Delivering Enterprise-Level Connectivity in Remote Desert

Mining company gains thousands of productive man-hours a year while boosting morale

EXECUTIVE SUMMARY

Customer Name: Sierra Gorda

Industry: Mining

Location: Chile

Number of Employees: 2000

Challenge
- Improve productivity of field and construction engineering personnel
- Help ensure efficiency of mining activities, specifically in the coordination of new plant construction
- Enhance staff loyalty through the provision of enterprise-level technology tools

Solution
- Cisco Unified Wireless Network built for extreme conditions

Results
- Productivity gain of about 720 man-hours per month for field and construction engineers
- Faster decision-making and more agile operations
- Improved employee satisfaction

Challenge

The Atacama Desert in northern Chile is the driest place on earth. Even the hardiest of plants find it difficult to survive in this parched land, where some weather stations have never seen rain and river beds have remained dry for 120,000 years. But the barren surface hides rich mining seams, with some of the world's largest deposits of copper, sodium nitrate, gold, silver, iron, and other minerals.

This mineral wealth attracts mining interests such as Sierra Gorda (literally "Fat Ridge" in Spanish), a company that got the go-ahead to extract copper and molybdenum in 2011 and is expected to commence operations in 2014.

The current backers of the project will put USD$3.9 billion into the company and expect it to yield 220,000 tons of copper, 11,000 tons of molybdenum, and two tons of gold a year over 20 years. This level of production will make it one of the largest copper and molybdenum mines in the world.

For the investment to start yielding a return, however, the open-pit mine first has to go through a complex site preparation process and construction of a copper concentration plant. This effort involves varying numbers of field construction engineers and superintendents (about 30 to 120, depending on the stage of the project) leading work teams from remote office quarters (typically metal shipping containers) spread out across the immense site.

Travel between these quarters and the mine's central office block is complicated not only by the topography of the terrain but also by the fact that blasting and trail re-routing are commonplace amid the construction activities on the site. As a result, round trips to the central block, for example to file reports and review plans and emails, can easily take a couple of hours a day, as well as adding to vehicle fuel expenses and employee fatigue.

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Jaime Ramírez
IT&C Manager
Sierra Gorda

Sierra Gorda was anxious to avoid such trips because they hindered productivity and decision-making, which could lead to further delays to the mine's construction schedule.

Chile has a very robust mining industry, prompting a concern that qualified field engineers could potentially be lured to other companies if they felt the conditions (including the communications infrastructure) were better elsewhere. Connecting remote quarters with wired or fiber-optic connections was not an option, though, because of the danger of the cables being dug up by site excavation activities.

For these reasons, the company was aware of the need to have a flexible and reliable wireless network across the whole site. As of 2012, however, and despite having implemented a number of different systems, Sierra Gorda was still unable to provide its field engineers with the Wi-Fi coverage they needed. It realized that achieving this goal was dependent on ruggedized routers that could be deployed in harsh environments where high daytime temperatures, low nighttime temperatures, dusty conditions, and lack of humidity were prevalent.

Solution

Sierra Gorda had originally built a point-to-point system using radio receivers connected to switches at each remote location. Having two technologies per location increased the chances of a failure of one of them, however, and as the number of end-user devices (including laptops and smartphones) in each remote base increased, the point-to-point connections became congested.

To address this, in 2012 Sierra Gorda started using a wireless mesh system. Implemented by a third party, this system was not able to manage the VLANs that the mine needed for communication across the site and with its parent companies. Consequently Sierra Gorda moved to another wireless mesh network, but the problem persisted.

Specifically, infrastructure could not work with the dynamic VLANs required by laptops and smartphones at the same time as the static VLANs needed for printers and other devices. In desperation, Jaime Ramírez, IT&C manager for Sierra Gorda, challenged Cisco to solve the issue directly. "Our challenge was to provide services to remote sites across a complex geography, be able to support a variable number of people, and deliver the same service level at all locations," he says.

In February 2013, Cisco responded by replicating the Sierra Gorda communications setup within a laboratory in Santiago de Chile and working on different access point configurations in an effort to overcome the mining company's issues. After three days, the Cisco team solved the problem in the laboratory and went out to the mine for field testing.

Some further configuration tweaks followed, then the team spent three days of scouting to determine the optimum positioning of access points around the site. Finally, the WLAN was put together within a day. From start to finish, Cisco took about two weeks to solve a problem that had affected Sierra Gorda for those first years.

The mine has implemented full Wi-Fi access with Cisco® Aironet® 1550 Series Outdoor Access Points mounted on poles above the remote offices and managed via a Cisco 5508 Series Wireless LAN Controller. The WLAN connects to a core network built on Cisco Catalyst® 3750X and 3560X Series Switches.

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These systems complement a range of other Cisco technologies in use around the mine between teams and for communications with Sierra Gorda parent companies. The collaboration infrastructure at Sierra Gorda includes Cisco Unified Communications Manager, Cisco TelePresence® Codec C40, Cisco Jabber® Video for TelePresence, Cisco Unity® Unified Messaging, and Cisco 3900 and 7900 Series IP Phones.

Results

The project engineers discovered the access points were able to deliver near-perfect coverage within the remote office units, despite the fact that the offices were made of metal. This arrangement allows the WLAN to deliver essentially the same level of connectivity and application delivery at remote sites as that available in the central office.

The infrastructure supports all Sierra Gorda core office, planning, and operations services, as well as mobility and collaboration applications, such as Cisco Jabber Video for TelePresence. The system is significantly improving productivity during the construction process across the mine.

Assuming a saving of two hours per field engineer per day, it's calculated that each person would save about 36 hours a month under the mine's shift arrangement of nine days on and five days off at a time. For an average field engineering force of around 20 people, that works out at 720 man-hours a month saved.

This solution results not only in more work being done per day on site, but also in much quicker decision-making. Previously field engineers might have had to return to the central office to resolve issues, but now they can solve them immediately on site.

Furthermore, says Ramírez: "As well as the hard savings, there is a psychological benefit in that our field engineers can enjoy working in technologically advanced office environments, even though the offices themselves are in unorthodox locations."

Finally, having ready access to a WLAN connection means it is easier for workers to stay in touch with relatives at home, which improves staff satisfaction and enhances loyalty.

Next Steps

The new WLAN design will be flexible enough to accommodate increasing numbers of workers on the site; at peak, Sierra Gorda is expected to be home to around 6500 construction workers. It is likely the design will be used at other projects by Sierra Gorda parent companies.

"As the head of IT&C for the this project, I have been pleasantly surprised by Cisco's willingness to work side by side with us in finding a way forward," says Ramírez. "We will undoubtedly reproduce this solution at other projects and workplaces, because we had been trying to solve this problem for a long time, and it was one that was having a serious impact on our processes on the ground."

For More Information

To learn more about the Cisco architectures and solutions featured in this case study please go to:

www.cisco.com/go/wireless

Product List

Wireless
- Cisco Aironet 1550 Series Outdoor Access Points
- Cisco 5508 Series Wireless LAN Controller

Switching
- Cisco Catalyst 3750X Series Switches
- Cisco Catalyst 3560X Series Switches

Telephony
- Cisco 7800 Series Media Convergence Server
- Cisco IP Phone 7975
- Cisco IP Phone 7945
- Cisco IP Phone 7937

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