



**INFRASTRUCTURE - BROADBAND/CELL COMMITTEE
MEETING AGENDA**

May 23, 2017

9:00 a.m.

Committee Room, Cariboo Regional District

Suite D - 180 North Third Avenue

Williams Lake, BC

Pages

1. CALL TO ORDER

(The meeting is scheduled to commence at 9:00 a.m.)

1.1 Adoption of Agenda

That the agenda items be adopted as presented.

2. ADOPTION OF MINUTES

2.1 Minutes of the Infrastructure - Broadband/Cell Committee Meeting - February 8, 2017

1 - 2

That the minutes of the Infrastructure - Broadband/Cell Committee meeting, held February 8, 2017, be received and adopted.

3. DELEGATIONS

3.1 9:30 a.m. - Falko Kadenbach, Vice-President of ABC Communications

3 - 27

Falko Kadenbach, Vice-President of ABC Communications, will appear before the Committee to discuss the 100 Mile Rural and Williams Lake Rural Projects.

That the ABC Communications funding request for 100 Mile Rural and Williams Lake Rural, be received. *Further action at the discretion of the Committee.*

4. IN-CAMERA SESSION

28 - 29

There will be items suitable for discussion in-camera pursuant to Section 90(1)(j) of the *Community Charter*.

That the meeting be closed to public to discuss items suitable for discussion in-camera pursuant to Section 90(1)(j) of the *Community Charter*.

5. ADJOURNMENT

That the meeting of the Infrastructure - Broadband/Cell Committee be adjourned at TIME, May 23, 2017.



**INFRASTRUCTURE - BROADBAND/CELL
COMMITTEE MINUTES**

February 8, 2017

11:00 a.m.

Cariboo Regional District Committee Room

Suite D - 180 Third Avenue North

Williams Lake, B.C.

- PRESENT :** Chair B. Coakley, Director T. Armstrong, Director Wagner,
Director A. Richmond (for a portion of the meeting)
- ABSENT :** Director D. Cash
- STAFF :** J. Bell, Chief Administrative Officer; D. Campbell, Manager of
Community Services; L. Schick, Deputy Corporate Officer;
J. Hammond, Regional Economic & Community Development Officer;
J. Larson, Programmer

1. CALL TO ORDER

1.1 Adoption of Agenda

IBC.2017-2-1

Moved Director Wagner
Seconded Director Armstrong

That the agenda items be adopted as presented.

Carried Unanimously

2. ADOPTION OF MINUTES

**2.1 Minutes of the Infrastructure - Broadband/Cell Committee Meeting -
November 24, 2016**

IBC.2017-2-2

Moved Director Wagner
Seconded Director Armstrong

That the minutes of the Infrastructure - Broadband/Cell Committee meeting,
held November 24, 2016, be received and adopted.

Carried Unanimously

3. DELEGATIONS

3.1 ABC Communications

Falko Kadenbach, Vice-President of ABC Communications, was in attendance to speak about internet services in the South Cariboo and request support for a grant application.

Director A. Richmond joined the meeting at 11:35 a.m., during the delegation.

4. REPORTS AND CORRESPONDENCE

4.1 ABC Communications - Request for Letter of Support

IBC.2017-2-3

Moved Director Armstrong

Seconded Director Wagner

That the letter from Falko Kadenbach, Vice-President of ABC Communications, dated February 2, 2017, requesting support for ABC Communications application to the Connect to Innovate Program, be received.

Carried Unanimously

5. ADJOURNMENT

IBC.2017-2-4

Moved Director Wagner

Seconded Director Armstrong

That the meeting of the Infrastructure - Broadband/Cell Committee be adjourned at 12:10 p.m., February 8, 2017.

Carried Unanimously

Chair

Corporate Officer

Brian Coakley
Cariboo Regional District
Broadband Committee - Chair
Suite D, 180 North 3rd Avenue
Williams Lake, BC
V2G 2A4

May 18, 2017

Regarding: Broadband funding request

Dear Mr. Coakley

ABC Communications would like to formally request the financial support of the Cariboo Regional Districts Broadband Committee towards our 100 Mile Rural and Williams Lake Rural projects.

ABC has been awarded funding through the Connecting British Columbia Program administered by Northern Development Initiative Trust. This program was able to fund 50% of the project costs leaving ABC with the other 50%. ABC would appreciate the support of the CRD to assist ABC with its portion of the investment. This would allow ABC to deploy these projects quicker as the overall capital requirements will cause ABC to stagger our procurement cycles more conservatively with these projects as they are not funded by the Federal Connecting Canadians Program.

The combined total costs for the 100 Mile and Williams Lake Rural Projects is \$940,263. If the CRD would be able to fund 25% (\$235,066) of the total project it would allow ABC to procure and deploy at a more accelerated rate than otherwise possible. This is supported by the 2 attached cashflow projections which show the large amount of capital ABC requires to bring these projects to completion. The CRD's financial support would provide ABC with additional capital to offset the high upfront costs of these deployments.

We appreciate your support and initiatives toward broadband development within the region. We also recognize that this request may not be feasible at this time. If it is not, or the amount is too high we are happy to work with you to develop a strategy that could work.

