westermo

Transportation

Solutions for Trackside Applications

35 years at the leading edge of industrial data communications

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Westermo provides a full range of data communications solutions for demanding applications in the transport, water and energy markets among others. For the past 35 years, we have been at the forefront of technological development and often pushed the limits of what is technically possible.

The staff at Westermo offers the highest possible service to help customers to select, configure and install the best solution for their specific needs. Our knowledge goes far beyond our own product range, regardless of whether the installation is in a substation, water treatment plant or alongside a railway.

In order to provide the best possible support, we have local presence in more than 35 countries through our authorized distributors and own offices.

Since 2008 Westermo has been part of the Beijer Electronics Group, a company with unique knowledge of the HMI and industrial automation business.

Do you want to learn more?

Do you want to know more about the entire Westermo product range? Order the Product Guide or visit our website: www.westermo.com

On our RedFox website you will find the latest news about our most advanced routing switch. Download data sheets, user guides, watch video tutorials on FRNT, VLAN, IGMP and much more at:

www.redfoxindustrial.com

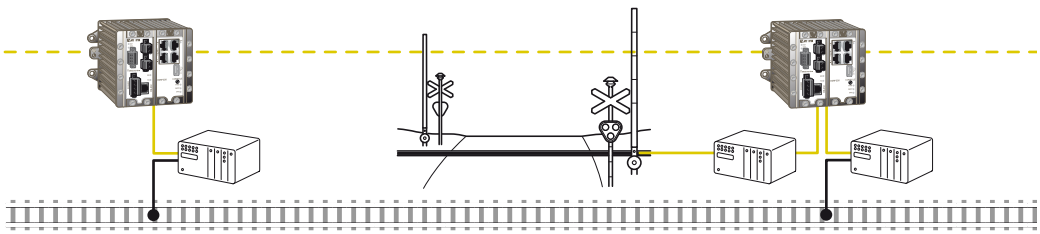
Westermo – A Worldwide Proven Track Record

Westermo have 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

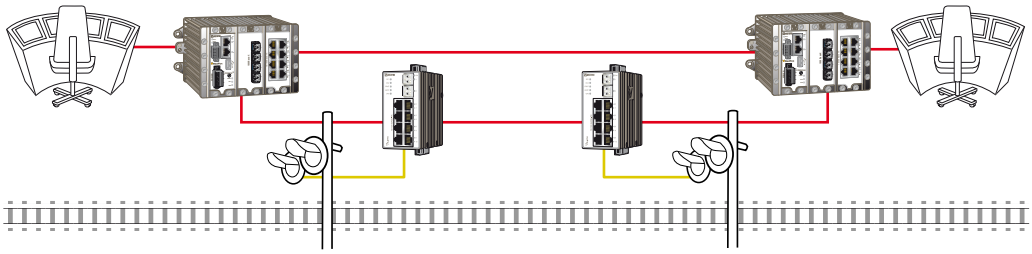
Trackside applications need data communication networks with an extremely high availability. As well as mechanical robustness the products must be resilient, secure and capable of supporting legacy protocols. The Westermo WeOS operating system, that drives our Redfox, Lynx, Wolverine and Viper families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



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.

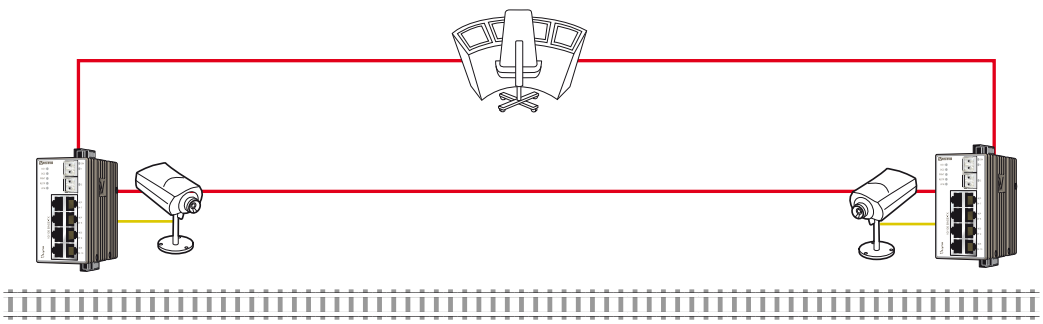
The WeOS operating system also has extensive serial to IP conversion options which allows old protocols to be encapsulated and routed via the IP backbone.



