westermo

# Trackside Networks

## Solutions for Railway and Trackside Applications

# Industrial Data Communications Heritage

**Produced by:**
Westermo Teleindustri AB
**Photo:**
IStockphoto,
BildN, Västerås, Sweden
**Illustrations:**
Visual Information Sweden AB
Eskilstuna, Sweden

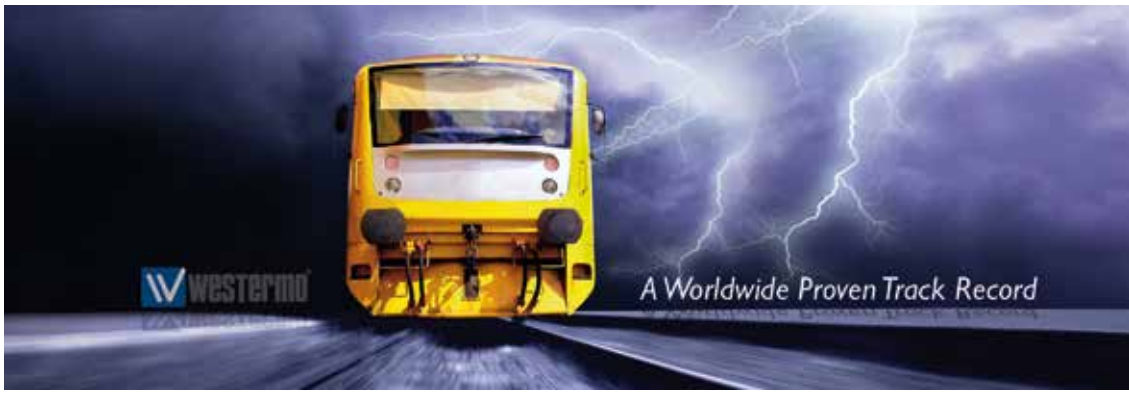


Westermo was established in 1975. The head office is located 150 km (93.2 miles) southwest of Stockholm in Sweden. Over the past three decades Westermo has grown with subsidiaries being established in Sweden, UK, Germany, France, Singapore, North America, Taiwan and sales partners appointed in over 35 countries worldwide.

The first Westermo data communications product was an RS-232 line driver called the KM-1 that allowed data to be transmitted over great distances using twisted pair cables. Today we still sell a product, the MD-12, that is plug compatible with this device.

In the 1990s Westermo created the world's first industrial DIN rail mount telephone modem the TD-22 pioneering remote access solutions for industrial devices like PLCs and HMIs.

In 2008 Westermo was acquired by The Bejier Electronics Corporation based in Malmo Sweden. Westermo now forms part of the Beijer Industrial Data Communications division.



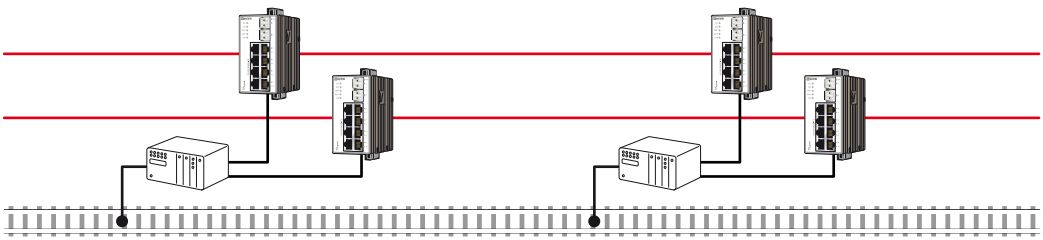

# Westermo – A Worldwide Proven Track Record

Westermo has many years of experience in both data communication technologies and railway applications both trackside and on-board the rolling stock. Our real expertise is in developing products that can function in the harshest environments and meeting the toughest approval specifications. Westermo is familiar with mission critical applications in many industries and has therefore developed products and techniques that meet the many specific needs of the rail industry. The patented Westermo FRNT protocol allows for the fastest ring recovery in Ethernet networks – 20 ms for a ring with 200 switches. Our Wolverine range is developed around a technology that allows the creation of Ethernet networks on old installed copper cables that can stretch for tens of kilometres along the trackside.

