Westermo

Transportation
Ethernet solutions for rail vehicles

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 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.
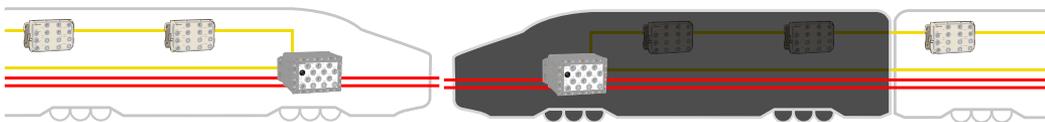

Carriage scalability and flexibility

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.
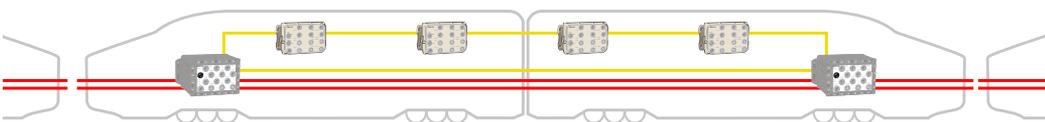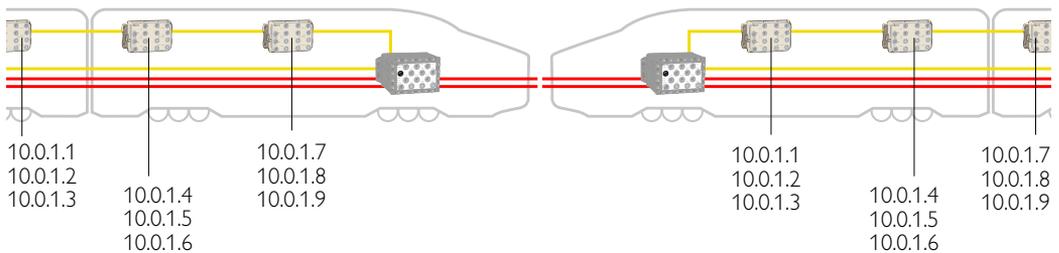
Control of network bandwidth

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.
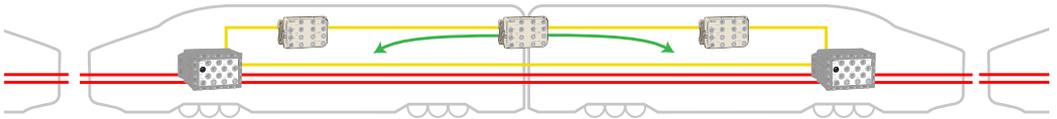

Simple to install and maintain

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.

10.0.1.1
10.0.1.2
10.0.1.3

10.0.1.4
10.0.1.5
10.0.1.6

10.0.1.7
10.0.1.8
10.0.1.9

10.0.1.1
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10.0.1.4
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10.0.1.6

10.0.1.7
10.0.1.8
10.0.1.9

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.

Original position

Second car rotated 180 degrees
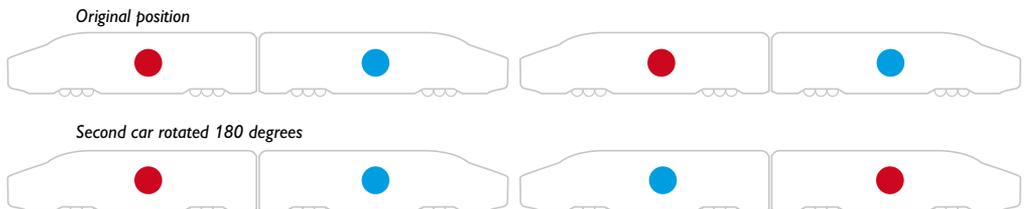
ABLE TO TRAVEL LIGHT

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
Environments
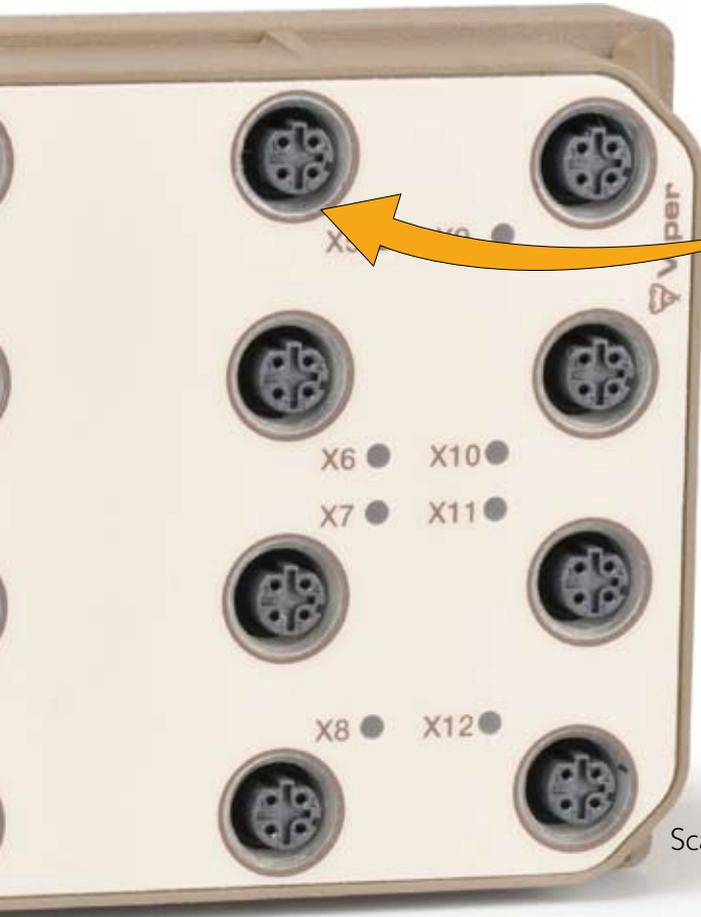
AN EVOLVED SKELETON

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.

