MASTERS IN MISSION CRITICAL COMMUNICATIONS

XTran Core Nodes

XT-2215-A: 1 NSM, 2 PSUs, 2 CSMs, 15 IFMs (S30926-B2215-X1)

OTN Systems
committed to get your information across

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Contents

List of figures

List of Tables

1. INTRODUCTION

1.1 General

This document is valid as of XTran Release 4.4.

The XTran product line has been designed for industrial MPLS-TP networks. The XTran Core nodes (XT-2215-A) have a ruggedized design and are compliant with the EMC standards listed in Ref.[5] in Table 1. All nodes are modular and 19" Rack mountable, see also Table 2 and Ref.[1] in Table 1 for an overview of the possible mounting kits.

NOTE: Core Nodes are the new generation high speed nodes with speeds up to 40 Gbps. Aggregation nodes (see Ref. [9] in Table 1) are the first generation nodes with speeds up to 10 Gbps.

All nodes are equipped with a Node Support module (=NSM), which hosts functions like I/O contacts and inputs for external PoE (=Power Over Ethernet, only on NSM-A) power supplies.

A node requires at least an NSM, one power supply unit (=PSU) and one central switching module (=CSM540-A). Each node provides a number of slots for interface modules to communicate with applications like Ethernet, SHDSL, E1/T1, C37.94 ...

- Nodes can be interconnected via copper cable or optical fiber.

Node XT-2215-A can be equipped with:

- NSM-A/B + Interface adapter kit (required);
- Dual PSUs (AC, DC) for redundancy purposes (one PSU is required);
- Dual CSMs for redundancy purposes (one CSM is required);
- 2 dedicated 9-L3A-L(=main)/9-L3EA-L (=extension) combinations;
- 5 Fan Modules (each module includes 6 fans) for cooling purposes;
- 15 universal IFM slots (≤ 60 back end ports)
  - Existing IFMs designed for aggregation nodes (Ref. [9] in Table 1) can be used in Core nodes provided that they are installed via an interface adapter kit;
  - New IFMs designed for core nodes: 4-10G-LW, 1-40G-LW, …

An example of an XTran network can be found in the figure below. The network is managed by a TXCare PC (=XTran Management System), see also Ref. [2Mgt] in Table 1.

The high capacity core node XT-2215-A is ideal to build up the high bandwidth network that operates as the core network. The other node types can be used to build up the aggregation network which might require less bandwidth availability.

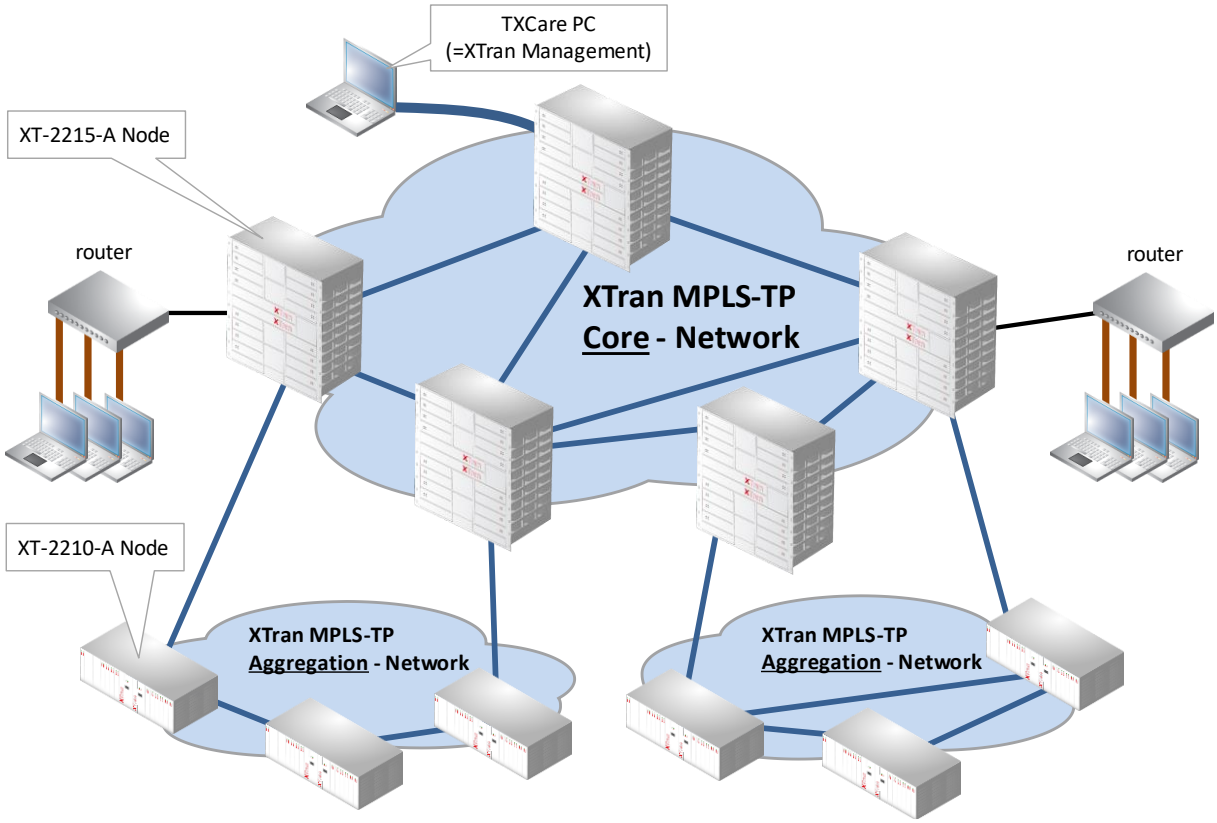

Figure 1 XTran MPLS-TP Network

1.2 Manual References

Table 1 is an overview of the manuals referred to in this manual. '&' refers to the language code, '*' refers to the manual issue. All these manuals can be found in the TXCare (=XTran Management System) Help function. Table 2 shows the ordering numbers.

Table 1 Manual References

Ref.	Number	Title
[1]	XA-M801-&-*	XTran Installation and Operation
[2Mgt]	XA-M830-&-*	TXCare Management Operation
[2Eth]	XA-M831-&-*	XTran Ethernet Services
[3]	XD-M803-&-*	XTran Central Switching Module: CSM310-A/CSM540-A
[4]	XE-M807-&-*	XTran Interface Module: 4-GC-LW/4-GCB-LW
[5]	XA-M810-&-*	XTran General Specifications
[6]	XE-M823-&-*	XTran Interface Module: 9-L3A-L (=main) / 9-L3EA-L (=extension)
[7]	XE-M842-&-*	XTran Interface Module: 1-40G-LW
[8]	XE-M843-&-*	XTran Interface Module: 4-10G-LW
[9]	XB-M801-&-*	XTran Aggregation Nodes: XT-2210-A, XT-2209-A, XT-2206-A, XT-1104-A
[100]	XA-M828-&-*	XTran Bandwidth Overview

Table 2 Product Ordering Numbers

Ordering Number	Description
S30926-B2215-X1	Node: XT-2215-A (5 Fans included, NSM not included)
C30965-A9550-D16	Interface adapter kit (3HU interface to XT-2215-A slots)
S30924-Q110-X101	Fan module for XT-2215-A, for spares only
C30965-A9550-F3	Dust filter kit for XT-2215-A
S30924-Q100-X101	Node Support Module (NSM-A)
S30924-Q100-X201	Node Support Module (NSM-B)
V30912-A5020-A4	AC PSU 100 to 240 VAC ± 10 % for XT-2215-A (ACP-B)
V30912-A5020-A5	DC PSU 36 to 60 VDC for XT-2215-A (DCP-C)
V30912-A5020-A6	DC PSU 88 to 300 VDC for XT-2215-A (DCP-D)
V30812-A5020-A97	ACPoE-A External DIN rail PSU (=AC 100-240 VAC Wide-range Input)
V30812-A5020-A98	DCPoE-A External DIN rail PSU (=33-62V Input)
C30965-A9550-B201	Empty IFM cover plate for XT-2215-A
C30965-A9550-B202	Empty PSU cover plate for XT-2215-A
C30965-A9550-B203	Empty CSM cover plate for XT-2215-A
V30812-A3060-A9	Europe: AC PSU Cable with locking mechanism (2.5m) for AC PSU 100 to 240 VAC ± 10 %
V30812-A3060-A10	Europe: AC PSU Cable with locking mechanism (5m) for AC PSU 100 to 240 VAC ± 10 %
V30812-A3060-A12	UK: AC PSU Cable with locking mechanism (2.5m) for AC PSU 100 to 240 VAC ± 10 %
V30812-A3060-A13	US: AC PSU Cable with locking mechanism (2.5m) for AC PSU 100 to 240 VAC ± 10 %
S30927-C1-A30	Cable (3m) to connect External DIN rail PoE PSU to the NSM
S30927-C16-A30	DC PSU Cable (3x4mm², 3m) with coding keys for DC PSU 36 to 60 VDC (DCP-C)
S30927-C17-A30	DC PSU Cable (3x4mm², 3m) with coding keys for DC PSU 88 to 300 VDC (DCP-D)

2. NODE DESCRIPTION

2.1 General

The XTran core node consists of a 11 U (11 U = 488.95 mm = 19.25 inches) high, 19 inches rack stainless steel (*) chassis. The EMC shielding of the chassis complies with the EMC standards listed in Ref.[5] in Table 1. This node type has a modular structure.

NOTE: (*) Stainless steel according EN A2 1.4016.

The following modules can be installed (see Figure 2):

- Node Support Module (NSM);
- 2 Power Supply Units (PSU-1/PSU-2);
- 15 Interface Modules (IFM-1,…, IFM-15);
- 5 Fan Modules (each module includes 6 fans), default available in the node;
- 2 Central Switching Modules (CSM-1/CSM-2);
- Backplane speeds (G=Gbps) by design are indicated as well. The real available bandwidth per slot depends on the used CSM, the IFM and the current release. This can be found in Ref. [100] in Table 1.

NOTE: For installation of all these modules, see See Ref.[1] in Table 1.

