

Redwood Coast Connect

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Table of Contents

Executive Summary	1
1.0 Introduction	12
2.0 Market Research	21
3.0 Aggregated Demand, Supply and Underserved Communities	39
4.0 Infrastructure	61
5.0 What is Different in Rural Areas	88
6.0 Existing Policies and Policy Recommendations	91
7.0 Project Evaluation	96
8.0 Next Phase of RCRA’s “Broadband for All” Initiative	101
Appendix I. Presentations Given about Redwood Coast Connect	104
Appendix II. Rural Health Survey Map	105
Appendix III. Written Broadband Survey	106
Appendix IV. Telephone Survey	112
Appendix V. Business Survey	115
Appendix VI. Del Norte Town-by-Town Analysis	117
Appendix VII. Humboldt Town-by-Town Analysis	119
Appendix VIII. Mendocino Town-by-Town Analysis	129
Appendix IX. Trinity Town-by-Town Analysis	135
Appendix X. Engaging Providers and Gathering Data	140
Appendix XI. Demand Aggregation and Anchor Tenants	161
Appendix XII. Humboldt County General Plan Telecom Element	174
Appendix XIII. Community Meeting Illustration	180
Appendix XIV. Case Studies	181
Glossary	198

Executive Summary

Redwood Coast Connect (RCC) is a project of Redwood Coast Rural Action (RCRA), a regional network of community leaders in partnership with the California Emerging Technology Fund (CETF). Envisioned to be the first phase in an ongoing initiative to make broadband Internet available to all residents in the region, this study focused on analyzing:

- Demand—including willingness to pay, the relative importance of broadband to homes and businesses, present uptake rates, and potential for and challenges to demand aggregation
- Supply—including mapping of current coverage, identifying unserved and underserved communities, and identification of critical missing infrastructure
- Current policy climate—including identification of policy barriers to rural deployment as well as opportunities for advocacy

The region covers almost 11,000 square miles (the size of Connecticut and New Jersey combined) and has a total population of approximately 266,000. There are 11 incorporated cities encompassing approximately 48% of the total regional population. In addition to the cities and smaller communities, there are 20 federally recognized tribal communities.

Settlement patterns in the region follow geographic features including mountain ranges and rivers that create a variety of challenges in serving all communities with broadband. Much of the land is heavily forested, some of which is not easily accessible by road. Winter storms and constant roadwork all too frequently disrupt services—even to the most populated areas. Infrastructure is expensive to build and difficult to maintain.

Much of the region lacks access to any fiber network affecting broadband availability, quality and reliability. Efforts to provide broadband to all residents and businesses will depend on significant investments in both middle and last mile infrastructure. It is clear that the underserved and unserved communities will require unique approaches and partnerships between larger telecom and cable companies linked to smaller local Internet providers.

The premise behind this study was that aggregation of demand would increase purchasing power making the economic case stronger for providing services to the unserved and underserved communities. In addition to aggregating demand, it is assumed that some level of public subsidy would be necessary to stimulate a buildout of infrastructure, thus increasing broadband availability.

The geographic and geologic challenges, coupled with the low population numbers, have resulted in an initial determination by larger telecom and cable companies that the remaining communities do not fit their “investment return models.” At the region’s annual Broadband Forum in August 2008, telecom and cable company representatives stated that with few exceptions the remaining unserved and underserved communities are not priority targets for expanded services. In addition, locally based service providers, including Wireless Internet Service Providers (WISPs), have the desire to serve niche markets but lack infrastructure capital, have limited access to backhaul, and do not qualify for existing public subsidies.

Methodology

Through a combination of quantitative and qualitative research methods, the level of local demand and the willingness to pay for broadband services for residential, business and governmental sectors were identified. Supply was also mapped identifying areas of unserved and underserved populations. Unserved and underserved communities were ranked according to both supply and demand, and resulting potential revenues were estimated. Conversations with potential providers, policy makers and business leaders set the stage for moving from information gathering and analysis to implementation.

Survey Process

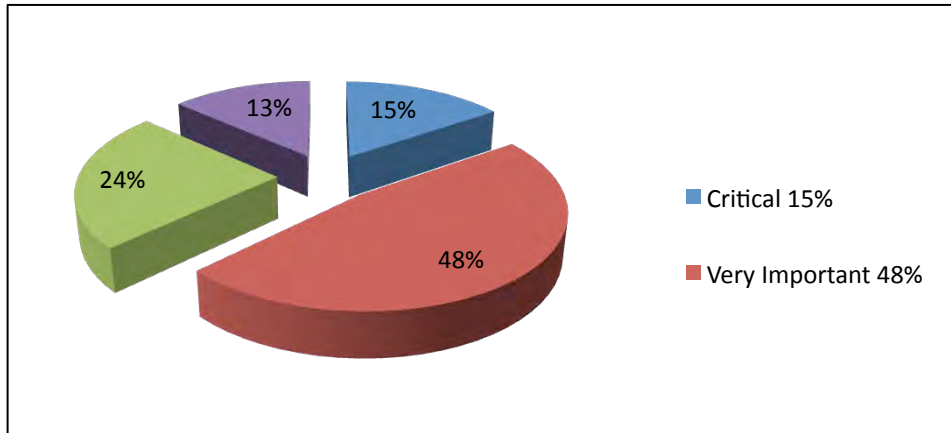
Written community surveys, online surveys, telephone surveys, and business mail-back surveys yielded 1869 completed surveys. The telephone and business mail-back survey data are more reflective of the general population since the sample was drawn using random selection for participation. Written survey respondents were self-selected, and data indicated a higher interest in broadband services and a higher educated respondent pool. Considering the data collectively, questions where the results were consistent among the methods are considered very robust.

Community Meetings

Seven community meetings were held in the counties of Del Norte, Humboldt, Mendocino, and Trinity from early November 2007 to early January 2008. The objectives of those meetings were to provide information to the public in making a compelling case for broadband deployment in the region; to understand the context of broadband demand in hearing from community members about why and how having reliable broadband access could impact their lives; and to support community mobilization and networking toward regional commitment to and ownership of steps towards building broadband infrastructure and services.

Residential Demand for Broadband

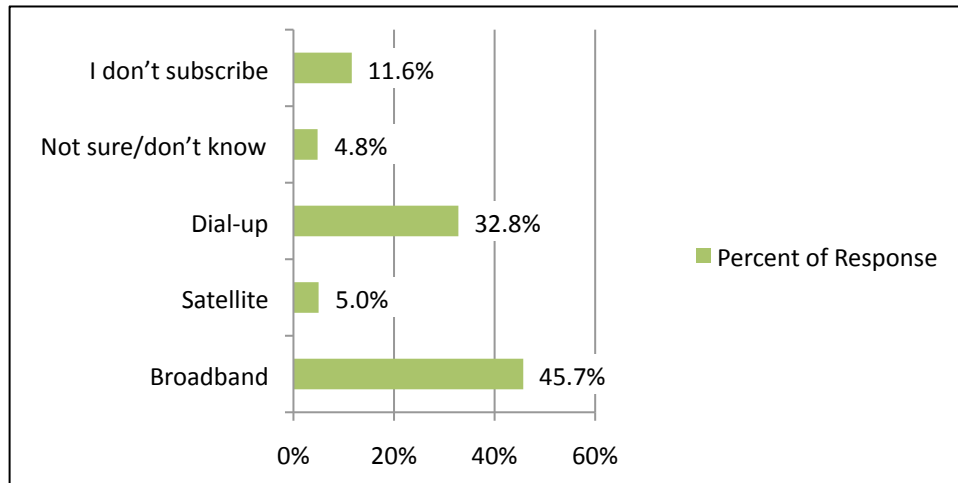
Residential: Importance of Internet Access at Home



Telephone survey, 95% confidence level, margin of error +/- 4%, sample size = 556

A majority of telephone survey participants (63%) consider Internet access at home to be either of critical importance or very important. Those who do not subscribe to Internet at home cite a lack of availability and excessive cost as the primary reasons for not subscribing.

Residential: Type of Internet Access



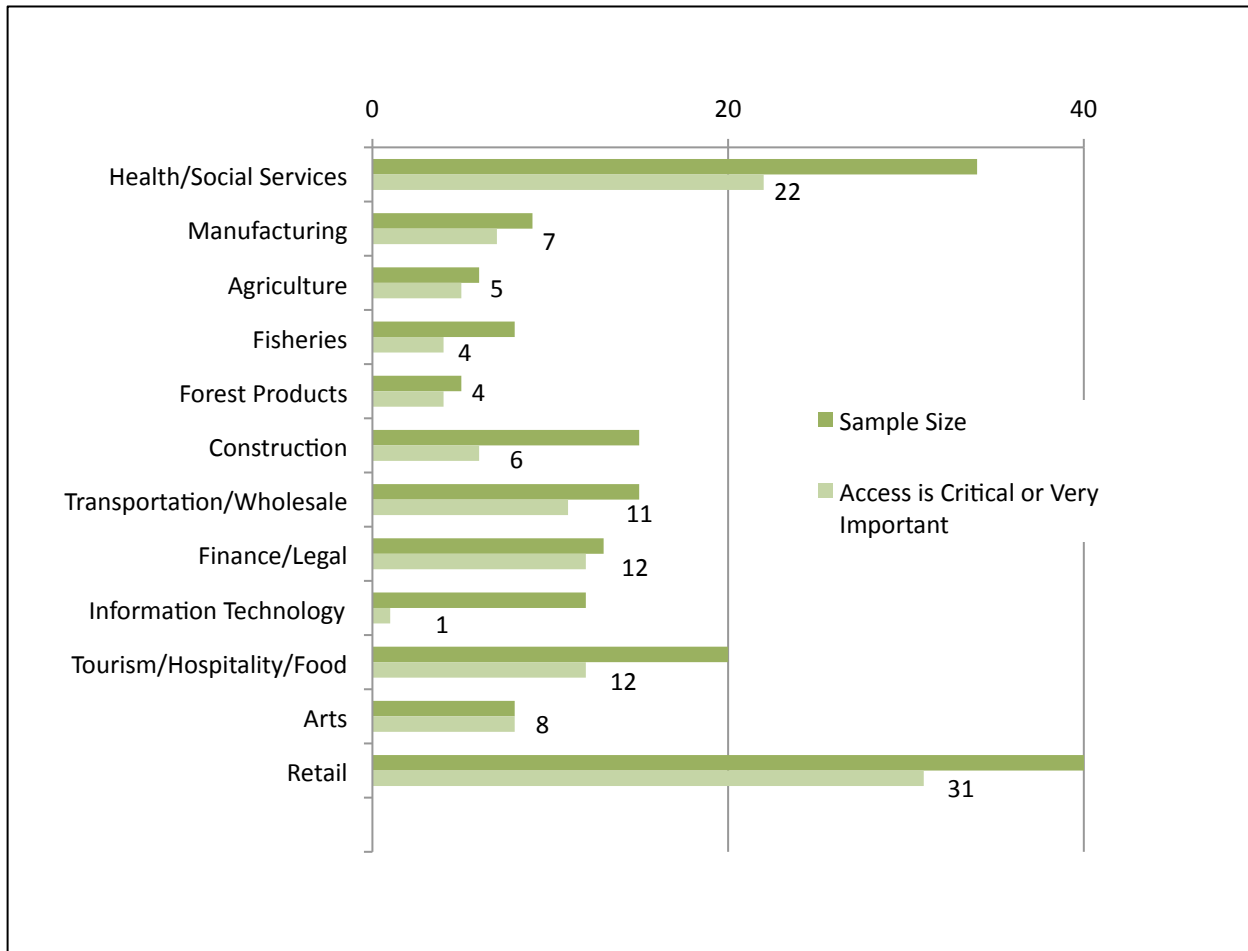
Telephone survey, 95% confidence level; margin of error +/- 4%, sample size = 556

For this project, both those residents who reported using only dial-up (32.8%) and those using satellite (5.0%) are considered unserved. Those who do not subscribe are a mix of households where Internet is available but they choose not to subscribe and those for whom the service is not available. Uptake rates for Internet (including broadband and satellite) appear high at 84% of respondents. It is unknown from the information collected what the uptake rate for broadband regionally might be. Using the telephone results, it can be estimated that over 35,000 households in the four-county area access the Internet through dial-up.

Residential Willingness to Pay

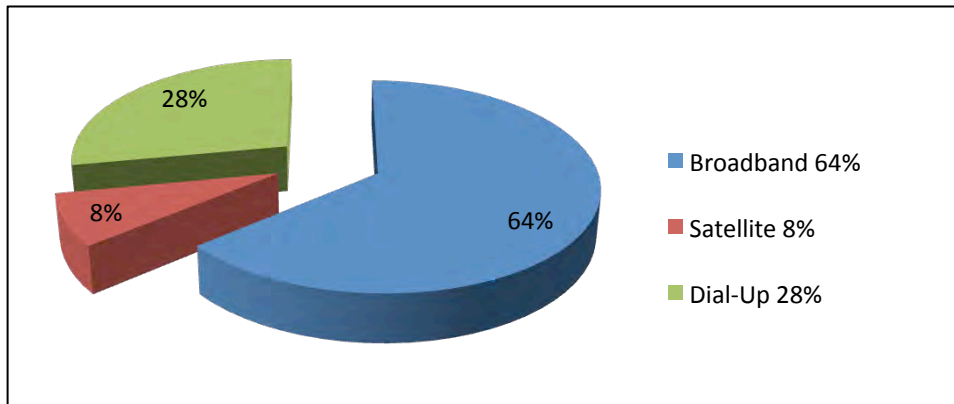
Over 36% of telephone survey participants reported that they would pay more for a faster connection at home. Considering only those participants who currently have dial-up access (i.e., using a modem to connect to the Internet at 56k), this number soared to over 60%. Although most respondents currently pay approximately \$20 per month for Internet access, the telephone and written survey results indicate that most participants in both surveys who have dial-up are willing to pay \$30 per month or more. Although \$30 was the most common response, over 40% of telephone and written survey participants were willing to pay more than \$40 per month.

Business Demand for Broadband



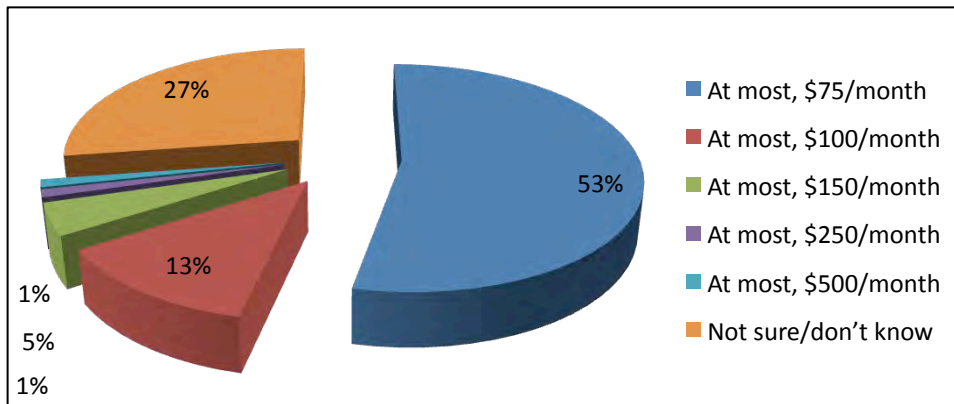
The above chart represents the relative importance of broadband to various industry sectors. Over 70% of businesses surveyed indicated that a broadband connection at work is critical or very important. These data were derived from both self-selected and business mail-back surveys. Additional breakdown and analysis of survey data are necessary to determine with better clarity which industry clusters are most dependent on having broadband service. Based on industry cluster focus groups held as part of the Targets of Opportunity project, health, manufacturing, finance/legal, information technology, and innovation and management services all stated that having reliable broadband services was critical to the future growth of their industries.

Business: Type of Internet Connection



Most businesses surveyed have access to broadband (wireless, DSL, T-1, cable, etc.)

Business Sector: Amount Willing to Pay for Broadband Access



Numbers represent actual responses; margin of error +/- 7% for total sample, sample size= 212

Over 28% of businesses surveyed were willing to pay more for a faster connection, and 39% would pay more for a more reliable connection. However, regardless of current access, most business survey participants indicated a willingness to pay no more than \$75 per month for broadband.

Aggregation of Demand

Aggregation of demand at the industry sector level (health care, education, business, government and residential) as a strategy to engaging large providers to extend services does not apply as neatly to the Redwood Coast region as it might in more urban environments. The regional demand is already segmented by a variety of telecom companies, each having their own territory. Multiple providers serving a single area is unusual outside of more urbanized areas.

There are, in the Redwood Coast region, blocks of public or quasi-public sector entities (health centers, schools and governmental agencies) whose demand could be used to leverage additional services should the needs of the whole region prevail over favorable pricing they currently enjoy. Government-supported programs continue to build out these critical nodes (i.e., E-Health network) which extend into rural areas, but presently the broadband services stop at the site (school, clinic or office). Opening up those networks to better serve rural communities by allowing use of those networks by other subscribers or extending the capacity at the individual sites to serve the community surrounding their site with broadband capacity should be a policy consideration.

In this study, the strategy for aggregating demand was to approach each underserved and unserved community on a geographic basis looking at both supply and apparent demand. By having a good understanding of the opportunities and barriers for each community, the hope is that appropriate partnerships could be developed to extend broadband services to those communities.

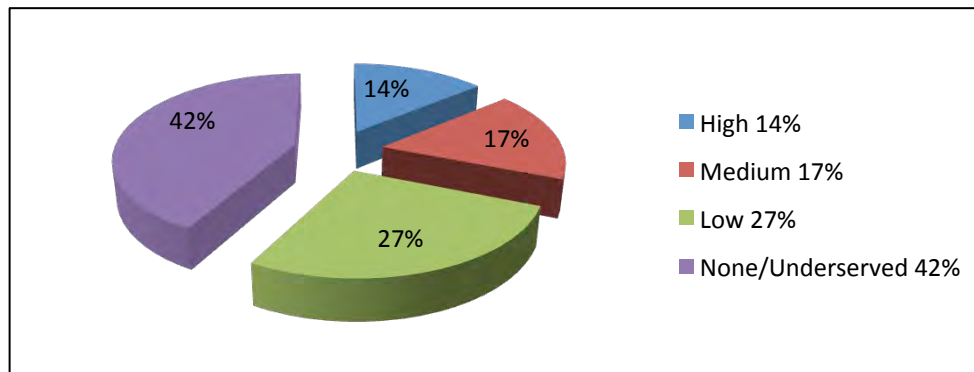
Apparent demand was ranked none, low, medium or high based on a combined numeric score taking into consideration the following:

- Participation in RCC activities
- Broadband importance and willingness to pay from survey data for that area
- Broadband importance to businesses
- Local leadership in broadband issues

Supply

According to the random telephone survey, over 90% of the study population has a personal computer. Sixty-nine percent of the respondents were found to be unserved by broadband access (either no Internet access, or access by dial-up only). However, a recent survey by the California Center for Rural Policy (CCRP) revealed a more troubling statistic—households with incomes below the Federal Poverty Level (FPL) are clearly disadvantaged with up to 14.2% reporting no phone, 45.1% reporting no computer and 55.4% reporting no Internet access in their home.

Ranking of Broadband Supply Available in Communities



N = 100 communities in the region

Supply for each community was ranked none, low, medium or high according to the following factors:

- Number of service providers
- Number of wireline service providers
- Proximity of services to the community
- Single carrier highest upload and download speeds
- Backhaul availability

Unserved and Underserved Communities Prioritized by Demand, Supply and Revenues (Del Norte County)

Del Norte County	Estimated Residences	Demand Rank	Supply Rank	Backhaul Needed	Estimated Annual Revenues
Hiouchi	183	Medium	Low	No	8,553
Klamath	267	Medium	None	Yes	99,580
Gasquet	274	Low	Low	No	12,830

Unserved and Underserved Communities Prioritized by Demand, Supply and Revenues (Humboldt County)

Humboldt County	Estimated Residences	Demand Rank	Supply Rank	Backhaul Needed	Estimated Annual Revenues
Hoopla	1882	High	Low	Yes	247,907
Willow Creek	961	High	Low	Yes	126,679
Whitethorn	440	High	Low	Yes	57,925
Miranda	354	High	Low	Yes	46,587
Alderpoint	165	High	Low	Yes	36,339
Blocksburg	88	High	Low	Yes	11,556
Fieldbrook	Unknown	High	Low	Yes	Unknown
Orleans	270	High	None	Yes	66,554
Weott	141	High	None	Yes	38,210
Myers Flat	133	High	None	Yes	29,193
Briceland	81	High	None	Yes	17,806
Bridgeville	394	Medium	None	Yes	90,088
Kneeland	217	Low	Low	No	28,635
Shelter Cove	Unknown	Low	Low	Yes	Unknown
Orick	239	Low	None	Yes	66,971
Phillipsville	83	Low	None	Yes	18,170
Crannell	Unknown	Low	None	Yes	3,600
Petrolia	161	None	Low	Yes	21,150
Honeydew	74	None	Low	Yes	9,812
Ettersburg	Unknown	None	Low	Yes	Unknown
Harris	Unknown	None	Low	Yes	Unknown
Redcrest	213	None	None	Yes	46,757
Korbel	105	None	None	Yes	26,736
Dinsmore	Unknown	None	None	Yes	3,600
Richardson Grove	Unknown	None	None	Yes	3,600
Ft. Seward	Unknown	None	None	Yes	Unknown
Holmes	Unknown	None	None	Yes	Unknown

Unserved and Underserved Communities Prioritized by Demand, Supply and Revenues (Mendocino County)

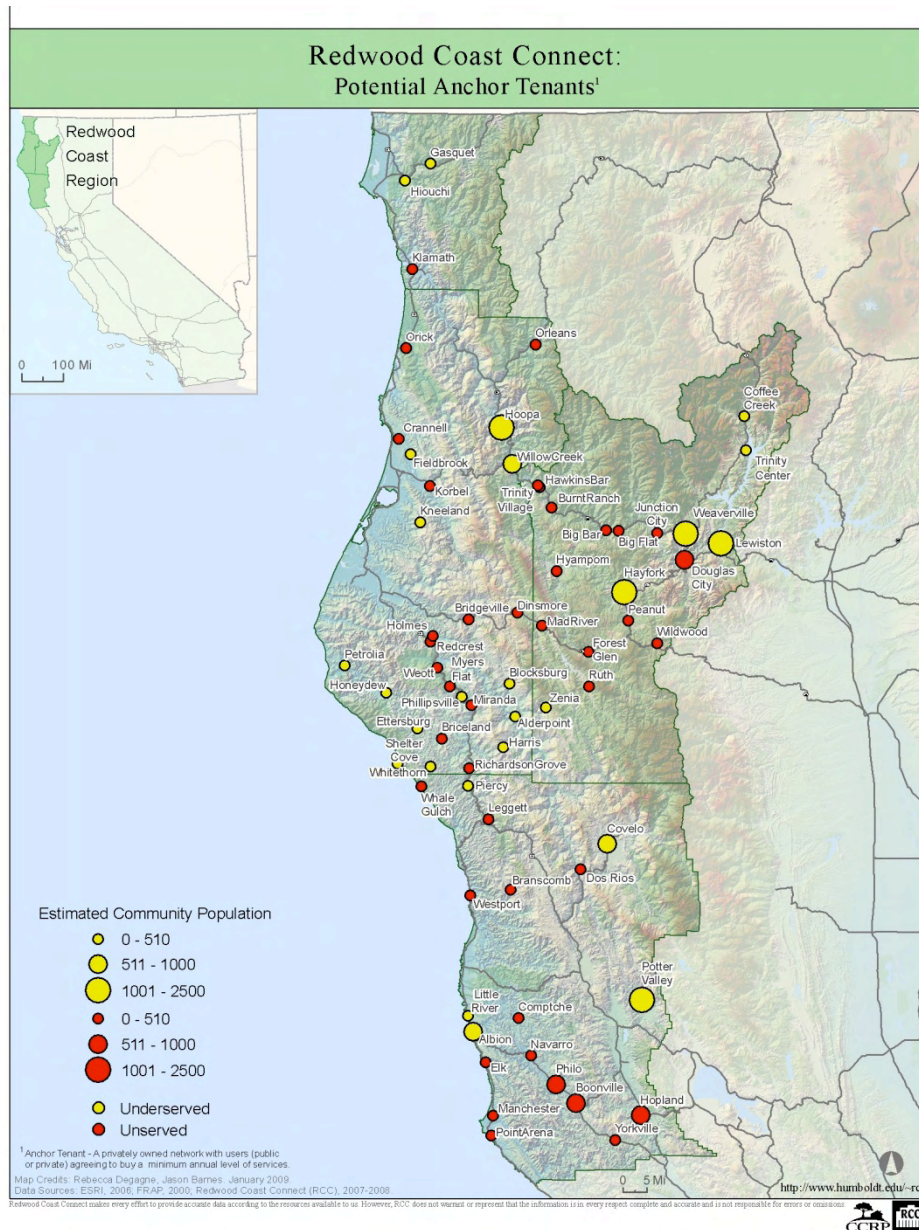
Mendocino County	Estimated Residences	Demand Rank	Supply Rank	Backhaul Needed	Estimated Annual Revenues
Albion	553	High	Low	No	149,310
Little River	469	High	Low	No	126,517
Hopland	726	High	None	Yes	261,401
Philo	587	High	None	Yes	211,198
Manchester	313	High	None	Yes	112,524
Point Arena	263	High	None	Yes	94,828
Comptche	197	High	None	Yes	70,784
Caspar	169	High	Low	No	60,798
Leggett	162	High	None	Yes	58,281
Westport	160	High	None	Yes	57,512
Potter Valley	1006	Medium	Low	Yes	271,643
Piercy	103	Medium	Low	Yes	27,843
Boonville	732	Medium	None	Yes	263,517
Elk	196	Medium	None	Yes	70,399
Yorkville	169	Medium	None	Yes	60,974
Navarro	76	Medium	None	Yes	27,313
Branscomb	35	Medium	None	Yes	12,695
Covelo	628	None	Low	Yes	169,507
Whale Gulch	53	None	None	Yes	19,235
Dos Rios	42	None	None	Yes	15,003

Unserved and Underserved Communities Prioritized by Demand, Supply and Revenues (Trinity County)

Trinity County	Estimated Residences	Demand Rank	Supply Rank	Backhaul Needed	Estimated Annual Revenues
Weaverville	2117	High	Low	Yes	388,656
Hawkins Bar	57	High	None	Yes	20,344
Hayfork	1416	Medium	Low	Yes	259,900
Lewiston	1038	Medium	Low	Yes	190,593
Trinity Center	279	Medium	Low	Yes	51,254
Zenia	143	Medium	Low	Yes	26,249
Douglas City	531	Medium	None	Yes	191,230
Junction City	410	Medium	None	Yes	147,491
Burnt Ranch	264	Medium	None	Yes	95,005
Mad River	145	Medium	None	Yes	52,283
Big Bar	143	Medium	None	Yes	51,469
Ruth	141	Medium	None	Yes	50,859
Coffee Creek	170	Low	Low	Yes	31,065
Hyampom	140	Low	None	Yes	50,452
Trinity Village	170	None	None	Yes	61,031
Wildwood	85	None	None	Yes	30,515
Big Flat	57	None	None	Yes	20,344
Forest Glen	14	None	None	Yes	5,086

Peanut	14	None	None	Yes	5,086
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The above charts prioritize all unserved and underserved communities in the four-county region. Demand was used as the most important highest ranking criterion (higher than even potential revenue) because in no cases will revenue alone justify the capital improvements and provision of services. The lack of backhaul in most instances significantly increases the cost of providing services. Clearly, building local demand will be critical in many of the underserved communities. For examples of possible backhaul routes, estimated costs and potential revenues, see Section 4, Infrastructure.



Anchor Tenants

The “anchor tenant” (or “main customer”) concept comes into play when talking about demand aggregation. The RCC project has reinforced findings in previous studies. Small rural communities rarely have any businesses larger than microenterprise size, but they may have government offices in communities not served by broadband. Agency purchasing is generally with pre-negotiated contracts at very good prices, which takes them out of the mix for aggregating demand; in some cases, it takes out the sole potential anchor tenant in a small community.

For example, the National Park Service (NPS) was contacted in Orick in 2006 as a potential anchor tenant for aggregation in the Orick Wireless Business Plan project since there is no backhaul available there and it would be extremely expensive to build microwave or fiber backhaul. While the NPS wants to help the community, security has been tightened since 9/11 and NPS was mandated to become part of a single domain model. As a result, Internet access for the NPS is now via a dedicated line to Denver.

All non-exempt state agencies¹ are required to utilize the CALNET MSAs to obtain mandatory telecommunications and network services. Exempt state agencies² and departments are encouraged, but are not required, to use the CALNET MSAs to purchase mandatory services. These services are identified at www.calnet.ca.gov. According to State Parks CIO Alan Friedman, where local telecom services are less expensive than the CALNET rates, they can make a case to purchase locally. According to Michael Liang of the State Department of Business, Transportation, and Housing, a CALNET contract is the first option, but where lower pricing options are available, they may be used.

The Corporation for Education Network Initiatives in California (CENIC) is another example of a closed network, this one provides services statewide to the education system or both K-12 and higher education. CENIC is a network providing a fiber-based backbone to which district offices and schools can connect. These closed networks, while serving government institutions in a cost effective manner, remove the only available anchor tenants in many of the underserved and unserved communities, utilize all available backhaul capacity in many areas, and limit access to their infrastructure.

Infrastructure

Microwave connects areas of the Redwood Coast along with key fiber links for backhaul. Del Norte County is served by a single fiber optic line traveling south from Oregon and terminating in Crescent City. Humboldt County is served by a single fiber optic line traveling north along Highway 101 from Santa Rosa and terminating in Eureka. Trinity County has no fiber optic backhaul lines serving its communities. Mendocino County has two fiber optic lines serving its communities: one traveling along Highways 1 and 128 and terminating in Fort Bragg and the other line along Highway 101 that also serves Humboldt County.

Critical gaps in fiber to provide backhaul and route diversity/redundancy are both north-south and east-west:

- Crescent City to Eureka (85 miles)
- Eureka to Redding (150 miles)
- Eureka to Red Bluff (150 miles)
- Crescent City to Medford (110 miles)
- Mendocino South Coast to Highway 101 or Fort Bragg (60-70 miles)

The key to providing last mile service in the unserved or underserved areas is backhaul. In well-served areas of the Redwood Coast, lack of route diversity/redundancy is a broadband reliability issue, with outages causing disruptions in Internet access, long distance calls, credit card processing and cellular service.

Policy and Program Strategies

Three key areas could be addressed at state programmatic and policy levels: anchor tenants, capital funding and Infrastructure buildout.

Anchor Tenants

Government offices (including education, state and federal agencies) and public lands hold the greatest promise in being integral to getting broadband services to small communities. Unlocking these assets and integrating them into solutions for remote communities could entail:

- New public/private partnerships utilizing public assets to support new infrastructure (i.e., cell towers)

¹ Non-exempt state agencies are those under the jurisdiction of the Executive Branch of California state government.

² Exempt state agencies and departments (colleges and universities, agencies headed by constitutional officers or agencies such as the State Compensation Insurance Fund and the Lottery) are those that are not required to use the CALNET MSA to purchase mandatory services.

- Opening of closed networks for extending broadband into the hardest-to-serve communities
- Allowing government offices in the hardest-to-serve communities to participate in aggregation of demand with those communities

Capital Funding

Research confirmed that few of the underserved and unserved communities are economically viable broadband service areas to providers. There is need for additional backhaul capacity in addition to last mile solutions in these communities. Public subsidy in the form of low cost capital and grants for planning and feasibility is critical.

- Expand funding available to WISPs and other small local entrepreneurs willing to serve small remote communities
- Provide grant funding to support community efforts in creating business plans for broadband coverage in their communities
- Support research and development of new technologies that hold promise for rural communities
- Reinstate support for buildout of phone services (i.e., AB140 which expired in 2006)

Infrastructure Buildout

Creating a fiber ladder with north-south trunks connected with east-west laterals is critical to providing service throughout rural areas. Successful infrastructure buildout that will serve the state into the future will require intentionality. It will necessitate using public assets more effectively while combining them with private sector investments.

- Create an “open trench” policy whereby state funded infrastructure projects look, at a minimum, at the feasibility of laying conduit or fiber in the ditch while it is open. Better yet, require it in projects that run along key rights-of-way (Caltrans). This should be a policy at all levels of government.
- Fund a pilot project to determine the viability of micro-trenching as an alternative to laying fiber in a public right-of-way (Caltrans)
- Create public owned infrastructure that can be leased by private operators willing to serve hardest-to-serve areas

Key Outcomes outside the Scope of this Project

Possibly more important than the actual data developed as a result of the survey process are the new linkages and relationships developed between local broadband advocates and regional service providers during the course of this project. Examples of accomplishments include:

- While looking for coverage data to establish regional broadband supply, one WISP provided key information on its transmission towers (location and height) to the RCC team. RCC used that information to model viewsheds showing the potential coverage within the existing infrastructure. That WISP currently uses this new map on its website to show availability.
- A WISP in Weaverville was having difficulty resolving tower issues, including the National Park system wanting to remove a key tower between Weaverville and the Interstate 5 corridor. Local referrals were made to agencies to help resolve issues as well as suggest potential tower sites.
- A WISP in northern Sonoma and southern Mendocino counties was caught between two providers and could get no response to its request for a T-1 line. With new contacts developed at a telecom company through the RCC project, the WISP was able to get connected to the appropriate contacts within Verizon.
- Mendocino Coast Broadband Alliance, a community group in Albion, with the assistance of the RCC team has surveyed their community, mapped all residents, created their own aggregation report and contacted several potential providers in a local effort to get broadband.
- Recently there was an unexpectedly large number of applications from regional providers to the California Advanced Services Fund (CASF) fund to extend services to underserved and unserved communities; this is the direct result of relationships developed in part through the RCC project.
- There are new partnerships between CASF applicants (providers of backhaul and wireless Internet companies) along both of the Highway 101 and Highway 299 corridors.

1.0 Introduction

Redwood Coast Connect (RCC) was a prototype project to describe the existing and potential consumer bases for broadband services in the four California counties of Del Norte, Humboldt, Mendocino and Trinity. The project is the first phase in an initiative of Redwood Coast Rural Action (RCRA), a network of community leaders working on regional action to get broadband accessibility to all homes and businesses throughout the region.

The project team has been engaged by RCRA and the California Emerging Technology Fund (CETF) to examine the supply of and demand for broadband services in the region. Through a combination of quantitative and qualitative research methods evaluating the level of local demand, the willingness to pay and the overall satisfaction with current broadband service were identified. Supply was also mapped identifying areas of unserved and underserved populations. Potential scenarios were created for a variety of communities and combinations of communities estimating the costs of necessary infrastructure and resulting anticipated revenue streams. Conversations with potential providers, policy makers and business leaders set the stage for the next phase, moving from information gathering and analysis to implementation.

Broadband is widely viewed as an enabling technology that will eventually change the way Americans live and work. It has been touted as an economic development panacea for rural communities in the current global marketplace allowing them to be more competitive while allowing them the ability to work remotely. Unfortunately, that dream for many small remote rural communities remains largely unrealized, mainly due to a lack of robust, reliable connections to the Internet. This report seeks to provide the information necessary to help the north coast region move closer to its goal of providing reliable broadband services to all residents of the region improving educational, health and economic outcomes for all.

1.1 Definition of Broadband

Broadband is a term that means many things to many people. To most broadband users, it means an always-on connection that works quickly enough to get the information they need in the time they need it. As one RCC participant put it, broadband to them is “instant gratification.” Or as another RCC participant who uses dial-up said, “Some things that friends send me like You Tube, I just can’t open, so I have to delete them. I feel like I’m in the Stone Age. It is impossible to do taxes online, for example.”

The Federal Communications Commission (FCC) defines basic broadband as 768k to 1.5 megabits per second (mbps). This definition is too vague and does not reflect the way people are using the Internet; the speeds are considered inadequate to support even today's uses including viewing YouTube videos or watching video broadcasts over the Internet. One step closer to adequate is the broadband definition used by the CASF which defines basic broadband as at least 1 mbps of connectivity for uploading information and at least three megabits of connectivity for downloading information.

The CASF definition was used as a target for all consumers in the region and the comparison speed for the analysis of the data. Clearly, though, these speeds are insufficient to support more sophisticated business needs and the future of technology. Sophisticated businesses are looking for symmetric data services with speeds reliably in excess of 10 megabits per second. It will be critical that businesses not remain satisfied with the standard that has been set in this initial project if as a community we are to attract and retain quality businesses to our region.

In the project, broadband was defined as services that encompassed DSL, cable modem, fixed wireless and mobile wireless services for business and residential use. There is almost no fiber to the premise (FTTP) deployed in the region. In addition, there are a number of dedicated data connections regionally to support state and local governments, schools and businesses. Typically, these are considered to be T1s or above in connectivity.

While satellite connections are utilized throughout the region, satellite was not analyzed to any great extent except as a service of last resort due to its inherent latency issues (the time it takes to get from earth to the satellite and back to earth) and the high cost to the consumer. Latency prohibits many common uses of the Internet for today's work-at-home or play-at-home user. For example, virtual private networks required by many companies are not supported. Online video gaming is also adversely affected since a second of delay is long enough to lose a game.

According to European standards, most urban areas having fewer than five providers in a given community are considered underserved since it is the competition that reduces costs to the end user and keeps the pressure on to upgrade

gservices to the latest technologies. Rural markets, on the other hand, can narrowly support a single provider—some communities not even that. It is difficult to aggregate enough consumers to attract any but the smallest, local wireless providers. This is compounded by the fact that large, sparsely populated rural areas may be divided among several telecom companies making aggregation even more challenging. Rural communities just do not fit the investment return model used by publicly traded telecom and cable companies. This study analyzed both supply and demand and brought providers of all types together with quality information to identify strategies for getting broadband to the most difficult-to-serve communities.

1.2 Objectives and Methodology

Project objectives include the following:

- Qualified and quantified prospective demand for broadband service
- Identification of preferred infrastructure scenarios for the targeted four-county region
- Recommendations for achieving a common set of county and municipal policies and standardized ordinances for telecommunications-related building, planning and construction for the region
- Recommendations for legislative action, regulatory change and/or programmatic changes where deemed appropriate (e.g., eCommerce incentives such as tax credits, grants, low-cost loans)

Qualified and quantified prospective demand for broadband service

Information summarized in this report and detailed in the complete appendices provides a description of prospective demand for broadband service in the four-county study area as assessed from the following sources:

- Quantitative analysis of survey results from a random sample of households (telephone survey) and a convenience sample (mailed survey) of businesses and not-for-profit agencies listed in the Yellow Pages
- Quantitative analysis of survey results from a self-selecting paper survey submitted by persons attending the community meetings and circulated to other community members by meeting attendees
- Quantitative analysis of results from an elective on-line survey submitted by persons visiting the website
- Qualitative analysis of input from community members attending the seven community meetings as described in Section 2.4, Community Meetings
- Analysis of input from community members and business and technology leaders in two dozen meetings and presentations conducted by project telecommunications consultants, with such groups as the Redwood Region Economic Development Commission, Southern Humboldt Working Together, the Redwood Technology Consortium, and the Tri-Agency Economic Development Authority (Del Norte County) (see Appendix I, Presentations Given about Redwood Coast Connect)
- Case studies of local demand written by telecommunications consultants to Redwood Coast Connect, based on their interviews with Internet service providers and community leaders (Redwood Coast Case Studies in Broadband)
- Additional feedback from key community informants confirmed the validity of results obtained from the surveys and infrastructure mapping (Section 4.0, Infrastructure). Key informants including county supervisors, Internet service providers, meeting attendees, listserv subscribers, residents, and businesses were asked to submit feedback about the preliminary draft of survey results. The general public also was invited to provide additional feedback.

Identification of preferred infrastructure scenarios for the targeted four-county region

A description and analysis of existing supply, examples of infrastructure scenarios and details of key backhaul projects necessary for serving both unserved and underserved communities can be found in Sections 3.0 and 4.0. Telecommunications consultants based analyses on data of existing infrastructure and knowledge of community readiness and leadership, as confirmed by discussions with the key community informants described above. Section 5.0 has a discussion of rural differences with regard to broadband.

Recommendations for achieving a common set of county and municipal policies and standardized ordinances for telecommunications-related building, planning and construction for the region

Section 6.0 reports on these policy recommendations. Recommendations are based on promising practices demonstrated in other jurisdictions and on discussions with regional policy makers.

Recommendations for legislative action, regulatory change and/or programmatic changes where deemed appropriate (e.g., eCommerce incentives such as tax credits, grants, low-cost loans)

These recommendations are also included in Section 6.0, as they pertain to policy recommendations. Redwood Coast Connect project staff and advisory board members provided testimony in support of SB1191 that allows CSD to provide

Infrastructure support broadband service to their residents. This bill was recently signed into law by the Governor. That such legislation was introduced and passed during the "lifetime" of the project is an appropriate and fitting accomplishment.

1.2.1 Data Collection Methodologies

Methods

Development of the study's data collection instrument, field sampling plan, and data analysis procedures was a cooperative venture between study investigators at Humboldt State University and consultants working on the project.

Study Area and Population

The study population included individual members of the general population and businesses (collectively hereafter referred to as the public) in Del Norte, Humboldt, Mendocino, and Trinity counties (hereafter referred to as the community). The study population included members of the public from the community from November 2007 through March 2008.

Sampling Plan and Instruments

RCC project researchers contacted members of the public in the community using three different approaches for data collection:

- A written survey was made available to people who attended one of a series of public meetings held in each of the four counties; this written survey also was distributed in various communities throughout each of the four counties, and to targeted "special" interest groups (e.g., at a Native American multi-tribal gathering). An online version of this survey also was available to anyone in the community who requested it.
- Generalizable data (i.e., data collected by way of a random sample that is representative of the larger population) were collected from the public by way of telephone surveys; the survey included a subset of questions taken from the longer written/online survey.
- Mail-back surveys were sent to businesses and non-profit organizations listed in the Yellow Pages directories for each of the four counties. Approximately 400 businesses were selected in each county.

The Table below summarizes the surveys completed for each sampling method.

Completed Survey Totals

Sampling Method	Number of Completed Surveys
Aggregate	1869
Community survey (online and meetings)	1131
Telephone	557
Business	181

- Community meetings were held in seven different locations in the four-county region (Section 2.4, Community Meetings). The meetings were held both to collect information from and provide information to the public. There were two types of data collected from these meetings, verbal data and written survey data. The verbal data collected during the meetings were informal and used, among other things, to gain insight into the aggregate demand for broadband. Results and discussions from the verbal data collected are found in Section 2.4, Community Meetings.

Collection of data provided a balance between quantitative methods using a randomly selected sample for making statistically valid inferences, and qualitative methods to reach harder-to-reach populations via community meetings, distribution of elective surveys through community members themselves, and collecting input from community meetings.

Underserved populations

A direct comparison of respondents to the telephone survey, by ethnicity, age group, and gender, to the 2000 Census population, was not possible since only persons 18 years of age and older were eligible to respond to the survey; the U.S. Census provides data in aggregated age groups. Therefore, ethnic groups represented in the telephone survey were compared to the closest age groups reported in the Census; that is, persons at least 18 years old were compared to the Census population of persons at least 15 years old. It should be noted that a Spanish-speaking interviewer was available to administer the survey over the phone, should the household respondent not speak English. It is not known how many Spanish-speaking households have a landline phone, so this may have been a limiting factor.

Website traffic for Redwood Coast Connect also provides a picture of the interest level of prospective users. It should be noted that:

- From late September 2007 to late May 2008, almost 2200 persons visited the Redwood Coast Connect website.
- Dial-up was utilized by 12% of the website visitors.
- Traffic was heaviest during the months of October through mid-January, coinciding with the planned public relations campaign, the community meetings, and the times that persons could take the surveys.
- Many referrals came from websites in Mendocino and Trinity counties.

1.2.2 Other Sources of information

RCC consultants contacted current and potential telecommunications providers throughout the process to keep them up to date; get feedback on information as it was developed; and provide them with information on new developments regarding local leadership, market interest, and statewide policy. This included marketing the opportunities to serve rural communities via the newly created CASF.

Data from Employment Development Department statistics on businesses located in each community were used to estimate potential aggregated demand revenues. Such data are limited to those businesses that reported payroll tax withholding for the prior year. This underestimates the number of actual businesses in a community by omitting owner-operator enterprises.

Information was taken from the North Coast Targets of Opportunity report completed by Collaborative Economics for the regional economic and workforce development communities (February 2007). The complete report can be found at www.HC-WIB.com. In addition to the original study identifying the targets of opportunity, information from industry leaders was obtained from focus groups held in conjunction with developing an implementation strategy.

California strategies for broadband deployment were derived from the final report released in December 2007 by the Governor's Broadband Task Force.

Information was presented at a broadband forum in August 2008, which included representatives from all the counties involved, residents, government officials, staff, businesses, and non-profit agencies. The broadband forum also brought together a myriad of providers from the largest telecom and cable companies to the small wireless providers who discussed at the forum their thoughts about what it would take to get broadband services to all communities in the region. Their input has informed the findings in this document.

Additional information about connectivity among the poor in outlying areas was taken from a December 2007 brief produced by the California Center for Rural Policy at Humboldt State University titled Disparities in Connectivity and Access to Health Care in the Redwood Coast region (Appendix II, Rural Health Survey Map).

1.3 Working Assumptions

An initial working assumption for this project was that by providing large telecom providers with the calculated revenue streams based on willingness to pay levels and uptake rate estimates, one of two things could happen. The first would make the case for those providers to extend services to currently unserved and underserved communities; the second would make the case for subsidies from government that would fill the gap between the investment warranted by anticipated revenue streams and the actual estimated investment in infrastructure necessary to get communities connected.

Early in the project, communication providers reinforced RCC's assumption that as long as providers can find lucrative markets outside of rural regions, remote communities will have limited options to broadband Internet. It also became apparent that there was not nearly enough money being allocated at both the state and federal levels combined to make a dent in the amount of money necessary to connect rural communities, particularly with fiber. Clearly, there needed to be another approach.

Revised assumptions:

- Each unserved and underserved community would require a unique strategy for obtaining broadband services.
- Aggregation of demand needed to be at the community level, not at the regional or county level.
- Aggregation by industry sector, government agency or government sector was not useful due to the geography of the unserved communities that rarely had anchor tenants located nearby. In addition, most large users of broadband were already located in areas with fairly good service—for them redundancy to increase the reliability of service was most important.
- All types of providers needed to be considered, not just telecom and cable companies.

1.4 Local, Regional, Statewide and National Broadband Activities

Redwood Coast Served/Unserved Communities

County	Community	Providers in alphabetical order - service as of 6/2008	Recent activity/plans in communities (10/13/2008)
Del Norte	Crescent City	Charter	
	Fort Dick	Charter	
	Gasquet	Charter	
	Hiouchi	Charter	
	Klamath	Unserved	Yurok Tribe and County of Del Norte planning broadband for southern part of county; also CASF application at CPUC
	Smith River	Charter	
Humboldt	Alderpoint	101Netlink	101Netlink planning service
	Arcata	101Netlink, AT&T, Cascadia Wireless, Suddenlink	CASF application at CPUC
	Bayside	101Netlink, Cascadia Wireless, Suddenlink	
	Benbow	101Netlink, Wave	
	Blocksburg	101Netlink	
	Blue Lake	Suddenlink	CASF application at CPUC
	Briceland	Unserved	101Netlink has started service
	Bridgeville	Unserved	CASF application at CPUC
	Carlotta	101Netlink, Suddenlink	
	Crannell	Unserved	
	Cutten	101Netlink, AT&T, Suddenlink	
	Dinsmore	Unserved	
	Ettersburg	101Netlink	
	Eureka	101Netlink, AT&T, Cascadia Wireless, Suddenlink	CASF application at CPUC
	Fernbridge	101Netlink, Suddenlink	
	Ferndale	101Netlink, Frontier, Suddenlink	Frontier expanding footprint
	Fieldbrook	Suddenlink	
	Fields Landing	101Netlink, Suddenlink	
	Fort Seward	Unserved	
	Fortuna	101Netlink, AT&T, Cascadia Wireless, Suddenlink	
	Garberville	101Netlink, Wave	
	Harris	101Netlink	
	Holmes	Unserved	
	Honeydew	Frontier	
	Hoopa	Velocity Technology	CASF application at CPUC
	Hydesville	101Netlink, Suddenlink	
	Kneeland	101Netlink	CASF application at CPUC
	Korbel	Unserved	CASF application at CPUC
	Loleta	101Netlink, AT&T, Suddenlink	CASF application at CPUC
	McKinleyville	AT&T, Cascadia Wireless, Suddenlink	CASF application at CPUC
	Miranda	AT&T	101Netlink planning service
	Myers Flat	Unserved	101Netlink planning service

County	Community	Providers in alphabetical order - service as of 6/2008	Recent activity/plans in communities (10/13/2008)
	Myrtletown	101Netlink, AT&T, Cascadia Wireless, Suddenlink	
	Orick	Unservd	CASF application at CPUC
	Orleans	Unservd	Residents have requested meeting with RCC team to talk about possibilities; CASF application at CPUC
	Petrolia	Frontier	
	Phillipsville	Unservd	101Netlink planning service
	Redcrest	Unservd	CASF application at CPUC
	Redway	101Netlink, Wave	
	Richardson Grove	Unservd	101Netlink planning service
	Rio Dell	101Netlink, AT&T, Suddenlink	
	Rohnerville	101Netlink, Suddenlink	
	Samoa	101Netlink, Suddenlink	
	Shelter Cove	101Netlink	
	Scotia	101Netlink, AT&T, Suddenlink	CASF application at CPUC
	Trinidad	101Netlink, Suddenlink	CASF application at CPUC
	Weott	Unservd	SBDC has applied for CDBG funds; 101Netlink planning service
	Whitethorn	101Netlink	
	Willow Creek	Almega	CASF application at CPUC
Mendocino	Albion	Comcast	CASF application at CPUC
	Boonville	Unservd	
	Branscomb	Unservd	
	Calpella	AT&T, Comcast, Pacific Internet, WillitsOnline	
	Caspar	Comcast	
	Comptche	Unservd	CASF application at CPUC
	Covelo	WillitsOnline	
	Dos Rios	Unservd	CASF application at CPUC
	Elk	Unservd	CASF application at CPUC
	Fort Bragg	101Netlink, AT&T, Comcast, WillitsOnline	
	Gualala	Central Valley Cable, Esplanade, Black Mtn. Communications	
	Hopland	WillitsOnline	CASF application at CPUC
	Laytonville	101Netlink, WillitsOnline	CASF application at CPUC
	Leggett	Unservd	101Netlink planning service
	Little River	Comcast	CASF application at CPUC
	Manchester	Esplanade	
	Mendocino	AT&T, Comcast	CASF application at CPUC
	Navarro	Unservd	
	Philo	Unservd	
	Piercy	101Netlink	
	Point Arena	Esplanade	

County	Community	Providers in alphabetical order - service as of 6/2008	Recent activity/plans in communities (10/13/2008)
	Potter Valley	Pacific Internet, WillitsOnline	
	Redwood Valley	Comcast, Pacific Internet, WillitsOnline	
	Ukiah	AT&T, Comcast, Pacific Internet	CASF application at CPUC
	Westport	Unservd	Residents have requested information about CSD possibilities
	Whale Gulch	Unservd	
	Willits	AT&T, Comcast, WillitsOnline	
	Yorkville	Unservd	
Trinity	Big Bar	Unservd	CASF application at CPUC
	Big Flat	Unservd	CASF application at CPUC
	Burnt Ranch	Unservd	CASF application at CPUC
	Coffee Creek	TDS Happy Valley	
	Del Loma	Unservd	CASF application at CPUC
	Douglas City	Velocity Technology	CASF application at CPUC
	Forest Glen	Unservd	
	Hawkins Bar	Unservd	CASF application at CPUC
	Hayfork	Com-Pair, Velocity Technology	
	Hyampom	Unservd	
	Junction City	Com-Pair, Velocity Technology	CASF application at CPUC
	Lewiston	Com-Pair, Velocity Technology	CASF application at CPUC
	Mad River	Unservd	Com-Pair planning service
	Peanut	Com-Pair	
	Ruth	Unservd	Com-Pair planning service
	Salyer	Unservd	CASF application at CPUC
	Trinity Center	TDS Happy Valley	
	Trinity Village	Unservd	CASF application at CPUC
	Weaverville	Com-Pair, DCA Cablelink, Velocity Technology	CASF application at CPUC
	Wildwood	Unservd	
	Zenia	101Netlink	CASF application at CPUC
Other Projects	Mendocino County		MCOE working with Sunesys on plan for fiber to school districts
	RCC Region		Verizon applying for several more cell tower permits throughout region and negotiating with property owners
	IP Networks		Fiber from Eureka to Red Bluff is in planning stages
	Trinity County	Trinity Public Utilities District	Deployment of cell tower network to cover entire county.
CA State Activities			Response to the final report by the Broadband Task Force- possible pending regulation and/or programs for implementation
			E-Health Network funding proposals submitted, pending decisions for funding.