We look forward to working with the Broadband Committee as we deploy projects within the CRD it is very nice to see the CRD having such a proactive approach to broadband.

Kind regards,



Falko Kadenbach, Vice-President
ABC Communications



Application Number:



A.B.C. Allen Business Communications Ltd.

Detailed Project Plan

100 Mile House Rural

Project Name

Authorization

This project plan was prepared by:

Falko Kadenbach		November 7, 2016
Vice-President	Signature	Date
A.B.C. Allen Business Communications Ltd.		

Terry Bordeleau		November 7, 2016
Executive Assistant	Signature	Date
A.B.C. Allen Business Communications Ltd.		

This project plan has been reviewed and authorized on behalf of A.B.C. Allen Business Communications Ltd. by:

Robert Allen		November 7, 2016
CEO	Signature	Date
A.B.C. Allen Business Communications Ltd.		

1.0 Project Rationale

The purpose of the project is to deliver fast and reliable internet services to as many rural and remote citizens of British Columbia as we sustainable can provide.

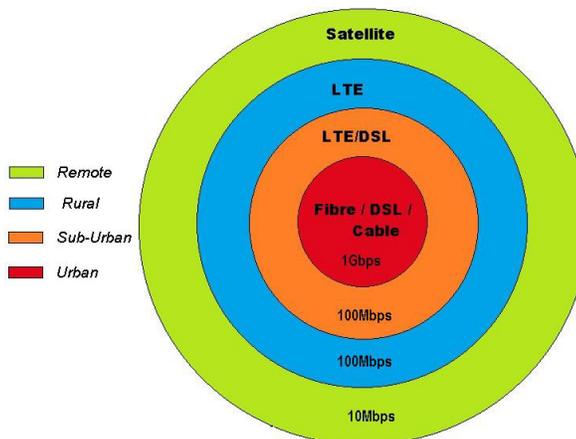
2.0 Background and Locale Profile

As the largest privately owned rural wireless ISP in British Columbia, ABC covers a market area that is vast in geography. Our southernmost network edge touches the US border near Osoyoos and continues North through the Okanagan, up through the Cariboo to Prince George and onto Burns Lake and Terrace.

There are several other Wireless Internet Service Providers (WISPs) who operate in different parts of the Province, generally locating near a larger community and servicing the rural areas around it. Traditionally WISPs have stayed within their own territories and have not directly competed with each other due to low population counts that do not support multiple suppliers. There is one competitor of note throughout the rural space however. That competitor is Xplornet. They are a national provider using the latest in satellite internet delivery systems to reach remote customers. While satellite suffers from some technology drawbacks related to latency, it can be a viable competitor to pre LTE systems. As consumer demand grows the limited capacity of satellite spectrum will limit the number of subscribers that can be served through this technology.

The market opportunity remains quite large. Wired infrastructure delivering ADSL or broadband over cable faces challenges delivering high speeds over long distances. To maximize revenue on their investments, the two largest providers in BC, TELUS and Shaw, have focused on larger urban populations. This leaves many smaller communities, as well as the outskirts of larger centres, underserved. It is estimated that 15-20% of homes in BC fall into this category. LTE solutions can deliver higher speeds than wired solutions at the edge of the cable footprint.

As the consumer appetite for video grows there exists significant opportunity for the first ISPs who can satisfy this demand.



Future Internet Technology and Population Density

ABC Communications application consists of 1 subprojects that will be built over one year.

The communities that are served by this project are classified as rural communities; Gateway, Perkins, South Canim Lake Horse Lake East Sheridan Interlakes and Lone Butte are too small for wireline services to make financial sense to deploy. ABC believes that with 4G LTE these communities and the surrounding outlying areas will be provided with fast, reliable, and affordable internet services.

Gateway and Perkins are small settlements of underserved homes Northeast of 100 Mile House on the way to Forest grove, a community that ABC currently services. Gateway and Perkins residents are partly serviced by Broadband Internet today however there are many areas that are not covered. This network proposal will provide that additional coverage.

South Canim Lake is an area of Canim Lake with underserved homes on the southern shore of Canim Lake, east of Forest grove, a community that ABC currently services. South Canim Lake residents are not serviced by Broadband Internet today and there have been many requests for more than satellite Internet in the area.

East Horse Lake is a small settlement of underserved homes East of 100 Mile House. East Horse Lake residents are not serviced by Broadband Internet today and there have been many requests for more than satellite Internet in the area. The development of this proposal would provide a much needed broadband services in the area.

Sheridan Lake (Interlakes) is a small community of underserved homes East of 100 Mile House on the way to Little Fort, a community that ABC currently services. Sheridan Lake residents are partially serviced by Broadband Internet today;

however there are large areas that are not covered. This development would provide the additional coverage required to bridge the divide

The entire project scope will provide coverage to 2785 underserved households, an estimated 1534 households have been classified as unserved with a remaining 1251 households that are listed as underserved; ABC plans to provide 4G LTE or equivalent services to these households within the project plan.

3.0 Objectives

The objectives of the project are to:

- Successfully deploy the infrastructure on time and on budget,
- Reach our forecasted uptake rates,
- Provide fast and reliable Internet to the targeted households.

