Intelligent Communications for Mining

Reach natural resources faster, farther and more safely

NOKIA
Mining companies usually operate in harsh, remote and sometimes uninhabited regions of the world. While they are faced with constantly changing commodity prices and strive to achieve eco-sustainability, profitability and safety, they are seeking ways to simplify their daily operations, reduce OPEX, accelerate resource delivery and increase margin, and manage the risks more effectively.

Nokia’s Intelligent Communications for Mining helps you reach resources faster, farther and more safely. Backed by our advanced technical expertise in all-IP and ultra-broadband networks, LTE and SDN-powered data centers, this secured network solution transforms your existing environment into a foundation for reinvention and innovation. With Intelligent Communications, you can adhere to stringent regulations, keep workers safe, and stand out in a highly competitive marketplace.
Fluctuating commodity prices vs profitability challenges

After a period of high prices during the 2000s, metal prices have been declining since 2011 (Figure 1) and are projected to continue declining in 2015 and 2016, with rising uncertainty on demand and supply.

The constantly fluctuating prices led to unstable and hesitating investment and higher pressure on sustainable cost reduction in the mining industry, which will eventually influence capacity and production. High-cost mines were the first to close down, as the current metal price might be close to their break-even point.

The fall in China's industrial production in recent months could bring further metal price declines, which will require a sustainable cost reduction of the mines.

Most of the mining companies are therefore shifting from maximizing value by increasing production volumes to maximizing returns from existing operations with improved productivity and efficiencies. Among the business risks that pose the greatest challenges to the mining and metals sectors, productivity improvements are at the very top.

Operating in unprecedented politically changing and more remote/hazardous regions

Few industries operate in more volatile business and political conditions than mining companies. They face the challenges of operations in harsh, remote and sometimes even uninhabitable regions in the midst of unpredictable world events. Production of metals and coal are centered in a few countries. Most of the production sites for coal and the most important three metals (copper, iron ore and aluminum) are in China, Australia, Brazil, Chile, Peru, Russia, Canada, and the United Arab Emirates (with the pits usually in hazardous regions).

Increasing requirements for safety and environmental protection

Occupational Health and Safety (OH&S) is an increasingly critical priority within the mining sector as insurance premiums reflect the potential hazards encountered on mine sites and the remote surroundings. Ensuring guaranteed voice and data communications is one of the most important concerns for the operation's management in reducing OH&S incidents.
The key role of communications in mining

Mining companies are transforming their operations with digital communications technologies that bring sophisticated automation, in-pit mobility and data-centric analytics to the mines. These technologies offer the potential to accelerate productivity and delivery, improve operational efficiency and provide superior protection for physical sites, networks and staff on site.

An intelligent communications infrastructure will help you take advantage of these technologies and get ready for the transformation in the future.

Figure 2. Intelligent communications network for mines
Faster
Improve resource delivery efficiency and quality

Speed and efficiency are crucial to success when miners are faced with the pressure of constantly fluctuating commodity prices as well as unpredictable world events. The more efficiently you discover, access and deliver the resources, the bigger success you will be able to achieve.

Production efficiency, fleet management and standards compliance will become even more important as you work in remote and hazardous locations. Miners rely on automation to establish a safer working environment while achieving higher efficiency. These systems must support mission-critical processes with fewer workers on site and shift decision making to the control center.

Intelligent Communications for Mining lets you drive this shift by deploying real-time data collection, management, and analytics capabilities in the mines. It enables you to facilitate employee collaboration and speed up critical decision-making processes by extending high-quality video communications and seamless high-data-rate connectivity across dispersed field and central office sites. It also helps you empower remote workers with wireless technologies that bring office tools and secure corporate data server access to the field.

• Automation provides more consistent and efficient operation of mining equipment while providing safer working conditions. Enhanced by real-time monitoring with high-definition video feed to sensors and high-precision GPS co-ordinates, autonomous systems in mines bring safety and smooth operation to the companies. In-pit Autonomous Haulage Systems (AHS), Autonomous Drilling Systems (ADS), driverless freight train control, anti-collision systems, in-pit proximity detection, in-pit CCTV, high-precision GPS, and an array of telemetry systems and sensors are now integral components of successful mine sites around the world.

