

Living in a Networked World:
**Humboldt County Telecommunications
Infrastructure and Usage Assessment**



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GUIDE TO THIS DOCUMENT

There is an overwhelming amount of diverse information contained in this document, and the target audiences may be different for each section. For simplicity of reporting and delivering results of the project, all information is contained in one document. This will also help give a single point of historical reference as the topic of our region's telecommunications is revisited at regular intervals in the future.

Major sections (in order) are:

- Executive Summary
- Introductory information and background
- Community input process
- CENIC's One Gigabit or Bust™ Initiative for California
- Overview of Humboldt County telecommunications infrastructure and vendors
- Recommendations – infrastructure, training, usage, Information Technology (IT) cluster development
- Recommendations – general
- General Plan Telecommunications Element research and recommendations
- Appendices – focus group information, online resources, and glossary

EXECUTIVE SUMMARY

The purpose of this project was to assess telecommunications infrastructure and its usage in Humboldt County. Surveys, focus groups, and research contributed to this report and its recommendations.

In 2000, SBC (the area's main telecom provider) began to install a fiber-optic link from Eureka to the Bay Area because its microwave system was at capacity. The project stalled in late 2001 and remained at a standstill for more than a year because of a disagreement over right-of-way fees the state transportation department (Caltrans) was imposing. The impasse was resolved in the summer of 2003 and the link was completed that fall.

Now that the SBC fiber project is done, many people think we're "done." The fact is, our telecom journey in Humboldt County has just started. The SBC/Caltrans impasse had one positive effect on the region – it raised general awareness of the importance of telecommunications and how dependent we are on it. The "bar is being raised" around the world, and we are not keeping up.

Our bandwidth advocacy to get fiber was just a start. The next steps need to be planned. Now that most of the county relies on the fiber link to the outside world, we need redundancy to add greater reliability and competition to get costs down. We also need to think about how we use the bandwidth to compete in a global economy.

Pre-1880, the United States was mostly an agricultural society, and roads and canals were important to building transportation infrastructure. The industrial age, from about 1880 to 1980, built additional infrastructure: electrical grid, highways, telephone and railroads.

Since 1990, the "knowledge" economy has been on the rise. Data communications infrastructure is vitally important. Telecommunications is now just another form of transportation. In the 21st century knowledge economy, many goods and services are delivered electronically and traditional businesses rely on high-speed telecommunications.

Humboldt County's traditional economy has been resource-based – timber, fisheries and agriculture. While those are still important elements of the local economy, there is more diversification in base industry clusters. Increasingly, all businesses rely on technology and telecommunications to support their basic business processes. Humboldt County businesses could take better advantage of technology. Central Humboldt cities have good access to telecommunications services, but that is not true of the entire county.

The county and cities play a key role in shaping the future of the region. They need to look beyond the traditional infrastructure of roads, water, electricity and sewer to the infrastructure needs of a knowledge-based economy, recognizing that the existing telecommunications infrastructure is not the same in all parts of the county. Depending upon where one lives, residents may be on the wrong side of the digital divide in Humboldt County.

Wireless telecommunications are emerging as a key part of telecommunications infrastructure, both in the US and globally. Wireless brings the opportunity to be better connected in this global

economy. In sparsely-populated rural areas, it is difficult to build a business case for traditional wireline infrastructure. Wireless technologies are key in rural economic development because of their relatively low capital costs. However, this brings issues with siting of wireless transmission facilities.

Part of this project was holding focus group sessions around the county. These were held in Garberville, Fortuna, Eureka, Arcata, and Willow Creek. The sessions were well attended, particularly outside the Eureka-Arcata corridor. Findings from these sessions varied, as one would expect from different levels of connectedness in each region as well as varying community cultures.

Other California counties do not have telecommunications elements in their General Plans, with the exception of the City/County of San Francisco. Research required looking farther afield than California. In discussions with telecommunications planning experts, there is no model plan. However, many California counties and cities do have Wireless Transmission Facilities ordinances that balance economic development with safety, scenery and compatible land usage.

The Southeastern Wisconsin Regional Planning Commission has a very good discussion on the impact of lack of planning or delays in planning for telecommunications at http://www.sewrpc.org/publications/prospectus/prospectus_telecommunications.pdf on page 59. They cite the consequences of lack of planning: dependence upon a few national telecom companies; unplanned proliferation of wireless transmission facilities; missed opportunities in telemedicine, public safety, education, transportation and quality of life; lack of universal broadband availability; socioeconomic stagnation; and a growing digital divide.

The key issues from Humboldt County's community meetings were:

Planning. Residents and businesses want more detailed, proactive telecommunications planning, not just general policies. They want the county and cities to take an active role.

Access/Coverage. This is the single biggest issue. We are not keeping up with the rest of the world, but there is a digital divide within the county as well. Broadband (high-speed) services are not available to half the county's residents, and cellular phone coverage is less than desirable.

Competition/Affordability. There is little competition within the county, and because of that, services are more costly. Most believe there should be universal access to broadband, with a choice of providers.

Reliability. Reliability means something different in each part of the county. In Eastern Humboldt, they'd like to be able to reliably make phone calls. In the area around the bay, residents would like redundancy to the single SBC fiber path. (If the SBC fiber link goes down, the majority of telecommunications users here would be affected. Redundancy, if correctly implemented, would provide a needed backup.)

Applications. Residents want e-government and better bandwidth to take advantage of advanced applications, such as telemedicine, distance learning, VoIP (Voice over Internet Protocol), transfer of large files and streaming audio, to name a few.

Education/Awareness. Residents think we need to be more educated in technology skills and more aware of what technology and telecommunications can do for us. This covered the

gamut of training workers in tech skills, training tech support people, awareness of the public and elected officials, and businesses that value technology and use it.

Advocacy. This needs to happen at all levels – locally, statewide and nationally. Residents want the County to actively advocate for telecommunications with state and national elected officials, the California Public Utilities Commission and the Federal Communications Commission.

INTRODUCTION

This project, called *Living in a Networked World*, was commissioned by the County of Humboldt and funded by a Community Development Block Grant (CDBG) in July 2004. The purpose is to assess telecommunications infrastructure systems and usage in the county. Outcomes specified are:

- State of county telecommunications infrastructure.
- State of usage of telecommunications and technology.
- Recommendations for workforce development.
- Recommendations for development of Information Technology industry cluster.
- Action plan to improve telecommunications infrastructure and usage.
- Telecommunications Element recommendations for General Plan Update.

Data from this project will not only be used by the county, but by other local organizations, notably the Redwood Technology Consortium (RTC), Redwood Region Economic Development Commission (RREDC), Redwood Coast Rural Action (RCRA) and the Workforce Investment Board (WIB).

This project is a natural follow-on for the two-year long SBC/Caltrans impasse over the fiber optic project. Awareness is up around the region, and most people can articulate what bandwidth means to them personally. Now that the fiber is completed, key issues are (1) how we are using the bandwidth and (2) reliability of service.

All businesses require technology and telecommunications to support their basic business processes. Increasingly, businesses are competing globally, not just locally. Numerous studies have revealed a correlation between economic health and good telecommunications infrastructure and usage.

METHODOLOGY

The RFP for the project called for utilizing focus groups, surveys and other forms of research. The approach to the project was to do online research, phone knowledgeable people in other regions, hold focus groups throughout the County, do a mail-out survey, and talk to or meet with telecommunications vendors.

The methodology was developed by the Computer Systems Policy Project (www.cspp.org). The CSPP assessment tool was 1990's-vintage and was in need of updating. CENIC (www.cenic.org) updated the CSPP assessment tool this year, and the result was the CENIC tool, called *On the Road to a Gigabit Broadband: Are we there yet? A Self-Assessment Guide for Communities*. This guide provided a road map for this project.

Focus groups were held in Garberville, Arcata, Eureka, Fortuna, and Willow Creek. Businesses (base clusters and supporting businesses), residents, educators, health care providers, government agencies and non-profit organizations in all regions of the county participated in focus groups during September and October 2004. These focus groups raised awareness about where we are in terms of technology usage and infrastructure and will direct where we want to go. Each session had a "personality" of its own, as might be expected from cultural and telephone company service differences.

PREVIOUS HUMBOLDT COUNTY TELECOMMUNICATIONS ASSESSMENTS

A telecommunications assessment is a snapshot in time on the journey to connecting Humboldt County. Resource documents are available to compare how far we've come.

Under the Rural E-Commerce grant administered by the North Coast Small Business Resource Center, a less detailed telecommunications assessment was done of the county in 2002. The report can be found on the RTC web site at:

http://redwoodtech.org/HotTopics/documents/49_northcoast_bandwidth.doc. This document gives a snapshot of the county's infrastructure prior to completion of the SBC fiber optic project and includes diagrams of sample networks and a discussion of Digital Subscriber Lines (DSL) versus cable modem services. This project did not touch on usage or applications.

The RTC Web site includes other historical and current documents of interest in <http://redwoodtech.org/HotTopics/> under the topics *Living in a Networked World* and *North Coast Fiber Optic Project*.

The Corporation for Network Initiatives in California (CENIC) also commissioned a study by Science Applications International Corporation (SAIC) in 2003, <http://www.cenic.org/pubs/reports/nwcticstudy.pdf>. This is a very detailed report which gives an assessment of Humboldt and Del Norte infrastructure and alternatives to bring new bandwidth to the region.

HUMBOLDT COUNTY DEMOGRAPHICS

Humboldt County, located in Northwestern California, is the southern gateway to the Pacific Northwest. The county is bounded on the north by Del Norte County, on the east by Siskiyou and Trinity counties, on the south by Mendocino County, and on the west by the Pacific Ocean. The largest city is Eureka, with a population of about 30,000. The nearest larger cities are Redding, 150 miles to the east, and Santa Rosa, 200 miles to the south.

According to the US Census Bureau, Humboldt County's 2003 estimated population is 127,915, living in 56,916 households. The population is 84.7% white, 6.5% Hispanic (and growing), 5.7% Native American and 3.1% other. The population is expected to grow by 6.9% by 2010.

Almost half of the population (47%) lives in the Humboldt Bay region (McKinleyville-Arcata-Eureka-Fortuna corridor). The rest live in small towns and rural settings. With 3,572 square miles, 80% of which is forest lands, protected redwoods and recreation areas, the population density is 35 per square mile, well below the State of California definition of 300 people per square mile for rural counties.

The terrain is rugged, with river canyons and mountains, making both wireline and wireless telecommunications a challenge.



FOCUS GROUP PROCESS

There were five telecommunications focus groups held in the following locations:

Garberville – 9/16/04

Arcata – 9/29/04

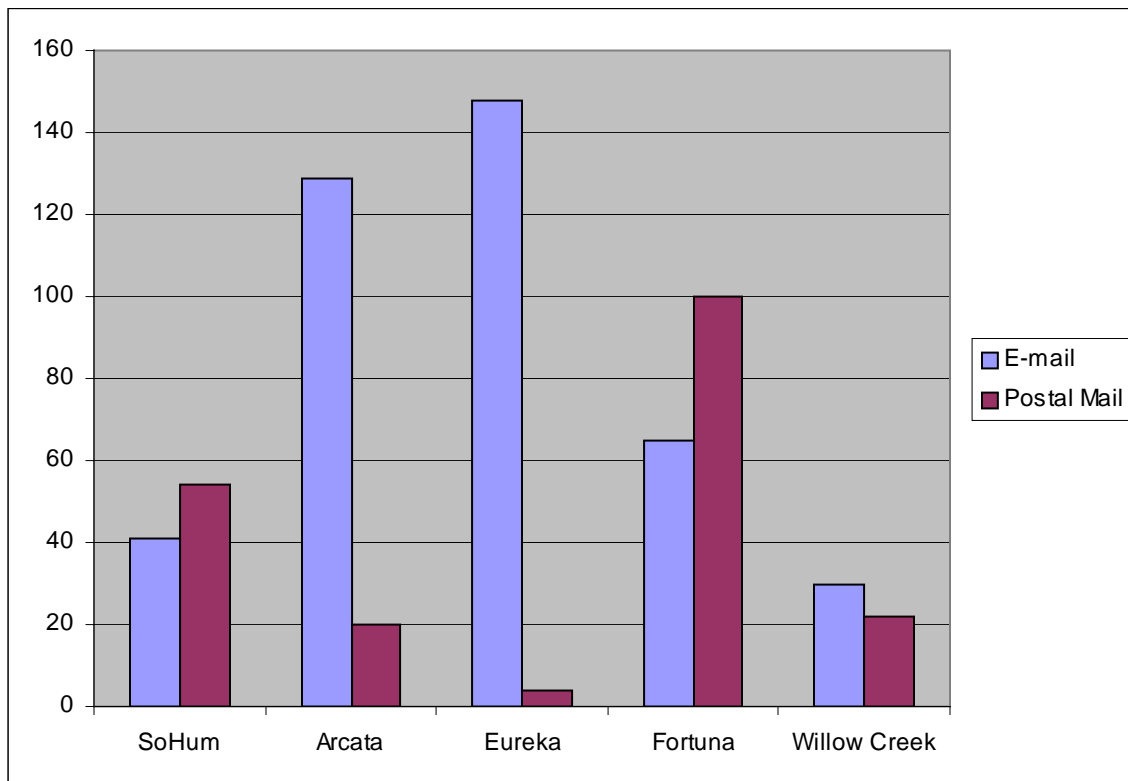
Eureka – 10/7/04

Fortuna – 10/14/04

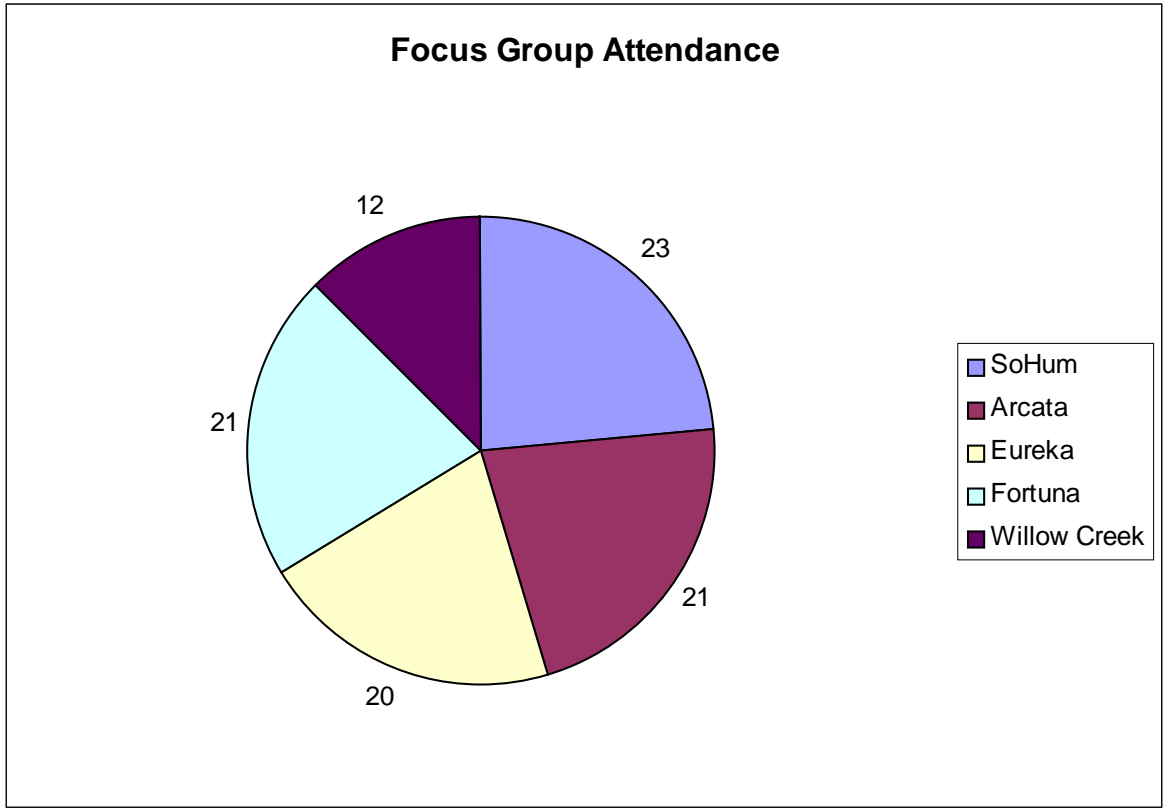
Willow Creek – 10/26/04

The focus group team consisted of Tina Nerat, Mike Nerat, Rhonda Wiedenbeck, and Nancy Reichard. The sessions were about 2.5 hours long. Each session had a personality of its own since community culture and telecommunications service offerings vary widely around the county.

Before any of the focus group sessions were held, there was an unexpected “test” of how connected the county businesses, organizations, and residents were. The expectation was that most invitations could be e-mailed after identifying potential attendees. The reality was that outside the Eureka/Arcata area, folks use e-mail much less and rely on the telephone and postal mail. Acquiring e-mail addresses was more of a challenge than getting a postal mailing address (which was also a challenge). This made for a very time-consuming invitation and RSVP process.

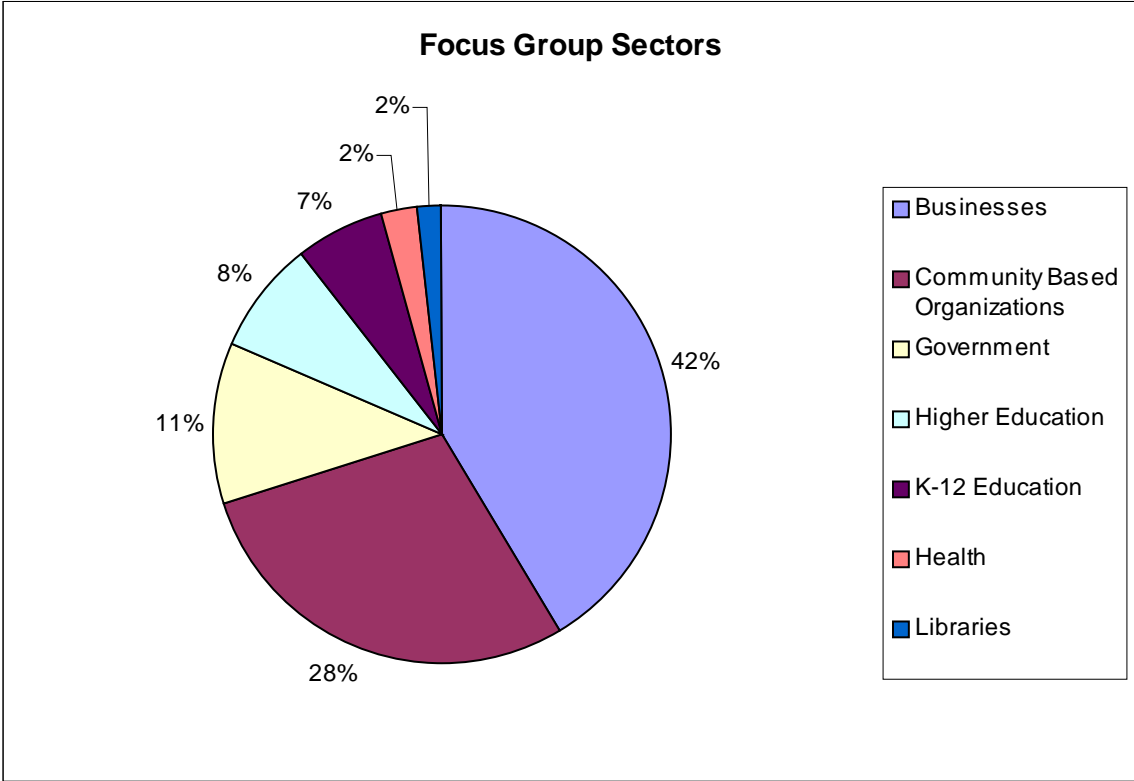


Attendance was very good in Garberville, Fortuna, and Willow Creek. Eureka and Arcata attendance was a bit lower given their populations, probably because a variety of high-speed telecom services are readily available, which may tend to give residents a sense of complacency. Rio Dell and Ferndale had a large attendance for their sizes. Two of the local telecommunications companies, Frontier and SBC, are to be commended for attending.

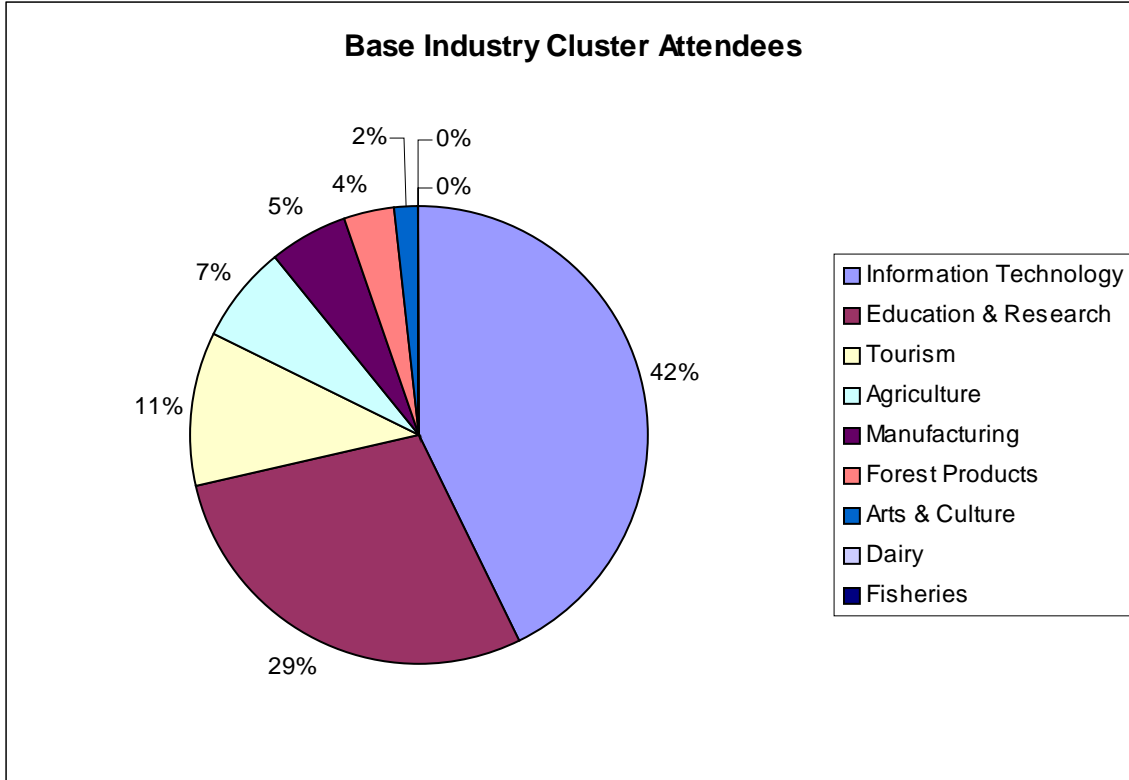


Lists of attendees are included in the Appendices. Those who attended were very happy they did. The attendees outside the Eureka-Arcata corridor appreciated that the team came to their communities to discuss telecommunications.

The attendees represented several sectors at the sessions. Based on the responses to the interactive exercises, sector representation was as follows:



The graph below groups the attendees into the county's nine base industry clusters. Telecommunications is important to the future of all of them, as well as the rest of the economy in the region. Not surprisingly, the IT cluster was best-represented at the focus groups. They have the most immediate needs, followed closely by the Education & Research cluster.



There was an evaluation form which asked three questions:

1. **Was this focus group meeting worthwhile to you?** The answer was 100% yes. Three people did not fill in YES or NO, but had positive comments.
2. **Comments?** Comments were very positive. Attendees liked to hear about “what could be”, thought it was educational, met new people in their communities, and said they were glad they came. Of course, they commented that talking is easy; action is hard.
3. **What could we have done to make your experience better?** Attendees wanted: more information about rural programs elsewhere, more people attending sessions, telecom providers present (some attended, some didn't), more about what's possible, hear more examples, and hear more wireless information. Several people wanted Wi-Fi connectivity at the sessions so they could be checking out Web sites that were referenced.

In all the sessions there was active “networking” and discussion taking place since there was a wide variety of people present, not necessarily the “same old crowd” who knew each other. Even though the sessions were in the evening and ran until about 7:30, many stayed long after they were done to chat.

In retrospect, things that went very well with sessions were:

- In spite of overwhelming logistics, having five regional focus group sessions rather than one large session in Eureka was of great benefit.
- Far more valuable information was gathered than expected.
- Attendees were very glad they came and went away with good information.
- There has been increased activity in letters to editor, newspaper coverage, and RTC meeting attendance from remote areas since the focus groups took place.
- Relationships were cemented with county and RTC, especially with residents in outlying areas.

