

Mass Transit Systems for Rail On Board Applications



**Be certain.
Belden.**

 **HIRSCHMANN**
A BELDEN BRAND

 **lumbergautomation**
A BELDEN BRAND

Cost Saving

Meeting and exceeding all data rate requirements for today and tomorrow

Reliability

Wired/wireless Ethernet systems designed to deliver total reliability in harsh conditions

Competitive Advantage

Belden is a partner with in-depth experience in mass transit applications



**Passengers rely on
their Transport Company.
Who does the Transport
Company rely on?**

Be certain. Belden.

Mass Transit Systems

The Belden portfolio of networking, connectivity and cabling products incorporates the latest innovations, based on proven technology.

The Belden product portfolio is designed to meet the uncompromising safety and reliability requirements of the Mass Transit industry. This portfolio includes all of the important network elements, from wired and wireless ethernet switching products to cabling and connectivity products. Through this integrated product portfolio Belden provides complete networking solutions for onboard systems, while complying with challenging requirements.

Cost Saving

Belden offers future proof solutions. Increasingly, Mass Transit vehicles are becoming more sophisticated, with more systems being installed onboard to take advantage of new technologies. As data rates increase to support all of these onboard systems, the Belden product portfolio is ready to meet and exceed current requirements. Whether implemented through the use of copper or fiber, a Belden supplied solution can be designed to provide data rates for the future, eliminating the need for upgrades in coping with future onboard system innovations.



Reliability

Best in class reliability for wired and wireless Ethernet systems. In the Mass Transit market, networks need to operate reliably in a harsh environment. This requires special performance and a high degree of resilience. Belden industrial products are designed to operate in humid conditions (some are waterproof), in high and low temperatures, and small spaces. They also need to meet the highest standards for redundancy, reliability, data security and availability. Choosing Belden Mass Transit network solutions ensures reliability and performance for onboard Ethernet networks.

Our portfolio makes Belden the ideal solutions partner to ensure you overcome your system challenges.



Competitive Advantage

Belden has a long history of working closely with all of the leading organisations within the Mass Transit industry: key operators, manufacturers and system integrators are all current and past customers. In a sector where domain knowledge is vital, Belden is able to offer an innovative product portfolio which is already proven within the industry. This portfolio, in combination with an unmatched range of services, from engineering to maintenance and support means that in choosing Belden you are choosing an experienced partner with in-depth Mass Transit industry knowledge to help you achieve your goals.

Communications Challenges for Trains

Mass transit vehicles are becoming increasingly more sophisticated with more systems being installed onboard to take advantage of new technologies.

