



Productivity and Safety through
Mine-Spec digital applications

IMPACT

WSN **wireless**
sensor network



Wireless connection to sensors

Open architecture

Reliable meshing

Low power consumption

Multiple mounting options

Robust and high IP rated

Applications

UNDERGROUND HARD ROCK MINES
ACTIVE ORE DRIVE AND WORKING FACES
AUTONOMOUS MINING



The **IMPACT technology suite is an industry leader in mining communications and digital infrastructure. The Wireless Sensor Network (WSN) utilizes the latest in wireless meshing technology to optimize communication and safety systems in hazardous mine environments.**

The WSN elegantly extends the benefits of a mine's existing, high bandwidth network through the WSN self-forming mesh networks. These networks wirelessly connect sensors in hazardous and dynamic parts of the mine back to the main mine data backbone, delivering crucial information where fixed cables or manual data gathering is difficult or dangerous. Data is delivered seamlessly, in real time, from the remote sensors underground.

Specifically created for use in underground hard rock mines the WSN is proves its worth in difficult areas, and where installing and maintaining cabling is challenging, such as:

- Haulage levels
- Active ore drives and working faces
- Areas where remote or autonomous machines are in use

The use of 802.15.4 protocol ensures stable meshing and low power consumption, to transmit data from Geotechnical and other instruments in a simple, efficient and reliable manner.

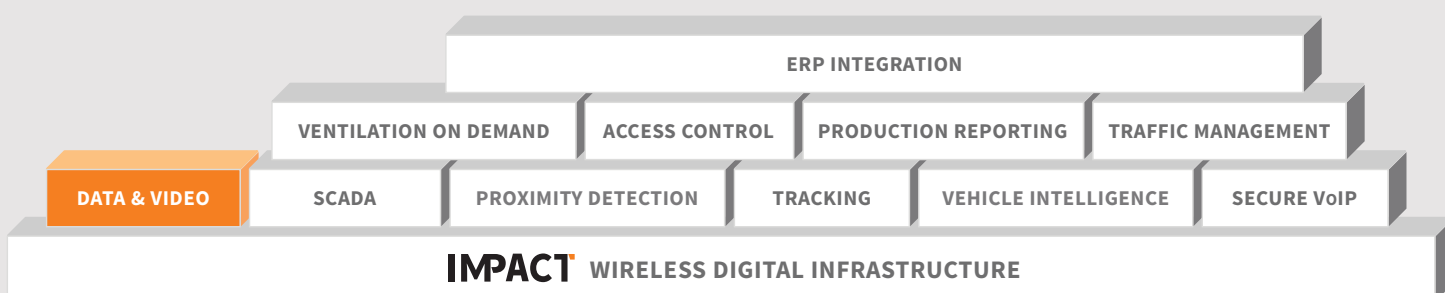
Features and Benefits

REMOTE TELEMETRY UNIT (RTU)

- Designed to fit around rock bolts and geotechnical instruments for secure installation
- Self-contained battery powers its own electronics as well as the external instruments
- 802.15.4 mesh radios provide wireless connectivity
- RTUs create their own wireless mesh network

GATEWAY (GW)

- Robust, high IP rated
- Creates interface between RTU wireless mesh network and fixed mine Wi-Fi network
- Extends capacity of, and leverages, mine's existing Wi-Fi backbone
- Very simply powered and connected via PoE port at the fixed AP, e.g. IMPACT NS50



A seamless system

The WSN enables connectivity to all parts of the mine by leveraging the existing mine Wi-Fi backbone (such as the IMPACT Wi-Fi system). This is achieved through the use of two robust, high IP rated devices:

- Remote Telemetry Unit (RTU)
- Gateway (GW)

The RTUs, utilize 802.15.4 radios to connect with each other to form their own wireless mesh network.

Designed for secure installation, each RTU easily fits around rock bolts and Geotechnical instruments for secure installation. Additionally, the fully self-contained battery not only powers itself, but also powers the external instruments.

The Gateway provides the interface between the wireless mesh network formed by the RTUs and the fixed mine network. Robust and high IP rated, the Gateway is very simply powered and connected via a PoE port at the fixed AP (such as an IMPACT NS50).

Multiple meshed RTU networks and Gateway units can be used simultaneously in various locations around a mine. Each one forming an independent, yet fully integrated, WSN.

A turnkey solution, from instrument sampling through to data handover, the MST Wireless Sensor Network is an industry leader for communications extension in active mining environments.