Focus Group Sessions

The agenda consisted of several components:

1. Internet access survey (at home and at work)
2. Powerpoint presentation
3. Self-assessing exercise – telecom usage and readiness to live in a networked world
4. Brainstorming on usage/goals/actions

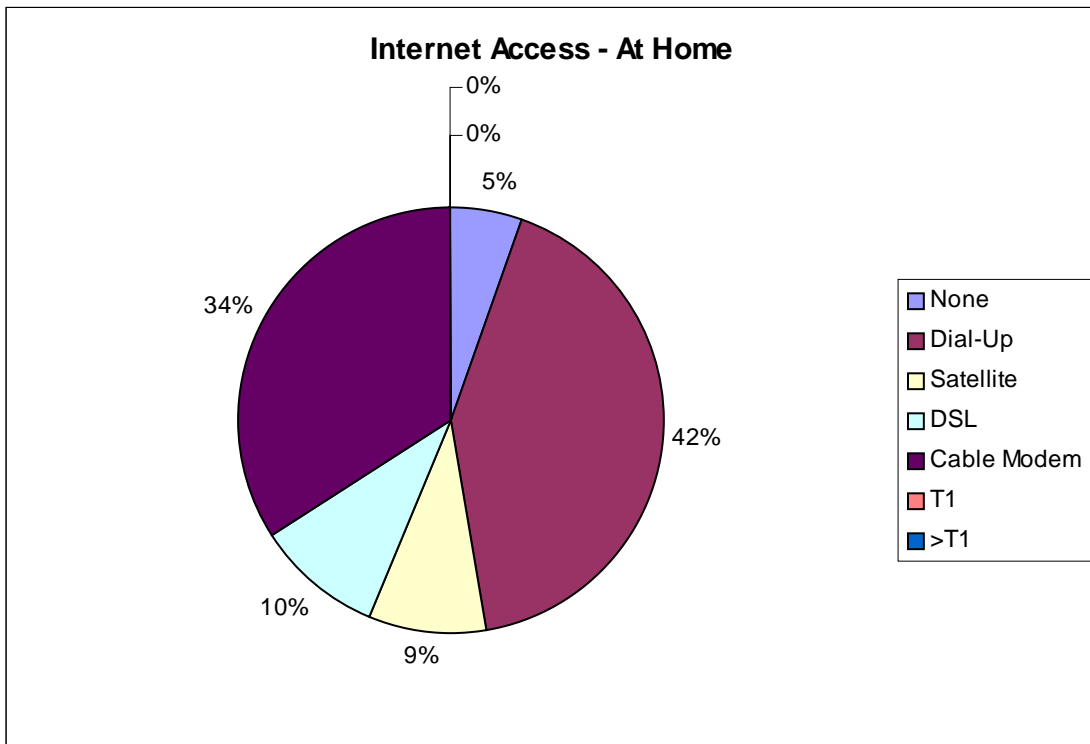
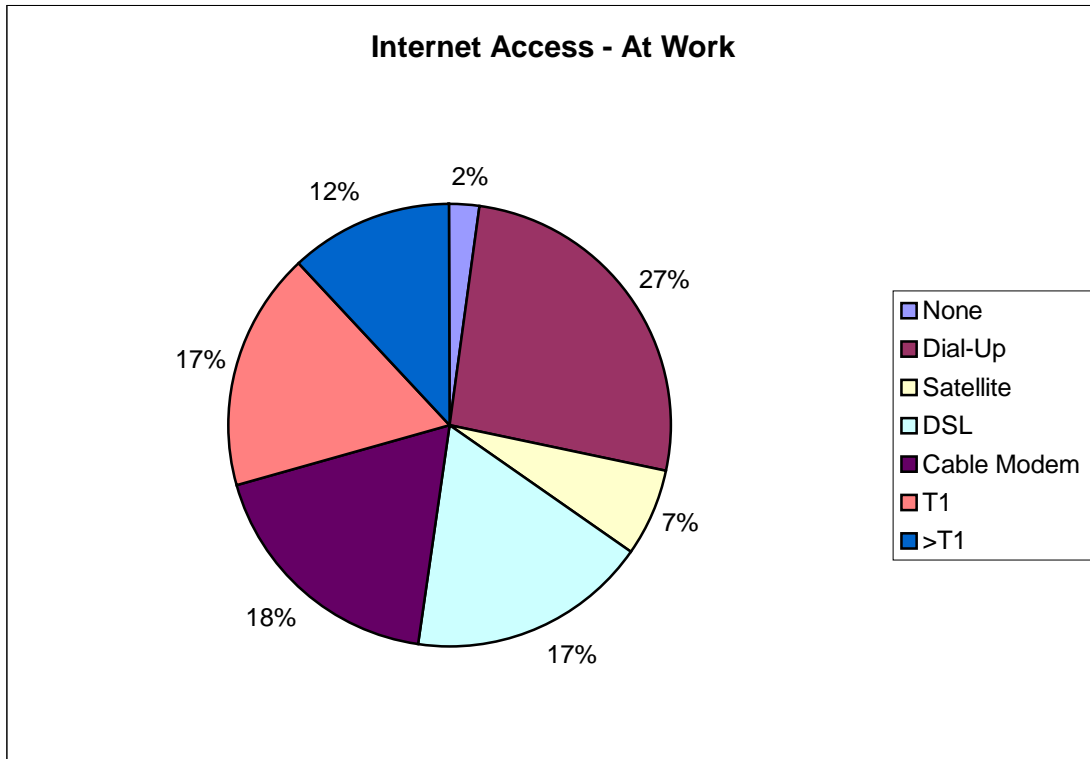
Internet Access

As attendees signed in, they were asked to put two “sticky dots” on an easel chart. The chart was designed to show in a graphical way how people got Internet access, both at work and at home. It’s unscientific, but there are conclusions one can draw from the distributions. The blank chart looked like the following before it was filled out:

Internet Access (region)	At My Business/Org	At My Home
None		
Dial-up		
Satellite		
DSL		
Cable Modem		
T1		
> T1		

See the following regional sections for their individual Internet access charts, where variations in service availability become more obvious. When these charts are placed next to the attendees’ self-evaluations of how they’re using telecommunications, there are definite correlations.

When combining all the sessions, Internet access at work and home looked like the following:



Presentation

The presentation is on the RTC web site at:

http://redwoodtech.org/HotTopics/documents/87_assess_web.ppt. Some of the presentation materials are in the Appendices. The presentation covered:

- Facts about our region
- Economic value of broadband
- Broadband in other regions and other nations
- Competing in a global economy
- The bar is raising and we are not keeping up
- Broadband terminology and education (types/speeds)
- Wireless information
- CENIC's Gigabit or Bust Initiative

Self-Assessment – Readiness for Living in a Networked World

This was another “sticky dot” exercise. Attendees were asked to rate their “sector” on how well it is connected, that is, its readiness to live in a networked world.

Levels of regional connectedness are defined as *stages*:

0. Not connected
1. Services are hard to get or expensive; limited use
2. High speed services are more available; limited Web sites
3. General access to high speed services; Web sites support transactions
4. Universal access to high speed services; Internet has changed the way all organizations operate and is fully integrated into everyday life

Each attendee had a worksheet for his/her sector(s) which gave examples of what an organization at each *stage* might be doing. The worksheets were modified from CENIC's Guide (<http://www.cenic.org/guide/pdfs/guide.pdf>) to fit our rural environment. The Humboldt County worksheets are in the Appendices or on the RTC web site at: http://redwoodtech.org/HotTopics/documents/86_assess_091404.ppt.

The following seven areas were defined as sectors:

- Businesses
- K-12 Education
- Health
- Libraries
- Higher Education
- Community Based Organizations (CBOs)
- Government

All worksheets covered three areas:

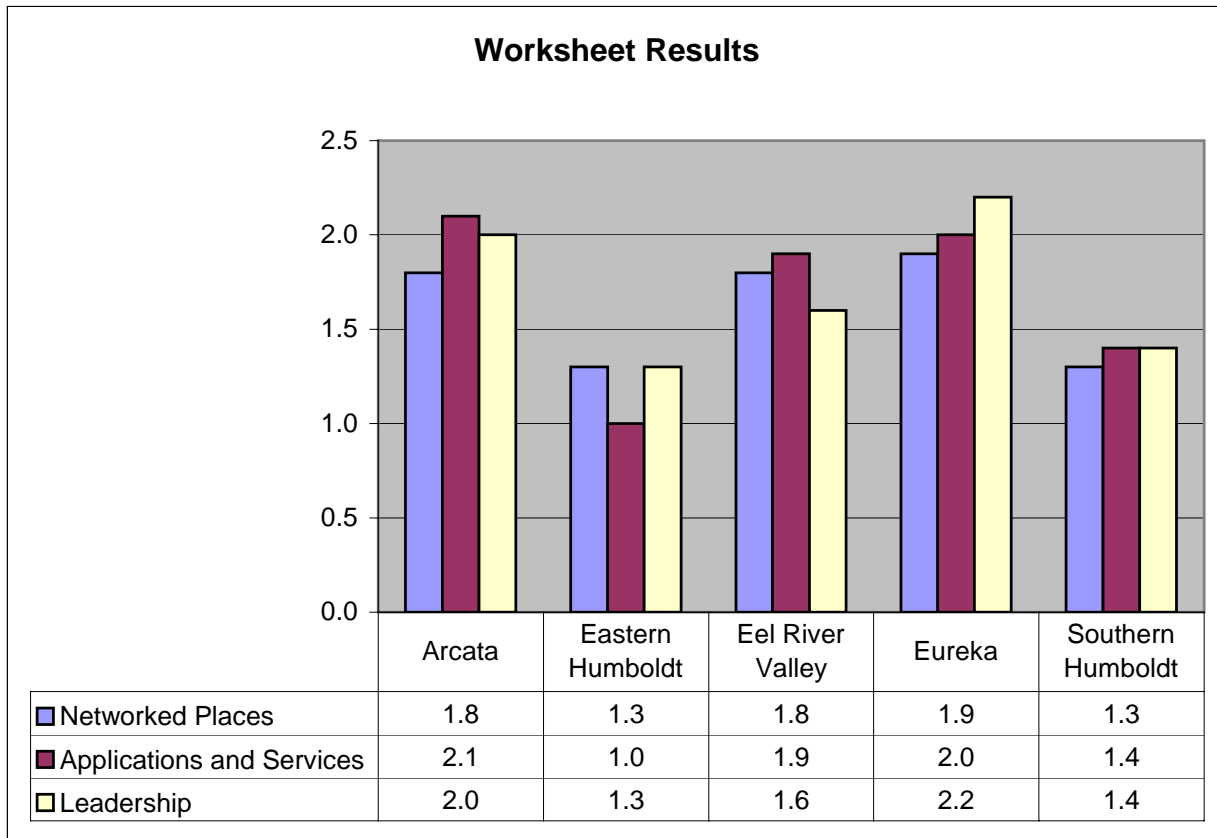
1. Networked Places
2. Applications and Services
3. Leadership

Because most residents of rural areas are involved in many organizations, it would not be unusual for an attendee to fill out several forms. For instance, an attendee might own a business, be on the school board, and be on the board of a non-profit, thus filling out three worksheets. Attendees rated their business/organization in terms of how connected it was.

The “sticky dot” chart on big paper on an easel looked like this before being filled out:

Stage	Networked Places	Applications & Services	Leadership
0			
1			
2			
3			
4			

The following chart shows how each region rated itself. There is a very definite correlation between level of connectedness and their telecommunications company and its available services. For instance, Eastern and Southern Humboldt are in Verizon territory, and the only broadband availability in those regions is in Garberville, Redway and Benbow in a limited area covered by Starstream Communications. Eastern Humboldt has no broadband available other than T1 services.



Brainstorming

The brainstorming covered three areas:

1. Usage, specifically what attendees CAN'T DO because of telecom issues
2. Goals out 1-2 years
3. Actions to work toward goals

Details of brainstorming are included in individual focus group commentary. This is a high-level summary.

Usage. Usage is what drives broadband demand. The purpose of focusing on the CAN'T DO aspect is to get people thinking about what they want to do but can't, not focusing on LACK OF infrastructure (for instance, DSL or Cable Modem services). There was a lot of commonality. Overall, the following were repeatedly cited (differences by region will be noted in following sections of this report):

- Transfer large files
- Download patches/applications updates
- Videoconferencing
- Video streaming
- Distance learning
- Streaming audio/simulcast
- Research
- Applications don't work with dial-up
- Telemedicine
- Real-time interactions
- VPN
- Local hosting
- Public records searches
- VoIP
- GSM phones
- Cell coverage is not acceptable
- Web sites built for broadband

Goals. Goals had some commonality, but tended to vary by region (see section on individual regions). The following is a top-level summary:

- *Planning by Cities, County, Businesses/Organizations.* This ran the gamut from policies to business tech plans to detailed plans of what a jurisdiction will do when they are digging up right-of-ways.
- *Access and Coverage.* Attendees wanted broadband for all residents, with a choice of providers. Mobility was requested as well, so that broadband service was available everywhere, not just in fixed locations such as one's office or home. Libraries are severely limiting open hours, and this is the only means of Internet access to a segment of our population.
- *Affordability.* Discussion here was on competition, which tends to bring rates down, and on a "lifeline" broadband rate for low-income residents.
- *Reliability.* This means different things to each region. To SBC customers in central Humboldt, it means redundancy to the fiber optic line. To Verizon customers, it

means being able to make a phone call without crosstalk and to know that 911 calls will respond to the correct address. See individual regions for more detail.

- *Applications.* Residents want e-government and the ability to do business online.
- *Education and Awareness.* This ran the gamut from making elected officials telecom-aware to increasing public awareness, helping businesses one-on-one to use technology more effectively, training end users and training technology service personnel.

Actions. Summary of actions brainstormed is as follows:

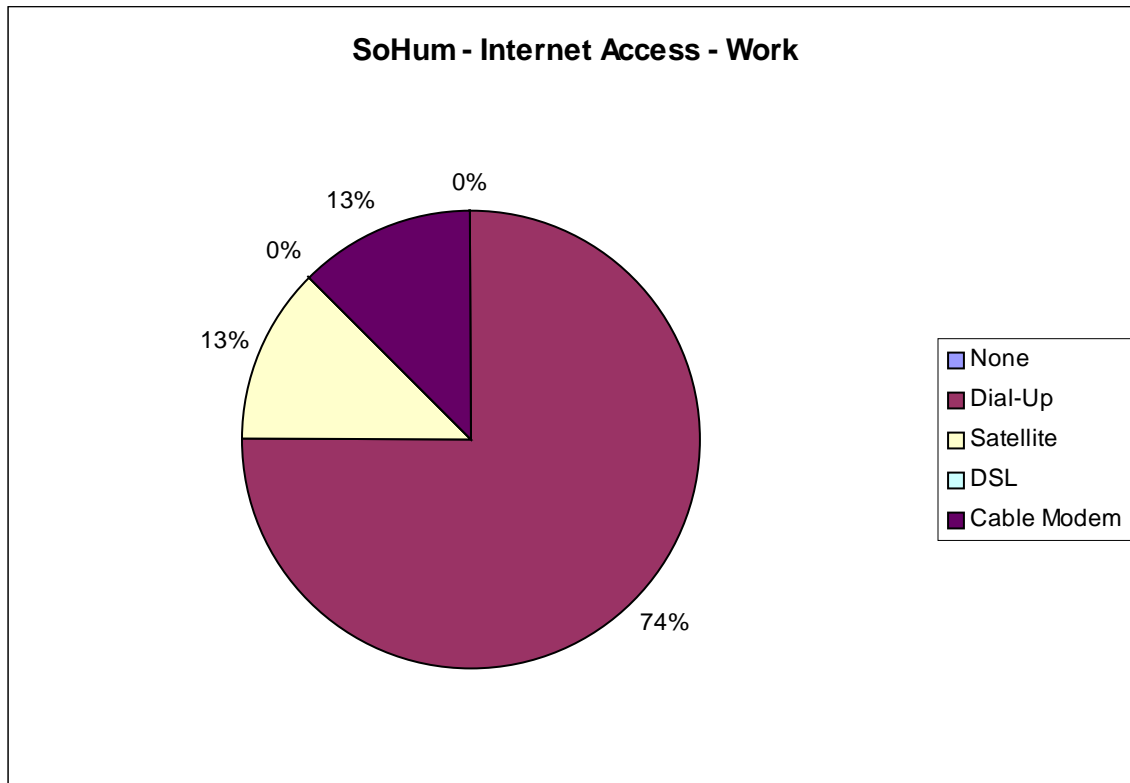
- *Fiber optic redundancy.* This is of high priority for most people. Advocacy has begun. It's a tough business case for SBC in a remote, rural area. From the residents' perspective, an SBC competitor putting in a fiber optic line would be optimal.
- *Funding.* Means of funding need to be explored. The most often mentioned are grants and investigating the idea of telecommunications service districts.
- *Advocacy.* This was heard loud and clear. Residents and local elected officials need to be doing telecommunications advocacy at all levels, including CPUC, FCC, state and federal elected officials.
- *Feasibility studies and prototype projects.* Much discussion was around BPL, wireless, and mesh. Several people wanted the "do nothing" option documented to see what that means to our region.
- *Strengthen RTC.* This was mentioned by non-RTC members. They see RTC as a force to take the region forward in telecom and technology.
- *Vendor relationships.* Those who lived in Verizon territory want Verizon to come to the table and talk. They maintain Verizon is not providing services they should be, and that CPUC complaints may be in order.
- *Planning/collaborations.* All sorts of collaborations were discussed - County, Cities, Tribes, RTC, etc. People want active planning for infrastructure.
- *Support alternative networks* (Last Mile Digital, CENIC).
- *Education.* This covered elected officials, the public, tech support people, end users, and businesses.

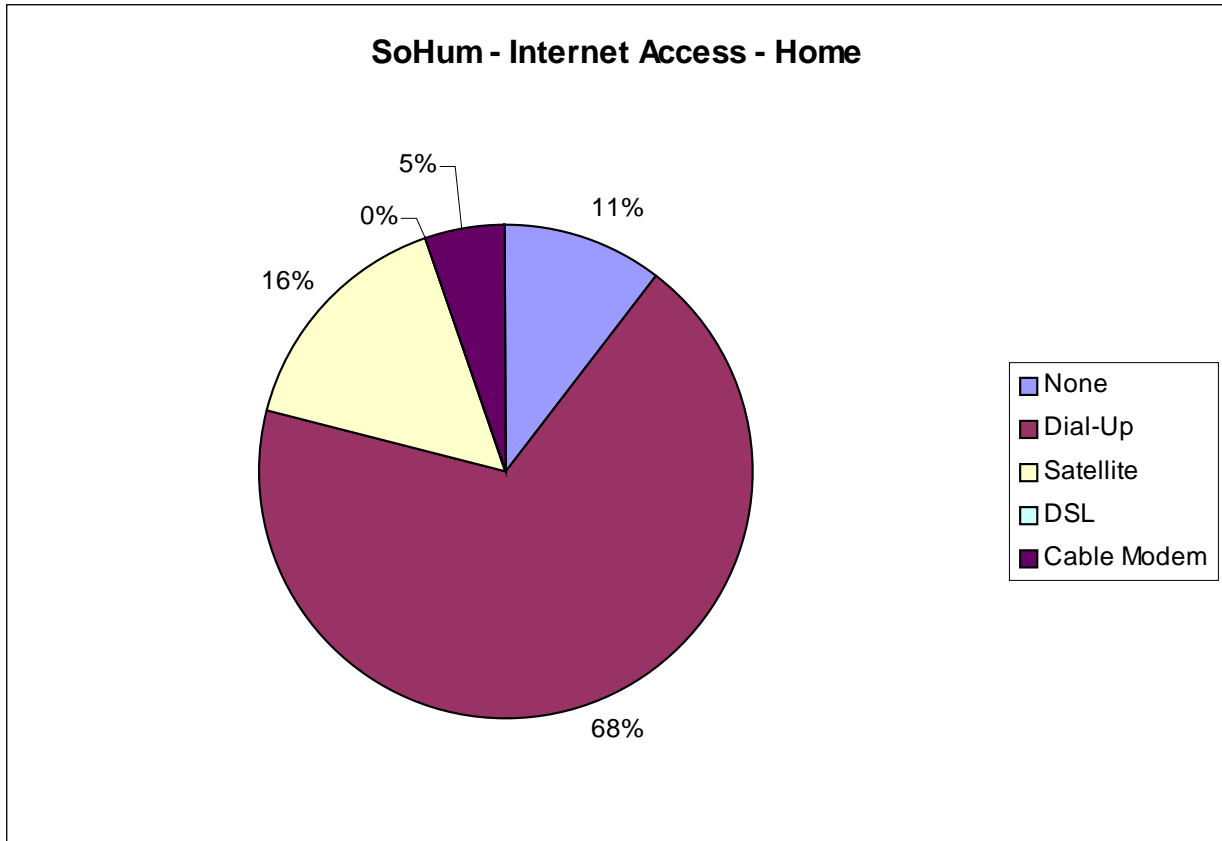
All of the groups wanted more active planning in all parts of the county, with regional initiatives to get us better connected. If left to vendors, it won't happen.

Focus Group - Southern Humboldt

As one can see from charts below, dial-up is the prevailing method of Internet access, due to lack of options in most areas of Southern Humboldt. Dial-up severely limits how effectively residents and businesses can use the Internet.

Attendees' main issues were lack of broadband coverage and Verizon California as the phone company in the region. The attendees want to investigate the feasibility of establishing a telecommunications service district and a project to work with emergency responders to build a wireless mesh network between Garberville and Shelter Cove. They also support Andy Johannesen's project to bring alternative wholesale bandwidth to the region.





Verizon issues included high cost of T1 Internet service (“special deals” cited at \$1400 to \$2000/month for normal business T1 Internet access) and lack of basic services, such as caller ID and voice mail.

Starstream Communications provides cable TV and cable modem services in Garberville, Redway, and Benbow. However, they are also hampered by high Verizon T1 costs to backhaul their traffic to the Internet.

Detailed notes from Southern Humboldt’s focus group session are as follows:

Can’t do

- Hours to download software updates, often times out before completion
- Sending/receiving photos
- Sending/receiving large files
- VoIP
- Digital streaming to remote classrooms
- Many home-schooled kids without adequate bandwidth
- Real Estate appraisals e-mailed
- E-filing tax returns
- Remote technical assistance
- Patch downloads (too long, expensive for client)

- County/public records searches
- GIS map data
- Internet research
- Web site content these days is built for broadband
- ISDN not available for videoconferencing and telemedicine
- Distance learning

Goals 1-2 years

- Someone buy Verizon and improve services
- Need Adult Ed here
- Encourage and nurture local expertise and talent for tech support
- Public hub/access to computers
- Telecom services district
- County influence via CPUC to get services
- State reps advocate for telecom
- Tech training to businesses
- CR – tech training in SoHum
- Community mesh network (Garberville=>Redway=>Briceland=>Shelter Cove)
- Work with CR for distance learning
- Wireless health issues education
- Public fiber from Garberville/Redway to outside world

Actions

- Challenge Verizon with equal access issues
- Railroad right of way
- Andy's project
- CSD (Community Services District) buy Andy's bandwidth
- Feasibility of fiber to Shelter Cove
- Local provider for DSL – are Verizon facilities adequate?
- Feasibility of mesh network
- County policy – swaps for infrastructure
- County to encourage broadband development as part of economic development
- School district take on Adult Ed
- CPUC complaint about Verizon
- Local committee/steering group
- County meet community needs

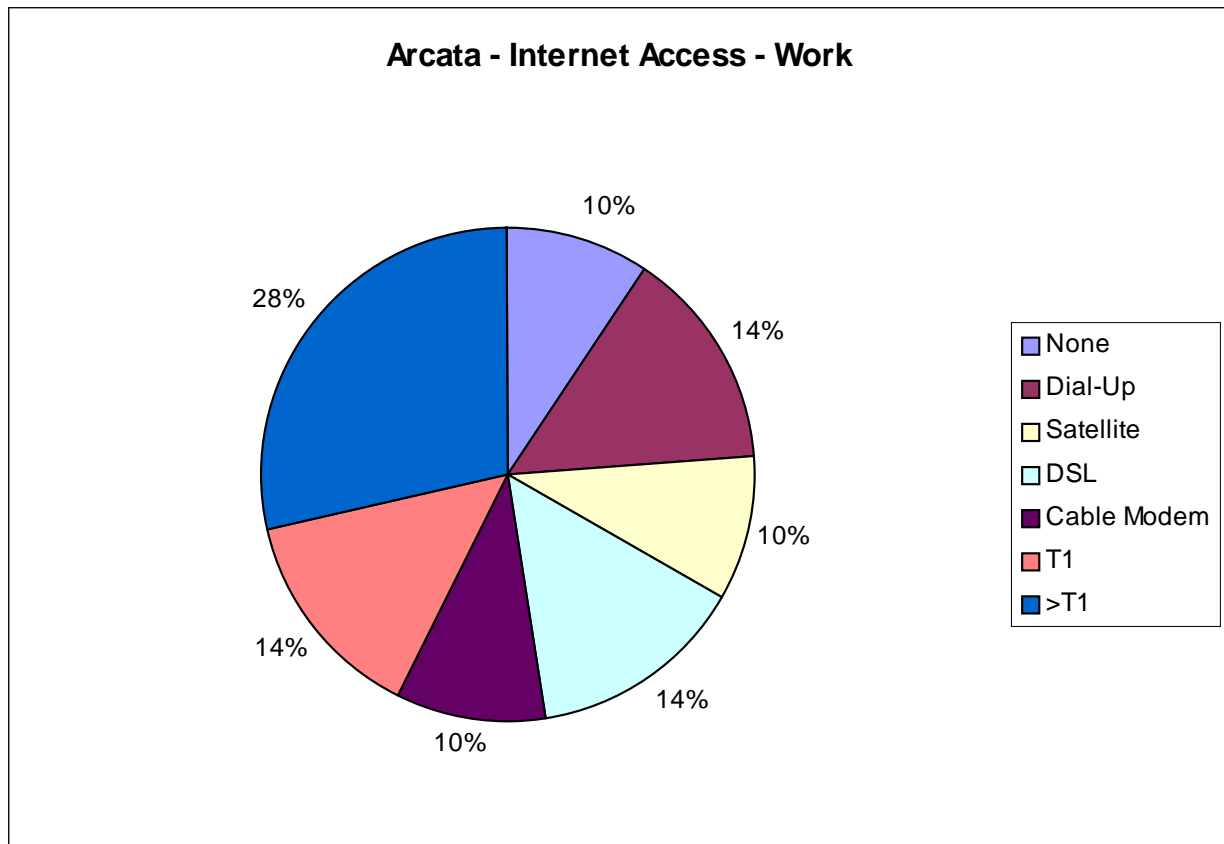
Focus Group – Arcata

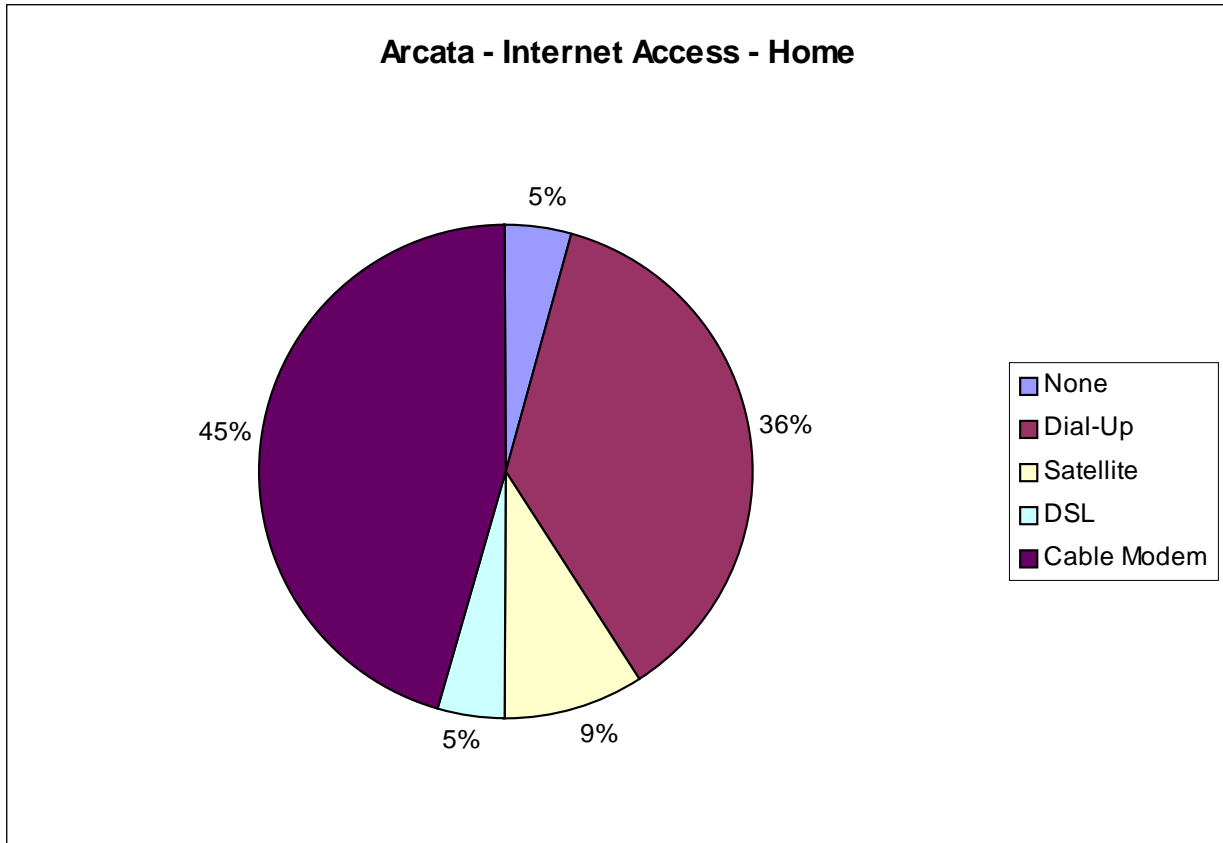
As one can see from the charts below, Arcata is very well connected compared to other areas of Humboldt County. SBC is the phone company and provides DSL in Arcata. HSU is very well-connected with OC3 Internet access. Cox Communications provides cable modem services in a wide area in Arcata.

