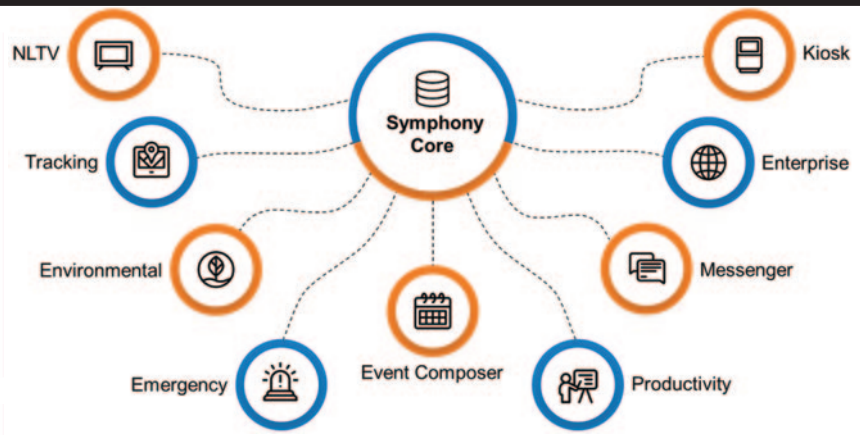
Northern Light Technologies

Networks for Harsh Environments



- Plug n' play, high speed modular network with pre-terminated fibre eliminates splicing underground
- Turnkey data and voice communications solution featuring rapid deployment and easy maintainance
- Data networking via a gigabit backbone for monitoring and control systems
- Video surveillance and monitoring includes personnel and vehicle tracking plus emergency management, alarms and optimized ventilation
- Install the modules you need now and add more in the future as required

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Disclaimer

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NLT Networks

NLT Networks is a proud industry expert in the design and installation of flexible communication, networking, monitoring and tracking systems for the underground mining and tunneling industries. Our solutions are used every day on roadways, subways, railways, mines, hydro and other harsh industries. N-Connex is simple, reliable and rugged.

Our engineers will work with you to design a solution that's based on your individual needs and requirements – we offer the industry's most reliable and durable communication solutions. The goal for every project is to help maximize the safety, productivity and profitability of our customers.

NLT Networks can also provide turn-key solutions to cover voice communications, tracking and visualization solutions. Our powerful software package is user friendly and designed for monitoring environmental conditions, emergency management and control functionality. N-Connex is the backbone that enables these proven solutions.

N-Connex

N-Connex is NLT Network's award-winning rugged, modular, IP67-rated networking solution for harsh environments.

From underground hard rock mines to process plants, from tunnels to heavy industry, N-Connex will provide a fit-for-purpose Wi-Fi and Ethernet solution like no other. As your demand for data, communications and IoT grows, N-Connex's fully modular system ensures your network will grow with you.

N-Connex enables a range of solutions that make use of Wi-Fi (802.11) and Ethernet connectivity.

Choose the functions and network configuration that meet your needs. Additional modules can easily be added to an existing installation to support growth.

Our award-winning design makes installation and maintenance easy. The modules hook easily onto an expandable custom rail system and then lock in placing using a thumb screw. Units can also be mounted in a stand-alone configuration.

N-Connex modules simply "plug & play" using Power over Ethernet (PoE) and pre-terminated CAT6 Ethernet and fibre cables.

Range

- Distribution 2.0 Module
- Power 2.0 Module
- Battery Module
- Analog I/O Module
- Digital I/O Module
- Alarm Module
- Evacuation Module
- Bolt 2.0
- Lightning Bolt
- Extender
- Tracking Tags
- CAT6 & Fibre Cables

Distribution 2.0 Module

The distribution module is the core N-Connex component that delivers a highly reliable Gigabit Ethernet network. It supports many advanced network standards to optimize network performance, ease maintenance issues and secure network safety.

