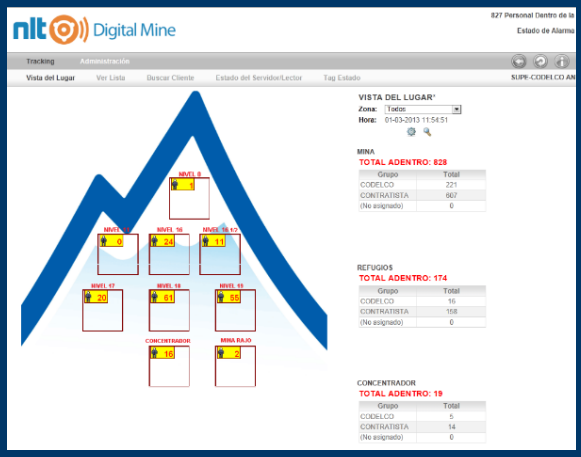
NLT Chile - Codelco Andina Mine

Tracking System for 11,000 Miners



Case Study

Supplier Details

NLT has developed a personnel mine tracking system using RFID and/or WiFi technology. In Chile the system is called a presence detection system, and it is based on RFID tracking technology. Providing real time information on the location of personnel, the system is based on active tracking Tags that emit a wireless signal every 1.5 seconds. The signal is captured by omnidirectional antennas attached to RFID Readers installed at all mine portals (17 in total) and entrances to refuge chambers (10 stationary and 6 portable) in the underground mine at Codelco Andina. The information sent by the antennas is received by application servers for further processing into an SQL Server database and is accessed via the Web through NLT Digital Mine™, NLT's tracking software. The project was fully led by NLT Chile with support from NLT Canada and NLT Australia. This is the first mega project NLT Chile has undertaken and the first of its kind in Chilean mining.

Location Details

These mining facilities are located in central Chile, in the province of the Andes in the 5th region, at the foot of the Andes at an altitude of between 2,500 and 3,700 meters. The mining company is mainly engaged in the extraction of copper and molybdenum concentrate. Codelco Andina has two mining areas within the huge underground mine and 17 entrances called portals. The Codelco Andina shift system currently tracks 2,000 full time employees as well as up to 9,000 contractors. The workers enter the industrial area by vehicle (truck or bus), and pass check-points into two main entrances (The Control Barrier and the Winter Hut at km 7). The tracking technology must be able to read each Personnel Tag (up to 40 per bus) travelling at speeds of up to 50 km / hr. The underground mine has 5 levels with about 100 tunnels, 2 industrial lifts, 3 canteens inside the mine and 2 on the surface, 14 admission areas distributed between the mine and the concentrator, 10 change rooms, and 45 underground offices. The vehicle traffic inside the mine is regulated by automatic traffic light systems which are located throughout all the levels.

Project Challenges

The challenges in the project are summarized in the following list:

- NLT Chile undertook the first tracking project in Chile's largest copper mine in Chile.
- Selecting a team of professionals with experience in large mining projects.
- Adapting the technology and software to meet the customer requirements.
- Working in teams to solve problems presented in the field between engineers in Canada, Australia and Chile with language barriers (Spanish and English)
- Installation of 33 kilometers of optical fiber to cover the entrances and stationary and mobile shelters within the mine.
- Performing installation and commissioning of 33 communications nodes, 8 fiber optic rings and 79 RFID antennas. Most of the equipment was installed at a height of 3 meters and there were significant distances between nodes.
- Enabling 4 servers, 2 application servers (Mine Digital Software) and 2 database servers. The challenge was in migrating the database system from My-SQL to SQL Server.
- Programming, inputting, and labelling data for 11,000 tags in to the NLT Digital Mine™
- Developing a contents folder detailing all the contract information

Project Details

The ultimate goal of the presence detection system was the need for an effective and efficient way of controlling the entry, exit, and the location of people continually, but especially in the event of an emergency inside the underground mine. In the future the system will be extended to multi-node installations within the mine areas to more precisely locate the whereabouts of all personnel.

Considerations of the project:
Installation of 33 km of fiber optics as the transmission medium of the data captured by 79 antennas and RFID Readers strategically located at the entrances to the mine, and in mobile and stationary shelters throughout the area.
60% of the fiber was installed into existing small mine conduits and the other 40% of the fiber was carried in the mines messenger cabling system.
In the working sections of the tunnel, the height is about 6 meters, so it was necessary to use lifting equipment called "Manitou" and the corresponding required safety equipment for working at heights was a requirement by Codelco.

After the fiber was installed, it was necessary to install and power 33 nodes (containing the communication board), consisting of two panels each, one for instrumentation and backup battery and the second for the fiber optic header. NLT mounted 79 antennas connected to the nodes and laid the electrical and communications cabling (RS 485).

Fiber optic, communication, and instrumentation cabling was deployed within galvanized steel conduit to provide an appropriate resiliency and aesthetic within the underground environment.

A total of 40 fiber fusion splices were made, to allow for the desired network architecture, distributed between 15 horizontal fiber optic splice enclosures. Each fiber optic ring was certified using the latest generation of instrumentation.

To deliver a robust solution to the client, the network topology was designed in fiber optic ring architecture in order to give continuity to the network in case of a power short. In total eight redundant rings were implemented, that run throughout all the facilities of Codelco's Andina division.

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