



StrataConnect™

Strata solutions for underground COMMUNICATION, TRACKING, MONITORING & CONTROL


STRATA
 WORLDWIDE

CONNECT YOUR MINE AND YOUR PEOPLE.

SIMPLE.
LOW-COST.
HIGHLY EXPANDABLE.
FULLY INTEROPERABLE.

VOICE COMMUNICATIONS	TEXT COMMUNICATIONS
TRACKING	ATMOSPHERE MONITORING
UNDERGROUND EQUIPMENT MONITORING & CONTROL	DATA RETRIEVAL

Strata Networks:

STRATA A-NODE: NON-IS WI-FI

- Requires fibre & power or StrataConnect DigitalBRIDGE™
- Supports all 802.11 devices
- Voice
- Data
- Video

STRATA C-NODE: BATTERY-POWERED-IS

- No existing infrastructure
- 100% wireless
- Battery-powered
- Fully operational post-accident
- Resistant to voltage spikes (such as lightning)

Communications:

FUNCTIONALITY

- Two-way voice, text and data communications
- Compatible with any standard IEEE 802.11b/g/n Wi-Fi device and StrataConnect Wireless protocol device

- Two-way text communications
- Post-accident communications
- Compatible with all StrataConnect Wireless protocol devices

Tracking:

- Personnel & asset tracking

- Personnel & asset tracking
- Post-accident tracking

Monitoring:

- Atmospheric conditions
- Gas detection
- Proximity detection systems (PDS)
- Belt & drive operations

- Atmospheric conditions
- Gas detection
- Proximity detection systems (PDS)
- Belt & drive operations*
- Post-accident monitoring

Control:

- Gas monitors
- Fans - Ventilation Automation & Control
- Belt drives
- Pumps

- Gas monitors
- Fans - Ventilation Automation & Control*
- Belt drives*
- Pumps*

(* Non-IS)

INSTALLATION & MAINTENANCE

- Fibre and power or StrataConnect DigitalBRIDGE™ required
- Certified electrician may be required at install
- A-Nodes installed along existing fibre or StrataConnect DigitalBRIDGE™ to create Wi-Fi "hotspots" with up to 1800 m of wireless coverage in each direction
- No external antennas
- 4/8/24 hour battery back-up pack optional
- Stable hotspots requiring low ongoing maintenance
- Strata Wi-Fi is 100% recoverable
- Flameproof Wi-Fi node available

- No hard-wired infrastructure required
- No external power – boosters, barriers or outstations
- No external antennas
- No certified electrician required
- Suspend C-Nodes at specified distance apart up to 305 m
- No line-of-sight between nodes required
- Self-forming mesh network
- Commercially available D-cell batteries with battery life 9-12 months
- Self-monitoring, self-healing
- Node damage or battery loss does not cause system failure or network interruption
- Automated network health checks
- StrataConnect Wireless is 100% recoverable
- Lowest cost of ownership



STRATA WI-FI IN YOUR OPERATIONS

- (Fibre or DigitalBRIDGE™)
- Incorporate Strata Wi-Fi into your existing fibre-optic or DigitalBRIDGE network to achieve powerful underground “hotspots”.
 - Strata A-Node access points installed in desired locations and establish up to 1,800 m of Wi-Fi coverage in each direction.
 - Strata Wi-Fi is compatible with any 802.11 device for voice calling, texting and high-speed data access
 - VoIP phones, Smartphones
 - Tablets, laptops
 - Strata A-Nodes are fully interoperable with StrataConnect C-Nodes, enabling expansion of wireless coverage into areas not requiring voice communications. Personnel and asset tracking, remote device monitoring and remote-control.

STRATACONNECT WIRELESS IN YOUR OPERATIONS

- (No Infrastructure)
- Truly wireless and battery-powered underground network
 - Eliminates the expense and heavy maintenance associated with wired infrastructures
 - Can be installed with as few as one or two people, with installation including simple suspension of battery-powered C-Nodes from the mine roof
 - Nodes automatically form wireless mesh network, providing complete coverage throughout the installed area.