Because Arcata is well-connected, there may be a sense of complacency now that the fiber optic path is completed. Increasingly, companies are finding that DSL and cable modem services are not adequate for what they want to do with videoconferencing and VoIP. However, a big issue is SBC fiber redundancy.

There were also attendees at the Arcata session who raised issues about e-waste and assessing the “do nothing” option because they did not believe we needed more capability in terms of technology and telecommunications.

No one from Orick attended, but they live in Verizon Northwest territory. They only have one Internet dial-up provider, Carroll’s Web, that is a local call. All others are long distance. There are no broadband options in Orick. The cable TV provider is Almega Cable





Detailed notes from Arcata’s focus group session are as follows:

Can’t do

- Uploading larger files
- Desktop teleconferencing for telecommuters
- Point to point and point to multipoint videoconferencing
- Can’t serve folks in rural areas (tribes, etc)
- Can’t choose providers
- Large file transfer (>4-5mb restriction by ISP)
- Statewide videoconferencing by HSU/HCOE/CR
- VPN
- Telemedicine
- Mobile Medical Office needs wireless broadband for Electronic Medical Records.
- Local hosting of national services
- Video on demand
- Law enforcement using mobile broadband
- Reliably offer simulated live training for teachers
- Updating Web sites (on dial-up)
- Easily capture and make available digital, interactive teaching content to students across the county.
- There is nothing we need or want to do but can’t due to telecom limitations.

- My limits are due more to lack of knowledge and communications between various players rather than to lack of equipment, access, or speed.
- RIM Blackberry doesn't have service in this area – bad for business.
- My national business is limited by lack of broadband capacity and geographic availability. Need more broadband in more areas.

Goals 1-2 years

- Wireless broadband everywhere
- Cable modem, DSL more widely available
- No digital divide in county
- Interconnect to neighboring cable companies (Charter in Crescent City, Mendocino)
- Cable providers pay for neighboring connectivity
- GSM cellular
- County and cities incentivize providers
- Develop a policy on hardware disposal (e-waste issues)
- Unified infrastructure plan (County and cities)
- Awareness/education – get the word out about wireless
- Investigate BPL (Broadband over power lines)
- More and different cellular vendors
- Cost benefit analysis on any proposed projects – who benefits and what's cost of “do nothing” option
- Work together with surrounding counties, especially on vendor relationships
- Ubiquitous access to libraries
- Libraries open more for access to computers for “have nots”
- Point of presence for other phone companies
- Health monitoring applications
- Higher ed “lectures on demand”
- Expanded linkage between education and other agencies
- Library as “hot spot”
- Telecom services should not slow down tech biz startups in region
- Anything to attract new, living wage jobs to Humboldt County
- Develop public infrastructure funding through grants or other sources
- Redundancy
- Expand options for connectedness – entice more providers
- Increase high speed connectivity linkages and online communities between agencies and institutions
- Determine whether to proceed based on scrupulous examination of cost vs benefits. What are potential impacts? Make sober decisions regarding accepting new technologies only after costs/benefits/impacts have been thoroughly examined
- Strive for a plateau in terms of hardware and software (at least for personal user) so that hardware doesn't have to be constantly upgraded. The goal should be for technology to be as accessible and affordable as possible
- Reducing the e-waste stream

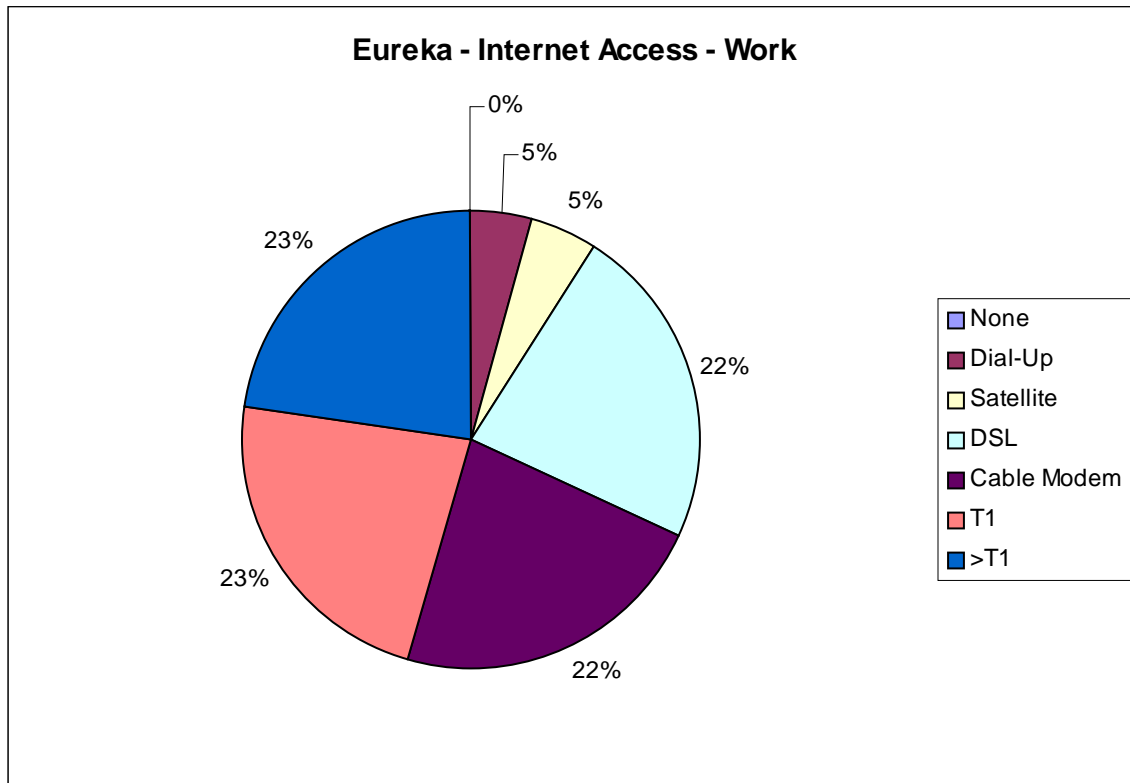
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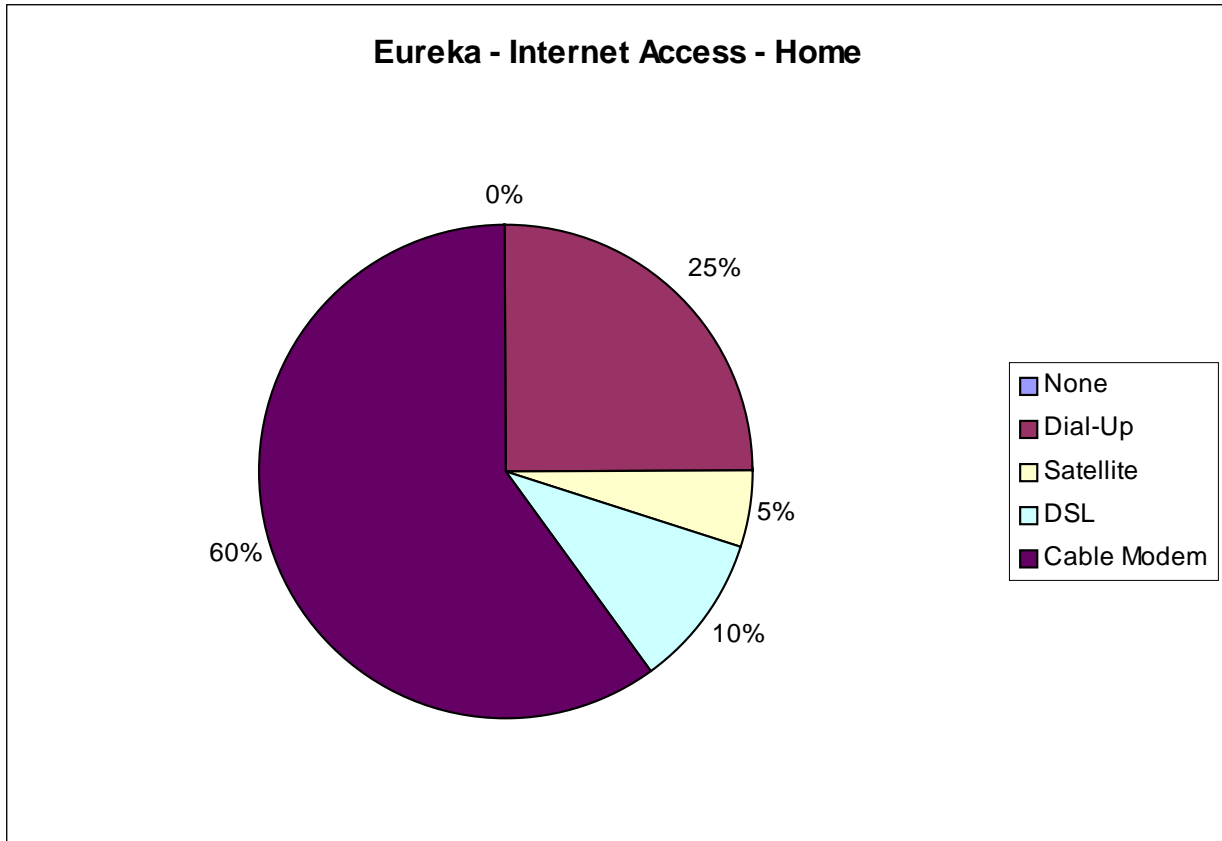
- Monitor Cox refranchise process to maximize results
- Study other communities
- Make sure County Board Of Supervisors sees output from these sessions
- Regional/rural consortium at the state level
- Treat telecom as public utility
- Network with Del Norte and Mendocino – find groups with common issues
- Talk to Carlson Wireless
- Explore grants for wireless
- Countywide IT plan – talk to BOS
- State government advocacy
- Communicate with manufacturers about e-waste
- Establish/expand online community to continue these discussions
- Legal representation regarding IT/telecom goals/issues
- Bring diversity to the table
- Strengthen RTC
- Improve tech support and education of the end user
- Take into account the problematic environmental and human impacts

Focus Group – Eureka

As one can see from the charts below, Eureka is very well connected compared to other areas of Humboldt County. SBC is the phone company and provides DSL in Eureka. CR is well-connected with access to the CENIC statewide network. Cox Communications provides cable modem services in a wide area in Eureka.

Because Eureka is well-connected, as in Arcata, there may be a sense of complacency now that the fiber optic path is completed. However, a big issue is SBC fiber redundancy. Increasingly, companies are finding that DSL and cable modem services are not adequate for what they want to do with videoconferencing and VoIP.





Detailed notes from Eureka’s focus group session are as follows:

Can’t do

- Roaming IP (able to use a mobile network device)
- Takes too long for research
- Cost precludes WAN
- Cost for parents to be involved in kids’ education
- Digital divide – cost of classroom connectivity countywide precludes usage
- Sites connected through fiber for broadcasting
- Can’t connect to California Public TV
- Cell phone coverage isn’t adequate
- Access isn’t equal among schools
- Streaming video
- Many small businesses don’t know how to use what they have – lack of tech assistance
- Can’t share big files – not enough upstream bandwidth
- Transmitting public meetings throughout the entire county
- Audio simulcasts
- Transmitting county public meetings outside Cox franchise area
- Streaming audio
- Webcasting

- Inadequate CR remote connectivity to Del Norte and Mendocino for multimedia, digital media
- Student (CR) wireless network too expensive without DSL
- DSL reliability issues in downtown Eureka

Goals 1-2 years

- Wireless/mobile access everywhere
- Broadband everywhere
- Don't want to choose technologies – talk about what you want to do
- All county and city agencies do business online – paying bills, licensing (e-government)
- Affordable training in technology
- Well-trained incumbent workforce
- Onsite training for businesses
- Bring down business costs of broadband
- Redundancy (fiber)
- Competition
- Universal access to broadband for everyone (affordability)
- Tower siting component in plan (signal replication)
- Lifeline rate for broadband
- Redundant fiber
- E-government
- Keep libraries open more or alternatives for access
- Lower basic broadband costs
- Local TV via satellite
- BPL

Actions

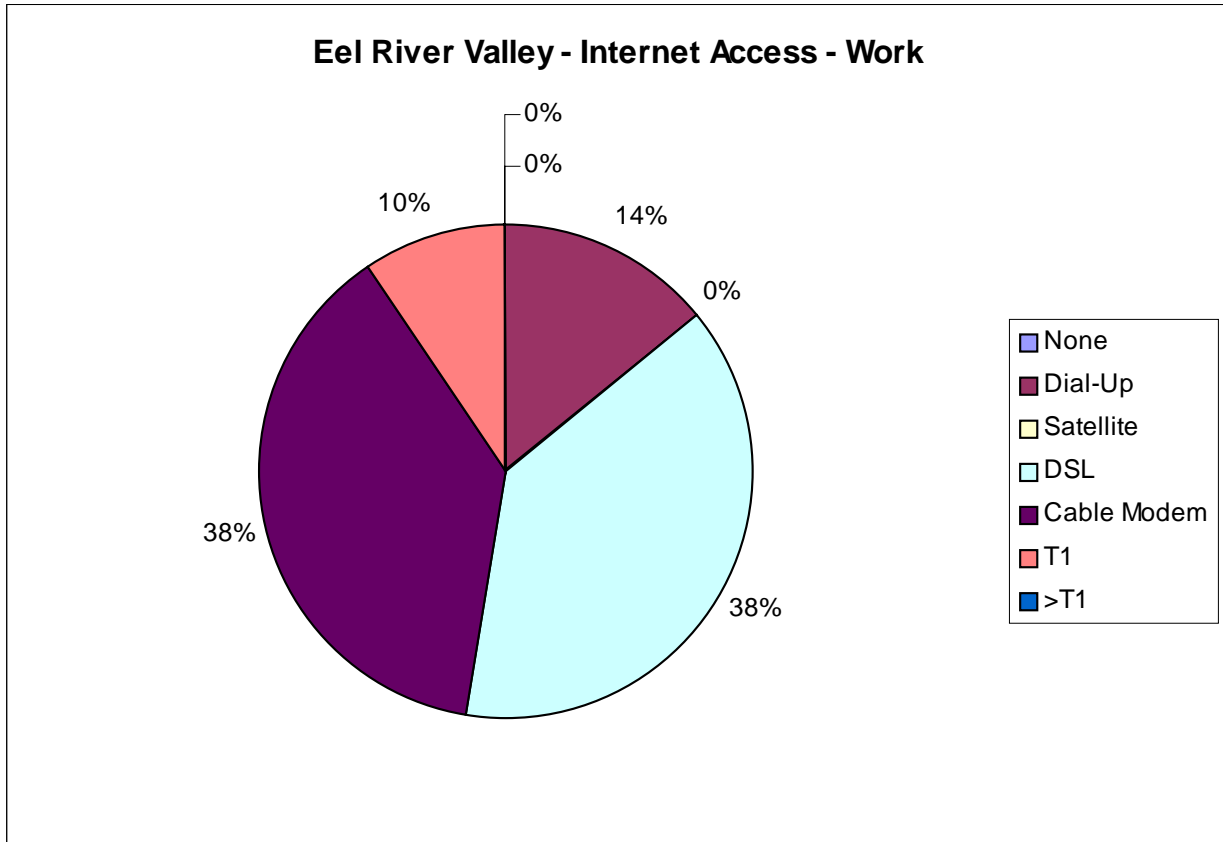
- Keep issues in front of elected officials
- Employer training panel (ETP) – tap this source of funds
- Make phone companies work together
- Support unsponsored community radio/TV
- Keep having forums like this
- County right-of-way (ROW) for fiber
- JPA (Again, spell out)
- Investigate microwave backup to fiber – rumor that it's being disconnected
- Leveraging tribes' influence to build infrastructure
- Publicize results of these meeting
- Don't let up – keep working the issues and engage community

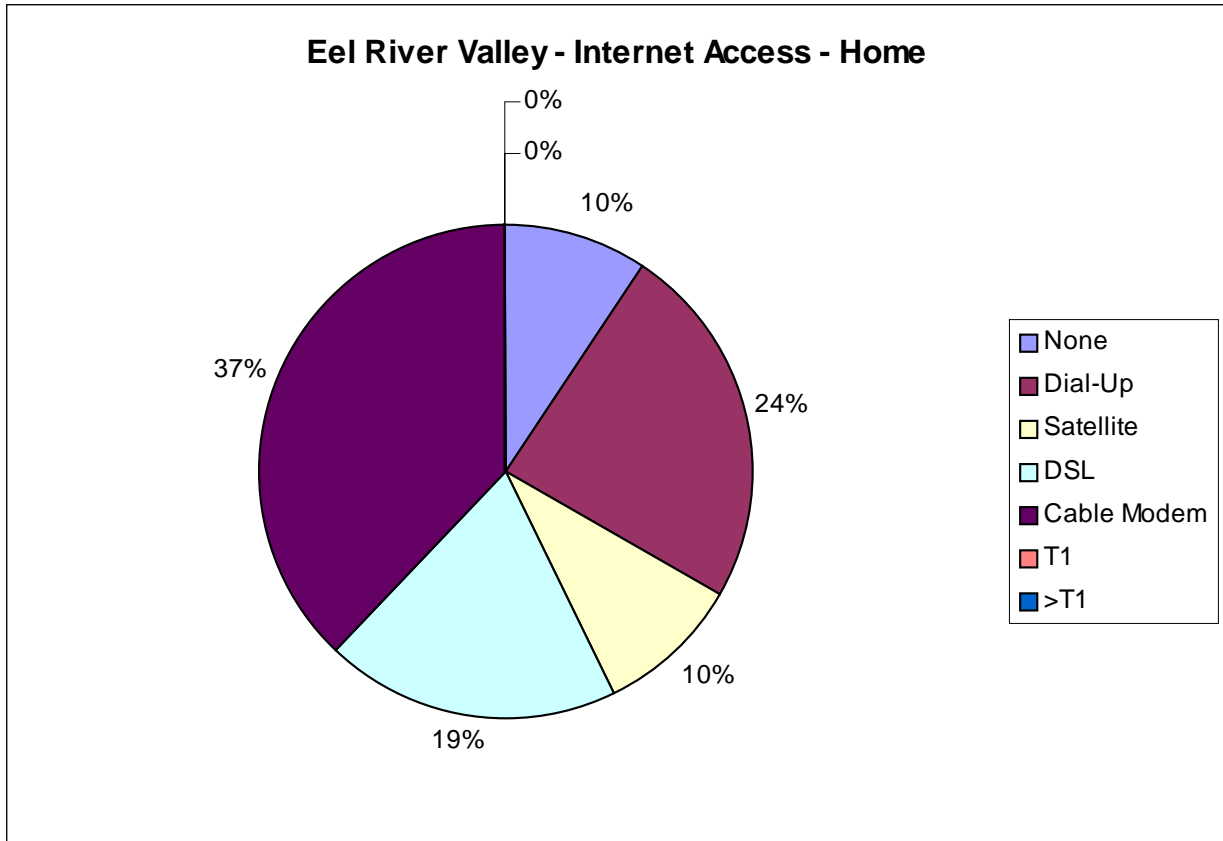
Focus Group – Eel River Valley

Represented at the focus groups were Fortuna, Rio Dell, Ferndale, and Bridgeville. Ferndale’s phone company is Frontier, and the rest are SBC. Ferndale and Rio Dell were well-represented. While Fortuna and Rio Dell have DSL access as well as Cox cable modem services, Ferndale has only one broadband option: Cox cable modem. Frontier does not provide DSL due to high cost of SBC bandwidth out of the area.

The charts below show large percentages of DSL and cable modem service, but still a number of people on dial-up services. For those in SBC territory, redundant fiber is a big issues, as it is in Eureka and Arcata. Ferndale would like to have DSL services, and Frontier heard that message loud and clear at the session and in a meeting the following day.

One unique message from other sessions was this group saying they needed to elect tech-savvy officials. If the existing officials don’t become aware, they will vote in people who are aware.





Detailed notes from Eel River Valley’s focus group session are as follows:

Can’t do

- Lack of e-mail usage
- Download large documents
- No choice of broadband vendor
- WiFi in Fortuna – commercial vendor such as T-Mobile
- GSM phones
- Cell service unreliable
- Videoconferencing
- Too costly for T1 in Ferndale
- Lack of skills to utilize
- Dial-up speed limitations with online education
- Redundant paths – lack of precludes hosting
- Applications won’t work with dial-up
- Remote access to other computers for service
- No T-Mobile access
- Real-time interactions
- Wireless with service trucks
- Large file transfers

Goals 1-2 years

- Redundancy
- Fiber to every home
- Broadband to every home
- New subdivisions wired/conduit
- Education to view broadband as required utility
- Change mindset of elected officials
- Supply of tech teachers
- Education/outreach on benefits to community
- Relationships between infrastructure and economy/jobs, especially to next generation
- Remote access to other computers for service
- Tech infrastructure to attract outside companies
- Service provider choices
- Incentives for municipalities to provide connectivity as a utility
- More info to farm people about benefit of technology and telecom
- Make telecom part of county and city plans

Actions

- Elected officials broadband education
- Education of general public
- How to raise \$\$ to finance broadband/infrastructure
- Elements in city plans, not just county
- New construction: require high speed access
- Developer awareness
- Wireless coverage
- Investigate WiMAX, other wireless
- Telecom services district
- Wi-Fi more widely available
- Elect tech-savvy officials

Focus Group – Eastern Humboldt

Attendees were from Willow Creek, Hoopa, and Orleans. The Hoopa and Karuk tribes were represented. The issues are very different in Eastern Humboldt than in the rest of the county. Verizon California is the phone company, and Almega Cable is the cable TV company. Neither offer broadband services. Residents and businesses have no broadband options other than T1 service from Verizon.

The Hoopa library is open more than most library branches in the county because the Hoopa tribe provides staffing for it.

Of great concern in this area is basic phone call quality. The attendees told stories of cross-talk on phone lines (hearing multiple phone calls), call routing to wrong numbers, and basic E911 response issues. As in Southern Humboldt, residents and businesses cannot order basic phone services such as caller ID and voice mail. There is demand for those services, especially by businesses.

