

## CASE STUDY

# 3D-P Helps a Mine in Northern Canada Prepare their Digital Mine of the Future

To learn more, call 3D-P  
at + 1.403.203.3018

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## EXECUTIVE SUMMARY

A mine in Northern Canada charged 3D-P to upgrade their wireless network and make it autonomy ready. With an Autonomous Haulage System on the horizon, Cisco was selected as the wireless technology vendor. 3D-P developed a Cisco wireless network design that was not only autonomy ready, but provided redundancy and scalability, while exceeding the performance requirements of the autonomous application.

## ABOUT THE COMPANY

The mine is located in the Northern Canadian oil-sands region. Remotely located and experiencing extreme winter weather, the mine operates a large fleet of approximately 190 haulage, loading and auxiliary equipment.

## THE CHALLENGE

For the mine to remain competitive, it is imperative they utilize the latest technology to ensure efficient production. Accordingly, the mine has always sought out the latest in production, safety and asset maintenance applications and technology. Of course, any solution must be able to survive the cold temperatures, snow and ice, as well as provide reliable communications in an open-pit mine.

Wireless technology is used at site to facilitate fleet communications and application data gathering. The existing wireless network, deployed in 2012, hit its maximum performance level in 2016. It became clear that a higher performing technology was required.

But any upgrade in technology would also have to accommodate the mine's vision for autonomy. Many view autonomous haulage as the future of mining. It offers a particularly appealing mix of cost savings and improved performance that mining operators such as this mine in Northern Canada see as fundamental to remaining competitive.



3D-P has been servicing the site for over six years. As a result of that relationship, 3D-P was tasked with upgrading their wireless network. And it would also be 3D-P that was called on to make sure the network upgrade, and all the associated technology, could meet the mine's vision of an autonomous mine. The so called "digital mine."

## THE SOLUTION

In response to the mine's need for a new wireless network, 3D-P developed a fit-for-purpose solution. The new network had six overarching requirements:

1. The network and the associated networking components must be approved for the Autonomous Hauling System (AHS) application. The AHS application required an order of magnitude improvement in network performance over the existing network;
2. While the network must be AHS capable, it must also support the existing legacy Mine Control Systems (MCS) applications;
3. The network design must be scalable;
4. The technology and products chosen must be able to survive the harsh environment;
5. The network should provide redundancy for critical applications; and
6. There should be little to no disruption to ongoing mine activity during the upgrade.

In preparation for this upgrade requirement, 3D-P and the mine had been implementing dual-radio Intelligent Endpoints® (IEPs) in the mine vehicles for some time. This approach allowed the site to migrate their fleet to the new network with limited network related downtime. As for the wireless network infrastructure supporting these radios, Cisco products were chosen because they meet all of the stated requirements.

3D-P's approach to the design and deployment of the mine's network was based on their experience deploying similar technology at over 90 mines globally. One of the key tenets of 3D-P's approach is their long-term view and strategy with regards to technology migration over the life of the mine. 3D-P's products, projects and support services are designed with long term partnership and performance in mind. In this case, the result was efficient and cost effective upgrading of technology, with the least possible impact to ongoing operations.

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**Fig 1.** The 3D-P Intelligent Endpoint



The upgrade plan required re-utilization of the same frequencies by the new network that were currently being used by the existing network. In order to minimize interference related concerns during the upgrade, it was determined a complete break would be undertaken, but in a manner that would result in the absolute minimum downtime for fleet applications.

Critical to the project's success was the commitment by the mine, 3D-P, and the autonomy provider to get the Intelligent Endpoint AHS approved for production at site. In parallel to the mine's upgrade project, 3D-P worked to complete all the required testing to ensure that all IEPs were ready to be used in the future AHS network.

The network upgrade implementation took place in four stages with initial cut-over occurring in the tailings pond area:

**Fig 2.** 3D-P Fuel Cell Power Station



1. The previously deployed Intelligent Endpoints on the fleet were firmware upgraded and configured, ready for the change of infrastructure and resulting connectivity on the second radio in the IEP;
2. The entire legacy network was shut down at one time;
3. The new network infrastructure elements had been pre-commissioned and were turned on immediately after the legacy network was powered off; and
4. The fleet was cut-over, with priority haulage and shovel equipment being the first to use the new network.

The 3D-P and mine site teams met onsite to do the preliminary cutover activities on February 2, 2017. The legacy network was powered off the following day. During the following days, these crews worked on the heaviest lifts and with minimal service interruption.

## INCREASED CUSTOMER SERVICE

During and subsequent to the network cut over, 3D-P provided an increased level of support, guaranteeing a smooth transition. In addition to their standard support, which includes email and phone support; firmware upgrades; and configuration assistance, a number of new support services were added, and are now available to all customers, providing a managed services solution that is helping the mine realize maximum performance from the network:

- Participation in mine planning—monthly meetings with the mine planners are conducted to determine proactive moves that aligned with changes to the shovels;
- Weekly site visits are held in support of the AHS network;
- Monthly site visits are held in support of the legacy Mine Control System (MCS);



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- Program tracking and reporting outside of the upgrade project are provided;
- Monthly key performance indicator (KPI) reports are generated; and
- Network monitoring using 3D-P's Insight application is utilized.

3D-P's Insight network monitoring application was developed in partnership with the site as a requirement for operation of the new network. Insight provides real-time visualization of network and assets performance. It

displays the up/down status as well as performance related indicators of all devices in the network. These include the Cisco access points; the Cambium point-to-point and point-to-multipoint radios; the 3D-P hybrid fuel cell solar trailers; and the fleet IEP devices.

Developed specifically as a mining network and asset monitor, Insight applies mining application specific rules to each asset monitored.

For example, rather than simply showing signal strength for a specific link, Insight monitors and alerts when mining application specific network deficiencies are found, such as GPS corrections arriving sporadically at a HPGPS receiver, or application specified latency requirements are not being met.



**Fig 3.** 3D-P Insight

## THE RESULTS

The MCS application performed better than expected on the new network, according to the mine staff. All cut-over objectives were met. Commissioning tests were conducted to ensure the network met all the initial design requirements and to establish performance benchmarks for ongoing network support.

In conclusion, the mine network upgrade and autonomous operation zone (AOZ) project delivered possibly the highest performing network of its kind in North America, at a fraction of the cost of other similarly-sized and complex networks. All of this was accomplished within an aggressive six-month implementation schedule.

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Visit [www.3d-p.com](http://www.3d-p.com)

200-8 Manning Close NE, Calgary, Alberta, T2E 7N5

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