KEYMILE

User Manual

SUPM1
supm1_r2b

POTS, TDM services

XMC20

XMC20

Document PEC

EN/LZTBU 372 129/1 RC

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1 Preface

1.1 Precautions and Safety

Before you handle any equipment you must comply with the safety advices.

Adherence to the safety instructions ensures compliance with the safety requirements as defined in EN 60950 (Safety of Information Technology Equipment).

Please refer to the following document:

[202] Safety Instructions “Precautions and safety”.

1.2 Symbols and Notations

This User Manual uses the following symbols:

WARNING

Non-observance could result in death or serious injury.

Indicates a hazard with a medium level of risk which, if not avoided, could result in death or injury to the user.

→ Possible actions are given.

NOTICE

Non-observance could result in equipment damage.

Failing to comply with this may result in physical damage.

→ Possible actions are given.

Risk of operating trouble!

Indicates that an action may lead to operating trouble or loss of data.

→ Possible actions are given.

Please note:

Shows significant information.

→ Possible actions are given.

1.3 Interfaces and Circuit Categories

Table 1: Electrical interfaces and circuit categories

SUPM1 interface	Circuit category according to EN 60950-1	Max. rating	
		Voltage	Current
Local power supply	TNV2	< 72 V_{DC}	< 2.5 A
PSTN a/b interface	TNV3	< 53 V_{DC}	< 45 mA
		< 75 V_{RMS}	< 120 mA

1.4 Document History

Table 2: Document history

KEYMILE PEC		Date	XMC20 release	Changes since previous version
EN/LZTBU 372 129/1	RC	November 2015	R6B	Revision for the XMC20 system releases R4C and R6B
EN/LZTBU 372 129/1	RB	July 2015	R6A	HW name for VOIP1 corrected
EN/LZTBU 372 129/1	RA	March 2015	R6A	Revision for the XMC20 system release R6A
EN/LZTBU 372 129	RC	February 2015	R4C	First revision for the XMC20 system release R4C

2 Introduction

2.1 General

This document describes the architecture and functions of the SUPM1 unit and shows, how this unit is commissioned and operated as part of the XMC20.

The SUPM1 unit is a 1-slot wide service unit of XMC20. It has 16 PSTN user ports with a telephony bandwidth of 300 Hz to 3.4 kHz. The SUPM1 unit converts the analogue voice signal to a 64 kbit/s digital signal (and vice versa). This type of user ports is also called FXS interface, 2-wire analogue interface or a/b-interface.

The SUPM1 unit allows the connection of an analogue telephone set to a local exchange via a TDM network.

Another application is in a private network where two telephone sets are directly interconnected without a local exchange.

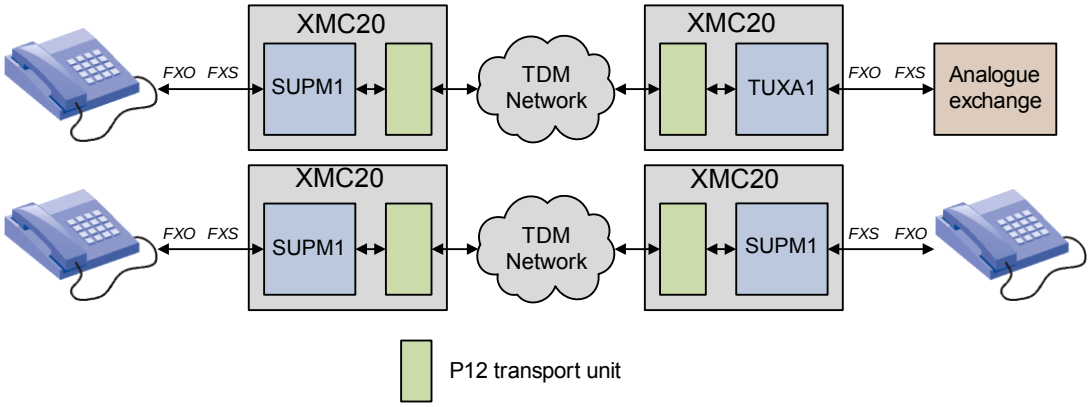


Figure 1: SUPM1 applications with and without local exchange

The SUPM1 unit is connected to a P12 transport unit, e.g. SELI8, via the PBUS in the backplane of XMC20.

The SUPM1 unit can also be connected to the Voice over IP (VoIP) media gateway VOIP1 via the PBUS in the backplane of XMC20.

Where the voice circuits are running in environments with high electrical interference, e.g. near the rail infrastructure, the high voltage common mode filter box FIL16 can be deployed between the SUPM1 front ports and the line. For more information please refer to [458] User Manual “FIL16”.

2.2 Unit View

Figure 2: SUPM1 unit view

Figure 2 "SUPM1 unit view" shows the SUPM1 unit hardware. On the front plate are two LEDs for the unit- and traffic failure indication and one standard DIN 41 612 based connector for 16 PSTN signals.

3 Functions and Specifications

The SUPM1 unit provides the following functions and conforms to the corresponding standards and recommendations (conformance to applicable parts of the standards).

3.1 Feature Licences

Part of the XMC20 functionality is subject to feature licences. For more information on feature licences please refer to [012] Release Note “XMC20” and to [915] Technical Bulletin “Feature Licences for XMC20”.

3.2 Main Functions and Specifications

NOTICE

Overvoltage. Risk of equipment damage!

Onboard overvoltage protection is only adequate for inhouse connections.

→ For connections leaving the building external primary protection with gas discharge tubes is mandatory.

Table 3: Main functions and specifications

Feature	Rating or standard	Release
16 PSTN user ports according to ITU-T Q.552	ITU-T Q.552 (11/2001) Transmission characteristics at 2-wire analogue interfaces of digital exchanges ITU-T G.711 (1988)	r1a
	Pulse Code Modulation (PCM) of voice frequencies	r1a
BORSCHT functionality:	Battery feed Overvoltage protection Ringing injection Supervision Codec Hybrid Testing	r1a
Voice impedances configurable for different countries and applications	ITU-T Q.552 (11/2001) Transmission characteristics at 2-wire analogue interfaces of digital exchanges	r1a
Input and output level configuration	ITU-T G.712 (11/2001) Transmission performance characteristics of pulse code modulation channels	r1a
Input and output overvoltage protection According to ITU-T K.20, enhanced test level with acceptance criteria A. Note: External primary protection (230V Gas Discharge Tubes) is mandatory	ITU-T K.20 (07/2003) Resistibility of telecommunication equipment installed in a telecommunications centre to overvoltages and overcurrents	r1a
Connector	DIN 41612	r1a
V5CAS mode of operation (internal communication)		r1a
MCAS modes of operation	Technical specification for customer signalling in public networks: T 0197, Mercury Communications Ltd., 1990 Analogue 2-wire signalling state diagrams: C6 0193 Issue 2, Mercury Communications Ltd, 1996	r1a
Phone-Exchange mode of operation		r1a
Phone-Phone mode of operation		r1a
Pulsed no battery type “a-wire disconnected” Pulsed no battery type “a-b-wire disconnected”	NZ PTC 107, 6.5	r1a
Wetting current	BT, SIN 242 Issue 2.2, November 2002 “Calling Line Identification Service”	r1a
Onboard ringing generator		r1a
Onboard line-test function		r1a
Thermal management		r1a
Protection against equipment damage caused by faulty installation of cables		r1a
Front panel access. One shielded cable is connected to the front panel. It carries all 16 subscriber lines		r1a
No hardware settable options on the unit. All unit parameters are software settable with the Element Manager		r1a

Table 3: Main functions and specifications (continued)

Feature	Rating or standard	Release
Hot swapping: You can replace a SUPM1 unit without interfering with any other units. No actions on powering, configuration or commissioning need to be taken if you remove/replace a SUPM1 unit		r1a
Alarm reporting	ITU-T X.733 (1992) Information technology – open systems interconnection – systems management: Alarm reporting function	r1a
Power supply		r1a
- Power supply range V_{BAT}	refer to [201] System Description “XMC20”	
- Maximum current consumption, I_{VBAT} V_{BAT} = -48 V	1.5 A	
- Maximum total power requirement from battery, P_{TOT} V_{BAT} = nominal voltage	60 W	
- Maximum basic power consumption from battery (all ports disabled), V_{BAT} = nominal voltage	5.5 W	
Mechanical parameters		r1a
- Construction practice	19 inch	
- Height of unit (1 HU = 44.45 mm)	6 HU	
- Width of unit (1 TE = 5.08 mm)	4 TE (1 slot)	
- Size of the PCB (H x D)	233 mm x 220 mm	
- Weight	430 g	
- RoHS	Directive 2002/95/EC of the European Parliament and of the Council of 27.1.2003 on the Restriction of the use of certain hazardous substances in electrical and electronic equipment	
- WEEE	Directive 2002/96/EC of the European Parliament and of the Council of 27.1.2003 on waste electrical and electronic equipment	
Reliability		r1a
- Calculated MTTF at 35 °C (MIL-HDBK-217F)	88 years	
Emission	refer to [201] System Description “XMC20”	r1a
Immunity	refer to [201] System Description “XMC20”	r1a
Safety	refer to [201] System Description “XMC20”	r1a
Ambient conditions	refer to [201] System Description “XMC20”	r1a

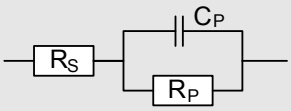
3.3 User Ports

Table 4: User ports

Feature	Rating or standard
Number of user ports per SUPM1 unit	16
Maximum number of subscribers in off-hook per SUPM1 unit, duration infinite	16

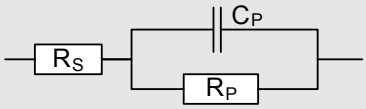
3.4 Voice Transmission Specification

Table 5: Voice transmission specification

Feature	Rating or standard
Voice impedance 	The following voice impedances are supported. Refer to Q.552; 2.2.1.1; Table 1: All impedances are configurable in the element manager.
Return loss	Q.552; 2.2.1.2; Fig. 1
Impedance unbalance about earth	Q.552; 2.2.2; Fig. 2
Relative voice levels - Input (Subscriber → SUPM1): - Output (SUPM1 →Subscriber): - Selectable in steps of 0.5 dB	Q.552; 2.2.3.1 -4 … +4 dBr -10 … 0 dBr
Tolerances of relative levels	Q.552; 2.2.3.2
Variation of gain with input level	Q.552; 3.1.1.4; Fig. 4
Loss distortion with frequency	Q.552; 3.1.1.5; Fig. 5a, b
Absolute group delay	Q.552; 3.1.2.1
Group delay distortion with frequency	Q.552; 3.1.2.2
Crosstalk	Q.552; 3.1.4
Input signals above 4.6 kHz	Q.552; 3.1.6.1
Level of individual components	Q.552; 3.1.7.1

ID	R_S [Ω]	R_P [Ω]	C_P [nF]	Codec
a	900	0	0	A-law
b	600	0	0	A-law
c	600	0	0	u-law
d	200	680	100	A-law
e	370	620	310	A-law
f	220	820	115	A-law
g	300	1000	220	A-law
h	270	750	150	A-law

Table 5: Voice transmission specification (continued)

Feature	Rating or standard
Terminal Balance Return Loss	The following test networks are supported. The test network ID must correspond to the voice impedance ID. Refer to Q.552; 3.1.8.1; Fig. 10: 
Weighted noise	Q.552; 3.3.2.1
Total distortion	Q.552; 3.3.3; Fig. 14 a, b

ID	R_S [Ω]	R_P [Ω]	C_P [nF]
a	900	0	-
b	600	0	-
c	600	0	-
d	200	680	100
e	370	620	310
f	220	820	115
g	370	620	310
h	270	750	150

3.5 Signalling Specification

Table 6: Signalling specification - DC loop feeding

Feature	Rating or standard
On-hook voltage unloaded @ V_{BAT} = -39.5 … -60.0 V_{DC}	U_{ONHOOK} = -53 … -59 V
@ V_{BAT} = -60.0 … -72 V_{DC}	| U_{ONHOOK} | = | V_{BAT} – 2 V | ± 3 V
On-hook voltage @ I_{LOOP} = 2.0 mA	| U_{ONHOOK} | ≥ 44 V
On-hook voltage @ I_{LOOP} = 5.0 mA	| U_{ONHOOK} | ≥ 44 V
Maximum on-hook loop current	I_{LOOP} ≤ 5 mA
Loop current	Constant current feeding
Selectable loop currents [a]	15.0 mA, ± 10% 19.5 mA, ± 10% 23.5 mA, ± 10% 30.0 mA, ± 10% 39.0 mA, ± 10% 45.0 mA, ± 10%
Normal polarity	a-wire is more positive than b-wire. a-wire is close to GND but still negative.
Maximum loop resistance	2 kΩ including the terminal. This fulfils the requirements of a long haul interface.
Off-hook detection @ default loop current (23.5 mA)	I_{LOOP} ≥ 15 mA
On-hook detection	I_{LOOP} ≤ 7 mA

a. When operating the SUPM1 unit in a passively cooled subrack the loop current is limited to 23.5 mA.

Table 7: Signalling specification - off-hook detection timing

Feature	Rating or standard
Safe detection No detection	t_{line} ≥ 20 ms t_{line} < 15 ms
If a wake up signal, e.g. a polarity reversal, is sent out to initiate CLIP, the terminal will draw a short current pulse which can be interpreted by the SUPM1 as an off-hook event. So the detection time for off-hook has to be increased to prevent this false off-hook detection to ≥ 200 ms. In the V5CAS mode of operation, the off-hook timing parameter is configured in the CPS of the VOIP1 unit as the Connect Timeout parameter (HS1.3). In the MCAS mode of operation the off-hook detection time is predefined to 200 ms in the SUPM1.	

Table 8: Signalling specification - reduced battery

Feature	Rating or standard
During the “reduced battery” state, the loop current is reduced to a predefined level. This level is set to a value that still ensures a correct on-hook/off-hook detection.	
Minimum loop current	15 mA

Table 9: Signalling specification - pulse dialling

Feature	Rating or standard
In the V5CAS mode of operation, the pulse dialling as well as the on-hook/off-hook times are defined by the custom parameter set (CPS) of the signalling interworking unit (VOIP1 unit). In the MCAS mode of operation, the following predefined values are used:	
Pulse cadence	9 pps … 12 pps
Pulse - pause ratio ($t_{break}/(t_{break} + t_{make})$)	0.53 … 0.72
Pulse length + pause length	90 ms … 110 ms
Pulse length (t_{break})	52 ms … 72 ms
Pause length (t_{make})	28 ms … 46 ms
Interdigit time	≥ 140 ms
Distortion (line-CAS):	≤ 10 ms

Table 10: Signalling specification - flash impulse

Feature
A flash impulse is transferred as an on-hook/off-hook signal. In the V5CAS mode of operation, the flash detection times are defined by the custom parameter set (CPS) of the signalling interworking unit (VOIP1 unit). In the MCAS mode of operation, the flash detection times are defined by the CAS. Note: If SUPM1 is in thermal overheat state 1 and a flash impulse is > 200 ms, then this flash impulse will interrupt the call since it is detected as a short but valid on-hook state.

