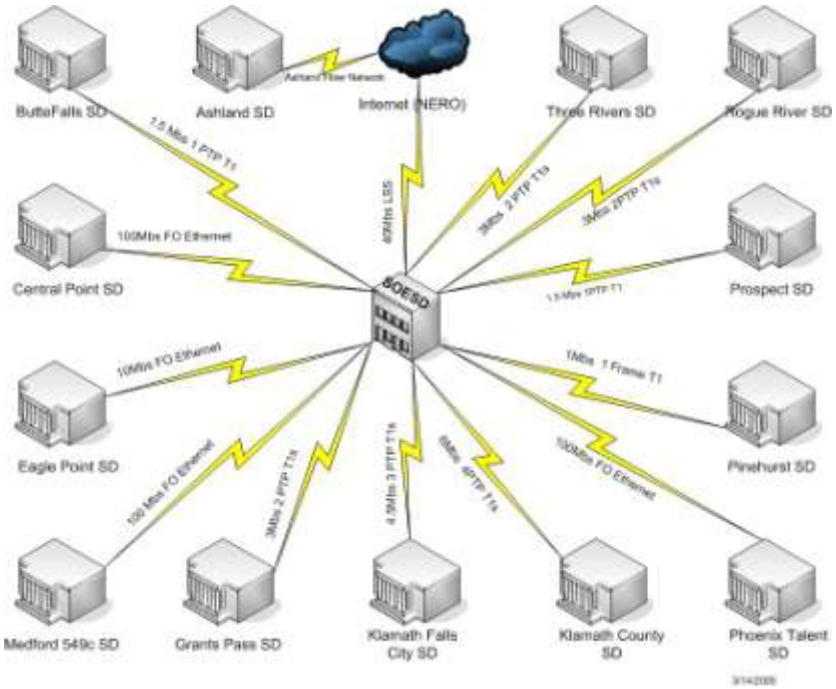
It's also worth noting that Medford is underway with planning for creation of a fiber-optic loop to provide additional robustness to their citywide communications. No specific plans are declared for opening up these networks to the public at this time.

Southern Oregon Educational School District (SOESD)[113]

The SOESD is touted by many as the premiere ESD in the state. Often cited are its technology competency and organization, scope of services and degree of collaboration within the region and throughout the state.

The Distance Education program at SOESD is a multi-point, interactive video network that connects 23 schools within the ESD service area. The ESD network also connects with high schools, ESD's and other institutions throughout the state of Oregon.

SOESD serves as the "hub" for the three county regional network (Josephine, Jackson and Klamath), providing scheduling and first level trouble shooting for the videoconference sites. Additionally SOESD provides training for teachers interested in using the network. Numerous events are scheduled on a daily basis among various sites.



Map 17 SOESD Network Diagram

Current SOESD Interactive Video Courses:

Course Title
French I, 2005/2006
Spanish I, 2005/2006
Health Occupations, 2005/2006
Spanish II, 2005/2006
Intro to Health Occupations, 2005/2006
Spanish III, 2005/2006
Calculus, 2005/2006
Accounting, 2005/2006
Geology, 2005/2006

Southern Oregon Extended Area of Service Region

Not a network per say but rather an aggregation of telephone exchanges wherein the cost of local long distance calling has been averaged across all those who elect the EAS rate. Non-participating customers can elect a metered rate. In general this serves to lower the local long distance rate to individual customers.

EAS stands for Extended Area of Service. Different phone companies may use a different terminology (for example, Extended Area of Calling or EAC).

Actual local calls are mostly limited to those within your own prefix area. For example, 582 is the prefix for Rogue River and anyone with a 582 number is able to call anyone else with a 582 number without any charges (i.e., local). There are a few exceptions of exchanges that have more than one prefix in their local calling area.

If someone in the 582 prefix can call another prefix (for example, 855 in Gold Hill), they are paying for EAS (Extended Area of Service) to that exchange and have either a flat or measured rate listed on their phone bill.

EAS is not free nor is it easily acquired. An exchange (for example, 582 in Rogue River) must apply to the Public Utility Commission (PUC) for EAS to another exchange. They must provide petitions and proof of social, economic, and political interdependency with each Exchange they are asking access to at a public hearing held by the PUC in that community/exchange. Then the PUC decides if there is enough "community of interest" to allow that exchange to get EAS to another exchange

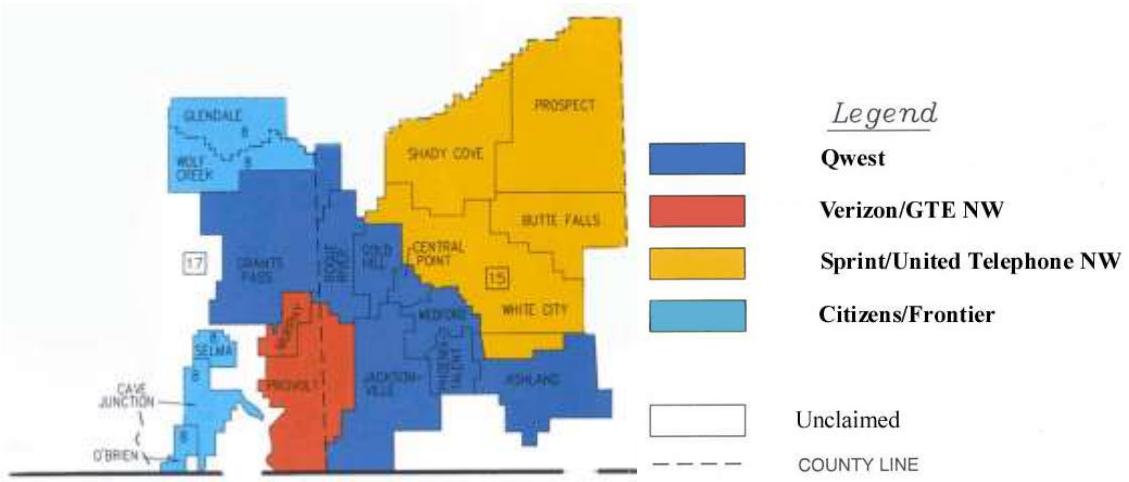
If you have EAS (or EAC) listed on your phone bill, your exchange went through this process. One charge for EAS may also incorporate more than one area, for example: Rogue River pays $2.03 per month for EAS as listed on their phone bills. This fee is for EAS to Grants Pass, Medford, Central Point and Gold Hill combined.

For each new exchange your exchange wants access to, you will have to use the process just described. One of the goals for the creation of the Southern Oregon Local Calling Region is to eliminate this process and the burdens it puts on communities to communicate with one another.

An EAS Region is a defined geographic area that may be served by one or more phone companies. Costs for the region vary depending on the phone company serving each exchange within the region and their current rate structure as approved by the PUC. Some phone companies equalize their costs throughout all their customers in that state while others do not.

An extended Area Service (EAS) region is a unified toll-free calling area. In a sense it is a "super-exchange" in that all of the exchanges compromising the region can call one another without without paying long distance charges, because the region is now a local calling area. For example, the Portland EAS Region is comprised of 32 exchanges, 992 separate EAS routes, served by 10 connecting telephone companies, and serves approximately 1 million access lines.

The Southern Oregon Extended Area of Service Region was “turned on” in the fall of 2004.



Map 18 Southern Oregon EAS Region

TELEPHONE CO	***EXCHANGE NAME***	***# ACCESS LINES***
Sprint	*Prospect*	*565*
	Shady Cove	*2544*
	Butte Falls	*445*
	White City	*11,122*
Qwest	*Central Point*	*8892*
	Medford	*52,114*
	Phoenix/Talent	*9148*
	Ashland	*16,682*
	Jacksonville	*3836*
	Gold Hill	*2893*
	Rogue River	*5,251*
	Grants Pass	*38,788*
Verizon	*Murphy/Provolt*	*3,200*
Citizens	*Selma*	*974*
	Cave Junction	*3,505*
	O'Brien	*309*
	Wolf Creek	*310*
	Glendale	*1,100*
Total Phone Co.'s 4	***Total Exchanges 18***	***Total # Lines 161,678***
Sprint	***4 Exchanges (9%)***	***Total Access Lines 14,676***
Qwest	***8 Exchanges (85%)***	***Total Access Lines 137,604***
Verizon	***1 Exchange (2%)***	***Total Access Lines 3,200***
Citizens	***5 Exchanges (4%)***	***Total Access Lines 6,198***

Table 25 Southern Oregon Local Calling Region Boundary Definition

January 13, 2003

QWEST	
Exchanges	Prefixes
Ashland	201, 482, 488, 552
Central Point	664, 665
Gold Hill	855
Grants Pass	471, 472, 474, 476, 479, 955, 956,
Jacksonville	899
Rogue River	582
Phoenix / Talent	512, 535
Medford	245, 282, 608, 618, 732, 734, 770, 773, 774, 776, 779, 857, 858, 864
SPRINT	
Exchanges	Prefixes
White City	826, 830, 831
Shady Cove	878
Prospect	865
Butte Falls	560
CITIZENS / FRONTIER	
Exchanges	Prefixes
Cave Junction	592
O'Brien	596
Selma	597
Wolf Creek	866
Glendale	832
VERIZON	
Exchanges	Prefixes
Murphy / Provolt	862, 846

Table 26 List of Prefixes for each telephone company in the region

The flat residential EAS rates for exchanges without the Region and for unlimited calling in the Region are as follows:

Exchange	Residential Rates
Prospect**	$9.00
Shady Cove**	$9.00
Butte Falls**	$9.00
White City**	$9.00
Central Point*	$2.20
Medford*	$2.20
Phoenix/ Talent*	$2.20
Ashland*	$2.20
Jacksonville*	$2.20
Gold Hill*	$2.20
Rogue River*	$2.20
Grants Pass*	$2.20
Murphy / Provolt++	$5.60
Selma+	$11.74
Cave Junction+	$3.37
O'Brien+	$8.98
Wolf Creek+	$12.04
Glendale+	$4.36

Table 27Flat Residential EAS Rates

Exchange	Business Rates
Prospect**	$14.85
Shady Cove**	$14.85
Butte Falls**	$14.85
White City**	$14.85
Central Point*	$3.27
Medford*	$3.27
Phoenix/ Talent*	$3.27
Ashland*	$3.27
Jacksonville*	$3.27
Gold Hill*	$3.27
Rogue River*	$3.27
Grants Pass*	$3.27
Murphy / Provolt++	$8.50
Selma+	$23.48
Cave Junction+	$6.74
O'Brien+	$17.96
Wolf Creek+	$24.08
Glendale+	$10.80

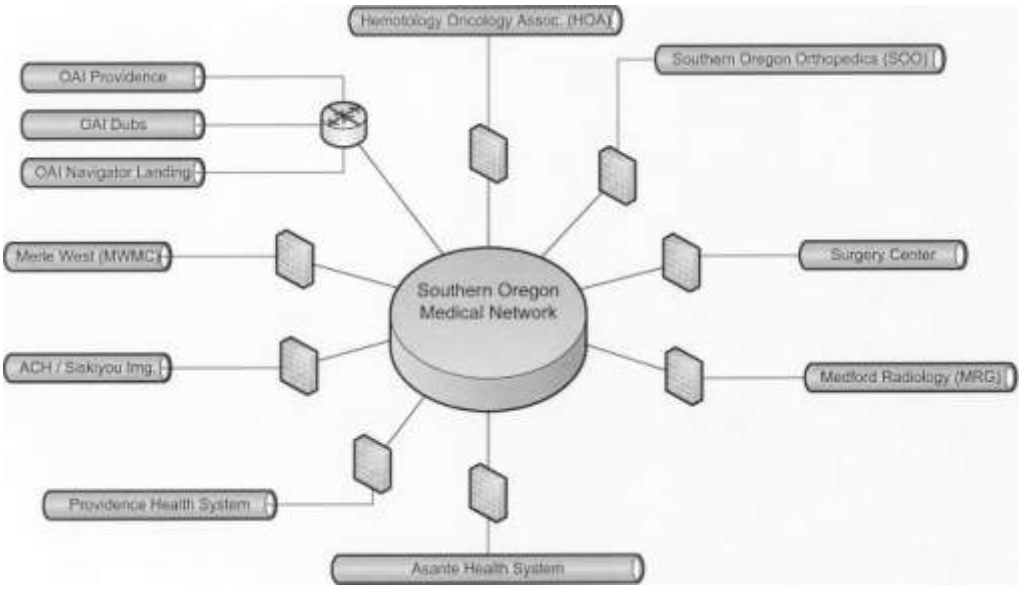
Table 28 Business EAS Rates for the Region

Note: All rates shown are monthly amounts.
(Citizens = +, Qwest = *, Sprint = **, Verizon = ++

Please see
http://www.puc.state.or.us/edockets/orders.asp?OrderNumber=04-217
for details (requires Adobe Acrobat to view).

Southern Oregon Medical Network

The Southern Oregon Medical Network (SOMN) is an opportunity for area medical organizations to participate in a high quality network.



Map 19 Southern Oregon Medical Network

SOMN is a gigabit Ethernet virtual private network provided through Charter Business Services. This one of the first implementations of this sort in the state and is a major step forward to providing for connectivity between medical service providers.

Southern Oregon Regional Communications[114]

Southern Oregon Regional Communications (SORC) is located in Medford Oregon and serves the population of the beautiful Rogue Valley. SORC is a combined emergency dispatch facility and Public Safety Answering Point (PSAP) for the Jackson County Oregon 9-1-1 lines. The Center is also a regional "drop point" for emergency information that needs to be given to Jackson and Josephine counties. This may include severe storm warnings or notice of a foreign enemy attack. This information is received through the National Air Warning Alert System (NAWAS) radio channel that covers the entire United States.

SORC has a rich history, starting initially as a Fire Communications Center in 1973. In 1975, by resolution and support of the County Board of Commissioners, the Center became a combined, centralized communications facility that includes law enforcement dispatching under the organizational structure of the Jackson County Sheriff's Office.

Between 1976 and 1980, numerous other emergency service agencies joined the Center and implementation of the 9-1-1 emergency telephone system was initiated countywide. During this period, the financial and operational activities of the Center were under the guidance of the Jackson County Advisory Council, which was made up of representatives from each user agency.

In 1981, the Center was transferred from the Sheriff's Office and placed organizationally under the County Administrator. In the several years that followed, control of the Center became a hotly debated issue. This finally culminated in the drafting of an agreement allowed under O.R.S. 190.10, which, in turn, established Southern Oregon Regional Communications as a stand-alone public entity. In essence, this agreement enabled the user agencies of the Center to come together as one organizational public body providing its own control and direction of emergency communications services. This is accomplished under the Council, consisting of representatives from the political jurisdictions that act as a Board of Directors for SORC. The SORC User Board handles center operational activities and subsequent recommendations to the Council. This entity consists of representatives such as police and fire chiefs from user agencies of the Center as well as those agencies that respond within the jurisdictional areas served by SORC.

In 1997, SORC implemented the Clauson system of emergency dispatch and all dispatchers are now certified in Priority Medical Dispatch by the National Academy of Emergency Dispatch.

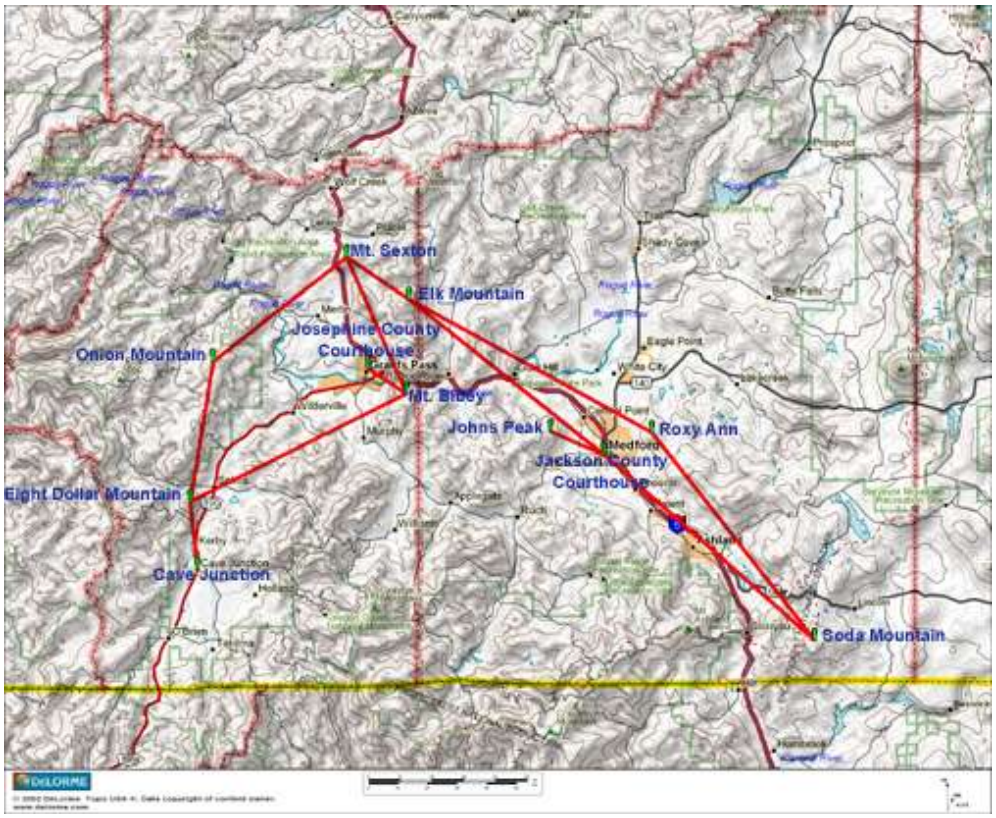
In April of 2000, SORC made a huge leap into the computer age with the addition of a Tiburon computer aided dispatch (CAD) system. This technology upgrade did away with the antiquated paper-based system, allowing for quicker and more effective use of user agency resources.

In November of 2001, the center was given a whole new look. The old furniture was replaced with new ergonomic furniture and a new computer based radio system from Motorola was installed, giving us even more communications flexibility.

Southern Oregon Regional Communications (SORC) receives 9-1-1 calls from the majority of Jackson County. There is one other PSAP (Public Safety Answering Point) in the county also located in Medford. If you live within the city limits of Medford or Ashland, your call will automatically be directed to Rogue Valley Consolidated Communications (RVCCOM).

SORC employs 16 dispatchers who work on a rotating shift basis. We are staffed 24-hours a day with at least 3 - 4 dispatchers on duty at a time. On most shifts two dispatchers are designated as law dispatchers and two more as fire. Dispatchers also answer all incoming 9-1-1 calls.

As you are giving information to the call-taker, he or she is inputting that data into the Computer Aided Dispatch system or CAD. While you are on the phone with SORC you will most likely hear the call-taker typing in the background. When the dispatcher has received the appropriate information from you, he/she will then enter it into the CAD system. The CAD program has a database of all addresses in the county and will then send it to the computer screen of the appropriate law enforcement, fire or ambulance dispatcher with a recommendation of which agency and how many units to send. When the dispatcher receives this information, he will send tones via radio to the responding agency and over the air advise them what is taking place and the response code they should use in responding. The responding units will then advise SORC by radio when they are responding and when they are on scene.



Map 20 SORC Microwave Network

SORC currently is underway with completion of a regional microwave communications infrastructure with the addition of Elk Mountain to the list of antenna structures. Communications will flow between the counties of Josephine and Jackson. As seen in the following map each county has a "ring" joined with a link between Mount Sexton and Elk Mountain. This provides for redundancy within the counties. The only segment, and a possible risk factor, is the single-threaded segment of the connection that will exist between Elk Mountain and Mount Sexton. With this infrastructure completed the region will benefit from very high availability for its public safety telecommunications.

Advisory Committee Focus Sessions

Advisory Committee

A well-balanced county telecommunications and technology planning effort requires representation from many parts of the county. To this end we formed the Advisory Committee (see Appendix 5) to ensure widespread participation in this planning effort. While not everyone made it to the meetings, they all were included in emailings throughout the course of the project. Many responded outside of the meetings.

A series of meetings addressed the following topics and provided useful information to assess perceptions held by residents of the status of telecommunications and technology in the county.

- County Leadership and Support
- Telecommunications Infrastructure
- Public Access, Technology Literacy, and Technology Training
- Economic development and ecommerce

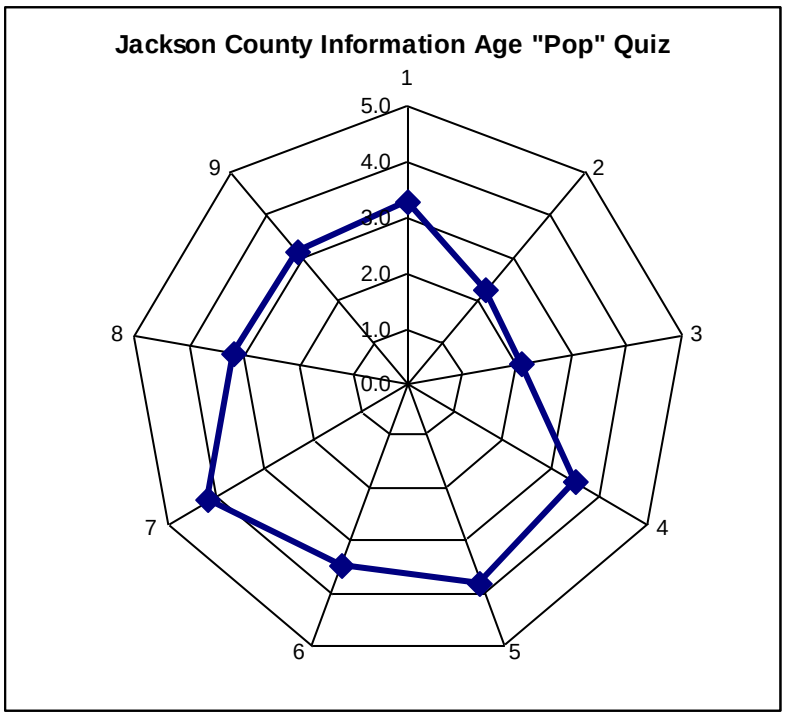
- Non-profits, Arts, Culture and History
- Public Library Services
- Education
- Healthcare
- Local Government and Community Services
- Criminal Justice, Law Enforcement, and Emergency Services

Information Age "Pop" Quiz

Prior to the meeting 1:1 meetings held with members of the Advisory Committee included an Information Age "Pop" Quiz. Aggregation of the results revealed the following profile of perceptions.

Categories

1. County leaders are aware of the importance of information technology and they work together to address IT development issues.
2. High bandwidth services are available to all businesses, organizations, and residents who want it.
3. Affordable access to high bandwidth services area available to all businesses, organizations, and residents who want it.
4. Public access sites and free or affordable training on basic computer and Internet skills are available.
5. There are opportunities for advanced information technology training through local high schools, colleges and universities, or other institutions.
6. Economic development initiatives are tied to the needs of Information Age businesses.
7. County services and information--including government, schools, and libraries—are available online.
8. There are good lines of communication and good working relationships among county institutions and citizens.
9. The county pays careful attention to quality of life issues.



Scale: *Strongly Agree = 5, Moderately Agree = 4, No Opinion = 3, Mildly Disagree = 2, Strongly Disagree = 1*

The radar diagram shows areas of opportunities for improvement, at least as viewed through perceptions of Advisory Committee members. It also shows perceived areas of strength.

Assessments

County Leadership and Support

Jackson County has at least two groups addressing telecommunications-related matters – Southern Oregon Telecommunications and Technology Council (www.sottc.org) and Rogue River Community Connections (www.rogueriver.org).

Southern Oregon Telecommunications and Technology Council (SOTTC)

The SOTTC is a nonprofit, membership organization created to promote the interests of telecommunications and technology stakeholders in Southern Oregon. The SOTTC advocates for increased connectivity and bandwidth in the region, supports the development of new communications technologies and aids in educating its members and the public about rapidly changing technology issues. The SOTTC holds educational forums on topics related to telecommunications and technology. SOTTC helps to connect those with an interest in technologies with regional expertise. The SOTTC is donating a list serve to aid with communications on this planning project.

SOTTC's long-range goals include:

- To improve infrastructure, education, training and access
- To position the region as a leader in the new E-conomy
- To provide a forum to assist businesses, governments, and community-based organizations in advancing their use of broadband communications and technology

SOTTC programs and advocacy help to ensure:

- Representation for southern Oregon on statewide issues and in organizations
- Building of public/private partnerships
- Research and advocacy for resources to build the telecommunications and technology sector in southern Oregon
- Current assessments of regional needs and priorities
- Legislative bulletins and expert testimony before key legislative committees
- Active recruitment of technology and telecommunications businesses
- Monthly educational programs on timely telecommunications and technology issues
- Annual gathering of industry leaders at the Silicon Orchard evening

Over the past several years the SOTTC focused on its educational forums and statewide legislative efforts. It is not a county planning or economic development organization per say. The SOTTC is available to provide technology expertise when requested.

Rogue River Community Connections (RRCC)

Rogue River Community Connections is an outgrowth of the Building an Information Age Community Committee (BIACC) and is now associated with the Shine The Light Foundation, a local non-profit organization created to support education, youth and community development. Representatives from all facets of Rogue River and surrounding areas joined together in this grass roots approach. They analyzed community telecommunication needs and developed an in depth community assessment. Participants included local businesses, communication providers, educators, seniors, health services, local government, fire and police departments, and more. Access to community information made the top of the priorities list. As a result of these efforts the Community Connections digital portal was born.

RRCC believes that successfully meeting the ever-shifting challenges of the future requires preparation. The Rogue River Community is at that "cusp of change" that so many rural communities are facing right now, working to maintain the small town atmosphere while

struggling not to be left out of emerging economic opportunities. Thoughtful planning and an understanding of how technology can improve their community are the keys to retaining that small town "community" orientation while building economic development, education, health care, law enforcement, and numerous other areas critical to the future of Rogue River's residents. Development of a Rogue River Area Information Age Community Strategic Plan is a major step by residents working together toward addressing the economic and quality of life concerns of residents of the Rogue River Community. For purposes of this strategic planning process they define the Rogue River Area Community to be inclusive of the City of Rogue River and the surrounding area.

The RRCC planning effort as well as the digital portal continues to evolve.

Southern Oregon Extended Area of Service Region

As a rule of thumb, actual local calls mostly are limited to those within your own prefix area. For example, 582 is the prefix for Rogue River and anyone with a 582 number is able to call anyone else with a 582 number without any charges (i.e., local). There are a few exceptions of exchanges that have more than one prefix in their local calling area

If someone in the 582 prefix can call another prefix (for example, 855 in Gold Hill), they pay for EAS (Extended Area of Service) to that exchange and have either a flat or measured rate listed on their phone bill

Some EAS facts:

- 1,700+ EAS routes in Oregon
- 79 EAS routes in Southern Oregon
- 2 EAS regions in Oregon (the Portland EAS Region and the Southern Oregon EAS Region)

An EAS Region is a defined geographic area that may be served by one or more phone companies. Costs for the region vary depending on the phone company serving each exchange within the region and their current rate structure as approved by the PUC. Some phone companies equalize their costs throughout all their customers in that state while others do not. Low-usage customers may opt for measured EAS rates in lieu of a flat EAS rate.

An extended Area Service (EAS) region is a unified toll-free calling area. In a sense it is a "super-exchange" in that all of the exchanges compromising the region can call one another without paying long distance charges, because the region is now a local calling area. For example, the Portland EAS Region is comprised of 32 exchanges, 992 separate EAS routes, served by 10 connecting telephone companies, and serves approximately 1 million access lines.

The exchanges in Southern Oregon were created some years ago. Many areas in Southern Oregon find themselves living in one community but a part of another community's exchange, requiring them to pay long distance to call within their community. Some paid long distance to call across the street. The old boundaries created around communities at the time no longer serve as they were intended. Instead of every community/exchange having to endure the difficult process of applying for local EAS to neighboring exchanges the regional concept came into being

Jackson and Josephine Counties are interlinked in a myriad of ways. Some work in Medford and live in Grants Pass or visa versa. Families are divided by current exchange boundaries and burdened by the high costs of long distance. Seniors on fixed incomes cannot call their doctors without paying for long distance charges they can't afford. Some have Doctors in Jackson and Dentists in Josephine or visa versa. In recent years we had some fires and both the Josephine County ODF and Jackson County ODF worked together. Our education system is one Southern Oregon ESD, serving both Jackson & Josephine Counties. We are a single Region in more ways than one can count that just happens to have two counties in it

The advantages of a regional EAS include:

- By combining Jackson, Josephine and parts of Douglas counties into one local calling area means you can pick up the phone and call anyone within the region without paying long-distance charges.
- You will no longer need to pay per-minute charges within the region to talk to your doctor, banker, supplier, relative or your neighbor a quarter mile away who is in another exchange.
- A more effective use of tax dollars with local calling access to/ from Southern Oregon educational & governmental services within the region (e.g., schools calling one another within the Region).
- Local calling access to Southern Oregon businesses helps strengthen our local economy
- Eliminates dialing 1-541 anywhere within the proposed region.
- Less expensive calling to neighboring exchanges in the EAS region.
- Minimizes impacts of outdated exchange boundaries that no longer match regional population areas.

State, local and community representatives from throughout the region believed that many municipalities, jurisdictions and rural community of Southern Oregon comprise a single larger community. The group proposed a single local calling region (Extended Area Service region) to reflect, support and enhance the vital economic, social and developmental communication that takes place throughout the region. The Oregon Public Utilities Commission (PUC) and the telephone service providers recognized this and participated in a process to provide affordable services to more effectively match the region's needs.

The PUC determined that there was a strong "community of interest" to be served by considering a Regional EAS and appointed an Advisory Task Force to assist in determining the boundaries of the new region.

County telecommunications planning to date

To date there has not been a countywide telecommunications strategic plan developed. In this planning effort we will examine infrastructure and services availability. We do this with an eye to economic development opportunities afforded through the use of telecommunications and related technologies.

Telecommunications is used in every nook and cranny of an economy and has become a critical pillar of economic development. Many components determine a successful economy. As such we need to also examine the so-called "quality of life" factors that are valued components in a successful economic environment. Some of these include educational institutions, healthcare

delivery organizations, access to government, community-based social and cultural networks to name just a few.

Interviews and participation on the Advisory Committee reveal interest in understanding the future role for telecommunications and the need for some level of planning. Encounters with residents in more informal settings reveal dissatisfaction with the availability of broadband services in more rural areas of the county. These same discussions also reveal a great deal of misunderstanding of the business realities that accompany deploying infrastructure. There is a perceived need for education of county leaders on telecommunications topics

Within the county we find a number of champions ensuring we have widespread availability of affordable broadband and that we also know what to do with it. Shayne Maxwell of Rogue River can be pointed to as a vocal and ardent voice on this matter. That the County Commissioners approved this project also points to a growing level of awareness in the county on the importance of telecommunications in our future. Enumerating all of those who express interest and support in this matter would require many pages.

Historically telecommunications planning in Jackson County is done in silos, e.g. governmental entities, education and healthcare develop separate planning strategies.

Support for public-private partnerships

Public-private partnerships are responsible for many of the region's telecommunications strengths (see the Infrastructure Analysis in another section that includes maps and descriptions). Of significant interest are the results of the Qwest/SB 622 build-out and the deployment by Hunter Communications.

Under Oregon Senate Bill 622 Qwest invested considerable funds based on community-defined needs in exchange for a change in rate management requirements administered by the Oregon Public Utility Commission. As a result in the Oregon Qwest service area 5 large route redundant rings (self-healing) were completed as well as deployment of ATM switches and DSL. Every Qwest serviced community in Jackson County received DSL. The benefits of being located on the southern ring mean a significantly higher level of uninterrupted telecommunications services.

Hunter Communications works closely with schools, the county, local governments and other entities in the region to provide expanded telecommunications capabilities within budgeted amounts for those services.

Demand aggregation

Examples of demand aggregation can be seen in the Hunter Communications approach to partnering with public entities, such as education and local government.

Demand aggregation occurs to some degree within sectors but by-and-large there appears to be little activity to work across sectors.

Local sources of funding

Local funding primarily stems from existing committed budgets for telecommunications services. Grants and loans from local entities or foundations have not been readily available per

some members of local telecom industry. Banking representation on the Advisory Committee indicated that solid business proposals dealing with telecommunications would be considered. One of the challenges for gaining loans for telecommunications infrastructure stems form an unwillingness to use the resulting network as collateral. This also applies to use of state of Oregon public works bonding authority.

Investigations of grant opportunities for state and federal funding continues but significant barriers to obtaining such exist. Results of a statewide study (August 2004) prepared at the request Senator Ron Wyden and Congressman Greg Walden yielded the following summary of federal USDA/RUS programs:

- The financing tool is too hard to use for the smallest, poorest communities.
- The cost of developing the application response and criteria that must be met exceed the financial capacity and expertise of most rural communities.
- There is a continuing lack of understanding of how the programs might be utilized.
- There is an issue with lag time between when a grant proposal must be submitted and when the funds are actually allocated.
- Entities that have successfully applied and received funds have full-time grant writing staff or resources (financial or otherwise, such as professionals volunteering their time) to acquire this expertise.
- Those successful gaining funds tend to speak more favorably of the programs than others (for example, RCC and Asante).

There is no organized group that pursues telecommunications funding on behalf of the county. Each silo pursues their agenda.

Many business and county leaders understand the importance of telecommunications and technology and there are efforts to cooperatively address such development (e.g., Southern Oregon Medical Network consists of county hospitals and a number of clinics). There is moderate county support for telecommunications and technology-related development.

Leadership for telecommunications efforts in the county is ad hoc and diffused across a variety of communities of interest.

Recommendations in this category

Development of county leadership for telecommunications and technology received a ***very high priority*** rating from Advisory Committee participants.

All key county and business leaders need to understand the importance of telecommunications and technology. There needs to be widespread county support for telecommunications and technology -related development. They need to ensure that they are actively and knowledgeably collaborating to address telecommunications and technology development for not just economic development but also for quality of life factors.

Telecommunications Infrastructure

Cellular telecommunication services

Multiple cellular phone companies serve Jackson County, including US Cellular, CellularOne, Cingular, T-Mobile, Verizon, Sprint, and Edge Wireless. Coverage primarily is along the major highways and in the more densely populated areas of the counties. Each company has it's own coverage areas. Coverage is best along the major highways and the more densely populated urban areas. Rural area coverage is spotty and depends on the company. There are quite a few areas in the county where there still is no cellular phone coverage. (see Appendix ## for a listing of providers, technologies employed and tower locations)

Service offerings and plans vary and include text messaging, walkie-talkie and Blackberry devices. Plan offerings and pricing is much to complicated and in such a constant flux that it is very difficult be precise and to do apples to apples comparisons. Consumers are advised to comparison shop before signing contracts.

Broadband services and pricing

Jackson County is served with a variety of competitive broadband offerings, some areas more so than others. Services offered in the county include ISDN, T-1s, DS-3s, cable modems, DSL a growing wireless presence and fiber to the premise (see Appendix ## for a listing of providers, services offered and infrastructure maps). Yet a number of areas remain unserved, except for satellite provided services. These areas tend to be more rural in nature. The more densely populated areas of the county see competition from 2 or more providers.

Pricing for services is generally competitive with larger metropolitan areas but can be somewhat higher as you move out from the more densely populated areas.

County-level leadership, awareness and involvement in telecommunications planning

It's the opinion of the Advisory Committee members that county leaders do not talk periodically with private infrastructure providers about plans and needs in serving the county, that they are not engaged in telecommunications planning at any level. The Advisory Committee does not believe that county leaders have yet to publicly recognize local technology infrastructure providers and businesses that are bringing cutting edge information technologies to the county.

The county has not identified businesses or other entities with advanced telecommunications needs nor has it inventoried its telecommunications infrastructure assets. The county has not to date inventoried its potential aggregated demand for telecommunications services nor projected the need for high-speed/broadband services and infrastructure for the next 3 to 5 years.

County governmental entities do not use their purchasing power to support telecommunications services upgrades in the county.

The county leadership has not made site visits to "leading edge" counties in the deployment of high-speed/broadband services and infrastructure. In all fairness very few Oregon counties may be considered "leading edge" in their deployments.

