# **Powell River Regional District**

Electoral Area 'E' Emergency Dispatch Option 'C' – Costing and Viability (2<sup>nd</sup> Report)

Chris Kellett & Associates Ltd.

December 7, 2017

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## Electoral Area 'E' Emergency Dispatch Option 'C' – Costing and Viability

Chris Kellett & Associates Ltd.

# **1. Introduction**

### 1.1. Purpose of this Report

In May of 2017, the Regional District Board requested an independent expert opinion regarding the operational viability of the Dispatch Option 'C' detailed in the December 2016 report from the Electoral Area 'E' Emergency Dispatch Advisory Committee (E-DAC). On June 6, 2017 Chris Kellett & Associates Ltd. delivered an Opinion Report which in part resulted in the July 27, 2017 additional direction/requests from the Board as follows:

THAT the Board concur with the recommendation of the Committee of the Whole to engage Mr. Kellett to prepare a second report for the Board and Lasqueti Island Volunteer Fire Department, costing the amended Option C (page 7 of the Kellett report) and detailing the viability of the amended Option C, and comparing that to the next best option as prepared by Mr. Kellett; and

THAT Mr. Kellett be advised that the Board would like him to visit Lasqueti Island to engage with Director Anderson, Messrs. Fall and Slik, and Fire Chief Carlson as part of his assignment.

This second report will cover the following:

- a) The Costs Associated to the Amended Option 'C' (Section 2)
- b) The Operational Viability of the Amended Option 'C' / Next Best Option (Section 3)

This report is an extension of the original June 6<sup>th</sup> Opinion Report, the combined reports are provided to the Powell River Regional District Board to assist with a decision on next steps for Electoral Area 'E' (Lasqueti Island) emergency services contact and dispatch.

# Electoral Area 'E' Emergency Dispatch Option 'C' – Costing and Viability

Chris Kellett & Associates Ltd.

#### 1.2. Disclaimer

The independent consulting services of Chris Kellett, through Chris Kellett & Associates Ltd., have been sought due to his industry experience, in part, obtained through the following committees:

The Association of BC 9-1-1 Service Providers (ABC911) – Direct involvement with this provincial group of primary and secondary Public Safety Answering Point (PSAP) management teams who actively participate throughout British Columbia and Canada in all facets of 9-1-1 operational, technical and management matters (since the 2010 inception of this group).

Alberta E9-1-1 Advisory Association (AEAA) – Direct and indirect involvement with this provincial group of primary Public Safety Answering Point (PSAP) management teams who participate throughout Alberta and Canada in all facets of 9-1-1 operational, technical, & management matters (member since 1995).

Canadian Radio-television and Telecommunications Commission – Emergency Services [E9-1-1] Working Group (ESWG) – Direct and indirect involvement with this group who are responsible for leading and delivering on the direction provided by the CRTC in order to ensure the most reliable 9-1-1 system in the world; a leader in this group since 1997, including being the elected Chair for the past 9 years.

The information provided in this report is expressly provided by Chris Kellett & Associates Ltd. It is not intended or to be implied as being representative of the ABC911, AEAA, or the CRTC ESWG. It is provided based on access to 9-1-1 documentation, with proper attribution (as applicable), throughout the report. The opinions expressed in this report are based over 25+ years of operational, technical, administrative, and management experience with all aspects of the 9-1-1 system and emergency dispatch, as detailed in the Appendix 'A' – Curriculum Vitae.

Chris Kellett & Associates Ltd.

# 2. The Costs Associated to the Amended Option 'C'

As noted in Section 1.1 (page 1), the Board requested that the following list of items, detailed on page 7 of the June 6, 2017 Opinion Report from Chris Kellett & Associates Ltd., be costed:

If the Board wants to consider moving forward with a revised Option 'C', then the following additional steps would be required for it to be operationally viable:

- *i.* Request a quote, and subsequently allocate funds to contract the services of an accredited Emergency Call Answer Centre ... for initial emergency call answer, fire alerting (when applicable), or transfer to police or ambulance;
- *ii.* Implement and follow the detailed Local Dispatcher operational criteria ...;
- iii. Provide the capital and operating funds for Local Dispatcher Training, creation and maintenance of an Incident Locator and Resource Tool, and new Alerting Options ...;
- iv. Conduct a cost/benefit analysis with TELUS and a Radio Consultant to determine what is required to mitigate radio coverage issues in a timely cost effective manner; provide future capital and operating funds for the approved upgrades ...;
- v. Provide capital and operating funds to implement and advertise a new local 10-digit emergency number to reach the new Emergency Call Answer Centre ...;

Based on a very informative October 19, 2017 site visit to Lasqueti Island and subsequent follow-up with applicable stakeholders and providers, the following sections detail the rough order of magnitude cost estimates and logistics to be considered for the amended Option 'C' items detailed above.

Chris Kellett & Associates Ltd.

# 2.1. Accredited Emergency Call Answer Centre

As detailed in Section 2.1 (page 2) of the June 6, 2017 Opinion Report:

**There is one major accredited agency in Canada that provides the described service**; that centre is called <u>Northern911</u> (link: http://www.northern911.com/). They provide service for all types of emergency call processing across Canada, and would be the only viable alternative to carry out this critical initial call answer and transfer process.

Based on the above background, the following additional step was proposed:

*i.* Request a quote, and subsequently allocate funds to contract the services of an accredited Emergency Call Answer Centre ... for initial emergency call answer, fire alerting (when applicable), or transfer to police or ambulance

On September 6, 2017 the attached Appendix 'B' quote was received from Northern911, wherein they have confirmed they would provide both Call Answer services for a single 10-digit emergency number (*described by them as a '911 type service'*), as well as Fire Dispatch services per the Costs detailed on page 12 of their document. These costs are summarized in Table 1:

Item	Capital Cost	<b>Operating Cost</b>	Notes
Installation and Set-up	\$350 <i>\$650</i>	n/a	One-time charge; plus a recommended contingency fund of \$650
Dedicated Telephone Line (new 10-digit emergency number)	n/a	\$56	\$4.63 monthly charge (annualized; rounded up)
Combined Emergency Call Transfer and Fire Dispatch	n/a	\$2,400	\$200 monthly charge <i>(annualized);</i> if more than 100 annual Fire Dispatch's - \$125 extra per month.
TOTAL (annualized):	\$1,000	\$2,456	Based on a 3-year contract (with a CPI inflation clause)

#### Table 1: Emergency Call Answer Centre Costs (Northern911)

The inclusion of the Fire Dispatch service is an important factor which has positive operational implications which are detailed in Section 2.2 next (*page 6*).

# **Electoral Area 'E' Emergency Dispatch Option 'C' – Costing and Viability**

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Northern911 also provides the following value added services that are important from a Regional District oversight perspective:

- Standard reporting which includes emailed reports at the completion of every call and access to our secure (dual authentication) Web Portal
- Weekly testing
- Standard changes to personnel information, account instructions etc.
- Individual toll free line which allows:
  - Callers to reach our Emergency Response Specialists 24/7
  - Fire Personnel to call in
  - Direct access for alarm companies and other outside third parties, etc.

Overall, these estimated costs are subject to confirmation through a proper implementation process and the execution of a contract. For this reason an additional one-time contingency fee of \$650 has been added, which is not part of the Northern911 quote, to cover any unforeseen costs that may arise during the implementation process.

Chris Kellett & Associates Ltd.

# 2.2. Local Dispatcher Function

As detailed in Section 3 (page 7) of the June 6, 2017 Opinion Report, the following additional steps were proposed:

- *ii.* Implement and follow the detailed Local Dispatcher operational criteria
- *iii.* Provide the capital and operating funds for Local Dispatcher Training, creation and maintenance of an Incident Locator and Resource Tool (and new Alerting Options)

Arising from the site visit meeting, subsequent consideration of ownership logistics (per the list of risk management items detailed on page 3 of the Opinion Report), and the fact Northern911 has included the Fire Dispatch Service in their quote; I am withdrawing the proposed additional Local Dispatcher Function steps detailed above, with the exception of the new Alerting Options (which are covered next in Section 2.3 Radio Coverage Issues).

It is important to note that this is not because of the actual current or ongoing delivery of these services through the local dispatchers using the home grown Incident Locator and Resource Tool. As stated in the initial Opinion Report, 'the use of a local dispatcher is innovative', and as observed, the people and tool are very useful for emergency response. However, <u>ownership</u> of the Local Dispatch Function as a service provided by and supported by the Regional District is highly likely to lead to an untenable situation for both the Regional District and the Lasqueti Island volunteers who provide the personnel and the Incident Locator and Resource tool.

Therefore, I recommend that the Lasqueti Fire Chief, per his/her incident command authority, include the use of Local Dispatchers as a Secondary Notification Tool to be utilized at their discretion. And that, the Regional District formally contract the responsibility for Fire Dispatch Services to Northern911.

Based on this updated recommendation, there are no Regional District costs for the Secondary Notification Tool – Local Dispatcher Function.

Chris Kellett & Associates Ltd.

# 2.3. Steps to Address Radio Coverage Issues / Future Paging

As detailed in Section 2.2 (page 4) of the June 6, 2017 Opinion Report:

The E-DAC report provides extensive details in terms of the current challenges with telephone and radio coverage on the Island; these obviously impact the ability for the public to reach emergency services, as well as limit the ability to notify and communicate with emergency response services.