Table 11: Signalling specification - ground key

Feature	Rating or standard
Detection during on-hook	on the negative wire (with normal polarity: b-wire)
Detection during off-hook	on the a-wire or b-wire
Detection time	≥ 6 ms
No detection time	< 6 ms
Delay (line-CAS):	≤ 100 ms

Table 12: Signalling specification - DTMF dialling

Feature
DTMF signals are transmitted transparently in the voice band. The SUPM1 does not influence the DTMF signalling.

Table 13: Signalling specification - CLIP (Calling Line Identification Presentation)

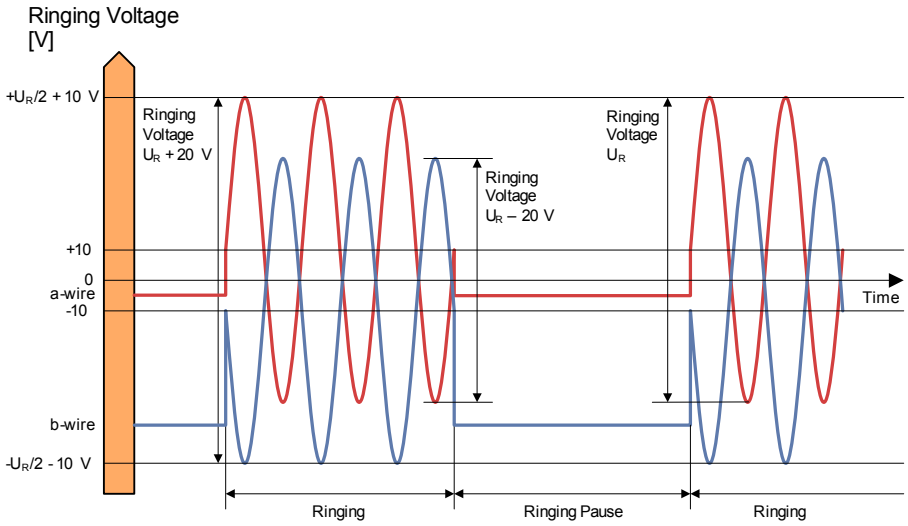
Feature
CLIP is supported. This means that on-hook VF-transmission is possible during ringing pauses, after an initial ring or after an (initial) polarity reversal.

Table 14: Signalling specification - ringing voltage (part 1)

Feature
Each SUPM1 subscriber port has its own ringing signal source. The ringing signal is balanced, also called symmetrical. Note: The ringing signal characteristics “ring over b-wire”, “ring over a-wire” and “ring over b-wire ringing earth-backed” are not applicable.

Table 14: Signalling specification - ringing voltage (part 1) (continued)

Feature
The ringing voltage is superimposed on both, the a-wire and the b-wire. It is a contra directional voltage. The difference of these two voltages gives the ringing voltage. The ringing signal has a DC offset of about 20 V_{DC}. During ringing pause the normal on-hook voltage is applied to the line.



Please note:

With the MCAS earth calling mode the ringing voltage is 40 V_{AC} unbalanced, applied to the b-wire only.

Table 15: Signalling specification - ringing voltage (part 2)

Feature	Rating or standard
Ring signal form	sinusoidal
Ring frequencies f_{RING}	16 2/3, 20; 25; 50 Hz ± 3 Hz
Maximum ring signal voltage	≤ 75 V_{RMS}, unloaded
Minimum ring signal voltage	≥ 65 V_{RMS}, maximum load
Maximum load per subscriber @ f_{RING} ≤ 25Hz or @ f_{RING} = 50 Hz or Definition of 1 REN:	 3 REN 1.6 REN 2.5 kΩ 1.8 kΩ + 850 nF = 7.7 kΩ -76.5° @ 25Hz
Maximum load per SUPM1 unit for simultaneous ringing	24 REN
Maximum ringing current (short circuit):	≤ 120 mA
Ringing signal crest factor	≥ 1.2
Ringing delay CAS → a/b-wire	≤ 40 ms
Ringing distortion CAS → a/b-wire	≤ 40 ms
Ringing cadence	according to CAS

Table 16: Signalling specification - metering

Feature	Rating or standard
Each subscriber circuit on the SUPM1 unit has its own metering generator. Metering pulses can be sent to the line during off-hook and up to 25.5 seconds after going on-hook.	

Table 16: Signalling specification - metering (continued)

Feature	Rating or standard
Metering frequencies	12 kHz ± 30 Hz 16 kHz ± 40 Hz
Metering level at 200 Ω load	0.5 ± 0.1 V_{RMS} 0.9 ± 0.2 V_{RMS} 1.8 ± 0.2 V_{RMS} 2.4 ± 0.3 V_{RMS} 3.0 ± 0.3 V_{RMS}
Metering level unloaded @ 0.5 V setting @ 0.9 V setting @ 1.8 V setting @ 2.4 V setting @ 3.0 V setting	 ≤ 0.9 V_{RMS} ≤ 1.7 V_{RMS} ≤ 3.0 V_{RMS} ≤ 4.0 V_{RMS} ≤ 5.0 V_{RMS}
Pulse and pause length	V5CAS: According to the custom parameter set (CPS) of the signalling interworking unit (VOIP1 unit). MCAS: According to the CAS
Shaping	smooth ramping avoids any noise

Table 17: Signalling specification - polarity reversal

Feature	Rating or standard
Polarity reversal with normal polarity (a-wire more positive than b-wire), off-hook	supported
Polarity reversal with reversed polarity (b-wire more positive than a-wire), off-hook	supported
Polarity reversal with normal polarity (a-wire more positive than b-wire), on-hook	supported if I_{LOOP} ≥ 1 mA
Polarity reversal with reversed polarity (b-wire more positive than a-wire), on-hook	supported if I_{LOOP} ≥ 1 mA
Delay CAS → a/b-wire	≤ 100 ms
Smooth polarity reversal	supported

Table 18: Signalling specification - pulsed no battery

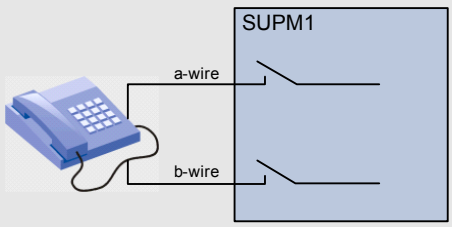
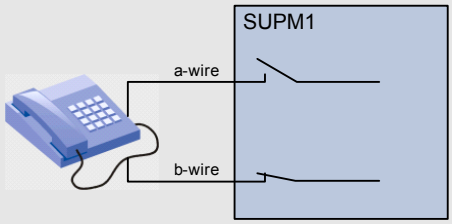
Feature	Rating or standard
	Pulsed no battery is supported in the **V5CAS** mode of operation only.
The SUPM1 unit supports two types of pulsed no battery:	
	a-wire and b-wire disconnected (default): An information element (IE) “pulsed no battery” causes a disconnect of both wires. 

Table 18: Signalling specification - pulsed no battery (continued)

Feature	Rating or standard
	a-wire disconnected: An information element (IE) “pulsed no battery” disconnects the a-wire only. The b-wire remains on the $-V_{BAT}$. 
Delay CAS → a/b-wire	≤ 100 ms

3.6 Thermal Management

Table 19: Thermal management

Feature	Rating or standard
Normal state No restrictions.	T ≤ 70 °C
Overheat state 1 In the V5CAS and MCAS direct line operation modes, new calls are possible only for high priority subscribers. Ongoing calls are not affected. In all other operation modes new calls are possible without restriction.	T_{ON} > 70 °C T_{OFF} < 68 °C
Overheat state 2 All ongoing calls are immediately stopped.	T_{ON} > 85 °C T_{OFF} < 83 °C

3.7 Line Test

Table 20: Line test - cyclic line test

Feature	Rating or standard
Cyclic line-test interval	1 day 1 week
Cyclic line-test starting time	Any time is configurable

Table 21: Line test - line test measurement ranges

Feature	Rating or standard
Isolation a - b b - a a - ground b - ground	 0 … 800 kΩ 0 … 800 kΩ 0 … 800 kΩ 0 … 800 kΩ
Foreign Voltage AC a - b a - ground b - ground	 0 … 250 V 0 … 250 V 0 … 250 V
Foreign Voltage DC a - b a - ground b - ground	 0 … 250 V 0 … 250 V 0 … 250 V
Noise a - b	 -40 … 0 dBm
Capacitance a - b a - ground b - ground	 0 … 40 µF 0 … 40 µF 0 … 40 µF

Table 22: Line test - line test alarm thresholds

Feature	Rating or standard
Resistance/Isolation: a - b b - a a - ground b - ground	 10; 20; 30; 40; 50; 100 kΩ, or “Not used”
Foreign voltage: DC	 10, 20, 40, 50, 60 V_{DC}, or “Not used”
Foreign voltage: AC	 5, 10, 20, 30, 40 V_{eff}, or “Not used”
Noise: a - b, in the range of 300 Hz … 3400 Hz	 -10, -20, -30, -40 dBm, or “Not used”
Capacitance	No threshold selectable since no alarm will be generated. The measured value will be displayed.

Table 23: Line test - permanent line check

Feature	Rating or standard
a-wire and b-wire short	not configurable
AC power cross	
Transversal current	
Longitudinal current	

3.8 Length of Subscriber Lines

Table 24: Length of subscriber lines

Feature	Rating or standard
The maximum subscriber (loop) cable length depends on several factors. One important factor is the resistance of the loop and the connected telephone set. The DC-resistance of the two wires should not exceed 2x1000 Ω including the telephone set. The telephone set is typically 200 - 600 Ω.	
Maximum cable length @ 0.4 mm wire diameter @ 0.6 mm wire diameter @ 0.8 mm wire diameter @ 1.0 mm wire diameter	 5.0 km 11.3 km 19.9 km 31.0 km
The above values are calculated under the assumption that the telephone set has a DC-resistance of 600 Ω.	
	Before you operate with a maximum line length investigate also the following criteria: - Influence of the cable length on the function of the subscriber set (national standards for telephone sets). - Cable attenuation for voice transmission and/or - Metering pulses.
	It is highly recommended to use twisted wire pairs in order to minimize the susceptibility to cross talk and induced voltages.

3.9 Power Consumption

Please note:

When operating the SUPM1 unit in a passively cooled subrack the loop current is limited to 23.5 mA

Table 25: Power consumption, V_{BAT} = -48 V

I_{Loop} [mA]	Loop length	Off-hook [n]	I_{VBAT} [A]	P_{TOT} [W]
-	-	0	0.12	6.0
15	short	16	0.25	16.8
19.5	short	16	0.4	19.2
23.5	short	16	0.45	21.6
30	short	16	0.52	25.0
39	short	16	0.65	31.2
45	short	16	0.7	33.6
15	long	16	0.5	24.0
19.5	long	16	0.6	28.8
23.5	long	16	0.7	33.6
30	long	16	0.85	40.8
39	long	16	1.0	48.0
45	long	16	1.2	57.6

The differentiation between short loop and long loop is the loop voltage, i.e. loop resistance x loop current. The indicative loop resistance for the **short** loop with the different loop currents is defined as follows:

- R_{LOOP} < 1400 Ω @ I_{LOOP} = 15.0 mA
- R_{LOOP} < 1100 Ω @ I_{LOOP} = 19.5 mA
- R_{LOOP} < 900 Ω @ I_{LOOP} = 23.5 mA
- R_{LOOP} < 600 Ω @ I_{LOOP} = 30 mA
- R_{LOOP} < 500 Ω @ I_{LOOP} = 39 mA
- R_{LOOP} < 400 Ω @ I_{LOOP} = 45 mA

The table below shows the power consumption of the SUPM1 unit with a load of 0.1 Erlang, i.e. with 2 active subscribers.

Table 26: Power consumption @ 0.1 Erlang, V_{BAT} = -48 V

I_{Loop} [mA]	Loop length	Off-hook [n]	I_{VBAT} [A]	P_{TOT} [W]
15	short	2	0.14	6.7
19.5	short	2	0.15	7.2
23.5	short	2	0.16	7.7
30	short	2	0.17	8.2
39	short	2	0.18	8.6
45	short	2	0.19	9.1
15	long	2	0.17	8.2
19.5	long	2	0.18	8.6
23.5	long	2	0.19	9.1
30	long	2	0.22	10.6

Table 26: Power consumption @ 0.1 Erlang, V_{BAT} = -48 V (continued)

I_{Loop} [mA]	Loop length	Off-hook [n]	I_{VBAT} [A]	P_{TOT} [W]
39	long	2	0.24	11.5
45	long	2	0.25	12.0

4 Installation

4.1 Prerequisites

Before installing a SUPM1 unit take care to follow the safety advices as listed in [202] Safety Instructions “Precautions and safety”.

Valid combinations of hardware (HW) and embedded software (ESW) versions are given in [012] Release Note “XMC20”.

For the installation of XMC20 HW

refer to [301] User Guide “XMC25 Installation”, or
refer to [310] User Guide “XMC23 Installation”, or
refer to [322] User Guide “XMC22 Installation”.

Please note:

The XMC22 subrack is not available in the system release R4C.

4.2 Slots and Deployment Scenarios for the SUPM1 Unit

The SUPM1 unit uses one slot in the XMC20 subrack.

In a XMC20, the SUPM1 unit can be operated in any of the following slots:

- XMC25: 1 … 10, 12 … 21.
- XMC23: 7 … 10, 12 … 14.
- XMC22: 9 … 10, 12.

Slot 11 is reserved for the working COGE5 unit.

In maximum 20 SUPM1 units (without network connection) can be operated in a XMC25. The number of SUPM1 units is reduced when using TDM transport units as connection to the TDM network.

