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XTran DIN rail mounted Access Node

XTD-2110-A

OTN Systems
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1. INTRODUCTION

The XTD-2110-A is the most compact member of the XTran product family.

It combines MPLS-TP transport on the backbone with Layer 2 and Layer 3 features on the Ethernet access ports in an integrated industrial housing which can be mounted on a DIN rail.

The XTD-2110-A provides a total of 10 Ethernet ports and 2 serial ports.

Figure 1 XTD-2110-A

XTD-2110-A Feature Highlights	

• MPLS-TP network node with 10 Ethernet ports
• WAN ports (MPLS-TP):
  ○ 2x 1/10Gbps SFP+
  ○ 2x 1Gbps SFP
• LAN ports (L2/L3):
  ○ 2x 1Gbps SFP
  ○ 4x Gigabit RJ-45 ports with PoE+
• PoE: IEEE 802.3af & 802.3at compliant with maximum 30 W per port
• Service types: E-Line, E-LAN, Logical ring
• 2x serial ports (RS232/422/485)
• 2x DIO
	• MACsec encryption possible on WAN links
	• Ptp 1588 & Sync-E support
	• Fully managed via the TXCare Network Management System
	• SD card for easy configuration swap
	• DIN rail mountable Aluminum Housing
	• Fanless design, passively cooled
	• Operating temperature range: -30°C to +65°C (-22°F to +149°F), startup @ -20°C/-4°F
	• Redundant Power input (24-57VDC)
	• Compliance with IEC 61850, IEEE 1613 (Power substation), EN50121-4 (Railway)

2. DESCRIPTION

2.1 Ethernet interfaces (LAN & WAN)

Different types of Ethernet ports are available for maximum flexibility.

Ports 1 and 2 can be used as MPLS-TP ports (WAN) or as access ports (LAN). The ports can be be fitted with optical SFP modules for 1Gbps Ethernet operation, or with optical SFP+ modules for 10Gbps Ethernet operation.

Ports 3 and 4 can be used as MPLS-TP ports (WAN) or as access ports (LAN). The ports can be be fitted with optical SFP modules for 1Gbps or 100Base-FX Ethernet operation.

When used in WAN mode, the traffic going over Ports 1, 2, 3 and 4 can be encrypted with MACsec for secure transmisson over the MPLS-TP link between adjacent XTran nodes.

Ports 5 and 6 can be used as access ports (LAN) with extended L2 and L3 features. The ports can be be fitted with optical SFP modules for 1Gbps or 100Base-FX Ethernet operation.

Ports 7 to 10 can be used as access ports (LAN) with extended L2 and L3 features. The RJ-45 ports can be used for 10/100/1000Base-T Ethernet operation. If the supply voltage is in the range between 50-57VDC, these ports can also supply PoE (802.3af, 15W) or PoE+ (802.3at, 30W) to the connected devices (e.g. IP cameras or WiFi access points).

Note: Port 10 can optionally be converted from an access port to a management port to connect the TXCare Network Management System for centralized network management.

2.2 Serial interfaces

The XTD-2110-A offers two serial interfaces (S1 & S2) for the the connection of legacy applications.

The S1 and S2 ports can be configured either as RS232, RS422 or RS485. In RS232 mode TX, RX, CTS & RTS are supported, in RS422/485 mode TX & RX are supported. The serial interface is suitable for asynchronous communication.

Inside the XTD-2110-A these serial interfaces are converted to Ethernet frames for transport over the XTran MPLS-TP network.

2.3 Digital Input / Digital Output (DI/DO)

The XTD-2110-A provides two Digital Inputs (DI1 & DI2) and two Digital Outputs (DO1 & DO2).

The Digital Inputs can be used to detect external events (e.g. cabinet door contact opening) and raise an appropriate alarm (e.g. 'door opened') in TXCare. Alarm properties can be assigned to the digital inputs via TXCare.
The Digital Outputs can be used to give a local indication of Major and Minor alarms (e.g. by means of external alarm lights or acoustic signals).

2.4 Mechanical Design

The XTD-2110-A is a DIN rail mountable device.

The dimensions are (HxWxD): 150x90x144,2 mm without DIN rail bracket and

172x90x152 mm including the DIN rail bracket.

The fanless design is passively cooled and allows it to operate in a wide temperature range from -30°C to +65°C (-22°F to +149°F). Cold start is possible at -20°C/-4°F.

To allow natural convection cooling, the node is equipped with heatsinks on both sides.

The housing is IP20 rated.

The MTBF is estimated at 87,6y.

2.5 Power Supply

The XTD-2110-A provides a redundant power input of 2x (24-57VDC).

When the input voltage is in the 50-57VDC voltage range, the PoE capability of the node can be enabled on ports 7, 8, 9 & 10. The XTD-2110-A is a power sourcing device that is compliant with IEEE 802.3af (PoE) and IEEE 802.3at (PoE+, maximum 30 W per port)).

