

DigitalPlatforms

SAFN-CM

TFLEXIBLE TRANSPORT/ACCESS MULTIPLEXER

THE PRODUCT



Introducing the SAFN-CM Multiplexer, a state-of-the-art solution specifically designed for Access and Transport networks in the energy market, enabling a smooth and efficient transition from traditional SDH systems to modern MPLS/TP-based infrastructures. The SAFN-CM Multiplexer is engineered to provide highly reliable and secure communication for mission-critical services in utility networks, such as RTU, SCADA, teleprotection, and operational voice services. The SAFN-CM Multiplexer bridges legacy TDM/PDH/SDH networks with packet-based MPLS/TP architectures, supporting a hybrid network environment to ensure continuity during the transition phase.

With advanced features like integrated Ethernet and TP/MPLS functionality, the SAFN-CM is ideal for managing both traditional and future-proof IP-based applications within the same platform, minimizing the need for costly infrastructure upgrades. Designed for flexibility, the SAFN-CM supports a variety of interface modules, enabling utilities to customize their network according to specific operational requirements. Its modular architecture provides scalability, allowing for easy expansion as network demands grow, and ensures high availability through robust redundancy mechanisms. This ensures seamless communication for critical applications like protection relays, substation automation, and data acquisition, all while ensuring low-latency and high-availability performance. The SAFN-CM also ensures comprehensive cyber security compliance, safeguarding communication networks in an increasingly digital energy landscape. Its dual functionality in both SDH and MPLS/TP environments makes it the ideal choice for energy providers looking to optimize their operational efficiency and prepare for the demands of smart grid infrastructure, ensuring a futureready, resilient communication network.

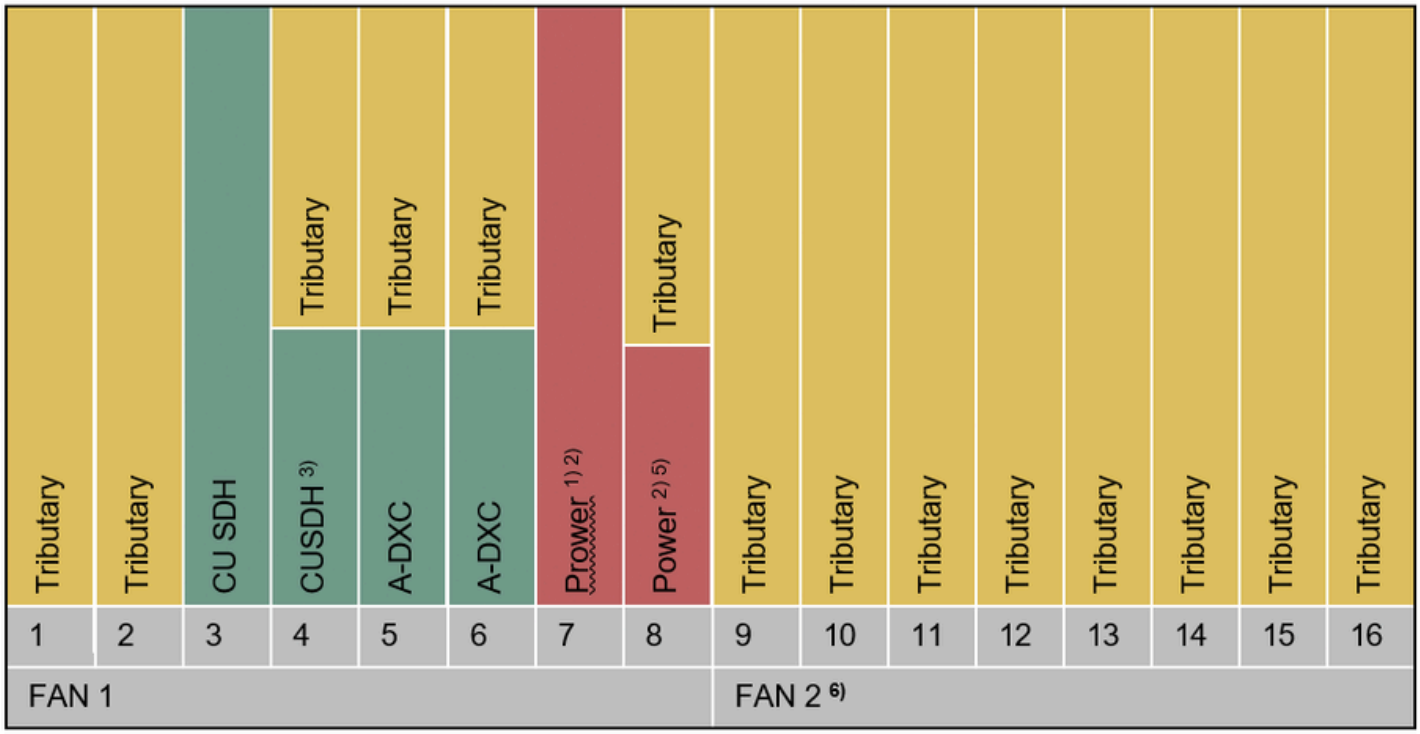
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SAFN-CM - EQUIPPING OPTIONS

SDH NODE, 6-SLOT SUBRACK

<table>
<tr><td rowspan="3">FAN</td><td>1</td><td>A-DXC</td><td>Tributary</td><td colspan="2">Power 1)</td><td>4</td></tr>
<tr><td>2</td><td>CU SDH 3)</td><td>Tributary</td><td>Power 5)</td><td>Tributary</td><td>5</td></tr>
<tr><td>3</td><td colspan="2">CU SDH</td><td>A-DXC</td><td>Tributary</td><td>6</td></tr>
</table>