Based on the above background, the following additional step was proposed:

*iv.* Conduct a cost/benefit analysis with TELUS and a Radio Consultant to determine what is required to mitigate radio coverage issues in a timely cost effective manner; provide future capital and operating funds for the approved upgrades

During the site visit to Lasqueti Island several additional factors, with limited details in the E-DAC report, were noted in terms of telephone and pager coverage:

- TELUS Landline coverage is limited due to the single tower site (up the road from the ferry dock) configuration and aging landline installations; users are limited due to reliability issues.
- TELUS Mobility cellular coverage is primarily facilitated by cell sectors based in and around Parksville, which means the signal is only available along the western shores of Lasqueti Island; coverage is lost a relatively short distance in-land (100 metres).
- Rogers Wireless cellular coverage is primarily facilitated by cell sectors based on Texada Island (to the north of Lasqueti); the location of the Rogers tower provides extensive coverage on Lasqueti, and is the primary reason that Rogers Wireless pagers are used by the LIVFD volunteers. Indications were most residents had Rogers Wireless service for these reasons.

The observation in terms of Rogers Wireless pagers is an important factor to consider in terms of future Alerting Options. Indications are they work well today, however it is not clear how much longer this service will be available, given the fact that many other major providers of paging services e.g. TELUS, have stopped offering it. Moving to VHF Radio paging in the future would eliminate the dependency on stand-alone pagers and may be more cost effective in the long run.

Further to the radio coverage issues, I provided the details from the E-DAC report to Palidor Radio Communications Consultants in mid-August and asked for their feedback. They noted that they could not comment on the information provided, since they don't have the base data that was used to derive the coverage diagrams or to substantiate subsequent findings and conclusions. In addition, Palidor noted that rather than spend the time and considerable effort required to verify the E-DAC work, they would provide a Proposal to undertake a formal Radio

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Coverage Analysis (Phase 1) which would result in recommendations for the most suitable radio site(s) and configuration. Upon completion of Phase 1, if requested, they will also provide a follow-up proposal to evaluate the detailed technology required and estimated costs for the implementation of a new radio site(s). The Palidor August 19, 2017 Phase 1 Proposal is included in Appendix C, with the summarized costs, including a ROM estimate of future costs, as follows in Table 2:

Item	<b>Capital Cost</b>	<b>Operating Cost</b>	Notes
Radio Coverage Analysis (Phase 1)	\$10,200	n/a	One-time charge
Radio System Upgrade Costs Analysis <i>(Phase 2)</i>	\$4,800	n/a	One-time charge; estimate only, subject to future Quote
<u>Future</u> Radio System Equipment Costs to assist coverage and VHF paging	\$50,000 to \$150,000	Unknown (dependent on the solution)	Rough order of magnitude estimate based on recent Vancouver Island installs (NOT provided by Palidor)
Total:	<b>\$15,000</b> plus future	Unknown	Q1-2018 costs only

Table 2: Radio Coverage Analysis	Costs (Palidor Radio	<b>Communications Consultants</b>	/ ROM)
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It is recommended that the radio coverage and future VHF paging be considered as a separate project to the Emergency Dispatch Service for Electoral Area 'E' decision. They do have an impact on the ability to alert (page) the LIVFD members of a medical first response or fire call, as well as facilitate on island radio communications during an incident; however these are not critical path issues that require immediate resolution.

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# 2.4. New Single Contact 10-Digit Emergency Number

As detailed in Section 2.4 (page 6) of the June 6, 2017 Opinion Report:

... the proposed Option C includes a new advertised 10-digit emergency number to reach the Emergency Call Answer Centre; this would be the next best thing to 9-1-1. With the understanding that the new Call Answer Centre must answer for all 3 emergency services i.e. Police, Fire, and Ambulance and transfer the call to the appropriate emergency dispatch centre. As well, the creation of Emergency Cards and a local advertising campaign would also be an important part of the implementation process.

Based on the above background, the following additional step was proposed:

v. Provide capital and operating funds to implement and advertise a new local 10-digit emergency number to reach the new Emergency Call Answer Centre

Based on observations and discussions during my October 19, 2017 site visit, it is obvious that residents of Lasqueti have an active local ability to share important information – including the current methods to contact BC Ambulance, Fire, and Police. As stated in the Opinion Report and reiterated here, the creation of a new single 10-digit emergency number to reach Northern911 is vital to the implementation of a new Emergency Dispatch Service directed and supported by the Regional District. The Northern911 quote includes the provisioning of a telephone number to reach them directly (see Section 2.1 and Appendix B for details), which means the only cost remaining is related to a one-time implementation Awareness Campaign, as well as an annual reminder campaign (NOTE: It could be included in the federal, provincial, and territorial governments Emergency Preparedness Week awareness campaign that is run the first full week of May each year). Estimated costs are detailed as follows in Table 3:

Item	<b>Capital Cost</b>	<b>Operating Cost</b>	Notes
Provision a new 10-digit Emergency Number	n/a	n/a	Included above in Table 1 (page 4)
Initial Awareness Campaign	\$1,000	n/a	One-time charge; <i>estimate</i> only, subject to costing
Annual Emergency Number Advertising	n/a	\$500	Estimate only; subject to costing
Total:	\$1,000	\$500	Q1-2018 costs only

#### Table 3: Cost of New 10-digit Emergency Number and Advertising

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The Table 3 cost estimates are based on the creation and local distribution of a laminated emergency services card with the applicable details; including making them available on the Lasqueti Island passenger ferry and at the False Bay and French Creek harbours. This same information can also be shared electronically as deemed appropriate by the LIVFD Chief.

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# 3. Operational Viability of the Amended Option 'C' / Next Best Option

Arising from the limited scope paper review of the E-DAC Report – Emergency Dispatch Option 'C' which resulted in the proposed Amended Option 'C' steps to consider, as well as the October 19, 2017 site visit which facilitated the opportunity to interact with many of the original E-DAC group members, it is my opinion that a new single 10-digit emergency number answered by Northern911 is an operationally viable Emergency Call Answer and Fire Dispatch Option for Electoral Area 'E'.

A comparison to the next best option i.e. 9-1-1 requires an explanation of the types of 9-1-1 systems that are available now or will be by mid-2020:

- Basic 9-1-1 (B9-1-1) is deployed in some parts of Canada i.e. Yukon, Newfoundland/ Labrador where the infrastructure for Enhanced 9-1-1 (E9-1-1) is not technically and/ or economically feasible. I consulted with TELUS 9-1-1 and confirmed that B9-1-1 would NOT be available, since their system is built for E9-1-1.
- 2. Enhanced 9-1-1 (E9-1-1) is widely deployed across Canada and is available from TELUS for deployment to Electoral Area 'E'. E9-1-1 implementation would require a Public Safety Answering Point (PSAP) in British Columbia. I consulted with NI911 and they confirmed they would consider E9-1-1 call answer and Fire Dispatch for Electoral Area 'E'. I also asked if a B9-1-1 system was available, would they consider this, and they advised they would only consider E9-1-1, not B9-1-1.
- 3. Next Generation 9-1-1 (NG9-1-1) has been mandated for voice only availability by mid-2020. The additional tools to facilitate real-time location for call routing and dispatch aren't expected until 2023 or later. Once real-time location is available, B9-1-1 and unserved areas in Canada are expected to move to NG9-1-1.

Based on the fact B9-1-1 has been confirmed as not being an option; E9-1-1 has clearly been turned down in the E-DAC Report; **therefore, the next best option would be NG9-1-1 with an estimated availability of 2023 or later.** 

In conclusion, the proposed implementation of a new single 10-digit emergency number answered by Northern911 is an important improvement to address the current issues identified in the June 6, 2017 Opinion Report. This is a proposed interim solution for the next 5 years, until the availability of NG9-1-1 (*per item 3 above*). The amended Option C would initially be roughly equivalent to B9-1-1 (using a single 10-digit emergency number); however by 2023 could be significantly improved by moving to NG9-1-1 (*per Section 4 – Recommendation #4*) which will include real-time location information. The pending policy decision in terms of implementing a new single 10-digit emergency number vs. moving to E9-1-1, which is available, needs to be reviewed as per Section 4 – Recommendation #5 Legal Opinion.

Chris Kellett & Associates Ltd.

# 4. Summary of Emergency Dispatch Option 'C' / Conclusions

The following Table 4 summarizes the costs associated with moving forward in 2018 with the implementation of a new single 10-digit emergency number with Call Answer/Transfer and Fire Dispatch Services from Northern911:

Item	<b>Capital Cost</b>	<b>Operating Cost</b>	Notes
Provision a new 10-digit Emergency Number	n/a	n/a	See Section 2.4; included with Northern911 Costs
Contract with Northern911 for Emergency Call Answer & Fire Dispatch Services	\$1,000	\$2,456	See Section 2.1 and Appendix 'B' for details
Annual Emergency Number Advertising	\$1,000	\$500	See Section 2.4 for details
Total:	\$2,000	\$2,956	Q1-2018 costs only

#### Table 4: Summary of Emergency Dispatch Option 'C' Costs

NOTE: Per Section 2.2, the Local Dispatcher Function is NOT included as part of the Regional District Emergency Dispatch Service for Electoral Area 'E'

These costs are subject to confirmation, however can be used for budgeting purposes moving forward.

In conclusion, based on the initial paper review and the subsequent opportunity to meet and/or contact the key stakeholders, I would recommend the following:

- 1. Take the steps necessary to implement a new 10-digit single emergency number with call answer/transfer and fire dispatch services provided under contract with Northern911 for a period of 5 years (2018 -2022);
- Fund and coordinate an initial and annual Emergency Number Advertising Campaign (2018-2022);
- 3. Fund and coordinate the evaluation steps necessary to determine the future costs to Address Radio Coverage Issues / Future Paging (see Section 2.3);
- 4. In 2022, undertake a follow-up review to determine the costs and timing to move from a 10-digit emergency number to NG9-1-1;
- 5. Get a final legal opinion with respect to a risk assessment for moving forward with Recommendation #1.

# **Appendix A – Curriculum Vitae for Chris Kellett**

## **OVERVIEW – Chris G. Kellett**

Superintendent (Ret.) Chris Kellett completed a distinguished 32-year career as a police officer with the Edmonton Police Service in January 2013. He started as a constable, and quickly moved up the ranks to detective, sergeant, staff sergeant, inspector, and superintendent / chief information officer. Since retiring, he started and operates a successful consulting business.

