

The first gigabit network providing both data and power using coaxial cable.



Vale Canada's Creighton Mine is an underground nickel mine located in Canada's historic Sudbury Basin. Vale's Production at Creighton Mine began in 1901 and at 2,400 meters (7,800 feet), the site is one of the deepest mines in Canada. Ontario Operations are recognized around the world as one of the largest fully integrated mining operations in North America.

Vale's Digital Transformation into the digital age of mining and integration of digital technologies into their underground operations has been facilitated by innovative suppliers such as *Maestro Digital Mine*. Starting at Totten Mine, Vale reviewed alternative cost-effective solutions to the pre-existing air quality monitoring stations. Totten required a system that had a proven track record in the underground environment; one that kept workers safe and helped achieve significant savings. Maestro's Vigilante AQS™ air quality stations met the demand and was successfully tested; becoming the primary system at Totten Mine.

Since 2015, hundreds of Maestro's Vigilante AQS™ are in use at Vale's underground operations, including Creighton Mine. With the success of integrating the Vigilante AQS™ and the high quality of service from Maestro, Vale approached Maestro about a last mile communication challenge at Creighton Mine.

Maestro worked closely with Vale's Creighton Mine to understand their challenges associated with traditional communication backbone solutions. Recognizing potential for substantial improvements to bring both power and data, Maestro took immediate action and installed the *Plexus PowerNet™* network. The *Plexus PowerNet™* network extended communications using existing infrastructure to where it is needed the most, i.e., *the last mile to the face*. This innovative extension increases production, reduces cost, and enhances worker safety.

The Challenge

Vale needed to monitor the CO and airflow levels near to an area in the 118 ore body that is often referenced as "being on fire" due to extremely high temperatures and humidity levels. "We have to monitor the fire at all times. You have to have a robust and reliable system in place to reassure people that they are safe", stated Paul Aho, Mine Engineering Technologist, Ventilation Specialist, Vale - Creighton Mine.

On the 2600 level of Creighton Mine, there is a network switch room. Vale needed to bring power down (400ft) to the fresh air raise at the 3000 level and across (900ft) to power the ventilation telemetry devices in two different directions of the drift. Since it is an extremely harsh environment underground and safety of the worker comes first, Vale



wanted to be able to measure and monitor, in real time, the airflow and the CO levels in both directions. The devices, power and data required by Vale happen to be Maestro's own *Vigilante AQS™* air quality stations and airflow sensors.

Fiber optic cabling is a fast and reliable communication network, however presents several challenges to underground mining. The dusty, hot, humid, wet environment makes splicing and repairing in the field, extremely difficult and time consuming. Fibre is expensive and time consuming to repair and requires external highly skilled professionals. Often production can be brought to a grinding halt. Vale required a new solution that would enable power and data to this challenging heading.