County	Community	Providers in alphabetical order - service as of 6/2008	Recent activity/plans in communities (10/13/2008)
National Activities		Clearwire, Sprint, IntelCorp, Google, Comcast, Time WarnerCable and Bright House Networks	Pending vote on partnership moving forward with national deployment of WiMAX. Unknown how or if it might affect rural areas.
			Internet Freedom Preservation Act of 2008 (HR5353) pending. (would preserve Net Neutrality)

1.5 Legislative and Regulatory Environment

1.5.1 Project Permitting

Two regulatory factors make buildout of broadband challenging in the Redwood Coast region: the lack of uniformity in permitting processes and ordinances across jurisdictions and the overlay of several permitting agencies at the state level. Several agencies could come into play in a single permitting process at the state level (i.e., Coastal Commission, state parks, Caltrans, State Department of Fish and Game, California Public Utilities Commission). In addition, at the national level one permit might require permission from the Environmental Protection Agency, National Park System, Bureau of Land Management, Department of Fish and Wildlife, etc. Permit streamlining could be a key strategy necessary to entice new infrastructure development.

Redwood Coast Rural Action leaders have initiated conversations at the county level about uniformity in local permitting ordinances and processes. In addition to the county level, city and tribal jurisdictional requirements will need to be addressed.

1.5.2 State and National Environment

California has taken a leadership role in promoting statewide broadband coverage. The Governor's Broadband Task Force concluded its objectives and released its final report with recommendations for actions toward implementing statewide broadband deployment. Regulations are still being formulated in response to that report.

At a national level the switch of TV broadcasting from analog to digital will open new possibilities as analog bandwidths become available. Broadcast stations in all U.S. markets are currently broadcasting in both analog and digital. After February 17, 2009, full-power television stations will broadcast in digital only. An important benefit of the switch to all-digital broadcasting is that it will free up parts of the valuable broadcast spectrum for public safety communications (such as police, fire departments, and rescue squads). Also, some of the spectrum will be auctioned to companies that will be able to provide consumers with more advanced wireless services (such as wireless broadband). Licensed fixed and mobile wireless transmission capacity operating in this freed up spectrum potentially will provide broadband using lower power and will overcome line of sight issues currently plaguing remote communities in rugged terrains.

2.0 Market Research

Methods

Development of the study's data collection instrument, field sampling plan, and data analysis procedures was a cooperative venture between study investigators at Humboldt State University and local and regional consultants, as well as a consultant from Public Sphere Information Group. In addition, service providers reviewed and approved the survey questions.

Study Area and Population

The study population included individual members of the general population and businesses (collectively hereafter referred to as the public) in Del Norte, Humboldt, Mendocino, and Trinity counties (hereafter referred to as the community). The study population included members of the community who were surveyed between November 2007 and March 2008.

Sampling Plan and Instruments

Researchers contacted members of the public in the community using three different approaches for data collection:

- A written survey was made available to people who attended one of a series of public meetings held in each of the four counties; this written survey also was distributed in various communities throughout each of the four counties, and to targeted "special" interest groups (e.g., at a Native American multi-tribal gathering). An online version of this survey also was available to anyone in the community who requested it.
- Generalizable data (i.e., data collected by way of a random sample that is representative of the larger population) were collected from the public by way of telephone surveys; the survey included a subset of questions taken from the longer written/online survey.
- Mail-back surveys were sent to businesses and non-profit organizations listed in the Yellow Pages directories for each of the four counties.

Completed Survey Totals

Sampling Method	Number of Completed Surveys
Aggregate	1869
Community survey (online and meetings)	1131
Telephone	557
Business	181

Data were collected from seven public meetings held in the four counties. The meetings were held both to collect information from and provide information to the public. There were two types of data collected from these meetings, verbal data and written survey data.

Community Survey

A written survey was one form of data collected from the public during these community meetings. The survey included 37 questions, and it was designed to gain a detailed picture of the preferences and needs for broadband in the community (Appendix III). The survey was distributed and filled out at the start of each meeting, prior to the informational presentation, in order to obtain the most unbiased information possible.

Using the survey instrument that was administered at the community meetings, information was collected from "special" groups and/or at "special" meetings other than the seven primary community meetings. The written survey was also distributed informally throughout communities in each of the four counties in a non-random way; distribution varied greatly among the counties. The survey also was made available online to any community member who requested participation via telephone, in writing or on the Redwood Coast Connect website. The online surveys were treated the same as the surveys collected at the community meetings, as well as the surveys that were non-randomly distributed in communities. These surveys were completed by individuals that self-selected to either participate in a community

meeting, fill out a written survey distributed to them in their community, or fill out the online survey from November 2007 through March 2008. From the four counties, 1131 individuals filled out either a written or online survey.

Telephone Survey

A second type of data was collected randomly from individuals in the community. Unlike the data collected from the community meetings, these participants were randomly selected and are not self-selected; therefore, these data can be used to generalize to the entire public from which the sample was derived. This is the most robust form of data collected and was used to estimate, among other things, aggregate demand for broadband. The data were collected via a telephone survey that was randomly administered to the public in the four counties from mid-November through December 2007. This 13-question survey is made up of questions from the longer community meeting survey (Appendix IV). From the four counties, 556 individuals completed the telephone survey.

There are two response rates important to note from the telephone survey. One is the total response rate of 15%, calculated from all calls made (3642) and total surveys completed (556); the other is calculated when invalid numbers are removed from the database. After removing such invalid numbers, fax machine numbers, and out-of-service numbers, etc., the response rate from the telephone survey is 21%.

Business Survey

The third type of data was collected from businesses in the four counties. Businesses (including non-profit organizations) were contacted via a mail-back survey. This 11-question survey was tailored to the business and professional community (Appendix V). Approximately 400 businesses were selected in each county.

Sampling strategy varied among counties depending on the number of businesses in the county. Businesses were chosen randomly from the Yellow Pages, unless 100% of businesses in a county were selected.

In Del Norte County, 448 businesses were selected (75% of businesses in the county). In Humboldt County, a total of 450 businesses were sampled, stratified by location within the county. In the outlying areas of the county, 180 businesses were sampled (100% of listings), while 270 businesses from the more populated areas of the county (Fortuna to McKinleyville) were sampled. In Mendocino County, a total of 413 businesses were sampled, stratified by location within the county. In the outlying areas, 215 businesses (approximately 50% of the listings) were sampled, while 198 businesses from the more populated areas of the county (Ukiah, Willits and Mendocino) were sampled. In Trinity County, a sampling of 377 businesses was completed (100% of county business listings).

It should be noted that inaccurate addresses might have had some impact on the response rate. In rural areas where mail often may be delivered to a post office box, the address listed in the phone book or online may not have been the actual mailing address but instead the location of the business itself. Every effort was made to locate the correct mailing addresses. Of the 1,688 business surveys sent out, 181 were returned, or 10.7%.

Response Rates from the Business Survey

County	Number Sampled	Percent of Total Businesses in County	Returned Surveys	Response Rate	Percent of Responses
Del Norte	448	54	37	8.3%	20.4
Humboldt	450	9	78	17.3%	43.1
Mendocino	413	10	32	7.7%	17.7
Trinity	377	83	12	3.2%	6.6
Unknown			22		12.2
Total	1688		181	10.7%	100

2.1 Community Surveys - Community Meeting, Written, and Online Surveys

Since participants in the community meetings, written, and online surveys were self-selected, the data are not random, and therefore cannot be generalized to the entire population. The table below shows the distribution of responses in each of the four counties. Results are weighted by county to reflect county population proportions. There is an aggregate sample size of 1131.

Aggregate County of Residence

County	Frequency	Percent of Responses
Del Norte	125	11.1
Humboldt	559	49.4
Mendocino	384	34.0
Trinity	62	5.5
Total	1131	100.0

Importance of Internet Access at Home by County

Importance	Del Norte Percent of Responses n = 54	Humboldt Percent of Responses n = 321	Mendocino Percent of Responses n = 638	Trinity Percent of Responses n = 109
Critical	42	46	56	42
Very important	41	42	38	41
Somewhat important	13	9	5	14
Not important	2	2	1	2
Not sure/don't know	2	1	0	1
Total	100	100	100	100

Nearly 90% of people think that it is critical or very important to have Internet access at home.

Aggregate Current Subscribers Type of Connection at Home

Connection	Frequency	Percent of Responses
Telephone dial-up	393	38.7
Accelerated dial-up	45	4.4
ISDN	12	1.2
DSL	139	13.7
Through cable TV modem	251	24.7
Wireless (antenna)	39	3.8
Satellite dish	113	11.1
Not sure/don't know	23	2.2
Total	1015	100.0

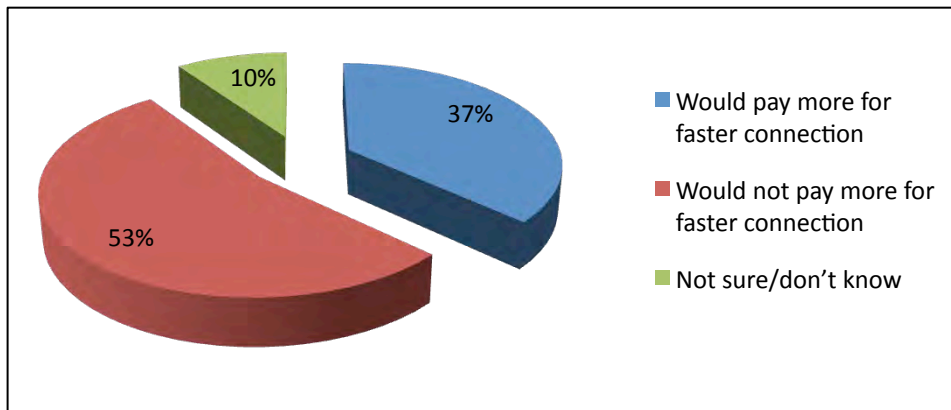
Nearly 100% of respondents said that Internet access is available to them at home, if they want it. About 90% of respondents already connect to the Internet at home.

Aggregate Reason for Not Subscribing to Broadband Internet Service

Reason	Frequency	Percent of Responses n = 1131
Don't need Broadband Internet	27	2.4
Broadband Internet is too expensive	133	11.7
Broadband Internet not available	370	32.7
Can get Broadband Internet elsewhere	25	2.2
Not sure/don't know	73	6.4

Participants were asked why they do not subscribe or connect to a broadband connection; respondents could indicate more than one reason. Most of the respondents (33%) said that broadband Internet is not available to them at home; however, not all respondents answered the questions so the total will not be 100%.

Residential: Willingness to Pay More for Broadband



95% confidence level, margin of error +/- 4%, sample size = 556

Thirty-seven percent of respondents would pay more for a faster Internet connection at home. Yet, of the respondents who said they currently have a telephone dial-up connection at home, 60% said they would be willing to pay more for a faster connection. Of the respondents who said they currently do not subscribe to the Internet at home, 33% said they would be willing to pay more for a faster connection. Of all the respondents who said they would not pay more for a faster connection, most (65%) already have some form of high-speed or broadband access at home.

Telephone Survey

Aggregate Sample, County of Residence: Actual Sample

County	Frequency	Percent of Responses
Del Norte	102	18.3
Humboldt	215	38.7
Mendocino	117	21.0
Trinity	101	18.2
Total	535¹	100.0

¹There were 21 additional responses with missing county information, for a total of 556 responses.

The aggregate sample size for all four counties is 556. This sample size provides a margin of error, at the 95% confidence level, of plus or minus 4%. U.S. Census data from 2000 estimate that there are 106,579 households in the four counties of Del Norte, Humboldt, Mendocino, and Trinity.

Aggregate Importance of Internet Access at Home

Importance	Frequency	Percent of Responses
Critical	86	15.4
Very important	263	47.4
Somewhat important	132	23.7
Not important	74	13.4
Not sure/don't know	1	0.2
Total	556	100.0

The majority of respondents (63%) feel it is critical or very important to have Internet access at home.

Aggregate Current Subscribers Type of Connection at Home

Connection	Frequency	Percent of Responses
Telephone dial-up	177	32.8
Accelerated dial-up	9	1.7
ISDN	3	0.5
DSL ¹	115	21.3
Through cable TV modem ¹	95	17.6
Wireless (antenna)	25	4.7
Satellite dish	27	5.0
Not sure/don't know	26	4.8
I don't subscribe	63	11.6
Total	540	100.0

¹After adjusting for known respondent errors (e.g., no DSL available in Del Norte County), DSL drops to 102 (18.9%) and cable TV modem increases to 108 (20.0%).

Approximately one-third of the respondents subscribe to a telephone dial-up connection at home.

Aggregate Reason for Not Subscribing to Broadband Internet Service

Reason	Frequency	Percent of Responses n = 557
Don't need broadband Internet	15	2.7
Broadband Internet is too expensive	21	3.8
Broadband Internet not available	80	14.4

The table below includes those people who said, "Yes, I would be willing to pay more for a faster Internet connection at home," and who provided an actual dollar amount (125 people). The median dollar amount people are willing to pay for broadband access is \$30 per month.

Aggregate Willingness to Pay for Broadband Access at Home (Mean = \$32.78, Median = \$30.00)

Willingness to Pay	Frequency	Percent of Responses n = 125
At most, \$20 per month	37	29.6
At most, \$30 per month	34	27.2
At most, \$40 per month	23	18.4
At most, \$50 per month	24	19.2
At most, \$60 per month	4	3.2
At most, \$70 per month	1	0.8
More than \$70 per month	2	1.6
Total	125	100.0

Analysis of Telephone Survey Respondents

County	Ethnic Group	Percent Represented in Telephone Survey (18 yrs & older)	Percent of Population (US Census Data: 15 yrs & older)	Comments (Representation in Survey)
Del Norte	American Indian/ Alaska Native	8.1	5.2	
	Native Hawaiian/ Pacific Islander	1.0	1.0	
	Black/African American	1.0	5.3	Under-represented
	Hispanic/Latino	9.1	13.8	Under-represented
	Asian	1.0	1.9	
	White	80.0	71.7	Over-represented
Humboldt	American Indian/ Alaska Native	7.4	4.7	
	Native Hawaiian/ Pacific Islander	0.5	0.2	
	Black/African American	0	0.8	
	Hispanic/Latino	4.9	5.4	
	Asian	0.5	1.5	
	White	82.4	84.9	
Mendocino	American Indian/ Alaska Native	7.3	3.6	
	Native Hawaiian/ Pacific Islander	0	0.1	
	Black/African American	0.9	0.6	
	Hispanic/Latino	5.5	13.5	Under-represented
	Asian	1.8	1.3	
	White	84.4	79.1	Over-represented
Trinity	American Indian/ Alaska Native	2.1	4.2	
	Native Hawaiian/ Pacific Islander	1.0	0.1	
	Black/African American	0	0.5	
	Hispanic/Latino	0	3.4	Under-represented
	Asian	1.0	0.5	
	White	94.8	88.0	Over-represented

It appears that in three of the counties, the Hispanic/Latino population may have been under-represented, and the White, non-Hispanic population may have been over-represented.

Del Norte County's Census 2000 group quarters population was estimated at 3,833 or 13.9% of the total population. The group quarters population includes all population not living in households (e.g., correctional facilities, nursing homes, mental hospitals, and college dormitories). Census maps indicate that this population primarily resides in the area of the

Pelican Bay State Prison with a 2006 inmate population of approximately 3,300. In comparison, an average of group quarters populations among total populations for Humboldt, Mendocino, Trinity, and Siskiyou counties is 2.3%.

The median income level of survey respondents was similar to the regional income median (by Census data), suggesting that low-income populations were adequately represented.

Aggregate Race or Ethnicity of Respondent

Race or Ethnicity	Frequency	Percent of Responses
White	440	83.4
American Indian / Alaska Native	38	7.1
Hispanic or Latino	28	5.3
Other	12	2.2
Asian	5	1.0
Native Hawaiian / Pacific Islander	2	0.4
Black / African American	2	0.4
Total	527	100.0

2.2 Business Surveys

Business surveys were collected from Del Norte, Humboldt, Mendocino, and Trinity county businesses. The survey was mailed primarily to private businesses, and not to government offices, schools, etc.

Aggregate County of Business

County	Frequency	Percent of Responses
Del Norte	37	20.4
Humboldt	78	43.1
Mendocino	32	17.7
Trinity	12	6.6
Unknown	22	12.2
Total	181	100.0

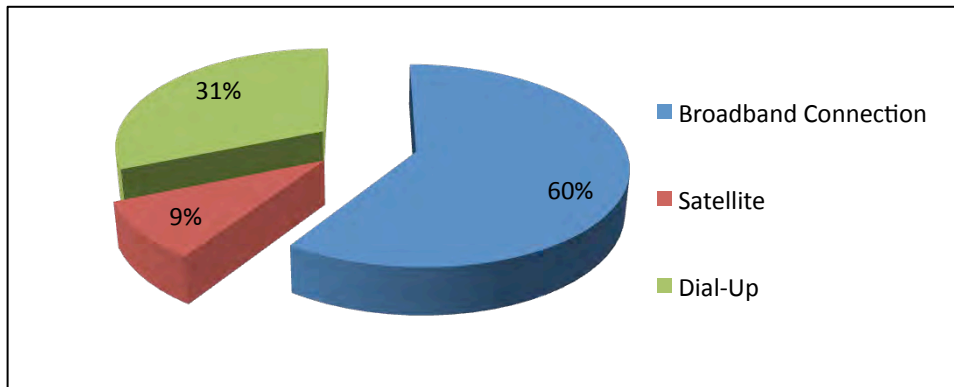
There was an aggregate sample size of 181; nearly half (49%) of the respondents have a business in Humboldt County.

Aggregate Type of Business

Business	Percent of Responses n = 181	Percent Industry in the Region
Other	26.8	
Retail	26.3	17.7
Health Care	14.0	11.9
Construction	8.4	12.5
Tourism, Hospitality and Food Service	11.2	16.3
Home-Based Business	7.3	
Human and Social Services	6.1	
Manufacturing	5.6	4.3
Finance, Insurance, Real Estate	5.0	9.3
Arts and Culture	5.0	2.0
Wholesale	5.0	3.1
Professional and Scientific (Incl. Legal)	7.2	7.7
Fisheries, Forest, Agriculture	10.7	2.4
Education	4.5	.1
Transportation and Warehousing	2.8	2.5
Government	2.2	
Utilities	1.1	.3
Information Technology	0.0	2.0

Respondents could check more than one category, so responses total more than 100%. Most of the businesses (26%) are retail stores. Some responses given in the “other” category are non-profit agencies, outdoor recreation, and various types of retail businesses.

Aggregate Types of Business Connections



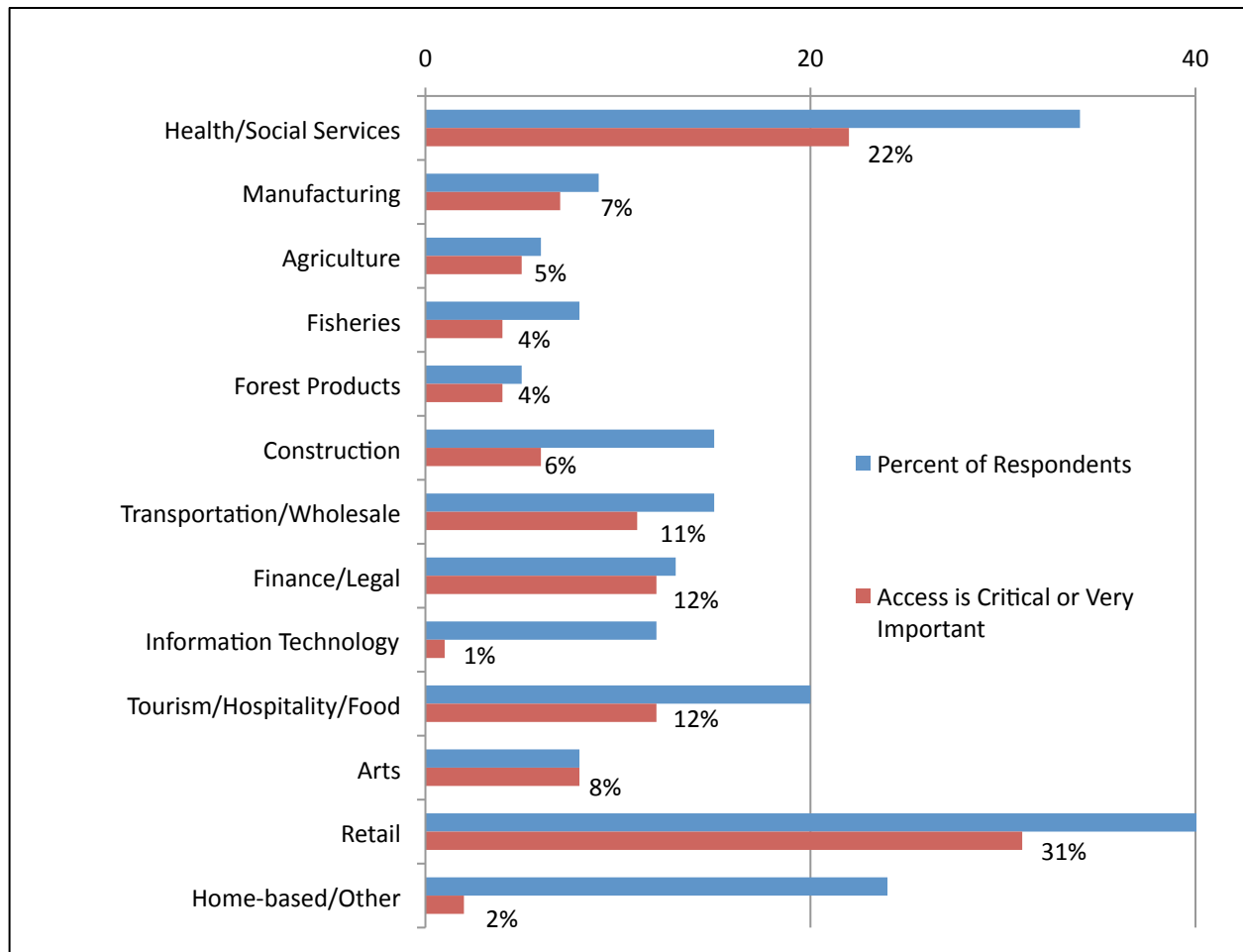
About 31% of businesses have a telephone dial-up connection.

Aggregate Importance of Business Broadband Internet Connection

Importance	Frequency	Percent of Responses
Critical	68	38.6
Very important	57	32.4
Somewhat important	28	15.9
Not important	18	10.2
Not sure/don't know	5	2.8
Total	176	100.0

The majority of respondents (87%) indicated that having a broadband connection at work is important. Just over half of businesses (54%) are very satisfied or satisfied with their current Internet provider at work; 52% of industry sectors surveyed would pay more for a faster connection.

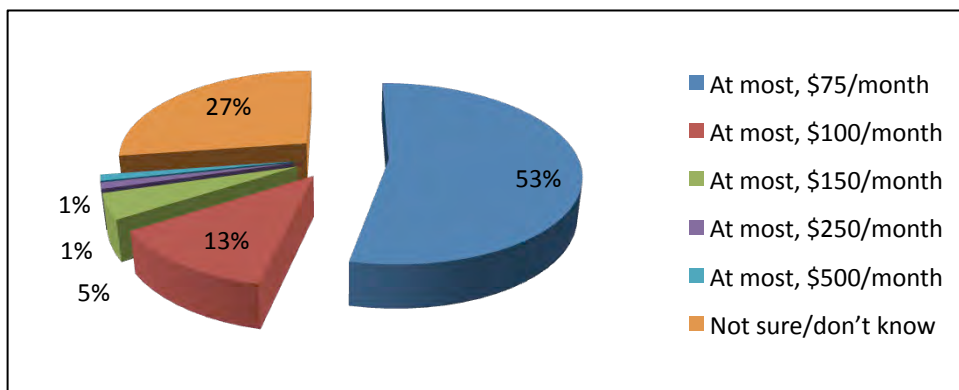
Industry Sector: Importance of Broadband Access



Numbers represent actual responses; margin of error +/- 7% for total sample, sample size= 212

Fifty-three percent of respondents would pay up to \$75 per month for broadband. Thirty-nine percent of respondents who currently have broadband would pay up to \$75 per month.

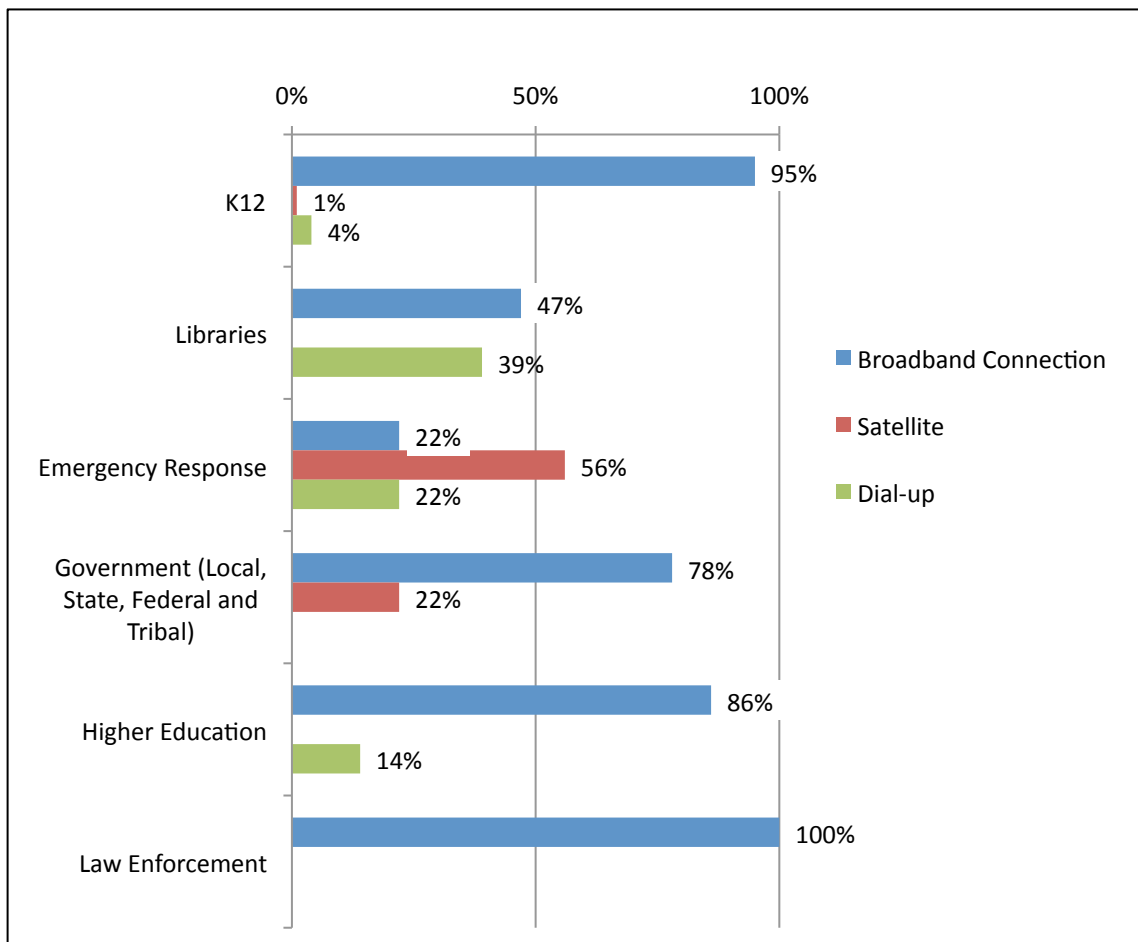
Industry Sector: Amount Willing to Pay for Broadband Access



Numbers represent actual responses; margin of error +/- 7% for total sample, sample size= 212

The following information was developed from interviews with governmental agencies.

Public Agency: Type of Internet Access



When interviewed, 100% of the public agencies surveyed believe that broadband access is critical to the work they do. The above chart would indicate that they also have a high level of current connectivity to broadband in the schools, government, law enforcement and higher education. Satellite connections are used more frequently in this sector than in

the population as a whole. The strong demand for, and utilization of, broadband makes all those in this sector candidates for anchor tenants for the underserved communities in which they are located.

Several of the subsectors above currently get their broadband services as part of a larger group. K-12 and higher education, for example, received broadband through a closed network called Corporation for Education Network in California (CENIC). Through CENIC these institutions have pooled their purchasing power to negotiate high bandwidth services at favorable prices. In some cases their power to negotiate has resulted in absorption of available backhaul capacity resulting in communities being underserved because backhaul is then insufficient to provide additional services to residents. When questioned about their willingness to aggregate demand with residents and other businesses in communities that are underserved, they are unwilling to risk higher prices or reduction in services, which could occur if they gave up their current positions.

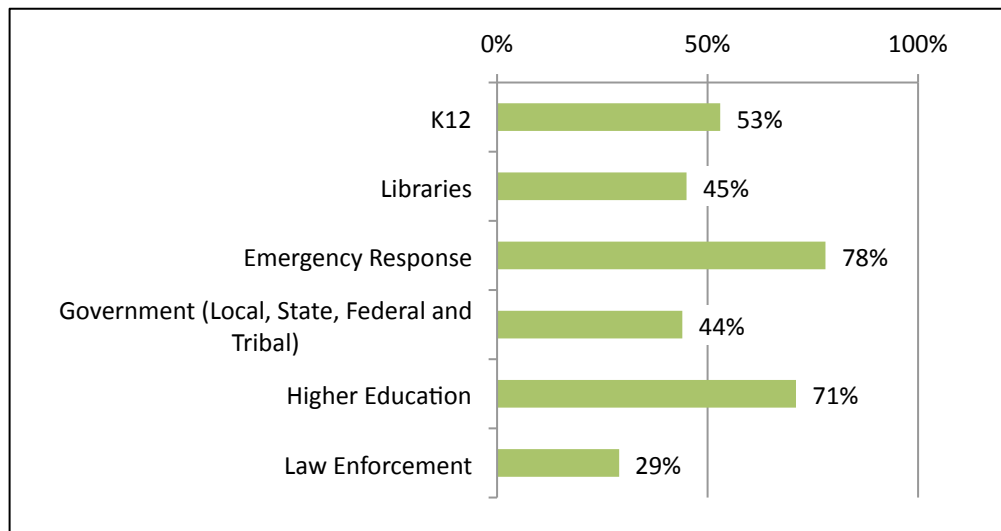
In some communities a school is a central feature that could utilize its current broadband connection to serve surrounding residents by wireless antenna. However, pricing agreements negotiated by CENIC do not allow extending services. One exception is in Mendocino County where the high-speed fiber was installed for use in the schools as part of an experiment with the National Aeronautical and Space Administration (NASA). After the project was over the school negotiated ownership and use of the line and created Mendocino Community Network (MCN) serving residents throughout the coastal area of Mendocino County (see Appendix XIV, Case Studies- Mendocino Connected Network).

It is possible that government buildings in underserved communities could be part of the solution to serving more residents and local businesses. Each situation will be somewhat unique. The following would need to be addressed:

- Concerns about possible compromises in security to existing systems
- Increased costs without corresponding increases in budgets
- Lack of capacity to manage an extended system
- Potential difficulties at the state or national level in dealing with policies on an individual site basis

Without a significant commitment at the state and/or national levels to be part of the broadband deployment solution for rural areas, these alternatives **may** be viewed as long shots instead of logical assets in communities from which to build services.

Public Agency: Satisfaction with Internet Service



2.3 Conclusions

Demand for Broadband at Home

Overall, according to the telephone survey results, over 90% of the study population has a landline telephone and a personal computer. Fewer respondents have a cell phone (75%) and the lowest number of respondents has cable

television (60%). Most people think having an Internet connection at home is critical or very important. The degree of importance varies with the sampling method used. The telephone respondents indicated having Internet to be of lower importance than the written respondents. Since the written respondents were self-selected and the telephone respondents were randomly chosen, the results of the telephone survey are more reflective of the general population's viewpoints.

According to the aggregate telephone survey results, over 90% of the survey population has some Internet access available to them and over 90% currently connect to the Internet at home. According to both written and telephone surveys, one-third of respondents currently subscribe to telephone dial-up service. The highest number of respondents in all four counties currently pays less than \$20 per month for Internet service. However, in Del Norte County an equal number of respondents also pay between \$40 and \$49 per month.

Respondents to the telephone and written surveys, when asked why they did not subscribe to broadband services at home, indicated that broadband was not available as the number one answer. The second most frequent answer in both pools was that broadband is too expensive.

Most people use the Internet at home for communicating electronically and looking up information on the World Wide Web. While respondents spend a wide variety of time on the Internet, the median amount of time spent on the Internet at home is two hours per day. The majority of respondents have access to the Internet outside of their home. The most common Internet access locations are work, wireless hotspots and libraries.

According to the telephone survey results, there is a range of willingness to pay for a faster Internet connection at home depending on the county of residence. Generally, the more respondents who connect to the Internet with telephone dial-up access, the higher the willingness to pay for a faster Internet connection within the county.

The percentage of respondents in each county who have a dial-up connection and the percentage of respondents who would be willing to pay for a faster connection are below.

Willingness to Pay for a Faster Internet Connection at Home (Telephone Survey)

County	Percent of Dial-up Connections	Percent Willing to Pay for Faster Service
Aggregate	33	37
Del Norte	29	26
Humboldt	25	33
Mendocino	41	43
Trinity	63	58

Written survey participants were given a choice of price categories so the values shown in the table are the categories containing the median value. Telephone survey participants were asked to give an open-ended dollar amount, so the values shown are the median dollar amounts. Overall, written survey respondents are willing to pay up to \$40 per month for broadband Internet service, which is more than telephone survey respondents, who are willing to pay up to \$30 per month.

Willingness to Pay for Broadband at Home

County	Written Survey	Telephone Survey
Aggregate	\$40	\$30
Del Norte	\$40	\$35
Humboldt	\$40	\$30
Mendocino	\$40	\$30
Trinity	\$40	\$30

Looking at the differences between the written and telephone surveys, the written survey respondents would pay more for broadband than the telephone survey respondents. However, because they participated in the survey by choice, i.e., they were “self-selected,” it can be safely assumed that written survey respondents already have an interest in broadband, and therefore the telephone results are more representative of the general population.

Looking at the differences in the “willingness to pay” dollar amounts among current dial-up customers across counties, Del Norte County has the highest “willingness to pay” amount (\$35 - telephone survey) and Trinity County has the lowest “willingness to pay” amount (\$28.75 - telephone survey).

Interestingly, of all four counties, Trinity County has the highest percentage of people who are willing to pay for a faster Internet service. Trinity County residents also place the most importance on having Internet at home. Income level does not appear to be a factor since telephone survey results do not indicate major differences in respondents’ income level in Trinity County compared to respondents in other counties. A possible explanation for the Trinity County willingness to pay result is a low sample size in that county. With a greater number of respondents, the willingness to pay would be more reflective of the general population. The majority of respondents from all survey methods prefer one combined bill for their phone, Internet and Pay TV.

Business Demand for Broadband

According to the business survey, the largest number of businesses reported being in the retail industry. Most businesses connect to the Internet with a DSL connection (32%) or a telephone dial-up connection (28%).

Overall, most businesses would not pay more for a faster Internet connection. This could be because many businesses already have broadband connections. However, most businesses would pay more for a more reliable Internet connection. This indicates that businesses are more concerned about reliability than increasing their currently available speed.

Results show that if businesses do not currently have Internet, they do not feel they need it and would not pay for a faster connection.

Demographics

Both the written and telephone surveys asked respondents basic demographic information. With both sampling methods, the most common age category is 50 to 59 years. The majority of respondents are white, which corresponds with U.S. Census data showing the percentages of white county residents to be 68% in Del Norte, 87% in Humboldt 72% in Mendocino and 90% in Trinity. The most common household income category is between \$20,000 and \$39,999 per year, which corresponds with U.S. Census data showing the median household income to be \$31,502 in Del Norte, \$33,281 in Humboldt, \$36,624 in Mendocino, and \$30,307 in Trinity. With both sampling methods, there is a nearly even distribution of male and female respondents.

A major demographic difference among categories is highest level of education. According to the written survey, most participants in Del Norte and Trinity counties have some college education. Most participants in Humboldt and Mendocino Counties have attended graduate school. U.S. Census data do not support this great variation among counties. Census results show the percentage of residents in each county who have earned a bachelor’s degree or higher to be 11% in Del Norte, 23% in Humboldt, 20% in Mendocino, and 16% in Trinity. This broadband study has seemingly attracted the attention of more highly educated residents. Despite this difference in education level among counties specifically, there does not appear to be an effect on demand and willingness to pay for broadband Internet.

2.4 Community Meetings

2.4.1 Description

Seven community meetings were held in the counties of Del Norte, Humboldt, Mendocino, and Trinity from early November 2007 to early January 2008. The meetings were attended by over 260 persons. As a critical part of Redwood Coast Connect, the meetings had three goals: (1) to provide information to the public in making a compelling case for broadband deployment in the region; (2) to understand the context of broadband demand in hearing from community members about why and how having reliable broadband access could impact their lives; and (3) to support community

mobilization and networking toward regional commitment to and ownership of steps toward building broadband infrastructure and services.

Objectives of the community meetings were to (1) inform the needs and assets assessment of “supply and demand” for broadband access; (2) promote and encourage participation in the Redwood Coast Connect surveys (i.e., the random telephone survey, the elective survey, or the business survey); (3) inform communities of ongoing efforts to increase broadband connectivity across the state; and (4) provide a forum for community members to foster networking toward building local and regional collaborative planning and support for broadband infrastructure and services.

All meetings were co-sponsored by local government and/or other public agencies and business organizations. The locations included:

- Weaverville (Weaverville Public Library), November 7, 2007, co-sponsored by the County of Trinity
- Crescent City (City Cultural Center), November 8, 2007, co-sponsored by the County of Del Norte and the Del Norte Chamber of Commerce
- Willow Creek (Camp Kimtu Cookhouse), November 13, 2007, co-sponsored by the County of Humboldt and the Willow Creek Community Services District
- Ukiah (County Office of Education Building), November 28, 2007, co-sponsored by the County of Mendocino and the Mendocino County Office of Education
- Fort Bragg (Town Hall), November 29, 2007, co-sponsored by the County of Mendocino and the Mendocino County Office of Education
- Redway (Healy Senior Center), January 8, 2008, co-sponsored by the County of Humboldt and Southern Humboldt Working Together (SHWT)
- Eureka (Humboldt Bay Aquatic Center), January 10, 2008, co-sponsored by the County of Humboldt and Redwood Technology Consortium

Solicitation of co-sponsors for the community meetings by local organizations served many aims: having a local host (and familiar presence) endorsing the community meetings; enabling use of public meeting space and meeting resources at free or reduced fees; and hosting volunteer efforts in publicizing the meetings, as well as inviting key stakeholders to the meetings.

On average, government officials and employees represented almost a quarter of the meeting participants, followed by the business community. In every county, there was a range of one to three supervisors attending the community meetings. Provider presence was also evident at every meeting, and in two cases, providers attended more than one community meeting.

2.4.2 Summary of Findings

During the community meetings, the following four observations emerged from community stakeholder input:

1. Having broadband access would promote the quality of life, personal development and enrichment of individuals in their physical environment across a broad array of arenas. Because broadband access enables large file transfer and streaming media, the following forms of communication, networking, and interaction are possible:
 - The communication and exchange of information between institutions (e.g., health care and educational) and government offices would be more efficient, thereby improving the quality of those interactions. Institutions can also more efficiently communicate and exchange information with each other.
 - Broadband opens up possibilities at a personal level, such as telecommuting to one’s job and communicating with clients, coworkers and contacts; shopping on-line; and receiving and sending news and information.
 - Broadband would enable individuals to interact with other individuals in virtual communities, whether social networking, e-commerce and virtual markets, virtual recreation (e.g., gaming), or virtual classrooms.
 - For seniors and people with disabilities, broadband is a tether to living a productive life by connecting them to information, allowing them to communicate with each other, offering information on life issues such as health care, and providing a viable means of earning a living.
2. Broadband access enables greater efficiency and effectiveness at work, whether it is being able to rely on a consistent Internet connection in order to provide a consistent and reliable level of service, or being able to improve one’s work environment by downloading software updates. In addition, broadband enables users to enhance and

increase the range of organizational capabilities and functions, e.g., a real estate agency being able to offer virtual home tours.

- Business training and education via the Internet could also improve an employee's effectiveness by providing some of the training and professional development needed for the job.
 - Personal efficiency and effectiveness could be increased by being able to utilize the free efficiency tools available on the Internet.
 - Collectively, these very real impacts that broadband can have on personal and organizational effectiveness and efficiency can save money, time and other resources, such as gas. Ultimately, this frees up individuals to be more engaged and involved with society, whether locally or globally, and better able to keep up and move forward with the rest of the world.
3. Having broadband access can improve the ability to promote and market regional goods, services and the region itself, to fuel the local economy at multiple levels.
- Marketing local/regional goods and services creates jobs, and thus, reduces "brain drain" (the outward migration of locally educated residents, especially younger residents), enabling rural residents to have viable jobs and allowing them to stay in the area.
 - Residents staying in and moving to the area keep real estate as a viable industry sector, as well as maintaining or boosting property values (and resulting taxes).
 - Broadband also enables marketing of the Redwood Coast region itself, promoting tourism and ecotourism as an industry, as well as marketing the region as a beautiful area in which to live, work and relocate businesses.
 - All of the above factors positively impacted by broadband connectivity lead to the ripple effect of increased consumer demand for local goods and services, real estate and new business opportunities, further fueling the local economy and adding jobs.
4. Community readiness can be seen as progressive stages a community or region may move through in order to have widespread broadband deployment. These stages range from networking and attracting investment in infrastructure to working toward policy development that acknowledges the real barriers rural communities face in terms of lower population densities and geographical challenges (i.e., isolation, terrain). These challenges include:
- Raising awareness of and educating the public about the importance of broadband access to individuals and their communities.
 - Networking among regional stakeholders is essential to mobilize the coalition building needed to (1) conduct collaborative and comprehensive planning for regional broadband deployment, (2) form public/private partnerships that could make adaptation of existing public infrastructure for broadband use a reality, (3) lobby legislators and policy-making groups, and (4) generate examples of policy changes that would promote and sustain broadband access in rural communities.
 - Assuring that the list of key players is comprehensive and pulls from the public and private sectors.
 - Identifying every county's small entrepreneurial Internet Service Providers (ISPs) that are taking the initiative to go after niche local markets and are savvy about utilizing existing infrastructure.

In several community meetings the concept of equitable broadband coverage (between urban and rural) was raised. Urban residents are perceived to have greater access to more affordable broadband services. Attendees voiced a need to raise awareness both within the region and at the state level regarding the lack of affordable services available in many rural communities. Their ideas about how better parity could be accomplished included the following:

- For providers who serve urban and rural counterparts, price points for broadband should be equitable.
- Create a competitive environment through fiber redundancy.
- Combine public funding with opportunities for private investment to obtain the funding needed to bring in infrastructure.
- Support research and development of new technologies for broadband access.
- Work toward defining the necessity of broadband access as a public utility, similar to the political clout that brought electricity to rural areas in the 1930s.

In sum, the community meetings have proven to be a successful component of a multi-layered approach to educating the public about new developments for bringing broadband access to rural areas. The community meetings revealed broadband needs of individuals, groups and organizations.

While community meetings are important as one of the tools that can lead to stimulation of broadband demand, a single meeting is obviously insufficient to “drive broadband demand.” Developing an overall strategy is recommended in order to build and nurture local community advocates who could be available in the community to coordinate local development of strategic plans and other vital, ongoing support mechanisms that also address adoption and usage.

Themes that Emerged from Community Meetings

- Raising awareness of, and educating the public about, the importance of broadband access to individuals and their communities emerged as a primary theme. Most people are unaware of how far behind the rest of the world the United States is in general, and particularly rural America, in terms of broadband access. Useful educational resources mentioned were FP Media, Broadbandreports.com, Benton.org, and dslreports.com.
- Networking among regional stakeholders (e.g., RCRA) is essential to mobilizing for the coalition building needed to:
 - Conduct collaborative and comprehensive planning for regional broadband deployment
 - Form public/private partnerships that could make adaptation of existing public infrastructure for broadband use a reality
 - Lobby legislators and policy making groups (e.g., Governor's Broadband Taskforce) to influence policy
- Another common theme was the discussion of policy changes that would promote and sustain broadband access in rural communities. In every county, there are small entrepreneurial ISPs who are taking the initiative to go after niche local markets and are savvy about utilizing existing infrastructure. On the demand side, land and property owners have literally aggregated their broadband access needs when seeking to attract ISPs considering their areas as feasible markets. Suggested policy changes included:
 - Provide low cost money for infrastructure to leverage where market rate funds are not economically justified (as in most underserved communities). Make those programs available to small local entrepreneurial ISPs in addition to the large telecom companies.
 - Freeing up use restrictions on publicly-funded infrastructure and rates (e.g., CENIC and public schools, e-rates for public libraries), and on use of public lands (e.g., a state park or forest service with towers) for resource sharing enabling wider community use.
 - Requiring fiber off-ramps and backhaul, and "splice points."
- An example of public/private partnerships for infrastructure (such as an old TV tower or an existing water tower) was suggested.
- Another theme identified what key players, groups or organizations need to be involved in planning broadband deployment. They were identified as key players for the following reasons:
 - They already have broadband infrastructure in place (e.g., school districts, libraries, public agencies).
 - They are entities with a critical need for broadband (e.g., fire departments, not-for-profit and nonprofit agencies serving low-income populations).
 - They own infrastructure that could be adopted for broadband deployment (e.g., community services districts, counties, state parks).
 - They already are in leadership roles for the region (e.g., Chambers of Commerce and Southern Humboldt Working Together (SHWT), tribal government).
 - They are in positions to shape ordinances and policies facilitating broadband deployment (e.g., local government negotiation for cable company franchises, state legislators introducing bills to address rural broadband access equity, county general plan development, requiring fiber installation when replacing water pipes or tearing up roads).
 - They can exert public pressure to address affordability.
 - They are in positions to provide the capital needed for deployment (e.g., private investors, major telecommunications providers).
 - They can provide broadband access directly to consumers, (e.g., local entrepreneurs and small ISPs).

3.0 Aggregated Demand, Supply and Underserved Communities

3.1 Business Demand—RCRA's Targets of Opportunity

The north coast's targets of opportunity are the region's most promising areas for economic and workforce development. They include specific industry sectors drawn from both the region's export-oriented base clusters and support sectors—focusing on the highest growth sectors in terms of jobs, wages and firms since 1990. Each target of opportunity includes elements that are export-oriented, population-driven, and offer career potential for local residents.

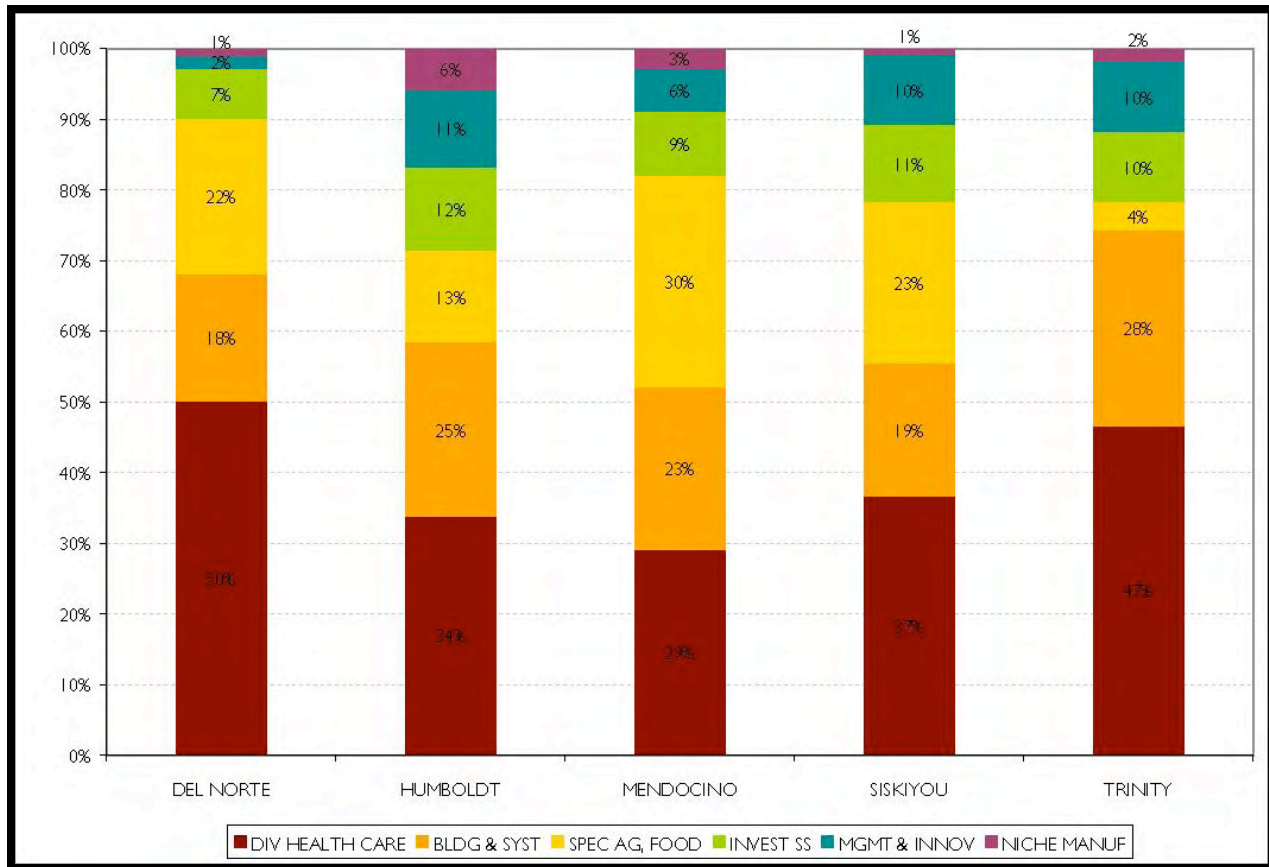
Areas of opportunity were identified, demonstrating a combination of (1) expanding opportunity (e.g., job and/or firm growth); (2) growing quality (e.g., wage increases); (3) improving competitiveness (e.g., strong and/or growing specialization compared to California as a whole); and (4) career potential (e.g., distribution of job opportunities across the occupational spectrum).

The six targets are (in order of size): (1) diversified health care; (2) building and systems construction and maintenance; (3) specialty agriculture, food and beverages; (4) investment support services; (5) management and innovation services; and (6) niche manufacturing.

These six clusters are growing faster than the rest of the region's economy—particularly the private sector economy. Over the last decade and a half, they have proven to be long-term sources of structural economic growth, expanding even through short-term economic cycles.

- Together these sectors comprise 39% of the region's private sector employment (2004)—up from 30% in 1990. They also comprise 53% of the region's private sector wages.
- Together these sectors grew 37% in employment during this period, while jobs in the private sector economy as a whole expanded by only about 4%. Even including government, total regional employment only grew 8% between 1990 and 2004.
- The number of firms in these combined sectors jumped 23%, while the total firms in the entire regional economy increased only 1.5% between 1990 and 2003 (the year with the latest comprehensive data available).