In order to be used in the trackside environment Westermo products are tested to the EN-50121-4 Electromagnetic compatibility standard for emission and immunity of the signalling and telecommunications apparatus on railway applications. As well as this Westermo products operate in extreme temperature ranges –40 to +70°C (–40 to 158°F) and are built into robust compact housings making them ideal for panel mounting.

# Solutions for the Trackside Applications

Trackside applications need data communication networks with an extremely high availability. As well as mechanical robustness the products must be resilient, secure and capable of supporting legacy protocols. WeOS, the operating system used in our managed trackside products, has been developed by Westermo to ensure reliability and also provide a future proof solution.

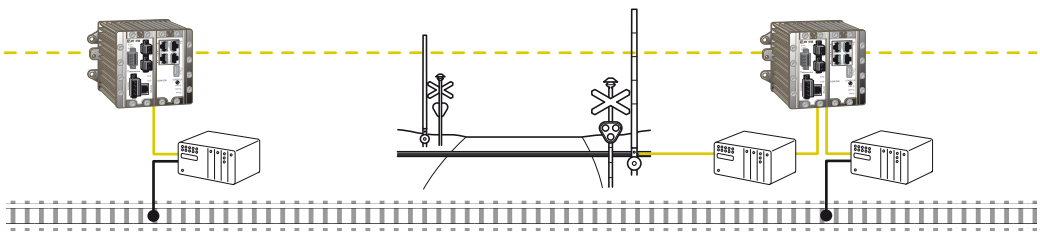


**Resilient MicroLok II interlocking solution**

In WeOS we have a comprehensive Microlok II gateway solution that can handle up to 64 addresses. There is also support for Hot / Standby configuration using heartbeat signal, this provides a resilient channel when controllers are in hot standby.

The inbuilt I/O port can be configured as an alarm output when session timeout occur.

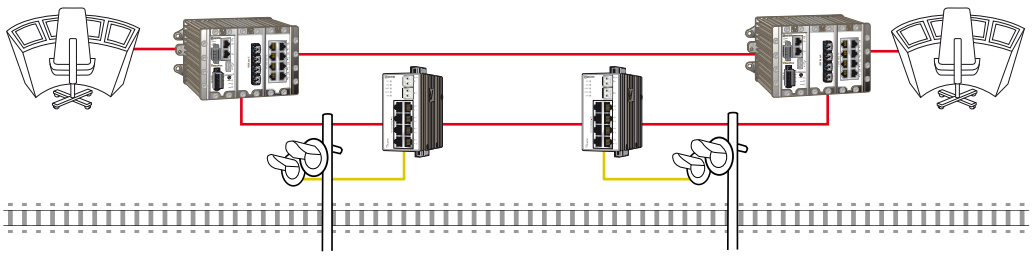
WeOS do not only support the Microlok II protocol, with the layer 3 solutions, you can also use dynamic routing and port based firewall solutions.



**Migration to IP connectivity**

IP technology is becoming the de facto standard for trackside applications, however the barrier to use is often the cost of new cable installation and the replacement of old, but reliable, serial devices. The Westermo Wolverine range of products can allow IP networks to operate over old copper twisted pair cabling allowing networks of many kilometres to carry data at rates sometimes over 15 Mbit/s.