With the inclusion of eight managed PoE ports, two non-POE perts and four single mode fibre ports, it enables a range of solutions and network topologies. When combined with the N-Connex Bolt Access Points, strong and reliable Wi-Fi coverage in underground mines, tunnels and heavy industrial facilities is achievable.

Key Features

- Eight (8) 1-/100/1000 Mbps RJ45 POE ports
- Two (2) 1-/100/1000 Mbps RJ45 non-POE ports
- Four (4) fibre optic single mode ports
- Total PoE budget of 200W at 25°C or 160W at 40°C
- 52 Gbps switching capacity
- Optional battery backup power
- Network management capabilities
- IP67 protected enclosure

Power 2.0 Module

The Power Module provides power to the Distribution Module of the N-Connex system, the Power Module connects to a single phase 110-240 VAC source and supplies an output load of 48 VDC at approximately 5 Amps.

Adding the optional (recommended) Battery Module will provide the Power Module with an Uninterrupted Power Supply (UPS) function. The Power Module will also provide a dedicated connection for the Battery Module.

Key Features

- Selectable AC Input Voltage 110/240 VAC, 47 - 63 Hz
- Total power output of 200W at 25°C
- Status indicators
- IP67 protected enclosure
- UPS functionality (optional)
- Up to 8 hours backup with the optional Battery Module
- Standalone or quick-fit rail mounting

Edge Module

The Edge Module provides connectivity to a Gigabit Ethernet backbone. The standard module includes six (6) managed PoE ports to enable a range of solutions. Optionally, the Edge can include two (2) single-mode or multi-mode fibre ports.

As with all N-Connex modules, the Edge is fit-for-purpose and designed for harsh environments. The module can be mounted on NLT's proprietary quick-fit frame or mounted as a standalone device.

Combined with the N-Connex Bolt Access Point, strong and reliable Wi-Fi coverage can be achieved in underground mines, tunnels and heavy industrial facilities.

The Edge can be connected to the Battery Module for continued operation during power outages.

NLT's pre-terminated, rugged Ethernet cable connects multiple Edge modules to form a redundant network topology.

A wide range of advanced network standards are supported by the Edge module to improve performance, ease maintenance, and enhance security. The Edge and Distribution modules can work concurrently to provide robust solutions for large-scale networks.

Key Features

- Six (6) 10/100/1000 Mbps RJ45 PoE ports
- Two (2) fibre optic single/multi mode ports (optional)
- Max power per port 30W IEEE 802.3 af/at
- Network management capabilities L2+ and L3
- Security: Anti-DoS attack, IP-MAC-VLAN-Port binding, ARP inspection
- QoS: Flow-based redirection and rate limiting, Queue Scheduling Algorithm (SP, WRR, SP+WRR), Diff-Serv QoS
- Spanning Tree: STP (IEEE802.1d), RSTP (IEEE802.1w), MSTP (IEEE802.1s)
- 52 Gbps switching capacity
- Optional battery backup power
- IP67 protected enclosure

Battery Module

The Battery Module is designed specifically to provide backup power when the main 120/240 VAC power source is shut down. The Battery Module connects with the Power Module to provide an uninterruptable power supply (UPS).

The Battery Module will provide 48VDC and will typically last for eight (8) hours (actual time depends on the overall load – determined by the number and type of PoE devices connected.

Key Features

- Nominal 48VDC to support active PoE
- Status indicator
- Vented, aluminum enclosure provides durability and efficient thermal management
- Recharges automatically via the Power Module
- Weatherproof IP67 enclosure
- Up to 8 hours backup

I/O Modules
Digital & Analogue

The IO module allows sensor and instrumentation integration into the N-Connex network, which enables the monitoring and control of a wide range of systems.

The IO is compatible with any PLC or control network using Modbus TCP. When paired with NLT Network's flagship Symphony software, the display of gas sensors, fan speeds or any other compatible device is made possible.

