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## Hardened Ethernet switches support Patriot Coal mine safety, measurement

Get industrial Ethernet implementation tips from this rugged GarrettCom application, with additional advice, links, and photos.

By Control Engineering Staff – Control Engineering, 2/24/2009

Mines require rigorous safety programs such as gas detection monitoring systems. If the monitoring network is inoperative there are only two alternatives: shut down a section of the mine or reassign miners from production teams to manually take readings in the area.

**Conspec Controls** designs and manufactures mine safety systems, and uses hardened communications equipment, including hardened managed Ethernet switches, to ensure reliability and availability. Rob Albinger of Conspec knows that the systems they provide require switches that are sealed against the dirt, dust, and moisture that are ever present in mines, and that their networks should be set up to operate as redundant rings, providing fail-over communications for customers such as Patriot Coal, Charleston, WV. Because of the bandwidth inherent in Ethernet deployments, Patriot was able to install a new gas detection monitoring system and address a second management initiative, which was to provide more visibility into the mines.

By installing video cameras and special software, the company could monitor the volume of coal coming up the belt and identify blockages or other problems.

The application used a combination of GarrettCom Magnum 6K25e and Magnum 6KQ managed switches supporting video cameras, Conspec boxes, a Kepware server and RSview software from Rockwell Automation.

While mining applications do not require the extended temperature hardening that is advantageous in a number of other industrial applications (mines typically remain about 18 °C), they do serve to underline the necessity for industrial grade versus commercial switches in many industrial applications.

Commercial switches are designed to operate in an environment that is comfortable for humans, but when a network is expected to operate in an environment that is damp, dusty, dirty, corrosive, laden with particulate matter, or subject to vibration or extreme electro-magnetic interference, it only makes sense that the equipment should be environmentally hardened, GarrettCom advises. When protective clothing and gear are needed to provide protection for the humans in an industrial area, the equipment should be protected as well.

## Hardened industrial equipment expands reliability

In mining and other rugged environments, commercial equipment can be more costly in many ways, says Lee House, CTO and vice president of engineering, GarrettCom.

- Commercial equipment addresses mainstream applications for use in controlled environments, and typically uses less expensive components commoditized by large volume production. This provides a life expectancy, and durability appropriate for many applications. However, hardened industrial equipment is designed for extended reliability and resiliency even in the face of extreme environmental conditions.
- Designed-in immunity from electromechanical interference, dust, corrosion, moisture, vibration, or corrosive environments clearly separates the two classes of equipment. Robust mechanical designs, conformal coating on active electronics, special purpose power supplies, components capable of standing up to extreme temperatures, and unique “fan-less” thermal cooling techniques are examples of the enhancements needed in truly hardened equipment. Industrial-class equipment is also tested to much more rigorous standards because industrial applications need equipment that exhibits long life, meets exacting standards, and has predictable behavior in real-time capital-intensive applications.
- Industrial equipment must support a wide range of physical interfaces to provide for industrial immunity (fiber optics), equipment distribution (fiber optics or wireless technology), or inter-working with legacy equipment. Such diversity in connectivity is very rare in commercial equipment.

## Cost versus investment

All of these essential design considerations do push up the price of industrial grade, or hardened, networking gear, House says. However, when inappropriately used in a harsh industrial environment, commercial equipment will frequently see a much shorter and uncertain life. In many applications, the increased likelihood of failure can make commercial product completely unacceptable for mission-critical applications, he adds.

Plus there's a need to look beyond the initial cost of the equipment, suggests Frank Madren, president and CEO of GarrettCom. "Operations people in industrial facilities typically understand the need for hardened equipment in mission critical applications. The challenge comes when budgets are tight, or when general office IT groups get involved that lack experience with and/or sensitivity to requirements in harsh environments."

As the benefits of Internet protocol (IP) continue to encourage the interconnectivity of industrial and corporate networks, Madren says, the groups will better understand the different requirements of different parts of the business, and the decision-making processes for using commercial versus hardened equipment will be more evident for all concerned.