4.0 Major Deliverables

The major deliverables for this project are listed below:

- Site construction/upgrades completion
- LTE basestation installation and provisioning
- Customer installations
- Completion of the project.

5.0 Links and Dependencies

This project is dependent on the following:

- All network segments are awarded

6.0 Issues and Constraints

Issues and constraints that could impact project success include:

Risk	Possibility	Impact	Mitigation measure
Design Risks			
Equipment Incompatibility	Low	Medium	ABC plans to use equipment that we have thoroughly tested and implemented into our networks. Acceptance testing of all products ensures that the selection of network and radio equipment will meet or exceed our network designs criteria.
Equipment Availability	Low	High	ABC will work closely with our vendors to ensure that there will be equipment available during the scheduled build times. ABC will work to purchase equipment well in advance of construction, not only to mitigate risk that may cause construction delays, but

Project Name

			also the delays in programming and commissioning equipment.
Fibre upgrade not available	Med	High	ABC will work with our upstream provider to ensure that fibre upgrades will be possible to both of the PoP locations in order to provide the required bandwidth and capacity that is available to our end users.
Frequency interference	Low	Med	ABC through careful radio design, will chose frequencies that have been licensed by ABC where frequency congestion may be present. ABC will continue to use its licensed 3500 MHz frequency for distribution to end users.
Construction Risks			
Fibre installation delays	Medium	Medium	ABC will work with its upstream provider to mitigate as much risk as possible with regard to Fibre construction delays.
Weather	Medium	Medium	Weather can affect construction schedules, and ABC will allow for weather in the construction schedules. ABC will plan in advance for areas that historically have had adverse weather conditions at specific time of year, and adjust the schedules accordingly.
Construction delays due to scheduling conflict	Low	Low	ABC has outlined the build schedule from the beginning of the project cycle to the completion of the last project build. ABC has built buffers into the schedule to allow for time off for holidays and schedule time off for team members.
Implementation Risks			
Shipment Delays	Medium	High	ABC will work closely with equipment suppliers to accurately schedule the delivery of equipment as to not impact ABCs build schedules. ABC will work with our suppliers to ensure that all equipment will be delivered within the time frames that have been given.
Unforeseen Expenses	Low	Low	ABC will work closely with equipment suppliers to accurately predict all expenses related to the procurement, installation and provisioning of the project builds. With careful project planning for design, construction and implementation; ABC has minimized unforeseen expenses within the

Project Name

			projects.
Defective Hardware	Low	Medium	ABC Communications rigorously tests all newly purchased equipment before it is placed within our network. Ensuring that the equipment will perform as per required. This ensures that there will be no delays in construction and implementation.
Funding Risks			
Funding partner insolvency	Low	High	ABC is working with our funding partners and leasing companies to secure the required matching funds.
Sustainability Risks			
Community slowdown	Low	Low	ABC has evaluated market risks within the proposed communities; assessing demographics, income and market trends within these communities. ABC believes that even though, if a community was to experience an economic slowdown, that there is still a business model in place to provide services to end users.
Lower than expected new customer uptake	Med	Med	All projects will have a marketing campaign associated with communities in the project areas, to ensure that there is a visible and viable market exposure to allow for an increased customer uptake. ABC will adjust marketing and promotion based on current market conditions for each project area; this will ensure that there will be the expected customer uptake that ABC has calculated in its projections.

ABC Communications has been providing Internet service to British Columbians for over 25 years. Over these 25 years ABC has encountered many risks to not only its business metrics, sustainability, construction and expansion of its broadband network into the highly competitive market of Internet service providers throughout BC. As British Columbia in itself is a challenging environment to provide rural broadband to communities. Mountainous regions, densely forested areas, very remote communities, and a host of other geographic challenges; ABC has found that a strong team within the company can mitigate a majority of the risks associated with the construction of rural broadband networks here in British Columbia.

With ABCs project development path for all projects begin with a rigorous design and engineering review, in-depth construction budgeting and scheduling, and finally market analysis and budget review. As with any project, there is, and always will be a number of risks in embarking on rural broadband projects. From radio and network design, construction planning to commissioning, ABC takes into account all possible risks, and tries to mitigate these and other risks, drawing from past experience. With ABCs experienced team, we can minimize our base risk exposure to a minimum.

ABC has been working with manufactures and suppliers to ensure that the network and radio equipment ABC will be purchasing for the upgraded expansion of ABCs broadband networks will be available to ABC Communications for purchase, but also that ABC will be able to have the equipment within the time frames that suppliers have set out.

ABC understands that a sustainable business model is necessary for planning and implementing rural broadband projects in BC. Careful market analysis is instrumental to pinpointing initial concerns to providing broadband services within rural communities; demographics, outside market factors, community vision all play a major role in ABCs planning. ABC models all broadband projects sustainability for a minimum of 5 years; all expense, revenue, customer uptake; break even models are calculated throughout the design and development process.

ABC has through careful market analysis has calculated multiple uptake scenarios, ensuring that the projected customer counts will be achieved through the adjustment of marketing and promotions to the market. Understanding market dynamics in rural British Columbia and properly interpreting market trends within these communities are a prerequisite to charting a successful course of action.