Analogue I/O Key Features

- Six (6) analog inputs
- Two (2) analog outputs
- Two (2) Digital inputs
- Two (2) Digital outputs
- IP65 Protection

Digital I/O Key Features

- Eight (8) Digital inputs
- Eight (8) Digital outputs
- IP65 Protection

Alarm 2.0 Module

The Alarm Module provides an emergency warning solution for the N-Connex Network. It features a high-intensity strobe light, a 110db siren and an illuminated emergency push button.

The module is powered by PoE and is designed to be connected to N-Connex Distribution modules via CAT6 cables. Combined with NLT Networks Ethernet extenders, it may be positioned up to 300m away from the
Distribution Module.

Key Features

- Remote trigger via Symphony or Modbus/TCP
- Local trigger via illuminated push button
- Weatherproof IP67 enclosure
- 110dB siren and high-intensity strobe
- Compatible with third party PoE equipment

Evacuation 2.0 Module

The Evacuation Module is an enhanced Alarm module that has similar functionality to the Alarm Module but includes an additional yellow/amber strobe and siren arrangement.

This second strobe/siren can be used for warning or testing purposes, leaving the primary red alarm/strobe to be used for true emergencies.

Features include a mute button so that the sirens can be momentarily muted to allow for voice communications.

Key Features

- Remote trigger via Symohony software or Modbus/TCP
- Local trigger via illuminated push button
- Weatherproof IP67 enclosure
- Two 110dB sirens
- High-intensity strobe
- Compatible with third party PoE equipment

Bolt 2.0

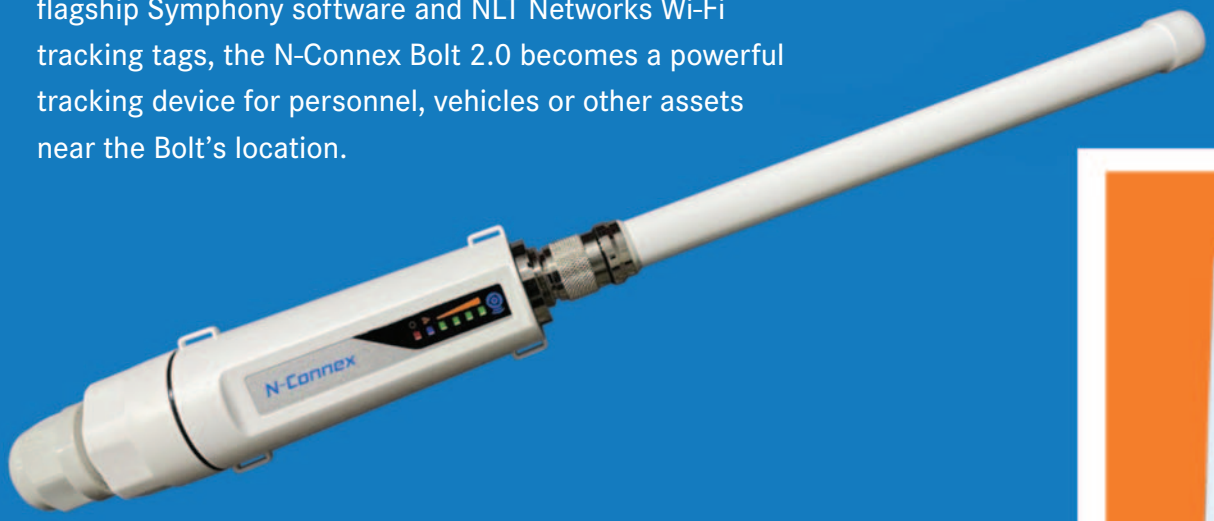
The N-Connex Bolt 2.0 is a compact 2.4 GHz outdoor and underground wireless access point. It is equipped with an N-Type antenna connector to fit an assortment of industry standard antenna options.

Powered by PoE, a single Cat6 cable provides network connectivity and power, making installation easy and intuitive.