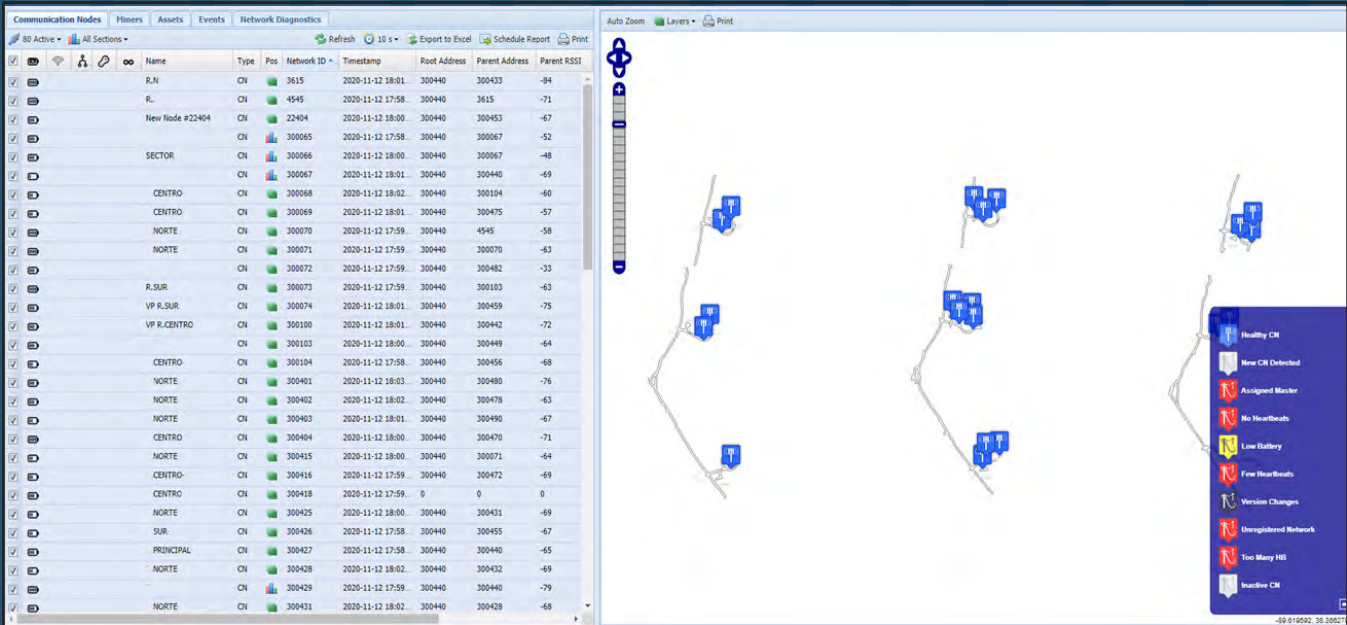
STRATACONNECT™ SERVER & GUI

– Providing a birds-eye-view of your mine

- At the heart of Strata communication systems are the StrataConnect™ Server and Graphical User Interface (GUI). These facilitate communication between surface and underground operations.
- Server provides the background processing that enables the data from the wireless, sub-surface network to be displayed at the surface. It integrates all underground systems into a single user interface.

- The Strata-developed GUI is a multi-layered, easy to navigate user interface that incorporates a map of the underground facility.
 - Locations of fixed nodes and all interfaced devices
 - Live tracking of mobile devices including visual direction of travel
- By toggling between system displays, surface operators can:
 - Manage all network and component health and status – including battery voltage
 - Track all tag-equipped personnel & machinery
 - Monitor atmospheric conditions underground
 - Monitoring and control ventilation system
 - Send and receive individual and broadcast messages & alerts
 - Monitor and control all electrical/battery-powered devices that are integrated with the system
 - Download status and activity reports from proximity detection systems
 - Manage activity and operating status of the underground Wi-Fi system

StrataConnect™ GUI enables system level monitoring, or high-resolution zoom into individual people and equipment. Data is stored for later reference and reporting.



StrataConnect™ Sample GUI

StrataConnect™ Communications

	STRATA A-NODE: NON-IS WI-FI
Voice:	<ul style="list-style-type: none">• Private, direct and group calling• Push-to-talk• Compatible with any standard IEEE 802.11b/g/n Wi-Fi enabled device<ul style="list-style-type: none">- Strata offers robust, low-cost VoIP phones as well as ruggedised, IP68 rated smartphones for voice, data and camera capabilities
High Speed Data:	<ul style="list-style-type: none">• High bandwidth capabilities• Enable access and transmission of digital documents on location underground• Stream-line operations and minimise down-time<ul style="list-style-type: none">- Daily performance log & progress reports- Annotate actual mine map- Equipment maintenance, repair and troubleshooting- SDS sheets- Service manuals• Download PDS data via Bluetooth® or Wi-Fi• Compatible with any standard IEEE 802.11b/g/n Wi-Fi enabled device<ul style="list-style-type: none">- Strata offers ruggedised, IP68 rated Wi-Fi tablets for data and camera capabilities
Messaging:	<ul style="list-style-type: none">• Standard mobile phone text messaging