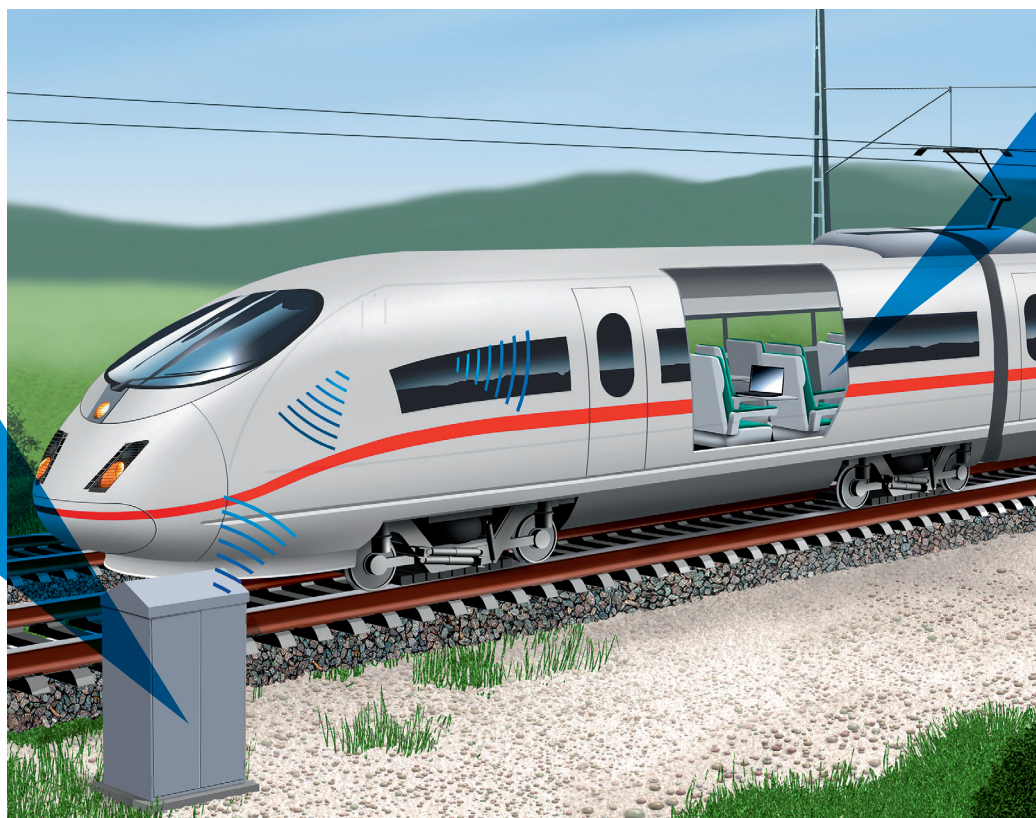
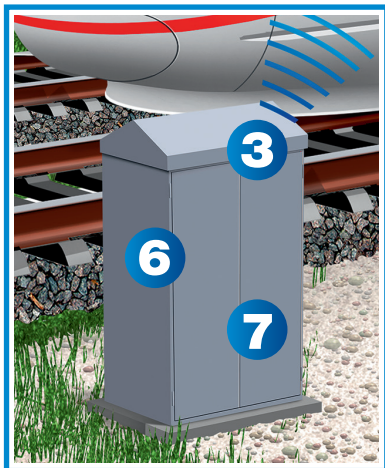
The Changing Role of the On-train Network

Today, train operators are looking to provide passengers with onboard WiFi and Internet access, along with real time journey information. At the same time, they must manage, diagnose and control increasingly sophisticated trains. As a result, the design philosophy is moving from multiple individual data bus systems supporting specific data networks to a single integrated network – and the technology being used is Ethernet.

Application Requirements

Train-to-Ground Communication

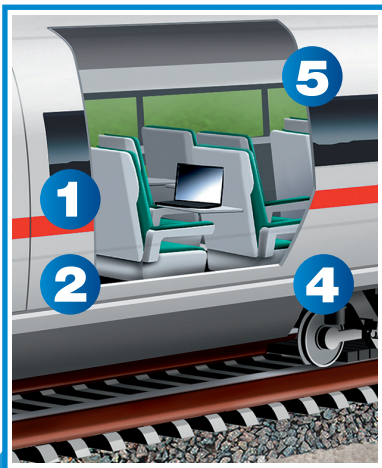
Train-to-Ground communication can provide exact information on position, speed, direction and distance. With this information, the safety level can be improved and preventive action can be taken to help optimize the flow of traffic on the rails. Having live information on the state of the train available at a central location instead of at the end of the day, decreases maintenance times and helps to increase passenger safety. This communications link is also vital for the provision of passenger internet access and real time journey information. Train-to-Ground communication is one of the most critical systems in the Mass Transit Industry; especially for high speed trains. Belden Ethernet technology has already been proven and is widely used across the world.