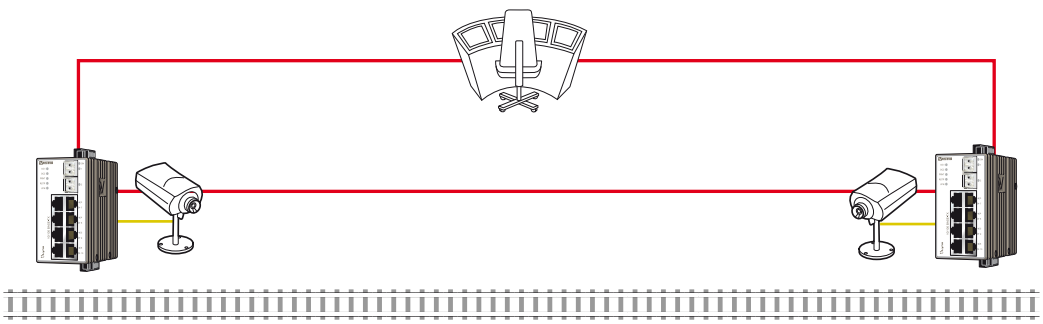
The WeOS operating system also has extensive serial to IP conversion options which allows old protocols to be encapsulated and routed via the IP backbone.



**Ethernet as a replacement for SDH**

In railway signalling, two different migrations take place at the same time. Apart from the migration from legacyIP systems, Ethernet systems now also have the capability to replace large parts of existing SDH systems (Synchronous Digital Hierarchy). In case of an increased density of trackside equipment, no additional SDH nodes are needed since Industrial Ethernet equipment is able to offer the needed availability, using either layer 2 redundancy and/or layer 3 dynamic routing.

Whichever need you have, from simple 25 year-old FSK serial technology up to complex routing across different media, Westermo has it all to support you in offering a complete solution for complex and demanding environments.



**Ensuring network availability with multiple high bandwidth protocols**

Long distance transmission of IP Video over existing backbone systems makes it possible to selectively monitor trackside cameras without draining the systems bandwidth when cameras are not monitored.

In the same way, it is possible to 'broadcast' a single stream over the network and make it available to an unlimited number of viewers, using only a single stream to each network node. With the implementation of IGMP Snooping and redundancy protocols supported in WeOS, Westermo is able to offer an IP CCTV and IP multicasting solution based on any kind of media. Whether it is copper, fibre, or interstation transmission over SDH (Synchronous Digital Hierarchy) backbones, WeOS offers all the protocols needed to build and manage the network solution.

# Westermo Robust

## Connecting Mission Crit

**Different switches for different demands**

Ethernet switches for trackside use have different demands, Lynx is the most compact switch on the market while Redfox offers different combinations of FX or TX solutions. In case IP 65 or M12 connector this is supplied by the Viper family of switches.

**Approvals**

All trackside products are 3:rd party type tested according to EN-50121-4 and IEC62236-46 to withstand emission and immunity of the signaling and telecommunications apparatus on railway applications.

# Network solutions

## tical Infrastructure Systems

**Solutions for legacy applications**

Legacy solution can be solved with verity communication solutions. We offer serial connectivity using PSTN modems, fibre optical modems, GSM, Device Servers, Serial adaptors, Ethernet Extenders or Switches.


**Long distance Ethernet on copper cables**

Westermo Ethernet extender technology based on SHDSL makes it possible to reuse many types of pre-existing copper cables which can lead to considerable financial savings when installing new systems.

## A rugged industrial switch, router and firewall in one box

The RedFox range of industrial layer 3 switches provides enhanced routing functionality, all in a robust, single unit design. The RedFox offers routing, VLAN, IPSec VPN support, DMZ and a powerful firewall in order to segregate networks and protect mission-critical data. With support for Network Address Translation (NAT) and port-forwarding, the RedFox ensures your network is protected from the threats posed by the Internet.

## 19" industrial routing switches

The RFIR (RedFox Industrial Rack) is a high performance layer 3 industrial Ethernet switch designed for high network traffic applications. The RFIR is available in different port configuratuions and runs efficently on AC or DC power. The design is robust and compact which makes it easy to mount into a 19" cabinet and therefore the RFIR range is perfectly suited for use both in control rooms as well as by the track-side, roadside or substation.

