Train Networks

Robust and Resilient Ethernet Solutions

Robust Industrial Data Communications
– Made Easy

Swedish engineering excellence

Westermo provides a full range of data communications solutions for demanding applications in industries that include transport, water and energy markets. Since 1975 we have been at the forefront of technological development and continue to push the limits of what is technically possible.

Westermo offers the highest levels of service to help customers to select, configure and install the right solution for their needs. Our experience and expertise goes far beyond our own product range, so that regardless of whether your installation is in a substation, water treatment plant or alongside a railway, we understand the specific demands and are able to provide the right advice.

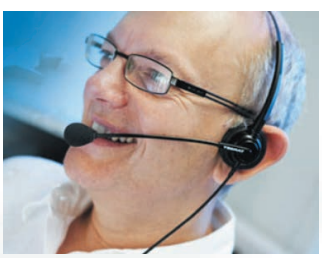
To provide the best support globally, we have local presence through our authorised distributors and Westermo offices in more than 35 countries worldwide.

Produced by:
Westermo Teleindustri AB
Eskilstuna, Sweden

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

Made in Sweden

To ensure the highest quality, all Westermo products are manufactured in our own state of the art industrial electronics manufacturing facility in Sweden.

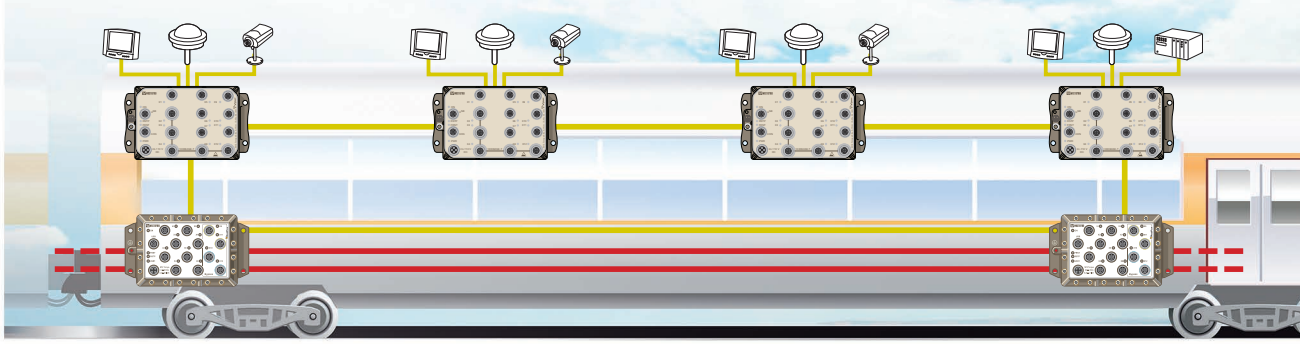


Reliable and versatile train networks

The use of IP technology has become the standard, over the last few years, for creating the data communication backbone used by the Train Control Management Systems (TCMS), Passenger Information Systems (PIS) and Infotainment Systems on trains. Robust Ethernet switches featuring a range of IP networking protocols are being used to build these networks which now are absolutely critical to the operation of the train.

As more and more different types of equipment are connected to these networks the need for more ports and capacity on the switches arises. More equipment also means that more cables need to be installed, both power and data. PoE (Power over Ethernet) technology is the ideal solution to this issue where end devices can be powered through the network cable resulting in significant cost and space savings.

Westermo provides an extensive range of network devices that can be used to create reliable solutions for many different applications on board trains.



Intelligent communications for Train Networks

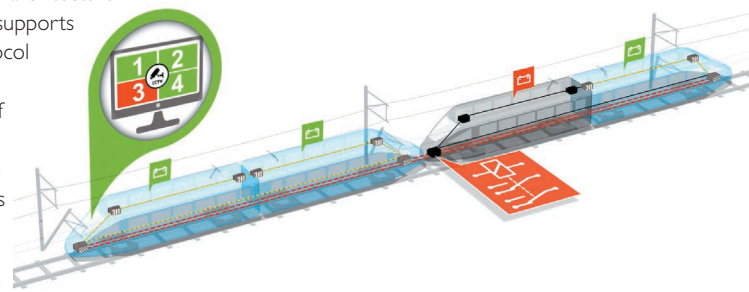
There are a number of factors that set train networks apart from traditional networks For instance, train networks have to deal with a dynamically changing topology, as rail cars are connected/disconnected to the train. It also has to ensure high uptime, by coping with a number of failure scenarios. Network security is another crucial aspect, as threats are intensifying.

Consequently, demands on the intelligence of the network are constantly increasing. Westermo has, through its many years in the data communications industry in general and in the train networks business in particular, developed a unique know-how about demands and solutions for the train networks market.