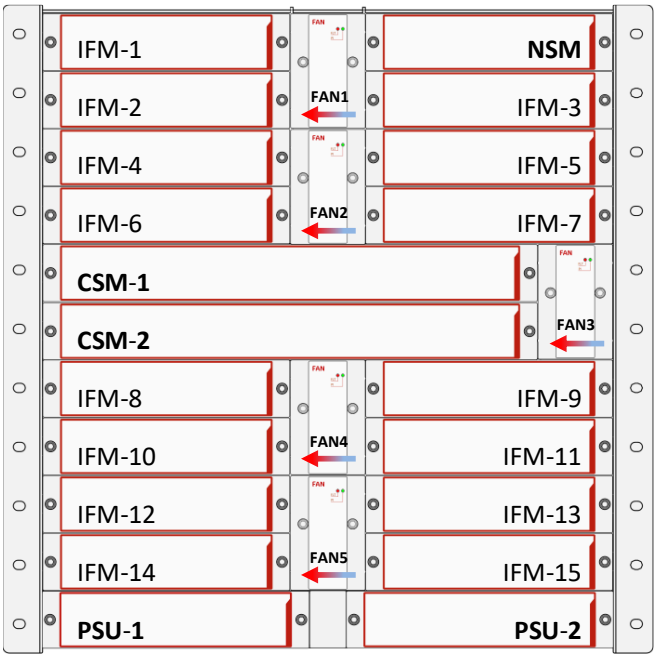

Figure 2 XT-2215-A Node

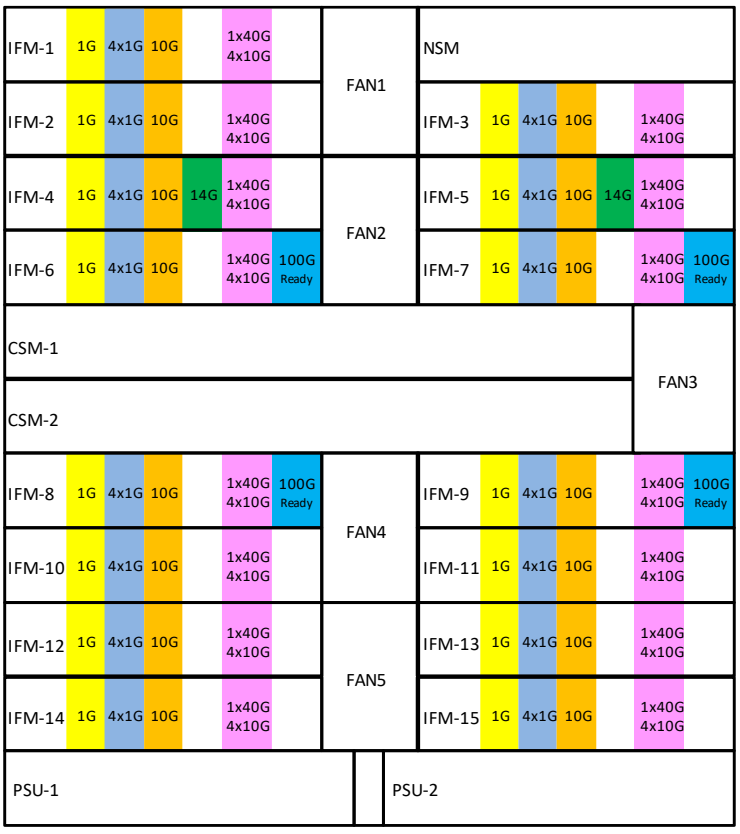

Figure 3 XT-2215-A Node Backplane Speeds by Design

2.2 NSM (=Node Support Module)

2.2.1 General

The NSM is required in each XTran node and performs the functions below via its front panel. Insert the interface adapter kit (see figure below) in the NSM slot in the node first and tighten its socket heads via a hex key. Next, insert the NSM into the interface container and tighten the NSM fastening screws after plugging in the NSM.

- Status indication of PSU(s) and CSM(s);
- Status and connection of Digital I/O;
- On NSM-A only: Status and connection of PoE Power inputs (redundant);
- Manual switch over of the active CSM via hidden push button;

The following functions can be performed via the module board itself (after unplugging it):

- Setting the Node Number via rotary DIP switches;
- Setting the NSM hardware edition (labeled as CARD_ID). This edition is factory set and must not be changed;

The NSM only communicates with the active CSM within its node and does not use XTran bandwidth. The NSM can be replaced and is hot-swappable.

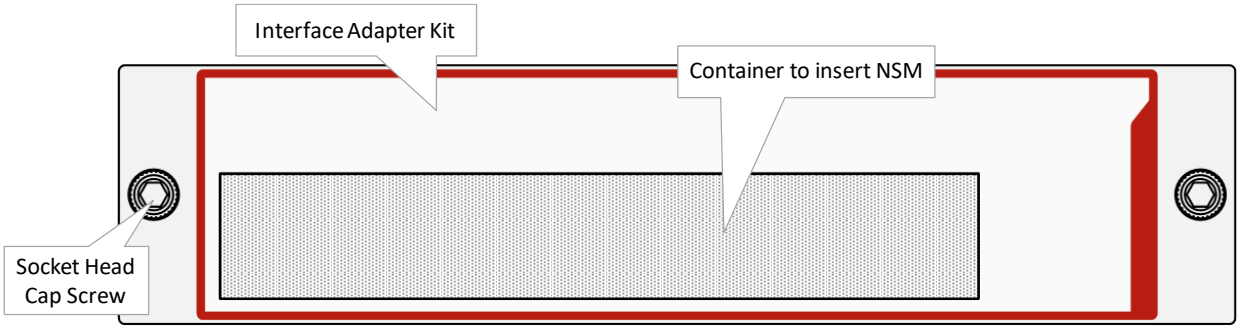

Figure 4 Interface Adapter Kit: Front Panel

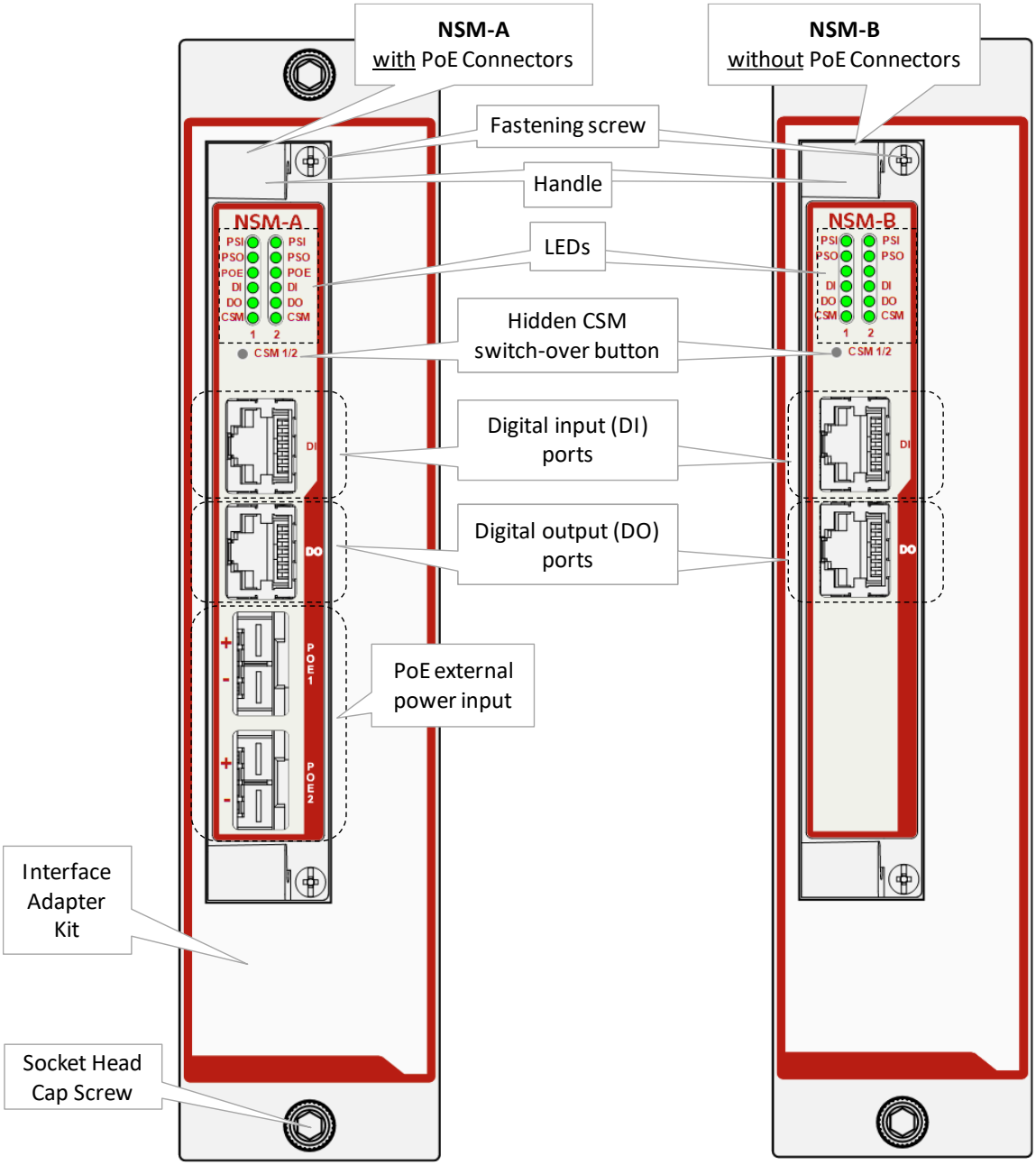

Figure 5 NSM-A, NSM-B + Interface Adapter Kit: Front Panel

2.2.2 Functions

a. Rotary DIP Switch Settings

The **Hardware Edition** (labeled as CARD_ID) and **Node Number** on the NSM are set by rotary DIP switches. In order to access them, the NSM must be partly removed from the node chassis.

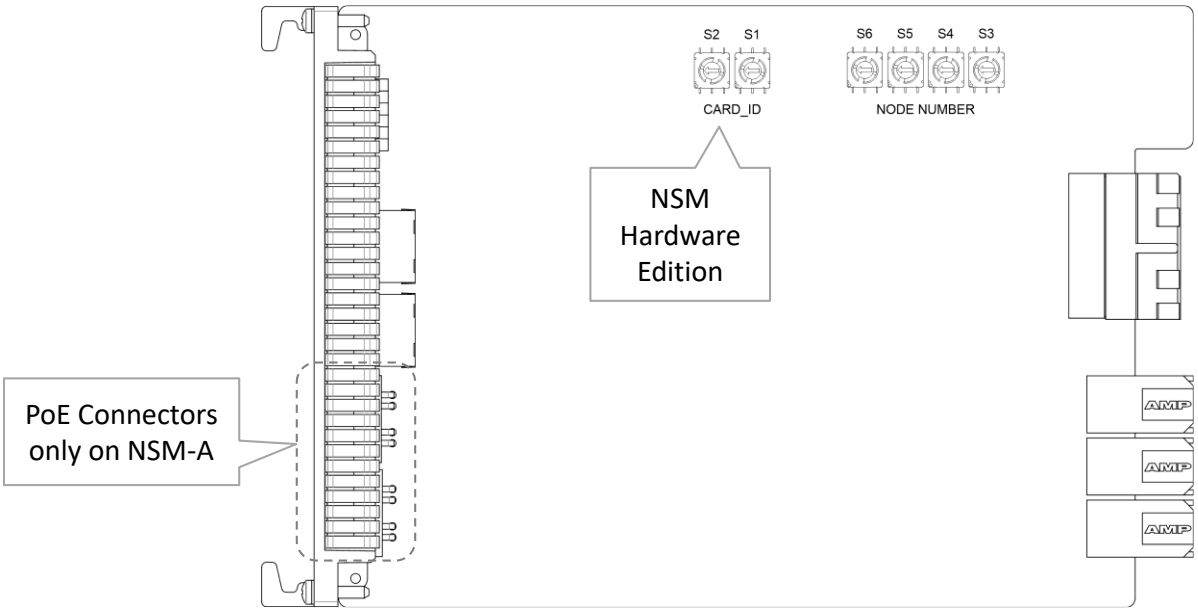

Figure 6 NSM-A: Side View

b. Node Number

Node numbers are set in decimal code using rotary switches S3 (=least significant) to S6 (=most significant). Valid decimal node numbers range from 0001 to 8999. The configured node number can be verified on the CSM display, see Ref.[3] in Table 1. An invalid configured node number would result in an error and node number '9001' on the display.