## Industrial data modems for the harshest environments

Whether you need to communicate through a PSTN, IDSN line, private wire, leased line, fibre optic cable, or even over GSM/GPRS Westermo have a solution for you. Our wide range of industrial modems is designed for use in such demanding applications as railways, water treatment, substation automation, roads and tunnels. All Westermo modems exceed industrial standards and ensure rugged, reliable communications.

| | |
|---|---|
| **ODW series** | Fibre optic modems |
| **TD-36/TDW-33** | Telephone and leased line modem |
| **GDW-11** | GSM modem |

## Rugged switches for industrial Ethernet

The Lynx range of managed Ethernet switches are designed for simple use in heavy industrial environments, with an integral DIN-rail clip. Powered by WeOS, the Lynx range provides redundancy fibre support, VLAN and IGMP functions. The layer 3 variants also provide a stateful inspection firewall, static and dynamic IP routing and IPsec VPN support for more advanced networks.

## Industrial device server switches

Lynx DSS is an industrial Ethernet switch for managing applications with a combination of IP and serial connections. Providing a single unit solution the Lynx DSS replaces the need for multiple units. Powered by an updated version of the Westermo WeOS operating system, the device delivers enhanced serial to Ethernet connectivity, and support for dual serial networks, modem replacement functionality, and Modbus gateways. Legacy devices can be connected via two serial ports. One of these is configured for RS-232 and the other for either RS-232 or RS-422/485.

## Extend your network far beyond the normal limits of Ethernet

The Wolverine series of industrial Ethernet extenders allow cost-effective Ethernet networks to be created over long distances, at high data rates. The SHDSL technology employed makes it possible to reuse many types of pre-existing cabling which in turn can lead to considerable financial savings. With support for transparent point to point connections, multidrop networks, redundant rings, legacy serial connections and layer 3 routing functions, the Wolverine can meet any demand your application requires.

## Sweden

**Application:**
Banverket the Swedish rail company used the Wolverine line extenders to provide communications on existing copper cable for an ERTMS system.

**Products:**
DDW-225

**Customer:**
Banverket

BANVERKET

## United Kingdom

**Application:**
On the oldest subway system in the world the Westermo Wolverine Ethernet extenders are used to allow old cabling to form part of the control network for a new power distribution system.

**Products:**
DDW-22x

**Customer:**
Transport for London

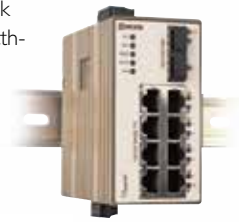
UNDERGROUND

## Italy

**Application:**
A high speed resilient Ethernet network over fibre optic cables used for data gathering from the trackside around Milan.

**Products:**
Lynx

**Customer:**
Ferrovienord



FERROVIENORD


# EN 50121-4 and IEC 62236-4, track side approval

To fully comply with EN50121-4 and IEC 62236-4 a product must be designed to meet a series a demanding standards covering EMC, vibration and power.

Track side installations needs to be more resistant to ESD, EFT, Surge, Radio frequency magnetic field as well as Puls and Power magnetic ield.

The following comparison shows the difference between the test levels.

| | **Generic Industry** | **Track Side** |
|---|---|---|
| ESD | 4kV | 6kV |
| Radio frequency magnetic field | 10V/m | 20V/m |
| EFT (fast transient) | 1 kV class B * | 2 kV class A * |
| Surge Signal L-E | 1 kV | 2 kV |
| Signal L-L | N/A | 2Kv |
| AC Pow.L-E | 2 kV | 2kV |
| AC Pow.L-L | 1kV | 2kV |
| DC Pow.L-E | 0.5 kV | 2 kV |
| DC Pow.L-L | 0.5 kV | 2kV |
| Power magnetic field | 30 A/m | 300 A/m |
| Puls magnetic field | N/A | 300 A/m |

**Class A do not accept restart of the unit or loss of package or restart, class B do not accept restart of the product but accept loss of data.*

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*For complete contact information, please visit our website at www.westermo.com/contact or scan the QR code.*


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