SDH NODE, 16-SLOTSUBRACK



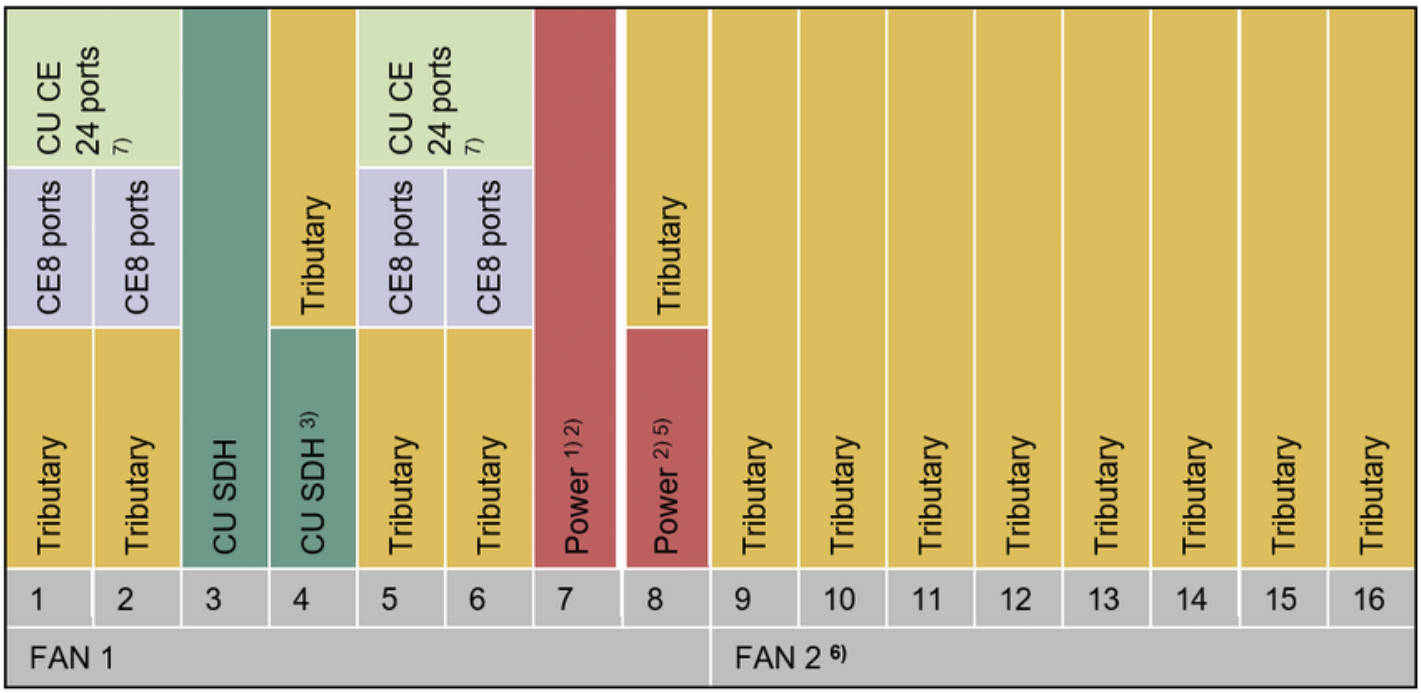
1) Power adapter unit in the primary power slot is mandatory becausethe local Ethernetmanagement and external synchronization are connected to it.
2) Must be Power Adapterwith Bus Extension
3) When two SDH trunk units are used, they can eitherwork in a hot-standby mode or as individual controlunits each with their own dedicated tributary units.
5) On redundant power units, the Ethernetmanagement interfaces and the external synchronization interfaces are not supported.
6) Depending on the subrack equipping, a second fan unit may be needed.

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HYBRID MPLS-TP/SDH, 6-SLOT SUBRACK

<table>
<tr><td rowspan="3">F A N</td><td>1</td><td>CE 8 ports</td><td>Tributary</td><td colspan="3">Power 1)</td><td>4</td></tr>
<tr><td>2</td><td>CU SDH 3)</td><td>Tributary</td><td>Tributary</td><td rowspan="2">CU CE 24 ports 7)</td><td>Power 5)</td><td>5</td></tr>
<tr><td>3</td><td colspan="2">CU SDH</td><td>CE 8 ports</td><td>Tributary</td><td>6</td></tr>
</table>

HYBRID MPLS-TP/SDH, 16-SLOTSUBRACK



1) Power adapterunit in the primary power slot is mandatory becausethe local Ethernetmanagement and external synchronization are connected to it.
2) Must be Power Adapter with Bus Extension
3) When two SDH trunk units are used, they can eitherwork in a hot-standby mode or as individual controlunits each with their own dedicated tributary units.
5) On redundant power units, the Ethernet management interfaces and the external synchronization interfaces are not supported
6) Depending on the subrack equipping, a second fan unit may be needed.
7) CU CE 24 ports occupies two slots.