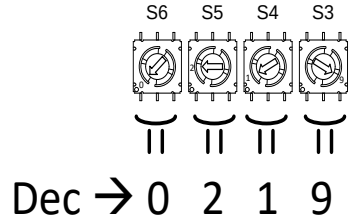

Figure 7 Example: Node Number 219

c. Hardware Edition

The hardware edition (labeled as CARD_ID) of the NSM has been factory set with rotary DIP switch S1 and S2 (=most significant) and MUST NOT BE CHANGED!

d. LED Indications

- PSI1/2 refers to the 'PSU-input' of the PSU in the PSU1/2 slot;
- PSO1/2 refers to the 'PSU-output' of the PSU in the PSU1/2 slot;
- Only on NSM-A: POE1/2 refers to the POE1/2 connectors. On the NSM-B, these LEDs are unused spare LEDs;
- DI1/2 refers to inputs1/2 on the digital input (=DI) connector on the NSM;
- DO1/2 refers to output contact1/2 on the digital output (=DO) connector on the NSM;
- CSM1/2 refers to the CSM plugged into CSM1/CSM2;

The meaning of the LEDs depends on the mode of operation (= boot or normal) in which the NSM currently is running. After plugging in the module or rebooting it, the module turns into the boot operation, see Table 3. After the module has rebooted successfully, after a few seconds), the module turns into the normal operation, see LEDs in Table 4.

Table 3 LED Indications in Boot Operation

Cycle	PSI1/2	PSO1/2	POE1/2 (only on NSM-A)	DI1/2	DO1/2	CSM1/2
1	✓	✓	---	---	---	---
2	✓	✓	---	---	✓	---
3	✓	✓	---	---	---	---

✓ : LED is lit
--- : LED is not lit
The sub cycle times may vary.
The entire boot cycle time [1→3] takes only a few seconds.

Table 4 LED Indications in Normal Operation

LED	Color	Status
PSI1/2	Not lit, dark	The corresponding PSU does not receive input voltage from a power source.
	Green	The corresponding PSU receives input voltage from a power source.
PSO1/2	Not lit, dark	The corresponding PSU does not deliver +12V output voltage to the node.
	Green	The corresponding PSU delivers +12V output voltage to the node.
POE1/2 (only on NSM-A)	Not lit, dark	The corresponding POE connector does not receive external power.
	Green	The corresponding POE connector receives external power. This power can be used by the PoE ports on the interface modules which are plugged into the node.
DI1/2	Not lit, dark	No activity or current has been detected on the corresponding input.
	Green	Current has been detected on the corresponding input of the digital input connector (DI).
DO1	Not lit, dark	**Minor** alarm is active on DO1 contact, DO1 contact is deactivated or idle, see §2.2.2g.
	Green	No alarm is active on DO1 contact, DO1 contact is activated, see §2.2.2g.
DO2	Not lit, dark	**Major** alarm is active on DO2 contact, DO2 contact is deactivated or idle, see §2.2.2g.
	Green	No alarm is active on DO2 contact, DO2 contact is activated, see §2.2.2g.
CSM1/2	Not lit, dark	The corresponding CSM is not plugged in or, it is plugged in and in standby/passive mode in case of redundant CSMs.
	Green	The corresponding CSM is active.

e. Hidden CSM1/2 Switch-Over Button

A hidden button is installed on the NSM to force a switch-over from the active to the redundant standby CSM.

Example:

- CSM1 = ACT or active = lit LED;
- CSM2 = STB or standby = dark LED;

To switch-over, push (with a non-conductive fine object e.g. toothpick) and hold the CSM1/2 switch-over button approximately 6 seconds until the CSM2 LED lights. The switch-over was successful resulting in CSM2 = ACT and CSM1 = STB;

NOTE: The witch-over is not possible if the state of the redundant CSM is 'PAS'. In order to switch-over, the state must be 'STB'.

f. DI (=Digital Input) Connector (RJ45)

Two digital inputs (=DI), to detect an open or closed potential free contact, are available via the DI RJ45 connector on the front panel, see Figure 5. Via these inputs, the NSM can pick up external events (e.g. opening door …) and raise an appropriate alarm (e.g. 'door opened') with help text (e.g. 'close the door') and severity (e.g. major). These alarm properties can be assigned to these inputs via TXCare. The normal behavior of the inputs can be configured as 'no current detected' or 'current detected' via TXCare as well. Table 4 shows the pin allocations for the DI connector. A standard Ethernet cable can be used on this connector.

Furthermore, two input LEDs DI1/2 are available, see Table 3. A DI LED is lit when current is detected on the input.

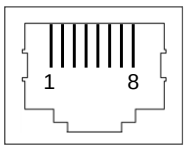

Figure 8 DI, DO RJ45 Connector

Table 5 DI Pin Allocation

Pin	DI (Input) Description
1	In1a
2	In1b
3	---
4	In2a
5	In2b
6	---
7	---
8	---

Inputs a and b are symmetrical. E.g. input1 (=In1), make a shortcut between pin In1a and In1b on the input to activate the input → current flows through the input, see figure below;

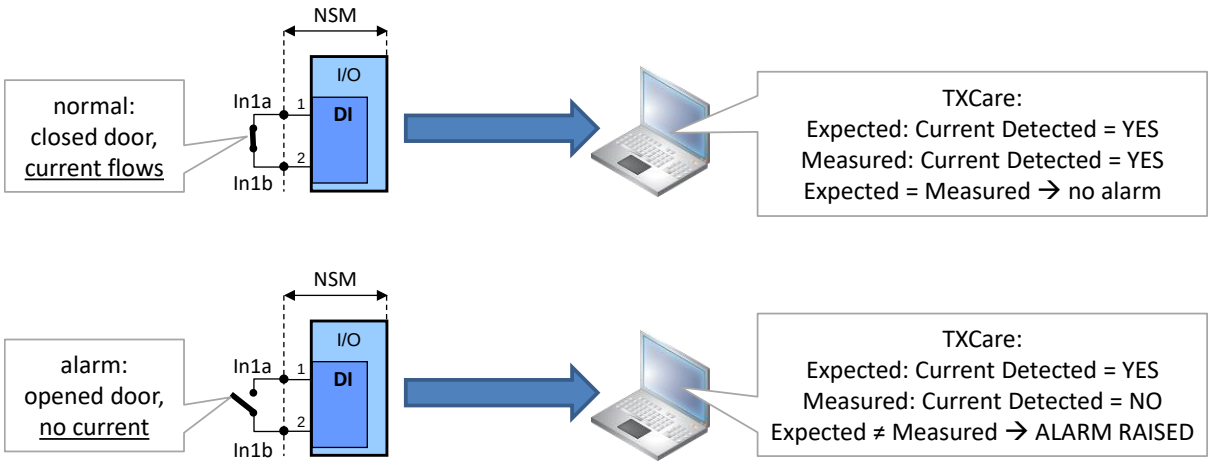

Figure 9 Example: Digital Input (=DI): Closed Input

g. DO (=Digital Output) Connector (RJ45)

Two digital output contacts (=DO) are available on the NSM front panel (Figure 5) for outputting minor/major alarms. These outputs can be used for example to activate an alarm siren. These alarms can be configured in TXCare, see Ref. [2Mgt] in Table 1. The operation of these contacts influences the DO LEDs, see Table 4.

These contacts are change-over contacts on a relay activated by a logical '1'. Maximum current through such a contact: 1A DC; maximum voltage: 60 VDC. The DO connector in Figure 8 has following pin allocation:

Table 6 DO Pin Allocation

Pin	Contact	Pin Name	DO (Output) Description	Alarm
1	DO1	C1	Out Common 1	Minor Alarms
2	DO1	NC1	Out Normal Closed 1	
3	DO1	NO1	Out Normal Open 1	
4, 5	---	---	---	---
6	DO2	C2	Out Common 2	Major Alarms
7	DO2	NC2	Out Normal Closed 2	
8	DO2	NO2	Out Normal Open 2	

How the DO contacts behave in a normal (no alarm) and an alarm situation can be found in the figure below:

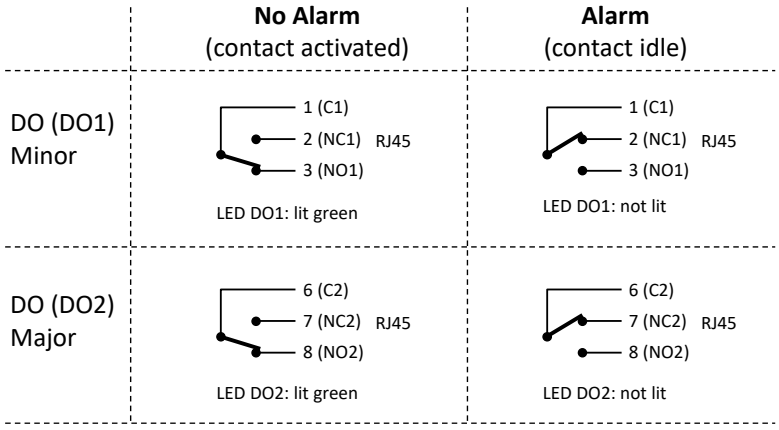

Figure 10 DO Contact Behavior: No Alarm/Alarm

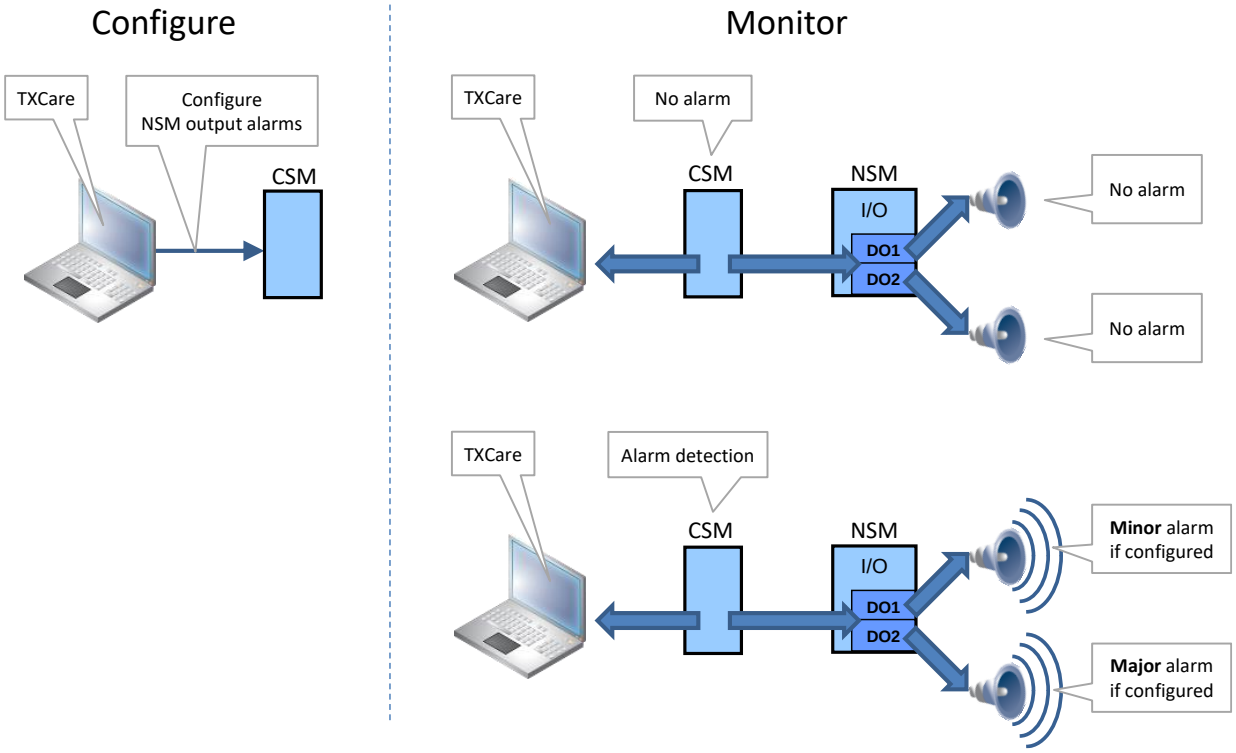

Figure 11 Alarming via Digital Output (=DO) Contacts

NOTE: A 'normal open output' contact is created between the 'C' and the 'NO' pin of that contact whereas a 'normal closed output' contact is created between the 'C' and the 'NC' pin of that contact.

NOTE: A standard Ethernet cable can be used on this connector.

2.2.3 PoE (=Power Over Ethernet) (only on NSM-A)

PoE is a technology that allows a Powered Device (=PD, e.g. IP telephones, IP cameras etc.) to receive power from 'Power Sourcing Equipment' (=PSE, e.g. the XTran node).

XTran nodes are able to deliver PoE when one (or two) external PoE PSU(s) is (are) connected to the NSM via the PoE connectors. A possible external PoE PSU and how to connect it can be found in §2.3.2.

The PD receives power in parallel to data, over the existing CAT-5 (or higher for more power) Ethernet infrastructure without it being necessary to make any modifications to it. PoE integrates data and power on the same cable, it keeps the structured cabling safe and does not interfere with concurrent network operation, see Figure 16.

PoE delivers a minimum of 48V of DC power over shielded/unshielded twisted-pair wiring for terminals consuming less than 25.5 Watts of power.

Before the power is delivered to a connected device, a protocol measures whether that device is a PoE device and how much power it needs (power classification). If required, the necessary power will be delivered by the PSE with a maximum of 40 Watts per port. PoE is supported on all the electrical RJ45 ports of the 4-GC-LW module. All these ports can deliver power according to the 802.3af (PoE) and 802.3at (PoE+) standard.

Via TXCare it is possible to enable/disable PoE per port and to verify which ports in each node are PoE enabled.

(Future) Power management is supported, i.e. the XTran node decides in an intelligent way which PoE ports will get power and which ones will not. There are a lot of possible scenarios in which power management must tune its delivered power on each port. Some configuration/status parameters in TXCare used by power management are:

- External PoE PSU power
- Available power budget
- Power Priority / Port Priority
- Power Class (class 0, 1, 2, 3, 4 configured and detected)
- Power management also offers PoE diagnostics in TXCare.

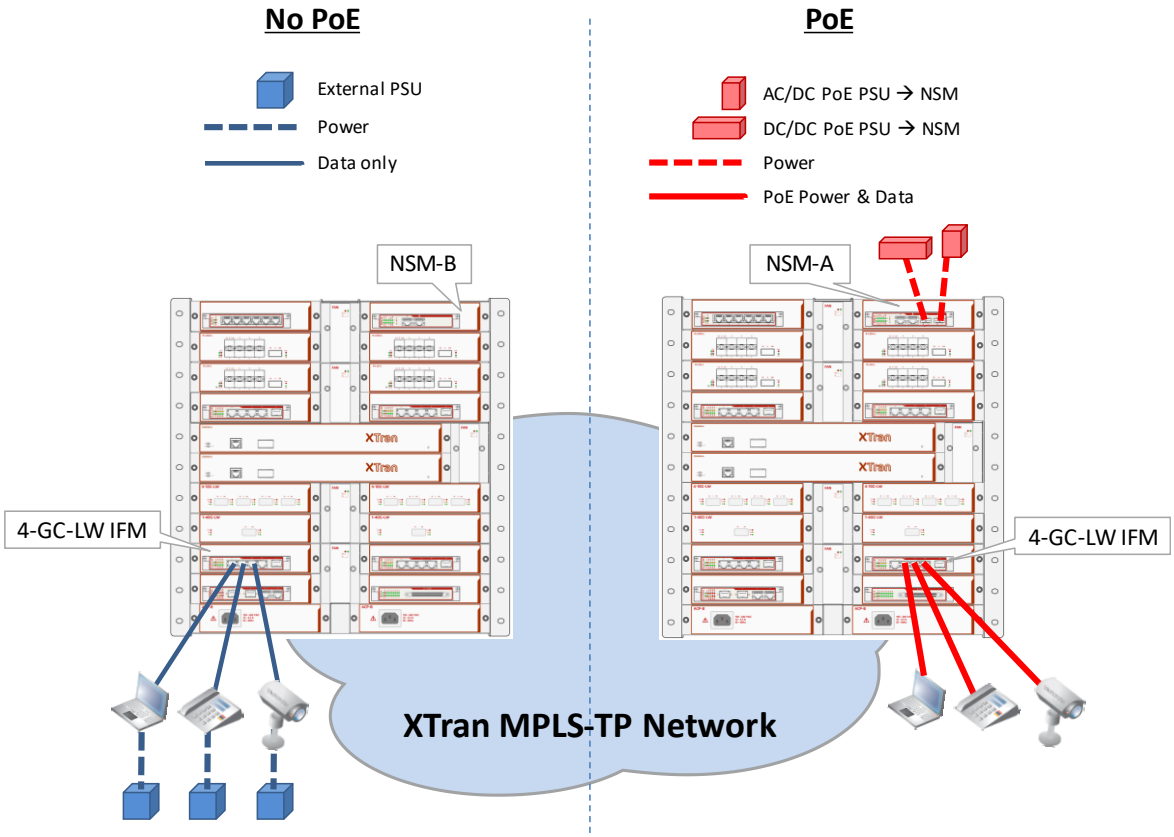

Figure 12 General PoE Example

2.3 PSU (=Power Supply Unit)

2.3.1 Node PSUs

PSU1 and/or PSU2 supply the voltage for all the modules in the node.

Two different power supplies are available, an AC PSU and a low voltage DC PSU. The core node can be equipped with dual PSUs for redundancy purposes. These two PSUs in one node can be of the same type or a mix of different types. If both PSUs are up and running, the load is shared over the two PSUs.

Make sure to tighten the PSU socket heads with a hex key after plugging in the PSUs into the node.

The AC power cable has protective earthing (=PE) and a locking mechanism. The DC PSUs and its power cable plug have unique coding keys (see figures below). A coding key is a physical obstruction in the PSU connector and cable with Phoenix plug to ensure that:

- only a low DC voltage (cable) can be connected to a low voltage DC PSU;

Following PSUs and cables are available:

a. AC PSU (ACP-B)

- PSU ACP-B, V30912-A5020-A4: input voltage 100 to 240 VAC ± 10 %;
- Power cables with protective earthing (=PE) and locking mechanism are available for Europe, UK and US, see Table 2.

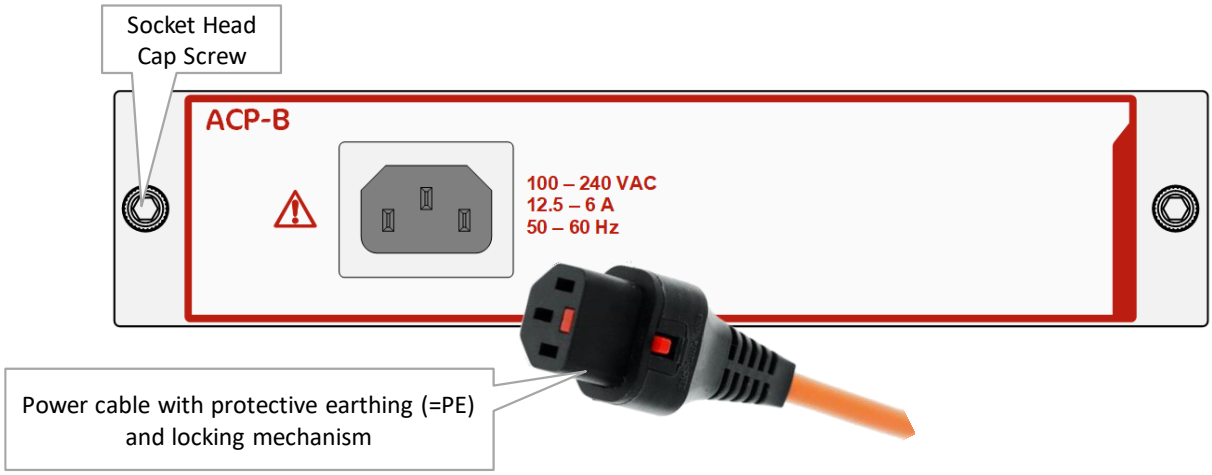

Figure 13 ACP-B PSU with Power Cable

b. DC PSU Low Voltage (DCP-C)

- PSU DCP-C, V30912-A5020-A5: input voltage 36 to 60 VDC;
- Power cable (3m) with code keys: S30927-C16-A30;

CAUTION: DC power supplies are intended to connect to a conditioned power supply system. In this case no minimum tolerance on test supply voltages shall be taken and full operating range is as mentioned on the labels.