Rights of Way and Construction

New subdivisions are not required to set aside telecom rights of way in most areas under Jackson County administration. Similarly developers are not required to install telecom duct, except in Central Point. There is no requirement for developers to turn over telecom duct to the county.

New buildings are not required to have structured wiring meeting Cat5e/Cat 6 standards.

It's not clear to the Advisory Committee whether or not governmental entities ensure the installation of duct and/or fiber just before repaving streets.

Light poles with built in mounting brackets for wireless access points are not being installed when replacing streetlights or putting in new streetlights. Medford attaches their MESH network devices with mounting brackets.

Reasonable rights-of-way fees are in place for all telecommunications providers per the Advisory Committee. Providers may have another opinion.

There are questions as to whether or not simplified application processes for telecommunications providers are in place.

The county may have some telecommunications infrastructure such as duct, fiber, or access points which can be leased to providers.

Current status of telecommunications in Jackson County

The Advisory Committee believes that many residences and business have cable modem, DSL or some form of wireless service available. Mobile digital wireless service is available in some locations. Cellular phone services are available to most homes and businesses.

Projection for telecommunications infrastructure in Jackson County

The Advisory Committee believes that with appropriate forward-leaning action that in 5 – 10 years all residences and businesses will have access to broadband -- fiber to the premises, cable modem, DSL or wireless service. Mobile digital wireless service as cellular phone service will be available throughout the community. Satisfaction with broadband services will be high.

Recommendations in this category

The Advisory Committee prioritizes future telecommunications infrastructure development in Jackson County as a ***high priority***.

Public Access, Technology Literacy, and Technology Training

Telephones and basic services

In Jackson County we believe that most residents that want a telephone have one. For those with income issues basic telephone services are available through the Lifeline program financed under the federal Universal Services Fund.

The Lifeline telephone discount program gives people with low incomes a discount on basic monthly service for the phone at their principal place of residence. This can be a wireline or wireless phone. The Link-Up program pays for a portion of the wireline or wireless installation or activation fee, not including the handset (see http://www.fcc.gov/cgb/getconnected/background.html).

Lifeline and Link-Up for Qwest Customers in Oregon
(http://www.lifelinesupport.org/li/consumers/states/or/qwest.asp)

In Oregon, Lifeline is known as Oregon Telephone Assistance Program (OTAP). You will save up to $13.50 on your phone bill. These benefits apply to your local telephone service charges that you purchase as a flat rate service, measured service and local service purchased as part of a bundled service. These benefits will also cover your subscriber line charge.

You're eligible for Lifeline if you participate in any of the following programs:

- Food Stamps
- Supplemental Security Income (SSI)
- Medicaid
- Oregon Health Plan
- Total Income (total household gross income does not exceed 133% of the Federally
- established poverty levels set forth for the number of persons in applicant's household.)

Lifeline can only be used for the main telephone line in a household. Lifeline customers may purchase all services offered to non-Lifeline customers. The name on your phone bill must match the name of the participant who is eligible for the program.

To apply for Lifeline call the Oregon Public Utilities Commission (PUC) at 1-800-848-4442, or in Salem at 373-7171 to be certified for eligibility. Your Lifeline benefits will take effect when proof of eligibility is received.

Eligibility is reviewed periodically. Your benefits will be discontinued when you no longer meet eligibility requirements or when proof of eligibility is not received.

There are other options that can help you save money, including the free toll blocking and waived deposit with toll blocking.

Link-Up, another program, helps households pay the installation charge for telephone service. This program pays some of the cost of installing local service in your home, but Link-Up does not cover the cost of wiring inside your home. Link-Up will pay 50% of your installation charges. The maximum benefit is $30. If you qualify for Lifeline, you also qualify for Link-Up. Your Link-Up benefit will be activated immediately upon request, however, you have sixty (60) days to provide proof of eligibility and still receive Link-Up.

To apply for Link-Up you will follow the same application process as Lifeline and the same proof of eligibility as Lifeline.

Being a Lifeline or Link-Up customer does not protect you from being disconnected if you fail to pay your telephone bill.

Sprint Customers in Oregon
(http://www.lifelinesupport.org/li/consumers/states/or/sprintor.asp).

You will save up to $13.00 for you basic monthly bill. These benefits apply to your local telephone service charges that you purchase as a flat rate service. These benefits will also cover your subscriber line charge.

You're eligible for Lifeline if you participate in any of the following programs:

- Food Stamps
- Low Income Home Energy Assistance Programs (LIHEAP)
- Medicaid
- Supplemental Security Income (SSI)
- Federal Public Housing Assistance (Section 8)

Lifeline can only be used for the main telephone line in a household. You may purchase any service available to a non-Lifeline customer.

To apply for Lifeline call 1-800-877-1125 to request an application. The Department of Social and Health Services will also identify customers who are eligible for enrollment in Lifeline. Your Lifeline benefits will take effect when proof of eligibility is received.

Eligibility is reviewed periodically. Benefits will be discontinued if proof of eligibility is not received or when you no longer meet eligibility requirements.

There are other options that can help you save money, including free toll blocking, waived deposit with toll blocking and voluntary limit on long distance calling (toll control).

Link-Up helps households pay the installation charge for telephone service. This program pays some of the cost of installing local service in your home, but Link-Up does not cover the cost of wiring inside your home. Link-Up will pay 50% of your installation charges. The maximum benefit is $30. The remaining balance of the service connection may be paid in four monthly installments with a minimum of $2.00 per installment.

If you qualify for Lifeline, you also qualify for Link-Up. You must provide proof of eligibility before the service can be activated. It can only be used for the charges for activating a new phone service or existing service to a new location. To apply for Link-Up you will follow the same application process as Lifeline and the same proof of eligibility as Lifeline.

Being a Lifeline or Link-Up customer does not protect you from being disconnected if you fail to pay your telephone bill.

Computer ownership and online usage

Anecdotal information indicates 55% or more of households have computers. This is consistent with findings from a number of studies. For example, in 2003, more than three out of four children (76 percent) ages 3 to 17 had access to a computer at home, up from 15 percent in 1984. Forty-two percent used the Internet at home; nearly double the percentage (22 percent) that had used it in 1997 (http://www.childtrendsdatabank.org/indicators/69HomeComputerUse.cfm).

Programs to recycle older computers to loan or give to low-income households exist in the county.

Anecdotal information indicates that 50% or more of Jackson County households are online. Findings from PEW indicate 136 million American adults now use the Internet. That is 67% of those 18 and older. Surveys show that 87% of teens (those ages 12-17) are online (http://www.pewinternet.org/ppt/Freedom%20to%20Connect%20Conference%20Speech.pdf).

75% or more of adult Internet users find information, compare, and buy goods and services online. Again this is consistent with PEW findings found at http://www.pewinternet.org/.

The libraries (15 in Jackson County), schools and senior centers provide places where residents who do not own a personal computer can use one to do work and to access the Internet.

Education and training

The public libraries offer some (limited) free training in the use of computer software and the Internet.

Students graduate from high school with computer skills on basic computer applications (e.g., word processing, spreadsheets, presentations, photo editing and digital video production).

RCC, SOU and workforce development programs offer classes on basic computer applications. There are volunteer groups in the county (e.g., ACES) that provide training on basic computer skills and Internet usage. Courses in digital photo editing are available as are courses in digital video editing, web site design and programming, database development and management, computer programming, courses and certifications in network management, and courses and certifications in network management.

For more advanced coursework and certifications you have to leave the area to attend training or take advantage of distance education offerings. This is not all bad as the stimulation and exchange of ideas that occurs with others from outside the area can be beneficial to introducing new ways of doing things in the county.

Videoconferencing facilities

Some internships are available in the county. More would be desirable.

Videoconferencing sites for public and private sector use in the county or in the region are available. Some examples include state offices, RCC, SOU, and SOESD. Some businesses have may have their own capabilities.

Community accessible facilities equipped for multimedia presentations for public and private use include the Smullin Center, RCC and SOU.

Use of Universal Service Funds

Eligible entities that receive support from the Universal Service Fund (USF) are schools and libraries. Healthcare entities do not receive relief from these funds. Eligibility and management of the fund is determined by the Universal Service Administration Company (USAC) (http://www.universalservice.org/default.asp).

Strengths of Public Access, Technology Literacy, and Technology Training

- Public libraries provide access, including wireless hotspots at 5 sites today
- Many options for access and training exist throughout the county
- SOU, RCC and SOESD
- OIT is just "over the hill"
- Widespread availability of broadband in densely populated areas means distance education is available (Issue: lack of broadband in rural areas of the county mean less opportunity for a quality DE experience)
- Significant in-service training provided at the larger healthcare institutions

Recommendations in this category

The Advisory Committee rates this as a ***very high priority*** topic and recognizes that we already have much to offer.

However, so that in five to ten years at least 90% of households are online, at least 90% of adults are Internet users and all advanced technology training needs can be met in the community or area we need to ensure:

- Improved communication and publicity of resources and opportunities
- Expand use of list serves to inform
- Provide a "one-stop" education portal for the county -- It takes a lot of Web searching to find information about the many educational opportunities in Jackson County
- Work to increase low enrollment in specialty classes often results in cancellations (need more publicity)
- Additional local training so that IT people don't have to go out of the area for advanced topics. Somewhat complex in that the perceived value of local expertise is low, so we have to send them elsewhere, even when the expertise to provide advanced training is here. However, this is not all bad as the stimulation and exchange of ideas that occurs with others from outside the area can be beneficial to introducing new ways of doing things in the county.

Economic development and ecommerce

Recognition of growing importance of telecommunications to economic development

Jackson County does not have an economic development strategic plan that addresses the growing role and importance of high-speed/broadband telecommunications and other technologies. As such there is no official recognition per say of opportunities and threats posed by the Information Economy. There does appear to be a general but somewhat vague awareness of the issues.

IT-related business recruiting

There no formal coalition of public and/or private organizations who support the development and recruitment of information technology (IT) businesses or businesses with a high use of IT. The Southern Oregon Telecommunications and Technology Council (www.sottc.org) provides

forums and makes available technical expertise to the area but does not actively engage in recruiting or workforce development issues. SOREDI actively and successfully promotes the region but does not focus on recruiting of IT businesses per say.

SOREDI has targeted some information-based businesses for development and recruitment to the county. Here we can include:

Back-office businesses such as finance centers, title companies, insurance companies;
Inbound call centers providing order taking or customer service;
Telemarketing firms;
Brokerage firms;
Retail or wholesale businesses that also have online sales; and
Regional headquarters of companies

The consensus of the Advisory Committee was that this effort could be stronger, including outreach to the above as well as:

Video or audio development companies;
Software development companies;
Regional headquarters of companies; and
Information technology manufacturers (but not too many)

Information technology workers

We are assisting businesses by developing information technology workers but the effort could be even stronger. While we are assisting businesses by developing IT workers, we are not assisting businesses in the recruiting of information workers. In addition we need to strengthen support for moving from information workers to knowledge workers. Here the discussion was one of promoting workforce development that includes giving workers training in how to apply the use of data.

Opportunity for improvements to permitting and inspection processes

A growing opportunity is for city, county, and regional authorities to "fast track" approvals for construction, site plans, utility extensions, inspection, etc. in order to meet a new or expanding business's time frame. Recent newspaper articles have conveyed a sense that we have many opportunities for improvement on this topic.

Incentives and business development assistance

Economic development leaders have fashioned incentives that fit information-based businesses, in particular the e-commerce overlay on the economic zone. This has yielded a substantial benefit to the area. In this instance it's a tax credit. Other incentives are addressed on more of a case-by-case basis. These may be customized training programs through RCC's Small Business Development offerings, property tax incentives or other innovative programs.

The area has a program assist information technology businesses through the auspices of the Business Development Team of RCC /SOU. Companies must pay for this valuable service. There is no true "business incubation" facility or approach in the region. Attempts to foster such have not been sustainable to date.

Telecommuting and lone eagles

There is considerable anecdotal information to indicate a presence of telecommuting work from home through information technology. It's hard to get hard data on this, as it is somewhat of a "stealth" business (not reported through the usual data collection processes).

The county has a number of "lone eagles," professionals who are able to work anywhere they choose because of information technology. But as for the telecommuters, this is a difficult category of workers to track. There is not an official policy or program to attract "lone eagles."

Availability of data/information on Jackson County

Sites and facilities	SOREDI, www.soredi.org **
Telecommunications infrastructure	SOTTC, www.sottc.org ** SOREDI, www.soredi.org ** J Irwin Community Informatics, www.callineb.com **
Utility services **	Utility permit general requirements http://www.co.jackson.or.us/Page.asp?NavID=1134 Electricity: Bonneville Power Administration, http://www.bpa.gov/corporate/ Pacificorp, http://www.pacificpower.net/Homepage/Homepage35759.html City of Ashland, http://www.ashland.or.us/Page.asp?NavID=8 Gas: Avista Natural Gas, http://www.avistacorp.com/
Labor statistics including availability, skill levels, and wage levels for representative job classes	Oregon Labor Market Information System, www.qualityinfo.org/olmisj/OlmisZine
Training programs	The Job Council, www.jobcouncil.org Rogue Valley Workforce Development Council, www.rvecn.org
Incentive programs	SOREDI, http://www.soredi.org/Page.asp?NavID=42
Educational institutions	Southern Oregon University, www.sou.edu Rogue Community College, www.roguecc.edu Oregon State University Extension, http://extension.oregonstate.edu/sorec/
Housing information	Southwestern Oregon Regional Resources & Links, http://www.ohcs.oregon.gov/OHCS/DO_RADSW.shtml Housing Authority of Jackson County, http://www.oraoha.org/orepgs/jackson.htm
Permits and other related requirements	Planning and Development Services (w/links to other local government sites), http://www.co.jackson.or.us/SectionIndex.asp?SectionID=30
Contact people**	SOREDI - Business assistance and industrial relocation services for Southern Oregon. Data and other regional information relevant to site location consultants, commercial real estate brokers, and

	corporate executives involved in community and site selection. - www.soredi.org **

Table 29 The county has Websites with information on the following:
** Could be better

Recognition of businesses who use technology

The chamber of commerce(s) recognize businesses but do not have a specific form of recognition for those that are innovatively using information technology in the county. Perhaps this is because the chambers tend to recognize growth and not leveraging of technology that might result in downsizing.

Technology parks

There is no specific technology park per say in the county. There are locations that house information technology businesses (e.g., Harry & David Holdings, Inc. on the Pacific Highway just outside of Medford or Musicians Friend just off of Biddle near the Airport).

Technology support services

Information technology support services (i.e., computer and printer repair services or network support services) exist throughout the county.

Cluster development -- IT

Local or state economic development officials have not to date directed their efforts to create "clusters" of similar types of information businesses. However, an e-Commerce Zone is designated for a large part of the Medford area.

e-Commerce educational resources

Resources do exist in the county for businesses who want to learn to conduct electronic commerce (e.g., Rogue Community College Small Business Development Center, http://www.roguecc.edu/SBDC/, Certificate in Interactive Marketing and e-Commerce, http://www.sou.edu/business/).

Business uses of the telecommunications and the Internet

Many businesses of all sizes are using broadband and/or have a Web site. Determining the percentage of such would require a costly survey and is not within the scope of this assessment.

Most local businesses accept credit card payments or other types of payments that can be made electronically.

While we can't be sure of the percentage of use without conducting an in depth survey, businesses in the county use the Internet to:

Research market information
Research competitors' offerings and prices
Send e-mail and transfer documents

Track government and large company procurement announcements
Advertise products
Sell products over the Web using pre-existing business relationships
Sell products using a toll-free number advertised on the Web
Sell products over the Web using credit card transactions

Web and Internet services

Most local businesses on the Internet appear to have their own domain names. Also there are those who use online trading sites such as e-Bay.

More than one business in the county offers Web design services.

Local Internet service providers host Web sites for local businesses. There are multiple Internet service providers hosting Web sites.

Product shipping

There are multiple local outlets for shipping products in a timely manner (e.g., FedEx, USPS and UPS).

Business uses of technology

These technology-based tools are in general use by many small businesses of all sizes in the county:

Accounting/bookkeeping
Inventory management
Bar codes
Wireless scanners
Fully integrated retail systems (Point of Sale, Inventory Management, Ordering, etc.)
Computer Aided Design/Computer Aided Manufacturing
Security systems

It's not clear how many businesses have a business plan that incorporates information technology.

Jackson County's economic development and e-commerce readiness

There is some recognition in the county that information technology is an economic development tool. Some local businesses are using information technology effectively to improve productivity and expand markets. Most small businesses are using information technology to one degree or another to improve productivity and expand markets. A large number of businesses have a Web site and are conducting business in one way or another online.

Strengths, resources and assets in the area of economic development and e-commerce

The Advisory Committee identified a number of strengths:

- SOREDI

- e-Commerce Zone designation
- Infrastructure – power, telecom, highways/roads, water, etc.
- Quality of life
- Education at all levels
- Availability of job training
- Excellent healthcare
- Growing population "baby boomer" retirees
- Rapidly becoming a destination area of choice
- Proximity to California
- Transportation – air, roads, rail
- Tax structure
- Workman's compensation rates
- Connectivity
- Concerted effort to market Oregon

Recommendations in this category

The Advisory Committee rates this as a very high priority and recommends:

- A more concerted and organized effort
- Development of opportunities for lateral job movement/depth of job offerings
- Focus efforts on developing an information age workforce
- Develop more affordable housing
- Career ladders -- entry-level positions with opportunities to move up
- More focus on small businesses, especially those that already exist
- Lots of "things" already exist that could be utilized through a more proactive mind-set
- Shape perceptions – the way in which we market the area is critical
- Lack of appropriately zoned land
- Emerging traffic patterns indicate potential issues for the future
- Use of an integrated planning process with frequent monitoring of progress and appropriate adjustments

Non-profits, Arts, Culture and History

Use of Websites by local non-profits

A great many not for profit organizations in the county have a Web presence. But the Advisory Committee notes that many seem to be out of date, some more than others. There is no centralized resource (e.g., a portal) that lists the not for profit Websites in the county.

Use of e-mail

Email is used to communicate with community members, especially with those within the group. Some organizations use it for outreach but generally to recipients designated as being open to this form of communication. It is not generally used for a first contact with a recipient as this might be construed as SPAM and could result in a negative view of the organization.

Some organizations do a good job of maintaining a contact database and/or have set up a list serve to facilitate and track e-mail communications.

Some organizations in the county are doing online fundraising. Examples include:

Living opportunities
www.lopp.org

Community Works
www.community-works.org

Local service organizations donate time
A number of organizations donate time and equipment to improve information technology in the schools, libraries, or community centers. A few examples include Kiwanis Club, ACES, and Harry & David.

Several locations provide public access where a not for profit can use an Internet-connected PC. Examples include Oregon State University Extension (10 PCs), RCC, Jackson County Public libraries. Note that most of these locations, except for the libraries, are in the more densely populated areas in and around the Medford-Ashland area/

Used computer renovations or donations
A number of organizations also provide personal computers to social service organizations or disadvantaged families.

Information available on the Internet

Visual arts (galleries and exhibits, organizations, arts classes and instruction)
Music (organizations, performance, classes and instruction)
Theater (organizations, performances, training and instruction)
Local artists

JPR, RRCC, SOU, JC Website, SOVA, Chambers of commerce and others. No "one-stop" Website available.

Recommendations in this category

The Advisory Committee rates this category as a ***moderate to high priority***. So that in five years 75% of non-profits and community-based organizations have informational Websites and use e-mail. A unified portal will provide access to a broad range of community information and services. Community-based organizations and non-profits will be actively using information technology to engage people in the community and make their services available.

To make this a reality we need to take steps to increase:

- availability and affordable broadband in rural areas,
- knowledge of how to incorporate the use of telecommunications and technologies into strategic and tactical processes,
- awareness of resources such as Netcorps (www.netcorps.org), and
- awareness of open source software as a way to reduce application acquisition expenses (e.g., browsers, email, office productivity applications - word processing, spreadsheets, presentation, database, Web authoring, etc.).

Public Library Services

Mission

The mission of the Jackson County Library is to preserve intellectual freedom and strengthen the communities it serves by providing open and affordable access to ideas and information.

To achieve its mission, the Jackson County Library has three primary roles:

- to be the open door to learning and reading for preschool children;
- to give excellent reference assistance to individuals and organizations seeking information;
- to provide popular materials for reading, listening and viewing for all ages.

As a secondary role, the library serves as a support center for formal education.

Governance, funding and organization

Public library services are provided to people by Jackson County government, which is overseen by a Board of Commissioners composed of three persons elected by county residents.

To advise them on library matters, the Board appoints seven citizens to a Library Advisory Committee. The committee meets monthly; minutes for recent meetings are available online. Meetings are open to the public and anyone who wishes may discuss matters with the committee.

The funding for library operations is primarily from property taxes approved by the voters. Funding for the future is uncertain. The Board of Commissioners has suggested that, faced with Jackson County's impending budget shortfall due to loss of O & C revenue, which will no doubt impact library services, cities might be able to share the cost of supporting the libraries. This and other options are being considered, e.g., fees for extraordinary transactions.

Jackson County Library is part of the Southern Oregon Library Information System (SOLIS) consortium. This consortium shares an automated library system and includes Josephine County Library System and Rogue Community College libraries. Patrons from any one of these jurisdictions can have library material sent to their own library for borrowing via the common online catalog, which all three jurisdictions share.

Locations

Jackson County library services are available at 15 sites throughout the county as well as through online services provided through Southern Oregon Library Information Services (SOLIS - http://www.solis.lib.or.us/) and the Jackson County Library System online (JCLS - http://www.jcls.org/index.html).

Central Library (WiFi enabled)
Headquarters Regional Services
205 South Central
Medford, Oregon 97501

Ashland Regional Library (WiFi enabled)

South County Regional Services
410 Siskiyou Blvd.
Ashland, Oregon 97520

Applegate Branch Library
West County Regional Services
18485 N. Applegate Rd.
Applegate, Oregon 97530

Butte Falls Branch Library
Upper Rogue Regional Services
626 Fir Street
Butte Falls, Oregon 97522

Central Point Branch Library
West County Regional Services
116 South Third Street
Central Point, Oregon 97502

Eagle Point Branch Library (WiFi enabled)
Upper Rogue Regional Services
239 W. Main Street
Eagle Point, Oregon 97524

Gold Hill Branch Library (WiFi enabled)
West County Regional Services
202 Dardanelles Street
Gold Hill, Oregon 97525

Jacksonville Branch Library
West County Regional Services
340 West "C" Street
Jacksonville, Oregon 97530

Phoenix Branch Library
South County Regional Services
110 West Second Street
Phoenix, Oregon 97535

Prospect Branch Library
Upper Rogue Regional Services
150 Mill Creek Drive
Prospect, Oregon 97536

Rogue River Branch Library (WiFi enabled)
West County Regional Services
412 E. Main
Rogue River, Oregon 97536

Ruch Branch Library

West County Regional Services
7919 Hwy 238
Ruch, Oregon 97530

Shady Cove Branch Library
22477 Hwy 62
Shady Cove, Oregon 97539

Talent Branch Library
South County Regional Services
105 North "I" Street
Talent, Oregon 97540

White City Branch Library
Upper Rogue Regional Services
3143 Avenue C
White City, Oregon 97503

Systems and networking

Jackson County public libraries have an automated catalog and circulation system. They have online reference tools available to patrons. The public libraries are networked with state and regional library systems, but it's not seamless today. They are networked with libraries in Josephine and Jackson counties, including Rogue Community College, Southern Oregon University and other university libraries in Oregon and Washington.

Remote access is available to search the library catalogs and request renewals or inter-library loans. Librarians are trained to use information technology as a research tool.

Online database access and links to other resources

Access to online databases from the SOLIS Website include:

<u>The Oregonian</u>
Archives of The Oregonian newspaper, 1988-Current. Complete full-text content of local and regional news, including community events, schools, politics, government politics, cultural activities, local companies, state industries, and people in the community. Paid advertisements are excluded. A SOLIS Library card is required.

<u>L-Net</u>
L-net is an online service of Oregon's libraries (formerly called Answerland). L-net is staffed by librarians from all over Oregon and the person you are talking with or who will answer your question may not be working for the library that you usually visit. E-mail service is available 24 hours a day, 7 days a week, except for holidays. E-mail your question to L-net and they will respond within 2 working days. Live chat service hours are: Sunday-Thursday, noon to 8 pm and Friday-Saturday, noon- 4 pm. All residents of Oregon may use L-net.

<u>EBSCOhost Web Online</u>
A variety of general and subject specific databases providing citations, abstracts and full-text magazine articles. Some newspapers, too. Try MasterFILE Premier for most searches. Students

and educators may want to use Academic Search Elite, Professional Development Collection, and ERIC. For business information, try Newspaper Source and Business Source Elite. For health issues, try Health Source: Consumer and Nursing/Academic editions, USP DI v. 2 Advice for the Patient, and Clinical Reference Systems. Also includes Searchasaurus for kids and TOPICsearch. A SOLIS Library card is required.

Access to the following is available through the Jackson County Library Web site (http://www.jcls.org/database.html):

Academic Search Premier
Agricola
Alt HealthWatch
Business Source Premier
Chilton's Automotive
Clinical Pharmacology
Computer Source
Contemporary Authors
EBSCO Animals
EBSCOHost
ERIC
Foundation Directory Online
Fuente Academia
Funk & Wagnalls New World Encyclopedia
Health Source -Consumer Edition
Health Source -Nursing/Academic Edition
HeritageQuest
Kids Search - Kindergarten - 5th grade
Learning Express Library
Legal Collection
LitFinder
Magill on Literature
MAS Ultra - School Edition
MasterFILE Premier
MedicLatina
MEDLINE
Middle Search Plus
Military & Government
Mitchell's Automotive Online
Newspaper Source
NoveList
Opposing Viewpoints
Oregonian
Primary Search
Professional Development Collection
Psychology and Behavioral Sciences
Regional Business News
Religion and Philosophy Collection
Searchasaurus
SIRS
Student Research Center 6th - 12th grade

TOPICsearch
Vocational and Career Collection
World Book Online

A variety of other links can be found at the JCLS Web site, for example:

Home Schooling
http://www.jcls.org/jr_homeschooling.html

Kid Stuff…

Internet Game Sites For Kids
http://www.jcls.org/jr_gamesites.html

A Game A Day 2005
http://www.agameaday.com/

Sesame Street Games
http://www.sesameworkshop.org/sesamestreet/

Fact Monster
http://www.factmonster.com

Teens…

Research Resources - Almanacs, Dictionaries, Encyclopedias and more.
www.jcls.org/ya_research.html

Homework Helper at Refdesk.com - Many useful Homework Help links
www.refdesk.com/homework.html

Multnomah County Library Homework Center - All the help you need from the School Corps
www.multnomah.lib.or.us/lib/homework/index.html

Ask Oxford - The Ultimate Dictionary
www.askoxford.com/

Michigan Electronic Library - An electronic collection at your fingertips
mel.org/

Ask a Jackson County Librarian - Submit an online question to our reference librarians
www.jcls.org/ask.html

L-Net - Oregon's Virtual Reference Desk - Ask your question in real time chat with a reference librarian
www.oregonlibraries.net/

Favorite links…

Articles (newspaper/magazine)
Arts
Automotive
Baby Names

Biography
Books
Business / Investing
Census
Consumer
Cooking / Recipes
Dictionaries/Encyclopedias
Education
Elections
Email for Free
Español
Entertainment / Recreation
Genealogy
Government
Grants and Charities
Health / Medicine / Nutrition
History
Homework
Internet Search Engines
Jobs / Careers
Languages
Law / Legal information
Libraries
Literature
Maps / Geography / Travel
Music
News and Newspapers
Online Auctions
Oregon
Phone Directories
Quotations
Science/Math
Seniors
Tax Information
Tests / Test Preparation
Transportation
Travel
Weather

Search Engines…

Links are provided to 21 Internet search engines from the SOLIS Web presence as well as from the JCLS site.

Coming in January…

Downloadable books on audio.

Public libraries e-readiness

The library actively promotes information technology through classes and providing individual assistance. Technology is effectively used to make resources more accessible to patrons and to improve efficiency. Wireless capabilities are available in 5 of the public libraries. All libraries have public use, on line PCs. Word processing is available at each of the libraries.

Our strengths in the area of public library e-readiness

- Interested staff
- Good infrastructure
- Large number of computer workstations, although we could use many more for the public's use
- A number of resources available remotely that you can't get to through Google
- Visionary leadership

Recommendations in this category

The Advisory Committee for Jackson County rated public library e-readiness as a ***very high priority***.

- More IT support
- More public workstations
- More e-Resources
- More empowerment to the patron
- Sustainable funding

So that in two to five years…

The library actively promotes information technology through classes and providing individual assistance. Technology is used to make resources more accessible to patrons and to improve efficiency. All libraries have wireless Internet available. There are sufficient numbers of workstations to meet patrons' needs.

Education

Technology plans

The public school systems do have technology plans and have integrated technology into daily usage in one form or another. The Southern Oregon ESD Website has information posted at http://www.soesd.k12.or.us/SectionIndex.asp?SectionID=139 with links to each of the school districts in Jackson County and beyond. Districts vary on the information posted but all indicate a commitment to use of technology and programs to help students gain digital skills of one type or another.

Ashland
Juli Di Chiro, Superintendent
885 Siskiyou Blvd.
Ashland, OR 97520

Phone: 1-541-482-2811
Fax: 1-541-482-2185
http://www.ashland.k12.or.us/

Butte Falls
Steve Pine, Superintendent
720 Laurel Street / PO Box 228
Butte Falls, OR 97522
Phone: 1-541-865-3563
Fax: 1-541-865-3217
http://www.buttefallsschools.org/

Central Point
Randy Gravon, Superintendent
300 Ash Street
Central Point, OR 97502
Phone: 1-541-494-6200
Fax: 1-541-664-1637
http://www.district6.org/

Eagle Point
Bill Feusahrens, Superintendent
11 North Royal / PO Box 548
Eagle Point, OR 97524
Phone: 1-541-830-6554
Fax: 1-541-830-6550
http://www.eaglepnt.k12.or.us/

Medford
Dr. Phil Long, Superintendent
500 Monroe Street
Medford, OR 97501
Phone: 1-541-842-3621
Fax: 1-541-842-1087
http://www.medford.k12.or.us/

Prospect
Don Alexander, Superintendent
160 Mill Creek Drive / PO Box 40
Prospect, OR 97536
Phone: 1-541-560-3653
Fax: 1-541-560-3644

Phoenix-Talent
Ben Bergreen, Superintendent
401 4th Street / PO Box 698
Phoenix, OR 97535
Phone: 1-541-535-1511
Fax: 1-541-535-3928
http://www.phoenix.k12.or.us/

Rogue River
Charles Hellman, Superintendent
1898 East Evans Creek / PO Box 1045
Rogue River, OR 97537
Phone: 1-541-582-3235
Fax: 1-541-582-1600
http://www.rogueriver.k12.or.us/

Private schools in the area also appear to have a similar integration of the uses of technology.

Private Schools – Medford:

Grace Christian
St. Mary's
Sacred Heart
New Dimension
Access
Cascade Christian

The colleges and universities have a technology plans and have integrated technology throughout the curriculum, as appropriate.

Southern Oregon University
Elisabeth Zinser, President
1250 Siskiyou Boulevard, Ashland, OR 97520
(541) 552-7672
Medford Campus
229 N. Bartlett St. in Medford
(541)552-6331
http://www.sou.edu/

Rogue Community College
http://www.roguecc.edu/

Riverside Campus
227 E. Ninth St. (mailing)
Medford, OR 97501
(541) 245-7500

Table Rock Campus
7800 Pacific Avenue
White City, OR 97503
(541) 245-7500

Teachers and other faculty continually receive training to use information technology as a teaching tool.

Students demonstrate some level of technology proficiency throughout their assignments.

Computers, in laboratory or classroom settings, are available for daily use by all students. In schools they go to a library of learning center. Many schools do have at least one computer in the classroom for teacher use. A number of classrooms are also equipped with projection devices to use in conjunction with the PC.

The Internet is available and used in the classroom as a teaching aid and not simply for browsing. Usage varies among schools and curriculum offerings.

School computers are networked within and between schools in the county school systems. Many are connected with a state of the art fiber-optic system.

Some youth are involved in technology projects with senior citizens and the business community. This is an area that could be bolstered.

Schools do have Web pages with information about programs, current events, student and teacher achievements, and PTA information.

A number of schools have interactive Web pages, including password protected access to homework assignments, attendance records and other mechanisms for parent as well as student involvement.

Students, teachers, parents, and administrators are using e-mail to communicate.

Most teachers have convenient access to telephones, with a phone in the classroom.

Two-way interactive distance learning (videoconferencing) and/or Web-based courses are used to expand course offerings for students as well as for faculty meetings and training..

Adult education classes in computer technology are offered by the county's educational system. K-12, colleges and universities offer a variety of technology courses in the county.

Schools struggle to work within increasingly scare funds.

The AC rated the county's education e-readiness as a very high priority and acknowledges the many improvements that have occurred in the past few years. However, there are serious questions regarding the future of education in the area if n the face of budget scarcities, aging facilities and seeming flagging support for our schools.

Healthcare

Many healthcare practitioners use videoconferencing for specialist consultation.

Teleradiology technology is available for rapid reading of X-rays by radiologists. Institutions also have invested in drug related systems. With the recent advent of the Southern Oregon Medical Network we see a greatly expanded opportunity for sharing of all sorts of medical related data.

Currently, videoconferencing is NOT used for home health care visits to elderly and disabled persons.

Many of the county's healthcare providers maintain Electronic Health Records. They are, however, held in a variety of proprietary systems that require additional effort to extract and share the data in a usable format. As such, medical records that are maintained in a digital format are not readily accessible in a single database or format.

Videoconferencing is used for in-service training of healthcare practitioners, especially at the larger institutions.

The Southern Oregon Medical Network connects a number of healthcare and medical service providers. Others have the option to join in.

Healthcare entities share medical records electronically but that requires some reformatting of data due to the variety of application systems in place.

The major healthcare facilities in the community do have Web sites.

Ashland Community Hospital
280 Maple Street
Ashland, OR 97520
(541) 482-2441
http://www.ashlandhospital.org/

Providence Medford Medical Center
1111 Crater Lake Avenue
Medford, OR 97504
PH: (541) 732-5000
http://www.providence.org/medford/

Rogue Valley Medical Center
2825 East Barnett Road
Medford, Oregon 97504
(541) 608-4900
http://www.asante.org/

Many clinics and doctors offices in the county also have a Web presence. The Jackson County Medical Society list 383 physicians (http://www.jcmsonline.org/default.asp).

We have yet to see Websites that allow for patients to gain access to their records. This remains in the domain of the providers.

None of the local entities maintain a 24 x 7 "ask a nurse" service. Some provide the opportunity to pose questions but do not guarantee a response time.

Recommendations in this category

The AC rated healthcare's e-readiness as a very high priority. There is a perceived need to rapidly develop the use of EHR's, as well as to see a greater demonstration by the major institutions to work together in a more collaborative and cooperative fashion. County residents feel that there is excessive competition between Asante and Providence to the general detriment of the community.

Local Government and Community Services

Telecommunications and information networking collaboration and cooperation

Local governments do not collaborate on telecommunications and information networking infrastructure. The public view of cooperation between the City of Medford and the County was cited as an example of where there is a great opportunity for increased collaboration. Many see this relationship as "hostile," "uncompromising" generally detrimental to the county as a whole.

Computers in local government are networked within buildings and between offices. There is very limited direct networking across jurisdictional lines (e.g., planning departments). Use of Web-based applications over time may change the perceived need for direct linkages.

Local governments attempt to include budgeted funding for technology upgrades and employee training. But it depends. Training is one of the first budget areas to be cut, especially in the face of revenue constraints.

Involvement with state-level networking policy formation

Local officials and representatives do play a role in state-level information networking policy formation. The involvement is generally at a very high level and in an indirect manner (except for the ORTCC's direct involvement with legislation development and recommendations), examples include:

- Marc Christiansen, CIO Jackson County, acting through membership on the Oregon Association of Government Information Technology and Management (www.oagitm.org)
- John Irwin, Oregon Telecommunications Coordinating Council (www.ortcc.org), chair.
- County Commissioners through their participation on the Association of Oregon Counties (www.aocweb.org).
- City Councils and managers through their participation on the League of Oregon Cities (www.orcities.org).