• In-pit broadband mobility enables staff to communicate and access business data to leverage intelligence from anywhere at any time. They can make decisions faster by facilitating collaboration between remote front-line workers and central office experts, and reduce onsite staff at the same time. Broadband introduces more possibilities such as data-intensive applications including fleet location and performance management, asset and logistic tracking.

• Big data analytics and IT applications play a big role from analyzing mining equipment conditions for preventive maintenance to optimizing pit-to-port transportation schedules based on forecasted worldwide supply and demand. Mine staff can tackle a great deal of data all at once, from geological data to ore control information to weather data and mining machine conditions, while business analysts track pertinent world economic and commodity data in the office.

Nokia Intelligent Communications for Mining gives you these capabilities. It enables mobility with next-generation operational systems and real-time applications that run on a single end-to-end IP/MPLS platform. Offering performance proven in multivendor environments, it helps you to reach and deliver resources faster, over longer distances, and with higher levels of safety.
With Intelligent Communications, you get a converged network capable of consolidating disparate legacy networks typically based on time division multiplexing (TDM) and maximizing availability for all mission-critical applications with resiliency. These solutions can preserve connectivity in multi-fault or disaster scenarios by providing multi-task and multi-path diversity in the network topology. Together, they offer an end-to-end infrastructure that supports powerful and flexible IP-based mobile broadband applications.

Intelligent Communications increases your speed and efficiency and maximizes the value of assets by extending ubiquitous, end-to-end, real-time monitoring and supervision capabilities across all your operations. These capabilities reduce diagnostic time and allow you to respond to safety, security, and mission-critical operational events more quickly and effectively.

Accelerate reaction on data management

Mining operations are becoming more data-centric than ever. The staff on site needs to deal with huge amounts of data from different resources all at once — geological data, ore control information, weather data, and mining machine operation conditions — while business analysts track pertinent world economic and commodity trading data in the office. The data center, where compute-intensive analytics software runs and enormous amounts of indispensable data are stored, has become the de facto brain of a mining company.

With cloud computing — also known as data center virtualization — mining companies can consolidate and virtualize compute resources distributed across multiple data centers in one seamless pool that can be dynamically and elastically allocated to individual mining operations nationally or globally. This enables individual mining operations to run different applications with on-demand compute resources, lessening the burden on data centers. A cloud-based approach with applications centralized in data centers is an efficient model for mining companies to help match the production with the demand in accordance with the boom-bust cycle.

An agile data center network is a must to support the new paradigm. With Intelligent Communications, through seamless coordination with a cloud orchestrator in the data center, the software-defined network (SDN) works as an overlay to configure the network automatically over the existing underlying network. It will automate the required network configuration change, and enable users to share and consume compute resources more dynamically and efficiently without underlying network infrastructure constraints.
Farther
Enhance mobility and remote operation

Most mines are located in remote areas in Africa, Australia, Latin America, Russia and China. Because of the geographical challenges, reliable and effective communications networks are essential to support critical applications for safe and efficient mining operations and processes.

Broadband radio communications like Long Term Evolution (LTE) networks, with their low latency and QoS management, are now available to address the increasingly harsh environments in which mining companies operate, and can be deployed end-to-end, from terabit core systems in climate-controlled operations centers to hardened and ruggedized gigabit edge platforms in environmentally challenging locations. And LTE enables mining companies to reach farther for remote connectivity and as last-mile access in the mine, providing efficiency and reliability to the staff on the field in support of mission critical applications.

Comparing with today’s private mobile radio (PMR) and Wi-Fi network, LTE can provide the following benefits:

• Broader bandwidth required for wireless services, even in areas with a disturbed radio environment
• Dependable quality of service (QoS) management
• Intrinsic resiliency and cyber-protection
• Low latency of 10 ms, which is essential for mission-critical applications requiring fast response times
It is well placed to support broadband speed with QoS management to facilitate in-pit, real-time machine-to-machine communications, high-definition video surveillance and broadband radio access by mine staff from anywhere in the pit. It forms a robust and reliable converged radio access network (RAN) catering to all data applications used in mining areas. With impending support of mission-critical voice, it can be extended to replace existing PMR/LMR radio systems, further consolidating pit communications systems.