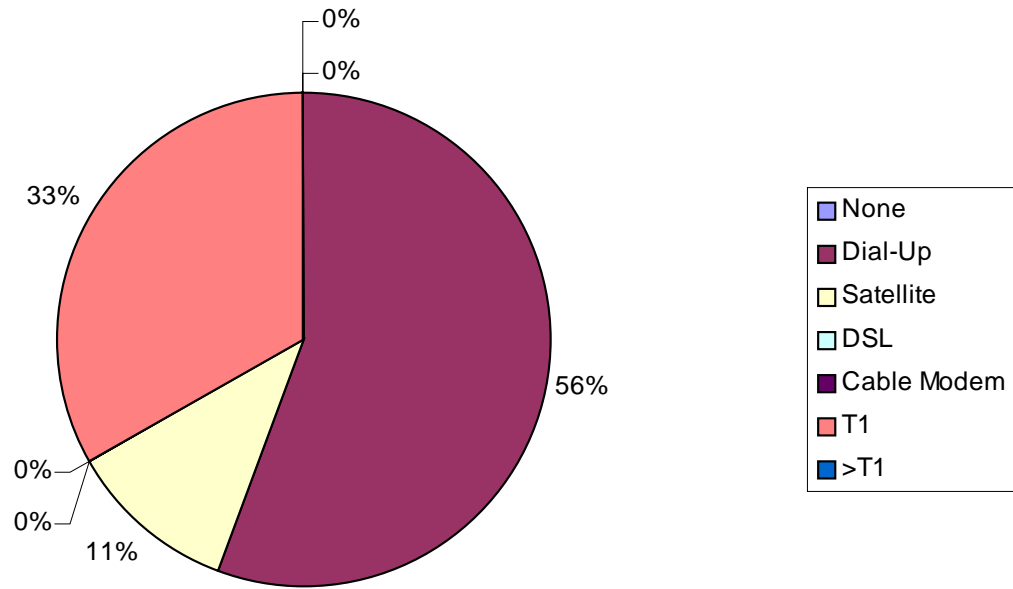
It is possible that some of the E911 issues are related to residents or houses which do not have “real” addresses in the phone company database. Not only does this cause emergency response issues but it also causes telecom service delays which translate to very high costs to rural telecom companies. The county can help in this by not issuing building permits without a valid address, and Verizon should not be installing service without a valid address.

Looking at the following charts, it’s clear that dial-up is the only option for most residents and businesses. The T1 service users here were mostly attendees from tribes, Caltrans, and U.S. Forest Service. Note that in the residential chart, some people have DSL service. These are people who live in Siskiyou County (Happy Camp or Somes Bar) and who work in Orleans.

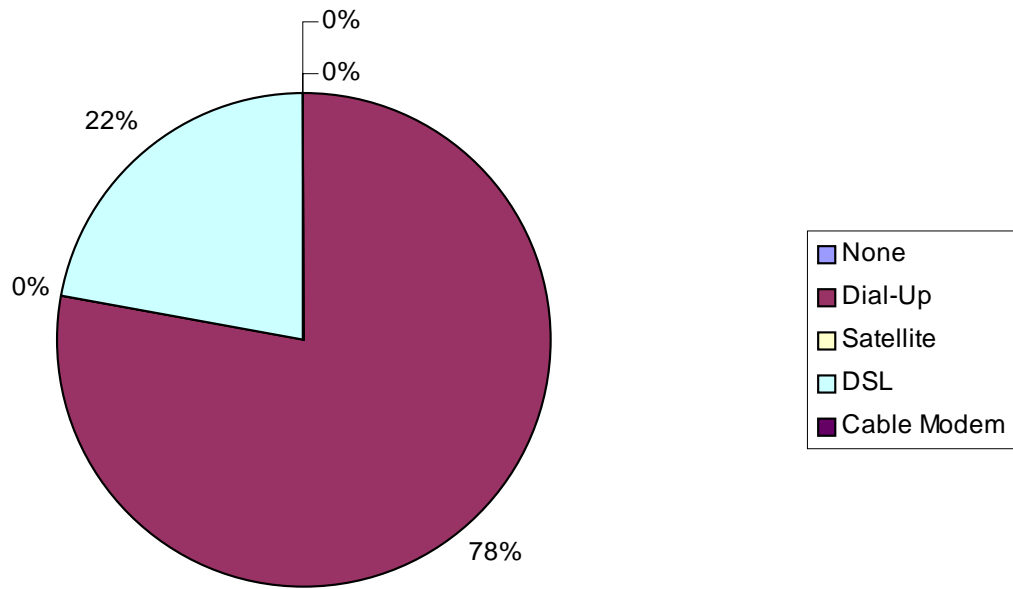
It was particularly helpful at this session that two of the attendees were the technical support staff for the Hoopa and Karuk tribes.

When looking at the following detailed sections, note that the list of “can’t do’s” is longer than any other region, and this came from a smaller group of people. It is a sign of poor connectivity.

Eastern Humboldt - Internet Access - Work



Eastern Humboldt - Internet Access - Home



Detailed notes from the Eastern Humboldt focus group session are as follows:

Can't do

- Participate remotely in county government
- Audio simulcast (ISDN required by KMUD and KIDE)
- Orleans audio service
- Videoconferencing (USFS, Caltrans)
- Stability/reliability for apps, e-mail
- CENIC guide took 32 minutes to download
- Lost opportunity due to slowness
- Grant applications online
- Updates/patches to apps/OS
- Electronic medical records
- Telemedicine
- Distance learning (teachers or students)
- E-mailing communications with the state are too slow
- California Department of Education (CDE) forms are online, takes too long to download
- Businesses responding to customers takes too long via Internet (uploading to Web site)
- Videoconferences for non-profits instead of driving hours to a meeting
- Lack of qualified tech people
- Can't host Web site and outsourcing=\$\$ due to data storage requirements
- Update Web sites
- Streaming audio
- Unreliable access
- E911 in Orleans
- Speech/resource teachers via videoconferencing
- Continuing/online education
- Build information business
- News access
- Tech support/education = not local
- Point of Sale (POS) systems unusable
- Originate radio programming
- Reliable phone calls
- Cell phone coverage is poor

Goals 1-2 years

- Improve connectivity
- Videoconferencing facility in every community
- Broadband access to every home and business
- Get Verizon to table to solve problems
- Competitive Local Exchange Carrier) CLEC
- Improve state of infrastructure
- Emergency communications infrastructure
- Access – library or other

- Business building with technology
- User skills
- Broadband awareness
- POS systems
- Gigabit speeds in libraries, open 16 hours/day
- County or CSD – PLAN – put in conduit, infrastructure when digging
- Public access to participate in community meetings
- Broadband
- Increase awareness
- Tech training on computer applications and helping small businesses
- More work between tribes and county
- New partnerships
- Better communication between county and residents
- Increase accessibility to low income populations
- Make community businesses more aware of value of tech and telecom

Actions

- Target funding (county)
- Call meeting to explore CSD (w/ local people and telecom skills, also Siskiyou and Trinity)
- Videoconferencing in communities – USFS, Caltrans, tribal offices, county able to receive
- Telecom planning to include outlying areas
- RTC advocate for outlying areas
- Means to share East County news
- Outreach – radio interview, column
- Start cooperative telecom company – contact LAFCO
- Get beyond county boundaries working among counties, not just Humboldt
- County needs to have more representation of entire county – not equal representation now – and direct conduit of \$\$ and services
- Train and educate more local IT support people
- Wake up and scream a lot – rural communities must get support from agencies
- Plan, lobby, outreach with tribes, who seem to be the IT leaders in rural areas
- Lay conduit and infrastructure

ADDITIONAL INPUT PROCESSES

Because not all were represented at the focus group sessions, additional outreach was done in the following ways:

- Hispanic input from Santiago Cruz
- Phone calls to emergency services providers (OES and CDF)
- General telecommunications survey in Chamber newsletters
- E-mail request for additional input on workforce training from focus group attendees

The following pages document additional input to the recommendations.

Hispanic Residents and Businesses

Since the Hispanic sector was not represented at the focus groups, a separate meeting was held with Santiago Cruz at Tu Casa. Santiago Cruz is the editor of El Heraldo, the Spanish language newspaper in Humboldt County, and also works closely with the Small Business Development Center (SBDC). Tu Casa is a family resource center for the Hispanic community.

The county's population is 7.5% Hispanic and growing. Santiago mostly works with first generation immigrants. Though language is an issue when they come here, they are increasingly more aware of technology, having used cell phones, TV and DVD in their small villages where the government is making technology more available. Second generation Hispanics do not have language barriers, and the third generation is fully immersed in terms of language and in the use of technology

Santiago raised issues that are not unique to the Hispanic community:

- Business owners need education on the value of using technology in businesses
- General awareness of value of technology and telecommunications
- Parental awareness of why getting an education and having technology at home will help level the playing field for their children in a technology-based world

The unique Hispanic issues raised were not related to technology:

- Bilingual staff needed at Job Market
- Businesses do not have bilingual capability here

Tu Casa's Technology & Media Education Initiatives Goals are:

1. Foster the reading of educational printed materials
2. Foster education via the Internet
3. Foster entering information through an Internet site
4. Educate users in the location of specific Internet sites which contain helpful information in regards to local happenings, business, learning opportunities and social assistance available to the immigrant community
5. Help build a database of the immigrant community that can be reached through e-mail, phone and mailings to facilitate in the dissemination of valuable information
6. Promote community involvement from immigrant business owners

Emergency Response Providers

Conversations were held with Dan Larkin of Office of Emergency Services and Kevin O’Neil of CDF. Both agencies use radio communications in emergencies, but expressed concern about dependability issues and interoperability issues. Radio communication is used for rural dispatch. Both believe there is a need for a comprehensive, countywide plan. There is funding for emergency services telecommunications, but it has been applied in a “Band-Aid” fashion. The need was cited for doing a detailed assessment and building a roadmap for the future. This assessment would entail looking at agencies, frequencies, dead spots and planning a future network. In Eastern Oregon, wireless broadband has played a role in connecting emergency responders. An article of interest can be found online at:

<http://www.aoi.org/members/articledetail.asp?id=581>.

Survey

A detailed survey was sent out (see Appendices). To reach the most people at a reasonable cost, it was sent out in the monthly Eureka, Fortuna, Bridgeville and Arcata Chamber newsletters. This reached an audience of more than 1650. Unfortunately, there were only 53 respondents, making the response too insignificant to be valid. Arcata response was the best. One could deduce several things:

- Low readership of chamber newsletters and flyers within these communities
- Complacency about telecommunications in the three best-connected communities in the county (Eureka, Fortuna and Arcata)
- Lack of interest in subject

Workforce Training Input

During the focus group sessions, there were numerous needs touched on in terms of education, awareness and training about telecommunications and technology:

- Educate public officials
- Make general public more aware
- Train more technical support people
- Train users of technology
- Help businesses understand importance and implement use of technology

Following the focus group sessions, an informal survey was sent out to all attendees, asking them to elaborate on these needs. Responses are summarized as follows:

- People don’t know where to go to get good, cost-effective technical support.
- Eastern Humboldt needs good local tech support, without dealing with long response times and paying someone to drive from Eureka/Arcata.
- Businesses want in-house workshops on how to troubleshoot and manage an office network, including knowing when to call in outside tech support.
- Businesses need to be educated on the financial benefits to using technology and staying on top of it. This leads to economic development.

- Businesses want one-on-one business training in such things as online bill paying, payroll taxes and where to find government information/forms.
- Businesses need training on safety/security with e-mail, browsing and anti-virus software.
- Incumbent workers need skills upgrades. Most often mentioned were Excel and Quickbooks, but also mentioned were Access, Publisher and Word.
- Those entering the graphics job market do not have the skills they need. Humboldt State University does not teach QuarkXpress, which is used by most graphics shops. Graphics design programs are too general – they give education in design and digital media but graduates aren't strong in either.
- Employers mentioned they want creative, responsible employees who can think “outside of the box” and meet deadlines.
- Security awareness is low in most companies and awareness needs to be raised. Employees need basic understanding of good security practices and use of anti-virus programs.
- Manual labor employees are finding that promotional and supervisory opportunities usually include the need for computer skills, which they do not have.
- Workers lack basics of using applications such as Word and Excel and need additional training.
- Technicians need to look at more than putting out desktop fires – look at the bigger picture and keeping things simple so people can support themselves to some extent.
- Feedback from seniors was that they wanted basic training on e-mail, Internet, and anti-virus programs.

WHAT IS CENIC?

CENIC (www.cenic.org) is the Corporation for Education Network Initiatives in California. They have already played a big role in helping Humboldt County connect to the outside world by helping with advocacy to bring an end to the SBC/Caltrans fiber optic impasse.

Their online brochure is themed *Leading the Way to Tomorrow's Internet*. CENIC has a board and various advisory councils that look like *Who's Who* in universities and high tech businesses. Founders of CENIC are Cisco, IBM, SBC and Sun Microsystems.

CENIC's Web site states "CENIC's Next Generation Internet (NGI) Roundtable addresses critical technical, policy, financial and organization challenges facing the delivery of one gigabit broadband to all Californians by 2010. The NGI Roundtable brings together the interests of research, education, commerce, state and local government and the general public to address the issues surrounding the implementation of robust end-to-end broadband capabilities to every education institution, business and home in California."

Gartner Group has been working with CENIC on the One Gigabit or Bust™ initiative, and Humboldt County is highlighted on page 25 of the report, which can be viewed at: <http://www.cenic.org/gb/pubs/gartner/GartnerFull.pdf>. The US is lagging behind other countries in broadband deployment. California is the fifth largest economy in the world. The Gartner report details the economic implications to California of gigabit speeds – they are enormous at \$376 billion in state gross product and 2 million jobs.

Humboldt County has been represented at every CENIC meeting for the past two years. CENIC is advocating for rural areas of the state, and policy changes at the state and national levels will be key for Humboldt's telecommunications future. Other states around the country are watching CENIC's progress and initiatives are starting up.

It was the CENIC report done by SAIC that was instrumental in bringing the SBC/Caltrans impasse to resolution by investigating how to build an alternate network into our region. This study can be viewed at: <http://www.cenic.org/pubs/reports/nwccenicstudy.pdf>

The RTC was winner of CENIC's Community Award honoring innovative uses of high-performance networking to overcome network disadvantages (economic and/or location based), citing: "Humboldt County on the North Coast of California was a poignant example of the digital divide, where the only link to move data was an at-capacity microwave link. The RTC, via broadband advocacy, illustrated the power of what a community can accomplish when it unites behind a common goal. By galvanizing local government, businesses and individuals, RTC helped Humboldt County complete a 21-mile fiber gap and bring advanced telecommunications services to this rural area."

Speeds/Bandwidth

On the journey to gigabit speeds throughout the state, the following relationships should be noted: “bits” generally refer to telecommunications speeds, while “bytes” denote storage, such as file sizes. Technically, there are eight bits to one byte, so both terms apply to the data itself, but they aren’t used interchangeably.

- Kilobit is approximately 1,000 bits
- Megabit is 1,000,000 bits
- Gigabit is 1 billion bits, or 1,000,000,000

The importance of higher speed lies in what can be done with it. Examples of applications which require greater bandwidth or higher speeds are:

- Voice over IP (VoIP)
- Streaming audio
- Videoconferencing
- Telemedicine
- Webcam monitoring
- Field data collection
- Networked traffic signals
- Electronic medical records
- Downloading music
- Distance learning
- Research
- Gaming
- Virtual Private Networks (VPN)
- Broadcast quality video
- HDTV
- Public records searches
- Off-site computing storage

Broadband Services

DSL and cable modem are two of the most popular and affordable broadband services, and they dominate the market. Both of these technologies have been on the market for a long time, but neither appear to provide good long-term solutions to bandwidth capacity expansion.

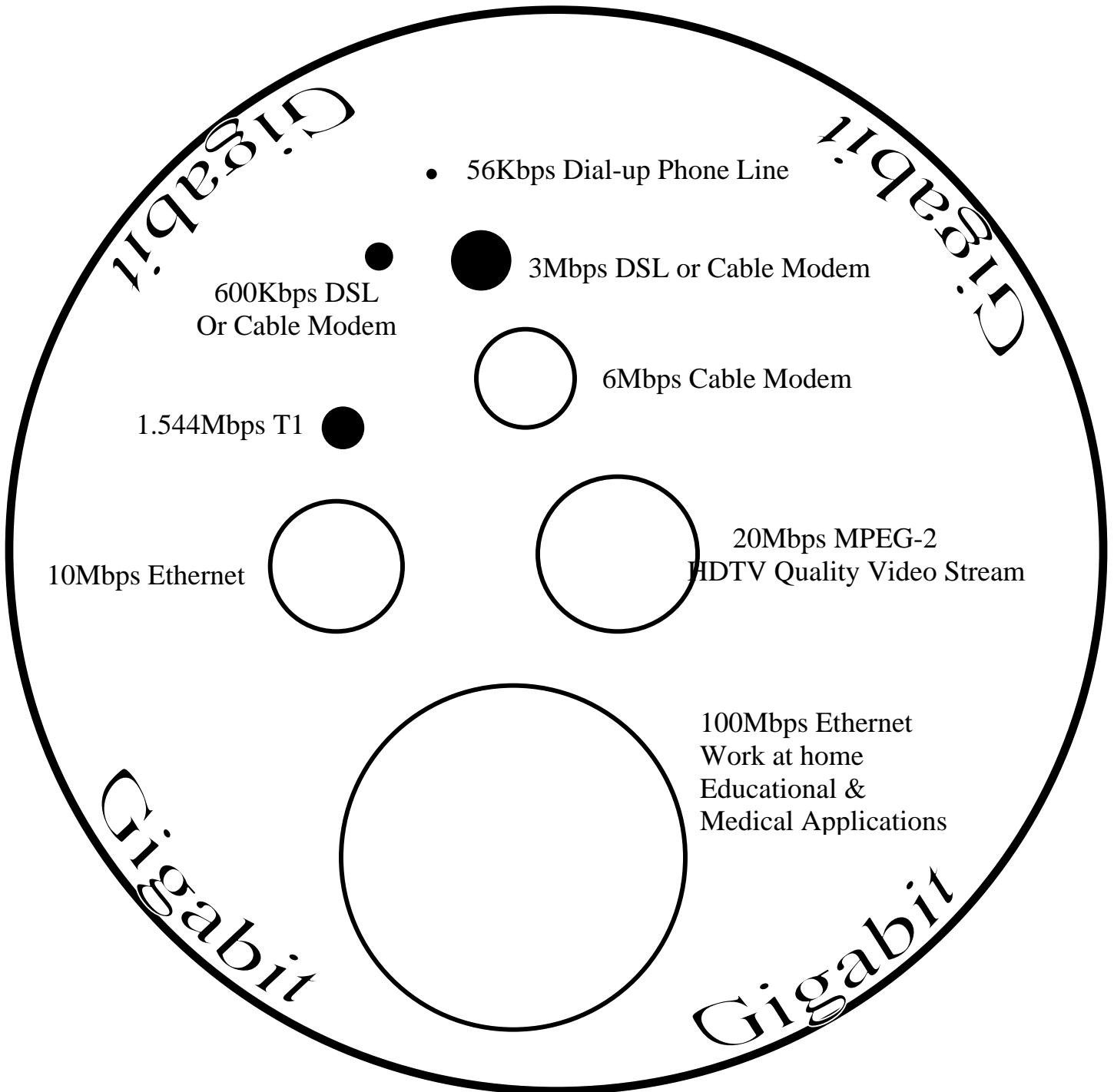
Long-term broadband communications transport methods are expected to be fiber and wireless. Fiber optic transmissions offer the ultimate in bandwidth but are very expensive to install, particularly in rural areas. Wireless is relatively easy to install and is lower in cost, but the finite nature of the spectrum may limit future growth.

Wireless may work better in some areas, and fiber may be a better solution in others. Any infrastructure built needs to be comparable in bandwidth, expandable and redundant.

Gigabit Speeds Comparison

The next diagram was created by the City of Fontana to use as an illustration to show their telecom vendors why they wanted gigabit speeds. Note how small the “pipe” size is for DSL and dial-up speeds in comparison to gigabit speeds. See the Appendices for a table of typical broadband speeds for the various technologies.

Bandwidth Comparisons



HUMBOLDT COUNTY TELECOMMUNICATIONS INFRASTRUCTURE

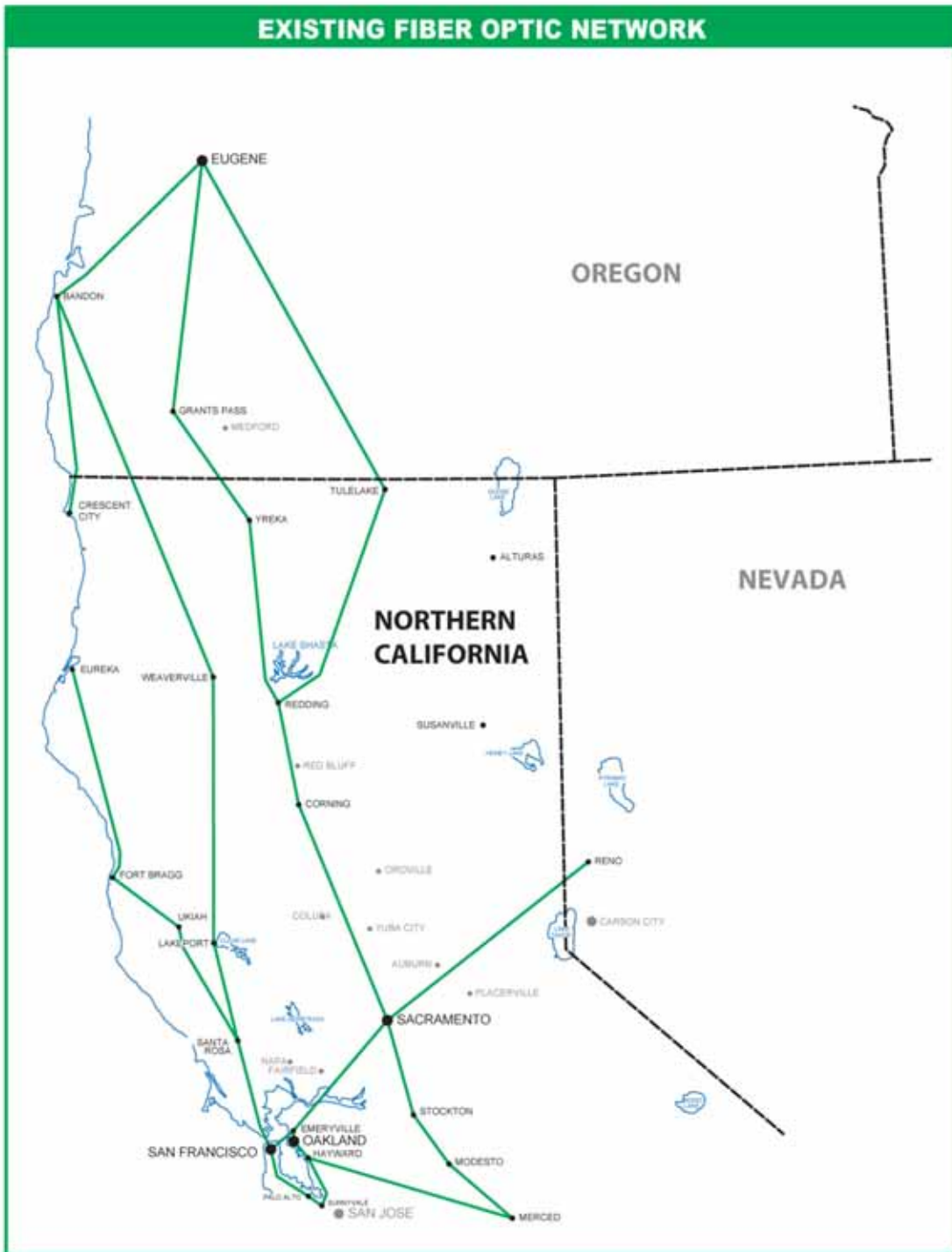
The major providers of telecommunications infrastructure and services are listed in this table. Depending upon the area of the county, there are different service providers and the service offerings vary widely. The following pages describe the providers and technologies in a little more detail.

Provider	Voice	Cable TV	Cable Modem	DSL	Satellite	Cellular
SBC	X			X		
Verizon California	X					
Verizon Northwest	X					
Frontier	X					
Cox Communications		X	X			
Starstream Communications		X	X			
Almega Cable		X				
CalNorth						X
Edge						X
Sprint						X
US Cellular						X
Direcway					X	
Starband					X	

Other than broadband services from Cox, Starstream, and SBC, there are numerous ISPs who support dial-up access in the county. However, even with accelerators, dial-up speeds are increasingly inadequate to perform anything more than basic tasks.

The following page shows the major fiber routes in Northern California and Southern Oregon. The route to Eureka is owned by SBC.

Northern California Fiber Map



Map courtesy of Victor Braud and CENIC

HUMBOLDT COUNTY PHONE COMPANIES

Most people are surprised to learn we have four phone companies in the county – SBC, Verizon Northwest, Verizon California, and Frontier. Major portions of Humboldt County are in California Public Utilities Commission (CPUC) unfiled territory, meaning there is *no* phone service (see map on next page). Telecommunications services, connectivity and reliability differ depending upon where one lives. Not all the county is connected as well as the Humboldt Bay region, which is in SBC territory.