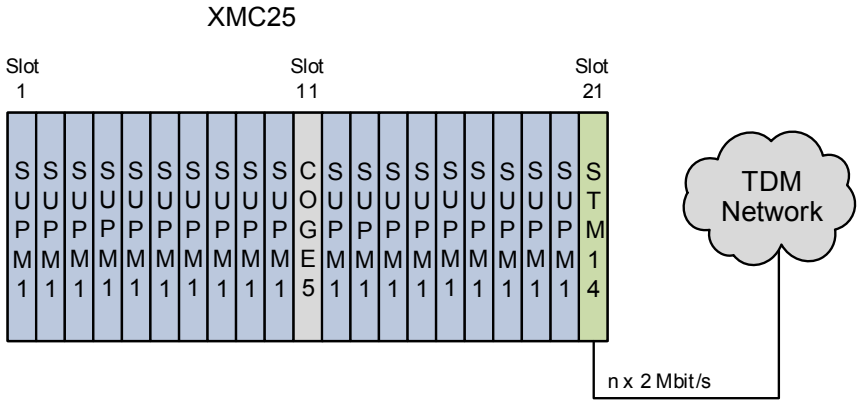


Figure 3: XMC25subrack with 19 SUPM1 units and 1 STM14 unit

The example above shows a XMC25 subrack equipped with 19 SUPM1 units, i.e. 304 user ports, which can be transported over a number of 2 Mbit/s links over the TDM network.

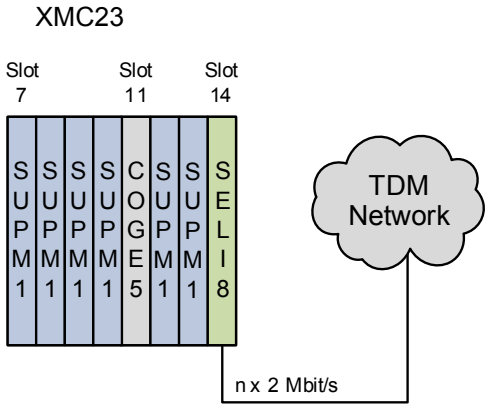


Figure 4: XMC23 subrack with 6 SUPM1 units and 1 SELI8 unit

The example above shows a XMC23 subrack equipped with 6 SUPM1 units, i.e. 96 user ports, which can be transported over a number of 2 Mbit/s links over the TDM network.

In maximum 19 SUPM1 units (304 subscribers) can be operated in a XMC25 when using a high capacity VOIP1 media gateway unit.

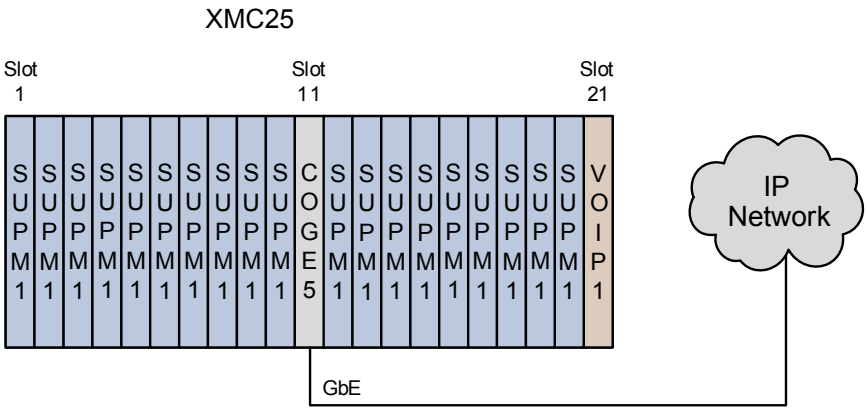


Figure 5: XMC25 subrack with 19 SUPM1 units and 1 VOIP1 unit

4.3 Splitters

Splitters combine or separate the PSTN signal and an xDSL signal for the transmission over a single copper pair. There are two different CO-splitter configurations:

- with an external splitter subrack,
- with an MDF splitter.

4.4 Jumpers

There are no jumpers or any other kind of hardware settable items on the SUPM1 unit.

4.5 Protection

External primary protection (230 V Gas Discharge Tubes) is mandatory for each subscriber line. These protection elements are normally plugged onto the MDF.

4.6 Compatibility

4.6.1 XMC20 Units

SUPM1 is compatible with any other XMC20 service unit with an ESW release of the current XMC20 system release. Please refer to [012] Release Note “XMC20”.

4.6.2 Previous ESW Revisions

The SUPM1 unit with ESW release supm1_r2b was first released for the XMC20 system release R4C. The ESW is compatible with the XMC20 system releases R6A and R6B.

4.7 Connections and Cables

4.7.1 Front Connector of the SUPM1 Unit

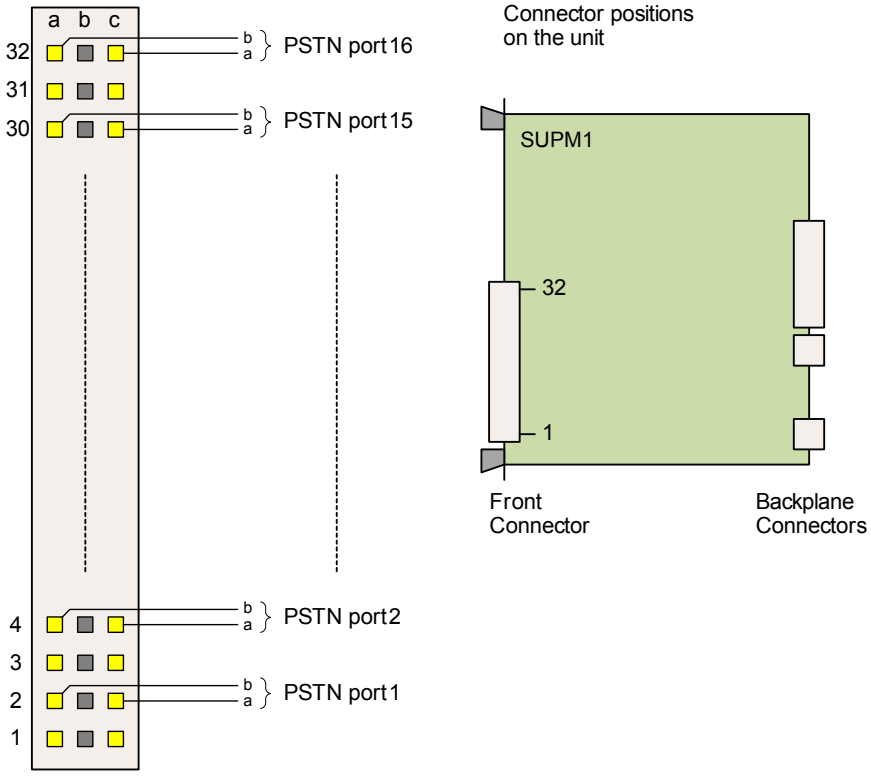


Figure 6: Pin-out of the SUPM1 front connectors, front view

Table 27: SUPM1 front connector pins

PSTN port	Connector pin for	
	signal a	signal b
1	2c	2a
2	4c	4a
3	6c	6a
4	8c	8a
5	10c	10a
6	12c	12a
7	14c	14a
8	16c	16a
9	18c	18a
10	20c	20a
11	22c	22a
12	24c	24a
13	26c	26a
14	28c	28a

Table 27: SUPM1 front connector pins (continued)

PSTN port	Connector pin for	
	signal a	signal b
15	30c	30a
16	32c	32a

4.7.2 Cable 16 Pairs, DIN 41612 to open End

An open ended or unterminated cable with 16 pairs is used to connect the 16 interfaces of the SUPM1 unit with the 2-wire interfaces to the MDF. The MDF end of the cable is open ended.

The length of the cable can be specified (minimum length 2 m).

Latching clips must be used to secure the cable to the SUPM1 front connector.

For details on SUPM1 cables, please refer to [506] User Manual “XMC20 cables”.

4.7.3 Fixing the Cables to the Cable Tray

When operating the SUPM1 unit in a XMC25, the cable must be attached to the cable tray as shown in the Figure 7 "Side view of the cable tray and the cable in XMC25".

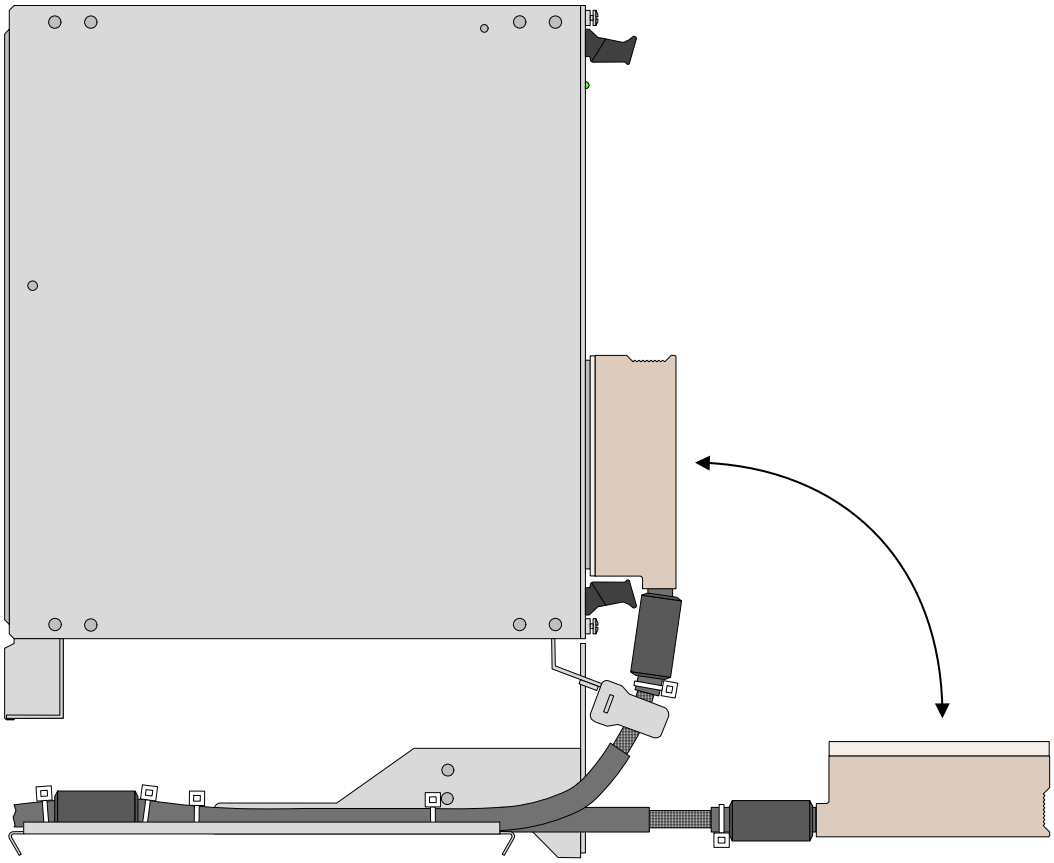


Figure 7: Side view of the cable tray and the cable in XMC25

Please note:

The cable route on the cable tray should follow approximately the projection of the unit slot on the cable tray.

In the XMC23 and XMC22, cables connecting to the SUPM1 unit or other units should be guided and attached similarly to the way shown in Figure 7 "Side view of the cable tray and the cable in XMC25" above. For more detailed information, please refer to [310] User Guide “XMC23 Installation” or refer to [322] User Guide “XMC22 Installation”.

5 Functional Description

This chapter gives the detailed functional description of the SUPM1 unit in the XMC20 subrack.

5.1 V5CAS Mode of Operation

Please note:

The V5CAS mode of operation is only applicable if the SUPM1 unit is connected to the VOIP1 media gateway unit.

A PSTN subscriber accesses the SUPM1 unit with three different logical channels:

- Analogue voice channel
- Inband PSTN signalling channel (e.g. DTMF dialling)
- Out of band PSTN signalling (e.g. off-hook)

The voice signal and the inband signalling are converted to/from the PCM format by the codec and are cross connected to the VOIP1 unit.

The out of band signalling is converted to/from CAS (channel associated signalling) by the SLIC and also cross connected to the VOIP1 unit. This protocol running between SUPM1 and the VOIP1 unit is KEYMILE proprietary and is called V5CAS.

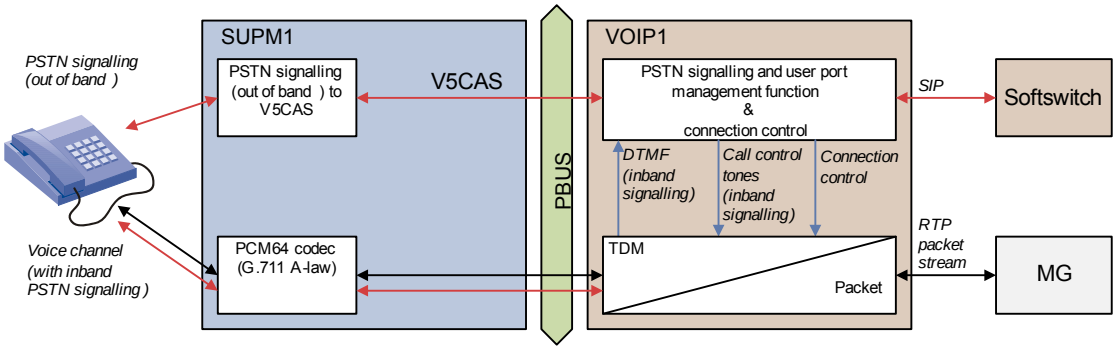


Figure 8: V5CAS routing in XMC20

In the V5CAS mode of operation the

- Blocked port line feed function can be enabled or disabled.
- Metering pulse function towards the subscriber can be enabled or disabled.
  Note that the metering pulse and its timing is also controlled by the CPS. This cannot be configured in the ECST.
- Pulse on answer function is enabled.
  Pulse on answer means that a metering pulse is sent to the subscriber when the called subscriber goes off-hook.
- Polarity reversal function towards the subscriber is enabled.

5.2 Mercury CAS Modes of Operation

This mode of operation is used in the United Kingdom market with Mercury CAS (MCAS) protocol compliant switches. The signalling bit settings are pre-defined.

The MCAS modes require a 2 Mbit/s (P12) transport connection to the switch supporting the Mercury CAS protocol. The P12 transport connection is implemented with the SELI8, STM14, NUSA1, NUSA2 or SDSL8 unit of the XMC20.