Chris is a recognized national expert in the areas of 9-1-1 and emergency services dispatch, having spent over 20 years of his career working at the operational, technical, and management levels of these mission critical areas. This also includes all aspects of project management for computer aided dispatch, records management, fixed/mobile radio, mobile computer terminals, and enterprise wide telephony.

Chris was a member of the senior management team, leading the key areas of human resources, information technology, interim deputy chief in charge of corporate services (finance, informatics, human resources), and involvement in labour relations and mediation matters. In addition, he has 15 years of training and participation with audit and finance responsibilities as an elected member of several Alberta Credit Unions.

Chris is on the current executive of the Alberta E9-1-1 Advisory Association (AEAA), as well as serving his eighth term as the elected chair of the CRTC Emergency Services [E9-1-1] Working Group (ESWG) and is the current lead for next generation 9-1-1 in Canada.

## **RELATED CAREER EXPERIENCE**

#### SUPERINTENDENT / CHIEF INFORMATION OFFICER

#### 2010 – 2012

**Informatics Division – Edmonton Police Service, Alberta, Canada.** A municipal police agency with 2200+ police and support staff responsible for public safety for over 1 million citizens in Edmonton and the surrounding areas.

- Responsible for information technology, information management, security management (both data integrity and CCTV physical security for 30+ facilities), telecommunications, and IT project portfolio management; 200 staff with a 40 million dollar operating / capital budget.
- Chief Information Officer providing direction and oversight for the ongoing development of leading edge business intelligence tools, national data standards for information exchange, transition to a province wide CAD/records management, and trunked mobile radio systems.
- Successfully coordinated and led the development and delivery of numerous business cases for upgrade software / hardware projects and additional staff for all these areas.
- Implementation of two factor authentication, and server/desktop virtualization.
- Implementation of a comprehensive Project Portfolio Management office and staff, including significant components of an enterprise architecture / change management.
- Built an industry leading management team with succession plans for key positions.
- Set 3 year financial and 5 year strategic plans for all facets of Informatics.
- Took a leadership role with key provincial and national committees and working groups to enhance information sharing and interoperability.

## INTERIM DEPUTY CHIEF 2011

## Corporate Services Bureau – Edmonton Police Service

- Appointed by the Edmonton Police Commission and Chief of Police as the interim deputy chief from January to June 2011.
- Responsible for human resources, informatics, finance, purchasing, and supply services.
- Organized and help deliver a successful 3 year Capital Budget Plan for over 100 million that included new buildings, IT infrastructure / software, and important projects to prepare us for future demands.
- Represented the organization as a speaker / presenter at numerous internal and external stakeholder events.

#### SUPERINTENDENT

#### **Operational Support Division – Edmonton Police Service**

- Responsible for Police Dispatch / 9-1-1, Traffic (including expert collision investigations), Tactical (SWAT), Flight Operations (fixed wing and helicopters), Disaster and Emergency Preparedness, and Canine response areas.
- Acquisition and implementation of the Priority Dispatch call evaluation / quality assurance program (first large police agency in Canada).
- Acquired a second helicopter and staffing to expand the real-time availability of this vital tool for rapid response and criminal pursuit prevention.
- Improved oversight and risk management for all Tactical and Canine deployments.
- Directly facilitated the deployment of 100+ police officers to the 2010 Winter Olympics in Vancouver.

## SUPERINTENDENT (Acting)

#### Human Resources – Edmonton Police Service

- Responsible for all hiring, training, employee assistance, and payroll programs.
- Hired over 300 new police and 100 support staff during the largest growth period in the history of the police service.
- Coordinated and delivered a new police promotion process for 500+ candidates over a four year period which utilized an industry leading Assessment Centre methodology.
- Directly responsible for the expansion of the Employee Assistance program, including the implementation of an advanced early intervention system.

## CONSTABLE TO INSPECTOR

#### Various Operational Areas – Edmonton Police Service

- Started in Patrol and Police Dispatch / 9-1-1 as a constable for 9 years; this included being the Project Manager for the first implementation of mobile data terminals in 1988/89.
- Promoted to detective / sergeant and worked in Criminal Investigation, Training, Telecoms, and Police Dispatch / 9-1-1; this included being the Project Manager for the 9-1-1 / PBX telephone system replacements, and on the team for the CAD/RMS upgrade, and the move to an 800 MHz trunked radio system.
- Promoted to staff sergeant and lead Police Dispatch / 9-1-1 and Domestic Violence.
- Promoted to inspector and helped lead the very busy Downtown Patrol area.

# 2002 – 2006

# 2007 – 2010

## 1981 – 2001

### **PROJECT MANAGEMENT / COMMITTEE HIGHLIGHTS**

**Mobile Data Terminal Deployment –** Project Manager for the first major installation of mobile data terminals in police vehicles in Canada.

**Operational Support and Communications System Replacement –** Working with Intergraph Canada *(now known as Hexagon)*, we designed and built their first complete CAD and Records Management system that is deployed around the world today. Responsible for the business analysis / liaison for many of the key components of the system, liaison for all trouble tickets, and coordinator / designer for the delivery of all training for 1500 users and system support staff.

**Telephone System Replacement –** Project Manager for the acquisition and implementation of a new 9-1-1 system, one large and 4 smaller PBXs, Category 5 re-wiring in five buildings, and the logistics to move the telephone facility from the basement to the computer server room.

**EPS Informatics Committee –** a member (including chair) of the group responsible for all major IT and Telecommunications decisions over the past 20 years; Edmonton is regarded as one of the most advanced information management services in North America.

**Alberta Credit Union System –** volunteered / elected to 3 different credit union boards over a 15 year period (including the chair position for 3 terms); Helped lead the provincial transition from many small credit unions to a few large credit unions, including changing the governance model; Participated on the executive and audit / finance committees for 10+ years.

**Canadian Association of Chiefs of Police (various committees)** – A very active member of the Informatics, Traffic, and Aviation Security Committee's over the past 6 years.

**Canadian Interoperability Technology Interest Group (CITIG)** – Actively participated with this group since its creation in 2008; responsible for providing key personnel and leadership for the creation of the current Action Plan for radio and data Interoperability in Canada. Currently working on expanding the plan to include next generation 9-1-1 transition.

**The Association of BC 9-1-1 Service Providers (ABC911)** – Direct involvement with this provincial group of primary and secondary Public Safety Answering Point (PSAP) management teams who actively participate throughout British Columbia and Canada in all facets of 9-1-1 operational, technical and management matters (since the 2010 inception of this group).

**Alberta E9-1-1 Advisory Association (AEAA)** – Direct and indirect involvement with this provincial group of primary PSAP management teams who participate throughout Alberta and Canada in all facets of 9-1-1 operational, technical, & management matters (member since 1995). Submitted numerous contributions, as part of CRTC proceedings, on behalf of the AEAA.

**Canadian Radio-television and Telecommunications Commission – Emergency Services (E9-1-1) Working Group (CRTC ESWG) –** Direct and indirect involvement with this group who are responsible for leading and delivering on the direction provided by the CRTC in order to ensure the most reliable 9-1-1 system in the world; a leader in this group since 1997, including being the elected Chair for the past 4 years. Participated and/or lead dozens of CRTC proceedings. Appendix B – Northern911 Emergency Call Answer & Fire Dispatch Services Quote



# **Lasqueti Island** British Columbia

An Information Package from

# Northern911

230 Alder Street Sudbury, Ontario P3C 4J2



September 6, 2017

Lasqueti Island British Columbia

Attention: Chris Kellett

Dear Client,

Thank you for giving Northern911 an opportunity to present information to you about how we can provide 911 type service and FIRE dispatch for your community.

Northern911 started business in 1954 as an Answering service/Call Center and grew to include ULC listed alarm monitoring and primary FIRE dispatch service for over fifty (50) Fire Departments.

The telephone company, Bell Canada, performed 911 call routing and we performed Fire Dispatch. Because of our relationship with the telephone company, when they considered getting out of the operator services portion of 911 they looked to us. After an exhaustive selection process, they sub-contracted all of their municipal E911 services to Northern911. As a private PSAP, we have now been performing E911 Call Routing since 2002.

We can provide this same exceptionally good service for you and your residents well.

Attached you will find information about;

- ✓ Our history and background
- ✓ Benefits in dealing with Northern Communications
- ✓ Our technical capabilities in providing emergency service.
- ✓ Physical location
- ✓ Pricing
- ✓ Letters of reference

Please feel free to call me at (800) 461-3317 at anytime to discuss any questions that you may have.

Regards,

Mike Shantz

Mike Shantz President mshantz@northern911.com

# **History**

The company was started in 1954 by an individual in Sudbury who operated a reliable message service for many years on "cord-boards." The company was purchased in 1980 and the name was changed to Northern Communication Services Inc. at that time. A new invention called "pagers" was introduced to the market place and was very well received.

The company prospered and through mergers and acquisitions now has branches in multiple cities. Currently the company is 100% owned by a group of individuals residing in Ontario. Within this group, there is both significant financial strength and an intangible sense of pride of ownership. This allows us to quickly respond to the unique needs and requirements of our customers.

The Message Centre has won the Canadian Award of Excellence multiple times over the years for the service that we provide to our customers. The Canadian Call Management Association (CAM-X) presented these national awards. We have some customers in the United States and have won the ATSI of Excellence as well. Now we are recognised on both sides of the border!

In a separate monitoring location and with specially trained staff we also provide Fire Dispatch to our clients. We have been providing this specialised service for more than sixty years.