There are four Incumbent Local Exchange Carriers (ILECs) in Humboldt County:

- SBC – Central to Southern Humboldt County
- Verizon California - Southern and Eastern Humboldt
- Verizon Northwest - Orick
- Frontier (formerly known locally as Citizens and referred to in this document as Frontier) - Ferndale, Petrolia

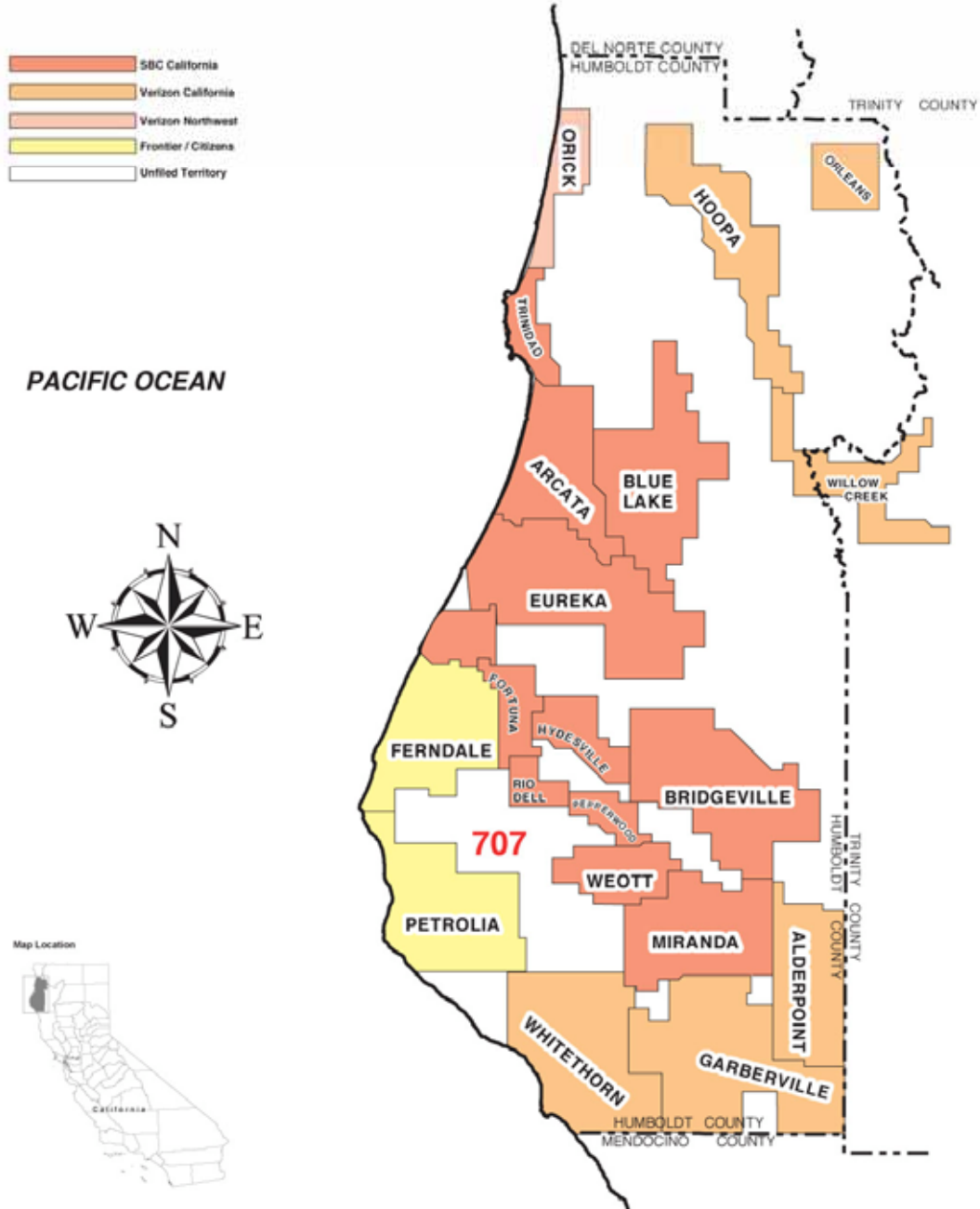
There are regulatory requirements for phone companies to provide “plain old telephone service” (POTS), but there are no requirements requiring provisioning of high speed broadband services. In general, phone companies prefer to serve the most densely-populated urban areas where capital costs are minimized and the number of customers are maximized. Capital costs per customer skyrocket in rural areas where homes and offices are distributed across large areas.

The map on the next page shows ILEC territories, with white denoting *unfiled* territory, meaning there is no ILEC or phone service in those areas. Those familiar with the county recognize that much of the unfiled territory is national forest, national/state park, or privately owned timber land. However, when and if development creeps into those areas there are serious implications about lack of telecommunications infrastructure for residents.

The map also shows what are called central offices (CO). These central offices house the local loop for each region. The local loop refers to the connection from the phone company’s CO and the subscriber’s home or office. COs are important in terms of dialing plans (local, long distance, toll calls) and DSL coverage.

Telephone Companies & Central Offices Map

TELEPHONE EXCHANGE AREAS Humboldt County, CA



Info from: <http://www.cpuc.ca.gov/static/industry/telco/area+code+info/acmaps.htm>

SBC

SBC covers the most population and the urban areas in the county, from Big Lagoon south to Miranda and east to Bridgeville and Blue Lake.

The “middle mile,” our SBC link to the outside world from central Humboldt County, was very limited until the end of 2003. All traffic was being carried by at-capacity microwave links to the south and to the east. From 2001-2003 SBC and Caltrans were at an impasse over right-of-way compensation on 21 miles of a fiber optic route from Ukiah to Eureka. Community advocacy convinced SBC and Caltrans to set aside the dispute in June 2003, so that the fiber could be completed. SBC and Caltrans are still in federal court to resolve the dispute, since it is a precedent-setting case. Since the fiber optic project was completed from Ukiah to Eureka in September, 2003, all COs have had fiber pulled into them except Bridgeville and Trinidad. The Trinidad route is engineered, but construction has not been started.

SBC provides basic dial tone services as well as broadband services. SBC and some resellers in SBC territory are the only vendors selling DSL services in the county. DSL has a copper wire length limitation of around 12,000-15,000 “wire feet” (not as the crow flies), so the DSL coverage area is limited. In the past, publicity about new DSL capabilities has brought with it complaints about lack of coverage in rural areas, so DSL is being quietly rolled out without fanfare to each CO that has fiber. Completed so far are McKinleyville, Fortuna, Eureka, Arcata and Rio Dell. More “remote terminals” are being installed in the Eureka area to further extend DSL in the urban areas. “Remote terminals,” also referred to as “fiber huts,” contain equipment to boost the DSL signal, thereby extending its reach another 12,000-15,000 feet. Theoretically, such terminals could be used to extend DSL via chains of these extensions into remote areas, but population density is so low that the economies of scale do not exist as an incentive for vendors to do this.

There is one fiber path in/out of the county (see map in previous section). This is a critical issue that needs to be addressed. Should the fiber be cut by any manmade or natural disaster, the legacy microwave systems cannot provide enough backup bandwidth for the current traffic volume. The SBC fiber route is the lifeline to most of Humboldt County.

Cost of T1 Internet service is high in SBC territory, almost three times that of urban areas in the rest of the state. This is due, in part, to lack of competition, low population density and remoteness of our region.

More detailed information about SBC services is included in a 2003 report by CENIC and SAIC entitled: Northwest California Network Infrastructure Analysis: Del Norte and Humboldt Counties at <http://www.cenic.org/pubs/reports/nwcenicstudy.pdf>. This was written because CENIC needed bandwidth into Humboldt and Del Norte counties and the SBC/Caltrans fiber optic impasse made bandwidth unavailable.

SBC relationships are close with the community, with SBC active in the Greater Eureka Chamber of Commerce and in the RTC.

SBC provides wireless Internet services in other parts of California, but not in Humboldt County. SBC's web site, www.sbc.com, makes it easy for DSL customers to find out if service is available at their home or business by simply entering the phone number of the site to be serviced. A menu of different service options is then displayed. There may be special promotional pricing at times. See Appendices for some sample services/pricing.

Verizon Northwest and Verizon California

Verizon territory is around the outer boundaries of the county (see previous CPUC map). There are actually two Verizon companies involved: Verizon Northwest and Verizon California. Orick is part of Verizon Northwest and Eastern/Southern Humboldt is part of Verizon California. There are completely different points of contact for both services and for community relations. Community Relations contacts for each company are in Southern California and Portland, Oregon.

Verizon is getting a lot of national attention with their "fiber to the home" initiative. They also have a 2004 goal of DSL to 80% of their COs. None of these services are offered in Humboldt County. In fact, local Verizon customers lack what many consider basic services, such as voice mail and caller ID.

The Verizon Northwest network to Orick is via microwave from Crescent City. This microwave link comes from SBC in Humboldt County. Orick has a modern digital switch. However, Orick's local calling area is only Orick; any other calls are toll calls. No Extended Area Service (EAS) is available. There is only one Internet Service Provider (ISP) in Orick with a local phone number, Carroll's Web. Access to any other ISPs are toll calls and costs can run quite high per month with even minimal Internet usage.

The Verizon California network relies on bandwidth provided by SBC. EAS was recently offered to customers. Digital switches are installed in all areas. However, service quality varies widely by community. When talking to Verizon personnel, "infrastructure" issues were mentioned when discussing quality of services. In Eastern Humboldt in particular, residents complain about "cross-talk" on phone lines, unreliable dial-up communications, E-911 issues, and connecting to the wrong person when dialing.

As with SBC, the cost of T1 Internet service through Verizon is several times what customers pay in urban parts of the state.

Frontier

Frontier covers Ferndale and Petrolia. The Ferndale CO has a digital switch. Petrolia is a "remote CO" off Ferndale, which means it is not a fully-equipped CO.

Frontier uses the term "stranded" when they talk about their presence in Humboldt County. This means their service from Ferndale and Petrolia must be backhauled to their network in the Central Valley via bandwidth purchased from SBC, rather than on their own network. As a result, DSL service is not offered, strictly due to cost of backhauling the traffic. Frontier would

like to provide DSL service to Ferndale. For our purposes “backhauling” is the “middle mile” or transmission from our remote area to a network backbone, such as the Internet.

Frontier says they are the largest independent phone company in the country. RREDC and RTC have a good relationship with Frontier. There is a designated Community Relations contact who regularly visits Humboldt County.

CLEC’s and Long Distance Point of Presence

There are no Competitive Local Exchange Carriers (CLECs) or long distance providers with facilities in Humboldt County. These carriers are important because they have their own facilities and do not simply resell services of an ILEC, such as SBC. They have their own networks and can provide competition, which drives prices down and offers alternatives to ILECs.

DSL (non-SBC)

There are a number of companies who resell SBC DSL services in Humboldt County. The phone book advertises a few and a Google search will yield many more. The services are available in the same areas where SBC DSL is available. They do not have their own equipment installed in COs; they simply resell SBC DSL services.

Internet Service Providers (ISP’s)

Other than Cox, SBC and Starstream, there are many ISPs providing dial-up services. The phone book listing under “Internet” is the best resource. Some have accelerator software to speed up services.

CABLE PROVIDERS

There are three cable providers in Humboldt County:

- Cox Communications - Scotia to Big Lagoon and east to Blue Lake and Carlotta
- Starstream Communications – Garberville, Redway and Benbow
- Almega Cable – Orick and Willow Creek

Cox Communications

Cox provides cable TV and cable modem Internet service to the more densely populated areas of the county. Cox is active in community affairs and has good relationships with RTC and the jurisdictions they service.

The franchise agreement covers seven jurisdictions: Humboldt County, Eureka, Arcata, Blue Lake, Fortuna, Ferndale and Rio Dell. The franchise agreement has expired, and renegotiation of the franchise is currently under way. A negotiator is representing all jurisdictions in the process. Community input to the process has shown interest in a community media center and an Inet (institutional network).

Cox cable modem services are available in their franchise area. This covers about half the county population where it is most dense in the central part of the county. In terms of geography, Cox has the best broadband coverage in the county, even though geographically it's a very small area (following this section, see map which shows all broadband coverage in county).

Cox has approximately 32,000 subscribers, which is 60% of the homes they pass. Of those subscribers, 20% are cable modem customers and the number is growing.

Cox must purchase bandwidth from SBC to provide access to their network. Until the SBC fiber optic project was completed, Cox was constrained in the number of customers to which they could provide service. Cox says they pay SBC five times the rate they pay in the rest of the country for bandwidth. There are also concerns about lack of redundancy out of the area.

Starstream Communications

Starstream Communications is the cable TV vendor in Garberville, Redway, and Benbow. In April 2004, they completed an infrastructure upgrade and began providing cable modem service. Their franchise with the county runs through June 2012.

Their service runs by 1100 houses, of which 800 are customers. About 15% of customers have cable modem service. Five customers per week are ordering cable modem service.

Starstream must purchase bandwidth from Verizon to provide Internet access. They pay four times the rate they pay in Santa Rosa for T1 services.

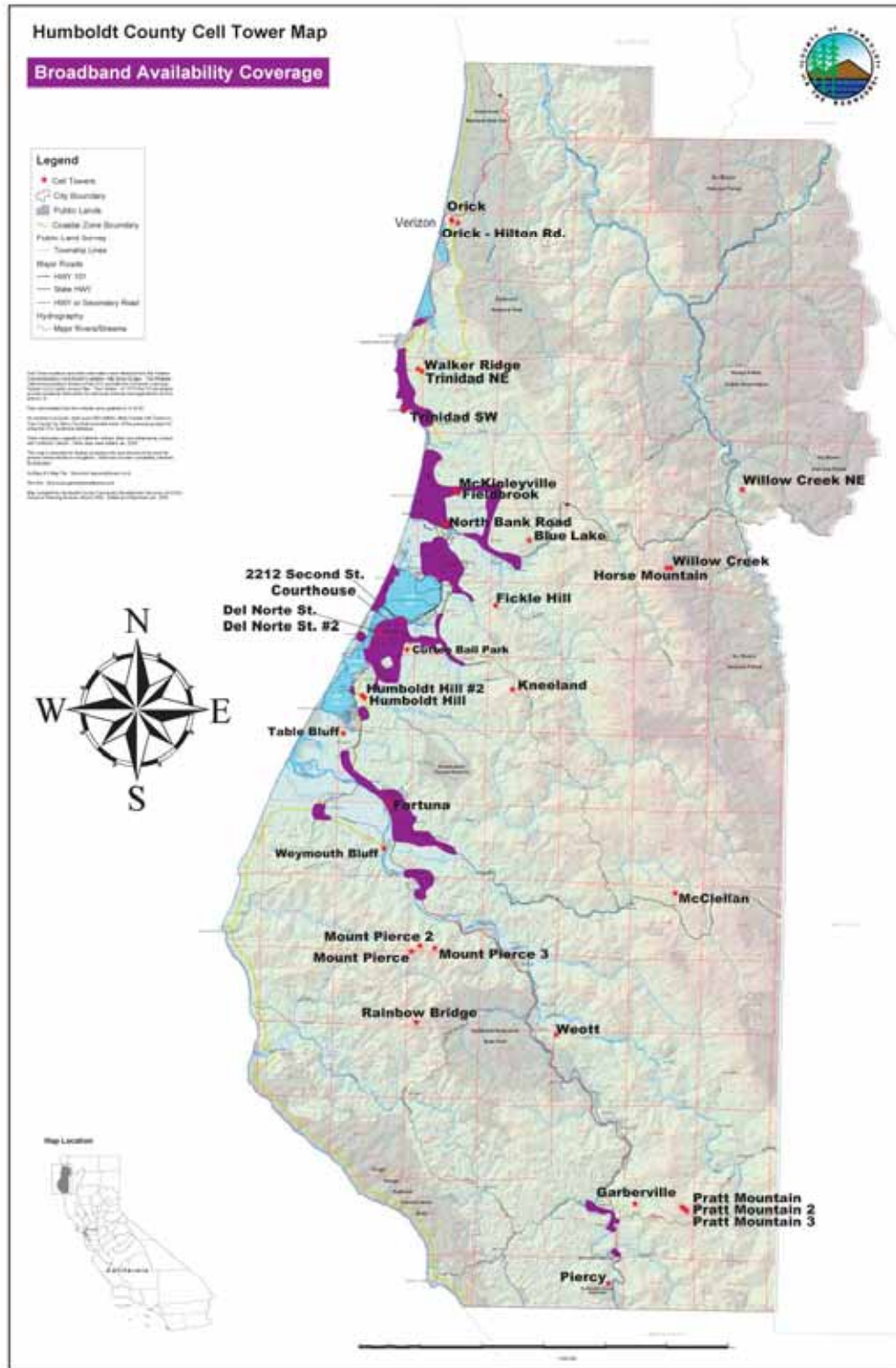
Almega Cable

Almega acquired Orick and Willow Creek when Mallard Cable went bankrupt. They do not provide cable modem service. Their franchise expires in January 2014.

Their ad in an Eastern Humboldt newspaper states: “Almega Cable is pleased to announce that we are the Cable TV, Digital TV, and High-Speed Internet provider in your neighborhood. Since 1986, we have been a proven leader with diverse and long-term experience in Cable TV, Internet Services, Coaxial Cable Systems, Satellite Systems, Fiber Optic Networks, and Wireless Systems.....We are currently upgrading our systems to bring high-quality picture and sound along with High-Speed Internet access to every home within your neighborhood.”

During the 2002 telecommunications assessment, Mallard Cable said their infrastructure needed upgrading and that they had no plans to provide Internet service. When Almega was called for the current project, they would not provide any information about planned service offerings, simply citing a “small market” when it comes to Internet service. However, after recent local telecommunications publicity surrounding this project, Almega has said they want Willow Creek residents to call if they have interest in Internet services.

HUMBOLDT COUNTY CELL TOWERS AND BROADBAND COVERAGE MAP



Note: broadband coverage areas are approximate and for illustrative purposes only

WIRELESS TELECOMMUNICATIONS INFRASTRUCTURE

Wireless telecommunications will be important to Humboldt County's future for two reasons:

1. Traditional wireline (fiber, coax, copper) telecommunications are very expensive to install in sparsely populated rural regions.
2. Convergence of voice, video and data.

Advances in technology have made it possible for different media (copper, fiber, coax, wireless, satellite, TV and computers) to transmit and process diverse information and services – voice, video and data, which are often referred to now as “triple play.” Phone companies are now offering data and video in addition to the traditional telephony services. Cable TV companies offer data and phone services in many areas. Cell phones are expected to use broadband networks in the future to carry voice, video and data. A multitude of service providers will be providing bundled products in the future over broadband networks.

With the growing demand for wireless services, there will be even more antenna sites required, each with smaller areas of coverage. The move to higher frequencies leads to higher absorption by trees, foliage and buildings. Planning for wireless is critical.

Wireless Vendors

NERATech has not been able to find any wireless data broadband retail or wholesale vendors in our region. However, there are some private point-to-point wireless networks between company or government buildings. Wireless “hot spots” (Wi-Fi) are rare, with a few in downtown cafes. Many residents use wireless connections for connecting computers within their home to a local area network (LAN).

One emerging local wireless vendor of note to watch is Last Mile Digital (<http://www.lastmiledigital.net/>) in Southern Humboldt. Andy and Deborah Johannesen of Whitethorn bought the Pratt Mountain “antenna farm” about six years ago. They are in the process of putting together a microwave network south to Ukiah, where customers can hook into Williams fiber. They have their FCC license and are starting to install equipment. This will give a wholesale data alternative to Verizon bandwidth, and pricing is expected to be favorable. In addition, they are also investigating feasibility of a path to the north to connect Central Humboldt County. This is desirable in terms of competition and an alternate path out of the county.

Cellular Phone Service

There are four cell phone vendors in our region:

- Cal North
- Edge
- Sprint
- US Cellular

Each of these cell phone vendors was contacted and asked about future plans. They are all working on better coverage, but none have plans for broadband (200 kbps and above) locally. All expressed interest in operations of a wireless broadband network if there is grant funding to build

the infrastructure. All had heard of RTC and were aware of issues in Humboldt County. A summary of future plans:

Cal North. Current projects focus on extending digital voice coverage in rural areas. In 2006, they plan to be data-capable at slower speeds (50-70 kbps), migrating to 1X technology. Because of the rural nature of their market, it's difficult to build a business case for services.

Edge. Their emphasis is on mobility; fixed wireless is not their business. The 10-14 kbps speeds they have are not adequate for data. They believe it's hard to build a business case for broadband in their licensed spectrum.

Sprint. Their coverage is primarily in the urban areas. They plan to have laptop cards late next year with 50-70 kbps data speeds.

US Cellular. They have completed a project to improve their coverage, especially around Eureka, and are now working on increasing the volume. They still have gaps in coverage both north and south in the county. In September, they turned on CDMA (Code Division Multiple Access, the type of digital cell phone network used throughout most of the US). They have no plans for wireless broadband. They are currently building a microwave path south to Ukiah so they can bypass SBC to backhaul traffic out of the county. SBC bandwidth will be simply a backup in case of emergency. They expressed interest in wireless data broadband, but think it's a tough business case to sell.

It should be noted that none of the data speeds mentioned above come anywhere close to broadband speeds by the FCC definition of 200 kbps and above. Most of the speeds are similar to dial-up or lower, not suitable for most data needs. And in fact, most experts believe the FCC definition of broadband is outdated.

It is important to note that many technology futurists believe that cell phones as we now know them will be obsolete not too far in the future. The cell phone of the future will be VoIP running on a wireless broadband data network.

Satellite

Some county residents who are not in the DSL or cable modem areas subscribe to satellite Internet services. The main providers in this area are Starband (www.starband.com) and Direcway (www.direcway.com). While these services are faster than dial-up, they have limitations and are expensive in terms of up-front installation and ongoing subscription costs. They require professional installation. Users report that upload speeds can be slow and that weather can affect reliability. It is reported that there are contractual limits to the amount of data that can be uploaded. Latency (or delays) are common. Poor to unacceptable uses are: large scale file transfers, gaming, Virtual Private Networks (VPN) and VoIP.

VPNs are necessary for some businesses and telecommuters. As Direcway says on its Web site, "If you choose to run VPN over satellite, your data speeds may be reduced by as much as 50-

75%. Note: DIRECWAY technical support does not provide help with configuring or troubleshooting problems associated with VPN clients.”

“If you can see the southern sky, you can get Starband” says the Starband Web site. However, just a few weeks ago, Starband service was lost when an Intelsat satellite was permanently lost. It is unknown how many Humboldt County residents were affected.

The following press release from Intelsat explains the incident. Starband has had recent financial difficulties and this may affect the sale of the company. Note that the press release says “most” customers have been transitioned to alternate services, some of which are dial-up services. Because of Intelsat’s orbit angle of 45 degrees, it can reach farther than other satellites which have an angle of 30 degrees. This is a big difference in rural areas hampered by terrain and trees.

Intelsat Reports Loss of Intelsat Americas™-7

Pembroke, Bermuda, 28 November 2004

Intelsat, Ltd. today said that its Intelsat Americas™-7 satellite experienced a sudden and unexpected electrical distribution anomaly that caused the permanent loss of the spacecraft on November 28, 2004 at approximately 2:30 am EST. Consistent with existing satellite anomaly contingency plans, Intelsat has made alternative capacity available to most of its IA-7 customers, many of whom have already had their services restored, reflecting Intelsat’s intention to ensure a smooth transition for its customers. Intelsat is working with Space Systems/Loral, the manufacturer of the satellite, to identify the cause of the problem. The satellite, which operated at 129° West, was launched in September 1999 and covered the continental U.S., Alaska, Hawaii, Canada, Central America, and parts of South America. The satellite was self-insured by Intelsat.

The upcoming launch of the IA-8 satellite, currently scheduled to occur on December 17, 2004, will provide 36 Ku-band, and 24 C-band, equivalent transponders to the Intelsat North American fleet and help mitigate the impact of the permanent loss of IA-7.

Under the terms of the Transaction Agreement and Plan of Amalgamation for the sale of Intelsat, dated as of August 16, 2004, among Intelsat, Ltd., Intelsat (Bermuda), Ltd., Zeus Holdings Limited, Zeus Merger One Limited and Zeus Merger Two Limited, the total loss of the IA-7 satellite would give the purchasers the right not to consummate the acquisition of Intelsat. The purchaser, Zeus Holdings Limited, has advised Intelsat it is evaluating the impact of the IA-7 failure.

Wi-Fi. After the term “cell phones,” Wi-Fi is the telecom term most often heard these days. Wi-Fi provides a local area network over very close range (up to 300 feet) using the 802.11 standard. To learn more about Wi-Fi, take a look at <http://computer.howstuffworks.com/wireless-network.htm>. Humboldt County has some Wi-Fi “hot spots” and many people have installed wireless networking equipment so they don’t have to run network cabling in their homes or businesses.

Wireless ISPs (WISPs)

To my knowledge, there are no wireless ISPs in Humboldt County. None are listed in phone books. There are a few free Wi-Fi “hot spots” in cafes and other public places.

Emerging Technologies

There are a number of emerging technologies that will play a role in future connectivity in Humboldt County. The following is a summary of some of them.

BPL. Broadband over powerlines has recently been approved by the FCC. According to Ivan Marruffo of PG&E, there are some tests going on in the Bay Area. The following is information he recently provided to RTC:

BPL (Broadband - High Speed Internet Access)

- PG&E and AT&T are participating in trials to test broadband Internet (BPL) over power lines
- BPL is a new technology of offering Internet services through utility power lines
- This is only a trial, in one neighborhood in Menlo Park ONLY
- There is no cost to customers or PG&E for AT&T’s trials
- Menlo Park was chosen as AT&T already has a lab in that city
- AT&T is conducting the trials and customers cannot be signed up
- Customers can contact AT&T at (866) 280-1792 for more information
- At this time there are no plans to offer BPL services to customers, nor any estimates on cost of service or even when such services might be offered

WiMAX. Wireless broadband has a future with WiMAX, which stands for Worldwide Interoperability for Microwave Access, the new 802.16 standard for wireless metropolitan area networks. WiMAX is a wireless technology comparable to DSL or cable modem service. WiMAX is considered the next step beyond Wi-Fi because it is optimized for broadband. There are improvements over Wi-Fi, such as quality of service, enhanced security, higher data rates, and mesh and smart antenna technology for better spectrum usage. Most important, WiMAX distances are up to around 30 miles. For more information on WiMAX, a Google search for “802.16” returns half a million entries.

