Using information technology to manage operations in today's complex, ever-changing mining environments requires four things:

- Maximum network capacity
- Seamless worksite mobility
- High network availability
- Enterprise security standards

Operations count on a constant flow of real-time information to make critical decisions that affect productivity, profitability and operator safety. The network's ability to support multiple applications and high data rates in a hostile and dynamic environment is crucial to maintaining the lines of communication.

Modular has focused on these challenges since 1979, developing robust networks that mines can depend on anywhere, anytime. MasterLink Enterprise pairs our systems integration expertise and leading mine management applications with Cisco's wireless network infrastructure, to provide an end-to-end solution for seamless connectivity between your central office and wireless client devices.

By choosing MasterLink Enterprise, you get unbeatable wireless communications, enterprise-class data security, field-proven mine management solutions, and integrated network management – all from a single provider. That's smart business.

World-class systems integration expertise.
Field-proven technologies.
Unrivaled end-to-end solutions.
To be successful, a wireless network needs dependable, purpose-built hardware, a solid backhaul infrastructure, intelligent up-front design, and knowledgeable support. MasterLink Enterprise delivers on all this and more.

**KEY COMPONENTS for a Successful Wireless Network**

- **Mobile Radios & Mounts**
  - 802.11n
  - High power 28 dBm output
  - Two antenna ports
  - Dust and waterproof IP67 enclosure
  - Rugged handrail mounting option

- **Mobile Antennas & Mounts**
  - Optimized for haul truck use
  - Vertical beamwidth: 30°
  - Antenna gain: 6 dBi
  - Two antennas per truck
  - 360° horizontal coverage
  - Simple handrail design

- **Solar Mobile Trailer**
  - Rugged, field-proven design for demanding conditions
  - Solar power options: 300 W / 600 W
  - Battery capacity: 400A-Hr to 1000A-Hr
  - Pole-mount solar power solutions available

- **Solar Charge Controller**
  - Optimizing charge controller
  - IP-addressed remote monitoring of voltage, current and temperature
  - Historical min/max data
  - Configurable alarms

**Legend**

- **LAN/Fiber Optic Link**
  - **Point-to-Point 2.4 GHz**
  - **5.8 GHz Mesh**

**Network Management System**

- Utilization monitoring and uptime optimization
- Network analysis tools
- Real-time alerts
- Historical data
- Dashboards with 100+ views
- Centralized management and monitoring of all access points, switches and routers

**Antennas**

- Optimized client coverage and mesh data rates
- Directional options to meet narrow coverage, high-gain requirements
- Omni-directional (360°) options for broad coverage in all directions

**Wireless Access Points**

- Self-configuring and self-healing
- 802.11n compatibility
- Data rates up to 300 Mbps*
- MIMO (2x3) design
- Support for three dual band or six single-band antennas
- High transmission (TX) power

**Point-to-Point-Links**

- High-speed LAN extension
- High-gain directional antennas
- Data rates up to 1 Gbps*
- Increased system capacity
- Configurable redundancy, frequency and bandwidth usage
Enterprise-class Security
By supporting the latest security and authentication standards, MasterLink Enterprise ensures that your data remains private and protected.

Interference Intelligence
Wireless network interference comes in many forms, any of which can severely impact your network’s performance and, in extreme cases, bring communications to a halt. To combat this threat, MasterLink Enterprise leverages Cisco® CleanAir™ technology. The CleanAir solution uses silicon-level intelligence to precisely detect and classify over 20 interference types, changing channels only if it determines that the interference is severe enough to impact network performance.

Reliable Data Transmission
MasterLink Enterprise provides the reliable, continuous communications required to sustain vital connections between your mine’s decision makers, the equipment they monitor, and the operators in the drivers’ seats.

A 5.8 GHz radio frequency provides Root Access Point (RAP)-to-Mesh Access Point (MAP) connectivity, enabling high-speed mesh communications between the central office and MAPs distributed throughout the mine. A second 2.4 GHz radio provides communications on up to three 802.11 channels to mobile units located in the pit, shops and other operating areas.

Self-configuring, self-healing mesh technology ensures continuation of coverage in the event that a MAP becomes unavailable, or as new pits and faces are opened. As changes occur the network automatically reconfigures itself to prevent interruptions.

Simplified Management
A comprehensive user interface enables centralized management of your entire MasterLink Enterprise network. LAN controllers, wireless access points, mobile devices, and more, are controlled through a single application, making system updates and configuration changes fast and easy.

Performance-focused Design
With an installed base of more than 250 mines worldwide, Modular knows that one size does not fit all when it comes to wireless network infrastructure. For this reason, we deploy a team of highly-skilled industry-specific experts to tailor a solution that meets the needs of your unique environment. By being involved in every step of the process, we ensure that your MasterLink Enterprise Network realizes its full potential for maximum performance, thereby setting you up for success.

Complete Solutions for Peace of Mind
As the provider of both the mine management applications and the communications network, our unique combination of system integration knowledge and industry-specific experience gives you a competitive edge.

Modular is your one-stop, single point of contact and accountability. We have a vested interest in minimizing performance and reliability risks, and keeping your entire system running smoothly.

Main Features
- High-bandwidth support for multi-application data, voice, and streaming video transmission
- Self-healing, self-configuring, and scalable network
- Low-maintenance, centrally-managed infrastructure
- Rugged, purpose-built, cold-weather operational, hardware
- VLAN and 802.11n support
- WPA2-compliant security
- High RF transmit power
- Solar-powered trailer and fixed solutions
- Reinforced by Cisco wireless network technologies

* Maximum data rate achievable under ideal operating conditions.
Comprehensive Service Solutions:
Operation and support made easy

From initial site assessments to long-term design, installation, monitoring, auditing and optimization packages; we are committed to helping your mine achieve and maintain maximum performance.

**SURVEY:**
Understanding Your Operation from the Ground Up

Designing a network for optimum performance requires a deep understanding of your unique environment and requirements. From inception, we will conduct an initial site assessment during which we will:

- Assess your mine’s existing wireless communications and capacity needs
- Obtain site specific topographic maps
- Perform a predictive RF analysis for optimal signal propagation

**DESIGN:**
The Right Solution for Your Mine

Custom-tailored solutions deliver the reliability, security, and throughput that your unique environment requires. Some of the influencing factors include:

- Current leverageable infrastructure and mine progression plans
- Signal strength calculations
- Solar power study data

**INSTALL:**
Expert Project Management from End-to-End

Our team of seasoned installation professionals ensures that your system is installed and operating to plan. Before leaving your site, we:

- Verify hardware deployment and operation
- Test the wired and Wi-Fi network configuration
- Validate wireless network capacity, signal strength, data rates and RF coverage

**SUPPORT:**
Flexible Options. Anytime Availability.

Standard support includes Modular’s 24/7 phone and helpdesk assistance. Additional tiered support levels are available depending on your unique operational and network availability needs, such as:

- Remote network health reports
- Network audits and optimization
- Network maintenance and return merchandise authorization (RMA) support

To learn more about available service and support options, contact your Modular Account Manager.

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