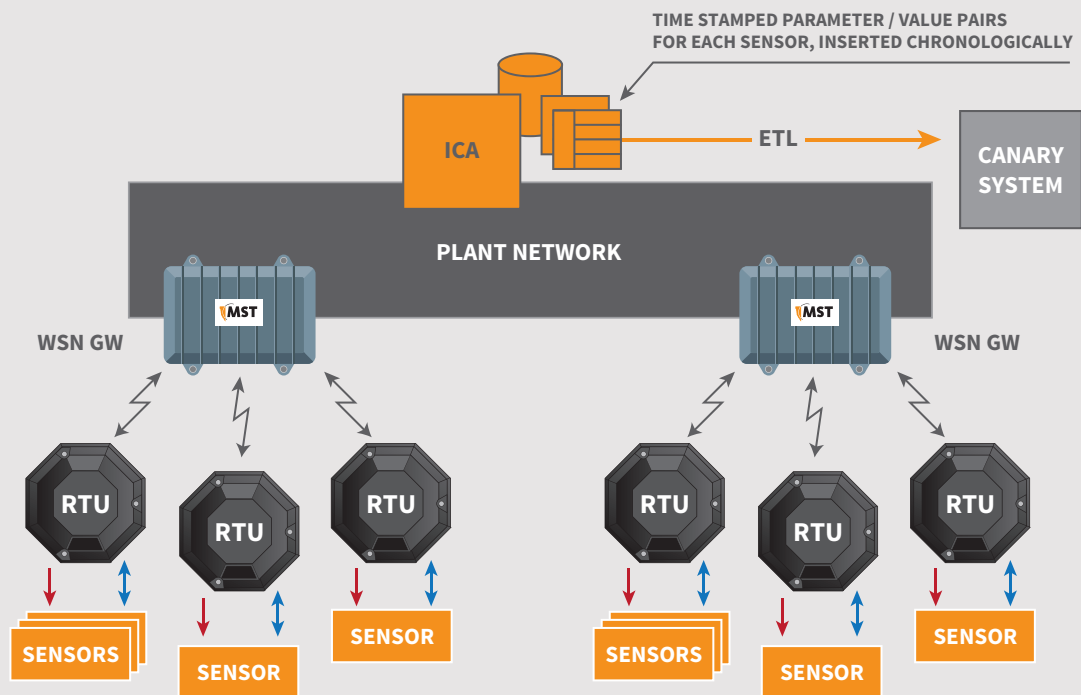


Fig1. WSN system architecture

REMOTE TELEMETRY UNIT (RTU)

- The rugged, IP66 RTUs are self-meshing to create a network extension of the existing mine Wi-Fi backbone
- Multiple antenna and mounting options ensure secure installation and communication transmission



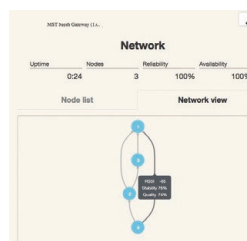
GATEWAY

- The rugged, IP66 Gateway is the interface which connects the RTU networks to the mine's main data highway
- It is simply powered and able to be installed in the most difficult terrain and conditions



DATA DELIVERY

- High quality mesh links ensure data is delivered to the fixed network and surface servers
- Delivery of reliable, understandable data in real-time



WIRELESS SENSOR NETWORK

- Multiple Wireless Sensor Networks (WRNs) can be utilised simultaneously
- Exponentially expands the existing data highway



TECHNICAL SPECIFICATIONS

WSN RTU

Ordering Code: **WSN-RTU01** WSN Remote Telemetry Unit - Serial

Size and Weight

- Height: 40.0mm (Excluding Antenna)
- Width: 195.0mm
- Depth: 195.0mm
- Weight: 0.5kg

In the Box

- RTU: MST Remote Telemetry Unit
- Connectors: 3x Dustcaps and 1x blanking plug
- Antenna: 2dBi N-Type Male Omni-directional

Interfaces

- Instrument: 3 x RS485 Instrument Ports
- Diagnostics: 1 x RS232 Console Port
- Antenna: N-Type Female

Power

- Battery: Internal 3.6V, Long-life Lithium

802.15.4e Radio Transceiver

- Frequency: 2.4 to 2.4835 GHz
- Channels: 15
- Modulation: OQPSK
- Output Power: 8 dBm
- Collision Avoidance: TDMA channel access

Mounting Options

- Rock Bolt: 26mm centre hole for mounting on rock bolts
- Attachment Bolts: 9mm mounting holes suitable for securing with bolts or ties

Environmental

- Operating Temperature: -30°C to 75°C
- Ingress Protection: IP66 (Dust tight and protection against powerful water jets)

Agency Approvals

- Radio: FCC Part 15.247 modular (Intentional Radiator)

WSN GW

Ordering Code: **WSN-GW01** Wireless Sensor Network - Gateway

Size and Weight

- Height: 43.0mm
- Width: 200.0mm
- Depth: 140.0mm
- Weight: 1.2kg

In the Box

- RTU: MST WSN Gateway Unit
- Connectors: Quick disconnect RJ-45
- Antenna: 2dBi N-Type Male Omni-directional

Interfaces

- Ethernet: IP network port
- Antenna: N-Type Female

Power

- PoE: IEEE 802.3af, maximum 15.4 W

802.15.4e Radio Transceiver

- Frequency: 2.4 to 2.4835 GHz
- Channels: 15
- Modulation: OQPSK
- Output Power: 8 dBm
- Collision Avoidance: TDMA channel access

Mounting Options

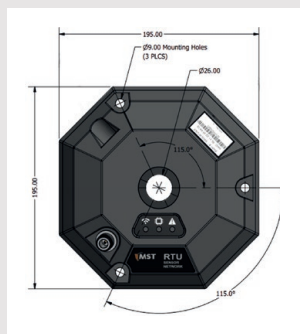
- Wall Mounting: 2-Point wall mount bracket
- Pole Top Mounting: Pole-top bracket + U-bolt

Environmental

- Operating Temperature: -30°C to 75°C
- Ingress Protection: IP67 (Dust tight and protection against immersion up to 1m)

Agency Approvals

- Radio: FCC Part 15 Class A (Pending)



MST offices and support centers are strategically located in the world's primary mining regions.

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