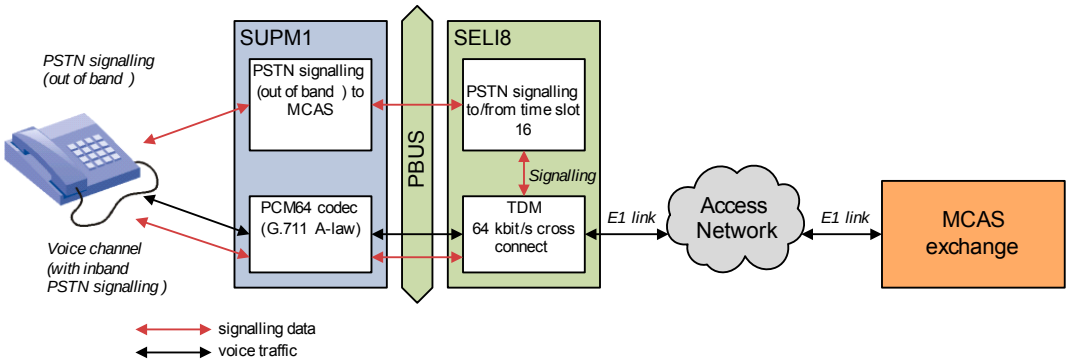


Figure 9: MCAS routing in XMC20

The SUPM1 supports four different sub modes for the Mercury CAS protocol:

- MCAS direct line
- MCAS loop calling PBX
- MCAS earth calling PBX
- MCAS PBX extension

The differences to the V5CAS mode of operation are as follows:

- Internal signalling pattern is according to MCAS.
- Pulse dialling, ground key and flash impulse timing parameters are fixed and can not be changed by the custom parameter set (CPS).
- Pulsed no battery signalling is not supported.
- The X.731 administrative state handling (lock, shutdown, unlock) is not supported.

In the MCAS mode of operation the

- Blocked port line feed function is fix enabled,
- Metering pulse function towards the subscriber can be enabled or disabled,
- Pulse on answer function can be enabled or disabled. The function is only effective if the metering pulse function is enabled.
  Pulse on answer means that a metering pulse is sent to the subscriber when the called subscriber goes off-hook,
- Polarity reversal function towards the subscriber is enabled.

5.2.1 MCAS direct Line

A standard telephone set is connected to the SUPM1 unit.

The predefined protocol fixes the CAS bit pattern according to the following table:

Table 28: MCAS direct line signalling

CAS bit				State	
a	b	c	d	downstream	upstream
0	0	0	1	Disconnect clear	-
0	1	0	1	Call established	Off-hook
0	1	1	1	Metering pulse	-
1	0	0	1	Ringing off	-
1	0	1	1	Ringing on	-
1	1	0	1	Circuit free (idle) or busy	On-hook
1	1	1	1	Blocking (AIS)	Blocking (AIS)

5.2.2 MCAS Loop calling PBX

A loop calling PBX is connected to the SUPM1 unit.

The signalling is identical to the MCAS direct line mode.

5.2.3 MCAS Earth calling PBX

An earth calling PBX is connected to the SUPM1 unit.

The predefined protocol fixes the CAS bit pattern according to the following table:

Table 29: MCAS earth calling PBX signalling

CAS bit				State	
a	b	c	d	downstream	upstream
0	1	0	1	Call established	Off-hook or ground key
0	1	1	1	Metering pulse	-
1	0	0	1	Ringing off	-
1	0	1	1	Ringing on	-
1	1	0	1	Circuit free (idle)	On-hook
1	1	1	1	Blocking (AIS) or busy	Blocking (AIS)

5.2.4 MCAS PBX Extension

A standard telephone set is connected to the SUPM1 unit, and a PBX is connected to an exchange side analogue subscriber line service unit.

The predefined protocol fixes the CAS bit pattern according to the following table:

Table 30: MCAS PBX extension signalling

CAS bit				State	
a	b	c	d	downstream	upstream
0	0	0	1	Disconnect clear	Ground key
0	1	0	1	Call established	Off-hook
0	1	1	1	Metering pulse	-
1	0	0	1	Ringing off	-
1	0	1	1	Ringing on	-
1	1	0	1	Circuit free (idle) or busy	On-hook
1	1	1	1	Blocking (AIS)	Blocking (AIS)

5.3 Phone-Exchange Mode of Operation

This mode of operation allows you to set the SUPM1 CAS-signalling according to your needs.

Subscribers connected to the SUPM1 can interwork with the exchange side analogue line card TUXA1 or with any third party equipment.

This mode is used to extend analogue PSTN subscriber lines via a digital access network.

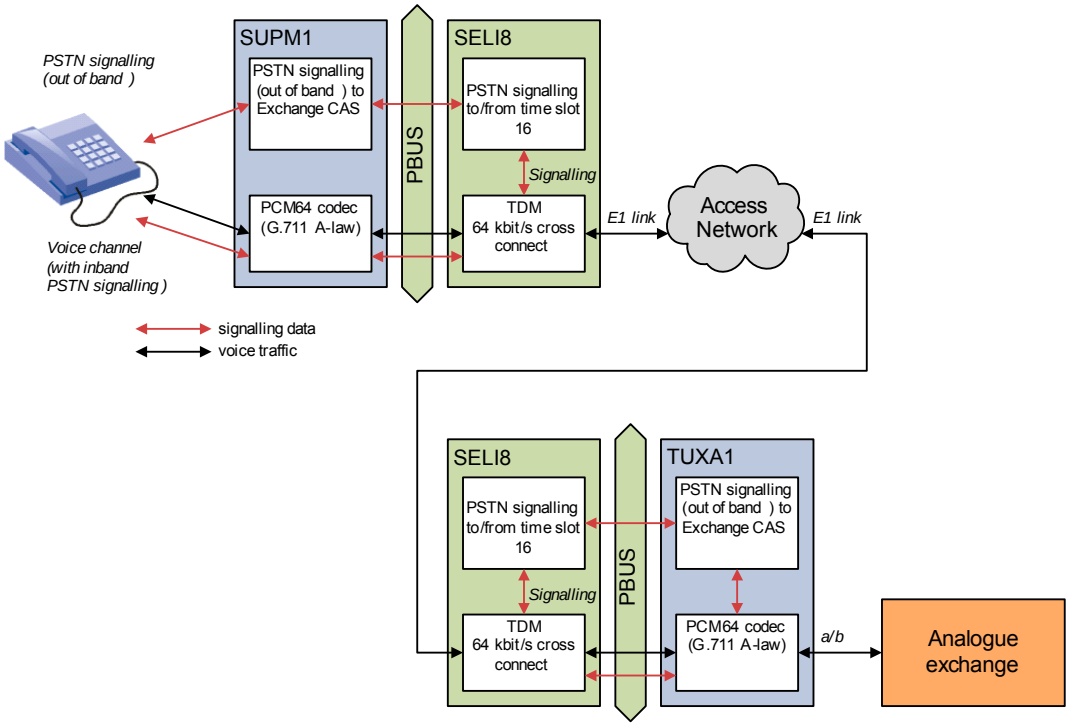


Figure 10: Phone-Exchange mode

The four CAS signalling bits can be set in accordance with the settings of the TUXA1 or the third party equipment:

- Towards exchange
  - On-hook
  - Off-hook
  - Ground key
- From Exchange
  - Ringing
  - Metering pulse
  - Polarity reversal

The default CAS bit pattern are set according to the following table:

Table 31: Phone-Exchange mode default signalling

CAS bit				State	
a	b	c	d	from exchange	towards exchange
0	0	0	1	Polarity reversal	Off-hook
0	1	0	1	-	On-hook
1	0	0	1	-	Ground key

Table 31: Phone-Exchange mode default signalling (continued)

CAS bit				State	
a	b	c	d	from exchange	towards exchange
1	0	1	1	Metering pulse	-
1	1	0	1	Ringing	-

Please note:

It is not possible to set two identical CAS patterns for the signalling of one direction.
In the CAS pattern comparison, a “x” in a CAS pattern from the exchange counts for “0” and “1”, e.g. 1101 and 1x01 are not allowed.

Please note:

Signalling patterns with all “0” or all “1” are not allowed.

In the Phone-Exchange mode of operation the

- Blocked port line feed function is fix disabled,
- Metering pulse function towards the subscriber can be enabled or disabled,
- Pulse on answer function is disabled,
- Polarity reversal function towards the subscriber can be enabled or disabled.

5.4 Phone-Phone Mode of Operation

This mode of operation is used in private networks. A PSTN user port is directly cross connected with another PSTN user port without any exchange in between. A subscriber (called A-subscriber) is able to speak with another subscriber (called B-subscriber) without dialling a number. This function works in both directions.

Such applications are generally called “Engineering Order Wire” (EOW).

The SUPM1 unit offers the following Phone-Phone mode:

- Phone-Phone auto ring down

In the Phone-Phone mode the A-subscriber receives a ring control tone from the B-subscriber. This ring control tone has a frequency of 444 Hz.

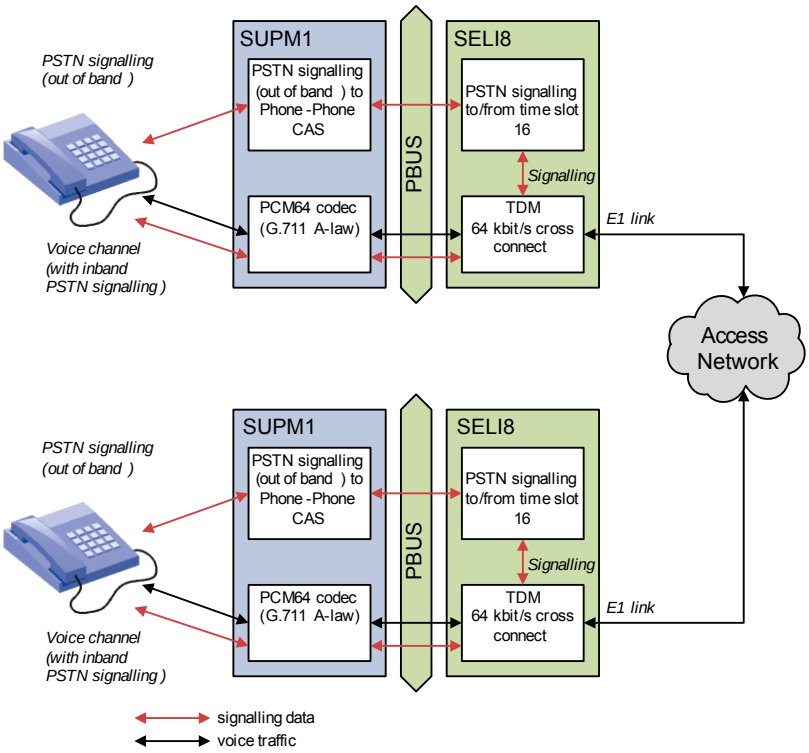


Figure 11: Phone-Phone mode

In the Phone-Phone mode of operation the

- Blocked port line feed function is fix disabled,
- Metering pulse function towards the subscriber is disabled,
- Pulse on answer function is disabled,
- Polarity reversal function towards the subscriber is disabled.

5.4.1 Phone-Phone Auto Ring Down

As soon as the calling subscriber (A-subscriber) goes off-hook, the SUPM1 sends the CAS pattern “Off-hook” in upstream direction. The SUPM1 on the receiving side creates the ring back control tone towards the A-subscriber and applies the ringing signal **cadence with 2 seconds ringing, followed**

by 4 seconds pause to the called subscriber (B-subscriber). The calling subscriber (A-subscriber) cannot influence the ringing cadence.

This mode is also called PLAR: Private Line Automatic Ring down.

The four CAS signalling bits can be set in accordance with the settings of the remote equipment:

- Towards/from remote equipment
  - On-hook
  - Off-hook

The default CAS bit pattern are set according to the following table:

Table 32: Phone-phone auto ring down mode default signalling

CAS bit				State
a	b	c	d	to/from remote subscriber
0	1	0	1	Off-hook
1	1	0	1	On-hook

Please note:

It is not possible to set two identical CAS patterns for the on-hook and off-hook signalling.

Please note:

Signalling patterns with all “0” or all “1” are not allowed.

5.5 Port States

Each PSTN user port has a subscriber state, an administrative state and an operational state, which are controlled by the subscriber, by the element manager or by the remote SIP subscriber connected to the VOIP1 unit. The state control messages are transported inside the XMC20 via the V5CAS protocol.

The port states handled in this section are used for the port maintenance and can be found in the user **port status** management function. Contrary to this the administrative state IETF and operational state IETF of the user **port main** management function reflect the status of the physical port.

If the port administrative state of the main management function is set to “down”, the port administrative state of the status management function is forced to “locked”.

Please note:

The administrative and operational port states are valid for the V5CAS mode of operation only.

→ In the MCAS mode of operation, the administrative and operational port states are not valid. The administrative port state is fixed to “unlocked”.

→ The subscriber state is valid as long as the IETF state is up.

Please note:

The administrative port state handling is supported in the V5CAS mode of operation only.

The **subscriber** state shows the analogue line state. This status can have two different states:

- idle
  Subscriber is on-hook.
- busy
  Subscriber is off-hook or ringing is applied.

The **administrative** state shows the network element controlled state of a subscriber. The administrative state is influenced by the network element itself and not by the signalling. It can take the following states:

- unlocked
- locked
- shutting down

Possible actions to change the administrative state are:

- lock (port status)
  The subscriber becomes blocked immediately. Ongoing calls are interrupted, no further calls are possible.
- shutdown (unit status)
  When shutting down all subscribers the network element requests a blocking from the softswitch or the local exchange. The softswitch or local exchange allows the blocking if the subscriber state is idle. An ongoing call is not interrupted. If any call is not terminated within the next 30 minutes after the issue of the shutdown command an SHT (shutdown timeout) alarm is raised.

- shutdown (port status)
  When shutting down a single subscriber the network element requests a blocking from the softswitch or local exchange. The softswitch or local exchange allows the blocking if the subscriber state is idle. An ongoing call is not interrupted. There is no SHT (shutdown timeout) alarm.
- unlock (port status and unit status)
  With the unlock command the subscriber becomes unblocked.

The **operational** state shows the state as defined and forced by the signalling. The possible states are:

- enabled
- disabled.

The following table gives some explanations about administrative and operational states according to ETS 300 376-1, Annex A:

Table 33: Port states

Administrative state	Operational state	Explanation
locked	enabled	The port has been locked by the management system of the NE and there are no local fault conditions, regardless of any knowledge about the softswitch or local exchange side.
locked	disabled	The port has been locked by the management system of the NE and there is an NE fault, regardless of any knowledge about the softswitch or local exchange side.
unlocked	enabled	The port has been unlocked by the management system of the NE and there is no NE fault and no blocking by the softswitch or local exchange. The port is ready to do calls.
unlocked	disabled	The port has been unlocked by the management system of the NE and there is an NE fault or a blocking by the signalling (H.248/MEGACO or SIP or V5). This state is also entered as part of the unblocking procedure if the NE sent UNLOCK to the port object and an acknowledgement from the signalling needs to be awaited.
shutting down	undefined	The subscriber port state is “busy”. The administrative state will become locked as soon as the subscriber terminates his call or the timeout of 30 minutes has elapsed.