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.

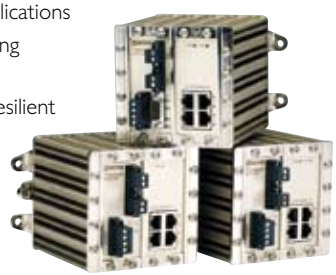
Wolverine Ethernet Extender

The Wolverine family of Ethernet extenders allows effective Ethernet networks to be created over long distances (up to 15 km) at data rates up to 15.3 Mbit/s. The SHDSL technology makes it possible to reuse many types of pre-existing copper cables which can lead to considerable financial savings. Dependent on cable characteristics, distances up to 15 km (9.3 mi) can be achieved. The Wolverine is powered by the WeOS operating system allowing complex networking functions to be easily configured. For simple applications, no configuration is required making the unit ideal for rapid installation.

EN 61000-6-2 Industrial Immunity · EN 61000-6-3 Residential Emission · 50121-4 Railway Trackside

Wolverine

- Save time and money reusing old cables
- Designed for use in harsh industrial applications
- Robust for long service life
- Secure and resilient networking

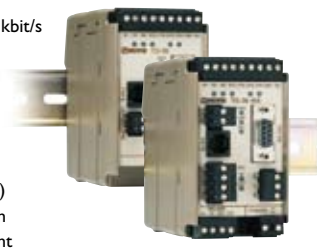


TD-36/TD-36 485 – Telephone modem

The TD-36/TD-36 485 is designed to function reliably within industrial environments and in areas of high level interference. The TD-36 has an RS-232 interface and the TD-36 485 has an RS-232 and RS-422/485 interface supporting terminal data rates up to 115 kbit/s. The TD-36/TD-36 485 are V.34 modems meaning that they can support bidirectional data rates of up to 33.6 kbit/s on the PSTN or leased line side. Fast connect ensures that leased lines can re-establish connections in the range of 5 seconds.

50121-4 Railway Trackside · EN 61000-6-2 Industrial Immunity · EN 61000-6-3 Residential Emission · EN 61000-6-4 Industrial Emission

- Extended temperature range –25°C to +70°C (–13°F to +158°F)
- Data rate up to 33.6 kbit/s
- Terminal rate up to 115.2 kbit/s
- V.23 FDX/HDX with multidrop
- Transient protection
- Tri-galvanic isolation (Interface/line/power)
- Remote configuration
- EN-50121-4 compliant



Compact Ethernet Switch

The Lynx family cosists of layer 2 and 3 industrial Ethernet switches, powered by the Westermo WeOS network operating system. Lynx is the most compact switch on the market and has the lowest power requirements in this class of switch. Lynx has 8 10/100 Mbit/s ports in addition to 2 ports which can be fitted with Gbit or 100 Mbit SFP transceivers.

Part 15 · Industrial IT enabled · EN 61000-6-2 Industrial Immunity · EN 55022 ITE Emission · EN 61000-6-4 Industrial Emission · 50121-4 Railway Trackside

Lynx

- Compact Industrial Ethernet switch design
- Designed for use in industrial applications
- Robust for long service life
- Unique future proof industrial networking solutions

Device Server Switch

The Lynx family cosists of layer 2 and 3 industrial Ethernet switches, powered by the Westermo WeOS network operating system. Lynx is the most compact switch on the market and has the lowest power requirements in this class of switch. Lynx has 8 10/100 Mbit/s ports in addition to 2 ports which can be fitted with Gbit or 100 Mbit SFP transceivers.

Part 15 · Industrial IT enabled · EN 61000-6-2 Industrial Immunity · EN 55022 ITE Emission · EN 61000-6-4 Industrial Emission · 50121-4 Railway Trackside

Lynx

- Compact Device Server Switch for legacy application
- Designed for use in industrial applications
- Robust for long service life
- Unique future proof industrial networking solutions

Industrial Routing Switch

RedFox is designed for industrial application with many functions designed for easy use. The high bandwidth design allows for up to 8 Gbit ports as well as having other ports that can deliver 10/100 Mbit. The RedFox is powered by WeOS (Westermo Operating System) which is our cross platform solution providing strong future proofing and ease of use.

