Telecommunication Crossroads

A report on the future of the Kootenay Boundary Region

As Prepared for:

The Kootenay Association for Science and Technology

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1. Executive Summary

In July of this year, the Kootenay Association for Science and Technology issued an RFP (Request for Proposal). The purpose of the RFP was to create a technical report that outlines the current, and potential, high-speed data communication infrastructure of the West Kootenay/Boundary region. The information from this report is intended to paint a picture of where we are today, where we could be tomorrow and how we can get there.

For a region to thrive, it is necessary for it to participate and compete on an even basis with the rest of the digital economy. The applications for high-speed data communication are numerous and these applications are fuelling the new digital economy. In this document you will read about some of the more important applications including Virtual Private Networks, video conferencing and IP Centrex (IP Telephony), as well as the impact they will have on our future. To be able to compete on an even footing, it is essential to have an infrastructure capable of running these applications.

The most interesting discovery made during the research for this report is that the existing telecommunications infrastructure is much better than expected. However, access to all its capabilities is severely limited by the lack of high-speed, yet affordable, "last mile solutions" such as cable or ADSL coming to our homes and offices. While 88% of the Kootenay Boundary region is now ADSL capable, this service is not accessible.

Throughout the province, high-speed last mile solutions are currently reserved for those regions with a large enough customer base to be profitable for the provider. To make certain the information presented is accurate and up-to-date, interviews with senior executives of Cable and Telephone companies were necessary to review their plans and dates for delivery of new services. At present, BC Tel does not have the Kootenay/Boundary region on the rollout schedule for their high-speed ADSL services. Shaw Cable has predicted that in less than one year they should be able to provide cable Internet services in areas where the company provides cable service today. In this region the exception to the lack of affordable high-speed connections has been Grand Forks and its successful partnership between School District #51 and Sunshine Communications.

In order for our telecommunications infrastructure to stay current with technological advances some new and unconventional thinking will be required. With the Kootenay/Boundary population making up only 2.4% of BC's population there is little incentive for government or telecommunication companies to seek us out and offer help. To bring government and business to the table we need to take the initiative and look after our own future.

There are a large number of government initiatives available to upgrade the infrastructure. The largest and most active initiative is the Provincial Learning Network (PLN), which has brought high-speed services to most schools in the region and the province. There is also Industry Canada's Community Access program, which can provide significant funding for infrastructure upgrading.

Learning the limitations and impediments of the current infrastructure is a necessary starting point for the process of upgrading the infrastructure. There can be many limiting factors, the level of technology, lack of funding, population levels and geography to name a few.

To successfully plan the upgrade of an infrastructure it is necessary to know what type of applications that system will be used for. An analysis of the bandwidth that is required for those applications reveals the minimum requirements for the new system. Those applications, among others, could be IP Telephony, Video Conferencing or tele-radiology.

One part of planning a new infrastructure is to identify, then interview, the stakeholders who would pay for new services. It is important to know what they want, what they will use the system for and how much they are willing to pay for it. Without this a successful business model cannot be established. Today's

stakeholders are mostly small to medium sized companies that are currently being severely overcharged, in comparison to what similar bandwidth would cost in Vancouver. In order for the current bandwidth providers to maximize the return on investment in their infrastructure it is not in their perceived interest to provide these new services. The cost of these new services, to the consumer, is many times lower than what is currently offered. For example, why would BC Tel sell a business a 2.0 Mbps ADSL line for approx. $200/month when it is currently selling that business a 1.544Mbps T1 line for approx. $1500 or more per month? In addition, new technologies such as IP Telephony would allow the customer to eliminate multiple phone lines by routing them through a single ADSL line. Another reason for the delay in implementing these services is recent advances in IP Telephony allow the customer to make long distance calls for free or very low rates.

We are not the first rural region to recognize the need to leap ahead into new technology. It is important to look at what other communities have done and the successful telecommunication models they have used. Communities such as Ashland, Oregon have shown how taking charge of their telecommunications infrastructure can not only lower their costs significantly but also improve the quality of their lives, improve their education and attract new industry and jobs to their area.

In the recommendations the authors present KAST with two models for going forward with changes to the telecommunications infrastructure. Both models begin with the formation of a Kootenay Boundary Communications Network (KBCN) committee but then go separate ways. The first model relies on a Request for Proposal (RFP) to seek out the best company to provide, with some financial assistance, the necessary services to the entire region. The second model takes a faster route to satisfy immediate needs by subsidizing the current major telecommunication companies' infrastructure to motivate them to provide the needed services earlier than they had planned. This model only works in the short term and will prove more costly than the first model when future upgrades are necessary.

The report ends with the authors setting out their recommendations, for what role KAST should play in transforming the infrastructure. Because of the scope of the project KAST is advised to create the KCBN as a separate entity.

2. Introduction

2.1. The New Economy and the Telecommunications Network

> "…communication, which in the end is what the digital technology and media are all about, is not just a sector of the economy. Communication *is* the economy."[1] Kevin Kelly, Managing Editor of Wired magazine

Never in the history of the world has so much change taken place in so short a span of time. In the very near future these changes will permeate every aspect of our lives in such a manner that they can neither be ignored nor avoided. No where are these changes more evident and important than those taking place in communications.

Telecommunications today is undergoing a revolution in both technology and use. The world is becoming one vast network tied together through telecommunications technology. This revolution is so all encompassing it will transform our economy, our culture and our politics almost beyond recognition.

> "Networks have existed in every economy. What's different now is that networks, enhanced and multiplied by technology, penetrate our lives so deeply that 'network' has become the central metaphor around which our thinking and our economy are organized. Unless we can understand

[1] New Rules for the New Economy, Kevin Kelly, Viking, 1998 p. 5

the distinctive logic of networks, we can't profit from the economic transformation now under way."[2] Kevin Kelly, Managing Editor of Wired magazine

As we enter this digital world distance is being replaced by time. The time it takes to communicate between two points is more important than the distance between those points. As the networking of the world increases distance becomes irrelevant. The faster we can communicate with each other, and the more options we have for that communication, the more effective it can be. For regions, cities and individual businesses, even countries, the choice is participate in this economy, on an even footing, or suffer the economic consequences. This is the new economy.

2.2. Importance of Proper Telecommunications Infrastructure in West Kootenay/Boundary Region

It is not possible to overstate the importance of telecommunications. With the world's economy increasingly more dependent upon the digital transmission of data the infrastructure that makes that transmission possible is of the utmost importance. A critical definition of a proper telecommunications infrastructure is its ability to transmit data at a very high rate of speed. Minimum acceptable speeds would be approximately 1 Megabits per second.

Without a strong telecommunication infrastructure in place, rural communities cannot effectively compete with their urban counterparts. Nor is it possible to educate our children in the technology they must to master in order to prosper in the future.

More critically, there is a limited time frame in which to accomplish the necessary changes. As communities and regions become advanced in their telecommunications capabilities the demand of corporations and people to relocate to those regions (in order to avail themselves of the opportunities arising from that technology) increases. If a community or region delays its infrastructure upgrade the competition for those corporations and people is increased. As a result, the ability of any particular community to attract those businesses becomes more difficult as there are now more communities to choose from.

3. The Demographics of the Communities covered by KAST

According the 1997 statistics compiled by the Minister of Municipal Affairs and Housing, the Kootenay/Boundary region has a population of approximately 91,000. This region makes up about 2.4% of the province's 3, 724, 500 people.

Of the 91,000 people in this region it is very important to note that only 9% of the population falls into the 18-24 years age group. (see Appendix A)

As this report is read keep those population statistics in mind when considering:

1) the ability of the region to influence change through government or big business
2) the importance of working together as a region;
3) the potential for growth once advanced telecommunications infrastructure is put in place.
4) The requirement to keep and attract youth to this region to ensure its future.

Note that with the addition of the East Kootenay region, the population increases to 147, 371 or approximately 4% of the province's population.

[2] New Rules for the New Economy, Kevin Kelly, Viking, 1998 p. 2

See Appendix A for detailed population statistic chart

4. Networks

4.1. What is a network?

4.1.1. General

Two or more devices (nodes) connected together in order to exchange communications. For example, all the fax machines in the world constitute a network. The first fax machine, off the assembly line, was useless until someone bought the second fax machine and plugged it in. Until that happened there was no network of fax machines for the first one to transmit information to and thus that fax machine had no value. Similarly in business, people network with each other by communicating with each other. The more people in your personal network the more valuable and efficient you, and that network, become.

4.1.2. Telecommunications

Most people when they think of "network" today think of the Internet. However, the Internet is only one of many facets of the global telecommunications network. This network, known as the telecommunications backbone, is a series of interconnected data lines that carry telephone voice calls, the Internet, private corporate networks plus much more. All this data is carried on the same lines as your basic telephone call.

To connect to the backbone, you must choose a "last mile solution" such as modem dial-up, cable or ADSL. A choice of affordable last mile solutions is the biggest challenge of all. For a full explanation of the telecommunications backbone and last mile solutions see Appendix G -Telecommunication Technology Overview.

5. Applications for Bandwidth

5.1. Overview

Before the cost of a serious telecommunication upgrade can be done, there must be an understanding of the applications that justify the expense. The following is a list of some applications where high bandwidth may be applied.

5.2. Digital Home Services

Soon every type of communication with the world will come to the home as a digital signal. The TV, the phone, the computer and even the refrigerator will communicate over the world-wide network. Why is this important? It all comes down to convenience and lower cost. We'll be able to choose quality TV programming pay $0 for long distance calls and have the refrigerator repairperson show up as soon as there is a problem.

5.3. Web Surfing

Time is a valuable commodity to all of us. With a high-speed connection, the time to get the information required can be reduced to $1/0^{th}$. Web sites come up instantly. File downloads take two minutes instead of an hour.

5.4. Virtual Private Network

For economic development, this is a must. Before a technology aware company can put in a branch office in the Kootenay/Boundary region they will be looking for high-speed telecommunications to minimize the effects of distance. The ability to connect to the company's wide area network (WAN) for voice and data communication will be one of the key deciding factors when setting up a branch office. Talented and highly trained people who want to move to a region will only do so if they know the infrastructure is in place to allow them to do their job. The combination of a rural lifestyle and world-class telecommunications will bring a flood of new talent and new jobs to the region.

5.5. Remote Imaging

There are many situations where a remote camera that can send images to a person hundreds or thousands of miles away would be valuable. For example a highly specialized surgeon could remotely assist a less experienced surgeon that is on site at a hospital. Or a Fire Lookout where the only inhabitant is a camera that watches for smoke and relays the images to a control centre. When an expert can't be there in person, remote imaging is the answer.

5.6. Distance Learning

With substantial bandwidth it is now possible to participate in University classes in a distant city while sitting in front of a computer right here in the Kootenay/Boundary. The latest technology allows for fully interactive two-way communication between the students and professor. The cost of this application can be justified through to the reduced the cost of the student being able to live at home. Also the community benefits by keeping its best talent in the region to share new ideas and create new opportunities.

5.7. Virtual Call Centre

This technology utilizes the latest advancements in telephony to allow people to work for a call centre from their home office. They log onto a network through a remote call centre and have their phone and data run through high-speed data communication lines right into the office of the company they are working for. This company may be located in New York or London. With the push of a button on the office's switchboard, a client calling in for service from anywhere in the world would be directed to their home office phone right here in the Kootenay/Boundary.

5.8. IP Centrex

Business voice communication is about to see a major change. Rather than having separate phone lines and data lines everything will soon run over the same line saving the customers 25% or more on their communication lines. Also, instead of having to call a phone reseller when something goes wrong or a change is needed, now the local Computer Company will be able to fix phone systems as well. And since the Internet is used to communicate, the cost of long distance calls theoretically will be $0 in other than the cost for the communication line.

5.9. Education of Children

The attention span of a child is very short. They need instant gratification or they are off to something else. Many of the best kid sites require high bandwidth or they are just a bunch of slow pictures on a screen. While there is much more to life than a computer, the time spent on the computer by children can be very valuable and give them a head start in life. With high bandwidth they could digitally walk down the street of a town in Thailand or watch an animated version of how algebra will affect their lives or see

space from a camera mounted inside a space shuttle. The sky is the limit and the children of the Kootenay/Boundary need the tools to prepare them for the digital world.

5.10. Video Conferencing

Visual and audio communication is far more powerful than the traditional telephone. The parties can see each other, diagrams, documents etc. This technology greatly reduces the need for air travel and can pay for itself in months when properly utilized.

6. Services available at Various Bandwidths

The bandwidth requirements stated below are estimates for reasonable service. While the application may function at a lower rate, the results will be less than satisfactory.

6.1. Applications

Application Kbps = Kilobits per second	28.8 K Modem 28 Kbps	33.6 K Modem 33 Kbps	56 K Modem 56 Kbps	64 K ISDN 64 Kbps	128 K ISDN 128 Kbps	DS1/T1 1.544 Mbps	xDSL 2 Mbps	Wireless 2 Mbps	Cable Modem 4 Mbps	E1 2.048 Mbps	DS2 6.312 Mbps
Distance Learning - Basic	x	x	x	x	x	x	x	x	x	x	x
Distance Learning - Interactive						x	x	x	x	x	x
File Transfer - Less than 20Mb	x	x	x	x	x	x	x	x	x	x	x
File Transfer - 20 to 50Mb			x	x	x	x	x	x	x	x	x
File Tranfer - 50Mb+					x	x	x	x	x	x	x
Server - Ecommerce						x	x	x	x	x	x
Server - Mail				x	x	x	x	x	x	x	x
Server - Streaming Audio					x	x	x	x	x	x	x
Server - Web					x	x	x	x	x	x	x
Thin Client - Remote access			x	x	x	x	x	x	x	x	x
Video Conferencing					3x	x	x	x	x	x	x
Virtual Call Centre Workstation					x	x	x	x	x	x	x
Virtual Private Network					x	x	x	x	x	x	x
Voice over IP				x	x	x	x	x	x	x	x
Web Access – Basic	x	x	x	x	x	x	x	x	x	x	x
Web Access – Medium		x	x	x	x	x	x	x	x	x	x
Web Access – Heavy			x	x	x	x	x	x	x	x	x

7. Successful Rural Community Telecommunication Models

7.1. Community Models

7.1.1. Ashland, Oregon

Ashland is a community of approximately 20,000 people in the eastern part of Oregon State. Several years ago they found themselves in a position, with regards to telecommunications, similar to where we find ourselves today in the Kootenays. That is, neither the cable companies nor the telephone companies (telcos) had given them any real hope for future growth in their telecommunication infrastructure. At this point Peter Lovrovich, the manager of Ashland's municipal electric utility company Ashland Electric, made

the decision that if the cable companies and the telcos would not take care of Ashland then Ashland would have to take responsibility for its own future.

Mr. Lovrovich approached the city government and received permission to lay a 12-mile (30 miles including the loops) fibre optic network through the city in order to connect the power company's various offices into a secure local area network. They then connected that fibre to each home via coaxial cable for the purpose of remotely monitoring household electric meters and in doing so effectively created a Municipal Area Network. Given cable access to the home it was easy for the company to begin offering Cable TV services and then to make that cable communication a two-way communication. Once they had done this it was a short step from there to connecting the fibre backbone to the world wide telecommunications network backbone and thereby gaining high-speed access to the Internet for all that wanted it. Included in this were contracts with the local schools and colleges to provide very high-speed access for their students thereby giving those students a competitive edge.

Internet access was sold to local ISP's (Internet Service Providers) who then sold it to the residents and installed the cable modems in the client homes. In this way Ashland Electric did not compete against the local ISP's but in fact made their lives much easier as they no longer had to maintain a pool of dial up modems. It made starting an ISP much easier. This was only the first of many economic benefits to the community.