STRATA C-NODE: BATTERY-POWERED-IS

- Hand-held miner communicator with full QWERTY keyboard
- Peer-to-peer and group text messaging
- Broadcast alerts
- Critical alert & response functions for miners
- Access to a full and automatically updating contact list
- Data storage for up to 500 messages
- Personnel identification

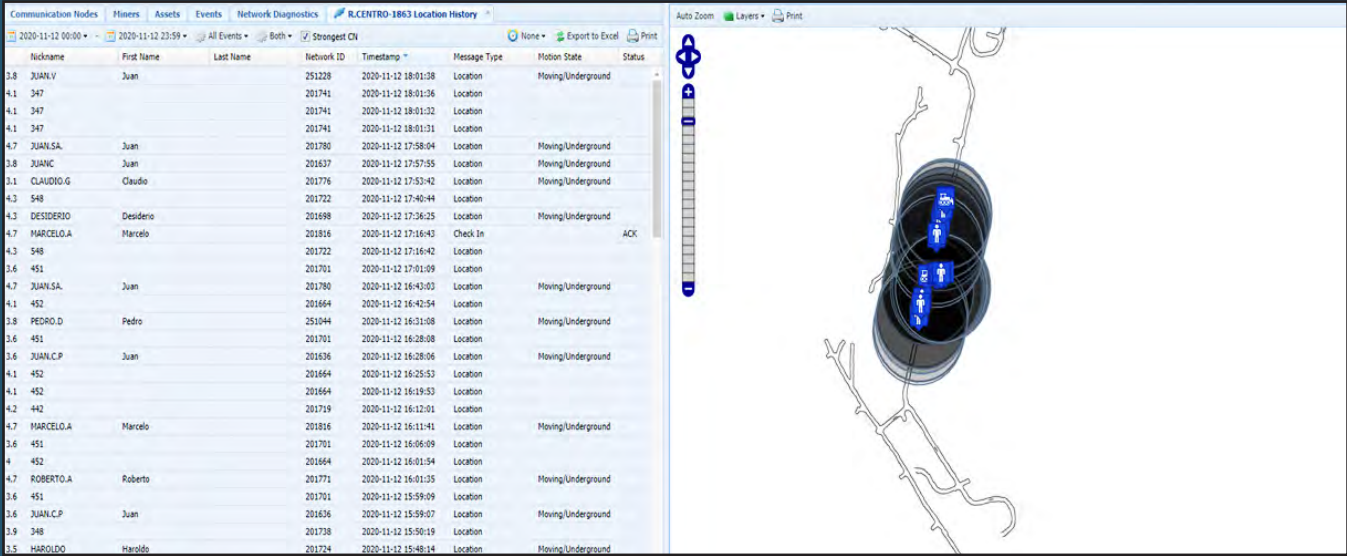
Personnel and Asset location and activity tracking in real-time.

StrataConnect offers best-in-class positioning for real-time location updates of underground personnel and equipment. The hand-held miner communicator facilitates miner-to-miner location look-up underground

