Serial to Ethernet for Mining Automation

Project

Improve Safety of Miners with Automated Underground Monitoring

Since the computation is reaching to every part of the world, coal miners from Africa also got benefited from it. To improve the safety standards and meet new laws, a decision was made to upgrade the current legacy system with new Ethernet based technology. Communication and data streaming in our target mine needed to be improved and upgraded to ensure higher standards of safety in the underground environment.

Mining operations are being equipped with sophisticated industrial controls and sensors for safety and operating efficiency. In many mining applications, data is combined with information from sensors and industrial controls, not only pushing the bandwidth requirements up but also to reduce the electromagnetic interference; hence forcing to deploy fiber optics.

Requirements

The purpose of this project was to establish a surface-to-underground communication to manage routine sensors, alarms and serial devices. Another requirement for the system was to link and administrate the group of mines. The control office on the surface has complete access of every activity inside the mines. Using the Ethernet, underground air quality is also monitored to see whether it is safe for workers to enter the mine. Carbon Monoxide (CO) sensors and Methane sensors are used for this purpose. Lightning was very common in the area.

The Challenge

To established a reliable link to communicate with underground PLCs, seismic equipment and ventilation controls. Because such a link has the potential for broader applications in the industry, this project shows specifically how the Ethernet link from the surface to the underground can be set up by using industrial-grade Ethernet products. A reliable communications link between the surface control office and the miners was a basic prerequisite. Fiber media is future-proof for speed, and single-mode fiber easily handles the huge distances.

Significant technology developments would be required to achieve Ethernet-grade communications over the shearer cable. So, given the time constraints of the project, an Ethernet system was designed to provide connectivity from the surface to the tunnels.

Solution

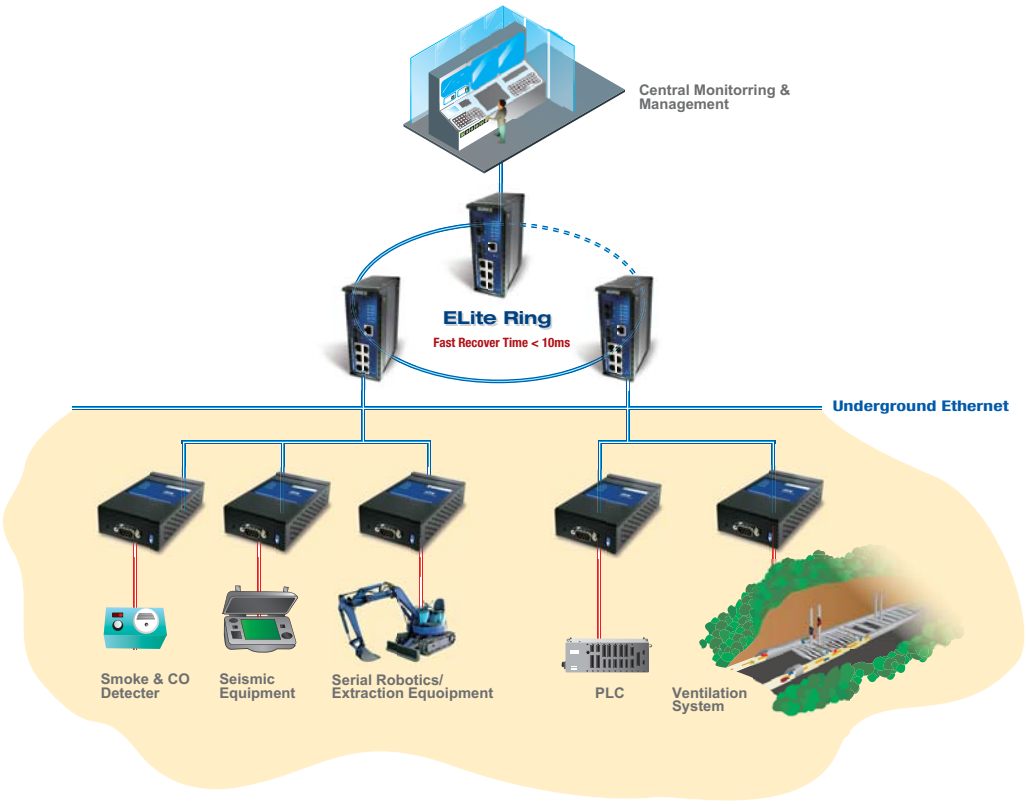
A combination of Managed Switches and Fiber Device Servers met the requirements perfectly. The flexibility of the optical ports offered the ideal solution for performing central and remote management of the distributed network architecture. Now the mine's management can manage up to 256 serial devices via Virtual COM port drivers, and Ring-based technology can be adopted for the connectivity without any failure. The fiber-optical cables offer the mine maximum data integrity from high incidence of lightning.

Why SUNIX

- **Extended serial to Ethernet communication solutions range.**
- **Higher reliability with Ethernet redundancy.**
- **Reliability with fiber optic conversion of serial transmission.**

The use of Ethernet products in the mine has provided a much safer working environment. The Ethernet keeps information flowing at all times, streaming data about the status of workers and equipment -- and about whether conditions are safe for workers to be in the mine. The rugged outer case of products is ideal for mining environments, providing protection for the highly durable internal electronics. The fiber optics provides flexibility and cost-effectiveness while offering the highest level of data integrity, especially in the lightning season. The mine can perform its daily operations more safely and more confidently. Device Servers removed the bottleneck created by the need to monitor and manage a large number of serial devices via the Ethernet.

Application Topology



Key Products

ESW-8062MM
DS-3010M