Part 15 · Industrial IT enabled · 50121-4 Railway Trackside · EN 61000-6-2 Industrial Immunity · EN 61000-6-4 Industrial Emission

RedFox

- High performance and configurable
- Designed for use in harsh industrial applications
- Robust for long service life
- Unique future proof industrial networking solutions

Fibre Optic Modems

The ODW series is designed for point-to-point or redundant ring connections between RS-422/485 networks or devices. The ODW is designed for harsh industrial usage as well as road or railway installations meeting industrial level EMC specifications and having a wide operating temperature range.

Part 15 · Industrial IT enabled · EN 61000-6-2 Industrial Immunity · EN 61000-6-3 Residential Emission

- Converter serial interface – optical fibre
- Point-to-point or ring communication via fibre optical network
- Serial interface, synchronous or asynchronous mode
- Designed for harsh environments

Cost effective improved rail safety

BANVERKET

BOMBARDIER

Wolverine

The European Rail Traffic Management System (ERTMS) is a major industrial project developed by a number of major manufacturers in close cooperation with the European Union, railway stakeholders and the GSM-R industry.

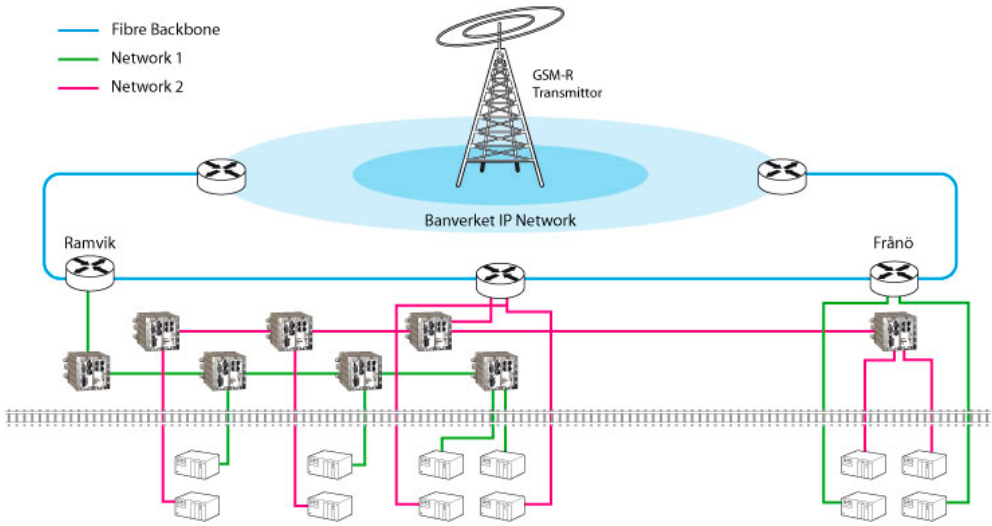
ERTMS has two basic components:

ETCS, the European Train Control System, is an automatic train protection system (ATP) to replace the existing national ATP-systems;

GSM-R, a radio system for providing voice and data communication between the track and the train, based on standard GSM using frequencies specifically reserved for rail application with certain specific and advanced functions.

ERTMS aims at replacing the different national train control and command systems in Europe. The deployment of ERTMS will enable the creation of a seamless European railway system and increase European railway's competitiveness.

ERTMS is specified at different levels, and the definition of the level depends on how the route is equipped and the way in which information is transmitted to the train. At Ådalsbanan in Sweden, Banverket together with Bombardier provided a section of railway with ERTMS Level 2. An application that is unique as it is the first level 2 installation ever to include equipment such as railway crossing barriers. In an ERTMS Level 2 system the engine driver can receive basic track and rail information via the GSM –R radio network. This driver information is sent from Banverket's control centre via an IP network, which is connected to control and monitoring devices along the railway.



All devices along the trackside are connected to the backbone fibre network via pre-existing coppercables and DDW-225. The wireless communication between the control central and the train are provided via GSM-R.