Unforeseen economic pressures outside of traditional forecasting have been difficult to predict using any sort of forecast model; ABC tries to take into account a certain percentage of this unforeseen risk into our sustainability/business models over the long term forecast for any community broadband project.

As with any project, large or small there will always be an inherent amount of risk implementing any broadband project; each with its own unique challenges. ABC has always, and continues to meet all new challenges with customary practicality and expedition.

7.0 Assumptions

The following assumptions have been made for the project:

- We will secure all funding sources
- We will not have the loss of any key personnel over the next three years
- We will not have any natural disasters that cause ABC to respond to disaster recovery situations
- Our market will stay in a similar state and not dramatically change over the life of the project
- We will maintain key anchor tenants in some rural communities

8.0 Approach

ABC has years of experience working on large scale network deployments and has built much of this with its highly skilled work force.

A combination of internal forces and subcontractors will build the network that has been proposed and allow us to deliver the fast reliable internet services to rural and remote areas of BC.

ABC has built open access into many of the its deployments allowing for other groups such as Municipal, Regional and Provincial Government to gain access to highly secure next generation networks in rural and remote areas of the Province.

9.0 Milestones

Following is a detailed list of project milestones:

Milestone	Target Completion Date
Start of 100 Mile House Rural Project	01/01/2017
RF & Network Engineering	15/02/2017
Engineering Sign-off	15/02/2017
Purchasing - NEI:2700	14/03/2017
Fibre installation - NEI:2710	15/05/2017
Programming & Network Configuration	12/05/2017
LTE Programming	10/05/2017
Construction	15/05/2017
Commissioning & Testing	27/10/2017
Advertising	13/02/2018
Customer Installations	31/08/2017
Project sign-off	31/03/2018
Final NDIT report for NEI:2700	31/03/2018

** Please refer to the attached document: Appendix A - ABC Communications Project Schedule 100 Mile House Rural for a more detailed view of the project.*

10.0 Work Plan

Please refer to the attached document: Appendix A - ABC Communications Project Schedule 100 Mile House Rural

11.0 Technical Details

Please refer to the attached document: Appendix B – ABC Communications Logical Network Diagram 100 Mile House Rural

Please refer to the attached document: Appendix C – ABC Communications 100 Mile House Rural Maps

ABC's proposed system consists of a network core, a fibre and microwave distribution network, and last-mile systems. All network components are designed to integrate into our existing network infrastructure, so that the entire system is expandable, robust, and easily managed.

Network Core

Foreign traffic crosses the ABC AS boundary via our primary upstream provider, TELUS at our Prince George datacenter. A combination of static and BGP routing protocols are used for TELUS delegated, and direct ARIN allocated IP space. All traffic transits our enterprise core switch, a Cisco 7606 with Ethernet service blades. LTE customer traffic passes through an Evolved Packet Core (EPC) in our Vancouver datacenter. Enterprise customer, wholesale ADSL and legacy wireless subscriber traffic transits a network of Carrier Ethernet Switched tails, Network to Network Interfaces (NNI), and aggregate at the Carrier-to-Carrier Interfaces (CCI) at both our Vancouver and Prince George datacenters. Customer billing, network performance monitoring, and lawful intercept services are conducted at the network core in Prince George.

Distribution Network

Traffic enters the fibre network through a CCI, and is delivered to the community Point-of-Presence (PoP) across fibre leased from TELUS. These fibre links are Layer-2 Ethernet Virtual Private Line (EVPL) connections that are expandable, and capable of carrying a multitude of services, enabling open access in each community. These circuits are terminated at their respective PoP site using Cisco equipment. ABC uses Cisco products, except where constrained by strict power budgets, extreme environmental conditions, or other considerations which Cisco's product catalogue may not cater to.

From the fibre PoP in each community, ABC uses microwave links to deliver the data to each last-mile system. ABC microwave links are implemented using unlicensed frequencies in areas with no congestion, and licensed frequencies elsewhere. ABC microwave backhaul links are designed to meet 99.99% availability. Throughout our network, ABC uses ruggedized, field-tested and reliable microwave radio equipment.

ABC has a mixture of facilities and infrastructure supporting its backhaul and distribution systems. ABC has installed standby power systems in all major network aggregation points throughout its network. These systems consist of Uninterrupted Power Supplies of varying size and performance, all the way up to complete off grid solar systems. ABC performs routine annual maintenance on these sites, to ensure they are operating at their best through the winter months when many sites are only accessible by snow cat or helicopter.

Project Name

Last-Mile Systems

The proposed project will use LTE eNodeB base station equipment to provide connectivity to customer premises at major distribution sites (> 20 customers), and non-LTE radio equipment at minor distribution sites (<20customers).

The LTE eNodeB radios used by ABC include equipment made by both Huawei and Telrad. Both manufacturers are proven suppliers of robust, carrier-grade equipment. LTE is the best fixed wireless solution available today, and promises ongoing scalability as the standard evolves in the future. These systems are currently capable of offering customer connections of up to 20 Mbps.

ABC carries spare network and radio hardware throughout its offices, to ensure fast response times in the unlikely event of hardware failure.