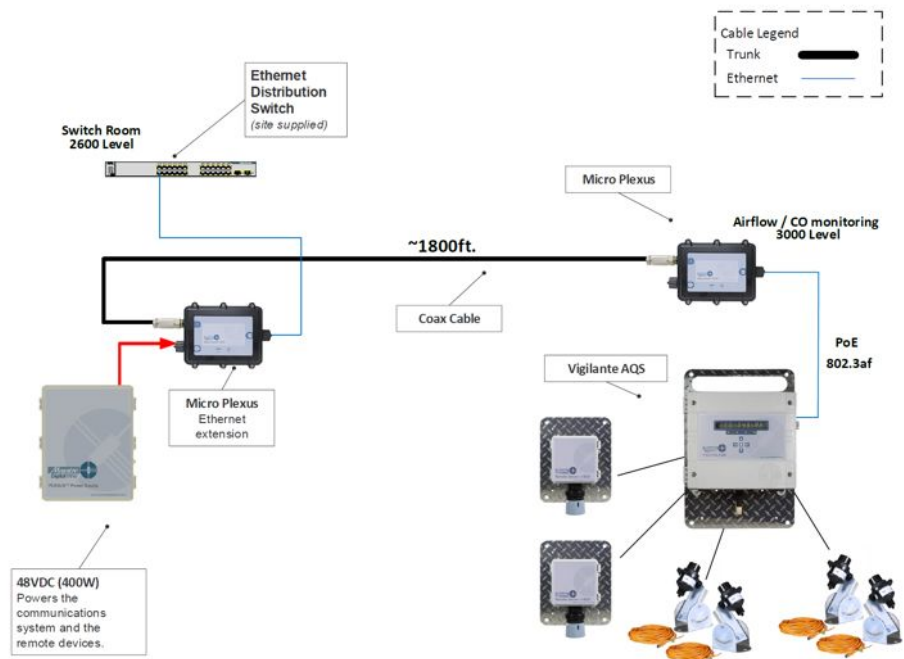
The Solution

While collaborating with Vale, the initial idea for the *Plexus PowerNet™* came out of discussions with the mine automation team at Totten and Creighton regarding the current challenges with underground networks. Maestro would go on to develop the last mile communication solution and it quickly became an enabling technology to existing mine's infrastructure. The backbone solution that can be integrated with existing technologies underground.

Understanding that the conventional way of running fibre down to the level and power to these devices would have been expensive and time consuming, Vale approached Maestro to learn more about the last mile communication solution, *Plexus PowerNet™* and how best to integrate it into Creighton Mine at 3000 level to power the *Vigilante AQS* required to monitor airflow and CO in both drifts. Vale quickly understood the advantage of using the coaxial cable. Running from the network switch room on 2600 Level, down the 2600-3800 Manway and to the work site on 3000 Level, 1700ft of coaxial cable was installed.

By installing the *Plexus PowerNet™*, to power and collect data, the *Vigilantes AQS™* were able to accurately measure and monitor, in real time. Making the installation time quick in the areas that required power the most. This solution was cost effective with the support of the Maestro team. *"Maestro responded immediately to the challenge we faced and provided the right solution to the right situation with high quality service to quickly install and get the Plexus up and running"*, remarked Aho.

Maestro designed a communication system that simplified the installation, extension, and maintenance of the network, while enabling high bandwidth, low latency, low jitter data and endpoint power using tried-and-true coaxial copper cable. The termination process now becomes easy and cost effective, utilizing basic tools. A termination can be completed by any tradesperson in less than 2 minutes. *Maestro Digital Mine's Plexus PowerNet™* is the world's first powered coaxial Gigabit network.



The Plexus Advantage

Aho confirmed, “The rugged, extremely durable components of both the Vigilantes and the Plexus can withstand the harsh temperatures and humidity in the area. The fact that the Plexus and the Vigilantes can survive this environment, means that they can probably survive anything!”

What matters is that the Plexus works!

It’s been over a year and so far, it is working well. It’s doing what it is supposed to do. You got to go with a modern system, but you got to keep it simple for installation and moving it forward for and easy termination. I didn’t get any complaints from the crew doing the termination and that is a good thing!”

Outcomes

Creighton Mine continues to use the *Plexus PowerNet™* at the 3000 level to power and collect the data from the two *Vigilante AQS™* measuring and monitoring airflow and CO levels. Due to this success, Creighton Mine is currently in the process of installing the *Plexus PowerNet™* with Maestro’s new *Zephyr AQS™* airflow monitoring devices in the upper country at Creighton (4000 – 6600 L) to provide real time airflow monitoring of these areas.

“The ease of installation is what prompted us to go with this system over others that are on the market. Maestro listens to our specific needs and builds the product to deliver, saving us time and money! High quality products and service from the Maestro team”, states Brian Keen, Ventilation Supervisor, Vale - Creighton Mine.



Plexus PowerNet™ delivers a high speed, low latency digital communication network that provides PoE+ power to Wireless Access Points (WAPs), cameras and any other IP based device. The system eliminates the need for costly outside fiber optic contractors and can be installed and maintained by any internal tradesperson.