Only the user ports in the state “unlocked” / “enabled” are really in operation and ready to do calls. In all the other states, the associated user port is either blocked or considered as blocked.

5.6 PSTN Maintenance

If for maintenance purposes a subscriber has to be removed from the MDF (main distribution frame) or a SUPM1 unit has to be removed from the XMC20 subrack, this should be done without interrupting ongoing calls. This is accomplished, under the control of the signalling (H.248/MEGACO, SIP or V5), by blocking a user port as soon as an ongoing call is terminated. This process is called “shutdown” (deferred locking).

Please note:

The administrative port state handling is supported in the V5CAS mode of operation only.

5.6.1 Activation of the Shutdown Procedure

Shutting down a user port can be done in different ways:

- Port status: Shut Down:
  A single subscriber port is shut down, i.e. it goes into the locked state.
- Unit status: Shutdown All Ports:
  All enabled subscriber ports are shut down, i.e. they go into the locked state.

The status of the shut down procedure can be observed by

- checking the unit status: Unit administrative state of all ports, or
- checking the port status: X.731 administrative state of any individual port.

Note that there is a timeout of 30 minutes after activating the “unit status: Shutdown All Ports” button. If after 30 minutes not all user ports have been locked a “Shutdown Timeout” (SHT) alarm is raised.

The SHT alarm is cleared as soon as the last subscriber becomes locked.

5.6.2 Deactivation of the Shutdown Procedure

The deactivation of the shutdown procedure of a user port can be done in different ways:

- Port status: Unlock:
  A single subscriber port is unblocked, i.e. it goes into the unlocked state.
- Unit status: Unlock All Ports:
  All enabled subscriber ports are unblocked, i.e. they go into the unlocked state.

5.6.3 Test Loop Procedure

For maintenance purposes the digital voice signal received by a subscriber can be looped back towards the network.

The loop is transparent, i.e. the received voice signal is forwarded towards the subscriber.

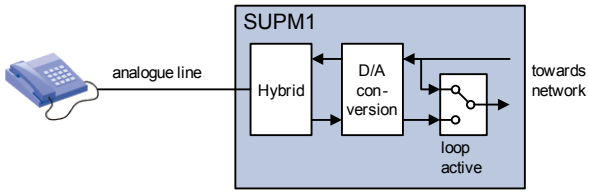


Figure 12: Digital test loop for voice signals

A test loop can be applied even if the subscriber is busy.

Risk of operating trouble!

An ongoing call will be interrupted in direction towards the network.

An active test loop activates the MFA (maintenance function active) alarm on the port.

5.7 Line Impedance Selection

The hardware of the SUPM1 unit is prepared to comply with many national requirements concerning the line impedance. The line impedance parameters can be configured with the element manager.

The line impedance is selected from a list according to the national requirements. The following impedances are implemented:

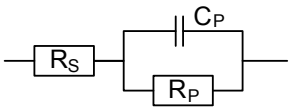


Figure 13: a/b impedance

Table 34: Line impedance

R_S [Ω]	R_P [Ω]	C_P [nF]	Country example
900 A-law	0	0	Inter exchange impedance, ANSI
600 A-law	0	0	Standard real impedance
600 u-law	0	0	USA
200	680	100	China
370	620	310	UK
220	820	115	Standard European complex impedance, e.g. for Germany etc.
300	1000	220	UK BT
270	750	150	ETSI definition

The voice impedance should match the impedance of the connected terminals. If the impedances don't match then the relative levels don't match with the defined values and the subscriber line interface can become unstable.

If you don't find your impedance in the list, please contact the KEYMILE Technical Support or your local KEYMILE customer support.

5.8 Input and Output Level

For each subscriber port the relative input level and relative output level of the analogue signal can be configured.

In the digital network the relative level is at 0 dBr according to ITU-T G.101, i.e. you effectively configure directly the relative levels at the analogue port. The following figure shows the relative levels, and in italic also the absolute levels.

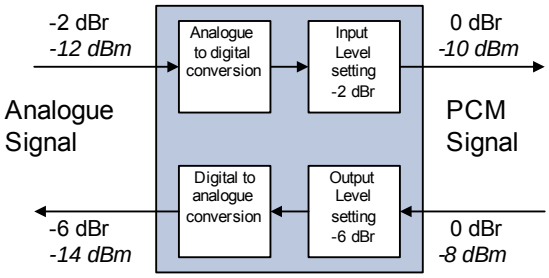


Figure 14: Level configuration on input and output directions

The values in italic are examples of absolute levels. With the shown configuration you have in upstream direction a gain of 2 dB and in downstream direction a loss of 6 dB.

The default levels, 0.0 dBr for input and -7 dBr for output levels, fit most applications.

Please note:

The absolute output level should always be at least 1 dB below the absolute input level in order to eliminate any echo or instability of the subscriber interface.

Note that the theoretical load capacity of a PCM A-law coded signal is +3.14 dBm0. With a relative level of 0 dBr, the maximum absolute level is therefore 0 dBr + 3.14 dBm0 = 3.14 dBm.

5.9 Line Feeding

The analogue a/b-wires of SUPM1 are fed with a line feed current, the loop current.

This is the current a subscriber will draw from the interface during off-hook. Since the interface behaves as a constant current source it is possible to define the value of this constant current (= maximum loop current) in the range from 15.0 mA up to 45 mA.

In the V5CAS mode of operation the line feeding of a blocked port can be enabled or disabled. In the MCAS mode of operation the line feeding is always enabled.

Please note:

Keep the loop current as low as possible to reduce the local power dissipation on the SUPM1. For most applications the default loop current 23.5 mA is sufficient.

Please note:

When operating the SUPM1 unit in a passively cooled subrack the loop current is limited to 23.5 mA

5.10 Signalling

5.10.1 Downstream PSTN Signals

The following PSTN signals towards the subscriber (downstream) are supported.

5.10.1.1 Ringing

Each subscriber line interface produces its own balanced ringing signal. Accordingly, parallel ringing of all user ports is possible without restrictions.

On unit level select the ringing frequency 16 2/3, 20, 25 or 50 Hz according to the network requirements.

5.10.1.2 Metering

On unit level configure the metering frequency 12 or 16 kHz according to the network requirements.

On unit level configure the metering level 0.5, 0.9, 1.8, 2.4 or 3.0 V_{RMS} (@ 200 Ω) according to the network requirements.

Please note:

Do not choose a level too high since this could cause a clipping in the voice path of the terminal.

In the MCAS mode of operation the “pulse on answer” can be enabled or disabled. Pulse on answer means that a metering pulse is sent to the subscriber when the called subscriber goes off-hook

On unit level, advanced board parameters, the “Metering Pulse after On Hook” can be configured. This timer defines the time a SUPM1 user port may send out any metering pulses after the subscriber went on-hook. Also the voice path remains transparent during this time.

It is recommended to set this parameter to a value between 1 and 5 seconds.

5.10.1.3 Polarity reversal

Supported.

5.10.1.4 Pulsed no battery

The pulsed no battery signalling is supported in the V5CAS mode of operation only.

On unit level, advanced board parameters, the “Pulsed No Battery Wire Selection” can be configured. The configuration defines the physical behaviour of a “pulsed no battery”.

- a-b-Wires Disconnected:
  An information element (IE) “pulsed no battery” causes a disconnect of both wires.
- a-Wire Disconnected:
  An information element (IE) “pulsed no battery” disconnects the a-wire only. The b-wire remains on $-V_{BAT}$ (negative battery voltage).

The pulse duration is defined in the custom parameter set of the signalling interworking unit VOIP1. Please refer to [452] User Manual “VOIP1 voip1_r2”.

5.10.1.5 Reduced battery

Supported.

5.10.1.6 CLIP

Calling Line Identification Presentation (CLIP) is an on-hook voice-frequency transmission. An initial ring or a polarity reversal signal is used as an indication that CLIP will follow as in-band tones.

In support of CLIP, the SUPM1 unit opens the voice path to the line upon reception of any PSTN CAS signal in the on-hook state.

5.10.2 Upstream PSTN Signals

The following upstream PSTN signals towards the softswitch (H.248/MEGACO, SIP), V5 or Mercury CAS enabled switch are supported.

5.10.2.1 On-hook / off-hook detection

Supported.

5.10.2.2 Pulse dialling

Supported.

5.10.2.3 DTMF dialling

DTMF signals are transmitted transparently in the voice band. The SUPM1 does not influence the DTMF signalling.

5.10.2.4 Flash pulse

Supported.

5.10.2.5 Ground key

Supported.

5.11 Line Test

The SUPM1 provides an integrated line-test that makes it possible for a network provider to check the subscriber lines after a new installation of the XMC20 or to check periodically any abnormal conditions on the 2-wire subscriber lines.

A line-test is started either manually (on demand line-test) or automatically in a user-defined interval (cyclic line-test).

The SUPM1 checks for each subscriber whether he is busy or idle. If a subscriber is busy (off-hook or ringing) the line-test for this particular subscriber is postponed.

Ongoing calls are not interrupted by a line-test. The line-test will be executed after the call is finished.

If during a running line-test a subscriber goes off-hook, the line-test is stopped. The line-test is restarted when the subscriber goes on-hook again.

It is possible to leave out specified subscribers while testing. This is helpful if a subscriber line always generates a fault when running the line-test due to the fact that the subscriber has connected “non standard” terminals or generates other problems with his line.

In the V5CAS mode of operation, SUPM1 requests permission to execute a line-test from the VOIP1 unit for each subscriber. So the VOIP1 is informed about the ongoing line-test. During the line-test

- the subscriber state is busy,
- the administrative state is locked and
- the operational state is enabled.

Please note:

Only idle subscribers are tested. There are no interruptions of ongoing calls due to line-testing.

In the MCAS modes and Phone-Exchange mode of operation, SUPM1 sends the “off-hook” CAS pattern towards the exchange.

In all Phone-Phone modes the EOW service is not available during a line test.

5.11.1 Cyclic Test and manual Test

The **cyclic** line-test is performed on all enabled user ports. The cyclic line-test has to be enabled in the SUPM1 unit configuration, on the “Line Test Parameters” tab.

For any subscriber port it is possible to prevent the cyclic line-test. This is done on the port configuration where you can disable the cyclic line-test.

For the cyclic line-test the following parameters can be configured:

- Line Test Schedule
  Here you define the interval between the executions of the line-tests. You can choose between daily and weekly.

- Start Date and Time
  In this dialogue you define the date of the first cyclic line-test and the starting time of the line-test. A reasonable time to start the test is between 2am and 4am since then the traffic is low.
  Please keep in mind that a line-test for an entire SUPM1 will typically take about 3 minutes and up to 8 minutes in the worst case.

The **manual** line-test can be performed for all enabled user ports or just for a selected user port.

To start a line-test for all enabled user-ports, press the “Start Line Test” button in the SUPM1 unit status.

To start a line-test for an individual user-port, press the “Start Line Test” button in the SUPM1 port status. The selected subscriber will be blocked automatically.

If a subscriber can not be blocked within the line-test timeout then “Rejected” will be displayed in the line-test status.

You can **stop** a running line-test at any time by pressing the “Stop Line Test” button in the SUPM1 unit status. This stops all manual and cyclic line-tests.

Please note:

A running line-test can not be restarted manually. To run a line-test you have to wait until the currently running line-test has finished. This may last typically up to 10 seconds and up to 30 seconds in the worst case.

Please note:

A running line-test started from the unit status dialogue generates a “Maintenance Function Active” (MFA) alarm on the unit layer.

Please note:

A running line-test started from the port status dialogue generates a “Maintenance Function Active” (MFA) alarm on the port layer.

The “Reset Line Test Defects” button in the SUPM1 unit status allows you to clear all alarms caused by the line-test.

5.11.2 Line-test Parameters

All test parameters covered by the line-test are grouped in test areas. SUPM1 offers four test areas for the line-test, where one area is always enabled and the other three areas can be enabled or disabled. The following test areas are available:

- Resistance / Isolation (always enabled)
  Tests the resistance between
  - a-wire and b-wire
  - b-wire and a-wire

The resistance measurements “a-wire to b-wire” and “b-wire to a-wire” allow to check the isolation between a-wire and b-wire (a-wire more positive than the b-wire) and the line impedance (b-wire more positive than the a-wire) using a test adapter at the subscribers location:

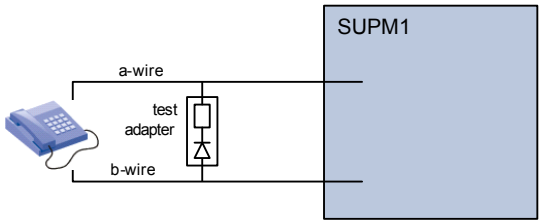


Figure 15: Test adapter

  - a-wire and ground
  - b-wire and ground
- Foreign Voltage
  Tests the subscriber lines for foreign AC or DC voltages:
  - foreign DC voltage between a-wire and b-wire
  - foreign DC voltage between a-wire and ground
  - foreign DC voltage between b-wire and ground
  - foreign AC voltage between a-wire and b-wire
  - foreign AC voltage between a-wire and ground
  - foreign AC voltage between b-wire and ground
- Noise
  Tests the subscriber line for the presence of noise with frequencies in the audible range of 300 Hz … 3400 Hz.
- Capacitance
  Tests the capacitance between
  - a-wire and b-wire
  - a-wire and ground
  - b-wire and ground

The test area selection is configured in the SUPM1 unit configuration, on the “Line Test Parameters” tab. The test area selection is valid for cyclic and manual line-tests.

The “Line Test Time-Out” parameter in the SUPM1 unit configuration, on the “Line Test Parameters” tab, limits the maximum time a line-test (including the test for any postponed subscribers lines) may last.

The timer starts at the beginning of a line-test. After this timer expires the line-test is stopped. Any not-tested lines (due to their off-hook state) remain untested.

5.11.3 Line-test Alarm Thresholds

The alarm thresholds of most line-test parameters can be configured in the SUPM1 unit configuration, on the “Line Test Alarm Thresholds” tab.

For the part “Resistance/Isolation” an alarm “Line Fault” (LNF) is generated if the measured line value is below the configured thresholds.

For the parts “Foreign DC Voltage”, “Foreign AC Voltage” and “Noise” the alarm “Line Fault” (LNF) is generated if the measured value exceeds the configured values.

The alarm thresholds can also be set to “Not Used”, then no alarm will be generated.

Please note:

No threshold is selectable for the capacitance since no alarm will be generated. The measured value will be displayed only.