In operating a twenty-four hour, seven day a week location, we ended up monitoring Burglar alarms, Fire alarms and a number of other types as well. As True Steel Security, we now are the largest supplier of alarm systems in Northern Ontario and operate our own alarm monitoring station. The monitoring station not only monitors alarms for our own clients but for many third party alarm companies as well. We are listed by Under Writer's Laboratories of Canada (ULC) and are inspected on an annual basis for compliance with their standards.

We now provide Enhanced 911 and Fire Dispatch to a great number of communities throughout the Province. Some are local and some are more than 1,000 kilometres away. We answer the call as a primary PSAP, a downstream 911 agency, some municipalities without 911 call forward their Fire line to us, or in some cases we provide the line for the residents to call. With our previous Bell Canada BNAS contract, we have provided 911 service to more than a million (+1,000,000) residences in various locations throughout Ontario. We are set up and can serve you today.

# **Benefits in Dealing With Northern911**

We are not a "national" company or a government department. We are not affiliated with any individual Police, Fire or Ambulance agency and as such are able to operate in a completely unbiased environment.

As private enterprise we are focused on customer service. Due to the life safety nature of the calls, 911 and FIRE service is our top priority. Our answer time for 911/FIRE calls is consistently better than 95% of calls answered in three rings or less!! Ask other suppliers for their average answer time and see how we compare.

We are a 100% privately owned business. For over 60 years our reputation has been established by our integrity.

With owner/managers running the company, you can immediately reach someone in a position of authority should a concern arise.

We have been recognized by unbiased third parties for the services that we provide our clients. In Message Services we have repeatedly won the Canadian Award of Excellence as awarded by the national association. The monitoring station is listed with Underwriter's Laboratories of Canada. On the security side, we have attained General Electric's "Security Pro" Dealership status. This standing is based on customer satisfaction, years in business, credibility & stability, proper licensing and reputation within the community. And, out of more than 300 international dealers, we are the first company in the world to achieve "Dealer of the Year" by GE twice in a row.

We offer very competitive pricing and always strive to maintain affordability.

We have courteous employees. Our customers often tell us how unusual it is to be treated so kindly. Our friendly, eager employees consistently demonstrate a "we're glad you're here" attitude.

People trust us. We provide 911 and emergency services for many communities and dispatch for numerous Fire Departments and First Response teams. Third party alarm companies even have us monitor ALL their clients on a wholesale basis. Many banks, jewelry stores, and other high-risk businesses depend on us to handle their emergency calls. We currently provide VoIP 911 address verification and call routing to various VoIP carriers all over North America. All 911 & Fire calls are handled by APCO trained staff on a 24/7 basis and we are compliant with NFPA 1061 standards for Fire Dispatch! We also meet or exceed most of the NFPA 1221 requirements.

# **Technical**

The following is an overview of a standard call flow and features. This call flow and the various components may change over time.

# 911 type Call Flow

In your case we understand that you don't have 911 service.

We will provide a toll free number and a secondary back up PSTN number.

(Never have a single point of failure!)

When a caller places an Emergency call the telephone company routes the call to Emergency Response Center.

Our Call Taker answers the call with the following script:

"Lasqueti Emergency Response line, do you need Police, Fire or Ambulance?"

Depending on the caller's answer, we immediately transfer the call to the proper downstream agency. (Police, Fire or Ambulance) This is smooth and fast.

# **Fire Dispatch**

When a caller calls the Emergency line and says Fire to the call taker, they will be routed to our Fire Dispatch Emergency Response Specialists so we can provide the dispatch for you.

In the event of a Fire, we immediately notify the Fire response team using the method(s) of your choosing. We can call on the phone, page, text, etc. You chose. If we page or text and no confirmation is received after 2 minutes, our standard is to dispatch again. If no response is received after another 1 minute, we dispatch again and we immediately start to call down the list of volunteers to alert the team. Note that this procedure can be customized for your account.

While you are on site, if additional support is required, you may communicate with our dispatchers to request services such as calling for a Hydro disconnect, or other support as required.

# Available features:

- > CUSTOM Fire dispatch procedures using intelligent scripting.
- Licensed copy of "IamResponding" which is an application that is loaded for free onto all the fire response team's Smartphones. When an alert is activated the members of the team can press a button on their phone to show that they are Responding. That information is immediately available to the Chief and to Dispatch. When the team arrives at the Fire Hall, if it is set up, a screen on the wall can show the information about the incident and the other members of the team who are responding. It provides record keeping, tracking, reporting and so much more! It's wonderful technology. Find out more at https://iamresponding.com

- To ensure that all dispatches are received, a secondary form of communication of your choosing may also be used simultaneously: Mass text, direct dial and more are available.
- Incident related dispatching procedures.
- > Coordination and scripting to accommodate Automatic Mutual Aid Agreements
- > Full dispatching service including Hydro, Gas, Oil, etc. disconnects.
- > Custom call configurations based on client needs.
- Individual toll free line which allows:
  - o Non-911 callers to reach our Emergency Response Specialists
  - Fire Personnel to call in
  - Direct access for alarm companies and other outside third parties, etc.

## Enhanced Reporting for 911 & Fire Dispatch:

At the completion of every Fire Dispatch call, a detailed call report which includes the all information about the call is sent via **email** to the distribution list provided in set-up.

The emailed call reports and additional call information is also available to authorised personnel on our secure (dual authentication) **Web Portal**. It allows you to view the detailed data about the calls and run reports at your convenience.

You can also pull various reports for your account as a whole:

- > <u>Call Statistics</u>: Includes the average answer times, average work time and much more!
- Yearly Overview: Provides call statistics by account/municipality for each month over an annual period. The data is available in table, pie chart and line graph formats.
- Call By Day/Hour: Provides the yearly amount of calls by day and hour of the week for the previous 365 days. The data is available in table and line graph formats.
- Calls by Phase of Moon: Provides the number of calls placed for the previous 365 days based on the phases of the moon. The data is available in table and bar graph formats.

You can even listen to the actual audio within thirty seconds of call completion from any high-speed connection anywhere in the world!

Below, you will find a sample Fire Call Detail Report. Note that it includes the IS Scripting summary any other actions/comments performed by our Call Taker during the call.

# E911/Fire Call Detail Report

		Script Detail	
item	Value	Timestamp	Event
Call Start Time	7/6/2016 6:10:50 AM	7/6/2016 6:10:56 AM	Call Received
Universal Call Number	-	7/6/2016 6:11:00 AM	Retrieve IP911 ANI/ALI-()
Agent	E-1138	7/6/2016	Dispatch Screen-Hangup
Billing Number	_	7/6/2016	Paged
Source Script	FireScript-	6 12 46 AM 7/6/2016	Call Admin- Dial: Fire Hall -
Infinity		6.13.31 AM	Call Admin - Despending Eiro Hall
IP911	-	6:14:03 AM	Cell
Record	20	7/6/2016 6:14:04 AM	Call Admin: Completed
ANI		7/6/2016 6 14 10 AM	Paged
Municipality		7/6/2016	Other OPERATOR ADVISED NO LONGER REQUIRED AS FIRE IS OUT
Service Class		6.15.18 AM 7/6/2016	Paged
		6 15 21 AM	
		7/6/2016 6:17:16 AM	Other RECEIVED NO LONGER REQUIRED PAGE BUT IS STILL RESPONDING
		7/6/2016 6:17:17 AM	Dispatch Completed
		7/5/2016 6.17.17 AM	Emailed Summary:
		7/6/2016 6:17:17 AM	Location :  Type :  Structural Fire   Other Info:  Caller Name: Caller Name: Caller Comp. 17/6/2016 6:12:14 AM 7/6/2016 6:12:48 AM Paged : Call Admin - Dial: Fire Hall - Call Admin - Dial: Fire Hall - Call Admin - Dial: Fire Hall - Call Admin - Responding: Fire Hall - Fire Call - Full Record: Fire Hall - Call Admin - Responding: Fire Hall - Call Admin - Responding -

# **Technical**

# Northern911's Capabilities

Our staff is experienced, trained and competent. We know what to do and have years of experience. All Call Takers pass through background screening and a structured training program.

- Minimum of four (4) to fourteen (14) Call Takers 24 hours per day, every day depending on call volumes.
- Additional staff available for "overflow"
- > Bi-lingual English/French service is available in-house at all times
- ➤ We subscribe to a translation service that provides services to 170 other languages
- With multiple branches and service provided twenty-four hours per day, seven days per week, we have over 150 employees. In the event that a single Call Taker or a number of Call Takers are off due to sickness or accident, we have other staff members, technical personnel and management who are "on-call"
- > We have TTY/TTD service for the hearing and voice impaired
- ➢ Instant Call retrieval is available for all calls

In the event that there is difficulty understanding the caller we can instantly replay the call as many times as required in an attempt to determine the problem. We have multiple data terminals displaying the Enhanced 911 data and an electronic printer capture port to log everything.

- > All calls are recorded in our computerized call recorder
- As soon as the caller hangs up, the record is imported into a database that resides on a storage area network (SAN) which includes a redundant array of independent disks (RAID) for data protection.
- > We keep about a year on line and then archive the calls and keep all "critical" calls for years.

At our location, we have considered all components in routing of the call from a disaster planning point of view. If any one of them were to fail, other back-up plans would continue to operate.

- Diverse fiber optic strands into the building
- Eight (8) T1 trunks to the various Bell 911 tandem switches across the province.
- > Complete Amtelco "Infinity" Call Center system with spares on-site.
  - o RAID1 mirrored drives
  - Dual power supplies
  - Redundant MDR
  - Multiple audio paths
- > Complete separate local PBX phone system with spares on-site.
  - o Dual bays
  - Redundant telephone paths

# Northern's Technical Capabilities continued ....

- > Complete redundant "Infinity" system in our North Bay office.
- > We use multiple different telephone suppliers for PSTN connectivity
  - $\circ$  Some telephone trunks are buried for entrance to the building.
  - Some telephone trunks enter via fiber spans.
  - We use multiple entrance paths.
  - We operate on T1s, ISDN span, Centrex on dedicated copper and even analogue POTS trunks.
  - In the event all physical lines to the building are cut, we have cellular for back up.
  - Our E911 system is monitored 100% of the time by Bell Canada 911 Surveillance Control.
- > We are connected to the Internet via multiple redundant paths.
  - Connected to multiple different suppliers.
  - Connected via direct copper loop.
  - Connected via dedicated fiber spans.

