

Internet of Everything

Case Study

Customer Name: Dundee Precious Metals
Industry: Mining
Location: Headquarters in Canada; Worldwide Operations

Challenge

- Increase production quality and output without increasing headcount and resources
- Improve miner safety
- Minimize costs

Solution

- Harnessed Internet of Everything to connect people, track the location of miners and vehicles, monitor vehicle status, and automate building controls
- Deployed Cisco solutions for Wi-Fi, unified communications, collaboration, and data center

Results

- Quadrupled production, from 0.5 million to 2 million tons annually
- Saved US\$2.5 million in long-distance costs over two years
- Improved miner safety by connecting blasting system with location-tracking system

Mining Firm Quadruples Production, with Internet of Everything

Dundee Precious Metals uses innovative IT strategy to connect people, process, data, and things, under and above ground.

We are entering the next big phase of the Internet, the Internet of Everything. People, process, data, and things are connecting at unprecedented scope and scale, making network connections more relevant than ever before. Dundee Precious Metals has capitalized on the Internet of Everything to transform one of the world's oldest industries.

Challenge

Mining operations haven't changed much in hundreds of years. Until now.

Dundee Precious Metals (DPM) is a Canadian-based, international mining company involved with precious metals. The company works to identify, acquire, finance, develop, and operate low-cost, long-life mining properties.

DPM's flagship mine, in Chelopech, Bulgaria, produces a gold, copper, and silver concentrate. In 2010, DPM set a goal to increase production by 30 percent. The IT team needed to find a way to reach the target without increasing manpower or the number of vehicles.

The idea was to "take the lid off the mine," says Mark Gelsomini, corporate director of IT for Dundee Precious Metals. "We wanted to see exactly what was going on, as it was happening, instead of waiting until the shift change." Important information includes miners' locations, equipment location, how many buckets have been filled, and vehicle status.

Tracking engine and oil temperature, for instance, would enable the company to perform repairs before vehicle problems interrupted operations.

Knowing what was going on at all times would require a new approach to communications. "Communications is very challenging in mines because Wi-Fi traditionally hasn't worked underground," says Gelsomini. Instead, mining companies usually set up what's called a leaky feeder. This is a cable strung through tunnels that emits and receives radio waves. But signals can't pass through solid rock. So miners and supervisors can only communicate if they are in the same tunnel.

For DPM, this meant that mine managers couldn't find out about production until supervisors filled out a paper report at the end of their eight-hour shift. "In between shifts changes, we had little knowledge of process interruptions," Gelsomini says. This prevented the company from fixing problems before they affected production.



“The evolution of the mining industry is under way. The Internet of Everything is helping to enhance safety, increase production, and optimize resources based on real-time information.”

– **Mark Gelsomini**, Corporate Director of IT, Dundee Precious Metals

Solution

DPM has succeeded in transforming centuries-old mining processes, by taking advantage of the Internet of Everything. Acrodex, a Cisco Gold Certified Gold Partner, worked closely with DPM’s IT team on planning and implementation.

The foundation of the solution is a Cisco® Unified Wireless network. Two hundred-eighty Cisco Aironet® Wireless Access Points provide coverage along 50 kilometers of tunnels. “We chose Cisco because of its commitment to support,” Gelsomini says. “They were willing to help us as we developed custom 2.4-GHz antenna to work underground.”

DPM is one of very few mining companies in the world using a wireless IP network at large scale. The network connects everyone and many things. These include Cisco Unified Wireless IP Phones. Vehicles. In-vehicle tablets. Video surveillance cameras. Cisco TelePresence® units. An internally developed mining operations application, Programmable logic controllers (PLCs) on the conveyor system in the mill. Lights, fans, and power. Even the blasting system.

The Internet of Everything makes processes more efficient. For example, drivers, supervisors, and managers use Cisco Unified Wireless IP Phones to communicate from anywhere, above ground or below. The DPM team customized the phones to also work like push-to-talk (PTT) devices. “Cisco Unified Communications is better than our old ‘leaky feeder’ system because it’s resilient,” Gelsomini says.

Shift supervisors and drivers anywhere in the mine can now exchange instant messages using Cisco Jabber® on iPhones, iPads, Android devices, PCs, and Macs. Drivers receive messages telling them where to go. They also see how many buckets they have dumped, and how many more before the end of the shift.

If an issue gets in the way of making the goal, such as a vehicle problem, drivers can use their tablets to capture video and share it with an expert in real-time.