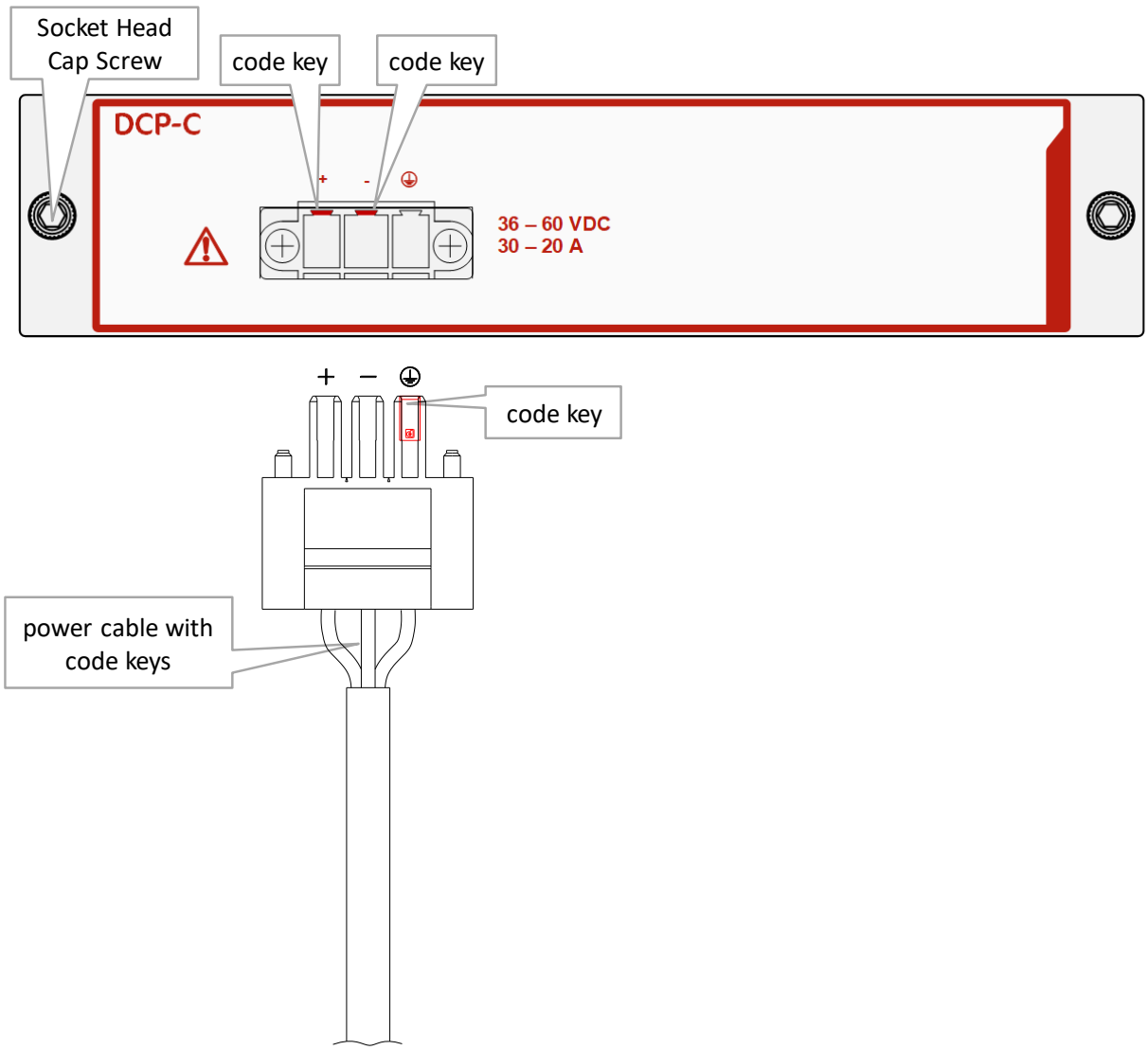

Figure 14 DCP-C PSU (36-60VDC) / Power Cable / Code Keys

Table 7 DCP-C PSU (36-60VDC) / Power Cable / Code Keys

Pin	PSU Side	Cable Side	Wire Color Codes
+	Code Key		BK with indication '1' or Brown
-	Code Key		BK with indication '2' or Blue
PE		Code Key	YE/GN

c. DC PSU High Voltage (DCP-D)

- PSU DCP-D, V30912-A5020-A6: input voltage 88 to 300 VDC;
- Power cable (3m) with code keys: S30927-C17-A30;

CAUTION: DC power supplies are intended to connect to a conditioned power supply system. In this case no minimum tolerance on test supply voltages shall be taken and full operating range is as mentioned on the labels.

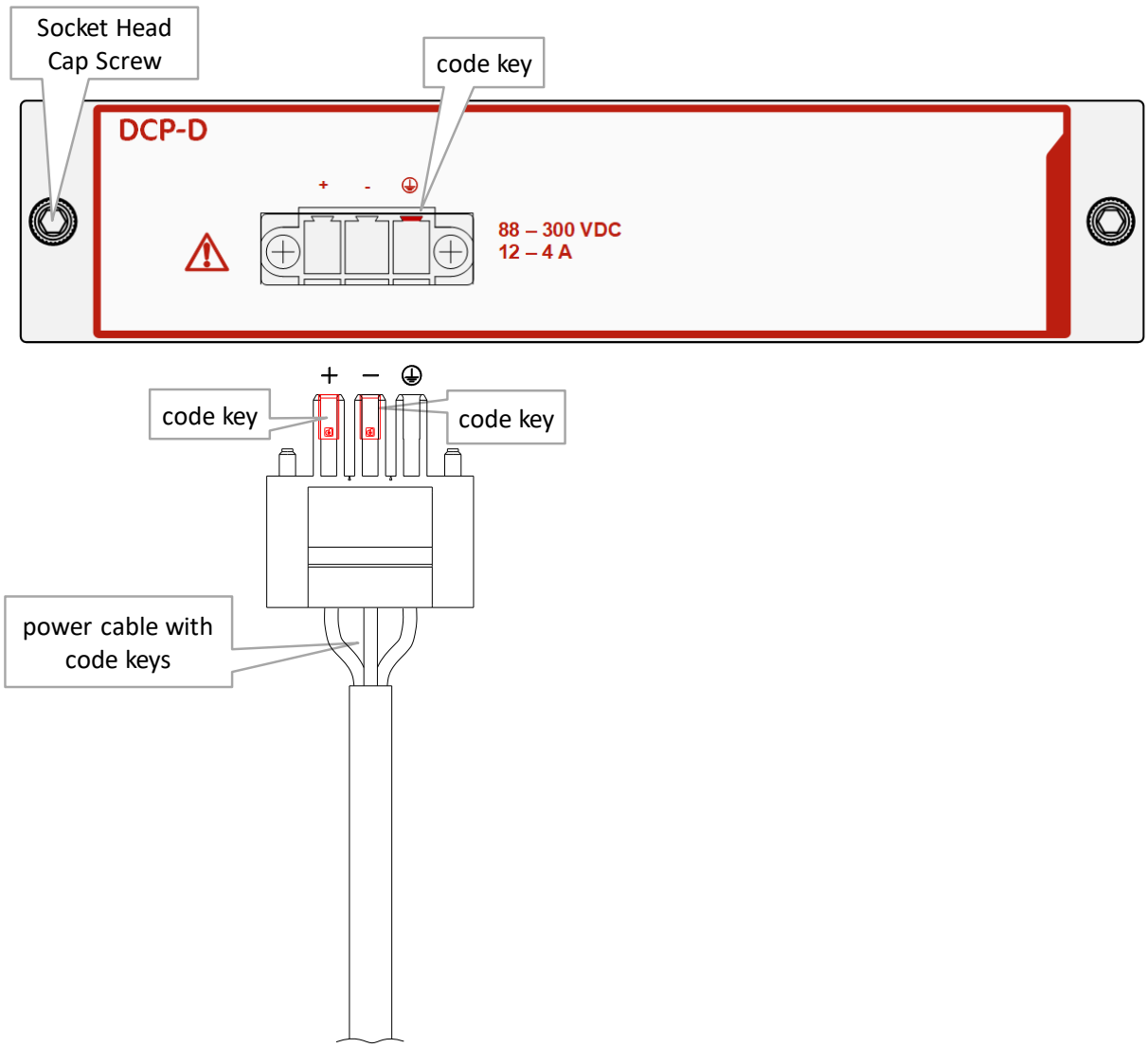

Figure 15 DCP-D PSU (88-300VDC) / Power Cable / Code Keys

Table 8 DCP-D PSU (88-300VDC) / Power Cable / Code Keys

Pin	PSU Side	Cable Side	Wire Color Codes
+		Code Key	BK with indication '1' or Brown
-		Code Key	BK with indication '2' or Blue
PE	Code Key		YE/GN

d. Overview

Some PSU LEDs (PSI1/2 and PSO1/2) indicate the operation of the PSUs, see Table 3.

The XT-2215-A node can operate with either one or two power supplies in any of the PSU positions. Any of the PSUs can be mixed in one node. An empty PSU slot in the node must be covered with a cover plate, see Table 2.

The total output of the power supplies is rated at 900 Watt with 12V output at 55°C/131°F. The total power consumption of the equipped node is the sum of all the individual power

consumptions of each module. Refer to the relevant module manuals for the power consumption of the CSM and IFMs. The tables below show the specifications of the PSUs.