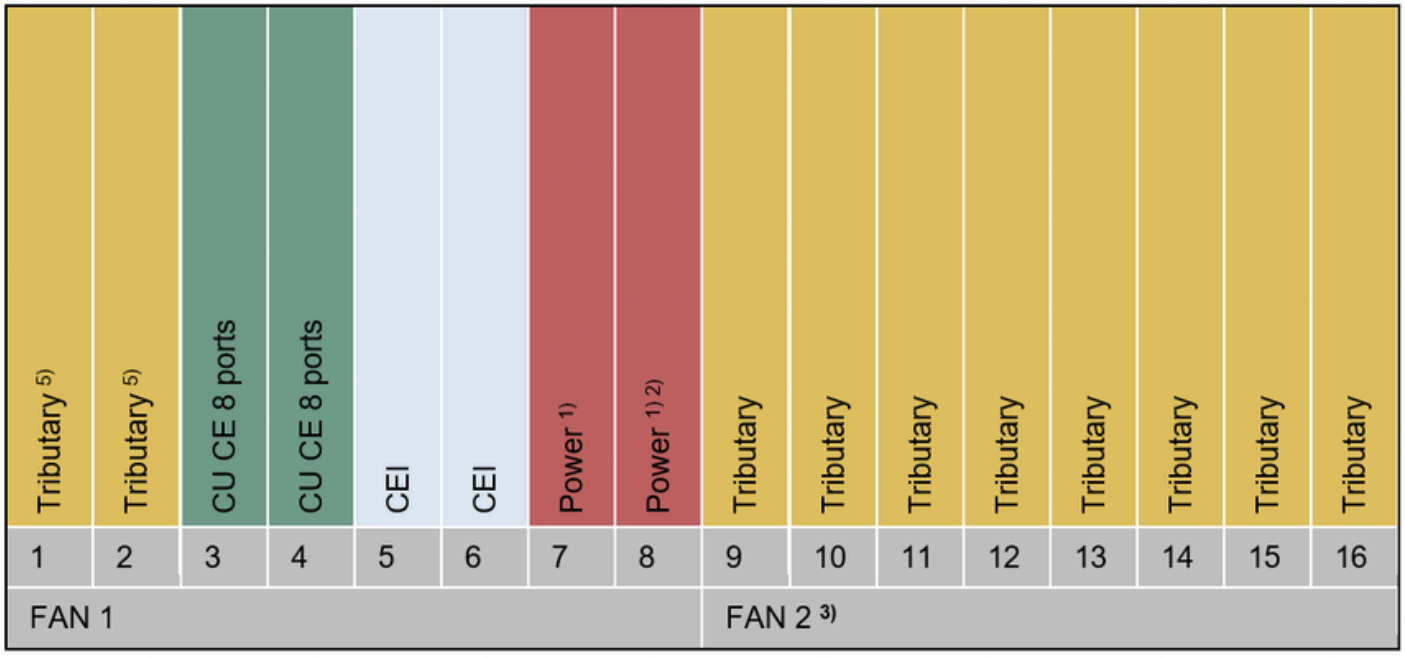
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NATIVE PACKET MPLS-TP, 6-SLOT SUBRACK.

FAN	1	CEI	Power **2)**	Power	Tributary	4
	2	CU CE 8 ports		Power **2)**	Tributary	5
	3	CU CE 8 ports		CEI	Power **2)**	6

FAN	1	N/A	Power	4
	2	CU CE 24 ports 4)	Power **2)**	5
	3		N/A	6

NATIVE PACKET MPLS-TP, 16-SLOTSUBRACK.



1) Must be Power Adapter with Bus Extension
2) The local Ethernetmanagement interfaces and the externalsynchronization interfaces are not supported.
3) Depending on the subrack equipping, a second fan unit may be needed.
4) CU CE 24 ports occupiestwo slots.
5) Slot 1 and 2 supported by CE8+ unit versionT33008.02—05 or newer

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SAFN-CM - TECHNICAL DATA – CONTROL UNIT SDH

CU SDH	
Low Order cross-connect capacity	500 VC-12s (add-drop terminal mux) 250 x 250 VC-12s (bypass) 128 VC12s SAToP
High Order cross-connect capacity	80 x 80 VC-4s (bypass)
DS0/64kbps cross-connect capacity	230 x 230 VC-12s/E1
LO/HI order VCAT	32 groups
Ethernet encapsulation	GFP, LAPS, PPP/HDLC: 32 channels, 2Gbps Ethernet over SDH / Ethernet over MPLS-TP conversion: 1Gbps
SDH protection	MSP 1+1 uni-directional MSP 1+1 bi-directional SNCP/UPSR ring Switch over time 50 ms
SFP interfaces 2)	4 x STM-4/16, 4 x STM-1/4 or 4 x STM-4/16, 2 x STM-1/4, 2 x GE Transceiver type selected by SFP - Digital diagnostics
Cooling	Forced cooling; fan is mandatory
Redundancy	1+1 hot stand-by Switch over time 500 ms

SDH Management – Multiservice Manager	
Compatible operating systems	Windows 11 Windows 10 Windows Server 2022 Windows Server 2025
Encryption	User names and passwords encrypted TLS
PC requirements	Processor: 1 GHz or faster processor or SoC RAM: 1 GB (32-bit) or 2 GB (64-bit) HD: 16 GB (32-bit) or 20 GB (64-bit); 100 MB free HD space for each Connection Master SDH Multiservice Manager release Minimum screen resolution: 1280x1024
Protocol/Port	TCP / 5138 (stand-by CU 5139) Software version 3.10 and higher TCP / 5145 (Stand-by CU 5146)

SDH Management	
Authentication	RADIUS 1)
Command line	USB local console SSH
Management Information Bases (MIBs)	Connection Master Private MIB RFC 1213 SONET MIB SNMP v2c compatible SNMP v3 compatible

1) Functional license needed
2) SFP are non-codelocked

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SAFN-CM - TECHNICAL DATA – CARRIER ETHERNET CONTROL UNIT

CU Carrier Ethernet Plus, 8 ports CU Carrier Ethernet Plus, 24 ports	
Ethernet interfaces T33008.02 3)	4 x 100 MbE / 1/2.5/10 GbE SFP and 4 x 100 MbE / 1/2.5 GbE SFP
Ethernet interfaces T33024.02 3)	4 x 100 MbE / 1/2.5/10 GbE SFP and 4 x 100 MbE / 1/2.5 GbE SFP and 16 x 10/100/1000 BASE-T RJ-45
Backplane access	2 x 10GE (CE to CE) 16 x 1GE (CE to CEI) 4 x 1GE (CE to Eth TU) 1 x 1GE (local management)
Layer 2 switching	Switching capacity max. 80 Gbps IEEE 802.3 CSMA/CD physical layer specifications IEEE 802.1D Media Access Control Bridges VLAN (IEEE 802.1Q) QoS (IEEE 802.1p) Link aggregation (IEEE 802.3ad) Flow control (IEEE 802.3x) Spanning tree (IEEE 802.1D, 802.1w, 802.1s) IGMP snooping (RFC 3376) GVRP
Layer 3 forwarding	IPv4/IPv6 L3 routing OSPF routing for remote management L3 multicast
Carrier Ethernet features (MEF CE2.0)	MEF UNI and NNI functionality HW-based OAM, performance, monitoring, and testing (IETF RFC 2544, ITU-T Y.1564) 454 x Ethernet Virtual Circuits (EVC) E-LINE, E-LAN VLAN Stacking Q-in-Q (IEEE 802.1ad)
MPLS-TP 1)	Virtual Private Wire & LAN Service (VPWS & VPLS) 200 x pseudo wires 200 x MPLS-TP tunnels 200 x LSP support Static LSP/PW provisioning via NMS 8 x CoS
Ethernet services	E-Line EV-Line E-LAN EV-LAN E-Tree EV-Tree E-Access E-Transit
TDM over Packet 2)	SAToP 128 x E1/VC-12 (IETF RFC 4553 MEF8) 1+1 path protection, TDM + SAToP CESoP 127 x 64k (IETF RFC5086)
TDM cross connection, time slot level 1)	Connection Matrix size 3968 x 64kbps B-type point-to-point 64kbps time slot connections TDM 64 kb/s data P2MP cross connection TDM 64 kb/s voice P2MP cross connection