To track the location of people and vehicles, DPM attaches RFID tags to miners’ caps and to vehicles. The wireless network picks up signals from the tags and transmits them to the control center. DPM’s custom software superimposes the locations on a 3D map. “The objective is safety,” says Gelsomini. “Now we know where miners are and have been.”

The new collaboration capabilities also extend to other company locations. For example, managers, geologists, and metallurgists in different locations can collaborate with an in-person experience, using Cisco TelePresence and Cisco WebEx®. Discussing production, development, and project schedules face-to-face helps to improve understanding and decision-making. That’s especially important in an international company, where people might be speaking in their second or third language.

DPM replicated the same technology in Armenia, and is working on its operations in Namibia. “When we open a new production area, we just install a new Cisco wireless access point and connect it to a fibre-optic cable,” says Gelsomini. “That’s it. There’s no downtime, no need for a repeater or balancer.”

Results

Increased Production

Since connecting its people, process, data, and things to the Cisco Unified Wireless Network, DPM increased production from 0.5 million to 2 million tons annually. That’s a 400 percent increase, far exceeding the 30 percent goal.



“We know where each vehicle is, so we can send an instant message to the driver to adjust the route to pick up more ore. And instead of leaving our vehicles idle, we’re redeploying them to get closer to 100 percent utilization.”

– **Mark Gelsomini**, Corporate Director of IT, Dundee Precious Metals

Throughout the day, supervisors can see shift changes, miners’ locations, the number of buckets filled and transported, and vehicle status. “We know where each vehicle is, so we can send an instant message to the driver to adjust the route to pick up more ore,” says Gelsomini. “And instead of leaving our vehicles idle, we’re redeploying them to get closer to 100 percent utilization.”

The ability to share real-time video also helps to improve production. This value was proven when vehicles inexplicably kept breaking down at DPM’s mine in Armenia. The vehicle manufacturer is in Canada. Before, DPM would have had to pay for a technician to fly from Canada to Armenia to diagnose the problem. This time, the technician diagnosed the problem by viewing real-time video. “We solved the problem in hours instead of a week, and saved almost \$50,000 in travel costs and time,” says Gelsomini.

Improved Safety

Most mining companies ignite blasts over the leaky feeder system. Now DPM is one of just a few companies worldwide that transmit blast signals over the wireless network. This capability improves safety because the blasting system integrates with the people-tracking system over the network. “It’s one more precaution to make sure that blasting will not occur unless every individual has exited the mine,” Gelsomini says.

Improved Asset Utilization

The Internet of Everything even helps DPM service vehicles before they break down and interrupt production. Vehicles continually transmit telemetry data over the wireless network, such as engine and oil temperature, tire pressure, rotations per minute, and the number of buckets dumped. When the information is out of range, the vehicle is brought in for repair. And if a vehicle is not ready when scheduled, it sends a notification so that the supervisor can request another vehicle.

Lower Communications and Energy Costs

All DPM operations in four countries use Cisco Unified Communications. “I’ve been in the lowest part of the mine and had conversations with people in Toronto,” says Gelsomini. Using the WAN for voice and videoconferencing has saved nearly US\$2.5 million in long-distance charges over two years.

Energy costs have also decreased. A central application controls fans, lights, and power over the network. “When more people are in an area, fans spin up and lights go brighter,” Gelsomini says. “When nobody is there, the lights turn off and fans spin down.”

Next Steps

Now DPM is modifying its Cisco infrastructure to work in open-pit environments. The company is also exploring the idea of extending the Internet of Everything concept to health monitoring. One plan is to connect environmental sensors.

Gelsomini concludes, “The evolution of our industry is under way. The Internet of Everything is helping to enhance safety, increase production, and optimize resources based on real-time information.”

Technical Implementation

In the Chelopech data center, DPM implemented a Cisco Unified Computing System™ (UCS®) C240 Rack Server that hosts Cisco Unified Communications Manager, other virtualized business applications, and large geology databases. Cisco Wide-Area Application Services (WAAS) optimizes WAN bandwidth between Chelopech and other company locations. This capability helps to make sure that replicating multi-gigabyte geology databases between data centers does not slow down other applications. “Application response times between overseas sites have improved fivefold,” Gelsomini says. “Even though we have more voice and video traffic, our overall network costs have actually decreased.”



For More information

To learn more about the Internet of Everything, visit: <http://www.cisco.com/tomorrowstartshere>.

To learn more about Mining and Internet of Things, visit: <http://www.cisco.com/go/mining>.

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