Targets of Opportunity are Important to All North Coast Counties



Note: Siskiyou County was included in the Targets of Opportunity economic analysis

All or most of the targets of opportunity share key characteristics:

- All six targets have grown in employment, all of them faster than the region's total job growth of 8%. The targets of opportunity have experienced growth rates ranging from 14% to 125% during the 1990-2004 period.
- All six targets have increased or essentially maintained their employment concentration—a measure of their competitiveness—relative to the state average over this period.
- Five of the six targets have far outpaced the regional growth in establishments. The growth rate in number of firms in Management and Innovation Services (80%), Diversified Health Care (34%), Investment Support Services (22%), Niche Manufacturing (19%), and Specialty Agriculture, Food and Beverages (11%) are all a much greater rate than the regional economy as a whole (1.5%).
- All targets of opportunity have not only a track record of growth, but prospects for future expansion, especially if they are supported by necessary infrastructure and can find skilled talent they need. Employers involved in focus groups in each area identified specific opportunities for future growth.

Targets of opportunity are the regional focus for both economic development and workforce development over the next 5-10 years. Regional target cluster leaders have already met on two occasions to discuss cluster needs to support growth. Four of the clusters - Diversified Health Care, Investment Support Services, Management and Innovation Services and Niche Manufacturing - specifically mentioned broadband services; and, while the largest employers in those targets had broadband services, the reliability of those services was of paramount concern.

The larger employers in all six of the clusters are known to be extensive broadband users requiring dedicated lines, and they act as anchor tenants in their respective communities. Uses include transmission of large files in telemedicine, online sales, data processing centers and networked offices. All of the anchor tenants (largest employers) in these clusters are currently located in areas with good broadband coverage. Future expansion to other regional communities will be dependent on access to adequate, reliable broadband services.

3.2 Demand and Supply Comparison Methodology

Feedback from broadband service providers attending the broadband forum held in August 2008 made it clear that aggregation of demand across the whole region is not sufficient to entice telecom and cable providers to invest outside their return-on-investment model. Aggregation was insufficient to get either redundant backhaul or new services to outlying communities. Smaller local WISPs were more forthcoming about working to get access to broadband services to communities, but they wanted more specific characteristics of target communities and an idea of readiness - an indication of quick uptake if services were provided.

In order to create a baseline of understanding about broadband in the region, an analysis of both supply and demand was completed. This approach allowed RCC to understand where there is adequate broadband deployment and to look at the factors that might drive demand in the well-served areas. In addition, demand was analyzed by factoring survey data on residential and business demand with local leadership. Comparing the supply against demand provided a clear picture of how each town and each county was doing, both in deploying broadband and in generating demand. The process highlighted red flag areas, especially the causes of the red flags. Additionally, projects within reach were identified (e.g., areas where there is high demand and little competition).

A numerical system was devised, and a supply ranking and a demand ranking were calculated for each community using data specific to each county. The supply ranking indicates the quality of the broadband deployment. The demand ranking indicates the local town support for broadband purchases. When analyzing the data on a town-by-town basis to provide a snapshot of specific areas and their needs, the broadband supply and the broadband demand for each town was first considered. This provided a complete overview of the region and identified towns where the broadband supply was inadequate, resulting in underserved areas.

The number of estimated residences was calculated from the 2000 Census data for households and the 2000 population data for adults over 20 years old. Current estimated populations by town were provided by Representative Patty Berg's office.

$$\begin{aligned} \text{Households/Adults} &= \% \text{ of Adults per household} \\ \text{Town Population} \times \% \text{ of Adults per households} &= \text{Estimated Residences} \end{aligned}$$

County	Adult Population	Total Households	Households as Percent of Adults
Del Norte	20,069	9,170	45.69
Humboldt	92,890	51,238	55.16
Mendocino	62,260	33,266	53.43
Trinity	9,887	5,587	56.51

Supply Analysis

Supply was ranked numerically in order to prioritize those communities most in need of attention. Unserved and underserved communities were given priority. In addition to identifying communities most in need of attention, the detail of how supply was ranked for each community made current supply weaknesses evident. There were 25 possible points available. Mobile wireless providers were not included in the analysis since the bulk of the mobile wireless broadband service was installed during the project. Mobile wireless providers are listed by town in Appendix VI through Appendix IX.

The criteria used:

- Number of service providers (5 points possible)

- Number of wireline service providers (5 points possible)
- Available service outside of town (adjacent coverage) (5 points possible)
- Single carrier highest upload speed (2.5 points possible) and highest download speed (2.5 points possible) (total of 5 points possible)
- Backhaul availability (5 points possible)

Supply ranking designations:

- Below 10 points, none/underserved designation
- 10-14 points, low designation
- 15-19 points, medium designation
- Above 20 points, high designation

The following assumptions were made when analyzing the broadband supply:

- Three or more service providers constitute a robust competitive environment in a rural area. This number was determined by researching current standards. Currently, the European Union has determined that it takes five carriers to provide a true competitive environment in urban settings. Because it is unrealistic to envision this depth in some of the more remote or sparsely populated rural areas in California, the number was lowered to 3 to reflect what might be reasonable in more populated rural areas.
- Because fiber is the optimal long-range buildout strategy, the number of wireline providers was given additional points. Wireline providers typically have also made much larger investments in the area.
- The CASF definition of broadband speeds (1 megabit upload and 3 megabits download) was used in the rankings of upload and download speeds. Full points were assigned to towns that had one provider who met or exceeded these speeds.
- Backhaul availability estimates were based on the number of providers offering backhaul as well as their ability to add additional backhaul circuits. In addition to a lack of backhaul facilities, a number of providers have backhaul for existing circuits but have no additional growth capacity available.

Apparent Demand Analysis

Demand was also ranked numerically. The characteristics ranked included perceived importance of broadband by residents and businesses, the level of leadership demonstrated in improving broadband conditions, and willingness to pay. These characteristics are thought to identify those communities where providers might have quicker uptake of available services and greater tolerance for price. There were 20 possible points available which were then normalized to 25 points.

Criteria used:

- Participation in RCC surveys, meetings, feedback (5 points possible)
- Broadband importance for residences and willingness to pay from survey data combined local expert opinion on town demand (5 points possible)
- Broadband importance to businesses from survey data (5 points possible)
- Local leadership based on local expert estimation (5 points possible)

Demand ranking designations (based on normalized totals):

- Below 10 points, none/underserved designation
- 10- 14 points, low demand designation
- 15- 19 points, medium demand designation
- Above 20 points, high demand designation

The following assumptions were made when analyzing the broadband demand:

- Participation in the RCC process through surveys, meeting attendance, and participation in the online June 2008 feedback showed heightened interest in broadband in a town and a greater likelihood of rapid broadband purchases when available.
- Local community leaders (volunteers, businesses and county officials) were polled to help frame local leadership and local demand. Local community leaders highlighted community grassroots efforts that helped generate demand for broadband. Local leadership is key to the success in broadband installation and growth.

For both the supply analysis and apparent demand analysis sections above, it should be noted that these are largely subjective analyses. While a mathematical formula is used, the components are largely subjective in their relative weightings. Nevertheless, this is a useful exercise and the resulting rankings largely correspond with anecdotal observations.

Underserved Communities

Local infrastructure supply and demand were further investigated for towns whose supply ranked in the low or none/underserved categories. Based on the factors analyzed in the supply analysis, infrastructure scenarios were identified for the unserved and underserved towns – those ranked none/underserved or low in the supply analysis. These scenarios were developed to gauge the level of investment needed to provide ubiquitous broadband deployment regionally. Using national average costs for installation and for revenues, an annual revenue and capital buildout cost for each town was projected. Some of the areas will require additional regional backhaul construction. Details of the regional backhaul scenarios can be found in Section 4.

In general, the following infrastructure scenarios were identified as feasible:

- Extend cable broadband coverage
- Extend DSL coverage
- Improve backhaul connectivity
- New provider opportunity (all services)
- Upgrade existing service levels

Successful implementation of these or other infrastructure scenarios is dependent on many factors including backhaul availability; buildout viability/affordability for low population centers; right-of-way permissions including tower placements; timing and costs; local political will; local residential and business support and subscription to services; and potential subsidies, etc.

Criteria used included the following: (1) logical infrastructure scenario(s) by town were determined from the facts found in supply analysis; (2) the unavailability of broadband was calculated from project survey data on a county-by-county basis; (3) the average residential take rate was calculated from project survey data on a county-by-county basis; and (4) two different new installation cost formulas were utilized for this analysis: unserved communities that had no infrastructure and underserved communities that might warrant an expansion or a new service provider.

- For unserved areas: # estimated residences x 2150
- For underserved areas: # estimated residences unserved x 2150

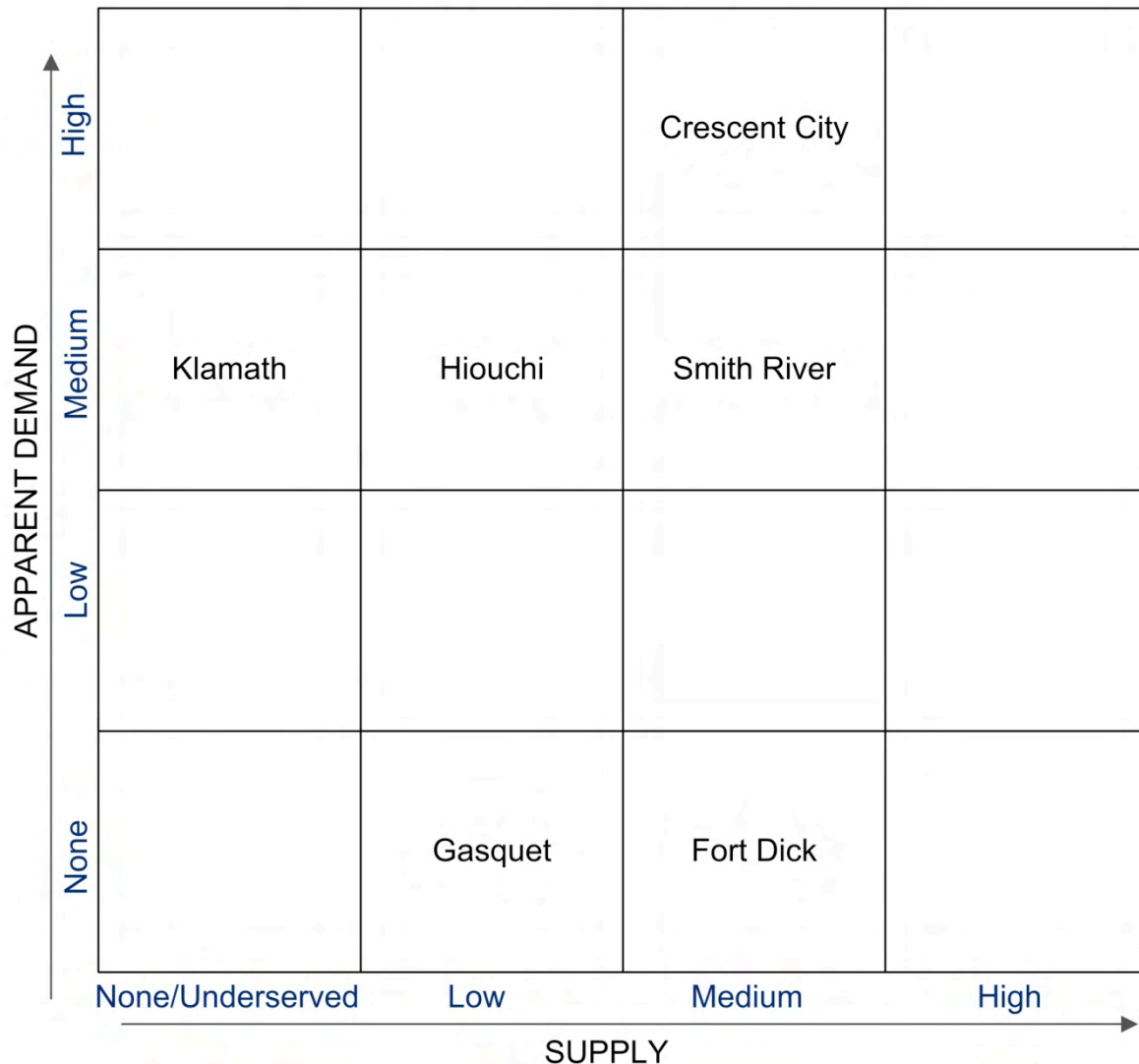
- \$2150 is the average “drop charge” for USDA Rural Broadband installation through its rural broadband funding program

3.3 Regional Findings

A number of regional characterizations can be made based on the analysis of supply and demand data. They are:

- Population centers are generally well served with both a variety of broadband choices and a price competition.
- The entire region suffers from a lack of redundancy that will hamper business expansion.
- Areas that have had active, ongoing broadband leadership for a number of years have better broadband deployment, higher satisfaction levels, high demand and less underserved areas.
- Geography is a key limiter to broadband penetration.
- Lack of backhaul capacity is a key limiter to broadband deployment in many of the underserved areas.
- Town centers may have limited broadband capabilities, but outlying areas are underserved (even at the block level). This seems to be more prevalent with the larger providers who draw arbitrary service lines owing to distance, technology constraints or operational cost constraints.
- Locally-owned fixed wireless providers are the only providers in most of the underserved areas.
- Mobile wireless coverage is expanding rapidly with 3G coverage available in mid-2008. However, topology constraints in the regions (especially dense trees and hills) make coverage spotty and unpredictable.

Del Norte Broadband Supply and Demand by Town



3.4 Del Norte County Supply/Demand Summary

Detailed information on a town-by-town basis is available in Appendix VI.

Del Norte County has approximately 29,000 residents. Six towns and their surrounding areas were studied. The 2000 Census data show the per capita income at \$14,573, and the median household income at \$29,642.

Supply Comments

Del Norte County reflects adequate rural broadband deployment; this is a sign of local government, business and resident priorities to have the county served at superior speeds from a dependable supplier.

- The results show that 50% of towns are ranked in the high and medium categories, which cover 86% of the county's population.
- The results show that 50% of towns are ranked in the low and unserved categories. They include approximately 14% of the overall county population.

- While there have been some reliability issues in the past, the supplier and the community worked together to increase reliability and service levels.
- There is only one supplier in the region, but the high available speeds and the coverage result in an acceptable regional ranking. However, the entire county would benefit from redundant backhaul out of the region and increased competition (at least one additional provider) as project participants generally thought that the service provided by the cable company was too expensive (\$55 per month).

Demand Comments

Survey data showed the following indicators of strong demand:

- Del Norte County has a high take-rate for services when they are available, 67%, which demonstrates a high level of general community awareness of the importance of broadband and the need for broadband.
- The county has only 13% of the population that has no broadband available.
- The average price people were willing to pay for residential service was \$34.22, which is higher than the regional average.
- The results show that 67% of the towns (88% of the population) were ranked with either high or medium demand, showing a strong understanding of the importance of broadband for both residential and business use.

Aggregated Demand in Underserved Communities

Underserved Towns in Del Norte County	Normalized Demand	Demand Rank	Participation	Residential Demand	Business Demand	Leadership
Gasquet	5	Low	0	2	0	3
Hiouchi	15	Medium	1	3	5	3
Klamath	18	Medium	4	3	3	4

The normalized demand number includes a balance of factors considered critical to quick uptake of broadband and a service provider friendly environment as shown in the table above. Klamath, which currently has no broadband service, shows the highest demand rate for the underserved areas. Hiouchi has a reasonable demand and Gasquet's demand is very low.

Klamath is home to the Yurok Tribal Headquarters, a school, a casino and small hospitality businesses as well as tourist destinations like the Trees of Mystery. These types of businesses will all require rapidly increasing broadband connectivity in order to serve both tourist and local business needs. Gasquet and Hiouchi have no major industry segments. Businesses look more like residential broadband purchasers – small retail establishments and microbusinesses (mainly telework-oriented).

Estimated Market Revenues and Buildout Costs in Underserved Communities

Underserved Towns in Del Norte	Estimated Residences	Applicable Infrastructure Scenario(s)	Local Loop Capital Needed	Possible New Annual Revenue	Notes
Gasquet	274	Expand Cable, New	\$67,080	\$12,830	Coverage outside of town needs to be built
Hiouchi	183	Expand Cable, New	\$44,720	\$8,553	Coverage outside of town needs to be built
Klamath	267	Backhaul, New	\$502,240	\$99,580	Requires Eureka to Crescent City backhaul

This chart depicts the number of residences in the underserved areas, possible infrastructure scenarios, an approximation of the buildout cost for local loops in the area, and possible new annual revenues if buildout is done.

Gasquet and Hiouchi are served by the cable company in the town centers, but coverage drops off drastically outside of town. Because Hiouchi has a better apparent demand rate compared to Gasquet, providers would find a more ready market in Hiouchi for their services.

Klamath, with its high demand and growing industry segments, is ready for broadband deployment. Uptake should be high based on its demand ranking. However, the costs shown in the chart are only a fraction of the construction needed to serve Klamath since backhaul is non-existent. See Section 4 for a more complete discussion of backhaul scenarios.

Humboldt Broadband Supply and Demand by Town

APPARENT DEMAND ↑	High	Briceland Myers Flat Orleans Weott	Alderoint Blocksburg Fieldbrook Hoopa Miranda Whitethorn Willow Creek	Trinidad	Eureka Fortuna Garberville Redway
	Medium	Bridgeville	Blocksburg	Bayside Blue Lake Carlotta Hydesville	Arcata Cutten Ferndale Loleta McKinleyville Rio Dell Scotia
	Low	Crannell Orick Phillipsville	Kneeland Shelter Cove		Benbow Fields Landing
	None	Dinsmore Ft. Seward Holmes Korbel Redcrest Richardson Grove	Ettersburg Harris Honeydew Petrolia		Fernbridge Samoa
		None/Underserved	Low	Medium	High
		SUPPLY →			

3.5 Humboldt County Supply/Demand Summary

Detailed information on a town-by-town basis is available in Appendix VII.

Humboldt County has approximately 133,000 residents. A total of 47 towns and their surrounding areas were studied. The 2000 Census data show the per capita income at \$17,203, and the median household income at \$31,226.

Supply Comments

Humboldt is a county where a denser population and a high level of consumer and business demand have created robust broadband deployment in certain areas. Better-served areas include those with higher populations or those close to areas with higher populations. It is also a study in the stark contrast between the haves and the have-nots owing to typical rural geographical issues. There are still a number of unserved and underserved communities, generally in areas of difficult or isolated geography and/or low populations.

- The results showed that 43% of towns are ranked in the high and medium categories, which cover 89% of the county's population.
- The results showed that 57% of towns are ranked in the low and unserved categories. They include approximately 11% of the overall county population.
- The expense of building and operating backhaul to these isolated areas has precluded local deployment of broadband.

Demand Comments

Survey data showed the following indicators of strong demand:

- Humboldt County has a high take-rate for services when they are available, 61%, which demonstrates a high-level of general community awareness of the importance of broadband and the need for broadband.
- Approximately 23% of the population is without broadband.
- The average price people were willing to pay for residential service was \$31.53.
- Approximately 61% of the towns (97% of the population) were ranked with either high or medium demand, showing a strong understanding of the importance of broadband for both residential and business use.

Aggregated Demand in Underserved Communities

Underserved Towns in Humboldt County	Estimated Residences	Normalized Demand	Demand Rank	Participation	Residential Demand	Business Demand	Leadership
Alderpoint	165	23	High	5	5	5	3
Blocksburg	88	21	High	4	5	5	3
Briceland	81	20	High	4	3	5	3
Bridgeville	394	18	Medium	3	3	5	3
Crannell	0	8	Low	2	2	0	3
Dinsmore	0	2	None	0	1	0	1
Ettersburg	0	6	None	0	2	0	3
Fieldbrook	0	20	High	2	5	5	4
Fort Seward	0	3	None	0	1	0	1
Harris	0	6	None	0	2	0	3
Holmes	0	5	None	0	2	0	2
Honeydew	74	5	None	0	2	0	2
Hoopa	1882	21	High	4	4	3	5
Kneeland	217	13	Low	4	2	0	5
Korbel	105	6	None	0	2	0	3
Miranda	354	22	High	5	4	4	4
Myers Flat	133	21	High	5	5	3	4
Orick	239	13	Low	5	2	0	4
Orleans	270	23	High	5	5	4	5
Petrolia	161	5	None	0	1	0	3
Phillipsville	83	14	Low	5	3	0	3
Redcrest	213	3	None	0	2	0	1
Richardson Grove	0	3	None	0	2	0	1
Shelter Cove	0	14	Low	3	4	0	4
Weott	141	22	High	5	5	3	5
Whitethorn	440	20	High	3	3	5	5
Willow Creek	961	21	High	5	5	2	5

The normalized demand number includes a balance of factors considered critical to the quick uptake of broadband and a service-provider friendly environment as shown in the table above. Residents and businesses in the underserved areas were the judges of whether they believed broadband was important to them. The data showed a wide variation between underserved communities with high demand and those with low demand. In general, the very small communities that showed no estimated residences (population data could not be confirmed), typically showed little or no demand for broadband services. Fieldbrook was the only exception to this.

The towns with the largest number of estimated residences scored in the medium to high rankings for demand. One notable exception is Orick, which scored low, but in reality has residents and businesses whose demand is high. This is based on feedback received in June 2008. However, the town has been studied for a number of years, and residents and businesses have grown discouraged because broadband is not forthcoming.

As is typical in the region, there are very few anchor tenants in the underserved towns. A few have schools and state offices, but generally only residential and business broadband services are needed. The exceptions include the following:

- Bridgeville: school
- Crannell: California Redwood Corporation
- Dinsmore: USFS
- Korbel: California Redwood Corporation
- Orick: California Redwood Corporation, School, National Park Service and Caltrans
- Orleans: winery and USFS
- Richardson Grove: state park
- Weott: school, state park, CDF (Calfire)

Estimated Market Revenues and Buildout Costs in Underserved Communities

Underserved Towns in Humboldt County	Estimated Residences	Applicable Infrastructure Scenario(s)	Local Loop Capital Needed	Possible New Annual Revenue	Notes
Alderpoint	165	New	\$355,782	\$36,339	Requires backhaul
Blocksburg	88	New	\$113,139	\$11,556	Requires backhaul
Briceland	81	New	\$174,333	\$17,806	Requires backhaul
Bridgeville	394	New	\$846,761	\$90,088	Requires backhaul
Crannell	Unknown	New	--	\$3,600	Requires backhaul
Dinsmore	Unknown	New	--	\$3,600	Requires backhaul
Ettersburg	Unknown	New	--	--	Requires backhaul
Fieldbrook	Unknown	Expansion, New	--	--	Requires backhaul
Fort Seward	Unknown	New	--	--	Requires backhaul
Harris	Unknown	New	--	--	Requires backhaul
Holmes	Unknown	New	--	--	Requires backhaul
Honeydew	74	Upgrade	\$96,061	\$9,812	Requires backhaul
Hoopa	1882	New	\$2,427,145	\$247,907	Requires backhaul
Kneeland	217	New	\$280,356	\$28,635	
Korbel	105	New	\$226,515	\$26,736	Requires backhaul
Miranda	354	Expansion, New	\$456,113	\$46,587	Requires backhaul
Myers Flat	133	New	\$285,812	\$29,193	Requires backhaul
Orick	239	New	\$514,698	\$66,971	Requires backhaul
Orleans	270	New	\$581,111	\$66,554	Requires backhaul
Petrolia	161	Upgrade	\$207,065	\$21,150	Requires backhaul
Phillipsville	83	New	\$177,891	\$18,170	Requires backhaul
Redcrest	213	New	\$457,773	\$46,757	Requires backhaul
Richardson Grove	Unknown	New	--	\$3,600	Requires backhaul
Shelter Cove	Unknown	New	--	--	Requires backhaul
Weott	141	New	\$303,601	\$ 38,210	Requires backhaul
Whitethorn	440	New	\$567,117	\$57,925	Requires backhaul
Willow Creek	961	Upgrade, Expansion	\$1,240,256	\$126,679	Requires backhaul

This chart depicts the number of residences in the underserved areas, possible infrastructure scenarios, an approximation of the buildout cost for local loops in the area, and possible new annual revenues if buildout is done. For towns with very small populations, the term *unknown* was used for the number of residences. As such, the local loop cost for that area was unable to be calculated. In some cases, it was known that dedicated line circuits were needed which is reflected in the potential revenue.

The buildout of these towns is dependent in every case (except for Kneeland) on provisioning adequate backhaul to the town. In some cases, additional capacity could be provisioned by fixed wireless providers if enough residences and businesses were willing to sign up together for services. In some cases, an incumbent-owned fiber runs through the town, but residences and businesses are unable to gain access to it (Highway 101). More information on backhaul scenarios can be found in Section 4 of this report.

Mendocino Broadband Supply and Demand by Town

APPARENT DEMAND	High	Comptche Hopland Leggett Manchester Philo Point Arena Westport	Albion Caspar Little River	Gualala Laytonville Mendocino	Fort Bragg Ukiah Willits
	Medium	Boonville Branscomb Elk Navarro Yorkville	Piercy Potter Valley	Redwood Valley	
	Low				
	None	Dos Rios Whale Gulch	Covelo		Calpella
		None/Underserved	Low	Medium	High
		SUPPLY →			

3.6 Mendocino County Supply/Demand Summary

Detailed information on a town-by-town basis is available in Appendix VIII.

Mendocino County has approximately 90,000 residents. In all, 28 towns and their surrounding areas were studied. The 2000 Census data show the per capita income at \$19,443, and the median household income at \$35,991.

Supply Comments

Mendocino County has a better than average supply of entrepreneurial fixed wireless and DSL resale companies, more than any of the other counties, but remains one of the poorest served counties in the region. There are major fiber runs along key county corridors (particularly the Anderson Valley and Highway 101), but the incumbent communications company has not allowed access to the fiber. There are areas where new backhaul needs to be built to provide a reasonable opportunity for service providers to build local broadband services including both fixed wireless and mobile

wireless services. Well-served areas in the mid and south county, along the 101 corridor, are exceptionally well-served since Ukiah is a fiber hub for many cross-country and international fiber paths.

- Scoring shows that 29% of towns are ranked in the high and medium categories, which cover 76% of the county's population.
- Scoring shows that 71% of towns are ranked in the low and unserved categories. They include approximately 24% of the overall county population.
- The expense of building and operating backhaul to these isolated areas has precluded local deployment of broadband.

Demand Comments

The demand for broadband in the area is phenomenal. The region had the highest participation in the RCC efforts – equaling half of all responses. Survey data showed the following:

- Mendocino County's take-rate for services when they are available is 41%.
- Approximately 40% of the population is without broadband.
- The average price people were willing to pay for residential service was \$33.92.
- Scoring shows that 82% of the towns (98% of the population) were ranked with either high or medium demand, showing a strong understanding of the importance of broadband for both residential and business use.

Aggregated Demand in Underserved Communities

Underserved Towns in Mendocino County	Estimated Residences	Normalized Demand	Demand Rank	Participation	Residential Demand	Business Demand	Leadership
Albion	553	21	High	5	4	3	5
Boonville	732	17	Medium	3	4	4	3
Branscomb	35	15	Medium	5	3	3	1
Caspar	169	22	High	5	4	3	5
Comptche	197	22	High	5	4	3	5
Covelo	628	6	None	2	3	0	2
Dos Rios	42	2	None	0	3	0	1
Elk	196	18	Medium	5	5	2	3
Hopland	726	21	High	3	5	5	5
Leggett	162	21	High	5	3	5	3
Little River	469	22	High	5	5	3	5
Manchester	313	21	High	5	5	3	5
Navarro	76	18	Medium	5	5	3	3
Philo	587	20	High	5	5	4	3
Piercy	103	19	Medium	3	3	5	3
Point Arena	263	20	High	5	4	3	4
Potter Valley	1006	19	Medium	2	3	5	4
Westport	160	20	High	5	4	2	5
Whale Gulch	53	0	None	0	0	0	0
Yorkville	169	20	High	4	3	5	4

The normalized demand number includes a balance of factors considered critical to quick uptake of broadband and a service-provider friendly environment as shown in the table above.

The Anderson Valley, known for its wineries, incorporates the unserved towns of Boonville, Comptche, Navarro, Philo and Yorkville. Incumbent-owned fiber runs through the towns, but no DSL is available for residents or businesses, creating a resentful population. The Mendocino Broadband Coast Alliance has organized coastal towns with the Anderson Valley towns to generate demand for broadband. Comptche has its own broadband grassroots group as well. More information on these groups can be found in Appendix XIV.

The interior towns of Covelo and Dos Rios have very low demand owing to their isolation and lack of significant industry. Whale Gulch, much of which is “off-the-grid,” has a very small population and low demand due to its isolation.

The south part of the county is expected to grow substantially over the next ten years owing to migration from the San Francisco Bay area. New residents expect the same quality of broadband services that they received in the Bay Area and will generate substantial new demand for next-generation broadband services.

Estimated Market Revenues and Buildout Costs in Underserved Communities

Underserved Towns in Mendocino County	Estimated Residences	Applicable Infrastructure Scenario(s)	Local Loop Capital Needed	Possible New Annual Revenue	Notes
Albion	553	Expand	\$ 891,713	\$ 149,310	
Boonville	732	New	\$ 1,573,781	\$ 263,517	Requires backhaul
Branscomb	35	New	\$ 75,817	\$ 12,695	Requires backhaul
Caspar	169	Expand	\$ 273,114	\$ 45,731	Requires backhaul
Covelo	628	New	\$ 1,012,332	\$ 169,507	Requires backhaul
Comptche	197	New	\$ 422,738	\$ 70,784	Requires backhaul
Covelo	628	New	\$ 1,012,332	\$ 169,507	Requires backhaul
Dos Rios	42	New	\$ 89,602	\$ 15,003	Requires backhaul
Elk	196	New	\$ 420,441	\$ 70,399	Requires backhaul
Hopland	726	New	\$ 1,561,144	\$ 261,401	Requires backhaul
Leggett	162	New	\$ 348,070	\$ 58,281	Requires backhaul
Little River	469	Expand	\$ 755,587	\$ 126,517	
Manchester	313	New	\$ 672,016	\$ 112,524	Requires backhaul
Navarro	76	New	\$ 163,122	\$ 27,313	Requires backhaul
Philo	587	New	\$ 1,261,322	\$ 211,198	Requires backhaul
Piercy	103	New	\$ 166,281	\$ 27,842	Requires backhaul
Point Arena	263	New	\$ 566,331	\$ 94,828	Requires backhaul
Potter Valley	1006	New	\$ 1,622,315	\$ 271,643	Requires backhaul
Westport	160	New	\$ 343,475	\$ 57,512	Requires backhaul
Whale Gulch	53	New	\$ 114,875	\$ 19,235	Requires backhaul
Yorkville	169	New	\$ 364,152	\$ 60,974	Requires backhaul

This chart depicts the number of residences in the underserved areas, possible infrastructure scenarios, an approximation of the buildout cost for local loops in the area, and possible new annual revenues if buildout is done.

Because of the demand and the local political will to increase broadband services, Mendocino could drive a model for public/private backhaul partnerships with commercial providers (particularly mobile wireless, both local and national) to serve its own emergency service needs. The capital shown does not include the backhaul infrastructure needed to implement services. More information on backhaul scenarios can be found in Section 4.

Albion and Little River could be well served by expansion of the cable service beyond the existing arbitrary cutoff points. The Mendocino Coast Broadband Alliance has mapped every residence that is not served in these towns, making it simple for providers to find new subscribers.

Boonville, Comptche, Hopland, Leggett, Navarro and Philo all have incumbent-owned fiber underground and need access to services for backhaul. Some of these are in the Anderson Valley on Highway 128 and others are on Highway 101 in the north of the county.

Trinity Broadband Supply and Demand by Town

APPARENT DEMAND	High	Hawkins Bar	Weaverville		
	Medium	Big Bar Burnt Ranch Douglas City Junction City Mad River Ruth	Hayfork Lewiston Trinity Center Zenia		
	Low	Hyampom Salyer	Coffee Creek		
	None	Big Flat Forest Glen Peanut Trinity Village Wildwood			
		None/Underserved	Low	Medium	High
		SUPPLY			

3.7 Trinity County Supply/Demand Summary

Detailed information on a town-by-town basis is available in Appendix IX.

Trinity County has approximately 14,000 residents. A total of 20 towns and their surrounding areas were studied. The 2000 Census data show the per capita income at \$16,868, and the median household income at \$27,111.

Supply Comments

Trinity suffers from a shortage of backhaul to the individual towns and the lack of capacity on the “middle mile” from Trinity County to the rest of the world. An AT&T fiber runs through the county, but it has no connection points anywhere in the county.

- No towns are ranked in the high and medium categories.
- All of the towns ranked in the low and unserved categories.

Demand Comments

Survey data showed the following:

- Trinity County’s take-rate for services when they are available is 32%.
- Approximately 51% of the population is without broadband.
- The average price people were willing to pay for residential service was \$35.62, the highest number in the four-county region. (Per 2000 Census data, Trinity County has the lowest median household income in the region.)
- Approximately 55% of the towns (87% of the population) were ranked with either high or medium demand, showing a strong understanding of the importance of broadband for both residential and business use.

Aggregated Demand in Underserved Communities

Underserved Towns in Trinity	Est. Residences	Normalized Demand	Demand Rank	Participation	Residential Demand	Business Demand	Leadership
Big Bar	143	16	Medium	3	3	5	2
Big Flat	57	4	None	0	1	0	2
Burnt Ranch	264	17	Medium	5	3	3	3
Coffee Creek	170	11	Low	1	1	5	2
Douglas City	531	19	Medium	1	4	5	4
Forest Glen	14	2	None	0	1	0	1
Hawkins Bar	57	21	High	5	4	5	2
Hayfork	1416	19	Medium	4	4	4	4
Hyampom	140	14	Low	4	4	0	3
Junction City	410	20	High	5	4	4	3
Lewiston	1038	18	Medium	4	4	3	3
Mad River	145	19	Medium	5	3	4	3
Peanut	14	8	None	5	1	0	1
Ruth	141	16	Medium	5	4	2	2
Salzer	366	14	Low	4	4	1	3
Trinity Center	279	17	Medium	4	4	3	3
Trinity Village	170	5	None	0	1	0	3
Weaverville	2117	21	High	5	3	4	5
Wildwood	85	2	None	0	1	0	1
Zenia	143	17	Medium	5	3	4	2

The normalized demand number includes a balance of factors considered critical to quick uptake of broadband and a service-provider friendly environment as shown in the table above.

Generally, there are no significant businesses in the region that would be perceived as anchor tenants. Much of the industry is either hospitality/tourist-based or consists of a few schools and a health clinic. Schools are located in Big Bar,

Burnt Ranch, Hyampom and Mad River. A health clinic is located in Mad River. Telework and small businesses will require broadband connections, as evidenced by many of the towns' rankings of business demand.

During the course of the RCC project, much of Trinity County was on fire and residents and businesses were unable to provide online feedback to the project. It is plausible that some of the lower demand rankings for the county would have been higher with that additional feedback.

Estimated Market Revenues and Buildout Costs in Underserved Communities

Underserved Towns in Trinity	Est. Residences	Applicable Infrastructure Scenario(s)	Local Loop Capital Needed	Possible New Annual Revenue	Notes
Big Bar	143	New	\$ 307,386	\$ 51,469	Requires backhaul
Big Flat	57	New	\$ 121,497	\$ 20,344	Requires backhaul
Burnt Ranch	264	New	\$ 567,389	\$ 95,005	Requires backhaul
Coffee Creek	170	Upgrade	\$ 185,525	\$ 31,065	Requires backhaul
Douglas City	531	New	\$ 1,142,067	\$ 191,230	Requires backhaul
Forest Glen	14	New	\$ 30,374	\$ 5,086	Requires Backhaul
Hawkins Bar	57	New	\$ 121,497	\$ 20,344	Requires backhaul
Hayfork	1416	New	\$ 1,552,179	\$ 259,900	Requires backhaul
Hyampom	140	New	\$ 301,311	\$ 50,452	Requires backhaul
Junction City	410	New	\$ 880,850	\$ 147,491	Requires backhaul
Lewiston	1038	New	\$ 1,138,264	\$ 190,593	Requires backhaul
Mad River	145	New	\$ 312,246	\$ 52,283	Requires Backhaul
Peanut	14	New	\$ 30,374	\$ 5,086	Requires Backhaul
Ruth	141	New	\$ 303,741	\$ 50,859	Requires backhaul
Salier	366	New	\$ 786,082	\$ 131,623	Requires backhaul
Trinity Center	279	New	\$ 306,098	\$ 51,254	Requires backhaul
Trinity Village	170	New	\$ 364,490	\$ 61,031	Requires backhaul
Weaverville	2117	New	\$ 2,321,142	\$ 388,656	Requires backhaul and middle mile
Wildwood	85	New	\$ 182,245	\$ 30,515	Requires backhaul
Zenia	143	New	\$ 156,767	\$ 26,249	Requires backhaul

This chart depicts the number of residences in the underserved areas, possible infrastructure scenarios, an approximation of the buildout cost for local loops in the area, and possible new annual revenues if buildout is done.

Every single town requires new backhaul capacity and possible scenarios are shown in Section 4. In addition, since Trinity is underserved, the local loop capital needed is significantly higher than other counties.

4.0 Infrastructure

“Telecom is a real estate game. Nothing more. Nothing less.” - Anonymous

4.1 Goals

In order to access supply vs. demand, one needs to know the state of telecom infrastructure. The goals of doing supply side analysis include:

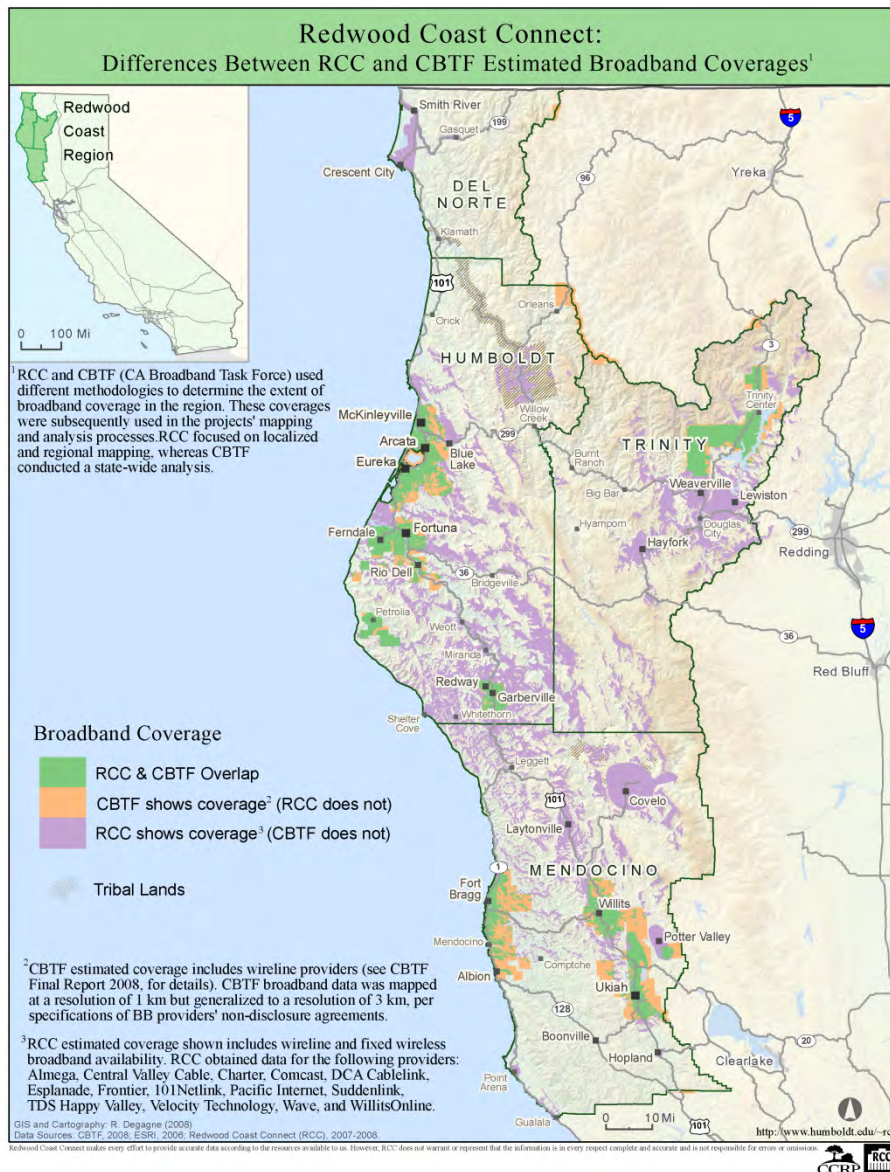
1. Identify current suppliers and the areas they cover, including telecom, cable, wireless and DSL resale entities.
2. Inventory fiber connections, switches, and other infrastructure from which additional service connections might be built.
3. Identify unserved communities and put them in context of proximate infrastructure.
4. Identify unserved and underserved potential anchor tenants that might be key to obtaining services in remote communities.
5. Engage providers in the dialogue of how to get unserved and underserved communities broadband access and help identify options for coverage and estimated cost for implementation.

4.2 Maps

In the early stages of the project, the plan was to use the “Baker” maps from the California Broadband Task Force (CBTF). In late 2007 when the CBTF maps were released, the maps were determined to be too inaccurate for the Redwood Coast, overstating coverage in some areas and missing coverage entirely in other areas. The decision was made to gather data and build new maps. This added another layer of difficulty and time required for the project that wasn’t anticipated and planned for.

The Baker maps provided a “broad brush” view of broadband and did not supply detailed information by community. In order for RCC to reflect an accurate assessment of broadband infrastructure, RCC produced maps as accurately as possible down to the community or sub-community level.

The map below shows a comparison between the RCC maps and the CBTF maps.



The main differences between the CBTF maps and the RCC maps are summarized as follows:

California Broadband Task Force (Baker) (Wireline)	Redwood Coast Connect (Wireline and fixed wireless)
<p>Broad view of NW California</p> <ul style="list-style-type: none"> • Incomplete – major providers missing • Overestimates coverage due to smoothing and 3km cell size • Does not include WISPs (fixed wireless) • Does not portray backhaul issues 	<p>Detailed view</p> <ul style="list-style-type: none"> • Includes almost all providers • Coverage acquired in numerous ways, from GIS maps to estimates drawn in • Includes WISPs (fixed wireless), which significantly changes the view of broadband connectivity
Del Norte	
<ul style="list-style-type: none"> • Shows no coverage 	<ul style="list-style-type: none"> • RCC acquired coverage data directly from Charter, who provides decent coverage; Charter in Del Norte is managed out of Oregon; suspected to be an oversight by Charter in California that data was not furnished for CBTF maps
Humboldt	
<ul style="list-style-type: none"> • Suddenlink, the largest provider in Humboldt County, did not provide data to CBTF 	<ul style="list-style-type: none"> • Suddenlink data provided in GIS format by County of Humboldt; also has the largest footprint and fastest speeds in county at combined 10-100mbps
<ul style="list-style-type: none"> • Southern Humboldt coverage shows large area of high speed (combined 10-100mbps) 	<ul style="list-style-type: none"> • Wave Broadband provides speeds in the combined 1-5mbps range in a smaller footprint (3km cell size and smoothing shows larger). Wave provides higher speeds throughout the state; suspect they gave CBTF one speed range for all territories.
<ul style="list-style-type: none"> • Central Arcata shows high combined speed of 10-100mbps, probably not from broadband, but from dedicated leased circuits at Humboldt State University 	<ul style="list-style-type: none"> • Wide area of Arcata is covered by Suddenlink, with combined speeds in 10-100mbps
<ul style="list-style-type: none"> • Almega Cable in Willow Creek not shown 	<ul style="list-style-type: none"> • Coverage in downtown Willow Creek estimated with local knowledge
<ul style="list-style-type: none"> • Sisqtel coverage (Siskiyou County) shown going downriver to Orleans (Humboldt County) 	<ul style="list-style-type: none"> • Coverage does not reach Orleans, which is in Verizon territory, probably due to smoothing and 3km cell sizes; however, it points out a “close by” provider for alternative scenarios. Also provided awareness that smaller telcos provide great DSL coverage
Mendocino	
<ul style="list-style-type: none"> • Coastal coverage overstated; it does not go that far inland 	<ul style="list-style-type: none"> • Better coverage estimates given
<ul style="list-style-type: none"> • Inland coverage overstated 	<ul style="list-style-type: none"> • Better coverage estimates given
<ul style="list-style-type: none"> • Central Valley Cable missing on south coast 	<ul style="list-style-type: none"> • Central Valley Cable mapped
Trinity	
<ul style="list-style-type: none"> • Missing DCA Cablevision 	<ul style="list-style-type: none"> • Accurate coverage

4.2.1 Challenges to Mapping

GIS mapping was more challenging and time consuming than originally planned. The assumption was made that data from the providers would be available in a GIS format. This was not the case; only one provider had data in GIS format. Providers ranged from providing much data to providing no data, citing that the data were proprietary company information. See the Data Gathering section of Appendix X for more information on methodology. Data for mapping broadband supply were gathered from a myriad of sources:

1. GIS maps
2. Provider engineering drawings
3. WISP maps or descriptions of service areas on websites
4. Mobile/cellular maps on websites
5. American Automobile Association (AAA) or topographical maps that were marked up by providers and local residents
6. Purchased data (TeleAtlas)
7. Provider employees, such as local linemen and cable employees
8. Modeling WISP coverage area (given latitude/longitude/height/distance)
9. ESRI GIS data for census and demographic information
10. Federal Communications Commission (FCC) tower/radio databases
11. Landcover data in GIS system
12. Office of Statewide Health Planning and Development (OSHPD) schools/library/clinic GIS data
13. California Department of Forestry (CDF) fire tower data from the state database
14. Land use data

Surprises in the mapping process were many:

1. The DSL coverage by small phone companies (Frontier and TDS Happy Valley) was very good.
2. Some providers, unless they were local companies, do not know who their competition is in rural areas.
3. WISP implementation activity has been remarkable in three of the four counties in the past 18 months.
4. Del Norte County does not have any WISPs.
5. Mobile/cellular broadband providers have increased their coverage at a fast pace.
6. There was openness of communication with some providers; and conversely, paranoia about sharing information with others.

The data also confirmed what the RCC team already sensed:

1. Backhaul issues (cost, lack of) are huge barriers to last mile implementation. This was known going in to the RCC project, but it has been underscored time and again in many areas with no remaining middle mile capacity or very high cost to middle mile connectivity.
2. Redundancy, or alternate fiber paths for route diversity, is needed in all counties for greater reliability of services. Risk is high for many providers with a single point of failure.
3. The poor condition of wireline infrastructure in some parts of the region was confirmed when talking to providers and ISPs.

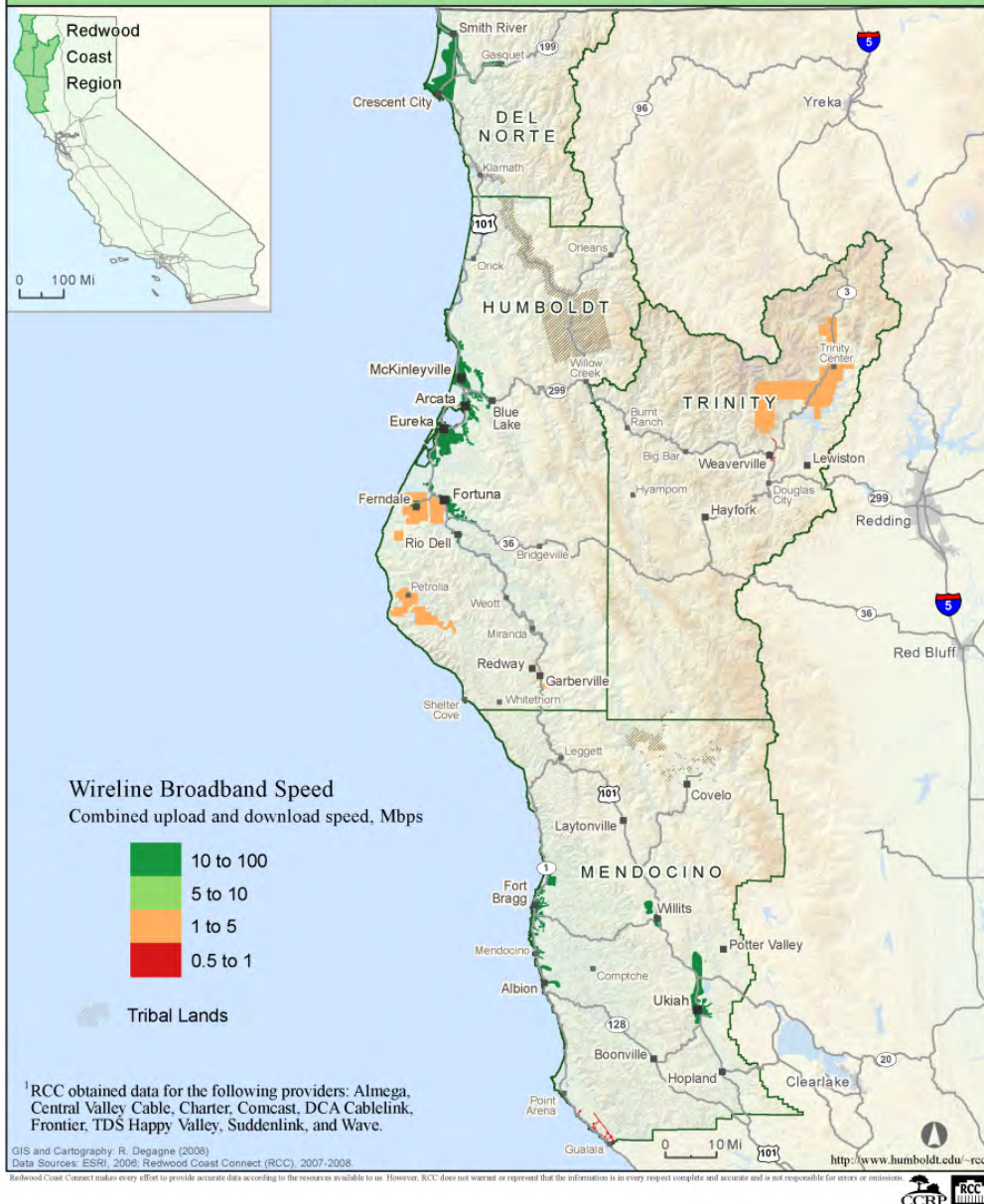
4.2.2 Key Maps

A number of maps were produced, including an online interactive map that allows the user to choose which layers to display. The PDF and interactive maps are on the RCC website at <http://redwoodcoastconnect.humboldt.edu/>. Many of the maps denote speed, using the Baker scale, which combines upload and download speed in the following categories: .5-1 Mbps, 1-5 Mbps, 5-10 Mbps, 10-100 Mbps.