With Intelligent Communications, you get expertise and technologies that can take your operations farther and into more remote environments. You get best-in-class planning, deployment and management services supported by experts in mission-critical applications, QoS requirements, and carrier-grade network design. And you get an easily and rapidly deployable network that combines products packaged for long-term operation in the field with greater reliability and lower risk.

Winner of 2015 ACOMM Communications Alliance & CommsDay Award

Nokia won the award "Vendor Innovation — Large" for designing, deploying and bringing into operation a 4G LTE wireless communications network in the Pilbara. The network was deployed at West Angelas mine in the Pilbara region, and used for in-pit mining operations such as safety systems and asset monitoring. Nokia provides 4G LTE wireless networks, fiber backbone, as well as network management and professional services.

It is the world’s first privately owned 4G LTE network used in the resources industry and Australia’s first privately owned 4G LTE network.

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More safely
Guaranteeing safety and security

Safety and security are the critical concerns of mining companies, with their operational mines located all over the world, especially in remote areas. The concerns include environmental or product-related risks that threaten the health and safety of the staff onsite, cyber-attack and theft, as well as other geographical, economic, or political issues that could put your operations at risk.

A service-aware communications network supporting legacy and new applications while preserving availability and security can safeguard your people, assets and data. It must be reliable and resistant to cyber-attacks and support control and surveillance subsystems. It must ensure interoperability and compliance with industry and regulatory standards. And it must offer dependable and secure voice and data communications to support security systems that protect your workforce and assets.
Intelligent Communications for Mining offers a flexible and robust network architecture together with a multi-tiered approach to security. This approach includes capabilities that:

- Support legacy, IP and Ethernet applications without jeopardizing system availability and security
- Enable all applications to support diverse traffic profiles and interconnection topologies while preserving separation and bandwidth
- Restrict unauthorized access to configured ports
- Resist cyber-attacks and provide comprehensive support for control and surveillance subsystems
- Prevent intrusions through the use of intrusion-detection checkpoints, centralized authentication and logging, service-specific security policies, MAC-pinning, IP and bandwidth filters, and multi-level password protection
Your transformation partner

A trusted partner will be able to get mining companies ready for the transformation. As a global leader in all-IP and ultra-broadband, Nokia offers end-to-end expertise that spans all aspects of transformation, from feasibility studies, conception and design to engineering, procurement, supply, implementation, operation and maintenance. Our solutions are proven to work with products from a full ecosystem of partners (mine management solutions vendors, machinery manufacturers, and manufacturers of ruggedized networking equipment, ruggedized handsets, sensors, etc.) developed to support the stringent requirements of this market. We provide a broad range of best-of-breed offerings, including:

- A converged, service-aware, mission-critical WAN composed of microwave, optics and IP/MPLS products
- A broadband mobile/wireless network that supports a whole set of applications: In-pit AHS, ADS, driverless freight train control, anti-collision systems, in-pit proximity detection, in-pit CCTV, high-precision GPS, and an array of telemetry systems and sensors
- A dynamic and elastic SDN-based data center network

Intelligent Communications for Mining combines our extensive local knowledge with our strategic global presence. We augment its technology base with rigorous detailed documentation and proven engineering and management to ensure alignment with corporate best practices, monitoring and quality standards, and approved equipment lists. We comply with local, regional, and national regulatory requirements and provide comprehensive security and reliability auditing.
Nokia information

Nokia is a trusted transformation partner to mining companies and telecom system integrators around the world. To date, we have managed more than 2,300 network migration projects across multivendor platforms in various industries. With a global presence in 130 countries and a history of successful deployments in highly challenging mission-critical environments, we leverage the unrivalled technical and scientific expertise of Bell Labs, one of the largest innovation powerhouses in the communications industry. Its knowledge of the stringent requirements and demanding conditions that characterize the mining industry enables us to deliver Intelligent Communications to help mining companies plan and transform the networks for 2020 and beyond.

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