On Board Communication

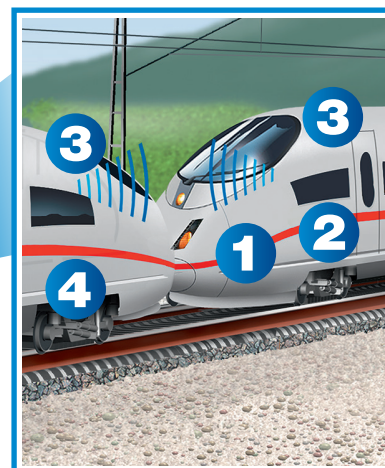
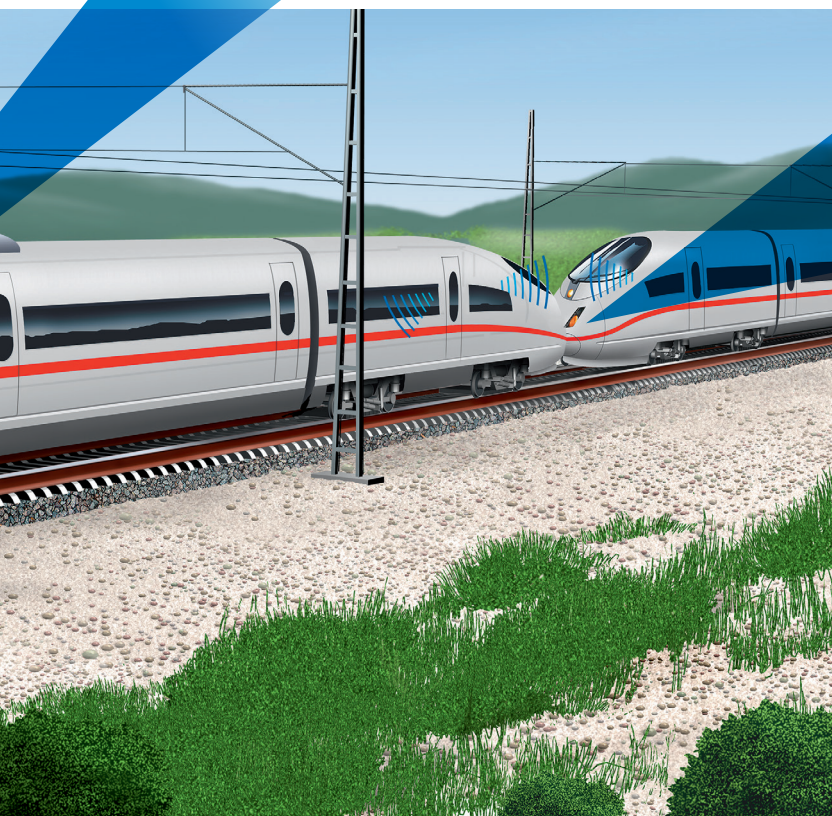
Increasingly, passengers demand improved comfort and safety on board trains. They require real time travel-related information such as arrival times, connecting points as well as multimedia services including internet



access and infotainment. The shift to Industrial Ethernet facilitates all these and future services. A Belden Ethernet system provides the functionality and high bandwidth necessary to transmit data, voice and video-streaming needed for passenger information, entertainment and video surveillance systems for increased security and safety.

Train-to-Train Communication

Train operators need the flexibility to reorganize trainsets in response to passenger demand; cars may need to be added or removed depending on the required capacity and whole trainsets may have to be replaced at short notice. However, these changes must not affect factors such as passenger seats that have already been reserved. To achieve this, train operators require greater flexibility from their existing onboard communication technology. At the same time, passengers are looking for more accurate and more frequent information, as well as more flexible reservation procedures; so their journeys become more comfortable. Belden wireless products certified for onboard rail use have outstanding performance, due to superior WLAN capabilities.



Belden Product Solution

Modern railway rolling stock needs to support an increasingly sophisticated array of services such as Video Surveillance/CCTV, Driver and Crew Orientated Services (e.g. Driver Advisory Systems and Electronic Ticketing), Passenger Orientated Services (e.g. Seat Reservation Systems and Internet access) and Train Operator/Maintainer Orientated Services (e.g. remote monitoring and fuel management). Emerging standards such as EN 61375 "Train Communication Network (TCN)" and EN 62580 "On-board Multimedia and Telematic Subsystems for Railways" now define the architecture and application interoperability requirements for these on-board network systems.

Belden's portfolio of EN 50155:2007 approved networking, connectivity and cabling products incorporates the latest innovations and are based on proven technology; thus guaranteed to meet the uncompromising safety and reliability requirements of the Mass Transit industry. This portfolio, coupled with in-depth knowledge of the industry and involvement in the drafting of future rail standards, makes Belden the ideal solutions partner to ensure you overcome the system challenges of today and tomorrow.

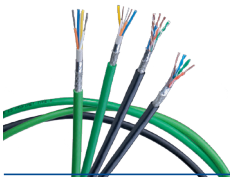
Industrial Connectivity

1

Belden Railway Approved Ethernet Data Cables

For reliable communications and enhanced system performance in railway, transportation and city transit systems.

