Transportation

Ethernet solutions for rail vehicles

Robust Industrial Data Communications
– Made Easy

35 years at the leading edge of industrial data communications

Produced by:
Westermo Teleindustri AB
Photo:
Westermo
IStockphoto,

Specifications are subject to change without notice due to continuous product development and improvement.

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.

Westermo – A Worldwide Proven Track Record

Westermo have many years experience in both data communication technologies and railway applications both trackside and onboard 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. Rail vehicles present one of the toughest environments for any electronic device so when Ethernet switches are used as part of a train control system they must be designed to the highest standards.

EN 50155 is a special onboard standard for electronic equipment that encompasses not just EMC requirements but also shock, vibration extended temperature range and humidity. The Westermo Viper and RedFox series meets this standard fully and have been designed with the highest MTBF figures to ensure long term field operation.

Intelligent network solutions for on-board applications

There are a number of factors that make networks on board trains differ from conventional networks. Rail cars are designed to be combined with any number of other cars and locomotives and to be linked together regardless of the direction the car is turned.

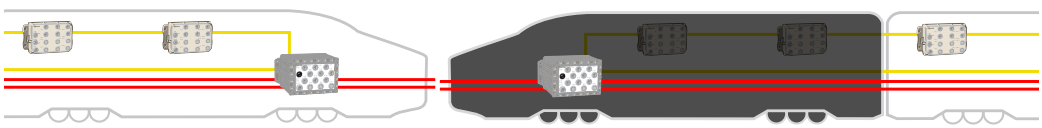
This puts high demands on the intelligence of the network which often results in complicated and unstable solutions were maintenance requires high network awareness.

Westermo has through its many years in the data communications industry developed a unique network concept to address many of the common problems faced in train environments.

Our developers have built in the intelligence to WeOS (Westermo Operating System) so that you do not need to worry about complex network technology. To extend the network or install a replacement product is done plug-and-play and as far as configuration is needed, this is done through a simple web-based interface or a preconfigured USB-plug. You get an intelligent and fully flexible network that is easy to maintain and control, is future-proof and scalable indefinitely.

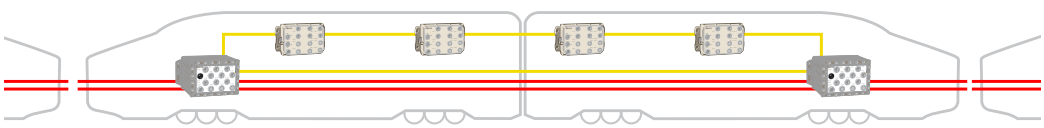
Resilient train backbone communication

The RedFox train switch is designed to aggregate a dual backbone, regardless of the state of the train. In case of power failure in one carriage an integral dual bypass relay closes to ensure that communication is maintained along the length of the train. All of the Westermo train products feature the 150 m extended Ethernet standard on the copper connections giving extra insurance that the Ethernet signal is strong enough to bridge the failed network segments.



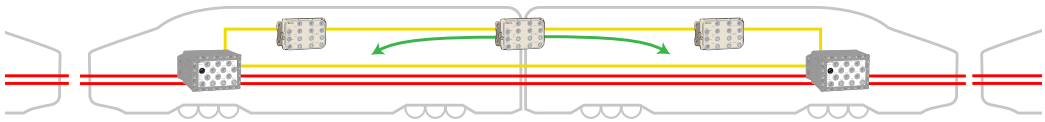
Carriage scalability and flexibility

WeOS allows you to create an intelligent network where you can change the number or position of cars without affecting the network. The network topology is automatically updated enabling endless scalability and mobility in the train network.



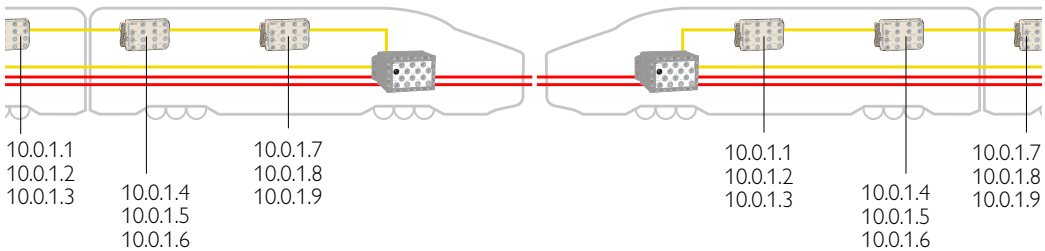
Control of network bandwidth

WeOS is a multilayer operating system which allows maximum throughput while maintaining absolute stability. Data traffic can be load balanced to achieve optimal resource utilization and avoid network overload.
The intelligent network will automatically handle increased traffic from, for example, newly installed cameras or video streams, without risking the stability of the network.