Local community volunteers were appointed to oversee the Cable TV coverage and the community was given a lot of input as to the programming that would be offered. This has resulted in a tremendous amount of community participation. They now have more program offerings at less cost than they had with the private Cable Company. That was yet another economic benefit to the community. A further benefit has appeared through the profits being made on this service. The community has been offered the choice of using those profits to either continue building the telecommunications infrastructure or to put back into the city treasury to reduce property taxes.

However, as great as those benefits are they pale in comparison to the real economic benefits that have been generated. Many new SOHO (Small Office/Home Office) businesses have been started to take advantage of the new affordable high-speed access available to them. This in turn has generated more tax revenue for the city. Furthermore they have had high technology companies relocate to Ashland in order to take advantage of a wired city. They have also had significant inquiries from European and Silicon Valley companies about relocating there. This is the true economic benefit to their community. Companies that rely on high-speed data communications will seek out those places where they can access it as well as maintain the lifestyles their employees desire thereby bringing high skilled high paying jobs into the community and raising the tax base of the community.

> "The fiber optic rings that weave through the city's neighborhoods are unlike any other system in Oregon. It's so revolutionary; software companies are scrambling to create state-of-the-art products to make use of our network's capabilities. A network that will provide us with incredible speed, unquestioned reliability, competitive pricing... and unlimited possibilities."[3]

7.1.2. Telegraph Creek, BC

Lucent Technologies' PubLan™ and Campus™ multi-point wireless network technology are currently undergoing beta trials in Telegraph Creek where are being tested as a MAN or Municipal Area Network (a Local Area Network that covers an entire city). Regardless of where you are within the boundaries of this wireless network you can connect into the network and from there out onto the telecommunication backbone thus accessing the world at large via other networks such as the Internet. This is quite a remarkable occurrence for Telegraph Creek as, to date, it has been quite isolated in terms of telecommunications. They have gone from almost no telecommunications abilities to leading edge over

[3] http://www.ashlandfiber.net/

night. As this is proprietary technology, that is currently undergoing beta trials, Lucent and the residents of Telegraph Creek have been very cautious about revealing any further information.

7.1.3. Grand Forks, BC

Grand Forks has the most advanced telecommunications of any community in the area covered by this study. With a population of about 4000 people it has managed to provide a high-speed cable Internet service capable of delivering up to 4 Mbps. This service arose out of a meeting between Denny Kemprud, the School District #51 Superintendent, and Bill Gillespie, Sunshine Cable.

The key point made by Mr. Kemprud is that the school district was the largest potential purchaser of services in the area and by capitalizing on the expertise of Sunshine Cable and investing almost $500,000, they were able to construct a state of the art telecommunications system. The students at the schools have benefited enormously from this service. Denny pointed out that one of the many benefits derived from this technology was the interest level of the students in the classroom. When asked for proof that this has benefited his students, he replied, “the best way to describe is to come and see it.”

Some of key benefits that have arisen from this project are:

- The ability to operate a state of the art one room school in the remote Big White area via a 70 Kilometre wireless link
- A single entry student enrolment that avoids duplicated entries once the student has entered the school system. Once entered the students information follows him from K-12 regardless of which school in the district he attends
- The TACT Project (http://www.tactproject.com/index.html) where the students were able to follow a modern day explorer, Lach Farrell as he drove his specially equipped Land Cruiser from North America down to the tip of South America and back to Alaska.

Mr. Kemprud also pointed out that they knew if the community was going to attract new business, this infrastructure was a necessity. He said, “When they built the CPR, it took a while for settlers to come.” In other words there is a parallel in the effect on population and business growth between the construction of the telecommunication infrastructure and the construction of the railroads.

7.1.4. Lusk, Wyoming

Lusk is a town in southeastern Wyoming near the Nebraska border. With a population of 1500, give or take a few, it is the biggest town in the least–populated county (Niobrara) in the least populated state in America. Lusk sits a long way from a city of any size—it's a two–hour drive to Casper, even further to Cheyenne. As isolated as they are, the people of Lusk are a resourceful lot. They have welcomed technology, incorporating computers and software to help them improve their lives. For instance, as early as 1985 schools in Lusk were using computers in the classroom. Now the schools have 320 computers for 500 students—a ratio unmatched by even the most progressive urban schools[4]. The public schools in Lusk start teaching computer skills to their students in Kindergarten

The local computer expert is a 17-year-old boy named Tyrel Lohr who, at 16 became a Microsoft Certified Technician. Tyrel has taught his friends and neighbours a lot about computers and they have taken it to heart bringing high technology into their lives at every opportunity. Here the ranchers use the Internet to check on daily cattle prices and the weather. They use sensors in their fields to track local weather and send that data to the weather bureau thereby improving the weather reports for all. They use spreadsheets to track all their cattle breeding programs and to share the results via the network with other

[4] http://eu.microsoft.com/questions/who_motivates_us/Lusk_text.htm

ranchers. They use computers to keep track of almost aspect of their business. They have incorporated technology into their lives in order to allow a small community to survive. While all across America small agricultural communities are slowly dying out Lusk is actually growing.

This is the lesson of Lusk: that a small isolated community can wire itself into the new technology and thrive in the process. That by embracing change they were not only able to survive, where so many other rural communities had not, but also to thrive and be ready to meet whatever the future brings headfirst on their own terns.

7.1.5. Internet Centre, Alberta

There are some interesting events taking place in Alberta these days centred on DSL. While there is no single community that has wired itself like Ashland or Grand Forks there are individuals that are creating small DSL communities. With the deregulation of the telephone companies, by the CRTC, the door has been opened for others to access the telephone company's Central offices and equipment. Further with the recent advances in DSL technology it has now become possible to set up services outside of the Central Office and operate DSL services independent of the Phone Company. Communities as small as an apartment complex have created their own access solutions by installing their own DSL equipment.

The significance of this technology is that it uses the existing copper telephone wire infrastructure. This significantly reduces the cost of obtaining high-speed services by reducing the costs of installing new infrastructure.

For those interested in learning more about DSL services and how DSL works please obtain "The DSL Sourcebook" from www.paradyne.com, or call (813) 530-8623

8. Review of Existing Telecommunications Infrastructure

8.1. Overview

On October 30th, 1997 KAST held a conference called Telecon '97, "Going Virtual in the Kootenays." This conference brought together a number of local people and companies to discuss and listen to presentations on the future of Telecommunications in the region.

Two significant presentations that were left for the afternoon were BC Tel and Shaw Cable. Both were expected to make announcements on delivery dates for their delivery of high-speed services. Both did and by December 1997, BC Tel had Fibre Optic services in place in Trail, Nelson, Castlegar and Grand Forks. Shaw cable followed shortly after with services in Trail, Nelson and Castlegar. RSL (formerly Westel) now has fibre in Nelson as well.

While these companies must be applauded for providing these high-speed services, fibre as a "last mile solution" is far beyond the budget of most organizations and people in the region. Affordable high-speed last mile solutions are a necessity to see substantial benefits. It must be noted that BC Tel has had Frame Relay services in the region for a number of years but the speed vs. cost makes it impractical.

In areas such as Vancouver, Victoria and Kelowna, cable Internet has been available for more than a year. The service costs less than $50 for an individual and Shaw Cable has a business offering for $120. BC Tel has announced ADSL as its Cable competitor and it will be released as a major offering to the lower mainland and Okanagan this fall at a price of $49.

8.2. What Services When

For this study, all the major carriers were contacted. They were asked for delivery dates of high-speed data services (both backbone and last mile) to the West Kootenay/Boundary region. The table below explains the current status:

Carrier	Backbone	Last Mile	Availability	Areas
BCT Telus	Fibre	Fibre	Now	Trail, Castlegar, Nelson, Grand Forks
		Frame	Now	All areas
		ISDN	Now	Trail, Nelson
		ADSL	Unknown	None
Shaw FibreLink	Fibre	Fibre	Now	Trail, Castlegar, Nelson
Shaw Cable	Fibre	Coaxial Cable	Within one year	All areas that are served by Shaw
Sprint Canada	None	None	Unknown	None
Sunshine Cable	Fibre	Coaxial Cable	Now	Grand Forks and Christina Lake
		Wireless	Now	Rossland, Trail, Castlegar
AT&T	None	None	Unknown	None
RSL	Fibre	Fibre	Now	Nelson

As far as delivery dates for affordable last mile solutions (Cable and ADSL), there weren't any concrete answers from BC Tel. While BC Tel is rolling out its home and business ADSL services in many areas of the province, the West Kootenay/Boundary region did not make it on the list and the company would not commit to a date. It has been made very clear that BC Tel is a "for profit" company and it is interested and motivated by ventures that make money.

The authors estimate that it will take at least a year to see services in our region in the bigger cities only. Note that in a Nelson Daily News article in June 1998 titled "Nelson Internet lags behind Lower Mainland", BC Tel said, "Over the next 18 months you would probably see in Nelson and Trail the application of ADSL." The region has now reached the 15-month mark.

Shaw Cable's report was much more optimistic. The company plans to deliver high-speed cable Internet services to Kootenay areas they service in one year or less. They have a new office in Cranbrook that has full budgeting responsibility for the Kootenays and reports directly to head office. While it could take up to a year, this is the best news reported by any of the major carriers. Note that Sunshine Cable has been providing service to the Grand Forks area for over three years now with excellent results. Please see Grand Forks under the Model Communities section for more details.

8.3. Current Coverage – Rock Creek to Nelson to Nakusp

There are Fibre Optic lines throughout the entire region with the exception of the area north of Nakusp to Galena Bay. BC Tel has said they have budgeted to lay fibre there next year. However, it should be noted that while having fibre is necessary for advanced services its presence in a community does not, necessarily, mean that those services are available there. See Appendices C and E for BC Tel coverage

While most communities in the region have access to CATV (cablevision), with the exception of Grand Forks none have access to two-way digital cable services. Shaw Cable has indicated that with their recent upgrade to digital services, in the Nelson, Castlegar, Trail corridor they plan on offering two-way digital services within 1 year.

BC Tel's copper telephone network has undergone a heavy upgrade over the last three years. In 88% of the region, it is ADSL capable but not ADSL ready. To make these areas ready requires the installation of special DSL equipment. For detailed coverage please see Appendix C.

8.4. Current ISP Infrastructure

ISP	City	Dial_up Service	Backbone Connection
Uniserve	Trail	v.90, Flex 56Flex and ISDN	512k Frame
	Castlegar	v.90, Flex 56Flex and ISDN	512k Frame
	Grand Forks	v.90, Flex 56Flex and ISDN	512k Frame
	Nelson	v.90, Flex 56Flex and ISDN	512k Frame
Net Idea	Trail	ISP did not respond	ISP did not respond
	Castlegar	ISP did not respond	ISP did not respond
	Nelson	ISP did not respond	ISP did not respond
Kootenay Net	Trail	v.90, Flex 56Flex and ISDN	E1 (2Mbps)
	Castlegar	v.90, Flex 56Flex and ISDN	E1 (2Mbps)
	Nelson	v.90, Flex 56Flex and ISDN	E10 (10Mbps)
Internet Direct	Trail	VPOP v.90, Flex 56Flex and ISDN	E10 (10Mbps)
	Castlegar	VPOP v.90, Flex 56Flex and ISDN	E10 (10Mbps)
	Grand Forks	VPOP v.90, Flex 56Flex and ISDN	E10 (10Mbps)
	Nelson	VPOP v.90, Flex 56Flex and ISDN	E10 (10Mbps)
Sympatico	Trail	VPOP v.90, Flex 56Flex and ISDN	E10 (10Mbps)
	Castlegar	VPOP v.90, Flex 56Flex and ISDN	E10 (10Mbps)
	Grand Forks	VPOP v.90, Flex 56Flex and ISDN	E10 (10Mbps)
	Nelson	VPOP v.90, Flex 56Flex and ISDN	E10 (10Mbps)

9. The New Telecommunications Models

9.1. Overview

It is obvious that the traditional large telephone and cable companies have changed substantially since the days when they strove to provide equal service for all customers. Motivated by profit and shareholder value, these companies see rural areas with small populations as, at best, low profit areas if not money losers. These entities are interested in providing lots of services to lots of people so long as it is profitable. They are truly set up to work in large cities.

There are three new telecommunication models that have arisen and should be viewed as viable alternatives. The first model is the CLEC (pronounced SeeLEC or competitive local exchange carrier), which was created out of the CRTC's need to remove the telephone company monopoly. A second new, as yet unproven, model is the ISTP (Internet Service Telephony Provider) model. It was developed from entrepreneurial ISPs (Internet Service Providers) who wanted to leverage the Internet in order to deliver low cost calls. The third is the Independent ADSL Service Provider, which installs its own equipment in the telephone company's central office or at its own facilities located near the central office.

To the West Kootenay/Boundary region these new models are significant. They provide a powerful means to achieve the desired ends. At this time no CLECs, ISTPs or ADSL Providers exist in the region.

9.2. CLEC

On September 16, 1994 the CRTC made a decision (94-19) to increase competition in the local telecommunications market. It determined that restrictions on entry into the local market should be removed. This began the process to create Telecom Decision 97-8, which allowed the formation of local telephone companies called CLEC or "Competitive Local Exchange Carrier." These companies can provide all the same services and sometimes more services than an ILEC or "Incumbent Local Exchange Carrier." These services include local and long distance phone services.

The 97-8 document contains 295 separate sections that outline in detail the background behind the forming of the CLEC model and how they operate. For more information, go to www.crtc.gc.ca. Beside the word "Archives", choose Telecom. Enter 97-8 in the Full Text box and change both year boxes to 1997. Press launch search. Scroll through documents on right side until the 97-8 documents show on the screen. Press the first 97-8 hyperlink to get started.

As a CLEC there are a number of obligations that must be met. This is outlined in the September 1, 1999 document called "Competitive Local Exchange Carrier (CLEC) Obligations". This three-page document is much easier to read and gives the reader a quick overview of what it takes to become a CLEC. See Appendix D

In discussions it was found that CLECs can sometimes be started for the cost of a good lawyer and some administration fees but in other cases a purchase of a $250,000 class 5 switch was required. It appears that there is still some firming up to be done with CLEC regulations.

9.3. ISTP

An Internet Service Telephony Provider makes use of the Internet rather than the traditional Telephone Company's infrastructure and rate structure to exchange all forms of telephone information. Since access to the Internet is available at local phone connection rates, an international or other long-distance call will be much less expensive than through the traditional phone services.

9.4. Independent ADSL Service Provider

CRTC 1005 - Provision of independent ADSL services separate from BC Tel. CRTC 1005 allows a service provider to gain access to BC Tel's Central Office (CO) with the intent of allowing the service provider to sell its own ADSL services. To provide this service, the provider must gain access to an Individual Residential Exchange Service access line from BC Tel. The pricing per line is $18 per month plus $225 installation charge. Also, the service provider can buy at a bulk line rate of $7 with a $110 install charge as long as a minimum of 500 lines are purchased within 90 days of the original order.

The significance of this ruling is an independent provider can now provide a high bandwidth xDSL solution. Network and Internet access must still be purchased. The conditions to be met are extensive but much less than starting a CLEC. See CRTC 1005 for more details.

10. Limitations and Impediments of Infrastructure

10.1. Overview

As technology improves all infrastructures begin to have limitations and impediments. The goal of a region is to be aware of those changes and to take the actions necessary to prevent obsolescence.