The equipment along the trackside has been linked to Banverket's IP network using pre-existing twisted pair copper cables and the Westermo DDW-225. The DDW225 uses SHDSL technology that allows data to be sent at a maximum speed of up to 5.7 Mbit/s at shorter distances and up to 15 km (9.3 mi) at lower speeds. In this installation however, network resilience and reliability were prioritised rather than bandwidth. The best balance between range and signal to noise ratio was achieved at 2.3 Mbit/s over distances from 2 to 7 km (1.2 to 4.3 mi).

The requirements for high reliability called for a redundant network solution, which is why the National Rail Administration created two individual networks connected to duplicated control equipment. The different networks are completely separate and connected to the backbone network by separate routers. Even if one network should fail full access to the entire route can be achieved through the redundant network. In addition, the DDW-225 supports a number of features that allow configuration for optimal control. VLAN, QoS, SNMP, SSH, and extended diagnostics were part of the requirements from the Rail Administration.

The DDW-225 is a robust Ethernet Extender with EN 50121-4-EMC approval for apparatus in trackside applications. The unit is designed for harsh environments and can operate in an extended temperature range –40°C to +70°C (–40°F to 158°F). The DDW-225 has contributed to significant cost savings as new fibre installation could be avoided. The DDW-225 is also future-proofed as it can be upgraded to support future networking standards as and when they are required.

Enginedriver Per Johansson get all necessary information on the screen to the right.

Improved railway safety for man and animal

The wild animals do not regard trains on the railway tracks as their natural enemies; they get used to the noise produced by these machines and accept them as part of their own habitat. Furthermore, the speeds that are developed today by trains, frequently around 160 – 200 km (99.4 – 124.2 mi) per hour, exceed the speeds that these animals have become familiar with during their natural existence in forests, on fields or meadows. The time to react, to escape is too short for an animal to give it a chance to survive an encounter with a train. Such collisions are not only fatal for animals but also very dangerous for trains. Many methods were used to solve this problem such as separation grids or aboveground passageways for animals but all these solutions resulted in liquidation of natural animal trails leading to environment degradation.

After numerous consultations with ecologists, scientists and experts in the field of wild animal behaviour, NEEL Ltd. in cooperation with Bombardier Transportation (ZWUS) Polska Sp. z o.o. and Forestry Research Institute has developed a state-of-the-art solution to the problem. This unique worldwide animal deterring system uses Westermo TD-29 modems and EDW-100 adapters as a communication basis. It is designed to prevent such game as the roe-deer, the red-deer, the elk, the bison, the wild boar or the fox from migrating through railway tracks directly at the time of a passing train. This system limits to the minimum the loss in the wild animal population caused by collisions with fast moving trains and yet allows these animals to pass across the tracks when there is no danger of such collisions.

UOZ-1 devices operate through sound signals, which deter animals from coming near the tracks. The signals are emitted by the UOZ-1 device for a certain time, directly before a train approaches the site. The animals perceive the sounds as a real warning and react as they do when coming across a natural predator or another danger that they are genetically programmed to avoid.

The essential information concerning the status of selected elements of the structure are transmitted through Ethernet to the controller, located at the station, in the control-diagnostic module MDS-UOZ. This module contains Westermo EDW-100 industrial Ethernet adapter which converts data to RS-485 standard. After analyzing the data obtained from the station and determine the location and speed of approaching train, station PLC sends results to the container PLC via TD-29 modem from Westermo. Data transmission takes place between all attached devices (multipoint topology) with a speed of 2400 bit/s.

Westermo Quality and Delivery

Westermo design and manufacture robust data communication devices for harsh environments. We supply products that provide the communication infrastructure, derived from proven commercial technology, for control and monitoring systems that are used in mission critical solutions where commercial grade products are not sufficiently resilient.

To ensure the highest quality products, Westermo has a state of the art industrial electronics manufacturing facility in Sweden. To maximise the reliability of the product testing is carried out at many stages of the manufacturing process.

- Manufacturing to IPC-A-610 under ISO9001-2008 QMS
- Solder Paste Inspection and Automated Optical Inspection
- X-ray examination and PCB testing
- Functional testing
- Burn-in testing to EN-50155

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