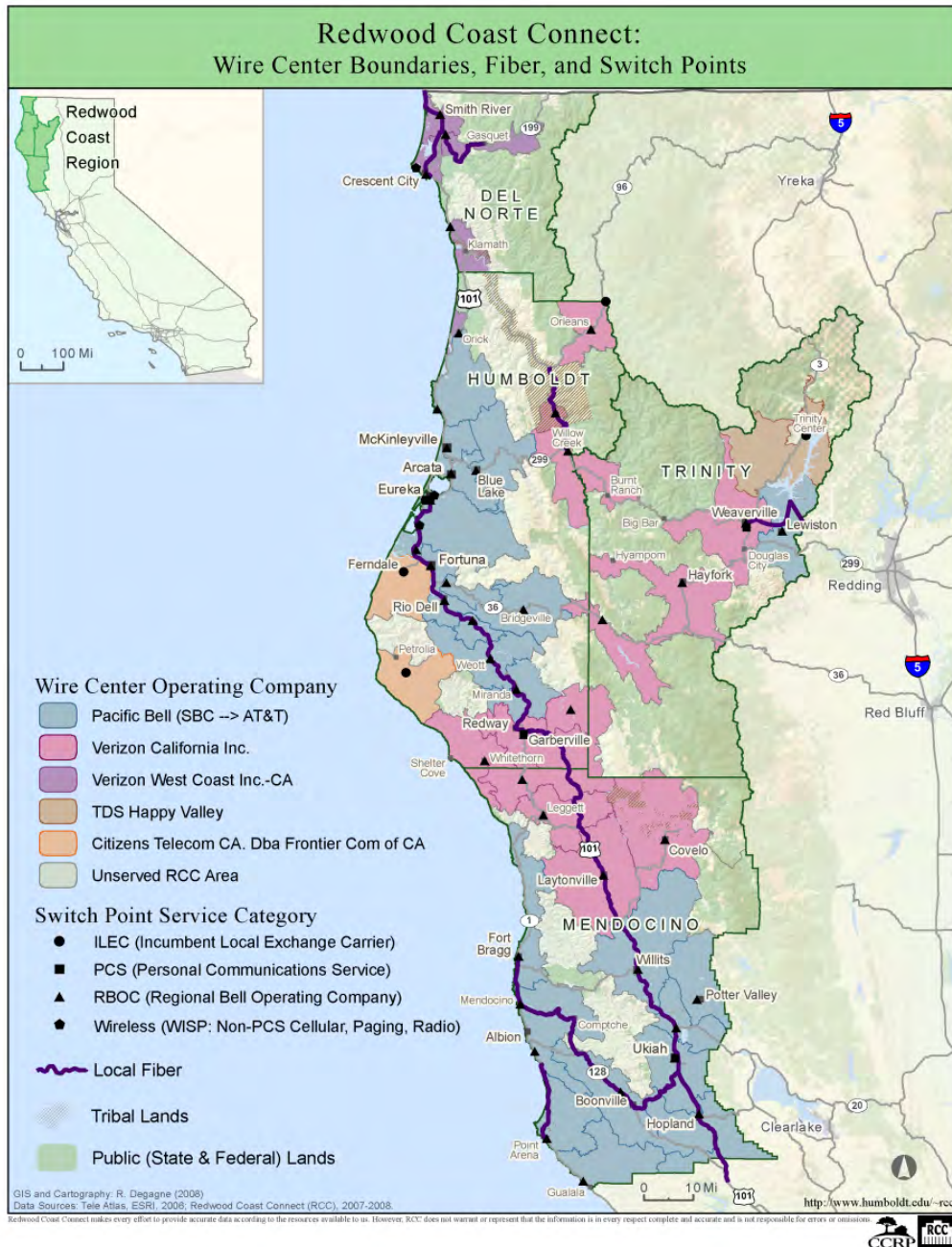
This map depicts wireline coverage, both cable modem and DSL, in the Redwood Coast region. Note that coverage is primarily in the larger population centers, with two notable exceptions: Frontier in Humboldt County and TDS Happy Valley in Trinity County. These two companies provide DSL to a large coverage area in their territories.

In the other areas of the region, DSL coverage is a smaller footprint than cable modem service, except for Miranda, where there is only DSL and no cable modem service. Del Norte County has no DSL service from Verizon. See the map on the next page for telephone company territories and switches.

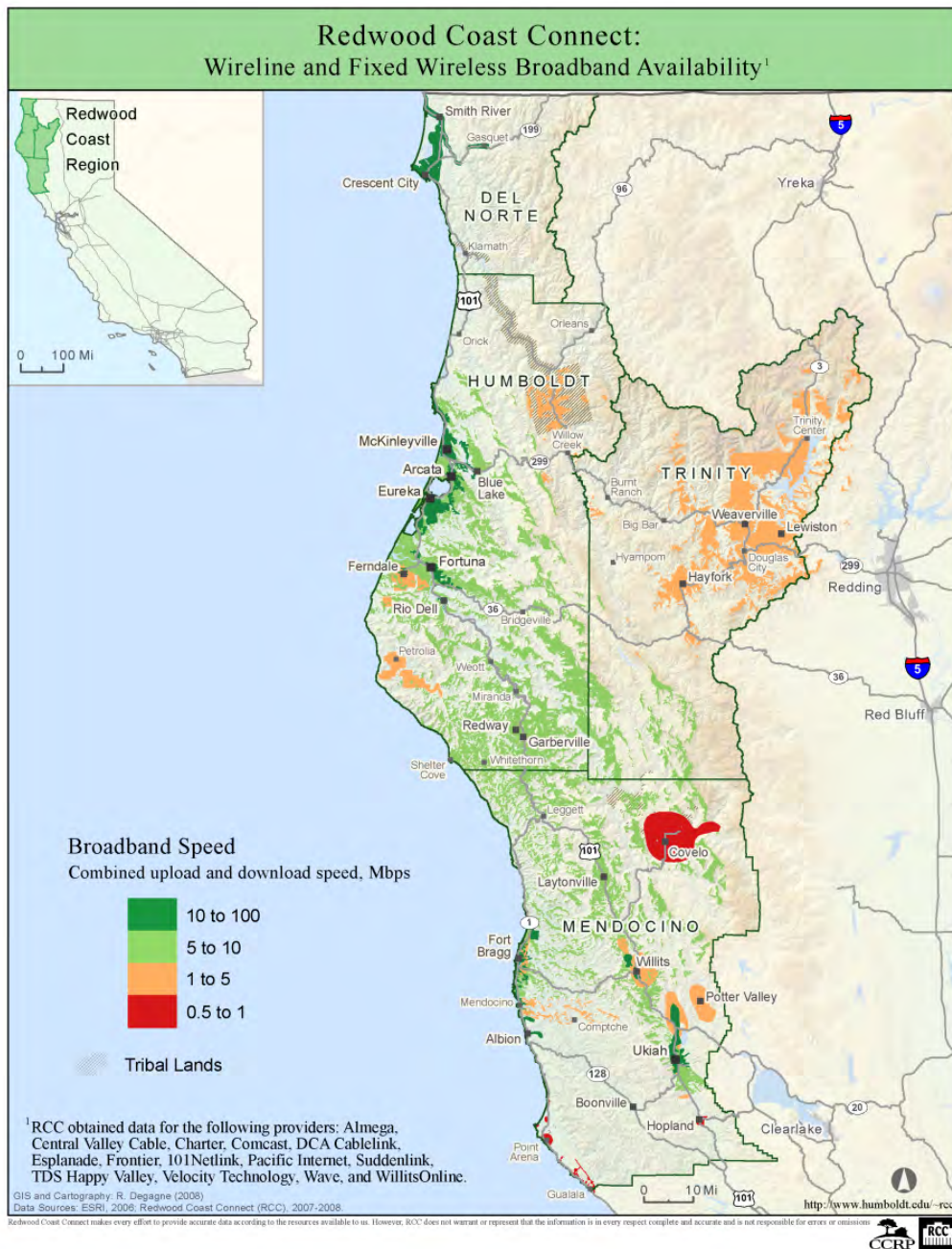
Redwood Coast Connect: Wireline Broadband Availability¹



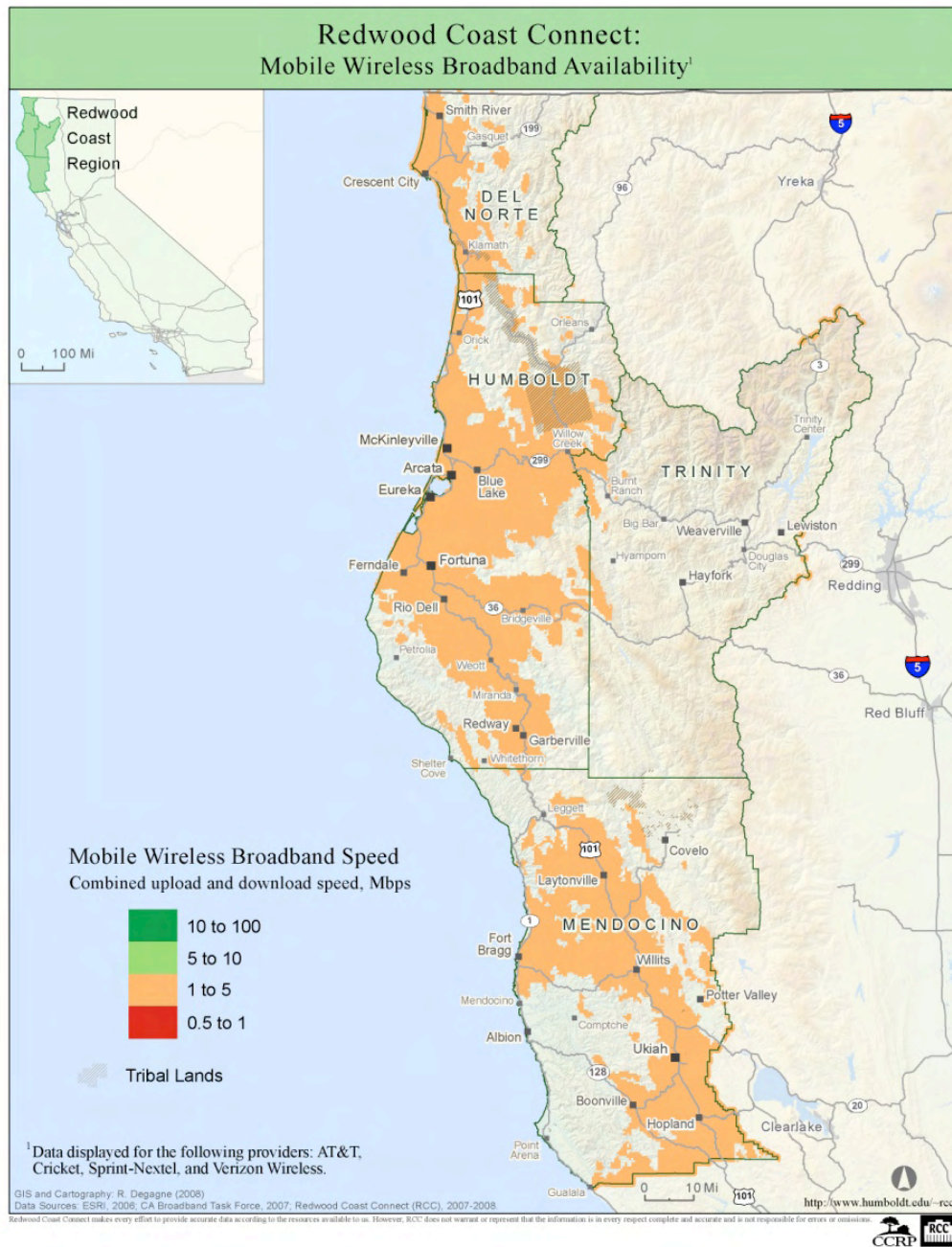
Telephone company territories and their switches are depicted on this map as well as regional fiber supply. Note that significant portions of the Redwood Coast are unserved by even telephone service. The DSL footprint was included in the previous wireline map.



This map depicts wireline and fixed wireless coverage by speed. When fixed wireless is added in to wireline coverage, the overall broadband picture in the region starts to look much improved, although there are still many unserved communities.



Mobile wireless coverage provided by cellular companies has been growing rapidly just in the time span of this project. This map depicts mobile/wireless coverage.



4.3 Community Infrastructure for the Unserved and Underserved

Broadband supply by community is shown below on the map. The red squares denote unserved communities. If compared to the backhaul map later in this section, one can see that there is a direct correlation between backhaul availability and lack of broadband service to communities.



4.3.1 Strategies for Addressing Unserved and Underserved Communities

An original assumption of this project was that by understanding the needs of different consumer groups (households, businesses, education, health and government), quantifying the aggregated demand represented by each group and determining the price sensitivity of different groups (willingness to pay), there would be sufficient information to either convince current large-scale providers to serve more places, or make the case for the public subsidy to entice providers to invest in necessary infrastructure. That, however, was not the case. Dealing with the myriad of providers in the region's small market is challenging in and of itself. It became apparent that large-scale providers were not going to be the answer, but each community would need to be assessed separately to determine the most probable and cost effective solutions to broadband access.

Every unserved and underserved community on the Redwood Coast is different. Variables affecting the supply include remoteness, topography, backhaul availability and cost, closest existing provider, and population density. Backhaul availability and cost have the most significant impact.

Strategies for coverage include:

1. Encourage the closest providers to expand their coverage areas.
2. Link larger middle-mile providers (the region still has middle-mile gaps) with smaller WISPs to provide final-mile services.
3. Push for universal access to privately held infrastructure running along public rights of way for providers willing to serve unserved and underserved communities along the pathway of the infrastructure.
4. Create public/private partnerships to underwrite the costs of infrastructure in difficult-to-reach places.
5. Aggregate demand where possible including anchor tenants and households. See Anchor Tenant discussion in Appendix XI.
6. Invest in the planning and permitting necessary for infrastructure projects making them more affordable and reducing the risk for private sector investment.
7. WISPs are key for sparsely populated rural regions. Find ways to increase their capacity and business stability.
8. Connect to neighboring counties that have more complete infrastructure, such as Siskiyou, Sonoma, Shasta, Tehama, and Curry (in Oregon). See Appendix X.

Community Service Districts (CSDs) and SB1191

Thanks to SB1191, CSDs now have broadband added to the 31 other powers already authorized (water, sewer, streetlights, cemeteries, etc.). For most communities, the first choice for service will be a private provider, such as a phone company, cable company or wireless ISP. However, for those communities too small or too remote who have been waiting a long time, CSDs can offer another option for broadband service. CSDs are trusted community organizations, they have billing systems in place, and as a government entity CSDs can apply for grants to fund up-front infrastructure. CSDs could outsource broadband operations.

There are a number of CSDs on the Redwood Coast that could take advantage of this legislation. The following CSDs are eligible:

Del Norte (all in Klamath area)

Hunter Valley
Klamath
Redwood Park

Humboldt

Orick
Orleans
Weott

Mendocino

Anderson Valley
Comptche

Trinity

Hyampom
Ruth Lake
Salyer

Trinity Public Utilities District (TPUD)

The TPUD is an interesting scenario for providing broadband to a large portion of the county. The dam in the north eastern part of the county has broadband; and Weaverville, the county seat, has service provided by DCA CableLink, Velocity Technology, and Com-Pair, but most of the county is either government-owned resource land or so remote from

a service provider that the chances of enticing one to cover the remaining population were nil. The logical provider was identified as the Trinity Public Utilities District, who could utilize its power grid to deliver service to most of the county. TPUD surveyed its customer base, both residential and commercial, and determined that 81% ranked the District's initiative to focus on high-speed Internet as either very important or somewhat important, and 70% approved of the District funding such research and development (R&D).

California Advanced Service Fund (CASF) Possibilities

During the process of gathering data, the CASF application period was opened. This CPUC fund was created by a surcharge on telephone bills, and is targeted at bringing broadband to unserved and underserved communities in California, many of which are rural. This fund contains \$100 million; funded applications will receive 40% of capital costs for broadband implementation. The RCC team asked all providers in the region to apply, but there were specific unserved areas targeted:

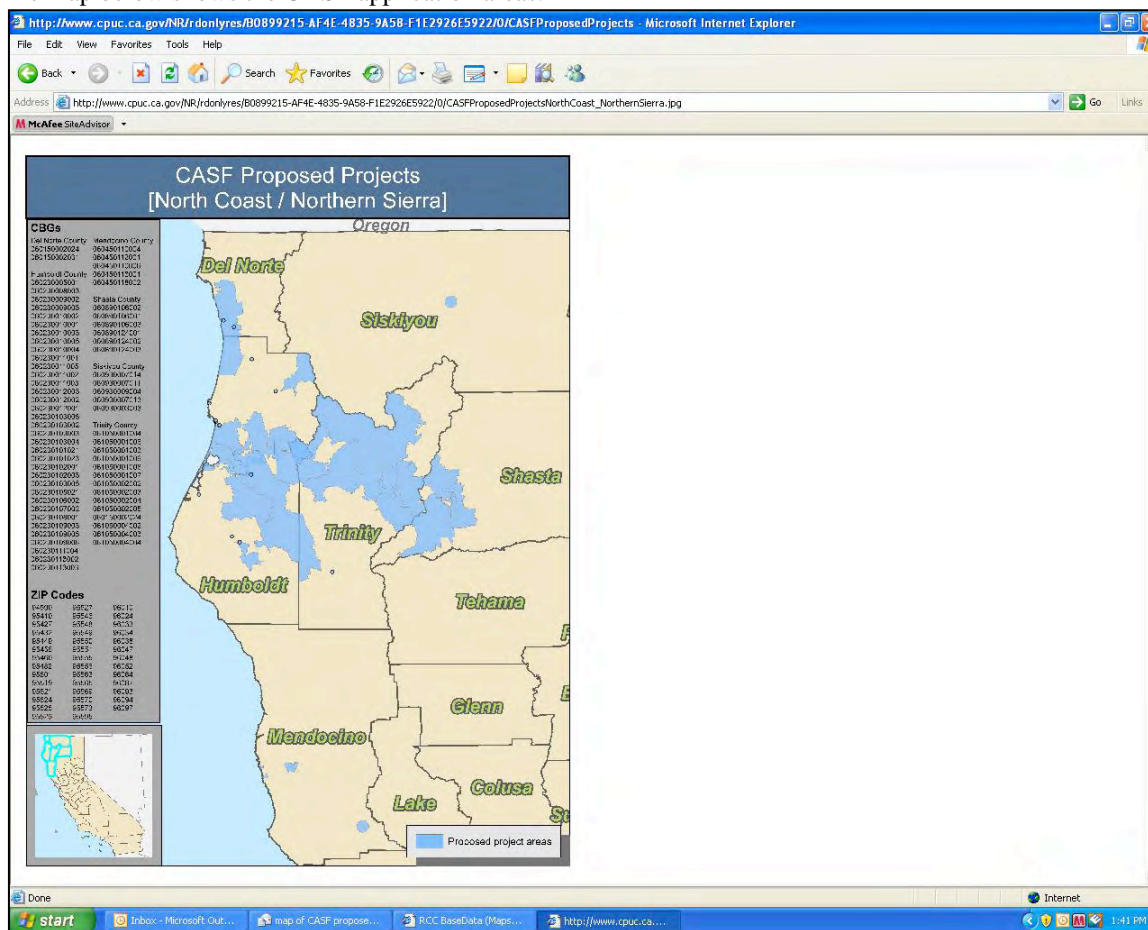
Possible project areas 3/28/2008	County
Klamath and Orick, with needed fiber to backhaul	Del Norte, Humboldt
Expand Comcast footprint on the coast	Mendocino
Avenue of the Giants (Weott, Phillipsville, Myers Flat, Redcrest, Holmes, Pepperwood)	Humboldt
Anderson Valley/Coast (Philo, Boonville, Comptche, Yorkville)	Mendocino
Highway 299 downriver to Willow Creek (Verizon backhaul at capacity)	Trinity
Expand Suddenlink footprint (Carlotta, Hydesville, Fortuna, Eureka, Kneeland, Fieldbrook, Arcata, McKinleyville)	Humboldt
Orleans	Humboldt
Pecwan/Johnson (no telephone service)	Humboldt
Mendocino South Coast	Mendocino

The following areas were posted on the CASF website over the summer of 2008. By late fall, decisions about funding are expected to be made. Not all of these communities are unserved.

County	Zip Code	City
Del Norte	95548	Klamath
Humboldt	95501	Eureka
	95519	McKinleyville
	95521	Arcata
	95524	Bayside
	95525	Blue Lake
	95526	Bridgeville
	95546	Hoopla, Weitchpec
	95549	Kneeland
	95550	Korbel
	95551	Loleta
	95555	Orrick
	95556	Orleans
	95565	Scotia
	95569	Redcrest
	95570	Trinidad
	95573	Willow Creek
Mendocino	95410	Albion
	95427	Comptche
	95428	Covelo
	95432	Elk
	95449	Hopland
	95454	Laytonville
	95456	Little River
	95460	Mendocino
	95482	Ukiah
	95527	Burnt Ranch
	95563	Salyer
	95595	Zenia
Trinity	96010	Big Bar
	96024	Douglas City
	96033	French Gulch
	96048	Junction City
	96052	Lewiston
	96093	Weaverville

Red =unserved

The map below shows the CASF application areas.



4.3.2 Preferred Scenarios

The CASF announcement during the course of the RCC project helped facilitate discussion of possible scenarios. Broadband providers were involved in the discussions throughout the project. When mapping was completed, the supply data supported what both large and small providers and communities knew – that backhaul was an important factor influencing the implementation of last-mile broadband service.

4.3.3 Backhaul, Redundancy and Scenarios

Backhaul, or middle mile, is key to providing broadband service. Backhaul routes provide the “highways” from the Redwood Coast towns to join with the major fiber routes or “freeways” to the Internet.

With few exceptions, ILECs (incumbent local exchange carriers) are the backhaul providers in rural areas. On the Redwood Coast, the larger ILECs of last/only resort are Verizon and AT&T, who have no financial incentive to provide affordable, scalable, redundant access to other companies (WISPs, cable, cellular) for backhaul. Services are currently provided at tariff rates, which generally far exceed the competitive rates available in urban and suburban areas.

The last-mile deployment in remote, sparsely populated rural areas of the Redwood Coast is most likely to be provisioned by fixed wireless service providers. Fixed wireless companies in the region tend to be locally-based microenterprises that have a low number of employees, use contractors for services, and have limited financial capacity. They need access to affordable, reliable, scalable fiber backhaul, or in more remote areas, microwave backhaul.

At the same time, mobile wireless (cellular) providers are realizing that increased usage of data services, through new technologies such as 3G (just introduced in the Redwood Coast area) and future 4G services, are driving the needs for

increased backhaul provisioning. They, too, are seeking financially viable solutions in rural areas, as the cost of traditional T-1 lines in rural areas is prohibitive for expansion of mobile data services.

There are two backhaul issues in the Redwood Coast region:

1. Unserved and underserved areas, along with areas of very low population density, do not have backhaul capacity, scalability, and affordability.
2. Well-served areas do not have the route diversity (redundancy) which would make broadband more reliable to residents, government agencies and businesses.

Redundancy has been an issue in Humboldt County since 2003 when SBC completed its fiber build from the Bay Area to Eureka. In the past two years there have been four fiber outages, two from backhoes, one from a windstorm, and one from a structure fire. As summarized in *Blackout* by Jim Hight, “fiber-optic communication outages caused Humboldt County businesses, agencies and residents to lose most or all of their Internet, long-distance and wireless telecom services. Retail transactions slowed or stopped as credit and debit cards could not be processed, and businesses and agencies experienced varying levels of other delays and interruptions.” The airport was closed down as well. Advocacy for redundancy continues in the region.

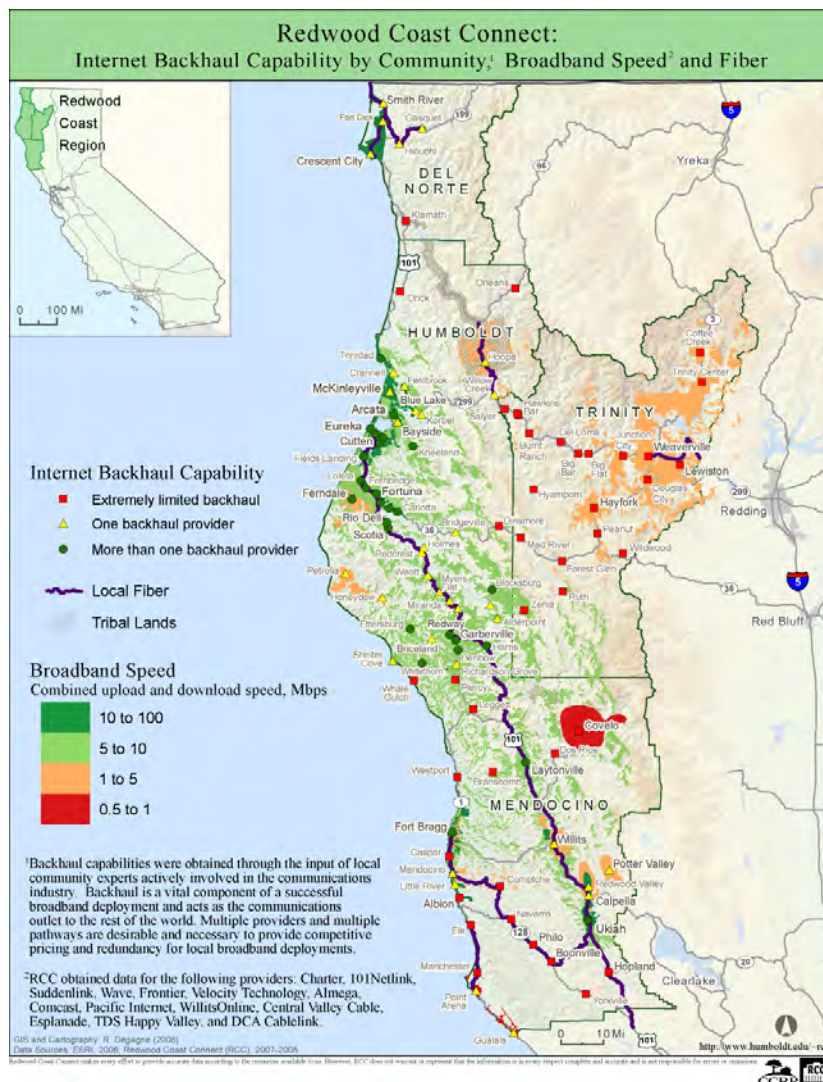
In other areas of the region, redundancy is not an issue (yet). These more remote areas of the region and the small providers who serve the residents would simply like to be able to purchase reliable backhaul capacity at a reasonable price. The backhaul provided by Verizon and AT&T is inadequate. There is no mandate for these monopolies to provision data services. Because they are monopolies and isolated by many miles to urban areas, the cost of backhaul is high in the region. The problem is widespread in nature and services are at the discretion of the “company of last resort.”

The companies who are dependent upon AT&T for backhaul in portions of the Redwood Coast are: Verizon, TDS Happy Valley, Frontier, Comcast, Suddenlink, CENIC, MCN, WillitsOnline, Central Valley Cable, Esplanade, Black Mountain Communications, Humboldt Internet, Cascadia Wireless, and some cellular companies.

The companies who are dependent upon Verizon for backhaul in portions of the Redwood Coast are Almega, Velocity Technology, DCA Cablelink, Black Mountain Communications, ASIS Internet, Wave Broadband, and some cellular companies. Verizon capacity is an issue in some areas.

Because of limited and expensive backhaul options, many of these providers sell vastly different and much slower last-mile service on the Redwood Coast than they do in other regions they serve in the rest of California and nationwide.

Looking at the speed and backhaul map below, one can see a correlation between limited backhaul capacity and last-mile slower speeds.



4.3.3.1 Building Backhaul is a Core Infrastructure Scenario

Based on the analysis of broadband supply in the region, six backhaul scenarios are proposed which:

- Identify the essential backhaul links for unserved and underserved areas to create an opportunity for local broadband buildout
- Classify areas of potential cooperation between local municipal groups and fixed wireless and mobile wireless providers
- Present policymakers with estimated capital costs for essential backhaul services to increase actions on subsidies, incentive plans and/or relaxed right-of-way policies (see Policy section)

There are two scenarios which would provide redundancy to the larger, well-served communities of Crescent City and Fort Bragg, but these backhaul scenarios do not have unserved communities along their routes (at least not in California):

- Highway 199 from Crescent City to Medford, Oregon (\$4-7m)
- Highway 20 in Mendocino County between Willits and Fort Bragg (\$4-6m).

The following six scenarios illustrate how a combination of last-mile and middle-mile backhaul infrastructure might be built in the region. These estimates include building fiber and looking at possible residential and anchor tenant revenue in the unserved regions on the Redwood Coast. While it is not quantified in these scenarios, building this backhaul can provide redundancy to larger, well-served communities where the fiber terminates.

1. Klamath-Orick Scenario Capital and Revenue

This scenario depicts the Highway 101 corridor between Crescent City and Eureka and could provide last-mile service to two unserved communities, Klamath and Orick. Klamath is the headquarters for the Yurok tribe, currently the largest Tribe in California, with more than 5,000 enrolled members.

Build fiber from Crescent City to Eureka. Provide wireless Internet access in Klamath and Orick, both unserved communities.



Klamath-Orick Scenario Capital and Revenue

Total Demand Revenues

Residential	\$ 139,392
Business	\$ 4,347
Public	\$ 60,000
Wholesale	unknown

Estimated Capital

Backhaul	\$5,071,000
Local Loop	\$ 166,511

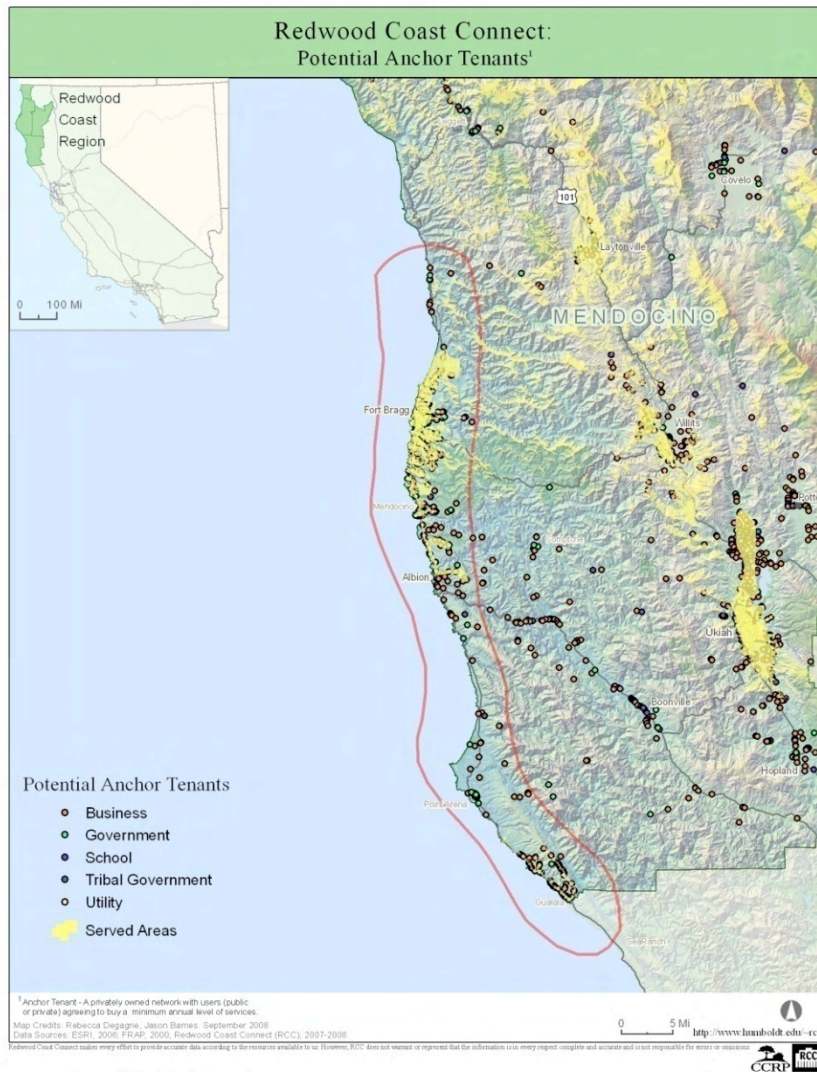
Discounted Cash Flow

w/o public	\$ 799,486
w/public	\$1,105,537

Est. Subsidy \$4-5 million

2. Mendocino Coast Scenario Capital and Revenue

Build fiber from Gualala/Sea Ranch to Fort Bragg. Provide wireless Internet access in unserved communities.



Mendocino Coast Scenario Capital and Revenue

Total Demand Revenues

Residential	\$ 158,875
Business	\$ 31,050
Public	\$ 66,000
Wholesale	unknown

Estimated Capital

Backhaul	\$3,520,000
Local Loop	\$ 558,386

Discounted Cash Flow

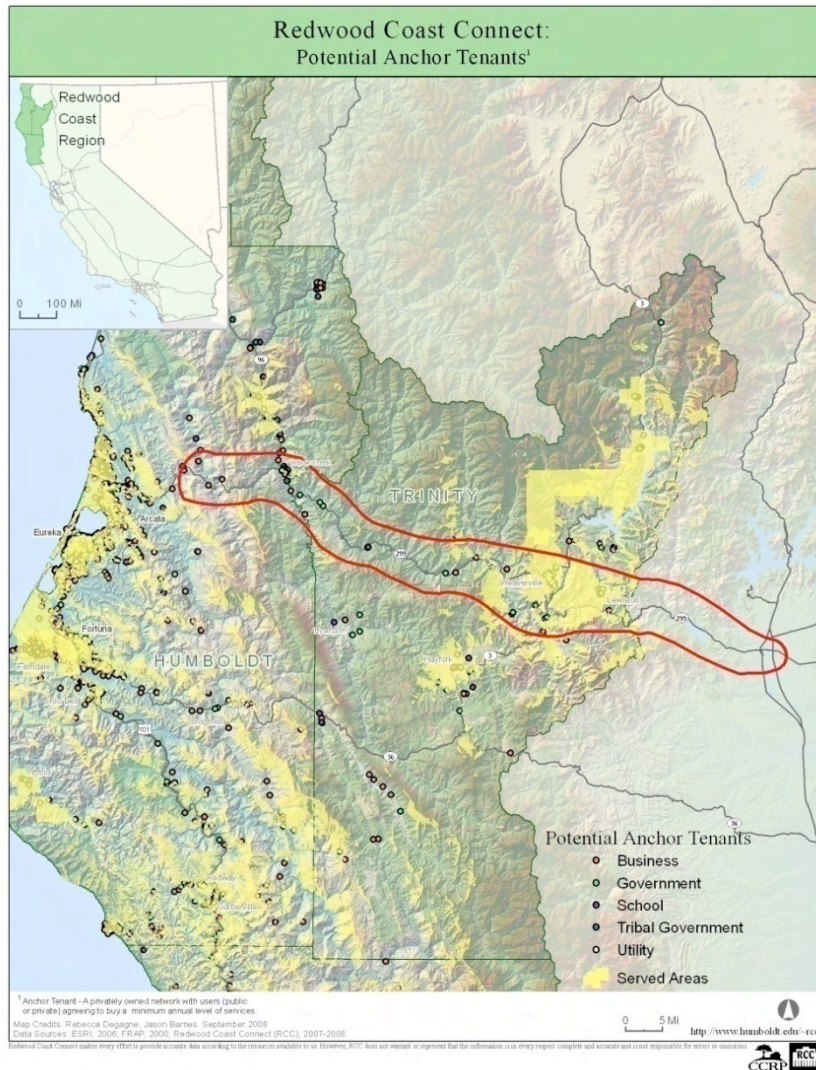
w/o public	\$1,030,579
w/public	\$1,388,711

Est. Subsidy \$2.5-3.5 million

3. Highway 299 Scenario Capital and Revenue

This scenario builds fiber across Highway 299 from Eureka to Redding and could provide last-mile service to unserved communities along the route (see shading for broadband coverage).

Build fiber from Eureka to Redding. Provide wireless Internet access in unserved communities.



Highway 299 Scenario Capital and Revenue

Total Demand Revenues

Residential	\$ 270,389
Business	\$ 7,452
Public	\$ 42,000
Wholesale	unknown

Estimated Capital

Backhaul	\$8,950,000
Local Loop	\$1,138,400

Discounted Cash Flow

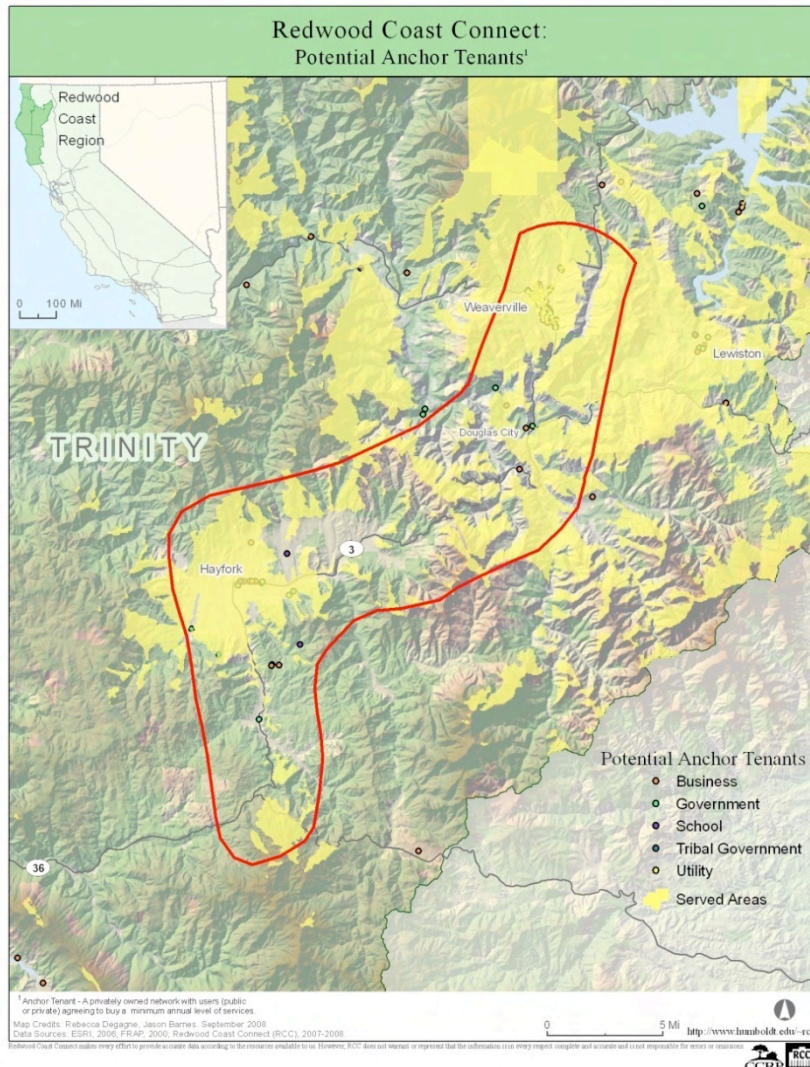
w/o public	\$1,507,633
w/public	\$1,735,535

Est. Subsidy \$9-10 million

4. Highway 3 Scenario Capital and Revenue

This scenario provides backhaul connectivity on Highway 3 between Highway 299 and Highway 36.

Build fiber from Highway 36 to Weaverville. Provide wireless Internet access in unserved communities.



Highway 3 Scenario Capital and Revenue

Total Demand Revenues

Residential	\$ 114,206
Business	\$ 31,050
Public	\$ 24,000
Wholesale	unknown

Estimated Capital

Backhaul	\$2,745,000
Local Loop	\$1,510,411

Discounted Cash Flow

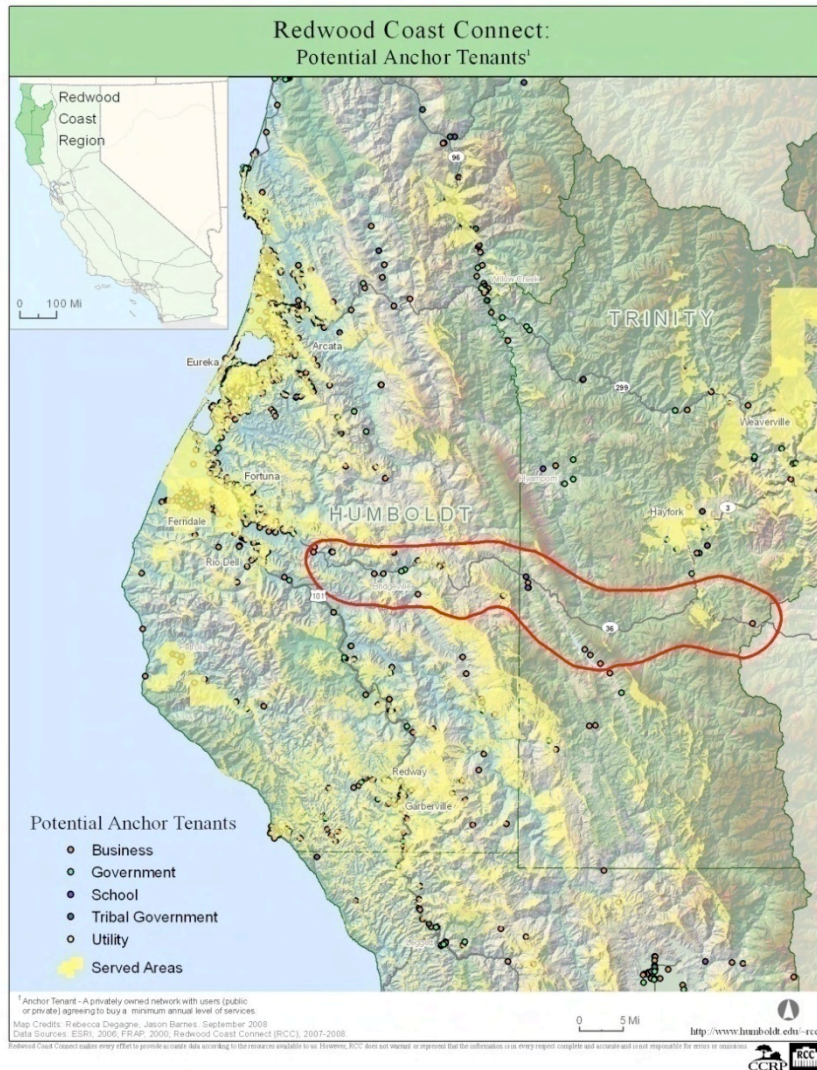
w/o public	\$ 788,194
w/public	\$ 918,424

Est. Subsidy \$3-4 million

5. Highway 36 Scenario Capital and Revenue

This scenario connects Eureka to Red Bluff

Build fiber from Eureka to Red Bluff. Provide wireless Internet access in unserved communities.



Highway 36 Scenario Capital and Revenue

Total Demand Revenues

Residential	\$	89,179
Business	\$	6,831
Public	\$	24,000
Wholesale		unknown

Estimated Capital

Backhaul	\$10,740,000
Local Loop	\$ 173,706

Discounted Cash Flow

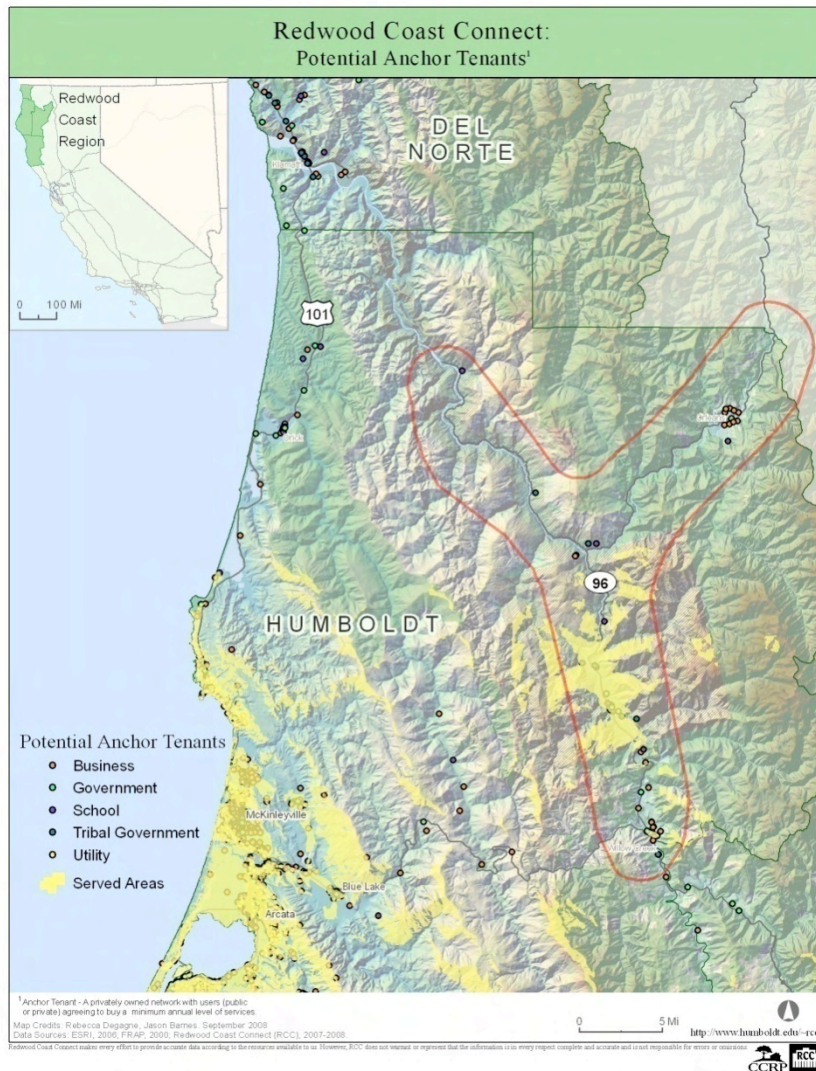
w/o public	\$ 520,973
w/public	\$ 651,203

Est. Subsidy \$10-10.5 million

6. Highway 96 Scenario Capital and Revenue

This scenario connects Highway 299 and Somes Bar, in Siskiyou. In addition, backhaul and last-mile service could be built downriver on Highway 196 to Johnson, which has no phone service. Much of this area is tribal land of the Hoopa, Karuk, and Yurok tribes.

Build fiber from Willow Creek to Johnson and to Somes Bar. Provide wireless Internet access in unserved communities.



Highway 96 Scenario Capital and Revenue

Total Demand Revenues

Residential	\$ 164,578
Business\$	\$ 11,799
Public	\$ 36,000
Wholesale	unknown

Estimated Capital

Backhaul	\$3,341,000
Local Loop	\$ 441,140

Discounted Cash Flow

w/o public	\$ 956,822
w/public	\$1,152,409

Est. Subsidy \$2-2.5 million

5.0 What is Different in Rural Areas

5.1 Broadband Coverage Challenges

Characteristics affecting rural broadband availability are population density, terrain, economic configuration, and a lack of infrastructure. These factors singularly and in combination make ubiquitous broadband availability to large swaths of California almost impossible with current technologies. It is difficult for most Californians to believe that there is almost seven hours of driving between San Francisco, considered “northern California,” and the Oregon border. The area of this study spans four counties, covers an area of almost 11,000 square miles (nearly the size of Connecticut and New Jersey combined) and has 266,000 residents.

Population Density

Population densities of the four counties:

Del Norte County	1008 square miles	27 people/sq. mile
Humboldt County	3572 square miles	35 people/sq. mile
Trinity County	3179 square miles	4 people/sq. mile
Mendocino County	5509 square miles	25 people/sq. mile

Approximately 70% of the population lives within town centers or their immediate surroundings and has broadband available, or will soon have broadband available, through expansion of current systems. What is missing in those areas is redundancy, or a second option for backhaul out of the area. Frequent weather and road maintenance and construction outages directly affect the capacity of data-dependent businesses. The balance of the population is scattered in small communities across the landscape.

Terrain

Settlement patterns in the region follow the geographic contours including mountain ranges, rivers and valleys; that is, places where laying fiber optic cable is difficult and line of sight options are challenging. Any option is expensive to build and maintain.

Economic Configuration

Rural communities may not have the traditional anchor tenant, a large business. Government agencies and schools are in rural communities, but their telecom providers or private network buying practices may be dictated at the state and/or national level preventing their participation as anchor tenants. The majority of the business community is located in well-served larger communities on the Redwood Coast. The unserved smaller communities generally have small microenterprises with broadband needs indistinguishable from residential broadband needs.

Current state and federal broadband purchasing policies often work to the disadvantage of rural communities by removing the ability to aggregate demand across ALL potential anchor tenants in rural communities. On the Redwood Coast, anchor tenants are more geographically-based rather than sector-based. WISPs providing broadband to residential and microenterprise customers and those providers who backhaul WISP traffic may be the predominant anchor tenants utilizing broadband infrastructure in remote rural regions (see Section 4, Infrastructure).

Infrastructure

From the research, it was evident that the issue of backhaul is common to all areas of the region. A single fiber line comes in from the south along Highway 101 stopping just north of the Eureka area and a single fiber line comes down from Oregon stopping in Crescent City—a gap of approximately 80 miles. Redundant fiber to the region would mean greater reliability in cities, and businesses and institutions are willing to pay more for such fiber. More backhaul routes could also mean that more communities could build last-mile infrastructure, wired or wireless, from those lines, but only if a wide variety of providers were able to take advantage of those lines—a recommendation of this report.

The greatest gains in broadband on the Redwood Coast in the past two years have been wireless, both fixed and mobile/cellular. Wireless, while not perfect, has been key for sparsely populated rural regions. Local small WISPs are actively expanding their footprints to small unserved and underserved communities. However, two hurdles were cited by residents and businesses:

1. The upfront costs of fixed wireless range from \$160-\$400 for residences and up to \$1,000 per businesses.
2. In parts of the region, there are groups actively working against wireless due to health concerns and tower aesthetics.

In addition to being hampered by public sentiment, WISPs currently do not qualify for access to the California Advanced Services Fund (CASF), a source of funding for infrastructure to provide broadband to unserved and underserved communities.

WiMAX (Worldwide Interoperability for Microwave Access) holds some promise for rural areas as it is not dependent on line of sight. However, the companies who hold most of the 2.5GHz licensed spectrum may be the least likely to deploy in rural areas.

5.2 Uptake rates

Survey respondents indicated a high level of adoption of Internet usage, even though in many communities service is poor quality (dial-up). Uptake rates of respondents ranged from 83% to 96%. Expense was the number one reason that people did not subscribe to Internet services.

Regional Results - Connection to the Internet at Home

Internet Connection	Del Norte % of Responses n = 53	Humboldt % of Responses n = 310	Mendocino % of Responses n = 624	Trinity % of Responses n = 107
Connect to the Internet	83	89	96	85
Do not connect to the Internet	15	10	4	15
Not sure/don't know	2	1	0	0
Total	100	100	100	100

Regional Results- Reason for Not Connecting to the Internet at Home

Reason	Del Norte % of Responses n = 8	Humboldt % of Responses n = 33	Mendocino % of Responses n = 22	Trinity % of Responses n = 16
Don't own a computer	25	39	0	13
Don't need the Internet	13	6	0	0
Internet access is unavailable	0	6	0	6
Internet access is too expensive	50	39	36	38
Can get Internet access elsewhere	37	9	18	44
Concerned about privacy and security	13	9	14	6
Don't have a land-line phone	0	18	14	31
Other	12	15	72	37

6.0 Existing Policies and Policy Recommendations

6.1 Local and Regional Policy Work

Throughout the Redwood Coast Connect region, over the past five years government and tribal leaders have been working on a number of different policy approaches to increasing broadband. However, there are many policies in place across the region at the local, state and federal levels that hamper broadband expansion.

6.1.1 Humboldt County General Plan Telecom Element

In 2008, Humboldt County Board of Supervisors directed staff to create a Telecom Element as part of its General Plan Update, the first county in California to do so. RCC worked with county staff to create the draft document, which will be circulated for public comment and board approval in early 2009 (see Appendix XII).

The draft plan's two main goals are ubiquitous broadband availability and reliability. It also identifies several implementation measures including: the preparation of a Telecommunications Facilities Ordinance that ensures compatibility of telecommunications facilities with nearby land uses; a review of the Standard Public Improvement Specifications to determine if telecommunications safe zones can be designated for installing new telecommunications infrastructure; and creation of a telecommunications infrastructure inventory including all available tall structures that could be used for telecommunications antennas.

6.1.2 Joint Powers Agreement – Humboldt and Trinity Counties

In 2006, Humboldt County and Trinity County signed a Joint Powers Agreement to develop a business and technical plan to assist in efforts to build an alternate east-west fiber route to connect Eureka to the I-5 corridor. The two counties combined planning efforts and applied jointly for Community Development Block Grant Program (CDBG) Planning and Technical Assistance funding. It was the first regional joint CDBG application in the state's history. The goal is to use the funding to lay the groundwork for public and private investment along the proposed fiber route, and to provide broadband to small low-income communities along the route using wireless technologies.

