

Wireless Digital Connectivity for Mining Operations

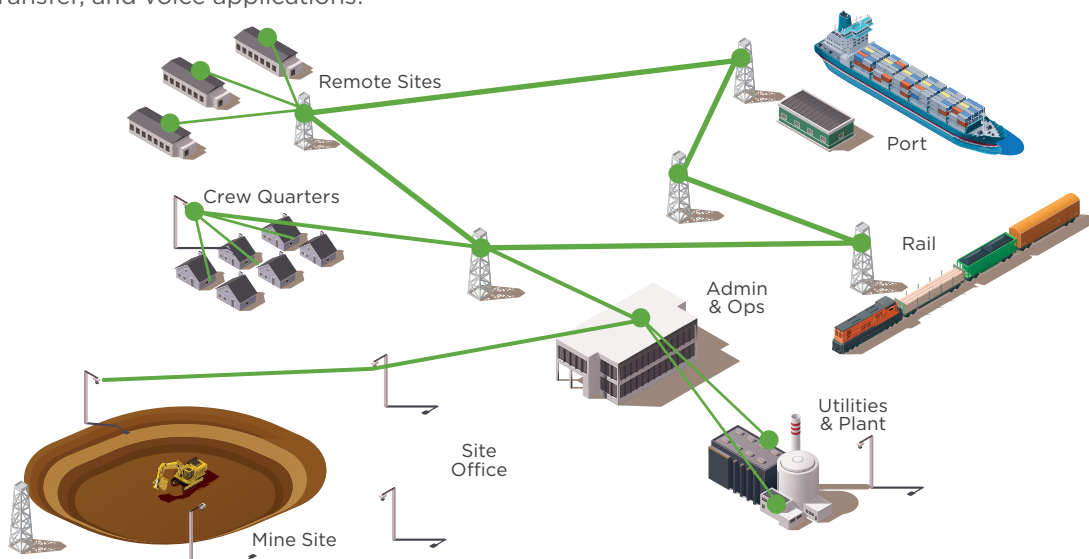
Mining operations occur over broad geographic areas, so efficient data communications provide the coordination across activity centers that distinguish consistently profitable and growing businesses. Companies with reliable and cost effective communications that synchronize



field operations, central management, security, and transportation have the sustainable advantage of agility – consistent ability to adjust to changing demand and circumstances. Data network operators supporting Mining operations must meet demands for increasing bandwidth and secure, reliable communications in harsh environments with wireless networks to achieve their operational objectives.

AGILE “PIT TO PORT” OPERATIONS REQUIRE CONNECTIVITY

Connect all work centers in the operation with a single IP-based wireless solution. Prioritize traffic to align with business goals while providing connectivity at each location to support streaming video, data transfer, and voice applications.



- **Mine sites** – With full visibility of the site, establish process control and telemetry by backhauling information from Supervisory Control and Data Acquisition (SCADA) sensor and control equipment. Oversee operations carried out by nomadic machinery and support large mining vessel telemetry.
- **Remote site office** – Connect remote offices to enable video conferencing, data transfer, and voice connectivity.
- **Field operations office** – View the network and operations across the entire system with high-speed connectivity that can be deployed rapidly and relocated as needed.
- **Utilities and supply depots** – View and manage access with SCADA sensors and controls and 24/7 video surveillance of assets and activities.
- **Crew Quarters** – Provide secure, high-speed connectivity for streaming video, skype access, face time calls, and data transfer for residents, and video surveillance to enhance safety.
- **Transportation control offices** – Manage time and movement of assets with rapid scheduling and complete coordination of resources with shipping partners, and promote safety of people and products with video surveillance.

BUSINESS CONNECTIVITY REQUIREMENTS

SCADA process control and telemetry – Access the benefits of IIoT automation by connecting sensors and controls, enabling real-time status updates for access portals, gates, and field sensors. Continuous monitoring of field assets helps improve safety, consistency, and productivity.

Primary and/or redundant connectivity – deploy wireless broadband as a primary connection between operation sites, or as a redundant link to protect business-critical information should the primary service fail.

Connected field operations – Reduce the cost of connecting remote field offices by 30% or more over leased lines, VSAT, or L-band connectivity from a third party, and save the recurring subscription fees.

Serial and IP interfaces – To provide connectivity to equipment and sensors already installed at field locations.

High-speed connectivity, now – Support increasing demand for high-bandwidth applications, and deliver high throughput (500 Mbps or more) to precise locations – within hours rather than weeks or months.

Low latency – Consistently low latency to provide for clear voice and video transmissions.

Reliability – Consistent, flexible, in-pit backhaul with Mesh or private LTE nodes for autonomous mining applications.

High throughput – High-performance Wi-Fi connectivity to support IPTV and Internet services for mining camp Fly-in/Fly-out employees.