Table 9 Specifications: ACP-B PSU (100-240VAC± 10%)

Parameter	Condition / Remark	Value
Input		
Input voltage range	50-60Hz	100-240VAC ± 10%
Efficiency	At 230VAC (full load) At 110VAC (full load) measured including fans	> 89% > 85%
Inrush current max.	Cold start ETSI 300-132-1	< 30Apk
General		
MTBF (MIL-HDBK-217F)	At 35°C/95°F (GB)	> 300000h with 2 units in a chassis, 900W Load
Protections	Auto recoverable	Over temperature, Overcurrent, Overvoltage
Input connector	IEC max. 10A	IEC320 on front panel

Table 10 Specifications: DCP-C PSU (36-60VDC)

Parameter	Condition / Remark	Value
Input		
Input voltage range	48VDC nominal, tolerance according to EN62368-1	36-60 VDC (nominal 48 VDC)
Efficiency	At 48VDC (full load) Measured including fans	> 89 %
Inrush current max.	Cold start (full load) ETSI 300-132	< 30 Apk
Input polarity protection		Yes
General		
MTBF (MIL-HDBK-217F)	At 35°C/95°F (GB)	> 300000h with 2 units in a chassis, 900W Load
Protections	Auto recoverable	Overtemperature, Overcurrent, Overvoltage
Input connector		PCB side: Phoenix PC 5/ 3-GF-7,62 - 1720806 Cable side: Phoenix SPC 5/ 3-STF-7,62 – 1996139

Table 11 Specifications: DCP-D PSU (88-300VDC)

Parameter	Condition / Remark	Value
Input		
Input voltage range	230VDC nominal, tolerance according to EN62368-1	88-300VDC (nominal 230 VDC)
Efficiency	At 230VDC (full load) Measured including fans	> 89 %
Inrush current max.	Cold start (full load) ETSI 300-132	< 30 Apk, at 230VDC
Input polarity protection		Yes
General		
MTBF (MIL-HDBK-217F)	At 35°C/95°F (GB)	> 300000h with 2 units in a chassis, 900W Load
Protections	Auto recoverable	Overtemperature, Overcurrent, Overvoltage
Input connector		PCB side: Phoenix PC 4/3-G-7, 62 1916009 Cable side: Phoenix SPC 5/ 3-STF-7,62 – 1996139

2.3.2 PoE PSUs (only on NSM-A)

The NSM-A front panel has 2 PoE connectors to connect 2 external PoE sources or PSUs. One or two AC/DC (=ACPoE-A) or DC/DC (=DCPoE-A) PSUs, or a mix can be connected to the NSM.

Two connected PSUs will operate redundantly. Power aggregation is not supported. When two PSUs are connected, always the lowest power of both PSUs will be taken by TXCare to calculate the PoE power.

For the configuration in TXCare, see ‘Power over Ethernet (PoE)’ in the 'XTran Ethernet Services' manual in Ref.[2Eth] in Table 1.

Following PSUs can be ordered:

- ACPoE-A DIN Rail PSU (V30812-A5020-A97), see below;
- DCPoE-A DIN Rail PSU (V30812-A5020-A98), see below;

a. ACPoE-A DIN Rail PSU (V30812-A5020-A97)

This ACPoE-A PSU has a wide-range input of 100-240VAC and an output range of 48-56VDC. The output voltage has been factory set to 56V.

In normal conditions, the continuously available power is 480W. As of higher ambient temperatures and as of an altitude of 2km, derating occurs resulting in less available output current and power, see Figure 17 .

Cable S30927-C1-A30 (3m) must be used to connect the PoE source to the NSM, see below:

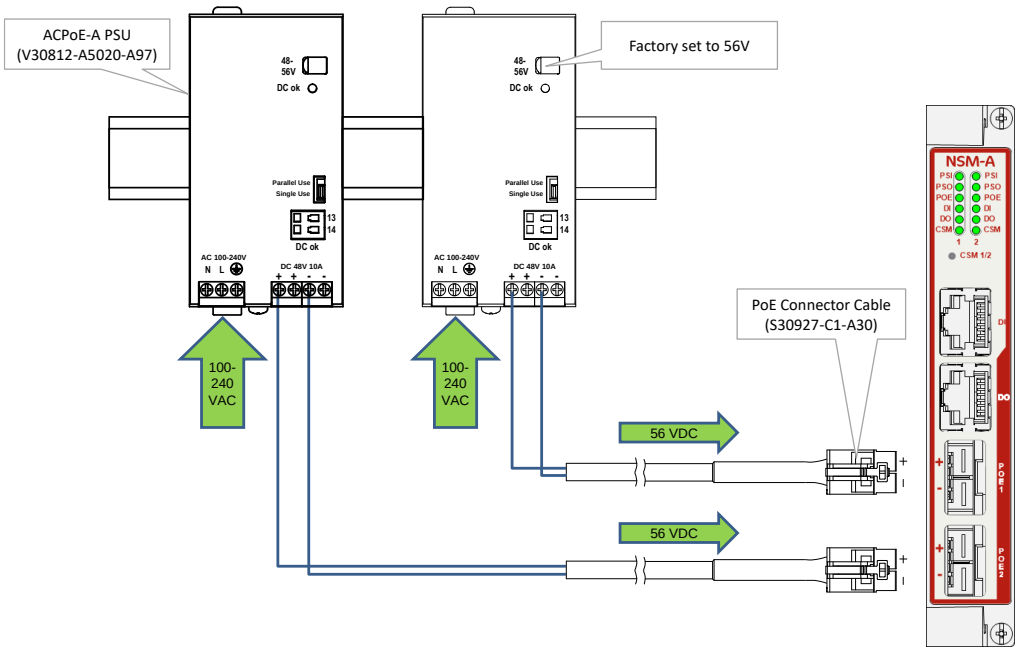

Figure 16 ACPoE-A PSU to NSM-A Connection

See the table below for the PoE PSU (V30812-A5020-A97) specifications.

Table 12 Specifications: ACPoE-A PSU

Parameter	Condition / Remark	Value
Input		
Input voltage range		100-240VAC -15%/+10%
Mains frequency		50-60Hz ± 6%
AC Input current	At 120VAC At 230VAC	4.36A 2.33A
Output		
Output voltage		48VDC
Adjustment range		48 - 56VDC
Output current	Continuous	8.6 - 10A
Output power	Continuous	480 W
Parameter	**Condition / Remark**	**Value**
General		
MTBF (MIL-HDBK-217F)	At 25°C/77°F (GB)	AC100V: 40.5 years AC120V: 41 years AC230V: 45 years
Weight		1.0 kg / 2.2 lb
Derating		12W/°C at +60 to +70°C (6.6W/°F at 140 to 158°F), see also figures below.
Dimensions	WxHxD	65 x 124 x 127 mm / 2.56 x 4.88 x 5 inches
Protections	Auto restart	overload, no-load and short-circuits, overtemperature

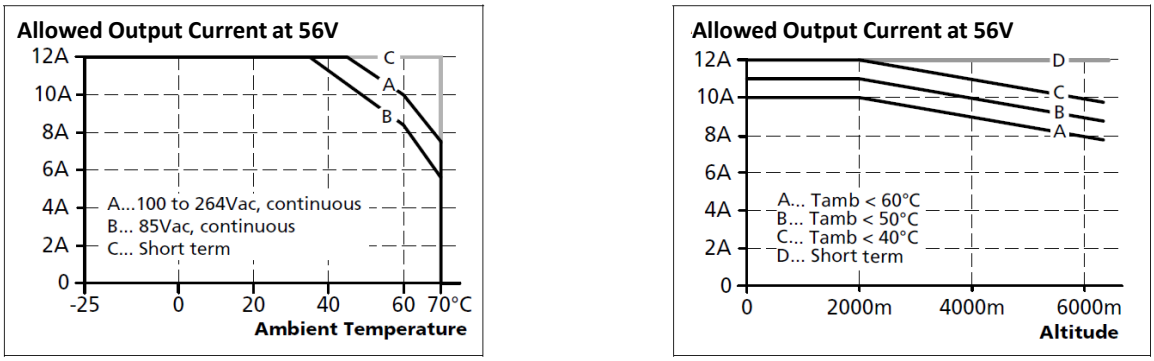

Figure 17 Output Current, Power Derating

b. DCPoE-A DIN Rail PSU or Wall Plate Mountable (V30812-A5020-A98)

This DCPoE-A DIN rail PSU has an input range of 33-62VDC and an output of 56VDC. This PSU is DIN Rail or iron baseplate mountable. The wall plate can be used for better cooling. Cable S30927-C1-A30 (3m) must be used to connect the PoE source to the NSM, see figure below:

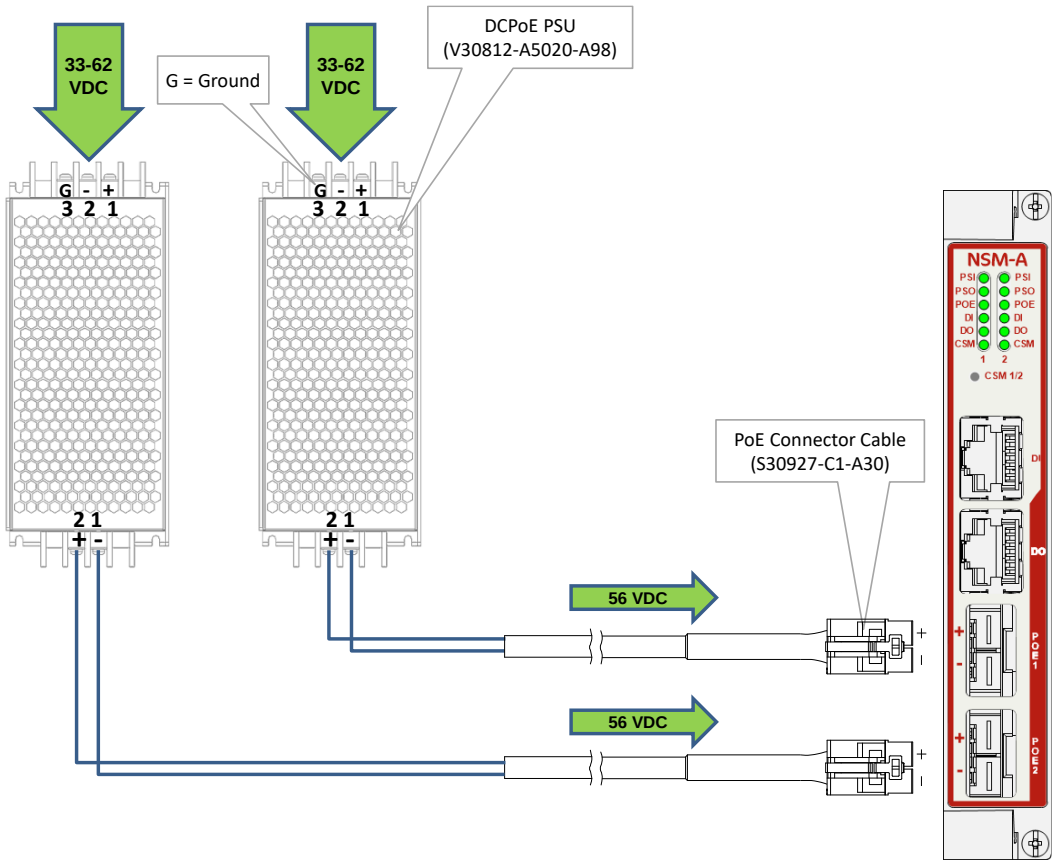

Figure 18 DCPoE-A PSU to NSM Connection

See table below for the PoE PSU (V30812-A5020-A98) specifications.