Westermo engineers have built in the required intelligence into WeOS (Westermo Operating System), a very well proven software which combines extreme robustness with ease of use, by hiding complex solutions behind intuitive user interfaces. With WeOS you get an intelligent, future proof and scalable solution.

Resilient train backbone

The RedFox Ethernet Train Backbone Node (ETBN) is designed to support an aggregated dual backbone, with a dual bypass relay to mitigate a failure on either auxiliary power or other error. It is designed for an architecture in line with IEC61375-2-5 and supports Train Topology Discovery Protocol (TTDP) to ensure automatic IP address configuration in case of multiple consist trains. With wirespeed routing power it can route traffic of multiple services over the backbone.



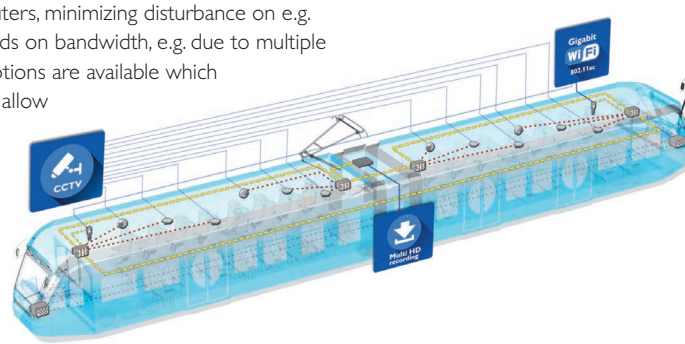
Power over Ethernet

Power over Ethernet (PoE) brings a multitude of benefits for train builders, such as faster installation, lower cost of material, lower weight and less required installation space. With the increasing amount of end devices suitable for PoE supply, e.g. CCTV cameras, the demand for PoE based solutions for train networks is growing steadily.

The Westermo PoE solution includes PoE+ capacity for high power devices and 10 ms hold-up on outgoing power. High-level isolation prevents end device problems from propagating into the switch and the network. Some models offer ports combining PoE with Gpbs capacity, ideal for e.g. WLAN access point connectivity.

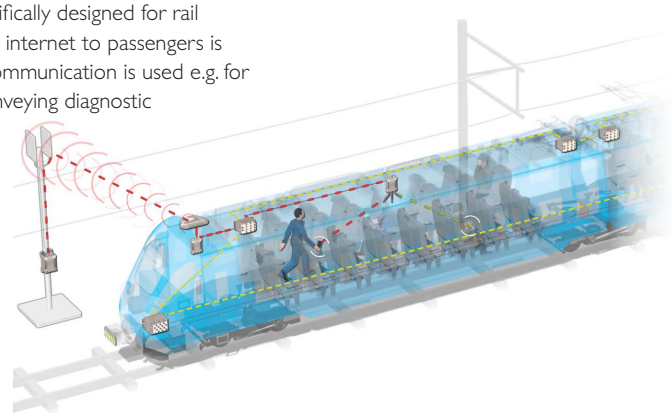
Intelligent consist network

WeOS provides ultra fast failover mechanisms to deal with failures within the consist ring or with redundant routers, minimizing disturbance on e.g. multicast video traffic. For high demands on bandwidth, e.g. due to multiple high definition video streams, Gbps options are available which not only enable a gigabit ring, but also allow connections of high bandwidth end devices, like network video recorders or WiFi access points. By isolating consist networks in separate subnets, it is possible to use the same IP plan in all consists, in order to facilitate installation and maintenance.



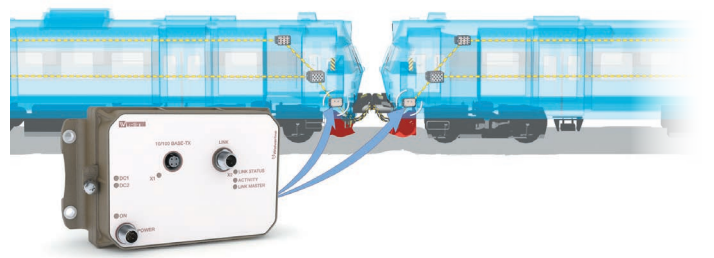
WLAN applications

The Westermo WLAN radios are specifically designed for rail applications. Offering high performance internet to passengers is an obvious example. Train to ground communication is used e.g. for off-loading of CCTV recordings, for conveying diagnostic data and for uplinking to the internet. Interconnect between rail cars is used as an alternative to rebuilding train couplers in refurbishment projects.



High bandwidth Ethernet over legacy cabling

Westermo has developed a gateway which is able to propagate high bandwidth Ethernet over legacy, two wire cabling. The communication is extremely robust and copes well with e.g. corroded connectors. This solution is very well suited for refurbishment projects where it is possible to reuse existing cabling e.g. over couplers, thus avoiding costly rebuilds.