Mesh Networks. Roughly following TechTarget and Telecom Glossary 2K definitions, a mesh network is defined as follows:

“A mesh network is a network that employs one of two connection arrangements, full mesh topology or partial mesh topology. In the full mesh topology, each node is connected directly to each of the others. In the partial mesh topology, nodes are connected to only some, not all, of the other nodes.”

There are many-to-many connections and they may allow mobility. Nice features are stability (no single point of failure), ease of install, low power and workable in difficult terrain.

Dirigibles. There is quite a bit of hype about dirigibles replacing satellites to provide telecommunications links, especially to rural areas. A recent PC Week article talks about this new technology at <http://www.pcmag.com/article2/0,1759,1545785,00.asp>. Stratsat is another product to watch at: <http://www.atg-airships.com/>.

Wireless and Health Issues

The debate rages on about RF (radio frequency) and health issues, but there are no conclusive answers. Research indicated that more investigation is needed. If you think about it, there is RF energy all around us – radio stations, TV stations, cordless phones, microwaves, fluorescent lights, and on and on. Some useful sites are:

<http://www.fda.gov/cellphones/qa.html>

<http://ftp.fcc.gov/oet/rfsafety/rf-faqs.html>

<http://electronics.howstuffworks.com/cell-phone-radiation.htm>

More Wireless Information

For those interested in the subject of wireless telecommunications, CENIC has a good wireless listserv at <http://lists.cenic.org/mailman/listinfo/wireless>. Excellent, up-to-date information comes out several times a week on wireless, policy issues, and community networks.

RECOMMENDATIONS

Recommendations – Workforce Development and Telecommunications Usage

These two subjects begin merging in some ways because of the large numbers of micro-businesses and home-based businesses in Humboldt County.

Often, technology and telecommunications are not used due to discomfort with change or lack of training. It should also be noted that when poor business processes are used, adding technology into the mix can make the situation worse. Good processes are key to making the most of technology and telecommunications. This points out the importance of continuing to aggressively market services such as the Pre-Venture workshops at the Small Business Development Center (SBDC) and to expand the offerings wherever possible.

Recommendations - Workforce Development

Based on feedback from focus groups, the following are recommendations for improving workforce skills and usage of technology and telecommunications:

1. Investigate use of Employment Training Panel (ETP) funds for assisting businesses in use of technology. http://www.etp.ca.gov/online_orientation.cfm
2. Train tech support personnel in the practical aspects of tech support: troubleshooting, people skills, customer service, looking at the “big picture,” and practicalities of configuration so people are more self-supporting.
3. Inventory tech support companies in all regions of Humboldt County and publish directory.
4. Provide awareness training to companies on advantages and good practices of using technology.
5. Put together a road show to educate elected officials and general public on technology issues and advantages.
6. Strengthen educational institution advisory committees (HCOE, CR)
7. In addition to Business Partners Program at HSU, establish an educational advisory committee (similar to HCOE and CR) to provide input to CIS program from IT cluster leaders and companies.
8. Analyze how best to deliver basic training to incumbent workers on security awareness and basic features of MS Office.
9. Provide a directory of training resources for basic computer skills and Quickbooks. Include information about targeted audience and prerequisites.
10. Identify and list local technology-based businesses.
11. Look more globally at identifying and better utilizing technology services external to Humboldt County, such as online training.
12. Inventory local videoconferencing capabilities and publish list.

Recommendations - Telecommunications Usage

The focus group sessions were kept on task emphasizing businesses, education and organizations rather than home usage, and attendees wanted examples of what they could do with technology and telecommunications. However, since usage always drives the demand for broadband, and part of that usage is at home, raising awareness of the many uses for broadband at home should help to naturally translate the emphasis from home usage to business usage and hence to fostering economic development.

For example, say a family buys a new computer and signs up for broadband service. Their daughter discovers she can watch a video clip of an interview on “Crossfire” that pertains to a paper she is writing. She shows it to her father, who owns a cabinet-making shop. It reminds him of a brochure he just received from a tool manufacturer about an online streaming video training program they’ve made available. He realizes he could use this technique to train his employees in the use of a new power tool that will save hours of work.

Humboldt County residents wish to use e-government when dealing with local jurisdictions. Capabilities vary widely across the county. Local jurisdictions should be surveyed and a directory compiled of what governmental services are available online. Coordination of services among jurisdictions should be looked at.

Virginia Tech is putting together a list of applications and the bandwidth required to support them. This data, due out soon, could be used in a general awareness campaign to residents and business. This could be done via newspaper articles, through RTC, Tech Beat columns in the Times-Standard and Redwood Times, radio interviews, and the RTC’s annual Tech Expo.

Applications being asked for are in Humboldt County include, but are not limited to:

- Voice over IP (VoIP)
- Streaming audio and video
- Videoconferencing
- Telemedicine
- E-government
- Webcam monitoring
- Field data collection
- Networked traffic signals
- Electronic medical records
- Music downloading
- Distance learning
- Research
- Gaming
- Virtual Private Networks (VPN)
- Broadcast quality video
- HDTV
- Public records searches
- Off-site computing storage

Recommendations - Information Technology Industry Cluster Development

In Humboldt County, the IT cluster has come to be synonymous with the Redwood Technology Consortium. It is hard to separate the IT cluster and RTC, so many of these recommendations are RTC-oriented. Feedback from focus group attendees was loud and clear to *strengthen RTC*, even from non-RTC members.

RTC is at a crossroads in its development. To take the organization to the next level requires moving beyond an all-volunteer board doing most of the work. Paid staff is the next step. RTC is in the middle of a one-year program of organizational development. The board is doing strategic planning, and a VISTA volunteer is assisting with organizational development.

A Headwaters grant was awarded to RTC to visit other communities and technology-based organizations around the country and benchmark RTC and Humboldt County against those areas. Visits are planned to Sacramento, Davis, Ashland (Oregon) and Blacksburg (Virginia).

Information gathered from those visits will help RTC determine its path for the next few years. RTC will also share the results of the trip with other clusters who may be trying to become better organized. In particular, the Blacksburg trip is expected to yield detailed information about just what makes up an “electronic village,” since Blacksburg has been hailed as the most wired community in the world.

Key RTC goals for the next few years are:

- Increase awareness of RTC and technology
- Increase membership and participation of membership
- Target funding to fund a paid staff member
- Continue to put on Tech Expo every year
- Continue to provide local scholarships

Key goals for the IT cluster in Humboldt County in general are:

- Improve telecommunications infrastructure
- Work with educators to develop IT career paths and training
- Network with other industry cluster leaders
- Enhance competitive edge of local businesses through technology

Recommendations – Infrastructure

Based on input from focus groups and inventory of infrastructure, recommendations are:

1. Investigate wireless as a means to get broadband outside the urban areas. The main issues involved other than terrain are: backhaul of traffic out of the area with four different ILEC's, tower cost or rental, and network operations. It is highly recommended that a separate feasibility study with regard to wireless broadband implementation be performed. Technical support may be available for this study if the "VISION" essay submitted to the FCC Wireless Telecommunications Bureau results in Humboldt County being selected for a pilot project in the program. In such a study, emphasis should be placed on the most remote areas that barely have access – and in some cases, don't – to basic phone service.
2. Investigate feasibility of telecommunications service districts for improving broadband coverage.
3. Assess emergency services telecommunications infrastructure.
4. Advocate with SBC for redundant fiber.
5. Investigate alternate fiber route with alternate vendor.
6. Advocacy for Andy Johannesen's project, which will bring competition into the county.
7. Establish relationship with Almega Cable.
8. Establish relationship with Verizon Northwest and Verizon California and get them to table to discuss issues of E-911, caller ID, voice mail, Orick Extended Area Service (EAS), infrastructure issues, quality of service, status of Yurok buildout, valid addresses for installation. Homework prior to meeting is CPUC research on services Verizon is required to provide to subscribers.
9. Continue to build relationships with SBC, Frontier, Cox, and Starstream.
10. County continue to require "real" address to issue building permits or install phone service.
11. County remind telcos again not to install phone service without "real" addresses.
12. Inventory tech support options/companies and publish list.

Recommendations - General

The county should consider the critical nature of telecommunications to future economic development. If the county is to play a larger role in telecommunications as basic county infrastructure, some thought should be given to having a telecom coordinator. The City of Davis has done this as part of their General Plan Computers and Telecommunications Element. Another option that might be explored is formalizing RTC's role in county telecommunications.

The county should be taking a proactive role in vendor relationships and in advocacy. The natural follow-ons to this project would be better implemented with a telecom coordinator involved: advocacy, awareness, infrastructure partnerships, emergency services telecommunications assessment/planning, access to computers and technology, county portals and e-government initiatives.

All future telecommunications planning in Humboldt County should include the following:

1. Knowing the state of existing telecommunications
2. Realizing the importance of telecommunications to economic health
3. Planning for broadband throughout the county
4. Addressing differences in regions of county, especially unserved and underserved areas
5. Investigating the need for public telecommunications and applications
6. Assisting local governments in telecommunications planning
7. Developing a well-conceived wireless transmission facility plan that is coordinated county-wide among jurisdictions

GENERAL PLANS

County General Plan Research

Humboldt County is in the process of updating its General Plan. Part of that update includes an assessment of the county's telecommunications infrastructure systems and usage. Research was done to determine whether or not other California counties have included a telecommunications element.

Every county and city in California is required by state law to prepare and maintain a planning document called a General Plan. It is designed to serve as the jurisdiction's land use and development "constitution." California Government Code Section 65302 requires the following seven elements in a General Plan, in no particular order:

1. Land Use
2. Circulation
3. Housing
4. Conservation
5. Open Space
6. Noise
7. Safety

Jurisdictions are not restricted to just these elements in their plans, and many in fact do add other elements. However, the Web site of the California Planners Information Network does not include either Telecommunications or Information Technology in its list of optional elements that counties and cities can add to their plans. This very fact seems to be a clear indicator that telecommunications ("telecom") and information technology (IT) planning in California is still in its infancy.

Telecommunications Plans

Although telecommunications is mentioned in a number of General Plans, often it is not in much detail and specific actions are not detailed with regard to ongoing telecommunications development and monitoring. Two notable exceptions include the City/County of San Francisco and the City of Davis. These are discussed in detail below.

Some General Plans include references to telecommunications goals, initiatives or policies within discussions of one of the required elements. Extensive research done for this report revealed that in many of these cases, the telecom references are contained in the Land Use, Circulation or Open Space element. Telecom is sometimes mentioned in more than one element. In other cases, cities or counties have renamed a required element, as in Orange County which calls the Circulation element "Transportation" instead. In still others, telecom is mentioned in one of the additional elements not required by law, such as "Public Facilities" or "Public Services." Additionally, some of the optional elements are incorporated into required elements, as in Inyo County which includes "Public Service & Utilities" within its Land Use Element. Within the scope of this report, therefore, it should be noted that there is little consistency across the General Plans that do mention telecommunications.

At the end of this report is a section titled Planning Resources containing a number of links to Web sites used for General Plan research. One excellent resource the County of Humboldt may want to consider in formulating its telecommunications plan is a paper titled “Should Your General Plan Have a Technology Element?” by Charles H. Kaylor and Christopher Steins. They surveyed more than 30 technology plans and projects across the country which revealed that communities for the most part have not adopted “coherent, wide-ranging strategies.” They point out that the boom in wireless telecommunications has raised a new challenge for jurisdictions, and that “local planning departments have entered the fray, motivated by the need to ensure public safety while minimizing the intrusiveness of cell phone towers.” While some communities have addressed this challenge by drafting elements in their General Plans or implementing cell tower ordinances, such plans do not appear to be part of a broader strategy for economic development. Conversations with Charles Kaylor indicated that there is no community with a “model” telecom element.

In the early-to-mid 1990s, technology planning was almost unheard of for local governments. It still is, in many places - at least as far as formalized plans are concerned. As Kaylor and Steins point out, even the city of San Jose, in the heart of Silicon Valley, did not have an official economic development plan through the 1990s. After the bursting of the dot-com bubble, San Jose is now preparing a plan that recognizes telecom and IT as critical to economic growth and success.

Many counties and cities in California are like the Silicon Valley region. In reviewing several dozen General Plans, mention was found of policies, goals, programs and initiatives relating to telecommunications. However, very few formal ordinances were found with regard to telecommunications requirements in new or existing public buildings. Most references to telecom revolved around a county or city encouraging the use of technology or telecommuting, or encouraging telecommunications providers to meet the telecom needs of the county, or a plan to perform a telecom assessment in the near future.

Examples of General Plan Language

The following are some examples of statements found in General Plans that contain references to telecommunications:

“The County shall convene a group of the existing service providers to assess the current state of telecommunications infrastructure, the needs for the future, and the role of the County and other agencies in facilitating implementation of services demanded by high technology firms.”

- Fresno County, Economic Development Element, Program ED-B.A

“The County shall encourage the provision of adequate gas and electric, communications, and telecommunications service and facilities to serve existing and future needs.”

- Fresno County, Public Facilities & Services Element, Policy PF-J.1

“The County shall explore the feasibility of requiring new development to prewire industrial areas and business parks for new information technologies.”

- Inyo County, Land Use Element, Public Services & Utilities Communication Infrastructure, Policy PSU-7.2

“Encourage the telecommunications industry to install and maintain state-of-the-art high-speed high-capacity service throughout the County so that established businesses, public agencies, and home businesses may overcome any distance-to-market competitive disadvantages they may currently have.”

- Inyo County, Economic Development Element, Implementation Measure 16.0

“Existing setting: A concern often mentioned was the need to establish high-speed connections to the Internet in the County. This was seen as a necessary step to allow new businesses to establish in the County.”

- Inyo County General Plan Goals and Policies Report, which also includes these statements:

“Incorporate new developments in communications/transportation technology.”

- Inyo County, Circulation Element, Other Circulation Topics, Goal OCT-2

“Support communications technology that reduces the need for vehicle travel.”

- Inyo County, Circulation Element, Other Circulation Topics, Policy OCT-2.2

“To reduce vehicle trip generation, consideration should be given to establishing a small scale telecommuting center in the community center. Equipping residential units with telecommunication capabilities should be encouraged.”

- Contra Costa County, Land Use Element, Circulation/Transportation section, with regard to a specific development called Discovery Bay.

“Encourage telecommuting, by wiring new homes for accessing telecommunication facilities, as an alternate to the work commute for new residents of the Country Club at Gale Ranch.”

- Contra Costa County, Land Use Element, Circulation/Transportation section, with regard to a specific development called Country Club at Gale Ranch.

“Community Regions shall be provided with adequate and reliable utility services such as gas, electricity, communication facilities, satellite and/or cable television ...”

- El Dorado County, Public Services & Utilities Element, Goal 5.6, Objective 5.6.1

“A telecommunications program would encourage the use of teleconferencing or telecommuting (working at home or at local work locations via computer rather than going into the main office location) to reduce commuting and meeting-related trips. This measure would be implemented by jurisdictions or organizations other than the Air Pollution Control District.”

- Kern County, Circulation Element, Telecommunications section

“The County shall assure that Community Plans and Infrastructure and Financing Studies address provisions for a high level of adequate public utilities, including lighting and telecommunication technologies.”

- Monterey County, Public Services Element, Policy PS-7.6

Notable Exceptions

1. San Francisco

Through Ordinance 293-96, the Mayor and Board of Supervisors of the City and County of San Francisco created a Telecommunications Commission in the mid-1990s and directed it to prepare a Telecommunications Plan. In 2002, the commission issued its first plan, and an update was issued in March 2004. The commission is required to revisit the plan every two years, and if necessary, update it to keep pace with emerging trends in telecommunications.

The plan was developed based on significant research and public participation. It addresses the telecommunications needs of the community, business and government. Requirements for the plan, as outlined in the Ordinance, include:

- Facilitating the deployment of telecom facilities in the city;
- Maximizing the availability of telecom services to residents, businesses and government;
- Preserving city property and resources;
- Protecting the health, safety and welfare of city residents.

Additionally, the plan's other benefits include:

- Establishing an overall telecom strategy for the city;
- Answering the most important public questions about internal and external telecom policy;
- Serving as a framework for telecom-related decision making;
- Providing a way to check the progress of telecom initiatives;
- Guiding the development of implementation plans and budgets for telecom initiatives.

Some of the external issues uncovered during the San Francisco plan research included the discovery that the deployment of robust new or upgraded networks in residential areas is only just beginning, and the choice of service providers in residential neighborhoods is limited. Providers were having difficulty fulfilling orders for new services, especially high-speed Internet access. Complaints about customer service were common, as were complaints about the difficulty of comparing services and prices. Furthermore, certain services such as payphones and mobile phones were not readily available in some regions, and the installation of telecom facilities was causing visual blight.

In order to address these issues, the commission had to perform extensive research. This included a survey of all telecom companies doing business in the city, surveying residents on telecom issues, conducting small business focus groups, interviewing major institutional users of telecom services such as large businesses in the financial district, and holding Telecommunication Plan public participation meetings that included specific groups such as youth, the economically challenged and homeless, and seniors and people with disabilities.

The 2004 update to the San Francisco Telecommunications Plan noted that there were four developments that have had a major impact on the telecom environment in the city. These developments were the driving force behind the update:

- Increased focus on security and safety, as highlighted in the wake of the Sept. 11, 2001 tragedies and the Aug. 7, 2003 power blackout in East Coast and Midwest states.
- Increased dependence on wireless networks.
- Less than anticipated competition, due to the general economic recession and sluggish recovery in California, combined with a severe downturn in the telecom sector.
- Increased technology interdependence, where the line between traditional telecom and IT systems is becoming more and more blurred; infrastructure designed and built for analog communications is now transmitting digital information, and the Internet is carrying voice traffic.

The commission thus identified three key areas to organize and prioritize in the plan's goals: Public security and safety, economic development and equal access. With these in mind, the commission recommended a number of policy initiatives that specifically spell out ways to focus the city's efforts in these areas.

2. Davis

The City of Davis has been way ahead of the game for more than a decade. In 1990, the Davis City Council created a task force to investigate the use of advanced telecom technologies as a way to reduce traffic, strengthen existing businesses and attract potential high-tech businesses. The task force's final report recommended that the city develop a long-term strategy for "information infrastructure and services." Telecom infrastructure has been identified in the city's long-term plan as community resources that are as important to the city's economic development as basic infrastructure services such as water and sewers.

The Davis General Plan provides for specific actions to be taken to assure continued development of telecommunications and technology usage. Those actions include:

- Designating a formal Technology Coordinator.
- Making sure city staff are properly trained.
- Providing public access at convenient computer sites.
- Monitoring IT development and city infrastructure issues at the same level as that of other building and construction standards.
- Promoting the city as a site for research and development.
- Working with other agencies to integrate telecom planning on a regional basis.
- Investigating ways to increase telecommuting possibilities for all residents.
- Reviewing any proposed city construction projects involving trenching for opportunities to extend the networking infrastructure.

It is interesting to note that, unlike many cities or counties whose General Plans merely "encourage telecommuting," the City of Davis has a policy that, when appropriate, it will provide connectivity services, training and portable computing equipment to City staff who wish to telecommute. Additionally, employers who aggressively and effectively implement telecommuting are eligible to receive appropriate incentives such as reduction of parking requirements. These two policies clearly illustrate the difference between what could be called an

“advanced” Telecommunications Element or General Plan policy and those that are in the very early stages of development.

Wireless Siting

The siting of wireless communication towers can be viewed as a sub-set of telecommunications elements in General Plans, even when not labeled as such and falling under the domain of the Land Use, Public Facilities or Public Services elements. Unlike telecom plans in general, cities and counties have made much more progress in developing policies and implementing ordinances guiding the siting and installation of wireless towers. (Again, it should be noted that inconsistency in terminology is the general rule here: towers are called “Wireless Communication Facilities,” “Personal Wireless Service Facilities” or “Telecommunication Facilities and Antennas.”)

Some of the ordinances reviewed for this report include those of the cities of Arroyo Grande, Glendale, La Canada-Flintridge, Milpitas, Pleasanton, San Dimas, Temecula, Yuba City, and the counties of El Dorado, Fresno, Inyo, King, Mendocino, Monterey, Napa, Santa Cruz and Sutter.

Because so many of these ordinances are so similar in wording, they are summarized here rather than discussed individually.

Examples of wireless tower restrictions found in many ordinances include:

1. Roof-mounted antennas should be constructed at the minimum height possible to serve the operator’s service area.
2. Equipment shelters or cabinets must be concealed to the extent possible from public view.
3. Shelters or cabinets must meet building setback standards.
4. Landscaping must be provided and maintained to screen ground structures or equipment.
5. All equipment, antennas, poles or towers must be painted or otherwise treated to minimize visual impact.
6. Telecom providers must co-locate on existing facilities whenever possible. New facilities must include provisions for future co-location opportunities with other providers.

Most ordinances include a provision that applicants for wireless tower siting permits are entitled to show evidence as to why they cannot comply with certain restrictions, if to do so would prevent them from providing service. Many planning commissions seem to be intent on making their ordinances “provider-friendly” so as not to discourage competition and availability of enhanced services.

Summary of Research

It can definitely be said that the General Plans of California counties and cities are not very far along the path to consistently containing telecommunications elements. The most telling measure of the lack of progress in this field is the fact that telecom and IT are not even included in the list of optional elements that jurisdictions can add to their General Plans. However, despite the lack of guidance from the state and the dissolution of the California Technology, Trade and

Commerce agency, cities and counties in California still appear to be ready to move forward on their own, recognizing that if they don't jump on the bandwagon soon, they will be left out of the state's future economic development picture.

Thus many jurisdictions are just now beginning to develop policies and implement ordinances governing such topics as installation of telecom conduits while trenching in new developments or during repairs, pre-wiring new buildings for fiber, encouraging and in some cases providing equipment for telecommuting, providing underserved community members with telecom services, regional telecom planning and co-location of facilities. And many, like Humboldt County, are in the early stages of assessing where they currently stand with regard to state-of-the-art telecom technology and surveying the needs of the residents, businesses and government agencies.

Recommendations – Telecom Element in County General Plan Update

The following are recommended goals, policies, standards and objectives formulated after research and holding focus group sessions in Garberville, Arcata, Eureka, Fortuna and Willow Creek. As noted in the research section above, San Francisco City/County is the only county in the state with a telecommunications element in their general plan.

The Appendices have planning resources and links. The best resources found for narrowing down these recommendations were:

- Blacksburg, Virginia
- San Francisco, California
- Davis, California
- Kerrville, Texas
- Loudoun County, Virginia
- Mount Vernon, Washington
- Southeastern Wisconsin Regional Planning Commission
- Articles by Steins and Kaylor

Introduction

Humboldt County recognizes that advanced telecommunications are an essential part of creating a positive economic development environment and meeting the desires of its residents for high quality services. Modern economies are heavily dependent upon telecommunications networks.

Telecommunications infrastructure and services are important regional resources. They are as likely to be as important to economic development as traditional water, sewer, and road infrastructure.

Goal 1: Encourage development of telecommunications infrastructure and services to allow all who live and work in Humboldt County to use technology to communicate and do business with others locally, statewide, nationally and globally while maintaining scenic beauty, rural heritage, quality of life and protecting the health, safety and welfare of county residents.

Objectives

- Implement a program of technology planning, installation and education.
- Make information about county government available to residents in electronic format.
- Identify areas where future commercial public telecommunications facilities can be located, while minimizing the proliferation of antennas.
- Ensure compatibility of telecommunications facilities with nearby land uses.
- In partnership with private enterprise, facilitate the implementation of the best available telecommunications infrastructure countywide that allows for voice, data and video communications.

Policies

- Encourage fair and equitable competition among telecommunications providers.
- Be proactive in the design and siting of wireless telecommunications facilities.
- Encourage comprehensive and efficient wireless telecommunications.

- Encourage a diverse infrastructure (fiber, copper, coaxial cable and wireless).

Standards

- New developments (both residential and commercial) should support modern telecommunications technologies, with conduit spaces within joint utility trenches and co-location facilities. As well, new developments should provide for future expansion of facilities, as well as redundancy/backup.
- Encourage development of diverse telecommunications infrastructure (copper, fiber, coaxial cable and wireless) since one technology does not “fit all.”

Actions

- Manage rights of way and easement assets wisely for the public good. This includes, but is not limited to, adopting reasonable regulations for utility separation, the timing and coordination of the work in right-of-way, safety rules and regulations, and the preservation of the roads in a condition to best serve the traveling public.
- Facilitate placement of utilities underground.
- Participate in cooperative projects with educational institutions, governmental entities and private enterprise.
- Create partnerships with telecommunications companies to provide broadband access to all, but especially unserved and underserved areas.
- Facilitate the installation of fiber to the home and installation of wireless broadband.
- Provide builder incentives to install structured wiring in all new construction.
- Require developers to install telecom conduit, just like water and sewer.
- Work with neighboring counties to integrate telecommunications infrastructure planning for the region.
- Monitor telecommunications infrastructure issues (planning and enforcement) at the same level as other building and construction standards.
- Discourage unnecessary proliferation of wireless facilities.
- Provide incentives for unobtrusive and compatible wireless antennas.