1) DS0 cross connectlicense needed
2) SAToP enabler licenseneeded at nativepacket node. SAToP included to Hybrid node basic license
3) SFP are non-codelocked

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SAFN-CM - TECHNICAL DATA – CARRIER ETHERNET CONTROL UNIT

CU Carrier Ethernet Plus, 8 ports **CU Carrier Ethernet Plus, 24 ports**	
Quality of Service (QoS)	Advanced QoS Hierarchical QoS Dual rate policing, shaping, queuing & statistics
Protection	Protection switching (sub 50 ms) 1:1 port protection (ITU-T G.8031/Y.1342) 1:N Port Protection G.8031 ERPS (ITU-T G.8032v2/Y.1344)
Synchronization	Precision Time Protocol (PTP) over Ethernet (IEEE 1588v2; ITU-T G.8275.1) Precision Time Protocol (PTP) telecom profile for phase/time synchronization with partial timing support from the network (IEEE 1588v2; ITU-T G.8275.2) Precision Time Protocol (PTP) over IP (IEEE 1588v2; ITU-T G.8265.1) Precision Time Protocol (PTP) Power profile C37.238)1) Adjustable port ingress/egress latency Maximum absolute time error – TE: 30 ns (G.8273.2) Maximum constant time error – cTE: 10 ns (G.8273.2) Synchronous Ethernet (SyncE; ITU-T G.8261) E1 2,048MHz
Data encryption 1)	L2 level AES-GCM 128/192/256 Encryption with authentication or authentication only Per VLAN/VLANs at a port Maximum 256 individual services Maximum encryption capacity 2 Gbps MTU decrypted 1972 bytes / encrypted 2042 bytes
OAM	End to end circuit provisioning via NMS OAM for Ethernet (IEEE 802.1ag, ITU-T Y.1731) OAM for MPLS-TP (ITU-T G.8113/Y.1372)
Security	RADIUS TACAS+ Access Control Lists
Management **1)** Functional license needed	CLI Web GUI SNMP v2c / v3 Syslog RFC 5424 (UDP)

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SAFN-CM - TECHNICAL DATA – INTERFACES

CEI - Carrier Ethernet Interface Unit RJ45	
Ethernet interface	8 x 10/100/1000 BASE-T RJ-45
Switching capacity	Non-blocking
Backplane access	8 x 1GE (CE to CEI)
Switching functionality	All CU CE features; switch matrix at CU CE units
Maximum frame size	10240 bytes
Switchover time from active to stand-by CU CE unit	Maximum 500 ms
PoE PSE	IEEE 802.3af Type 1 IEEE 802.3.at Type 2
PoE PSE maximum power per interface	Type 1: 15 W Type 2: 30 W
PoE PSE maximum total power per subrack	200 W
Alarms	Loss of Link Port MEP

CEI - Carrier Ethernet Interface Unit SFP	
Ethernet interface	8 x 100 MbE / 1 GbE SFP Digital diagnostics
Backplane access	8 x 1GE (CE to CEI)
Switching capacity	Non-blocking,
Switching functionality	All CU CE features, switch matrix at CU CE units
Maximum frame size	10240 bytes
Switchover time from active to standby CU CE unit	Maximum 500 ms
Alarms	Loss of Link SFP alarm Port MEP

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SAFN-CM - TECHNICAL DATA – INTERFACES

Ethernet Unit 1000BT, 8 ports	
RJ-45 interface	6 x 10/100/1000BASE-T Full duplex or half duplex Auto negotiation 4 x PoE
SFP interface	1 x 10/100/1000BASE 1 x 1000BASE Transceiver type selected by SFP Digital diagnostics
Maximum frame size	1632 bytes
L2 switching	VLAN (IEEE 802.1Q) QoS (IEEE 802.1p) Port statistics Backplane capacity 1Gbps
PoE PSE	IEEE 802.3af
PoE PSE maximum power	15 W
Alarms	Loss of Link
E1/T1 Unit, 8 ports, 75 ohm **E1/T1 Unit, 8 ports, 120 ohm**	
G.703 interface	8 x SMB (T32003.01) 8 x RJ-45 (T32003.11)
Impedance	75 ohm (T32003.01) 120 ohm (T32003.11)
Framing	G.704 or unframed
E1 interface	Short haul, maximum attenuation 6 dB
Alarms	Loss of Signal, RxAIS, Loss of Frame, Loss of Multiframe (LOM), BER 10E-3, RDI (Remote Defect Indicator)
Testing utilities	Loop to Equipment, Loop to Line (local loop), Loop to Equipment and Line

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SAFN-CM - TECHNICAL DATA – INTERFACES