The secret power of the N-Connex Bolt 2.0 is the built-in Wi-Fi tracking function. When paired with NLT Network's flagship Symphony software and NLT Networks Wi-Fi tracking tags, the N-Connex Bolt 2.0 becomes a powerful tracking device for personnel, vehicles or other assets near the Bolt's location.

Key Features

- 802.11 B/G/N
- IP67 enclosure
- Up to four (4) SSIDS
- VLAN capable
- PoE powered
- N-Type antenna connector



Lightning Bolt

The Lightning Bolt is a compact dual-band outdoor and underground wireless access point. It is equipped with two N-Type antenna connectors to fit an assortment of industry-standard antenna options.

Powered by gigabit PoE, a single Cat6 cable provides network connectivity and power, making installation easy and intuitive. Additionally, the low power design ensures 802.11AC Wi-Fi can be achieved at up to 300m from the NLT Networks Distribution Module when paired with NLT Network's Cat6 extenders.

The secret power of the Lightning Bolt is the built-in Wi-Fi tracking Function. When paired with NLT Network's Symphony software and NLT Networks Wi-Fi tracking device, it is capable of tracking personnel, vehicles or other assets that are in the proximity of the Bolt.

Key Features

- 2.4/5 GHZ Wi-Fi access point
- IP67 enclosure
- PoE+ gigabit Ethernet
- Dual-stream MU-MIMO
- Web-based management
- Ethernet extender support (up to 300M)
- Rugged N-Type antenna connectors

Industrial Network Cameras

NLT Dahua cameras combine great value, high performance and advanced features. Additionally, they are compatible with your existing CCTV system (ONVIF-compliant). A wide range of AI features are offered, including face detection / recognition, auto-tracking and smart motion detection.

A Video Monitoring solution is easy to install when the NLT N- Connex network is operational. The N-Connex Distribution module provides up to eight (8) Power Over Ethernet (PoE) ports and two standard Ethernet ports. These can all be used to connect IP Network cameras. The Gigabit fiber backbone of N-Connex is sufficient to carry a significant number of video signals to the Network Video Recorder (NVR).

Here are four of NLT's most popular IP cameras and the NVR that can meet almost any surveillance need.

4MP/8MP Vari-focal Bullet

- 4MP (2560 × 1440) @25/30 fps, max. supports 4MP (2688 × 1520) @20 fps
- Built-in IR LED, max IR distance: 60 m
- Smart H.265+ & Smart H.264+
- Intelligent detection: Intrusion, tripwire
- IP67 protection, IK10 protection

Panoramic 4-Directional Dome (4 × 5 MP)

- 5MP (2592×1944) @25/30fps
- Max. IR LEDs Length 30m
- H.265&H.264 dual stream encoding
- Micro SD memory, IP67, IK10, PoE+

8MP 40X PTZ AI Speed Dome

- 8MP-4K (3840 × 2160) @ 25/30 fps
- Powerful 40x optical zoom
- Smart H.265+
- Smart wiper
- IP67

4MP 4X PTZ Dome

- 4MP (2560 × 1440) @25/30 fps
- Powerful 4x optical zoom
- Smart H.265+ & Smart H.264+
- IP66 protection, IK10 protection

NVR 2U 8HDDs (16/32/64 CH)

- AI by recorder: 2-CH face detection and recognition, 4-CH perimeter protection, and 8-CH SMD Plus
- Smart H.265+/H.265/Smart H.264+/H.264/ MJPEG decoding
- Max. 384 Mbps incoming/recording/outgoing bandwidth
- Support Raid 0/1/5/6/10

Voice & Audio Communications

In the tunnel and on the surface, NLT Networks provides wireless coverage for voice

WLAN Transceiver Handheld

The Wi-Fi signal allows WLAN transceiver handhelds to be used. These units are equivalent to standard two-way radios but offer significant advantages. The WLAN transceiver handheld that is shown can have up to 50 different “talk groups” (Channels) programmed.