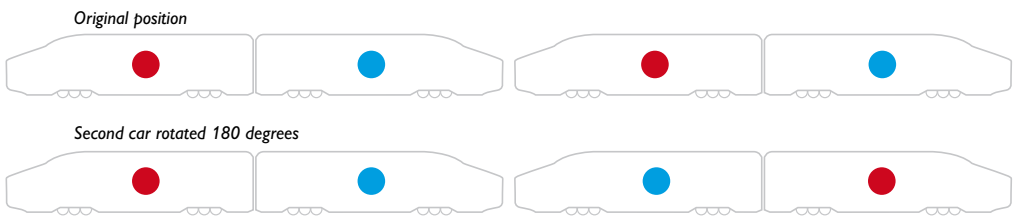
Simple to install and maintain

WeOS makes it easy to create, install and maintain a train network. Equipment which is connected to the network can be assigned identical IP addresses in each carriage, which simplifies the overall IP plan as well as maintenance and installation of new or replacement devices.



Unique network solutions within trains

In all other network environments it is highly unlikely a section of network will move, however with train carriages this can happen. Undesirable phenomena may occur if a railway carriage is rotated 180 degrees from its original position. WeOS detects and compensates for such changes in the network without any manual re-configuration.



Witness Extre
for On-boarc

ABLE TO TRAVEL LIGHT

With an ambient temperature range of -40° to 70°C, there is no need for extra 'garment' when installing this unit.

HOTLINE INTO PROCESS CONTROL

A serial console port allows you to talk to the 'engine' room without interfering with Ethernet traffic.

CRAWLING IN CONFINED SPACES?

Our engineers left no stone unturned in the search for a space optimized design. They succeeded without compromising the distance between the connectors, resulting in one of the most compact and energy efficient designs on the market.

GET READY FOR A BUMPY RIDE!

Depending on the vehicle, even a 'straight' track might not feel smooth. That's why the design is 10g shock and vibration resistant.

eme Evolution

d Environments

AN EVOLVED SKELETON

Since the connector threading is integrated in the housing, it removes the need for separate connector chassis parts, which in turn decreases the risk of loose parts.

Viper

Scale 1:1

WHAT'S THIS BUTTON FOR?

Our experience has made us aware of issues with re-configuration in the field. This is why we developed a configuration backup on a IP65 USB-stick in case of configuration error or replacement.

IT'S ALIVE!

Even though the unit is fully IP65 rated, the unit actually 'breathes' through a Gore-Tex membrane to prevent condensation built up by climatic day/night cycling.

Ethernet on trains

Ethernet has been proven in many industries to be a very effective technology for providing data communications backbones. Ethernet switches featuring a range of networking protocols are now being used to build these networks on trains, allowing a state of the art TCS (train control system) to manage every aspect of the train operation.

The onboard rail environment is one of the toughest imaginable for any electronic devices. An Ethernet switch which is going to be used in a network on a train has to exceed the tough EN50155 standard which covers a wide range of environmental requirements and ensures that equipment can survive the rigours of operation on a train.

Robust EN 50155 Ethernet switches

The Viper is a rugged Ethernet switch designed for applications with severe operating conditions and extreme environments. With an ultra robust design, sealed to IP65 and vibration resistant to military standards these units are ideal for situations where mechanical stress, moisture, condensation, dirt or continuous vibrations could adversely affect the function of standard Ethernet switches.
Fully approved for onboard rolling stock, these units can be deployed in all kinds of rolling stock.