Data Unit V and X, 4 ports	
4-port SSC interface	V.28, V.11, V.35, X.21, RS-530, RS-530A
Interface type	DCE or DTE
Transmission mode	Asynchronous / synchronous: V.28, V.11, V.35, X.21, RS-530, RS-530A Asynchronous: By using async / sync conversion (ITU-T Rec. V.14 or over sampled)
Transmission rate	48 kbit/s, 56 kbit/s, nx64 kbit/s up to 1984 kbit/s Subrates by using V.110 rate adaptation: 0.6...56 kbit/s Subrates by using transition coded, sampling or sampling&filtered: 0.6...19.2 kbit/s
Alarms	Loss of Signal, Loss of Clock, Loss of V.110 Frame
Testing utilities	Loop to Line (local loop), Loop to Equipment, BERT towards line or equipment
Telecontrol	IEC 60870-5-101
Data Unit G.703/64k, 8 ports	
G.703 / 64 kbit/s interfaces	8 x RJ-45
Impedance	120 ohm
Signaling	co-directional / contra-directional
Alarms	Loss of Signal, AIS, Loss of Octet Timing
Testing utilities	Loop to Line (local loop), Loop to Equipment, BERT towards line or equipment
Data Unit V.24, 20 ports	
V.24 interfaces	4 x SSC connectors, 5 ports / SSC
Transmission mode	DCE Asynchronous V.110: By using async / sync conversion (ITU-T Rec. V.14 or over sampled) Transition coded (ITU-T Rec.
Transmission rate	V.110: 0.6...38.4 kbit/s Transition coded and sampled 64k: 0.6...19.2 kbit/s
Alarms	Toggled (non-activity of incoming signal), Loss of V.110 Frame
Testing utilities	Loop to Line (local loop), Loop to Equipment, BERT towards line or equipment
Telecontrol	IEC 60870-5-101

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SAFN-CM - TECHNICAL DATA – INTERFACES

Optical Teleprotection Unit, 4 ports	
Optical interfaces	8 x ST connector, 4 ports nx64 kbit/s payload (n = 1...12); multimode fiber; transmission capacity per port: 64...768 kbit/s
Protocol	IEEE C37.94
Fiber type	50/125 µm or 62.5/125 µm multimode optical fiber
Distance	Max. 1.5...2 km; depends on used fiber and the selected OTP transmitter level
Optical receiver sensitivity	-32 dBm (±2 dB)...-11 dBm (±2 dB)
Optical transmitter wavelength	830 nm ± 40 nm
Optical transmitter level	50 µm fiber: > -23.0 dBm (±2 dB) and < –11.0 dBm (±2 dB) 62.5 µm fiber: > -20.5 dBm (±2 dB) and < –14.3 dBm (±2 dB) OTP transmitter level is SW settable
Bit rate	2048 kbit/s ± 100 ppm
Alarms	Loss of Signal Loss of Clock Loss of Frame Remote Defect Indicator (RDI) AIS AIS signal to line / equipment
Testing utilities	Loop to Line (local loop), Loop to Equipment BERT towards line or equipment Round trip delay measurement

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SAFN-CM - TECHNICAL DATA – INTERFACES

Optical Teleprotection SFP Unit , 4 ports	
Optical interfaces	4 x SFP nx64 kbit/s payload (n = 1...12); multimode or single-mode fiber; transmission capacity per port: 64...768 kbit/s
Protocol	IEEE C37.94 Direct mode for non-standard interfaces
Fiber type	50/125 µm or 62.5/125 µm multimode optical fiber 9/125 µm single-mode fiber
SFP type	Standard (LVDS) Single-ended (LVTTL)
Distance	Depends on used fiber and SFP
Bit rate	2048 kbit/s ± 100 ppm
Transport	Timeslot mode Direct mode, 2,048Mbps User data inversion User data time slot shift
Alarms	Loss of Signal Loss of Clock Loss of Frame, Remote Defect Indicator (RDI) AIS AIS signal to line / equipment Tx Fault SFP
Testing utilities	Loop to Line (local loop), Loop to Equipment BERT towards line or equipment Round trip delay measurement'

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SAFN-CM - TECHNICAL DATA – INTERFACES

VF/E&M Unit, 8 ports	
8-port SSC interface	8 x 2-wire / 4-wire
Impedance 4-wire	600 ohm
Impedance 2-wire	600 ohm 900 ohm 600 ohm + 2.16 µF 900 ohm + 2.16 µF 270 ohm + 750 ohm || 150 nF 220 ohm + 820 ohm || 120 nF 220 ohm + 820 ohm || 115 nF 370 ohm + 620 ohm || 310 nF
Transmit / Receive Level settings	-30.0...+15.5 dB (freely selectable values)
Signaling	3 x E and 3 x M per port
Alarms	AIS
Testing utilities	Tx/Rx test tone, Equipment loop from digital to digital direction, Line loop from analog to analog direction
FXS Unit, 16 ports	
RJ-45 interface	8 connectors, 2 ports/connector
Integrated ring generator	25 Hz / 50 Hz
Impedance	600 ohm 900 ohm 600 ohm + 2.16 µF 900 ohm + 2.16 µF 270 ohm + 750 ohm || 150 nF 220 ohm + 820 ohm || 120 nF 220 ohm + 820 ohm || 115 nF 370 ohm + 620 ohm || 310 nF
Cable maximum length	10 km @ 0,4mm
Transmit / Receive Level settings	-30.0...+6.0 dB; selectable values: -30.0, -20.0, -15.0, -12.0, -10.0, -8.0, -6.0, -5.0, -4.0, -3.0, -2.0, -1.0, 0.0, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0
Signaling	R2 / Hot Line / Custom CAS
Alarms	AIS
Testing utilities	Tx/Rx test tone, Equipment loop from digital to digital direction, Line loop from analog to analog direction,

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SAFN-CM - TECHNICAL DATA – INTERFACES

FXO Unit, 16 ports	
RJ-45 interface	8 connectors, 2 ports/connector
Alarms	AIS
Transmit / Receive Level settings	-15.0...+12.0 dB (values selectable in 1 dB steps)
Signaling	R2 / Hot Line / Custom CAS
Testing utilities	Tx/Rx test tone, Equipment loop from digital to digital direction, Line loop from analog to analog direction.
Advanced DXC Unit	
Cross-connect capacity	Based on license Maximum cross-connect capacity: 189 x E1 / VC-12 links (equivalent to 63 E1 Y loops) Granularity: 8 kbit/s...nx64 kbit/s, non-blocking
Connection types	B, point-to-point connection with support for max. 2 condition bits Y, loop protection with support for pilot bit C, digital summing with support for max. 2 condition bits S, VF summing with support for max. 2 condition bits M, bit masking with support for max. 2 condition bits D, fixed data pattern with support for max. 2 condition bits
Framing	G.704 framed; PCM30, PCM30CRC4, PCM31, PCM31CRC4
Redundancy	1+1 hot stand-by