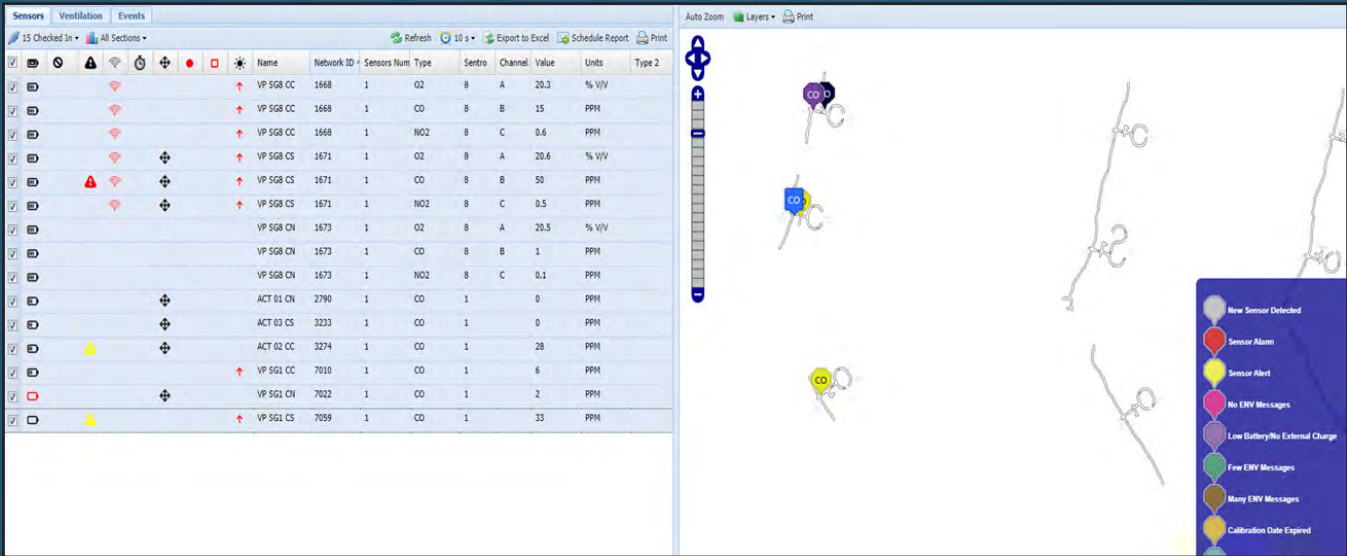
- Multi-node architecture provides overlapping coverage and disruption mitigation.
- Surface operators can track and monitor all personnel and machinery in real-time.
- Tracking accurate to within 60m*

	STRATA A-NODE: NON-IS WI-FI	STRATA C-NODE: BATTERY-POWERED-IS
Personnel Tracking:	<ul style="list-style-type: none">• Tracking Tags<ul style="list-style-type: none">- Hardhat or belt worn tracking devices- Rugged, light-weight & low-cost- Two-way alerts, worker & dispatch- Flashing location light- Broadcast panic alert- Commercial battery-powered- Breadcrumb tracking with direction of travel	<ul style="list-style-type: none">• Tracking Tags<ul style="list-style-type: none">- Hardhat or belt worn tracking devices- Rugged, light-weight & low-cost- Two-way alerts, worker & dispatch- Flashing location light- Broadcast panic alert- Commercial battery-powered• Miner Communicator (MC2)<ul style="list-style-type: none">- The StrataConnect MC2 is a dual function device for communications and tracking- Pouch with belt-loop - MC2 LED notifications visible- Breadcrumb tracking with direction of travel- MSHA and IECex Intrinsically Safe Approved- Li-Ion 3.7V rechargeable batteries
Asset Tracking:	<ul style="list-style-type: none">• Track all mobile equipment underground• Monitor production• Eliminate excessive time and money spent locating equipment• Tracking tag permanently or magnetically mounted onto vehicles• Accurate to within 60m*• AAA-cell battery-operated	<ul style="list-style-type: none">• Track all mobile equipment underground• Monitor production• Eliminate excessive time and money spent locating equipment• Tracking tag permanently or magnetically mounted onto vehicles• Housed in ruggedised poly cover• AAA-cell battery-operated

(*Variable depending on underground environment and node layout.)



StrataConnect™ Tracking



StrataConnect™ Atmospheric Monitoring

WIRELESS ATMOSPHERIC MONITORING

Leveraging the utility and flexibility of the Sentro 1 Wireless gas detector, surface operators can remotely monitor underground environments and control electronic devices during real-time operations.

The Sentro 1 Wireless Unit

- Truly wireless, battery-powered and completely IS
- Two-way communication for remote command and control
- Utilises commercially available D-cell batteries with battery life 40-60 days
- Dual-wall housing provides maximum impact strength and protection against dust and moisture
- IP65 rated
- MSHA and IECex approved



The Sentro eModule for gas detection

- Intelligent standardised gas sensing
- Monitoring of multiple gas types
- Simple exchange of eModules and/or D-cell batteries, completes maintenance
- eModule calibration performed on the surface every 31 days