6.1.3 Trinity Public Utilities District (TPUD)

In spring 2008, TPUD surveyed residential and commercial customers regarding their interest in the utility providing broadband services. The TPUD is a community-owned electric system that powers most of Trinity County with the lowest-cost energy in the state. TPUD was created in 1982, and serves 5,918 residential customers and 1,144 commercial and industrial customers.

The residential results indicated that 81% ranked the District's initiative to focus on high-speed Internet as either very important or somewhat important and 70% approved of the District funding such research and development (R&D). Although slightly lower than residential, commercial customer responses reflect similar levels of support for the District offering broadband services, with 61% ranking this an important initiative for the District to focus on and 57% approving the District funding such R&D.

Among the data results, indications that the District should proceed include:

- Ninety-four percent believe that low-cost, high-speed Internet access is very or somewhat important to the future economy of the District.
- Although 71% would like to have high-speed Internet service from any provider, almost half would prefer the District as a service provider.

In late August 2008, the TPUD Board of Directors directed staff to research the feasibility of accessing unused federal fiber adjacent to its existing fiber. In addition, if access to the federal fiber appears feasible, the TPUD will develop a technological plan and a business plan.

Although the District is encouraged by the results of the survey, it is concerned about expanding its current mission. According to Rick Coleman, Executive Director of the TPUD, "Staff believes that ultimately more public support than that which was demonstrated by the survey will be needed before the District should make a final commitment to provide broadband services."

6.1.4 Trinity County Cell Tower Project

In 2004, Trinity County received a \$2.5 million grant from the California Public Utilities Commission to build publicly owned cell towers to serve citizens in remote regions of the frontier county that in some cases lack even basic telephone service. The funding came from AB 140, passed in 2001, by former Assemblywoman Virginia Strom-Martin, which created a Rural Telecommunication Infrastructure grant program to pay for the facilities to serve remote, unserved communities. The law provided up to \$10 million, funded out of an existing surcharge on telephone services. The bill expired on January 1, 2006.

The Trinity County Board of Supervisors produced the final design and engineering work for eight cell tower sites considered necessary to cover the neediest parts of the county. The county estimates it will be able to build five of the cell tower sites with the current funding available and the 2009 grant deadline. Verizon Wireless has made a commitment to appear on all five of the county's proposed towers. The county is seeking additional funds for the remaining three proposed towers. U.S. Cellular has expressed interest in renting space and providing backhaul from all of the towers.

Picking sites for the cell towers required leases and permits with Shasta-Trinity National Forest. The county was able to negotiate successfully the leases and started construction on one of the towers in October 2008.

6.1.5 Yurok Tribe Service down the Klamath River

The Yurok Tribe, whose tribal boundary is located along the Klamath River in Del Norte and Humboldt counties, also plans on building community-owned cell towers using Indian Community Development Block Grant funds in 2009.

6.1.6 City of Rio Dell Municipal WiFi

The city of Rio Dell in Humboldt County used a public/private partnership model to create Humboldt County's first redundant municipal broadband connection. Digital Rio Dell offers free WiFi access at city hall (including the police station), the public library and the fire hall. The city plans to expand the wireless network to serve other municipal purposes – including public health, safety and welfare. The project is managed by a local non-profit Access Humboldt, which establishes, maintains and operates community public, education and government (PEG) access service.

6.1.7 Mendocino Community Network

Mendocino Community Network (MCN), a unique ISP organization owned by the Mendocino Unified School District, was started in 1994 after acquiring a 56K dedicated line from NASA. When NASA's grant ended, the school district leveraged the Internet connection by selling access to the community to support the Internet connection to the schools. In addition, it added a web hosting and domain service and partnered with Central Valley Cable (CVC) to provide Internet services for customers at its plant in Gualala, California. MCN helped CVC implement a wireless Internet service for part of its customer base in 2005.

In November 2004, MCN took advantage of AT&T's Digital Subscriber Line (DSL) wholesale program and began offering DSL service in northern California. Through Sonic.net's DSL sublease program, MCN now offers service throughout most of northern California. Today MCN's 11 employees continue to develop the business and maintain a high level of service for the company's nearly 4,000 dial-up and DSL customers.

6.1.8 Del Norte's Teletransportation Strategic Plan

In May 2006, the Del Norte County Board of Supervisors adopted its "Comprehensive Economic Development Strategy, Del Norte County, California, 2006 – 2008" which included a goal to "Remove barriers to upgrading telecommunications infrastructure by supporting Del Norte Local Transportation Commission policy. Support the Tri-Agency's partnership with the Commission to identify physical, technological and political solutions to regional broadband deficiencies. Encourage the engagement of public entities and private carriers. Foster the development of strategies in pursuing legislative remedies to improve telecommunications."

In order to begin the process of achieving that goal, the Del Norte Tri-Agency Economic Development Authority and the Del Norte Local Transportation Commission worked together to produce a series of telecommunication planning documents including a comprehensive market profiling, a broadband survey, and a detailed map of county

telecommunication infrastructure. The Del Norte agencies also produced a Tele-transportation Strategic Plan, focusing on job creation, infrastructure and telecommuting, making the case to tap transportation planning funding for its efforts.

A parallel effort occurred at the same time across the border in Curry County, Oregon. In 2007, the two counties used the aggregated regional demand data and potential for market growth information to incentivize accelerated investment in a 5 Gb broadband connection from Bandon, Oregon, to Crescent City. All relevant reports from Del Norte County can be viewed at <http://www.jirwinconsulting.com/documents.htm>.

6.2 Regional Policy Challenges

The Redwood Coast, like many rural communities around the state, has vast resources that community members are passionate about protecting. Government leaders often are asked to straddle the line between protecting environmental assets and providing services. As much as the region values broadband access, it also is known that much of that access must come from wireless solutions that require towers.

The recently approved Arcata General Plan has language balancing telecommunications access and environmental concerns. The language calls for co-location to minimize the number of facilities and requires special permits for towers higher than 10 feet with a cap at 30 feet. The General Plan also states that any proposed city construction projects involving trenching shall be reviewed for opportunities to extend high-speed networking infrastructure.

As the second largest city in Humboldt County, Arcata is a well-served community that can expect few complaints of limiting service. However Mendocino County is not so lucky. In 2001, the Mendocino County Planning Commission passed a resolution establishing guidelines “to protect and promote public health, safety, community welfare, and the aesthetic quality of the county, and to minimize the adverse impacts of wireless communications facilities, in conformity with goals and policies of the General Plan, while providing for the communications needs of residents, business, visitors and government within Mendocino County.”

However, small wireless providers in the county have said the resolution is too costly and overly burdensome for them to extend services to some of the smaller unserved and underserved communities.

6.3 State Policy Advances

Thanks to the leadership of Governor Schwarzenegger, in the past few years California has made great progress in the broadband policy arena that will make a significant difference to broadband accessibility in rural communities.

In a very short amount of time, his innovative efforts have led to the appointment of the Broadband Task Force and its final report, the creation of the California Emerging Technology Fund, the new California Advanced Services Fund, and the California Telehealth Network.

6.3.1 California Telehealth Network (CTN)

In March 2007, Governor Schwarzenegger signed Executive Order S-06-07 to accelerate the adoption of Health Information Technology (IT) throughout the state. The Governor directed state agencies to provide leadership and coordination for Health IT efforts to achieve electronic health data exchange, leverage state purchasing power, and improve health care outcomes. The order directed the state to develop, by December 31, 2007, initial performance metrics to measure the success of health care transparency and accountability efforts in collaboration with a working group of state agencies and key public and private stakeholders.

All clinics and hospitals in the Redwood Coast region have submitted surveys of interest qualifying them to participate in the project. The CTN will allow a site to connect to the California Telehealth Network; to a nationwide “backbone” (i.e., National LambdaRail, Internet2); and to the public Internet. The network also will provide two key capabilities that are currently not a standard part of broadband connections. HIPAA-compliant security and Quality of Service will insure secure high-quality videoconferencing and other critical real-time applications, such as telefetal monitoring, telecardiology, etc.

6.3.2 Caltrans

In a short time span Caltrans has gone from being the Redwood Coast villain and impediment in broadband deployment efforts to being a hero. The dramatic turnaround of events stems from the elimination of right-of-way fees and the state's new streamlined permitting process.

Governor Schwarzenegger's Executive Order S-23-06 led to the creation of a single application for the installation of broadband facilities within State of California rights-of-way. This is great news for rural communities that have multiple state agencies with various jurisdiction oversights.

6.4 State Policy Obstacles

Although the Redwood Coast residents are very excited about many of the policy challenges that have been addressed, there still are improvements that need to be addressed.

6.4.1 Corporation for Education Network Initiatives (CENIC)

The key organization in supplying network connectivity to California educational institutions is the Corporation for Education Network Initiatives (CENIC), which operates a statewide, fiber-based network in order to provide cost-effective broadband to the vast majority of K-20 educational institutions.

CENIC delivers broadband service to each county office of education, and individual schools are responsible for the cost of connecting to that office. This strategy leaves many schools in the outlying areas of the region without broadband availability.

6.4.2 State Approach to the Right-of-Way Issue

Most experts agree that right-of-way issues are a major roadblock to timely and lower cost broadband deployment. Certainly, everyone in Humboldt County, which experienced years of delays due to a dispute between Caltrans and SBC, understands the importance of right-of-way issues.

In 2006, the Digital Infrastructure and Video Competition Act eliminated cities' and counties' negotiation authority over the use of public rights-of-way for the delivery of video services.

Unfortunately, the franchise law has no buildout requirements. Redwood Coast government leaders are deeply concerned that services will only be provided in the more urban areas, further widening the digital divide in the rural communities. After all, if you were a shareholder in a telecom company would you want it to invest in rural communities when there are still underserved heavily populated urban areas?

6.5 National Policy Work

Redwood Coast Connect members have been engaged in discussions on a few of the endless list of policy issues that the federal government should tackle during the next administration.

6.5.1 National Broadband Policy

First, and most important, is the creation of a National Broadband Policy. Rural communities like ours must play a BIG role in its creation to assure it strives for ubiquitous affordable availability.

Most developed countries have national plans to connect all of their citizens to fast, affordable and open Internet. Unfortunately, the U.S does not, which could explain why we are ranked 15th on the list of 30 developed nations in deployment of broadband.

As one member of the Mendocino Coast Broadband Alliance stated; "High speed Internet ranks up there with water, septic, land for gardening, and good air as essential home site requirements."

6.5.2 White Spaces

The FCC should open TV "white spaces" to wireless providers. This would allow local governments and entrepreneurs in many rural communities to gain rapid access to affordable wireless broadband.

6.5.3 Streamlining Broadband Deployment Permit Applications on Federal Lands

The creation of a streamlined, uniform broadband deployment-permitting policy on federal lands would greatly benefit the region. Many of the middle-mile scenarios require fiber routes through national parks and national forests. Timely and affordable fiber and wireless deployment are particularly challenging in Del Norte and Trinity counties, which have more than 70% of their land base owned by the federal government.

6.5.4 Net Neutrality

Insuring that the Internet remains an open system, where providers do not have control over the content that a user visits or the right to charge additional fees, is important to the Redwood Coast. In fact, there is a growing concern in rural communities across the country about policy challenges to Net Neutrality.

6.5.5 A New Federal Telecommunications Act

The Telecommunications Act of 1996 primarily focused on telephone services. A new federal Telecommunications Act is needed that addresses the importance of broadband. It also must balance the needs of urban and rural big business and small business customers with the needs of all residential users.

6.5.6 Universal Service Fund Expansion

There is also more that the federal government could do to provide funding for rural broadband. The FCC should expand the list of subsidized services allowed under the Universal Service Fund to cover broadband deployment.

7.0 Project Evaluation

An internal project evaluation of Redwood Coast Connect was facilitated by a member of the project team. RCC project staff and consultants were invited to review and provide input on evaluation observations and conclusions. The evaluation report includes an analysis of achievement of project objectives and attainment of project milestones, as documented by implementation or completion of project activities and related outcomes from those activities. The entire RCC project evaluation is available as a separate document. This section will summarize what worked and what did not work about the project conception and design, and it will provide recommendations for other rural communities working on similar projects.

7.1 Overview of Methodology

Sampling Plan and Instruments

Researchers contacted members of the public in the community using three different approaches for data collection:

- Generalizable data (i.e., data collected by way of a random sample that is representative of the larger population) were collected from the public by way of telephone surveys; the survey included a subset of questions taken from the longer written/online survey.
- Mail-back surveys were sent to businesses and non-profit organizations listed in the Yellow Pages directories for each of the four counties.
- A written survey was made available to people who attended one of a series of public meetings held in each of the four counties; this written survey also was distributed in various communities throughout each of the four counties, and to targeted “special” interest groups (e.g., at a Native American multi-tribal gathering). An online version of this survey also was available to anyone in the community who requested it.

Both approaches 1 and 2 were designed as random samples in order to derive information that could be generalized to the entire public or grouping (business sector) from which the sample was derived. The written survey and the online version were created in order to provide to attendees of the community meetings, and to others who expressed a personal interest, an opportunity to participate in the survey process.

7.2 Process Evaluation

7.2.1 Survey Instruments - Evaluation

Three different survey instruments were utilized without consistency in how questions were answered making comparisons from one respondent group to another difficult and cumbersome. It also meant that analysis of survey instruments was done multiple times. There were no perceived benefit questions in any of the surveys, preventing users from building the case at the public level.

Written Survey

The written survey instrument contained 37 questions and included questions about both home and business access to and use of broadband and the Internet. Trying to gather information from business owners about their businesses' broadband needs by using the same survey that residents completed to describe their personal use was confusing. The inclusion of both types of questions, and the method by which they were asked, made it difficult to determine whether the respondent was answering as a business owner or in regard to their use at a place they were employed. Without knowing whether all of the questions asked about the workplace were being answered by a business owner, the general written survey responses to business questions cannot be pooled into the respondents to the business written survey reliably. It is unknown how these questions were handled.

Business Survey

The business survey contained 13 questions, and it was mailed to business addresses taken from the Yellow Pages. Not all of the questions in the business survey were the same questions as those in the written survey. Question 12, "*Which of the following activities do you conduct on the Internet?*" had the same choices as the same residential question and missed asking about more sophisticated business broadband uses (i.e., sending large files, enabling staff to work remotely using a full suite of the office's technology functions, and collaborating on projects using video and uploading large files).

While the residential survey appears to be adequate, a more sophisticated set of business questions would have yielded more valuable information. Several comments in this report reflect on the effect of the size of a business on the willingness to pay for broadband; a question as to the size of the business on the survey might have been helpful to prove or disprove that theory.

Telephone Survey

The telephone survey contained 13 questions. It was administered solely to residents (not businesses). Different from the residential questions on the written survey, the telephone survey asked, "how much would you be willing to pay?" as an open-ended question. Other surveys provided a selection of possible prices to choose from which may make the calculation of willingness to pay from the telephone surveys more reliable than the answers from the written surveys for that question.

Online Survey

While the web-based survey was originally in the project plan, it was not implemented as the primary data gathering tool. However, it did prove to be a useful method for soliciting community input. In retrospect, it would have been prudent to have more web development at the onset of the project. This also would have enabled a consistent message at all of the community meetings as to the types of surveys that would be available. In addition, it might have reduced the volume of paper surveys, as well as the data entry burden.

Other Thoughts from Team Members

Provider input was essential to the survey planning process –finding the information they need is critical to their partnership in implementation.

Understanding of consumer willingness to pay "more" must be considered within the context of how much they currently pay. Survey item construction should take this into consideration.

Community meeting participants, particularly in no/low broadband access areas such as Trinity County, stated that many poor residents do not have a landline phone, and therefore could not participate in the telephone survey.

7.2.2 Survey Response Analysis

Multiple surveys and multiple groups (random and otherwise) made summarizing the data cumbersome. No analysis of the similarities and differences in responses by the two groups was done. Without ascertaining that the answers provided by the two groups were not statistically different, the surveys could not be combined and maintain a level of certainty. This meant two of every table with few meaningful comparisons.

No multivariate analysis was done on the survey response. Learning from the survey was limited to a simple tabulation. It is unclear whether the need for multivariate analysis was unclear, there was insufficient time or not enough money. Examples of questions that might have been answered if additional analysis were possible include:

1. Where do the people live who indicated they do not have access to broadband?
2. Did the answers given by Latino respondents, Native American respondents etc., differ from the general population?
3. Did the business sector affect the amount a respondent business was willing to pay?

Responses were greater from Trinity and Del Norte counties relative to the total number of businesses because all businesses in those counties were sent surveys—as opposed to a percentage in Mendocino and Humboldt counties. There was no analysis of where the business respondents were located other than by county although Question 5 did ask for the street address.

Business surveys were not targeted to gather information from specific industry segments or clusters. It might have been useful to focus some attention on clusters targeted by the economic development community for growth. It might also have been useful to focus efforts to gather information from potential “anchor tenants” specifically.

7.3 Community Meetings

A portion of this project was to go into the communities and hold meetings to explain broadband and the benefits to the individuals and the businesses. This was a very successful piece of the project. Community meetings were well attended and people were energetic and full of ideas. These ideas were visually charted in a series of common themes that represented the community’s demands (Appendix XIII).

The community meetings seemingly attracted the attention of more highly educated residents. It is likely that such “first responders” to the broadband study, with a higher educational level, were “early adopters” who already recognize the importance of broadband to their communities. Community meeting attendees emphasized the need to educate the general public about the value of broadband access to the vitality and sustainability of the larger community.

If the objective is to assess the needs of rural areas with only dial-up options, then it would be advisable to select the smaller or more remote communities (e.g., Gualala, remote areas of Trinity County, Klamath/Orick) – with fewer persons attending the meetings. On the other hand, holding meetings in the county seats, i.e., Eureka, Crescent City, Weaverville, and Ukiah, was important to getting county/city officials to the meetings.

7.4 Lessons Learned about Data Gathering

Telecommunications consultants, hired by RCC, found the local expertise with local knowledge of the service coverage area or infrastructure, even if it was by talking to linemen or cable installers. The unique expertise of consultants who were familiar with the telecommunications landscape and who had existing relationships with local government, the business community, providers and “on-the-ground” techies, was helpful in obtaining information for the study, as well as obtaining the needed input from providers for the wording on survey items.

The planning and designing of the database structure was done in concert with the survey design such that the survey results could be easily integrated. In addition, data entry was very time consuming and needs to be considered.

Have discussions about and make a final decision about the value of collecting data in an area where there is a small population; conflicting views may exist on maintaining statistical rigor versus omitting critical profiling of a community.

Define data categories and what their uses will be. For instance, questions to be answered include:

- Who is the target demographic population? Broadband: unserved or underserved?
- Who are the provider stakeholders?
- What will the report look like? Whom is the report geared toward?
- How will the data be updated over time? Or is it just a one-time effort?
- How will understanding a market profile of potentially aggregated broadband demand actually encourage investment?
- How will the data be used?

- Demand = understanding business, government, home and education requirements – how can you collect data for your area? How can you quantify it?
- Supply = understanding drivers that create a market for service providers – what are they in your area? How can you quantify it?

7.5 Mapping

A critical path was the role of the Baker data; assumptions were made about the quality of the dataset, which was further compounded by the dataset not being available as originally projected. Thus, the project timeline was set back by that dataset being delayed, and then further set back due to having to "retool" methods for data acquisition to work with a level of data quality that would be useful for rural areas.

GIS staff did data extrapolations and manipulations requiring a high degree of technical sophistication in order to analyze and translate the dataset at a level that would be useful for rural communities.

In order to do accurate data mapping, getting high quality data is key. Considerations are:

- Getting mapping data will take longer than first projected and very little of it will be in GIS compatible formats, thus requiring extensive data conversion and/or entry.
- If one is dealing with obtaining data across multiple counties, data will not be from consistent sources in each county.
- Acknowledge that data from different sources will be acquired from different time periods as well (i.e., older vs. more current data).
- There was a lot of variation as to the amount and quality of the coverage data that providers shared. Sometimes engineering information was shared; some were more worried about competition.
- Consider supplementing data (quantity and quality) by purchasing datasets such as telecommunications data (TeleAtlas) and U.S. Census data (ESRI) for the state of California that was prepared in a "ready-to-use" format for GIS mapping. Such purchases are expensive, but trade-offs are reduced data preparation time, improved data consistency and possibly data quality.
- Commercial software for web-mapping is expensive, complex and requires high power servers. The GIS mapping capacity of projects should be realistically assessed and planned.
- Baker data had 3 km accuracy range in mapping and while a 3 km range is adequate for estimating coverage in a metropolitan area, it is less useful for rural areas. In rural areas, it results in an overestimation of coverage in areas that actually do not have coverage
- Estimations of wireless coverage are particularly over-optimistic in modeling because it does not account for the realities of obstructions such as vegetation, buildings, etc.
- Major providers on the Redwood Coast (Suddenlink, Charter, Central Valley Cable, Almega, DCA Cablelink) do not have data included in Baker.
- Wireless ISPs (WISPs) are not included in Baker data.

7.6 Other Challenges

The "classic" divide that occurs in community/academic research, also occurred in this project. That is, how to balance the academic perspective and values placed on study rigor and objectivity required to provide a "'clean' non-confounding approach" in collecting data (e.g., conduct all of the surveys first, then hold community meetings) versus using the survey as part of a larger strategy to grow demand for broadband.

7.7 Other Lessons Learned

Develop a detailed communication plan in advance of the project launch, with the point person who oversees the plan development also serving as project spokesperson. Planning for the first press conference, as well as for all contacts with the media, would benefit from a detailed plan that:

- Describes a media protocol (e.g., what are mandatory messages in every press release). This also includes the "chain of approval" before any messages go out to the public.
- Includes a prepared speaker's packet. An information packet was eventually assembled over the course of the project, but could have been done upfront.
- Oversees or is in sync with the website development.
- If time and resources allow, considers messages in different languages.

- Part of the external communication plan includes a targeted outreach strategy to engage government representatives, service providers, broadband customers (both business and residential).

Due to the short timeline on the project, the project planning time before several activities were to be launched was felt to be unrealistically short. It was suggested that at least one to two months additional lead time be built into the time frame before the first major activity. A half- or whole-day retreat should be held in the beginning with the whole team and the advisory committee to make sure that everyone has the same understanding of not only how the project would proceed, but why it came to fruition in the first place.

Website development should consider that users with dial-up are a target audience for collection and dissemination of information.

8.0 Next Phase of RCRA’s “Broadband for All” Initiative

8.1 Outreach Plan for Report Dissemination

A more formalized communication plan needs to be developed. Without a coordinated and funded effort, this project will lose momentum.

8.1.1 Target Audiences

RCRA leaders

It will be critical for RCRA leaders to celebrate the completion of this first phase and begin to strategize where funding might come from to move to implementation. Having an individual whose role is to keep focused on this initiative will be important to maintaining momentum.

Broadband service providers

All providers will be provided the executive summary (additional detail available on the website). This first step will serve to continue the communication with this audience. More important than the actual report will be the sharing of the scenarios created with providers who have expressed an interest in developing plans for expansion. Local WISPs have already created an online discussion site where they can work together toward critical policy change and building support for funding availability.

Community activists

All activists whose names have been gathered through the past four broadband forums will also receive the executive summary for review and comment. Unserved communities will be provided the report as part of the outreach.

Current CETF peer groups in other communities

These groups will receive the completed final report with complete appendices available on the website.

8.1.2 Methodologies

Web:

The web will be the primary vehicle for dissemination of information for several reasons:

- The report is so big that printing and mailing will be expensive.
- There is more information available than could be included in the final report and should be made available to those who could find it helpful.
- The web will allow us to split the information into useable parts making access to specific information easy for users.
- Web links to the report (which will reside on the California Center for Rural Policy site) will be encouraged by all groups. For easy reference, the total report and complete appendices will also be broken down into component parts allowing different users to download only the parts of interest. The fate of the Redwood Coast Connect website is unclear at this time, although it will be maintained as long as possible.
- Notification Cards: All participants of the broadband forum will receive a card notifying them that the report is complete and directing them to the website. They also will be given contact information to receive paper copies if the web is not available to them (dial-up for example.)
- Paper copy: Sufficient executive summaries will be printed to mail to the target audience.
- Press: The press strategy still needs to be developed for a regional release for the information.

8.2 Next Steps

The next step is to secure funding for a point person to continue progress on this initiative.

8.2.1 Ongoing Policy, Program and Project Work

Building collaboration between jurisdictions

Important to the success of building out broadband to the most difficult-to-serve communities is the seamless, or at least streamlined, process of working across jurisdictions. Release of this report will provide another opportunity to present findings at the county board level, sharing practices and encouraging adoption of similar or the same ordinances and permitting processes regarding broadband deployment.

Disseminating information about SB 1191

It is likely that most districts are not aware of the bill recently passed into law that allows Community Service Districts (CSDs) to provide broadband services. While not all CSDs are eligible, and this model may not be appropriate for all, information dissemination is the first step. The CSDs might want to look at the survey process the TPUD went through with its customers to explore the idea of adding broadband to its services.

Maintaining provider partnerships

Monitor and participate in the discussion groups created by the providers. Create opportunities for them to come together, possibly using the scenarios as a draw to a working group meeting to continue to build relationships. Get new ideas out on the table and encourage expansion of services into unserved and underserved areas.

State level advocacy

- Work to gain greater acceptance of WISPs as part of the rural broadband deployment solution. This will be a political push as much as anything due to the dominance of telecoms in the broadband deployment process.
- Work to get required fiber off-ramps and backhaul, and “splice points” on backhaul lines utilizing public rights of way.
- Develop incentives for private investment in rural infrastructure
- Free up use restrictions on publicly-funded infrastructure and rates (e.g., CENIC and public schools)

Support for broadband projects currently in process

There are several projects currently underway in the region that run the risk of hitting policy barriers. It will be critical to respond to their needs on these issues. Working collaboratively builds good will and increases regional visibility outside the region. Visibility outside the region can make the difference between receiving funding or not, and between having a policy instituted at the state level that is detrimental to rural broadband deployment or having someone ask for a review of the policy for rural impacts before it is instituted.

- Support the communities of Albion and Comptche (Mendocino County), Orick (Humboldt County) and Klamath (Del Norte County) who all have active communities organizing themselves to get broadband service. These areas, while difficult to serve, are within reach.
- Support efforts by the Yurok Tribe to serve their reservation lands along the Klamath River. This could include helping create partnerships and providing advocacy support.

Prepare the region to be an early adopter of WiMAX

WiMAX holds promise for rural communities, but they will not be high on the priority list for deployment. Experience has shown that visibility and advocacy for pilot projects in rural areas make a difference. The Redwood Coast region would like to be a demonstration site for WiMAX deployment in rural areas.

Developing new supply/demand partners for isolated communities

In many communities, the National Park System might be the only potential anchor tenant for a broadband system, while in other communities it might be a school or a health center. All of these potential anchor tenants are unavailable at the present time for aggregation of demand because they currently pay a negotiated lower rate than would be commercially available. The answer lies in creating a new relationship, one that opens up the possibility of extending their broadband connections to the surrounding community. In some cases that might be as easy as creating a space in a ranger station that provides the community a WiFi hot spot or a computer they can use or putting up a tower on state park land. It will be different in different communities, but we know that these government outposts can be of greater service to the communities in which they are located.

8.2.2 Redundancy

Redundancy remains a critical issue throughout the region. Even in the best served areas (Eureka for example) there is a lack of adequate backhaul capacity to ensure true redundancy. Several times in the past 18 months, the fiber line has been taken out by storms, fire, and construction mistakes.

In 2006 a feasibility study was completed as a public/private partnership to run a fiber line east-west which would create redundancy in the region. Upon completion of the feasibility study, a private company moved forward with the creation of a business plan for the route and announced at the broadband forum in August 2008 that they would complete the project by early 2009. Lines would run in conjunction with PG&E's rights-of-way.

This fiber project is to provide redundancy on a wholesale basis. Actual redundancy for individual businesses would be dependent on their primary provider purchasing redundancy from the new source or, if the business is big enough, it is possible that a deal could be struck. Suddenlink had announced intentions to negotiate for purchase of bandwidth at the time of the fiber project announcement at the broadband forum.

8.2.4 Training

Internet and technical training are available from several sources including College of the Redwoods, Mendocino Community College, Shasta Community College and adult school programs. A specific focus on training may be integrated into the effort to increase usage, a project for the future.

Aggregate Interest in Training on Business Uses of Internet

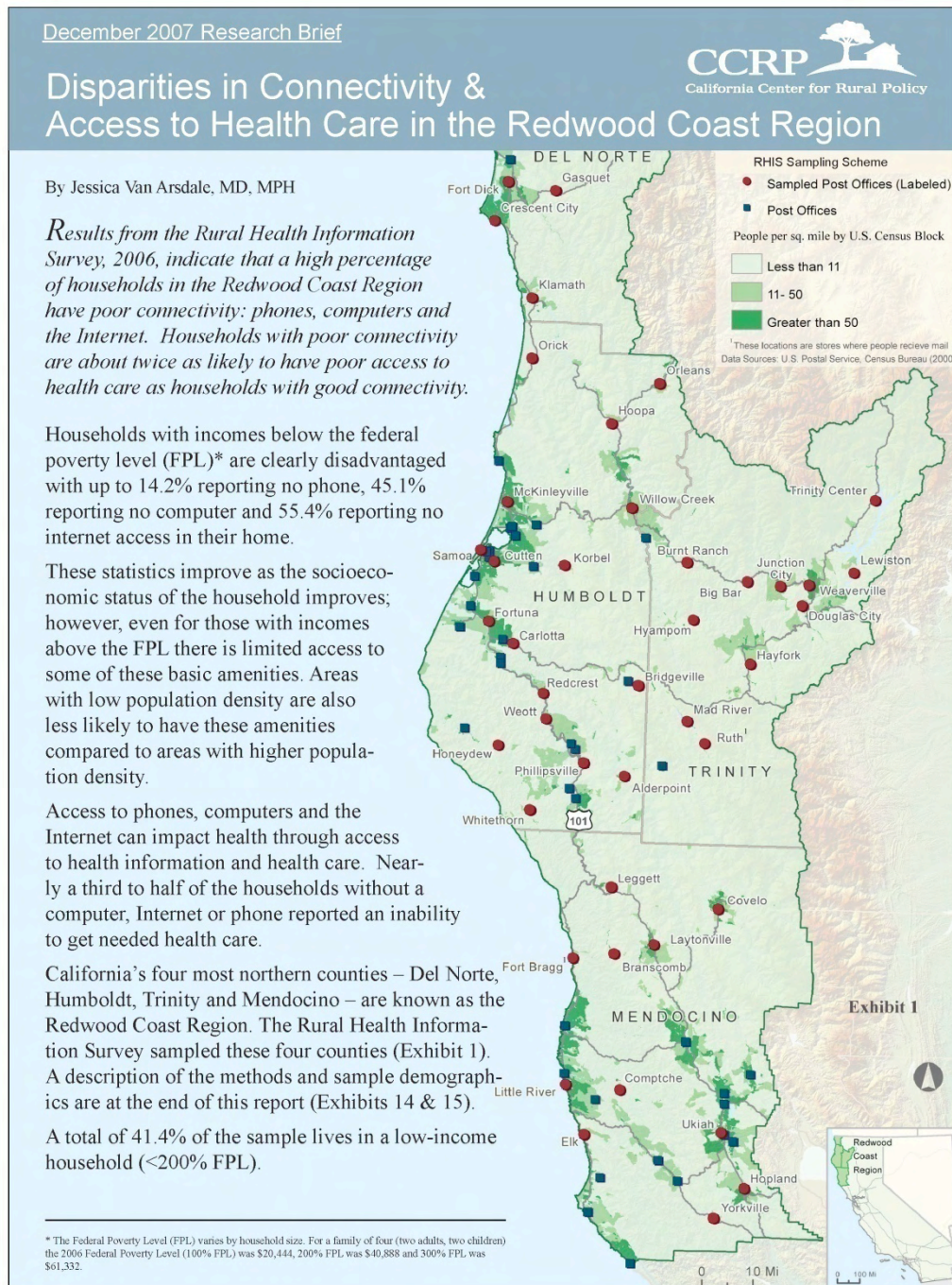
Interest	Frequency	Percent of Responses
Interested	43	26.1
Not interested	122	73.9
Total	165	100.0

There were few actual ideas for training. Two specific topics were suggested: web development and maintenance for the business owner and how to monitor and control unauthorized use of the Internet access during working hours.

Appendix I. Presentations Given about Redwood Coast Connect

Organization	Date	Presenter(s)
Headwaters Fund Board of Directors	9/18/2007	Tina, Connie, Peter
Redwood Region Economic Development Commission	9/24/2007	Tina
Fortuna City Council	10/15/2007	Tina
City Manager's Meeting (Humboldt)	10/18/2007	Tina
Fort Bragg City Council	10/22/2007	Mitch Sprague
Jefferson Public Radio	10/23/2007	Tina
Point and Click Radio News KZYX and KZYZ, Mendocino County Public Broadcasting	10/24/2007	Mitch Sprague
KIEM News Channel 3	10/25/2007	Terry (evening news)
Weaverville Community Meeting	11/8/2007	Terry, John
Crescent City Community Meeting	11/8/2007	Terry, John
Willow Creek Community Meeting	11/13/2007	Terry, Tina
Mendocino Coast Chamber of Commerce Board Meeting	11/13/2007	Mitch Sprague
Fort Bragg Rotary	11/14/2007	Mitch Sprague
HCOE EdTech Meeting	11/14/2007	Tina
Fortuna Chamber of Commerce	11/26/2007	Tina
Mendocino Coast Broadband Alliance	11/27/2007	Tina
Ukiah Community Meeting	11/28/2007	Terry, Tina
Fort Bragg Community Meeting	11/29/2007	Terry, Tina
Comptche Fire District and community members	11/29/2007	Tina
KIEM News Channel 3	12/19/2007, 01/09/2008, 01/10/2008	Terry, live coverage of Eureka Meeting
Redway Community Meeting	1/8/2008	Terry, Tina
Eureka Community Meeting	1/10/2008	Terry, Tina
Mendocino Coast Broadband Alliance	2/29/2008	Tina
Humboldt BOS on SB1191	4/22/2008	Tina, Connie
CETF Conference in Redding	5/9/2008	Terry, Tina, Denise, Steve
Zero Divide	5/30/2008	Tina
Humboldt BOS	6/10/2008	Tina
Mendocino BOS	6/10/2008	Susan
Trinity BOS	6/17/2008	Tina
Del Norte BOS	6/24/2008	John
Tri-Agency Economic Development Authority	6/25/2008	John
Orleans/Comptche/Orick CSDs - CA Senate Local Government Committee SB1191 testimony	4/2/2008 & 6/4/2008	Tina, Peter, Denise

Appendix II. Rural Health Survey Map



Appendix III. Written Broadband Survey

Redwood Coast Connect Telecommunications Survey

General Information

1) Your Location

- a. What county do you live in? _____
- b. What is your zip code at home? _____
- c. Zip code at work (if you work away from home)? _____
- d. What city/town do you live in, or what is the closest city/town to where you live? _____
- e. If you don't live in the city/town, how many miles from that city/town do you live? _____

Home Internet Service

2) Which of the following does your household have? (*Check all that apply*)

- ☐ Land-line telephone
- ☐ Cell phone
- ☐ Personal computer
- ☐ Cable television
- ☐ Not sure/don't know

3) How important is it to you to have Internet access at home? (*Check only one*)

- ☐ Critical
- ☐ Very important
- ☐ Somewhat important
- ☐ Not important
- ☐ Not sure/don't know

4) Is Internet access available to your home? In other words, could you get Internet access at your home if you wanted it?

- ☐ Yes
- ☐ No (*if No, skip to Q. 13*)
- ☐ Not sure/don't know

5) Do you subscribe or connect to the Internet at home?

- ☐ Yes (*if Yes, skip to Q. 7*)
- ☐ No
- ☐ Not sure/don't know

6) Which of these are the reasons you don't subscribe or connect to the Internet at home? (*Check all that apply, then skip to Q. 13*)

- ☐ I don't own a computer
- ☐ I don't need the Internet
- ☐ Internet access is not available in my home
- ☐ Internet access is too expensive
- ☐ I can get Internet access elsewhere
- ☐ I'm concerned about privacy and personal security
- ☐ I don't have a land-line telephone
- ☐ Other (describe) _____
- ☐ None of these
- ☐ Not sure/don't know

7) If you currently subscribe to the Internet in your home, how much do you pay per month for your Internet access at home?

- ☐ Less than \$20
- ☐ \$20 - \$29
- ☐ \$30 - \$39

- ☐ \$40 - \$49
- ☐ \$50 - \$59
- ☐ \$60 or over
- ☐ Not sure/don't know

8) If you subscribe to the Internet in your home, which of the following describes the type of Internet service you have at home? (*Check only one*)

- ☐ Telephone dial-up (*please answer Q. 9*)
- ☐ Accelerated dial-up (*please answer Q. 9*)
- ☐ ISDN (*please answer Q. 9*)
- ☐ DSL (*skip to Q. 10*)
- ☐ Through my cable TV modem (*skip to Q. 10*)
- ☐ Wireless (antenna) (*skip to Q. 10*)
- ☐ Satellite dish (*skip to Q. 10*)
- ☐ Not sure/don't know

9) Which of these are reasons you don't subscribe or connect to some type of Broadband (high-speed) Internet service? (*Check all that apply*)

- ☐ I don't need Broadband (high-speed) Internet service
- ☐ Broadband (high-speed) Internet is too expensive
- ☐ Broadband (high-speed) Internet is not available in my area
- ☐ I can get Broadband (high-speed) access somewhere else
- ☐ None of these
- ☐ Not sure/don't know

10) What is the name of the company that provides your Internet access at home? If you're not sure, tell us who you pay your Internet bill to.

11) How satisfied are you with your Internet service provider (ISP) at home?

- ☐ Very satisfied
- ☐ Satisfied
- ☐ Somewhat satisfied
- ☐ Dissatisfied
- ☐ Very dissatisfied
- ☐ Not sure/don't know

12) Would you be willing to pay more for a faster Internet connection at home?

- ☐ Yes
- ☐ No
- ☐ Not sure/don't know

13) If Broadband (high-speed) Internet access was available to your home, please indicate how much you think your household would be willing to pay for Broadband (high-speed) access at home. (*Check only one*)

- ☐ At most, \$20 per month
- ☐ At most, \$30 per month
- ☐ At most, \$40 per month
- ☐ At most, \$50 per month
- ☐ At most, \$60 per month
- ☐ At most, \$70 per month
- ☐ More than \$70 per month
- ☐ I'm not interested in having Internet access at home
- ☐ Not sure/don't know

14) What is the address of the residential location(s) where you would like to receive Broadband (high-speed) Internet service?

-
-
- 15) If you don't already have this, would you prefer to receive one bill for your phone-Internet-pay TV?
- ☐ Yes
 - ☐ No
 - ☐ I already have this
 - ☐ Not sure/don't know
- 16) Do you have access to the Internet from locations outside of your own home?
- ☐ Yes
 - ☐ No (*If No, skip to Q. 18*)
 - ☐ Not sure/don't know
- 17) At what locations outside of your own home do you have access to the Internet? (*Check all that apply*)
- ☐ Work
 - ☐ Library
 - ☐ School
 - ☐ Someone else's home
 - ☐ Wireless hotspots
 - ☐ Cell phone
 - ☐ Community Center
 - ☐ Other (describe) _____
 - ☐ None
 - ☐ Not sure/don't know
- 18) Which of the following activities do you conduct on the Internet? (*Check all that apply*)
- ☐ Communicating electronically
 - ☐ Looking up information on the World Wide Web
 - ☐ Purchasing items/services online
 - ☐ Selling items/services online
 - ☐ Doing job-related work online
 - ☐ Accessing government services and information
 - ☐ Accessing health care services
 - ☐ Accessing financial services and information
 - ☐ Uploading or downloading music, webcasts, podcasts, or video
 - ☐ Taking on-line classes
 - ☐ Other (describe) _____
 - ☐ Not sure/don't know

Telecommunications at Your Workplace

- 19) If you are employed, in what kind of workplace? (*Check all that apply*)
- | | |
|--|--|
| <input type="checkbox"/> Health Care | <input type="checkbox"/> Forest Products |
| <input type="checkbox"/> Human/social services | <input type="checkbox"/> Information technology |
| <input type="checkbox"/> Manufacturing | <input type="checkbox"/> Tourism/Hospitality |
| <input type="checkbox"/> Agriculture | <input type="checkbox"/> Arts and Culture |
| <input type="checkbox"/> Fisheries | <input type="checkbox"/> Food services |
| <input type="checkbox"/> Construction | <input type="checkbox"/> Wholesale |
| <input type="checkbox"/> Transportation and warehousing | <input type="checkbox"/> Retail |
| <input type="checkbox"/> Finance, insurance, real estate | <input type="checkbox"/> Education |
| <input type="checkbox"/> Government | <input type="checkbox"/> Professional/scientific |
| <input type="checkbox"/> Legal | <input type="checkbox"/> Utilities |
| <input type="checkbox"/> Retired | <input type="checkbox"/> Home-based business |
| <input type="checkbox"/> Not employed | <input type="checkbox"/> Not sure/don't know |
| <input type="checkbox"/> Other (describe) _____ | |

20) What kind of Internet connections do you have at your workplace? (*Check all that apply*)

- ☐ Telephone dial-up
- ☐ Accelerated dial-up
- ☐ ISDN
- ☐ DSL
- ☐ Through cable TV modem
- ☐ Wireless (antenna)
- ☐ Satellite dish
- ☐ DS-3
- ☐ T1
- ☐ Gigabit Ethernet
- ☐ Other (describe) _____
- ☐ Not sure/don't know

21) How important is it to have a Broadband (high-speed) Internet connection at your workplace? (*Check only one*)

- ☐ Critical
- ☐ Very important
- ☐ Somewhat important
- ☐ Not important
- ☐ Not sure/don't know

22) What is the name of the company that provides your workplace Internet access? If you're not sure, tell us who you pay your Internet bill to.

23) How satisfied are you with your workplace Internet service provider (ISP)?

- ☐ Very satisfied
- ☐ Satisfied
- ☐ Neither satisfied or unsatisfied (neutral)
- ☐ Unsatisfied
- ☐ Very unsatisfied
- ☐ Not sure/don't know

24) Are you the person with the authority to make decisions regarding Internet access at your workplace?

- ☐ Yes
- ☐ No (*if No, skip to Q.29*)
- ☐ Not sure/don't know

25) Would your workplace be willing to pay more for a faster Internet connection?

- ☐ Yes
- ☐ No
- ☐ Not sure/don't know

26) Would your workplace be willing to pay more for a more reliable Internet connection?

- ☐ Yes
- ☐ No
- ☐ Not sure/don't know

27) If Broadband (high-speed) Internet access was available to your workplace, please indicate how much you think your workplace would be willing to pay for Broadband (high-speed) access. (*Check only one*)

- ☐ At most, \$75 per month
- ☐ At most, \$100 per month
- ☐ At most, \$150 per month
- ☐ At most, \$250 per month

- ☐ At most, \$500 per month
- ☐ At most, \$1,000 per month
- ☐ At most, \$2,500 per month
- ☐ More than \$2,500 per month
- ☐ Not sure/don't know

28) What is the address of the workplace location(s) where you would like to receive Broadband (high speed) Internet service?

29) Which of the following activities do you conduct on the Internet at your workplace? (*Check all that apply*)

- ☐ Communicating electronically
- ☐ Looking up information on the World Wide Web
- ☐ Purchasing items/services online
- ☐ Selling items/services online
- ☐ Uploading or downloading music, webcasts, podcasts, or video
- ☐ Accessing government services and information
- ☐ Company Web site
- ☐ Accessing financial services and information
- ☐ Accessing health care services
- ☐ Taking on-line classes
- ☐ Other (describe) _____
- ☐ Not sure/don't know

30) On average, how much time per day do you spend on the Internet?

At home: _____ At work: _____

31) Are you interested in getting training on potential workplace uses or applications of the Internet/Web?

- ☐ Yes
- ☐ No

If Yes, please describe: _____

Demographic Information About You

Now, just to make sure we are fairly representing different kinds of households, we have a few questions about you.

32) What is your age? _____

33) What is your gender?

- Male
- Female
- Decline to answer

34) What is your highest level of education? (*Circle one number*)

- | | | | | |
|-----------------|-----|----|----|---------------------------|
| High School | 9 | 10 | 11 | 12 |
| College | 13 | 14 | 15 | 16 (16=Bachelor's degree) |
| Graduate School | 17+ | | | |

Almost done! Just three more questions.

35) Which of these groups would you say best represents your race or ethnicity? (*You may choose more than one*)

- ☐ American Indian/Alaska Native
- ☐ Tribe? _____
- ☐ Native Hawaiian/Pacific Islander

- ☐ Black/African American
- ☐ Hispanic/Latino
- ☐ Asian
- ☐ White
- ☐ Other (please specify) _____
- ☐ Decline to answer

36) Which of the following categories best describes your annual household income from all sources?

- ☐ Less than \$20,000
- ☐ Between \$20,000 and \$39,999
- ☐ Between \$40,000 and \$59,999
- ☐ Between \$60,000 and \$79,999
- ☐ Between \$80,000 and \$99,999
- ☐ \$100,000 or more
- ☐ Decline to answer

37) How did you hear about or receive this survey from Redwood Coast Connect?

- ☐ At a public meeting
- ☐ Was mailed or e-mailed to me
- ☐ Other (describe) _____

Thanks for completing the survey!

Your input is greatly appreciated. For more information on Redwood Coast Connect, look us up on the Web at <http://redwoodcoastconnect.humboldt.edu/>

If you did not receive an addressed, postage-paid envelope with this survey, please return it to:

Jenny Wrye
Siemens Hall, Room 209
Humboldt State University
1 Harpst Street, Arcata, CA 95521-8299

Redwood Coast Connect is an initiative to promote Internet connections for all in the Redwood region. This survey will help us understand the telecommunications needs of residents and businesses in your area. The survey should only take a few minutes. ***Redwood Coast Connect*** welcomes your feedback and your answers will be kept confidential. You must be at least 18 years old to participate.

If you have any questions about this study, please contact Dr. Carolyn Ward at (707) 826-5639 or cjw5@humboldt.edu, or Dr. Steve Martin at (707) 826-5637 or srm1@humboldt.edu.

Thank you for providing us with the information needed to better serve your communications needs.

Appendix IV. Telephone Survey

Redwood Coast Connect Broadband Demand Telephone Survey

Hi my name is _____. I'm calling on behalf of Humboldt State University and we're doing a survey of the availability of high-speed Internet in your area. We are not affiliated with any telephone or internet service provider and this is not a sales call of any kind. Your feedback will help local telecommunications companies decide how to bring high speed Internet service to your area. Do you have just a couple minutes to answer a few questions?

1) Which of the following does your household have? *(Check all that apply)*

- ☐ Land-line telephone
 - ☐ Cell phone
 - ☐ Personal computer
 - ☐ Cable television
 - ☐ Not sure/don't know
 - ☐ Responses that don't fit one of the categories _____
- _____
- _____

2) How important is it to you to have Internet access at home? *(Check one)*

- ☐ Critical
 - ☐ Very important
 - ☐ Somewhat important
 - ☐ Not important
 - ☐ Not sure/don't know
 - ☐ Responses that don't fit one of the categories _____
- _____
- _____

3) **[Ask open ended]** If you subscribe to the Internet in your home, what type of Internet service do you have? *(Caller checks one response)*

- ☐ I don't subscribe to the Internet at home *(go to Question 4A)*
 - ☐ Telephone dial-up *(go to Question 4A)*
 - ☐ Accelerated dial-up *(go to Question 4A)*
 - ☐ ISDN *(go to Question 4A)*
 - ☐ DSL *(go to Question 4B)*
 - ☐ Through my cable TV modem *(go to Question 4B)*
 - ☐ Wireless (antenna) *(go to Question 4B)*
 - ☐ Satellite dish *(go to Question 4B)*
 - ☐ Not sure/don't know *(go to Question 4A)*
 - ☐ Responses that don't fit one of the categories *(go to Question 4A)* _____
- _____
- _____

4A) If you don't subscribe to some type of Broadband or high-speed Internet service at home, why not?

OR

4B) If you do subscribe to Broadband or high-speed Internet at home, what is the address (street address, ZIP code and county) of the location where you receive that service? If respondent is unwilling to provide street address, ask nearest community, how many miles from that community, ZIP code and county.

Street address _____

ZIP code _____

County _____

Or nearest community _____

Miles from nearest community _____

ZIP code _____

County _____

5) **[Ask open ended]** Would you be willing to pay more for a faster Internet connection at home? (*Caller checks one response*)

☐ Yes

☐ No (*go to Question 8*)

☐ Not sure/don't know

☐ Responses that don't fit one of the categories _____

6) If high-speed Internet access was available to your home, how much would your household be willing to pay per month for high-speed Internet access at home? (*Caller types in response*) _____

7) What is the address of the residential location or locations where you would like to receive Broadband or high-speed Internet service? (*Be sure to get street address, county and ZIP code*) If respondent is unwilling to provide street address, ask nearest community, how many miles from that community, ZIP code and county.

Street address _____

ZIP code _____

County _____

Or nearest community _____

Miles from nearest community _____

ZIP code _____

County _____

8) **[Ask open ended]** If you don't already have this, would you prefer to receive one bill for your phone-Internet-pay TV? (*Caller checks one response*)

- ☐ Yes
- ☐ No
- ☐ I already have this
- ☐ Not sure/don't know
- ☐ Responses that don't fit one of the categories _____

Now, just to make sure we are fairly representing different kinds of people and households, we have a few questions about you. These are entirely confidential.

9) What is your age? _____

10) What is your gender? _____

11) What is your highest level of education? _____

12) Which of these groups would you say best represents your race or ethnicity? (*Check all that apply*)

- ☐ American Indian/Alaska Native
(*If yes*) Name of Tribe? _____
- ☐ Native Hawaiian/Pacific Islander
- ☐ Black/African American
- ☐ Hispanic/Latino
- ☐ Asian
- ☐ White
- ☐ Other (please specify) _____
- ☐ Decline to answer

13) Which of the following categories best describes your annual household income from all sources? (*Caller checks one response*)

- ☐ Less than \$20,000
- ☐ Between \$20,000 and \$39,999
- ☐ Between \$40,000 and \$59,999
- ☐ Between \$60,000 and \$79,999
- ☐ Between \$80,000 and \$99,999
- ☐ \$100,000 or more
- ☐ Decline to answer

Appendix V. Business Survey

Redwood Coast Connect Telecommunications Survey

1) What county is your business or workplace in? _____

2) What kind of business or workplace? (*Check all that apply*)

- | | |
|--|--|
| <input type="checkbox"/> Health Care | <input type="checkbox"/> Forest Products |
| <input type="checkbox"/> Human/social services | <input type="checkbox"/> Information technology |
| <input type="checkbox"/> Manufacturing | <input type="checkbox"/> Tourism/Hospitality |
| <input type="checkbox"/> Agriculture | <input type="checkbox"/> Arts and Culture |
| <input type="checkbox"/> Fisheries | <input type="checkbox"/> Food services |
| <input type="checkbox"/> Construction | <input type="checkbox"/> Wholesale |
| <input type="checkbox"/> Transportation and warehousing | <input type="checkbox"/> Retail |
| <input type="checkbox"/> Finance, insurance, real estate | <input type="checkbox"/> Education |
| <input type="checkbox"/> Government | <input type="checkbox"/> Professional/scientific |
| <input type="checkbox"/> Legal | <input type="checkbox"/> Utilities |
| <input type="checkbox"/> Retired | <input type="checkbox"/> Home-based business |
| <input type="checkbox"/> Not employed | <input type="checkbox"/> Not sure/don't know |
| <input type="checkbox"/> Other (describe) _____ | |

3) What kind of Internet connections do you have at your business or workplace? (*Check all that apply*)

- | | |
|---|--|
| <input type="checkbox"/> Telephone dial-up | <input type="checkbox"/> Wireless (antenna) |
| <input type="checkbox"/> Accelerated dial-up | <input type="checkbox"/> Satellite dish |
| <input type="checkbox"/> ISDN | <input type="checkbox"/> DS-3 |
| <input type="checkbox"/> DSL | <input type="checkbox"/> T1 |
| <input type="checkbox"/> Through cable TV modem | <input type="checkbox"/> Gigabit Ethernet |
| <input type="checkbox"/> None | <input type="checkbox"/> Not sure/don't know |
| <input type="checkbox"/> Other (describe) _____ | |

4) What is the street address(es) of the business or workplace location(s) where you either have or would like to receive Broadband (high-speed) Internet service? Please include ZIP code.