Video security – Protect employees and assets with 24/7 video surveillance. Place wireless cameras exactly where they're needed rather than where they can reach an existing wired network, power them with solar panels if outlets aren't available, and relocate them easily if necessary.

HAZLOC certification – Choose from wireless communications equipment that meets any required HAZLOC specifications.

24/7 Support – Immediate access to the appropriate level of certified technical support specialists to minimize costly down time.

Rapid deployment – Plan the deployment with Cambium's free LINKPlanner software, and install equipment within hours. Relocate the equipment as needs change.

CONNECTIVITY COMPONENTS

Point-to-Point links deliver high capacity Wi-Fi access over long ranges to connect remote field operations. These links operate in both the licensed and unlicensed spectrum, and perform in Line of Sight (LoS) applications, near Line of Sight (nLoS), and difficult Non Line of Sight (NLoS) installations. Designed for high performance in harsh conditions and over rough terrain, these systems are equipped with Dynamic Spectrum Optimization (DSO) to continuously monitor performance and automatically adjust to maximize throughput.

Multipoint Wide Area Networks can be configured as “last mile” outdoor Wide Area Networks (WAN) that spread connectivity over areas of 200 square miles (500 square km) or more. Operating in licensed and unlicensed frequency bands, these systems connect hundreds of remote locations to the network. The multipoint WAN also serves as a backbone network to connect Wi-Fi access or narrowband SCADA backhaul.

Indoor and Outdoor Wi-Fi access networks provide secure, reliable, high-speed, 802.11ac wave 2 industry standard wireless connectivity for laptops, tablets, and other devices in field office environments or residence camps, and support streaming video, data transfer, and voice services. These systems are typically used in mining camp configurations where 100 or more Wi-Fi hotspots support residence locations where thousands of workers reside in numerous rooms.

SCADA backhaul networks provide long-range wireless connectivity to support the needs of narrowband sensors and controls. Operating in lower frequency ranges with lower throughputs, these systems are optimized to reliably transport information on temperature, valve settings, and door and access controls from remote locations.

End-to-end network management provides a real-time, bird’s eye view of network performance, quickly identifying the exact location of communication bottlenecks. Instead of coordinating efforts with a communications service provider, administrators have total control of the dedicated network and can manage software loads, adjust performance, and prioritize maintenance activities that keep the network optimized for the needs of the overall business.

TECHNOLOGY REQUIREMENTS

Mining operations should center the higher order issues of the core business, rather than communications performance and cost issues. Their networks must be reliable, flexible, and scalable – supporting current activities, leveraging opportunities that emerge, and promoting rapid growth of operations to create efficient work sites anywhere they are needed.

Once deployed, the network must provide secure throughput that supports any and all applications, maintaining clear, consistent communications that keep content uploading and downloading smoothly.

Where applicable, the system must also comply with regulations, including interoperability standards and guidelines regarding use of electronics in hazardous locations.

CAMBIUM NETWORKS PORTFOLIO

Cambium Networks is a global provider of wireless connectivity solutions built to last under any conditions. With more than seven million modules deployed in tens of thousands of networks in 150 countries around the world, our portfolio of field-tested technology solutions provides the capacity needed to support any operation. Whether connecting one remote building or a community of thousands of people, our Wide Area Network distribution systems scale to ensure consistently clear connectivity, reliably.

Wireless solutions from Cambium Networks are designed to provide a low total cost of ownership (TCO). Our Industrial modules feature IP-67 rated enclosures to offer low-maintenance performance that withstands harsh environments to deliver reliable streaming video, data, and voice service for more than a decade.

With free LINKPlanner software, network operators can plan deployments that work the first time, enabling faster user access. Once installed, the cnMaestro™ management system monitors the network to ensure that performance meets standards, and any issues can be identified and resolved quickly. Cambium Care flexible service plans provide technical support options such as SLA based network services, all risks warranty, and network monitoring services if needed.

OVEN FIXED WIRELESS CONNECTIVITY SOLUTIONS					
Application	Narrowband SCADA	Indoor and Outdoor 802.11ac Wi-Fi	Wide Area Network Distribution	Long Range Backhaul	Licensed Microwave
SCADA backhaul	√		√		
Mine site	√	√	√	√	√
Remote Office		√	√	√	√
Field Ops		√	√	√	√
Supply Depot		√	√	√	√
Video Security		√	√	√	
Living Area		√	√	√	
Throughput	10 kbps - 4.4 Mbps	300 Mbps	1.2 Gbps with 4 sectors	450 Mbps	Mult-Gigabit capability
Spectrum	220, 450, 700, 900 MHz	2.4, 5 GHz	2.4, 3.5, 3.65, 4.9-5.95 GHz, 900 MHz	4.4 - 6.0 GHz	6-38 GHz



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