Existing local ordinances been not been reviewed and modified to remove anti-technology bias. But there is also no known example that this sort of bias exists.

Local government Websites

The local governments have Web sites in varying degrees of information posted and ability to do online transactions. Examples include:

In an August, 2005 review of all Oregon county Websites[115], none posted any information about their telecommunications infrastructure.

Entity	***Meeting agendas***	***Meeting minutes***	***Budget documents***	***Audio/Video of Meetings***	***Property tax appraisals***	***Ordinances***	***Land use and zoning maps***	***Information for new or prospective residents***	***Permits, forms, and applications***	***Perform online information searches***	***Online transactions***	***Online RFP/Bid postings***
Jackson County www.co.jackson.or.us	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ashland www.ashland.or.us	Y	Y	Y	Y	N	Y	Y	L	Y	Y	Y	L
Butte Falls None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Central Point www.ci.central-point.or.us	Y	Y	Y	N	N	Y	Y	L	Y	Y	Y	N
Eagle Point www.cityofeaglepoint.org	Y	Y	Y	N	N	N	N	Y	N	N	N	Y
Gold Hill www.ci.goldhill.or.us	N	N	N	N	N	N	N	L	N	N	N	N
Jacksonville www.jacksonvilleoregon.org	N	N	N	N	N	N	N	Y	N	N	N	N
Medford www.ci.medford.or.us	Y	Y	Y	Y	N	Y	Y!!	Y	Y	Y	Y	Y
Phoenix www.phoenixoregon.net	L	L		N	N	Y	Y	L	Y	N	N	N
Rogue River www.rogueriver.org Note: community portal	N	N	N	N	N	N	N	Y	N	N	N	N
Rogue Valley Council of Governments www.rvcog.org	N	N	N	N	N/A	N/A	N	L	N/A	Y	N/A	N
Rogue Valley Metropolitan Planning Organization www.rvmpo.org	Y	Y	Y	N	N/A	N/A	N/A	N/A	N/A	Y	N/A	N
Shady Cove www.shadycove.net	N	N	N	N	N	N	N	Y	N	N	N	N
Talent www.cityoftalent.org	Y	Y	N	N	N	Y	N	Y	Y	N	N	N

Table 30 Categories of Information Posted on Jackson County Community Websites

L = Limited
N = No
N/A = Not Available or not applicable
Y = Yes

Online availability of health and human services information

Health and human service organizations do not have a centralized computer database of county resources. Services availability is addressed through Resource links on several sites in the county. Recently there was a move to create a centralized portal hosting this sort of information but we have not heard any updates in many months and so far there has been no announcement of progress of implementation dates. Development of such a portal would be consistent with the "one-stop" approach in the county's health and human services physical locations approaches.

Human service organizations do communicate with the public and each other electronically. Email is the primary vehicle for this activity (vs. Internet Messaging or other similar approaches).

Online community and events information

The county has numerous Web sites for the community with links to other local home pages and with information of specific interest to newcomers and visitors. A few examples include:

SouthernOregon.com
www.southernoregon.com

Rogue River Community Connections
www.southernoregon.com

City of Ashland
www.ashland.or.us

City of Medford
www.ci.medford.or.us

Southern Oregon Visitors Association
www.sova.org

Today In Ashland
www.todayinashland.com

eSouthernOregon.com
www.esouthernoregon.com

Jefferson Public Radio
www3.jeffnet.org

Online GIS information

There have been assessments of the overlapping data and/or mapping needs of local agencies such as the County Assessor, County Register of Deeds, city/county emergency response, city/county planning and zoning authorities, city/county public safety agencies, natural resources districts, local utilities and public works departments, economic development entities, and County Engineer/Highway Department. This includes an ongoing effort to determine what

digital maps, geospatial data or technical assistance is available through state government agencies.

City and county governments do cooperate to some extent in presenting computerized geographic information system information. For example, a number of city websites point to the Jackson County GIS resources (Jackson County Front Counter Application - http://web.jacksoncounty.org/fca/index.cfm), especially for property tax information. The cities of Medford and Ashland also post maps relative to their areas. The county resource is unique due to its search capabilities.

Rating of local and county government's e-readiness

- Many of the county and municipal governments post meeting announcements and materials online.
- Many of the area's Websites are updated regularly, while a number do not see regular updates.
- Many governmental employees appear to have their own e-mail address. However, many are not listed in online directories reducing direct access (see state of Oregon Web site for an example of how this might be presented, http://www.oregon.gov/state_contact.shtml).
- Citizens can conduct some online transactions via local government Websites.
- Governments across the county are on their way, with some distance to go, to use information technology to run operations more efficiently and to serve citizens 24 hours a day.

For the above reasons the Advisory Committee gave a rating of between 2 and 3 out of a possible 4. To achieve a rating of 4 there would need to be a 100% demonstration in each of the above categories.

Recommendations in this category

Continue to build on to the county's award winning Website as a central repository for countywide information. Cities should look to the Websites maintained by Ashland and Medford as examples of how they might improve their offerings. Increase the amount of linking between any and all Websites in the county.

Criminal Justice, Law Enforcement, and Emergency Services

The criminal justice agencies of the county are organized and they do face-to-face meet somewhat regularly.

All offices in the criminal justice community have the ability to exchange e-mail.

All offices in the criminal justice community can exchange documents electronically. However, we still hear of instances where a rural community drives paperwork to a central location.

All the criminal justice agencies use information technology to maintain their records.

Some criminal justice agencies use videoconferencing technologies for booking. Whether it's used for trials was not clear from the AC members.

All criminal justice agencies have immediate electronic access to:

Local criminal justice records
State criminal justice records
Federal criminal justice records

The communications systems of local criminal justice and emergency service providers would benefit from continuing a move to standardization among the various radio services utilized in the county. 29 jurisdictions are members of SORC. Medford maintains it's own systems. SORC and Medford maintain separate 911 call centers, which on occasion creates minor delays in responding to calls. All are underway with conversion to narrowband radio frequencies to comply with the FCC deadline of 2013.

In a pinch all emergency services be dispatched and controlled from a single point. However, SORC and those 29 jurisdictions are dispatched separately for Medford. Th eSORC HQ is also the state of Oregon's backup Emergency Operating Center.

Emergency service dispatch personnel collect, retain, maintain and access information about:

Emergency procedures for hazardous waste or toxic materials
Location of known hazardous waste or toxic material within their service area
Location of residences by road and/or telephone number
Road closings or other barriers to emergency vehicle dispatch

All the criminal justice agencies maintain continuing funding for technology support, systems enhancement or replacement, and training, although those funds are hard to come by. The need to comply with the FCC ruling has put additional pressure on the jurisdictions to replace radios. Also, new technologies that can have a big impact the quality of service place demands on budgets as well.

Recommendations in this category

The AC rates the e-readiness of criminal justice, law enforcement and emergency services as a very high priority. There is a need to ensure that all of our public safety workers are fully prepared for not only their daily communications activities but to also be prepared to communicate seamlessly during an emergency situation

Summary

Today we find ourselves confronting rapidly changing economic realities as well as the many existing challenges that present themselves to areas such as Jackson County with our mixture of urban and rural. Community discussion of ways to move the region forward frequently turns to the impediments of not having widely available and affordable advanced telecommunications infrastructure (i.e., broadband). However, in Jackson County we find there is a lack of understanding of the actual telecommunications resources available, even as we readily recognize that we have yet to connect the last household.

Education, healthcare, governments, businesses, not for profits, myriad other organizations, and individual residents all will be better positioned to take advantage of the benefits afforded

through both continued expansion of opportunities for sharing information and knowledge and through availability of 21st century education and skills training with the realization of the recommendations of this Strategic Plan. We have reached a point where we need to foster even greater increase utilization of the telecommunications resources available to us and to understand how to position ourselves for greater participation in the global economy.

Economic diversification is the cornerstone of a healthy, growing community. By taking full advantage of our telecommunications infrastructure, Jackson County is poised to become a world-class destination for a wide variety of businesses, healthcare, retirees and tourism. A 21st century county benefits from leveraging the communication technologies available to it, improving the quality of life and standards of living for all residents. Listed here are just a few of the ways in which we will all benefit:

- Access to world-class telecommunications services that will enable community leaders to actively recruit companies to the county.
- Family wage jobs will become the rule and not the exception due to expanded employment opportunities.
- New options will become available for businesses to establish operations in rural areas as well as providing employees with the choice of working from their homes.
- Educators and students alike will have the opportunities to develop skills and knowledge by employing telecommunication services to work with and learn from people around the world.
- Healthcare options will grow dramatically for communities and their residents in the area. Online consultations, diagnostics, and patient monitoring will be available to those requiring special assistance. Medical staff will have access to state-of-the-art training.
- Public safety, of greater concern than ever before, will operate with improved efficiency and responsiveness.
- Housing will become more affordable due to rising incomes of prospective homebuyers.

Appendix 1 - Terms used in Oregon to describe communication service providers[116]

	Holders of Certificates of Authority from OPUC					
Communications Provider	**Cooper-ative**	**CLEC**	**ILEC**	**IXC**	**Radio & Wireless**	**Data & Internet**
Definitions for OPUC under Oregon Revised Statute (ORS) Chapter 759:						
Call aggregator		X		X		
Carrier	X	X	X	X	X	X
Competitive local exchange carrier (CLEC) or intraexchange carrier	X	X	X			
Competitive provider (CP)		X		X		
Incumbent local exchange carrier (ILEC)	X		X			
Interexchange carrier (IXC)	X		X	X		
Reseller		X				
Shared service provider		X				
Telecommunications carrier	X	X	X	X		
Telecommunications provider	X	X	X	X		
Telecommunications utility			X			
Definitions for Dept. of Revenue under ORS Chapters 305-317:						
Communications utility – for property tax	X	X	X	X	X	X
Public utility – for income tax		X	X	X	X	X

Table 31 Telecommunications Terms that are Commonly Used in Oregon[117]

Telecommunications carrier in Oregon

A telecommunications carrier is a telecommunications provider that provides any retail telecommunications services, except a call aggregator (pay phones) (ORS 759.400). For purposes or telecommunications service quality standards under ORS 759.450, however, each telecommunications cooperative, radio communications service provider, radio paging service provider, commercial mobile radio service provider, personal communications service provider, and cellular communications service provider is excluded.

Telecommunications provider in Oregon

A telecommunications provider may be a competitive provider, competitive local exchange carrier (CLEC), incumbent local exchange carrier (ILEC), interexchange carrier (IXC), shared service provider, reseller, telecommunications utility, telecommunications cooperative, or telecommunications association. For information about specific providers, see http://www.puc.state.or.us under Telecommunications, Telecommunications Providers, and Utility Search Page.

Competitive provider in Oregon?

According to ORS 759.005(2)(a), a competitive provider is a "telecommunications service provider which has been classified as such by the Public Utility Commission pursuant to ORS 759.020." A competitive provider may offer local exchange service and/or interexchange service.

Competitive local exchange carrier (CLEC) in Oregon

A CLEC has certificate(s) of authority in Oregon under ORS 759.020 and ORS 759.050 to provide intraexchange service only or to provide intraexchange and interexchange services.

Incumbent local exchange carrier (ILEC) in Oregon

Under ORS 759.025, ILECs are telecommunications utilities, cooperatives, and associations. For information about specific providers, see http://www.puc.state.or.us under Telecommunications and Exchanges of Incumbent Local Exchange Carriers.

Telecommunications utility in Oregon

Under ORS 759.005 and ORS 759.025(1), a telecommunications utility is any person, company, or corporation that provided intrastate telecommunications services *to the public* on January 1, 1986, and is an incumbent local exchange carrier. ORS 759.040 divides the telecommunications utilities into two categories: 50,000 or more access lines (large telecommunications utilities) and fewer than 50,000 access lines (small telecommunications utilities).

Telecommunications cooperative or association in Oregon

Under ORS 759.005(1)(b)(B) and ORS 759.025(2), a telecommunications cooperative or association is one of 11 incumbent local exchange carriers that does *not* provide intrastate telecommunications service *to the public* in Oregon.

Public utility in Oregon

Under ORS 757.005, a "public utility" produces, transmits, delivers, or furnishes heat, light, power, water, or wastewater services to or for the public.

Under Department of Revenue statutes, however, a public utility includes telecommunications utilities and other telecommunications providers whose rates are established or approved by any governmental agency. According to ORS 305.655 Article IV subsection (1)(f) and ORS 314.610(6), a public utility is any business entity (1) which owns or operates any plant, equipment, property, franchise, or license for the transmission of communications . . . and (2) whose rates of charges for goods or services have been established or approved by a federal, state or local government or governmental agency.

Communications utility in Oregon

Communications utility is a term used by Oregon property tax assessors and collectors. OPUC staff believes the term includes radio common carriers, wireless communications service providers, and telecommunications providers. According to ORS 308.505(6) for property tax

assessments, "communication" includes telephone communication, telegraph communication, and data transmission services by whatever means provided.

To derive Oregon taxable income for purposes of the corporation excise tax assessed under ORS Chapter 317, a public utility is apparently defined in ORS 757.005 and a telecommunications utility is apparently defined in ORS 759.005. See ORS 317.267(1).

Applicable Laws and Rules

Most laws related to OPUC and telecommunications providers are in Oregon Revised Statute (ORS) Chapters 183, 192, 469, 756, 758, 759, and 772.

Most rules related to OPUC and telecommunications providers are in Oregon Administrative Rule (OAR) Chapters 860 and 952. A chart that shows which divisions apply to the different service providers is available at http://www.puc.state.or.us under Commission Overview, OPUC Administrative Rules, and FAQs about Applicability of Rules. Copies of all statutes and rules are available via link at http://www.puc.state.or.us.

Appendix 2 – Jackson County Radio Licenses (ULS)

County Results – Universal Licensing System[118]

636 Row(s) were retrieved

Licensee Name	*Callsign / File Num*	*Status*	*Service*
ACTION OF MEDFORD INC	WRP313	Active	IK
ACTION OF MEDFORD INC	WNTR885	Active	MG
ADVANCED ELECTRIC	WPUH980	Active	IG
AERONAUTICAL RADIO INC	KBQ7	Active	AF
AERONAUTICAL RADIO INC	KCW6	Active	AF
AERONAUTICAL RADIO INC	KGI3	Active	AF
AERONAUTICAL RADIO INC	KSE9	Active	AF
AERONAUTICAL RADIO INC	KZH5	Active	AF
AERONAUTICAL RADIO INC	WDU6	Active	AF
AERONAUTICAL RADIO INC	WIY5	Active	AF
AERONAUTICAL RADIO INC	WON8	Active	AF
Aeronautical Radio Inc	WPWG674	Active	AF
Aeronautical Radio Inc	WPXB977	Active	AF
Aeronautical Radio Inc	WPXL638	Active	AF
AERONAUTICAL RADIO INC	WQBE558	Active	YB
Aeronautical Radio Inc.	WPYE925	Active	AF
AIRPEAK Communications LLC	WPHQ461	Active	GX
AIRPEAK Communications LLC	WPIH908	Active	GX
AIRPEAK Communications LLC	WPIH909	Active	GX
AIRPEAK Communications LLC	WPIH910	Active	GX
AIRPEAK Communications LLC	WPIJ307	Active	GX
AIRPEAK Communications LLC	WNMD376	Active	YX
AIRPORT CHEVROLET	WPUU787	Active	IG
AITERRA WYNWOOD	WPTP479	Active	IG
AMERICAN MEDICAL RESPONSE	WPXB388	Active	PW
AMERICAN TELECASTING OF MEDFORD INC	WPNI667	Active	MG
American Telecasting of Medford, Inc.	KNSC239	Active	MD
AMERICAN TELECASTING OF MEDFORD, INC.	WLK249	Active	MD
AMERICAN TELECASTING OF MEDFORD, INC.	WLK253	Active	MD
AMERICAN TELECASTING OF MEDFORD, INC.	WMX333	Active	MD
AMERICAN TELECASTING OF MEDFORD, INC.	WNTJ458	Active	MD
AMERICAN TELECASTING OF MEDFORD, INC.	WMX659	Active	VX
AMERICAN TELECASTING OF MEDFORD, INC.	WMX660	Active	VX
APPLEGATE VALLEY RFPD 9	WNPA548	Active	PW
APPLEGATE VALLEY RFPD 9	WPRF718	Active	PW
Arch Wireless License Co., LLC	KWT987	Active	CD
ASANTE HEALTH SYSTEM	WPRI986	Active	IG
ASANTE HEALTH SYSTEM	WPVC860	Active	IG
ASANTE HEALTH SYSTEM	WPXS390	Active	IG
ASANTE HEALTH SYSTEMS	WPLD458	Active	IG
ASHLAND COMMUNITY HOSPITAL	WPQA388	Active	IG

Licensee Name	*Callsign / File Num*	*Status*	Service
Ashland Community Hospital	WQBR541	Active	IG
ASHLAND COMMUNITY HOSPITAL	KXV672	Active	PW
ASHLAND MIDDLE SCHOOL	WPKQ208	Active	IG
ASHLAND SCHOOL DISTRICT	WNJY405	Active	PW
ASHLAND SCHOOL DISTRICT 5	WPIV401	Active	IG
ASHLAND SPRINGS HOTEL	WPRB656	Active	IG
ASHLAND, CITY OF	WPSU459	Active	GP
ASHLAND, CITY OF	WQBF617	Active	IG
ASHLAND, CITY OF	KJE997	Active	PW
ASHLAND, CITY OF	KNHR823	Active	PW
ASHLAND, CITY OF	KOA560	Active	PW
ASHLAND, CITY OF	WNKE562	Active	PW
ASHLAND, CITY OF	WPIN403	Active	PW
ASHLAND, CITY OF	WPMA635	Active	PW
ASHLAND, CITY OF	WPWZ968	Active	PW
ASHLAND, CITY OF	WQBH307	Active	PW
Ashland, City of	WQCM543	Active	PW
ASSOCIATED FRUIT CO	WPAU257	Active	IG
ASSOCIATED FRUIT COMPANY	WNGX529	Active	IG
ASSOCIATED OREGON LOGGERS INC	WDW326	Active	IG
ASTERIA BROADCASTING CORPORATION	WLQ236	Active	AS
AVISTA CORPORATION	KCL312	Active	IG
AVISTA CORPORATION	WNTU825	Active	MG
B & B Organics, LLC	WPZQ719	Active	IG
BEAR CREEK CORP	WPFM924	Active	IG
BEAR CREEK CORPORATION	WPPV611	Active	IG
BEAR CREEK OPERATIONS	KIN920	Active	IG
BEAR CREEK OPERATIONS	KNDC718	Active	IG
BEAR CREEK OPERATIONS	KWZ438	Active	IG
BEAR CREEK OPERATIONS	WPJQ450	Active	IG
BEAR CREEK OPERATIONS	WPKW708	Active	IG
BEAR CREEK OPERATIONS	WPLD329	Active	IG
BEAR CREEK ORCHARD INC	WPZI852	Active	IG
BEAR CREEK ORCHARDS INC	WPQF636	Active	IG
BEAR CREEK VALLEY SANITARY AUTHORITY	KYJ213	Active	PW
BETTENDORF TRUCKING	WPXE860	Active	IG
BETTER LIFE TELEVISION	WPQX560	Active	TI
BETTER LIFE TELEVISION, INC.	WPVT522	Active	TI
BETTER LIFE TELEVISION, INC.	WPVU348	Active	TI
BETTER LIFE TELEVISION, INC.	WPVU361	Active	TI
BETTER LIFE TELEVISION, INC.	WPYW902	Active	TI
BETTER LIFE TELEVISION, INC.	WPZY739	Active	TI
BILL'S BACK-HOE SERVICE INC.	WPTV494	Active	IG
BIOMASS ONE LP	KB78675	Active	IG
BISH, DANIEL DBA PLANT OREGON	WPIG802	Active	IG
BOC EDWARDS	WPNV845	Active	IG
Boise Building Solutions Manufacturing, L.L.C.	KNNL430	Active	IG
Boise Building Solutions Manufacturing, L.L.C.	KOF980	Active	IG

Licensee Name	*Callsign / File Num*	*Status*	Service
Boise Building Solutions Manufacturing, L.L.C.	WPAY792	Active	IG
Boise Building Solutions Manufacturing, L.L.C.	WPYR712	Active	IG
Boise Building Solutions Manufacturing, L.L.C.	WPYS239	Active	IG
BROADCASTING LICENSES, L.P.	WMU830	Active	TS
BURGER KING BK9403	KNNL695	Active	IG
BURL BRIM EXCAVATION INC	WQBQ291	Active	IG
BURL BRIM EXCAVATION INC.	WPTB886	Active	IG
BUTTE FALLS, CITY OF	WPLT316	Active	PW
C-2 Utility Contractors, LLC	WPMB906	Active	IG
CALIFORNIA OREGON BROADCASTING INC	WMV549	Cancelled	TT
CALIFORNIA OREGON BROADCASTING, INC.	KPH579	Active	RP
CALIFORNIA OREGON BROADCASTING, INC.	KPH599	Active	RP
CALIFORNIA OREGON BROADCASTING, INC.	KR4792	Active	RP
CALIFORNIA OREGON BROADCASTING, INC.	KPH56	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	KPH59	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	KWU77	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	WHM966	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	WHQ324	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	WHQ383	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	WHY231	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	WLE477	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	WLE478	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	WLF839	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	WLI582	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	WLJ799	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	WME677	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	WME767	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	WME895	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	WMU326	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	WMU344	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	WPNN696	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	WPOP539	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	WPZJ875	Active	TI
CALIFORNIA OREGON BROADCASTING, INC.	KB55384	Active	TP
CALIFORNIA OREGON BROADCASTING, INC.	KH3940	Active	TP
CALIFORNIA OREGON BROADCASTING, INC.	KKY25	Active	TS
CALIFORNIA OREGON BROADCASTING, INC.	KOP44	Active	TS
CALIFORNIA OREGON BROADCASTING, INC.	KRT61	Active	TS
CALIFORNIA OREGON BROADCASTING, INC.	WME673	Active	TS
CALIFORNIA OREGON BROADCASTING, INC.	WPZJ739	Active	TS
CALIFORNIA OREGON BROADCASTING, INC.	WPZL620	Active	TS
CALIFORNIA OREGON BROADCASTING, INC.	WPZL621	Active	TS
CALIFORNIA, STATE OF	WNZZ960	Active	PW
CASCADE RANCH	WPJT760	Active	IG
CASCADE TIMBER CO INC	KRU390	Active	IG
CENTRAL OREGON AND PACIFIC RAILROAD	WPKM534	Active	IG
CENTRAL OREGON AND PACIFIC RAILROAD	WPMB874	Active	IG
CENTRAL OREGON AND PACIFIC RAILROAD	WPZJ382	Active	IG

Licensee Name	*Callsign / File Num*	*Status*	Service
CENTRAL POINT, CITY OF	KOG567	Active	PW
CENTRAL POINT, CITY OF	WNKG797	Active	PW
CERTAIN TEED	WPNX899	Active	IG
CITICASTERS LICENSES, L.P.	WDF26	Active	AI
CITICASTERS LICENSES, L.P.	WLE749	Active	AS
CITICASTERS LICENSES, L.P.	WMV423	Active	AS
CITICASTERS LICENSES, L.P.	WMV836	Active	AS
CITICASTERS LICENSES, L.P.	WPJE760	Active	AS
CITICASTERS LICENSES, L.P.	WPNF632	Active	AS
CITICASTERS LICENSES, L.P.	KC25308	Active	RP
CITICASTERS LICENSES, L.P.	KFT441	Active	RP
CITICASTERS LICENSES, L.P.	KOP362	Active	RP
CITICASTERS LICENSES, L.P.	WPYP698	Active	RP
CITICASTERS LICENSES, L.P.	WPYS236	Active	RP
City of Ashland	WPRS619	Active	MG
City of Ashland	WQBA734	Active	PW
City of Central Point	/ 0002132736	Pending	MG
COLE, MARSHALL:COLE, NANCY DBA MARSHALL & NANCY COLE FOREST PRODUCTS	WNYG678	Active	IG
COLESTIN RURAL FIRE DISTRICT	WNPF902	Active	PW
COOK TELECOM INC	WNLX788	Active	IK
COOK TELECOM INC	WPAS925	Active	IK
COOK TELECOM INC	WPLR497	Active	IK
COOK TELECOM INC	WNEX391	Active	MG
COOK TELECOM INC DBA COOK PAGING	KNNS217	Active	IK
COOK TELECOM INC DBA COOK PAGING	WPIC680	Active	IK
COOK TELECOM, INC DBA: COOK PAGING	KNKP219	Active	CD
COOK TELECOM, INCDBA COOK PAGING	WPXI569	Active	IK
COONAN, LURLINE R	WNSW627	Active	IG
COVERED BRIDGE CONSTRUCTION INC	WNCT941	Active	IG
CRATER LAKE MOTORS	WZK928	Active	IG
DAIRY QUEEN	WPQD634	Active	IG
DAIRY QUEEN	WPQK700	Active	IG
DAIRY QUEEN	WPRH963	Active	IG
DARK HOLLOW WATER ASSOCIATION INC	WPEI402	Active	IG
DAY MANAGEMENT CORP DBA DAY WIRELESS SYSTEMS	WPDS300	Active	IG
DAY MANAGEMENT CORP DBA DAY WIRELESS SYSTEMS	WPEG698	Active	IG
DAY MANAGEMENT CORP DBA DAY WIRELESS SYSTEMS	WPHA242	Active	YG
DAY MANAGEMENT CORP DBA DAY WIRELESS SYSTEMS	WPKX820	Active	YG
DAY MANAGEMENT CORP DBA DAY WIRELESS SYSTEMS	WPKX879	Active	YG
DAY MANAGEMENT CORPORATION	WHQ451	Active	CF
DAY MANAGEMENT CORPORATION	WHQ452	Active	CF
DAY MANAGEMENT CORPORATION	WHS967	Active	CF
DAY MANAGEMENT CORPORATION	WHS968	Active	CF
DICKS WRECKER SERVICE	WRQ634	Active	IG
DOUBLE R RANCH	WPCF845	Active	IG
DOUBLETREE HOTEL MEDFORD	WPAF860	Active	IG
EAGLE POINT GOLF COURSE	WPJM423	Active	IG

Licensee Name	*Callsign / File Num*	*Status*	Service
EAGLE POINT HIGH SCHOOL	KNNW973	Active	IG
EAGLE POINT IRRIGATION DISTRICT	KGO881	Active	IG
EAGLE POINT NATIONAL CEMETERY	WPUB234	Active	IG
EAGLE POINT SCHOOL DISTRICT 9	KVN791	Active	PW
EAGLE POINT, CITY OF	KQN815	Active	PW
EAGLE POINT, CITY OF	KVG853	Active	PW
EAGLE POINT, CITY OF	WPIW885	Active	PW
EARLY, MICHAEL J	KNIK577	Active	IG
Eastman Kodak Company	WPXG676	Active	IG
Edge Wireless Licenses, LLC	WPTY572	Active	CF
Edge Wireless Licenses, LLC	WPTY580	Active	CF
Edge Wireless Licenses, LLC	WPTY584	Active	CF
Edge Wireless Licenses, LLC	WPUF743	Active	CF
ERICKSON AIR CRANE INC	WIW7	Active	AF
EVERGREEN FOREST PRODUCTS INC DBA ALLWEATHER WOOD TREATERS	WNWE698	Active	IG
Falcon Cable Systems Company II, LP	KGK779	Active	IG
FIRST CHURCH OF THE NAZARENE	WPTF400	Active	IG
Fixed Wireless Holdings, LLC	/ 0002135079	Pending	MG
Fixed Wireless Holdings, LLC	/ 0002135081	Pending	MG
Fixed Wireless Holdings, LLC	/ 0002135283	Pending	MG
FREEDOM BROADCASTING OF OREGON INC	WLD910	Cancelled	TI
FREEDOM BROADCASTING OF OREGON INC	WLD914	Cancelled	TI
Freedom Broadcasting of Oregon Licensee, L.L.C.	KRF943	Active	IG
FREEDOM BROADCASTING OF OREGON LICENSEE, L.L.C.	KKN685	Active	RP
FREEDOM BROADCASTING OF OREGON LICENSEE, L.L.C.	WPRU966	Active	TI
FREEDOM BROADCASTING OF OREGON LICENSEE, L.L.C.	WPSG668	Active	TI
FREEDOM BROADCASTING OF OREGON LICENSEE, L.L.C.	WPTA706	Active	TI
FREEDOM BROADCASTING OF OREGON LICENSEE, L.L.C.	WPTC604	Active	TI
FREEDOM BROADCASTING OF OREGON LICENSEE, L.L.C.	WPTD825	Active	TI
FREEDOM BROADCASTING OF OREGON LICENSEE, L.L.C.	KM7830	Active	TP
FREEDOM BROADCASTING OF OREGON LICENSEE, L.L.C.	KHU95	Active	TS
FREEDOM BROADCASTING OF OREGON LICENSEE, L.L.C.	KPT27	Active	TS
FREEDOM BROADCASTING OF OREGON LICENSEE, L.L.C.	WLD643	Active	TS
Freedom Broadcasting of Oregon, Inc.	WPRU458	Terminated	TI
FREEDOM BROADCASTING OF OREGON, INC.	WLD647	Cancelled	TS
FREEDOM COMMUNICATIONS OF MEDFORD INC	KM8023	Expired	TP
FREEDOM COMMUNICATIONS OF MEDFORD INC	KT9323	Expired	TP
FUND A ROGUE VALLEY INC	WNML642	Active	IG
GAS TRANSMISSION NORTHWEST CORPORATION	WPYX960	Active	IG
GEORGIA PACIFIC CORPORATION DBA GEORGIA PACIFIC RESINS	KNNW766	Active	IG
GOLD HILL, CITY OF	WPYY431	Active	PW
GRANGE CO OP	WNUP694	Active	IG
GROWERS REFRIGERATING	WNKU321	Active	IG
H & M INC	KD39692	Active	IG
HAMILTON, WILLIAM K:PUDERBAUGH, THOMAS R DBA BEAR CREEK LOCK AND SAFE	KNJE549	Active	IG
HARDESTY, HAROLD	KNIP348	Active	IG

Licensee Name	*Callsign / File Num*	*Status*	Service
HEINDEL, ALFRED M	WPRH472	Active	IG
HighSpeed Commmunications, LLC	WPRT719	Active	CF
HighSpeed Communications, LLC	WPRT718	Active	CF
HILL MANAGEMENT LLC	WPTK342	Active	IG
Honeywell International	WQBL349	Active	AF
Honeywell International	WQBN774	Active	AF
HUGHES BROTHERS CONSTRUCTION	WPRK435	Active	IG
I2WAY CORPORATION	WPSH519	Active	YK
I2WAY CORPORATION	WPSN287	Active	YK
International Communications Group, Inc. d/b/a Corban Networks	WLC231	Active	CF
International Communications Group, Inc. d/b/a Corban Networks	WLC232	Active	CF
International Communications Group, Inc. d/b/a Corban Networks	WLT314	Active	CF
International Communications Group, Inc. d/b/a Corban Networks	WNCK997	Active	IG
International Communications Group, Inc. d/b/a Corban Networks	WNCY571	Active	IG
INTERNATIONAL LINE BUILDERS INC	WPDX989	Active	IG
JACK IN THE BOX	WQBX461	Active	IG
JACKSON COUNTY COMMUNITY JUSTICE	WNYY225	Active	PW
JACKSON COUNTY FIRE DISTRICT 3	KA89562	Active	PW
JACKSON COUNTY FIRE DISTRICT 3	KCQ641	Active	PW
JACKSON COUNTY FIRE DISTRICT 3	KNCJ426	Active	PW
JACKSON COUNTY FIRE DISTRICT 3	KNCJ826	Active	PW
JACKSON COUNTY FIRE DISTRICT 3	KNCJ827	Active	PW
JACKSON COUNTY FIRE DISTRICT 5	KNHZ982	Active	PW
JACKSON COUNTY FIRE DISTRICT 5	KNHZ983	Active	PW
JACKSON COUNTY FIRE DISTRICT 6	KNCP858	Active	PW
JACKSON COUNTY FIRE DISTRICT NO 3	WNYY756	Active	PW
JACKSON COUNTY FIRE DISTRICT NO 3	WPKT915	Active	PW
JACKSON COUNTY FIRE DISTRICT NO 3	WPWF958	Active	PW
JACKSON COUNTY FIRE DISTRICT NO 4	KNHJ755	Active	PW
JACKSON COUNTY JUNVENILE DEPARTMENT	WQCC874	Active	GP
Jackson County School District #6	WPWH985	Active	IG
JACKSON COUNTY VECTOR CONTROL DISTRICT	KTV708	Active	PW
JACKSON EDUCATION SERVICE DISTRICT	KNHN216	Active	IG
JACKSON EDUCATIONAL SERVICE DISTRICT	WPNI999	Active	MG
JACKSON EDUCATIONAL SERVICE DISTRICT	WPNJ680	Active	MG
JACKSON, COUNTY OF	WPEM572	Active	GP
JACKSON, COUNTY OF	WNEX428	Active	MW
JACKSON, COUNTY OF	WNEX429	Active	MW
JACKSON, COUNTY OF	KCQ625	Active	PW
JACKSON, COUNTY OF	KCQ650	Active	PW
JACKSON, COUNTY OF	KCQ661	Active	PW
JACKSON, COUNTY OF	KDA674	Active	PW
JACKSON, COUNTY OF	KDX397	Active	PW
JACKSON, COUNTY OF	KFE936	Active	PW
JACKSON, COUNTY OF	KIU930	Active	PW
JACKSON, COUNTY OF	KNDE686	Active	PW
JACKSON, COUNTY OF	KNDE687	Active	PW
JACKSON, COUNTY OF	KVA532	Active	PW

Licensee Name	*Callsign / File Num*	*Status*	Service
JACKSON, COUNTY OF	KYN674	Active	PW
JACKSON, COUNTY OF	WBM83	Active	PW
JACKSON, COUNTY OF	WPFB777	Active	PW
JACKSON, COUNTY OF	WPPY392	Active	PW
JACKSON, COUNTY OF Dept of Public Works	WPET227	Active	PW
JACKSON, COUNTY OF Southern Oregon Regional Communications	KNFU637	Active	PW
JACKSONVILLE CITY OF	WPWJ401	Active	PW
JACKSONVILLE, CITY OF	WNKK711	Active	IG
JACKSONVILLE, CITY OF	WNWD445	Active	PW
JET CENTER MFR	WPEA592	Active	IG
JOHN SR, PAUL:STRANBERG II, JOHN DBA VALLEY VIEW NURSERY	WNKK722	Active	IG
JOSEPHINE, COUNTY OF	WQN751	Active	PW
KEWISH, DAN	WNMC838	Active	IG
KEZI, INC.	WMV217	Active	TI
LAIDLAW TRANSIT INC	WNYB807	Active	IG
LAKE CREEK RURAL FIRE DISTRICT	WNJZ548	Active	PW
LANE COMMUNITY COLLEGE	WDT900	Expired	AI
LANE COMMUNITY COLLEGE	WDT901	Cancelled	AI
LANE COMMUNITY COLLEGE	WDT902	Expired	AI
LARIOT CORP	WPZS641	Active	IG
LARIOT CORP	WQCQ484	Active	IG
LOWERY, NELDA	WPHY516	Active	GX
LTM INC.	KNDR282	Active	IG
LTM INC.	WPLI489	Active	IG
LULL, WILBURT W	KTY603	Active	IG
MAPLETON COMMUNICATIONS, LLC	WDD767	Active	AS
MAPLETON COMMUNICATIONS, LLC	WDF27	Active	AS
MAPLETON COMMUNICATIONS, LLC	WGX45	Active	AS
MAPLETON COMMUNICATIONS, LLC	WHY751	Active	AS
MAPLETON COMMUNICATIONS, LLC	WLD873	Active	AS
MAPLETON COMMUNICATIONS, LLC	WLQ235	Active	AS
MAPLETON COMMUNICATIONS, LLC	KPF844	Active	RP
MAPLETON COMMUNICATIONS, LLC	KPF845	Active	RP
MAPLETON COMMUNICATIONS, LLC	WHE987	Active	RP
MCI WorldCom Network Services, Inc.	WPBV823	Active	IG
MCI WorldCom Network Services, Inc.	WPWL768	Active	IG
MEDFORD CELLULAR TELEPHONE CO., INC.	KNKA722	Active	CL
MEDFORD FIRE DEPARTMENT	WQCK337	Active	GP
MEDFORD FIRE DEPARTMENT	WQCK339	Active	GP
MEDFORD INTERNET	WPOS478	Active	MG
MEDFORD IRRIGATION DISTRICT	KBI201	Active	IG
MEDFORD MOULDING CO	WNRV932	Active	IG
MEDFORD READY MIX CONCRETE INC	WNGX530	Active	IG
MEDFORD SCHOOL DISTRICT #549C	WPLI597	Active	IG
MEDFORD SCHOOL DISTRICT #549C	WPLJ412	Active	IG
Medford School District 549 C	WQCI873	Active	IG
Medford Water Commission	WQAC664	Active	IG