If no DC power is available, an external PSU can be used such as the ACPoE-XTD-A.

2.6 SFP (Small Form factor Pluggable) Transceivers

The XTD-2110-A has 6 Gigabit Ethernet SFP ports that can be equipped with different types of 1000 Base SFP transceivers for Single Mode and Multi Mode fiber operation.

Port 1 and Port 2 can optionally be used for 10Gbps SFP+ transceivers to create 10 Gigabit Ethernet MPLS-TP WAN links or LAN connections.

2.7 SD Card

The configuration of the XTD-2110-A node is stored on an SD memory card. When the device needs to be replaced in the field, the SD card can be swapped to the new device to automatically copy all the configuration data.

3. NETWORK TOPOLOGY

Different network topologies can be built with the XTD-2110-A nodes including daisy chain, star, ring or mesh topologies.

XTD-2110-A nodes can be used to build a stand-alone network, or they can be used as an MPLS access network in combination with modular XTran nodes such as XT2210/2209/2206/1104 aggregation nodes or the XT2215 core nodes.

Typically ports 1&2 are used for WAN links to create an MPLS-TP ring of 1Gbps or 10Gbps. Ports 3&4 can also be used as MPLS WAN ports to link to other rings or spur nodes. In this way it is possible to create a fully meshed topology.

Alternatively, unused WAN ports (ports 1-4) can be converted to LAN ports that offer basic L2 connectivity.