When changing the threshold values the line-test status will be adapted accordingly without running the test again. You just have to press the “Apply” or “Refresh” button in the port status window.

The alarm threshold configuration is valid for cyclic and manual line-tests.

5.11.4 Line-test Results

The line-test lasts about 10 seconds for each subscriber.

The results of the line-tests are displayed in the port status on the “Line Test” tab individually for every subscriber port.

Each result is displayed with a time stamp. The date and time stamp shows when the subscriber was last tested.

The resulting line-test status is displayed as follows:

- Requested
  In this phase the SUPM1 checks the subscriber line for its state (on-hook / off-hook).
  If a subscriber is on-hook the user port is set to the locked state (V5CAS mode of operation only). If the subscriber is off-hook the user port is left in the unlocked state until the subscriber goes on-hook. If by this time the line-test timeout has not occurred the user port is set to the locked state.
- Rejected
  Indicates a busy subscriber line and therefore the line-test was not executable or the line-test timeout has occurred
- Running
  This means that the line-test for this particular subscriber is ongoing.
- Passed
  The result of that specific test is within the thresholds. If all test results of the subscriber are passed then the subscriber line is usable.
- Failed
  The result of that specific test is out of the thresholds and therefore a problem may be present on that subscriber line.
  A failed line-test is reported as an alarm on the port layer.
- Aborted
  This text is displayed if a line-test is stopped manually.
- See results
  This state indicates that a particular test could not be executed due to any abnormal line conditions. The line-test results window status shows in this case “untestable”. The conditions for untestable items are:
  - Isolation < 5 kΩ:
    Capacitance is untestable,
    Noise is untestable.
  - Foreign AC voltage > 10 V:
    Isolation is untestable,
    Capacitance is untestable,
    Noise is untestable.

- Foreign DC voltage > +20 V or < -20 V:
  Isolation is untestable,
  Capacitance is untestable,
  Noise is untestable.

  Another reason can be that an alarm from a failed line-test has been cleared by the “Reset Line Test Defects” button in the SUPM1 unit status.

• Not tested
  Indicates that this test was not executed and so no test results are available.

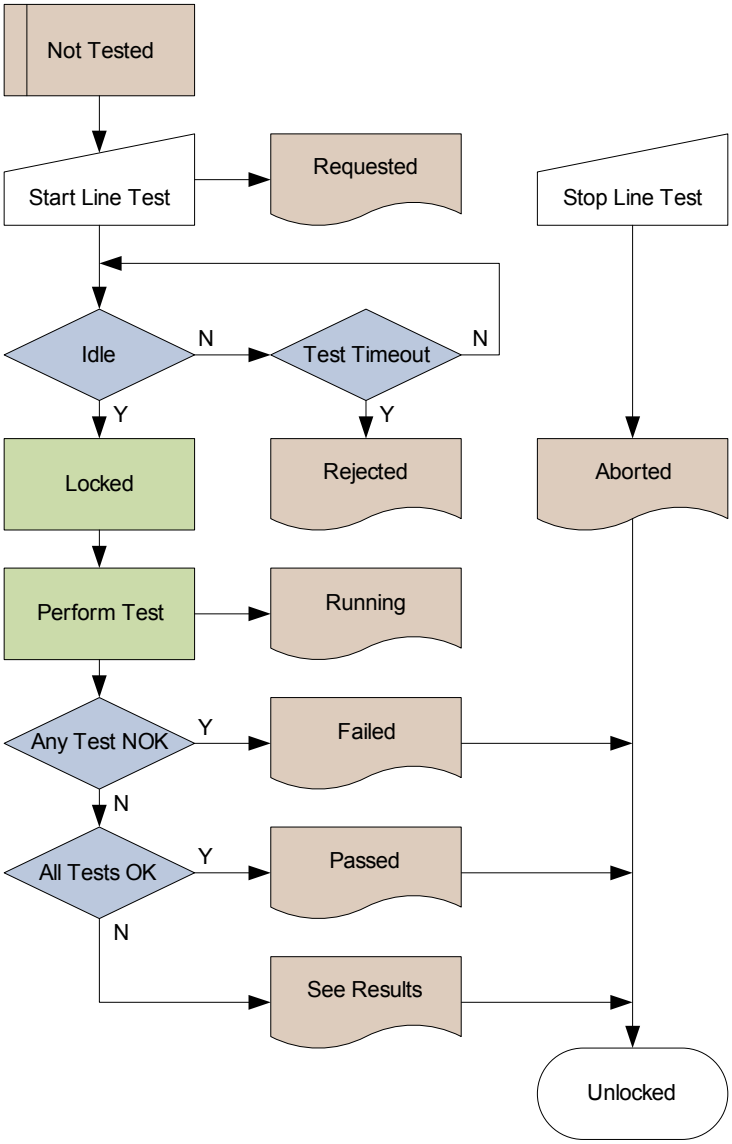


Figure 16: Finite state machine for the line-test procedure

The line-test measurement **results** are displayed with the test description, the test status and the measured value.

The test status can take the following states:

• Not Tested
  A line-test is running but this test parameter has not been tested so far.

- OK
  The test of the parameter has finished and the measurement value fulfils the threshold limit.
- Failed
  The test of the parameter has finished and the measurement value does not fulfil the threshold limit.
- Untestable
  The test could not be done since an abnormal line condition prevents this specific test.
- Cleared
  The test has failed and the alarm has been cleared with the “Reset Line Test Defect” button in the SUPM1 unit status.

5.11.5 Permanent line check

The permanent line checks are running on the SUPM1 unit as a background process. These line checks do not need any configuration, they run forever automatically.

The following parameters are supervised by the permanent line checks:

- Foreign voltage.
  Indicates the presence of foreign voltages, e.g. from mains, on a subscriber line.
- Continuous shortcut from b-wire to ground.
- Continuous shortcut from a-wire to battery.
- Continuous shortcut from a-wire to b-wire.

Any anomalies are reported as an alarm on the port layer.

Please note:

The foreign voltage of the permanent line check is not the same measurement as the foreign voltage of the line-test. Measurement ranges and thresholds of the line-test do not apply.

5.12 Thermal Management

The thermal management system on the SUPM1 prevents any damage of the unit caused by overheating. It is achieved with a temperature sensor. The board controller reads the sensor every second and determines the required action.

There are three thermal states on SUPM1:

- In the **normal state** the unit works according to the specifications.
- If the unit temperature rises above 70 °C the **overheat state 1** is reached. In this state any new calls of normal priority subscribers in the V5CAS or MCAS direct line operation mode are suppressed. New calls of high priority subscribers in the V5CAS or MCAS direct line operation mode are still possible. Ongoing calls are not affected.
  In the other operation modes new calls are possible without restriction.
- If the unit temperature rises above 85 °C the **overheat state 2** is reached. All ongoing calls are immediately stopped.

A hysteresis of 2 °C for the temperature thresholds prevents from uncontrolled oscillations between the thermal states.

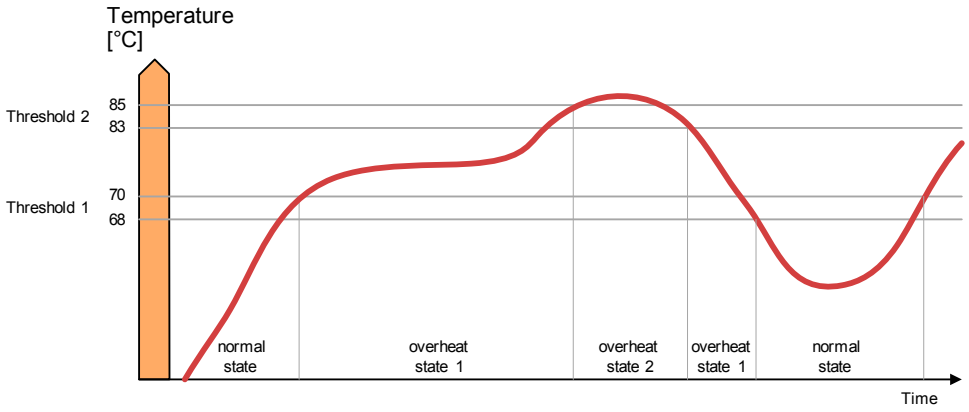


Figure 17: Thermal management thresholds

The subscriber priority is configured in the port configuration.

Please note:

In the V5CAS and MCAS direct line operation modes up to three high priority ports can be configured per SUPM1 unit.
In the other operation modes all ports are handled as high priority ports.

5.13 Power Management

The subscriber telephone sets in the PSTN (POTS) application are powered by the access node, i.e. by the SUPM1 unit. The SUPM1 unit is designed to be able to deliver the power to all 16 subscribers simultaneously. If the simultaneous ringing of several connected telephone sets it is possible that the requested total loop current exceeds the capability of the onboard power supply. To prevent an uncontrolled behaviour of the loop powering, SUPM1 has a built-in power management feature avoiding the overload of the loop current power supply.

Depending on the power state the setup of new calls is only allowed with a reduced current, or not allowed at all. There are three power states on SUPM1:

- In the **normal state** the unit provides the configured loop current without restrictions.
- If the total loop current rises above the threshold 1 the **power state 1** is reached. In this state any new calls of normal priority subscribers are set up with a reduced loop current. New calls of high priority subscribers and ongoing calls are not affected.
- If the total loop current rises above the threshold 2 the **power state 2** is reached. The loop current of all ongoing calls of normal priority subscribers are modified to the reduced loop current.
  In the power state 2 no additional calls of normal priority subscribers are possible.
  High priority subscribers are not affected.

A reduced loop current state of a subscriber port persists until the call is terminated.

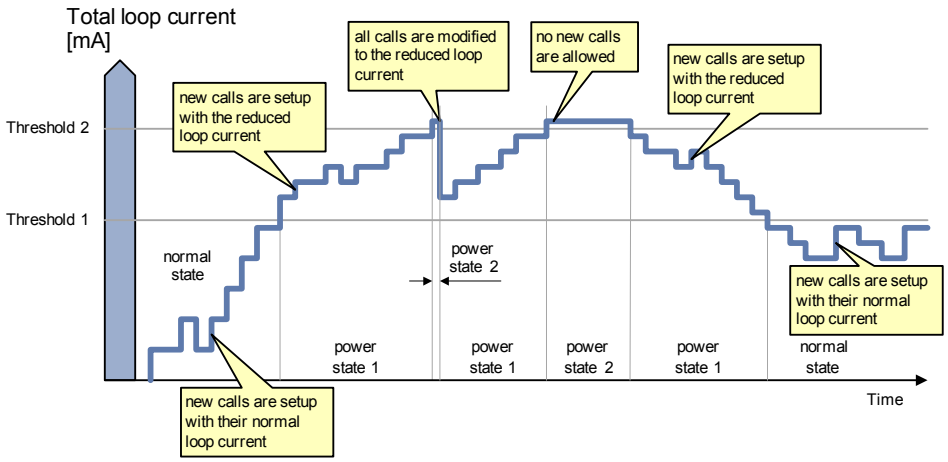


Figure 18: Power management for normal priority subscribers

The power management feature and the value of the reduced loop current are configurable in the AP: /unit-x, Configuration - Advanced Unit Parameters.

Please note:

In the V5CAS and MCAS direct line operation modes up to three high priority ports can be configured per SUPM1 unit.
In the other operation modes all ports are handled as normal priority ports.

5.14 Special Features

5.14.1 Wetting Current

SUPM1 allows specific phones to draw a wetting current during the ringing pause. If a wetting current occurs the SUPM1 does not enter the off-hook state.

This feature does not need to be configured.

6 Commissioning

In this section, you will find a commissioning example of the SUPM1 unit and the configuration of a port.

Please refer to [355] User Manual “ECST” for details on the general GUI aspects, and to [302] User Guide “XMC25/XMC23/XMC22” for specific characteristics of the XMC20.

6.1 Commissioning of a PSTN Port

6.1.1 Prerequisites

Before starting the commissioning of a PSTN port on the SUPM1 unit, the following prerequisites need to be fulfilled.

6.1.1.1 COGE5 unit

In a XMC20, a COGE5 needs to be in operation in slot 11 of the XMC20 subrack.

6.1.1.2 SUPM1 unit

The SUPM1 service unit is inserted into a slot of the XMC20 subrack. Available slots are listed in section 4.2 Slots and Deployment Scenarios for the SUPM1 Unit (on page 28).

A valid ESW is installed on the SUPM1 unit. For the management of ESW, refer to [355] User Manual “ECST”. For details about compatible ESW versions, refer to [012] Release Note “XMC20”.

Port-y of the SUPM1 unit is connected to an analogue telephone set via a two wire telephone cable.

6.1.1.3 Transport or gateway unit

A transport unit is inserted in the XMC20 and is running with a proper ESW:

- SELI8,
- STM14,
- NUSA1,
- NUSA2,
- SDSL8,
- VOIP1.

6.1.1.4 ECST

ECST needs to be installed on a PC, and a management connection from the ECST to the XMC20 needs to be up and running. For details about the installation and operation of the ECST, please refer to [355] User Manual “ECST” and [354] Quick Guide “ECST”.

The amount and accessibility of operations depend on the user profile with which you are logged in. For more information, please refer to [323] User Guide “Management Communication”.

6.1.1.5 PETS

The PETS on the XMC20 network element must be configured to an appropriate synchronization clock source, i.e. a clock source traceable to a PRC. For the PETS configuration refer to [314] User Guide “TDM Services and Cross Connections in XMC20”

6.1.2 Configuration of a PSTN Port

For the configuration of the PSTN port, the following steps have to be performed. The voice impedance and location specific parameters have to be adapted according to the application.

Port configuration

This action list shows step by step how to configure a PSTN port. The given example uses mostly the default values. The MCAS mode of operation covers the application with a MCAS local exchange.

The following assumptions and identifiers are used:
- The SUPM1 unit is assumed to be plugged in slot 9 of the XMC25.
- The SUPM1 unit is assigned.
- The port to be configured has the identifier port-1.
- Only one provisioning set is used. The provisioning set 2 is not configured.

Configure the unit parameters

Proceed as follows:

1. Navigate to the general parameters:
   - AP:/unit-9, Configuration - Unit Parameters - General.
2. Select the voice impedance:
   - Voice Impedance = 600 Ohm A-law.
3. Select the ringing frequency:
   - Ringing Frequency = 25 Hz.
4. Select the Metering frequency:
   - Metering Frequency = 16 kHz.
5. Select the metering level:
   - Metering Level = 1.8 Vrms.
6. Execute “Apply”.
7. Select the provisioning set 1 parameters:
   - AP:/unit-9, Configuration - Unit Parameters - Provisioning Set 1.
8. Select the V5CAS operation mode:
   - Mode Of Operation = V5.