Goal 2: Raise technology skills and awareness levels in county residents and businesses.

Objectives

- Encourage educational opportunities in computers and technology.

Policies

- Focus on interactions among people, businesses, governments, educational institutions and non-profit groups rather than on technology.
- Increase access to information technologies to all members of the community.

Actions

- Promote universal service and access to every citizen.
- Support affordable pricing.
- Support equitable access.

- Promote training and education on technology and telecommunications to County residents and businesses.

Goal 3: Use telecommunications and technology to maintain and enhance County government information resources and services provided to Humboldt County residents.

Objectives

- Utilize the Internet as a source of public information.
- Provide access technology points, such as libraries, to residents.
- Use the Internet as a tool to aid in delivery of public services.

Policies

- Promote regional cooperation in information technology to facilitate government-to-government transactions and exchanges of data.
- Continue to expand Geographic Information Systems (GIS) to facilitate E-government initiatives in providing convenient, user-friendly access to county information.
- Use technology to improve internal processes and customer service.

Actions

- Continue to enhance the county government network.
- Continue to leverage technology for improving county services.
- Continue the development and maintenance of the GIS and expand its use for all county departments, for residents and for corporate users.
- Improve usefulness of county information through discussions with users, such as opportunities for electronic dialogue between residents and county officials.
- Include wireless technologies for inclusion in county technology and service initiatives.
- Increase public access to computers and the Internet through libraries and other public buildings.
- Facilitate the creation of community technology centers allowing public access to technologies that may not be available in the home.
- Create government-to-government connections and data sharing.
- Implement on-line payment for county services and encourage cities to do the same.
- Implement on-line services to issue permits and process licenses and encourage cities to do the same.
- Use technology to improve common internal processes and move toward an online environment, where applicable.
- Acquire technology to enable broadcast of Board Of Supervisor meetings over the Web.
- Continue to maintain Web site as portal to county government.
- Continue to train County staff in use of technology.
- Continue to encourage County staff to use e-mail.

Goal 4: Promote use of telecommunications and technology to enhance the economic vitality of Humboldt County.

Objectives

- Utilize telecommunications services to support economic development and competitiveness.
- Facilitate advanced telecommunications infrastructure for residences, businesses, and educational institutions.

Policies

- Encourage electronic commerce in Humboldt County in all its forms, from wholesale and retail sales to communications, delivery of training services, and cooperative projects within and across industry sectors.

Actions

- Promote the concept of local businesses conducting business over the Internet.
- Promote Humboldt County as a region for technology-based businesses and research and development.
- Facilitate education of local businesses and organizations in the value of technology usage.

Goal 5: 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.

Objectives

- Encourage telecommuting for local businesses.
- Encourage telecommuting for county employees where feasible.

Standards

- Employers who implement telecommuting are eligible to receive incentives, such as reduction of parking requirements.

Actions

- Provide or continue to provide county services online.
- When appropriate, provide connectivity, training and equipment to county staff who wish to telecommute.

Goal 6: Develop an awareness that Humboldt County understands and supports technology and telecommunications.

Objectives

- Convey through promotional documents that the government and community understand and use advanced telecommunications and technology.

Actions

- Promote the County as technology-aware.
- Periodically review this plan as technology changes.
- Refer to current innovative technology projects in print publications and online.

- Use electronic media in city publications and communications.
- Continue to maintain high quality County Web site.
- Promote the Tech Expo to areas within a few hours' drive – Redding, Ukiah, etc. – giving residents in those areas the incentive to bring their small business here for more than just the cool weather.

MISCELLANEOUS REPORTS TO COUNTY PLANNING DIVISION

During the course of the project, I was asked to comment on the proposed wireless transmission facility ordinance and the subdivision map act with regard to wireless broadband. The following covers those topics.

Comments on Proposed Wireless Transmission Facility Ordinance

Comments follow on the proposed Wireless Telecommunications Facilities Ordinance from August 2003. Most technical and business folk agree that wireless broadband will play a huge role in connecting Humboldt County, since the population is too sparse for traditional telecommunications companies to make a business case to install wireline (copper and fiber) infrastructure. Broadband is an economic development issue, and there are elements in this ordinance that will have an impact on wireless broadband deployment.

- The purpose section does not have any statement about wireless' role in economic development. This is a stated goal in Tuolumne County, where they have taken the lead in acknowledging wireless broadband as an economic development tool. The purpose section also says *promote*, when a more appropriate word might be *regulate*.
- Next generation wireless technology and broad usage may require a proliferation of antennas. A plan for siting is critical.
- There are references to pagers, cell phones, radios and TV but not broadband. Most technology and telecommunications futurists believe that it won't be long before most telecommunications are over broadband, and that cell phones as we now know them will not exist. Perhaps a bit of updating is in order given how fast technology is changing.
- In 8.1 Applicability section, item B might be expanded to read *Radios operating in the license-free (ISM: Industrial/Scientific/Medical, Wi-Fi, WiMAX, Amateur) bands transmitted with less than a watt of radiated power and using antenna dishes one meter or less in diameter*. Copper or fiber will never serve some of the rural areas of this county, so this addition could be important.
- Section 8.3 Development Standards Section A is extremely restrictive. Requirement to site WTF more than 100 feet from exposed ridgelines will greatly limit coverage areas and in the end beget more towers as greater geographical coverage is required. Given the amount of public land, recreational, and scenic lands in this county, it will be difficult to find sites under this ordinance.
- Requiring co-location of towers is good. 8.3 Section B is very restrictive and might preclude creative alternatives.
- 8.3 Sections C and D use the term *monopole* where *antenna structure* might be more appropriate. Ditto for 8.4 Section B.
- The county should consider a study of best sites in terms of coverage if wireless is going to be important in our economic future.

Subdivision Map Act

Early on in the project, a county planning staff member asked: “Can you tell us if this broadband stuff is included in the cellular and telecommunications exception from the Subdivision Map Act (§66412j, CA Gov’t Code). We’re having some trouble with figuring out whether a lease agreement between a company and a landowner for the placement of tower/facility is subject to the SMA.” Feedback was as follows on 8/5/04:

I found this at http://ceres.ca.gov/planning/pzd/sub_ch1.html in the section listing exemptions:

66412 (j) The leasing or licensing of a portion of a parcel, or the granting of an easement, use permit, or similar right on a portion of a parcel, to a telephone corporation as defined in Section 234 of the Public Utilities Code, exclusively for the placement and operation of cellular radio transmission facilities, including, but not limited to, antennae support structures, microwave dishes, structures to house cellular communications transmission equipment, power sources, and other equipment incidental to the transmission of cellular communications, if the project is subject to discretionary action by the advisory agency or legislative body.

In my opinion, this covers both data and voice transmission, though I find the wording to be somewhat obsolete, which is not surprising since it was probably written 10 years ago when cellular telephone towers were proliferating, before wireless data broadband technology. For instance “cellular radio transmission” should probably read “radio transmission” these days, without the “cellular”. I don’t even pretend to understand the legalese at the end of the paragraph “if the project is subject to etc etc etc.

Radios are becoming “smart” and can do many things. See:

http://www.economist.com/science/tq/displayStory.cfm?story_id=2246155

<http://cc.uoregon.edu/cnews/spring2001/sdr.html>

http://iwce-mrt.com/ar/radio_fcc_opens_rulemaking/

<http://www.gdds.com/press2003/0519nextgensmartradios.html>

And on and on..... search Google with “smart radios”.

Google search on “subdivision map act” + california + wireless also yields tons of links to other counties/cities where they have exemptions on “radios,” “wireless,” “antenna,” “microwave,” etc. Some were:

<http://www.co.kern.ca.us/planning/ldo1805.asp>

<http://www.townoftruckee.com/DCCCh090.html>

http://www.ci.livermore.ca.us/lmc_html/lvmore18.html

I stopped looking after seeing more of these as well as many board agendas on the subject.

The following is an FCC antenna registration site that may prove useful:

<http://wireless.fcc.gov/antenna/index.html>

APPENDICES

Planning Resources

Links to all 58 California counties' General Plans can be found at the Web site of the California Land Use Planning Information Network (LUPIN), part of the California Environmental Resources Evaluation System (CERES): ceres.ca.gov/planning/genplan/index.htm

“Should Your General Plan Have a Technology Element?” by Charles H. Kaylor and Christopher Steins. July 6, 2004. www.matr.net/article-11432.html

“Today’s Scheme For Tomorrow’s Technology” by Charles H. Kaylor and Christopher Steins. July 2004. <http://www.urbaninsight.com/virtual/planmag0704.html>

“Prospectus for a Regional Telecommunications Planning Program,” Southeastern Wisconsin Regional Planning Commission, December 2003, http://www.sewrpc.org/publications/prospectus/prospectus_telecommunications.pdf

Technology Element, Mount Vernon (Washington) Comprehensive Plan, October 2002, www.mrsc.org

Technology Element, Comprehensive Plan, Plano, Texas, November 2002, www.planoplanning.org

ACCESS, San Joaquin Valley, California, www.greatvalley.org

Utah Telecommunications Open Infrastructure Agency, www.utopianet.org

California Planners Information Network: www.calpin.ca.gov

Knoxville Wireless Facilities Plan: <http://www.knoxmpc.org/plans/wireless/goals.htm>

Blacksburg, Virginia Information Technology Plan, www.blacksburg.gov/comp_plan/information_tech/body.html

Davis, California General Plan, <http://www.ci.davis.ca.us/pb/gp/005-08-Computers-and-Technology.pdf>

Other Online Resources

Redwood Technology Consortium

www.redwoodtech.org

CENIC

www.cenic.org

CENIC/SAIC Northwest California Infrastructure Analysis: Del Norte and Humboldt

<http://www.cenic.org/pubs/reports/nwcenticstudy.pdf>

CENIC/Gartner One Gigabit or Bust Initiative

<http://www.cenic.org/gb/pubs/gartner/index.htm>

(note mention of Humboldt County on page 25)

CENIC Roundtable Meeting and Conference presentations (some about Humboldt)

<http://www.cenic.org/pubs/presentations.htm>

Listserves of interest

<http://lists.cenic.org/mailman/listinfo/wireless>

<http://www.redwoodtech.org/>

Focus Group Attendees

SoHum Focus Group 9/16/2004

Name	Organization
Dan Baleme	One Log House
Dave James	Redwoods Rural Health
David Rippner	Alternative Energy
Dean Hazen	Starstream Cable
Deborah Jo Johannesen	Last Mile Digital
Dee Dower	Garberville-Redway Chamber of Commerce
Evelyn King	Healy Senior Center
Garth Epling	Emerald Technologies
J Ryan Peters	ASIS
Janet Finch	Hi Oak Farm
Jim Baker	School Board
Jim Lamport	Legal, Healthcare District
John Christiansen	Library
John Rogers	Lost Coast Computing
Lisa Tine	Umpqua Bank, Chamber
Lori Anzini	Funnygate Technologies
Lori Richeson-Smith	County of Humboldt, WISH, Healthcare
Nonie Heinze	Accounting
Andy Johannesen	Last Mile Digital
Rick Silva	Alternative Energy, KMUD
Sally Then	ASIS
Skip Stone	Redwood Times

**Arcata Focus Group
9/29/2004**

Name	Organization
Becky Luening	Education, CBO, Arts&Culture
Bill Cannon	HSU
Bob Doran	North Coast Journal
Bob Freeman	BtB Software
Cathy Dickerson	HCOE
Dave Edmonds	SBC
Fred Shinnick	Resident
Harold Horne	UIHS
Helen Gale	CBO, Health, IT, Education
Jan Kraepelien	Govt, CBO, Educ, IT
John Ennis	Scandoc
John McBrearty	CR
Larry Goldberg	IT business
Libby Maynard	CBO, Tourism, IT, Arts&Culture
Mark DuBrow	RISE
Mitch Trachtenberg	IT business
Rebecca Lesley	Arcata Chamber
Rollin Richmond	HSU
Todd Stone	Humboldt Hookup
Tom Conlon	City of Arcata

**Eureka Focus Group
10/7/2004**

Name	Organization
Alicia Cox	Cox-Rasmussen
Angela Shelton	Anderson, Lucas, Somerville & Borges
Barbara Madaras	Consultant
Bob Morse	Morse Media & RAIN
Connie Anderholm	HCOE
Diane Batley	Eureka Reporter
Don Ehnebuske	Biz, CBO, AEDC
Don Wolksi	HSU
Janet DePace	Biz, AEDC, WIB
Jaye Inabit	HumLUG
John McBrearty	CR
Kevin O'Brien	Eureka Adult School
Kevin Plessinger	Humboldt Merchant Services
Kim Kerr	County of Humboldt
Nancy Streufert	Attorney at Law
Rene Agredano	Agreda Communications
Ron Schoenherr	KEET
Steve Setterlund	HCOE
Tom Waitman	Area Council on Aging, Pulp Mill

**Eel River Valley Focus Group
10/14/2004**

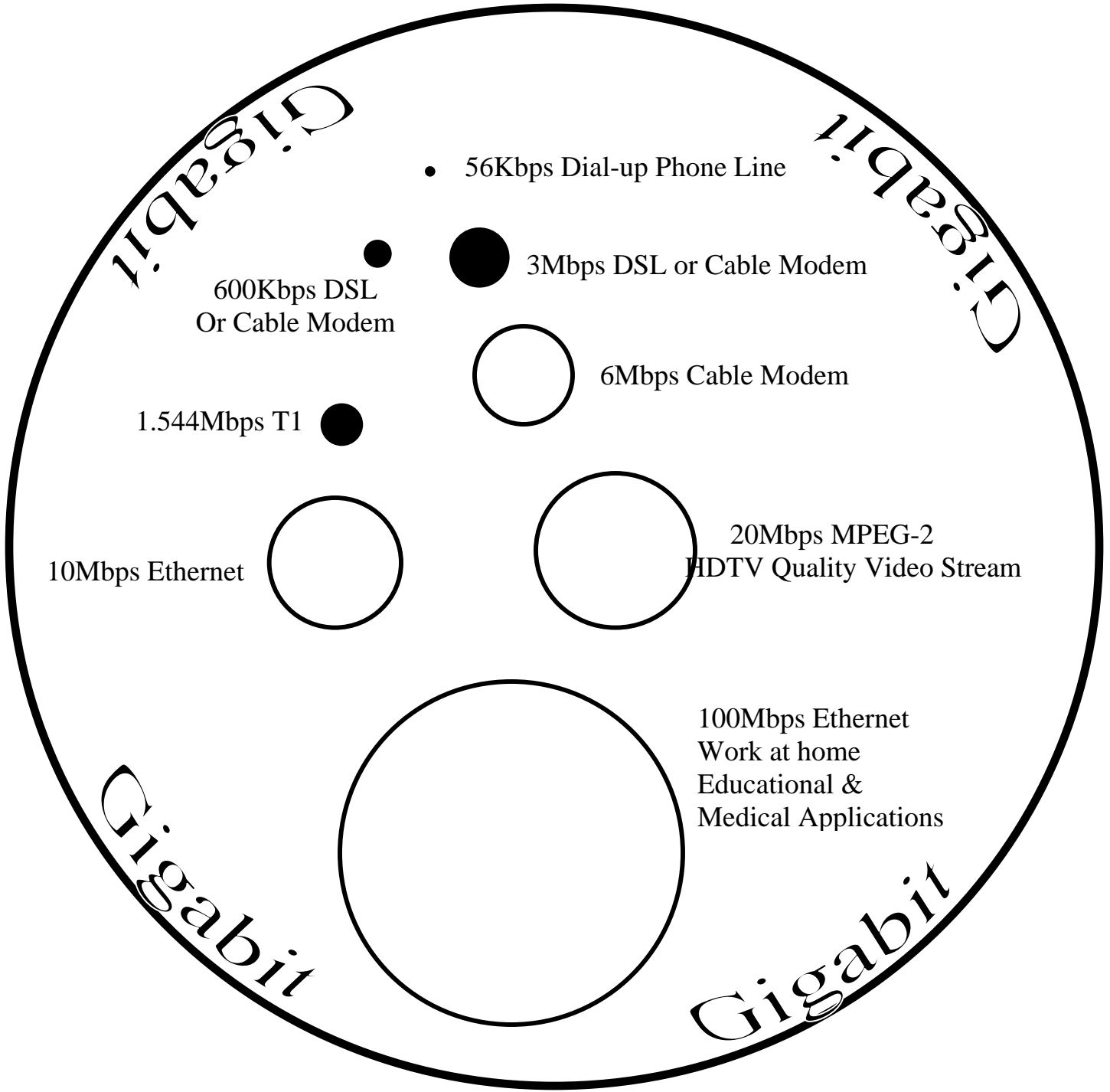
Name	Organization
Alan Fox	Fox Weather LLC
Beth Rogers	Fortuna Adult Education
Bob Judevine	SBDC
Daniel Fuller	Bridgeville Community Center, Educ
Demetrius DiStefano	IT business
Eli Naffeh	City of Rio Dell
Ellen Briggs	Ferndale Chamber of Commerce
Gary Black	Frontier
Greg Duerden	Beacon
Greg Kastanek	IT business
Gregg Foster	RREDC, WIB
Jenny Willhite	Consulting business
Judy Pieratt	Rio Dell Community Resource Center, CofC
KD Drew	Rio Dell Community Resource Center, Biz
Malcolm Carpenter	IT business
Matt Knowles	Aesthetic Design & Photography
Nancy Kaytis-Slocum	City of Ferndale
Peter Krueger	Precision Intermedia
Susan Quinn	Ripe To Your Door
Tim Foster	NMS
Travis Fuller	Bridgeville Community Center, Youth

**Eastern Humboldt
Focus Group
10/26/2004**

Name	Organization
Ashley Welbanks	Resident
Chad Paine	Cinnabar Sam's
Chris Kleeman	Karuk Tribe
Debra Stauffacher	Resident
Gene Genoar	Hoopa Tribe, Education
Jerry Nobles	WC Christian School
Joseph Orozco	KIDE, Hoopa Tribe
Nita Rowley	Willow Creek Chamber of Commerce
Rhoby Cook	CBO, Agriculture, KIDE
Roberta Coragliotti	USFS, Educ
Steve Paine	WCCSD

Focus Group Presentation Illustrations

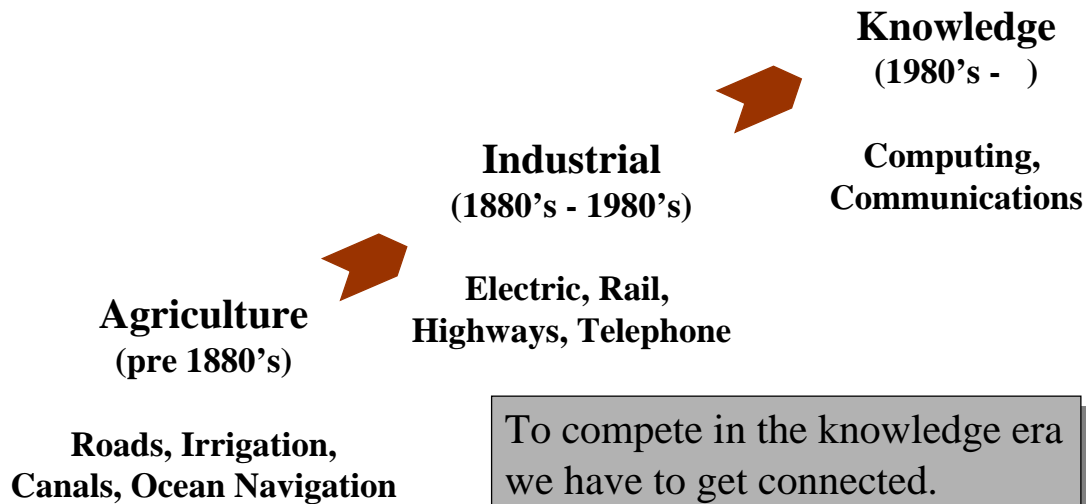
This page and the following pages have some of the illustrations used in the focus group sessions.



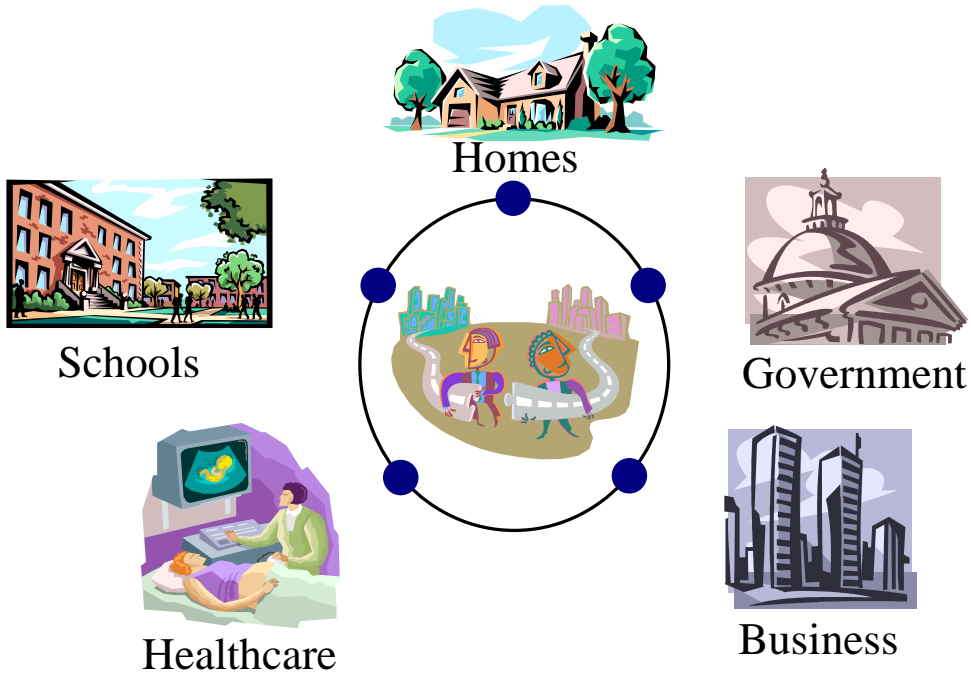
Technologies and Bandwidth

Service Type	Upstream	Downstream
Dial-up	56kbps	56kbps
Satellite	50-256kbps	500kbps-1mbps
DSL	128-384kbps	384kbps-3mbps
Cable Modem	256-768mbps	1-6mbps
Fractional T1	128kbps-1.5mbps	128kbps-1.5mbps
T1	1.5mbps	1.5mbps
Gigabit	1gbps	1gbps

We are making the transition to the knowledge era. Each era has critical, enabling infrastructures



To achieve this vision we have to connect every sector.



And we have to reduce barriers; we have to close the digital divide.

Haves &
Have Nots



- Access
- Tools

Can &
Can Nots



- Skills
- Ability

Will &
Will Nots



- Applications
- Leadership

Steve Peters, Arizona Information Technology Alliance

Wireless facilities



Mail-Out Survey

The survey is on the following page.



Humboldt County Telecommunications Survey

Please take a moment to fill out and return this survey. Information will be used to document current telecommunications usage and to make recommendations for improvements in Humboldt County. For more information on the project, check out “Living in a Networked World” at www.redwoodtech.org/hottopics. Results will be posted in December. Thank you for your help.

**Return by 11/15/04 via FAX to 707-445-9652 or mail to:
Tina Nerat, Prosperity Center, 520 E Street, Eureka CA 95501**

What type of Internet service do you have at work and at home? Check all that apply.

Internet Service	None	Dial-Up	Satellite	DSL	Cable Modem	T1	>T1
At work?							
At home?							

Please check which network applications your organization is using now, plus those that are expected to be used in the future. This provides a measure of utilization and what your bandwidth needs may be in the future.

Internet and Intranet Applications	Used now?	Expect to use?
e-Mail, with attachments		
Web browsing and research		
Transfer of large files		
Voice over IP (VoIP)		
Teleworking/telecommuting		
Banking		
Placing orders		
Making payments		
Web site for marketing or publishing information		
Web site for receiving orders/payments		
Web site for providing customer or employee support		
Education and training		
Audio streaming on demand		
Video streaming on demand		
Monitor and control for security or alarms		
Monitoring for health applications		
Telemedicine		
Online graphical applications (CAD, GIS, etc)		
Network storage and/or backup		
Disaster recovery and loss avoidance of data		
Communications between sites at T1 speeds		
Communications between sites at >T1 speeds		
Wireless LAN access		
Other (specify):		


What price/month would you consider paying for bandwidth that supports the applications you use?

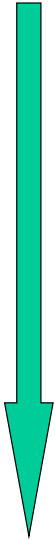
\$ _____

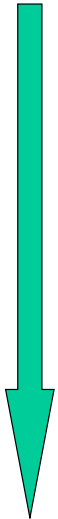
Please use the back of this page for any comments or e-mail comments to tnerat@cox.net. Especially important to hear about is what you **can't** do because of lack of bandwidth.


Focus Group Worksheets

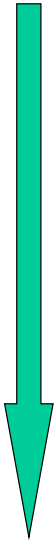
The following seven worksheets were used by each attendee at the focus group sessions. Attendees rated their organization(s) based on the criteria on the matrix, one worksheet for each organization they were representing.