Simply select the appropriate talk group and press the Push-To-Talk (PTT) button. The unit also supports sending and receiving short messages.

Radio System Integration

Where a tunnel has an incumbent VHF or UHF radio system, NLT can easily integrate our Digital Network to re-broadcast any voice communications over both the existing radio system and the new Digital Wi-Fi network.

The RoIP gateway allows you to bridge almost any modern communications system to Icom’s universe of Network products and more. Interconnect a variety of radio protocols from Icom’s IDAS™ conventional/trunking systems, wireless LAN, analog, P25, DMR systems and even SIP phones. Enhance and ensure communication for any operation.

Extender

The NLT Networks Ethernet Extender provides a convenient system for extending Ethernet beyond the 100-meter Cat6 limit. The extender uses an active PoE connection to self-power and extend the Cat6 Ethernet connection up to an additional 100 meters.

A maximum of 3 extenders cam be used in a daisy chain configuration to extend the connection up to 400 meters, while still providing up to 4 watts of power to PoE peripherals.

When combined with a N-Connex Bolt wireless access point, Wi-Fi coverage can be provided for an entire site. The Extenders are fitted with IP67 Cat6 receptacles to ensure waterproof and dust-free connections when using NLT Networks Cat6 pre-terminated Cables.

Key Features

- 10/100/1000 Mbps
- LED power indicator
- 100M Extended range
- 15/30W PoE Power
- Rugged metal enclosure
- Easy installation
- IP67 Ingress Protection

Industrial Switch

The NLT Networks Industrial Switch is designed to seamlessly integrate with various data acquisition systems, including SCADA and HMI systems. It supports MEF service delivery and offers timing over packet solutions, such as IEEE 1588 and synchronous Ethernet.

With its robust construction and small footprint, the NLT Industrial Switch is an ideal choice for critical applications that require reliable and secure networking capabilities.

Key Features

- Eight (8) 10/100/1000 MPPS PoE ports
- Two (2) 10/100/1000 MBPS NON-PoE ports
- Four (4) fibre optic single mode ports
- Total PoE budget of 240W
- L2+ features
- Support for spanning tree STP, RETP, MSTP
- Optional UPS monitoring
- DIN rail mount
- 52 GBPS switching capacity

Fibre Patch Cable

NLT Network's Fibre Patch Cables provide backbone connectivity to our range of network devices. Pre-terminated lengths are available for ease of installation and custom lengths can be supplied for special applications.

Stainless Steel armor ensures the fibre cables are protected from crushing, cuts and abrasion. Rugged IP68 connectors are suppled on the network devices and fibre cables to enable quick, simple connections in harsh construction environments.

Key Features

- Pre-terminated for ease of use
- High chemical resistance
- Halogen free
- Crush resistant
- UV protected for outdoor use
- High tensile strength
- Abrasion and cut resistant
- Armored stainless steel Axial tube cable
- IP68 Rating

CAT6 Cable

Key Features

- Rugged RJ-45 connectors
- IP65 with N-Connex products
- 23 AWG
- Low smoke zero halogen

The pre-terminated N-Connex CAT6 cables enable simple connection and maintenance for the Ethernet backbone of the N-Connex network solution.

The cables come pre-terminated in a variety of lengths and are fitted with a captive screw-on connector which mates with the RJ-45 connector on the Distribution Module of the N-Connex system.

The pre-terminated CAT6 makes installation simple, maintenance easy and stocking more manageable.

N-Connex Inline Adapters

For Seamless System Integration

Easily integrate your existing system with NLT's N-Connex platform using our inline adapters. These solutions support plug-and-play mounting of network devices — such as Cisco APs, MOXA APs and network cameras — for seamless compatibility with N-Connex ruggedized IP67 switches.