9. Configure the blocked port line feed:
   - Blocked Port Line Feed Enabled = true.
10. Configure the metering pulse:
   - Metering Pulse Enabled = true.
11. The pulse on answer configuration is not applicable in the V5CAS operation mode.
12. The polarity reversal configuration is not applicable in the V5CAS operation mode.
13. Execute “Apply”.

Configure the advanced unit parameters

Proceed as follows:

1. Navigate to the advanced unit parameters:
   - AP:/unit-9, Configuration - Advanced Unit Parameters.
2. Set the CAS AIS debouncing time:
   - CAS AIS Debouncing Time = 1.0 s.
3. Set the metering pulse after on-hook time-out:
   - Time-Out = 4.0 s.
4. Select the pulsed no battery wires:
   - Pulsed No Battery Wire Selection = a-b-Wires Disconnected.
5. Enable the loop current power management:
   - Enable Loop Current Reduction = true.
6. Select the reduced loop current:
   - Reduced Loop Current = 15 mA.
7. Execute “Apply”.

Configure the line test parameters

Proceed as follows:

1. Navigate to the line test parameters:
   - AP:/unit-9, Configuration - Line Test Parameters.
2. Enable the cyclic line test:
   - Enable Cyclic Line Test = true.
3. Select the line test schedule:
   - Line Test Schedule = Daily.
4. Set the start date and time:
   - Start Date And Time = 2010-01-01 02:00:00.
5. Enable the foreign voltage measurement:
   - Foreign Voltage = true.
6. Enable the noise measurement:
   - Noise = true.
7. Enable the capacitance measurement:
   - Capacitance = true.
8. Set the line test time-out:
   - Line Test Time-Out = 3.0 h.
9. Execute “Apply”.

Configure the line test alarm thresholds

Proceed as follows:

1. Navigate to the line test alarm thresholds:
   - AP:/unit-9, Configuration - Line Test Alarm Thresholds.

2. Select the resistance/isolation between a and b wire:
   - a-b = 30 kOhm.
3. Select the resistance/isolation between a wire and GND:
   - a-GND = 30 kOhm.
4. Select the resistance/isolation between b wire and GND:
   - b-GND = 30 kOhm.
5. Select the foreign DC voltage between a and b wire:
   - a-b = 20 V.
6. Select the foreign DC voltage between a wire and GND:
   - a-GND = 20 V.
7. Select the foreign DC voltage between b wire and GND:
   - b-GND = 20 V.
8. Select the foreign AC voltage between a and b wire:
   - a-b = 5 Veff.
9. Select the foreign AC voltage between a wire and GND:
   - a-GND = 30 Veff.
10. Select the foreign AC voltage between b wire and GND:
    - b-GND = 30 Veff.
11. Select the noise level:
    - Noise = 10 -dBm".
12. Execute "Apply".

Result: The unit parameters are configured.

Configure the port general parameters

Proceed as follows:

1. Navigate to the general parameters:
   - AP:/unit-9/port-1, Configuration - General.
2. Select the provisioning set:
   - Provisioning Set = Set 1.
3. Select the loop current:
   - Loop Current = 23.5 mA.
4. Set the input level:
   - Input Level = 0.0 dBr.
5. Set the output level:
   - Output Level = -7.0 dBr.
6. Select the priority:
   - Priority = Normal.
7. Enable the cyclic line test for this port:
   - Enable Cyclic Test = true.
8. Disable the DSL adaptation. The SUPM1 does not make use of this parameter:
   - Enable DSL Adaptation = false.
9. Execute "Apply".

Configure the port CTP parameters

Proceed as follows:

1. Navigate to the CTP parameters:
   - AP:/unit-9/port-1, Configuration - CTP.

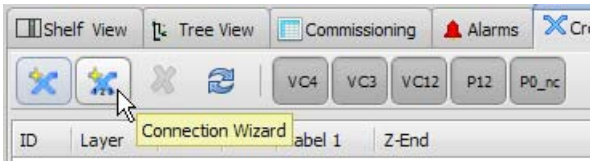
2. The CTP configuration parameters are implicitly set and fixed. All displayed parameters are read-only.
3. Enter the z-End configuration parameters:
   - Revertive Protection Switching = true.
   - CAS AIS Supervision = false.
   - Switch-Over Logging = false.
4. Execute “OK”.

Result: The PSTN port is completely configured.

Create the cross connection

Proceed as follows:

1. Configure the unprotected cross connection from the PSTN port to a time slot on a SELI8 unit. It is assumed that the connection termination point (CTP) on the SELI8 unit has been created before on port-8, time slot 1. Please note that the termination mode of the SELI8 port must be configured to PCM30 or PCM30C, i.e. using CAS!
2. Select the “Cross connections” view of the ECST.
   - Click on the “Connection Wizard” button:



   - The “Create TDM Connection” dialogue opens.
3. Set the connection parameters:
   - Layer Rate = P0-nc.
   - Directionality = Bidirectional.
   - Protected = No.
   - Label 1 = <anyName>.
   - Label 2 = <anyName>.
   - Number = 1.
4. Execute “Next ->”.
5. Select the Z-End CTP:
   - Select the SUPM1 unit, port-1.
6. Execute “Next ->”.
7. Select the A-End CTP:
   - Select the SELI8 unit, port-8/chan-1.
8. Execute “Create”.

Result: The bidirectional cross connection between SUPM1 and SELI8 is configured.

Activation

Proceed as follows:

1. Set the administrative state of the port-1 to up
   AP:/unit-9/port-1, Main - Admin And Oper Status:
   - Set Administrative Status to “Up”.
2. Execute “Apply”.

   → The “Operational Status” changes to “Up”.

Result: The port is activated.

End of instruction

7 Operation

This section describes the operation functions of the SUPM1 unit.

Please note:

The operation functions described in this section assume a correctly configured and operational SUPM1 unit.

7.1 Unit Optical Indicators

LEDs on the front of the SUPM1 unit are used to indicate to the user the alarm status summary of the unit and of the network traffic signals.

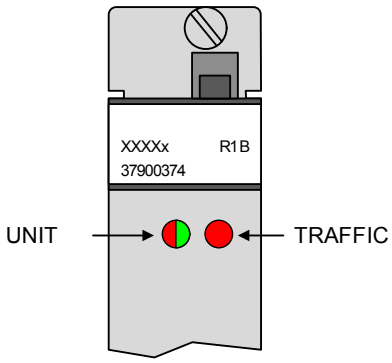


Figure 19: Fault indication LEDs on the SUPM1 unit

Table 35: LED signalling on SUPM1

LED name	Colour	State	Meaning
UNIT	Red	Failure	Unit is not in service. The unit is not able to provide the requested function due to - equipment failure (total breakdown), - mismatch of HW and SW. Recovery from this error situation is done usually by replacement of unit HW or ESW.
	Green / Red (blinking 1 Hz)	Booting or waiting	Unit has not been taken in service yet or the unit has not been provisioned. Recovery from this situation is done by taking this unit into service with ECST.
	Green	Running	Unit is up and running, it is ready to provide the required service.
	Off	Failure	System is not powered or outage of power supply on unit or outage of LED.
TRAFFIC	Red	Failure	One or more active failures on the unit, independent of the severity. More detailed information is provided by ECST.
	Off	Normal	Normal (error free) operation.

7.2 Maintenance

7.2.1 Inventory Data

It is possible to read inventory data from the SUPM1 unit via the ECST with the following access point:

AP: /unit-x, Main - Inventory.

7.2.2 Unit ESW Download

It is possible to update the embedded software (ESW) of the SUPM1 unit via software download.

Please refer to [355] User Manual “ECST” for the description of the ESW download.

Risk of operating trouble!

The assignment of new embedded software restarts the SUPM1 unit.

→ Thus, the installation of new ESW on the unit affects all traffic functions of the SUPM1 unit.

8 User Interface Reference

This section gives a complete reference of the managed objects, properties, and commands of the SUPM1 service unit as far as these are not covered in the generic descriptions in [302] User Guide “XMC25/XMC23/XMC22”.

For a description on how to configure and bring into operation the SUPM1 unit and its main functions, please refer to section 6 Commissioning (on page 61).

8.1 Introduction

Below, you will find a detailed description of all the configuration parameters and operations belonging to the managed objects model (MOM) for the SUPM1 service unit.

The Figure 20 "MOM (managed object model) of the SUPM1 unit" shows the access point (AP) tree for the SUPM1 unit with its managed objects:

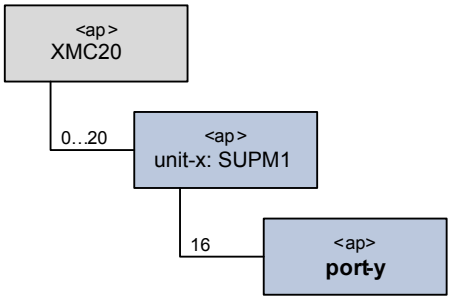


Figure 20: MOM (managed object model) of the SUPM1 unit

With these managed objects (MOs) the following functions are covered:

Table 36: Managed objects (MOs) for SUPM1

MO	Description of the management functions
unit-x: SUPM1 Rxx (supm1_r2b)	Restart of the unit, management of the unit ESW, labelling, indication of equipment status, read of inventory data, access to logbooks, indication of temperature problems. Configuration of unit parameters and line-test parameters. The detailed properties are described in section 8.2 AP: / unit-x: SUPM1 (on page 70).
port-y	Management of PSTN port related functions, like the level configuration and line-test status. The detailed properties are described in section 8.3 AP: / unit-x / port-y (on page 82).

For each of the managed objects, properties and commands, the GUI “Tree Views” are given.

This reference section comprises the management functions:

- Overview,
- Main,
- Configuration,
- Fault Management,
- Performance Management, and
- Status.

Most of the APs only offer a part of the management functions listed above.

The order of appearance of the management function descriptions is in accordance with the APs in the ECST AP tree and the availability of the management functions of each AP.

In the tables of the sections below, the parameter default values for properties are underlined.

Please note:

For better legibility of numbers in this user guide, inverted commas are used when the number's size exceeds three digits (e.g. 40'000). In parameter entry fields of the ECST, these inverted commas must not be entered. Instead, the numbers are entered without these inverted commas (e.g. 40000).

Please note:

Screenshots presented in this reference are examples and show configurations or data that may not correspond to the view you see when managing your XMC20 equipment.

8.2 AP: / unit-x: SUPM1

8.2.1 AP: / unit-x, Overview

For a description of the

- "Overview - Alarms", and
- "Overview - Cross Connections"

management functions, please refer to [302] User Guide "XMC25/XMC23/XMC22".

8.2.2 AP: / unit-x, Main

For a description of the

- "Main - General",
- "Main - Equipment",
- "Main - Inventory",
- "Main - Logbooks", and
- "Main - Software"

management functions, please refer to [302] User Guide "XMC25/XMC23/XMC22".

8.2.3 AP: / unit-x, Configuration

All **unit** configuration parameters are valid for all ports.

8.2.3.1 AP: / unit-x, Configuration - Unit Parameters - General

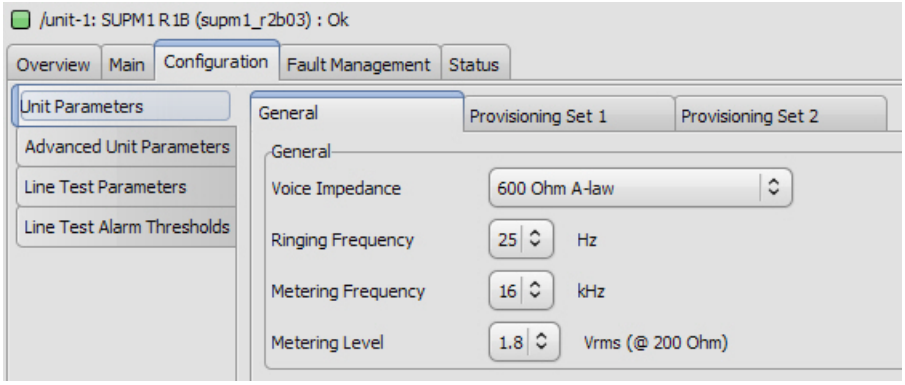


Table 37: AP: / unit-x, Configuration - Unit Parameters - General

Operation Name	Parameter Name	Range	Description / Details
General	Voice Impedance	900 Ohm	Select the appropriate PSTN line impedance.
		600 Ohm A-Law	
		600 Ohm u-Law	
		200 Ohm + (680 Ohm // 100 nF)	
		370 Ohm + (620 Ohm // 310 nF)	
		220 Ohm + (820 Ohm // 115 nF)	
		300 Ohm + (1000 Ohm // 220 nF)	
		270 Ohm + (750 Ohm // 150 nF)	
	Ringing Frequency	16 Hz	Select the appropriate ringing frequency.
		20 Hz	
		25 Hz	
		50 Hz	
	Metering Frequency	12 kHz	Select the appropriate metering frequency.
		16 kHz	
	Metering Level	0.5 V_{RMS} (@ 200 Ohm)	Select the appropriate metering level. The level is valid for an impedance of 200 Ω
		0.9 V_{RMS} (@ 200 Ohm)	
		1.8 V_{RMS} (@ 200 Ohm)	
		2.4 V_{RMS} (@ 200 Ohm)	
		3.0 V_{RMS} (@ 200 Ohm)	

8.2.3.2 AP: / unit-x, Configuration - Unit Parameters - Provisioning Set 1

The table below shows the default configuration parameter values for the different modes of operation. Green shaded entries can be modified, grey shaded entries are fixed.