Licensee Name	*Callsign / File Num*	*Status*	Service
Medford Water Commission	WQCR853	Active	MG
MEDFORD, CITY OF	WPPX318	Active	IG
MEDFORD, CITY OF	KCX396	Active	PW
MEDFORD, CITY OF	KXV551	Active	PW
MEDFORD, CITY OF	KXV582	Active	PW
MEDFORD, CITY OF	WNFI474	Active	PW
MEDFORD, CITY OF	WPBM598	Active	PW
MEDFORD, CITY OF	WPIV466	Active	PW
MEDFORD, CITY OF	WPTB743	Active	PW
MEDFORD, CITY OF	WPTB882	Active	PW
MEDFORD, CITY OF	WQH291	Active	PW
MEDFORD, CITY OF	WQH292	Active	PW
MEDFORD, CITY OF	WRE343	Active	PW
MEDFORD, CITY OF DBA MEDFORD, CITY OF	KOM515	Active	PW
MELROSE ORCHARDS INC	KBF674	Active	IG
Mercy Flights Inc	WQAM397	Active	IG
MERCY FLIGHTS INC	KAW251	Active	PW
METRO TAXI INC	WYR749	Active	IG
Metrocall USA, Inc.	KNKL939	Active	CD
MEYER, RONALD	WPYM589	Active	IG
Mobex Network Services LLC	KAE889	Active	MC
MORGAN, DICK	WQC319	Active	IG
Mount Ashland Racing Association	WPWN255	Active	IG
NATIONAL SKI PATROL SYSTEM INC	WXQ923	Active	PW
NAUMES INC	KNGW518	Active	IG
NEW CINGULAR WIRELESS PCS, LLC	WMI467	Active	CF
NEW CINGULAR WIRELESS PCS, LLC	WMK790	Active	CF
NEW CINGULAR WIRELESS PCS, LLC	WMM431	Active	CF
NEW CINGULAR WIRELESS PCS, LLC	WPND465	Active	CF
NEW CINGULAR WIRELESS PCS, LLC	WPNL463	Active	CF
NEW CINGULAR WIRELESS PCS, LLC	WPVL961	Active	CF
NEXTEL LICENSE HOLDINGS 2 INC	KNJH997	Active	YX
NEXTEL LICENSE HOLDINGS 2 INC	WPGI561	Active	YX
Nextel License Holdings 4, Inc	WPGW863	Active	GX
Nextel License Holdings 4, Inc	WPGY396	Active	GX
Nextel License Holdings 4, Inc	WPHJ298	Active	GX
Nextel License Holdings 4, Inc	WPHS757	Active	GX
Nextel License Holdings 4, Inc	WPHS765	Active	GX
Nextel License Holdings 4, Inc	WPHY880	Active	GX
Nextel License Holdings 4, Inc	WPIE556	Active	GX
Nextel License Holdings 4, Inc	WPIM606	Active	GX
Nextel License Holdings 4, Inc	WPIM737	Active	GX
Nextel License Holdings 4, Inc	WPIP973	Active	GX
NEXTEL LICENSE HOLDINGS 4, INC.	WPVM232	Active	CF
NEXTEL LICENSE HOLDINGS 4, INC.	WPEW603	Active	YX
NEXTEL LICENSE HOLDINGS 4, INC.	WPUS679	Active	YX
NEXTEL LICENSE HOLDINGS 4, INC.	WPUZ373	Active	YX
NEXTEL LICENSE HOLDINGS 4, INC.	WPVX236	Active	YX

Licensee Name	*Callsign / File Num*	*Status*	Service
NEXTEL LICENSE HOLDINGS 4, INC.	WPWK571	Active	YX
NEXTEL LICENSE HOLDINGS 4, INC.	WPWW917	Active	YX
NEXTEL LICENSE HOLDINGS 4, INC.	WPXD574	Active	YX
NEXTEL LICENSE HOLDINGS 4, INC.	WPYE650	Active	YX
NEXTEL LICENSE HOLDINGS 4, INC.	WPYE653	Active	YX
NEXTEL LICENSE HOLDINGS 4, INC.	WPYE660	Active	YX
NEXTEL OF CALIFORNIA, INC.	WPIH329	Active	GX
NEXTEL OF CALIFORNIA, INC.	WPIH337	Active	GX
Norman Lumber	WQCH679	Active	IG
NORTHERN CALIFORNIA EMERGENCY MEDICAL SERVICES INC	WPMI376	Active	PW
NORTHWEST NATURAL GAS COMPANY	WPJX510	Active	GO
NPG OF OREGON, INC.	WDD788	Active	TI
NPG OF OREGON, INC.	WDD789	Active	TI
OPUS BROADCASTING SYSTEMS, INC.	WHM972	Active	AS
OPUS BROADCASTING SYSTEMS, INC.	WHM973	Active	AS
OPUS BROADCASTING SYSTEMS, INC.	WLO230	Active	AS
OPUS BROADCASTING SYSTEMS, INC.	WLO233	Active	AS
OREGON DEPARTMENT OF TRANSPORTATION IS WIRELESS GROUP	WPSF961	Active	PW
OREGON STATE OF	KNDX488	Active	PW
Oregon State of DBA Oregon Department of Forestry	WPTZ291	Active	PW
OREGON UNIVERSITY SYSTEM	WNC771	Active	VX
OREGON, STATE OF	WLD6	Active	AF
OREGON, STATE OF	WPMT615	Active	LN
OREGON, STATE OF	WPMT618	Active	LN
OREGON, STATE OF	WNEU940	Active	MG
OREGON, STATE OF	KCR96	Active	MW
OREGON, STATE OF	WHI251	Active	MW
OREGON, STATE OF	WNEZ500	Active	MW
OREGON, STATE OF	WNEZ501	Active	MW
OREGON, STATE OF	WPNE557	Active	MW
OREGON, STATE OF	WPNE558	Active	MW
OREGON, STATE OF	KB74700	Active	PW
OREGON, STATE OF	KB80275	Active	PW
OREGON, STATE OF	KBF817	Active	PW
OREGON, STATE OF	KNNH639	Active	PW
OREGON, STATE OF	KOA699	Active	PW
OREGON, STATE OF	KSP256	Active	PW
OREGON, STATE OF	KWV640	Active	PW
OREGON, STATE OF	WAH246	Active	PW
Oregon, State of	WFR330	Active	PW
OREGON, STATE OF	WGE34	Active	PW
Oregon, State of	WNAQ840	Active	PW
Oregon, State of	WNAQ843	Active	PW
OREGON, STATE OF	WNEC783	Active	PW
OREGON, STATE OF	WNFK881	Active	PW
OREGON, STATE OF	WNFQ363	Active	PW

Licensee Name	*Callsign / File Num*	*Status*	Service
OREGON, STATE OF	WNGP501	Active	PW
OREGON, STATE OF	WNQH601	Active	PW
OREGON, STATE OF	WNYY221	Active	PW
OREGON, STATE OF	WPDJ274	Active	PW
OREGON, STATE OF	WPEK547	Active	PW
OREGON, STATE OF	WPEK551	Active	PW
OREGON, STATE OF	WPEK555	Active	PW
OREGON, STATE OF	WPEK559	Active	PW
OREGON, STATE OF	WPEK841	Active	PW
OREGON, STATE OF	WPEN673	Active	PW
OREGON, STATE OF	WPIC820	Active	PW
OREGON, STATE OF	WPLW670	Active	PW
OREGON, STATE OF	WYV368	Active	PW
OREGON, STATE OF	WPMM838	Active	QM
OREGON, STATE OF (DEPT. OF TRANSPORTATION, ISB WIRELESS GROUP	WPVA881	Active	PW
OREGON, STATE OF (DEPT. OF TRANSPORTATION, ISB WIRELESS GROUP)	WPVB925	Active	PW
OREGON, STATE OF (DEPT. OF TRANSPORTATION, ISB WIRELESS GROUP)	WPVM656	Active	PW
OREGON, STATE OF (DEPT. OF TRANSPORTATION, ISB WIRELESS GROUP)	WQBP279	Active	PW
OREGON, STATE OF DEPARTMENT OF FORESTRY	KON208 / 0002061614	Pending	PW
OREGON, STATE OF: DBA DEPARTMENT OF FORESTRY	KON208	Active	PW
OREGON, STATE OF: DBA DEPARTMENT OF FORESTRY	WQBN761	Active	PW
OREGON, STATE OF: DBA DEPARTMENT OF FORESTRY	WQBP222	Active	PW
OREGON, STATE OF: DBA DEPARTMENT OF FORESTRY	WQBQ536	Active	PW
PACIFIC ELECTRICAL CONTRACTORS INC	KES442	Active	IG
PACIFIC MICROWAVE JOINT VENTURE	KPQ99	Active	CF
PACIFIC MICROWAVE JOINT VENTURE	WMT382	Active	CF
PACIFICORP	KBP258	Active	IG
PACIFICORP	KKK857	Active	IG
PACIFICORP	KNIR665	Active	IG
PACIFICORP	KOA390	Active	IG
PACIFICORP	KOC480	Active	IG
PACIFICORP	KOH311	Active	IG
PACIFICORP	KOK238	Active	IG
PACIFICORP	KPD37	Active	IG
PACIFICORP	KPD38	Active	IG
PACIFICORP	WNKT302	Active	IG
PACIFICORP	WNZS879	Active	IG
PACIFICORP	WPDY677	Active	IG
PACIFICORP	WPHJ657	Active	IG
PACIFICORP	WPMF513	Active	IG
PACIFICORP	WNEH737	Active	MG
PACIFICORP	WNEV663	Active	MG
PACIFICORP	WNEV664	Active	MG
PACIFICORP	WNEV665	Active	MG

Licensee Name	*Callsign / File Num*	*Status*	Service
PACIFICORP	WNEV666	Active	MG
PACIFICORP	WNTL620	Active	MG
PACIFICORP	WNTL621	Active	MG
PACIFICORP	WNTL622	Active	MG
PACIFICORP	WNTM323	Active	MG
PACIFICORP	WNTQ322	Active	MG
PACIFICORP	WNTT937	Active	MG
PACIFICORP	WNTV601	Active	MG
PacifiCorp	WPSK656	Active	MG
PacifiCorp	WPVV335	Active	MG
Pacificorp	WPXM604	Active	MG
PHOENIX, CITY OF	KNGV252	Active	PW
PHOENIX, CITY OF	WNFU933	Active	PW
PHOENIX, CITY OF	WZM998	Active	PW
PORTER, STEVE	WNPE401	Active	IG
PORTER, STEVE	WPHM809	Active	IG
PORTER, STEVE	WNYT666	Active	IK
PORTER, STEVE	WPCS397	Active	IK
PORTER, STEVE	WQBY729	Active	YG
PORTER, STEVE	WPMV838	Active	YK
PORTER, STEVE	WPTF766	Active	YK
PROVIDENCE HOSPITAL	WRO238	Active	IG
PROVIDENCE HOSPITAL OF MEDFORD	KXV673	Active	PW
Putnam, L R	WLK726	Active	CF
QUALITY FENCE CO INC	WPGV253	Active	IG
Qwest Corporation	KOR61	Active	CF
Qwest Corporation	KPB49	Active	CF
Qwest Corporation	WDU576	Active	CF
Qwest Corporation	WDU577	Active	CF
Qwest Corporation	WDU578	Active	CF
Qwest Corporation	WMQ301	Active	CF
Qwest Corporation	WCD874	Active	IG
RAYS FOOD PLACE	WPLG437	Active	IG
RF Bandwith Acquisition Corp	WPUU373	Active	YO
ROBCO INC	WPWJ395	Active	IG
ROBERTSON, RICHARD	WNXF473	Active	IG
ROGUE PRO INDUSTRIAL	WNUF217	Active	IG
ROGUE RIVER RURAL FIRE PROTECTION DISTRICT	KEV473	Active	PW
ROGUE RIVER VALLEY IRRIGATION DISTRICT	KXU414	Active	IG
ROGUE RIVER, CITY OF	WQAF890	Active	IG
ROGUE RIVER, CITY OF	KNFE728	Active	PW
Rogue Valley Consolidated Communications (RVCCOM)	KXV552	Active	PW
Rogue Valley Consolidated Communications (RVCCOM)	KXV583	Active	PW
Rogue Valley Consolidated Communications (RVCCOM)	KYQ323	Active	PW
Rogue Valley Consolidated Communications (RVCCOM)	WAN544	Active	PW
ROGUE VALLEY COUNTRY CLUB	WNJF969	Active	IG
ROGUE VALLEY COUNTRY CLUB	WPQH962	Active	IG
ROGUE VALLEY MANOR	WPMH848	Active	YP

Licensee Name	*Callsign / File Num*	*Status*	Service
Rogue Valley Manor / Quail Point	WQAW853	Active	IG
ROGUE VALLEY MANOR/QUAIL POINT	WQAM341	Active	IG
ROGUE VALLEY MEDICAL CENTER	WNCS526	Active	IG
Rogue Valley Medical Center	WPVU790	Active	IG
ROGUE VALLEY MEDICAL CENTER	KWV803	Active	PW
ROGUE VALLEY MEDICAL CENTER	KXV671	Active	PW
ROGUE VALLEY MEMORIAL HOSPITAL	WQBX435	Active	IG
Rogue Valley Partners LP	WPXH682	Active	IG
ROGUE VALLEY SEWER SERVICES	WPZN830	Active	PW
ROGUE VALLEY TRANSIT DISTRICT	KNGD621	Active	PW
Rogue Waste Systems	WPZT340	Active	GB
Rouge Valley Country Club	WQCE629	Active	IG
S.S.E. Inc.	WPVP313	Active	IG
SAIF CORPORATION	WQCQ256	Active	IG
SECURITY COMMUNICATIONS	WPUW378	Active	YB
SHEKINAH NETWORK INC	WLX975	Active	VX
Sierra Pine Ltd	WPUA833	Active	IG
SILKE COMMUNICATIONS INC	WPJX224	Active	IG
Silke Communications Inc.	WPTU775	Active	MG
SIMS COMPANY, INC.	KOR793	Active	CD
SKI ASHLAND INC	KNIR766	Active	IG
SkyTel Corp.	KNKG859	Active	CD
Skywest Airlines	WPWZ327	Active	IG
SLATER, ALAN D	KNNM810	Active	YX
SMITH, T J DBA T J SMITH TRUCKING	WNJF238	Active	IG
SODA MOUNTAIN BROADCASTING INC	WPOS508	Active	MG
SODA MOUNTAIN BROADCASTING INC	WPOS509	Active	MG
SODA MOUNTAIN BROADCASTING, INC.	KB55903	Active	RP
SODA MOUNTAIN BROADCASTING, INC.	KPE983	Active	RP
SODA MOUNTAIN BROADCASTING, INC.	KPF305	Active	RP
SODA MOUNTAIN BROADCASTING, INC.	WLP339	Active	TI
SODA MOUNTAIN BROADCASTING, INC.	WHS398	Active	TS
SODA MOUNTAIN BROADCASTING, INC.	WLP332	Active	TS
SODA MOUNTAIN BROADCASTING, INC.	WLP340	Active	TS
SOUTHERN OREGON EDUCATION CO	WCT813	Expired	TI
SOUTHERN OREGON EDUCATION CO	WCT814	Expired	TI
SOUTHERN OREGON EDUCATION CO	WHB234	Expired	TS
SOUTHERN OREGON PUBLIC TELEVISION	WPUK606	Active	RP
SOUTHERN OREGON PUBLIC TV, INC.	WCD927	Active	TS
SOUTHERN OREGON PUBLIC TV, INC.	WLP732	Active	TS
SOUTHERN OREGON PUBLIC TV, INC.	WPNF916	Active	TS
SOUTHERN OREGON PUBLIC TV, INC.	WPNF917	Active	TS
SOUTHERN OREGON PUBLIC TV, INC.	WPNF918	Active	TS
SOUTHERN OREGON PUBLIC TV, INC.	WPUH840	Active	TS
Southern Oregon Regional Communications	WPXI715	Active	MW
Southern Oregon Regional Communications	WPXI740	Active	MW
SOUTHERN OREGON REGIONAL COMMUNICATIONS	WQAI984	Active	PW
SOUTHERN OREGON REGIONAL COMMUNICATIONS	WQAU817	Active	PW

Licensee Name	*Callsign / File Num*	*Status*	Service
SOUTHERN OREGON REGIONAL COMMUNICATIONS	WQAW719	Active	PW
SOUTHERN OREGON SANITATION INC	KNAF630	Active	IG
SOUTHERN OREGON SKYWAYS	KCB9	Active	AF
SOUTHERN OREGON SPEEDWAY	WPJV594	Active	IG
SOUTHERN OREGON TALLOW CO INC	KAS778	Active	IG
SOUTHERN OREGON TIMBER INDUSTRIES ASSN	KOB320	Active	IG
SOUTHERN OREGON TIMBER INDUSTRIES ASSOC	KVI229	Active	IG
SOUTHERN OREGON TIMBER INDUSTRIES ASSOCIATION	KOE205	Active	IG
SOUTHERN OREGON TIMBER INDUSTRIES ASSOCIATION	WGQ395	Active	IG
SOUTHERN OREGON TIMBER INDUSTRIES ASSOCIATION	WNVT739	Active	IG
SOUTHERN OREGON TRANSPORTATION INC DBA CASCADE CAB CO	WYA399	Active	IG
SOUTHERN OREGON UNIVERSITY	WPVQ761	Active	IG
Southern Oregon University	WQAK869	Active	IG
SOUTHERN OREGON UNIVERSITY	WNC759	Active	VX
SPRINT COMMUNICATIONS CO LP	WPPA287	Active	YG
Sprint Communications Company L.P.	WPNQ639	Active	IG
Sprint Communications Company L.P.	WPNQ640	Active	IG
Sprint Communications Company L.P.	WPPG528	Active	IG
STATE OF ORE./STATE BD. OF HGR. ED.	WLP574	Active	AI
STATE OF ORE./STATE BD. OF HGR. ED.	WLP575	Active	AI
STATE OF OREGON ACTING BY & THROUGH THE ST BD OF HIGHER ED	WLE334	Active	AI
STATE OF OREGON ACTING BY & THROUGH THE ST BD OF HIGHER ED	WLE338	Active	AI
STATE OF OREGON ACTING BY & THROUGH THE ST BD OF HIGHER ED	WLI733	Active	AI
STATE OF OREGON ACTING BY & THROUGH THE ST BD OF HIGHER ED	WLO417	Active	AI
STATE OF OREGON ACTING BY & THROUGH THE ST BD OF HIGHER ED	WLO420	Active	AI
STATE OF OREGON ACTING BY & THROUGH THE ST BD OF HIGHER ED	WLO424	Active	AI
STATE OF OREGON ACTING BY & THROUGH THE ST BD OF HIGHER ED	WLP269	Active	AI
STATE OF OREGON ACTING BY & THROUGH THE ST BD OF HIGHER ED	WLI414	Active	AS
STATE OF OREGON ACTING BY & THROUGH THE ST BD OF HIGHER ED	WLO807	Active	AS
STATE OF OREGON ACTING BY & THROUGH THE ST BD OF HIGHER ED	KPK363	Active	RP
SUBWAY	WPQD635	Active	IG
SUPERIOR HELICOPTER, LLC	WQCG360	Active	IG
T L FOREST PRODUCTS INC	KNAH769	Active	IG
T L FOREST PRODUCTS INC	WNGL803	Active	IG
TACO BELL	KNNM847	Active	IG
TACO BELL RESTAURANT	WPJR594	Active	IG
TACO BELL RESTAURANT	WPJU271	Active	IG
TALENT IRRIGATION DISTRICT	KOL386	Active	IG
TALENT, CITY OF	WPJV438	Active	PW
TALENT, CITY OF, PUBLIC WORKS	WPUN342	Active	PW

Licensee Name	*Callsign / File Num*	*Status*	*Service*
TALENT, CITY OF, PUBLIC WORKS	WPUP993	Active	PW
TALENT, CITY OF, PUBLIC WORKS	WPUQ581	Active	PW
Terra Spase Inc	WPSS273	Active	IG
THOMPSON INVESTMENT MANAGEMENT COMPANY	WPVY719	Active	IG
THOMPSON, JUANICE	WPIG246	Active	GX
THOMPSON, STEPHEN A	WPIA886	Active	GX
Timber Products Company	WPWC776	Active	IG
UCB USA, INC.	WHS650	Active	AS
UCB USA, INC.	KPE778	Active	RP
United Air Lines, Inc., Debtor-in-possession	WPQB318	Active	IG
UNITED STATES CELLULAR OPERATING COMPANY OF MEDFORD	WLR433	Active	CF
UNITED STATES CELLULAR OPERATING COMPANY OF MEDFORD	WLR434	Active	CF
UNITED STATES CELLULAR OPERATING COMPANY OF MEDFORD	WML648	Active	CF
UNITED STATES CELLULAR OPERATING COMPANY OF MEDFORD	WMN833	Active	CF
UNITED STATES CELLULAR OPERATING COMPANY OF MEDFORD	WMR218	Active	CF
UNITED STATES CELLULAR OPERATING COMPANY OF MEDFORD	WMR221	Active	CF
UNITED STATES CELLULAR OPERATING COMPANY OF MEDFORD	WMR503	Active	CF
UNITED STATES CELLULAR OPERATING COMPANY OF MEDFORD	WPOQ356	Active	CF
UNITED STATES CELLULAR OPERATING COMPANY OF MEDFORD	WPOR263	Active	CF
UNITED STATES CELLULAR OPERATING COMPANY OF MEDFORD	WPOR705	Active	CF
UNITED STATES CELLULAR OPERATING COMPANY OF MEDFORD	WPOS979	Active	CF
United States Cellular Operating Company of Medford	WPRV681	Active	CF
UNITED STATES CELLULAR OPERATING COMPANY OF MEDFORD	KNKA683	Active	CL
UNITED TELEPHONE COMPANY OF THE NORTHWEST	WMW856	Active	CF
URTON, RAYMOND W	WNYI933	Active	IG
USCOC OF OREGON RSA #5, INC.	KNKN672	Active	CL
USF REDDAWAY	WPWC471	Active	IG
VANDERLIP LOGGING CO	KUM335	Active	IG
WATCHTV INC	WPJE323	Cancelled	TI
WATCHTV INC	WPJE322	Cancelled	TS
WCTU RAILWAY COMPANY	WPRG683	Active	IG
WEYERHAEUSER COMPANY	WNDH741	Active	IG
WINDMILL INNS OF AMERICA	WPCA686	Active	IG
Wireless Connections, LLC	WPZS903	Active	GB
YELLOW CAB	KON635	Active	IG
YUM RESTAURANT LICENSING CORP	WPWZ991	Active	IG
	WOX82	Active	TI

Code	Description
!!	Cable Operations & Antenna Database
AA	Aviation Auxiliary Group
AB	Aural Microwave Booster
AC	Aircraft
AF	Aeronautical and Fixed
AI	Aural Intercity Relay
AM	AM Station
AR	Aviation Radionavigation
AS	Aural Studio Transmitter Link
AX	International Broadcast Station
CA	Commercial Air-ground Radiotelephone
CB	BETRS
CD	Paging and Radiotelephone
CE	Digital Electronic Message Service - Co
CF	Common Carrier Fixed Point to Point Mic
CG	General Aviation Air-ground Radioteleph
CI	INTERNATIONAL FIXED PUBLIC
CL	Cellular
CM	Commercial
CN	PCS Narrowband
CO	Offshore Radiotelephone
CP	INTERNATIONAL FIXED PUBLIC PRESS
CR	Rural Radiotelephone
CT	Local Television Transmission
CW	PCS Broadband
CZ	Paging and Radiotelephone, Auctioned
DM	DTV Channel Change
DN	New DTV Allotment
DR	DTV Channel Substitution
DT	Digital TV
FA	FM Allotments
FB	FM Booster
FL	Low Power FM
FM	FM Station
FX	FM Translator
GB	Business, 806-821/851-866 MHz, Conventi
GC	929-931 MHz Band, Auctioned
GF	Public Safety Ntl Plan, 821-824/866-869
GI	Other Indust/Land Transp, 896-901/935-9
GO	Other Indust/Land Transp, 806-821/851-8
GP	Public Safety/Spec Emerg, 806-821/851-8
GS	Private Carrier Paging, 929-930 MHz
GU	Business, 896-901/935-940 MHz, Conventi
GX	SMR, 806-821/851-866 MHz, Conventional
HA	Amateur
HV	Vanity
I!	International Bureau

IG	Industrial/Business Pool, Conventional
IK	Industrial/Business Pool - Commercial,
LD	Local Multipoint Distribution Service
LM	LM
LN	902-928 MHz Location Narrowband (Non-mu
LP	Broadcast Auxiliary Low Power
LS	Location and Monitoring Service, Multil
LW	902-928 MHz Location Wideband (Grandfat
MA	Marine Auxiliary Group
MC	Coastal Group
MD	Multipoint Distribution Service (MDS an
MG	Microwave Industrial/Business Pool
MK	Alaska Group
MR	Marine Radiolocation Land
MW	Microwave Public Safety Pool
NC	Nationwide Commercial 5 Channel, 220 MH
NM	NTSC Channel Change
NN	New NTSC Allotment
PC	Public Coast Stations, Auctioned
PE	Digital Electronic Message Service - Pr
PW	Public Safety Pool, Conventional
QA	220-222 MHz Band, Auctioned
QD	Non-Nationwide Data, 220 MHz
QM	Non-Nationwide Public Safety/Mutual Aid
QO	Non-Nationwide Other, 220 MHz
QT	Non-Nationwide 5 Channel Trunked, 220 M
RP	Broadcast Auxiliary Remote Pickup
RR	Restricted
RS	Land Mobile Radiolocation
SA	Ship Recreational or Voluntarily Equipp
SB	Ship Compulsary Equipped
TA	Vacant channel in the Table of Assignme
TB	TV Microwave Booster
TI	TV Intercity Relay
TN	39 Ghz, Auctioned
TP	TV Pickup
TS	TV Studio Transmitter Link
TT	TV Translator Relay
TV	Television
TX	TV Translator or LPTV station
VX	Instructional Television Fixed Service
WA	Microwave Aviation
WS	Wireless Communications Service
WX	700 MHz Bands
XC	EXPERIMENTAL CONTRACT (DEV)
XD	EXPERIMENTAL DEVELOPMENTAL
XE	EXPERIMENTAL EXPORT
XR	EXPERIMENTAL RESEARCH
YB	Business, 806-821/851-866 MHz, Trunked

YC	SMR, 806-821/851-866 MHz, Auctioned
YD	SMR, 896-901/935-940 MHz, Auctioned
YF	Public Safety Ntl Plan, 821-824/866-869
YG	Industrial/Business Pool, Trunked
YI	Other Indust/Land Transp. 896-901/935-9
YK	Industrial/Business Pool - Commercial,
YO	Other Indust/Land Transp. 806-821/851-8
YP	Public Safety/Spec Emerg, 806-821/851-8
YS	SMR, 896-901/935-940 MHz, Trunked
YU	Business, 896-901/935-940 MHz, Trunked
YW	Public Safety Pool, Trunked
YX	SMR, 806-821/851-866 MHz, Trunked
ZA	General Mobile Radio (GMRS)
ZV	Interactive Video and Data Service

Table 32 Service Code Look-Up Chart

County Results International Bureau Filing System (IBFS)[119]

8 Row(s) were retrieved

Licensee	*Site City*	*Callsign*	*Subsystem*
Ascent Media Systems and Technology Services, LLC	MEDFORD	E7566	SES
FALCON CABLE SYSTEMS COMPANY II, L.P.	MEDFORD	E910119	SES
FOX BROADCASTING CORPORATION	MEDFORD	E000430	SES
SODA MOUNTAIN BROADCASTING, INC.	MEDFORD	E040426	SES
TALK RADIO NETWORK	CENTRAL POINT	E930388	SES
THE ASSOCIATED PRESS	ASHLAND	E970296	SES
THE ASSOCIATED PRESS	MEDFORD	E970299	SES
TRINITY CHRISTIAN CENTER OF SANTA ANA, INC.	MEDFORD	E890407	SES

Appendix 3 – A Primer on Bits[120]

Measuring Bytes Bit by Bit

Below are the standard metric prefixes used in the SI (Système International) conventions for scientific measurement. With units of time (e.g., gigabits per second) or things that come in powers of 10, they retain their usual meanings of multiplication by powers of 1,000 = 10^3. When used with bytes (e.g., gigabytes of data storage) or other things that naturally come in powers of 2, they usually denote multiplication by powers of 1,024 = 2^{10}.

Base 10				
1 Kilobit/s	=	$1{,}000^1 = 10^3$	=	1,000
1 Megabit/s	=	$1{,}000^2 = 10^6$	=	1,000,000
1 Gigabit/s	=	$1{,}000^3 = 10^9$	=	1,000,000,000
1 Terabit/s	=	$1{,}000^4 = 10^{12}$	=	1,000,000,000,000
1 Petabit/s	=	$1{,}000^5 = 10^{15}$	=	1,000,000,000,000,000
1 Exabit/s	=	$1{,}000^6 = 10^{18}$	=	1,000,000,000,000,000,000
1 Zettabit/s	=	$1{,}000^7 = 10^{21}$	=	1,000,000,000,000,000,000,000
1 Yottabit/s	=	$1{,}000^8 = 10^{24}$	=	1,000,000,000,000,000,000,000,000
Base 2				
1 Kilobyte	=	$1{,}024^1 = 2^{10}$	=	1,024
1 Megabyte	=	$1{,}024^2 = 2^{20}$	=	1,048,576
1 Gigabyte	=	$1{,}024^3 = 2^{30}$	=	1,073,741,824
1 Terabyte	=	$1{,}024^4 = 2^{40}$	=	1,099,511,627,776
1 Petabyte	=	$1{,}024^5 = 2^{50}$	=	1,125,899,906,842,624
1 Exabyte	=	$1{,}024^6 = 2^{60}$	=	1,152,921,504,606,846,976
1 Zettabyte	=	$1{,}024^7 = 2^{70}$	=	1,180,591,620,717,411,303,424
1 Yottabyte	=	$1{,}024^8 = 2^{80}$	=	1,208,925,819,614,629,174,706,176

Table 33 Bytes Bit by Bit

Carrier Technology	Data Rate (Mbps)	Description	64 Kbps Circuits*
DS-0	0.064	Base rate in the Digital Signal (DS) level hierarchy	1
T-1 (DS-1)	1.544	Primary level of the American T-carrier multiplexing system; capacity is the same as a DS-1 carrier	24
T-2 (DS-2)	6.312	Four times the capacity of T-1	96
T-3 (DS-3)	44.736	28 times the capacity of T-1	672
T-4 (DS-4)	274.176	168 times the capacity of T-1	4,032
E-1	2.048	Primary level of the European E-carrier multiplexing system	30
E-2	8.448	Carries four multiplexed E-1 signals	120
E-3	34.368	Carries four E-2 signals	480
E-4	139.264	Carries four E-3 signals	1,920
E-5	565.148	Carries four E-4 signals	7,680
OC-1/STS-1	51.840	Basic signaling rate of SONET hierarchy	672
OC-3/STM-1	155.520	Exactly three times the capacity of OC-1**	2,016
OC-12/STM-4	622.080	12 times the capacity of OC-1	8,064
OC-24	1,244.160	24 times the capacity of OC-1	16,128
OC-48/STM-16	2,488.320	48 times the capacity of OC-1	32,256
OC-192/STM-64	9,953.280	192 times the capacity of OC-1	129,024

Table 34 Measuring Telecommunications Bandwidth—DS-0 to OC-192

"T" T-carrier system in U.S., Canada, and Japan with 1.544 Mbps as the primary level (24 voice channels x 64 Kbps per channel).

"DS" Digital Signal that travels on the T-carrier or E-carrier.

"E" Used in countries other than U.S., Canada, and Japan. The hierarchy was established by the CEPT (Conférence Européenne des Postes et Télécommunications) with 2.048 Mbps as the primary level ([30 voice channels + 2 channels for overhead] x 64 Kbps per channel).

"OC" Optical Carrier interface designed to work with STS-n (Synchronous Transport Signal) signaling rate in a SONET (Synchronous Optical Network).

"STM" Synchronous Transport Module refers to a large carrier (base signal 155.52 Mbps) in a SONET.

"STS" Synchronous Transport Signal is the electrical counterpart to the Optical Carrier (OC).

Notes:

* The number of 64 Kbps is presented for comparative purposes only. The actual number of simultaneous conversations possible over a given carrier may vary depending on the encoding scheme used.

** In the "E" and "T" hierarchies, each higher level is set to be "almost but not exactly" a multiple of the bit rate for the previous order (plesiochronous).

To eliminate problems associated with plesiochronous multiplexing, SONET, a synchronous hierarchy, was defined in the United States in 1986. As a result, the "OC" and "STM" carriers are exact bit-rate multiples of their primary levels, OC-1 and STM-1, respectively.

Appendix 4 – Electromagnetic Spectrum

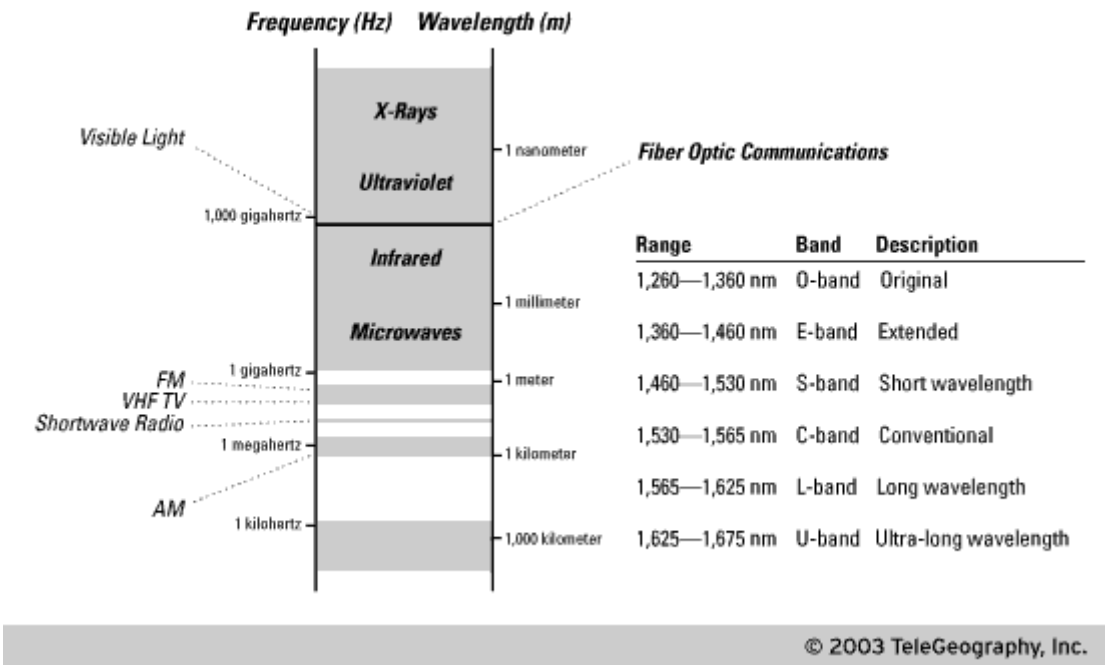


Chart 51 Electromagnetic Spectrum

The laser light used in fiber-optic communications operates within a narrow band on the electromagnetic spectrum. Radiation (such as TV signals and light) on the electromagnetic spectrum can be measured by both frequency (the number of wave cycles per second, or Hertz) and wavelength (in meters). Frequency and wavelength are inversely proportional (that is, the higher the frequency, the shorter the wavelength), and either can be used to describe communications signals. For example, radio broadcasts are denoted in frequency—a 100 megahertz (MHz) frequency on the FM dial corresponds to approximately a three meter wavelength. In contrast, signals on fiber-optic cables operate at much higher frequencies, and have tiny wavelengths—only 850 to 1,625 nanometers (billionths of a meter).