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SAFN-CM - TECHNICAL DATA – INTERFACES

Alarm Unit	
Relay interface	1 connector, 3 relay outputs, cable connector 6-position Phoenix MC1.5/6-ST-3.81; dry loop or ground connection
Relay output	Logical “0” level resistance > 100 kohm Logical “1” level resistance < 100 ohm Maximum voltage between relay contacts (relay open) 100 V Maximum current 100 mA; 2A with jumper NR5/6/7R connected
Digital interfaces	3 connectors, 15 inputs, cable connector 6-position Phoenix MC1.5/6-ST-3.81; E&M or TTL; Alarm filtering time 10 ms...10 min
Digital input E&M state	Logical “0” level < 100 ohm to ground Logical “1” level > 100 kohm to ground Nominal voltage -10.0 V (open circuit) Nominal current limit (shorted to ground) -1.8 mA
Digital input TTL state	Logical “0” level < 0.8 V Logical “1” level > 2.4 V Nominal voltage 3.0 V (open circuit) Nominal current limit (shorted to ground) 1.5 mA
Analog interface	1 connector, 4 inputs, cable connector 6-position Phoenix MC1.5/6-ST-3.81; Alarm filtering time 10 ms...10 min
Analog input	Measurement scale: -120 VDC...+120 VDC (LSB 0.3 V) or 0.0 VDC...3.3 VDC (LSB 4 mV) Accuracy 1% 10-bit A/D conversion Sampling rate approx. 10 kHz Averaging filter follows alarm filter setup.

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SAFN-CM - TECHNICAL DATA – MECHANICS

Subrack 6-Slot	
Installation capacity	2...4 tributary units
Size (w x h x d)	439 mm x 88 mm x 282 mm (2U height)
Subrack 16-Slot	
Installation capacity	12...14 tributary units
Size (w x h x d)	439mm x 269mm x 282mm (6U height)
Air Filter	T32009.30: Optional dust filter to left hand side fan.
Fan Unit for 6-Slot Subrack	
Maximum rotation	6900 rpm
Lifetime of fans	8 years (at +20 °C ambient temperature)
Air flow	75 m3/h (6900 rpm)
Fan Unit for 16-Slot with alarm output	
Maximum rotation	6000 rpm
Lifetime of fans	8 years (at +20 °C ambient temperature)
Air flow	130 m3/h (6000 rpm)
Alarm interface	3-position Phoenix MC1.5/3-G-3.81 (unit connector) 3-position Phoenix MC1.5/3-ST-3.81 (cable connector) Characteristics of relay contact: U = 57 V , I max = 500 mA
Blanking Plate (5 pcs)	**All empty slots in a subrack must be covered with blanking plates.**
ETSI brackets for CM 6-Slot Subrack	**Optional installation accessory.**
ETSI brackets for CM 16-Slot Subrack	**Optional installation accessory.**

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SAFN-CM - TECHNICAL DATA – POWER

Power Adapter DC	Interfaces
Battery	2 x voltage inputs
RJ-45 interface SYNC	E1, 120 ohm
Alarms	Loss of Signal, RxAIS, Loss of Frame
Testing utilities	Loop to Equipment, Loop to Line (local loop),
RJ-45 interfaces ETH1 and ETH2	10/100BASE-T local management interfaces

Power adapter options	6-Slot Subrack	16-Slot Subrack	ETH1, PoE PSE 3)	Voltage monitor 4)
T32008.01 Power Adapter DC 48V	✓	✓ 2)	✓	✓
T32008.05 Power Adapter DC 48V Lite	✓	✓ 2)	-	-
T32008.02 Power Adapter DC 24-60V/48V 1)	✓	-	✓	✓
T32008.11 Power Adapter DC 48V Bus Ext.	-	✓	✓	✓
T32008.15 Power Adapter DC 48V Bus Ext. Lite	-	✓	-	-
T32008.12 Power Adapter DC 110V Bus Ext.	✓	✓	✓	✓

1) Mixed installation of the power adapter variant DC 24-60V/48V and the other variants – DC 48V and DC 110V – in a single subrack is not acceptable
2) Only slots 1-8 supported
3) IEEE802.3af
4) Battery input voltage and current monitor

DC Power Adapter voltages					
Unit	**Umax (V)**	**Umin (V)**	**Pmax out (W)**	**Imax (A)**	**Breaker size (at 80V) 2)**
Power Adapter DC 48V	-36	-570	400 W	9.98 A	10 A
Power Adapter DC 24-60/48V	-200	-720	80 W at 24V 120 W at 48V	4 A (24V) 3 A (48V)	10 A
Power Adapter DC 48V Bus	-36	-570	400 W	9.98 A	10 A
Power Adapter DC 110V Bus	-77	-138	300 W	3.90 A	5 A 3)