10.2. Limitations and impediments of current infrastructure

The main factors that limit telecommunications in this region are the mountainous terrain, the sparse population, the difficulty in attaining funding for changes, and, in some areas, outdated telephone switches and the lack of cable services. The cost of installing and maintaining telephone or cable poles in mountainous terrain, with their attendant lines and equipment, is very high. However, an alternative to these structures is wireless radio transmission that requires fewer structures to be erected. With the present 2nd Generation equipment that is available, for wireless, the cost is still too high for the average user. Sparse population is also an impediment of sorts as there may be insufficient business potential to motivate the service provider to upgrade their service offerings. Cable services are missing from some areas all together and where they are present (with the exception of Sunshine Communications in Grand Forks) two-way digital communications are not yet offered. See Appendix E for a chart of available services and Appendix C for a chart of where DSL services are feasible.

10.3. Suitability and Sustainability of current infrastructure for growth

The picture however is not as bleak as the above would suggest. The majority of the West Kootenay/Boundary region has fibre optic lines. Fibre optic lines are the critical component needed to support high-speed telecommunications. Currently this fibre is mostly configured for BC Tel's phone network with data access being available in Trail, Castlegar, Nelson and Grand Forks.

10.4. Infrastructure required to provide services required today

Although there is fibre running through each town it cannot necessarily be accessed for high -speed services due to the lack of specialized high-speed digital switches that are very expensive to install. Further, once installed the access to the fibre is still too expensive for most organizations.

There is, however, a light at the end of the tunnel. New advances in technology allow for the use of existing copper wire infrastructure to, over short distances, connect to that fibre backbone and achieve very high rates of data transmission. This technology is referred to as DSL (digital subscriber line), which has speeds ranging from 780 Kbps to 11Mbps. It requires the end user to be within approximately four kilometres of the telephone company's Central Office (CO), or remote switch, which has been upgraded for high-speed services and that the CO has DSL equipment installed. At present 88% of this region has the infrastructure needed to support DSL services. See Appendix C to see which cities or towns have ADSL capability.

10.5. Infrastructure required to provide services required tomorrow

As telecommunication technology evolves the demand placed on infrastructure resources increases. While it is impossible to accurately predict what the future needs will be it is safe to say that 10 Mbps to the home will very shortly be a minimum requirement. This can be accomplished via fibre, DSL services, cable services or 3rd generation wireless.

"As consumers become increasingly mobile, they'll want all the communication services they've come to depend upon available wherever they happen to be, at any given time. IP delivers anytime anywhere communications."[5]

[5] The Elegant Evolution to Third-Generation Wireless, Bo Hedfors, Wired, October 1999

In all likelihood wireless communications will be the eventual media of choice due to its portability. IP (Internet Protocol) is the architecture, or standard, that drives the Internet. It is the common protocol that allows different operating systems and software to communicate with each other. Because of its software and hardware transparency it is the long awaited solution for the convergence of fixed and mobile communications. 3rd Generation (3G) wireless is being designed completely around IP and that, along with its mobility, makes it the ideal candidate.

Because of this the infrastructure should be designed with 3G wireless technologies in mind. If it isn't this region will likely find itself in the same position in the near future that it is in today, unable to keep pace with the rest of the world.

In terms of communications the world of the very near future will be very different from what it is today. With the advent of wireless handheld devices and affordable dedicated (24 hour 7 day) connections to the network the impact on business as well as private lives will be many times greater than was the impact of cell phones. The ability to conduct personal or corporate business at any time from anywhere will allow individuals to maximize the use of their time and manage it to suit their own particular needs. Today's cell phone will become tomorrow's Personal Data Assistant that will handle video conferencing, voice calls, email, data transfer, banking, and smart money exchanges, to name but a few. In short anything that is digital, or can be digitized, will be accessible through a handheld wireless device.

11. Supporting Initiatives

11.1. Regional

11.1.1. Community Futures - Trail

The Trail Community Futures office has an extensive understanding of telecommunications and its importance to the community. Over the last number of months they have applied or are applying for a number of grants in an attempt to purchase advanced telecommunications equipment that is not in the community at this time. The goal is to prove that this new equipment can provide affordable last mile solutions. Some of the sources for funding that they have been working with are:

- Community Access Program (CAP) described under Federal Government below
- Canadian Rural Partnerships (CRP) described under Federal Government below

11.1.2. Community Futures - Nelson

One of the most exciting Telecommunication developments in the region is the Virtual Call Centre project being developed by CFDC Central Kootenay. This project will utilize the latest advancements in telephony to allow people to work for a call centre from their home office. They would log onto a network through a remote call centre and have their phone and data run through high-speed data communication lines right into the office of the company they are working for. With the push of a button on the office's switchboard, a client calling in for service from anywhere in the world would be directed to their home office phone right here in the Kootenay/Boundary.

Some of the funding sources that CFDC is working on are:

- Canadian Jobs Fund – Human Resources Development Canada
- Canadian Rural Partnerships (CRP) described under Federal Government below

11.1.3. Columbia Basin Trust (CBT)

In a discussion with the Trust's CEO, Don Johnston, he commented that the CBT sees telecommunications as being critically important to the region but it is not something that they have had a lot of discussion about. He stated that telecommunications needs to be seen as an overarching concern and the CBT will play a significant role.

Mr. Johnston has now begun reviewing the Trust's potential role in the future of Telecommunications in the region.

It was further suggested by Josh Smienk , Chairman of the Board for Columbia Basin Trust, that the CBT would be willing to allocate some funds, through their Education and Technology committee, to create a Columbia Basin Management Planning group that would work with all concerned parties. The intent of the group would be to increase communication between all concerned parties in the region in order to achieve a coherent and workable plan to upgrade the telecommunications infrastructure. CBT would also help find additional funding sources when the time came to proceed with upgrades. Mr. Smienk also suggested that a solution could be to hire a private company as a management group to co-ordinate the best possible services for each community.

11.1.4. Selkirk College

11.1.4.1. Smart Communities Program

Recently Selkirk College submitted an application on behalf of the region to the Smart Communities Program. The Smart Communities Program is a three-year federal program created and administered by Industry Canada to help Canada become a world leader in the development and use of information and communication technologies for economic, social and cultural development.

11.2. Federal

11.2.1. Community Access Program

CAP, Industry Canada's Community Access program works with rural Canadian communities to take advantage of new communication technologies. CAP's goal is to foster economic, social, and cultural growth in Canada. All CAP sites are community-based, with a variety of provincial, territorial, and national partnerships supporting these local initiatives. Also helping to guide the program are Industry Canada's regional CAP reps, CAP's Provincial/Territorial Review Committees, Special Provincial Agencies, and the CAP National Advisory Committee. [6]

"The highly successful program connecting 5,000 rural and remote communities to the Internet by 2000 will be expanded to Canada's urban areas creating a national network of 10,000 community centres accessible by all Canadians. These public on-ramps to the info-highway are located in community centres, public libraries and schools across Canada." [7]

11.2.2. SchoolNet

SchoolNet is a world-leading program that encourages all of Canada's 16,500 schools and 3,500 public libraries to connect to the Internet. **SchoolNet** aims to give children the opportunity to use computers and

[6] http://cap.unb.ca/aboutcap/info/
[7] http://www.millennium.gc.ca/project_e.html#17

assures their access to the World Wide Web. The program has become an international model for the US and other countries as part of their learning strategies for the 21st century. [8]

11.2.3. Computers for Schools

Computers for Schools - Working with the provinces, territories, learning institutions, and the private sector, Industry Canada will expand computers for schools to provide 250,000 computers for use in classrooms across the country and extend connectivity to all First Nation schools and communities.[9]

11.2.4. Volnet

Voluntary Sector Network Support Program (Volnet) - Voluntary organizations play a crucial role in the social and economic well being of many Canadians. These organizations employ over 1.3 million people and mobilize over 6 million volunteers across the country. **Volnet** will link 10,000 voluntary organizations to the Internet and to each other, enhancing the technological capacity of the sector to better service the needs of Canadians. **Volnet** will increase voluntary groups' access to computer equipment, modems, network support, and Internet skill development. [10]

11.2.5. CRP

Canadian Rural Partnership - The 1998 Federal Budget confirmed funding of $20 million over four years for the Canadian Rural Partnership (CRP). The CRP is designed to support rural community development by adopting new approaches and practices to respond to rural development issues and concerns. A key component of the CRP is the Rural Dialogue.

"The objective of the Rural Dialogue is to better understand local and regional issues and to identify the appropriate role for the federal government in addressing key rural issues. The Rural Dialogue allows the federal government to engage rural Canadians and listen to their needs. The Rural Dialogue has been designed to facilitate broad participation, while respecting the need for managing expectations. It builds on existing consultation networks and federal government regional infrastructures." [11]

11.2.6. Smart Communities Program

Smart Communities Program - The Smart Communities Program is one component of the Government of Canada's **Connecting Canadians** initiative that aims to make Canada the most connected nation in the world. The program incorporates the advice of the Panel on Smart Communities, which was established by the Prime Minister in **June 1998.** [12]

11.3. Provincial

11.3.1. Electronic Highway Accord

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[8] http://www.millennium.gc.ca/project_e.html#17
[9] http://www.millennium.gc.ca/project_e.html#17
[10] http://www.millennium.gc.ca/project_e.html#17
[11] http://www.rural.gc.ca/dialogue_e.html
[12] http://smartcommunities.ic.gc.ca/program.html

Electronic Highway Accord is:

- an agreement to ensure the new information technologies are available in all British Columbia communities;
- a partnership to help all British Columbians get on-line; and
- a plan for managing the development of the electronic highway in British Columbia[13]

11.3.2. PLNet

PLNet - PLNet is a new telecommunications network that will vastly enhance British Columbia's public education system. A progressive initiative by the provincial government, PLNet gives all public schools, colleges and other institutions throughout BC full access to modern computer networking and communications capabilities. PLNet means learners, teachers and administrators in all BC schools — of location or size — will be able to benefit from a full range of on-line educational and administrative resources. [14]

12. Interviews

12.1. Requirements of Stakeholders

12.1.1. Major Business

12.1.1.1. West Kootenay Power

This Company runs one of the most advanced networks in the region with a fibre based virtual private network that connects all its offices in British Columbia. Also, since it is a subsidiary of Utilicorp United of Kansas City, MO, it must communicate with its head office.

The company has always been a strong supporter of the Kootenay/Boundary and expressed a desire to be part of the telecommunications development process.

12.1.1.2. Cominco

The company uses a Fractional T1 for access to Vancouver. This line is used to transfer large files, access the Internet and also the company's Intranet.

The voice system is separate but they are considering putting them together in the near future. With Telephone Company cost restructuring it is currently cheaper to use Long Distance services than to talk over the leased line (Fractional T1)

To date the company has not started using video conferencing. For a large company it is still a light user of high bandwidth. The connectivity is also used for email.

The company has a central file-processing centre and does a lot of Process Control. There are 1000 workstations connected to their LAN. They do not have a current budget for high bandwidth access.

Head office in Vancouver makes their telecommunications decisions. The Trail office would like to get good bandwidth. The company would also like to participate in a telecommunications committee.

[13] http://www.ista.gov.bc.ca/eha/index.html
[14] http://www.plnet.bc.ca/about/about.html

12.1.1.3. AGRA Simons (formally HA Simons)

This is another example of a company that is utilizing the power of telecommunications. Since the Trail office is a branch of a major engineering firm, they need to be in communication with head office at all times. There is the constant need to exchange large amounts of data and that requires high-bandwidth. The Trail office is connected via fibre optic line to the Vancouver office where it connects to the company's virtual private network. AGRA Simons has many offices like Trail all over the world. Even the office in Chile is part of the network. In some cases satellite technology is used.

12.1.1.4. Trimac

This Company has to be in constant contact with their Calgary head office through their Intranet. As a result of this they too have connected to the fibre network through their own Virtual Private Network.

12.1.1.5. Celgar

Celgar's telecommunications needs are growing. The company expects to need greater bandwidth in the near future. This will pose a problem for them as poor quality phone lines and the lack of fibre services hamper their location. The company has looked into BC Tel's T1 options but the cost vs. performance was poor value. Wireless may be a solution for them.

Celgar would be an active supporter of any telecommunication initiative that would benefit the region. Any upgrade to the infrastructure would save Celgar a considerable amount of money.

12.1.1.6. Slocan Forest Products

Today Slocan Forest Products operates their Local Area Network on a 56K Frame Relay circuit. All Internet access is through dial-up. At present they are unable to run the client server applications they wish to on their circuit, as it is does not supply enough bandwidth. Also they would like to transfer large files. The major reason they haven't upgraded is cost. They are considering a wireless solution if the cost is reasonable.

12.1.1.7. Pacific Insight

At this time, high bandwidth is not a major priority to Pacific Insight. With some upcoming business changes, their requirements may increase. Currently their infrastructure priority is electrical power as a series of recent power outages and surges have caused problems.

They expect to be a $100 Million dollar company within two years. They are interested in seeing continued improvements in telecommunications as they noted services cost more here than in bigger centres.

12.1.2. Mid Size Business

12.1.2.1. Toxco

They are looking to do some data transfer in the future. At the moment they are doing some email and extensive web use. Their web site is hosted and maintained in California, which lowers their need for bandwidth currently. Very interested in voice over IP and realize that with better access they would find ways to use the access. The idea of a CLEC was appealing to the company.

12.1.2.2. KBS

Kootenay Broadcast Systems is part of a large group of BC and Alberta radio stations owned by Telemedia out of Montreal. Recently, KBS switched to a digital format. Music and advertising is broadcast from a sophisticated computer system. Much of the content comes from other radio stations and advertisers.

At this time, the information is received via dial-up modem. In Kelowna, their sister station has cable modem access that is at least 50 times faster for about $20 difference. This is a prime example of how good telecommunications infrastructure can improve business efficiency.

KBS is very interested in supporting telecommunications initiatives.

12.1.2.3. BKR

Boundary Kootenay Radio is an integral part of Sunshine Communications, which provides Cable and Dial-up Internet access to Grand Forks area as well as wireless solutions in Grand Forks, Trail and Castlegar. As part of Sunshine Communications they have high-speed wireless LAN and Internet access, which is routed through Grand Forks.

12.1.2.4. Heatwave

This is a fast growing company that now requires having its server accessible 24 hours a day 7 days a week to collaborate with its other offices. At this time they only have dial-up Internet access but are in the process of purchasing high-speed access. They are looking at Fibre and Wireless solutions. If BC Tel had an affordable high-bandwidth solution, which was provided through an ISP, they would consider it.

The company believes there should be some competition for local telecommunication suppliers. The CLEC model was very attractive to the company.

12.1.2.5. Nelson Daily News

Has a strong need for a high-speed connection. Cable or ADSL access would be a great solution for them. ISDN is too slow and expensive for their requirements. They need to be able to move 40 to 50 Mb files several times a day. The Inability to move these files quickly can impact them economically. Today they are losing advertising revenue because of the inability to successfully download large graphics files from their advertisers.

The company is very interested that KAST is addressing the need for quality telecommunications. They understand the absolute necessity of this for the economic growth of this region.

12.1.3. ISP Plans for Providing High-Bandwidth Solutions

12.1.3.1. Internet Direct

In a recent subscriber newsletter from the President of the company Internet Direct informed their users that they had just signed an agreement with Optel Communications Corporation to supply DSL services up to 7 Mbps. At this point it is unclear whether this will apply to Internet Direct's service in this region.

In another conversation with the company, it was stated that the company is moving towards a one-stop shop for all Internet services. It was admitted that they are reliant on the major Telcos and Cable companies for services. In the same newsletter above, it was disclosed that through the actions of the CRTC cable access is now deregulated giving all ISPs access these networks. The newsletter, however, expressed concern with the likely reaction of the cable companies to delay rollout of this access.

12.1.3.2. Net Idea

The Company did not respond to phone calls or email.