Table 13 Specifications: DCPoE-A PSU

Parameter	Condition / Remark	Value
Input		
Input voltage range	Continuous	33.6 ~ 62.4VDC
Efficiency		92%
Inrush Current		45A
DC Input current		7.2A
Output		
Output voltage		56VDC
Output rated current		6.3A
Output rated power		302 W
General		
MTBF (MIL-HDBK-217F)	At 25°C/77°F (GB)	14.8 years
Weight		1.2 kg / 2.6 lb
Derating		-40°C/-40°F ~ +55°C/131°F (no derating) ; +70°C/158°F @ 60% load by free air convection ; +70°C/158°F no de-rating with external iron base plate, TX class compliance
Dimensions	WxHxD	97 x 40 x 216 mm / 3.82 x 1.57 x 8.5 inches
Protections	Auto recover Repower	Overload (auto recover) Overvoltage (must be repowered) Overtemperature (autorecover)

2.4 CSM (=Central Switching Module)

2.4.1 General

The XT-2215-A node can host two redundant CSMs. The CSM is the heart of the node and controls communication between the different interface modules. It also provides the interface to TXCare (=XTran Management System).

The node or the CSM itself exchanges services data (Ethernet, MPLS-TP, E1/T1, SHDSL…) with the outside world via the interface modules that are plugged into the XTran node. This means that an XTran node only communicates with other XTran nodes via its interface modules, not via the CSM itself. The only data that enters/leaves the front panel of the CSM is the management data to TXCare. For more information on the CSM, see Ref. [3] in Table 1.

2.4.2 CSM Redundancy

CSM Redundancy means that two CSMs are installed in the node. One CSM will be the active one while the other CSM will be the standby one.

CSM Redundancy provides a higher availability of the services through a node if a CSM should fail. If one fails, the redundant hot-standby CSM will take over automatically to the keep the node and all its services alive (with a minimal service interrupt).

A manual switchover is also possible via the NSM, CSM or TXCare. For more information, see Ref. [3] in Table 1.

2.5 IFM (=Interface Module)

All peripherals are connected to the XTran Network via IFMs, which are available for a wide range of applications in the areas of data and LAN.

Each IFM has its own manual, which can be found on the 'OTN Systems Customer and Partner Portal' (= https://extranet.otnsystems.com) via Shortcuts → Manuals.

The XT-2215-A node provides 15 IFM slots. IFMs with different speeds (1Gbps, 10Gbps, 40Gbps) can be used together in the same node. The slot into which the IFM can be plugged depends on the IFM speed type (1G, 4x1G or 10G) and the node type slot speeds.

Verify the 'XTran Bandwidth Overview' manual (see Ref.[100] in Table 1) to find out in which IFM slots your IFM can be used.

For the correct programming of the IFMs, see the module manuals and TXCare.

2.6 Backplane

The backplane interface provides for status & control communication between the IFMs, NSM, PSUs and CSM. The CSM communicates its status & control data with TXCare. User data communication occurs between IFMs and the CSM. The IFMs are connected in a star configuration to the CSM resulting in an individual data bus for each IFM. Data transfer is full duplex. The Backplane Edition and Node Chassis Edition are factory set and cannot be changed. These editions can be read out via TXCare.

2.7 PE: Protective Earth

A PE (=Protective Earth) point is provided on the node back panel, in the bottom left-hand corner. The PE connection ensures that all exposed conductive surfaces have the same electrical potential as the surface of the earth.

It avoids the risk of an electrical shock if a person touches a device in which an insulation fault has occurred. An insulation fault (a "short circuit") will cause a very high current flow, which will trigger an overcurrent protection device (fuse, circuit breaker) and disconnects the power supply.

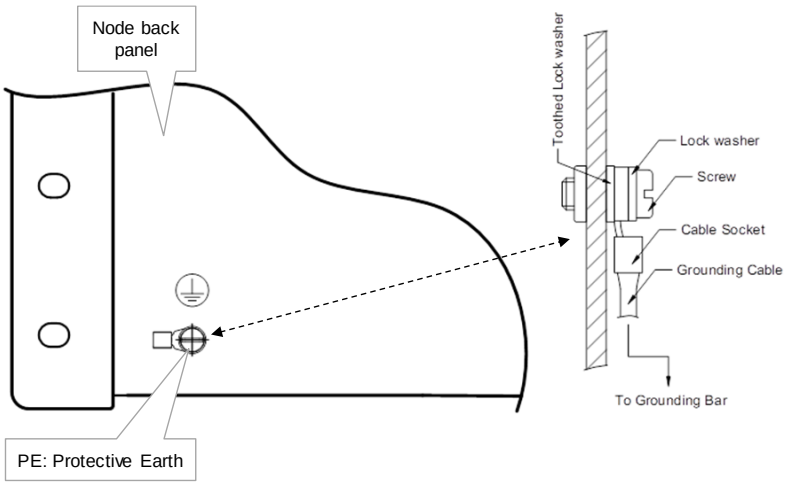

Figure 19 PE: Protective Earth (on Node Back Panel)

2.8 Fans / Cooling / Temperature Sensing

CAUTION: Make sure that all empty slots are covered with cover plates (see Table 2) to guarantee the correct air flow through the node.

The XTran Nodes have a rugged industrial design and the cooling in the XTran nodes occurs via forced ventilation using 5 fan modules (FAN1..FAN5) in the node. The fan module looks like in the figure below.

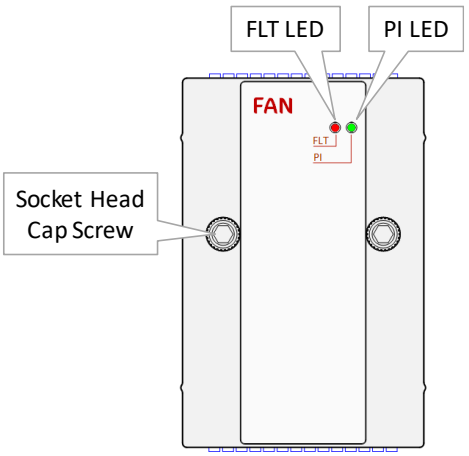

Figure 20 Fan Module

See the table below for a description of the fan module LEDs.

Table 14 Fan Module LED Indications

LED	Color	Status
PI (=Power Input)	Not lit, dark	+12V power input to the fan module not OK, no ventilation via this fan module.
	Green	+12V power input to the fan module OK
FLT (=FauLT)	Not lit, dark	The fan module is ok, up and running.
	Red	The fan module is erroneous. Possible one of the 6 fans on the fan module is broken. The entire fan module must be replaced as soon as possible.

The fan modules pull the airflow through the node from right (=cold air) to left (=warm air) to cool all the modules in the node, see the figure below.

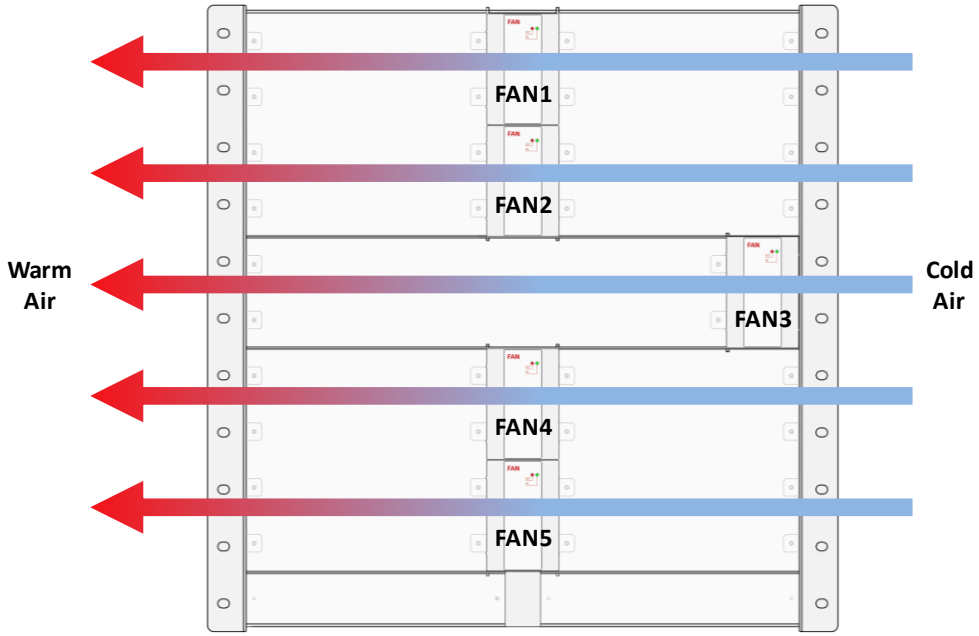

Figure 21 Forced Ventilation Airflow In Node

Each fan module includes 2 rows of 3 fans resulting in a total of 6 fans per module. If one fan in a row of three fans fails, it is not a problem. The remaining two fans in the row can compensate the ventilation loss of a broken fan = Fan redundancy. A broken fan results in a red FLT LED. The fan speed of the fan modules is temperature dependent, see the table and figure below.

Table 15 Fan Speed: Temperature Dependent

Measured Temperature (=T)	Fan Speed	Consumed Power
T <= 10 °C T <= 50 °F	Minimum (30%)	3 W
10 °C < T < 65 °C 50 °F < T < 149 °F	Increases stepwise depending on the temperature according graph	3..28 W
65 °C <= T 149 °F <= T	Maximum (100%)	28 W

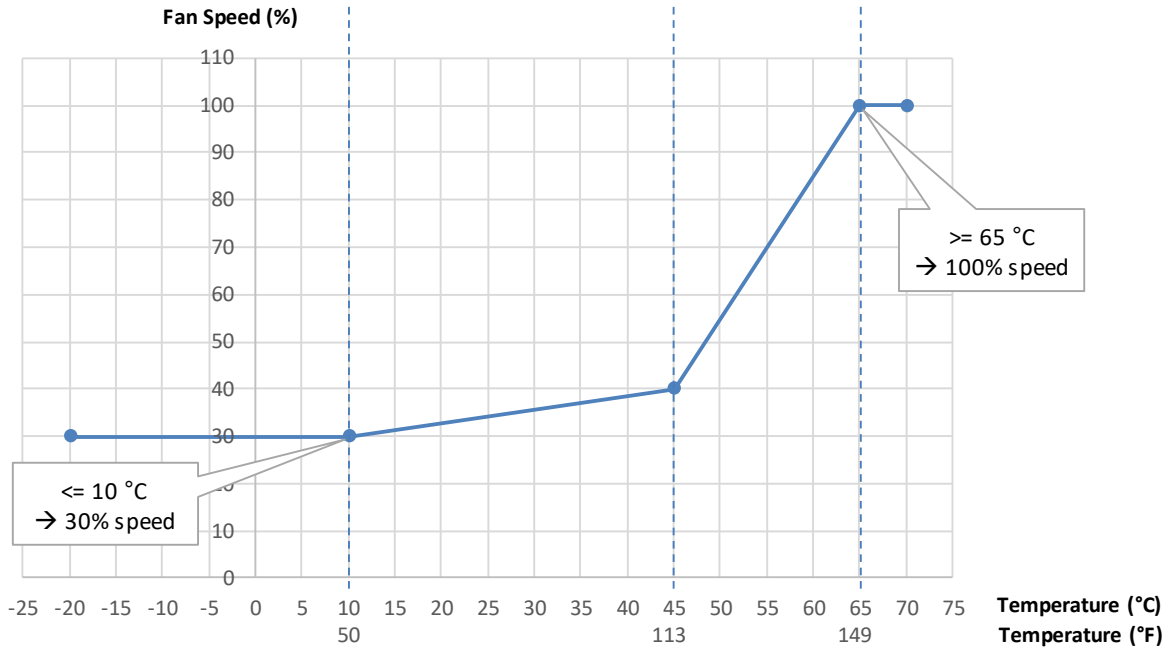

Figure 22 Fan Module: Fan Speed Based on Measured Temperature

Each IFM or CSM hosts several temperature sensors which results in one temperature per module. This resulting temperature per module can be read out via TXCare. When a temperature sensor goes beyond its allowed temperature range (see Ref. [5] in Table 1), an appropriate temperature alarm will be triggered via TXCare.

