AGNICO EAGLE

LaRONDE MINE : ONE MORE STEP TOWARDS 4.0

Nowadays, all mining operators talk about the concept of "Mine 4.0". They are all ready to embrace this new technology, to bring their company into this new technological era. The LaRonde mine just increased the pace towards joining this industrial revolution through the implementation of wireless communications. Indeed, by acquiring its own underground 4G LTE cellular network – a first in Canada – the mine facilitates the integration of digital technologies into its operations.

THE ADVANTAGES OF LTE

There were many arguments in favour of a private LTE solution at the LaRonde mine. In addition to reliability and robustness, this technology provides, among other things, security and data protection, ownership of its own local servers, SIM cards exclusive to Agnico Eagle Mines and an inventory of 500 smart phones. A private network also prevents interferences from other systems.

The decision to use a private LTE cellular network (project completed in November 2017) was taken when planning the implementation of underground means of communication at the **LaRonde Zone 5 project**. With little enthusiasm to repeat what had been done before with traditional systems, project initiators decided to look at cellular technology.

- PERFORMANCE
- ROBUSTNESS
- SECURITY AND PROTECTION OF DATA
- LOCAL SERVERS
- EXCLUSIVES SIM CARDS
- NO INTERFERENCE
- FULL COVERAGE

"We want to have a modern mine that raises the industry standards and that is ready to enter the era 4.0. We did not want to implement technologies that were used 20 years ago. They would have worked, but would not have been what is best for a modern mine. We challenged experts to give us proofs that we were on the wrong direction in using LTE, but nobody could."

- Sylvain Bernier,
Operational Technology Technician.

"In fact, we did not invent anything. We used a technology that already existed, that is tested by millions of people every day, and we worked with our suppliers to adapt and integrate it in a different environment where nobody had tried yet, and above all, in an environment where communication is the biggest challenge."

- Alain Larose,
Assistant-Superintendent Maintenance.

TOWARDS MINE 4.0

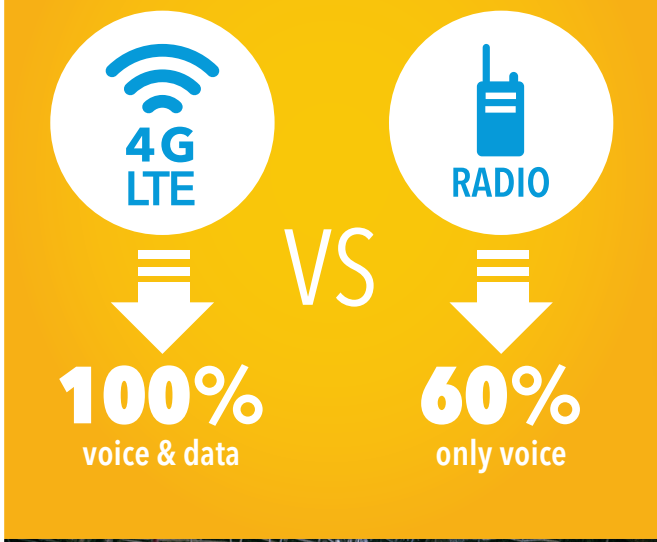
The Industry 4.0 concept is essentially defined by the introduction of digital technologies ensuring connectivity and greater communication between various equipment and resources of the company, as well as analysis of massive amounts of data in order to monitor and control in real time machinery and equipment for superior productivity and efficiency of working methods.

At the LaRonde mine, the key to revolution and true innovation is really the implementation of the underground LTE cellular technology by adapting it to our operations, a first in the Canadian mining industry. This technology provides security, liability, performance and a complete cellular coverage of all underground zones at all times. With the cellular network, all traditional communication systems can be used with only one infrastructure. Traditionally, LaRonde has been using, like most mines, a traditional two-way radio system to meet its voice communication needs (*Leaky Feeder* system), and a Wi-Fi network for its wireless data communication. This conventional system requires two distinct networks along with their respective equipment.

The Wi-Fi technology has its limits in terms of coverage and speed, and the complex configuration of the LaRonde mine with its various levels of production is a real challenge. Initially designed to provide an Internet connexion to fixed equipment located near access points (hotspots), Wi-Fi is less suitable for moving machinery. In a mining operation such as LaRonde, Wi Fi access points are only available in certain areas, like garages, which requires employees to frequently travel back and forth to these areas to get a signal.

Benefits of using this technology are also significant for workers because it allows constant communications between them and the operations, no matter where they are underground. While a conventional radio system would offer about 60% of coverage only for voice communications, LTE network enables 100% of voice and data coverage.

> **Wi-Fi is a technology that works and that can integrate all systems, but for a mining operation as large as the LaRonde mine, it's like using a family car to transport loads of sand seven days a week. It's going to work, but it is not designed for that. With LTE, we can use a 10-wheeler truck to transport the sand.**
>
> - Sylvain Bernier,
> Operational Technology Technician.



Antennas installed in various locations throughout the mine relay the cellular signal everywhere into the mine.

An underground worker can consult the inventory of spare parts available at the surface and directly send a request.

Employees sharing information with their supervisor using a cellular phone directly from their work place.

Nurses at the LaRonde Mine are experimenting the opportunity to interact with workers underground and to see them live.

REAL TIME DATA

ENDLESS POSSIBILITIES

TELEMETRY
AUTOMATED DATA COLLECTION
GEOLOCATION OF THE WORKERS
REMOTE CONTROL OF OPERATIONS IN REAL TIME

THE BIG DATA

“The real revolution is being able to send and receive data in real time from all underground operations. It allows people to make decisions and immediately react no matter where they are on Earth! Before, the supervisor would receive information from employees one or two times a day, during shift changes. Now, they are be able to know everything in real time and to give appropriate directions instead of waiting for the next shift change”, explains, Mr. Larose.

The revolutionary aspect of this technology lies in all specialized tasks and applications that can be developed, which were, up until now, difficult or simply impossible to achieve. According to the two initiators of the project, possibilities are endless: telemetry (remote monitoring) in real time, automated data collection, geolocation of workers, remote control of fixed and mobile operations in real time, etc.

“At first, this project seemed very abstract because it was difficult to see all the possibilities that a cellular network had to offer, but we soon identified several benefits. For example, the day the nurse realized that they could see in real time their next patient 3 km underground via Skype of Facetime and that they would be able to see their health condition, physical condition and to speak with them live, and then, that they would have seven minutes to get ready before the injured person arrives at the surface, they quickly realized that it would definitely change their way of providing health care and ensuring the health and safety of workers”, says Mr. Larose.

All mine department without exception will benefit from this technological advance. Since the implementation of the network at the LaRonde complex last fall, the “to do” list of everyone’s needs for applications and other customized features is getting longer every day.

“We definitely haven’t seen all opportunities that the cellular network can provide in our operations. It’s the first real step towards a Mine 4.0, but it is already revolutionizing our working methods. The very fact that data is collected in real time is changing the way and the speed of interpretation and analysis.”

- Alain Larose,
Assistant-Superintendent Maintenance.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