12.1.3.3. Kootenay Net

The Company has plans to offer many bundled services including ADSL, Long Distance, Cellular and Cable as the infrastructure allows it.

12.1.3.4. UNIServe Online

This ISP based in Aldergrove, BC now has the largest Dial-up Internet coverage in the province. They have some plans to develop high bandwidth services in the Kootenay/Boundary region that are being spurred on by the deregulation of cable companies which gives them the ability to provide Internet services over cable. Also, the CRTC has made it easier for ISPs to provide high-speed services by allowing access to the Telephone Company Central Office. The company did not have any firm dates as to when these new services would be available.

12.1.3.5. Sunshine Communications

Sunshine has been providing high-speed cable access (4 Mbps) for over three years to the Grand Forks area. They now have 2 Mbps wireless services to Rossland, Trail and Castlegar and soon Nelson as well. The pricing on this service is $700 per month plus $1500 to install. They will also set up wireless VPN's in those areas upon request. Sunshine has consistently been the first company to provide innovative telecommunications solutions in the region. Sunshine Communications is a driving force behind the success story in Grand Forks.

12.1.3.6. Kaslo Internet Society

This society was formed with the aid of a CAP grant to provide Internet access to a region that had none. BC Tel cannot even provide T1 access to the area. This is a non-profit ISP with sites located in public areas such as libraries and college. There are not enough phone lines in the area to provide good service and they think it is time to look at alternative means of fending for themselves when it comes to

telecommunications. They are wary of regional initiatives that distribute on a per capita basis as small communities have the greatest needs for development but their population is too small to get the funds.

12.1.4. Technology Users

12.1.4.1. Caelo Software

This is a local up and coming software company. Their software will be largely distributed via their Web server. It is expected that prospective customers will download trial versions of the software by the thousands. The company expressed a serious concern about the lack of a hosting company in our area that has redundant network connections. For example, in 1998 a mudslide severed a fibre optic line outside of Castlegar and shutdown all Internet services on BC Tel's network in the Trail, Castlegar, and Nelson corridor. This type of failure would be catastrophic to a company that relies on their web server for customer contact and Ecommerce. They have chosen to host with a major provider outside of the Kootenays. This is another example of how business is lost due to poor and costly telecommunications infrastructure.

12.1.4.2. Kootenay Marketing Group

This company developed and manages the highly successful Discover Nelson web site. This site will soon be providing web-hosting services for upwards of 100 local businesses. Affordable high-bandwidth is very important to ensure that this site can handle the large volume of anticipated web traffic. Kootenay Marketing Group is highly supportive of telecommunications initiatives in the region.

12.1.4.3. Chamber of Commerce Members

Since the Chambers of Commerce represents a large number of businesses that we could not reach individually, we gathered information about them in three ways:

1) Interview with the District Director
2) Group presentation/discussion with Chamber Managers
3) Survey of Members

Below are the results.

District Director - The BC Chamber of Commerce has created an award winning web site to promote BC Ecommerce. See www.e-commercebc.net. For the most part, the members still need to put up their own web site first and aren't that knowledgeable about the Internet or telecommunications. The BC Chamber feels it is ahead of the game at this point. Not sure if the local businesses would support another type of telephone company like a CLEC. It is difficult for small business to find the time to take a look at this kind of opportunity.

Group Presentation/Discussion – The chamber managers from Castlegar, Trail, Montrose, Nelson, Salmo, and Rossland attended a presentation on the importance of telecommunications in the region. After a brief presentation there were a number of thoughtful questions asked and a general atmosphere of interest. Most of the Chambers then proceeded to send out the Information Highway and the Future of Your Business Survey. You can find the questions and the results in the table below.

Survey Results – The survey was sent to about 400 chamber members and 42 responses were received. The survey demonstrated a high use of Internet for business with 86% of respondents using the Internet at work. Most of the businesses thought of themselves as having an intermediate understanding of telecommunications. 50% were very interested in supporting a Telecommunications initiative and the majority was willing to pay for services. Most were willing to pay a maximum of $50 per month although a

couple of respondents realizing the impact that proper telecommunications could have on their business were willing to pay $500 or $1000 per month. When asked if they would support a community based telephone company, 50% wanted more information and 40% were in favour with 10% not. To see the actual survey results go to Appendix F

12.1.5. Municipalities

12.1.5.1. Overview

For this survey, it was deemed important that input be sought from mayors to get an understanding of state of telecommunications awareness in their community. Here are the results for the cities & towns that were reached.

12.1.5.2. Greenwood

Greenwood has an impressive set-up for a small town. It won CAP Grant (see Initiatives for details on CAP) to put in a 20-station computer training facility. They currently have about 200 students enrolled. The facility's students come from Grand Forks and the surrounding area, to be trained in office applications. They would like to access the fibre optic line that runs right through Greenwood, however, it is too expensive. If they had affordable access to the fibre, the local cable company could then provide high-speed Internet access. Greenwood is very supportive of any local regional initiatives that would improve this situation.

12.1.5.3. Grand Forks

This City is documented thoroughly under Model Communities as the most advanced city in the region. They are very proud of what they have accomplished and are quite aware of the importance of an advanced communication system. The Mayor sees Grand Forks taking a leading role in any regional communications initiatives. He understands that what is healthy for the region is healthy for each part of the region.

12.1.5.4. Rossland

Rossland City Council has met, unsuccessfully, with both BC Tel and Shaw Cable to try and negotiate improved communication services. In this matter BC Tel gave them the "cold shoulder." They have informed BC Tel that Rossland will not be left behind in the matter of telecommunications. Rossland needs advanced communications ability in order to attract businesses to develop Red Mountain, which in turn would greatly increase tourism.

Both the economic development office and the Chamber of Commerce have complained to City Council about the poor telecommunications service in the city. Rossland City Council has requested a presentation on the concept of a CLEC, as they are interested in controlling their own telecommunications future.

12.1.5.5. Trail

The City of Trail thinks that we must work as a region to get the telecommunications infrastructure we want. They asked that a presentation be made to council to educate them on the best way to proceed. They know that advanced communications is a serious economic development factor. It was

recommended contact be made with Columbia Basin Trust to encourage their support for the project. They would be interested in sitting on a committee to promote infrastructure improvements.

12.1.5.6. Fruitvale

The major concern for Fruitvale is the lack of cell phone coverage. While a big supporter of BC Tel, the mayor sees that if BC Tel cannot supply the service we need, then we need to do it ourselves.

12.1.5.7. Castlegar

The mayor felt we should talk to the city's Chief Administrative Officer for this interview. The CAO said that access to fibre at an affordable price is a necessity. There are a lot of SOHOs, mostly consulting firms, which are starting up in Castlegar. Affordable access for these companies is important. High-speed access is also important for the hospital in order to do medical tele-imaging. Many of their schools still need better connections to a proper educational environment. They would like to be involved in future planning.

12.1.5.8. Nelson

This interview was with the Mayor and the CAO. One of their major concerns for Nelson was how to pay for telecommunications upgrades. They do not believe that there is sufficient business demand to warrant bringing in these services. They would like BC Tel to come to the table to explain BC Tel's position. They prefer to work from a local perspective before a regional one.

12.1.5.9. Kaslo

Kaslo lost a significant opportunity to move a 20-person company from Calgary. The phone lines were too poor. This opportunity is still available should upgrades happen. Very supportive of a CLEC model or anything we can do to shape our future. Would like the city and him to be put on the list for support of any telecommunications initiative.

12.1.5.10. Silverton

Their biggest need is for cell phone coverage and access to emergency services after 4:00 p.m. After 4:00 p.m. their emergency calls go to Nelson. A 911 system would be a big improvement. They would like to have teleconferencing and videoconferencing ability for regional meetings to reduce travel costs and save time. Small villages have a problem paying for any service improvements due to their small tax base. Money for capital improvements must be allocated carefully. They need clean water before advanced telecommunications. They can't even afford a grant from Columbia Basin Trust, as they can't meet their one third cost commitment.

12.1.5.11. New Denver

There have been some improvements to the phone system in the past few years. These improvements have led to an increase in business. An engineering firm has moved in and several others have indicated that their business has increased as a result of the improvements. Would like to get involved in any co-operative venture to improve accessibility, but like Silverton cost is a factor due to their small tax base.

12.1.5.12. Nakusp

People are having trouble getting phone lines in Nakusp. Like the rest of this area cell phone coverage is extremely important and unavailable. The phone lines are very poor for dial-up Internet access. In some outlying areas they still have party lines. The mayor is a Columbia Basin Trust board member and they have been looking as advocates to see whom they could work with to make telecommunications better in this area. There a people who want to move to Nakusp for the lifestyle but won't because of poor telecommunications. Very supportive of the idea of a CLEC and was strongly interested in the Ashland model (see model communities).

12.1.6. Education

12.1.6.1. School Districts

12.1.6.1.1. Overview

It is the opinion of the authors of this study and many in the educational field that School Districts have been, in part, hampered with the PLN initiative being forced upon them. PLN is a program costing "$123 million over six years to provide K to 12 and post secondary students with equitable access to educational opportunities and resources. ($98.2 million of this will be spent on the K-12 system) The expenditure will cover the cost of telecommunication services required to connect all schools and post secondary institutions as well as the cost of a 6-year contract with EDS Systemhouse, which will provide client consultation, a provincial help desk, and network management service. This expenditure represents a significant increase over the current level of telecommunications expenditures of all educational institutions."[15] It should, however, be noted that without PLN some school districts would still have no connectivity as for them there were few, if any, alternatives.

While it may be argued that this initiative is, by connecting the schools to the Internet, fulfilling the Provincial Government's mandate, the bandwidth provided is overpriced and badly underpowered. A kindergarten student's attention span is insufficient to wait for web pages to open at the speeds PLN provides. Most elementary schools have expensive 56K frame relay services that, with multiple students accessing, are slower than the average home dial-up service.

While he was not critical of PLN, a key point made by Denny Kemprud (see Grand Forks under Model Communities) was the need to understand that school districts should participate in the development of high–speed Internet services in the communities and available to the communities they serve.

The PLN network utilizes redundant Government Network Access points and does not share the network with the community or local ISPs. This approach isolates the school from the community making the community fund its requirements separate from the huge investment that the school district could make. This is counter to the very design of the Internet.

12.1.6.1.2. School District 20

This district is connected through a combination of many different connection types:

- 56 Kbps Frame Relay for elementary schools
- 128 Kbps Frame Relay for District Office
- T1 Frame Relay for JL Crowe and Rossland Secondary

[15] http://www.plnet.bc.ca/about/funding.html

- 112 Kbps Frame Relay for Beaver Valley Middle School
- 6 schools are running on 64 Kbps ISDN and 4 schools on shared fibre T1s.

Even at the elementary school level, speed is very frustrating. Kids are at an age where it is impossible to keep them patient while waiting for web pages to load. To add to this problem their teachers are often technologically illiterate so that it becomes even more important that labs work smoothly, which at present they don't.

12.1.6.1.3. School District 10

School districts and colleges have come together to act as one voice. The big issue is that the current switching capacity does not allow access to fibre in many communities like Nakusp. Even though fibre is there, it will remain dark (fibre uses light to transfer data) until proper switches are put in place. It was suggested that the reduced governmental training travel would help pay for the extra costs. The acting Superintendent has initiated discussions with Industry Canada on the possibility of a single CAP grant to cover the entire region to upgrade these switches. BC Ministry of Education would support such an initiative. A regional approach is necessary. There is a need to find a mechanism to bring people together for regionalization.

12.1.6.1.4. School District 51

This school district has been mentioned multiple times in this document as the most innovative in the region. Please refer to Grand Forks under model communities.

12.1.6.2. College

12.1.6.2.1. Selkirk College

The College has a Virtual Private Network utilizing fibre between campuses in Castlegar, Trail, Nelson and Grand Forks. At this time just data travels over the network but there are plans to also carry voice between city campuses. There is a West Kootenay/Boundary regional educational group formed to ensure communication between schools and the college. Recently the college applied for a $5 million grant for the creation of a Smart Community (see Smart Communities under Initiatives). The college has been actively involved in the West Kootenay Telecommunication Consortium who meets every two months to promote improved telecommunications. This group would be much stronger if it worked with other groups who had a similar agenda.

12.1.6.3. Skills Centre

12.1.6.3.1. Greater Trail Community Skills Centre

Distance learning is the next priority for the Skills Centre. The new model, which is required for more technical training, needs a combination of audio and visual with two-way interaction. This service requires a minimum bandwidth the equivalent of a T1 (1.544 Mbps) or higher. This would allow students to live here and take courses from SAIT for example. The new multimedia lab is already in need of increased bandwidth to meet student needs.

12.1.7. Health

12.1.7.1. Overview

The main telecommunications issue for health is having the necessary bandwidth to transmit images in real time. For example, a doctor in a clinic Nakusp needs to be able to transmit ultrasound images to Trail Regional Hospital as the images are being produced in order to consult with a specialist there.

12.1.7.2. Health Councils

12.1.7.2.1. Greater Trail

Trail Community Health Council – Margarita Loyola – Director of Information Systems, Trail Regional Hospital - They are in the process of installing wireless between all Trail CHC sites. They are connected to ITSD's (Provincial Government) Regional Network Centre via a 128K ISDN connection to Trail Regional Hospital.

They will be doing some remote analysis of patients. For example, ultrasound images can be sent between hospitals to capitalize on the expertise available throughout the province or country making better use of the specialists.

The CHC is interested in participating in a telecommunications forum.

12.1.7.2.2. Boundary Health Council

They are looking for high-speed connections to transfer tele-radiology images. To do this the council requires minimal downtime and high-bandwidth. They have investigated fibre optics but it is too expensive. Would like to see all of Grand Forks wired with fibre optics.

12.1.7.2.3. Nelson & Area

It is not a big issue for them to get bandwidth. The government has supplied them with T1s.

13. Expert Advice and Support

This expert advice section is made up of a number of interviews with companies who develop and sell advanced telecommunications products and services. When interviewed, they were presented with the current status of telecommunications in this region and asked for their recommendations. Please note these companies would all stand to profit by selling their products and services to this region.

13.1. Corporate Advisors

13.1.1. Shaw FibreLink and Shaw Cable Systems

These two companies work together to provide backbone and last mile services. An office located in Cranbrook now supports the region and reports back to head office in Calgary. Shaw's services cover a good portion of the region with Rock Creek to Grand Forks and the area north of Nelson being the major exceptions.

In one year or less, Shaw will have its @HOME and @WORK services running on its fibre and coaxial cable network. To speed this process up and ensure the region gets its needs met, Shaw suggested putting together a proposal that includes a clear description of what it required, the time frame for completion and how much investment the region would contribute. The company noted that while it is a large company, it does have the ability to make quick decisions but it has to have something concrete to work with.

Comments: Shaw has been very successful in Calgary, Victoria and Kelowna. It's quality of service is very high and bandwidth excellent for the price. With the exceptions noted above, the company has substantial infrastructure in the region that can be leveraged to keep costs low.

13.1.2. Nortel Networks

Nortel is one of Canada's greatest high technology success stories. With over 80,000 employees around the world and sales to 180 countries Nortel is a force to be reckoned with. Nortel, with the exception of its support of BC Tel, is not active in the region.

Nortel prefers to build a solution from the application level. For example, in New Brunswick, Nortel was a driving force behind the development of the call centre industry. In the Kootenay/Boundary the virtual call centre, for example, may be an ideal application to justify the cost of building the network.

Nortel is a one-stop solution provider. They have the ability to provide everything from hardware to legal advice to financing. The key point they made is that the region would need to work as a whole to afford the technology.