Network monitoring

All ABC network equipment is monitored by Orion Network Performance Monitor - a product developed by Solarwinds. This monitoring system rapidly alerts our technical staff of any equipment failures or anomalies that may require immediate action. Any failed equipment is replaced as soon as a field technician can reach the site, usually within one to six hours, depending on the site location.

12.0 Project Review and Completion Criteria

The project will be deemed successful when all the objectives have been met.

The project will be deemed complete when:

- all tasks in the project workplan have been completed;
- all project issues have been addressed;
- Northern Development has acknowledged receipt of a final report

Application Number:



A.B.C. Allen Business Communications Ltd.

Detailed Project Plan

Williams Lake Rural

*Project Name***Authorization**

This project plan was prepared by:

Falko Kadenbach		November 7, 2016
Vice-President	Signature	Date
A.B.C. Allen Business Communications Ltd.		

Terry Bordeleau		November 7, 2016
Executive Assistant	Signature	Date
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This project plan has been reviewed and authorized on behalf of A.B.C. Allen Business Communications Ltd. by:

Robert Allen		November 7, 2016
CEO	Signature	Date
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1.0 Project Rationale

The purpose of the project is to deliver fast and reliable internet services to as many rural and remote citizens of British Columbia as we sustainable can provide.

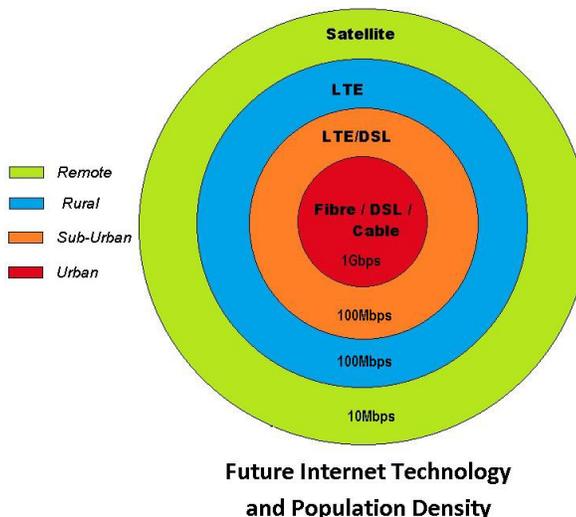
2.0 Background and Locale Profile

As the largest privately owned rural wireless ISP in British Columbia, ABC covers a market area that is vast in geography. Our southernmost network edge touches the US border near Osoyoos and continues North through the Okanagan, up through the Cariboo to Prince George and onto Burns Lake and Terrace.

There are several other Wireless Internet Service Providers (WISPs) who operate in different parts of the Province, generally locating near a larger community and servicing the rural areas around it. Traditionally WISPs have stayed within their own territories and have not directly competed with each other due to low population counts that do not support multiple suppliers. There is one competitor of note throughout the rural space however. That competitor is Xplornet. They are a national provider using the latest in satellite internet delivery systems to reach remote customers. While satellite suffers from some technology drawbacks related to latency, it can be a viable competitor to pre LTE systems. As consumer demand grows the limited capacity of satellite spectrum will limit the number of subscribers that can be served through this technology.

The market opportunity remains quite large. Wired infrastructure delivering ADSL or broadband over cable faces challenges delivering high speeds over long distances. To maximize revenue on their investments, the two largest providers in BC, TELUS and Shaw, have focused on larger urban populations. This leaves many smaller communities, as well as the outskirts of larger centres, underserved. It is estimated that 15-20% of homes in BC fall into this category. LTE solutions can deliver higher speeds than wired solutions at the edge of the cable footprint.

As the consumer appetite for video grows there exists significant opportunity for the first ISPs who can satisfy this demand.



ABC Communications application consists of 2 subprojects that will be built over one year.

The communities that are served by this project are classified as rural communities; both Dugan Lake and McLeese Lake are too small for wireline services to make financial sense to deploy. ABC believes that with 4G LTE both communities and the surrounding outlying areas will be provided with fast, reliable, and affordable internet services.

Dugan Lake is a small settlement of 220 households in an underserved area, 99 households are classified as unserved with the remaining 121 households remaining to be listed as underserved; Dugan Lake is 24 km East of Williams Lake on the way to Horsefly. Dugan Lake residents are not serviced by Broadband Internet today and there have been many requests for more than satellite Internet in the area.

McLeese Lake is a small settlement of 143 households in the underserved area, 117 are classified as unserved with a remaining 26 households whom are showing to be underserved; McLesse Lake is a small rural community 43 km South of Williams Lake and 76 km North of Quesnel on Hwy 97. Mcleese Lake residents are not serviced by today’s classification of Broadband Internet today and there have been many requests for more bandwidth in the area. Our proposed build will bring a much needed development to the region.

3.0 Objectives

The objectives of the project are to:

- Successfully deploy the infrastructure on time and on budget,
- Reach our forecasted uptake rates,
- Provide fast and reliable Internet to the targeted households.

4.0 Major Deliverables

The major deliverables for this project are listed below:

- Securing CBCA fibre pop in Dugan Lake
- Securing Access to TELUS tower in McLeese Lake
- Dugan Lake tower construction completion
- LTE basestation installation and provisioning
- Customer installations
- Completion of the projects in both McLeese Lake and Dugan Lake.