In scientific literature, a wavelength often is denoted as lambda (l). Individual wavelengths also are referred to as colors—an analogy to frequencies within the visible light spectrum.

One of the more important objectives of fiber designers has been to design fiber that has a wider "window" or range of usable frequencies for light signals. The wider the usable band, the more distinct signals can be transmitted. This is determined in part by the composition of the fiber itself. Hence, some recent designs have extended the low attenuation window at 1550 nm (now called the C-band) to 1600 nm (called the L-band), allowing more signals to be transmitted. At the other end, scientists have eliminated water molecules that greatly increase attenuation at 1400 nm, releasing this band (the S-band) for possible future use.

Appendix 5 – Jackson County Telecommunications Advisory Committee

Note: This is the list of those on the listserv provided by the SOTTC. Not all members attended community meetings. All were advised via email of meetings. A number of folks responded by email or telephone.

Sector/Name	*Organization*	*Title*
Business		
Joe Danelson	US Bank	Regional President Southern OR/No. CA
Brad Hicks	Medford Chamber of Commerce	Executive Director
Mike Davis	Macintosh Help	Owner
Jim Teece	Project A	President & CEO of Project A
Criminal justice, law enforcement, and emergency services		
Mike Winters	Sheriff's Department	Sheriff
Economic Development		
Gordon Safely	Southern Oregon Regional Economic Development, Inc.	Executive Director
Kelly Madding	Economic and Special Development, Urban Renewal Agency	Director
Education		
Ron Enger	Southern Oregon Education School District	Director, Technology and Media Services
Jay Matheson	Southern Oregon Education School District	Supervisor, Technology and Media Services
Mike Prinslow	Southern Oregon Education School District	Network Specialist, Network/Computer Support Services
Barbara Scott	Southern Oregon University	Associate Provost for Extended Programs
Government		
Michael Cavallero	Rogue Valley Council Of Government	Executive Director
Jeff Griffin	Governor's Office, Economic Revitalization Team	Regional Coordinator, Southwest Oregon
Steve Gilmore	U.S. Congress, 2nd district of Oregon	Medford District Office staff
Dave Hussell	Eagle Point	City Administrator
Dave Kanner	Jackson County	Deputy Administrator
Elise Smyrzinski	Shady Cove	City Administrator
Healthcare		
Cathy Britain	Asante Health Systems	Telehealth Coordinator
Don Bruland	Rogue Valley Council Of Government, Senior and Disabled Services	SDS Director
Charli Myers	KC's Adult Family Care	Adult foster care and hospice
Information Technology		
Marc Christiansen	Information Technology	Chief Information Officer
Libraries		
Ronnie Budge	Jackson County Library	Library Director
Sylvia Lee	Southern Oregon Library Information System	System Administrator Southern Oregon Library Information System (SOLIS)
Non-profits, arts, culture, and history groups		
Jenny Council	NetCorp	Not For Profit Technology Service Consultant
Other groups or		

Sector/Name	*Organization*	*Title*
sectors with the community		
Jerry Haynes	Jacobson, Thierolf & Dickey, P.C.	Technology Attorney
Rural Community Advocates		
Shayne Maxwell	Rural resident, Footes Creek	Rural Advocate
Telecommunications providers		
Keith Grunberg	Charter Communications	Sales Engineer
Richard Ryan	Hunter Communications	Owner
Jim Keene	Sprint	Field Ops Supervisor – Southern Oregon
Jim Nelson	Sprint	Public & External Affairs Manager - Oregon
Greg Theis	Clearwire	General Manager
Ron Trullinger	Qwest	
Norm Young	Applegate Broadband, LLC	Owner
Workforce Development		
Dennis Alexander	Rogue Valley Workforce Development Council	Coordinator
Rob Hegeman	Rogue Valley Workforce Development Council	Business Coordinator

Appendix 6 - 21st Century Education, Technology and the Role of Distance Education

Introductory Remarks

Education delivery methods continue to evolve in America and the world. Applied instructional theory now sees more and more integration of the tools of information technology ("IT meets IT"). As a result we are seeing challenges to so-called traditional pedagogical approaches. While the classroom is no stranger to change, the rate of change brought on by an inundation of advances in information technology and high-speed telecommunications services is a significant catalyst in the discussion over what to do and what not to do.

Educators should not feel alone in this sea of change awash with the opportunities afforded by technological innovation. Retail, healthcare, manufacturing, transportation and numerous other sectors experience this same challenge and share many similar issues of planning and absorption.

Yet it's not merely technology that is spurring change. The students and businesses that drive the marketplace in our consumer-oriented society are demanding more and more from their educational institutions. We might also add for less and less cost. How will we meet increased demands by populations forever increasing needs for education and skills transfer? How do we ensure the opportunities of education are available to all who want and need them? How we ride the waves of constant and rapid change will have everything to do with our abilities to meet the demands of students of all ages in every location.

Distance education using digital technologies and telecommunications will play a crucial role in meeting the demands for anytime, anywhere education in the 21st century. However, it's not a "one size fits all" proposition.

Distance Education Defined

Several definitions have emerged.

> "Distance Learning (DL) is an instructional delivery system which connects learners with educational resources. DL provides educational access to learners not enrolled in educational institutions and can augment the learning opportunities of current students. The implementation of DL is a process which uses available resources and will evolve to incorporate emerging technologies."[121]

> "Distance education is planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as special organizational and administrative arrangements".[122]

> "The process of extending learning, or delivering instructional resource-sharing opportunities, to locations away from a classroom, building or site, to another classroom, building or site by using video, audio, computer, multimedia communications, or some combination of these with other traditional delivery methods."[123]

> "The acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance."[124]

> "Distance education is instruction that occurs when the instructor and student are separated by distance or time, or both."[125]

"Distance learning is a term which encompasses all learning that takes place at locations remote from the point of instruction. It is an option for beginning studies or continuation of study off-campus in locations via cable television, Internet, satellite classes, videotapes, correspondence courses, or by other means. Distance learning integrates technology in educational courses whereby students may view and participate in lectures from various locations, or on an individual basis. Various forms of computer-based communication may be used to facilitate class discussions and communication among faculty and students. Distance learning may take the forms of an instructor-led course delivered via satellite to traditional home study correspondence courses, which is viewed by the hierarchy in education as still the most effective practice which wields the highest course grades, in short, results."[126]

"Trying to define distance education is rather like trying to define art of science…we all have a sense of what it is when we see it but would be hard pressed to accurately define it. Learners and teachers are separated by geography and or time."[127]

Last, but certainly not least, here's one community college's definition.

"Distance education is any type of learning where students and instructor are separated by time and/or place. It can be delivered using a variety of methods or technologies including modem/on-line computer, videotape, public broadcasting, satellite, or other media. Southwestern offers distance education by modem/on-line computer instruction through Southwestern On-Line and through a consortium, OCCDL, over the Internet, as well as selected telecourses and teleconferences through Ed-Net satellite."[128]

No matter how you define it, distance education is part of a field undergoing fundamental change.

"Although not an old discipline by academic standards, distance education practice and theory has evolved through five generations in its 150 years of existence. For most of this time, distance education was an individual pursuit defined by infrequent postal communication between student and teacher. The last half of the twentieth century witnessed rapid developments and the emergence of three additional generations, one supported by the mass media of television and radio, another by the synchronous tools of video and audio teleconferencing, and yet another based on computer conferencing. The first part of the twenty-first century has produced the first visions of a fifth generation—based on autonomous agents and intelligent, database-assisted learning—that we refer to as the educational Semantic Web. Note that each of these generations has followed more quickly upon its predecessor than the previous ones. Moreover, none of these generations has completely displaced previous ones, so that we are left with diverse yet viable systems of distance education that use all five generations in combination. Thus, the field can accurately be described as complex, diverse, and rapidly evolving.

However, acknowledging complexity does not excuse inaction. Distance educators, students, administrators, and parents are daily forced to make choices regarding the pedagogical, economic, systemic, and political characteristics of the distance education systems within which they participate. Never in the history of life on our planet has the need for informed and wisdom-filled action been greater than it is today. Distance education is a discipline that subsumes the knowledge and practice of pedagogy, of psychology and sociology, of economics and business, of production and technology.

As we enter the twenty-first century, the world is in the midst of a great turning as we adopt and adapt to the technological capabilities that allow information and communication to be distributed anywhere/anytime. Education is one of the few sustainable means to equip humans around the globe with the skills and resources to confront the challenges of ignorance, poverty, war, and

environmental degradation. Distance education is perhaps the most powerful means of extending this resource and making it accessible to all."[129]

21st Century Education and Digital-Age Proficiencies

Distance education is a Digital Age mechanism for distributing education. As such there are reasonable questions to ponder as we move forward with Distance Education, questions that emerge as we come to a fuller understanding of what is meant by a 21st century education and the challenges we face in meeting this transformation.

To prepare students to thrive in a digital economy they will need Digital-Age proficiencies. It is important for the educational system to make parallel changes in order to fulfill its mission in society. The educational system needs to understand and embrace the 21st-century skills within the context of rigorous academic standards.

It's a "good news, bad news" story.

> "First, the good news: in the years ahead, the declining cost of computation will make digital technology accessible to nearly everyone, from inner-city neighborhoods in the United States to rural villages in developing nations. These technological advances have the potential to fundamentally transform how and what people learn throughout their lives. Just as advances in biotechnology made possible the "green revolution" in agriculture, new digital technology can make possible a "learning revolution" in education.
>
> Now, the bad news: while digital technology could make a learning revolution possible, it certainly does not guarantee it. Early results are not encouraging. In most places where digital technology is used in education, it is used simply to reinforce outmoded approaches to learning. Even as scientific and technological advances are transforming agriculture, medicine, and industry, the ideas and approaches to teaching and learning remain mostly unchanged. To take full advantage of new technology, we need to fundamentally rethink our approaches to learning and education and our ideas of how new technology can support them."[130]

In the last decade, the federal, state, and local governments have invested over $40 billion to put computers in schools and connect classrooms to the Internet. Results are positive related to hardware and connectivity. The percentage of schools connected to the Internet rose from 35 percent in 1994 to 99 percent in 2001. The student to Internet connected computer ratio has improved dramatically in an even shorter time frame, going from 12 students per computer in 1998 to five to one in 2001. Many students who do not have computer and Internet access at home at least have some access at school. However, there are indications that many schools are not using this new infrastructure to maximum advantage.[131]

Michael Resnick in a paper "Revolutionizing Education in the Digital Age" shares the following assessment:

> "Education and learning are often considered in terms of information: What information is most important for people to know? What are the best ways to transmit that information from one person (a teacher) to another (a student)? What are the best ways to represent and display information so that it is both understandable and learnable? It's not surprising that people see a connection between computers and education. Computers enable transmission, accessibility, representation, and manipulation of information in many ways. Because education and computers are both associated with information, the two seem to make a perfect marriage. This focus on information, however, is limiting and distorting, both for education and for computers. If we want to take full

advantage of new computational technology and help people become better thinkers and learners, we need to move beyond these information-centric views of computing and learning.

Over the past 50 years, psychologists and educational researchers, building on the pioneering work of Jean Piaget have come to understand that learning is not a simple matter of information transmission. Teachers cannot simply pour information into the heads of learners. Rather, learning is an active process in which students construct new understanding of the world around them through active exploration, experimentation, discussion, and reflection. In short, people don't *get* ideas; they *make* them.

Despite the common use of the phrase "information technology," or IT, computers are more than simply information machines. Of course, computers are wonderful for transmitting and accessing information. Furthermore, they are a new medium through which people can create and express themselves. If we use computers to simply deliver information to students, we will fail to take advantage of the revolutionary potential of new technology for transforming learning and education.

It is through design activities that computers offer the greatest new learning opportunities. Research has shown that many of the best learning experiences come when engaged in designing and creating things, especially things that are meaningful either to us or to those around us. Computers can also be used as a "material" for making things -- and not just by children, but by everyone. Indeed, the computer is the most extraordinary construction material ever invented, enabling people to create a variety of things, from music videos to scientific simulations to robotic creatures. Computers can be seen as a universal construction material, greatly expanding what people can create and what they can learn in the process.

Unfortunately, most people don't use computers that way today. When people are introduced to computers, they are typically taught how to look up information on the Web, how to use a word processor, and how to send e-mail. But they don't become *fluent* in the technology.

What does it mean to be digitally fluent? Consider the analogy with learning a foreign language. If someone learned a few phrases so that he could read menus in restaurants and ask for directions on the street, would you consider him fluent in that language? Certainly not. That type of phrase-book knowledge is equivalent to the way most people use computers today. This knowledge is useful, but it is not fluency. To be truly fluent in a foreign language, one must be able to articulate a complex idea or tell an engaging story. In other words, one must be able to "make things" with language. Similarly, being digitally fluent involves not only knowing how to use digital technology, but also knowing how to construct things of significance with digital technology. Fluency with language not only has great utilitarian value in everyday life, it also has a catalytic effect on learning. When one learns to read and write, one is in a better position to learn many other things. This is also true with digital fluency. In the years ahead, digital fluency will become a prerequisite for obtaining jobs, for participating meaningfully in society, and for learning throughout a lifetime."[132]

Schools face the challenge of preparing students to live, learn and work successfully in today's knowledge-based digital society. To do so will require high-performance learning of academic content using 21st-century skills and tools. To accomplish this, schools must become high-performance learning organizations (see footnote for graphic showing components and relationships within a High-performance school system). [133]

The following skill clusters, when considered within the context of rigorous academic standards, are intended to provide the public, business and industry, and educators with a common understanding of -- and language for discussing -- what is needed by students, citizens, and

workers in the Digital Age (see footnote for an expanded list of the components of 21st Century Learning).[134]

Digital-Age Literacy
- Basic, scientific, economic, and technological literacies
- Visual and information literacies
- Multicultural literacy and global awareness

Inventive Thinking
- Adaptability and managing complexity
- Self-direction
- Curiosity, creativity, and risk taking
- Higher-order thinking and sound reasoning

Effective Communication
- Teaming, collaboration, and interpersonal skills
- Personal, social, and civic responsibility
- Interactive communication

High Productivity
- Prioritizing, planning, and managing for results
- Effective use of real-world tools
- Ability to produce relevant, high-quality products

Educating the Generations

The first thing to understand is that there is a sea change underway with students. It is not just an "age thing." While understanding the learning styles and perceptions of students is critical to the creation of better and more successful learning environments, a change in student demographics or perceptions is not always followed by changes at the institutional level. The kind of enterprise wide change necessary to break down old ways of doing business requires leadership, new organizational structures, and constant measurement. [135]

Consider the following imaginary student.

> "Each morning, Jason Keene wakes up in his dorm room and peers over at his PC monitor to see how many IMs arrived while he slept. Sometimes more than 15 attempts to reach him are visible on the screen, along with various postings to the blog he's been following since the semester began in January. After a quick trip to the shower, the sophomore computer science major pulls up an eclectic mix of news, weather, sports, and information on the home page he customized using Google. He then logs onto his campus account to see if the previous day's sociology lecture is posted. He notices a reminder that there will be a quiz that day as well as another one letting him know that the paper he's writing needs to be e-mailed to a professor by midnight the next day. With a cup of instant coffee on the desk next to him, Jason IMs a few friends and then pulls up a wiki to review progress a teammate has made on a project they're doing for their computer science class.[136]

The rest of us might be wondering when Jason is going to start his day, but if you ask Jason, he's already halfway through it. Other than the lecture that he may or may not attend—he can download the notes—he's likely to spend most of the morning in his room. By noon, he's sent a text message from his cell phone to a friend to meet him at the Student Union, where most afternoons he can be found sitting with a group of students, laptop poised on his knees, accessing

notes, papers, and documents using the campus's wireless network. Back in his room, he's likely to stay up past midnight juggling notes, papers, instant messages, and an Internet-based multiplayer game he thinks he's almost beaten. He's been to the library once in the two years he's been at college, and he communicates frequently with his professors via e-mail. When it comes to research, he's more likely than not to consult Google and Wikipedia.

Students 18–22 years of age speak primarily about the ways in which they communicate and maintain community but not necessarily about specific technologies. That observation supports much of the current data about college-age students, most of who have grown up with technology and view it, not as a device or application, but as a means for communicating and maintaining relationships. The real news, however, is how little today's college and university leaders know about Jason and his peers, and how that lack of knowledge could be hampering their ability to remain competitive.

NetGeneration and Millennial students

Today's Net Gen college students have grown up with technology. Born around the time the PC was introduced, 20 percent began using computers between the ages of 5 and 8. Virtually all Net Gen students were using computers by the time they were 16 to 18 years of age. Computer usage is even higher among today's children. Among children ages 8 to 18, 96 percent have gone online. Seventy-four percent have access at home, and 61 percent use the Internet on a typical day.[137]

Whether or not students have access to computers and the Internet from home, they consider such access important. When high school students were asked why technology is essential to their education, responses included[138]:

- It's part of our world.
- Technology is so embedded in our society, it'd be hard not to know how to use it.
- It's really helpful -- it makes things faster.
- Abstract concepts are often easier to grasp when technology is used effectively as a teaching tool.
- Some students at my school who weren't great students are better ones now thanks to computers.
- Technology allows us to learn as much as we want to about virtually any topic.
- I usually connect with friends either to get help or to help others.
- By the teenage years, students use the Web extensively for school research (94 percent) and believe it helps with schoolwork (78 percent). Although technology is used heavily, students seem to keep technology in perspective. In their words:
- Teachers are vital to the learning process. Tech is good, but it is not a perfect substitute.
- Computers can never replace humans.
- Learning is based on motivation, and without teachers that motivation would cease to exist.
- A major part of school is building social skills. If we were to always communicate through technology and not in person, then the way we would view life would change dramatically.

The characteristics of traditional age (18-to-22-year-old) college students—a group sometimes called the Millennials -- have been described as individuals who:

- Gravitate toward group activity
- Identify with parents' values and feel close to their parents
- Believe it's cool to be smart
- Are fascinated by new technologies
- Are racially and ethnically diverse; one in five has at least one immigrant parent
- Are focused on grades and performance
- Are busy with extracurricular activities
- When asked about the biggest problem facing their generation, many respond that it is the poor example that adults set for kids.[139]

Individuals raised with the computer deal with information differently compared to previous cohorts: "they develop hypertext minds, they leap around."[140] A linear thought process is much less common than the ability to or piece information together from multiple sources. Among other differences are their:

> **Ability to read visual images** -- they are intuitive visual communicators
> **Visual-spatial skills** -- perhaps because of their expertise with games they can integrate the virtual and physical
> **Inductive discovery** -- they learn better through discovery than by being told
> **Attentional deployment** -- they are able to shift their attention rapidly from one task to another, and may choose not to pay attention to things that don't interest them
> **Fast response time** -- they are able to respond quickly and expect rapid responses in return

Although many observations can be made about the Net Generation, several merit special mention because of the potential impact on higher education.

Nontraditional Students

At the same time that colleges and universities are graduating their first Net Generation learners, most campuses are experiencing an influx of nontraditional students.[141] Three-quarters of all undergraduates are "nontraditional," according to the National Center for Educational Statistics. Nontraditional students are defined as having one or more of the following characteristics:

- Delayed enrollment -- did not enter postsecondary education in the same year they graduated from high school
- Attend part-time, for all or part of the academic year
- Work full time -- 35 hours or more -- while enrolled
- Financially independent as defined by financial aid
- Have dependents, other than a spouse, which may include children or others
- Single parent, having one or more dependent children
- Lack of a high school diploma

The more nontraditional characteristics students possess, the less likely they are to persist in college after the first year or to graduate. Nontraditional learners tend to be concentrated in specific types of institutions. In community colleges, for example, nearly half the students have delayed beginning postsecondary education. Half also had two or more persistent risk factors. In contrast, 91 percent of students in four-year colleges enrolled immediately after high school; 85

percent had no persistent risk factors. Adult learners represent a significant category of nontraditional learners[142]:

- 35 percent of undergraduates are adult learners
- 70 percent of all adult learners are female
- 38 is the median age of undergraduate adult learners
- 80 percent of adult learners are employed

The motivation for going to college is often different for adult learners compared to the Net Gen. Among adult learners 70 percent have a degree as their goal; the other 30 percent are seeking a certificate or a specific set of skills.

It is often said that we see the world through our own eyes. Our experiences and the environment around us shape how we think, behave, and act. Consider birthplace. If you were born in the south, you might have a southern accent; if raised in Canada, you would speak differently. Tastes in food and clothes might differ, as would customs and expressions. We are all products of our environment -- and technology is an increasingly important part of that environment.

Comparing the Generations

Few generalizations are entirely correct. However, generalizations -- such as those about generations -- highlight trends. Today's generations can be described as follows.[143]

Birth Dates	**Matures 1900–1946**	**Baby Boomers 1946–1964**	**Generation X 1965–1982**	**Net Generation 1982–1991**
Description	• Greatest generation	• Me generation	• Latchkey generation	• Millennials
Attributes	• Command and control • Self-sacrifice	• Optimistic • Workaholic	• Independent • Skeptical	• Hopeful • Determined
Likes	• Respect for authority • Family • Community involvement	• Responsibility • Work ethic • Can-do attitude	• Freedom • Multitasking • Work-life balance	• Public activism • Latest technology • Parents
Dislikes	• Waste • Technology	• Laziness • Turning 50	• Red tape • Hype	• Anything slow • Negativity

Other attributes show generational trends as well (for example, attitude toward changing jobs or locus of community). One of the most striking attributes is the attitude toward the Internet. For the Net Gen, the Internet is like oxygen; they can't imagine being able to live without it.

Maybe It's Not an "Age Thing"

Although these trends are described in generational terms, age may be less important than exposure to technology. For example, individuals who are heavy users of IT tend to have characteristics similar to the Net Gen. In fact, the pervasiveness of technology -- in our professions and in our personal lives -- virtually ensures that most individuals gradually assume some Net Gen characteristics. For example, ask yourself:

- Are you more comfortable composing documents online than longhand?
- Have you turned your "remembering" (phone numbers, meetings, and so on) over to a technology device?
- Do you go to meetings with your laptop or PDA?

- Are you constantly connected? Is the Internet always on whether you are at home or work? Is your cell phone always with you?
- How many different activities can you effectively engage in at one time?
- Do you play video or computer games?[144]

The differentiating factor may not be so much one person's generation versus another; the difference may be in experience. Whether the Net Generation is a purely generational phenomenon or whether it is associated with technology use, there are a number of implications for colleges and universities. Most stem from the dichotomy between a Net Gen mindset and that of most faculty, staff, and administrators.

Is More Technology Necessarily Better?

Maybe yes, maybe no. It is an almost instinctive assumption to believe that Net Gen students will want to use IT heavily in their education; they certainly do in their personal lives. However, if you ask Net Gen learners what technology they use, you will often get a blank stare. They don't think in terms of technology; they think in terms of the activity technology enables. In general, the Net Gen views the Internet as an access tool -- a medium for distribution of resources rather than a resource with limitations.[145]

Student satisfaction with online learning exemplifies our assumptions about online learning. Since Net Geners spend so much of their time online, it seems reasonable to expect that they would have a strong preference for Web-based courses. The reverse is actually true. Older students (Matures and Baby Boomers) are much more likely to be satisfied with fully Web-based courses than are traditional-age students. The reason relates to the Net Gen desire to be connected with people and to be social as well as their expectations of higher education. Traditional-age students often say they came to college to work with faculty and other students, not to interact with them online. Older learners tend to be less interested in the social aspects of learning; convenience and flexibility are much more important.

The implication is that colleges and universities should not assume that more technology is necessarily better. Technology that enables certain types of activities is likely to be appreciated. For example, wireless networking enables learner mobility and makes it possible to be constantly connected. The majority of wireless network use, however, may be outside the academic realm. Using technology to increase customization, convenience, and collaboration is well received; however, its integration into most courses or curricula is not as deep as into students' personal lives.

How Well Do We Know Our Students?

It is easy to assume that we understand our students, but there is often a difference in perspective between the Net Generation and faculty/administrators. As a result, it is important that schools, colleges and universities ask the right questions and not simply assume that the current student cohort is like we were. Important questions for colleges and universities to ask include the following.

- **Who are our learners?** Although the institution may have demographic information (date of birth, home town, gender, ethnicity, and so on), we may not understand how students view the world, what is important to them, or even how they learn best. It is increasingly important that colleges and universities engage

learners in a dialogue to better understand their perspective. Institutions make massive investments (IT infrastructure, residence halls, recreational facilities) for the sake of meeting students' wants and needs; basing these decisions on assumptions is risky.

- **How are today's learners different from (or the same as) faculty/administrators?** Although the Net Generation may be different in many ways from Baby Boomers, some things stay the same. Students still come to college to meet people, to socialize, and to interact with faculty. Many of the measures of student engagement have consistently shown the importance of interaction with faculty and other students, as well as a supportive campus environment. Student preferences for how they receive information are likely different, however -- they favor more graphics, a rapid pace, and immediate responses. If faculty and administrators can understand the factors that lead to student success -- which persist and which differ from their own college experience -- they will be able to more effectively develop programs and target investments.
- **What learning activities are most engaging for learners?** It isn't technology per se that makes learning engaging for the Net Gen; it is the learning activity. If today's students are experiential learners, lectures may not be an optimal learning environment. If they are community oriented, providing opportunities for peer-to-peer experiences or team projects may be preferable to individual activity. There are significant individual differences among learners, so no one-size-fits-all approach will be effective. Even so, learning science and the habits of the Net Generation provide some clues as to how we can improve learning.
- **Are there ways to use IT to make learning more successful?** Learning science indicates that successful learning is often active, social, and learner-centered. However, with the multiple responsibilities of faculty, staff, and administrators, as well as the large numbers of students most campuses serve, ensuring successful learning without the support of IT may be impossible. Individualization and customization are laudable goals for instruction; they are also time intensive. With the appropriate use of technology, learning can be made more active, social, and learner centered—but the uses of IT are driven by pedagogy, not technology.

Educating students is the primary goal of colleges and universities. However, reaching that goal depends on understanding those learners. Only by understanding the Net Generation can colleges and universities create learning environments that optimize their strengths and minimize their weaknesses. Technology has changed the Net Generation, just as it is now changing higher education.[146]

Appendix 7 - Using Technology to Improve the Lives of Seniors and Persons with Disabilities

Overview

> "We have the largest group of elders alive on the planet in human history. By the end of the decade, it is estimated that one in three households in the United States will have at least one family member dealing with cognitive decline. We need to consider how computing can evolve to meet their needs. And tomorrow's elders will be different than today's. For instance, baby boomers accustomed to the PC and the Internet will expect applications and services to enhance their retirement years."[147]

> "New opportunities for persons with disabilities and low income seniors to live more independent lives and be full participants in communities reflect the astoundingly rapid cultural change we are all experiencing."[148]

The way we care for seniors today cannot scale to meet the looming age wave, and before long we'll face a full-blown national crisis. Indeed, we are already seeing the beginnings of this impact. We have an obligation to our parents -- indeed to the next generation of seniors -- to ensure they get the best possible care and that they receive it in a place they want to call home. As a caring society we must also address the needs of those persons with disabilities. What we need is a countywide strategic plan as well as the will to achieve -- one that brings together leaders from industry, government, health care, research, and consumer advocacy -- to prepare for the aging of our population. Much of what we can do for seniors is also directly and immediately applicable to persons with disabilities. [149]

New technology solutions offer great promise to improve quality of care while reducing healthcare costs. Technology already has transformed our lives -- from email to MP3s and from online shopping to cell phones. It is time now for technology to transform the experience of aging as well as improving the lives of those persons with disabilities.

Fortunately, today we already see many practical uses for existing technologies and expect exciting new technologies coming in the next 5-10 years that offer the potential to dramatically improve the quality of care we can provide. We can and must make it happen through vision, leadership, and a county commitment to prepare for the demographic and economic changes that will inevitably transform our swiftly aging planet.

We can unleash the potential of technology for innovative development across the continuum of healthcare, housing and services for the aging and persons with disabilities in order to:

- Help older adults and the disabled maximize their independence
- Support the needs of professional and family caregivers
- Improve quality of care and quality of life
- Reduce our nation's healthcare costs
- Increase aging and disability services provider efficiency

Potential Economic Benefits to the from Accelerated Broadband Deployment to Older Americans and Americans with Disabilities[150]

It is widely understood that broadband technologies that allow rapid and "always on" connections to the Internet will provide significant benefits to the U.S. economy. We now can

estimate the economic benefits to the nation due to cost savings and output expansion resulting from the use of broadband technologies for an important specific sub-group of the U.S. population: the roughly 70 million Americans who are over 65 or under that age but have disabilities.

Three types of benefits from broadband deployment and use are identified:

- lower medical costs;
- lower costs of institutionalized living; and
- additional output generated by more seniors and individuals with disabilities in the labor force.

Considered together, these three benefits are estimated to accumulate to at least $927 billion in cost savings and output gains in 2005 dollars (with future benefits discounted for the "time value of money") over the 25-year period, 2005 to 2030. This amount is equivalent to half of what the United States currently spends annually for medical care for all its citizens ($1.8 trillion). As large as these benefits may appear, they are line with previous estimates for the benefits of broadband for the population as a whole.

Policies designed to accelerate the use of broadband for these populations, however, could significantly add to the benefits, by cumulative amounts ranging from $532 billion to $847 billion (depending on the wages earned by the additional working seniors). The policy benefits are as substantial as what the federal government is likely to spend on homeland security over the next 25 years. Total cumulative benefits, under the right set of policies, could exceed what the United States currently spends annually for health care for all its citizens.

With so much at stake, policymakers have strong reasons to consider measures to accelerate the deployment and use of broadband technologies for America's seniors and individuals with disabilities. There is wide agreement that broadband will provide enormous benefits to users and to the entire economy, especially as the take-up rate increases. But so far, relatively little attention has been paid to the potential benefits to be reaped by different groups within American society and how this in turn will generate economic benefits and cost savings over time.

It will not surprise many to know that the young -- who typically are among the first to adopt many new technologies -- have benefited and will continue to benefit greatly from the use of broadband. But it turns out that broadband technologies also hold great promise for a different, important and growing segment of the U.S. population: the 35 million Americans over 65 and as many as 36 million non-elderly Americans with disabilities.

We can now project estimates of the potential economic benefits of broadband for these populations from three sources (for a detailed review of the development of the estimates the reader is referred to "Great Expectations: Potential Economic Benefits to the Nation From Accelerated Broadband Deployment to Older Americans and Americans with Disabilities," Robert E. Litan, 2005 -- see footnotes for a link to the entire report):

- lower medical costs for both seniors and individuals with disabilities (which can be realized largely through broadband "in the background" rather than through individuals tapping away on computers);
- lower costs from delayed or avoided institutionalized living arrangements for senior citizens and individuals with disabilities; and

- additional output made possible by increased labor force participation by individuals in both groups.

Note that none of the economic estimates include the additional benefits of lives saved and quality of life improvements made possible by broadband.

America is graying

And so too is our county (see the section on demographics in the Plan).

Nationwide currently, about 35 million, or 12 percent of the U.S. population, are over the age of 65. By 2030, the Census projects those over 65 will number 71 million, accounting for 21 percent of the population. The reasons are straightforward and commonly understood: the retirement of the baby boom generation and longer life spans due to advances in medical technology.

Many Americans have some kind of disability. Depending on the definition of the term, as many as 50 million individuals are in this category, of which as many as 36 million are under the age of 65 (non-senior citizens with disabilities).

America has multiple government programs in place to meet the special needs of senior citizens and individuals with disabilities. These programs are already hugely expensive, however, and will grow more so over time, as these populations grow and as technology continues to drive up the cost of health care in general. The same forces will also contribute to rising private sector health care costs incurred by senior citizens and individuals with disabilities.

Governments and individuals will be looking for many ways to reduce the financial burden of these programs -- both through cost savings and expansion of national output (which would generate more government revenues). One prominent federal effort is to bring health care into the 21st century by facilitating the widespread use of electronic medical records (EMR).

Broadband: An Unrecognized Source of Potentially Significant Cost Savings

Another important, and heretofore unrecognized, source of potentially significant cost savings for both the public and private sector, and possibly output (and thus revenue) expansion: the broader use of the Internet, and specifically “broadband” technologies, to deliver health care services and information to senior citizens and individuals with disabilities, and to make it easier for members of both populations to work, if they are willing to do so.

For many, the term “broadband” conjures up images of individuals plugged into their PCs, browsing the Internet, and frequently downloading songs or even movies at speeds once thought to be impossible. In fact, many senior citizens and individuals with disabilities citizens currently use broadband in precisely this way.

But broadband is about much more than personal computers, which are only one way to access the Internet. Already today, millions of Americans (and many more around the world) use their cell phones and other wireless devices (such as personal digital assistants or PDAs) to access the Internet through broadband technology. Wireless is also becoming the method of access for many PC users, especially as more city governments roll out plans to turn their cities into giant Wi-Fi “hot spots.” Millions more users will take advantage of one or more broadband access

technologies in the future, especially as Internet access devices proliferate and prices for both them and the service come down.

Indeed, broadband will be built into many other devices or goods -- into homes, clothes and other things people wear (wristwatches, eyeglasses, hearing aids, for example), automobiles, and various appliances. This will significantly enhance broadband penetration throughout the population. In short, *broadband eventually will be ubiquitous*, not just for the young who are always the early adopters of any new technology, but for people of all ages, whether or not they want to or know how to use a personal computer.

Broadband will also confer benefits on society that exceed -- very likely far exceed -- the benefits that individuals believe they will get from it when they purchase access to it. That is because, like other networks, broadband technologies are *platforms*, on which a variety of services have been and will continue to be built.

Consumers who buy a basic broadband service, however, only take account of the benefits they privately derive from the service – such as entertainment, information, and education. They have no reason or incentive to take account of or to anticipate the broader social benefits the platform enables, such as the "network externalities" that users create for others by enlarging the network and by providing added incentives for more content creators to develop more and better applications for Internet users. For example, it is unlikely that subscribers to broadband only several years ago realized the full extent to which they would soon have access to music, videos, video games and the wealth of information that is now available on the Internet. Or that they would have a platform -- via eBay -- to join in what is now surely the world's largest market for used merchandise.

Although, as of 2003, official government statistics indicated that only a little more than half of all American households had some type of Internet access, more recent private data indicate that the Internet household penetration rate now may exceed 70 percent. Broadband penetration, however, is substantially less, at roughly one-third of all U.S. households, though this fraction has been steadily increasing.

It is important to distinguish between *access to* and *usage of* broadband, for the terms have very different meanings. Virtually all Americans how have "access to" DSL, cable or some form of wireless broadband service. But most Americans who could purchase broadband do not do so because they apparently do not believe that the content justifies the price -- typically about $40 per month (though some services are now substantially cheaper than this).

Nonetheless, broadband use could and almost certainly will be higher over time, as service prices come down and more content continues to be delivered for the medium. There is a "chicken-and-egg" aspect to the broadband market, as there is for all markets subject to "network externalities" -- or markets in which the value to one user grows as more users join the network. In the case of broadband, the service becomes more valuable as the quality and variety of content improves; but investment in content, in turn, depends on broadband usage. So, which comes first: the service or the content?