2) Breaker located on the board
3) Glass tube fuse

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SAFN-CM - TECHNICAL DATA – POWER CONSUMPTION, WEIGHT AND MTBF

Product	Power consumption (max. W)	Weight (g) (includes package)	MTBF (years)
CU SDH	50	750	26
CU Carrier Ethernet plus 8 ports	30	600	40
CU Carrier Ethernet plus 24 ports	40	880	30
Carrier Ethernet RJ45 IF Unit, 8 ports	18 **1)**	530	65
Carrier Ethernet SFP IF Unit, 8 ports	15	500	94
Ethernet Unit 1000BT, 8 Ports	12 **1)**	540	60
E1/T1 Unit, 8 ports, 75 ohm	8	490	104
E1/T1 Unit, 8 ports, 120 ohm	8	490	114
Data Unit V and X, 4 ports	9	500	69
Data Unit G.703/64k, 8 ports	5	560	62
Data Unit V.24, 20 ports	5	500	69
Optical Teleprotection Unit, 4 ports	5	490	43
Optical Teleprotection SFP Unit, 4 ports	10	490	118
VF/E&M Unit, 8 ports	10	580	26
FXS Unit, 16 ports	20	600	54
FXO Unit, 16 ports	20	520	45
Fan Unit for 6-Slot Subrack	9	400	190
Fan Unit for 16-Slot Subrack with alarm output	29	1780	230
Power Adapter DC 48V	6 **1)**	630	91
Power Adapter DC 48V Lite	6	630	111
Power Adapter DC 24-60/48V	15	690	82
Power Adapter DC 48V Bus Extension	15 **1)**	720	69
Power Adapter DC 110V Bus Ext.CM	165	690	62

1) Without PoE (Power over Ethernet) load.

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SAFN-CM - TECHNICAL DATA – POWERCONSUMPTION, WEIGHT AND MTBF

Product	Power consumption (max. W)	Weight (g) (includes package)	MTBF (years)
Power Adapter DC 48V Bus Extension Lite	15	720	80
Subrack 6-Slot	n/a	3920	568
Subrack 16-Slot	n/a	9160	326
Advanced DXC Unit	8	450	122
Alarm Unit	5	490	50
SFP transceiver	1	40	380

SAFN-CM - TECHNICAL DATA – ENVIRONMENTAL – COMPLIANCE WITH STANDARDS

Climatic	Operation: EN 300 019-1-3, Class 3.2 Continuous operating temperature: -5 to +55 °C Continuous operating relative humidity: 5 to 95% Temporary operation: maximum 16 h at +65 °C Storage: EN 300 019-1-1 Class 1.2 (-25 to +55 °C) Transport: EN 300 019-1-2 Class 2.3 (-40 to +70 °C)
EMC	EN 300 386 V1.6.1 EN 55032 EN 50121-4 EN 61850-3:2014 clause 6.7
Safety	EN 60950-1 IEC 62368-1:2023 EN 60825-2 (Class 1 laser product)
RoHS	EN IEC 63000:2018

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SAFN-CM - TECHNICAL DATA – FUNCTIONALITIES – COMPLIANCE WITH STANDARDS

CSAFN-CM complies with the relevant parts of the below standards.

SDH standards	ITU-T G.664 Optical safety procedures and requirements for optical transport systems **1)** ITU-T G.702 Digital hierarchy bit rates ITU-T G.703 General physical/electrical characteristics of hierarchical digital interfaces ITU-T G.704 General synchronous frame structures used at 1544, 6312, 2048, 8448 and 44736 kbit/s levels **2)** ITU-T G.706 Frame alignment and CRC procedures relating to basic frame structures defined in recommendation G.704 ITU-T G.707 Network node interface for the synchronous digital hierarchy ITU-T G.783 Characteristics of synchronous digital hierarchy (SDH) equipment functional blocks ITU-T G.784 SDH management ITU-T G.785 Characteristics of a flexible multiplexer in a synchronous digital hierarchy environment**3)** ITU-T G.803 Architecture of transport networks based on the SDH ITU-T G.805 Generic functional architecture of transport networks ITU-T G.825 The control of jitter and wander within digital networks which are based on the SDH ITU-T G.826 End-to end performance parameters and objectives ITU-T G.828 Error performance parameters and objectives for international, constant bit-rate synchronous digital paths ITU-T G.829 Error performance events for SDH multiplex and regenerator sections ITU-T G.841 Types and characteristics of SDH network protection architectures ITU-T G.957 Optical interfaces for equipment and systems relating to the synchronous digital hierarchy ITU-T G.7041/Y.1303 Ethernet encapsulation (GFP) ITU-T X.85, X.86, Y.1321 Ethernet encapsulation ITU-T G.7042/Y.1305 Link capacity adjustment scheme (LCAS) for virtual concatenated signals ITU-T G.707/Y.1322 Network node interface for SDH RFC 1619/1662/2615, PPP data encapsulation over SONET/SDH for remote communications ETS 300 147 Synchronous digital hierarchy multiplexing structure ETS 300 417 Transmission and multiplexing; Generic requirements of transport functionality of equipment **4)** ETS 300 417-1-1 / EN 300 417-1-1 V1.1.2 Generic processes and Performance **5)** ETS 300 417-2-1 / EN 300 417-2-1 V11.2 SDH and PDH physical section layer functions **6)** ETS 300 417-3-1 / EN 300 417-3-1 V1.1.2 STM-N regenerator & multiplex section functions **4)** ETS 300 417-4-1 / EN 300 417-4-1 V1.1.2 SDH path layer functions ETS 300 417-6-1 / EN 300 417-6-1 V1.1.2 Synchronization layer functions **7)** ETS 300 462-1 / EN 300 462-1-1 V1.1.1 Transmission and multiplexing; Generic requirements for synchronization networks; Part 1: definitions and terminology for synchronization networks EN 300 462-4-1 V1.1.1 Transmission and multiplexing; Generic requirements for synchronization networks; Part 4-1:Timing characteristics of slave clocks suitable for synchronization supply to SDH and PDH equipment **7)** ETS 300 462-5 / EN 300 462-5-1 V1.1.2 Transmission and multiplexing; Generic requirements for synchronization networks; Part 5:Timing characteristics of slave clocks suitable for operation in SDH equipment **7)**

1) ALS supported, no APR
2) Only 2048 Kbps
3) Not supported: Synch interface at 2048 kHz
4) Data rates STM-1/4/16. No MS-SPRing protection
5) No MS-SPRing protection
6) Data rates STM-1/4/16
7) Only 2Mbps and optical STM-n

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SAFN-CM - TECHNICAL DATA – FUNCTIONALITIES – COMPLIANCE WITH STANDARDS

SAFN-CM complies with the relevant parts of the below standards.