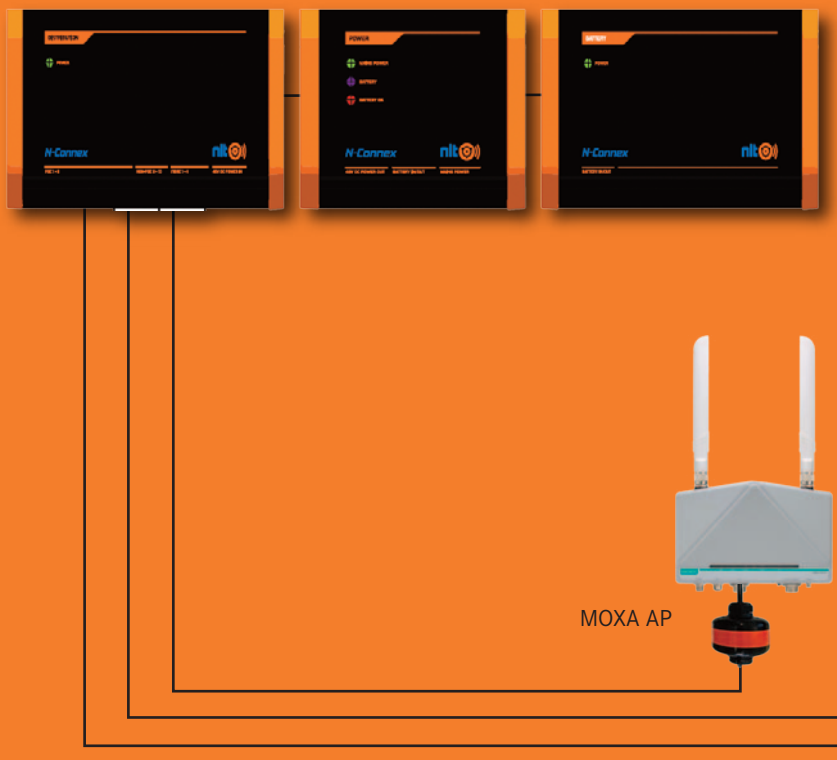
Need something specific? We can also design and manufacture custom adapters tailored to your current infrastructure.

Inline Adapter for MOXA AP DT5905SA

Cisco Inline Adapter DT5902SA

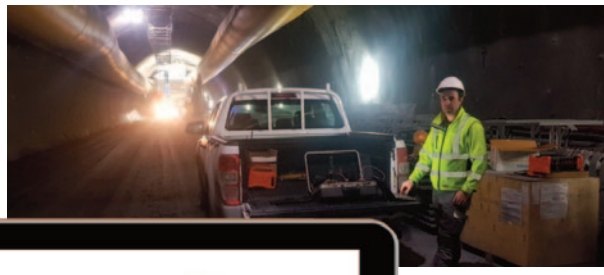
M-12 X-Coded Cisco Inline Adapter DT5903SA