Nortel needs the co-operation of an existing utility company to install the fibre. Companies like West Kootenay Power and BC Tel are ideal partners as they already have the right-of-ways and the poles in place.

Nortel stated that the models in use today are already way behind. An example of this is distance learning. In today's model, most distance learning is being conducted on networks that only have T1 (1.544 Mbps) speeds. This is insufficient bandwidth to accomplish real-time interactive distance education. Nortel is looking at supplying OC3 (155.52 Mbps) speeds for this application.

The company suggested:

- The region start with a business plan of what it wants to accomplish and bring that document to Nortel to discuss the options available.
- It's going to require visionary municipal, regional and provincial governments as well as big business to glue this all together.

Comments – Nortel has more resources and experience than any other company interviewed for this study. A partner such as this, if affordable, would guarantee ongoing state of the art telecommunications for this region. A further benefit is that Nortel is a Canadian company experienced in finding solutions for Canadian problems.

13.1.3. Group Telecom

Group Telecom is a Vancouver based CLEC. They would consider providing their services to the region if there was a supportable business case. They would have to use BC Tel's infrastructure, as would any CLEC. Also, they strongly suggested adding a wireless component to leapfrog the limitations of the existing copper infrastructure and avoid just being another "me too" region.

The company stated that BC Tel is not going to have the funds for remote areas as there is too much demand on their resources from more heavily populated areas. The business case is too hard for them to support.

Comments – Second generation wireless technology is still too expensive for last mile solutions that include small businesses and home users. When third generation wireless products come online sometime in the next one to two years this hurdle will be overcome.

The advantage of working with this type of company is they already have CLEC status. This eliminates the time wasted and avoids the legal red tape necessary to obtain CLEC status.

13.1.4. Paradyne

Paradyne is a leading manufacturer of DSL communication equipment. The company suggested a telecommunications model that utilizes BC Tel's copper infrastructure and DSL technology. This combination is fully capable of providing affordable high bandwidth solutions using what is already in place. It is however, limited to 7 or 8 kilometres of copper wire from the DSLAM (Digital Subscriber Line Access Multiplexer) to the home or office. Note that this service must be routed through the local central office or remote switch.

Paradyne suggested the concept of a Community CLEC. To make this model work, the first place to start is by getting the local municipal government and school districts on side. In Ontario, the Hydro Company has involved the community to put together a community based non-profit network. Hydro companies are one of the most important partners in a community since they have the marked right of ways. In some cases they are willing to become a CLEC themselves.

The benefit of a CLEC is the opportunity to take on the local Telephone Company. The costs can be reasonable if you know whom to work with. The Community CLEC model will get a lot of people coming over from the Telephone company. All telecommunication services can be provided by a CLEC. This includes local dial, long distance and data services.

To justify this model, there are many applications that should be looked at such as medical services, entertainment strategies and distance learning. As with Nortel, Paradyne is able to offer assistance with both network design and financing.

Comments – While DSL services are a good intermediate source of high bandwidth they do suffer from distance limitations that pose difficulties for rural communities. The advantages however are that it is low cost and with the recent BC Tel upgrades described under "Review of Existing Telecommunications Infrastructure" 88% of the region is now DSL capable. Paradyne would not be the all-encompassing partner that Nortel would be, but they would be ideal for a low cost immediate solution.

13.1.5. Lucent

Lucent is a spin-off company from AT&T that develops and sells high-end telecommunications equipment. Lucent is a direct competitor of Nortel Networks. The company expressed strong interest in working with the region. To get started they requested an email outlining where we are today and where we wish to be tomorrow.

Comments - The email was sent but the company did not respond in time for the completion of this study. Much of what was said in the Nortel Interview can be applied to the way Lucent would tackle our issue. Lucent's new wireless Publan and Campus products (described under Model Communities – Telegraph Creek) may revolutionize the industry by allowing for communication from any device anywhere within the

broadcast area. The cost is about $500 per node for up to 11 Mbps transfer rates. Wireless also eliminates the need for expensive wiring and cabling of traditional systems.

13.1.6. BC Tel

The company is rolling its new ADSL service out in September of 1999. The service will only be available in the Lower Mainland, Okanagan and Kamloops areas. There will be three levels of service, 1.5 Mbps residential, 2.5 Mbps business and 4.0 Mbps business. The whole process requires the installation of a DSLAM into a fibre based Central Office. A microwave signal will also work.

The priority list is based on demand. Rolling these services out is labour intensive. They have partnered with some ISPs to speed up the process.

It was clearly stated that the Kootenays would be left behind as, “why put the same money into a small area when you can invest in a major and get better return.”

Comments – These comments are to be expected from the sales and marketing division of any major telephone company that has to answer to shareholders for bottom line profits. On another note, in this region, the local BC Tel engineering staff started budgeting for and construction of a network capable of supporting ADSL services three years ago. As mentioned elsewhere in this report, this region is now 88% capable of supporting DSL services and the engineering staff should be commended for their foresight.

13.1.7. AT&T

AT&T is focused on supplying services to 20 of the countries largest cities. It will be a very long time before anything will be done in this area. They are currently selling off their residential services, as they prefer to be in long distance and data services. The economics of building service is what it comes down to. There is not enough business in the region to justify their investment.

The company commented that getting ADSL from BC Tel is the most cost efficient way to proceed. As a plan B, the region should be looking at coaxial cable. There is far greater capacity on coaxial cable than on telephone copper wire and it is now capable of delivering local dial tone. AT&T’s purchase of TCI and Microsoft’s investment in coaxial cable technology will ensure its future viability.

It is better to stay away from AT&T and work with the companies that are already in the area. It may be a good idea to get network access from the US, say Spokane WA, because of the huge bandwidth there.

Comments – Obviously this is a company that cannot assist the region. The comments on the capability of coaxial cable demonstrate its potential in the future. Network access from the US could be a good idea if the CRTC were to allow voice services. At this time, the authors of the study understand that to provide local dial tone the CLEC must obtain its network connection from a Canadian carrier.

13.1.8. The Internet Centre

This company has been promoting the idea of circumventing the Telephone companies’ xDSL services by creating independent DSL access services. This is accomplished by, purchasing a high-speed line from the Phone Company and then ordering a copper connection to the customer from the independent DSL access site. They believe that it is much better to have to maintain control of the equipment and addressing space. Also, using wireless communications in some areas may be a great add-on solution.

Comments – This model could be a great starting point for the region. It is relatively cost effective (approximately $25,000 per DSLAM). The downside to locating DSL services outside the central office is it reduces the total distance that can be covered and when in remote switch areas, availability of equipment space and copper wiring could be difficult.

13.2. Special Advisors

13.2.1. CRTC

Accessing telephone company central offices is restricted to CLECs and with specific restrictions, ISPs. Therefore, this status must be obtained if the region wants to control its own telecommunications. If services aren't available, it is possible to demand a price from BC Tel but the price they give may be outrageous.

There are initiatives for rural areas to have access to the information highway, such as the Provincial Government's Electronic Highway Accord, which could provide funding to offset the telephone company's costs. It was recommended that the region ask about a cost sharing arrangement to obtain services that would not be installed otherwise.

Comments – The CRTC has managed to open up a number of avenues for alternative services. One major issue however is that there are no regulations that force the Telcos to supply unregulated services at a reasonable cost.

13.2.2. Susan Crichton

In this study, Susan represents the issues of remote areas of the region. She lives in New Denver where she and her partners have a backcountry ski business and she also works as a teacher. As someone who has been deeply involved in the issues of rural education as well as other issues that affect rural communities such as emergency services and business communications, she is well qualified to comment on these issues.

Why is the Canadian government working in Nepal and Bangladesh to install cell service before ensuring its own rural areas such as the New Denver area are supplied with the same service? The government must be an agent for its people first. She is not supportive of the CRTC. Six years ago, she wasted two years of her time petitioning the CRTC to get toll free dialling for her area. It was not successful until the government became involved.

As far as education is concerned, the schools in this district have very poor access. BC Tel seems to be uninterested in the area. Access, where available, is limited to 56K dial-up service at the elementary school level. The high school in Nakusp got a T1 that PLN was going to put into the board office but the school board insisted it go to the high school instead.

Search and Rescue is an important service in the remote areas of the province. Companies that offer backcountry adventures, and individuals, are unable to safely venture in the remote parts of the province if they are unable to communicate with search and rescue services in the event of an emergency. As an example she pointed out the time it took to respond when Michelle Trudeau was swept into the lake by an avalanche near Kokanee Glacier. Because there is no cell phone coverage in that area, someone had to walk out to make contact.

One of the major growth industries in BC is the tourism business. This is particularly true in the Kootenay/Boundary region. This business cannot continue to grow without a proper telecommunications infrastructure. Due to the lack of phone lines in outlying areas, simple services that we take for granted such as electronically verifying a credit card are not available. There have been times where the snowfall

is so deep that the potential customers could not even reach them on radiophone. It's hard to run a business where they customers can't reach you.

Susan justifies the expenditures necessary to build this remote infrastructure through the enormous dollars that are coming out of the region to the provincial government's coffers. Historically the Kootenays have been one of the major sources of revenue for the government. The government heavily promotes "Supernatural BC" and talks about the money the backcountry pours into the economy but yet turns a deaf ear when it comes to essential communication services. The viability of the communities in the region depends on these services. (See Appendix A)

Susan would like to see more visioning sessions in the near future, such as the KAST session that occurred in June 1999.

13.2.3. Okanagan High Tech Council (OHTC)

Recently, the OHTC completed a similar study to this one for the Okanagan. Unlike the Kootenay/ Boundary region, it demonstrated that lots of strong local competition was going to ensure that the region was not left behind. They pointed out that high-speed wireless communication was expected to greatly reduce the overall infrastructure cost and that a central antenna in the community may be a great solution.

The comment was made that it is very important to get the community mobilized to pay attention and get them interested. They must be told that they will be left behind if they don't involved and start talking with public sector users. For example, Lumby BC, when the major employer left town 145 people were put out of work. A lifeline-learning centre was established through a CAP Grant. Various electronic training courses are delivered through the centre. Part of this program involved creating community access sites to the Internet.

13.2.4. College of Rockies

The College, along with their partners, Rocky Mountain School District, Kootenay Lake School District, Southeast Kootenay School District, Regional Health Council and Hospitals, Tembec/Crestbrook Forest Industry, East Kootenay Science Council, Elk Valley Mines and others, commissioned a similar study to this one in 1998.

It was strongly suggested that the college already have several interested partners who could be advantageous to the Kootenay/Boundary region if the region takes a perspective that includes all of the Kootenays and therefore seeks a solution that encompasses all of the Kootenays. However, the East Kootenays are different from the Kootenay/Boundary in their ability to organize and cooperate with each other to promote the good of the region as a whole.

Their study focused on the actual hardware in place and the services available at that time from BC Tel. As such it provided a valuable reference for them and the process of bringing that study together provided a focus for the region as a whole. Due to lack of funds, the study was not able to look to the future.

The college is looking into wireless connectivity at present and they are also upgrading their landline to an E10 (10 Mbps) this fall. They are working with PLN to see if they can begin using streaming video.

14. Recommendations

14.1. Overview

The authors of this report are presenting two separate recommendations. The first recommendation is the most thorough and has the highest potential to meet the goals of the region. However, it will take longer to implement and will likely cost more initially. The second recommendation allows for a faster start up with a minimal investment. However, it reduces the region's control over its infrastructure and will be more costly in the long run. It will be up to the region to decide which approach is preferred.

The starting point for both recommendations is the same.

1. Form an Executive Telecommunications Committee For the creation of the Kootenay Boundary Communications Network (KBCN). This committee will be made up of knowledgeable and enthusiastic stakeholders. In the process of conducting this study, the authors have uncovered a number of suitable candidates, whose names will be submitted to KAST for follow-up.
2. Executive committee identifies and appoints proper representation for all significant parties affected by telecommunications, to form the KBCN committee. The Executive Committee must take special care to ensure the KBCN board membership does not include anyone currently employed in the telecommunications industry. However, the KBCN board should have available to them a list of advisors from the industry. These advisors should be, where possible, chosen from local industry.
3. The KBCN's mandate is to ensure the region gets the telecommunication infrastructure it needs to meet short and long-term goals.
4. KBCN committee chooses either Option 1 or Option 2

14.2. Option 1

14.2.1. Short Term (0 to 1 Year)

5. KBCN Committee creates a Telecommunications Vision Plan that identifies short and long-term goals, incorporating long-term goals into short-term goals. The plan must include:
   - Discussions with the East Kootenays to see if there is a common vision that can be shared for a larger, more powerful and influential telecommunications network
   - A means to go beyond any technology chosen in the short-term plan
   - Technology that is upgradeable, or at least transferable, for use within the KBCN.
   - A goal to have affordable (less than $150 per business and less than $50 per home) high bandwidth services running throughout the region in under twelve months.
   - A means to provide sustainable funding to meet future requirements
6. KBCN tenders an RFP to source the best-qualified solution to begin building the KBCN. Current providers (i.e. BC Tel and Shaw) should be encouraged to take part in the RFP. No exclusions should be put on who can bid on the RFP.
7. KBCN works with RFP winner to assemble budget requirements for the infrastructure upgrades or replacement.
8. KBCN and RFP winner source funding to meet short-term requirement for infrastructure upgrades or replacement.
9. RFP Winner implements short term plan

14.2.2. Long Term (over 1 year)

10. RFP winner implements long term plan at end of year one or earlier if possible

The authors of this study recommend that the committee outlined above operate on the Carver model. It should to set the ends (goals) and then let the contractor provide the means to meet those ends. The committee should not interfere in the day-to-day operation of the enterprise but instead provide a framework from within which the contractor will operate.

14.3. Option 2

14.3.1. Short Term (0 to 1 year)

5. Contract with consultant to write a short-term telecommunication plan to meet one-year requirements and long term requirements. This will require meeting with various levels of government and regional organizations to seek out funding options.
6. Plan A – Approach BC Tel in search of a partnership agreement. The company has the largest amount of infrastructure that can be upgraded in the shortest period of time. These discussions will involve investment, from sources discovered in step 1, to attract BC Tel. . Plan B – If there is no partnership agreement with BC Tel, approach Shaw and other Cable companies working in this region to put in place a similar partnership agreement in order to cover as much of the region as possible. This would include wireless solutions, from a vendor such as Sunshine Communications, for those areas not covered by cable.
7. If the above is not possible go to recommendation 1.

14.3.2. Long Term (over 1 year)

8. Review the long-term Telecommunications Vision Plan that takes control of the regions telecommunications needs.
9. Review the impact that the short-term plan had on the region. This is necessary to aid in planning future funding.
10. Begin implementation of long term plan

14.4. Authors Opinion

It is the opinion of the authors of this report that Option 1, as stated above, is the correct manner in which to proceed. It is the best option for guaranteeing long-term sustainability of infrastructure as well as accountability. This option presents the best possibility for having management of, and responsibility for, the region's telecommunications infrastructure put in the hands of a company, or organization, that has a vested long-term interest in this region.

14.5. Funding Options

14.5.1. Provincial

The Electronic Highway Accord is specifically designed to level the electronic playing field for all communities in British Columbia.
See Provincial Programs under Initiatives

14.5.2. Federal

A suggestion was made to approach Industry Canada to create a region wide CAP grant for upgrading the infrastructure. Industry Canada has indicated an interest in this idea.

See Federal Programs under Initiatives

14.5.2.1. Municipal

As each municipality in the region will benefit from upgrades they should be approached to contribute an agreed upon share of the total budget. The formula arrived at should take into account the limited financial resources of the small municipalities and the fact that their infrastructure costs are higher.