5) How important is it to have a Broadband (high-speed) Internet connection at your business or workplace? (*Check only one*)

- ☐ Critical
- ☐ Very important
- ☐ Somewhat important
- ☐ Not important
- ☐ Not sure/don't know

6) What is the name of the company that provides your business or workplace Internet access?

7) How satisfied are you with your business/workplace Internet service provider (ISP)? (*Check only one*)

- ☐ Very satisfied
- ☐ Satisfied
- ☐ Neither satisfied or unsatisfied (neutral)
- ☐ Unsatisfied
- ☐ Very unsatisfied
- ☐ Not sure/don't know

8) Would your business/workplace be willing to pay more for a faster Internet connection?

- ☐ Yes ☐ Not sure/don't know
☐ No

9) Would your business/workplace be willing to pay more for a more reliable Internet connection?

- ☐ Yes ☐ Not sure/don't know
☐ No

10) If you **don't** have Broadband (high-speed) Internet access at your business or workplace, please indicate how much you think your business/workplace would be willing to pay for Broadband (high-speed) access. (*Check only one*)

- ☐ At most, \$75 per month
☐ At most, \$100 per month
☐ At most, \$150 per month
☐ At most, \$250 per month
☐ At most, \$500 per month
☐ At most, \$1,000 per month
☐ At most, \$2,500 per month
☐ More than \$2,500 per month
☐ Not sure/don't know
☐ We already have Broadband.

Appendix VI. Del Norte Town-by-Town Analysis

Total Towns 6

Crescent City

The Broadband Supply is MEDIUM. (16 points)

- Wired Broadband Providers: Charter
- Fixed Wireless Broadband Providers: None
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: .512 megabits upload, 2 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (21 points)

Fort Dick

The Broadband Supply is MEDIUM. (16 points)

- Wired Broadband Providers: Charter
- Fixed Wireless Broadband Providers: None
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: .512 megabits upload, 2 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (5 points)

Gasquet

The Broadband Supply is LOW. (14 points)

- Wired Broadband Providers: Charter
- Fixed Wireless Broadband Providers: None
- Mobile Wireless Broadband Providers: None
- Highest Speed Available from a wired or fixed wireless provider: .512 megabits upload, 2 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (5 points)

Hiouchi

The Broadband Supply is LOW. (14 points)

- Wired Broadband Providers: Charter
- Fixed Wireless Broadband Providers: None
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: .512 megabits upload, 2 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is MEDIUM.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (15 points)

Klamath

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: None
- Fixed Wireless Broadband Providers: None
- Mobile Wireless Broadband Providers: None
- Highest Speed Available from a wired or fixed wireless provider: None
- Availability of adjacent coverage outside of town is NONE.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (18 points)

Smith River

The Broadband Supply for is your town is ranked MEDIUM. (16 points)

- Wired Broadband Providers: Charter
- Fixed Wireless Broadband Providers: None
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: .512 megabits upload, 2 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (17 points)

Appendix VII. Humboldt Town-by-Town Analysis

Supply and Demand Summary

Alderpoint

The Broadband Supply is LOW. (10 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: 101Netlink
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is LOW.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (23 points)

Arcata

The Broadband Supply is HIGH. (25 points)

- Wired Broadband Providers: AT&T, Suddenlink
- Fixed Wireless Broadband Providers: 101Net link, Cascadia Wireless
- Mobile Wireless Broadband Providers: Edge/AT&T, Sprint, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (19 points)

Bayside

The Broadband Supply is MEDIUM. (19 points)

- Wired Broadband Providers: Suddenlink
- Fixed Wireless Broadband Providers: 101Net link, Cascadia Wireless
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is MEDIUM.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (19 points)

Benbow

The Broadband Supply is HIGH. (21 points)

- Wired Broadband Providers: Wave Broadband
- Fixed Wireless Broadband Providers: 101Netlink
- Mobile Wireless Broadband Providers: Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is LOW based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (8 points)

Blocksburg

The Broadband Supply is LOW. (14 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: 101Netlink
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)

- Availability of adjacent coverage outside of town is MEDIUM.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (21 points)

Blue Lake

- The Broadband Supply is MEDIUM. (16 points)
- Wired Broadband Providers: Suddenlink
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: .768 megabits upload, 10 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (19 points)

Briceland

The Broadband Supply is NONE/UNDERSERVED. (3 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (20 points)

Bridgeville

- The Broadband Supply is NONE/UNDERSERVED. (3 points)
- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (18 points)

Carlotta

The Broadband Supply is MEDIUM. (19 points)

Wired Broadband Providers: Suddenlink

Fixed Wireless Broadband Providers: 101Net link

Mobile Wireless Broadband Providers: Edge/AT&T, Sprint, Verizon Wireless

Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)

Availability of adjacent coverage outside of town is MEDIUM.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (15 points)

Crannell

The Broadband Supply is NONE/UNDERSERVED. (3 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is LOW based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (8 points)

Cutten

The Broadband Supply is HIGH. (25 points)

- Wired Broadband Providers: AT&T, Suddenlink
- Fixed Wireless Broadband Providers: 101Net link
- Mobile Wireless Broadband Providers: Edge/AT&T, Sprint, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (16 points)

Dinsmore

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (0 points)

Ettersburg

The Broadband Supply is LOW. (14 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: 101Netlink
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is MEDIUM.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (6 points)

Eureka

- The Broadband Supply is HIGH. (25 points)
- Wired Broadband Providers: AT&T, Suddenlink
- Fixed Wireless Broadband Providers: 101Net link, Cascadia Wireless
- Mobile Wireless Broadband Providers: Edge/AT&T, Sprint, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (21 points)

Fernbridge

The Broadband Supply is HIGH. (21 points)

- Wired Broadband Providers: Suddenlink
- Fixed Wireless Broadband Providers: 101Net link
- Mobile Wireless Broadband Providers: Edge/AT&T, Sprint, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (6 points)

Ferndale

The Broadband Supply is HIGH. (25 points)

- Wired Broadband Providers: Frontier, Suddenlink

- Fixed Wireless Broadband Providers: 101Net link
- Mobile Wireless Broadband Providers: Edge/AT&T, Sprint, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (18 points)

Fieldbrook

The Broadband Supply is LOW. (12 points)

- Wired Broadband Providers: Suddenlink
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: .768 megabits upload, 10 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is LOW.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (20 points)

Fields Landing

The Broadband Supply is HIGH. (21 points)

- Wired Broadband Providers: Suddenlink
- Fixed Wireless Broadband Providers: 101Net link
- Mobile Wireless Broadband Providers: Edge/AT&T, Sprint, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is LOW.

The apparent broadband demand is LOW based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (10 points)

Fort Seward

The Broadband Supply is NONE/UNDERSERVED. (3 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (3 points)

Fortuna

The Broadband Supply is HIGH. (25 points)

- Wired Broadband Providers: AT&T, Suddenlink
- Fixed Wireless Broadband Providers: 101Net link, Cascadia Wireless
- Mobile Wireless Broadband Providers: Edge/AT&T, Sprint, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (20 points)

Garberville

The Broadband Supply is HIGH. (21 points)

- Wired Broadband Providers: Wave Broadband
- Fixed Wireless Broadband Providers: 101Net link
- Mobile Wireless Broadband Providers: Verizon Wireless

- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (21 points)

Harris

The Broadband Supply is LOW. (14 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: 101Netlink
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is MEDIUM.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (6 points)

Holmes

- The Broadband Supply is NONE/UNDERSERVED. (3 points)
- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (5 points)

Honeydew

The Broadband Supply is LOW. (12 points)

- Wired Broadband Providers: Frontier
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: .128 megabits upload, 1 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (5 points)

Hoopla

The Broadband Supply is LOW. (10 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: Velocity Technology
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: .768 megabits upload, .768 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is MEDIUM.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (21 points)

Hydesville

The Broadband Supply is MEDIUM. (19 points)

- Wired Broadband Providers: Suddenlink
- Fixed Wireless Broadband Providers: 101Netlink
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)

- Availability of adjacent coverage outside of town is MEDIUM.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (17 points)

Kneeland

The Broadband Supply is LOW. (12 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: 101Netlink
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is LOW.

The apparent broadband demand is LOW based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (13 points)

Korbel

The Broadband Supply is NONE/UNDERSERVED. (3 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (6 points)

Loleta

The Broadband Supply is HIGH. (25 points)

- Wired Broadband Providers: AT&T, Suddenlink
- Fixed Wireless Broadband Providers: 101Net link
- Mobile Wireless Broadband Providers: Edge/AT&T, Sprint, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (19 points)

McKinleyville

The Broadband Supply is HIGH. (20 points)

- Wired Broadband Providers: AT&T, Suddenlink
- Fixed Wireless Broadband Providers: Cascadia Wireless
- Mobile Wireless Broadband Providers: Edge/AT&T, Sprint, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: .768 megabits upload, 10 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (18 points)

Miranda

The Broadband Supply is LOW. (14 points)

- Wired Broadband Providers: AT&T
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: .768 megabits upload, 6 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is MEDIUM.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (22 points)

Myers Flat

The Broadband Supply is NONE/UNDERSERVED. (3 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (21 points)

Orick

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is LOW based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (13 points)

Orleans

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (23 points)

Petrolia

The Broadband Supply is LOW. (12 points)

- Wired Broadband Providers: Frontier
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: .128 megabits upload, 1 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (5 points)

Phillipsville

The Broadband Supply is NONE/UNDERSERVED. (3 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is LOW based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (14 points)

Redcrest

The Broadband Supply is NONE/UNDERSERVED. (3 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (3 points)

Redway

The Broadband Supply is HIGH. (21 points)

- Wired Broadband Providers: Wave Broadband
- Fixed Wireless Broadband Providers: 101Netlink
- Mobile Wireless Broadband Providers: Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (24 points)

Richardson Grove

The Broadband Supply is NONE/UNDERSERVED. (3 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (3 points)

Rio Dell

The Broadband Supply is HIGH. (25 points)

- Wired Broadband Providers: AT&T, Suddenlink
- Fixed Wireless Broadband Providers: 101Net link
- Mobile Wireless Broadband Providers: Edge/AT&T, Sprint, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (19 points)

Samoa

The Broadband Supply is HIGH. (21 points)

- Wired Broadband Providers: Suddenlink
- Fixed Wireless Broadband Providers: 101Net link
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (4 points)

Scotia

The Broadband Supply is HIGH. (25 points)

- Wired Broadband Providers: AT&T, Suddenlink
- Fixed Wireless Broadband Providers: 101Net link
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless

- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (19 points)

Shelter Cove

The Broadband Supply is LOW. (14 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: 101Netlink
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is MEDIUM.

The apparent broadband demand is LOW based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (14 points)

Trinidad

The Broadband Supply is MEDIUM. (19 points)

- Wired Broadband Providers: Suddenlink
- Fixed Wireless Broadband Providers: 101Net link
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 1.5 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is MEDIUM.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (21 points)

Weott

The Broadband Supply is NONE/UNDERSERVED. (3 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (22 points)

Whitethorn

The Broadband Supply is LOW. (14 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: 101Netlink
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: 1 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is MEDIUM.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (20 points)

Willow Creek

The Broadband Supply is NONE/UNDERSERVED. (9 points)

- Wired Broadband Providers: Almega
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: .128 megabits upload, 1.1 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)

- Availability of adjacent coverage outside of town is LOW.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (21 points)

Appendix VIII. Mendocino Town-by-Town Analysis

Supply and Demand Summary

(28 total towns)

Albion

The Broadband Supply is LOW. (10 points)

- Wired Broadband Providers: Comcast
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: 2 megabits upload, 12 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is LOW.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (21 points)

Boonville

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (17 points)

Branscomb

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (15 points)

Calpella

The Broadband Supply is HIGH. (25 points)

- Wired Broadband Providers: AT&T, Comcast
- Fixed Wireless Broadband Providers: Pacific Internet, WillitsOnline
- Mobile Wireless Broadband Providers: AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 2 megabits upload, 12 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (3 points)

Caspar

The Broadband Supply is LOW. (10 points)

- Wired Broadband Providers: Comcast
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 2 megabits upload, 12 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is LOW.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (22 points)

Comptche

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (22 points)

Covelo

The Broadband Supply is LOW. (8 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: WillitsOnline
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: .128 megabits upload, .768 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (6 points)

Dos Rios

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is LOW based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (2 points)

Elk

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (2 points)

Fort Bragg

The Broadband Supply is HIGH. (21 points)

- Wired Broadband Providers: AT&T, Comcast
- Fixed Wireless Broadband Providers: 101Netlink, WillitsOnline
- Mobile Wireless Broadband Providers: AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 2 megabits upload, 12 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is MEDIUM.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (21 points)

Gualala

The Broadband Supply is MEDIUM. (15 points)

- Wired Broadband Providers: Central Valley Cable
- Fixed Wireless Broadband Providers: Black Mtn. Communications, Esplanade
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider .384 megabits upload, .512 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (21 points)

Hopland

The Broadband Supply is NONE/UNDERSERVED. (6 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: WillitsOnline
- Mobile Wireless Broadband Providers: AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: .128 megabits upload, .768 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is MEDIUM.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (21 points)

Laytonville

The Broadband Supply is MEDIUM. (16 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: 101Netlink, WillitsOnline
- Mobile Wireless Broadband Providers: AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 1 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (22 points)

Leggett

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (21 points)

Little River

The Broadband Supply is LOW. (13 points)

- Wired Broadband Providers: Comcast
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: 2 megabits upload, 12 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is LOW.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (22 points)

Manchester

The Broadband Supply is NONE/UNDERSERVED. (3 points)

- Wired Broadband Providers: none

- Fixed Wireless Broadband Providers: Esplanade
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: .256 megabits upload, .256 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is LOW.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (21 points)

Mendocino

The Broadband Supply is MEDIUM. (17 points)

- Wired Broadband Providers: AT&T, Comcast
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: 2 megabits upload, 12 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is LOW.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (21 points)

Navarro

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (18 points)

Philo

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand in your town is ranked HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (20 points)

Piercy

The Broadband Supply is ranked LOW. (10 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: 101Netlink
- Mobile Wireless Broadband Providers: Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 1 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is MEDIUM.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (19 points)

Point Arena

The Broadband Supply is NONE/UNDERSERVED. (6 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: Esplanade
- Mobile Wireless Broadband Providers: none

- Highest Speed Available from a wired or fixed wireless provider: .256 megabits upload, .256 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is LOW.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (20 points)

Potter Valley

The Broadband Supply is LOW. (12 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: Pacific Internet, WillitsOnline
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: .512 megabits upload, 1.5 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)

Availability of adjacent coverage outside of town is MEDIUM.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (19 points)

Redwood Valley

The Broadband Supply is MEDIUM. (18 points)

- Wired Broadband Providers: Comcast
- Fixed Wireless Broadband Providers: Pacific Internet, WillitsOnline
- Mobile Wireless Broadband Providers: AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 2 megabits upload, 12 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is MEDIUM.

The apparent broadband demand in your town is ranked MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (16 points)

Ukiah

The Broadband Supply is HIGH. (25 points)

- Wired Broadband Providers: AT&T, Comcast
- Fixed Wireless Broadband Providers: Pacific Internet
- Mobile Wireless Broadband Providers: AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 2 megabits upload, 12 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (20 points)

Westport

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (20 points)

Whale Gulch

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand in your town is ranked NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (Note: direct feedback solicited during firestorm so unintended nonparticipation affected results.)

Willits

The Broadband Supply for your town is ranked HIGH. (23 points)

- Wired Broadband Providers: AT&T, Comcast
- Fixed Wireless Broadband Providers: WillitsOnline
- Mobile Wireless Broadband Providers: AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: 2 megabits upload, 12 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand in your town is ranked HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (20 points)

Yorkville

The Broadband Supply for your town is ranked NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand in your town is ranked MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (20 points)

Appendix IX. Trinity Town-by-Town Analysis

Supply and Demand Summary

(22 total towns)

Big Bar

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is LOW based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (16 points)

Big Flat

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (4 points)

Burnt Ranch

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (17 points)

Coffee Creek

The Broadband Supply is LOW. (13 points)

- Wired Broadband Providers: TDS Happy Valley
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: .512 megabits upload, 3 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is LOW based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (11 points)

Del Loma

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none

- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (NA)

Douglas City

The Broadband Supply is NONE/UNDERSERVED. (6 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: Velocity Technology
- Mobile Wireless Broadband Providers: Edge/AT&T Wireless
- Highest Speed Available from a wired or fixed wireless provider: .768 megabits upload, .768 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is LOW.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (19 points)

Forest Glen

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (2 points)

Hawkins Bar

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (21 points)

Hayfork

The Broadband Supply is LOW. (11 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: Com-Pair, Velocity Technology
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: .768 megabits upload, .768 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (19 points)

Hyampom

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is LOW based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (14 points)

Junction City

The Broadband Supply is NONE/UNDERSERVED. (7 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: Com-Pair, Velocity Technology
- Mobile Wireless Broadband Providers: Edge/AT&T, VerizonWireless
- Highest Speed Available from a wired or fixed wireless provider: .768 megabits upload, .768 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is LOW.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (19 points)

Lewiston

The Broadband Supply is LOW. (11 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: Com-Pair, Velocity Technology
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: .768 megabits upload, .768 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (18 points)

Mad River

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (19 points)

Peanut

The Broadband Supply is NONE/UNDERSERVED. (6 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: Com-Pair
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: 768 megabits upload, .768 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is LOW.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (8 points)

Ruth

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (16 points)

Salyer

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none

- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (14 points)

Trinity Center

The Broadband Supply is LOW. (13 points)

- Wired Broadband Providers: TDS Happy Valley
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: .512 megabits upload, 3 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (17 points)

Trinity Village

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (5 points)

Weaverville

The Broadband Supply is MEDIUM. (15 points)

- Wired Broadband Providers: DCA Cablelink
- Fixed Wireless Broadband Providers: Com-Pair, Velocity Technology
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: .768 megabits upload, .768 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is HIGH.

The apparent broadband demand is HIGH based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (21 points)

Wildwood

The Broadband Supply is NONE/UNDERSERVED. (0 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: none
- Availability of adjacent coverage outside of town is none.

The apparent broadband demand is NONE based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (2 points)

Zenia

The Broadband Supply is LOW. (8 points)

- Wired Broadband Providers: none
- Fixed Wireless Broadband Providers: 101Netlink
- Mobile Wireless Broadband Providers: none
- Highest Speed Available from a wired or fixed wireless provider: 1 megabits upload, 4 megabits download (meets CPUC 1 megabit upload/3 megabit download recommendation)

- Availability of adjacent coverage outside of town is LOW.
- The apparent broadband demand is MEDIUM based on local interest shown through participation in the RCC project and local leadership in creating broadband demand. (17 points)

Appendix X. Engaging Providers & Gathering Data

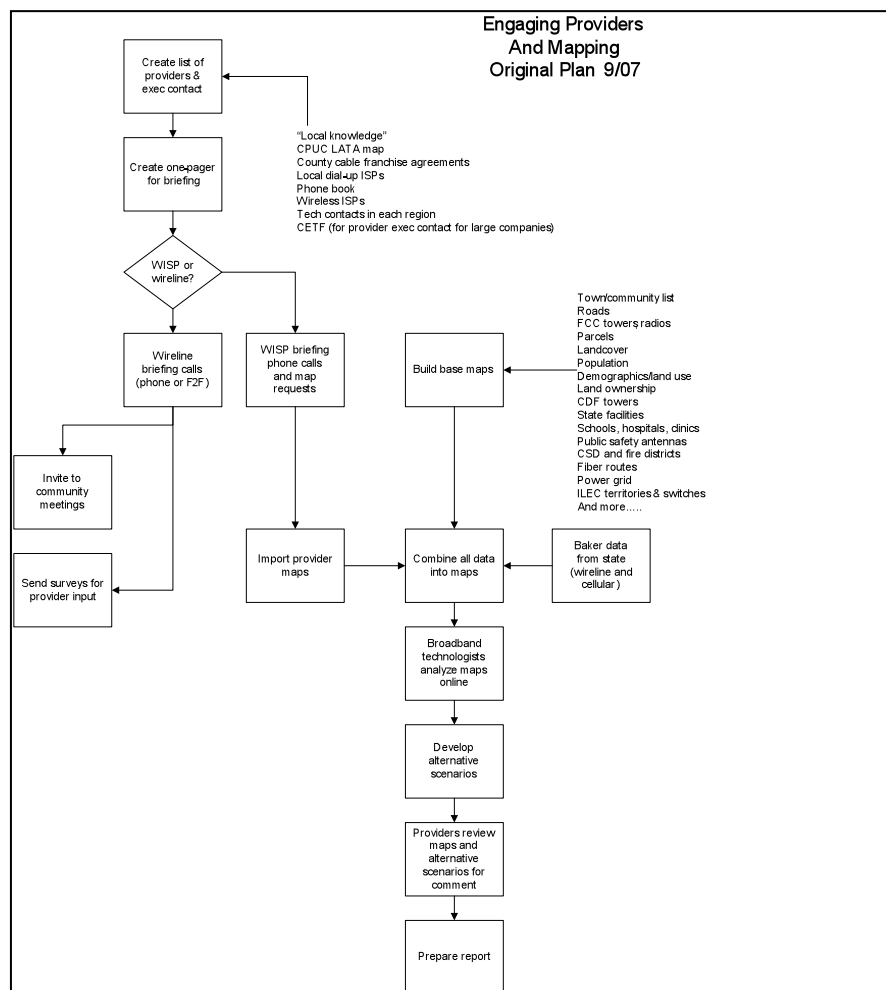
In order to assess the regional broadband infrastructure, recognizing that providers are stakeholders and engaging the current providers from the beginning is critical. Providers have a vested interest in the project since demand data may point out unserved or underserved markets where demand makes providing broadband financially feasible.

Several assumptions were made while planning and beginning the project:

- Providers would be interested and would engage in the process.
- Baker maps from the California Broadband Task Force (CBTF) would be used for wireline broadband coverage, with local parcel, demographic, population, government, and other information added.
- Wireless ISPs would be asked for coverage information to map and would willingly provide information.
- Providers would be interested in attending community meetings.
- Providers would interact with the team and provide feedback on proposed alternative scenarios.
- Providers would use the data generated by the project.

Engaging Providers

Below is a flow chart of the expected process of working with providers and gathering data, given our assumptions.



RCC began this phase of the project by creating a spreadsheet of providers. This spreadsheet was used continuously over the life of the project. Information listed was:

- County
- Provider name
- Type of provider (telco, cable company, WISP, cellular, PEG, K-20)
- Management contact name/phone/e-mail
- Technical contact name/phone/e-mail
- General location of services
- Notes

During the process of developing the list of providers, key local officials or technical folks were contacted in each county to get information about phone company DSL, cable modem service, and local providers. Dial-up ISPs and WISPs, in particular, were very aware of who provides broadband in their regions. The CPUC has a Telephone Exchange map online that shows phone company territories, LATA boundaries, and area codes. County or city government had copies of cable franchise agreements. Yellow pages in phone books had some providers listed. Key contacts for larger cable and telephone companies were identified with help from CBTF and CETF.

Providers on the Redwood Coast are:

Redwood Coast Connect		
Broadband Providers 8/1/2008	Company	Type of provider
Del Norte County	Charter	cable company
Humboldt County	101netlink	WISP, microwave
	Almega	cable company
	AT&T	telephone company
	Cascadia Wireless	WISP
	Frontier	telephone company
	Suddenlink	cable company
	Velocity Technology	WISP
	Wave Broadband	cable company
Mendocino County	101netlink	WISP, microwave
	AT&T	telephone company
	Black Mountain Communications	WISP
	Central Valley Cable	Cable company, WISP
	Comcast	cable company
	Esplanade	WISP
	Pacific Internet	WISP
	WillitsOnline	WISP
Trinity County	Com-Pair	WISP
	DCA CableLink	cable company
	TDS Telecom dba Happy Valley	telephone company
	Velocity Technology	WISP
Cellular data providers	Edge	cellular
	Sprint	cellular
	Verizon	cellular
Dial-up and DSL resellers	ASIS Internet	ISP (& wireless reseller)
	Humboldt Internet	ISP
	Mendocino Community Network	ISP
	Pacific Internet	ISP
	Saber	ISP
Special providers/...potential providers	Access Humboldt	PEG
	CENIC	K-20 telecommunications
	Trinity Public Utilities Department	PUD
	Mendocino cell tower project	County govt
	Mendocino Coast TV & Ukiah Valley PEG	PEG
	Trinity County cell tower project	County govt

A one-page briefing sheet was created (see end of this Appendix) and sent to all providers along with a request for a meeting. If the provider contact was local, a face to face meeting was scheduled, otherwise conference calls were scheduled. All providers were invited to community meetings; half attended. Initially, wireline providers were not asked for any mapping information since the intention was to use Baker maps from the CBTF. During briefing calls, wireless ISPs were asked for coverage or footprint information. Some were willing to provide information, others were not. See next section for details of gathering provider mapping information.

Mapping Infrastructure

At this point, several months into the project, reality deviated from plan in the mapping phase of the project. CBTF (“Baker”) maps were acquired in late 2007. Based on local knowledge, the maps were determined to be too inaccurate for the Redwood Coast, overstating coverage in some areas and missing coverage in other areas. The decision was made to gather our own mapping data. Comparison of mapping data is below, confirming the local knowledge used in the decision to create our own maps.

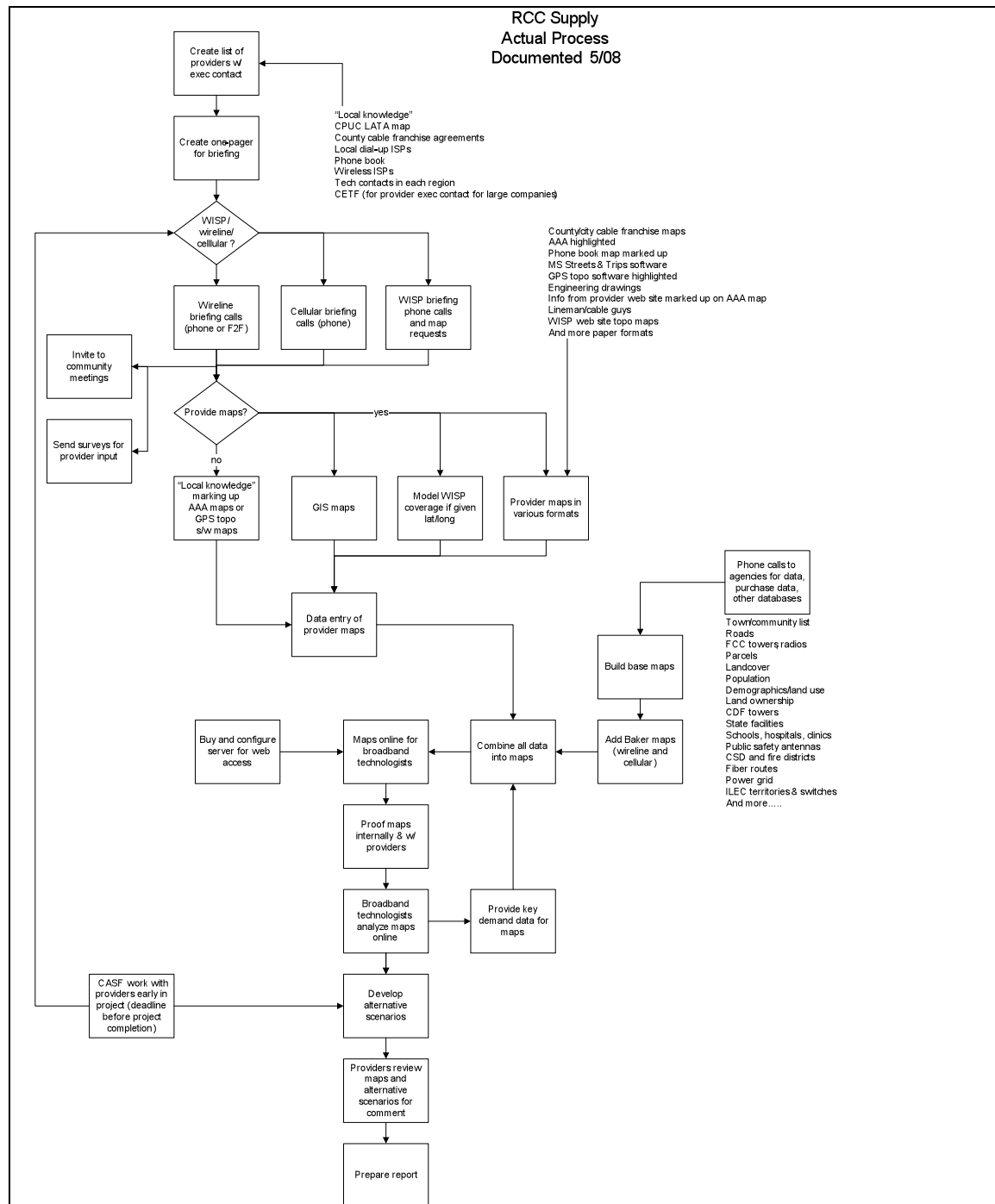
Below is a summary of differences between the maps and why the decision was made to gather our own data.

California Broadband Task Force (Baker) (Wireline)	Redwood Coast Connect (Wireline and fixed wireless)
Broad brush view of NW California Incomplete – major providers missing Overestimates coverage due to smoothing and 3km cell size Does not include WISPs (fixed wireless) Does not portray backhaul issues	“Line in the sand” view Includes almost all providers Coverage acquired in numerous ways, from GIS maps to estimates drawn in Includes WISPs (fixed wireless), which significantly changes the view of broadband connectivity
Del Norte	
Shows no coverage	RCC acquired coverage data directly from Charter, who provides decent coverage; Charter in Del Norte is managed out of Oregon; suspected to be an oversight by Charter in California that data was not furnished for CBTF maps
Humboldt	
Suddenlink, the largest provider in Humboldt county, did not provide data to CBTF	Suddenlink data provided in GIS format by County of Humboldt; also has the largest foot print and fastest speeds in county at combined 10-100mbps
Southern Humboldt coverage shows large area of high speed (combined 10-100mbps)	Wave Broadband provides speeds in the combined 1-5mbps range in a smaller footprint (3km cell size and smoothing shows larger). Wave provides higher speeds throughout the state; suspect they gave CBTF one speed range for all territories.
Central Arcata shows high combined speed of 10-100mbps, probably not from broadband, but from dedicated leased circuits at Humboldt State University	Wide area of Arcata is covered by Suddenlink, with combined speeds in 10-100mbps
Almega Cable in Willow Creek not shown	Coverage in downtown Willow Creek estimated with local knowledge
Sisqtel coverage (Siskiyou County) shown going downriver to Orleans (Humboldt County)	Coverage does not reach Orleans, which is in Verizon territory, probably due to smoothing and 3km cell sizes; however, it points out a “close by” provider for alternative scenarios. Also provided awareness that smaller telcos provide great DSL coverage
Mendocino	
Coastal coverage overstated; it does not go that far inland	Better coverage estimates given

California Broadband Task Force (Baker) (Wireline)	Redwood Coast Connect (Wireline and fixed wireless)
Inland coverage overstated	Better coverage estimates given
Central Valley Cable missing on south coast	Central Valley Cable mapped
Trinity	
Missing DCA Cablevision	Accurate coverage
California Broadband Task Force (Mobile/cellular wireless)	Redwood Coast Connect (Mobile/cellular wireless)
Accurate picture at end of 2007	Landscape has drastically changed since 2007 with greater coverage

Revised Map Data Gathering Process

Creating our own maps immediately changed the scope of the project as well as the process. The process became more complex and started to look like the chart below.



The WISP providers had already been contacted per the original plan. Additional phone calls were made to all the wireline providers to ask for map data. The following lists the various ways mapping data was acquired:

- Maps in GIS format (one cable vendor whose county franchise agreement required keeping coverage maps up to date)
- Provider engineering drawings (some companies shared detailed information) in the form of digital or printed data which required conversion to GIS compatible format.
- Public information (talking to local residents, especially in rural towns, and they know where coverage begins and ends) which required conversion to GIS compatible format.
- WISP maps on websites (in varying levels of detail) in JPEG or PDF format which required conversion to GIS compatible format.
- Purchased GIS data – TeleAtlas (gives telco wireline extents and Central Offices) and ESRI (census dataset to inform the housing model and associated demographic information).
- AAA maps with highlighter marking (this was common and works) which required conversion to GIS compatible format.
- Linemen and cable guys sharing info (talking to providers' employees – some were directed to call RCC and clarify boundaries) which required conversion to GIS compatible format.
- WISP lat/long/tower height which was georeferenced to the GIS to develop modeled viewshed for coverage (RCC was able to give one provider back the modeled coverage for posting on his website)
- "Local knowledge" marked up on GPS topo software maps (maps printed out, marked up with highlighter based on conversations) which required conversion to GIS compatible format.
- Local dial-up providers know the "lay of the land" (they know where coverage is and isn't) which required conversion to GIS compatible format.
- Google maps were very useful to look at aerial views to see where dwellings and buildings are located in unfamiliar areas

One advantage of the project technical consultants gathering data in the various formats is that the mental picture of broadband supply starts forming immediately, triggering analysis "on the fly" while still acquiring all the mapping data.

Redwood Region Providers by Community

Providers by community are listed in table. After map data was gathered, we generated a list of unserved communities. Note that if only a portion of the community is served, the provider(s) are still listed, which will distort the perception of broadband coverage. For instance, Albion has a small amount of coverage by Comcast close in to Highway 1, but a much larger portion of the community is unserved by any provider.

Redwood Coast Served/Unserved Communities (10/12/2008)

County	Community	Providers in alphabetical order (may serve only portions of communities listed)
Del Norte	Crescent City	Charter
	Fort Dick	Charter
	Gasquet	Charter
	Hiouchi	Charter
	Klamath	unserved
	Smith River	Charter
Humboldt	Alderpoint	101Netlink
	Arcata	101Netlink, AT&T, Cascadia Wireless, Suddenlink
	Bayside	101Netlink, Cascadia Wireless, Suddenlink
	Benbow	101Netlink, Wave
	Blocksburg	101Netlink
	Blue Lake	Suddenlink
	Briceland	unserved (service just beginning at publication time)
	Bridgeville	unserved
	Carlotta	101Netlink, Suddenlink
	Crannell	unserved
	Cutten	101Netlink, AT&T, Suddenlink
	Dinsmore	unserved
	Ettersburg	101Netlink
	Eureka	101Netlink, AT&T, Cascadia Wireless, Suddenlink
	Fernbridge	101Netlink, Suddenlink
	Ferndale	101Netlink, Frontier, Suddenlink
	Fieldbrook	Suddenlink
	Fields Landing	101Netlink, Suddenlink
	Fort Seward	unserved
	Fortuna	101Netlink, AT&T, Cascadia Wireless, Suddenlink
	Garberville	101Netlink, Wave
	Harris	101Netlink
	Holmes	unserved
	Honeydew	Frontier
	Hoopa	Velocity Technology
	Hydesville	101Netlink, Suddenlink
	Kneeland	101Netlink
	Korbel	unserved
	Loleta	101Netlink, AT&T, Suddenlink
	McKinleyville	AT&T, Cascadia Wireless, Suddenlink
	Miranda	AT&T
	Myers Flat	unserved

County	Community	Providers in alphabetical order (may serve only portions of communities listed)
	Myrtletown	101Netlink, AT&T, Cascadia Wireless, Suddenlink
	Orick	unserved
	Orleans	unserved
	Petrolia	Frontier
	Phillipsville	unserved
	Redcrest	unserved
	Redway	101Netlink, Wave
	Richardson Grove	unserved
	Rio Dell	101Netlink, AT&T, Suddenlink
	Rohnerville	101Netlink, Suddenlink
	Samoa	101Netlink, Suddenlink
	Shelter Cove	101Netlink
	Scotia	101Netlink, AT&T, Suddenlink
	Trinidad	101Netlink, Suddenlink
	Weott	unserved
	Whitethorn	101Netlink
	Willow Creek	Almega
Mendocino	Albion	Comcast
	Boonville	unserved
	Branscomb	unserved
	Calpella	AT&T, Comcast, Pacific Internet, WillitsOnline
	Caspar	Comcast
	Comptche	unserved
	Covelo	WillitsOnline
	Dos Rios	unserved
	Elk	unserved
	Fort Bragg	101Netlink, AT&T, Comcast, WillitsOnline
	Gualala	Central Valley Cable, Esplanade, Black Mtn. Communications
	Hopland	WillitsOnline
	Laytonville	101Netlink, WillitsOnline
	Leggett	unserved
	Little River	Comcast
	Manchester	Esplanade
	Mendocino	AT&T, Comcast
	Navarro	unserved
	Philo	unserved
	Piercy	101Netlink
	Point Arena	Esplanade
	Potter Valley	Pacific Internet, WillitsOnline
	Redwood Valley	Comcast, Pacific Internet, WillitsOnline
	Ukiah	AT&T, Comcast, Pacific Internet
	Westport	unserved
	Whale Gulch	unserved
	Willits	AT&T, Comcast, WillitsOnline
	Yorkville	Unserved
Trinity	Big Bar	unserved

County	Community	Providers in alphabetical order (may serve only portions of communities listed)
	Big Flat	unserved
	Burnt Ranch	unserved
	Coffee Creek	TDS Happy Valley
	Del Loma	unserved
	Douglas City	Velocity Technology
	Forest Glen	unserved
	Hawkins Bar	unserved
	Hayfork	Com-Pair, Velocity Technology
	Hyampom	unserved
	Junction City	Com-Pair, Velocity Technology
	Lewiston	Com-Pair, Velocity Technology
	Mad River	unserved
	Peanut	Com-Pair
	Ruth	unserved
	Salzer	unserved
	Trinity Center	TDS Happy Valley
	Trinity Village	unserved
	Weaverville	Com-Pair, DCA Cablelink, Velocity Technology
	Wildwood	unserved
	Zenia	101Netlink

California Advanced Services Fund (CASF)

During the process of gathering data, the CASF application period was opened. This CPUC fund was created by a surcharge on telephone bills, and is targeted at bringing broadband to unserved and underserved communities in California, many of which are rural. This fund contains \$100 million over a 2-year period; funded applications will receive 40% of capital costs for broadband implementation. The CPUC hoped the project team would work to promote provider applications from the Redwood Coast Connect region. This triggered another round of conversations with providers, as well as analysis of areas to target before maps were even completed to show the overall picture. The team contacted all providers again and encouraged them to apply for CASF funds. The reactions ranged from enthusiasm to dubiousness to refusal to discuss their CASF plans.

Targeted areas were:

Possible project areas 3/28/2008	County
Klamath and Orick, with needed fiber to backhaul	Del Norte, Humboldt
Expand Comcast footprint on Coast	Mendocino
Ave of Giants (Weott, Phillipsville, Myers Flat, Redcrest, Holmes, Pepperwood)	Humboldt
Anderson Valley/Coast (Philo, Boonville, Comptche, Yorkville)	Mendocino
299 downriver to Willow Creek (backhaul too - Verizon backhaul at capacity)	Trinity
Expand Suddenlink footprint (Carlotta, Hydesville, Fortuna, Eureka, Kneeland, Fieldbrook, Arcata, McKinleyville)	Humboldt
Orleans	Humboldt
Pecwan/Johnson (don't even have phone)	Humboldt
Mendocino South Coast	Mendocino

Lessons Learned

Compiling provider list

1. Ask every provider who else serves in that area and their contact information.
2. Check CPUC Telephone Exchange map for phone companies
3. ftp://ftp.cpuc.ca.gov/acmaps/2007_CPUC_map_46X54_2.pdf
4. Talk to technically knowledgeable persons in the region; they'll know the providers.
5. Check the Yellow Pages under *Internet*, *Cable TV*, and *Telecommunications*.
6. Continue to add to provider contact list – every engineer, sales person, lineman, cable guy. Those names will be needed over and over.
7. Build the relationships with every phone call or meeting.

Gathering mapping data

1. This is a time-consuming, and somewhat inconsistent process, especially when maps are provided in paper or digital graphic formats that must be converted to GIS formats for analysis and mapping.
2. Many providers are not willing to share this data, even though it's on their websites in one form or another.
3. GIS map availability will be the exception, rather than the rule.
4. Decide up front and be consistent on what maps should be marked up with coverage when data is gathered manually. Base maps provided by the project GIS analyst in the appropriate projection, datum and scale would improve consistency and accuracy of the resulting footprint maps.
5. Map data needs to be gathered by technical consultant who understands broadband and knows the providers.
6. At some point, a cut-off date needs to be chosen and “best guesses” made for missing coverage. This is easier said than done, with the broadband landscape changing rapidly. “Best guesses” introduce an unquantifiable amount of error to the resulting maps due to the wide variability of the data.
7. Non-disclosure agreements (NDAs) should be created and signed up front.
8. Get cable franchise agreements from all counties and cities.
9. Build the relationships with every phone call or meeting.
10. Build list of towns/communities up from GIS place names to include on maps using consistent decision rules (e.g. population, important for spatial coverage, appropriateness for cartographic design, etc.) and have all on team agree to the list early in the process. Include towns where county elected officials live. Include towns where there are libraries, schools, and clinics.

Cross-Border Considerations

When looking at anchor tenants and broadband alternative scenarios, RCC cannot limit itself to jurisdictional boundaries. In provider discussions, LATA boundaries are less important than they used to be, yet their engineers still tend to avoid looking beyond LATA boundaries as well, affecting network design for a wider regional infrastructure.

With only 11 incorporated cities in the four-county region (none in Trinity County), the term “community” is a loose term without precise boundaries. Residents may live in one rural community but receive mail at a PO box in a neighboring community. In some areas in the region, the economies and infrastructure may be aligned with neighboring counties or the state of Oregon. The following areas are deserving of some discussion since they are among the most unserved and underserved.

Cross-Border: River Communities of Eastern Humboldt, Western Trinity, Southern Del Norte

These river communities have several things in common:

- Large tribal populations.
- Terrain is difficult – mountains, rivers, trees.
- Verizon is the ILEC and does not provide any broadband in the region.
- WISP backhaul capacity from Verizon is limited in capacity and costly.
- Cellular coverage is non-existent in many communities.
- With the exception of Hoopa and a several-square-block section of Willow Creek, they are all unserved by broadband.
- Emergency services collaboration is common among river communities since they are so often cut off from phone service during winter storms and wildfires.

Orleans is on the Klamath River in the far northeast corner of Humboldt County, only 8 miles from Siskiyou County. Karuk tribal headquarters are in the area. Orleans has no cellular service. Orleans' telephone service is from Verizon, but DSL is not available. There are no WISPs serving the area. Yet, their neighbors and friends just up the road 8 miles in

Somes Bar have DSL from Sisqtel, who provides DSL to almost all their customers in Siskiyou County, no matter how remote. This points out a huge difference in broadband deployment between a small local phone company and a large phone company such as Verizon.

Klamath River and Trinity River communities on the Yurok tribal lands span two counties: Del Norte and Humboldt. There is no direct road connecting the Yurok tribal headquarters in Klamath (Del Norte County) with the other tribal communities up the river – Weitchpec, Johnson, and Pecwan in Humboldt County. None of these communities have broadband available. Further, Johnson and Pecwan (downriver from Weitchpec) have no electricity or landline or cellular phone service. Jack Norton School in Johnson is served by generator power and satellite. Verizon and PG&E have partnered to bring poles and service closer to Johnson and Pecwan, but the gap is still more than 10 miles.

Trinity River towns of Hoopa and Willow Creek have some broadband, though speeds are slow. Hoopa is served by Velocity Technology (WISP). Willow Creek is served by Almega, the cable company, though only in a very small part of downtown Willow Creek. Between Willow Creek and Junction City, there are many unserved communities: Salyer, Burnt Ranch, Del Loma, Big Bar, Big Flat. They see themselves as a region irrespective of county boundaries, and from a telecom perspective, they all have the same phone company.

Cross-Border: Southern Humboldt/Northern Mendocino

Northern Mendocino communities of Leggett, Piercy, and Whale Gulch feel like they are a part of the Southern Humboldt group of communities, with residents shopping and using services in Garberville and Redway. While Piercy has broadband available from a Southern Humboldt WISP, 101Netlink, Leggett and Whale Gulch are unserved.

Cross-Border: Del Norte County/Curry County, Oregon

These counties share more than a border. There is an equal daily flow of workers between the counties. Educational attainment roughly is equal between the two counties: Del Norte - bachelor degrees at 11%, high school graduates at 72% and Curry bachelor degrees of 16%, high school graduates at 82%. Many Del Norte residents shop in Brookings.

Some notable differences are seen in population trends. Curry has an older median population (49.2 years) vs. Del Norte (35.9 years). This is especially true for persons over 65 years of age: Del Norte 13% and Curry 26.5%. Del Norte's overall population is relatively young and growing at a faster rate compared to most surrounding counties. Curry's over 65 population growth rate is among the highest in the nation.

There is considerable cooperation and collaboration across county lines. A few examples include participation in a Joint Powers Agreement for development of Jack McNamara Air Field, recent contribution by Curry Economic Development to the Border Coast Regional Airport Authority to assist in their marketing and website for the Airport, recent receipt of a grant for hospitality industry training in the two county area, shared tourism marketing under the auspices of America's Wild rivers Coast, and regional collaboration in broadband planning.

Cross-Border: Gualala Area and Sea Ranch

Sea Ranch is in Sonoma County just across the Gualala River from Mendocino County. Sea Ranch's phone company is Verizon, while Gualala's is AT&T. Backhaul is a joint effort between the two companies, and appears to be of dubious quality and capacity. In talking to the WISPs and the cable company in the area, the RCC consultants were told about lack of backhaul capacity, often waiting months for T1 orders to be fulfilled or denied. The small providers in that area generally serve both Sea Ranch and Gualala, so conversations about broadband in the area included both Sonoma and Mendocino County residents.

Data-Gathering Surprises

Anyone going into a project like RCC will have preconceived notions about broadband coverage and the providers. The following are some of the "surprises" from the data-gathering and provider briefing phases of the RCC project.

- Very good DSL coverage by small telephone companies (Frontier and TDS/Happy Valley). Their territory is some of the most sparsely populated in the state, yet most customers have DSL available. And both companies shared any information we asked for.

- While phone companies know where potential customers are because most people still have land lines, large providers, such as cable companies, may not know where new potential customers are in rural markets, even just adjacent to their coverage areas.
- Most providers, unless they are local companies, don't know who their competition is in rural markets.
- Wireless ISP activity has been huge in 3 of the 4 counties in the past 18 months. An astounding number of smaller communities now have coverage.
- Openness of conversations with some companies and referral to key people within the organization was refreshing. Conversely, paranoia in others about sharing any information.
- No WISPs in Del Norte.
- Mobile/cellular broadband coverage expanded remarkably, just during the duration of the project.

Confirming Local Knowledge

- Backhaul issues (cost, lack of) are huge barriers to last mile implementation. We knew this going in to the RCC project, but it has been underscored time and again in many areas with no remaining middle mile capacity or very high cost to middle mile connectivity.
- Redundancy, or alternate fiber paths for route diversity, are needed in all counties for greater reliability of services. Recent outages have pointed this out. Risk is high for many providers with a single point of failure.
- The poor condition of wireline infrastructure in some parts of the region were confirmed when talking to providers and ISPs.

Additional GIS methods and recommendations:

Development of geospatial data, analysis, modeling and mapping as well as the RCC website, online surveys and interactive map was completed by the Humboldt State University Institute for Spatial Analysis (ISA). This provided for a good level of consistency and coordination for many aspects of the project. However, management of the written community and business surveys and analysis as well as the random telephone survey were handled by others which did lead to some unforeseen complexities in maintaining consistent database schema through all components of the RCC project.

Essential software for the project included:

- ArcGIS 9.2 (ESRI, Redlands California) for GIS data preparation, analysis, modeling and mapping.
- CommunityViz Professional 3.1 (Placeways) for scenario modeling.
- ArcGIS Server 9.2 (ESRI) for web-based, interactive maps. These maps are served via an ArcGIS Server platform (Online Corporation).
- Adobe Creative Suite 3 (Adobe) for cartographic design of publically available PDF format maps and for management and conversion of various data sources provided in non-geospatial graphic formats.
- Limesurvey (Carsten Schmitz) for development of online surveys on the RCC website.

In addition a typical suite of web servers and applications provided by Humboldt State University Central Computing and the ISA support the web infrastructure necessary to support the RCC website.

Geospatial data were acquired from a variety of sources including commercially available telecommunications data (TeleAtlas) and prepared US Census data (ESRI) for the State of California, as well as a wide array of publically available data (e.g. geographic boundaries, land ownership, parcels, communications infrastructure/towers, road networks, topography, etc.) from Federal, State, County and local sources. Where additional, detailed data was required, we worked directly with broadband providers to develop maps of their coverage areas.

Survey data included street address information for the location where broadband service was desired, and responses were geocoded to allow for accurate mapping of demand. Unfortunately, the telephone survey contractor selected ignored this question, instead opting to use reverse lookup of addresses which provides the location called as opposed to the location at which service is desired. Furthermore, the dataset delivered by the contractor had numerous inconsistencies in data entry making it difficult to use in conjunction with the other geospatial and survey data obtained for the project.

A first step in the GIS analysis was to acquire and evaluate available data. We acquired over 500 geospatial data sets covering the four-county study area at the state, county and municipality levels. After review, layers containing similar information were merged into a single data layer. For example, broadband footprints by provider were combined into a single broadband access footprint layer. After evaluation and aggregation of available data and creation of additional data layers from survey information, hand digitizing and data extraction from the wide array of hard-copy and digital sources we reduced this to approximately 200 geospatial data layers. Over 100 of these were compiled into a comprehensive geodatabase to be accessed via the ArcGIS Server online mapping system.

One of the more challenging aspects of obtaining accurate broadband coverage footprints was the variety of forms in which data was, or was not available. Some providers were unwilling to share detailed coverage information for competitive reasons. In these cases we were limited to coarse resolution (3 km raster data) provided in the Baker maps supplied by CETF. In other cases we were provided standard road maps, photocopied engineering diagrams, and even maps ripped from phone books, with highlighted coverage areas as delineated by providers or other individuals with local knowledge. For these sources, we were required to hand digitize and georeference the data to the degree possible, however due to a lack of metadata the accuracy of these sources and the delineated coverage footprints is of unknown accuracy.

For some of the fixed wireless providers we were provided tower locations and transmitter specifications which allowed us to model coverage footprints using viewshed analysis tools in ArcGIS in conjunction with elevation data from the national elevation data (NED) at 10m resolution. In a few cases, providers were willing and able to provide coverage footprints in GIS compatible formats.