All of these various computer and phone systems operate on battery back-up systems. In the event of a commercial power loss, we are able to run off the batteries for some time. When the power outage occurs and we are running on the battery back-up system, we have a diesel powered generator, which automatically starts after one minute and an electrical transfer system set up to run the entire building.

- The Electrical grid which powers the telephone system and the computer network is provided by Sudbury Hydro and is extremely reliable in our area. (We provide the back-up site for their overflow calls from their operations centre in the event of an electrical problem anywhere in the city.)
- > All critical items at our location are on Battery Back up
- In the event that a commercial electrical outage is a long one, we have an auto start Generator on site that is tested on a scheduled basis.
- In the event of primary generator problems, we have some small back-up generators available for back up on the back up.

We have centralized our equipment spares and have virtually every part on hand. All critical components from hard drives, voice-processing cards to entire computer shelves are covered.

- Computer database records are backed up multiple times on a daily basis
- > We have multiple redundant IBM network servers
- > We use VMware with "Fault Tolerant High Availability" programming.
- > Data is "striped" across multiple RAID drives.
- > All critical computers have a redundant computer on-site
- In addition to the regular daily back-ups, we also take a copy of all data off-site on a regular basis.

# Northern's Technical Capabilities continued ...

We do "Disaster Planning" and have procedures and regular training in-place to cover many different situations.

- We have a Disaster plan for both total telephone line cuts and/or building evacuation, to provide many services from an alternative site. We use our North Bay branch office, which is located at 236 Worthington Street, North Bay to back-up our 911, Fire Dispatch and some other services.
- > We have a complete redundant "Infinity" system here.
- This location was chosen to be in a separate location in a different city in the event of a major problem in our area.

We understand the critical nature of the service and we plan for the unexpected with our backups in place.

# **Physical Location**

Northern911's head office is at 230 Alder St. in Sudbury, Ontario where our Dispatch Centre is located.

- > We are less than a kilometer from the main Sudbury telephone company Central Office.
- ➤ We own the building. It has three floors and about 12,000 square feet.
- The section of the building where we handle our emergency calls is called the "Emergency Services Department"
- We also handle alarm monitoring in this area. We are listed and inspected by the Underwriters Laboratories of Canada (ULC)
- The Emergency Services Department (Dispatch Centre) is built on a solid concrete floor and has a two hour fire rating on all interior perimeter walls.
- To gain entrance to the area you must first be observed on camera and if you do not have security card access must call into the Dispatch Centre on the telephone to state your business. The staff inside can decide to electronically unlock the exterior door if required.
- Once entrance is gained past the first door, there is a security vestibule. The interior door cannot be opened simultaneously with the exterior door.
- Employees with a security card must perform a biometric finger print scan to open the door. Those people without a card will again be observed on another camera to confirm that no unauthorized people entered. Once satisfied, the staff can electronically open the door.
- > There is a full washroom inside the protected area.
- The telephone cables enter the building through an underground conduit and are terminated in a room that is locked and alarmed.
- > From that room they are run to the protected area in conduit.
- Electricity enters the building in another area of the building as well. From the main distribution point, it is routed to the protected area through conduit.
- > All windows in the protected area have bars on them.
- In the event that the building comes under attack we have a "panic" button that sends a signal to another ULC listed alarm monitoring station to advise them to immediately send the police.
- In addition to the "panic" button we also have two motion detectors so that in the event there is no motion in the protected area for thirty (30) minutes the alarm is sent out as well.

# **Costs**

Our services are based on either a minimum charge or by population on a per resident basis per month. I understand that the population in your area is about 425 and as such you would be at our minimum rate.

#### **Combined Emergency Call Transfer Service and Fire Dispatch**

For this combine service, our minimum charge is \$200.00 per month.

### Installation and set up is a one time charge of \$350.

A monthly Telco (line) fee of \$4.63 per account will also be charged. This is to cover some of the telephone costs associated with handling your account. This fee may change on a yearly basis.

Our services are invoiced monthly plus all taxes as applicable.

The above charges are based on a three (3) year contract which includes a CPI clause.

#### For Fire Dispatch, the rates above include the following:

- License to IamResponding for the department.
- Dispatch to a single Station by a method of the Fire Department's choosing: Page, SMS, telephone call, etc...
- Includes 100 dispatches or less over the course of the year.
- Weekly testing.
- Standard reporting which includes emailed reports at the completion of every call and access to our secure (dual authentication) Web Portal.
- Standard changes to personnel information, account instructions etc.
- Individual toll free line which allows:
  - Callers to reach our Emergency Response Specialists 24/7
  - Fire Personnel to call in
  - Direct access for alarm companies and other outside third parties, etc.

# **Additional Services and Rates for Fire Dispatch:**

## **Number of Dispatches**

If you exceed 100 dispatches per year, an additional fee of \$125.00 per month will apply.

# **Additional Programming**

Should you require significant programming changes that are not considered standard, an hourly rate shall apply at the then current rates. Such charges are to be approved prior to the work being completed.

# **Staff Information**

Mike Shantz	Manager/Owner	Employed since1980
John Whitehead	Manager/Owner	Employed since 1994
Angèle Spears	Manager/Client Satisfaction	Employed since 2013
Cindy Schroeder	Emergency Services Manager	Employed since 1989
Melanie Kennedy	Emergency Services Asst. Manager	Employed since 1988

All dispatch operations people have been through a comprehensive training program. The initial 911 portion of the training is modeled after the Bell Canada standards and initially as provided by Bell Canada representatives.

All Call Takers are APCO trained. APCO is the Association of Public Safety Communications Officials and is internationally recognized for their high standards in training. Find out more at <a href="http://www.apcointl.org">http://www.apcointl.org</a>

Staff evaluations, training and regular informative meetings are an ongoing thing.

In addition to all the technical capabilities listed, the city has invested heavily in telecommunications and a fiber infrastructure. Sudbury is "wired" and we are connected. I have been told that the communications infrastructure in Sudbury is second to none in Ontario and in some respects North America. Your calls will get through!!

For more information, feel free to explore our web site.

# www.northern911.com

We look forward to the opportunity of adding you to our list of clients.

# **References**

Numerous client testimonials are available on our website. They can be located at the bottom of our various pages. We can also provide references upon request.

Appendix C – Radio Consultant Phase 1 Coverage Analysis



Radio Communications Consultants Ltd.

, INDEPENDENT WIRELESS VOICE & DATA COMMUNICATIONS SYSTEM DESIGN & CONSULTING

# PROPOSAL TO

# POWELL RIVER REGIONAL DISTRICT-ELECTORAL AREA 'E' EMERGENCY DISPATCH MODIFIED OPTION 'C' ANALYSIS

AUGUST 19, 2017

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> Prepared By: Fred Palidor (<u>fred@palidor.com</u>) Stuart Palidor (<u>stuart@palidor.com</u>)



Radio Communications Consultants Ltd.

. INDEPENDENT WIRELESS VOICE & DATA COMMUNICATIONS SYSTEM DESIGN & CONSULTING

# PROPOSAL TO POWELL RIVER REGIONAL DISTRICT-ELECTORAL AREA 'E' EMERGENCY DISPATCH MODIFIED OPTION 'C' ANALYSIS

#### August 19, 2017

#### 1.0 INTRODUCTION

PALIDOR Radio Communications Consultants (PALIDOR) is pleased to submit a proposal to the Powell River Regional District - Electoral Area 'E' (PRRD) to carry out a two-way radio communications coverage analysis for the Lasqueti Island VFD (LIVFD) service area on Lasqueti Island (Emergency Dispatch Modified Option 'C' Analysis).

We have been <u>independent</u> radio communications consultants for over 34 years. We have successfully completed over 75 projects throughout Canada and the United States including some international projects.

Over half of the 75 projects are for first responder public safety agencies, with the majority of the public safety projects for fire services, many of which are throughout BC.

We have no affiliation with any manufacturers, vendors, maintenance or commercial telecommunications services. We work solely in the interests of our clients.

A list of our projects over the past 34 years is attached.

Please also visit our web site at <u>www.palidor.com</u>

#### 2.0 PROJECT OBJECTIVES

- 1. Carry out an on-site visual (physical) survey to identify suitable potential locations for a radio repeater site.
- 2. Conduct a computer-modelled predictive radio frequency propagation (coverage) analysis to evaluate the extent of reliable radio frequency signal coverage to meet the LIVFD's specified minimum needs from each identified location.
- 3. As part of the radio frequency coverage analysis, determine:
  - the practical minimum acceptable antenna height above ground for the repeater antenna
  - the most suitable antenna configuration required to achieve the minimum acceptable radio signal coverage reliability.

- the minimum repeater (transmitter and receiver) performance specifications to achieve acceptable radio communications coverage to meet the LIVFD's needs. based on readily available off-the-shelf technology
- 4. Provide recommendations for the most suitable site(s) and radio site configuration.

Upon completion of the above work if required by PRRD, we will provide a follow up proposal and scope of work to evaluate the detailed technology requirements and estimate the costs for the implementation of a new facility on Lasqueti Island.