Viper WeOS

Viper-012	Unmanaged 12-port switch
Viper-112	Managed 12-port switch
Viper-212	Managed 12-port routing switch
Viper-008	Unmanaged 8-port switch
Viper-408	Managed 8-port switch
USB-M12	EN 50155 configuration backup device

EN 50155 PoE routing switches

The Viper-x12-P8 is a 12 port power over Ethernet switch designed to meet the full requirements of the rail vehicle market. The Viper is capable of delivering up to 66 W of power across 8 of the ports, derived from the wide operating DC voltage of the unit. The Westermo WeOS operating system provides an extensive suite of IP networking standards allowing resilient and flexible networks to be created, meeting the needs of the rail market.

Viper-112-P8 Managed 12-port switch with PoE
Viper-212-P8 Managed 12-port routing switch with PoE

Viper WeOS

Managed EN 50155 backbone routing switch

The RFR-12FB has been specially designed to allow the creation of a fault tolerant Ethernet backbone structure in trains. The dual bypass relay ensures that aggregated links between carriages are maintained, even if one carriage has a power failure. The 12 100 Mbit/s Ethernet ports support the extended specification 185 m standard so even if several carriages are bypassed, communication is maintained. The Westermo WeOS operating system provides an extensive suite of IP networking standards allowing resilient and flexible networks to be created, meeting the needs of the rail market.

RFR-12-FB 12 port Train Switch with dual bypass relay

RedFox WeOS

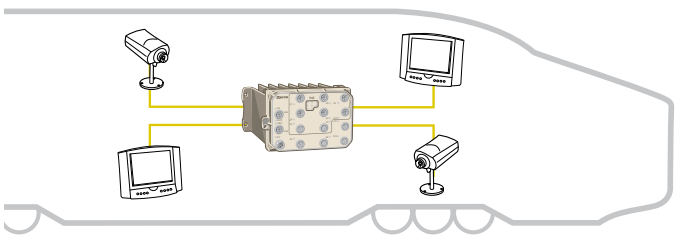
Made Easy PoE solution for on-board infotainment system

Today's rail passengers have high demands on travel comfort during their journey, which is why many train operators choose to install amenities such as video, audio, Wi-fi and other things that contribute to increased comfort on board.

The Westermo IP train concept delivers a complete Ethernet switch and routing solution providing a robust network infrastructure for PIS (Passenger Information System) and infotainment systems on-board trains. All products are designed and manufactured to exceed the EN50155 standard and to ensure extended service life and ultra-reliable operation.

Newag, one of Poland's largest companies in production, modernization and repair of complete train sets chose the Viper series from Westermo due to the switches' rugged features and the Made Easy management in one of their latest refurbishment projects.

The project included 100 Viper PoE switches to create the on-board communications network in a number of rail coaches. Newag could achieve a straightforward robust system with simple management where further costs could be kept down as a PoE solution requires fewer cables. Secure, durable and made easy – The Westermo IP train.



Viper

- Compact rail-approved PoE Ethernet switch solution
- Externally tested and verified to EN50155
- Designed for long life and extreme operational environments
- Design and production testing to match requirements for train control

System integrator:

newag

Westermo supplier:

teknisha

EN 50155 – Rolling Stock Standard

To fully comply with EN50155 a product must be designed to meet a series a demanding standards covering EMC, vibration and power.

In addition to this the manufacturing facility must ensure 24 hour temperature cycle testing of **every** unit. Westermo is uniquely positioned for this with our own state of the art production facility in Sweden.

Complete scope including Shock, vibration, temperature and EMC

- 85°C (185°F) dry heat compliant according EN50155
- Ambient temperature –40°C (–40°F) to +70°C (158°F)
- Vibration Resistance 10 g according IEC 61373 Cat. 1 Class B
- 5 kV fast transient immunity (compliant to IEC 61000-4-4)
- 8.4 kV surge resistant (compliant to EN50155, IEC61000-6-4 and EN50121-4)
- 1.5 kV RMS isolation (compliant to EN50124-1)
- 300 A/m power frequency magnetic field immunity (compliant to EN/IEC61000-4-8)
- Low Conducted Emission (with >14 dB margin to EN 50121-3-2)

EN50155 Power supply requirements

- Power hold up 10 ms
- 24 V, 48 V, 72 V, 96 V and 110 V DC are the nominal voltages
- Supply over voltage 40% over nominal

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