14.5.2.2. Other

Economic development is part of the mandate of the Columbia Basin Trust (CBT). As no other single initiative would contribute as much to long term economic growth, as a state of the art telecommunications infrastructure would, the CBT should be approached to help finance this project. CBT dollars should be leveraged with other funding sources to maximize the return.

14.5.3. Private Industry

Private industry is by far the quickest road to acquiring funding for profitable areas of the region. They should be approached for cost sharing, with government funding sources being utilized to ensure outlying small municipalities are included. For example, there is no need to use the limited grant funds available to fund Trail, Castlegar and Nelson. These cities should have a profitable market base that would attract private funding. Small municipalities however will need government funds, as they would otherwise be unprofitable for private industry.

14.6. KAST's Role

KAST's role will be the assembly of the executive committee for the KBCN
Similar to the Kootenay Product Development Fund, the KBCN should become a separate entity overseen by KAST

14.6.1. Overview

The authors see KAST as providing the initial stimulus for this operation but not managing the ongoing operations. Since a telecommunications project of this size will require a highly focussed team the authors feel that the KBCN must be a separate entity from KAST to ensure its success.

14.6.2. Immediate Actions

14.6.2.1. October 15th

Release study to public
Assemble KBCN Executive Committee (see attached recommended list)

14.6.2.2. October 29th

Confirm that full KBCN board has now been appointed and that their first meeting has been scheduled.

14.6.2.3. November 15th

KBCN becomes its own entity similar to the Kootenay Product Development Fund
KBCN begins search a full time manager.
KAST or other funding sources to allocate 1 year funding for staff and office.

15. A Vision of the Future

15.1. The future's so bright you've got to wear shades

Here's the picture – our subject is a 50 years old International Marketing professor. She has a 20-year-old son attending the University of Toronto. She lives in Rossland and teaches at the University of British Columbia.

Shortly after she wakens she sits down at her computer and videoconferences with her son, before his first class of the day. She notices he appears paler than normal. Taking concern over this she opens another channel to an online medical clinic and conferences in a physician. After a visual examination and some well-placed questions the doctor reassures her that her son is only suffering from the normal stress of exam time at the university. By now it is 7:30 AM and she does not have to teach her first class until 10 AM.

She goes off to meet a friend at the local coffee house for a continental breakfast. While walking there, to meet her friend, she receives an email from a student asking her to schedule a private videoconference. With a click of a button her PDA (personal digital assistant) automatically schedules the student, at a time convenient for all, and notifies the student of the appointment. Through the wireless IP network, that covers the entire Kootenay Boundary region, the PDA also synchronizes the schedule with her home computer. Joining her friend in the restaurant she tells her PDA that she does not wish to be disturbed. The PDA relays that information to her home network, which then takes all incoming requests (data, voicemail, email, and conference mail) and schedules appropriately according to pre-set rules.

Arriving home 30 minutes before her first lecture she scans the outline for the class and makes certain she has all her presentation material. Today's class is a particularly difficult subject that will require multiple tools to ensure the students grasp the material. Five minutes before the class starts she comes online to see how many students are in the physical lecture hall and how many have joined the online lecture hall. She has full control of the audio-visual capabilities of both the real lecture hall and the online hall to enable her to control who is able to speak at any given time. She can see all the students and they can see her. At 10 AM she calls the class to order and begins with a 3-minute video presentation then switches to lecture. The lecture consists of a full range of multi media and virtual reality presentations.

After the lecture she finds she cannot resist the new powder on Red Mountain and goes skiing. She just reaches Paradise Lodge when her PDA reminds her that she has a scheduled private meeting, which she forgot about. Using the PDA's IP phone function she keeps her meeting (less the video) and relays information through her home system to the student.

While still enjoying the fine powder on Granite she uses her PDA to inform her home system to order the groceries from the list generated earlier by her system. She arrives home at 4:30 PM to find her groceries waiting at her door. While cooking dinner she replies to emails and other messages received while she was out using the voice recognition function of her access terminal in the kitchen. At the same time her home system is playing her favourite music from a site off the Internet.

After dinner she takes a couple of virtual tours, of the wine country in France, in preparation for her vacation this summer. Afterwards, using her digital TV's remote control she orders an online movie. After the movie she reviews her calendar for the following day and retires for the night.

While she sleeps her personal network performs many functions on her behalf co-ordinating her schedule with University activities as well as with her private life. It seeks out data off the World Wide Web that will be of use to her research and relieves her of the time consuming task of co-ordinating routine events.

All of the above is possible, not tomorrow, but today. What it requires is a proper telecommunications infrastructure. With enough bandwidth a whole new world of possibilities and opportunities is opened. The above scenario can be accomplished today using 3rd generation wireless networks for the PDA and a dedicated high-speed connection to the Internet.

16. Glossary of Terms

Glossary

ADSL	Asymmetric Digital Subscriber Line – a technology that allows data to be transmitted over regular telephone company copper wires at speeds ranging from 640Kbps to 2+Mbps – effectiveness is dependent on the distance from the TelCo's Central Office or remote switch
ATM	Asynchronous transfer mode - a fast transmission protocol based on hardware rather than software. It is a packet switched network that uses 53 byte packets (48 bytes data and 8 bytes overhead) – the small packet size allows for very fast transmission rates up to 13 Gbps
Backbone	A larger communication line that smaller ones feed into. A good analogy would be the body's veins and arteries. Smaller blood vessels (lines) merge into veins (small backbone), which in turn merge into arteries (telecommunications backbone). The main backbone pipes are very large such as OC-256
Bandwidth	A measure of the amount of data – usually measured in bits per second – which can be passed across a network connection in a specific period of time. The larger the amount of data that needs to be moved the greater the amount of bandwidth is needed to move it in the same period of time as a smaller amount of data.
Cable	Co-axial cable. This is the same cable that delivers your cable TV signal. It is capable of very high-speed data transfer.
CAP	Community Access Program
CLEC	Competitive Local Exchange Carrier – competition for the ILEC's that have come into being with the deregulation of the telephone industry. CLEC's have full access rights to the ILEC's infrastructure.
Client Server Applications	Refers to the relationship between two computers where one computer (client) requests information from another computer (server). An example would be when you use your computer to access your bank records. The banks computer is the server yours is the client.
CRP	Canadian Rural Partnership
CRTC	Canadian Radio and Television Commission – the regulatory body that governs telecommunications in Canada
Data	Information – generally in digital form – being transmitted
Data Pipeline	Refers to the wires ("pipes") that carry data through the networks. The bigger (or "fatter") the pipeline the more data can be carried.
DSLAM	Digital Subscriber Line Access Multiplexer - a device that terminates multiple DSL connections in the telephone companies Central Office and from there puts them out onto the high speed backbone
Ecommerce	Electronic commerce – the exchange of goods or information over a network for money. This can include buying off the net or business-to-business transactions, for example.

Fibre	Optical fibre – flexible glass lines that carry data transmitted via light waves. Capable of carrying much more data than copper wire or cable. The upper limit of fibre's carrying capacity has yet to be determined.
Frame Relay	Frame relay puts data in a variable-size unit called a frame and leaves any necessary error correction (retransmission of data) up to the end-points, which speeds up overall data transmission
Gigabit	1,000,000,000 bits (1 billion)
Hosting Company	A company that supplies Web hosting. When a person or company needs a server to locate their web site on a hosting service is chosen.
ILEC	Incumbent Local Exchange Carrier – the original telephone companies before deregulation. BC Tel is an example of an ILEC.
Infrastructure	The underlying framework of lines and equipment that makes up the network
Internet	A collection of computer networks throughout the world made accessible through a common series of protocols. The Internet is the "net of nets" – it ties all the publicly accessible networks together into one big network.
Intranet	A private network contained within a corporate Local Area Network that offers features similar to the Internet.
IP	Internet Protocol – the means by which data is transferred from one computer to another over the internet
ISDN	Integrated Services Digital Network – a dial up or dedicated connection that requires a special adapter on both ends. Speed is either 64Kbps or 128 Kbps.
ISP	Internet Service Provider – most peoples access point to the internet. A company that provides users with access.
ISTP	Internet Service Telephony Provider – a business that allow users to send voice signals over the Internet via IP packets thereby avoiding most long distance charges.
KAST	Kootenay Association for Science and Technology. A catalyst for advancing technological development to revitalize and diversify the West Kootenay Boundary regional economy.
Kilobit	1,000 bits (1 thousand)
Last Mile	The distance between the network access point and any device that is connected to the network. E.g.: ISP to home modem
Local Area Network	A network of computers (workstations) connected to a main server that shares its processing power and resources with the workstations. In a local area network all common data is stored on the server where it is accessible by all users on the network.
Mb (Megabyte)	1,048,576 bytes or 8,388,608 bits
Megabit	1,048,576 bits
Modem	A device that translates the digital signal from a computer to an analog signal that can be transmitted over an ordinary phone line.
Network	Any series of points, or nodes, connected via some form of communication
Node	Any discrete point or a device on a network
PLN	Public Learning Network
Redundant Network Connection	Refers to networks having multiple connections to the backbone from different providers so that if one provider fails the network will remain intact.
SAIT	Southern Alberta Institute of Technology
SDSL	Single-line DSL that can provide 1.544 Mbps speeds in both directions on a standard duplex line.
Server	A computer dedicated to storing electronic files and those with permission to use the network can access these files. Also a program that provides services to other computer programs on the network.
SOHO	Small Office Home Office – the new wave in business. As corporations

	downsized many people went into business for themselves from their houses or small offices. In some cases this can be a “virtual” office
Telecommunications	Any communication carried out over phone, fax, radio, video, data carried over a network
VDSL	Very high data rate DSL –limited to short distances of less than 300 metres but with very fast data rates between 51 and 55 Mbps
Video Conferencing	The exchange of two way video signals between two points on the network in order to enable real time two way video transmission
Virtual Call Centre	Uses IP Telephony and other advanced telecommunications to connect people from anywhere through a central switchboard. For example a customer could call Ajax Inc.’s 1-800 support number and reach an operator in Los Angeles who would the route the call to someone, who could be anywhere in the world, that is best able to handle the problem. This allows people to work from their homes.
Virtual Private Network	VPN is a set of protocols that allow two or more computers on a public network to form a private network by creating “tunnels” between the nodes that are not visible to the public network.
Web Server	A computer dedicated to hosting websites
Web Site	A series of documents written in HTML (Hypertext Markup Language) that when viewed on the internet with a web-browser appear as coherent formatted text
Web Traffic	The amount of data flowing through a web-server, from the server to the clients accessing the server via a web browser.
Web Hosting	To have a web site on the internet it must be hosted on someone’s server. A web server is a computer that is dedicated to the task.
Wireless	Data signal usually broadcast over the radio frequency or infrared frequency spectrum.

17. Appendices

17.1. APPENDIX A - Regional Statistics

Changing Demographics of Greater Trail

	1971	1981	1986	1991	1996
School Age 0 - 19	38.2%	30.6%	28.9%	27.4%	27.1%
Labour Force Age 20 - 64	54.4%	57.6%	56.5%	55.7%	55.9%
Seniors 64+	7.4%	11.8%	14.6%	16.8%	17.1%
Total Population 100%	23,020	22,940	20,320	20,313	20,508

1991 Census

Most Significant Emplyoment Sectors

Sector	Employees	% of Total
Manufacturing	1,915	21.5%
Retail	1,260	14.2%
Health/Social Services	1,025	11.5%
Education	700	7.9%
Accomodations	625	7.0%
Mining	600	6.8%
Government	480	5.4%
Construction	420	4.7%
Utilities/Communications	375	4.2%
Finance/Insurance	285	3.2%
Business Services	230	2.6%
Wholesale	210	2.4%
Transportation	200	2.3%
Forestry (logging)	125	1.4%
Real Estate	110	1.2%
Agriculture	90	1.0%
Other	235	2.7%
Total Employed Workforce	8,885	100.0%

1991 Census

Occupational and Gender Profiles

Occupation	Males	Females	Employees	% of Total
Clerical	210	1,155	1,365	15.4%
Services	515	810	1,325	14.9%
Processing	725	50	775	8.7%
Managerial/Administration	530	245	775	8.7%
Health	110	590	700	7.9%
Fabrication/Assembly	615	45	660	7.4%
Sales	315	335	650	7.3%
Construction	560	25	585	6.6%
Natural Sciences/Engineering	405	60	465	5.2%
Teaching	115	320	435	4.9%
Transportation	250	10	260	2.9%
Machining	150	20	170	1.9%
Mining	140	10	150	1.7%
Forestry (logging)	120	5	125	1.4%
Equipment Operation	110	10	120	1.4%
Social Services	40	80	120	1.4%
Farming	70	20	90	1.0%
Art/Literature	45	35	80	0.9%
Religion	25	10	35	0.4%
Total Employed Workforce	5,050	3,835	8,885	100.0%

1991 Census

Greater Trail area employers with 100+ employ

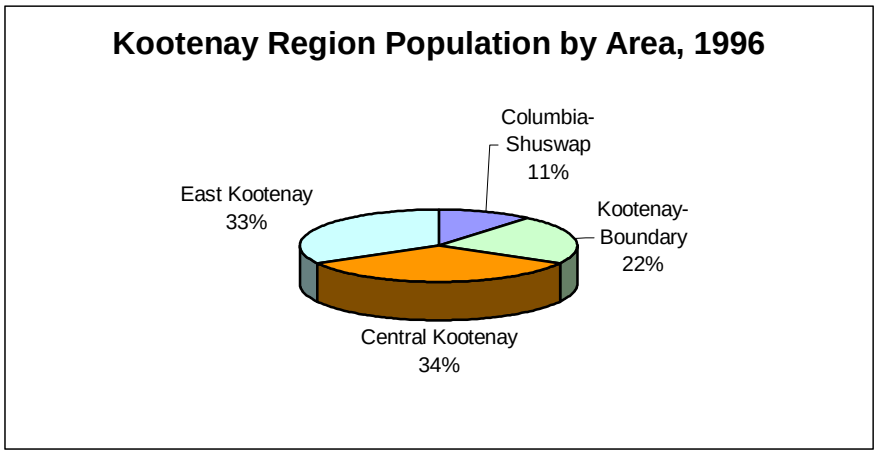
Cominco	1,850
Trail Regional Hospital	520
School Dist./Selkirk College	440
Atco Lumber	100
Local Governments	200
WK Power	160 locally 140 dependant contractors
Emcon	140
KSCU	128
Red Mountain Resorts	120
H.A. Simons	105
Terra Nova Hotel	80 to 100

Regional District Central Kootenays

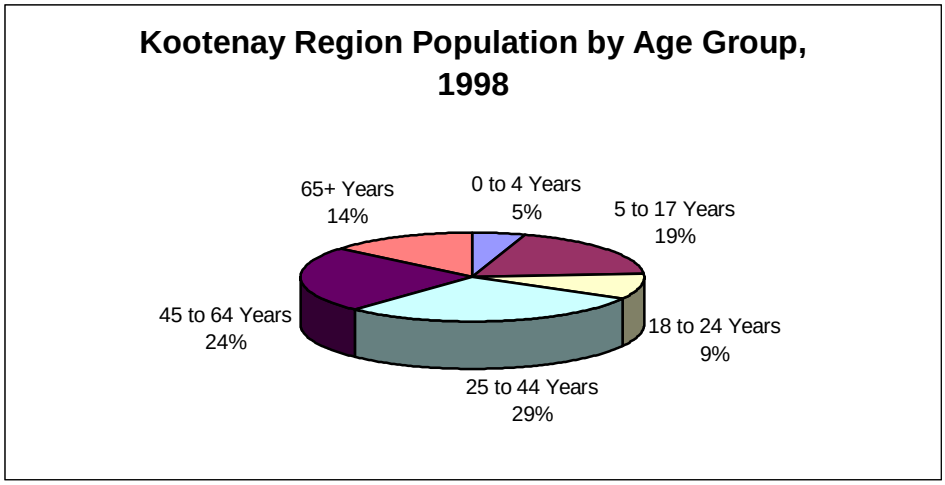
CITIES	**1996**
Castlegar	**7,027**
Nelson	**9,585**
TOWNS	
Creston	**4,816**
VILLAGES	
Kaslo	**1,063**
Nakusp	**1,736**
New Denver	**579**
Salmo	**1,202**
Silverton	**241**
Slocan	**335**
ELECTORAL AREAS	
A	**2,095**
B	**4,901**
C	**1,472**
D	**1,596**
E	**3,854**
F	**3,533**
G	**1,573**
H	**4,460**
I	**2,507**
J	**3,527**
K	**1,997**
Total	**58,099**