The Sentro Vortex Wireless for air flow and ventilation monitoring

- Measures air flow for ventilation
- Air flow sensor responds to the velocity of the air or gas being monitored and generates an output signal that is linearly proportional to the actual flow velocity
- Backlit LCD with flow velocity information and diagnostic data
- Two (2) user-programmable alarm set points (Alert/Alarm)

Combustible eModules:

- CH4 0-100% LEL
- CH4 0-5% v/v
- CH4 0-100% v/v
- IR LED Technology
- Low Power Consumption

Toxic Gases eModules:

- CO: 0-500ppm
- H2S: 0-50ppm
- SO2: 0-20ppm
- NO2: 0-20ppm
- Cl: 0-10ppm
- O2: 0-25%
- NO : 0-200ppm
- H2: 0-1000ppm

BELT & BELT DRIVE MONITORING

Strata can replace traditional belt controllers with the StrataConnect™ controller that enables real-time, remote monitoring and control of the mine belt lines and drives during operations.

- Wide variety of sensors and control points can be monitored simultaneously
- Real-time wireless data transmission to user interface
- Data storage for analysis and reporting
- Minimal maintenance
- Operation and update performed by mine personnel



	STRATA A-NODE: NON-IS WI-FI	STRATA C-NODE: BATTERY-POWERED-IS
Wireless Gas & Fire Detection:	<ul style="list-style-type: none">• Wireless monitoring of toxic and explosive gases during operations• Measures levels every second and reports status at pre-set intervals to dispatch• Enter Alert/Alarm mode if levels rise & data is streamed continuously• Gas level status & incident location identified	<ul style="list-style-type: none">• Wireless monitoring of toxic and explosive gases during operations• Measures levels every second and reports status at pre-set intervals to dispatch• Enter Alert/Alarm mode if levels rise & data is streamed continuously• Gas level status & incident location identified• Fully operational post-accident and in the event of power or ventilation loss
Wireless Airflow & Ventilation:	<ul style="list-style-type: none">• Air or gas flow measured and status reported at pre-set intervals• Enter Alert/Alarm if air flow drops and data is streamed continuously• Air flow/Ventilation status & incident location identified	<ul style="list-style-type: none">• Air or gas flow measured and status reported at pre-set intervals to dispatch• Enter Alert/Alarm if air flow drops and data is streamed continuously• Air flow/Ventilation status & incident location identified• Fully operational post-accident and in the event of power or ventilation loss
Atmospheric Monitoring:	<ul style="list-style-type: none">• Wireless Sentro or powered PLC• Real-time monitoring of air temperature, humidity and pressure• Report data to dispatch	<ul style="list-style-type: none">• Wireless Sentro or powered PLC• Real-time monitoring of air temperature, humidity and pressure• Report data to dispatch
Remote Control:	<ul style="list-style-type: none">• Gas Detectors<ul style="list-style-type: none">- On/Off- Reading and setting I/O- Manipulate thresholds- Alarm On/Off• Fans & Pumps<ul style="list-style-type: none">- On/Off	<ul style="list-style-type: none">• Gas Detectors<ul style="list-style-type: none">- On/Off- Reading and setting I/O- Manipulate thresholds- Alarm On/Off• Fans & Pumps<ul style="list-style-type: none">- On/Off

Monitor:

STRATA A-NODE: NON-IS WI-FI

- Belt speed
- Belt motor & bearing temperature
- Materials flow-rate over main scale
- Pull cord
- Plugged chute
- Belt slip
- Belt stoppage
- Misalignment
- Tension
- Local lock-out