#### 3.0 SCOPE OF WORK

- 1. Travel to Lasqueti Island to:
  - a) meet with LIVFD members to determine:
    - existing radio communications coverage deficiencies that are causing operational problems.
    - the minimum acceptable radio communications coverage requirements to meet the LIVFD's foreseeable needs.
    - priorities for correcting specific existing coverage problems as the basis for assessing remedial importance against estimated costs.
  - b) Conduct a visual (physical) survey of the LIVFD response areas, and the alternative available location(s) for a radio site (or sites) as the basis for establishing the parameters for the computer-modelled coverage analysis.

For proposal purposes, 2 full days are included on-site on Lasqueti Island for the discussions with LIVFD members and the physical survey.

- 2. Establish the technical benchmark performance parameters (technology minimum performance, antenna configuration, antenna heights, etc.) for each site for the computer-modelled predictive analysis tool.
- 3. Carry out a predictive radio communications coverage analysis throughout the LIVFD response areas for each available alternative location for:
  - -- vehicle two-way radio communications
  - handheld two-way radio communications (outdoors and in-building)
  - pager one-way communications (outdoors and in-building).

<u>Note</u>: For purposes of this proposal, it is assumed that the analysis will be conducted for 3 separate potential radio site locations.

- 4. Display the results of the coverage analysis on full colour map images (Google Earth or other suitable images), to identify areas where the radio communications coverage is inherently reliable (solid coverage), areas that are marginal coverage (variable from poor to good), and areas where the coverage is poor and/or void.
- 5. Review the coverage analysis map displays and the required technical performance parameters for each site via teleconference with PRRD/LIVFD members to discuss the coverage from each site, and to make specific recommendations for the implementation of a suitable radio site (or sites).
- 6. Prepare a report with the results of the surveys, technical performance requirements and map displays for review with PRRD and the LIVFD.
- 7. Assist PRRD/LIVFD to determine the next step(s) for implementing the most costeffective solution.

## 4.0 <u>COMPUTER-MODELLED PREDICTIVE ANALYSIS</u>

The computer-modelled propagation analysis is an industry standard propagation analysis tool. The propagation analysis model is calibrated to realistically predict RF coverage based on extensive measurements and other empirical data collected by PALIDOR over 34 years of designing and implementing radio communications systems.

The model is proven to be repeatedly accurate to identify specific problems with existing systems, and to determine specific solutions to correct any existing radio coverage problems.

The analysis will evaluate the radio propagation for communications in the direction from vehicle and handheld radio transmissions for reception at the radio site (inbound/talk-in/uplink direction), and for communications in the direction of transmissions from the radio site to the vehicle and handheld radios and pagers (outbound/talk-out/downlink direction).

The separate evaluation of each direction is the basis for determining the most costeffective design to ensure that the radio communications signal is reliable in both directions for vehicle and handheld radios, and for the outbound/talk-out direction for pagers.

The computer-modelled analysis includes factors for:

- tree foliage and other vegetation that causes radio signal attenuation (losses)
- radio signal diffraction (obstruction) caused by buildings and other man-made structures
- building penetration attenuation (losses of radio signal through building walls)

The analysis will use high resolution digital terrain (topographic) data from Natural Resources Canada (Canadian Centre for Mapping & Earth Observation) for analyzing radio signal propagation over the natural terrain (including terrain obstruction) throughout the LIVFD response areas.

#### 5.0 FEES AND EXPENSES

Please refer to the attached Fee Schedule & Terms & Conditions.

#### 5.1 <u>Fees</u>

Fees include:

- 2 days on-site on Lasqueti Island
- 1 day for round trip travel from Vancouver
- All other work described under the Scope of Work

Total Fees (excluding GST):

\$ 9,390.00 plus GST

\$ 810.00

<u>Note</u>: It is assumed that LIVFD will provide transportation for the field survey throughout Lasqueti Island.

#### 5.2 Expenses

Expenses are estimated based on current ferry fares, accommodation rates, and parking in French Creek.

Expenses are charged at actual cost plus 8% administrative surcharge.

Expenses include:

- Round trip ferry fare from Tsawwassen to Duke Point on Vancouver Island.
- Round trip ferry to Lasqueti Island
- 2 nights accommodation
- Parking at French Bay
- Round trip mileage

Total estimated expenses including administrative surcharge:

#### 5.3 <u>Total Fees & Expenses</u>

Total fees and estimated expenses: \$10,200.00

#### 6.0 PRELIMINARY SCHEDULE

It is expected that we will be able to start work and be on-site on Lasqueti Island within 2 weeks after receipt of authorization to proceed.

The balance of the tasks will be completed within 3 weeks after the on-site survey; i.e. within 5 weeks after receipt of authorization from PRRD.

#### **PALIDOR Radio Communications Consultants**

2 2

Fred Palidor (attachment)

### FEE SCHEDULE AND TERMS AND CONDITIONS FOR SERVICES

Effective January 1, 2017

#### Consulting Fees

Effective January 1, 2016 the following is our standard schedule of fees for all consulting work. All fees are in Canadian dollars (CAD).

The following are our standard fees for each of the applicable labor categories.

<u>Consulting</u> Resource	Hourly Fees
Principal Consultant	\$215 per hour
Senior Staff Consultant	\$195 per hour
Associate Consultant	\$195 per hour
e above fees are ann	licable through complet

The above fees are applicable through completion of the project Staff Consultant \$145 per hour

We generally assign personnel at the lowest fee schedule, consistent with the required skills and capabilities, and availability for the project work at the time.

#### **Expenses**

Expenses are in addition to the fees stated in the Fee Schedules above. Direct expenses and disbursements include round trip air-fare, surface transportation and overnight accommodations for out of town travel, long distance telephone and fax, courier (as required), photocopying reports and formal documentation (\$0.25 a copy), company vehicle use at \$0.60 per km, and other expenses that are subject to prior client approval. All expenses and disbursements are charged at our direct cost, plus 8% administrative surcharge on expenses and disbursements only. Receipts are provided for all direct expenses and disbursements.

#### **Payment**

Payment is due 30 days from invoice date. Invoices are submitted at the end of each month, or upon completion of a project, whichever is earliest.

## PALIDOR Radio Communications Consultants Ltd.

**PROJECT LIST** 



Radio Communications Consultants Ltd.

, INDEPENDENT WIRELESS VOICE & DATA COMMUNICATIONS SYSTEM DESIGN & CONSULTING

# August 2017

	PUBLIC SAFETY SYSTEMS PROJECT LIST				
	Client	Project Description			
1.	District of Kitimat Fire & Ambulance Services and Public Works	Completed detailed technical evaluation of the existing system, recommended solutions, a conceptual system design and budgetary costs to correct existing system problems			
2.	City of Sarnia Ontario Police Services	Phase 1: Completed detailed technical evaluation of the existing system, recommended solutions, a conceptual system design and budgetary costs to correct existing system problems. Phase 2 (In Progress): Detailed design of a new system to meet the needs of Sarnia Police Services into the future.			
3.	Regional Fire District Of Fraser-Fort George, British Columbia (Prince George area, central British Columbia)	VHF, UHF, 900 MHz - Over 20 years as the Regional Fire District's system technical and design consultants responsible for the evaluation, planning, design, and project management for the initial system upgrade, continuing system upgrades as the system aged, system expansion and periodic system performance audits for the centralized fire dispatch center and emergency radio communications network that that extends over 22,000 square miles (70,000 square km) for 23 agencies in the rugged north British Columbia.			
4.	Regional Municipality Of Wood Buffalo (Fort McMurray, Alberta, Canada)	UHF & Microwave - Evaluation, planning, design, detailed technical specifications, RFP and implementation management of a 6 site simulcast emergency communications system, and a 16 site broadband microwave network that extends over a distance of approximately 200 miles (320 kilometres) in the rugged, northern Alberta, Canada oil sands region.			
5.	City Of Woodstock Police, Fire and Public Works departments, Woodstock, Ontario, Canada (Located Between Toronto And Detroit)	<ul> <li>VHF &amp; Microwave - Evaluation, planning, design, detailed technical specifications, RFP, contractor selection and project management for the implementation of a police, fire and public works radio communications system, and automatic vehicle location (AVL) system.</li> <li>Evaluation, planning, design and project management for an expansion of the system to augment coverage.</li> </ul>			
7.	Municipality of Delta, British Columbia	<ul> <li>2 Projects:</li> <li>Technical and operational evaluation of Police Department, Fire Department, and Engineering Department voice and data dispatch and communications system, including the public safety dispatch center staffing and grades of service levels.</li> <li>800 MHz - Evaluated alternative solutions, carried out a preliminary design for a new 800 MHz voice &amp; data communications system and dispatch center, and</li> </ul>			

	PUBLIC SAFETY SYSTEMS PROJECT LIST				
	Client	Project Description			
		assessed the cost, performance, and operational benefits of participating in a regional communications network compared to the 800 MHz municipal public safety system.			
8.	of West Vancouver, British Columbia	VHF - Evaluation, planning, design including RF propagation measurements and computer-modeled analyses, detailed technical specifications, RFP and project management to implement a new Police Department voice dispatch and communications system and dispatch centre, including an assessment of dispatcher staffing and grades of service levels.			
9.	The City and Fire District of North Vancouver, British Columbia	Evaluation of alternatives for 9-1-1 and centralized dispatch for the City and Fire District of North Vancouver Police Department (RCMP) including call-taker and dispatcher service levels, and staffing requirements to meet specified grades of service.			
10.	The Corporation of The Township of Richmond, British Columbia	800 MHz - Evaluation, planning, design, detailed technical specifications, RFP and project management of a Fire Department 800 MHz voice dispatch and communications system and dispatch centre including evaluating dispatcher staffing and grades of service levels.			
11.	City of Coquitlam, British Columbia	800 MHz - Evaluation, planning, design including RF propagation measurements and compouter-modelled analyses, detailed technical specifications, RFP and project management of a Fire Department 800 MHz voice dispatch and communications system and dispatch centre including evaluating dispatcher staffing and grades of service levels.			
12.	City of New Westminster, British Columbia	VHF - Technical evaluation and recommendations to correct the existing Fire Department VHF dispatch and communications system deficiencies and operating problems that were resolved after the recommendations were implemented.			
13.	Regional Fire District of North Okanagan, British Columbia	UHF - Evaluation, planning, design, detailed technical specifications, RFP and project management to implement a new regional fire department voice dispatch and communications system and centralized dispatch centre for 10 fire departments., including an assessment of dispatcher staffing and grades of service levels.			
14.	Cowichan Valley Regional Fire District, British Columbia	VHF - Evaluation, design, detailed technical specifications, RFP and project management for the implementation of a regional VHF emergency dispatch and communications and system for 18 fire departments.			
15.	Fort Nelson, British Columbia	VHF - Evaluation, design, detailed technical specifications, RFP and project management for the implementation of a VHF emergency dispatch and communications and system for the Fort Nelson Fire Department.			
14.	University of British Columbia, Vancouver, BC	UHF - Evaluation, conceptual design, recommendations and implementation plan for the Campus Security Department dispatch and communications System including interoperability with the local detachment of the RCMP and City of Vancouver Fire Department.			