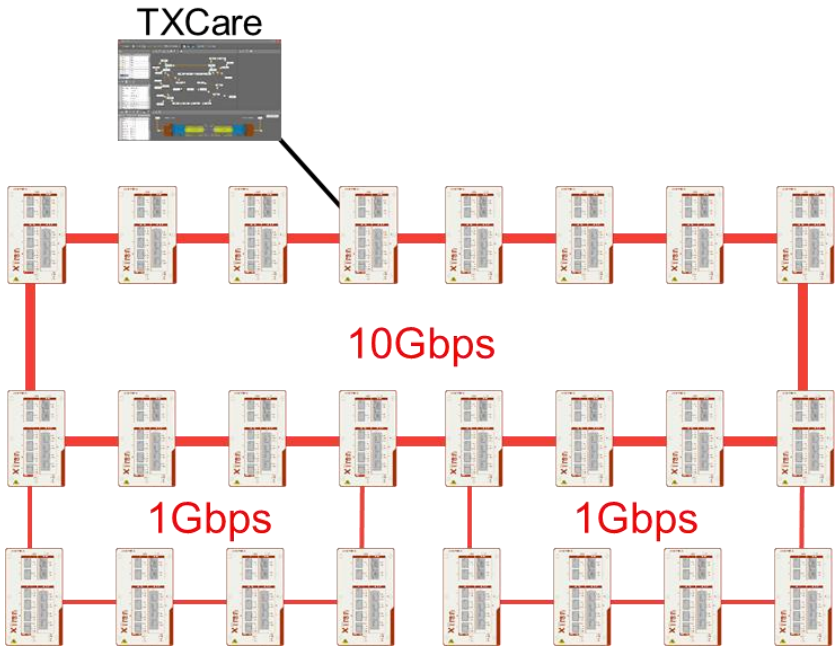

Figure 2 Stand-alone XTD-2110-A network

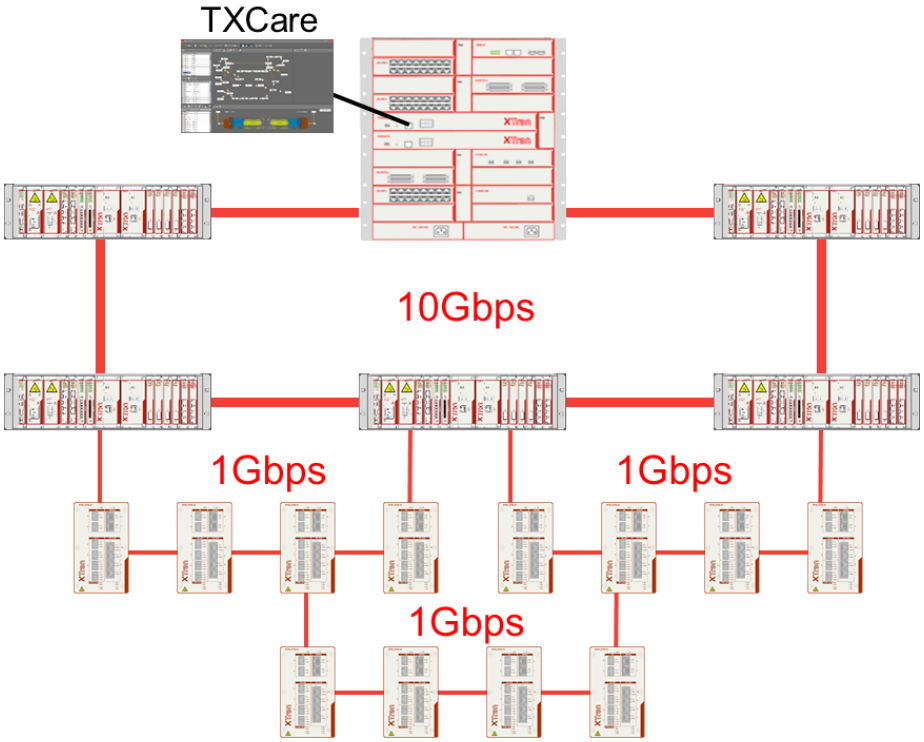

Figure 3 XTD-2110-A used as XTran access network

4. NETWORK MANAGEMENT

The XTD-2110-A can be fully managed via the TXCare Network Management System. When the XTD-2110-A is used as a stand-alone network, the TXCare server can be connected to the management port of one of the nodes (Ethernet port 10) to allow centralized management.

If the XTD-2110-A is used as an access network interconnecting to modular XTran nodes, the XTD-2110-A nodes can be managed via the encrypted DCN channel embedded in the WAN link.

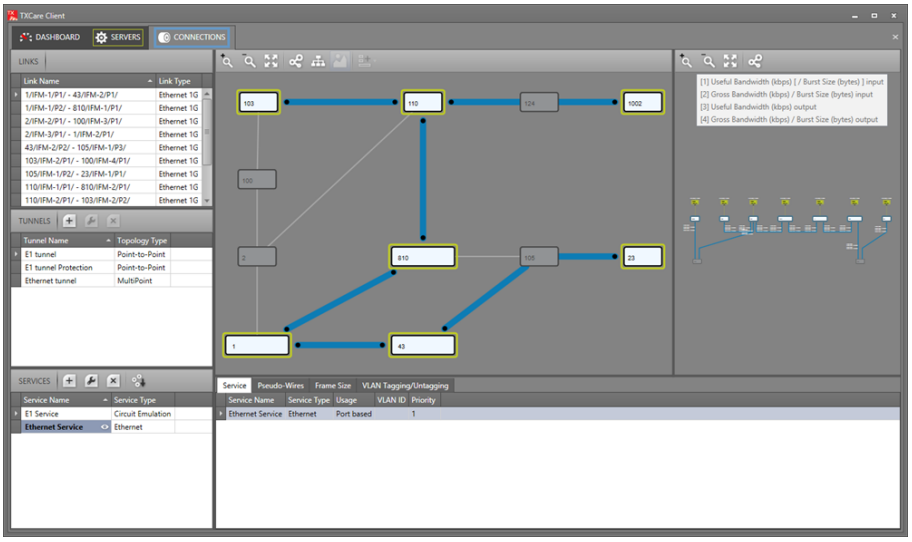

Figure 4 XTD-2110-A is managed by the TXCare NMS

5. ORDERING INFORMATION

XTD-2110-A	S30926-D2110-XA
OS License (XTD2110 Base)	XG-L1002
OS Feature License (XTD2110 L3)	XG-L1003
OS Feature License (XTD2110 10G on port 1&2)	XG-L1008
TXCare Node License XTD2110	XG-L1005
TXCare MACSec License for 1G link	XG-L996
TXCare MACSec License for 10G link	XG-L997

6. SPECIFICATIONS

XTD-2110-A Specification overview

Interfaces	
WAN ports (MPLS-TP)	2x 1/10Gbps SFP+ (Port 1&2) (use of 10Gbps is license based)
	2x 1Gbps SFP (Port 3&4) (including support for 100Base-FX)
LAN ports (L2/L3)	2x 1Gbps SFP (Port5&6) (including support for 100Base-FX)
	4x 10/100/1000Base-T RJ-45 ports with PoE+ (Port 7-10)
PoE	IEEE 802.3af & 802.3at compliant with maximum 30 W per port
Serial	2x serial ports RJ-45 (RS232/422/485), Asynchronous Serial over Ethernet*
	RS232: Rx, Tx, RTS, CTS, GND, RS422/485: Rx, Tx.
Digital Input	2 inputs
Digital Output	2 outputs
SDH/Sonet (optional through Smart SFP)	If ports 3 or 4 are not used for WAN interconnections, they can be used as LAN interfaces and accept Smart SFPs for SDH/Sonet transport over packet.*
	*Roadmap

MPLS-TP service types	
E-LINE	Point to point service (VPWS)
E-LAN	Layer 2 VPN, Multipoint (VPLS)
L3VPN	Layer 3 VPN
Ring/Subrings	Logical Ethernet Ring (ERPS)
E-Tree	Multipoint communication allowed only between root and leaves
Protection schemes	1:1, ERP logical rings (<50ms protection switching)