5.0 Links and Dependencies

This project is dependent on the following:

- The assignment and delivery of a Connecting British Columbia Agreement Fibre Point of Presence for the community.

6.0 Issues and Constraints

Issues and constraints that could impact project success include:

Risk	Possibility	Impact	Mitigation measure
Design Risks			
Equipment Incompatibility	Low	Medium	ABC plans to use equipment that we have thoroughly tested and implemented into our networks. Acceptance testing of all products ensures that the selection of network and radio equipment will meet or exceed our network designs criteria.
Equipment Availability	Low	High	ABC will work closely with our vendors to ensure that there will be equipment available during the scheduled build times. ABC will work to purchase equipment well in advance of construction, not only to mitigate risk that may cause construction delays, but also the delays in programming and commissioning equipment.
Fibre upgrade not available	Med	High	ABC will work with our upstream provider to ensure that fibre upgrades will be possible to both of the PoP locations in order to provide the required bandwidth and capacity that is available to our end users.
Frequency interference	Low	Med	ABC through careful radio design, will chose frequencies that have been licensed by ABC where frequency congestion may be present. ABC will

Project Name

			continue to use its licensed 3500 MHz frequency for distribution to end users.
Construction Risks			
Fibre installation delays	Medium	Medium	ABC will work with its upstream provider to mitigate as much risk as possible with regard to Fibre construction delays.
Weather	Medium	Medium	Weather can affect construction schedules, and ABC will allow for weather in the construction schedules. ABC will plan in advance for areas that historically have had adverse weather conditions at specific time of year, and adjust the schedules accordingly.
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Implementation Risks			
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Unforeseen Expenses	Low	Low	ABC will work closely with equipment suppliers to accurately predict all expenses related to the procurement, installation and provisioning of the project builds. With careful project planning for design, construction and implementation; ABC has minimized unforeseen expenses within the projects.
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Funding Risks			
Funding partner insolvency	Low	High	ABC is working with our funding partners and leasing companies to

			secure the required matching funds.
Sustainability Risks			
Community slowdown	Low	Low	ABC has evaluated market risks within the proposed communities; assessing demographics, income and market trends within these communities. ABC believes that even though, if a community was to experience an economic slowdown, that there is still a business model in place to provide services to end users.
Lower than expected new customer uptake	Med	Med	All projects will have a marketing campaign associated with communities in the project areas, to ensure that there is a visible and viable market exposure to allow for an increased customer uptake. ABC will adjust marketing and promotion based on current market conditions for each project area; this will ensure that there will be the expected customer uptake that ABC has calculated in its projections.

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ABC has been working with manufactures and suppliers to ensure that the network and radio equipment ABC will be purchasing for the upgraded expansion of ABCs broadband networks will be available to ABC Communications for purchase, but also that ABC will be able to have the equipment within the time frames that suppliers have set out.

Project Name

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ABC has through careful market analysis has calculated multiple uptake scenarios, ensuring that the projected customer counts will be achieved through the adjustment of marketing and promotions to the market. Understanding market dynamics in rural British Columbia and properly interpreting market trends within these communities are a prerequisite to charting a successful course of action.

Unforeseen economic pressures outside of traditional forecasting have been difficult to predict using any sort of forecast model; ABC tries to take into account a certain percentage of this unforeseen risk into our sustainability/business models over the long term forecast for any community broadband project.

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A combination of internal forces and subcontractors will build the network that has been proposed and allow us to deliver the fast reliable internet services to rural and remote areas of BC.

ABC has built open access into many of its deployments allowing for other groups such as Municipal, Regional and Provincial Government to gain access to highly secure next generation networks in rural and remote areas of the Province.

9.0 Milestones

Following is a detailed list of project milestones:

Milestone	Target Completion Date
Project Start Date	01/01/2017
RF & Network Engineering – McLeese Lake	13/01/2017
Engineering sign-off – McLeese Lake	13/01/2017
RF & Network Engineering – Dugan Lake	31/05/2017
Engineering sign-off – Dugan Lake	01/06/2017
McLeese Lake - NEI:2500 - Project start date	01/01/2017
Purchasing - NEI:2500	28/02/2017
Programming & Network Configuration - NEI:2500	31/05/2017
Construction - NEI:2500	28/09/2017
Commissioning & Testing - NEI:2500	19/06/2017
Project Sign-off - NEI:2500	20/06/2017
Advertising - NEI:2500	28/06/2017
Customer Installations - NEI:2500	19/06/2017
Project sign-off - NEI:2500	20/06/2017
Final NDIT report for NEI:2500	31-03-2018
Dugan Lake - NEI:2600 - Project start date	29/05/2017
Purchasing - NEI:2600	30/06/2017
Programming & Network Configuration - NEI:2600	03/07/2017
Construction - NEI:2600	17/08/2017
Commissioning & Testing - NEI:2600	30/08/2017
Project Sign-off - NEI:2600	31/08/2017
Advertising - NEI:2600	28/09/2017
Customer Installations - NEI:2600	31/08/2017
Final NDIT report for NEI:2600	31-03-2018

** Please refer to the attached document: Appendix A - ABC Communications Project Schedule Williams Lake Rural for a more detailed view of the project.*

10.0 Work Plan

Please refer to the attached document: Appendix A - ABC Communications Project Schedule Williams Lake Rural

11.0 Technical Details

Please refer to the attached document: Appendix B – ABC Communications Logical Network Diagram Williams Lake Rural

Please refer to the attached document: Appendix C – ABC Communications Williams Lake Rural Maps

ABC's proposed system consists of a network core, a fibre and microwave distribution network, and last-mile systems. All network components are designed to integrate into our existing network infrastructure, so that the entire system is expandable, robust, and easily managed.