X6 ●   X10 ●
X7 ●   X11 ●

X8 ●   X12 ●

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.

A product range to meet every demand

Westermo provides a full range of data communication solutions for such demanding applications as railways, aeronautics, defence, water treatment, substation automation, roads and tunnels. The staff at Westermo can provide the highest levels of service and technical support to help our customers to choose, configure and install the best solution for each specific application requirement. Our knowledge goes far beyond our own product range; we have a unique competence regarding your environment whether it is on a train, in an aeroplane, on the seabed or in a substation. To ensure a close relationship with the customer, Westermo has a local presence in more than 35 countries. The Westermo product line includes more than one thousand different types and versions of our modems, switches, routers, time servers and converters.

Managed and unmanaged ultra slim M12 switch

The 8-port Viper was the Westermo first generation vehicle switch with real-time properties for critical applications. The IP 65 sealed metal case and rugged M12 front connectors makes it robust and allows for the surrounding air temperature to be between –40 to +70°C (–40°F to +158°F). There are no sensitive or fragile components, hardening the product against shock and vibration making these units suitable for rolling stock usage. The power supply operates over a wide input range from 24 to 110 VDC.

Viper

- **Solutions to fit different applications**
  - Managed and unmanaged versions
- **Designed for extreme environments**
  - MTBF- 800,000 hours
- **Externally tested** and fully verified to EN50155
  - Delta Labs reports
- **Designed for tight spaces**
  - Ultra thin design
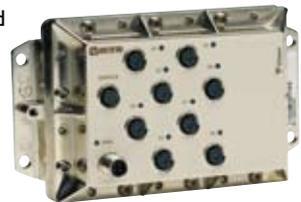
WeOS powered Robust 12-port Ethernet M12 switch

The Viper-12 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 trains, trams, busses, mining trucks, army vehicles and drilling rigs.

CE FC Part 15

EN 61000-6-2
Industrial Immunity

EN 61000-6-4
Residential Emission

EN 50155
On Board Rail

EN 50121-4
Railway Trackside

Viper

- One model for worldwide deployment
  - single unit 24–110 VDC +/- 40% to EN50155
- Designed for extreme environments
  - MTBF 900,000 hrs
- Externally tested and fully verified to EN50155
  - Delta Labs reports
- Comprehensive management features
  - WeOS™ operating system

Train Switch with dual by-pass relay

The RedFox-R12 is a rugged Ethernet switch designed for applications with severe operating conditions and enhanced resilience demands. With an ultra robust design, vibration resistant to military standards and a dual failsafe bypass relay 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 trains, trams, busses, mining trucks, army vehicles and drilling rigs.

CE **EN 50155**
On Board Rail

RedFox

- One model for worldwide deployment
  - single unit 24–110 VDC +/- 40% to EN50155
- Resilience for extreme environments
  - Dual bypass relay to mitigate powerless car scenario
- Externally tested and fully verified to EN50155
  - Delta Labs reports
- Comprehensive management features
  - WeOS™ operating system

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Locomotive propulsion and control network

Westermo has supplied the ultra robust M12 switch platform, Viper, to be used in a electric locomotives ordered by the Chinese Ministry of Railways. The project scope is for more than 500 locomotives into which 2500 Viper switches will be installed. The first locomotive was completed in December 2008 and the project is estimated to be completed by August 2012.

The Viper series fulfilled the customer's demands for a robust switch that could cope with continual engine vibration and surge levels of up to 8.4 kV. The easy wall mount and the slim design of the housing (W 175 × H 100 × D 50 mm) were other advantages that made the customer choose the Viper. Most importantly the Viper meets the EN 50155 standard for rolling stock applications.
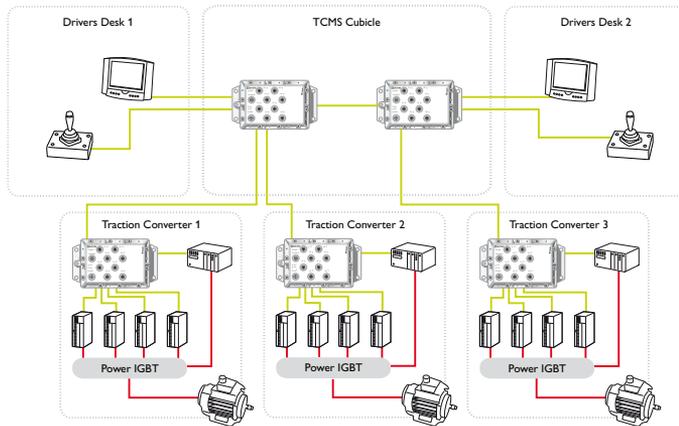
Ultra Slim M12 Switch

The Viper-series is a family of three 8 port switches with real-time properties for critical applications. The IP 65 sealed metal case and rugged M12 front connectors makes it robust and allows for the surrounding air temperature to be between −40 to +70°C (−40°F to +158°F).

- 10/100BaseT rugged M12 connectors
- <20 ms FRNT ring redundancy on large networks
- SNMP, VLAN, QoS, IGMP Snooping, HoL, STP/RSTP
- Made easy configuration and comprehensive diagnostic
- EN 50155 approved for rolling stock
- Extended temperature range (−40°C to +70°C), (−40°F to +158°F)
- 24 to 110 VDC power input
- MTBF >800 000 hours
- IP 65 robust ultra slim metal housing

EN 501 55 – 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

H E A D   O F F I C E

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