Witness extrem

The result of Swedish en

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.

Viper

CRAWLING IN CONFINED SPACES?

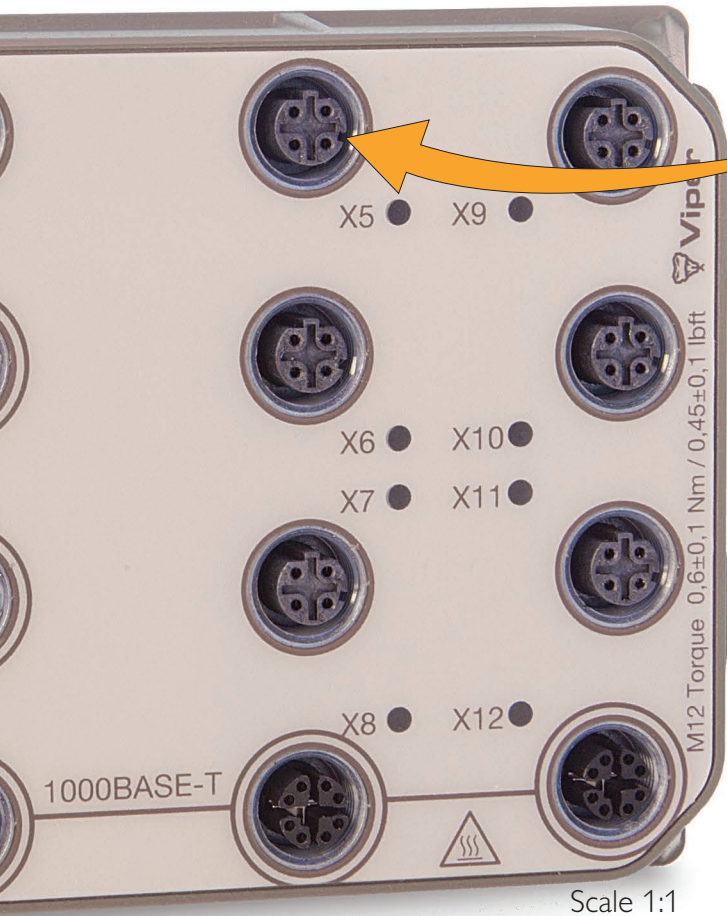
Our engineers left no stone unturned in the search for a space optimized design. They succeeded without compromising the distance between the connectors, resulting in the most compact and energy efficient design on the market.

GET READY FOR A BUMPY RIDE!

Depending on the vehicle, even a 'straight' track might not feel smooth. That's why the design is 100g shock and vibration resistant.

eme evolution

engineering excellence



Scale 1:1

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. The integrated design also means an extreme resistance to forces applied to the cable or connector.

THUNDER AND LIGHTNING!

The electrical environment on-board a train poses many challenges for electronic equipment. For ultimate robustness and the ability to connect directly to the train mains, we have carefully designed the unit to provide isolation and overvoltage protection, far beyond the formal requirements.

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 IP67 USB-stick in case of configuration error or replacement.

IT'S ALIVE!

Even though the unit is fully IP67 rated, the unit actually 'breathes' through a GORE-TEX® membrane to prevent condensation built up by climatic day/night cycling.

Compact, robust and reliable EN 50155 Ethernet products

Westermo provides an extensive range of network devices that can be used to create reliable solutions for many different applications such as WLAN access points, observation and surveillance cameras, multimedia displays, network video recorders, online timetable information, diagnostic data and much more.

The onboard rail environment is one of the toughest imaginable for any electronic device. Westermo switches and routers have been designed to exceed the tough EN 50155 standard to ensure that the equipment can survive the harsh operating conditions on trains for a long time. As switches are often required to be mounted behind wall panels or in tight spaces, Westermo devices have been designed to be extremely compact. The Westermo WeOS operating system provides an extensive suite of IP networking features allowing resilient and flexible networks to be created, meeting the needs of the rail market.

The Viper Family

The Viper family is designed for severe operating conditions and tough environments to suit every need in train networking. The Viper is characterized by its unique compactness, unchallenged robustness and powerful, easy to use software. By exceeding the requirements of EN 50155, covering shock and vibration, humidity, temperature and EMC, the fulfillment of rail industry requirements is ensured.

8 port switches

Viper-008	Unmanaged switch
Viper-408	Managed switch

Check out **www.westermo.com** for the latest product range news.