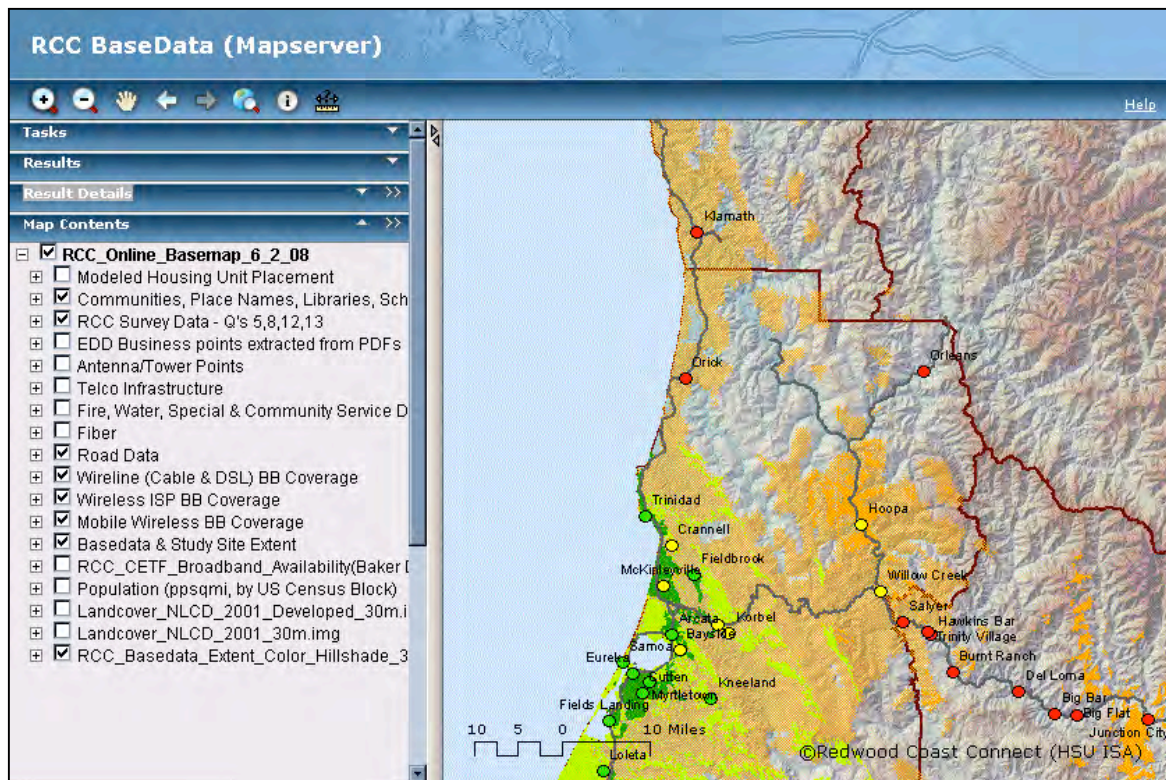
Because there are relatively low population densities in rural regions and large tracts of public land, it is not appropriate to assume housing or broadband demand is equally distributed throughout census blocks. Unfortunately, parcel information was only available for two of the study counties to determine parcels which were zoned residential. Therefore, we modeled housing as a surrogate for actual parcel data. To ensure populations were allocated to appropriate areas, housing units were allocated only on private lands (excluding the substantial areas of State and Federal public lands in the study region) and within a reasonable distance of roads based on average distances observed.

Results

Our objectives to develop available coverage maps as well as to generate demand areas from geocoded survey data were met. Three categories of products were developed by the Institute for Spatial Analysis as components of the geospatial analysis. These include:

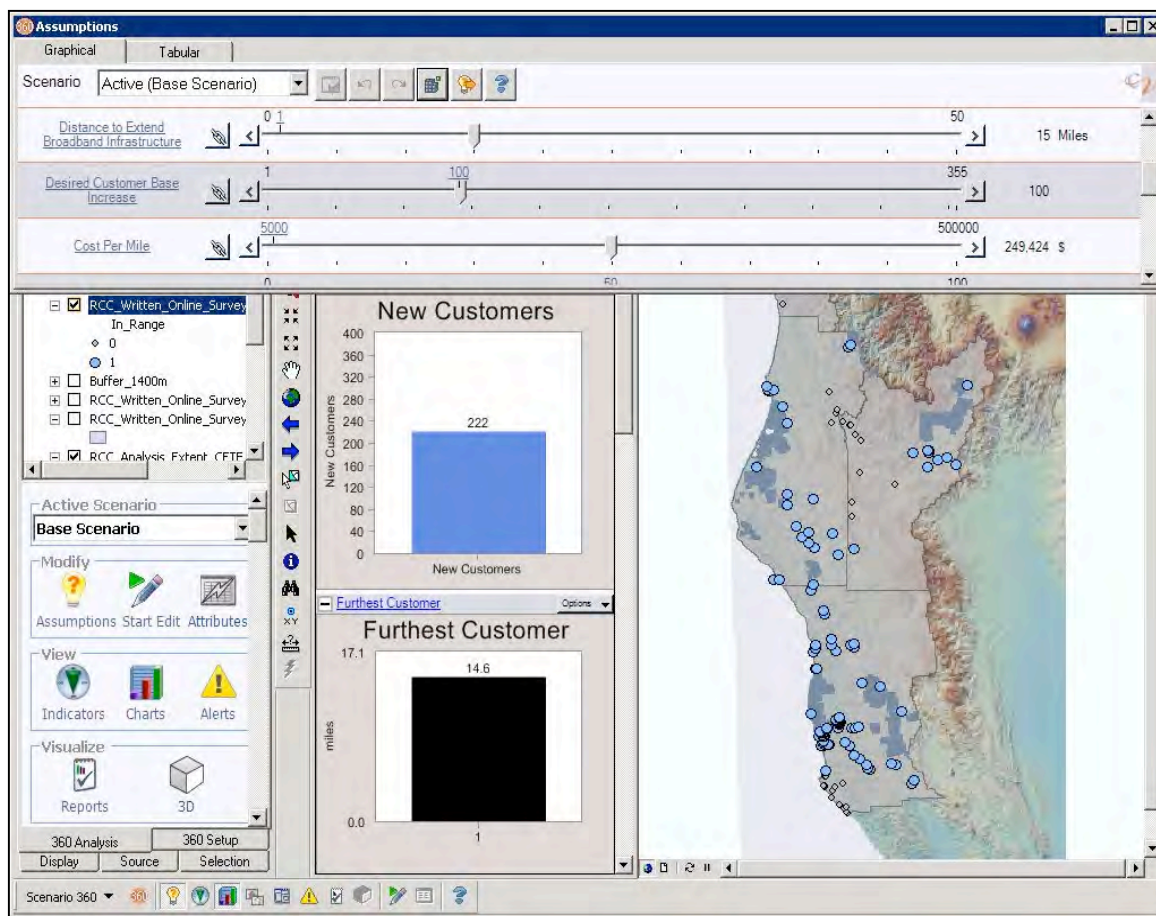
- A map series, in the form of portable document files (PDF) for use in PowerPoint presentations, large format poster printouts, or printed handout sizes available for download at the RCC website.
- An online mapping tool which provides access to geospatial data layers via an ArcGIS Server interactive map. This interactive mapping tool provides users the ability to pan and zoom to regions of interest and to view data themes in desired combinations using information acquired during and developed through this project.

Modeling tools developed through this process include ArcGIS Model-Builder (ESRI) tools as well as an interactive model developed with CommunityViz (Placeways). These models may be useful to others conducting similar analyses by providing a framework for duplicating aspects of our analysis via a defined workflow process and potentially to policy-makers, providers and community members interested in exploring additional “what-if” scenarios relating to broadband demand.



The ArcGIS Server interface developed for the RCC project. This tool makes approximately 100 layers of geospatial information available via a web-based interface.

To facilitate exploration of various scenarios for extending broadband coverage, we developed an interactive modeling tool using the CommunityViz 3.1 software extension for ArcGIS. This tool provides tools allowing a user to set parameters based on distance to extend coverage, number of new customers desired (including capture rates for anticipated subscriptions) as well as specifying cost per mile to extend the infrastructure. These tools allow interactive mapping based on the data and parameter settings. As the user alters values in the system, the ArcGIS map display is updated to show the households that would be captured under a given scenario.



The CommunityViz scenario modeling interface. Slider bars such as those shown at the top of the figure permit a user to alter the values for a variety of parameters. The number of new customers and distance to the furthest new customer are dynamically updated and highlighted on the map and in bar graphs shown in the ArcGIS interface.

Fixed wireless broadband provided locally appears to be one means for extending broadband service more widely. However, rugged topography and vegetation limit the extent any single transmitter can effectively cover. More importantly however, is the backhaul capacity to connect providers to the Internet.

Redwood Coast Connect:

Broadband Providers 8/1/2008	Company	Type of provider	Web Site	Phone Number
Del Norte County	Charter	cable company	www.charter.com	888-438-2427
Humboldt County	101netlink	WISP, microwave	www.101netlink.com	707-923-0400
	Almega	cable company	www.almegaonline.com	877-358-1322
	AT&T	telephone company	www.att.com	800-288-2020
	Cascadia Wireless	WISP	www.cascadiawireless.com	707-441-0600
	Frontier	telephone company	www.frontieronline.com	800-921-8101
	Suddenlink	cable company	www.suddenlink.com	877-443-3127
	Velocity Technology	WISP	www.velotech.net	530-623-3550
	Wave Broadband	cable company	www.wavebroadband.com	707-923-3106
Mendocino County	101NETLINK	WISP, microwave	WWW.101NETLINK.COM	707-923-0400
	AT&T	telephone company	www.att.com	800-288-2020
	Black Mountain Communications	WISP	www.broadbandfortheboonies.com	877-457-3474
	Central Valley Cable	Cable company, WISP	http://cvc.mcnblog.org/	707-884-4111
	Comcast	cable company	www.comcast.com	800-226-2278
	Esplanade	WISP	www.esplanade.us	800-711-3181
	Pacific Internet	WISP	www.ukiahwireless.com	707-468-1005
	WillitsOnline	WISP	www.willitsonline.com	707-459-0824
Trinity County	Com-Pair	WISP	www.com-pair.net	530-357-3200
	DCA CableLink	cable company	http://weaverville.dca.ltbx.com/local/	800-676-2757
	TDS Telecom dba Happy Valley	telephone company	www.tdstelecom.com	866-571-6662
	Velocity Technology	WISP	www.velotech.net	530-623-3550
Cellular data providers	Edge	cellular	www.edgewireless.com	866-350-3343
	Sprint	cellular	www.sprint.com	800-927-2199
	Verizon	cellular	www.verizon.com	800-922-0204
Dial-up and DSL resellers	ASIS Internet	ISP (& wireless reseller)	www.asis.com	707-923-2366
	Humboldt Internet	ISP	www.humboldt1.com	707-825-4638

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	TDS Telecom dba Happy Valley	telephone company	www.tdstelecom.com	866-571-6662
	Velocity Technology	WISP	www.velotech.net	530-623-3550
Cellular data providers	Edge	cellular	www.edgewireless.com	866-350-3343
	Sprint	cellular	www.sprint.com	800-927-2199
	Verizon	cellular	www.verizon.com	800-922-0204
	Mendocino Community Network	ISP	www.mcn.org	707-937-1444
	Pacific Internet	ISP	www.pacific.net	707-468-1005
	Saber	ISP	www.saber.net	707-467-0739
Special providers/ potential providers	Access Humboldt	PEG	http://accesshumboldt.net/site/	

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	Sprint	cellular	www.sprint.com	800-927-2199
	Verizon	cellular	www.verizon.com	800-922-0204
	CENIC	K-20 telecommunications	www.cenic.org	
	Mendocino cell tower project	County govt	www.co.mendocino.ca.us	
	Mendocino Coast TV & Ukiah Valley PEG	PEG	www.mccnet.mcn.org	

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	AT&T	telephone company	www.att.com	800-288-2020
	Cascadia Wireless	WISP	www.cascadiawireless.com	707-441-0600
	Frontier	telephone company	www.frontieronline.com	800-921-8101
	Suddenlink	cable company	www.suddenlink.com	877-443-3127
	Velocity Technology	WISP	www.velotech.net	530-623-3550
	Wave Broadband	cable company	www.wavebroadband.com	707-923-3106
Mendocino County	101NETLINK	WISP, microwave	WWW.101NETLINK.COM	707-923-0400
	AT&T	telephone company	www.att.com	800-288-2020
	Black Mountain Communications	WISP	www.broadbandfortheboonies.com	877-457-3474
	Central Valley Cable	Cable company, WISP	http://cvc.mcnblog.org/	707-884-4111
	Comcast	cable company	www.comcast.com	800-226-2278
	Esplanade	WISP	www.esplanade.us	800-711-3181
	Pacific Internet	WISP	www.ukiahwireless.com	707-468-1005
	WillitsOnline	WISP	www.willitsonline.com	707-459-0824
Trinity County	Com-Pair	WISP	www.com-pair.net	530-357-3200
	DCA CableLink	cable company	http://weaverville.dca.ltbx.com/local/	800-676-2757
	TDS Telecom dba Happy Valley	telephone company	www.tdstelecom.com	866-571-6662
	Velocity Technology	WISP	www.velotech.net	530-623-3550
Cellular data providers	Edge	cellular	www.edgewireless.com	866-350-3343
	Sprint	cellular	www.sprint.com	800-927-2199
	Verizon	cellular	www.verizon.com	800-922-0204
	Trinity County cell tower project	County govt	www.trinitycounty.org	

Redwood Coast Connect Project

Project Focus

The project's goal is broadband demand aggregation for our four-county rural region including the counties of Del Norte, Humboldt, Mendocino, Trinity. The intent is to begin to understand and build a robust broadband market by increasing

the supply of services (especially to underserved areas and constituencies) while, at the same time, growing business and home consumer demand in the region. In addition, the project will investigate local, regional and statewide policies that create a favorable environment for building new broadband services and fostering their use. The project is being managed by Humboldt State University under a grant provided by the California Emerging Technology Fund and the Humboldt Area Foundation. The project is scheduled for completion in June, 2008.

Communication Provider Participation is Needed

We are inviting all interested communications providers to take an active role in this project. It is important that we understand how this effort can benefit your organization -- we are looking for ways for you to leverage this activity to drive both broadband supply and demand. The aim is to create a win-win-win environment for you, for the region and for consumers. Opportunities for participation include:

- Input to community surveys – collect survey data of interest to providers
- Input to mapping process – map data of interest to providers
- Collaboration on alternative broadband scenarios for underserved communities
- Input to policies and ordinances for create a favorable environment for new builds
- Opportunity to participate in community meetings
- Definition of marketing data of value to providers
- Web links through the Redwood Coast Connect website
- Other suggestions are welcome

Quick Project Facts

A. Stakeholder Groups

- Government (public safety, libraries, education, fed, state, local, tribal, special districts)
- Business sectors (health, timber, mfg, IT, arts, tourism, ag, fisheries, dairy)
- Seniors, disabled, low-income, minorities
- Communication providers

B. Key Elements

- Understanding and Building Supply (current infrastructure and future plans)
- GIS mapping (population/demographics, broadband availability, cell towers, etc)
- Development of alternative scenarios and community evaluation process
- Drive Demand (new adoption and usage)
- Region-wide community meetings (8) to gather data and spur demand
- Surveys – snail mail, e-mail, telephone
- Create Policy (develop planning, ordinances to increase both supply and demand)
- Review of current policies and ordinances, with recommendations for commonality

For More Information

Contact Tina Nerat at tina@neratech.net or by phone at 707-268-0777 or visit the project website at <http://redwoodcoastconnect.humboldt.edu>

Appendix XI. Demand Aggregation and Anchor Tenants

I. Background

The “anchor tenant” (or “main customer”) concept comes into play when talking about demand aggregation. Rural communities may not have the traditional anchor tenant, a large business. Government agencies and schools are in rural communities but their telecom providers or private network buying practices may be dictated at the state or national level, which prevents their participation as anchor tenants. This section is intended to address anchor tenancy on the Redwood Coast.

Recent work has been done on anchor tenancy with regard to backhaul and redundancy needs in Humboldt County. These needs are applicable to the other three counties in terms of needs, as pointed out from the last mile and middle mile issues uncovered in this Redwood Coast Connect (RCC) project. The RCC project has reinforced findings in previous studies.

In 2006 the County of Humboldt commissioned *An Alternate Middle Mile Fiber Feasibility Study* report. Then in 2007, the Redwood Technology Consortium funded taking the feasibility study to the next step – defining the customer base and next steps. The 2006 report is online at: www.firstmile.us/pubs/MiddleMileStudy.pdf.

Organizations Interviewed in the 2006 Middle Mile Project

Government

- Assemblymember Patty Berg’s Office: Connie Stewart
- California State Parks: Ilijana Asara, Liz Burko, Phil Esry, Alan Friedman, Chris Ortiz
- City of Arcata: Dan Hauser, Paul Pitino
- City of Blue Lake: Wiley Buck
- City of Eureka: Dave Tyson
- City of Ferndale: Michael Powers
- City of Fortuna: Duane Rigge
- City of Rio Dell: Jay Parrish
- County of Humboldt: Kim Kerr, Dan Larkin (OES), Loretta Nickolas, John Woolley
- Humboldt County Office of Economic Development: Jacqueline Debets
- National Weather Service: Nancy Dean, Dave Ridella
- Redwood Region Economic Development Commission (RREDC): Gregg Foster & Board
- State of California Business, Transportation & Housing: Jeff Newman
- US Coast Guard: Chief Fletcher, Commander Christopherson, Lt. Steward

Health care

- North Coast Clinics Network: Heather Bonser-Bishop
- Open Door Clinics: Hermann Spetzler
- St. Joseph Health System: Larry Raizen

Business

- Eureka Chamber of Commerce: Chris Crawford
- Humboldt Area Foundation: Kathy Moxon
- Humboldt Artworks: Angie Schwab
- Humboldt Creamery: Lisa Carnahan, Rich Ghilarducci
- Humboldt Merchant Services: Ann Condon
- Independent: John Hauser
- Redwood Technology Consortium (RTC): Bob Morse, Tina Nerat
- Security National Service Corporation: Mark Hodgson
- Small Business Development Center (SBDC): Kristin Johnson

Tribes

- Hoopa Tribe
- Yurok Tribe

Telecom

- AT&T (formerly SBC): Rhunette Alums, Gary Mandella
- Cox/Cebridge (now Suddenlink): Mark Geiger
- Edge Wireless (now AT&T): Roy Willy
- Frontier: Donna Dilts
- Last Mile Digital (now 101Netlink): Andy Johannesen
- Level 3: Erik Huntsinger
- Sprint: Phil Butler, Steve Easley
- Verizon: Kurt Rasmussen, John Dokken, Hogart, Richard Smallwood, Richard Uknea, Clair Griffin
- US Cellular: Bernie Gribbon

Education

- College of the Redwoods: John McBrearty
- Corporation for Education Network Initiatives in California (CENIC): Jim Dolgonas
- Humboldt County Office of Education: Garry Eagles, Jon Sapper
- Humboldt State University: Ann Burroughs, Brad Finney, Denice Helwig, David Mashall, Rollin Richmond, Rick Vrem

Pertinent excerpts regarding anchor tenancy from the 2006 Middle Mile report are as follows:

“In the proposed middle mile structure, the anchor tenants are comprised of communication companies and companies that need large amounts of network resources for internal management purposes. Communications companies are also commonly called *carriers* in the industry. They buy conditioned circuits or dark fiber or something in between, depending on their requirements. They will generally interconnect via the AT&T or Level 3 intersecting fibers to traverse additional networks to their chosen point of termination. The list of carriers in the area who are likely users includes: AT&T, CENIC, Frontier Communications, Level 3, PG&E, Sudden Link and Verizon.

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We have broken out the vertical markets (markets that are oriented to one particular specialty) in Humboldt County into six different areas. These areas were determined after interviews as well as researching general Humboldt business data. In particular, we noted segments that seem to have a great need to communicate outside the Humboldt area. The vertical markets and their core buyers include:

Generally, federal, state and local government offices are mandated or eligible to purchase communications services via a large contract. For example, the state government *must* buy communications services via the CALNET contract. Municipalities and schools are not mandated to purchase via this same contract but are eligible for its reduced pricing. This means that many of the inbound and outbound circuits in Humboldt County are using AT&T services, the awardee of the current CALNET contract with the State of California.

Industry may have different buying patterns, but in many cases, will have a preferred provider for out-of-county services generally chosen through a competitive bidding process. Until recently, these included Sprint, MCI and AT&T. With the recent merger of AT&T with SBC and MCI with Verizon, buying will be consolidated.

There is another consideration for buyers of broadband services. A number of groups in Humboldt County are eligible for special funds that subsidize a portion of their connectivity. Healthcare, education and library groups are eligible for both federal and state subsidy programs through the Universal Service Fund and the California Teleconnect Fund. Their communications provider is responsible for filing for the subsidies and rebating these users and must be certified by the Federal and State government.

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The 2007 Middle Mile project further researched the interest on the part of the proposed telecommunications anchor tenants listed in the 2006 report. The 2007 report listed the primary potential anchor tenants as the telecommunications companies, those who needed large amounts of bandwidth:

1. AT&T
2. CENIC
3. Frontier
4. PG&E
5. Suddenlink
6. Verizon

Cellular companies and WISPs are also possible anchor tenants, but at the time in 2006, they did not have the high bandwidth needs of the companies listed above. Given the explosion of wireless in the past 2 years, cellulators and WISPs are likely to be more interested in the future.

II. Business

Businesses on the Redwood Coast are on a much smaller scale than those businesses in urban areas, especially in those very rural areas unserved by broadband.

The following is from the *NORTHERN CALIFORNIA REGIONAL COMPETITIVENESS NETWORK (NCRN) INDUSTRY CLUSTER AND SMALL BUSINESS WORKING PAPER*:

“This study represents an analysis of small businesses by industry in the designated 16-county region from 1996 to 2005. Research conducted by the [Office of Advocacy of the Small Business Administration](#) shows that small businesses create most of the nation’s net new jobs and bring dynamic ideas, innovative services, and new products to the marketplace. The Office of Advocacy recognizes that viable small businesses are the core of sustainable rural communities. Local firms serving rural communities often have more difficulty accessing needed technology, transportation, and services, making it harder to compete in the marketplace.

Small businesses with 1 to 5 employees account for approximately 60 percent of establishments and 10 percent of employment within the 16-county region. The number of establishments increased in six industries and declined in six industries during the period. More than 31 percent of the 11,624 small businesses in the region reported one employee and 56 percent of establishments reported one to two employees. More than half of the small business industry sectors have a higher employment concentration than the State.”

Relative sizes of businesses with employees by Redwood Coast County

			Employment Development Department
			Labor Market Information Division
Table 3A: Third Quarter Payroll and Number of Businesses by Size Category			
Classified by County for California			
Third Quarter, 2006			
	Third Quarter		Number of Businesses by Size Category

	Payroll										
Counties	(in thousands)	Total	0-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999	1000+
Del Norte	\$62,235	837	531	126	74	64	26	(2)	(1)	0	0
Humboldt	\$378,424	5,218	3,300	805	560	382	110	48	9	4	0
Mendocino	\$248,112	4,114	2,799	545	381	261	83	38	(2)	(1)	0
Trinity	\$22,852	457	323	78	29	16	7	(2)	(1)	0	0

(1) Data are confidential if there are fewer than 3 businesses in a category or one employer makes up 80 percent or more of the employment in a category.

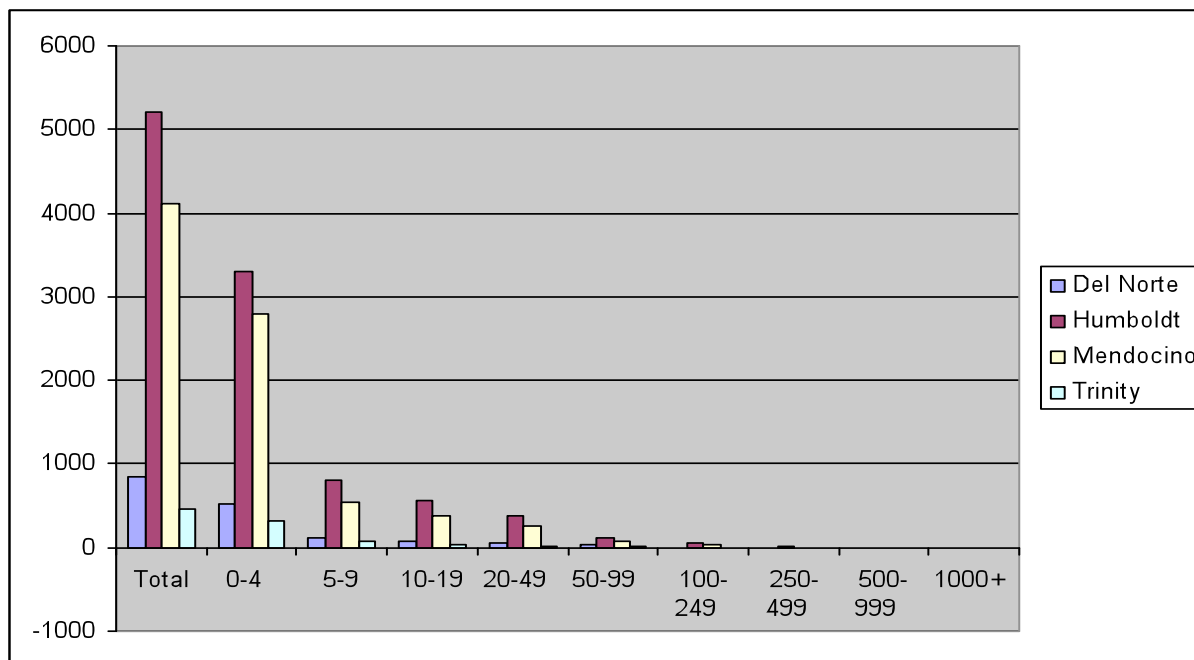
(2) Data are suppressed because confidential data could be extrapolated if these totals were included.

(3) Businesses are designated as "Unknown/Statewide" when there is insufficient information to classify them into a county.

Definitions of Terms and Source Notes: www.calmis.ca.gov/file/indsize/0appsize.htm

Sole proprietorships with no employees are not included in EDD statistics and are difficult to quantify. These are often home-based businesses where the only potential tracking is by business license, if the jurisdiction requires it and the owner applies for the license.

Number of businesses by size (employees), third quarter 2006 from EDD



III. Government

County, state and federal government agencies were contacted during the Middle Mile project as well as during the *Orick Wireless Broadband Business Plan* project. In addition, there were invitations to the RCC Community Meetings. Small rural communities rarely have any businesses larger than microenterprise size, but they may have government offices in communities not served by broadband. Agency purchasing is generally with pre-negotiated contracts at very good prices, which takes them out of the mix for aggregating demand, in some cases taking out the sole potential anchor tenant in a small community.

For example, the National Park Service was contacted in Orick in 2006 as a potential anchor tenant for aggregation in the Orick Wireless Business Plan project since there is no backhaul available there, and it would be extremely expensive to build microwave or fiber backhaul. While the NPS wants to help the community out, since 9/11 security has been tightened and they were mandated to become part of a single domain model for the NPS and their Internet access is now via a dedicated line to Denver.

Many city, county, and state government agencies purchase off the state CALNET contract, which can give them huge discounts (30-80%, depending upon service).

From http://www.documents.dgs.ca.gov/osp/sam/mmemos/MM04_08.pdf:

POLICY

All non-exempt state agencies are required to utilize the CALNET MSAs to obtain mandatory telecommunications and network services.

Exempt state agencies and departments are encouraged, but are not required, to use the CALNET MSAs to purchase mandatory services.

The designation of mandatory and non-mandatory services is at the sole discretion and approval of the DTS. These services are identified at www.calnet.ca.gov.

According to State Parks CIO Alan Friedman, where local telecom services are less expensive than the CALNET rates, they can make a case to purchase locally. According to Michael Liang of the State Department of Business, Transportation, and Housing, CALNET contract is the first choice, but where lower pricing options are available, they may be used.

Emergency services were contacted as part of the Middle Mile project. At that time, they had their own network and were not ready to look at broadband. Mendocino County is planning a new network for emergency services, so conversations are beginning regarding use of towers for broadband. A recent study completed in Del Norte County (2008) indicates that many public safety entities at the local and regional level would be interested in joint planning for broadband resources utilized by public safety entities. Broadband is playing an increased role in public safety communication.

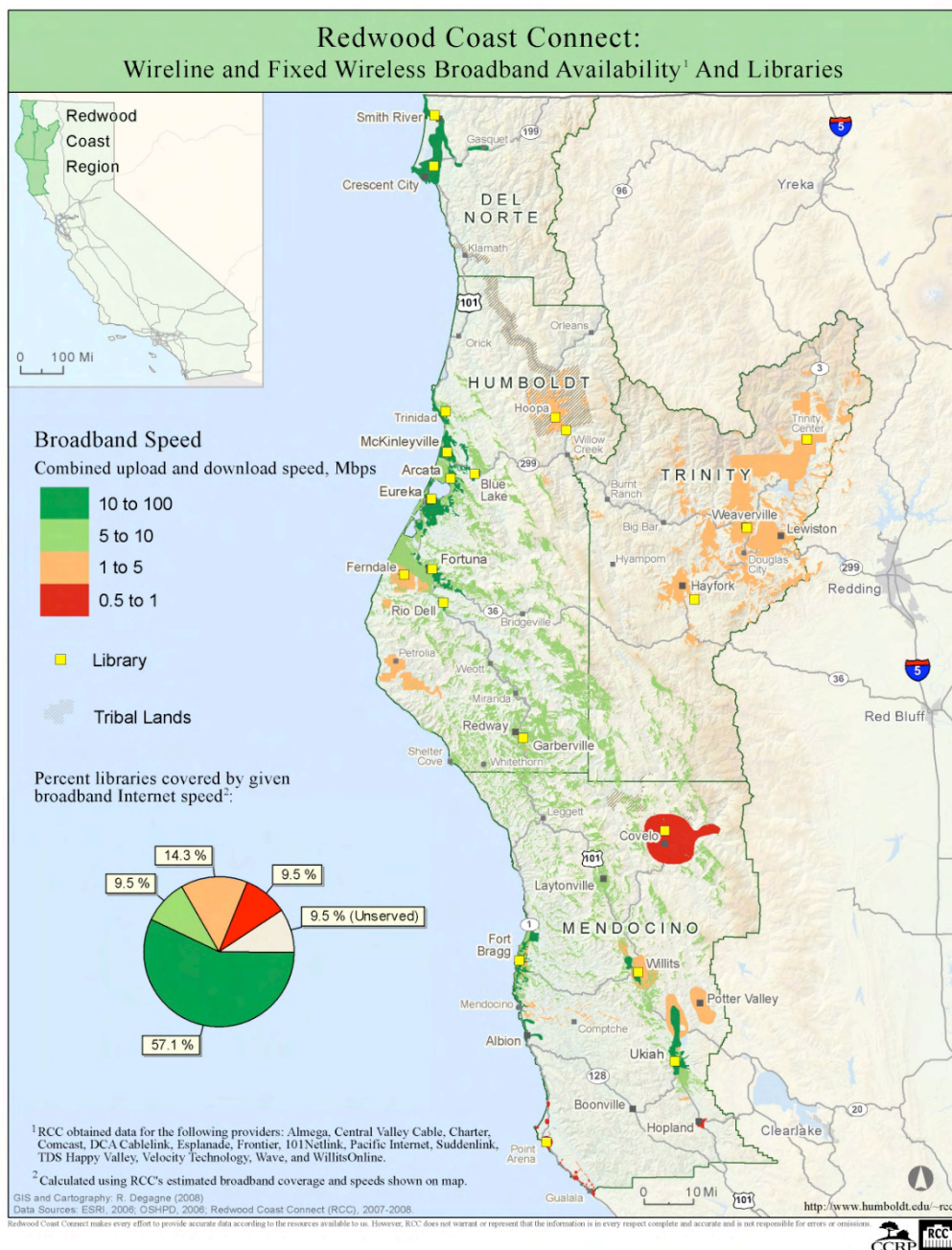
IV. Libraries

All Redwood Coast county libraries have Internet-connected computers available for residents to use. Not all branches have broadband-connected computers available for use. Many of the branches allow reservations for computers and there are time limits imposed when busy. Redwood Coast libraries have limited hours of operations, making the availability of residential broadband all that more important.

None of the library branches are in unserved communities. Some branches have free Wi-Fi available for those who bring laptops, but Wi-Fi availability is not the norm. Wi-Fi availability tends to be a budgetary issue (equipment purchase, installation, ongoing tech support, and monthly fees for Internet access).

Not all libraries use E-rates to fund telecommunications. E-rate funding requires content filtering, which is contrary to the mission of most libraries.

The map below shows the broadband availability at libraries in Redwood Coast counties.



Del Norte library branches are in Crescent City and Smith River. The website contains only basic contact information. A phone call to the Crescent City branch was informative: Wi-Fi is available as well as public computers connected to high speed Internet. The Smith River branch has public computers with high speed Internet but no Wi-Fi at this time.

Humboldt libraries are in Eureka, Arcata, Blue Lake, Ferndale, Fortuna, McKinleyville, Rio Dell, Hoopa, Trinidad and Garberville. The Fortuna and McKinleyville branch libraries rely upon DSL for public Internet service. There are currently seven branch libraries in Humboldt County that still rely upon 56K dial-up for their Internet connectivity. Wi-Fi is available only at the Eureka and Rio Dell branches. From their website:

“All branches of the Humboldt County Library have computers available for public use. Use of the computers is free. Some of the computers in each branch offer Internet access. Users under 18 must have parental permission for Internet use on their library cards, or a parent present. Time limits and sign-up procedures vary by branch. The Internet stations also feature special databases, word processing, spreadsheets, and other software, as well as the library catalog. *Note: All Internet stations have time limits, but some branches also feature non-internet computers that allow you to use the other functions with no time limit.* Computer users may bring their own diskette or flash drive for downloading or saving material. Printing is available at a cost of 10 cents per page.

All public computers can be adjusted for use by people who have visual impairments or prefer larger type. To hear audio from computers in the library, please bring your own headphones or check with the staff to see if headphones are available.”

Mendocino library branches are in Covelo, Fort Bragg, Ukiah and Willits. Wi-Fi is available to the public at all library branches. From their website:

“Other than restriction of children’s access based on parental approval, limitations on the amount of time a person can use workstations will be imposed to make workstations more accessible to all potential users. A limitation of two persons per workstation is required in order to reduce disturbing conversation and to discourage behavioral problems. Exceptions may be made for families and special circumstances to be determined by staff.”

Trinity County libraries are in Hayfork, Trinity Center and Weaverville. They are connected by T1 at Hayfork and Weaverville, but Trinity Center does not have Internet access. They do not have Wi-Fi available, except in the Weaverville branch Board Room. From their website:

“The Library provides public computers for use including several computers obtained through a grant from the Bill and Melinda Gates Foundation. All computers are connected to the Internet and offer a wide variety of programs including educational programs for children, encyclopedias, atlases, Word, Access, Excel, PowerPoint and Publisher. The Library accepts advance reservations for its computers. There is a one-hour time limit on all computers when busy. All public computers are connected to a black and white laser jet printer.”

Licensed Health Care Facilities

Data from OSHPD is mapped below. Hospitals are located in:

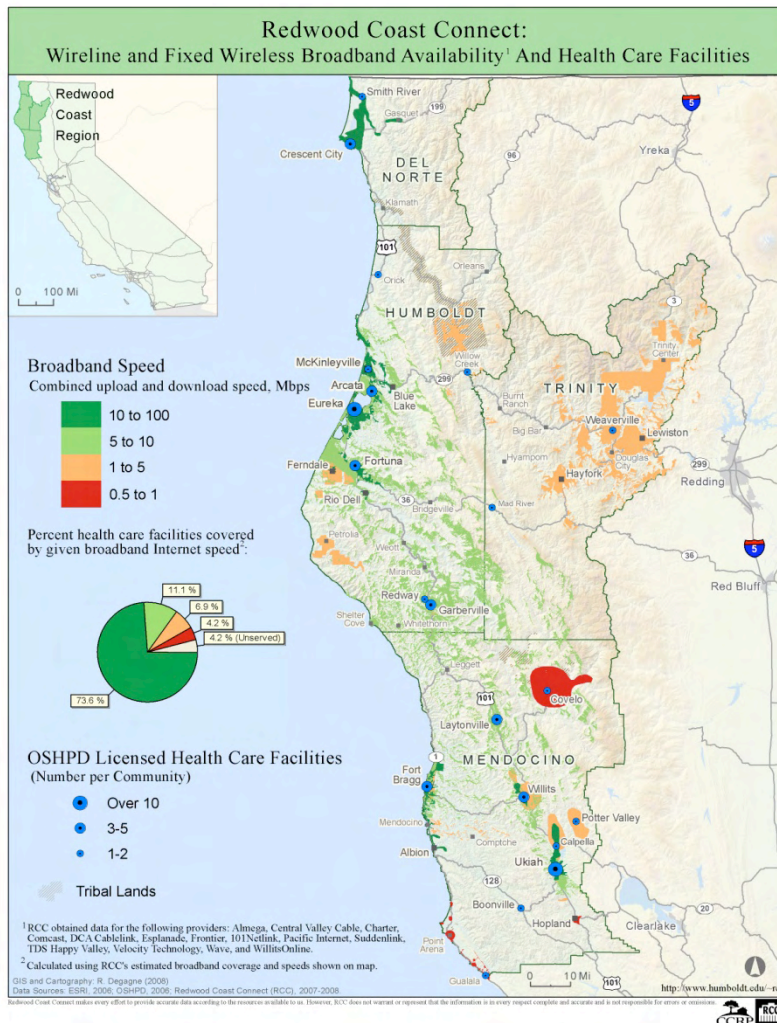
- Del Norte: Crescent City
- Humboldt: Arcata, Eureka, Garberville
- Mendocino: Fort Bragg, Ukiah, Willits
- Trinity: Weaverville

The hospitals are located in areas where broadband is available. Most hospital purchase dedicated lines from providers.

In working through the Humboldt County Middle Mile Fiber Feasibility Project in 2007, the biggest issue the team heard from the hospitals was lack of redundancy and the implications of fiber outages if using radiological services and storage outside the region.

Also contacted during the Middle Mile project, one of the larger clinic networks tech staff indicated that they use E-rates to bring the costs down to where it’s affordable for dedicated T1 lines. There wasn’t interest at that time to aggregate with other tenants regionally due to their low-cost E-rate subsidized lines. Several clinics are located in communities where broadband is not available (Boonville, Mad River, Orick) or where broadband may be of insufficient speed for telemedicine (Covelo).

The map below depicts locations of licensed healthcare facilities:



Education

The key organization in supplying network connectivity to California Educational institutions is CENIC. CENIC, the Corporation for Education Network Initiatives in California, operates a statewide, fiber-based network in order to provide cost-effective, high-bandwidth networking to support educational missions and answer the needs of the institutions' faculty, staff, and students. CENIC designs, implements, and operates CalREN, the California Research and Education Network, a high-bandwidth, high-capacity Internet network specially designed to meet the unique requirements of these communities, and to which the vast majority of the state's K-20 educational institutions are connected.

CENIC coordinates its activities through each of the public segments of education, through the Imperial County Office of Education and its K12 High Speed Network (K12HSN) program funded by the California Department of Education, through the Community College Chancellor's Office, through the California State University's Chancellor's office and through the University of California's Office of the President. CENIC also works directly with many of the private Universities in the State.

CENIC provides Internet access to all public higher education institution through funding provided by the segments' statewide offices referred to above. For K-12, the California Department of Education receives funding for only a portion of the connectivity to K-12 schools. Network and Internet services are provided by CENIC via funding from Imperial County Office of Education (K12HSN) to each County office of Education. And 79% (7,946) of schools, 87% (861) of school districts, are connected to the CENIC CalREN backbone. However, schools and districts pay for their

connectivity to the CENIC CalREN backbone and not all have funds available to do so as revealed by not all being connected.

State Educational Technology Directors Association (SETDA) represents the state directors for educational technology. SETDA recently recommended the following in www.setda.org/web/guest/class2020actionplan:

High-Speed Broadband Requirements

In a technology-rich learning environment for the next 2-3 years, SETDA recommends:

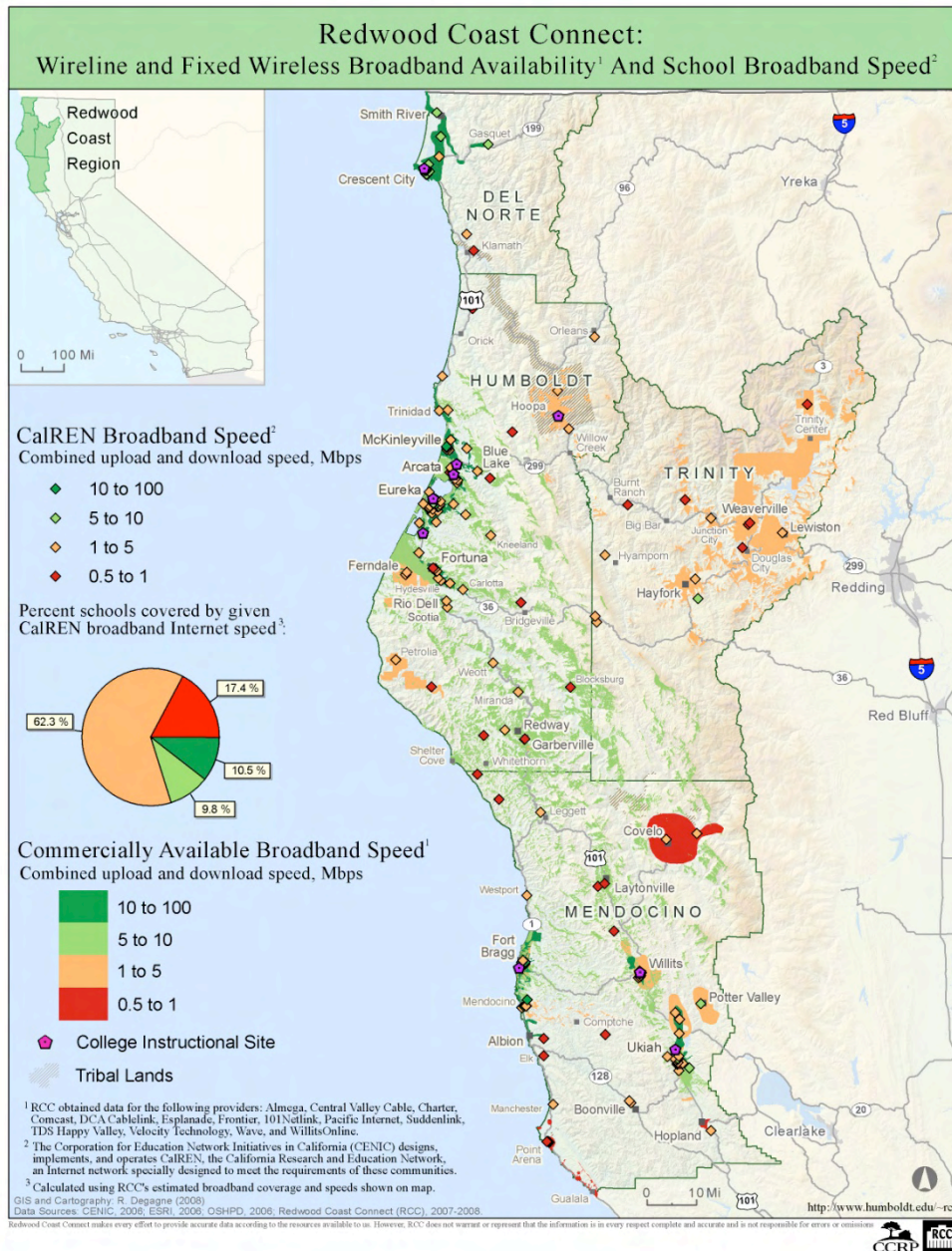
- An external Internet connection to the Internet Service Provider of at least 10 Mbps per 1,000 students/staff
- Internal wide area network connections from the district to each school and between schools of at least 100 Mbps per 1,000 students/staff

In a technology-rich learning environment for the next 5-7 years, SETDA recommends:

- An external Internet connection to the Internet Service Provider of at least 100 Mbps per 1,000 students/staff
- Internal wide area network connections from the district to each school and between schools of at least 1 Gbps per 1,000 students/staff

There are a number of schools located in areas without broadband availability. These schools may or may not have connectivity depending upon bandwidth availability, e-rate eligibility, and cost. However, students do not have broadband available to do homework when they go home. This will only widen the digital divide.

A map of Redwood Coast schools is below.



Redwood Coast school attendance numbers are as follows:

2007-2008 Average Daily Attendance (ADA)

LEA Name	County ADA	County Operated Program ADA	School District ADA	TOTAL ADA
Del Norte COE	293.50	61.43	3,500.93	3,855.86
Humboldt COE	1,075.59	110.54	16,670.24	17,856.37
Mendocino COE	442.93	339.51	11,866.10	12,648.54
Trinity Co. COE	23.19	42.78	1,843.15	1,909.12
Redwood Region TOTAL ADA				36,269.89

Source: www.cde.ca.gov/fg/aa/pa/documents/otherpurpose07p1.xls

CBEDS data shows the number of districts and schools in each county:

County	# Districts	Elem. Schools	Middle/ Jr, High Schools	High Schools	Continuation Schools	Alternative Schools	Comm. Day Schools	Other Schools	Total Schools
Del Norte	2	8	1	1	1	1	0	1	13
Humboldt	33	53	5	8	7	1	1	4	79
Mendocino	13	27	5	11	9	3	3	1	59
Trinity	12	12	0	3	3	0	0	2	20
TOTAL	60	100	11	23	20	5	4	8	171

Schools in each county with dial-up or 56kbps frame relay access are:

- Del Norte – none
- Humboldt –Casterlin, Ettersburg, Maple Creek, Whitethorn
- Mendocino – Whale Gulch
- Trinity – Trinity Center, Coffee Creek (both to be put on DSL soon)

Satellite is used at: Burnt Ranch (Trinity), Green Point (Humboldt), Jack Norton (Humboldt), Zenia (Trinity)

Among the challenges of small schools in these rural areas are: declining enrollment, budgetary challenges, and availability of affordable as well as capable tech support. With increasing reliance upon technology and telecommunications in the classrooms and for the school's business offices, technical resources are taxed. The schools have three choices with the current Redwood Coast infrastructure:

- Connect to their District Office or their COE with dedicated lines. This can be at very high cost, even with E-rates, for a school with a handful of students. Some districts have additional challenges of having schools in more than one phone company territory (Southern Humboldt Unified is an example). Trinity COE cited a cost of \$3000/month for T1 service from Trinity Center to Weaverville (from TDS/Happy Valley to Verizon territory). Even with E-rates, this is very high cost.
- Connect to a local WISP or cable company. If using E-rates, this option requires adding the complexity of content filtering to the school's network. And if the school needs to connect to its district office for student information systems or financial systems, a virtual private network (VPN) must be set up and maintained, adding yet more complexity to their network.
- Use dial-up or have no Internet access.

Anchor Tenancy Conclusions

The majority of the business community is located in well-served larger communities on the Redwood Coast. The unserved smaller communities generally have small microenterprises with broadband needs undistinguishable from residential broadband needs. Most government agencies mandate purchase of dedicated lines to connect to private agency networks.

Current state and federal policy mandating purchase of broadband services works to the disadvantage of rural communities by removing the ability to aggregate demand across ALL potential anchor tenants in rural communities.

In the rural communities of the Redwood Coast, anchor tenants are more geographically-based rather than sector-based. WISPs providing broadband to residential and microenterprise customers and those providers who backhaul WISP traffic may be the predominant anchor tenants in remote rural regions. See the Infrastructure section for the status of backhaul infrastructure on the Redwood Coast.

Appendix XII. Humboldt County General Plan Telecom Element

Chapter 7.1 Telecommunications

7.1.1 Introduction

Purpose

The purpose of this chapter is to present telecommunications policies and programs to meet the needs of Humboldt County in the 21st century. Telecommunications infrastructure and services include basic telephone, wireless telephone, and broadband Internet. These services are critical to businesses for economic prosperity, and to residents of the county to provide improved quality of life, education, research, electronic communications, and access to health care and government services. Telecommunications issues have been an important consideration in other sections of the plan and are reflected in the Community Infrastructure and Services, Economic Development and Circulation Elements. This chapter provides goals, policies, standards and implementation measures that strive to achieve ubiquitous telecommunications access, reliability, and capacity in Humboldt County.

7.1.2 Background

Understanding Telecommunications

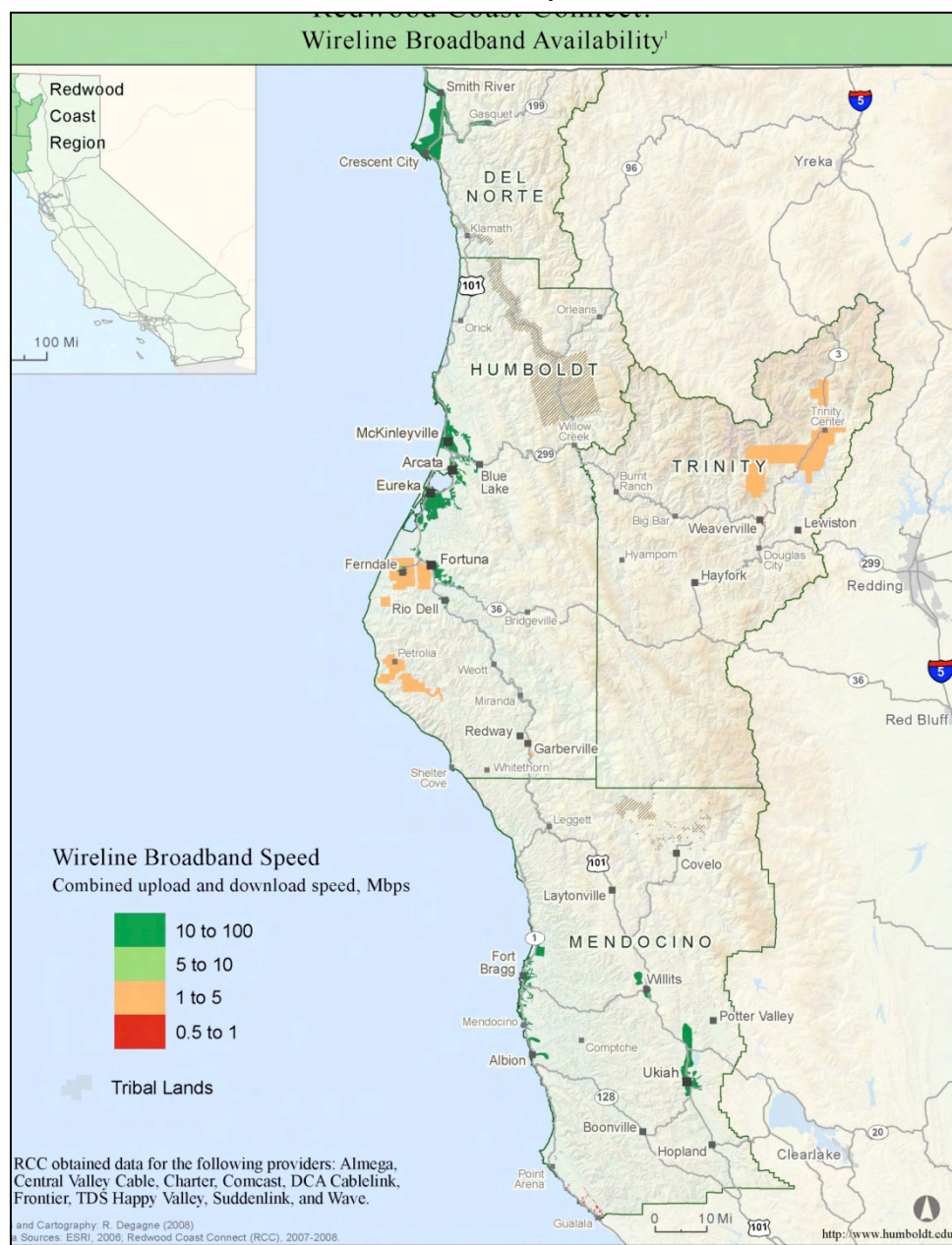
Telecommunications infrastructure and services, including basic telephone service, wireless telephone, and broadband Internet, are now essential to everyday activities for both businesses and residents. As a rural area with a dispersed population base, Humboldt County lags in access to reliable telecommunications services compared to urban areas such as the San Francisco Bay Area. In fact, several communities on the Yurok Reservation, including the Jack Norton Elementary School, are still without basic telephone service.

Humboldt County has a long history of telecommunications awareness and advocacy, starting with the formation of the Redwood Technology Consortium in 1997. Local groups worked closely with Assembly Member Virginia Strom-Martin to establish the Rural Telecommunications Infrastructure Grant Program in 2001, the first of its kind in the nation, which provides grants for construction of telecommunications infrastructure to low-income, rural communities currently without telephone service. In 2002, NERATECH prepared an in-depth analysis of Humboldt's telecommunications infrastructure and services. NERATECH, under contract to Humboldt County in 2004, prepared a supply and demand analysis called Living in a Networked World. 2006 saw development of a wireless broadband business plan for Orick. In 2007, the counties of Del Norte, Humboldt, Mendocino, and Trinity began a broadband demand aggregation study, Redwood Coast Connect.

