BELDEN | OTN Systems

Network solutions for Rapid Mass Transit

XTran: MPLS for Operational Telecom made easy

- Tailored for industrial applications
- Intuitive and simple
- Reliable operations in harsh environments

"More than 85 transport authorities around the world currently rely on OTN Systems for their operational communications.

Real-world implementations have been running continuously for over 15 years. Because of its operational simplicity, the network can be maintained with limited efforts and costs."

Mission-critical networks for rapid mass transit

OTN Systems develops fiber optic networking products dedicated to the operational telecommunication departments of metros, light rail systems, people movers and monorails. The product line XTran (Excellence in TRANsport) guarantees that all related operational communication needs are fulfilled so that passengers anywhere in the world can be transported safely and interruption-free.

A vast number of cities now rely on OTN Systems for their mass transit infrastructure. They range from green field deployments in developing economies to brown field installations, which are being expanded and upgraded, making OTN Systems the world's no.1 in operational telecommunication for metro & lightrail.

In search of the right network solution

Telecommunication needs for rapid mass transit operators differ to a great extent from the requirements encountered in a carrier or an enterprise environment. Carriers want to sell telecom services, while optimizing business processes is key in the enterprise world. Rapid mass transit operators however have a different challenge as they need to secure the safe and timely transport of people, in an efficient way, 100% guaranteed. A reliable telecommunication network is an important building block to achieve this.

Focus on safety and security

Safety is undoubtedly one of the top concerns for passengers when they choose to ride on a mass transit system.

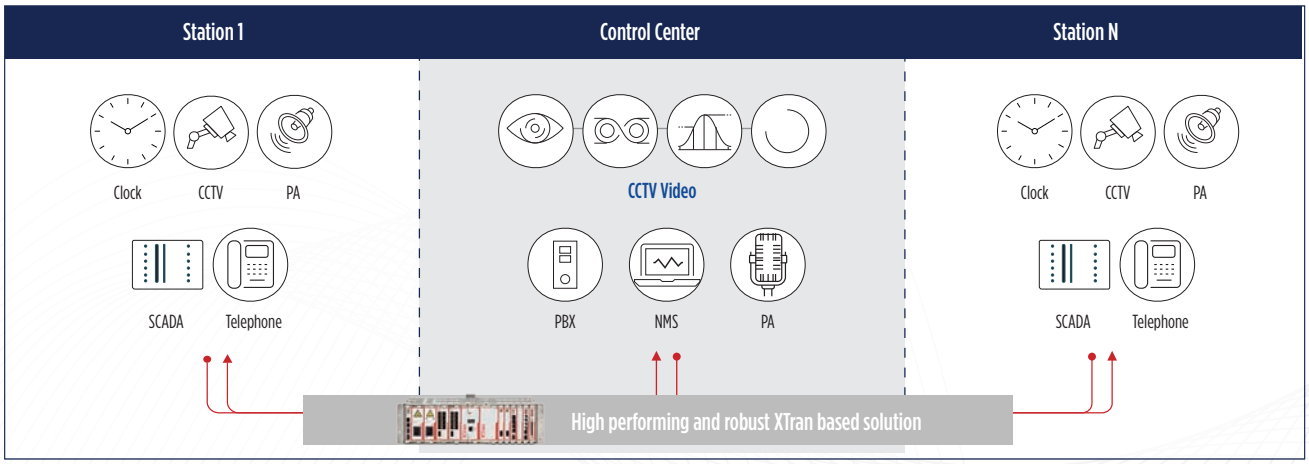
XTran supports the critical communications requirements of operational safety features.

XTran has been designed to support the critical communications requirements of operational safety features, such as collision-avoidance systems and automatic braking systems for driverless trains.

In addition, the network efficiently carries voice, video and data traffic from a diverse range of passenger security-related applications, such as CCTV video, public announcement systems, emergency phones, fire and smoke alarms and real-time passenger information displays.

New applications can be added without impacting network performance.

The large capacity of the network can accommodate several thousands of cameras used for live monitoring or recording purposes.



In these days of cybercrime, operators also need to protect their applications and sensitive data including CCTV images or personal data from passengers. XTran has been designed with multi-level security features preventing unauthorized access or denial of service attacks.

Reliability providing ease of mind

Reliability is probably second only to safety on a passenger's wish list. Even a short period of downtime in a rapid transit system can cause a lot of chaos, leading to frustrated passengers, loss of revenue, damage to the reputation of the transport operator and unhappy city politicians.

Therefore, OTN Systems develops communications networks which use multiple levels of redundancy to guarantee an extremely high level of availability 24/7.

XTran can operate flawlessly in an outdoor cabinet or inside a tunnel. This claim is proven by the numerous worldwide installations that have been running for over 15 years without any downtime.

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Guaranteeing the lowest TCO

Most of the technical staff of a transport operator have multidisciplinary skills and know-how. Hence, they should be relieved from having to handle a highly complex telecom infrastructure.

Already at the early design stage of its portfolio, OTN Systems pays particular attention to reduce the operational costs of a deployed network.

TXCare, the XTran network management software has been developed to allow an operator to configure, visualize and monitor the entire network from a central control room, without the need for extensive training.

Industry-standard interfaces make it easy to connect legacy or new equipment to the telecommunication backbone without the need for converters, specialized knowledge or technical support. If a network card needs to be added or replaced, this can be done by the operational staff without the need of detailed network expertise.

The operator should be relieved from handling a highly complex telecom infrastructure.

Maximizing flexibility

A mass transit system probably requires one of the most complex data communications environments that exists today. Multiple applications require guaranteed throughput and have very specific requirements: CCTV video traffic requires a very short delay between camera and control room, a radio network might need synchronous links, aged legacy equipment may still use analog interfaces.