Network Core

Foreign traffic crosses the ABC AS boundary via our primary upstream provider, TELUS at our Prince George datacenter. A combination of static and BGP routing protocols are used for TELUS delegated, and direct ARIN allocated IP space. All traffic transits our enterprise core switch, a Cisco 7606 with Ethernet service blades. LTE customer traffic passes through an Evolved Packet Core (EPC) in our Vancouver datacenter. Enterprise customer, wholesale ADSL and legacy wireless subscriber traffic transits a network of Carrier Ethernet Switched tails, Network to Network Interfaces (NNI), and aggregate at the Carrier-to-Carrier Interfaces (CCI) at both our Vancouver and Prince George datacenters. Customer billing, network performance monitoring, and lawful intercept services are conducted at the network core in Prince George.

Distribution Network

Traffic enters the fibre network through a CCI, and is delivered to the community Point-of-Presence (PoP) across fibre leased from TELUS. These fibre links are Layer-2 Ethernet Virtual Private Line (EVPL) connections that are expandable, and capable of carrying a multitude of services, enabling open access in each community. These circuits are terminated at their respective PoP site using Cisco equipment. ABC uses Cisco products, except where constrained by strict power budgets, extreme environmental conditions, or other considerations which Cisco's product catalogue may not cater to.

From the fibre PoP in each community, ABC uses microwave links to deliver the data to each last-mile system. ABC microwave links are implemented using unlicensed frequencies in areas with no congestion, and licensed frequencies elsewhere. ABC microwave backhaul links are designed to meet 99.99% availability. Throughout our network, ABC uses ruggedized, field-tested and reliable microwave radio equipment.

ABC has a mixture of facilities and infrastructure supporting its backhaul and distribution systems. ABC has installed standby power systems in all major network aggregation points throughout its network. These systems consist of Uninterrupted Power Supplies of varying size and performance, all the way up to complete off grid

Project Name

solar systems. ABC performs routine annual maintenance on these sites, to ensure they are operating at their best through the winter months when many sites are only accessible by snow cat or helicopter.

Last-Mile Systems

The proposed project will use LTE eNodeB base station equipment to provide connectivity to customer premises at major distribution sites (> 20 customers), and non-LTE radio equipment at minor distribution sites (<20customers).

The LTE eNodeB radios used by ABC include equipment made by both Huawei and Telrad. Both manufacturers are proven suppliers of robust, carrier-grade equipment. LTE is the best fixed wireless solution available today, and promises ongoing scalability as the standard evolves in the future. These systems are currently capable of offering customer connections of up to 20 Mbps.

ABC carries spare network and radio hardware throughout its offices, to ensure fast response times in the unlikely event of hardware failure.

Network monitoring

All ABC network equipment is monitored by Orion Network Performance Monitor - a product developed by Solarwinds. This monitoring system rapidly alerts our technical staff of any equipment failures or anomalies that may require immediate action. Any failed equipment is replaced as soon as a field technician can reach the site, usually within one to six hours, depending on the site location.

12.0 Project Review and Completion Criteria

The project will be deemed successful when all the objectives have been met.

The project will be deemed complete when:

- all tasks in the project workplan have been completed;
- all project issues have been addressed;
- service provision to citizens in McLeese Lake and Dugan Lake begins;
- Northern Development has acknowledged receipt of a final report

Williams Lake Rural

Project Cashflow Projection 2017-18

Months	May	June	July	August	September	October	November	December	2018	January	February	March	GOV Fiscal
Expense													
Direct Labour													
NEI:2500	4029.17	4029.17	4029.17	5238.33	5238.33	5238.33	1090						
NEI:2600	4029.17	4029.17	4029.17	5238.33	5238.33	5238.33	1090						
totals	8,058.34	8,058.34	8,058.34	10,476.66	10,476.66	10,476.66	2,180.00	-		-	-	-	
Direct Equipment & Material													
NEI:2500				33822.69	33822.69	33822.69	24000						
NEI:2600				33822.69	33822.69	33822.69	24000						
totals	-	-	-	67,645.38	67,645.38	67,645.38	48,000.00	-		-	-	-	
Direct Travel													
NEI:2500				1600	1600	1600							
NEI:2600				1600	1600	1600							
totals	-	-	-	3,200.00	3,200.00	3,200.00	-	-		-	-	-	
Other Direct Costs													
				-	-	-	-	-		-	-	-	
total	8,058.34	8,058.34	8,058.34	81,322.04	81,322.04	81,322.04	50,180.00	-		-	-	-	
Claim payments													
ABC	-	4,029	4,029	4,029	40,661	40,661	40,661	25,090		-	-	-	
NDIT advance	79,580									79,581.00			
CRD	79,580												
Float	159,160	4,029	4,029	4,029	40,661	40,661	40,661	25,090		79,581	-	-	
Balance		151,101.66	147,072.49	143,043.32	65,750.45	25,089.43	(15,571.59)	(25,090.57)		(0.57)	79,580.43	79,580.43	

