



ZUMLINK 900 SERIES - REMOTE, RUGGED AND LOW POWER IIOT

Tordrillo Lodge and Heli Skiing Area – Alaska

Overview

Communication Infrastructure Corporation (CIC – www.cicusa.com) is an experienced provider of microwave radio and fixed wireless network solutions. CIC has developed backhaul communication networks for many industries, including mobility, rural broadband, utilities and Oil & Gas. A 20-year innovator in wireless communication infrastructure design, construction and management, CIC deploys new and innovative solutions for the Industrial Internet of Things (IIoT).

When an Alaskan resort company, the Tordrillo Lodge, needed data connectivity for a remote, heli-skiing and fishing lodge, CIC stepped in to provide a robust broadband network traversing rural Alaska that would be reliable and self-contained. The network would be self-powered at remote repeater locations and able to withstand the harsh Alaskan wilderness. Built from the ground up for low-power environments and able to establish point-to-point wireless data links of **65 kilometers**, **FreeWave's ZumLink 900 Series** was CIC's choice for out-of-band power monitoring of this microwave backhaul network.

Needs

One of the obstacles the team faced was powering the remote mountain top repeater sites. Non-grid, onsite power generation was the only option. Therefore, all equipment for the sites needed to run on the least amount of power possible.

Tordrillo Lodge and CIC engineers decided that a combination of solar, wind and fuel cell would be the most efficient and reliable solution to power the critical communications microwave backhaul network. During most of the year, the solar panels would provide power for the site, but during the dark weeks in winter the site would depend on wind power. For times when wind and solar were unreliable, a fuel cell would provide the backup electricity for the system. Fuel cells are dependable, silent, and have a small footprint. Moreover, they generate 100% green power, with no moving parts, no combustion and a waste product of pure water.

Another obstacle the team faced was that the power system for the site needed to be continuously monitored **out-of-band** from the primary communication link, thus, an alternate communication link was necessary to reach the repeater site.

This posed one of the biggest challenges as the repeater site was over 65 kilometers from a reliable data connection.

Solution – Real-Time Monitoring

The power system requires continuous status monitoring to determine the health of the fuel cells and ensure uptime of microwave radio network. At this mountainous location with drastic weather swings, remote monitoring is the only viable option because the site is only accessible by helicopter at great risk to personnel. In fact, 100% of the materials and resources required to construct the site, including the tower structure, had to be flown in via helicopter. Tracking real-time energy production and critical levels in the fuel cell demands a reliable and robust connection. Thus, CIC chose the **ZumLink Z9-PE** for this vital point-to-point network.

An enclosed radio of the ZumLink 900 Series, the Z9-PE is a cost effective, high-speed, rugged wireless communication platform specifically designed for outdoor locations and extreme environmental conditions. However, ruggedness and reliability were not CIC's only considerations. Wireless communication links often demand the most power in a typical system. Although sensors

and devices can be powered down for long periods of time, communications, particularly receivers, must be kept in listening-mode for transmissions. The continuous monitoring solution deployed by CIC needed to be low-power consumption so as not to further burden the onsite power generating system. With a power draw of 355 mA at 12V in transmit and 100 mA at 12V in receive/standby, Freewave ZumLink 900 Series was the logical choice.

Connected to a Remote Terminal Unit at the endpoint via Ethernet, the ZumLink radio network transmits vital data, such as, fuel consumption, battery voltage, output current and operating state. Although capable of throughput rates of up to 4 Mbps, CIC configured the Z9-PE radios to transmit and receive data from tower equipment at a minimum throughput rate of 100 kbps over a **65 kilometer point-to-point** link utilizing high-gain 16 dBi directional antennas.





RESULTS, COST SAVINGS AND FUTURE PLANS

- > The ZumLink network is running at planned receive signal level (-73 dBm), with a 33 dB margin.
- > Achieved throughput of 100 kbps over a 65 kilometer (40 miles) point-to-point RF link.
- > Z9-PE low-power consumption allows the link to be powered year-round by non-grid power sources (solar, wind, and fuel cell).
- > ZumLink radio connectivity protects investment in the fuel cell system, ensuring that fuel reserves do not go below certain thresholds.
- > Remote status monitoring allows for Predictive Planning and Maintenance for fuel cell cartridge replacement.
- > Costly and potentially dangerous manual inspections of the tower and infrastructure have been significantly reduced.
- > The ZumLink 900 Series radios futureproof the network as CIC intends to add weather stations and snow condition sensors to the network.
- > With 1 GB of flash and 512 Mb of RAM, Z9-PE radios include the **ZumIQ Application Environment** which allows the development and deployment of third-party applications and puts intelligence at the edge. CIC is exploring applications to improve remote monitoring capabilities via ZumIQ.

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