2.9 Dust Filter Kit

An optional dust filter kit can be ordered (see Table 2) to protect the node in dusty environments. It must be installed on the air-inlet side (=right-hand side) of the node. This kit must be installed after the node has been installed in the rack.

Prerequisites: There must be enough room inside the rack between the right-hand side of the node and the rack cabinet wall for installation and ventilation. At least a free distance of 15 cm must be available. If the rack cabinet is too small, the right-hand cabinet wall must be removed to free up some space.

For the installation instructions of this kit, see 'XTran Installation and Operation Manual' Ref.[1] in Table 1.

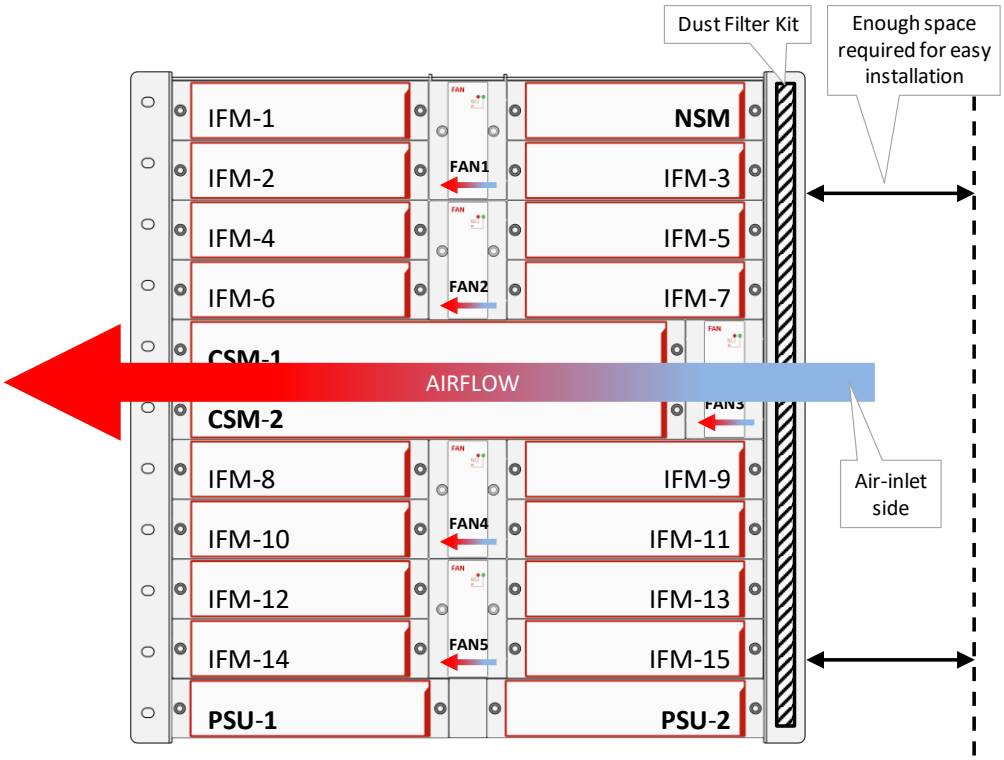

Figure 23 Dust Filter Kit

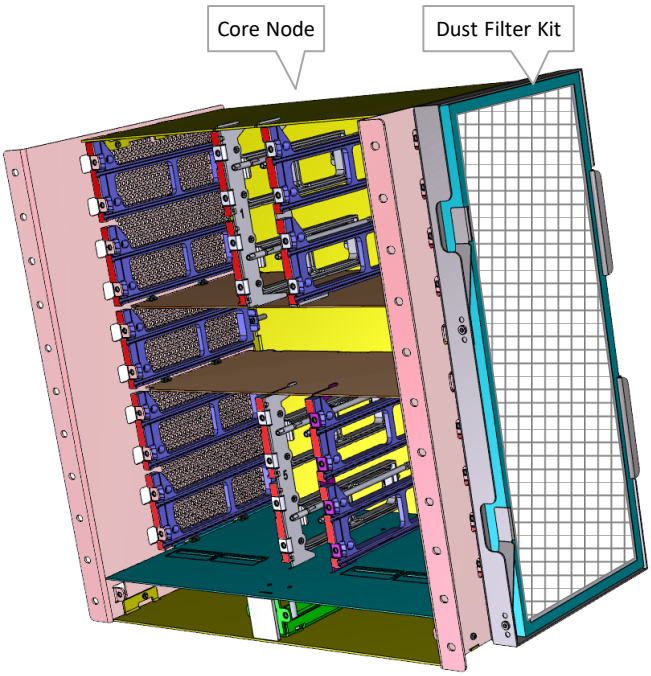

Figure 24 Dust Filter Kit 3D View

2.10 Add a New Node to a Live Network

See Ref.[1] in Table 1.

3. SPECIFICATIONS

3.1 General Specifications

For general specifications like temperature, humidity, EMI ... see Ref.[5] in Table 1.

3.2 Weight

Table 16 Product Weights

Description	Weight
Node: XT-2215-A (empty)	17.72 kg /39.02 lb
Node Support Module (NSM-A)	0.21 kg / 0.5 lb
Node Support Module (NSM-B)	0.18 kg / 0.4 lb
AC PSU 100 to 240 VAC ± 10 %	2.5 kg / 5.5 lb
DC PSU 36 to 60 VDC	2.15 kg / 4.74 lb
ACPoE-A External DIN rail PSU (=AC 100-240 VAC Wide-range Input)	1.0 kg / 2.2 lb
DCPoE-A External DIN rail PSU (=33-62V Input)	1.2 kg / 2.6 lb
Fan Module	0.53 kg / 1.17 lb
Interface Adapter Kit	0.29 kg / 0.63 lb
Dust Filter Kit	1.14 kg / 2.51 lb

3.3 MTBF

- PSU: 34 years at 25°C/77°F;
- FAN: 23 years at 25°C/77°F;
- NSM-A: 437 years at 25°C/77°F;
- NSM-B: 616 years at 25°C/77°F;
- Backplane: 665 years at 25°C/77°F.

3.4 Power Consumption (Empty Node)

- AC PSU + backplane + NSM + CSM + 0 Fan modules: 60 W
- AC PSU + backplane + NSM + CSM + 5 Fan modules in minimum speed: 75 W;
- AC PSU + backplane + NSM + CSM + 5 Fan modules in maximum speed: 210 W;

3.5 Dimensions

Table 17 Dimensions

Item	Width	Height	Depth
Node	482 mm / 18.98 inches	488.95 mm / 19.25 inches (11 U)	285.8 mm / 11.25 inches
IFM Slot	187.5 mm / 7.36 inches	44.5 mm / 1.75 inches (1 U)	285.8 mm / 11.25 inches
CSM Slot	374.0 mm / 14.72 inches	44.5 mm / 1.75 inches (1 U)	285.8 mm / 11.25 inches
PSU Slot	200.0 mm / 7.87 inches	44.5 mm / 1.75 inches (1 U)	285.8 mm / 11.25 inches
Fan Slot	58.5 mm / 2.30 inches	89.0 mm / 3.5 inches (2 U)	285.8 mm / 11.25 inches

3.6 Cooling

See §2.8.

3.7 Input Voltage Range

- V30912-A5020-A4: High voltage PSU 100 to 240 VAC ± 10 %;
- V30912-A5020-A5: Low voltage PSU 36 to 60 VDC;

3.8 Digital Output Contacts

- Maximum current: 1A DC;
- Maximum voltage: 60V DC;
- See also §2.2.2g;

3.9 Ordering Information

See Table 2.

4. INSTALLATION INSTRUCTIONS

Instructions for node installation can be found in document Ref. [1] in Table 1.

CAUTION:
Double pole/neutral fusing.

CAUTION:
First connect the GND (Ground) to the housing of the node before connecting the mains voltage. Only the mains voltage plug can disconnect the node's mains voltage. For DC input PSUs: never apply an excess input voltage and respect the correct polarity. The PSU might get damaged when an incorrect voltage source has been connected!

5. WEEE GUIDELINES

The XTran nodes are compliant with the European guidelines 2002/96/EG (WEEE = Waste of Electrical and Electronic Equipment). This compliancy is indicated at the back of the node by a crossed-bin symbol in Figure 25.

Figure 25 Crossed-Bin Symbol

The equipment that you bought required the extraction and use of natural resources for its production. It may contain substances that are hazardous to human health and the environ-

ment. In order to avoid the dissemination of those substances in our environment and to reduce the pressure on the natural resources, we encourage you to use the appropriate take-back systems. These systems will reuse or recycle most of the materials of your end-of-life equipment in a sound way.

The crossed-bin symbol invites you to use those systems.

If you need more information on the collection, reuse and recycling systems, please contact your local or regional waste administration. You can also contact us for more information on the environmental performances of our product.

6. ABBREVIATIONS

AC	Alternate Current
CE	Conformité Européenne
CSM	Central Switching Module
DC	Direct Current
DI	Digital Input
DIN	Deutsches Institut für Normung
DO	Digital Output
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
GND	Ground
IEEE	Institute of Electrical and Electronics Engineers
IFM	InterFace Module
LAN	Local Area Network
MPLS-TP	Multiprotocol Label Switching – Transport Profile
MSB	Most Significant Bit
MTBF	Mean Time Between Failures
NSM	Node Support Module
PD	Powered Device
PE	Protective Earth
PI	Power Input
PoE	Power Over Ethernet
PSE	Power Source Equipment
PSI	Power Supply Input
PSO	Power Supply Output
PSU	Power Supply Unit

SHDSL	Symmetrical High Bitrate Digital Subscriber Line
TXCare	XTran Management System
U	Rack Unit
WAN	Wide Area Network
WEEE	Waste of Electrical and Electronic Equipment
XTran	eXcellence in Transport