100 Mile House Rural

Project Cashflow Projection 2017-18

Months	May	June	July	August	September	October	November	December	2018	January	February	March
Expense												
Direct Labour												
NEI:2700	5139.56	5139.56	5139.56	11021	11021	11021	1900					
NEI:2800		5139.56	5139.56	5139.56	11021	11021	11021	1900				
NEI:2900	5139.56	5139.56	5139.56	11021	11021	11021	1900					
totals	10,279.12	15,418.68	15,418.68	27,181.78	33,063.33	33,063.33	14,821.11	1,900.00		-	-	-
Direct Equipment & Material												
NEI:2700		28980.42	28980.42	28980.42	28980.42	37333.33						
NEI:2800			28980.42	28980.42	28980.42	28980.42	37333.33					
NEI:2900		28980.42	28980.42	28980.42	28980.42	37333.33						
totals	-	57,960.84	86,941.26	86,941.26	86,941.26	103,647.08	37,333.33	-		-	-	-
Direct Travel												
NEI:2700			919.17	919.17	919.17	919.17	919.17					
NEI:2800			919.17	919.17	919.17	919.17	919.17					
NEI:2900			919.17	919.17	919.17	919.17	919.17					
totals	-	-	2,757.51	2,757.51	2,757.51	2,757.51	2,757.51	-		-	-	-
Other Direct Costs												
total	10,279.12	73,379.52	105,117.45	116,880.55	122,762.10	139,467.92	54,911.95	1,900.00		-	-	-
Claim payments												
ABC	-	5,140	36,690	52,559	58,440	61,381	69,734	27,456		950	-	-
NDIT advance	155,485										155,485	
CRD	155,485											
Float	310,970	5,140	36,690	52,559	58,440	61,381	69,734	27,456		950	155,485	-
Balance		300,690.88	232,450.92	164,023.23	99,701.41	35,379.58	(42,707.29)	(27,885.28)		(2,329.31)	(1,379.31)	154,105.70

GOV Fiscal

Meetings that may or must be closed to the public

90 (1) A part of a council meeting may be closed to the public if the subject matter being considered relates to or is one or more of the following:

- (a) personal information about an identifiable individual who holds or is being considered for a position as an officer, employee or agent of the municipality or another position appointed by the municipality;
- (b) personal information about an identifiable individual who is being considered for a municipal award or honour, or who has offered to provide a gift to the municipality on condition of anonymity;
- (c) labour relations or other employee relations;
- (d) the security of the property of the municipality;
- (e) the acquisition, disposition or expropriation of land or improvements, if the council considers that disclosure could reasonably be expected to harm the interests of the municipality;
- (f) law enforcement, if the council considers that disclosure could reasonably be expected to harm the conduct of an investigation under or enforcement of an enactment;
- (g) litigation or potential litigation affecting the municipality;
- (h) an administrative tribunal hearing or potential administrative tribunal hearing affecting the municipality, other than a hearing to be conducted by the council or a delegate of council;
- (i) the receipt of advice that is subject to solicitor-client privilege, including communications necessary for that purpose;
- (j) information that is prohibited, or information that if it were presented in a document would be prohibited, from disclosure under section 21 of the *Freedom of Information and Protection of Privacy Act*;
- (k) negotiations and related discussions respecting the proposed provision of a municipal service that are at their preliminary stages and that, in the view of the council, could reasonably be expected to harm the interests of the municipality if they were held in public;
- (l) discussions with municipal officers and employees respecting municipal objectives, measures and progress reports for the purposes of preparing an annual report under section 98 [*annual municipal report*];
- (m) a matter that, under another enactment, is such that the public may be excluded from the meeting;
- (n) the consideration of whether a council meeting should be closed under a provision of this subsection or subsection (2);
- (o) the consideration of whether the authority under section 91 [*other persons attending closed meetings*] should be exercised in relation to a council meeting.

90 (2) A part of a council meeting must be closed to the public if the subject matter being considered relates to one or more of the following:

- (a) a request under the *Freedom of Information and Protection of Privacy Act*, if the council is designated as head of the local public body for the purposes of that Act in relation to the matter;
- (b) the consideration of information received and held in confidence relating to negotiations between the municipality and a provincial government or the federal government or both, or between a provincial government or the federal government or both and a third party;
- (c) a matter that is being investigated under the *Ombudsperson Act* of which the municipality has been notified under section 14 [*ombudsperson to notify authority*] of that Act;
- (d) a matter that, under another enactment, is such that the public must be excluded from the meeting.

90 (3) If the only subject matter being considered at a council meeting is one or more matters referred to in subsection (1) or (2), the applicable subsection applies to the entire meeting.