Proven Trackside
Technology Since

2018

COMPLETE
SIGNALLING
POWER
MONITORING
FOR SAFETY, PERFORMANCE
& EFFICIENCY

CABLE GUARDIAN®

A VIPER INNOVATION

Insulation Monitoring & Fault Location on Signalling Power Systems

Developed in collaboration with Network Rail, **CableGuardian** is an advanced monitoring solution designed to improve the reliability, safety, and efficiency of railway signalling power systems.

It enables real-time condition-based monitoring, reducing the need for periodic manual cable testing and minimising the frequency and duration of service-affecting failures. By continuously assessing insulation resistance, capacitance, voltage, and current, **CableGuardian** provides precise fault detection and asset health insights, allowing railway operators to take proactive maintenance actions before failures occur.

Compliant with key industry standards such as NR/L2/SIGELP/50000 and NR/L2/SIGELP/27725, **CableGuardian** eliminates the need for traditional five-yearly manual cable testing by offering continuous real-time assessment of electrical system integrity. This shift from periodic to real-time monitoring supports the modernisation of maintenance practices, helping railway operators meet increasing demands for reliability, safety, and cost-efficiency. Integrated with Network Rail's Intelligent Infrastructure and RADAR systems, **CableGuardian** provides a seamless solution for asset managers looking to optimise maintenance strategies and extend asset lifespan.

Comprehensive Monitoring & Fault Detection

CableGuardian operates across three key functions—Monitor, Diagnose, and Recover—to ensure comprehensive oversight of the signalling power system.

- **Monitor:** The system continuously collects data on key electrical parameters, such as insulation resistance, capacitance, voltage, and current. Multiple sensor units are installed at Principal Supply Points (PSPs) and Functional Supply Points (FSPs), feeding data to a secure, cloud-hosted analytics system.

- **Diagnose:** Using advanced diagnostics, **CableGuardian** detects faults in real time and precisely identifies their location, down to individual cable sections. By leveraging Spread Spectrum Time Domain Reflectometry (SSTDR) technology, the system can help to locate high or low impedance core to core faults. Unlike traditional monitoring devices that provide a single insulation resistance reading for an entire circuit, **CableGuardian** offers cable section-level monitoring, improving accuracy and reducing unnecessary maintenance.

- **Recover:** Fault data and system health insights are accessible through the **CableGuardian** Web Portal, which provides a user-friendly interface for reviewing real-time and historical trends. The portal integrates with Network Rail's Intelligent Infrastructure, allowing configurable alarm and pre-alarm settings to provide early warnings of degradation or potential failures before they impact operations. Engineers can use these insights to take corrective action long before a fault becomes critical, significantly reducing downtime and improving operational efficiency.

Tailored for your system requirements

To provide tailored solutions based on network complexity and operational needs, **CableGuardian** offers three levels of monitoring in accordance with **NR/L2/SIGELP/27725**:

- **Tier 3 Monitoring:** A single **CableGuardian** unit is installed in the PSP, monitoring all connected feeders and returning an overall insulation resistance (IR) value for the entire system. This provides a broad overview of system health.

- **Tier 2 Monitoring:** The insulation resistance of each feeder is monitored individually from the PSP, allowing faults to be attributed to specific feeders. This level enhances fault detection by isolating the affected area.

- **Tier 1 Monitoring:** Multiple **CableGuardian** units are installed on each feeder, measuring insulation resistance and other key parameters at multiple points along the circuit. This allows the system to locate faults down to individual cable sections between adjacent **CableGuardian** units. Using SSTDR technology, the system identifies low impedance and high impedance core to core faults, enabling faster fault resolution and reducing trackside fault-finding requirements.

By implementing **CableGuardian**, railway operators gain unmatched visibility over their signalling power systems, reducing costly trackside inspections, improving safety for maintenance personnel, and ensuring continuous compliance with industry standards. This proactive approach to asset management enhances network reliability, reduces unplanned disruptions, and supports the long-term sustainability of railway infrastructure.

We can also provide an Asset Condition Assessment; this offers reliable insights into the health of power supply systems, supporting planned maintenance as part of a proactive asset management strategy. For more information about **CableGuardian** Asset Condition Assessments and our full list of service levels, please refer to our Service Guide, which can be found on our webite.

Key benefits:

Improved Safety

CableGuardian enhances safety for rail maintenance personnel and the public by reducing the need for road travel and on-track working, minimising exposure to high-risk environments. By predicting and preventing complex signalling failures before they occur, it eliminates the dangers associated with reactive fault management. Additionally, improved monitoring technology helps mitigate the risk of electric shock during maintenance and operations by identifying touch-potential hazards early, ensuring a safer working environment for railway staff and greater protection for train users.

Signal Failure Reduction

CableGuardian significantly reduces signalling power failures by identifying potential issues months or even years in advance. It detects key precursors to failure, such as cable and equipment degradation, intermittent faults from loose or high-resistance connections, and transformer winding failures. By identifying failure locations and monitoring asset conditions during flood events, the product helps mitigate disruptions, minimising delay per incident.

Proven Trackside Technology Since 2018

Across 1million+ metres of cables monitored, this advanced system has been proven in operation since August 2018, with multiple UK regions already benefitting from the technology and further installations scheduled across the network this year.

Delivering Efficient Asset Renewals

CableGuardian delivers maximum efficiency and sustainability in renewals by enabling a moving to prioritised, spot replacement of assets in SPS systems. The enhanced monitoring data allows teams to intervene well before failure or plan very specific renewals years in advance, affording the engineer the opportunity to plan exact life extension works to the minimum specification, allowing maintenance delivered rolling renewals based on hard evidence.

Reduce Manual Faulting & Periodic Testing

CableGuardian eliminates the need for manual five-yearly cable testing in line with NR/L2/SIGELP/50000, replacing periodic inspections with real-time, condition-based monitoring. By continuously tracking insulation resistance, capacitance, voltage, and current, it provides a comprehensive view of asset health, reducing unnecessary maintenance and improving fault detection. Its advanced technology provides reliable fault location allowing faster repairs and minimising service disruption. This remote solution enhances safety by reducing trackside work and ensures compliance with industry standards while lowering maintenance costs and optimising asset performance.

Improve Train Performance, Avoid Delays

Signalling failures can lead to over 5,000 delay minutes per incident, severely impacting train performance. **CableGuardian** helps prevent high-impact failures caused by cable theft, rodent damage, and trackside project work. It also reduces the risk of intermittent signal loss due to vibration, overload, or ageing infrastructure. By enabling rapid recovery after flood incidents through continuous monitoring of insulation resistance and capacitance, **CableGuardian** ensures trains can return to service as quickly as possible.

Keeping the trains running on time.

CABLE GUARDIAN®
A VIPER INNOVATION

VIPER
INNOVATIONS ®

Get in touch with one of our experts today and learn what
CABLEGUARDIAN could do for you.

www.viperinnovations.com/cableguardian

or contact one of our experts on:
enquiries@viperinnovations.com

www.viperinnovations.com