- 100 Mbps, 1000 Mbps and 10 Gbps cables according to system requirements
- Best in class flex life with sustained data transmission due to highly stranded copper conductors
- Fully compliant with EN 50155 Class TX giving a superior temperature rating



2

Lumberg Automation™ Shielded M12 Railway Connectors and Patch Cables

Maximum security due to compliance with the highest fire protection class including Hazard Level 2.

- Fast and inexpensive installation due to molded and field-attachable connector types
- Industrial protection class IP67
- Robust design ensures maximum reliability and a long service life
- Ready to install pre terminated M12 Patch Cables



Industrial Infrastructure

3

Hirschmann™ IP67 OpenBAT Clear Space® Wireless

The OpenBAT-F series supports the IEEE 802.11n transmission standard, which allows data speeds of up to 450 Mbps in both the 5 GHz and the 2.4 GHz bands.

- State-of-the-art technology: WLAN is now 50% faster
- Reliable, fast and flexible: OpenBAT is the most versatile solution on the market
- Clear Space® technology and integrated ESD protection: for maximum lifetime and robustness



4

Hirschmann™ Octopus IP67/54 Switches

Octopus managed and unmanaged switches are maintenance-free and have exceptional reliability as well as a variety of redundancy mechanisms. Optimum fail-safety thanks to extremely robust hardware, comprehensive redundancy methods and security functions.

- Increased productivity owing to efficient network structures for optimum data communication
- Additional space for other equipment or applications thanks to compact dimensions



5

GarrettCom® Magnum 6KM Ethernet Switch

Heavy Duty Managed Switches for mobile networking applications.

- Configurable ports for 10/100 copper, PoE, fiber and Gb copper of fiber
- DC Power choices of 12 V, 24 V, 48 V, 110 V, 125 V and 250 V
- Additional space for other equipment or applications thanks to compact dimensions



6

Hirschmann™ Managed RSP Switches

The RSP switches from Hirschmann, with robust hardware and a powerful operating system, are able to withstand extremely harsh environmental conditions.

- Option "0ms" recovery (PRP, HSR) and Fast MRP
- Prepared for add-on software packages (L3, NAT,...)
- Maximum security, precise time stamping IEEE 1588v2, up to 3 x GE ports, plus 8 FE ports



7

Hirschmann™ WLAN Controllers

Centralized management and monitoring of large-scale WLAN networks.

- Automatic configuration and central management of all the access points in the WLAN
- Full throughput of payload data as per IEEE 802.11n for each access point Integrated IP router with firewall





The Belden Brand Promise

The world is growing more and more connected with an explosion of links from human to human, human to machine, and machine to machine. And, as more connections are created, the networks they form become increasingly vital to our daily lives and our long-term goals.

But, with more connectivity comes more complexity. As the machines, processors and systems that power our world become more sophisticated, the people who design, build and maintain them need a partner with perspective that spans technology platforms, geographies, and industries.

That's why Belden is on a path to assemble a portfolio of best-in-class communication technology brands. As a part of Belden, our brands benefit from over a century of excellence in manufacturing to the highest standards, and they're able to share innovations and thought leadership across the organization to stay ahead of the competition.

Our customers across all our brands can rely on what we build to outperform and outlast in the most demanding conditions, and they know that we'll support them with uncompromising and responsive service.

We are greater than the sum of our parts. We prove it by adding expertise and resourcefulness that goes above and beyond product performance. We prove it through our focus on the applications and markets that are most in-demand from industrial IT, to industrial connectivity, to enterprise connectivity, and broadcast. We prove it through continually optimizing our portfolio of technologies, capabilities and brands to create the strongest connections possible.

BELDEN

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 **lumbergautomation**
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 **TOFINO SECURITY**
A **BELDEN** BRAND





About Belden

Belden Inc., a global leader in high quality, end-to-end signal transmission solutions, delivers a comprehensive product portfolio designed to meet the mission-critical network infrastructure needs of industrial, enterprise and broadcast markets. With innovative solutions targeted at reliable and secure transmission of rapidly growing amounts of data, audio and video needed for today's applications, Belden is at the center of the global transformation to a connected world. Founded in 1902, the company is headquartered in St. Louis, USA, and has manufacturing capabilities in North and South America, Europe and Asia.

For more information, visit us at:
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