Regional District Kootenay Boundary

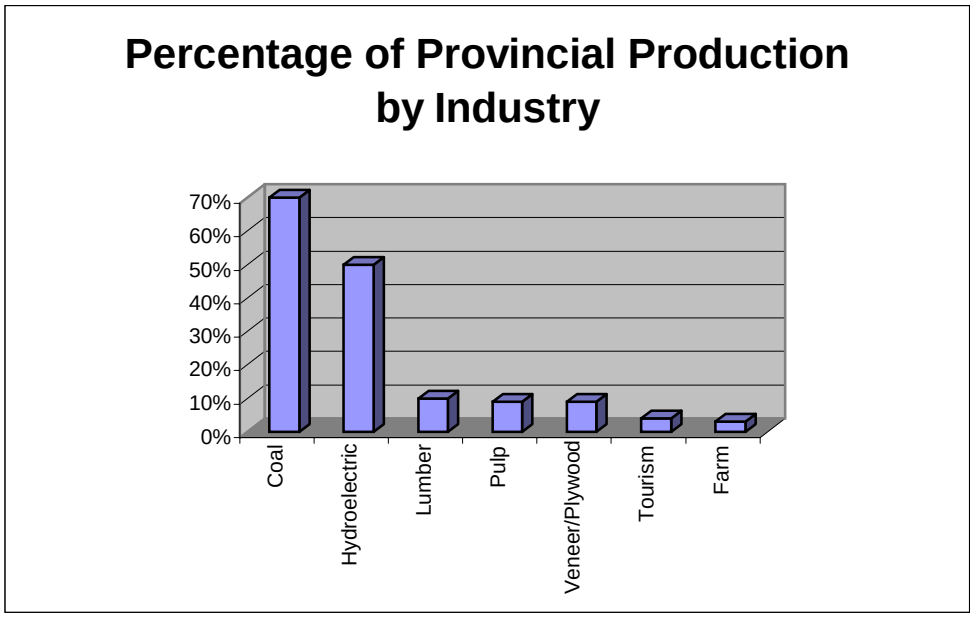
CITY	96 Population
Grand Forks	**3,994**
Greenwood	**784**
Rossland	**3,809**
Trail	**7,696**
Villages	
Fruitvale	**2,117**
Midway	**686**
Montrose	**1,137**
Warfield	**1,788**
Electoral Areas	
A	**2,339**
B	**1,622**
C	**1,408**
D	**3,390**
E	**2,136**
TOTAL	**32,906**



The following chart breaks down the population of the Kootenay Region by age groups. It is very important to note that only 9% of the population falls into the 18-24 years age group. This group is the most important group for the future growth of the region. One of the central ideas reflected in this report is that the growth of the telecommunications infrastructure in this region will encourage companies that require high-speed services to relocate here. These companies typically consist of a high percentage of employees in the 18-30 years age group.



The following chart represents the percentage of provincial production generated in the Kootenay Region in critical industries. For example, 70% of provincial coal production originates in the Kootenays. Another way to view this is 70% of provincial revenues derived from coal production originate in the Kootenays. Thus, while the Kootenays may only have 4% of the Province's population we apparently supply more than 4% of the provincial coffers.



17.2. APPENDIX B - Telecommunication line speeds

Type of line or technology	Speed	What it's carried on	Application
GSM (Global system for mobile communications)	9.6 to 14.4 Kbps	RF- Radio Frequency (wireless transmission)	Mobile phone voice services

HCSD (High-speed circuit-switched data service)	56 Kbps or less	RF- Radio Frequency (wireless transmission)	Mobile phone services
General Packet Radio System (GPRS)	56Kbps to 114 Kbps	RF- Radio Frequency (wireless transmission)	Next generation of mobile phone technology – just coming on line now
Enhanced Data GSM Environment (EDGE)	384 Kbps	RF- Radio Frequency (wireless transmission)	Next generation of mobile phone technology – ready in about 1 year
Satellite	400 Kbps (DirecPC)	RF- Radio Frequency (wireless transmission)	home and small business usage
Universal Mobile Telecommunications System (UMTS)	2 Mbps or less	RF- Radio Frequency (wireless transmission)	Next generation of mobile phone technology – ready in about 1 year)
Plain Old Telephone System (POTS)	56 Kbps or less	Copper twisted pair	Dial up internet access
56K Frame Relay	56 Kbps	Various	Dedicated business line or small ISP
DS0	64 Kbps	All	The base signal on a channel in the set of Digital Signal levels
ISDN	BRI - 64 Kbps <single channel> to 128 Kbps <dual channel> PRI - 23 (T-1) or 30 (E1) addressable DS0 channels (64kbps) plus control channel; 1.544 Mbps (T-1) or 2.048 Mbps (E1)	BRI: Copper twisted pair PRI: T-1 or E1 line	BRI (Basic Rate Interface) is used for faster home/small business access PRI (Primary Rate Interface) is used for larger businesses such as ISP's
Frame Relay	56 Kbps to 1.544 Mbps	Copper twisted pair or coax	Used to connect LANs and WANs for large companies as well as backbone connections for ISPs
DS1 or T-1	1.544 Mbps	Copper twisted pair or coax and fibre optic	Used to connect LANs and WANs for large companies as well as backbone connections for ISPs
E-1	2.048 Mbps	Copper twisted pair or coax and fibre optic	European T-1 except with 32 DS0 channels
DS2 or T-2	6.312 Mbps	Copper twisted pair or coax and fibre optic	Large company or ISP to Internet backbone

Digital Subscriber Line (DSL)	512 Kbps to 8 Mbps	Copper twisted pair	Home, small business, dedicated access using existing copper infrastructure
E-2	8.448 Mbps	Copper twisted pair or coax and fibre optic	4 multiplexed E-1 signals
Cable Modem	512 Kbps to 11Mbps (52 Mbps at the ISPs end)	Coax to Ethernet	Home, business, school access
Ethernet	10 Mbps	10Base-T (twisted-pair) 10BASE-2 or -5 (coax) 10BASE-F (fibre)	Local Area Networks (LAN)
E-3	34.368 Mbps	Copper twisted pair and fibre optic	16 E-l signals
DS3 or T-3	44.736 Mbps	Coax	ISP to telecommunications backbone and also used for some parts of the Internet backbone
OC-1	51.84 Mbps	Fibre optics	ISP to telecommunications backbone and also used for some parts of the Internet backbone
Fast Ethernet	100 Mbps	100BASE-T4 (copper twisted pair) 100BASE-FX(optical fiber)	Workstations with 10Mbps Ethernet connections
T-3D or DS3D	135 Mbps	Fibre optics	ISP to telecommunications backbone and also used for some parts of the Internet backbone
E-4	139.264 Mbps	Fibre optics	4 E3 channels
OC-3 or STM-1	155.52 Mbps	Fibre optics	Large company backbone Internet backbone
E-5	565.148 Mbps	Fibre optics	Carries 4 E4 channels
OC-12 or STM-4	622.08 Mbps	Fibre optics	Internet backbone
OC-24	1.244 Gbps	Fibre optics	Internet backbone
OC-48 or STM-16	2.488 Gbps	Fibre optics	Internet backbone
OC-192 or STM-64	10 Gbps	Fibre optics	Telecommunications Backbone
OC-256	13.271 Gbps	Fibre optics	Telecommunications Backbone

17.3. APPENDIX C - Table of ADSL Services Capability

Arrow Park	**Y**	**Midway**	**Y**
Balfour	**Y**	**Montrose**	**Y**
Beasley	**N**	**Nakusp**	**Y**
Belleview	**N**	**Needles**	**N**
Birchbank	**Y**	**Nelson**	**Y**
Birchdale	**Y**	**New Denver**	**Y**
Blueberry Creek	**Y**	**Oasis**	**Y**
Bonnington Falls	**Y**	**Passmore**	**Y**
Box Lake	**N**	**Patterson**	**Y**
Brilliant	**Y**	**Queens Bay**	**Y**
Burton	**N**	**Robson**	**N**
Casino	**N**	**Rock Creek**	**Y**
Castlegar	**Y**	**Rosebery**	**N**
China Creek	**Y**	**Rossland**	**Y**
Christina Lake	**Y**	**Salmo**	**Y**
Cooper	**Y**	**Shutty Bench**	**N**
Crescent Valley	**N**	**Silverton**	**Y**
Fauqier	**N**	**Slocan**	**Y**
Fraser	**N**	**Slocan Park**	**N**
Fruitvale	**Y**	**South Slocan**	**Y**
Genelle	**Y**	**Taghum**	**N**
Graham Landing	**N**	**Thrums**	**N**
Greenwood	**Y**	**Trail**	**Y**
Grand Forks	**Y**	**Vallican**	**Y**
Hall	**Y**	**Waneta**	**N**
Hills	**Y**	**Warfield**	**Y**
Howser	**Y**	**West Demars**	**Y**
Johnsons Landing	**Y**	**Willow Point**	**Y**
Kaslo	**Y**	**Winlaw**	**N**
Kinnaird	**Y**	**Ymir**	**N**
Lardeau	**Y**		
No Fibre Available until next year			
Shoreholm	**N**		
St. Leon	**N**		
Halcyon Hot Springs	**N**		
Galena Bay	**N**		

17.4. APPENDIX D - CLEC Obligations

COMPETITIVE LOCAL EXCHANGE CARRIER (CLEC) OBLIGATIONS

	CLEC OBLIGATIONS	✓
1.	Obtain at least one Central Office code (NXX) for each Incumbent Local Exchange Carrier's (ILEC) exchange in which it provides services. (Para 23)	
2.	Treat CLEC-generated calls between ILEC exchanges where ILEC toll charges are applicable as toll calls for contribution payment purposes. (Para 23)	
3.	Share equally the costs of interconnection trunks (required only within a given ILEC exchange) and Common Channel Signaling 7 (CCS7) links. (Para 27 and 28)	
4.	File interconnection agreement to implement no. 3, above. (Para 27)	
5.	Designate one switch or establish a point of interconnection (POI) as its gateway for the purposes of interconnecting to other local exchange carriers (LECs) operating in that exchange. (Para 32)	
6.	Provide a CCS7 POI in each Numbering Plan Area (NPA) in which it provides service. (Para 40)	
7.	Exchange minimum set of CCS7 message types. (Para 41)	
8.	Provide advanced notification of changes to network-to-network interfaces and be prepared to conduct technical tests of the proposed changes with all of the carriers to which it is interconnected. (Para 45)	
	ENTRY OBLIGATIONS	✓
9.	File proposed tariffs for interexchange equal access and justify any departure from the terms and conditions contained in ILEC tariffs. (Para 190)	
10.	File proposed tariffs providing for Wireless Service Providers (WSP) interconnection that are equivalent to the terms and conditions contained in the ILEC tariffs, justifying any departure therefrom. (Para 192)	
11.	Ensure that the end-users it serves are able to have direct access, under reasonable terms and conditions, to services provided by any other LEC serving in that area. (Para 206)	
12.	File intercarrier tariffs for the provision of subscriber listings to LECs that contain rates capped at the rates approved for ILECs. (Para 227)	
13.	File tariffs for services provided to other LECs and intercarrier agreements. (Para 279)	
14.	Include provisions for reciprocal technical interconnection in tariffs and agreements, as appropriate. (Para 282)	

15.	Implement local number portability. (Para 282)	
16.	Provide 9-1-1 service and Message Relay Service (MRS). (Para 286)	
17.	Required to satisfy all existing and future regulatory requirements designed to protect customer privacy. These include (Para 288): • Delivery of the privacy indicator when invoked by an end customer; • Provision of automated universal per-call blocking of calling line identification; • Provision of per line call display blocking to qualified end customers; • Disallowance of Call Return to a blocked number; • Enforcement of the Commission's restrictions on Automatic Dialing-Announcing Devices, Automatic Dialing Devices, and unsolicited facsimiles applicable in the ILEC territory where they operate; and • Provision of universal Call Trace.	
18.	Required to abide by Commission rules regarding confidentiality of customer information established in Review of the General Regulations of the Federally Regulated Terrestrial Telecommunications Common Carriers, Telecom Decision CRTC 86-7, 26 March 1986, as amended by Telecom Order CRTC 86-593, 22 September 1986 and as modified from time to time. (Para 289)	
19.	Make serving area maps available upon request at its business offices. (Para 291)	
20.	Provide the following information to consumers, upon request (Para 292): • Local calling area boundaries; • Details of all service options, with applicable prices; • Details of all potentially applicable service charges; • Policy on access to enhanced service providers; • Available special needs services; and • Information respecting privacy, including the company's responsibilities with regard to protecting the confidentiality of customer records.	
21.	Provide the following information to customers, prior to contracting for service (Para 293): • Billing frequency and payment policy; • Disconnection policy; • Security deposit policy; • Policy on directories; • The name and address of the company providing service to the customer; • A toll-free telephone number from which the customer can obtain further information or lodge a complaint; • Billing date; • Due date for payment; • Interest rate applicable to late payments; • 9-1-1 service and MRS information, including customer charges, if any; • Information on company obligations with regard to customer safety and privacy protection.	

22.	Any future obligation arising from the proceeding on provision of billing information and billing inserts in alternative formats. (Para 294)	
	ENTRY PROCEDURES	✓
23.	Attest in writing that it understands and will conform to the obligations set out in Decision 97-8 and provide a map of its proposed serving area to the Commission. (Para 295(1))	
24.	Serve the documentation filed with the Commission pursuant to paragraph 295(1) on all other Canadian carriers providing service in exchanges where the CLEC is proposing to provide service, and all other persons who have proposed to provide service in compliance with these entry procedures. (Para 295(2))	
25.	File its proposed interconnection agreements and tariffs for Commission approval. (Para 295(3))	
26.	Provide the Commission with all of the customer information identified in paragraphs 291, 292, 293 and 295 of Decision 97-8. (Para 295(4))	
	OTHER OBLIGATIONS	✓
27.	Contact the Canadian Numbering Administration Consortium with regards to number administration. Your contact: Mr. Hugh Hospodar Secretary Canadian Numbering Consortium Inc. Blake, Cassels and Graydon 45 O'Connor Street 20th Floor Ottawa, Ontario K1T 1A4 Voice: (613) 788-2203 or (613) 788-2224 (Mr. Garry Gessop) Fax: (613) 788-2247 Email: heh@blakes.ca or gg@blakes.ca.	
28.	Participate in the Local Number Portability Consortium. Your contact: Mr. Scott Fletcher Secretary Canadian LNP Consortium Inc. Gowling, Strathy & Henderson 160 Elgin Street Suite 2600 Ottawa, Ontario K1P 1C3	

	Voice: (613) 233-1781 Fax: (613) 563-9869 Email: fletches@gowlings.com	
29.	Participate in the Central Fund Administration Consortium. Your contacts: Progestic International Inc. CFA Division C/o Mr. Al DeCaigny Central Funds Administrator 310 Broadway Suite 600 Winnipeg, Manitoba R3C 0S6 Voice: (204) 925-7864 Fax: (204) 925-7866 Email: al.decaigny@progestic.com Mr. Stephen Whitehead Secretary Canadian Portable Contribution Consortium Inc. 275 Slater Street Suite 1700 Ottawa, Ontario K1P 5H9 Voice: (613) 236-3882 Fax: (613) 230-6423 Email: whitehead@johnstonbuchan.com	
30.	Notify the Commission once the requirements imposed on CLECs in Telecom Decision CRTC 97-8, Local Competition, 1 May 1997 have been satisfied. The notification should include a description on how the CLEC obligations have been satisfied along with a reference to the relevant Commission determinations. Serve a copy of the notification on other local exchange carriers, on the Central Funds Administrator and on the three consortia.	

