

Modular Underground Communication Network

Ensuring maximum safety and efficiency during the construction of an underground tunnel requires robust and reliable communication and high-speed data networks throughout the surface-to-underground operation.

An effective tunneling network solutions need:

- To be easy to install.
- To be maintainable by internal staff.
- Can expand and grow with project needs.
- A simple and understandable design.
- Full redundancy in case of emergency.
- Clear and accessible safety mechanisms.
- The ability to offer operational data from both personnel and machinery.

“There’s more tunnelling happening today than ever before and customers no longer find it adequate to install a communications system through the course that requires a technician to make adjustments or expansions,” says Ian Turner, Managing Director of Strata Europe. “Uptime, clear signals, and solid data are critical to safety and efficiency. From environmental data to proximity detection events, a well-designed network provides predictability, allowing managers to recognize potential risks to safety and production schedules and enact preventative measures.”

CONNECT™ Fiber is Strong, Reliable and Cost Effective

CONNECT™ Fiber is a highly adaptable multifunctional underground fiber optic networking solution that provides simple “plug-and-play” connectivity to fiber optic



networks. The system exceeds safety standards and can be easily dismantled for transfer to another site. The benefit of the modular system design is that it enables the network to be configured according to the project needs at the time of installation, and then easily modified and expanded as additional functions are required.

The backbone of the network is a strong fiber cable that can withstand the punishing tunneling and mining environment where constant movement and vibration is present. StrataConnect™ SSATC fiber optic cable is flexible, yet sturdy. The Kevlar strength outer membrane provides strength against harsh treatment, as well as insect and rodent resistance. Suitable for installation above ground along a catenary or on a tray, it's also applicable in construction where harsh environment cable assemblies are required.

The CONNECT™ Fiber system is custom-designed and configured to fit the requirements of the project, the system ensures minimum latency and maximum bandwidth for optimal performance. Strata Data Units, installed along tunnel courses, provide high-speed connectivity to IoT devices and Power-over-Ethernet (PoE/PoE+) devices. Each Data Unit incorporates four x 1 Gbps SFP ports and up to 16 x 1 Gbps interfaces with PoE+ (802.3at) capability. All field devices connect to the data unit via IP67-rated Cat6 plus and cable.

CONNECT™ Fiber is an upgraded solution for comprehensive monitoring and communication with features that include:

- Wi-Fi6 Access
- Gigabit Fiber Connectivity
- PoE/PoE+
- Bluetooth®
- CCTV
- Alarm and warning 110dB Siren and strobe
- VoIP communications
- Tracking personnel, vehicles, and assets
- Environmental monitoring
- Ventilation control
- Network monitoring
- Fire detection
- PLC Connection
- Battery buffered 12+ hours

Strata *Wi-Fi Access Points (APs)* have omnidirectional or directional antennae which allow for a 150m range in both directions of high-performance 802.11ax Wifi6 access.



The signal also facilitates strong easily configurable underground Bluetooth® connectivity which enables precise personnel and equipment tracking. Strata's Bluetooth® IP67-rated tracking tags attach to user hard hats and include an integrated button for man-down notifications and SOS alerts.

Plug and Play: Installation and Maintenance Can't Get Simpler

Expensive and detailed service contracts with on-call technicians who need to travel to the site to work on equipment and software issues is a thing of the past. No matter how excellent the technician's response, with the introduction of IoT and customer-centric design allowing for remote software updates and immediate internal workarounds and maintenance, the hassles and downtime associated with service contracts can be eliminated.

At the core is a good network design with easy-to-use-and-understand hardware. CONNECT Fiber is designed to be simple enough to be maintained in-house. Following the initial installation, as the tunnel advances, the system requires continuous extension, and this ongoing maintenance shouldn't require constant site visits from an outside contractor. With training and support from a trusted partner like Strata Worldwide, downtime is mitigated, and maintenance scheduling is better managed which reduces the cost to the operation.

Safety Should Never Be an Afterthought

Most companies that offer tunneling communications networks provide safety equipment and software as an add-on. In these cases, the software and hardware are rarely proprietary and may not be fully integrated into the existing management platform.

"Offering safety as an integrated feature rather than an add-on provides contractors a seamless solution that works from day one with no hassles or complications," Turner pointed out. "It allows for safety inclusions that fit the needs and regulatory requirements of the individual project."



CONNECT Fiber includes a safety package that easily connects CCTV Cameras to the network for live streaming of video surveillance underground. The dome or bullet-style units provide high-resolution night vision monitoring, as well as foot traffic mapping.

The early *Fire Detection System* provides fast and secure alerts, communicating timely and critical information during fire emergencies to ensure safe evacuation or sheltering for staff. *Alarm and Intercom Modules* are emergency response hardware systems that enable broadcast alerts and push-to-talk communication between surface and underground operations. Equipped with two built-in 110dB (A) sounders and high-intensity flashing strobes, when the module is activated, surface operations are immediately notified and vice-versa.

Real-time reading and warning alerts are triggered by the *Environmental Monitoring and Gas Detection systems* when preset thresholds approach emergency levels. These remote monitoring and control mechanisms allow surface operators to manage monitoring systems. Strata offers a suite of sensors and systems to manage any variety of gas, dust, and atmospheric variables required.

Improving Efficiency and Safety Through Better Communication

Running in the control room of each tunnel portal staging point, and anywhere else approved users want to access the information, the Strata SafeSITE™ software is a customizable platform where all stakeholders see the same information for consistent workflows and communication. It collects and compiles critical data, centralizes communication, provides alerts, and generates reports.

The network effortlessly connects the hardware for clear communication and quickly feeds data to the CONNECT™ Fiber Server and Graphical User Interface (GUI). This facilitates communication between underground and surface personnel by enabling the data from the underground devices to be visible and accessible at the surface.

Communications Hardware Designed for Tunneling

Strata's handheld IP67 Radios with the Simultaneous TalkListen™ function provide full duplex communication like a standard telephone conversation and one-to-group



communication. Operating similarly to traditional two-way radios, they work with or without an external headset. Radios can be used for personnel alert/alarm devices and a designated emergency channel can be added.

For redundancy and safety, the network includes strategically placed Strata IP67 VoIP telephones. These wall-mounted units with standard receivers are housed in a rugged and durable shell made from cast aluminum alloy. Featuring a full keypad with memory and a 10-button programmable speed dial, the phone incorporates a noise-cancelling microphone and loud ring tone.

CONNECT™ Fiber Wi-Fi6 emits a strong signal that connects Smartphones, tablets and laptops with almost zero lag or downtime. The standards-compliant system enables password-controlled mobile Wi-Fi calling on standard Smartphones and any IEEE 802.11 device with the correct credentials can be used. It also enables Smartphones to be used for VoIP calling and as push-to-talk radios.

Consistent Uptime = Peace-of-Mind

Tunneling contractors don't just build one tunnel, some projects are extensive and may have different needs for each phase or work section. The CONNECT™ Fiber system is not only able to be modified but also transferred from one project to the next. Once trained, internal resources can set it up, and different software subscription levels can be chosen.

“This is a highly reliable, well-designed, and very rugged system available to the global market,” concluded Turner. “Through several field-tested experiences, tunneling contractors who've used the CONNECT™ Fiber system have helped perfect the design to offer all of the components and services needed to create a robust and truly modular network.”

Contact us to learn more and get an assessment of your project –
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