E1 standards	**ITU-T G.703, G.704, G.706, G.732, G.735 1), G.736, G.7371), G.823**
Clocking	ITU-T G.957, G.692, G.810, G.811, G.812, G.813
V and X standards	ITU-T V.14, V.110, R.111, V.24/V.28, X.21(V.11), V.35
Ethernet	RJ-45 interfaces 10BASE-T IEEE 802.3i 100BASE-T IEEE 802.3u 1000BASE-T IEEE 802.3ab SFP interfaces 100BASE-T IEEE 802.3u 1000BASE IEEE802.3z 2.5GBASE IEEE802.3bz 10GBASE IEEE8023.ae
Voice channels	ITU-T G.711, G.712
Optical teleprotection	IEEE C37.94-2017
DCC Interoperability	ITU-T G.7712 IP only mode RFC STD51/RFC 1661
Management	RFC 1213 MIB 2 RFC 2558 SONET MIB
Routing (DCC channel)	RFC 1058, RFC 2453 RIP RFC 2328 OSPF
Syslog	RFC 3164 RFC 3195
Power over Ethernet	IEEE802.3af IEEE802.3at

1) 64k supported

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SAFN-CM - TECHNICAL DATA – FUNCTIONALITIES – COMPLIANCE WITH STANDARDS

SAFN-CM complies with the relevant parts of the below standards.

MPLS-TP standards	ITU-T G.8101/Y.1355 Terms and definitions for MPLS transport profile ITU-T G.8110/Y.1370 MPLS layer network architecture ITU-T G.8110.1/Y.1370.1 Architecture of the Multi-Protocol Label Switching transport profile layer network ITU-T G.8112/Y.1371 Interfaces for the MPLS transport profile layer network ITU-T Y.1731 OAM functions and mechanisms for Ethernet based networks ITU-T G.8113.1/Y.1372.1 Operations, administration and maintenance mechanism for MPLS-TP in packet transport networks ITU-T G.8121/Y.1381 Characteristics of MPLS-TP equipment functional blocks ITU-T G.8121.1/Y.1381.1 Characteristics of MPLS-TP equipment functional blocks supporting ITU-T G.8131/Y.1382 Linear protection switching for MPLS transport profile ITU-T Y.1731 G.8113.1 OAM functions and mechanisms for Ethernet based networks RFC 3032 MPLS Label Stack Encoding RFC 3270 Multi-Protocol Label Switching (MPLS) Support of Differentiated Services RFC 3443 Time To Live (TTL) Processing in Multi-Protocol Label Switching (MPLS) Networks RFC 4448 Encapsulation Methods for Transport of Ethernet over MPLS Networks RFC 4762 Virtual Private LAN Service (VPLS) Using Label Distribution Protocol (LDP) Signaling RFC 5085 Pseudowire VCCV: A Control Channel for Pseudowires RFC 5586 MPLS Generic Associated Channel RFC 5654 MPLS-TP Requirements RFC 5921 A Framework for MPLS in Transport Networks RFC 5950 Network Management Framework for MPLS-TP Networks RFC 5951 Network Management Requirements for MPLS-TP Networks RFC 5960 MPLS Transport Profile Data Plane Architecture RFC 6073 Segmented Pseudowire RFC 6370 MPLS Transport Profile (MPLS-TP) Identifiers RFC 7026 Retiring TLVs from the Associated Channel Header of the MPLS Generic Associated Channel RFC 7213 MPLS Transport Profile (MPLS-TP) Next-Hop Ethernet Addressing RFC 7708 Using a Generic Associated Channel Label as a Virtual Circuit Connectivity Verification Channel Indicator 1:1 bidirectional EVC protection with working and protection LSPs using G.8031 1:1 bidirectional EVC protection with working and protection PWs using G.8031 Ring protection with LSP monitoring using G.8032

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SAFN-CM - TECHNICAL DATA – COMPLIANCE WITH STANDARDS - DETAILS

Standard	Test	Test object	Level
EN 55032 (2012)	Radiated emissions	Enclosure port, 30 MHz...6 GHz	Class B
EN 55032 (2012)	Conducted emissions	DC power port	Class B
		Signal port	Class B
EN 61000-4-2 (2009)	Electrostatic discharge immunity	Contact discharge	±6 kV
		Indirect contact discharge	±6 kV
		Air discharge	±8 kV
EN 61000-4-3 (2006); +A1 (2008); +A1 (2010)	Radiated RF field immunity	Enclosure ports, 80...2700 MHz	10 V/m
		Enclosure ports, 800...1000 MHz	20 V/m
EN 61000-4-4 (2004); +A1 (2010)	Electrical fast transient/burst immunity	DC power port	±4 kV
		Signal ports	±2 kV
EN 61000-4-5 (2006)	Surge immunity	DC power port line to line	±2 kV
		DC power port line to GND	±2 kV
		Signal ports line to GND	±2 kV
EN 61000-4-6 (2009)	Conducted RF immunity	DC power port	10 V
		Signal ports	10 V
EN 61000-4-8 (2010)	Power frequency magnetic field immunity	Enclosure port	300 A/m
EN 61000-4-9 (2009)	Pulsed magnetic field immunity	Enclosure port	±300 A/m
EN 61000-4-16	Conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz	DC power port	Continuo us 30V / 60s
			Pulse 300V / 1s

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SAFN-CM - TECHNICAL DATA – COMPLIANCE WITH STANDARDS - DETAILS

Standard	Test	Test object	Level
EN 61000-4-18 (2010); +A1 (2010)	Slow damped oscillatory wave immunity	DC power input, common mode	2.5 kV
		DC power input, differential	2.5 kV
		Signal ports, common mode	1 kV
		Signal ports, differential	1 kV
EN 61000-4-29 (2000)	Test voltage level during dip, % of rated voltage	DC-power supply cable	B
IEC 61000-4-12 (1995)	Oscillatory waves immunity	DC power port	2.5 kV
		Signal ports	2.5 kV
IEC 61000-4-17	DC power, ripple immunity	DC power port	10%
ITU-T K.45	Surge immunity	Signal ports outdoor	±1500 V

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