XTran network users do not need to worry about these challenges as the portfolio overcomes complexities by providing a mature multi-service solution based on a next generation packet based solution, powered by MPLS-TP.

A single network combines all data traffic onto one backbone and ensures 100% separation between the applications without jeopardizing performance or data security.

No matter what applications run over the network today, XTran has been designed to handle them.

Selecting the right technology is key

The XTran portfolio has adopted the MPLS-TP standard as underlying technology. The standard is drafted in cooperation between the ITU-T (International Telecommunication Union) and the IETF (Internet Engineering Task Force).

MPLS-TP uses the main functionalities of MPLS but comes with extra features to support mission critical transport of information.

MPLS-TP offers a mode of operation and predictability close to SDH/SONET but with the advantages of a packet based infrastructure.

This is why MPLS-TP is seen by the industry as the natural successor of SDH/SONET. OTN Systems has taken the MPLS-TP standard and augmented it with specific features ideal for transport authorities. By adopting features from Carrier Ethernet and IP routing, XTran offers the best next generation network capabilities, while substantially reducing complexity of standard MPLS.

XTran: eXcellence in TRANsport

An XTran network consists of nodes, interconnected by copper or fiber cable, and a management system called TXCare. A variety of node types is available providing the ideal solution for each location. All nodes are hardened, ideal for trackside applications. The network is perfectly scalable from tens of nodes to thousands of nodes. Links between the nodes provide a capacity of 1Gbps, 10Gbps, 40Gbps or 100Gbps.

XTran comes with an unprecedented suite of interface cards for legacy equipment, including the popular analogue circuits for operational telephony, as well as state of the art Ethernet/PoE and IP routing capabilities.

Various types of logical tunnels between the nodes can be created: point-to-point, multipoint and logical rings. Creating back-up paths is only a mouse click away.

Predictability is key in rapid mass transit networks. With XTran, in conjunction with TXCare, one is able to configure the delay, wander and jitter of each individual connection. In this way, timing sensitive rapid mass transit applications will work flawlessly over an XTran network.

Redundancy is key in order to maximize network availability. Common control, switching fabric, network synchronization, uplinks, MPLS tunnels, pseudowires and power supply modules can all be duplicated. The hardware is hot-swappable. Obviously, this results in excellent network availability.

XTran comes with a unique set of features

- Hitless switching on circuit emulation. Not a single bit of information will get lost in case of a failure of the prime route.
- MACsec wire speed encryption of the links between the nodes.
- Fanless design.
- OAM according to Y.1731 and BFD providing in service monitoring.
- Sub-50 ms protection switching.
- EN50121-4 compliance.
- Layer 3 routing for increased flexibility.

Network management is king

With TXCare, OTN Systems follows the SDN (Software Defined Networks) philosophy. A network is as clever as its network management system. TXCare offers end-to-end service performance monitoring, element management and full network management. Failures in the network are detected instantaneously, diagnosed and repaired. Most importantly, TXCare is extremely **intuitive and user friendly.** It takes only a few days of training to turn a network novice into a TXCare expert having full control over the XTran network.

TXCare allows the network engineers to preconfigure the network entirely off-line. In this way all bottlenecks can be verified in advance and surprises during the network roll-out are avoided.

A variety of XTran node types

Model	XTD-2110-A	XTR-2124-A(F)	XT-1104-A	XT-2206-A	XT-2209-A	XT-2210-A	XT-2215-A
Hardware							
Redundant PSU	✓	✓	-	✓	✓	✓	✓
Redundant CSM	-	-	-	✓	✓	✓	✓
Din rail mountable	✓	-	✓	-	-	-	-
Fan-less	✓	✓	✓	✓	✓	✓	-
Modular slots	-	-	4	6	9	10	15
Connectivity							
Ethernet (CU, F, PoE)	✓	✓	✓	✓	✓	✓	✓
Sector interfaces	2 serial	2 serial	✓	✓	✓	✓	✓
L3 Routing	✓	✓	✓	✓	✓	✓	✓
Speed							
Max WAN Speed	10G	10G	10G	10G	10G	10G	100G
Management							
TXCare	✓	✓	✓	✓	✓	✓	✓
SD Card	✓	✓	✓	✓	✓	✓	✓

XTran: MPLS for Operational Telecom made easy

Tailored for industrial applications

- Built on MPLS-TP standard
- Sector specific capabilities
- Future-proof

Intuitive and simple

- NMS made easy
- Fast diagnostics
- Seamless support for legacy

Reliable operations in harsh environments

- Optimized network security
- Unmatched network resilience
- Rugged industrial design

OTN Systems offers you peace of mind

We designed XTran around the idea that operators of mass transit systems should be free to focus on their customers rather than on the technology that makes it all happen.

This philosophy has won the hearts of 85 of the world's most renowned transport authorities.

ABOUT OTN SYSTEMS

OTN Systems develops mission-critical networks for specific industrial markets. The company is the designer and supplier of the XTran (eXcellence in TRANsport) product line.

By working closely with numerous customers over 30 years, OTN Systems has acquired the necessary expertise to come up with perfect networking solutions. The company is headquartered in Olen in Belgium and has offices all over the world. From these regional offices the local partners and customers are supported. With its unique portfolio and more than 500 satisfied customers in 75 countries, OTN Systems promises you peace of mind when it comes to mission critical networking.

We are committed to getting your information across.

OTN Systems became part of the Belden group in January 2021. Belden connects and protects organizations worldwide with the industry's most complete suite of end-to-end networking solutions.

OTN Systems

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