Types of Benefits

The estimated benefits are of two broad types: *cost savings* and *additional output*. The cost savings arise because broadband will enable members of both populations to benefit from

disease management programs that require constant or "real-time" communication between patients and providers of medical care in a way that would be much less convenient or even impossible in a "dial-up" world (for example, through remote monitoring by healthcare providers and by two-way communications between patients and health care providers, or "telemedicine").

Lower costs will show up directly in lower amounts spent on medical care. Medical monitoring enabled by broadband should also delay (or conceivably eliminate the need for) institutionalized living for some seniors and individuals with disabilities who through the use of broadband can be monitored at their current residences or less expensive community health care centers. The cost of living in institutional settings is far more expensive than living at home.

The cost savings implicitly assume that seniors and individuals with disabilities will not demand more medical care when it becomes somewhat cheaper. Should they do so, some of the cost "savings" will be offset by additional care -- which clearly would be a good thing, and thus to the extent this occurs (and lowers the "cost savings"), it should be welcomed.

Broadband should also expand total output because it will enable some seniors and individuals with disabilities who choose to continue working to do so remotely. "Telecommuting" through broadband is a qualitatively different experience than working over a dial-up connection. The availability of broadband therefore should effectively expand the size of the labor force and the income it will generate (aside from enhancing the satisfaction and well-being of individuals who choose to take advantage of the technology).

Potential Broadband-Related Medical Cost Savings

It has been widely observed that of all industries in the economy, health care has been among the least beneficially affected by the Internet revolution. As one report puts it, "The health care sector lags every other major service industry in its investment in information technology."

This disappointing conclusion is due to several factors. One reason is that the limited technology investments that are made in this sector focus on high-tech diagnostic devices (such as CAT scans) that assist in acute care, but not in routine care or in managing patients with chronic illnesses. In addition, many physicians, especially those who have been in practice for some time, grew up in a generation when the Internet and indeed computers were not integral to their practice, or to business in general. As a result, many physicians and other health care providers (including hospitals) still do not take full advantage of information technology to digitize record-keeping, invoicing, prescription ordering, and other functions. Meanwhile, of particular importance to patients, there is no generally available system of portable, easily used patient medical records so that patients need not fill out new sets of forms, including their medical histories, each time they visit a new health care provider (physician, HMO, or hospital).

Electronic Medical Records

Internet-based technologies have much potential to bring substantial cost savings to the medical care system. Analysts conclude that the savings from web-based claims processing alone would shave 1.5 percent off of total U.S. health care expenditures (then estimated at $1.2 trillion in 1999). Additional savings could be realized through widespread online access to patients' electronic medical records (EMR); clinical decision support and payer guidelines; prescription and ordering of medical tests; real-time verification of reimbursement eligibility; appointments scheduling and referrals; patient education and interaction (including "email appointments"

rather than in-person visits); compliance monitoring; and greater use of the Web in ordering supplies (business-to-business or B2B commerce).

But EMR will not work without cooperation from physicians, and that in turn will require systems that allow easy data entry, portable devices with which physicians are comfortable and which they will use, and devices that patients trust to carry their information (such as chips on a card, since patients wary of their privacy are unlikely to trust a single, centralized medical data bank). Ultimately, the cost savings from universally used EMR could be substantial. A recent RAND study estimates them at $42 billion annually over a 15-year period, an amount equivalent to approximately 2.5 percent of all current medical costs ($1.8 trillion).

Integrated Monitoring

Perhaps the most important way in which broadband may be used to save medical costs is through integrated monitoring and intervention systems for patients with chronic illnesses. As features of this system are introduced for seniors and individuals with disabilities generally, there should be significant opportunities for cost savings. One major factor holding back accelerated implementation of such systems, however, is the failure so far of the highly fragmented U.S. health care system to reimburse -- and thus give incentives for -- physicians and other health care providers to use this technology. In addition, there is a need to educate patients, especially those with one or more chronic conditions, on the benefits of broadband-enabled integrated monitoring and intervention systems.

Although generic cost savings from broadband should help all seniors (in the same way that they should benefit all Americans) -- through lower administrative costs, savings arising from implementation of EMR, and other cost reductions -- the subpopulation among seniors likely to benefit the most *are those with chronic diseases that require continued medical care and monitoring.* These patients are at high-risk for serious health care problems and acute episodes requiring hospitalization.

Roughly 8 million Medicare beneficiaries (out of a total senior population of approximately 35 million) currently have five or more chronic conditions, and account for over 2/3 of the program's spending. Of the U.S. population in general, 45 percent suffer from at least one chronic condition (which can include coronary heart disease, chronic obstructive pulmonary disease, mental health disorders, diabetes, hypertension and asthma). Nationwide, care for those chronic illnesses accounts for at least *78 percent* of all health care spending, or well over $1 trillion annually – an amount that is certain to climb as both the population and health care costs continue to increase.

The potential savings that broadband could bring to this population are perhaps best realized through integrated systems of home monitors – wireless devices and clothes with transmitters that relay information about vital signs to a central office that can alert health care providers when immediate interventions are necessary, and otherwise reduce the need for individuals to see their physicians and even be admitted to the hospital, which is a very expensive form of health care. A key advantage of such systems is that *they do not require the patients to have access to or use a computer, but instead only to wear a monitor that transmits vital signs and other relevant medical data over current wireless networks in real-time--made more efficient with broadband wireless technologies--to a central office that itself has computers and a data base that are linked by broadband connections.*

In fact, the potential savings from disease management enabled by broadband based remote monitoring for all chronically ill patients are potentially quite extraordinary -- as much as 30 percent of all hospital, out-patient, and drug expenses. Since care for the chronically ill already accounts for 78 percent of total medical costs, a 30 percent saving of costs in this category could reduce overall healthcare expenses for the United States by roughly one quarter, or about $350 billion annually.

One key impediment to more widespread use of such cost-saving programs is that current reimbursement practices do not reward or encourage physicians to use them. Though it may be difficult (or politically impossible) for the federal government to require private insurers to change their reimbursement policies, both federal and state governments have a direct interest in generating efficiencies in the insurance programs they directly operate, Medicare and Medicaid. Thus, the estimates of cost savings from broadband assume that governments eventually will change their reimbursement practices so that these benefits can be realized.

In any event, the cost savings estimates from broadband based solely on chronic disease management programs should understate the potential broadband-related medical cost savings that may be realized for seniors (and individuals with disabilities). The estimates do not take account of the potential cost savings from the wider use of telemedicine – or two-way video communication between patients and health care providers – that would eliminate the need for many in-person visits to health care providers. In addition, the costs savings estimated here are based on existing technologies and thus may understate the range of uses for broadband-enabled remote monitoring and delivery of health care that will benefit both seniors and individuals with disabilities. Thus, researchers are already at work on new technologies that would monitor certain vital signs via attachments to one's personal computer, cell phone and even television. In the future, it is not difficult to imagine even more complete monitoring devices in wristwatches, hearing aids, jewelry and clothing.

Some portion of non-elderly individuals with disabilities also should benefit from a chronic disease management program, while the entire population of individuals with disabilities should benefit to some degree as well as from the savings in general administrative costs, increasing use of EMR, and the ancillary benefits of PC-based broadband.

Lives Saved From Broadband Technologies

In addition to the cost savings it should make possible, broadband should also help save lives -- just as telephone service (through 911) has in the past, but in the case of broadband, perhaps to a greater extent. This should happen in at least three ways.

First, the wider use of broadband should cut down on errors associated with wrong doses or inappropriate medications. In a widely cited study from 2000, the Institute of Medicine reported that as many as 98,000 people die unnecessarily each year because they are given the wrong amount of a medication or indeed even the wrong medication itself**.** The *Ending The Documents Game* report cites subsequent studies suggesting that the true number may be twice as high.

Medical errors would be significantly reduced if prescriptions were digitized, and if pharmacists and doctors had access to patient-specific medical records that would identify whether the patient was allergic to the medication. Broadband technologies would facilitate this process because physicians, nurses and other medical personnel should find them so much easier and more convenient to use than the much slower dialup services. Physicians and hospitals could use

broadband-based landline or wireless transmission devices working over broadband networks to relay this information to pharmacists and thus dramatically reduce the totally unnecessary and tragic loss of life associated with what, in essence, are simple-to-fix problems in the medical system.

Second, as more individuals use the Internet for medical information, many of them may be encouraged to make appointments with physicians at earlier points when their diseases or conditions may be more amenable to treatment. Similarly, patients can use information on the Internet to avoid seeing doctors when it is unnecessary to do so.

Third, it is quite possible that in the not-so-distant future when a sizeable number of seniors and individuals with disabilities have video capabilities associated with their broadband, they will be able to interact remotely -- in a visual fashion -- with health care providers. These interactions may permit interventions or advice that could save lives, as well as avoid some expenses associated with unnecessary trips to emergency rooms and physicians' offices.

Potential Broadband-Related Cost Savings from More Independent Living

As of 2002, only about 5 percent of all Medicare-eligible individuals, or 1.6 million seniors, lived in nursing homes. This number, however, is expected to dramatically increase over time, especially as the baby boomers retire and as life spans lengthen. By one estimate, 44 percent of 65-year-olds today can expect to live in a nursing home at some point in the future. For the 2020 cohort of 65 year-olds, this figure is projected to rise modestly to 46 percent due to likely longer life spans.

Nursing home, or institutionalized, care is expensive, far more so than personal medical attention given at home. In 2004, a private room in a nursing home facility cost about $78,000 annually; a semi-private room cost nearly $62,000. By comparison, home health care -- delivered three hours a day for five days a week -- cost an average of about $14,000. The difference between institutionalized and home care then, runs easily in the range of $50,000 or more per person.

In 2004, $135 billion was spent on long-term care for the elderly, of which $92 billion (68 percent) was spent on care provided through nursing homes, and the $53 billion balance (32 percent) spent on home care. Of the total, Medicaid paid 35 percent, Medicare covered 25 percent, and private health insurance picked up 4 percent. The rest, or about 33 percent, of all costs were borne by the individuals and their families.

In principle, the same broadband-based monitoring programs for the chronically ill can be used to monitor the health of the elderly. However, unlike other senior citizens (or many of those with disabilities), monitoring alone cannot deliver services in persons in need. The issue is whether monitoring, *in conjunction with home health care*, can delay or, in some cases, avoid institutionalization of individuals. It is reasonable to expect that the answer is "yes."

As broadband equipped with two-way video transmission diffuses throughout this population, seniors will be able to interact much more intimately with their relatives and friends than is possible now through the telephone. This should reduce feelings of loneliness and depression, and thereby enhance the willingness of some who might otherwise feel resigned toward moving to a nursing home, to remain in their homes.

The cumulative cost savings through 2030 are estimated to be $32 billion (in 2005 dollars).

The savings assumptions implicitly reflect the possibility that broadband will provide some cost savings that have not yet been fully realized for individuals who live in institutional settings. Such savings can arise from greater use of telemedicine -- and thus savings from avoided physician visits -- as well as through broader use of the Internet by residents to locate more effective treatments for their conditions.

Potential Broadband-Related Output Gains From Increased Labor Force Participation

Because they enable workers to "telecommute" -- that is, to work from home or at locations other than at an employment site -- broadband technologies have the potential for increasing labor force participation by both senior citizens and individuals with disabilities. In particular, broadband can permit individuals to continue working as consultants for their former employers and/or for new clients, or to establish new enterprises so that they are "working" for themselves (for example, by running Internet based businesses).

Opportunity for Economic Development

A considerable amount of the technology necessary to implement these changes already exist (for example for the many types of home monitoring[151]), while others are in development. Assembling the existing technologies and providing installation and maintenance service is one economic development opportunity. Given the rapid aging of the county's residents as well as the general availability of disposable income in that group, this could become a very good economic opportunity.

Through the process of implementing pilot projects a great deal of experience and knowledge will be gained that could be used to drive additional hardware, software service model development. This too will foster additional economic development opportunity.

We also have some interesting models up and running in some locations in the U.S. One example is BlueRoof Technologies in Pensylvannia.[152] Blueroof Technologies is developing a comprehensive program for the McKeesport, Pennsylvania area to become a leader in Senior Smart Technology. Senior Smart Technology focuses on Information Technology, sensors, and computer hardware and software to monitor and optimize the lives of senior citizens, thereby avoiding or postponing institutional care by providing a safe home environment. Blueroof Technologies also will stimulate community and economic growth by providing training and long-term employment opportunities. A special focus will be offering youth the opportunity to train as workers in all levels of the program, thereby aiding their development as responsible community citizens.

Additional work needs to be done to size the economic development potential from these activities.

A Gap Exists

There is a gap between availability of innovative technology and effective implementation particularly as it pertains to the needs of low-income seniors and people with disabilities. Although lack of funding continues to be an issue, lack of infrastructure capacity represents a significant barrier to integration of assistive technology into affordable housing development and long-term supports. There is a need for mechanisms to promote systematic consideration of

consumers' assistive technology needs as related to housing and long-term supports. There is also a need for innovative ways to educate and connect consumers, technical assistance providers, and property managers who are responsible for long-term supports in housing communities.

Potential Source of Tax Credits

Oregon Housing and Community Services is Oregon's housing finance agency, providing financial and program support to create and preserve opportunities for quality, affordable housing for Oregonians of lower and moderate income.

The current agency was created in 1991, when the legislature merged the Oregon Housing Agency with State Community Services. The coordination between housing and services creates a continuum of programs that can assist and empower lower-income individuals and families in their efforts to become self-reliant. OHCS administers federal and state antipoverty, homeless and energy assistance, and community service programs. OHCS also assists in the financing of single-family homes, the new construction or rehabilitation of multifamily affordable housing developments, as well as grants and tax credits to promote affordable housing.[153]

The tax credits go hand in hand with the financing OHCS can provide. They are based upon a portion of the project construction cost. The project owner sells the credits, and the cash realized from the sale of the credits is provided to the project to pay some of the development expenses, thereby reducing the amount of debt borrowed and associated monthly debt service - and thereby reducing monthly project operating expenses and the rents to the tenants.[154]

Steps to Bridge the Gap[155]

- Establish a countywide task force to develop a plan for meeting the needs of low-income seniors and people with disabilities.

- Review currently available technologies and identify infrastructure deficits that act as barriers to effective technology integration into housing for seniors and people with disabilities.

    - Prepare a comprehensive review of available technology for enhancement of affordable housing and supports.
    - Conduct a Needs and Awareness Survey to provide a picture of assistive technology awareness, experience, and barriers to use among seniors and people with disabilities. This information will help shape training activities, demonstration projects, and recommendations for systems change.
    - Determine the extent to which current policies address assistive technology.
    - Identify key policies that may be modified to effectively expand the integration of assistive technology.

- Develop a plan for system change that will provide tools to promote the potential of assistive technology and result in its incorporation in key program planning and individual planning processes.

- Implement recommended infrastructure improvements and demonstration projects, and develop information resources and training materials for consumers, housing developers, case managers, families, contractors, and others.

Appendix 8 – Building A 21st Century Workforce

There's A Major Change Occurring

The digital revolution is dramatically powering America's economy and accelerating changes in how we learn, work, and go about our daily lives. During the transition from the Old Economy to the New Information Economy, the fate of specific industrial sectors and particular companies is uncertain. However, any status report on the American economy would reveal that there is an ever-growing need for a workforce that is skilled, knowledgeable, and adaptable to a rapidly changing global landscape.[156]

Once upon a time, Bill Cambio [fictional name] was a plumber, till he got tired of coming home with gunk on his hands. "I wanted to do something with my brain," he says. So off he went to community college, where new skills awaited. Two years later, he was a technical-support rep, working the kinks out of complex computer networks in Seattle. This may be the feature of the 21st Century Economy that's easiest to fathom: The guy who unclogged your toilet now tends your local-area network. It's other changes that may take some getting used to.

The landscape of the workplace has changed across all sectors of the economy. Imbedded in this change are the critical systems that involve information movement and management in all phases of commercial and public enterprise. Projections for the future estimate that 75% of American workers in the year 2010 will come from the current workforce.[157] The impact of information management will increasingly change the nature of many industries, therefore; an investment in continuous training of the active workforce makes good business sense.

Professional employees, who create value through intangible assets such as brands and networks, now constitute up to 25 percent or more of the workforce in financial services, health care, high tech, pharmaceuticals, and media and entertainment.[158]

Welcome to the 21st Century

A 21st century economy is powered by highly skilled people having great ideas, then having the resources to turn those ideas into practical products and services so the rest of society can benefit from their research.

The 21st Century workforce is not just about making sure that Silicon Valley has enough engineers. Its mission is to provide hope -- to ensure that all American workers have the opportunity to equip themselves with the necessary tools to succeed in their careers and in whatever field they choose in this new and dynamic global economy. This is a time of tremendous change across the country and across the globe. America's 21st Century workforce needs to adjust to the changes of the 21st Century economy. These changes include a fundamental transformation for all industries and increasingly require higher skill sets and higher education.

So what is a 21st century economy knowledge worker? [159]

- A problem solver versus a production worker;
- A person who uses intellectual rather than manual skills to earn a living;
- An individual who requires a high level of autonomy;

- A manipulator of symbols; someone paid for quality of judgment rather than speed of work;
- A worker who uses unique processes;
- Someone who possesses un-codified knowledge, which is difficult to duplicate;
- A worker who sources between his ears;
- Someone who uses knowledge and information to add to deeper knowledge and information.

Management theorist Peter Drucker is credited with coining the term "knowledge worker" nearly fifty years ago. The term refers to employees whose basic means of production is not labor, capital, or land, but rather the creative, productive use of knowledge. Examples of knowledge workers include lawyers, doctors, diplomats, law makers, marketeers, software developers, managers and bankers…" Drucker, writing in *California Management Review* in 1999, indicated that the 21st century's greatest management challenge would be increasing knowledge worker productivity. He offered several recommendations: more careful definition of work tasks; giving knowledge workers a high degree of autonomy; expecting them to "manage themselves"; encouraging continuous learning; finding new ways to measure their work; and treating knowledge workers as "assets" who must really want to work for the organization if they are to be productive.

The issue is important in our high-tech, constantly innovating business environment. The U.S. Bureau of Labor Statistics estimated a few years ago that about 80% of the U.S. workforce generates, moves, and processes information, while only 20% make physical products.

> "Their main value to an organization is their ability to gather and analyze information and make decisions that will benefit the company. They are able to work collaboratively with and learn from each other; they are willing to take risks, expecting to learn from their mistakes rather than be criticized for them."[160]

> "Knowledge workers are continually learning, aware that knowledge has a limited shelf life."[161]

The 21st Century Enterprise

Such an enterprise enhances the quality and flow of knowledge, regardless of geography. Key to its success is a strategy that calibrates culture, structure, and systems to the needs of customers and the marketplace. These businesses leverage the knowledge in the organization in interactions with customers, regulators, suppliers, and other stakeholders.[162]

There is no more evidence of this than how outsourcing has gained wide acceptance as a strategic tool in management in the U.S., and as a way to refocus needed resources on value-added activities in the organization (and of course in many instances as a way to cut costs). Outsourcing is roughly a $450 billion business in the U.S., more than 4 times the size of Japan's outsourcing activities, and is growing 15% a year. A further $67 billion is being outsourced to overseas locations.[163]

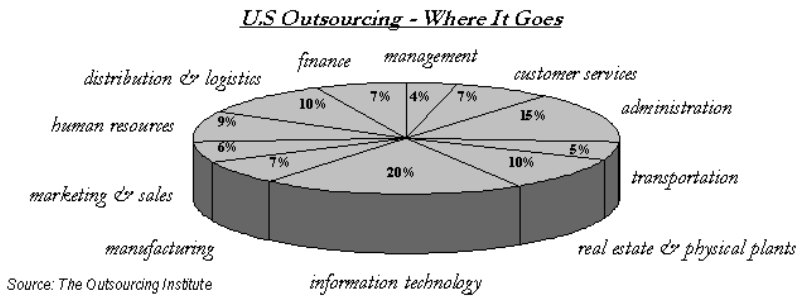


Chart 52 U.S. Outsourcing – Where It goes

U.S. outsourcing also takes place in a wide variety of fields, not only in back office operations, or what has been more recently termed business process outsourcing (BPO). This likely suggests a strategic approach is being taken when companies look at their operations. Furthermore, in a survey of the top ten reasons why U.S. firms outsource by the Outsourcing Institute, at least half of the reasons are seemingly to focus resources on more value related activities.

Number of U.S. Jobs Moving Overseas

	2005	*2010*	*2015*
Life Sciences	3,700	14,000	37,000
Legal	14,000	35,000	75,000
Art, Design	6,000	14,000	30,000
Management	37,000	118,000	288,000
Business Operations	61,000	162,000	348,000
Computer	109,000	277,000	473,000
Architecture	32,000	83,000	184,000
Sales	29,000	97,000	227,000
Office Support	295,000	791,000	1,700,000
Total	**588,000**		**3,300,000**

Data: Forrester Research (from Business Week

Chart 53 Numbers of U.S. Jobs Going OVerseas

One of the key features of this enterprise is its degree of reliance on IT. The following chart shows some of these relationships:

	CREATORS of Information Technology	IMPLEMENTERS of Information Technology	USERS of Information Technology
ROLE	Design & Build IT systems and components	Install, Operate, Maintain & Support IT systems	Use computer-based systems in their work
EXAMPLE OCCUPATIONS	Programmers Web Designers Assemblers EE Engineers	Network Administrators PC Technicians Technical Support Website Maintainers	Accountants Graphic Artists Data Entry Administrative Assistants

Chart 54 Creators, Implementers and Users of IT[164]

Preparing the Workforce – 21st Century Learning

The current and future health of America's 21st Century Economy depends directly on how broadly and deeply Americans reach a new level of literacy -- "21st Century Literacy" -- that includes strong academic skills, thinking, reasoning, teamwork skills, and proficiency in using

technology. Every American youth and adult needs to acquire 21st Century Literacy -- strong academic, thinking, reasoning, and teamwork skills, and proficiency in using technology.

Chart 55 Elements of 21st Century Learning

As society changes, the skills needed to negotiate the complexities of life also change. In the early 1900s, a person who had acquired simple reading, writing, and calculating skills was considered literate. Only in recent years has the public education system expected all students to build on those basics, developing a broader range of literacies (International ICT Literacy Panel, 2002). To achieve success in the 21st century, students also need to attain proficiency in science, technology, and culture, as well as gain a thorough understanding of information in all its forms.

Digital-Age Literacy:

- **Basic Literacy:** Language proficiency (in English) and numeracy at levels necessary to function on the job and in society to achieve one's goals and to develop one's knowledge and potential in this Digital Age.
- **Scientific Literacy:** Knowledge and understanding of the scientific concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity.
- **Economic Literacy:** The ability to identify economic problems, alternatives, costs, and benefits; analyze the incentives at work in economic situations; examine the consequences of changes in economic conditions and public policies; collect and organize economic evidence; and weigh costs against benefits.
- **Technological Literacy:** Knowledge about what technology is, how it works, what purposes it can serve, and how it can be used efficiently and effectively to achieve specific goals.
- **Visual Literacy:** The ability to interpret, use, appreciate, and create images and video using both conventional and 21st century media in ways that advance thinking, decision making, communication, and learning.

- **Information Literacy:** The ability to evaluate information across a range of media; recognize when information is needed; locate, synthesize, and use information effectively; and accomplish these functions using technology, communication networks, and electronic resources.
- **Multicultural Literacy:** The ability to understand and appreciate the similarities and differences in the customs, values, and beliefs of one's own culture and the cultures of others.
- **Global Awareness:** The recognition and understanding of interrelationships among international organizations, nation-states, public and private economic entities, sociocultural groups, and individuals across the globe.

Inventive Thinking:

- **Adaptability and Managing Complexity:** The ability to modify one's thinking, attitude, or behavior to be better suited to current or future environments; and the ability to handle multiple goals, tasks, and inputs, while understanding and adhering to constraints of time, resources, and systems (e.g., organizational, technological).
- **Self-Direction:** The ability to set goals related to learning, plan for the achievement of those goals, independently manage time and effort, and independently assess the quality of learning and any products that result from the learning experience.
- **Curiosity:** The desire to know or the spark of interest that leads to inquiry.
- **Creativity:** The act of bringing something into existence that is genuinely new and original, whether personally (original only to the individual) or culturally (where the work adds significantly to a domain of culture as recognized by experts).
- **Risk Taking:** The willingness to make mistakes, advocate unconventional or unpopular positions, or tackle extremely challenging problems without obvious solutions, such that one's personal growth, integrity, or accomplishments are enhanced.
- **Higher-Order Thinking and Sound Reasoning:** The cognitive processes of analysis, comparison, inference and interpretation, evaluation, and synthesis applied to a range of academic domains and problem-solving contexts.

Effective Communication:

- **Teaming and Collaboration:** Cooperative interaction between two or more individuals working together to solve problems, create novel products, or learn and master content.
- **Interpersonal Skills:** The ability to read and manage the emotions, motivations, and behaviors of oneself and others during social interactions or in a social-interactive context.
- **Personal Responsibility:** Depth and currency of knowledge about legal and ethical issues related to technology, combined with one's ability to apply this knowledge to achieve balance, integrity, and quality of life as a citizen, a family and community member, a learner, and a worker.
- **Social and Civic Responsibility:** The ability to manage technology and govern its use in a way that promotes public good and protects society, the environment, and democratic ideals.

- **Interactive Communication:** The generation of meaning through exchanges using a range of contemporary tools, transmissions, and processes.

High productivity:

- **Prioritizing, Planning, and Managing for Results:** The ability to organize to efficiently achieve the goals of a specific project or problem.
- **Effective Use of Real-World Tools:** The ability to use real-world tools—the hardware, software, networking, and peripheral devices used by information technology (IT) workers to accomplish 21st century work—to communicate, collaborate, solve problems, and accomplish tasks.
- **Ability to Produce Relevant, High-Quality Products:** The ability to produce intellectual, informational, or material products that serve authentic purposes and occur as a result of students using real-world tools to solve or communicate about real-world problems. These products include persuasive communications in any media (print, video, the Web, verbal presentation), synthesis of resources into more useable forms (databases, graphics, simulations), or refinement of questions that build upon what is known to advance one's own and others' understanding.

Educational Programs

Educational programs need to be modeled on several common principals:

- The growth and development of the worker is a critical success factor in the global economy.
- The "knowledge worker" is essential for economic success as the nature of work evolves.
- Individual workers must " own the process" of their own educational and training development (empowerment) and be convinced of the value of lifelong learning for their personal and career growth.
- Educational and training opportunities must be relevant to individual workers' needs and interest and be easily accessible.
- The development of a more highly skilled workforce benefits all parties-it strengthens individuals, unions, and business.
- Companies, unions, and other strategic stakeholders must assure that the resources, financial and otherwise, for lifelong learning opportunities are made available.
- Labor and management have a joint responsibility for the development, design and implementation of the program.

A model of worker development includes:

- Comprehensive career planning for employees, including drafting of personal development plans, which are continuously updated to reflect new circumstances.
- Needs assessments to determine the skill needs of the future and to plan training for them; training that meets current and future business needs and also enhances employment security for the workers by giving them the skills that are in demand, transferable, and portable.
- A focus on personal ownership of the educational process and the freedom to choose. (Voluntary Enrollment)

- Access to educational opportunities both at the workplace and at external educational facilities and through the development of delivery systems that are not time or place bound.
- Dedicated access to funds to support individual training and development activities.

Though building a collaborative business is an ongoing process, there are steps that will get you on your way with a content and collaboration platform in the short term. It involves both technology and corporate culture.

- Develop and heighten the awareness of concerning what effective content and collaboration could represent for the economy.
- Bring together a cross-functional group of business leaders and IT staff to formulate a content and collaboration platform that's linked to the business' strategic drivers. Be sure business-process owners are involved.
- Put in place a multitiered governance structure that will ensure the right level of business sponsorship and consultation to engender the shared ownership of this platform.
- In the course of formulating the strategy, identify the key business applications that will justify the investment in the platform. Start small to show early wins. Use existing infrastructure and skill sets to keep costs and training at a minimum.
- Define and map the different phases of implementation and the results to be obtained at each phase.
- Experiment and renew the strategy as you go along.

Appendix 9 - Libraries in the 21st Century[165]

"I don't need the library, it's too big, too complicated, and anyway, everything worth having is on the Internet."[166]

Libraries Strengthen Communities

Beyond their role as repositories of information, libraries have long been community centers. While some librarians worry that the digital age has eroded this part of the library's identity, others see a continuing role for libraries in helping people tap the unlimited community-building promise of the new technologies.

Evolving Role of Libraries

Libraries have long been pivotal community institutions, public spaces where people can come together to learn, reflect, and interact. But today, information is rapidly spreading beyond books and journals to digital government archives, business databases, electronic sound, image, and film collections, and the flow of electronic impulses over computer networks. Will libraries lose their role as lending institutions? And what will happen to libraries as physical places where diverse people can gather to pursue knowledge individually and collectively?

Research findings provide a theoretical underpinning and a practical guide for librarians, public officials, advocacy groups, community organizations, and others who seek to ensure a central role for libraries in the 21st Century digital age. This body of work reflects a conviction that libraries are uniquely suited to make the benefits of new information technologies available to everyone, regardless of economic status or place of residence; to bring focus and organization to the often bewildering and ever-expanding universe of information; and to counter the centrifugal forces of modern life by nurturing community, civic engagement, and democratic traditions.

Many of us live by a hierarchical information model, especially those of us whose introduction to libraries preceded the computerized card catalog. We think of information as organized and structured taxonomies of sources; we understand the difference between government documents and rare books, between the US history and Latin American history sources, and we expect to find these materials in their appropriate, separately structured locations in our libraries. We think that science and art, business and literature inhabit different information spaces. Educated in a world dominated by the physicality of libraries, from the neighborhood public libraries to college libraries and the great international research libraries, we think of information as residing in a particular place.

For all of the digital progress we have seen, this generation and the next will continue to find that libraries remain imposing buildings that house relics of a past age. These library monuments already serve as places to study or places to get online at a computer laboratory. Some pursuing difficult projects will ask a librarian for help.

Yet the activity of the traditional library takes place within uneasy hearing distance of the current trendy mantra anticipating the total digitization of human knowledge, whatever its original form (print, manuscript, picture, sound, or digital representation). The library, we hear, is pretty much over unless it can remake itself into an academic *Yahoo*, an intellectual *Google*, or some other competitive hyper-textualized, multi-threaded, linked, digital resource.

What are librarians to do and what should their public think?

Building and Enhancing Collections

Libraries must go digital just to keep pace with the hundreds of journals and newsletters that are becoming available online. Technology can also make collections more accessible. New computer tools can help in analyzing data. Geographic Information Systems can now be used with standard web tools to present data about environmental, land use, and other matters on a map, making it easy to visualize the impact of community and business resources and decisions.

Librarians can use computer tools to evaluate the expanding universe of knowledge and select what is reliable and relevant to the needs of individuals and communities. This helps make information manageable, so that individuals can better judge and use it.

While the web can vastly increase our access to information by automatically linking us to innumerable search “hits,” how do we assess the quality and reliability of these other sources?

New technologies enable libraries to serve a wider variety of users by making it possible to carry all kinds of mediums -- text, sound, and pictures-in one digital form. That doesn't mean, however, that print will disappear, or that libraries will cease to have value as a place for people to browse through books and conventional periodicals. Some describe their modern library as "stepping over a stream," with one foot placed firmly on each bank. On one bank are valued traditional services; on the other is a leading role in the new age of technology.

What then, does this mean for the library, the librarian? Is it the end of the world, as we know it? Is the digital revolution likely to eliminate the art, craft, and science of librarianship? Not likely, but it certainly has and will continue to change it.

So where, in this wonderful new world, is the library? We do not know for sure. How then does a library, in real time and with real money and serving real people, deal with infinite possibilities of the digital age?

The digital world has forced us to think somewhat differently about the value of the library. Once we valued the library for the duplication it could sustain, as represented in the annual ranking of library volumes and acquisition expenditures. In a digital world, no one cares who has the copy we find on line. The existence of duplicate copies gives no one an advantage when the digital copy is infinitely reproducible.

Who among us has not used *Google* or *Yahoo* or *Altavista*? The Internet search engine is a miracle, but it also finds more junk than stuff.

Librarians should be in this game in a big way, and many are. As the Internet becomes so large an information space that it requires systematic and authoritative management, the librarian's skills, properly translated, will become crucial for ensuring me that I do indeed have all that I should on Bolívar. The ownership of the physical space or the artifacts matters much less than the ability to find the right digitally stored knowledge. I do not care where Bolívar's *Carta de Jamaica* is stored; I care that I can read the authoritative annotated text on line.

Will all this become free? No. Money will change hands, and probably more money than we now spend on libraries, but we will spend the money differently. We will spend it on hardware,

software, and the gurus who manage them. We will spend it on translating content into digital form; we will spend it on search engines and the research that builds them. The construction of these tools, currently in the earliest stages, will require us to waste much money. We will build the tools, anticipating one kind of bandwidth and capacity and as soon as our tools appear, the bandwidth will expand to such an extent that we will need to begin again.

Libraries and librarians will do two things most. They will maintain and manage unique collections of objects (sheet music from Hoagy Carmichael or the Letters of Thomas Jefferson), many of which they will digitize and deliver into the world. They will provide their constituents with help and assistance, as they always have, in finding, evaluating, and understanding the universe of information that the digital world has provided us. They will spend less time and energy developing collections and much more developing on-line guides to subjects, topics, and resources. They will buy fewer materials. No one will care what volume of material each library owns, only what volume of materials each library's clients can access.

Supporting Our Modern Library -- It's up to each us

The National Telecommunications and Information Administration asserted:

> *Public libraries can play a vital role in assuring that advanced information services are universally available to all segments of the American population on an equitable basis. Just as libraries have traditionally made available the marvels and imagination of the human mind to all, libraries of the future are planning to allow everyone to participate in the electronic renaissance.*

But how? Despite the federal commitment, Washington cannot achieve this ambitious goal on its own. The solutions will need to come from a variety of sources. Nonprofit service organizations, including community medical centers and homeless shelters, churches, community and cultural centers, public computer access centers, cable access providers, student groups, arts organizations, alternative media outlets, public schools, community activist organizations, environmental groups, and teachers-as well as individual library users-all have a role to play.

Successful partnering agreements have included library funding, grants, gifts, corporate partnership and contributions, government funding, university or college support, nonprofit organizational funding, and-in some instances-revenue through subscriptions and fees.

It may also be an appropriate time to evaluate fees for certain services. Some examples might include provision of document research for healthcare organizations, corporations and other businesses.

It will be up to us as members of the community to ensure that our libraries continue, grow and expand their services. They are critical lynchpins in the foundational infrastructure that underlies a successful economy. Without a strong library presence we weaken that foundation.

Appendix 10 – From Silicon Forest to Internet Forest: A Vision for the Oregon Economy[167]

I. The Vision

Oregon has been steadily shifting from a natural resource based economy that depends heavily on fisheries and forests to an economy that increasingly depends on high technology and the businesses of the ***"Silicon Forest."*** The next potential wave of economic development following high tech companies like Intel and Hewlett Packard will be Internet businesses like Google and Yahoo, open-source technology businesses, and the wide spread adoption of e-commerce and other Internet-dependent strategies by Oregon businesses.

Oregon has an opportunity to build upon the success of the Silicon Forest and actively recruit and create the Internet businesses that will be the engine for the next wave of economic growth. Oregon is an ideal location for these businesses and has the potential to become a preferred Internet gateway to the Pacific Rim, to become the ***"Internet Forest."***

II. The Internet

The Internet is the major transportation network for the global information-intensive economy of the 21st century and is increasingly recognized as essential for business, yet it is still in its infancy as the key infrastructure underlying the global economy. The first major commercial browser permitting easy access to the "World Wide Web," Netscape, was introduced in 1995, only ten years ago. Already, World Wide Web access has flattened the world (as Thomas Friedman's book, *The World Is Flat*, describes it) to permit highly competitive global commerce. In that same time period we have seen the global transition from narrow-band dial-up access to widespread use of broadband access. We have seen the rapid expansion of the Internet and its applications despite the dotcom bust. The Internet will be just as disruptive over the next ten years with applications that continue to transform the way business is conducted and applications that will produce dramatic changes in education, health care and government. The businesses, institutions, and communities that leverage the Internet will thrive, and those that do not will falter.