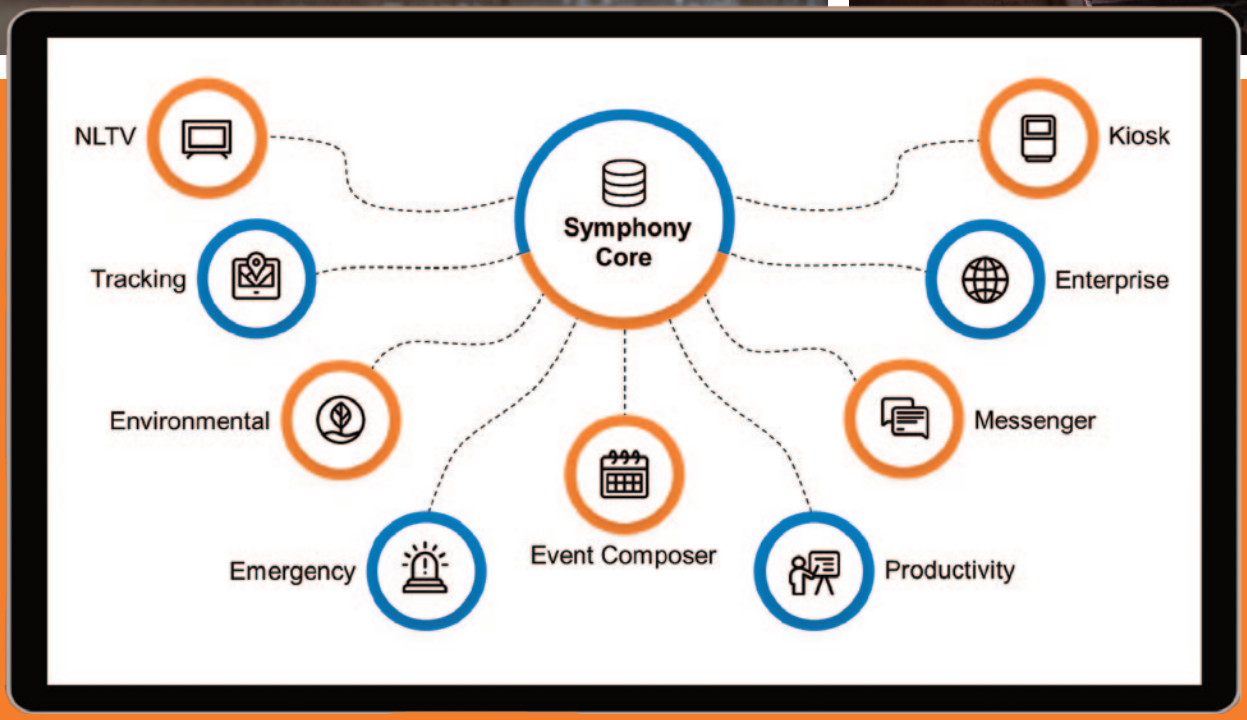
Inline Adapter for Cameras DT5904SA



Symphony

nlt Digital Solutions





Symphony

Symphony is the ultimate solution for mining and tunneling companies looking to maximize safety and productivity. With its suite of application, advanced analytics, real time monitoring and partner API, Symphony provides the insights and flexibility needed to stay ahead of the competition.

The Tracking Application enables real-time monitoring of vehicles, equipment and personnel displayed on a user-managed mappy system for improved situational awareness and emergency response. Alongside Tracking, Messenger, Environmental and Emergency Management applications enhance communication, monitor conditions and provide rapid alerts. Integrated N-Connecct Alarm and Evacuation modules further strengthen safety, while the NLTV Display System ensures critical data is accessible in remote locations

By combining advanced technology with powerful data analytics, Symphony helps mining and tunneling operations boost efficiency, reduce downtime and enhance safety.

Wireless LAN Controller (WLC)

Included with Symphony Core, the Wireless LAN Controller (WLC) streamlines wireless network management, eliminating the need to configure each access point individually. Password updates, MAC filtering and firmware upgrades can all be handled centrally, ensuring seamless connectivity. The WLC Dashboard provides real-time insights into network performance, showing active and inactive APs, network load, total throughput and usage trends - all in a clear, intuitive interface.

Messenger

Secure communication platform for workers to stay in touch with each other and with management. Messenger also facilitates emergency management with some of NLT Digital Solutions' proprietary mobile devices.

Symphony

Tracking

Real-time tracking of all vehicles, equipment and personnel in the mine or tunnel that can be easily displayed on your own cost-effective, user-managed mapping system.

Environmental

Monitoring of key environmental factors, such as air quality, temperature and humidity, to ensure compliance with regulations and provide a safe and healthy work environment for employees.

Emergency

Rapid response system for emergency situations, such as fires or accidents. The Emergency application also controls our N-Connex Alarm and Evacuation hardware modules, providing an integrated emergency response solution that can be activated quickly and efficiently.

Symphony

Event Composer

Customizable platform for creating and managing events. The Event Composer provides any user the ability to use all of the available data in Symphony to make decisions and take action, all without writing a single line of code. Optimize your ventilation, trigger a partial evacuation, send a report via email... all configurable by you.