Broadband Communications Benefits and Availability

High-speed Internet access, or broadband, is a fundamental aspect of the infrastructure required to educate our youth, create jobs, promote public safety, improve our standard of living, and to deliver essential services like health care. According to the California Public Utilities Commission, reasonable broadband service in 2008 is 1 mb upload/ 3 mb download (about 20 to 60 times the capacity of a telephone connection). Only one provider in the County is providing that level of service. While some Humboldt County residents have access to broadband, many residents and businesses are underserved in terms of provider choice or speeds. Humboldt County is seriously lagging behind the rest of the state in the quality and availability of broadband.

Wireline and Fixed Wireless Broadband Availability



The above map shows the geographic availability of broadband telecommunications in Humboldt County. These figures show that broadband services are widely available in the greater Humboldt Bay Area. For many other areas of the County, broadband service is not available. Unserved areas include: Briceland, Bridgeville, Crannell, Ft Seward, Holmes, Korbel, Myers Flat, Orick, Orleans, Phillipsville, Redcrest, Richardson Grove, Weott, and the Yurok Reservation communities of Wautee/Johnsons, and Pecwan (which do not have basic telephone service). Underserved areas, which are defined as having a combination of one or more of the following: slow speeds, less than three providers, backhaul issues (availability and/or cost), no wireline coverage, small provider coverage area, include: Bayside, Carlotta, Fieldbrook, Honeydew, Hoopa, Hydesville, Kneeland, Petrolia, Weitchpec, and Willow Creek.

Ubiquitous broadband service availability will help the County accomplish many of its economic development objectives. Broadband will help strengthen and retain existing businesses and organizations. Broadband availability is also essential to create and recruit new jobs within identified targeted industry clusters who need reasonably priced

advanced telecommunications services in order to compete from a rural location in a world economy. New residential and commercial development projects should include the infrastructure components necessary to support modern communication technologies such as conduit space within joint utility trenches for future high speed data equipment and flexibility in conduit placement to allow for easy retrofit for high speed data systems.

Medical services in Humboldt County are limited by our remote location. Telemedicine, which is the use of communication technology to provide and support health care when distance separates the participants, could help improve healthcare in Humboldt County. Telemedicine can allow specialist to augment their practices by providing services to smaller surrounding communities. Also, telemedicine can allow resident's access to specialists without the burden of traveling hundreds of miles to other more populated areas of the state. With the help of telemedicine, Humboldt County residents can have equal access to the best specialists in the medical profession.

Expanding broadband and wireless services to smaller and remote communities will have several additional benefits. Improved telecommunications infrastructure will support public safety and emergency services by improving communications and access to information. Economic development objectives such as improved tourism, industry diversification, job creation, and promoting local businesses will benefit from a stronger on-line presence. Additionally, broadband technology will enable online education opportunities, telecommuting, and reduce the need for other vehicle trips.

Broadband Telecommunications Planning

Redwood Coast Connect Project

In 2007, the counties of Del Norte, Humboldt, Mendocino, and Trinity began a broadband demand aggregation study. The intent was to begin to understand and build a robust broadband market by increasing the supply of services (especially to underserved areas and constituencies) while, at the same time, growing business and home consumer demand in the region. In addition, the project investigated local, regional and statewide policies that create a favorable environment for building new broadband services and fostering their use. The project was managed by Humboldt State University under a grant provided by the California Emerging Technology Fund, the Humboldt Area Foundation and the McLean Foundation.

California Broadband Task Force

In 2007, Governor Arnold Schwarzenegger created California Broadband Task Force (CBTF) composed of industry leaders, public officials, and community representatives. Humboldt County was also was fortunate enough to have two Task Force members including Humboldt State University President Rolling Richmond and Humboldt Area Foundation Executive Director Peter Pennekamp. In its final report to the Governor, the Task Force made five determinations: 1) 96% of California residences have access to broadband; 2) 1.4 million mostly rural Californians lack broadband access at any speed; 3) barely more than half of Californians have adopted broadband at home; 4) only half of Californians have access to broadband at speeds greater than 10 Mbps (including upstream and downstream speeds); and 5) broadband infrastructure is deployed unevenly throughout the state, from state-of-the-art to nonexistent.

The CBTF set three statewide goals:

- California must ensure ubiquitous and affordable broadband infrastructure, made available through a variety of technologies to all Californians.
- California must drive the creation and use of applications that produce the greatest economic, educational, and social benefits for California's economy and communities.
- California must construct next-generation broadband infrastructure, positioning California as the global economic leader in a knowledge-based economy.

The Legislature is currently considering a measure that would allow Community Service District's to construct, own, improve, maintain, and operate broadband facilities and provide broadband services, if a private person or entity is unable or unwilling to deploy broadband service. If the measure becomes law, many of Humboldt County's unserved smaller communities could benefit.

7.1.3 Goals and Policies

Telecommunications Goals

T-G1 Ubiquitous Availability

A regional economy and quality of life strengthened by maximizing the use of telecommunications technology by ensuring availability to every resident, business and institution in Humboldt County.

T-G2 Broadband Reliability

A reliable broadband Internet infrastructure that distributes a choice of economically accessible broadband services into our most rural communities, and is not vulnerable to disruption, with broadband service capability integrated into new buildings and developments and broadband access in remote or rural communities and available to low-income and disadvantaged residents.

Telecommunications Policies

T-P1 Development of Telecommunications Infrastructure and Services.

Encourage development of telecommunications infrastructure and services to facilitate the use of the best available technology for business, households, and government. (IS-P61)

T-P2 Service Continuity

Encourage continuity of service by broadband telecommunications providers and to protect the network from becoming obsolete over time.

T-P3 Telecommunications Facility Siting

Establish and utilize wireless and wireline telecommunications siting standards, in coordination with other jurisdictions, to identify areas where future commercial or public telecommunications facilities can be located, while minimizing potential impacts, and establish telecommunications performance standards. (IS-P62)

T-P4 e-Government Infrastructure

Continue to expand the County's website and telecommunications capabilities and as a source of public information, including the use of geographic information system resources, and as an aid in the delivery of public services.

T-P5 Telecommunications Facilities Within County Rights of Way

Encourage telecommunications service providers to size underground and overhead facilities to accommodate future expansion, changes in technology, and where possible the facilities of other telecommunications providers.

T-P6 Telecommuting

Encourage telecommuting and home-based businesses that use the Internet, to the extent that such activity does not change the residential character of neighborhoods.

T-P7 Broadband Internet

Promote the provision of broadband infrastructure in all communities. (ED-P3)

T-P8 Broadband Internet

Support the development and management of an alternative fiber optic line that connects to the fiber backbone running along the U.S. 5 corridor. The County shall support the expansion and delivery of broadband Internet in the rural or remote communities in the county through all appropriate technologies. (ED-P13)

T-P9 Workforce Development

Continue to work with local businesses to identify special telecommunications needs, and to ensure that there are a variety of service providers available to address those needs.

T-P10 Subdivision improvement requirements

New residential and commercial development projects should include the infrastructure components necessary to support modern communication technologies such as conduit space within joint utility trenches for future high speed data equipment and flexible telephone conduit to allow for easy retrofit for high speed data systems.

T-P11 Joint Telecom Planning

Work with local governments, utilities, schools, medical service providers, and neighboring counties integrate telecommunication infrastructure planning on a regional basis.

T-P12 E-911

Ensure that the County's radio, telecommunications, and Internet services are capable of providing timely emergency information and facilitating rapid and reliable emergency response.

T-P12 Cable Franchise Ordinance

Ensure that the County's cable franchise ordinance is kept up-to-date to deal with the changing nature of federal and state law, as well as the changing nature of telecommunications technology so that the best possible services are available to residents.

T-P13 Wireless “Hot Spots”

Encourage the installation of public-use wireless broadband antennas at every county building.

T-P14 Trip Reduction

Encourage telecommunications infrastructure improvements as a means to reduce transportation impacts and improve air quality.

T-P14 Public Broadband Telecommunications Service Providers

Support the provision of broadband telecommunications services by public agencies.

T-P15 Technology Awareness

Encourage awareness of broadband telecommunications technology by businesses and residents.

7.1.4 Standards

Standards

T-IM5 Telecommunications Siting Standard

Siting of new telecommunications facilities shall comply with standards contained in a Telecommunications Facilities Ordinance that incorporate the following:

Site Sharing

When feasible, telecommunications facilities shall be located adjacent to, on or incorporated into existing or proposed buildings, towers or other structures. The County should identify areas where telecommunications providers can jointly locate equipment and require providers to allow affordable co-location.

Public Health and Safety

Placement and operation of telecommunications facilities and other technological infrastructure shall be such that the public health and safety is not compromised

Minimize Tower Height and Size

Site facilities at the lowest possible point along ridge lines.

Minimize the size and extent of appurtenant facilities – such antennas, dishes, and equipment buildings, while still providing room for growth and co-location of future providers.

Require, as part of a special use permit, that the top-most position of a monopole or tower be occupied with antennas to ensure that the ultimate structure height is justified.

Scenic and Cultural Resources

Placement and operation of telecommunications facilities shall be such that cultural and scenic resources are protected.

Landscaping

Landscape appropriately around the perimeter of the facility.

Mask Structures

Use “stealth” technology solutions for masking views of antennas. Use muted earth-tone colors or colors that match the background setting.

Expansion of Existing Facilities

Allow for expansions of existing telecommunications facilities to the extent that the expansion is adequately justified through radio frequency propagation (wireless service coverage area) maps and other means, and to the extent that the expansion does not unduly impact nearby residential and historically significant areas.

Removal of Un-used Facilities

Require the timely removal of telecommunications towers and equipment when they are no longer needed as a condition of approval.

Shared Facility Requirement

Where appropriate, require commitments for sharing of new monopole or tower sites as a condition of approval.

7.1.5 Implementation Measures (Preferred Plan Alternative B)

Telecommunications Implementation Measures

T-IM1 Telecommunications Facilities Ordinance

Prepare a Telecommunications Facilities Ordinance that ensures compatibility of telecommunications facilities with nearby land uses; is proactive in the design and siting of wireless telecommunications facilities, provides incentives for unobtrusive and compatible wireless antennas and establish clear standards for such facilities. (IS-IM32)

T-IM2 Broadband Deployment

Revise subdivision regulations to require the provision, where feasible, of infrastructure for broadband Internet. (ED-IM3)

T-IM3 Improvement Specifications within Road Rights-of-Way

Review the Standard Improvement Specifications for Public Improvements to determine if a location for the placement of conduit for telecommunications use can be designated and to develop safe zones for installing new telecommunications infrastructure.

T-IM4 Telecommunications Infrastructure Inventory

Create and maintain an inventory of telecommunications infrastructure located within and outside public rights-of-way and all existing and proposed telecommunications facilities and their locations in the County, including all available tall structures – that could be used for telecommunications antennas.

T-IM5 Public Conduit

Work with other local and state jurisdictions to evaluate the feasibility of installing publicly owned telecommunications conduit as part of capital construction projects such as water, wastewater, power, roads, and sidewalks.

T-IM6 Ongoing Telecommunications Planning

Prepare and periodically update a telecommunications improvement program based on existing local, Countywide, and regional telecommunications planning studies that identifies existing conditions, needed improvements, funding programs, and that establishes criteria for prioritizing projects.

Appendix XIII. Community Meeting Illustration



Appendix XIV. Case Studies

I. Mendocino Community Network

The Mendocino Community Network (MCN) is based in Mendocino, California, a small rural community in Northern California, three hours from San Francisco. MCN started in 1994 as the outgrowth of a grant from NASA. NASA installed a 56K dedicated line into the school district for the purpose of exploring the use of the Internet in the classroom. As the end of the grant approached, the district decided to form MCN to leverage the Internet connection by selling access to the community to support the Internet connection to the schools. MCN continued to grow through the late 1990s and into early 2000s building a growing customer base through excellent service and a focus on its local customers. In addition, it added a web hosting and domain service and partnered with Central Valley Cable to provide Internet services for CVC's customers at its plant in Gualala, California. MCN helped CVC implement a wireless internet service for a part of its customer base in 2005.

In November of 2004, AT&T delivered fiber optic cable to MCN's core service area. MCN took advantage of AT&T's Digital Subscriber Line (DSL) wholesale program and began offering DSL service in Northern California. In two years, MCN added close to 1,000 subscribers. Through Sonic.net's DSL sublease program, MCN now offers service throughout most of California. Today MCN's 11 employees continue to develop the business and maintain a high level of service for the company's nearly 4,000 dial-up and DSL customers.

MCN is a unique organization owned by the Mendocino Unified School District. There is very high community approval and loyalty to MCN; it's considered a coastal Mendocino community asset.

II. Del Norte Telecommunications

For several years now, Del Norte County has been active in telecommunications efforts. Under the auspices of the Del Norte Tri Agency Economic Development Authority (TA EDA) and Del Norte Local Transportation Commission (DN LTC), considerable teletransportation/ telecommunications planning work commenced in 2006. These efforts included a comprehensive market profiling, a detailed broadband survey, and mapping of county telecommunication infrastructure.

A parallel effort occurred at the same time in Curry County, Oregon. Taken together these two counties demonstrated the value of aggregating regional demand across geo-political boundaries. Telecommunication strategic plans were adopted by both counties and are now being implemented.

By mid-2007 the aggregated demand and potential for market growth information was used to incentivize accelerated investment in a 5 Gb broadband connection from Bandon, Oregon, to Crescent City. The result is that both counties benefited and now there is up to 10 Mbps cable modem access available as far south into Del Norte as the Crescent City area. Additional other high-end data services are also now available to the region (e.g., virtual private networks (VPNs), voice over Internet protocol (VoIP) and digital subscriber TV).

The planning work continues and now focuses on bringing broadband south of Crescent City and obtaining route redundancy for the region. All relevant reports can be viewed at <http://www.jirwinconsulting.com/>.

This work is important on a couple of levels: 1) It provided an early impetus/model for the four-county approach brought to the attention of the California Emerging Technology Fund (CETF), and 2) The rationale/approach served as the model used to write the initial Redwood Coast Connect (RCC) concept proposal. It also served as the beginning framework for the development of the RCC project plan.

III. Redwood Technology Consortium

The Redwood Technology Consortium (RTC) in Humboldt County is now 10 years old. It is an example of how local leadership and advocacy can make a difference. RTC is a unique organization dedicated to technology education and awareness. The following is its history, in excerpts from a 2007 Times-Standard "Tech Beat" article by Rene Agredano.

"In 1997, computers and the Internet were merely luxurious playthings to the average North Coast resident. Locally, there is one group that can take much of the credit for building awareness of the importance of technology and

connectivity in our community. These champions of tech are the entrepreneurs, educators and public officials who founded and run the Redwood Technology Consortium (RTC), which is celebrating its 10 year anniversary in 2007.

“The RTC began in 1997, when a small group of residents with a common interest in technology sought to connect with others who also believed that something big was under way in the computing community. They started meeting regularly to share ideas and evangelize about technology to the greater community.

“As the group grew, it became apparent that better organizational structure was needed to ensure viability. In 2001, board members helped the RTC become a 501(c)3 non-profit organization, with the purpose of serving as the primary advocacy, outreach, information and technology resource for the North Coast. It wasn’t long before the RTC began gaining recognition within the community at large, and membership began growing to encompass all types of businesses and individuals in the region, not just programmers and telecommuters.

“In 2001, RTC members started writing a weekly “Tech Beat” column in local newspapers. A web site was developed, and yearly Tech Expo showcases continued. RTC volunteers began educating economic development decision makers and community leaders about the vital role that technology would play in Humboldt County’s future – while simultaneously educating them about the region’s many critical telecommunications limitations.

“As more Humboldt-based companies, from banks to print shops, came to rely on the Internet to conduct business, by the year 2000 the region’s only Internet connection to the outside world – a slow and unreliable microwave link – was soon at capacity. High speed Internet access was limited to a few areas of Arcata and Eureka, and local businesses as well as school districts quickly found themselves on the wrong side of the digital divide.

“At this time, the RTC, along with the Redwood Region Economic Development Commission (RREDC), led local advocacy efforts for completion of a 168-mile long fiber optic line to connect Humboldt to Ukiah, but all work on the project stopped when the California Department of Transportation (CalTrans) sought over \$2 million in unprecedented right-of-way fees from the region’s telecommunications provider, SBC (now AT&T). RTC members wrote letters to newspaper editors, there was extensive coverage of the issue in local newspapers, and the Associated Press and San Francisco Chronicle even wrote articles. Local politicians made pleas to the governor. A formal complaint was filed with the California Public Utilities Commission. Finally, in September 2003, SBC agreed to put the demanded fees in escrow until the matter was resolved in court. The fiber optic line was completed, and more broadband capacity was brought to the North Coast.

“RTC has also led the way in developing a work plan for Humboldt County’s Information Technology Industry Cluster. To this day, Humboldt’s IT segment is one of the smallest – but fastest growing – industry clusters when it comes to job creation and wages.

“Their first annual Broadband Forum education and discussion session took place for the first time in 2005, and thanks to the involvement of the Redwood Region Economic Development Commission and the Redwood Coast Rural Action group, two more forums have taken place since.

“RTC infrastructure projects and studies about this are still ongoing. In 2007, as predicted, the four fiber optic outages lived up to the worst case scenario as Humboldt County business and education operations came to a screeching halt after a construction accident, fire, and wind damage severed the region’s connection to the Internet.

“RTC continues to warn that if a second fiber line isn’t implemented, outages will continue, and residents will experience expensive, missed opportunities ranging from routine public safety communications, to vital new telemedicine, education, and transportation needs. Without a second line and expanded broadband coverage, the Middle Mile Fiber Feasibility Report states, Humboldt County residents will continue to be victims of a growing digital divide.

“Even when a second fiber line is finally completed, Humboldt’s technology challenges still aren’t over until broadband is included in local city planning regulations, is available to everyone, affordable and consistently reliable. This cannot happen without more widespread public participation.

“Ten years after its formation, RTC is pleased to have helped everyone, ranging from economic development leaders to mom and pop retail shops, understand that all businesses require technology and telecommunications to support basic

business processes. In a region with extremes of opinion and economic issues, everyone certainly agrees on this conclusion.”

IV. Comptche DSL Request to AT&T

Assemblymember Patty Berg’s office connected Tina Nerat of RCC to Randal MacDonald of Comptche. A few years ago, a Comptche DSL Committee was formed. They canvassed residents with a petition asking SBC (now AT&T) for DSL service. Comptche still does not have DSL or any other type of broadband and is working with RCC to market to providers.

The petition had 150 signatures and read:

“Whereas, the residents of Comptche desire access to high-speed Internet services. Most residents use slow dial-up connections to connect to the Internet. There is no local cable TV service to provide high-speed Internet access; and no cable provider has plans to install cable to serve our community. Comptche is a mountainous rural community in the Northern California redwood forest, so sight lines for satellite high-speed Internet access are limited.

“Therefore, a significant local demand exists for high-speed Internet services via DSL. Furthermore, the residents of Comptche patiently endured months of disrupted travel last year due to SBC’s installation of fiber optic cable in our only local roadway. And, provision of DSL service to Comptche will be recognized by the CPUC as a needed assistance to a rural community in this state. And, the local SBC substation is scheduled for upgrade in the near future, making installation of a DSL switch more economical for SBC.

“We, the undersigned residents of Comptche, hereby provide this evidence of commercial demand and request provision of high-speed access to the Internet via SBC DSL.”

In 2006, Comptche DSL Committee wrote the following letter to AT&T executive Abel Meza requesting service and attaching the signed petitions:

“We are writing to request that SBC/AT&T install DSL service in our town of Comptche., a rural community in Northern California. SBC provides our telephone service, but has not yet provided DSL capability.

“Last year, an SBC contractor laid dozens of miles of fiber optic cable through the Comptche area, causing summer-long traffic disruptions that Comptche residents patiently endured. This new cable allows SBC to offer DSL service to nearby coastal communities. However, even though the fiber runs right through our own local telephone station in Comptche, SBC has not yet installed a DSL switch to serve our community.

“We recognize that DSL technology is expensive for SBC to install and limited in range. However, we believe we can demonstrate a business case for installation of DSL in our community for the following reasons:

1. More than 150 Comptche residents have signed the attached petition to indicate their interest in receiving DSL service. These residents are currently only able to access the Internet through slow methods such as telephone dial-up connectivity.
2. DSL will have very little competition in Comptche because there is no cable TV service installed in our area, and satellite Internet access is limited due to the mountainous local terrain and numerous tall redwood trees.

“There is a market here for DSL service, and we are asking that SBC serve the Comptche market. Please let us know whether and when you plan to provide DSL connectivity in our community.”

This petition was signed by Comptche residents Belinda Pollack and Randal MacDonald with cc: to Senators Barbara Boxer and Dianne Feinstein, then-State Senator Wes Chesbro, State Representative Patty Berg, and CPUC.

V. Humboldt County Telecommunications Efforts

The County of Humboldt and the North Coast Small Business Development Center (SBDC) have a long history of telecommunications awareness and advocacy, starting with the formation of the Redwood Technology Consortium (RTC) in 1997. In 2002, a Rural E-Commerce grant through SBDC funded NERATECH to prepare an analysis of

Humboldt's telecommunications infrastructure and services. This served as a basis to advocate for completion of the SBC (now AT&T) fiber optic line into Eureka.

Following that, in 2004 the County of Humboldt had NERATECH develop a supply and demand analysis called Living in a Networked World. 2006 saw development of a wireless broadband business plan for the town of Orick, a project led by Planwest Partners. In 2005, 2006 and 2007, the Redwood Coast Rural Action (RCRA), Redwood Region Economic Development Commission (RREDC), and RTC partnered to put on Broadband Forums with speakers brought to the North Coast to discuss telecommunications issues with Del Norte, Humboldt, Mendocino, and Trinity residents and elected officials.

In 2007, the counties of Del Norte, Humboldt, Mendocino, and Trinity began a broadband demand aggregation study, Redwood Coast Connect, the result of which is this report. In 2008, Humboldt put together a telecom element for the General Plan Update, the first county in California to do so.

All of this activity over the period of six years has made most residents and businesses very broadband-aware and has given them a non-controversial cause to rally around time and again. Various project documents of interest can be found at: www.redwoodtech.org and www.neratech.net.

VI. Mendocino Coast Broadband Alliance

The Mendocino Coast Broadband Alliance (MCBA) is an excellent example of how the Redwood Coast Connect project partnering with local leadership and advocacy has been a catalyst for change. The following is an outline of the history of the group:

- In late February 2007, a general community meeting was held in Albion, a town just south of Mendocino, about getting high speed Internet. Out of the chaos of need and dissent from folks who do not want wireless technology came the seed of what is now the MCBA.
- Mendocino County resident Shirley Freriks decided it was time to start advocacy activities because the need is great. She invited Rod Lorimer, Steve Drake, Ted Williams and Bob Coppock to also pool their talents and interests to see what is possible.
- This group met frequently to plan a strategy and was introduced through circuitous means to John Irwin, who had planned the Southwestern Oregon hookup and who was planning the new Redwood Coast Connect (RCC) project in Northwest California. John was very helpful to this fledgling team, which had been nicknamed the Albion Upstarts.
- In September 2007, the Albion group was introduced to the RCC team and started to work with them on their project as well as its own ideas for Albion connection.
- In November 2007, RCC came to Fort Bragg to hold a town hall meeting and the Albion team helped gather support.
- Meanwhile, Tina Nerat of RCC took over from John Irwin as Albion's main supporter and advisor. The Albion group was very grateful that she would take the time to meet with them in Albion.
- Tina had been in contact with Jim Moorehead on Little Lake Road and was impressed with the mapping he had done. He was invited to join the team.
- As the RCC project became more visible and its survey started being distributed, it seemed there was a need and a desire for more communities to be included. So, the Albion Upstarts became the Mendocino Coast Broadband Alliance, which includes Mendocino, Caspar and Little River in addition to Albion.
- MCBA's next big project was to gather density statistics. It completed a comprehensive mapping project using the Assessor's Parcel maps, to show the homes in density areas for all of the communities, plus notations as to their status: owner occupied, improvements likely to be homes, potential building areas, and the extent of the Comcast TV cable. This mapping project was done with the intention of attracting providers.
- A survey (paper and online) to get more detail on the economic potential in the area. There were 185 respondents to the MCBA survey.
- MCBA is currently focusing on an education and awareness campaign for the populace as well as businesses, inspiring advocacy in a variety of business sectors, and completing a business plan.

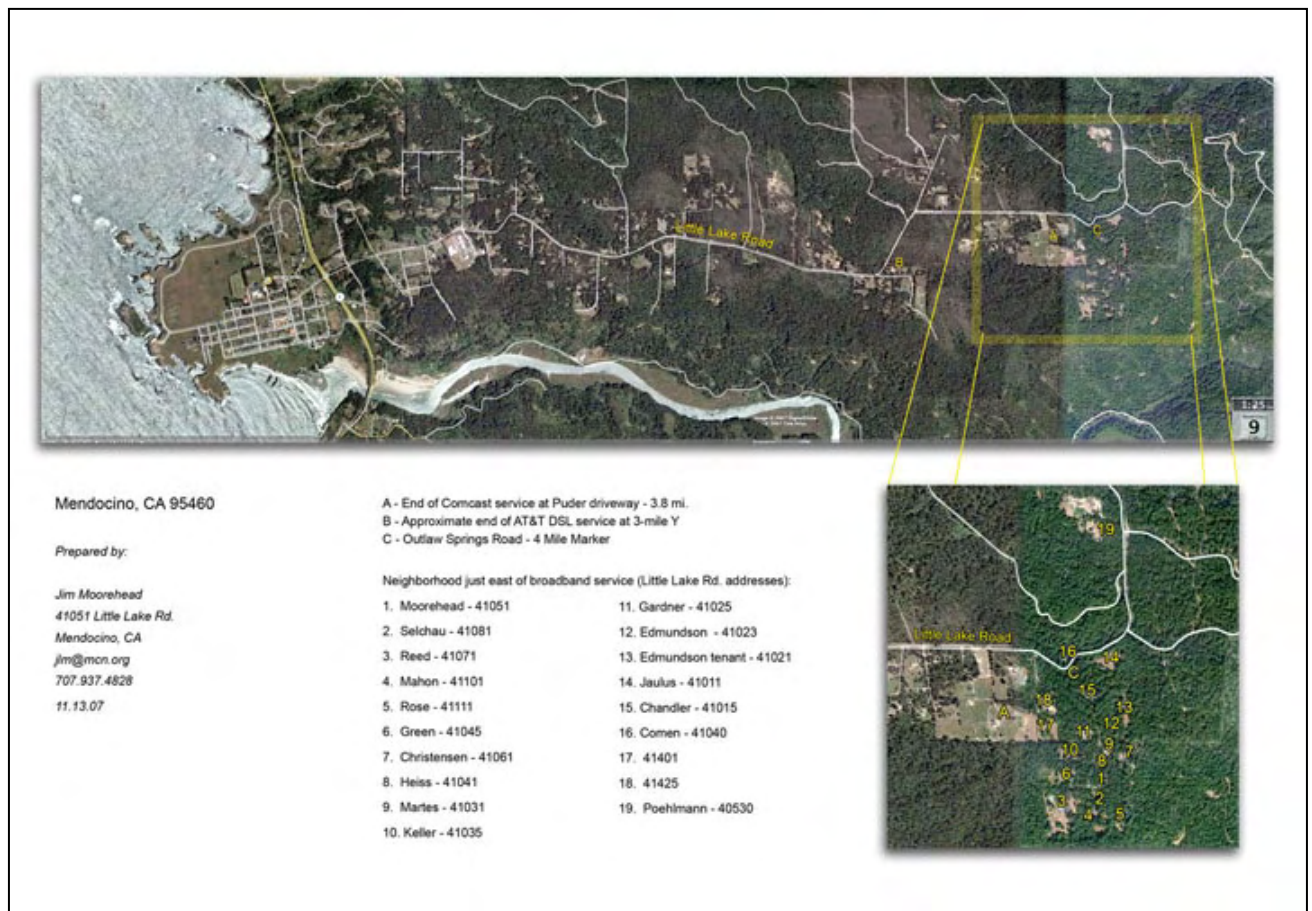
VII. Little Lake Road, East of the Town of Mendocino

In June 2007, Jim Moorehead called in to Jefferson Public Radio when Tina Nerat was talking on air about broadband. His e-mail to her followed:

“Interesting topic on JPR this morning, and I was the first caller ... My interest is to get broadband more widely distributed on the Mendocino Coast. Comcast and AT&T DSL provide a narrow band of service mainly in Fort Bragg and Mendocino village. Homes or businesses outside this narrow service area either accept dial-up or pay for the expensive HughesNet or other satellite provider. ...A recent Santa Rosa Press Democrat article prompted me to write to the FCC I realize that the big guys have their own business case to follow, but it doesn't mean they are complying with the goals of the FCC and helping rural communities connect ... If you have plans to do something regionally (include Mendocino County) I'd be interested in somehow participating in the effort (I'm not a tech person, but I have energy and time to get involved).”

Tina's response to him on the radio show was to suggest getting a better inventory of the “lay of the land” in his neighborhood. Jim came up with a very detailed map (see Fig. x below), which was presented to Comcast as part of the Redwood Coast Connect project in hopes of Comcast expanding their footprint in his neighborhood.

This is an example about how local advocacy can help bring about change. Jim has since joined up with the Mendocino Coast Broadband Alliance to continue to advocate with the larger region for coastal Mendocino connectivity.



VIII. Stealth Networks - T1 With WiFi Sharing Among Neighbors

Chris Baker in Anderson Valley has come up with a local solution for himself and his neighbors who are tired of waiting for providers to offer service. He writes:

“I originally purchased a T1 so that I could work from my home in the Anderson Valley. Gradually my neighbors learned of my connection and asked if it was possible for them to connect. We had great difficulty finding anyone to help us design and install a system so I started to do some research and since the equipment is not outrageously expensive, I simply purchased some antennas and access points and experimented. I’m now supporting 5 neighbors, some of whom run businesses from their premises, and next month hope to connect in 2-3 more.

“I found the variety of equipment and equipment manufacturers a little bewildering – everyone seems to have their own favorite, and it’s very hard to compare brands and even sometimes different models within the same brand. I’ve been using Netgear equipment to connect with my neighbors and have had no problems with it. I also use Apple Airports for indoor networks which is not really necessary but it allows me much greater ease and flexibility in terms of management, and the extra end-user features (wireless printing and music distribution even from Windows PCs) are of great benefit. I use access control lists and passwords on all of the equipment.

“I’ve recently had some experience with Deliberant and Linksys equipment and soon hope to be able to compare the long distance performance of the Netgear equipment I’ve been using with comparable Deliberant equipment.

“Word has spread from my immediate neighbors, and I’ve recently been receiving an increasing number of inquiries from people almost desperate for a reliable connection. Most currently exist on dial-up but a significant number use satellite but keep hitting their upload/download restrictions. I recently placed an ad in a local newspaper offering free advice and assistance for those willing to set up their own network. Despite a huge response only one group has so far taken the plunge – I think the cost of the T1 is a challenge together with worries regarding on-going support and maintenance.”

This is a prime example of the Redwood Coast “can do” attitude. But this is not a solution for everyone:

- T1 costs are high in rural areas and vary widely, depending upon location (reports range from \$500-\$2000/month plus installation costs).
- Some telecom providers are at capacity and have no T1 capacity to sell.
- Not everyone is comfortable with installing and supporting this type of network.

IX. ColusaNET

Rick Kunze of Colusanet.com visited the North Coast a few years back to share his wireless ISP experiences in nearby Colusa County.

One of the most interesting experiences he shares is how to build your own tower:

<http://www.do-it-yourself-tower.com/selftowerinstall.pdf>

In this presentation, he shows a pictorial history of building the tower as well as dos and don'ts of a project like this.

Rick Kunze's Build-it-Yourself Tower



The following case studies present an overview of projects aimed at improving emergency services and telecommunications for the counties indicated.

X. Mendocino County Microwave Project

This information was taken from the presentation to the Mendocino County Board of Supervisors on 11/20/07. The present microwave system used by emergency services around the county has issues and needs an overhaul. By planning the system, they will be able to eliminate dead spots, reduce the number of service calls, and provide reliability in services. The proposed cost is \$2.6 million for the multi-phased project.

Build a Network capable of converging traditional mission critical telecom traffic with the county's IT (information technology) traffic to achieve the following:

- Reliable networking for both Telecom and IT traffic
- Allow for migration of traditional applications
- Allow for the introduction of new IP applications to increase the county's security, efficiencies and collaborations
- Allow for a cost-optimized networking by eliminating redundancies between Telecom and IT group and improve operations
- Allow for disaster recovery mechanisms for both traffic categories

Multiprotocol Label Switching (MPLS):

- Provide resiliency with Fast Reroute. Recovery of fault in sub 50 msec (no calls dropped)
- Provide multiple services: Voice, Land Mobile Radio (LMR), high speed data
- Intelligent: different priorities for different users, applications and organizations
- Virtual Private Networks (VPN): Allows multiple agencies, to utilize the same network without jeopardizing the integrity and privacy of individual user
- Conventional radio overlays for interoperability
- Condition the network to introduction of 4.9 GHz or 700 MHz broadband data or video applications in the future

Microwave:

- 99.999% reliable licensed technology
- No interference
- Predictable performance
- Reduce latency, reliability and the flip-flop of M/W paths
- Provide both Ethernet interface and 32 port T1 interfaces on the same radio
- Protected investment/longevity of the solution
- Interface diversity - Time Division Multiplexing (TDM) and Ethernet
- Licensed frequency
- Scalable bandwidth architecture

Proposed Mendocino Microwave Project



XI. Humboldt Grand Jury Findings About Emergency Services

The following excerpts are from a Times-Standard “Tech Beat” column by Tina Nerat, published in 2007. The Humboldt County Grand Jury report had findings about emergency services.

“In late 2004, I completed a study called Living in a Networked World. This study looked at demand for broadband, documented the existing infrastructure, and proposed a telecom element for our General Plan update. In the process of doing this study, I talked to emergency services providers around the county. The consensus was that we have reliability and interoperability issues. In the report, one of the recommendations was assessing emergency telecommunications infrastructure. (neratech.net/docs/final_report.pdf)

“The Grand Jury report scraped the surface of some symptoms, but it may not have gone far enough. There were only summary statements in the report, not providing a lot of information: Shelter Cove is not served, communications can only be to one repeater at a time, and there are chain-of-command issues. The fixes proposed sound simple to the casual observer (install a fuel gauge at Horse Mountain, evaluate costs/feasibility for Shelter Cove, fix electrical hazard at Rogers Peak, assess whether current system can be improved, and remedy chain of command issues). But are these actions just Band-Aids?

“Technology is changing rapidly, and I suspect the current systems were put in place many years ago. It seems like it’s time to step back and look at the entire system to define the extent of the reliability and interoperability problems, then take a look at current emergency services technology options. Some of the newer technologies may even bring with them the ability to get broadband to some of the remote, unserved communities of Humboldt.

“Other rural areas have made the transition to new technology with impressive results. Google ‘umatilla +broadband +emergency services’ and you will see many articles about how rural eastern Oregon built a wireless network to provide emergency services as well as broadband to consumers.

“There’s even funding out there. On Thursday, July 19, (2008), the Times-Standard ran an article titled “Feds give \$1B to fix post-9/11 radio problems”. This article points out: ‘In January, homeland security officials found that more than 60 percent of the communities studied had the ability to talk to each other during a crisis, but only one in five showed ‘seamless’ use of equipment needed to also communicate with state and federal authorities ... where needed, adopt new technology to handle a natural or manmade disaster.’

“I would encourage our emergency services providers to look beyond how to patch up the current systems. Sometimes using new technology will cost less in the long run and provide better services for years into the future.”

XII. Trinity County Cell Tower Project

The following excerpt is from the CPUC web site:

“In 2004, Trinity County received a \$2.5 million grant from the California Public Utilities Commission to build publicly owned cell towers to serve citizens in remote regions of the frontier county that in some cases lack even basic telephone service. The funding came from AB 140, passed in 2001, by former Assemblywoman Virginia Strom-Martin, which created a Rural Telecommunication Infrastructure grant program to pay for the facilities to serve remote, unserved communities. The law provided up to \$10 million, funded out of an existing surcharge on telephone services. The bill expired on January 1, 2006.

The Trinity County Board of Supervisors produced final design and engineering work for eight cell tower sites considered to cover the neediest parts of the county. The county estimates it will be able to build five of the cell tower sites with the current funding available and the 2009 grant deadline. Verizon Wireless has made a commitment to appear on all five of the county’s proposed towers. The county is seeking additional funds for the remaining three proposed towers. US Cellular has expressed interest in renting space and providing backhaul from all of the towers.

Picking sites for the cell towers required leases and permits with Shasta-Trinity National Forest. The county was able to successfully negotiate the leases and started construction on one of the towers in October 2008, ahead of the snow.”

XIII. Synchronous Broadband Speeds

Most broadband providers' services are asynchronous, much faster on the download than on the upload. This is an issue for many who need to upload large documents. One of the Redwood Region providers, Velocity Technology, has synchronous services. When owner Travis Finch was asked why his service is synchronous, this was his response:

"One of the main reasons we offer synchronous services is that we aren't looking to squeeze every last dime out of our customers. Most ISPs offer some sort of basic upload speed such as 128k or 256k while the download speeds are 512k, 768k, or more. If you want a faster upload speed from these providers, you'd naturally have to pay more.

"Since our main pipe to the Internet is a synchronous connection (NxT1 upload and download), the majority of the time I have multiple T1's worth of upload capacity never being used. I figured we might as well let people use it and tout the fact that we have a synchronous service. I can honestly tell you we've had people switch to us just for the upload speeds even though they may be giving up a faster download speed (such as satellite or cable).

This is especially important to telecommuters who need to upload large files. We have a gentleman who comes into our office quite often to upload large files because he can't get our wireless at his home (yet) and the upload speed offered by his current provider is abysmal (128k or 256k, I think).

One of the other reasons we offer synchronous service is because when I sat down and decided I wanted to start an ISP, I vowed I wasn't going to charge my customers any more than I'd personally want to pay, and I was going to offer them the services I'd personally expect or look for in a provider."

XIV. New Broadband Users as a Result of RCC Outreach

In the year-long process of working through the Redwood Coast Connect project, the region's awareness level has been raised as a direct result of the RCC project outreach. The e-mail below from a Willow Creek resident is a perfect example of this. There are many more recent examples around the four-county region about residents who have become aware of new broadband opportunities during the course of the project. As they tell their neighbors, the broadband "take rate" should rise.

The Web page that this resident saw on the RCC feedback site was:

Willow Creek

- The Broadband Supply for your town is ranked LOW
- Wired Broadband Providers: Almega
- Fixed Wireless Broadband Providers: none
- Mobile Wireless Broadband Providers: Edge/AT&T, Verizon Wireless
- Highest Speed Available from a wired or fixed wireless provider: .128 megabits upload, 1.1 megabits download (does not meet CPUC 1 megabit upload/3 megabit download recommendation)
- Availability of adjacent coverage outside of town is LOW.

His e-mail said:

"Hello, I recently filled out your feedback page, after seeing the article on your project in the June 24 (Arcata) Eye. I live in Willow Creek, and had just about given up on broadband, after a year of trying. The cable company was unwilling to repair our cable, even after I offered to pay all of the expenses. The satellite company wanted me to drill a big hole in my roof to mount the dish.

After I filled out your feedback page, I noticed your suggestion that Verizon offers WWAN service here. I called them, they sent me a modem for \$30, and I now have superior, fast Internet, usually > 1 meg bps. That's better performance than the cable connection I had on the coast.

"Thank you for solving my problem! It was easy and inexpensive. I just wanted to let you know that you have helped at least one household in Willow Creek to get 'up to speed.'"

XV. Viewshed Analysis for Fixed Wireless Coverage

A viewshed is determined by line-of-sight visibility from one point to another. To determine the potential coverage footprint for fixed wireless Internet service, we used viewshed modeling tools available in ArcGIS 9.2 GIS software.

To accomplish this analysis, we obtained 10-meter national elevation data (NED) from the U.S. Geological Survey. This data provides land surface spot elevations on a gridded pattern of 10 x 10 meter pixels (a ground area of 100m²). This data does not account for features extending above the surface such as vegetation or built structures.

Using wireless antenna information obtained from local providers, antenna/transmitter positions were geocoded in the GIS software. Because the specific height of obstructions such as trees and structures is unknown, we made the assumption that wireless antenna/transmitter height was comparable to the height of typical obstructions and did not attempt to account for either in the model. We also used information from local providers to limit our viewshed coverages to reasonable distances, i.e. to take into account how far a signal can travel based on transmitter strength/type.

The result of a viewshed analysis is a binary data layer. This layer is coded to show those cells that are visible and those that are not visible from the specified tower location, assuming there are no obstructions or attenuations to the signal. This approach provides a reasonable first-cut for the coverage footprint of a particular wireless antenna/transmitter. To determine complete coverage, this same process is carried out for each existing antenna/transmitter and the resulting data layers are mathematically combined to show all locations visible to one or more antennas/transmitters.

Due to limitations of available data, we were not able to determine specific coverage and signal strength for fixed wireless coverage in the study region. Obstructions such as vegetation are highly variable. With more detailed information it is possible to specify characteristics of the antenna/transmitter of the viewshed model to account for height above ground, minimum and maximum look angles of the antenna, and minimum and maximum transmission distances appropriate to the specific hardware and frequency used. This detailed information, coupled with detailed information on above-surface obstructions such as vegetation and structure height and location, would permit much more precise viewshed modeling.

XVI. Digital Rio Dell

The following excerpts are from a Times-Standard “Tech Beat” column by Sean McLaughlin, published 08/14/07.

“Several months ago a non-profit, public and private partnership launched a futuristic project called *Digital Rio Dell* that created Humboldt County’s first redundant municipal broadband connection. With this project, Rio Dell became the first city in the region with the capability to avert Internet interruptions caused by the type of fiber optic line breaks that have plagued California’s North Coast. Internet service for *Digital Rio Dell* is provided by 101Netlink, a tier 2 digital service company based in southern Humboldt County.

“The *Digital Rio Dell* project also created a municipal wireless broadband network that offers free WiFi access at City Hall (including the Police Station), the Public Library and the Fire Hall. The City plans to expand the wireless network to serve other municipal purposes – including public health, safety and welfare.

“A redundant Internet connection is very important,” said City Manager Nancy Flemming. “Broadband access to the Internet is essential infrastructure for the future of Rio Dell, as much as it is for the entire North Coast. Our city is delighted to have partners who share our commitment to build public service networks that give our residents access to digital communications.”

“Access Humboldt conceived the project in collaboration with the city of Rio Dell and local companies, including Carlson Wireless, 101Netlink, C4i Security and Security National Servicing Corp.

“*Digital Rio Dell* is a unique model for the future of community broadband in several respects. First, the project is managed by a local non-profit that is committed to public, education and government (PEG) access, Access Humboldt, whose mission is “local voices through community media.” As such, *Digital Rio Dell* is on the leading edge of a national movement known as PEG Broadband, or Community Broadband – where the empowerment of local voices is central to the mission.

“And *Digital Rio Dell* is a completely local project – all of the funding is from local sources, and all of the private businesses involved are locally owned and locally controlled. This is surprisingly uncommon – a community network providing municipal broadband service that is 100% locally owned and locally managed through a community based non-profit.

“Access Humboldt is a community based organization that is committed to continue working with local companies to build network infrastructure for Public, Education and Government agencies – including the county and local cities, along with community service districts, school districts and others.”

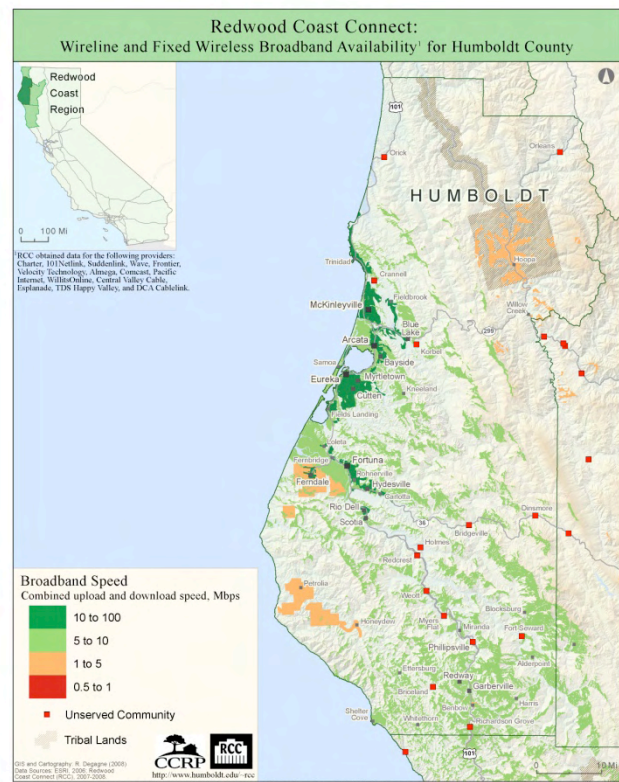
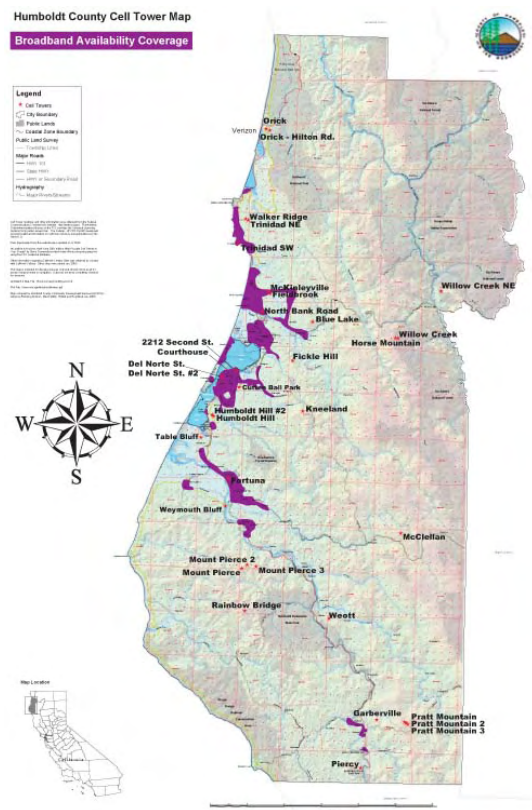
XVII. Comparison of Humboldt County Broadband 2004-2008

Extensive work has been done in the past several years to assess Humboldt County's broadband landscape. Below are two maps for comparison; one can see the huge changes in Humboldt County's broadband coverage over just four years. The majority of the impact has been fixed and mobile wireless, though Frontier is to be commended for their wide DSL coverage in the Ferndale, Honeydew and Petrolia region.

Maps showing Humboldt County Broadband Coverage in 2004 and 2008:

2004
(dark shading)

2008
shaded by speed from
dark green (fastest) to light green to orange (slower)



XVIII. Trinity Public Utilities District (TPUD)

The TPUD is the provider of electrical power to the majority of Trinity County. They surveyed their residential and commercial customers regarding their interest in the utility providing broadband services.

The residential results indicated that 81% ranked the District's initiative to focus on high-speed Internet as either very important or somewhat important and 70% approved of the District funding such research and development (R&D). Although slightly lower than residential, commercial customer responses still reflect similar levels of support for the District offering broadband services, with 61% ranking this an important initiative for the District to focus on and 57% approving the District funding such R&D.

Among the data results, indications that the District should proceed include:

- Ninety-four percent believe that low-cost, high-speed Internet access is very or somewhat important to the future economy of the District.
- Although 71% would like to have high-speed Internet service from any provider, almost half would prefer the District as a service provider.

In late August, the TPUD Board of Directors directed staff to research the feasibility of accessing unused federal fiber adjacent to existing TPUD fiber. In addition, if access to the federal fiber appears feasible, the TPUD will develop a technological plan and business plan.

Although the TPUD is encouraged by the results of the survey, it is concerned about expanding its current mission. According to Rick Coleman, Executive Director of the TPUD, "Staff believes that ultimately more public support, than that which was demonstrated by the survey, will be needed before the District should make a final commitment to provide Broadband services."

Glossary

Backhaul

Also called ‘middle mile’ - a communications link from a local region to the Internet backbone

CASF

California Advanced Services Fund - universal service fund program of the CPUC to subsidize implementation of broadband in unserved and underserved regions of the state
docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/76947.doc

CBTF

California Broadband Task Force - convened by executive order in 2006, report published in early 2008
www.calink.ca.gov/taskforcereport/

CETF

The California Emerging Technology Fund (CETF) was established and funded by the SBC-AT&T and Verizon-MCI merger agreements approved by the CPUC in November 2005. This fund will focus on “achieving ubiquitous access to broadband and advanced services in California, particularly in underserved communities through the use of existing and emerging technologies.”

CPUC

California Public Utilities Commission
www.cpuc.ca.gov

DSL

Digital Subscriber Line – a technology used by telephone companies to bring information over copper lines to homes and businesses

Cable Modem

A device that allows a home or business to connect to the Internet via local cable TV network

E-rate

Commonly used name of the Schools and Libraries Fund of the Universal Service Fund. Funds are administered by USAC under the direction of the FCC (Federal Communications Commission).

Fixed Wireless

A network that serves fixed locations, such as a home or a business

GIS

Geographic Information System

GPS

Global Positioning System – GPS locates are often used to relate the exact position of telecommunication antennas and other related radios.

ILEC

Incumbent Local Exchange Carrier – local telephone companies.

ISP

Internet Service Provider

LATA

Local Access and Transport Area - a geographic region assigned to one or more telephone companies

Microwave

Electromagnetic waves with wavelengths ranging from 1 mm to 1 m, or frequencies between 300 MHz and 300 GHz. Before the advent of fiber optic transmission, most long distance telephone calls were carried via microwave point-to-

point links. Antennas are located at hops of approximately 40 miles. Many areas still rely on microwave for telecommunications.

Middle Mile

Also called 'backhaul' - a communications link from a local region to the Internet backbone

Mobile Wireless

Wireless network that allows for mobility, often provided by cellular telephone companies

PEG

Public, Education, and Government networks or TV channels

RCC

Redwood Coast Connect

RCRA

Redwood Coast Rural Action - Redwood Coast Rural Action (RCRA) is a network of community leaders and institutions working together regionally (Del Norte, Humboldt, Mendocino, Trinity) to improve current and future conditions of local people and the land.

VoIP

Voice Over Internet Protocol – delivery of voice over the Internet rather than traditional phone lines.

VPN

Virtual Private Network – Use of the Internet to provide secure communications for remote offices or individuals to their organization's network.

Wireline

Often called landline. Refers to cable or phone-company wired systems that use in-ground or pole-mounted wiring.

WiFi

Trade name for a popular wireless technology used in home networks, mobile phones, video games and more. WiFi is supported by nearly every modern personal computer operating system and most advanced game consoles. WiFi networks have limited range. A typical WiFi home router using 802.11b or 802.11g with a stock antenna might have a range of 32 m (120 ft) indoors and 95 m (300 ft) outdoors. Range also varies with frequency band. WiFi in the 2.4 GHz frequency block has slightly better range than WiFi in the 5 GHz frequency block. Outdoor range with improved (directional) antennas can be several kilometers or more with line-of-sight.

WiMAX

The Worldwide Interoperability for Microwave Access, is a telecommunications technology that provides wireless data in a variety of ways, from point-to-point links to full mobile cellular type access. It is based on the IEEE 802.16 standard, which is also called WirelessMAN. The name WiMAX was created by the WiMAX Forum, which was formed in June 2001 to promote conformance and interoperability of the standard. The forum describes WiMAX as "a standards-based technology enabling the delivery of last mile wireless broadband access as an alternative to cable and DSL."

WISP

Wireless Internet Service Provider