L2 Features	
VFI	Virtual Forwarding Instances (virtual switches)
MSTP (multiple spanning tree)	IEEE 802.1Q-2003, Flush of relevant VFI's in case of topology change
BPDU Guard	Shuts down the LAN port when a BPDU packet enters this port
VLAN handling	VLAN based or port based services. Multi VLAN via Q-in-Q
LAG	Link Aggregation Group is possible on ports 7-10
Storm control	Unlearned Unicast, Broadcast and Multicast ingress limitation combined with traffic engineering
IGMP Snooping	Multicast traffic handling through Internet Group Management Protocol. IGMP snooping on XTD-2110-A is IP based.
Port mirroring	Copy traffic from a source port (mirrored port) to a destination port (mirroring port). (Mirroring is possible within port group 1-4 and within port group 5-10)

L3 Features (license based)	
VRF	Virtual Routing and Forwarding (virtual routers)
VRRP	Virtual Router Redundancy Protocol
Static Routing	Static routes configured through TXCare NMS
Dynamic Routing	OSPF (Open Shortest Path First) routing protocol
PIM (Protocol-Independent Multicast)	PIM support for Multicast Routing
IGMP	IGMP querier
DHCP (Dynamic Host Configuration Protocol)	DHCP Relay

XTD-2110-A L2/L3 performance parameters	
Switching fabric capacity	64Gbps (full duplex)
Forwarding rate (switching silicon)	95,23 mpps @ minimum length packets
MAC addresses	16K
VLAN IDs	4K
VRFs	10
L3-VLANs/ IP Interfaces	128
ARP entries	2048
Unicast routes	4096
Multicast routes	512
VRRP instance	10
OSPF Neighbors	64
PIM Neighbors	64
ACL L2 and L3	128
DHCP Relay	10

QoS	
VLAN based service	VLANs can be mapped to a dedicated pseudowire with strict traffic engineering
VLAN priority	Priority handling based on IEEE 802.1p
DSCP	Priority handling based on the DSCP value of the IP packet
LAN ports (port 5-10)	8 queues/port
WAN ports (port 1-4)	Hierarchical scheduler with Strict Priority and Weighted Deficit Round Robin
Traffic engineering per service over the MPLS network	Bandwidth, burst size, priority,…

Synchronization	
IEEE 1588 PTP Precision Time Protocol	IEEE 1588 PTP v2 Transparent Clock support on ports 1-4
Sync-E (Synchronous Ethernet)	Sync-E support on ports 1-4

Cyber Security	
MACsec Encryption	WAN connections @ 1G or 10G can be encrypted using MACsec (license based)
Management Communication Encryption	SNMP V3
Access Control Lists	MAC & IP based ACL
MAC limiting	Limit the number of allowed MAC addresses per VLAN
Sticky MAC	Convert learned MAC addresses to static and disable MAC learning
IEEE 802.1x authentication NMS	Radius Authentication on TXCare NMS (login)
IEEE 802.1x authentication ports	Radius Authentication on user ports*
SD Card encryption	Encryption of configuration data on SD Card
	*Roadmap

Network Management	
Network Management	XTD-2110-A networks are centrally managed by TXCare NMS via an encrypted SNMP v3 channel (embedded DCN). Optionally the TXCare NMS can be connected to port 10 if it is configured as a management port.
Performance monitoring	Based on Y.1731 Loss and Delay
SD card slot	Easy configuration swap in case of node replacement

Mechanical/Environmental	
Housing material	Aluminum
Mounting	DIN-Rail
Dimensions are (HxWxD):	150x90x144,2 mm without DIN rail bracket
	172x90x152 mm including the DIN rail bracket.
Weight	<1,5kg
IP Class	IP20
Fanless design	Passively cooled through natural convection
Operating Temperature Range	-30°C to +65°C (-22°F to +149°F)
	Cold start is possible at -20°C/-4°F
MTBF	87,6y

Power requirements	
Input Voltage	Redundant Power input (24-57VDC)
	POE operation requires 50-57VDC input voltage.
Power consumption	<40W (excluding POE power). Maximum POE+ Power = 4x 30W (4 ports delivering POE+)

Certification	
Power substations	IEC 61850, IEEE 1613 (pending)
Railways trackside	EN50121-4 (pending)
For detailed specifications on EMC/Shock/vibration please refer to:	M810_*_XTran_General_Specifications_A4_E.pdf

OTN SYSTEMS NV

Industrielaan 17b, 2250 Olen, Belgium
www.otnsystems.com

Tel: +32 14 25 28 47
Fax: +32 14 25 20 23
E-mail: info@otnsystems.com
www.otnsystems.com

Ref. No.: XG-S1006-E-7
Issued May, 2021
Specifications subject to change as design improvements are implemented.