Productivity

Advanced analytics and insights into production processes and equipment or vehicle performance. Allows you to easily monitor and report on materials movements and vehicle travel and idle times.

NLTV

High-resolution display system for showing data on remote autonomous display devices that is "set and forget". That is, they do not require human intervention to reconnect to the network and resume functionality after power or communication outages.

Symphony

Enterprise

Application that allows for remote authentication against Microsoft's Active Directory or other LDAP solutions, enabling secure access to Symphony and simplifying user management.

Kiosk

We provide a remote kiosk to allow users to easily associate themselves with tracking devices before heading underground. This also serves to remove a paper-based register for visitors and temporary device allocations.

Partner API

In addition to its suite of applications, Symphony also offers a partner API, allowing customers to integrate their data with third party software. This means that mining and tunnelling companies can leverage their data in new and innovative ways, gaining deeper insights and improving decision-making across the organization.

Vehicle Tag

The Wi-Fi Vehicle Tag is the market's leading tracking tag, with more units deployed than any other tag of its kind. These rugged battery-powered tags can be attached to a variety of vehicles such as light vehicles, trucks or loaders.

Tagged vehicles can be accurately located in real-time in any environment. Wi-Fi Vehicle Tracking Tag beacons are received and processed by NLT's Wi-Fi access points, keeping infrastructure costs low and installation simple. Optionally, a beacon can be forced using a tag reader where high resolution tracking is required.

Key Features

- Rugged design
- IP65 Protection
- Vehicle powered
- Wi-Fi tracking
- Customizable beacon rate
- Optimised for Symphony software suite

Wi-Fi Tracking Tag

The Wi-Fi Tracking Tag is the market's leading tag, with more units deployed than any other tag of its kind. These IP65 rugged, battery-powered tags can be attached to people and a variety of equipment types, such as tools, containers, manufacturing equipment and vehicles. This enables tagged items to be accurately located in real-time and in any environment.

Wi-Fi Tracking Tag messages are received and processed by NLT Network's Wi-Fi access points, keeping infrastructure costs low and installation simple. As with all tags, location determination is performed through a unique beaconing method that keeps network impact low and ensures scalability and long battery life.

Key Features

- Long life
- Rugged design
- Motion sensor
- Wi-Fi tracking
- Customizable beacon rate
- Optimized for Symphony software suite
- IP65 Ingress Protection
- NLT cap lamp options available

Tracking-Enabled Cap Lamps

Aries

Falcon Plus

Eagle Plus

KEY BENEFITS FOR MINES

- Tag is always on the miner (missing tags can be dangerous; replacing tags is expensive)
- One charger/one rechargeable battery (a significant cost reduction over disposable batteries)
- Mine knows where their personnel are at all times
- More & better data for mines to support safety and productivity
- Personnel pinpointed & evacuation expedited in the instance of a mine event
- Reduction in miners' injury & death from equipment impact through proximity awareness
- Mine can better allocate resources, such as an electrician, to fix a situation

Vigilance Smart Lamp

NLT Digital's line of Smart lamps debuted with Messenger, the world's first cap lamp to accomodate bi-directional messaging. Our new Vigilance Smart Lamp is the culmination of years of experience and engineering to supply a lamp unrivalled in its functionality, capabilities and design.

For use in the harshest environments, the intrinsically safe (IS) Vigilance has the capacity to accommodate a variety of tracking tag options, while keeping the quality of the battery and light source at the forefront.

Two-way messaging, the integrated camera and smart apps are where Vigilance shines. With massive 3.5-inch touch screen and integrated smart apps, the Vigilance lamp aims to improve work flow and communications for the most demanding underground environments.

Key Features

- Wi-Fi network connectivity
- 3.5" touch screen
- Button keypad
- Intuitive messaging
- RFID tracking
- Built-in camera
- NLT Digital Wi-Fi tracking