III. The Opportunity

Oregon has the opportunity to become the ***"Internet Forest."*** The Internet is not a single network under anyone's control, but rather a network of interconnected networks operated by many different parties. Ultimately, future changes in the Internet infrastructure in Oregon and elsewhere will result from the decisions of private sector businesses and will be driven by end-user demand. The most effective way to stimulate continued investment in an advanced competitive telecommunications infrastructure in Oregon is to increase demand in Oregon. Organizing a community of interest among large private sector users and combining it with the aggregated purchasing power of state government, local government, education and health care networks could be used to leverage an improved Internet infrastructure in Oregon. Public-private partnerships or other government incentives could provide additional stimulus for investment in Oregon's Internet infrastructure and industry clusters that will use it.

There are two other assets that may be used by Oregon to improve its future position on the Internet. Those two assets are Oregon's undersea cable landings and its high quality telecommunications infrastructure.

Asset 1: Undersea Cable Landings

Eleven undersea cables currently come ashore in Oregon. Oregon has a competitive advantage over Washington and California in attracting future west coast cable landings due to established "fast track" permitting polices and a mature cooperative relationship between the undersea cable industry, the fishing industry and the state. Currently, most of those undersea cables pass through Oregon on their way to major out-of-state connection points. Oregon has the choice of being passive and becoming a poor neighborhood living "under the freeway" without an on-ramp to this economic opportunity as these highways of the future pass through without leaving much local benefit. Oregon also has the choice of being proactive and arranging its Internet connections so that Oregon becomes a preferred geographic location for organizations doing business in the Pacific Rim.

Asset 2: Oregon's Telecommunications Infrastructure

Oregon has a telecommunications infrastructure extending throughout the state that is world class. Fiber optic backbone networks with diverse routing together with extensive broadband access provide excellent network reliability and connectivity throughout the state for both voice and data traffic.

Oregon should continue to build on these strengths and work to improve the Internet infrastructure that will be the key to the state's future economic development. Oregon's physical location on main communication routes has great value. Currently, the Internet includes "backbone" Internet providers that interconnect with each other bi-laterally or at a number of "peering locations" for the exchange of traffic. Most local Internet Service Providers (ISPs) connect via secondary networks that are like minor streams flowing toward the major rivers of fast-flowing data on the Internet backbone. These local ISPs do not "peer" with the Internet backbone providers. Instead they purchase Internet "transit" services from these providers. There are currently three major peering locations for Internet backbone providers on the west coast of the United States where these mighty rivers of data interconnect. They are in the Seattle area, the San Francisco Bay Area and southern California. Consequently, much of Oregon's Internet traffic, even when both ends of the connection are in Oregon, travels out of state to one or more of the major Internet connection locations in Seattle, San Francisco, Denver, Chicago or Dallas before getting to its destination back in Oregon. Oregon has relatively low speed intrastate and interstate Internet connectivity compared to other states affecting not only the quality, but the cost of connectivity for large-scale applications. If unchanged, this situation will place Oregon at a competitive disadvantage.

The fewer the number of router hops between sender and receiver, the higher the quality of service. Locations with direct access to major Internet backbone nodes are preferable to locations at the end of long "tail circuits" or spur lines. They provide higher quality and lower cost. Unfortunately, Oregon is currently on Internet spur lines. As individuals and organizations become more dependent on the Internet and as Internet traffic incorporates more time sensitive applications such as videoconferencing and Voice over Internet Protocol (VoIP), network performance will be increasingly sensitive to routing delays. Major Internet-dependent businesses will prefer to locate their "servers" (data processing and storage facilities) near major Internet connecting locations because close proximity to the Internet backbone shortens the route to their customers and improves the reliability and quality of their service.

Oregon has an opportunity to improve its position on the Internet and should begin to do so by establishing specific goals and strategies.

IV. Goals for Oregon's Internet Infrastructure

The following goals are suggested for the Internet in Oregon to meet the needs of an "Internet Forest" economy.

Goal 1:
Organize a statewide community of interest to improve network connectivity, capacity, quality and the consequent competitive advantage for every Internet user in Oregon.

Goal 2
Make Oregon a preferred location for the hosting of primary and mirrored sites for open technology development.

Goal 3
Make Oregon a preferred location for any business or organization needing high bandwidth connectivity between North America and locations on the Pacific Rim.

Goal 4
Internet Protocol (IP) traffic that both originates and terminates in Oregon should be interconnected in Oregon without having to go through out-of-state interconnection points.

Goal 5
IP traffic between North America and Asia transported on transpacific fiber optic cables landing in Oregon should find an efficient, reliable and cost-effective route (including the path with least congestion and fewest router hops) by interconnecting in Oregon.

V. Transition Strategy

Though most of the changes in Internet infrastructure in Oregon will result from the decisions of private sector carriers, Oregon may influence these decisions by planning, organizing and taking action.

Recommended Strategies

- Promote and organize a community of interest among large public and private sector users to improve the Internet infrastructure in Oregon for mutual benefit.
- Recognize, aggregate and use the purchasing power of all branches of state and local government, tribes, educational institutions and health care institutions, to influence service provider decisions and Oregon's Internet infrastructure.
- Expand demand by supporting Oregon's emerging Open Technology Cluster and the hosting of primary and mirrored sites for open technology development.
- Support the expansion and interconnection of Oregon's Internet exchanges: Northwest Access Exchange (www.nwax.net) and the Oregon Internet Exchange (www.oregon-ix.net), and determine the viability of developing

additional Oregon Internet exchanges, e.g., east of the Cascades and in southern Oregon, to develop an Internet infrastructure that will keep Oregon Internet traffic within Oregon and aggregate a sufficiently large volume of Internet transit traffic at the interconnected exchanges to make it economically attractive for Internet backbone providers to interconnect with their customers through the exchanges.

- Engage network carriers and service providers in a discussion of Oregon's Internet Forest vision and identify industry issues and obstacles.
- Provide incentives to encourage the necessary private sector investments and to bridge financing gaps when the private sector's return-on-investment is insufficient to justify desired capital expenditures (the objective is not to build a new public sector network, but to encourage private sector investment in a network infrastructure that will be available for use by all).
- Support innovation and the research and development environment in Oregon by establishing a regional optical network for research and education, and an Internet2/Lambda Rail network point of presence (PoP) in Oregon.
- Support Internet research, development and technology transfer in Oregon.
- Make broadband Internet access available to all areas of the state and to all Oregon businesses.

VI. Funding

Once a critical mass of Internet traffic has been aggregated in Oregon, the interconnection infrastructure and its on-going operation should be economically self-sustaining. The key will be combining enough private sector and public sector participation in the initial stages to get the necessary funding and infrastructure in place and the volume of traffic up to the point of self-sustainability. Federal funding may be available for some parts of the project. Because of the potential to find solutions to some of the major technical problems of the Internet, National Science Foundation funding may be available. Rural Utility Service funds may be available for infrastructure serving rural Oregon. Aggregating Oregon public sector network traffic would leverage the government funds used for the purchase network services to influence vendor investments. The state government's network purchasing power could be a major factor in reaching self-sufficiency. Oregon's cities, counties, and tribes may be included in the community of interest. Private sector participants may see a sufficient opportunity for adequate return on investment to make much of the initial investment themselves. We should be far enough along in planning before the 2007 legislative session to know how much, if any, funding to request from the Oregon legislature. The prospective benefits to Oregon's economy should be demonstrable and compelling to justify any needed funding.

VII. A Request for Action

The "Internet Forest: A Vision for the Oregon Economy" holds tremendous potential for economic development if it can be validated, supported, and translated into action. If you are interested in participating in the development of this concept and formulating a strategy for the *Internet Forest*, please contact Chris Tamarin at the Oregon Economic and Community Development Department, 503 508-0178 or Christopher.tamarin@state.or.us.

Appendix 11 – Community Development Resource Centers

Integrating Technology Into Daily Life To Achieve Economic and Quality of Life Outcomes In Rural and Underserved Communities

Introduction

Many of our rural communities find themselves struggling to provide economic and quality of life factors for their residents. Resources many times are not being used in an integrated fashion resulting in inadequate programs, program failures or lack of interest from a community. Working together in a cooperative and collaborative manner many communities find that they have hitherto untapped community wealth, both talent and capital. In this short paper you will find an introduction to a holistic approach to community development that focuses coordination and integration of efforts through a community lead and directed Community Development Resource Center. Best described as a synthesis of best practices taken from many resources (listed at the end of the document), the intent of this paper is to get folks to collaborating and cooperating across their communities and the region they live in. Read it and share it. What do you think?

Community Digital Wells

Just as water is the source and sustenance of life, so too are information, knowledge, and how to access and use it in the new economy.
Residents will benefit from a "community digital well," a shared place to dip into the "waters" of the new economy.
Community Development Resource Centers (CDRC's) can serve as that access point.
To date, most initiatives aimed at closing the digital divide have focused on providing underserved and low-income communities with greater access to computers, Internet connections, and other technologies. Yet technology is not an end in itself -- technology without a purpose is worthless!

The real opportunity before our society is to lift our sights beyond the goal of expanding access to technology and instead focus on *integrating* technology into our daily lives to achieve the outcomes we seek: tangible and meaningful improvements in the standard of living of families who are now struggling to rise from the bottom rungs of our economy.

Key Questions

Our communities now have a remarkable opportunity to marshal the resources and energies that have been summoned to the cause of closing the digital divide to create powerful real improvements in the daily lives of millions of people. The key is for our communities to unite around a new set of aspirations for technology investments in and by underserved and low-income communities. In every case, we must ask the following questions:

- Are we investing in technology for technology's sake, or are we investing with real outcomes in mind?
- Are the intended outcomes only what outsiders think the community might want, or are they in fact what people living there see as top priorities?

- Are we investing with an overzealous faith in the promise of technology, or do we have a realistic appreciation for the challenges underserved and low-income communities face?
- Will our investments simply satisfy our desire to be philanthropic, or will they produce real improvements in people's lives?

Cooperation & Collaboration Required

The disparate interests working to bridge the digital divide can come together and can provide a powerful push to help our communities respond to the opportunities that technology offers underserved and low-income communities.
We can help communities apply technology to speed delivery of vital human services, attract new resources, improve job skills, facilitate neighborhood planning and community organizing, and build learning networks through which people with similar interests can share their diverse experiences.
Technology can spark community change so powerful that it will shatter the status quo. Such change will require much more than access to new tools; it will require a rigorous new focus on outcomes along with smart, large-scale investments to help communities achieve those outcomes.
The measure of our communities' progress in narrowing its fundamental disparities will have little to do with how many computers and Internet connections we install. It will have everything to do with how well we can enable those who are less fortunate to elevate their own lives and the lives of their children.

Ten Premises for Moving Forward

The following 10 premises are provided to stimulate interest in thoughts on how we can meet the challenge head on.

Premise One: **Focus on Narrowing Social — Not Digital — Divides** It is time to stop focusing so intensively on the technology divide. The real differences we should seek to narrow are America's core *social* divides: the grave disparities in economic opportunity, education, health, safety, housing, and employment.

Premise Two: **Concentrate on Achieving Concrete Outcomes** Efforts to help low-income communities gain the benefits of technology must be directed toward achieving specific outcomes — in other words, tangible improvements in people's standards of living.

Premise Three: **Work Through Trusted Leaders in the Community** No matter how impressive the technology or how well-intended the motives, technology initiatives imposed on a community by outsiders are often ineffective.

Premise Four: **Support Efforts by Communities to Strengthen Their Capacity** The hard truth is that until at least a basic level of community capacity is in place, large-scale technology initiatives have little hope of success.

Premise Five: **Apply Technology to Help Build Capacity** Once a community has achieved at least a basic level of capacity, technology can be a powerful tool for the next stage of capacity-building efforts.

Premise Six: **Recognize that Technology Requires Its Own Capacity** Investments in technology must go far beyond funding for hardware, software, and wires.

Premise Seven: **Make the Case for Applied Technology** The truth is that most people, especially those in low-income communities, see little reason to embrace technology.

Premise Eight: **Make Major Changes in Public Policy** Although public officials have been quick to grasp the importance of helping low-income communities participate in the digital revolution, public policies have lagged behind public pronouncements.

Premise Nine: **Dramatically Expand the Availability of Capital** To address a social challenge of this size, the sheer magnitude of available capital must increase exponentially, and that capital must be invested strategically.

Premise Ten: **Dramatically Broaden the Scope of Efforts** Anything less than a massive mobilization of resources, financing, talent, and innovation is destined to produce only incremental and isolated victories.

Economic Challenges For Rural Communities

The nation likes returning to rural America. Every week millions of radio listeners go back to Lake Wobegon to hear the news. They like the reassuring images of Main Street, where the women are strong, the men are good looking, and all the children are above average. Whether the aural art of Garrison Keillor or the printed frame of Norman Rockwell, the nation returns to these rural icons to confirm that all is well in America.

All is not well, however, if the nation looks past the icons to the *real* rural America. Some parts of the countryside are doing well, to be sure. Rural communities nestled in the Rockies of the Intermountain West, for example, are booming as newcomers flock to a scenic lifestyle. But a majority of rural places have not been swept along in the nation's long-running economic expansion.

Put simply, many parts of rural America face a make or break period in the coming years. The challenges are immediate to thousands of rural communities scattered throughout the nation's countryside, but they are also important to the nation. Slightly more than a fifth of the nation's people live in rural America. Rural places make up 97 percent of our nation's space -- places where we grow our food and where we go to play. Did you know that rural America is home to more than 5,000 commercial banks, more than half the nation's total?

Rural America has always faced unique challenges, but the challenges ahead are of a different stripe, in part because the rural economy has moved far beyond agriculture, timber, and natural resources extraction. Moreover, a deep divide in the performance of the rural economy now makes it unlikely that a new tide will lift all rural boats.

Against the backdrop of these rural changes, two challenges will be critical in shaping the rural economic outlook:

- Tapping digital technology and
- Improving human capital.

The Role for Community Development Resource Centers

- CDRC's work to enhance learning opportunities for low-income and other Americans through the use of computers and other technological tools.
- CDRC's serve as a technology resource **and more** in the community; helping businesses, community organizations, and local institutions use technology to strengthen their endeavors and the community as a whole.
- CDRC's reach those who are currently unreached, enhance knowledge and opportunities, provide a needed asset, and strengthen the community. CDRC's also help to develop leaders from the community to speak out in local and state policy debates.CDRC's can also help to educate residents as to the opportunities afforded them through access to high-speed online services. This helps to build the demand necessary to drive infrastructure investment by communications providers on rural and underserved areas.

CDRC or CTC?

It's the "**and more**" that distinguishes CDRC's (Community Resource Development Centers) from CTC's (Community Technology Centers), moving the emphasis to a larger service offering wherein technology has a significant role but is not the sole reason for providing these resources.

What is a Community Development Resource Center (CDRC)?

- A CDRC is a community service, social action, and/or educational facility where computers, related communications technologies, and education programs are available to people who otherwise might have little or no opportunity to use or learn to use these technologies.
- A CDRC may be an independent agency dedicated to this mission; it may be a program within a larger multi-service agency; or it may be a program designed to enhance the overall mission of a service agency with a specialized mission. Each CDRC has its own unique qualities, yet all share a commitment to technology and education access and a belief that a CDRC can be a means for participants to increase their self-sufficiency.
- A successful CDRC offers opportunities to improve education levels, gain job-related skills, develop business management knowledge, and build personal and community capacity.
- It can offer a place where participants gather together and link with the entire community. An important criterion for success will be the degree to which the CDRC becomes an integral part of its community. Participants can and should take part in the planning process and have a real role in directing and sustaining center operations.

Learn From Others to Achieve the Promise of Centers

Best practices taken from the experiences of others tells us what works:

- Centers must tailor their activities and "look and feel" to the unique cultural and economic needs of each community.
- Centers must be deeply involved in their local communities, able to refer families to other organizations for real world needs, to offer joint programs or services

with other nonprofits, and to build bridges to employment agencies and employers.
- Centers must build private sector partnerships with technology companies' help to leverage resources in valuable ways.
- There is no cookie cutter or franchise formula. It is essential that each center articulate what it wants to accomplish in its community and then harness the technology to achieve that mission.
- Developing curriculum that supports measurable objectives, figuring out the best way to link participants to jobs, and finding and retaining the right staff provide significant challenges.
- With adequate resources and technical assistance, Centers accomplish more than provide valuable direct services to participants. They serve as a technology resource to public and private entities in the community, meeting a pressing need that otherwise would not have been met.

CDRC Program Goals

CDRC's can help participants build any number of important academic, business, and life skills, including:

- **Access Goals:** Provide computers and Internet access to a community that lacks these resources, or expand hours of public access to computers.
- **English Language Literacy Goals:** Improve language skills to an immigrant community or a community with historically low English reading and writing skills.
- **Educational Goals:** Improve academic achievement among school-age children, provide GED courses to adults, or adult education.
- **Basic Computer Literacy Goals:** Provide essential skills of computer usage, such as how to turn off the computer or how to use simple desktop tools and the Internet.
- **Advanced Technical Skills/Career Readiness Goals/Business Development:** Teach programming or use of specialized software tools that will offer new career opportunities, provide a suite of programs to assist in job searches and business development, or seminars on business management and leveraging of technology.
- **Community Building/Empowerment Goals:** Strengthen a community through improved communication and/or promoting involvement in local issues.

Likely Program Areas for a CDRC

Here are just a few possibilities to consider…

- Public Access to computers with Open Lab Time
- Pre-school and Family Activities
- Afterschool Activities
- Adult Education
- Elder Services
- Internet Access (this can be a focus as well as part of other offerings)
- Career Development and Job Preparation
- Job Placement

- Business incubation and nurturing
- Electronic Publishing (including video or multi-media)
- Electronic Commerce

Who Will Participate? What Are Their Interests?

Every community consists of many different groups of people with a variety of interests.

In the past we have looked primarily to classroom teachers and schools.

In the minds of many responsibility for improving educational opportunity for the least advantaged sectors of our population extends beyond the classroom and the responsibility of only the educational institutions.

Families, faith-based groups, charities, educational institutions, government, and community organizations (e.g., chambers of commerce) each have an important role to play in addressing educational inequalities in our country and in reshaping educational institutions for the future.

It's up to communities to lead this effort on their behalf, as only they know what is in the best interest of their communities.

CDRC Service Offerings

So that residents, small businesses, and not for profits will be better equipped to succeed, the CDRC will offer:

Space	• Use of a conference room • Limited office space
Education Services	• Technology and business skills training • Business education programs and consulting - Marketing, management, Finance/Accounting, Strategic Planning • High speed Internet access – businesses and public • Access to distance learning programs – businesses and public
Office Equipment	• Access to computers and software – word processing, spreadsheets, database, presentations, Internet browsers, email • Fax and copier at reasonable rates
Other Services	• Networking opportunities • Introductions to business resources • Information and linkages to funding sources • Light clerical assistance - Telephone Answering, Word Processing, Photocopying

	• Audiovisual Equipment • Mail box and mailing address • Answering service

Centers and their relationship to business incubation

- Utilizing the resources offered through a Center seems a reasonable and appropriate use in our small and rural communities.
- Eighty percent of businesses started will not be around at the end of five years.
- Indications are that eighty percent of new businesses started using this Incubator model will be.It's not just for startups.
- About 55 percent of all new jobs arise from the expansions of existing businesses and start-up companies create 45 percent. Start-ups fail at a much higher rate than established businesses.
- Making available these resources, especially the educational and training components, can be a big boon to existing businesses and to growing local economies. Incubator members have free or low-cost access to a wide range of business seminars and programs and free advice on office systems, marketing, growing your business, where to go for financing and many other areas of expertise.

Keeping in mind that this is but one of the functions that Centers can provide (business incubation), consider the possibilities. We know that most businesses started today will fail. What can a small business owner do to increase the odds of success? Let's paint a picture of how a Center and its associated resources might contribute to success.

Reasonably priced space, services, office equipment, group discounts and other services are available so that small businesses will be better equipped to succeed. The objective of the Incubator is to reduce overhead costs and management pitfalls of young businesses during critical early years of operation. This early assistance enhances an entrepreneur's chances for survival and success.

The Center space is provided in a way that best meets the needs of the associates, while allowing for additional space when needed. All of this at a price much lower than traditionally leased space. Access to a conference room is also provided at no charge. Without the concern of exorbitant rent, clerical services and equipment, entrepreneurs and business owners can concentrate on getting their business off the ground and running, making profits and developing new jobs.

The Incubator associates have access to a variety of office equipment: fax, copier and computers. Desks, chairs and other office furniture are also provided. A receptionist is available to greet clients, monitor visitors and assist with clerical needs. Interns from area training centers and the community colleges are also available to assist.

Centers and their relationship to not for profit organizations

Not for profit organizations are increasingly under pressure to leverage resources, to raise funds, and to operate their organizations efficiently and effectively. Technology can provide tools to assist not for profits in their missions. Centers can provide training in the use of tools, access to

those tools, and staff to assist not unlike the way in which Centers can help with business incubation and nurturing. Here are a few examples:

General technology concepts
Internal uses of computer networks, External uses of computer networks, Local area and wide area networks, Types of software applications, Online service providers, Security

Education
Refining technology goals and requirements, Developing an agency technology plan, How to link technology to strategy and work processes.

Use of Database technology
Systems that track people and information about them (volunteers, donors, participants, customers, clients, etc.).

The Internet
Use the Internet successfully to manage organizations and to attract and keep donors, volunteers and other supporters; using the 'Net to find information and funding leads; how to market an organization online; and more. Managing the web development process, whether or not they will be doing the actual web page design and work or outsourcing the work.

CDRC Sustainability

Bottom line is…you have to have one to "stay alive."
True sustainability comes from becoming self-sustaining through revenue generating activities.
Use grants for "gap-financing."

- Revenue possibilities:
- Fees for services
- Space rent
- Sliding scalesGrantsDonationsCorporate partnersSchool district partners

Volunteers -- fill many roles

Getting Started…You Gotta Have A Plan

Strategic planning helps communities identify which strategies offer the most potential to address local needs.

Strategic planning for can help communities to:

- Identify gaps in existing services and educational needs by pinpointing problems that limit economic development, services, or quality of life;
- Help people decide which problems are most important to address first
- Create opportunities for partnerships by identifying common interestsBuild more broad-based support for Center activitiesProvide a mechanism to coordinate multiple strategies

A complete strategic-planning process for Centers is comprised of three parts:

1) A needs assessment,
2) Goal setting to address the most critical issues, and
3) Crafting an appropriate action plan.

Advice: Hire a professional facilitator

Impacts of Centers

- An important resource for women and girls, people of all ages, and members of racial or ethnic minorities.
- Offer a range of opportunities to use computers and other technologies in classes as well as in self-directed activities.
- A valuable resource for obtaining job skills and learning about employment opportunities.
- Have a positive effect on participants' educational goals and experiences. Foster a sense of community and personal effectiveness, and allowed real community building to occur.
- A well-used resource for obtaining civic and government information: more than half of center users rated finding out about local events, local government, or state/federal government as important reasons for coming to their center.
- Help to increase users' self-confidence and reduce computer fears and anxieties.
- Participants' overall feelings about their Centers are overwhelmingly supportive.
- Meet resource needs of businesses and not for profits.

Starting A CDRC

The start-up process for a CDRC generally moves through the following steps:

- Form a CDRC Steering Committee to serve as the governing body for the CDRC or as an advisory committee to the agency's existing governance structure.
- Engage in a process of community mapping to identify interests and needs of prospective participants along with assets and strengths available through other community enterprises and community members themselves.

- Form partnerships and develop commitments for assistance from members of the community (e.g., space, volunteers, funding, equipment & furnishings, etc.).
- Research and structure program offerings in response to identified needs and interests (e.g., adult education, after school sessions, job preparation, elder services, family and pre-school programs).
- Initiate a pilot program through which to test the planned programming structure and to further refine conclusions relating to community interest and need.
- Consider and plan for the operational needs of the CDRC (e.g., space, hardware, software, personnel, and resulting financial requirements).
- Develop a business plan mapping the CDRC's operational and financial assumptions so interested parties and founders can buy into the effort.
- Engage in whatever additional fund-raising, space and equipment acquisition, staff and volunteer recruitment is necessary to make the plan operational. NB: Do not plan to start full operations until the Steering Committee is satisfied that the CDRC has sufficient backing to stay in operation for at least 12 months.

How Long Will it Take to Create a CDRC?

The time required to create a CDRC depends upon many variables, such as:

- Staff
- Computers
- Participants
- Space
- Available funds for operations

A CDRC can be established within a shorter time if a supervisor, hardware, and space is readily available.

In general, however, it is likely to take at least a year to establish a CDRC. This timeframe assumes that Steering Committee members have constraints upon their time, such as full-time jobs and families, which means that the time given to the CDRC will be limited.

Next steps…

- Form a CTC steering committee.Create a project plan.
- Build partnerships.Define outcomes.

Research Resources

Please note that many have worked hard to assemble their thoughts and approaches on economic and community development. This document does not intend to do anything more than share information and knowledge with the intent to incite discussion and change. If I have inadvertently left out a resource, please understand it was not intentional and you deserve full credit for your efforts. My hope is that I have added value by bringing these ideas together and mingling them with my own.

"From Access To Outcomes", "Venture Philanthropy: The Changing Landscape", The Morino Institute
http://morino.org

"The Organization Of Learning In Community Technology Centers: Learning With Technology In 6 Communities" - SRI International
http://www.sri.com/policy/ctl/assets/pdfs/vstaera2001.pdf

Community Technology Centers' Network
http://www.ctcnet.org/

Lone Eagles Consulting
http://lone-eagles.com/

TechSoup
http://www.techsoup.org/articles.cfm?topicid=12&topic=CTC%27s

Community Learning Centers: Best Practices and Innovations
http://flconline.org/clctraining/

"COMMUNITY TECHNOLOGY CENTERS : Keys to Successful Planning, Implementation & Sustainability"
http://www.ctcnet.org/pub/telecommunity2000/planning.html

Community Technology Centers Program
http://www.ed.gov/offices/OVAE/CTC/

HUD's Neighborhood Networks
http://www.hud.gov/nnw/nnwindex.html

Information Technology Indicators Project
http://www.cityofseattle.net/tech/indicators/

"Impact of CTCNet Affiliates: Findings from a National Survey of Users of Community Technology Centers"
http://www.ctcnet.org/impact98/imp98toc.htm

AmericaConnects
http://www.americaconnects.net/

"Applying the Principles of Youth Development to Youth Opportunity Grants, WIA Formula Funded Programs & Community-Based Youth Programs" - Larry Brown, WAVE, Inc.
http://www.waveinc.org/documents/Youth%20Dev%20Principles%20for%20YO%20&%20WIA%20Programs.doc

"Ten Thoughts for Your New Community Technology Center"
http://www.techsoup.org/articlepage.cfm?articleid=163&topicid=12&CFID=869308&CFTOKEN=53519029

Meeting A New Century of Challenges In Rural America
http://minneapolisfed.org/pubs/region/99-12/rural.html

Appendix 12 – Telecommunications Providers and Services

Organization	*Broadband*	*Radio*	*ISP*	*Subscriber TV*	*Telephone*	*TV*
ABISP 772-1325 P.O. Box 14164 Humble, Texas 77347 www.abisp.com			X			
Almega Cable 6655 Rogue River Drive Shady Cove, OR 97539 www.almegacable.com				X		
Ashland Fiber Network 552-2222 90 North Mountain Ave. Ashland, OR 97520 www.ashlandfiber.net	X		X	X		
Ashland Home Net 488-9207 3005 Highway 66 Ashland, Oregon 97520 www.ashlandhome.net			X			
Budget Internet 474-6082 204 NW 4th Street Grants Pass, OR 97526 www.budget.net			X			
Carroll's Web 800-290-4599 www.carrollsweb.com			X			
Chambers Multimedia Connection 779-5262 1090 Knutson Medford, OR www.cmc.net			X			
Charter Communications 779-1814 www.charter.com www.charter.net	X		X	X		
Computer Country Internet Services, Inc. 772-2170 1930 Table Rock Road Medford, OR www.ccountry.net			X			

Organization	*Broadband*	*Radio*	*ISP*	*Subscriber TV*	*Telephone*	*TV*
ClearChannel Radio 3624 Avion Drive Medford, OR 97504 KISS 107.5 FM http://107kiss.com KMED 1440 AM http://kmed.com KOOL 103.5 http://kool103.net KRWQ 100.3 & 999.3 FM http://krwq.com KZZE 106.3 FM http://kzze.com		X				
Clearwire 245-3045 www.clearwire.com **Adept Business Communications** 601-9058 55 S 5th Street Central Point, OR 97502 **Computer Guys Service Center/cfc Industries** 665-2801 29 S Front Street Central Point, OR 97502 **High Tech Center** 494-7575 607 Nebula Way Medford, OR 97504 **Satellite Dishes** 779-5300 4003 Crater Lake Highway Medford, OR 97504 **Progressive Audio** 772-8103 1313 Court Street Medford, OR 97504	X					
Crystal Clear Satellite 899-3999 7632 Highway 238 **Jacksonville, OR 97530**	X			X		

Organization	*Broadband*	*Radio*	*ISP*	*Subscriber TV*	*Telephone*	*TV*
DirectTV 1-888-777-2454 www.directv.com CIRCUIT CITY EXPRESS 608-3794 519 MEDFORD CTR MEDFORD, OR 97504 IRONWOOD COMMUNICATIONS 858-4019 541 BUSINESS PARK DRIVE MEDFORD, OR 97504 SATELLITE DISHES INC 779-5300 4003 CRATER LAKE HWY MEDFORD, OR 97504 WAL-MART 770-2010 3615 CRATER LAKE HWY MEDFORD, OR 97504				X		
e-fussion (541) 618-6392 1030 Court Street Medford, OR, 97501			X			
Earthlink 1-800-511-2041 www.earthlink.net			X			
GRR Technology, Inc. 820 Crater Lake Avenue, Suite 209 Medford, OR www.mind.net			X			
Hunter Communications 772-9282 801 Enterprise Drive Central Point, Oregon 97502 www.huntercommunications.net	X		X			
Infostructure 488-1962 1-800-419-4805 611 Siskiyou Blvd Suite 2 Ashland, OR 97502 www.mind.net			X			

Organization	*Broadband*	*Radio*	*ISP*	*Subscriber TV*	*Telephone*	*TV*
JeffNet **Jefferson Public Radio KSOR / KSMF / KSJK** 552-6301 1250 Siskiyou Boulevard Ashland, OR www3.jeffnet.org	X	X	X			
KAPL 1300 899-5275 PO Box 1090 Jacksonville, OR 97530 www.kaplradio.org		X				
KDRV Channel 12 - Soda Mountain Broadcasting 773-1212 1090 Knutson Ave. Medford, OR 97504 www.kdrv.com		X				
KDOV 97.7 FM Radio 776-5368 1236 Disk Drive Medford, OR www.thedove.us		X				
KOBI Newschannel 5 779-5555 125 S. Fir Street Medford, OR 97501 www.localnewscomesfirst.com						X
KRRM 94.7 FM 479-6497 225 Rogue River Highway Grants Pass, OR www.krrm.com		X				
KTVL Television 10 773-7373 KTVL-TV 1440 Rossanley Drive Medford, OR 97501 www.ktvl.com						X
Medford Computers – Mighty Net 776-2373 1037 Court Street Medford, OR www.mighty.net			X			
Northwest ISP 1-888-821-1436 **www.northwestisp.com**			X			
Open Door Networks 488-4127 110 S. Laurel St. Ashland, OR www.opendoor.com			X			

Organization	*Broadband*	*Radio*	*ISP*	*Subscriber TV*	*Telephone*	*TV*
Oregon Telecom 779-7004 1910 E Barnett Rd. Suite 101 Medford, OR 97504 www.oregontelecom.com	X			X	X	
PCEZ.COM 1-800-327-7090 www.pcez.com			X			
Pacific Coast Networks 1-866-764-8007 www.pcn.com			X			
Peak Internet 471-0028 www.peakinternet.com			X			
Qwest 1-800-244-111 (residential, LD, Wireless) 1-800-603-6000 (Small Business) 1-800-777-9594 (Large Business) 1-800-996-2516 (Internet) www.qwest.com	X		X	X	X	
RADIO MEDFORD 779-1550 1438 Rossanley Drive Medford, OR Lite KCMX 102 FM www.lite102.com Kat Country KAKT 105 FM www.kat105.com KBOY 95.7 FM www.957kboy.com Beat 93 FM KTMT FM www.beat93.com ESPN Sports Radio AM 580 KTMT AM www.espnam580.com Newstalk 880 KCMX AM www.kcmxam.com		X				
Rio Communications 494-3333 920 Town Centre Drive Medford, OR 97504 www.rio.com	X		X		X	
Rogue Valley Internet 774-1939 www.webtrail.com			X			

Organization	*Broadband*	*Radio*	*ISP*	*Subscriber TV*	*Telephone*	*TV*
Southern Oregon Public Broadcasting – SOPTV 779-0808 34 South Fir St. Medford, OR 97501 www.soptv.org						X
Sprint 1-800-877-7746 (Residential) 1-800-877-2000 (Business) www.sprint.com	X		X		X	
Unicom 776-5380 820 Crater Lake Avenue. Suite 205 Medford, OR www.uci.net	X		X		X	
WaveNet 824 E Jackson Medford, OR www.wave.net			X			

Appendix 13 – WiFi Hotspot Sampler

Anne Hathaway's Cottage
586 E. Main
Ashland Oregon

Ashland Center for Women's Health
540 Catalina Drive
Ashland Oregon

Ashland Community Hospital
280 Maple Street
Ashland, Oregon

Black Sheep
51 N Main
Ashland Oregon

Caffe Diem Coffeehouse/Cafe
675 Medford Center
Medford, Oregon

Chanticleer Inn
120 Gresham
Ashland, Oregon

Evo's Java House
376 E. Main St.
Ashland, Oregon

Hampton Inn
1122 Morrow Rd
Medford, Oregon

Holiday Inn Express Ashland
565 Clover Lane
Ashland OR 97520

Holiday Inn Express Medford
1501 S. Pacific Hwy
Medford OR 97501

InfoStructure
611 Siskiyou Blvd.
Ashland, Oregon

Jackson County Airport
3650 Biddle Road, #13
Medford, OR 97504

Jackson County Libraries

Central Library
Headquarters Regional Services
205 South Central
Medford, Oregon 97501

Ashland Regional Library
South County Regional Services
410 Siskiyou Blvd.
Ashland, Oregon 97520

Eagle Point Branch Library
Upper Rogue Regional Services
239 W. Main Street
Eagle Point, Oregon 97524

Gold Hill Branch Library
West County Regional Services
202 Dardanelles Street
Gold Hill, Oregon 97525

Rogue River Branch Library
West County Regional Services
412 E. Main
Rogue River, Oregon 97536

La Baguette
340 A Street
Ashland, Oregon

La Quinta Inns & Suites
434 Valley View Rd
Ashland, Oregon

McDonald's 17575
43 S 9th St
Central Point OR 97502

Oak Hill Bread and Breakfast
2190 Siskiyou Blvd.
Ashland, Oregon

Oregon Mountain Coffee
930 N Phoenix Rd
Medford, Oregon

Pony Espresso Cafe
540 N. Fifth Street
Jacksonville, Oregon

Rogue Regency Inn
2345 Crater Lake Hwy.
Medford, Oregon

Project A
340 A Street
Ashland, Oregon

Rogue Valley Roasting Company
917 E. Main
Ashland, Oregon

Siskiyou Brew Pub
31 B Water Street
Ashland. Oregon

Southern Oregon University
1250 Siskiyou Blvd.
Ashland, Oregon

Starbucks
120 E. Main
Ashland, Oregon

Stratford Inn
555 Siskiyou Blvd.
Ashland, Oregon

Tudor House
217 Beach Street
Ashland, Oregon

Science Works
1500 E. Main Street
Ashland, Oregon

Standing Stone brewery
101 Oak Street
Ashland, Oregon

The Palm Cottages
1065 Siskiyou Blvd.
Ashland, Oregon

The UPS Store #1239
711 Medford Center
Medford OR 97504

Siskiyou Cyclery

1729 Siskiyou Blvd.
Ashland, Oregon

Starbucks
1474 Siskiyou Blvd.
Ashland, Oregon

Windmill Inns & Suites
2525 Ashland Street
Ashland, Oregon

Windmill Inn & Suites
1950 Biddle Rd
Medford, Oregon

Zoey's Café and all natural ice cream
199 East Main St
Ashland, Oregon

Appendix 14 - Web Development Services Sampler

Cobalt Web Designs
Medford, OR
www.blue2.com
541.535.8059

DNA
Mailing Address:
P.O. Box 2009
Rogue River, OR 97537
Physical Address:
8901 Rogue River Hwy.
Grants Pass, OR 97527
www.dailydna.com
541.582.8154

GMR Design
443 Courtney Street
Ashland, OR 97520
www.gmrdesign.com
541.488.4297

Infostructure
611 Siskiyou Blvd Suite 2
Ashland, OR 97502
www.mind.net
541-488-1962

Passey Advertising Inc.
1124 West Main St.
Medford, OR 97501
www.passeyadvertising.com
541.779.5455

ProjectA
340 A Street
Ashland, OR 97520
www.projecta.com
541.488.1702

Rogue Web Pages
Medford, OR 97501
www.rogueweb.com
541.773.1658

Rosetta Publishing
P.O. Box 3028
Ashland, OR 97520

www.vortexmaps.com
541.951.3394

Scarab Media
835 E. Main Suite A
Medford, Oregon 97504
www.scarabmedia.com
541.734.7308

Tak-a-BYTE Computer Consultants
1017 N. Riverside Avenue, Suite 126
Medford, OR 97501 USA
www.tak-a-byte.com
541.245.3983

Vortx
180 Lithia Way, Suite 202
PO. Box 899
Ashland, Oregon 97520
www.vortx.com
541.201.9965

websites.ac
4300 Tami Lane
Central Point, OR 97502
www.websites.ac
541.858.7010

WikWeb
130 A st.
Ashland, OR. 97520
www.wikweb.com
541.488.1711

Appendix 15 - Regulations Pertaining to Antenna Structures

The federal government governs placement of antenna structures. Section 332(c)(7)(A) of the Telecom Act provides that "[e]xcept as provided in this paragraph, nothing in this Chapter shall limit or affect the authority of a State or local government or instrumentality thereof over decisions regarding the placement, construction, and modification of personal wireless service facilities." 47 U.S.C. § 332(c)(7)(A). This portion of the U.S.C has its origin in the Telecommunications Act of 1995, specifically:

> SEC. 704. FACILITIES SITING; RADIO FREQUENCY EMISSION STANDARDS.
> (a) NATIONAL WIRELESS TELECOMMUNICATIONS SITING POLICY- Section 332(c) (47 U.S.C. 332(c)) is amended by adding at the end the following new paragraph:
>
> (7) PRESERVATION OF LOCAL ZONING AUTHORITY-
> (A) GENERAL AUTHORITY- Except as provided in this paragraph, nothing in this Act shall limit or affect the authority of a State or local government or instrumentality thereof over decisions regarding the placement, construction, and modification of personal wireless service facilities.
> (B) LIMITATIONS-
> (i) The regulation of the placement, construction, and modification of personal wireless service facilities by any State or local government or instrumentality thereof--
> (I) shall not unreasonably discriminate among providers of functionally equivalent services; and
> (II) shall not prohibit or have the effect of prohibiting the provision of personal wireless services.
> (ii) A State or local government or instrumentality thereof shall act on any request for authorization to place, construct, or modify personal wireless service facilities within a reasonable period of time after the request is duly filed with such government or instrumentality, taking into account the nature and scope of such request.
> (iii) Any decision by a State or local government or instrumentality thereof to deny a request to place, construct, or modify personal wireless service facilities shall be in writing and supported by substantial evidence contained in a written record.
> (iv) No State or local government or instrumentality thereof may regulate the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the Commission's regulations concerning such emissions.
> (v) Any person adversely affected by any final action or failure to act by a State or local government or any instrumentality thereof that is inconsistent with this subparagraph may, within 30 days after such action or failure to act, commence an action in any court of competent jurisdiction.[168]

The Telecom Act requires that permit denials be supported by substantial evidence. Specifically, 47 U.S.C. § 332(c)(7)(B)(iii) states that "[a]ny decision by a State or local government or instrumentality thereof to deny a request to place, construct, or modify personal wireless service facilities shall be in writing and supported by substantial evidence contained in a written record."