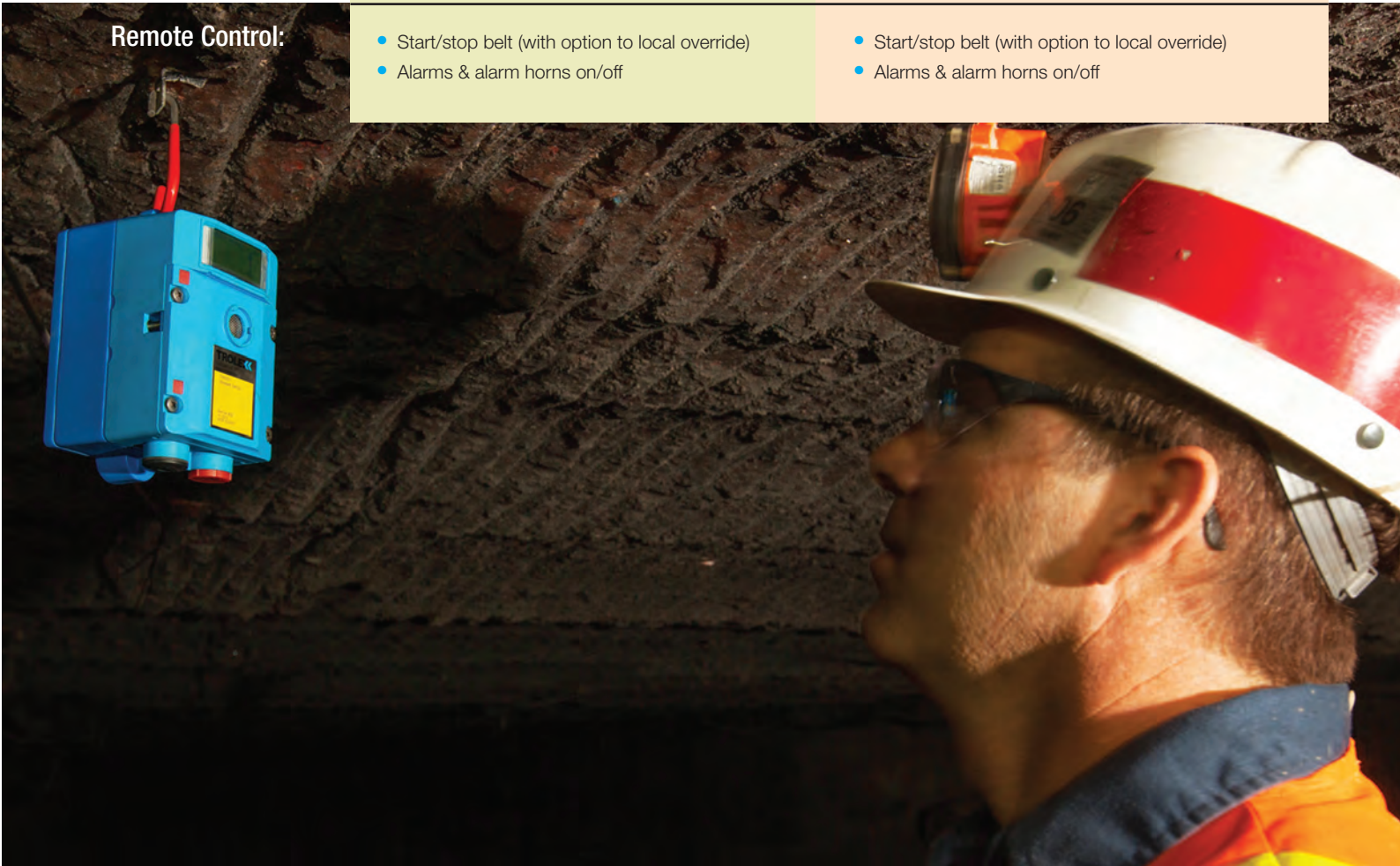
STRATA C-NODE: BATTERY-POWERED-IS

- Belt speed
- Belt motor & bearing temperature
- Materials flow-rate over main scale
- Pull cord
- Plugged chute
- Belt slip
- Belt stoppage
- Misalignment
- Tension
- Local lock-out

Remote Control:

- Start/stop belt (with option to local override)
- Alarms & alarm horns on/off

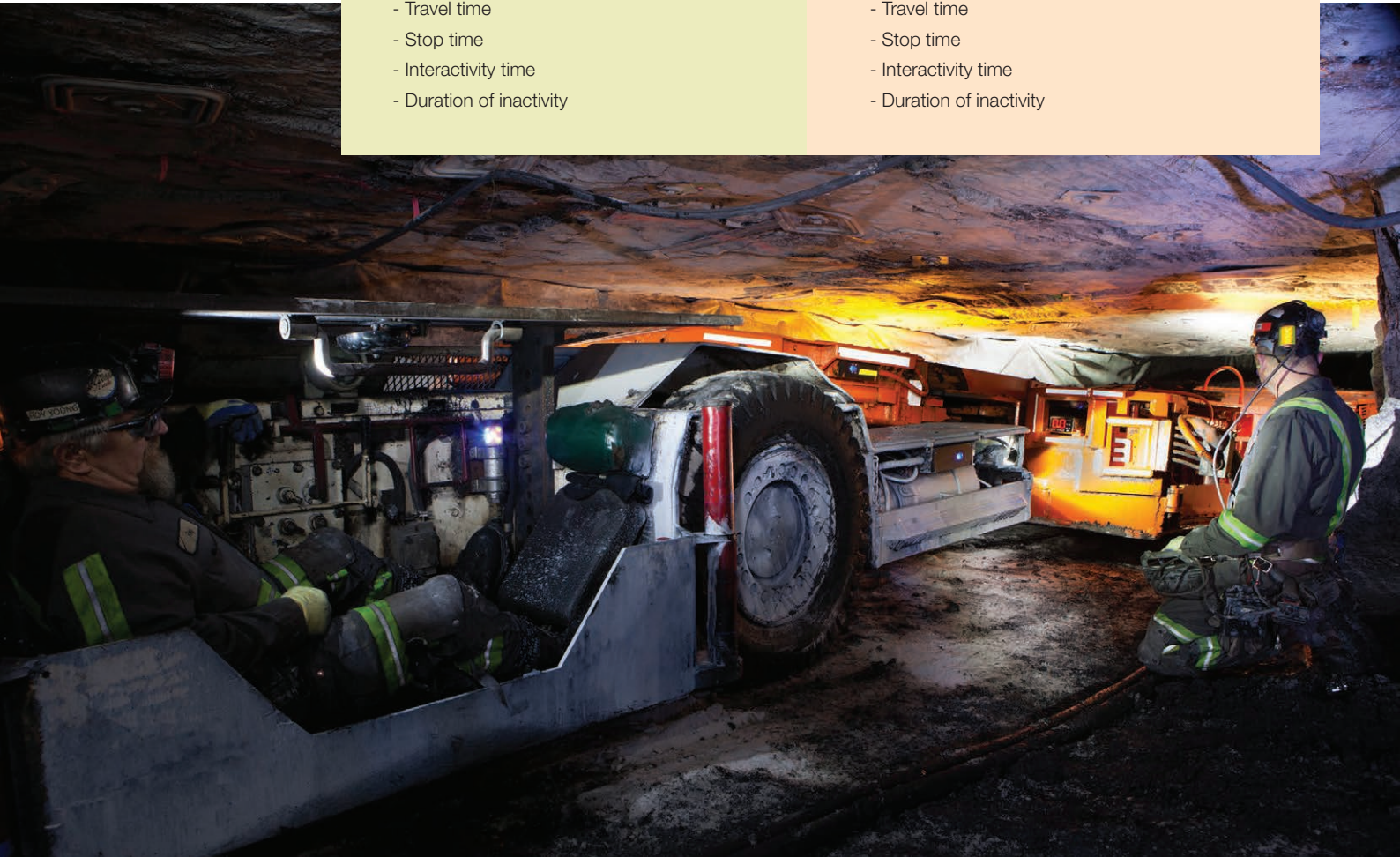
- Start/stop belt (with option to local override)
- Alarms & alarm horns on/off



PROXIMITY DETECTION DATA RETRIEVAL

Strata's HazardAvert® proximity detection system is continuously monitoring system activities and warning alerts. This information is logged and stored and can be wirelessly transmitted to the surface for training and reporting purposes.

	STRATA A-NODE: NON-IS WI-FI	STRATA C-NODE: BATTERY-POWERED-IS
Monitor:	<ul style="list-style-type: none">• Individual identity of machinery• Worker and machinery interaction• Warning and/or Hazard zone breaches and duration of breach• Remote stop• Emergency, Hazard zone stop• Duration of inactivity	<ul style="list-style-type: none">• Individual identity of machinery• Worker and machinery interaction• Warning and/or Hazard zone breaches and duration of breach• Remote stop• Emergency, Hazard zone stop• Duration of inactivity
Reporting:	<ul style="list-style-type: none">• Safety Reports<ul style="list-style-type: none">- Worker and machinery operator safety practices- Zone breaches – frequency and duration• Productivity reports<ul style="list-style-type: none">- Machinery tracking- Travel time- Stop time- Interactivity time- Duration of inactivity	<ul style="list-style-type: none">• Safety Reports<ul style="list-style-type: none">- Worker and machinery operator safety practices- Zone breaches – frequency and duration• Productivity reports<ul style="list-style-type: none">- Machinery tracking- Travel time- Stop time- Interactivity time- Duration of inactivity



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