	PUBLIC SAFETY SYSTEMS PROJECT LIST				
	Client	Project Description			
16.	Fire District of the Municipality of Maple Ridge, British Columbia	VHF - Evaluation, design, detailed technical specifications, RFP and project management for the implementation of a VHF emergency dispatch and communications and system for the Maple Ridge Fire Department			
17.	City Of Bellingham & Whatcom County, Washington State	<ul> <li>3 separate projects over approximately 8 years:</li> <li>VHF &amp; UHF - Evaluated all existing UHF &amp; VHF law enforcement, fire, EMS and local government radio communications systems (17 separate agencies), carried out RF propagation analyses &amp; technology assessments to determine causes of problems, make recommendations for alternative solutions and estimate costs.</li> <li>800 MHz - Carried out preliminary design including RF propagation analyses &amp; estimated costs for a county-wide public safety 800 MHz system for all 17 public safety agencies and local government services.</li> <li>VHF &amp; UHF - Carried out preliminary design &amp; estimated costs to upgrade existing UHF &amp; VHF law, fire, EMS &amp; local government systems for 17 agencies in lieu of a wholesale system replacement</li> </ul>			
18.	Idaho National Laboratory, Idaho Falls, Idaho (US Government Department Of Energy Nuclear Research Facility)	UHF - Evaluation of extensive and complex emergency services VHF and UHF radio (wireless) communications system for a nuclear test facility that covers an area of over 8500 square miles in southeast Idaho.			
19.	City Of Nampa Fire Department, Nampa Idaho	VHF - Evaluation, planning, design including RF propagation measurements and computer-modelled analyses, detailed technical specifications, RFP, contractor selection & project management to upgrade existing fire department VHF radio communications system.			
20.	West End Communications Authority, San Bernardino County, Ca.	<ul> <li>800 MHz - Evaluated alternative solutions to resolve existing system coverage and system performance problems for a multiagency trunked, simulcast 800 MHz system.</li> <li>The West End Communications Authority (WECA) was a partnership of five (5) municipal jurisdictions that owned and operated a trunked 800 MHz emergency radio communications network that served 5 police departments, 5 fire departments, a local water Fire District, and other local government services in the south west corner of San Bernardino County, California.</li> </ul>			
21.	Whitehall Police Department, Pennsylvania	UHF - Technical Evaluation including propagation measurements and computer modelled analyses of existing communications system coverage and performance problems, and recommendations for solutions for a, multi-site, simulcast conventional system.			
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PALIDOR Radio Communications Consultants Proposal to Powell River Regional District\_Lasqueti Island.docx

PUBLIC SAFETY SYSTEMS PROJECT LIST		
	Client	Project Description
	(Rochester Area)	<ul> <li>800 MHz - Evaluation, planning, design, detailed technical specifications, RFP, contractor selection and project management for a County Wide Multiple Police Department Mobile Data Communications System</li> <li>VHF &amp; UHF - Evaluated a County Wide Multiple Fire/EMS Dispatch and Communications system for 14 agencies and a county-wide Public Alerting Communications System. We identified specific technical and operational deficiencies and problems, recommended solutions and developed a phased implementation plan</li> </ul>
23.	Fairfax County, Virginia	800 MHz - Evaluation, planning, design, detailed technical specifications and project management for a county Wide Police And Fire Department Mobile Data Communications System for over 700 users
24.	Charlotte-Mecklenburg Police Department, Charlotte, N.C.	800 MHz - Evaluation, planning, design, detailed technical specifications, RFP and contractor selection for a county Wide Police And Fire Department Mobile Data Communications System for over 700 users
25.	City And County Of Missoula, Montana	<ul> <li>VHF &amp; UHF -Evaluation and alternative solutions for the implementation of a mobile data communications system for the City Police and Fire Departments, County Sheriff's Department, and for County fire and other emergency response agencies.</li> <li>The evaluation included an assessment of mobile data effects on dispatcher services, and grades of service levels.</li> </ul>

	LOCAL GOVERNMENT SYSTEMS PROJECT LIST		
	Client	Project Description	
1.	The Corporation of The Fire District of West Vancouver, British Columbia	800 MHz - Evaluation, design including RF propagation measurements and computer-modelled analyses, detailed technical specifications, RFP and project management for the implementation of a new 800 MHz municipal radio communications system for the Public Works, Parks, and Transit Departments.	
2.	Fire District of North Vancouver, British Columbia	900 MHz - Evaluation, technical study and recommendations for the Municipal SCADA (Telemetry - Supervisor Control And Data Acquisition) Radio System) including detailed RF path analysis and field measurements for over 115 point-to-point RF paths in the 928 - 960 MHz frequency bands.	
3.	City Of Coquitlam Municipal Multi- User Radio Site, British Columbia	VHF to Microwave - Designed the radio site, prepared detailed specifications and RFP, and managed the project to implement a multi-user shared site facility for the City Of Coquitlam municipal radio services and for commercial multi-use radio communications systems. We continue provide technical management services for the site on behalf of the City of Coquitlam.	
4.	City Of Coquitlam, British Columbia	VHF to microwave - We provide general and specific radio communications consulting services on an ongoing basis.	
5.	City Of Coquitlam, British Columbia	900 MHz - Detailed study and evaluation of the radio system requirements for an extensive telemetry (SCADA) system for the water and sewer systems that involved detailed RF path analysis including computer modelling and field measurements for over 80 point-to-point RF paths in the 928 - 960 MHz frequency band.	
6.	The City Of Burnaby, British Columbia	VHF - Evaluation, design, detailed technical specifications, RFP and project management for the Engineering and Public Works departments.	
7.	Capital Regional Fire District Water Department, Victoria British Columbia	VHF to microwave - Evaluation, design, detailed technical specifications, RFP and project management for the development of a new shared radio site tower and facilities.	
8.	Atmospheric Environment Services (Environment Canada weather bureau)	HF, 900 MHz & 2,4 GHz -In-depth technical study of a long range HF communications system, a UHF radio link remote control system and the feasibility of implementing a 900 MHz and 2.4 GHz point-to-point data link system.	
9.	British Columbia Ministry Of Lands And Parks	VHF - Evaluation, design, detailed specifications for a mountain top repeater station on Hope Mountain as part of a mountain top repeater network and a UHF trunk system for the Manning Park mobile communications network.	
10.	Transport Canada, Vancouver International Airport	VHF & UHF - In-depth study of all ground radio communications requirements on Vancouver International Airport for Airport Operations, Security, Maintenance, Crash/Fire/Rescue, and the commercial airlines, involving over 350 radio users, including extensive in-building (terminal) RF propagation measurements and analyses.	

	LOCAL GOVERNMENT SYSTEMS PROJECT LIST		
	Client	Project Description	
		Prepared detailed system and equipment design specifications and a cost analysis of the various alternatives for a multi-user interoperable airport emergency radio dispatch and communications system.	
11.	The Metro Vancouver (Greater Vancouver Regional Fire District), British Columbia	800 MHz - Evaluated the feasibility, conducted a detailed design study and conceptual design for a regional public safety and local government multiple agency radio communications network including a detailed radio coverage survey in the 800 MHz band of the entire Greater Vancouver operating area for all participating municipalities, as the prelude to development of a shared inter-municipal communications system.	
12.	Health And Welfare Canada	HF - Evaluation, technical study and recommendations for a HF data and voice communications linking network for the remote nursing stations in Northern British Columbia.	
13.	Expo 86 1986 World Exposition In Vancouver, British Columbia	UHF - System design, specifications, detailed technical specifications, RFP and project management for the implementation of Security And Operations radio dispatch and communications system for the Worlds Fair in 1986	
14.	City of Chilliwack, British Columbia	<ul> <li>VHF – Automatic Vehicle Location &amp; voice communications system.</li> <li>Evaluated the infrastructure and technological requirements to implement a City owned automatic vehicle location (AVL) system to replace an existing commercial, web based system, conducted computer modelled coverage analyses, prepared a conceptual design and estimated the costs for phased implementation of the system.</li> </ul>	
15.	British Columbia Hydro And Power Authority	VHF - Voice Communications System. Carried out a detailed radio propagation measurements and computer-modelled analyses in the mountainous area in north central British Columbia for a multiple site system as part of the B.C. Hydro province wide land mobile radio system network.	
16.	Utah Transit Authority, Salt Lake City, UT	900 MHz - Technical evaluation, design and implementation plan for a replacement of a 900 MHz voice and data communications system to meet the transit system needs for at least the next 10 years for over 700 transit vehicles, and a light rail system.	
17.	Northshore School Fire District, Bothell, WA	<ul> <li>VHF - Evaluation, design, detailed technical specifications, RFP and project management for the implementation of an upgrade to the VHF dispatch and communications system for 115 school buses, and supervisory and maintenance vehicles and paging system.</li> <li>Design and preparation of detailed system technical</li> </ul>	
		specifications, and cost analysis for an alternative 800 MHz system.	