> The interpretation of "substantial evidence" in the context of the Telecom Act was the focus of extended analysis in *MetroPCS*, which held that "the substantial evidence inquiry does not require incorporation of the substantive federal standards imposed by the [Telecom Act]." 400 F.3d at 723. Rather, courts should consider whether the denial is based on "substantial evidence in the context of applicable *state and local law*." *Id.* at 724. Consequently, the Telecom Act " 'does not affect or encroach upon the *substantive* standards to be applied under established principles of state and local law.' " *Id.* (quoting *Cellular Tel. Co. v. Town of Oyster Bay*, 166 F.3d 490, 494 (2d Cir. 1999); *see also id.* (concluding that the substantial evidence standard "does not create a substantive federal limitation upon local land use regulatory power"))

> (internal quotation omitted). *MetroPCS* accords with the decisions of other circuits in this respect. *See id.* at 723 (noting that "there appears to be universal agreement among the circuits as to the substantive content of [the substantial evidence] requirement"); *see, e.g.*, *Preferred Sites, LLC v. Troup County*, 296 F.3d 1210, 1219 (11th Cir. 2002); *Oyster Bay*, 166 F.3d at 494.
>
> The substantial evidence standard is "essentially 'deferential,' " and courts may not " 'engage in [their] own factfinding nor supplant [a city's] reasonable determinations.' " *MetroPCS*, 400 F.3d at 725 (quoting *Oyster Bay*, 166 F.3d at 494) (first alteration in original). Substantial evidence implies "less than a preponderance, but more than a scintilla of evidence." *MetroPCS*, 400 F.3d at 725 (internal quotation omitted).[169]

The FCC addresses those structures that must be registered as antennas and is tied to Federal Aviation Administration (FAA) reporting requirements.

> The FCC Rules specifically define the term "antenna structures" as "[T]he radiating and/or receive system, its supporting structures and any appurtenances mounted thereon." In practical terms, an antenna structure could be a free standing structure, built specifically to support or act as an antenna, or it could be a structure mounted on some other man-made object (such as a building or bridge). In the latter case, note that the structure must be registered with the FCC, not the building or bridge. Objects such as buildings, observation towers, bridges, windmills, and water towers that DO NOT have an antenna mounted on them ARE NOT antenna structures and should not be registered. Keep in mind that the FCC only has jurisdiction over antenna structures, and thus, other objects that do not house antennas are not required to be registered with the FCC -- regardless of their location or height.
>
> The Antenna Structure Registration Program is the process under which each antenna structure that requires FAA notification -- including new and existing structures -- must be registered with the FCC by its owner. The owner is the single point of contact for resolving antenna-related problems and is responsible for the maintenance of those structures requiring painting and/or lighting. Note that because the Antenna Structure Registration requirements only apply to those antenna structures that may create a hazard to air navigation (either by their height or proximity to an airport), the registration files do not contain a comprehensive record of all antenna structures.
>
> Antenna Structure Registration does not replace the FAA notification requirement. Registration must be undertaken *after* an owner has requested a study of the site by the Federal Aviation Administration and received a "final determination of no hazard," but before any licensing applications are filed with the FCC for the site.[170]
>
> Primary antennas for cellular and PCS transmissions are usually located outside on towers, water tanks and other elevated structures like rooftops and sides of buildings. The combination of antenna towers and associated electronic equipment is referred to as a "cellular or PCS cell site," or "base station." Typical heights for cell site towers are 50-200 feet. Antennas are usually arranged in groups of three with one antenna in each group used to transmit signals to mobile units, and the other two antennas used to receive signals from mobile units.[171]

Radio Frequency Safety – Cellular and PCS Base stations[172]

Radiofrequencies constitute part of the overall electromagnetic spectrum. Cellular communications systems use frequencies in the 800-900 megahertz (MHz) portion of the radiofrequency (RF) spectrum (frequencies formerly used for UHF-TV broadcasting), and transmitters in the Personal Communications Service (PCS) use frequencies in the range of 1850-1990 MHz. Primary antennas for cellular and PCS transmissions are usually located on towers, water tanks and other elevated structures including rooftops and the sides of buildings.

The combination of antennas and associated electronic equipment is referred to as a cellular or PCS base station" or "cell site." Typical heights for base station towers or structures are 50-200 feet. A typical cellular base station may utilize several "omni-directional" antennas that look like poles or whips, 10 to 15 feet in length. PCS (and also many cellular) base stations use a number of "sector" antennas that look like rectangular panels. The dimensions of a sector antenna are typically 1 foot by 4 feet. Antennas are usually arranged in three groups of three with one antenna in each group used to transmit signals to mobile units (car phones or hand-held phones). The other two antennas in each group are used to receive signals from mobile units.

The Federal Communications Commission (FCC) authorizes cellular and PCS carriers in various service areas around the country. At a cell site, the total RF power that could be transmitted from each transmitting antenna at a cell site depends on the number of radio channels (transmitters) that have been authorized and the power of each transmitter. Typically, for a cellular base station, a maximum of 21 channels per sector (depending on the system) could be used. Thus, for a typical cell site utilizing sector antennas, each of the three transmitting antennas could be connected to up to 21 transmitters for a total of 63 transmitters per site. When omni-directional antennas are used, up to 96 transmitters could be implemented at a cell site, but this would be very unusual. While a typical base station could have as many as 63 transmitters, not all of the transmitters would be expected to operate simultaneously thus reducing overall emission levels. For the case of PCS base stations, fewer transmitters are normally required due to the relatively greater number of base stations.

Although the FCC permits an effective radiated power (ERP) of up to 500 watts per channel (depending on the tower height), the majority of cellular base stations in urban and suburban areas operate at an ERP of 100 watts per channel or less. An ERP of 100 watts corresponds to an actual radiated power of 5-10 watts, depending on the type of antenna used (ERP is not equivalent to the power that is radiated but is a measure of the directional characteristics of the antenna). As the capacity of a system is expanded by dividing cells, i.e., adding additional base stations, lower ERPs are normally used. In urban areas, an ERP of 10 watts per channel (corresponding to a radiated power of 0.5 - 1 watt) or less is commonly used. For PCS base stations, even lower radiated power levels are normally used.

The signal from a cellular or PCS base station antenna is essentially directed toward the horizon in a relatively narrow beam in the vertical plane. For example, the radiation pattern for an omni-directional antenna might be compared to a thin doughnut or pancake centered around the antenna while the pattern for a sector antenna is fan-shaped, like a wedge cut from a pie. As with all forms of electromagnetic energy, the power density from a cellular or PCS transmitter decreases rapidly (according to an inverse square law) as one moves away from the antenna. Consequently, normal ground-level exposure is much less than exposures that might be encountered if one were very close to the antenna and in its main transmitted beam. Measurements made near typical cellular and PCS installations have shown that ground-level power densities are well below limits recommended by RF/microwave safety standards.

In 1996, the FCC adopted updated guidelines for evaluating human exposure to radiofrequency (RF) fields from fixed transmitting antennas such as those used for cellular radio and PCS base stations[1]. The new guidelines for cellular and PCS base stations are identical to those recommended by the National Council on Radiation Protection and Measurements (NCRP)[2]. These guidelines are also similar to the 1992 guidelines recommended by the American National Standards Institute and the Institute of Electrical and Electronics Engineers (ANSI/IEEE C95.1-1992)[3]. The FCC adopted guidelines for hand-held RF devices, such as cellular and PCS phones,

that are the same as those recommended by the ANSI/IEEE and NCRP guidelines (see later discussion).

In the case of cellular base station transmitters, at a frequency of 869 MHz (the lowest frequency used), the FCC's RF exposure guidelines recommend a maximum permissible exposure level of the general public (or exposure in "uncontrolled" environments) of about 580 microwatts per square centimeter (µW/cm2), as averaged over any thirty-minute period. This limit is many times greater than RF levels typical found near the base of typical cellular towers or in the vicinity of other, lower-powered cellular base station transmitters. For example, measurement data obtained from various sources have consistently indicated that "worst-case" ground-level power densities near typical cellular towers are on the order of 1 µW/cm2 or less (usually significantly less). Calculations corresponding to a "worst-case" situation (all transmitters operating simultaneously and continuously at the maximum licensed power) show that in order to be exposed to levels near the FCC's limits for cellular frequencies, an individual would essentially have to remain in the main transmitting beam (at the height of the antenna) and within a few feet from the antenna. This makes it extremely unlikely that a member of the general public could be exposed to RF levels in excess of these guidelines from cellular base station transmitters.

For PCS base station transmitters, the same type of analysis holds, except that at the PCS transmitting frequencies (1850-1990 MHz) the FCC's exposure limits for the public are 1000 µW/cm2. Therefore, there would typically be an even greater margin of safety between actual public exposure levels and the recognized safety limit.

When cellular and PCS antennas are mounted at rooftop locations it is possible that RF levels greater than 1 µW/cm2 could be present on the rooftop itself. This might become an issue if the rooftop were accessible to maintenance personnel or others. However, exposures approaching or exceeding the safety guidelines are only likely to be encountered very close to and directly in front of the antennas. Even if RF levels were to be higher than desirable on a rooftop, appropriate restrictions could be placed on access. Factoring in the time-averaging aspects of safety standards could also be used to reduce potential exposure. The fact that rooftop cellular and PCS antennas usually operate at lower power levels than antennas on free-standing towers makes excessive exposure conditions on rooftops even less likely. This reason and the significant signal attenuation of a building's roof also minimizes any chance for harmful exposure of persons living or working within the building itself.

Radio Frequency Safety – Mobil (vehicle-mounted) antennas[173]

Vehicle-mounted antennas used for cellular communications normally operate at a power level of 3 watts or less. These cellular antennas are typically mounted on the roof, on the trunk, or on the rear window of a car or truck. Studies have shown that in order to be exposed to RF levels that approach the safety guidelines it would be necessary to remain very close to a vehicle-mounted cellular antenna. For example, a study done for AT&T Bell Laboratories by the University of Washington documented typical and "worst-case" exposure levels and specific absorption rates (SAR) for vehicle occupants and persons standing close to vehicle-mounted cellular antennas. Worst-case exposure conditions were considered when an individual was at the closest possible distance from the antenna. Several configurations were tested using adult and child "phantom" models.

The results of this study showed that the highest exposure (1900 µW/cm2) occurred with a female model at a distance of 9.7 cm (3.8 inches) from one of the antennas operating at a power

level of 3 watts. Although this level is nominally in excess of the FCC's exposure limits for power density at this frequency, analysis of the data indicated that the antenna would have to be driven to 7 W of power before the limit for specific absorption rate (SAR) allowed by the FCC guidelines would be exceeded. The intermittent nature of transmission and the improbability that a person would remain so close to the antenna for any length of time further reduces the potential for excessive exposure.

The University of Washington study also indicated that vehicle occupants are effectively shielded by the metal body. Motorola, Inc., in comments filed with the FCC, has expressed the opinion that proper installation of a vehicle-mounted antenna to maximize the shielding effect is an effective way of limiting exposure. Motorola and other companies have recommended antenna installation either in the center of the roof or the center of the trunk. In response to concerns expressed over the commonly-used rear-window mounted cellular antennas, Motorola has recommended a minimum separation distance of 30-60 cm (1 -2 feet) to minimize exposure to vehicle occupants resulting from antenna mismatch for this type of antenna installation.

In summary, from data gathered to date, it appears that properly installed, vehicle- mounted, personal wireless transceivers using up to 3 watts of power would result in maximum exposure levels in or near the vehicle that are well below the FCC's safety limits. This assumes that the transmitting antenna is at least 15 cm (about 6 inches) or more from vehicle occupants. Time-averaging of exposure (either a 6 or 30 minute period is specified) will usually result in still lower values when compared with safety guidelines.

Radio Frequency Safety – Hand-held cellular telephones and PCS devices[174]

A question that often arises is whether there may be potential health risks due to the RF emissions from hand-held cellular telephones and PCS devices. The FCC's exposure guidelines, and the ANSI/IEEE and NCRP guidelines upon which they are based, specify limits for human exposure to RF emissions from hand-held RF devices in terms of specific absorption rate (SAR). For exposure of the general public, e.g., exposure of the user of a cellular or PCS phone, the SAR limit is an absorption threshold of 1.6 watts/kg (W/kg), as measured over any one gram of tissue.

Measurements and computational analysis of SAR in models of the human head and other studies of SAR distribution using hand-held cellular and PCS phones have shown that, in general, the 1.6 W/kg limit is unlikely to be exceeded under normal conditions of use. Before FCC approval can be granted for marketing of a cellular or PCS phone, compliance with the 1.6 W/kg limit must be demonstrated. Also, testing of hand-held phones is normally done under conditions of maximum power usage. In reality, normal power usage is less and is dependent on distance of the user from the base station transmitter.

In recent years publicity, speculation and concern over claims of possible health effects due to RF fields from hand-held wireless telephones prompted industry-sponsored groups, such as Wireless Technology Research, L.L.C. (WTR) and Motorola, Inc., to initiate research programs aimed at investigating whether there is any risk to users of these devices. Past studies carried out at frequencies both higher and lower than those used for cellular and PCS phones have led expert organizations to conclude that typical RF exposures from these devices are safe. However, the Federal Government is monitoring the results of the ongoing industry-sponsored research through an inter-agency working group led by the EPA and the FDA's Center for Devices and Radiological Health.

In a 1993 "Talk Paper," the FDA stated that it did not have enough information at that time to rule out the possibility of risk, but if such a risk exists "it is probably small." The FDA concluded that there is no proof that cellular telephones can be harmful, but if individuals remain concerned several precautionary actions could be taken. These included limiting conversations on hand-held cellular telephones to those that are essential and making greater use of telephones with vehicle-mounted antennas where there is a greater separation distance between the user and the radiating structure.

Appendix 16 – Legislation

Telecommunication Reform

How will regulators treat Internet Protocol television and telephony? How should video franchises be awarded? Will the openness of the Internet be preserved and extended in the broadband world? Can communities explore the broadband solutions that work best in their area?

These are just some of the questions Congress is considering as it takes up bills that address broad reform of US telecommunications law. This is the second major rewrite of Telecommunications Act in 70 years. Telecommunications policy affects every American family in ways that determine their access to information, how much they pay for it, and even the quality and diversity of that information.

The Telecommunications Act of 1996 was the first major rewrite of US telecommunications law. Much has changed in the past decade. Then, reform proponents promised that deregulation of the telephone and cable industries would result in competition that would lower prices for consumers while giving them more choices. Cable, long-distance and local telephone companies would each get into the others' businesses. The legislation gave little mention of the Internet.

Since passage of the 1996 Act, cable rates have surged by more than 50 percent, local phone rates have risen by 20 percent, and scores of media companies merged, denying consumers choice and competition, and depriving our democracy of diverse viewpoints.

Today's legislative debate focuses on the Internet. As the National Journal's Drew Clark writes, "Overlooking the Internet [in the 1996 Act] meant the law gave little guidance on broadband and Internet phones. But on the positive side, neglect allowed digital applications to develop and flourish in a laissez-faire climate."

Now, phone calls, television programs and all kinds of content move over high-speed or "broadband" networks. Over broadband "pipes" into homes, telephone and cable companies are competing to offer a bundle of voice (telephony), data (Internet) and video (television) services. As Congress considers legislation this year, the lobbyists for these industries will seek a leg up on the competition.

Universal Services Modernization

Americans have long agreed that certain communications tools are so fundamental that their provision should not be left to the vagaries of the marketplace alone. Access to information and communications tools increasingly shapes our ability to manage our complex lives, participate in civic affairs, acquire learning skills needed for economic success, and enjoy social and cultural life.

Universal service is the concept that every individual in the U.S. should have basic telephone service available at an affordable price. It is smart economic policy that protects ratepayers from paying for stranded investments in telephone networks, adds to the value of those networks, and improves the overall productivity, health, and education of society. Universal service policies maximize the size of telephone networks, making citizens more available to education, health and safety services; to businesses; to government; and to each other by reducing the financial burden of telephone subscribership.

Congress is about to embark on a path to modernize universal service, examining the contribution and distribution mechanisms for the web of federal and state subsidies aimed at making telephone service affordable throughout the country.

The Digital Television Transition and Public Safety Act

In late December 2005, the House and Senate agreed on legislation to speed the nation's transition to digital television while helping consumers to continue to use their analog televisions, recover spectrum for use by public safety officials and improve emergency communications, and auction off additional spectrum to reduce the national deficit. As of January 2006, the legislation, a piece of a major budget bill, awaits final approval from the House.

Appendix 17 – Jackson County Income Comparison of 1993 vs. 2003

Category	***1993***[175]	***2003***[176]
POPULATION	159,054 (ranked 6th in the state)	190,366 (ranked 6th in the state)
PER CAPITA PERSONAL INCOME (PCPI) Personal income is the income that is received by persons from all sources. It is calculated as the sum of wage and salary disbursements, supplements to wages and salaries, proprietors' income with inventory valuation and capital consumption adjustments, rental income of persons with capital consumption adjustment, personal dividend income, personal interest income, and personal current transfer receipts, less contributions for government social insurance.	$18,424. This PCPI ranked 11th in the state and was 92 percent of the state average, $20,046, and 86 percent of the national average, $21,346. The 1993 PCPI reflected an increase of 4.1 percent from 1992. The 1992-1993 state change was 4.2 percent and the national change was 2.4 percent. In 1983 the PCPI of Jackson was $10,644 and ranked 20th in the state. The 1983-1993 average annual growth rate of PCPI was 5.6 percent. The average annual growth rate for the state was 5.4 percent and for the nation was 5.4 percent.	$26,617. This PCPI ranked 7th in the state and was 93 percent of the state average, $28,734, and 85 percent of the national average, $31,472. The 2003 PCPI reflected an increase of 1.8 percent from 2002. The 2002-2003 state change was 0.9 percent and the national change was 2.2 percent. In 1993 the PCPI of Jackson was $18,424 and ranked 11th in the state. The 1993-2003 average annual growth rate of PCPI was 3.7 percent. The average annual growth rate for the state was 3.7 percent and for the nation was 4.0 percent.
TOTAL PERSONAL INCOME (TPI) Personal Income is the income that is received by all persons from all sources. It is calculated as the sum of wage and salary disbursements, supplements to wages and salaries, proprietors' income with inventory valuation and capital consumption adjustments, rental income of persons with capital consumption adjustment, personal dividend income, personal interest income, and personal current transfer receipts, less contributions for government social insurance. The personal income of an area is the income that is received by, or on behalf of, all the individuals who live in the area; therefore, the estimates of personal income are presented by the place of residence of the income recipients.	$2,930,374. This TPI ranked 6th in the state and accounted for 4.8 percent of the state total. In 1983 the TPI of Jackson was $1,416,979 and ranked 6th in the state. The 1993 TPI reflected an increase of 6.8 percent from 1992. The 1992-1993 state change was 6.6 percent and the national change was 3.7 percent. The 1983-1993 average annual growth rate of TPI was 7.5 percent. The average annual growth rate for the state was 6.9 percent and for the nation was 6.5 percent.	$5,066,877. This TPI ranked 6th in the state and accounted for 4.9 percent of the state total. In 1993 the TPI of Jackson was $2,930,374 and ranked 6th in the state. The 2003 TPI reflected an increase of 3.7 percent from 2002. The 2002-2003 state change was 2.1 percent and the national change was 3.2 percent. The 1993-2003 average annual growth rate of TPI was 5.6 percent. The average annual growth rate for the state was 5.3 percent and for the nation was 5.1 percent.

Category	***1993***[175]	***2003***[176]
COMPONENTS OF TOTAL PERSONAL INCOME Total personal income includes net earnings by place of residence; dividends, interest, and rent; and personal current transfer receipts received by the residents.	Net earnings accounted for 59.3 percent of TPI (compared with 57.7 in 1983); dividends, interest, and rent were 24.0 percent (compared with 25.3 in 1983); and personal current transfer receipts were 16.7 percent (compared with 16.9 in 1983). From 1992 to 1993 net earnings increased 8.3 percent; dividends, interest, and rent increased 3.1 percent; and personal current transfer receipts increased 7.3 percent. From 1983 to 1993 net earnings increased on average 7.8 percent each year; dividends, interest, and rent increased on average 7.0 percent; and personal current transfer receipts increased on average 7.4 percent.	Net earnings accounted for 61.2 percent of TPI (compared with 59.3 in 1993); dividends, interest, and rent were 20.7 percent (compared with 24.0 in 1993); and personal current transfer receipts were 18.1 percent (compared with 16.7 in 1993). From 2002 to 2003 net earnings increased 6.5 percent; dividends, interest, and rent decreased 2.4 percent; and personal current transfer receipts increased 1.9 percent. From 1993 to 2003 net earnings increased on average 6.0 percent each year; dividends, interest, and rent increased on average 4.1 percent; and personal current transfer receipts increased on average 6.5 percent.
EARNINGS BY PLACE OF WORK Earnings by place of work is the sum of wage and salary disbursements, supplements to wages and salaries, and proprietors' income.	Earnings of persons employed increased from $1,813,789 in 1992 to $1,962,875 in 1993, an increase of 8.2 percent. The 1992-1993 state change was 6.9 percent and the national change was 4.2 percent. The average annual growth rate from the 1983 estimate of $906,789 to the 1993 estimate was 8.0 percent. The average annual growth rate for the state was 7.4 percent and for the nation was 6.7 percent.	Earnings of persons employed increased from $3,299,398 in 2002 to $3,515,831 in 2003, an increase of 6.6 percent. The 2002-2003 state change was 3.4 percent and the national change was 4.1 percent. The average annual growth rate from the 1993 estimate of $1,962,875 to the 2003 estimate was 6.0 percent. The average annual growth rate for the state was 5.6 percent and for the nation was 5.3 percent.

Note: All income estimates with the exception of PCPI are in thousands of dollars, not adjusted for inflation.

Per capita personal income Personal income is the income that is received by persons from all sources. It is calculated as the sum of wage and salary disbursements, supplements to wages and salaries, proprietors' income with inventory valuation and capital consumption adjustments, rental income of persons with capital consumption adjustment, personal dividend income, personal interest income, and personal current transfer receipts, less contributions for government social insurance. This measure of income is calculated as the personal income of the residents of a given area divided by the resident population of the area. In computing per capita personal income, BEA uses the Census Bureau's annual midyear population estimates.

Total Personal income Personal Income is the income that is received by all persons from all sources. It is calculated as the sum of wage and salary disbursements, supplements to wages and salaries, proprietors' income with inventory valuation and capital consumption adjustments, rental income of persons with capital consumption adjustment, personal dividend income, personal interest income, and personal current transfer receipts, less contributions for government social insurance. The personal income of an area is the income that is received by, or on behalf of, all the individuals who live in the area; therefore, the estimates of personal income are presented by the place of residence of the income recipients. All state and local area dollar estimates are in current dollars (not adjusted for inflation).

Net earnings Net earnings by place of residence is earnings by place of work *less* contributions for government social insurance, *plus* an adjustment to convert earnings by place of work to a place of residence basis. Earnings by place of work is the sum of wage and salary disbursements, supplements to wages and salaries, and proprietors' income.

Dividends, interest, and rent Personal dividend income, personal interest income, and rental income of persons with capital consumption adjustment are sometimes referred to as "investment income" or "property income." *Dividends:* This component of personal income consists of the payments in cash or other assets, excluding the corporation's own stock, made by corporations located in the United States or abroad to persons who are U.S. residents. It excludes that portion of dividends paid by regulated investment companies (mutual funds) related to capital gains distributions. *Interest:* This component of personal income is the interest income (monetary and imputed) of persons from all sources. Rent: Rental income is the net income of persons from the rental of real property except for the income of persons primarily engaged in the real estate business; the imputed net rental income of the owner-occupants of nonfarm dwellings; and the royalties received from patents, copyrights, and the right to natural resources.

Personal current transfer receipts This component of personal income is payments to persons for which no current services are performed. It consists of payments to individuals and to nonprofit institutions by Federal, state, and local governments and by businesses. Government payments to individuals includes retirement and disability insurance benefits, medical payments (mainly Medicare and Medicaid), income maintenance benefits, unemployment insurance benefits, veterans benefits, and Federal grants and loans to students. Government payments to nonprofit institutions excludes payments by the Federal Government for work under research and development contracts. Business payments to persons consists primarily of liability payments for personal injury and of corporate gifts to nonprofit institutions. All state and local area dollar estimates are in current dollars (not adjusted for inflation).

Earnings by place of work Earnings by place of work is the sum of Wage and Salary Disbursements, supplements to wages and salaries and proprietors' income. BEA presents earnings by place of work because it can be used in the analyses of regional economies as a proxy for the income that is generated from participation in current production. All state and local area dollar estimates are in current dollars (not adjusted for inflation).

NOTE: The national estimates may temporarily differ from the state estimates because of different estimating schedules. The state estimates of wages and salaries and farm proprietors' income incorporate source data that are not available when the national estimates are prepared; these data are later incorporated into the national estimates when they are revised.[177]

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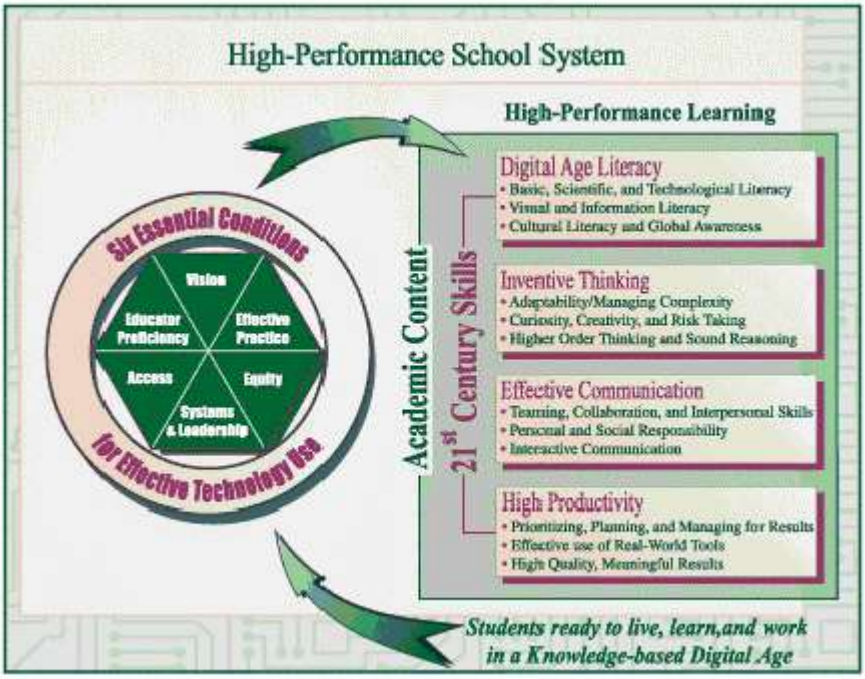

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Digital-Age Literacy *includes the following:*
Basic Literacy: Language proficiency (in English) and numeracy at levels necessary to function on the job and in society to achieve one's goals and to develop one's knowledge and potential in this Digital Age.
Scientific Literacy: Knowledge and understanding of the scientific concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity.
Economic Literacy: The ability to identify economic problems, alternatives, costs, and benefits; analyze the incentives at work in economic situations; examine the consequences of changes in economic conditions and public policies; collect and organize economic evidence; and weigh costs against benefits.
Technological Literacy: Knowledge about what technology is, how it works, what purposes it can serve, and how it can be used efficiently and effectively to achieve specific goals.
Visual Literacy: The ability to interpret, use, appreciate, and create images and video using both conventional and 21st century media in ways that advance thinking, decision making, communication, and learning.
Information Literacy: The ability to evaluate information across a range of media; recognize when information is needed; locate, synthesize, and use information effectively; and accomplish these functions using technology, communication networks, and electronic resources.
Multicultural Literacy: The ability to understand and appreciate the similarities and differences in the customs, values, and beliefs of one's own culture and the cultures of others.
Global Awareness: The recognition and understanding of interrelationships among international organizations, nation-states, public and private economic entities, sociocultural groups, and individuals across the globe.

Inventive Thinking *is comprised of the following "life skills":*
Adaptability and Managing Complexity: The ability to modify one's thinking, attitude, or behavior to be better suited to current or future environments; and the ability to handle multiple goals, tasks, and inputs, while understanding and adhering to constraints of time, resources, and systems (e.g., organizational, technological).
Self-Direction: The ability to set goals related to learning, plan for the achievement of those goals, independently manage time and effort, and independently assess the quality of learning and any products that result from the learning experience.
Curiosity: The desire to know or the spark of interest that leads to inquiry.

Creativity: The act of bringing something into existence that is genuinely new and original, whether personally (original only to the individual) or culturally (where the work adds significantly to a domain of culture as recognized by experts).
Risk Taking: The willingness to make mistakes, advocate unconventional or unpopular positions, or tackle extremely challenging problems without obvious solutions, such that one's personal growth, integrity, or accomplishments are enhanced.
Higher-Order Thinking and Sound Reasoning: The cognitive processes of analysis, comparison, inference and interpretation, evaluation, and synthesis applied to a range of academic domains and problem-solving contexts.

Effective Communication *involves:*
Teaming and Collaboration: Cooperative interaction between two or more individuals working together to solve problems, create novel products, or learn and master content.
Interpersonal Skills: The ability to read and manage the emotions, motivations, and behaviors of oneself and others during social interactions or in a social-interactive context.
Personal Responsibility: Depth and currency of knowledge about legal and ethical issues related to technology, combined with one's ability to apply this knowledge to achieve balance, integrity, and quality of life as a citizen, a family and community member, a learner, and a worker.
Social and Civic Responsibility: The ability to manage technology and govern its use in a way that promotes public good and protects society, the environment, and democratic ideals.
Interactive Communication: The generation of meaning through exchanges using a range of contemporary tools, transmissions, and processes.

High productivity *currently is not a high-stakes focus of schools, yet the skills involved in this cluster often determine whether a person succeeds or fails in the workforce:*
Prioritizing, Planning, and Managing for Results: The ability to organize to efficiently achieve the goals of a specific project or problem.
Effective Use of Real-World Tools: The ability to use real-world tools—the hardware, software, networking, and peripheral devices used by information technology (IT) workers to accomplish 21st century work—to communicate, collaborate, solve problems, and accomplish tasks.
Ability to Produce Relevant, High-Quality Products: The ability to produce intellectual, informational, or material products that serve authentic purposes and occur as a result of students using real-world tools to solve or communicate about real-world problems. These products include persuasive communications in any media (print, video, the Web, verbal presentation), synthesis of resources into more useable forms (databases, graphics, simulations), or refinement of questions that build upon what is known to advance one's own and others' understanding.

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[169] SPRINT PCS ASSETS, L.L.C., a Delaware limited liability company, wholly-owned by SPRINT TELEPHONY PCS, L.P., a Delaware limited partnership, *Plaintiff-Appellant,* v. CITY OF LA CAÑADA FLINTRIDGE, a public entity; STEPHEN A. DEL GUERCIO, in his official capacity as Mayor of the City of La Cañada Flintridge, LAURA OLHASSO in her official capacity as Mayor Pro Tem of the City of La Cañada Flintridge, Anthony J. PORTANTINO, in his official capacity as Council Member of the City of La Cañada Flintridge; GREGORY BROWN, in his official capacity as Council Member of the City of La Cañada Flintridge; DAVID A. SPENCE, in his official capacity as Council Member of the City of La Cañada Flintridge, *Defendants-Appellees,* No. 05-55014, D.C. No. CV-03-DOC OPINION, Appeal from the United States District Court for the Central District of California David O. Carter, District Judge, Presiding Argued and Submitted October 19, 2005, Pasadena, California, UNITED STATES COURT OF APPEALS FOR THE NINTH CIRCUIT

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