12 port switches

Viper-012	Unmanaged switch
Viper-112A	Managed switch
Viper-212A	Managed routing switch
Viper 112A-T3G	Managed switch with 3 Gbps ports
Viper-212A-T3G	Managed routing switch with 3 Gbps ports
Viper-112A-T5G	Managed switch with 5 Gbps ports
Viper-212A-T5G	Managed routing switch with 5 Gbps ports

PoE

Viper-112A-P8-HV	Managed switch with 8 PoE ports, high voltage
Viper-212A-P8-HV	Managed routing switch with 8 PoE ports, high voltage
Viper-112A-P8-LV	Managed switch with 8 PoE ports, low voltage
Viper-212A-P8-LV	Managed routing switch with 8 PoE ports, low voltage
Viper-112A-T3G-P8-HV	Managed switch with 3 Gbps and 8 PoE ports, high voltage
Viper-212A-T3G-P8-HV	Managed routing switch with 3 Gbps and 8 PoE ports, high voltage
Viper-112A-T3G-P8-LV	Managed switch with 3 Gbps and 8 PoE ports, low voltage
Viper-212A-T3G-P8-LV	Managed routing switch with 3 Gbps and 8 PoE ports, low voltage
Viper-112A-T5G-P8-HV	Managed switch with 5 Gbps and 8 PoE ports, high voltage
Viper-212A-T5G-P8-HV	Managed routing switch with 5 Gbps and 8 PoE ports, high voltage

ACCESORY

USB-M12	EN 50155 configuration backup device

20 port switches

Viper-120A	Managed switch
Viper-220A	Managed routing switch
Viper-120A-T4G	Managed with 4 Gbps ports
Viper-220A-T4G	Managed routing switch with 4 Gbps ports

PoE

Viper-120A-T4G-P8-HV	Managed switch with 4 Gbps ports and 8 PoE ports, high voltage
Viper-220A-T4G-P8-HV	Managed routing switch with 4 Gbps ports and 8 PoE ports, high voltage
Viper-120A-T4G-P8-LV	Managed switch with 4 Gbps ports and 8 PoE ports, low voltage
Viper-220A-T4G-P8-LV	Managed routing switch with 4 Gbps ports and 8 PoE ports, low voltage

ACCESORY

USB-M12	EN 50155 configuration backup device

RFR-212-FB

The RFR-212-FB 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. Train Topology Discovery Protocol (TTDP) according to IEC 61375-2-5 is fully supported, thus enabling automatic network inauguration.

RFR-212-FB 12 port backbone routing switch with dual failsafe bypass relays

WLAN ROUTERS

RedFox

The RT series of WLAN routers is characterized by optimized radio characteristics, 3x3 MIMO technology and sophisticated DFS (Dynamic Frequency Selection), vouching for robust high bandwidth communication at all times. The environmental ruggedness, including lightning protection, further contributes to the RT series' ability to cope with the demanding rail environment.

RT-310 EN 50155 Access Point
RT-320 EN 50155 Client / Bridge / Acess Point
RT-370 Trackside Access Point

DDW-002-B1

Wolverine

The DDW-002-B1 provides robust broadband Ethernet over existing 2-wire cables. In refurbishment projects, it provides an easy and cost effective way to bridge networks over existing couplers, eliminating the need for rebuild.

DDW-002-B1 Ethernet broadband bridge with 1 Ethernet port and one cable port

WeOS

Netherlands

Sprinter SNG
Sprinter SLT4
TRAXX F140 Locomotives

Belgium

SNCB Class 28 & 29 Locomotives
Brussels CityRunner Trams

United Kingdom

GT Rail Class 365
Victoria Line
Eurostar High Speed Trains
London Underground S7 and S8

France

Paris RATP MP14
SNCF MI-79 trains
Thalys TGV Paris-Amsterdam
Île-de-France SNCF Class Z50000

Spain

Renfe Marcancias Locomotives
Renfe Talgo T250

Germany

Karlsruhe Flexity Trams
Berlin Metro
DB Regio class 1428
Stuttgart S-Bahn
Leipzig Trams

Italy

Trenitalia Tuscany Swing

Poland

PKP Intercity Dart

Norway

Flytoget

Sweden

Stockholm C30
Stockholm C20
Stockholm X60

Finland

Helsinki Metro

Russia

Moscow Aeroexpress
Moscow St Petersburg Railway

India

Delhi Metro
Kochi Metro

Brazil

Sao Paolo Line 4

Australia

Sydney Millennium Trains
Queensland NGR
Tengara Trains

USA

New York City Subway NTT
Washington WMATA 6000 series
Chicago CTA 5000 series
Portland Tri-Met SD160 streetcars
Washington WMATA 7000 series
Florida Brightline trains

Canada

Toronto Rocket Subway
GoTransit
Edmonton Light Rail Transit

China

Nanjing Metro Line 4
Xian Metro Line 5
Dalian HXD3B Locomotives
Guangzou Metro Line 6
Heifei Metro Line 2
Nanchang Metro Line 1
Chongqing Line 5,10 and Ring

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