	INDUSTRIAL & BUSINESS SYSTEMS PROJECT LIST		
Client		Project Description	
1.	VAALCO Energy Inc, Equatorial Guinea, West Africa	Evaluated existing satellite system operational unreliability and system technical performance problems. Worked with VAALCO's satellite system provider and VAALCO to correct the problems to meet VAALCO's foreseeable needs	
2.	Marathon Oil, Equatorial Guinea, West Africa	<ul> <li>VAALCO's satellite system provider and VAALCO to correct the problems to meet VAALCO's foreseeable needs.</li> <li>VHF, UHF &amp; Microwave - 4 projects over a 6 year period:</li> <li>Evaluated existing Radio Communications &amp; Wireless Systems including RF measurements and computer modelled RF propagation analyses and determined future system requirements for 3 Major processing plants and offshore production platforms and prepare a business case, implementation plan, and conceptual design for a long-term radio communications/wireless network solution.</li> <li>Designed, prepared detailed technical specifications, RFP and carried out the project management for the implementation of a 20 channel, 4 site trunked LMR system to cover the entire north end of the Island of Bioko and the production platforms approximately 18 miles (32 km) from the Island of Bioko in the Gulf of Guinea.</li> <li>Designed, prepared detailed technical specifications, RFP and carried out the project management for the implementation of an automatic vehicle for the implementation of an automatic vehicle for the implementation of an automatic vehicle location (AVL) system to cover the entire north end of the Island of Bioko in the Gulf of Guinea.</li> <li>Designed, prepared detailed technical specifications, RFP and carried out the project management for the implementation of an automatic vehicle location (AVL) system to cover the entire north end of the Island of Bioko</li> <li>Designed, prepared detailed technical specifications, RFP and carried out the project management for the implementation of a short-haul broadband microwave system between 2 Marathon facilities.</li> <li>Designed, prepared detailed technical specifications, RFP and carried out the project management for the implementation of a long-haul broadband microwave system between 2 Marathon facilities.</li> <li>Designed, prepared detailed technical specifications, RFP and carried out the project management for the implementation of a long-haul broadband microwave system be</li></ul>	

INDUSTRIAL & BUSINESS SYSTEMS PROJECT LIST		
	Client	Project Description
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3.	Marathon Oil, North America	VHF, UHF, Microwave, 4 separate projects
		• Texas – evaluated, recommended design changes and estimated the costs to correct unreliability problems for a 15 site microwave backbone, and a 7 site communications system for drill rig communications throughout an area of approximately 6,300 square miles (over 16,000 square kilometers)
		<ul> <li>Oklahoma – determined all infrastructure requirements, estimated costs, and prepared a conceptual design for a microwave backbone and for drill rig communications throughout an area of approximately12,000 square miles (31,000 square kilometers).</li> <li>North Dakota – evaluated the microwave path communications reliability of an existing microwave network and for drill rig communications throughout an area of over 2,600 square miles (approximately 6,800 square kilometers).</li> <li>Wyoming – evaluated the infrastructure requirements, prepared a conceptual design, and estimated the costs to implement a wide- area land mobile communications system and interconnections to a microwave backbone to provide reliable mobile communications throughout an area of approximately 6,800 square miles (over 17,000 square kilometers).</li> </ul>
		square kilometers).
4.	Marathon Petroleum – Texas City	UHF - Assessed the causes of existing handheld radio communications system coverage and unreliability problems throughout the refinery and adjacent geographic areas, evaluated alternative solutions, prepared a conceptual design, and estimated the costs to correct all system deficiencies and problems.
5.	Noble Energy, Equatorial Guinea	<ul> <li>Microwave – 2 Projects over approximately 1 ½ years         <ul> <li>Evaluated the existing microwave and wireless communications network including the terrestrial microwave communications for a Floating Production Storage and Offload (FPSO) vessel to the corporate offices, to determine the causes of unreliability and poor system performance; assessed alternative solutions and recommended solutions and estimated costs to implement the recommendations.</li> <li>Evaluated alternative terrestrial microwave routes and infrastructure requirements between the corporate offices. a new production platform and the FPSO, identified specific sites for the infrastructure, prepared a conceptual design, and estimated the costs to implement the terrestrial microwave network.</li> </ul> </li> </ul>
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	INDUSTRIAL & BUSINESS SYSTEMS PROJECT LIST		
	Client	Project Description	
6.	Glaxosmithkline (GSK) Pharmaceuticals, Raleigh, North Carolina	800 MHz – Assessed the causes of existing handheld radio communications system coverage and unreliability problems throughout the Triangle Research Park campus including inside multiple buildings and laboratories, evaluated alternative solutions, prepared a conceptual design, and estimated the costs to correct all system deficiencies and problems.	
7.	Airborne Express, Seattle, Washington	800 MHz - Nation-Wide Communications Land Mobile Network Analysis, Evaluation And Strategy Plan	
		In-depth technical and business case evaluation, strategic and cost analysis, for all Airborne Express nation-wide wireless (mobile radio) communications needs for the next 10 years.	
8.	Elite Limousine Plus Inc., New York City	800 MHz - Mobile Data And Voice Dispatch And Communications System.	
		Elite Limousine operates a fleet of over 500 limousines throughout the Greater New York City area.	
		Planned, designed, and managed the implementation of a mobile data and voice communications system for reliable communications throughout the greater New York City area.	
9.	Skyline Credit Ride Inc., New York City	800 MHz & UHF - Mobile Data, And Voice Dispatch And Communications System.	
		Skyline Credit Ride operates a fleet of over 500 limousines throughout the greater New York City area.	
		Planned, designed, and managed the implementation of a mobile data and voice communications system for reliable communications throughout the greater New York City area.	
10.	DHL Airways Inc., San	800 MHz - Mobile Data Communications System.	
	Francisco And Los Angeles	Evaluated the existing mobile voice and data radio communications systems requirements in San Francisco and Los Angeles areas to determine the causes of RF bandwidth and coverage limitations, analyzed alternative solutions, prepared a conceptual design and estimated costs to resolve the problems.	
11.	Williams Bros Atlanta.	VHF - Voice Dispatch And Communications System.	
	Georgia	Williams Bros. is a large concrete ready mix company with over 450 vehicles operating on six (6) VHF radio channels.	
		Evaluated the existing radio communications system to determine compatibility with digital status reporting technology, assessed alternative solutions, recommend a solution and estimated costs to resolve system operating and performance problems.	

	INDUSTRIAL & BUSINESS SYSTEMS PROJECT LIST		
	Client	Project Description	
12.	United Parcel Service (UPS)	220 MHz, 800 MHz, 900 MHz - Nation-Wide Mobile Data Communications System	
		RF communications consulting services as part of the development of a nation-wide mobile data network for the extensive UPS vehicular network throughout the United States. The project included an in-depth assessment of various state of the art mobile data technologies in the 800 MHz, 900 MHz, and 220 MHz frequency bands.	
13.	USX Corporation-USS Gary Works, IN	800 MHz - Industrial Plant Data Communications System	
		Evaluated the system performance and technology for an RF data collection system for a plant modernization project at USS Gary Works facility.	
14.	DLA Associates Inc., New Jersey	800 MHz - Mobile Data Dispatch And Communications System.	
		DLA is a computer system integration firm in New Jersey specializing in computer communications.	
		Conducted detailed RF coverage measurements and system infrastructure analyses and radio site evaluation for a high speed digital mobile communications system in New York City.	
15.	USS-Posco, Pittsburg, CA	800 MHz - Industrial Plant Data Communications Systems.	
		Conducted an in-depth RF signal survey and propagation analysis for a large in-plant data collection system using high speed digital communications system for a major U.S. steel manufacturer in Pittsburg, CA.	
16.	Southern Railway Of British	VHF - Voice Dispatch And Communications System	
	Columbia	Designed, prepared detailed specifications and the RFP and managed the implementation of a fixed point-to-point RF link system to provide wireless connections between the dispatch and maintenance control operations and two primary mountain-top base stations that covered the rail line and rail yard operations.	
17.	Royal City Taxi, New	UHF - Mobile Data And Voice Dispatch Communications System.	
	Westminster, British Columbia	Design, prepared the detailed specifications, RFP and project management for the implementation of a 450 MHz voice and mobile data communications system.	
18.	Grouse Mountain, Multi-User	Radio Site Design and Technical Management	

INDUSTRIAL & BUSINESS SYSTEMS PROJECT LIST		
	Client	Project Description
	Radio Site, British Columbia	Designed and managed the implementation of a commercial multi-user radio site that included a 125 foot (38 meter) tower at the 3700 foot (1128 meter) elevation on Grouse Mountain for VHF, UHF and 800 MHz radio communications systems.
19.	Federal Express Canada Ltd.	UHF & 800 MHz - Mobile Data Communications System.
		• Carried out a detailed radio coverage analysis for a mobile data system throughout the greater Vancouver area, in British Columbia and south western Ontario fr the implementation of a mobile data system for the Federal express courier operations.
		Provided radio station regulatory licensing assistance for Federal Express radio operations throughout Canada,
20.	Glennet Network Services Inc.	We designed the RF infrastructure that included RF propagation analyses and measurements, selected the paging sites, and managed the implementation of a wide area commercial paging system throughout Southwestern B.C. and Alberta.
22.	Canadian Telelink Ltd.	<ul> <li>900 MHz Wide-Area Digital Paging System</li> <li>Conducted the RF system design, including propagation analyses (measurements and computer-modeled), and selected the sites for a Canadian wide 900 MHz digital paging system.</li> <li>We managed the implementation of the system in Southwestern B C and Southern Optario.</li> </ul>