

Achieving Digital Voice and High-Speed Data to Underground Mining at the Working Face – A Technology Collaboration

NORCAT.org, founded in 1995 by a team of business and academic visionaries, “recognized the need for an organization to promote, educate, and support local entrepreneurs, tech innovators, and skilled labor workers to enable long-term and sustainable economic and social prosperity for Northern Ontario”. One of its core values is teamwork and collaboration. Among its offerings is the NORCAT Underground Centre located in Sudbury, Ontario (Canada). It is an underground operating mine that serves as both an innovation and training centre, providing two services:

- Technology Development, Testing & Demonstration
- Experimental, Hands-on Training & Development

The Challenge

Underground mining operations, often found in remote and hazardous locations, face a myriad of unique communication challenges. From signal obstacles and harsh environmental conditions to excessive noise and lack of redundancy, these issues not only affect worker-to-worker communications but also limit effective personnel tracking, emergency management, and safety measures.

Communications within the mine and from ‘underground to surface’ have traditionally been enabled using two-way radio frequencies over an antiquated, single ‘Leaky Feeder’ radiating cable network. These networks provide basic two-way radio voice communications. However, they do not address communications at the working face of the mine where the production takes place.

Furthermore, independent networks are always required to address air quality management, teleoperations for remote control of equipment and ground control systems.



Testing Location

- NORCAT Underground Centre in Sudbury, Ontario (Canada)

The Partners

- **Rajant Corporation:** Pioneers of peer-to-peer radio communications enabling real-time voice, video, and data to connect machines, robots, and people together everywhere as part of a secure private fully mobile network.
- **Crossover Distribution:** Founded in 2007 by a group of industry veterans bringing a new approach to how wireless and networking solutions are sold and supported in North America
- **Sonim Technologies:** A leading U.S. provider of ultra-rugged mobility solutions designed specifically for task workers physically engaged in their work environments, often in mission-critical roles.
- **Mutualink:** Committed to providing secure, seamless, interoperable communications to keep communities connected in the event of a public emergency.

Solution Components

- Rajant Kinetic Mesh® wireless technology
- Mutualink GO KIT with LNK360 software
- Sonim Technologies XP10 Rugged Handheld Smartphones

The Solutions

The proof of concept (POC) at the NORCAT mine was to demonstrate how to extend wireless communications from the existing Leaky Feeder system into the working face of the mine. To achieve this, wireless Rajant Kinetic Mesh technology was used as a gateway that crossbands VHF signals to 2.4/5 GHz signals.

The success factors of the solution:

- Rajant Hawk wireless nodes, known as BreadCrumbs® and a Mutualink GO KIT for the infrastructure
- Sonim Technologies XP10 rugged smartphones enabled with Mutualink's LNK360 Push-to-Talk (PTT) application
- A single VHF two-way radio to connect to the Leaky Feeder network

Within the underground mine environment, Rajant Kinetic Mesh BreadCrumbs were strategically placed in the drift alongside and past the existing leaky feeder system to extend coverage into the working face. The Mutualink GO KIT was installed on the surface and into the wired portion of the Rajant wireless network. A second port from the GO KIT was used to interface with a VHF radio, providing a wireless connection to the leaky feeder system.

Within 15 minutes of deploying the aforementioned solution, full wireless communications were immediately established between workers in the mine using handheld portable VHF radios and miners working at the face of the mine, who were equipped with Sonim smartphones using PTT functions.

When a smartphone user pushes the PTT button, the VHF radio channel is activated, and the radio users hear the smartphone's broadcast over the leaky feeder system. When a radio user pushes the PTT button, the voice signal is broadcast over the wireless Kinetic Mesh network to the smartphones.

Additionally, miners using Sonim smartphones at the working face could share live video feeds to the surface and beyond. This also solves the communication issues with a lone worker at the mine face.

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As a leading wireless technology distributor, Crossover is proud to have collaborated with our key vendor partners, Rajant, Mutualink, and Sonim Technologies to create such a unique solution to address age old communication challenges in the mining industry.

— **Darin Gibbons**

Executive Vice President, Crossover

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The Results

This technology is agnostic and an interoperable solution that can connect to any leaker feeder system, regardless of the frequency band being used. This solution enables new VoIP phones and existing handheld portable radios to communicate with each other. It allows mines to continue expanding present technology into additional areas of the mine while leveraging existing leaky feeder systems.

Employees will benefit from mine-wide communications by simply installing a Rajant BreadCrumb on mobile equipment such as drills, loaders, or trucks, effectively making the machine a wireless hot spot.

Crossover Executive Vice President Darin Gibbons, shares of the experience, “Rajant is a complement to other technologies, like Sonim and Mutualink, in the Crossover portfolio. Rajant enabled us to test and prove a VHF to VoIP phone crossbanding solution that seamlessly allows the worker to use either a phone or a radio and communicate on a legacy and Kinetic Mesh system in the extreme environment of an underground mine.”