Users of this table are reminded that this table is an unofficial document which is intended as a convenience only, not to be relied upon as an official version of Decision 97-8.

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17.5. APPENDIX E – BC Tel Advanced Services

Below are listed some of the more advanced services available from BC Tel, followed by an explanation of what those services are.

City	Centrex	Micro Link	DD56	Mega Link	DEA	Home ADSL	Bus ADSL	DNA DSO	DNA DS1	DNA DS3	MEGA RTE DS1	MEGA RTE DS0	MEGA STREAM
Balfour	Y					N	N	Y		Y	Y	Y	N
Castlegar	Y		partial	partial		N	N	Y		Y			N
Christina Lake						N	N						N
Duncan Lake						N	N						N
Fauqier						N	N	Y				Y	N
Fruitvale	Y		partial			N	N	Y	Y				N
Genelle	Y		Y			N	N						N
Grand Forks	Y	partial		partial		N	N	Y	Y		Y	Y	N
Greenwood						N	N	Y	Y				N
Kaslo	Y					N	N	Y	Y			Y	N
Midway	Y					N	N	Y	Y				N
Nakusp	Y					N	N	Y				Y	N
Nelson	Y	partial	partial	partial	partial	N	N	Y	Y		Y	Y	N
New Denver	Y					N	N	Y	Y				N
North Nelson	Y		Y			N	N	Y	Y		Y	Y	N
Rock Creek						N	N						N
Rossland	Y					N	N	Y	Y		Y	Y	N
Salmo	Y					N	N	Y	Y				N
Slocan						N	N	Y	Y				N
South Slocan	Y					N	N	Y	Y			Y	N
Thrums	Y					N	N						N
Trail	Y	partial	partial	partial	partial	N	N	Y	Y		Y	Y	N
Trout Lake						N	N						N
Vallican						N	N						N

17.6. Services Available from BC Tel

MICROLINK

Microlink services are based on the Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI) standard. Microlink provides digital transmission of information between the Company's serving central office and compatible terminal equipment located at the customer's premises. Microlink provides a switched end-to-end, digital service utilizing existing twisted pair, non-loaded, metallic local loop wiring. The digital local loop carries two 64 kilobits per second (Kbps) B channels and one 16 Kbps D channel. The B channels are used for voice and/or data telephone calls. The D channel is used for call control and related features for the B channels. The D channel may also be used for low speed packet data (at extra cost to the customer). For packet data applications the D channel is connected to packet switched data networks (i.e. Datapac)

DD56

Datadial service is non-featured digital service between the customer's premises and a suitably equipped DMS 100, GTD-5 and some selected remote switches. The service provides a single 7-digit directory number and access to the local Public Switched Telephone Network (PSTN)/Digital Switched Network (DSN) at data transmission speeds up to 56 Kbps.

MEGALINK

It is a DS-1 based digital local access service with the ISDN PRI interface standard between the customer's CPE and the central office's switch. It allows integrated access of the PSTN, Inbound and outbound Long Distance services plus Virtual private Network service. Megalink supports voice, data and image applications at 64 Kbps per DS-0 channel up to DS-1 (1.544 Mbps) speed. ISDB PRI Standard supported by BC Tel: NI-1 and NI-2 for DMS switching office, NI-2 for GTD5 and 5ESS switching offices. Megalink access loop uses Clear Channel/Out of Band signaling technology: ESF for framing, and B8ZS for line code.

DEA

Digital Exchange Access or DEA is a BC Tel service offering that connects Customer Premises Equipment (CPE) to the PSTN. This service provides a standardized digital interface typically between a PABX and a central Office. The access is provided on a DS-1 basis (1.554 Mbps), which is subdivided into 24 usable channels (DS-0's at 64Kbps). At the present time the channels associated with a DEA DS-1 may only be used to access the PSTN.

ADSL

ADSL (Asymmetric Digital Subscriber Line) technology provides high –speed transmission of digital information over a regular telephone line at speeds 50 to 100 times faster than a standard modem. It enables a regular residential or business telephone line (1R, 1B or the pilot number of a residential or business multiline) to accommodate both voice (analog) and data on the same line, thus allowing users to phone and surf simultaneously. Customers gain the capability to transmit voice and data at the same time using the same phone number associated with the residential or business telephone line. ADSL technology is asymmetric in that it uses most of the channel to transmit downstream to the user and only a small part to receive information from the user. The ADSL services available through BC Tel Advanced Communications (BCTAC) provide customers with upstream connection rates of up to 640Kbps and downstream connection rates of up to 4Mbps depending on the ADSL service offering to which the customer has subscribed.

17.7. Services Available from BC Tel Advanced Communications

DNA DS0

DNA DS-0 was initially introduced as a connection into the Megaplan family in conjunction with Megaplan Service Extension Feature, later known as Basic Service Extension (BSE). DNA DS-0 provides access from the customer's premise to the Serving Central Office into the IX network, and provides low-speed access for MSEF and other services such as Hyperstream.

DNA DS1

DNA DS-1 Access Service provides for the digital transmission of information from the customer's premises to the Serving Central Office. Although a DNA DS-1 access has a maximum line rate of 1.544 Mbps this rate is not accessible to customers. 8 Kbps of this is always utilized by BC Tel for framing and signalling purposes. Instead customers have two transmission rate options available to them when subscribing to DNA DS-1 Access Services:

1.344 Mbps (24 channels x 56Kbps) – usually provided

1.536 Mbps (24 channels x 64 Kbps) – This is the maximum throughput available to the customer.

1.536 Mbps is provided only if the customer subscribes to the Clear Channel signalling (B8ZS) option under the Special Assembly Tariff.

DNA DS3

DNA DS-3 provides up to 44.736 Mbps digital transmission capability from the customer's premise to the Serving Central office (Wire Centre) to connect with other network services such as Megaroute, Hyperstream and Advantage Vnet. DNA DS-3 is ideal for high-volume users and allows the consolidation of DS-1 access services over a single channelized DS-3 access facility.

MEGAROUTE DS1 and DS0

Megaroute service is furnished for point-to-point digital transmission of information at 1.544 Mbps (DS-1 capacity) between two service points within an exchange (INTRA-exchange), or on an INTER-exchange basis. Channel capacity may be required to accommodate such overheads as signalling and supervision.

MEGASTREAM

Megastream is an Inter-Exchange ONLY, point-to-point service offered between rate centres designated as Megastream serving areas. The service provides digital transmission capacity on a channelized basis at ds-0 level (64 Kbps nominal) (DS-1, DS-2 or DS-3 rates may apply) and may be used for integrated voice, data and image/video applications. PSTN access is usually via Digital Exchange Access (DEA) or FX or Centrex.

17.8. APPENDIX F - Telecommunication Survey Results

The following questions were asked of the Chamber of Commerce members:

1) Do you use the Internet today for:

2) When it comes to Business Telecommunications, would you consider yourself a:

3) If you were aware of a Telecommunications initiative that would greatly help the future of business in our area how interested would you be in supporting it:

4) How committed would you be to such an initiative?

5) If the best solution for our community is a community based telephone company that is able to offer you Local Dial, Long Distance, High Speed Internet, Voice over Internet, Video Conferencing and more, for equal or less money, would you switch from B.C.Tel?

6) What is the maximum per month you would be willing to pay for Internet access 50 times faster than a 56K modem?

The answers we received are listed below:

Telecommunication Survey Results

	Business	**Home**	**Voice**	**Don't Use**	**Other**
Question #1	36	29	3	3	1
	Novice	**Intermed.**	**Expert**		
Question #2	13	26	5		
	Very Interested	**Somewhat Interested**	**Undecided**	**Not Interested**	
Question #3	21	13	5	2	
	Invest Money	**Pay For Use**	**Volunteer Time**	**Support It**	**Ignore It**
Question #4	4	29	8	7	3
	Yes	**No**	**Tell Me More**		
Question #5	17	5	21		
	$50	**$100**	**$200**	**$500**	**$1,000**
Question #6	22	5	4	2	1

17.9. APPENDIX G - Telecommunication Technology Overview

17.9.1. Overview

There are many different means by which your telephone calls and data are carried around the world and delivered to other computers and telephones. Each method has its advantages and its disadvantages. Some have become quite outdated. In terms of "last mile" solutions (that is the connection between the end user and the telecommunications backbone) there are only a few connection methods to be considered. For home users and SOHO users there are options such as dial up access, ISDN, ADSL, cable modem and wireless. Large businesses can access Frame Relay, ATM and bi-directional satellite. If you wish to know more about these connections read the following section and see "Telecommunication line speeds" in Appendix B.

17.9.1.1. Telecommunication Backbone

17.9.1.1.1. Frame Relay

Frame Relay operates between 56 Kilobits per second (Kbps) to 1.544 Megabits (Mbps) per second. It is a wideband telecommunication service designed for cost-efficient data transmission for intermittent traffic between local area networks (LAN) and between end-points in a wide area network (WAN). Frame relay puts data in a variable-size unit called a frame and leaves any necessary error correction (retransmission of data) up to the end-points, which speeds up overall data transmission. Frame Relay is mainly used for data transmission and is available throughout BC.

17.9.1.1.2. ATM

ATM operates between speeds of 155 Mbps or 13Gbps. Asynchronous Transfer Mode (ATM) moves data via “packets”. When data is transmitted via ATM it is broken down into packets (or cells), Each packet contains 48 bytes of data and 5 bytes of address information. Every packet is independent of all others as it contains all the information needed – in that 5 bytes – to get to where it is going and to be re-assembled in the correct sequence. This means each packet can travel a different route through the network to arrive at the same end if necessary. This makes the transmission of data very fast and efficient and is ideal for real time video transmission as well as Voice over Internet Protocol (VOIP). ATM service is only available where fibre optic lines are available and appropriate switches are in place.

17.9.1.2. Last Mile Solutions and Bandwidth

The "last mile" refers to the connection from your home or business to the telecommunications network. The problem really lies with the last hundred yards or so. Many homes have two types of lines -- one for phone and one for cable TV. Either one is capable of providing fast access to the Internet for our computers. Below are the current last mile solutions.

17.9.1.2.1. Coaxial Cable

Data is supplied over coaxial cable between 300 Kbps to 10Mbps. This is the same cable that brings television signals into the home. While the data transfer rate is high it is also quite variable. The more nodes (connections) a cable company connects to each Ethernet segment the lower the overall data transfer rate for each node.

17.9.1.2.2. Copper Wire Solutions

17.9.1.2.2.1. Dial-Up

Dial up connections operate between 9.6 Kbps to 56.6 Kbps, while the most common, are the least efficient means of electronic data transmission. In current use we have modems that range from 9.6Kbps to 56.6Kbps (download only upload is a maximum 33.6Kbps). A modem takes the digital output from a computer and translates it to an analog signal that is then transmitted through the telephone system. At the receiving end that analog signal is then retranslated into a digital signal, by the receiving modem, for the computer. At this point the data may be passed to a Frame Relay or ATM network by the receiving modem (If you are dialling up an Internet Service Provider, for example) in order to move it to its ultimate destination. This is a slow and inefficient method. Also, it is very prone to errors due to line noise and other factors that further slow the speed of transmission due to the necessity of re-transmission of data for error correction.

17.9.1.2.2.2. ISDN BRI & PRI

ISDN BRI (Integrated Services Digital Network, Basic Rate Interface) operates on 2 channels at 64Kbps per channel. Both channels may be utilized for a total maximum throughput of 128 Kbps. It is a set of international standards for the digital transmission of voice and data over ordinary telephone copper wire. ISDN BRI can be either dial on demand or a full time dedicated connection. Until recently it was the fastest connection available from home. It is distance sensitive, which means that to get ISDN service you must be within approx. 6Km of the telephone company’s CO (Central Office). ISDN PRI (Primary Rate Interface) operates at 1.54 Mbps and

offers 23 digital channels plus 1 signalling channel. This service is a dedicated connection to the CO and may be used for a combination of voice and data.

17.9.1.2.2.3. Frame Relay

Typically used to deliver a high-speed line, such as a T-1 (1.54 Mbps) or a partial T-1 to a Local Area Network (LAN) or to an Internet Service Provider's (ISP) Ethernet which dial up users can then connect to.

17.9.1.2.2.4. xDSL

There are many versions of xDSL (Digital Subscriber Line) available. These versions include DSL, ADSL, SDSL and VDSL. They can transmit data at speeds up to 8Mbps (52 Mbps with VDSL) downstream to the user and up to 1Mbps (2.0 with VDSL) upstream. However for the purposes of this report we only need to concern ourselves with ADSL (Asynchronous Digital Subscriber Line) as that is the most common and widely used form. ADSL has a downstream rate ranging from 1.5 to 6 Mbps with an upstream rate of 640Kbps.

17.9.1.2.3. Fibre Solutions

17.9.1.2.3.1. ATM

Similar to Frame Relay except it can handle a much higher data transfer rate. It can supply data at rate up to 400 times faster than Frame Relay can. ATM is more expensive than Frame Relay due to the higher capacity of the lines. With both Frame Relay and ATM the telephone companies charge both a monthly connect fee plus an added fee for transmission of data over a set limit. For example: they might charge $20 per gigabyte (Gb) over a 16 Gb limit.

17.9.1.2.4. Satellite

Unidirectional satellite transmission can provide a very good transmission rate but it is only affordable if it is unidirectional. Downstream rate is between 2 and 3 Mbps. Upstream is through the dialup modem access, which is limited to 128Kbps at best with ISDN. Satellite transmission stations are very expensive to set up and transmission fees are also quite high. This makes satellites a poor last mile solution for all but large companies that can justify those costs.

17.9.1.2.5. Wireless

Wireless transmission of data and voice is one of the fastest growing sectors of telecommunications. All major telecommunications hardware companies are rolling out new products continuously. While currently wireless is still a relatively expensive option with some technical limitations the prices are rapidly falling and some of the limitations are being overcome.

17.9.1.2.5.1. Point to Point

Point to point refers to the transmission of a signal via radio transmitter from one transmitter to a dedicated receiver. For example: sending data from one building to another to avoid the use of telephone lines.

Point to Point can deliver a signal ranging from 2.5 miles to 30 miles depending on the speed at which data is to be transferred and the type of antennae used. Speed can currently range up to around 11 Mbps with increases to 30 Mbps expected shortly

17.9.1.2.5.2. Point to Multi-Point

Point to Multi-point refers to the transmission of a signal via radio transmitter from one transmitter to multiple receivers. For example: cell phones.

An example of this would be Lucent Technologies PubLan ™, which is undergoing public Beta trials right now. In this type of network the transmitter is located in a place where it can broadcast to a very large area. Speeds can reach 11 Mbps and the network is accessible from anywhere inside the range of the transmitter and the client can be seamlessly passed from one transmitter to another.

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