Businesses		Type/Name of Business: _____			
		Your Name: _____			
This assessment tool is designed to quickly assess where the community stands today. A rating of Level 1 is the lowest, Level 4 is the highest, and Level 0 is disconnected.					
	Least Connected	Stage	Networked Places	Applications & Services	Leadership
	0	Not using the Internet.	No computer use. No Web site. Customers use phone and postal mail.	No technology or telecom plan.	
	1	Some office employees have always-on connections to the Internet at their desks.	Some businesses have an informational Web site. Some businesses transmit or receive some orders electronically.	You view the Internet as essential to business operations. Employees are trained on basic applications.	
	2	Most office employees have always-on connections to the Internet at their desks. Some mobile workers have laptop computers and can access the office network remotely. Affordable videoconferencing facilities are available in the community.	Most businesses have an informational Web site. Some retail Web sites can accept credit card purchases. Some businesses participate in an electronic supply chain.	Some businesses permit some employees periodically to telework. Some businesses encourage employees to take work-related classes online. Employee training on new technology is a priority.	
	3	Some businesses uses VoIP to save money. Some office workers have converted from desktop computers to portable devices with wireless connections. Some office computers have webcams for videoconferencing.	Some businesses outsource most of their computing services. Some retailers and manufacturers sell goods out of state or internationally. Some employees work remotely, some out of state.	Some businesses permit some employees to telework one or two days a week. Some businesses encourage employees to take work-related classes online. Businesses are working with educational partners to raise workforce skill levels.	
	4	Most businesses use VoIP to save money. Most computers have video cameras. Some retailers and manufacturers use RFID to track inventory and equipment.	Some businesses send and receive video mail. Some businesses outsource most of their computing services. Some businesses routinely use multiparty videoconferencing to coordinate operations.	Some businesses have restructured to focus on their core contribution and outsource nonessential functions. New hires are required to have experience using new technology in business applications.	
		Most Connected			

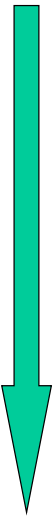
K-12		District: _____		
		Your Name: _____		
This assessment tool is designed to quickly assess where the community stands today. A rating of Level 1 is the lowest, Level 4 is the highest, and Level 0 is disconnected.				
Least Connected  Most Connected	Stage	Networked Places	Applications & Services	Leadership
	0	Not using the Internet.	Use phone and postal mail. No Web site.	No technology or telecom plan.
	1	Many middle and high schools have computer labs for students. Some classrooms and teachers have access to computer projectors.	Many schools have an informational Web site. The Internet is rarely used as a resource for instruction or homework assignments.	Few schools have plans for better utilizing telecommunications services and technologies in their classrooms. Some experienced teachers are trained in how to incorporate material from the Internet into their curriculum.
	2	Schools provide at least one computer for every five students in grades seven and above. Most classrooms have computers for student use. Some teachers use computer-based presentation tools and projectors for their lessons.	Some schools have an interactive Web site that offers access to homework assignments and communication with teachers and administrators. Many experienced teachers know how to incorporate Internet information into the curriculum. Many teachers welcome e-mail from parents and students.	The school board sees opportunities to use the network to raise test scores and operate the school more efficiently. Teacher training on new technologies is a priority at most school districts. Schools are using consultants to take advantage of e-rate and other school discounts.
	3	Some students bring their own laptop computers to school. Some computer labs have been closed. Many classrooms teachers have access to digital projection capabilities. Most middle and high schools have video programs that allow students to produce and share shows on a public network. Some schools use wireless sensors to monitor energy consumption.	Many schools have an interactive Web site that offers access to homework assignments and e-mail contact with teachers and administrators. All teachers are trained to use the Internet for instruction. Parents and family members are encouraged to participate in student learning via e-mail and online applications. Some seniors are taking college-level classes on the Internet.	Some schools have comprehensive plans for learning activities utilizing technology in the classroom. New hires are required to have experience using new technology in the classroom. Computer labs are made available to family and community members. Schools take responsibility for continuing e-rate and other discounts.
4	Most students bring their own laptop computers to school. Most computer labs have been closed. Many classrooms have large, flat-panel displays or projectors for video-based instruction. Most schools have converted their phone system to VoIP to save money.	Schools use the network to connect students, teachers and parents, improve learning via online resources, and manage administrative responsibilities more efficiently. Schools have ICT literacy requirements in place. Technology training is offered to the community. Many high school students use online teachers and experts to explore subjects and develop learning plans.	Many schools have comprehensive plans for learning activities utilizing technology in the classroom. School districts actively promote ICT literacy to drive positive impacts on economic performance, skills and innovation in the classroom. The school system plays a vital role in raising the skill level and awareness of community and family members.	

Health		Clinic/Provider/Hospital: _____		
		Your Name: _____		
This assessment tool is designed to quickly assess where the community stands today. A rating of Level 1 is the lowest, Level 4 is the highest, and Level 0 is disconnected.				
Least Connected  Most Connected	Stage	Networked Places	Applications & Services	Leadership
	0	Not using the Internet.	Customers use phone and postal mail. No Web site.	No technology or telecom plan.
	1	Some doctors regularly use computers to enter and maintain patient records. Digital instruments and imaging equipment are being acquired.	Many clinics and hospitals have informational Web sites.	Work is just beginning on the evaluation of conversion to electronic medical records.
	2	Some doctors and nurses are using laptop and palmtop devices connected to wireless networks to enter patient information and access databases. Local laboratories are converting to digital equipment in order to transmit test results electronically.	Many providers have informational Web sites. Some providers store patient records electronically. Telemedicine is being evaluated. Some offices are electronically transmitting records to insurers for reimbursement.	Many providers have begun the conversion to electronic medical records. Some providers are investigating how to deploy wireless technologies for mobile workers.
	3	Internet-based videoconferencing is used to consult experts and for training programs. Some patients are being monitored at home and at work via portable devices with wireless transmitters.	Some providers allow patients to e-mail doctors. Many providers store patient records electronically. Some lab results and images are received electronically.	Work is underway by some providers to begin online exchanging of test results and other medical records with appropriate parties. Healthcare leaders are talking with the community about enhancing online services and using the network to improve communitywide healthcare.
4	Most equipment has been converted to digital. Desktop videoconferencing is routine at all hospitals and major clinics. Telephone systems have converted to VoIP to save money. Remote monitoring of patients with chronic conditions is standard procedure.	Many providers allow patients to schedule appointments, view records and get advice online. Many patient records are stored electronically and routinely sent electronically to distant providers to aid diagnosis and treatment for emergency patients. Telemedicine routinely is used to access specialists. Wireless feeds in ambulances provide real-time patient assessment to ER staff.	Healthcare leaders see themselves as a key part of the community's overall economic strategy. Leaders are visible and active in strategy development and implementation. Executives of the region's hospitals, clinics, insurers, employers and other healthcare providers are meeting regularly to find ways to collaboratively reduce the cost of healthcare without compromising quality of service.	

Libraries		Library: _____		
		Your Name: _____		
This assessment tool is designed to quickly assess where the community stands today. A rating of Level 1 is the lowest, Level 4 is the highest, and Level 0 is disconnected.				
Least Connected  Most Connected	Stage	Networked Places	Applications & Services	Leadership
	0	Libraries do not provide Internet access.	Customers use postal mail or phone. No Web site.	There is no technology or telecom plan.
	1	Public libraries provide several computers with free access to the Internet.	Most libraries have a Web site with basic information about hours of operation and location.	Libraries are the first to offer free access and instruction in the use of the Internet.
	2	There is rarely a more than 10-minute wait to use the Internet-enabled computers.	Most libraries have catalogs online. Patrons may use the Internet to place books on hold and request books from other libraries in the library system. Patrons can search online databases from home, school or work. Libraries host live video feeds of public interest events.	The library research desk is an online community resource. Staff training on new technologies is a priority at most libraries. Libraries are using consultants to take advantage of e-rate and other discounts. Library policies reflect appropriate filtering requirements.
	3	Public libraries have added network ports or wireless networks and electrical outlets to carrels.	Patrons may review their accounts online and pay fines by credit card. Patrons can access the library online as a portal for other online information services.	Libraries help the community understand copyright issues and how to protect privacy on the Internet. New hires are required to have experience using new technology. Libraries take internal responsibility for continuing e-rate and other discounts. Libraries have developed network management policies and technologies to prevent patrons from sending spam.
	4	Most public libraries offer patrons a 100 mbps or faster wireless network.	Public libraries offer live video consultations. Public libraries allow patrons to borrow e-books over the Internet. They help patrons conduct research and assist with legal access to copyrighted databases and publications, including music and movies. Two-way videoconferencing is available to the general public.	Libraries continue to upgrade their facilities to offer the community the next-generation in technology, services and training. Libraries actively promote ICT literacy to drive positive impacts on economic performance, skills and innovation in the community.

Higher Education		College/University: _____		
		Your Name: _____		
This assessment tool is designed to quickly assess where the community stands today. A rating of Level 1 is the lowest, Level 4 is the highest, and Level 0 is disconnected.				
Least Connected  Most Connected	Stage	Networked Places	Applications & Services	Leadership
	0	Not using the Internet.	Use phone and postal mail.	No technology or telecom plan in place.
	1	Most on-campus residences have a 10 mbps connection to the network. Some classrooms are wired to the college/university network and are equipped with digital projection capabilities.	Some faculty members are trained to use the Internet for instruction. Some classes use digital content and/or Web-based content for instruction.	Few departments have plans for better utilizing telecommunications services and technologies in their operations.
	2	Most on-campus residences have connections to the network in every room at least 100 mbps. Some classrooms have projection equipment that allows the instructor to display videos from the Internet into the classroom.	Some of the faculty are trained to use the Internet for instruction. Some classes use digital content and/or Web-based content for instruction. Students use chat rooms to discuss lessons and ask questions of instructors outside of class hours. Online registration, catalogs and payment available.	Specialized courses have been developed to cater to area businesses seeking to improve the skills of workers. Some colleges and universities have or are developing online classes to provide greater convenience for students and to increase student enrollment. Faculty training on new technology is a priority.
	3	Some classrooms have been remodeled to include network connections and power outlets at every seat. Many students bring laptop computers or other network-enabled devices to class. Some classrooms have video equipment for recording lectures.	Many of the faculty is trained to use the Internet for instruction. Many classes use digital content and/or Web-based content for instruction. Some undergraduate students take distance learning classes for specialized subjects and graduate-level research.	Higher education and local businesses are working together to raise the skill level of the current workforce. Community colleges are expanding their capacity by using distance learning technologies to reduce the need for classroom time. Some colleges and universities are developing online classes to market to students in other parts of the country and the world.
4	Many classrooms have been remodeled to include network connections and power outlets at every seat. Most students bring laptop computers or other network-enabled devices to class. Many classrooms have video equipment for recording lectures.	Some undergraduate students take distance learning classes for specialized subjects and graduate-level research. All aspects of higher education are available through the network including instruction and administration.	The college/university sees itself as a vital partner in the community's economic development strategy and has formed partnerships with local businesses to provide skilled technology workers and innovative solutions. Colleges/universities actively promote ICT literacy to drive positive impacts on economic performance, skills and innovation in the classroom.	

Community Based Organizations		Name of Organization: _____		
		Your Name: _____		
This assessment tool is designed to quickly assess where the community stands today. A rating of Level 1 is the lowest, Level 4 is the highest, and Level 0 is disconnected.				
Least Connected  Most Connected	Stage	Networked Places	Applications & Services	Leadership
	0	Not using the Internet.	No computer use. No Web site. Use phone and postal mail.	No technology or telecom plan.
	1	Some CBOs have computers that are no more than three years old. Many CBOs have e-mail. Some office employees have always-on connections to the Internet at their desks.	Some CBOs have informational Web sites.	CBOs are minimally involved in community economic development issues. Little or no plans exist for better utilizing telecommunications services and technologies. Some CBOs provide technology training to their staff at least once a year.
	2	Many CBOs with at least five paid staff have at least one computer for every three employees. Many CBOs have e-mail.	Many CBOs have an informational Web site. Many local chapters are able to share data electronically with the national parent organization. Some CBOs accept online donations.	Some CBO leaders are involved in specific economic development initiatives, but most do not participate. Some CBOs plan to use telecommunications services and technologies within the next year. Some CBOs provide technology training to their staff at least once a year.
	3	Many CBOs with at least five employees have direct connections to the Internet. All paid staff has e-mail accounts. Some CBOs use VoIP to save money. Some office workers have converted from desktop computers to portable wireless devices. Some office computers have video cameras.	Many community-based organizations have an informational Web site. A unified CBO portal provides access to a broad range of community information and services. Many local chapters are able to share data with the parent organization. Many CBOs accept online donations.	Some CBO leaders are actively involved in community economic development issues and there are visible leaders taking a significant role in economic development. Some CBOs plan to use telecommunications services and technologies within the next year. Most CBOs provide technology training to their staff at least once a year.
4	Every CBO is connected to the Internet. Every computer can access the Internet via a local area network. Many CBOs use VoIP. Many computers have video cameras. Most CBOs use affordable videoconferencing facilities.	Some CBOs utilize an interactive service to further engage the community and make their services more broadly available. Electronic data sharing is a common practice between CBOs locally and with national parent organizations. Most CBOs accept online donations.	CBOs have a defined role in supporting local economic development initiatives. Most CBOs plan to use telecommunications services and technologies within the next year. CBOs collaborate with one another regularly to share resources and provide up-to-date training to their employees and volunteers.	

Government		Jurisdiction: _____		
		Your Name: _____		
This assessment tool is designed to quickly assess where the community stands today. A rating of Level 1 is the lowest, Level 4 is the highest, and Level 0 is disconnected.				
Least Connected  Most Connected	Stage	Networked Places	Applications & Services	Leadership
	0	Not using the Internet.	No Web site.	No technology or telecom plan.
	1	Some employees have e-mail accounts.	Most public agency Web sites offer informational features such as community calendar, staff directory and downloadable forms. Customers rely mostly on postal mail and telephone to conduct business.	Public agencies do not have a strategy for how best to use e-government. Minimal telecommunications planning has occurred. Elected officials are not involved in telecommunications issues.
	2	Many employees have e-mail accounts. Some field workers are collecting data on laptop computers or palmtops. Webcams are starting to be deployed.	Some e-government applications are available, such as simple building permit applications, e-mail listserv and some downloadable forms. E-mail from residents is manually routed to the appropriate departments. Some agencies routinely use the network to share data.	Government staff is actively involved in framing technology and telecommunications issues. Processes are underway for enhancing connectivity, rights-of-way management and IT innovation. Employees are trained and knowledgeable on basic applications.
	3	Some employees are using desktop videoconferencing. Some field workers use wireless networks to upload and download data in the field. Sensors and webcams monitor locations, such as rivers, that may be a threat to public safety.	Parks and recreation classes can be registered for online. Customers can make routine payments, such as parking fines, online using credit cards or EFT. Building inspections and violations can be entered from the field.	Elected officials understand the importance of the network for economic development and quality of life. Rights-of-way & tower siting policies are in place. Some agencies have a formal policy that allows some employees to work at home at least one day a week.
4	Desktop videoconferencing is widely available. Many field workers use wireless networks to upload and download data in the field. Critical traffic signals are connected. The telephone system is being converted to VoIP to save money.	Interactive applications, such as customer relationship management, online GIS and video streaming are in regular use. Employees manage benefits programs on an intranet. Emergency response teams can reliably communicate across jurisdictions. Council meetings are indexed and available for searching and retrieval online.	The government has telecommunications, e-government and IT master plans in place to guide its efforts. Innovative processes are used to collaborate with the private sector.	

Glossary

Many of the explanations of these terms came from www.webopedia.com, www.jwire.com, and www.whatis.com.

1X – A prefix for cellular data technology that indicates that only 1.25 MHz of spectrum is in use.

3G - Third-Generation mobile communications technology, as defined by the ITU, provides a global standard for cellular networks capable of handling live video calls and data access at broadband speeds. There are several flavors of 3G, including EDGE, CDMA 2000, and WCDMA/UMTS.

ATM - Asynchronous Transfer Mode, a network technology based on transferring data in cells or packets of a fixed size. The cell used with ATM is relatively small compared to units used with older technologies. The small, constant cell size allows ATM equipment to transmit video, audio, and computer data over the same network, and assure that no single type of data hogs the line. Some people think that ATM holds the answer to the Internet bandwidth problem, but others are skeptical. ATM creates a fixed channel, or route, between two points whenever data transfer begins. This differs from TCP/IP, in which messages are divided into packets and each packet can take a different route from source to destination. This difference makes it easier to track and bill data usage across an ATM network, but it makes it less adaptable to sudden surges in network traffic. When purchasing ATM service, you generally have a choice of four different types of service:

- **Constant Bit Rate (CBR)** specifies a fixed bit rate so that data is sent in a steady stream. This is analogous to a leased line.
- **Variable Bit Rate (VBR)** provides a specified throughput capacity but data is not sent evenly. This is a popular choice for voice and videoconferencing data.
- **Unspecified Bit Rate (UBR)** does not guarantee any throughput levels. This is used for applications, such as file transfer, that can tolerate delays.
- **Available Bit Rate (ABR)** provides a guaranteed minimum capacity but allows data to be *burst* at higher capacities when the network is free.

Backhaul – 1) In wireless network technology, to transmit voice and data traffic from a cell site to a switch, i.e., from a remote site to a central site, 2) To transmit data to a network backbone or the Internet.

Bandwidth - The amount of data that can be transmitted in a fixed amount of time. For digital devices, the bandwidth is usually expressed in bits per second (bps).

Broadband - A type of data transmission in which a single medium (wire) can carry several channels at once. Cable TV, for example, uses broadband transmission. In contrast, baseband transmission allows only one signal at a time. Most communications between computers, including the majority of local area networks, use baseband communications. The FCC definition of broadband is 200kbps.

CDMA – Code Division Multiple Access. The type of digital cellular phone network used throughout most of the United States, but rare elsewhere in the world. CDMA2000 is the third generation.

CLEC - Pronounced *see-lek*. A Competitive Local Exchange Carrier is a telephone company that competes with an Incumbent Local Exchange Carrier (ILEC) such as PacBell, Verizon, etc.

CO - Central Office. In telephony, a CO is a telecommunications office centralized in a specific locality to handle the telephone service for that locality. Telephone lines are connected to the CO on a local loop. The CO switches calls between local service and long-distance service. ISDN and DSL signals also channel through the CO.

DS3 - A dedicated phone connection supporting data rates of about 43Mbps (megabits per second). Also called a T-3, the line actually consists of 672 individual channels, each of which supports 64Kbps. DS3 lines are used mainly by Internet Service Providers (ISPs) connecting to the Internet backbone. Large businesses also use DS3 lines when they have large sites to interconnect.

DSL - Refers collectively to all types of Digital Subscriber Lines. DSL technologies use sophisticated modulation schemes to pack data onto copper wires. They are sometimes referred to as last-mile technologies because they are used only for connections from a telephone switching station to a home or office, not between switching stations. The most common forms of DSL are:

- **ADSL** - The variation called ADSL (Asymmetric Digital Subscriber Line) is the form of DSL that is most familiar to home and small business users. ADSL is called “asymmetric” because most of its two-way bandwidth is devoted to the downstream direction, sending data to the user. Only a small portion of bandwidth is available for upstream or user-interaction messages.
- **SDSL** (Symmetric DSL) can carry up to 1.544 Mbps (U.S. and Canada) each direction on a duplex line. It’s symmetric because the data rate is the same in both directions.
- **IDSL** (ISDN DSL) is somewhat of a misnomer since it’s really closer to ISDN data rates and service at 128 Kbps than to the much higher rates of ADSL.

Ethernet - A Local Area Network (LAN) architecture developed by Xerox Corporation in cooperation with DEC and Intel in 1976. Ethernet uses a bus or star topology and supports data transfer rates of 10Mbps. It is one of the most widely implemented LAN standards. A newer version of Ethernet, called 100 baseT (or Fast Ethernet), supports data transfer rates of 100 Mbps. And the newest version, Gigabit Ethernet supports data rates of 1 gigabit (1000 megabits) per second.

Firewall - A system designed to prevent unauthorized access to or from a private network. Firewalls can be implemented in both hardware or software, or a combination of both. Firewalls are frequently used to prevent unauthorized Internet users from accessing private networks connected to the Internet. All messages entering or leaving the private network pass through the

firewall, which examines each message and locks those that do not meet the specified security criteria.

Frame Relay – A packet-switching protocol for connecting devices on a Wide Area Network (WAN). Frame Relay networks in the U.S. support data transfer rates at T-1 (1.544Mbps) and DS3 (45 Mbps) speeds. In fact, you can think of Frame Relay as a way of utilizing existing T1 and DS3 lines owned by a service provider. Most telephone companies now provide Frame Relay service for customers who want connections at 56 Kbps to T-1 speeds. In the U.S., Frame Relay is quite popular because it is relatively inexpensive. However, it is being replaced in some areas by faster technologies, such as ATM.

GSM phones – Global System for Mobile Communications – the de facto standard for cellular communications over 100 countries in Asia and Europe.

Hub - A common connection point for devices, such as computers and printers, in a network.

ILEC - Incumbent Local Exchange Carrier. An ILEC is a telephone company that was providing local service when the Telecommunications Act of 1996 was enacted. Compare with CLEC, a company that competes with the already established local telephone business.

ISDN - Integrated Services Digital Network. An international communications standard for sending voice, video, and data over digital telephone lines or normal telephone wires. ISDN supports data transfer rates of 64 Kbps. Most ISDN lines offered by telephone companies give you two lines at once, called B channels. You can use one line for voice and the other for data, or you can use both lines for data to give you data rates of 128 Kbps, a faster rate than provided by modems.

Inet – Institutional Network. Provides a high-speed connection between government, educational and community entities. It is often negotiated with a cable franchise, in exchange for using right-of-way in a jurisdiction.

ISP - Internet Service Provider. A company that provides access to the Internet. For a monthly fee, the service provider gives you a software package, username/password, and access phone number. Equipped with a modem/cable modem/DSL router, you can then logon to the Internet and browse the World Wide Web, and send and receive e-mail. In addition to serving individuals, ISPs also serve large companies, providing a direct connection from the company's networks to the Internet. A WISP is a wireless ISP.

LAN –Local Area Network. A computer network that spans a relatively small area. Most LANs are confined to a single building or group of buildings. However, one LAN can be connected to other LANs over any distance via telephone lines and radio waves. LANs connected in this way are called a Wide Area Network (WAN).

LATA - Local Access and Transport Area. A U.S. term that refers to a geographic region assigned to one or more telephone companies for providing communication services. A connection between two telephone companies within the same region is referred to as

intraLATA. A connection between two local exchange carriers in different regions is called interLATA, which is the same as long-distance service. Provisions guiding the use of LATAs are outlined in the Telecommunications Act of 1996.

Last mile - The portion of the cable or telephone company that is wired directly into the customer's home.

Local loop - In telephony, a local loop refers to the connection between a telecommunication company's CO to the lines in the service subscriber's home or office. Originally, local loop service carried only telephone service to subscribers. But today, with the use of modems, ISDN and DSL, signals are transmitted to subscribers as well through the local loop.

NIC - Network Interface Card. A board you insert into a computer so the computer can be connected to a network.

OC3 - Optical Carrier 3. An optical fiber line carrying 155Mbps; a U.S. designation generally recognized throughout the telecommunications community worldwide.

Packet/Packet Switching - Refers to protocols in which messages are divided into packets before they are sent. Each packet is then transmitted individually and can even follow different routes to its destination. Once all the packets forming a message arrive at the destination, they are recompiled into the original message.

POP - Point of Presence. A telephone number that gives you dial-up access. Internet Service Providers (ISPs) generally provide many POPs so that users can make a local call to gain Internet access.

POTS - Plain Old Telephone Service. Refers to the standard telephone service that most homes use. In contrast, telephone services based on high-speed, digital communications lines, such as ISDN, are not POTS. The main distinctions between POTS and non-POTS services are speed and bandwidth. POTS speed is generally restricted to about 52K.

Router - A device that connects any number of LANs. Routers use headers and a forwarding table to determine where packets go. Very little filtering of data is done through routers. Routers do not care about the type of data they handle.

ROW - Right-of-Way.

Switch - A device that filters and forwards packets between LAN segments. Switches are preferable to hubs for bandwidth throughput.

T1 - A dedicated connection supporting data rates of 1.544Mbits 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. Most telephone companies allow you to buy just some of these individual channels, known as *fractional T1* access. T1 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 DS3 connections.

TCP/IP - Transmission Control Protocol/Internet Protocol, and pronounced as separate letters. TCP enables two computers to establish a connection and exchange streams of data. TCP guarantees delivery of data and also guarantees that packets will be delivered in the same order in which they were sent. The IP protocol deals only with packets, specifying the format of packets and the addressing scheme.

Telco – An abbreviation for Telephone Company.

Telecommunications - Refers to all types of data transmission, from voice to video.

Videoconferencing – Conducting a conference between two or more participants at different sites by using computer networks to transmit audio and video data.

VoIP – Voice over Internet Protocol. A category of hardware and software that enables people to use the Internet or Wide Area Network (WAN) as the transmission medium for telephone calls. Internet telephony products are sometimes called IP telephony, Voice over the Internet (VOI) or Voice over IP (VoIP) products.

VPN - Virtual Private Network. A private data network that makes use of the public telecommunication infrastructure, maintaining privacy through the use of a tunneling protocol and security procedures. A virtual private network can be contrasted with a system of owned or leased lines that can only be used by one company. The idea of the VPN is to give the company the same capabilities at much lower cost by using the shared public infrastructure rather than a private one. Phone companies have provided secure shared resources for voice messages. A virtual private network makes it possible to have the same secure sharing of public resources for data.

Using a virtual private network involves encrypting data before sending it through the public network and decrypting it at the receiving end. An additional level of security involves encrypting not only the data but also the originating and receiving network addresses. VPN software is typically installed as part of a company's firewall.

WAN –Wide Area Network. A computer network that spans a relatively large geographical area. Typically, a WAN consists of two or more Local Area Networks (LANs). Computers connected to a wide-area network are often connected through public networks, such as the telephone system. They can also be connected through leased lines or satellites. The largest WAN in existence is the Internet.

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