Table 38: Default configuration parameters

Parameter	Mode Of Operation			
	V5	MCAS	Phone-Exchange	Phone-Phone
Blocked Port Line Feed Enabled	enabled	enabled	disabled	disabled
Metering Pulse Enabled	enabled	enabled	enabled	disabled
Pulse On Answer Enabled	enabled	disabled	disabled	disabled
Polarity Reversal Enabled	enabled	enabled	enabled	disabled

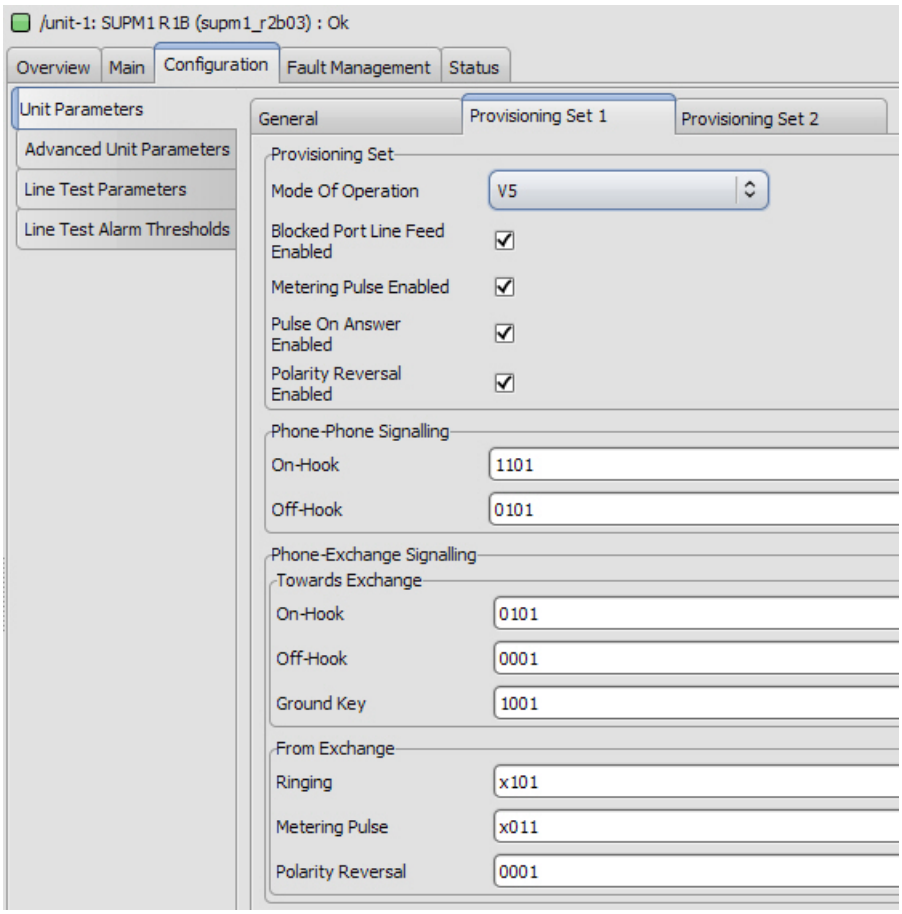


Table 39: AP: / unit-x, Configuration - Unit Parameters - Provisioning Set 1

Operation Name	Parameter Name	Range	Description / Details
Provisioning Set 1	Mode Of Operation	V5	V5 is the KEYMILE proprietary V5CAS signalling mode of operation between the SUPM1 unit and the VOIP1 unit. Mercury CAS is the signalling mode of operation (used in the United Kingdom) between the SUPM1 unit and the P12 transport units in the application with a Mercury CAS enabled switch. Please refer to section 5.2 Mercury CAS Modes of Operation (on page 36) for a description of the MCAS signalling modes.
		Mercury CAS Direct Line	
		Mercury CAS Loop Calling PBX	
		Mercury CAS Earth Calling PBX	
		Mercury CAS PBX Extension	
		Phone-Exchange	Phone-Exchange interworks with the analogue exchange side line card TUXA1 or any 3rd party equipment. Please refer to section 5.3 Phone-Exchange Mode of Operation (on page 39) for a description of this signalling mode.
		Phone-Phone Auto Ring Down	Phone-Phone modes are used in EOW applications without the need of an exchange. Two subscribers have to be cross connected directly. Please refer to section 5.4 Phone-Phone Mode of Operation (on page 41) for a description of this signalling mode.

Table 39: AP: / unit-x, Configuration - Unit Parameters - Provisioning Set 1 (continued)

Operation Name	Parameter Name	Range	Description / Details
	Blocked Port Line Feed Enabled	☑ ☐	If set to true, the analogue a/b-wires on the user ports are still fed with DC-current during port blocking. Note: This parameter is controlled by the “mode of operation” parameter. Please refer to Table 38.
	Metering Pulse Enabled	☑ ☐	If set to true, the metering pulse function towards the subscriber is enabled. Note: This parameter is controlled by the “mode of operation” parameter. Please refer to Table 38.
	Pulse On Answer Enabled	☑ ☐	If set to true, a metering pulse can be sent to the subscriber when the called subscriber goes off-hook. Note: This parameter is controlled by the “mode of operation” parameter. Please refer to Table 38.
	Polarity Reversal Enabled	☑ ☐	If set to true, a polarity reversal can be applied to the subscriber line. Note: This parameter is controlled by the “mode of operation” parameter. Please refer to Table 38.
Phone-Phone Signalling	On-Hook	4 characters	On-hook CAS pattern “abcd” which is used by the local and remote subscribers. Valid characters are “0” and “1”. The default CAS pattern is “1101”.
	Off-Hook	4 characters	Off-hook CAS pattern “abcd” which is used by the local and remote subscribers. Valid characters are “0” and “1”. The default CAS pattern is “0101”.
Phone-Exchange Signalling	Towards Exchange, On-Hook	4 characters	On-hook CAS pattern “abcd” which is sent towards the exchange. Valid characters are “0” and “1”. The default CAS pattern is “0101”.
	Towards Exchange, Off-Hook	4 characters	Off-hook CAS pattern “abcd” which is sent towards the exchange. Valid characters are “0” and “1”. The default CAS pattern is “0001”.
	Towards Exchange, Ground Key	4 characters	Ground key CAS pattern “abcd” which is sent towards the exchange. Valid characters are “0” and “1”. The default CAS pattern is “1001”.
	From Exchange, Ringing	4 characters	Ringing CAS pattern “abcd” which is received from the exchange. Valid characters are “0”, “1” and “x”. “x” means “don’t care”. The default CAS pattern is “x101”. Note that polarity reversal during ringing is not supported.

Table 39: AP: / unit-x, Configuration - Unit Parameters - Provisioning Set 1 (continued)

Operation Name	Parameter Name	Range	Description / Details
	From Exchange, Metering Pulse	4 characters	Metering pulse CAS pattern “abcd” which is received from the exchange. Valid characters are “0”, “1” and “x”. “x” means “don’t care”. The default CAS pattern is “x011”. Note that polarity reversal during metering pulse is not supported.
	From Exchange, Polarity Reversal	4 characters	Polarity reversal CAS pattern “abcd” which is received from the exchange. Valid characters are “0”, “1” and “x”. “x” means “don’t care”. The default CAS pattern is “0001”.

8.2.3.3 AP: / unit-x, Configuration - Unit Parameters - Provisioning Set 2

The provisioning set 2 parameters are identical to the provisioning set 1 parameters:

Please refer to section 8.2.3.2 AP: / unit-x, Configuration - Unit Parameters - Provisioning Set 1 (on page 71).

8.2.3.4 AP: / unit-x, Configuration - Advanced Unit Parameters

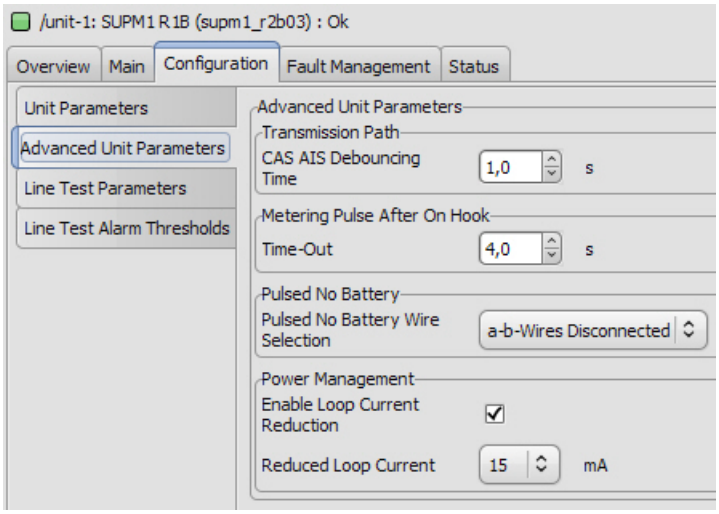


Table 40: AP: / unit-x, Configuration - Advanced Unit Parameters

Operation Name	Parameter Name	Range	Description / Details
Advanced Unit Parameters, Transmission Path	CAS AIS Debouncing Time	0.1 … 1.0 … 25.5 s, step 0.1 s	This is the time the SUPM1 uses to accept an AIS on voice and signalling (without interrupting an ongoing call). This setting can be important if you have a protected transmission path. During switchover from the working to the protecting path the arriving PCM signal on SUPM1 carries AIS. If you loose the voice path during a transmission protection switchover, then increase the value of this parameter.

Table 40: AP: / unit-x, Configuration - Advanced Unit Parameters (continued)

Operation Name	Parameter Name	Range	Description / Details
Advanced Unit Parameters, Metering Pulse After On Hook	Time-Out	0.0 … 4.0 … 25.5 s, step 0.1 s	This timer defines the time a SUPM1 user port may send out a metering pulse after the subscriber went on-hook. Also the voice path remains transparent during this time. Recommended range: 1 … 5 s.
Advanced Unit Parameters, Pulsed No Battery	Pulsed No Battery Wire Selection	a-b-Wires Disconnected	Physical behaviour of a pulsed no battery information element. Note: This signalling parameter is for the V5CAS mode of operation available only.
		a-Wire Disconnected	
Advanced Unit Parameters, Power Management	Enable Current Reduction	☑	If set to true, the loop current of active subscriber ports is managed to avoid an overload of the loop current power supply. Refer to section 5.13 Power Management (on page 59).
		☐	
	Reduced Loop Current	15 mA	The reduced loop current is assigned to new calls in the power state 1. Refer to section 5.13 Power Management (on page 59).
		19.5 mA	
		23.5 mA	

8.2.3.5 AP: / unit-x, Configuration - Line Test Parameters

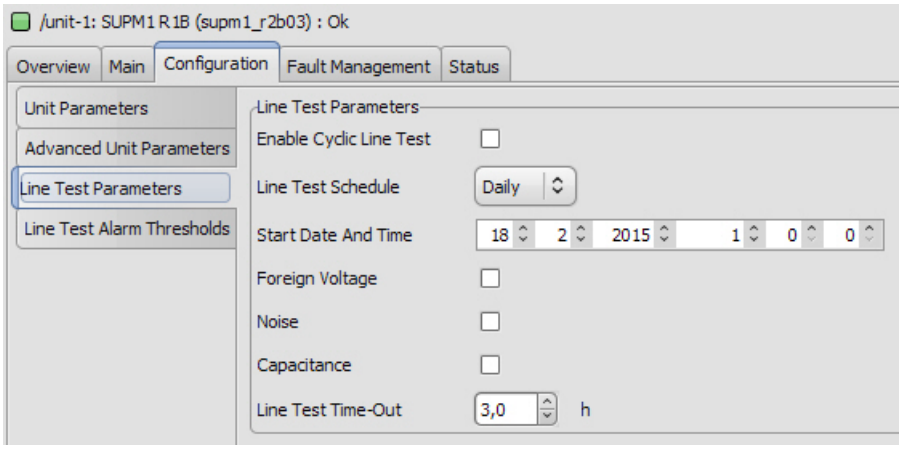


Table 41: AP: / unit-x, Configuration - Line Test Parameters

Operation Name	Parameter Name	Range	Description / Details
Line Test Parameters	Enable Cyclic Line Test	☑	This enables the cyclic line test for all enabled user ports of the unit.
		☐	
	Line Test Schedule	Daily	Select the appropriate test interval.
		Weekly	
	Start Date And Time	<DD> <MM> <YYYY> <hh> <mm> <ss>	Select the appropriate line-test start date and time. Default date: Actual date plus 1 day. Default time: 02:00:00
	Foreign Voltage	☑	If set to true, the foreign voltage line-tests will be done.
		☐	
	Noise	☑	If set to true, the noise line-tests will be done.
		☐	

Table 41: AP: / unit-x, Configuration - Line Test Parameters (continued)

Operation Name	Parameter Name	Range	Description / Details
	Capacitance	☑	If set to true, the capacitance line-tests will be done.
		☐	
	Line Test Time-Out	1.0 … 3.0 … 12.0 h, step 0.5 h	Set the maximum duration a line-test may last.

8.2.3.6 AP: / unit-x, Configuration - Line Test Alarm Thresholds

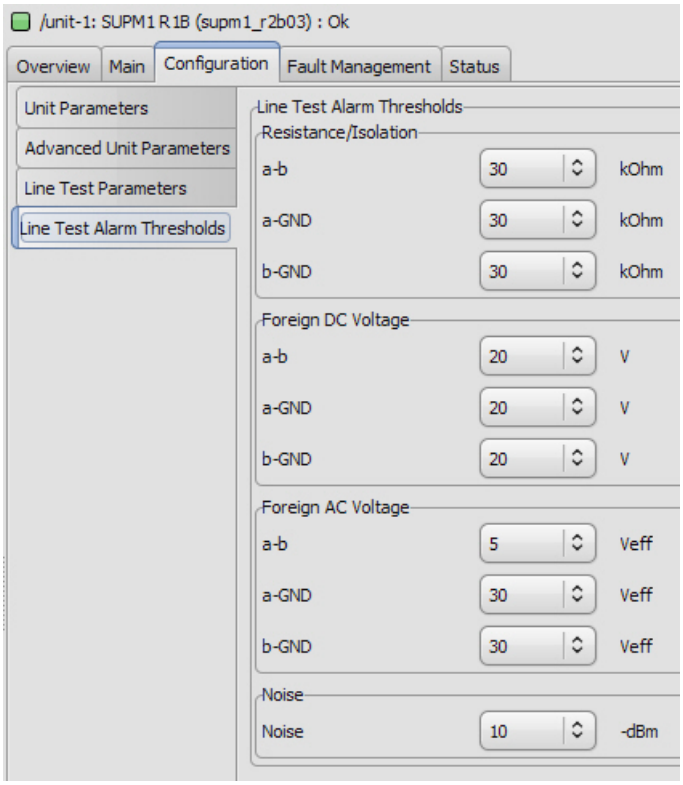


Table 42: AP: / unit-x, Configuration - Line Test Alarm Thresholds

Operation Name	Parameter Name	Range	Description / Details
Line Test Alarm Thresholds, Resistance/Isolation	a-b	Not Used	Alarm threshold resistance between a-wire and b-wire.
		10 kOhm	
		20 kOhm	
		30 kOhm	
		40 kOhm	
		50 kOhm	
		100 kOhm	

Table 42: AP: / unit-x, Configuration - Line Test Alarm Thresholds (continued)

Operation Name	Parameter Name	Range	Description / Details
	a-GND	Not Used	Alarm threshold resistance between a-wire and ground.
		10 kOhm	
		20 kOhm	
		30 kOhm	
		40 kOhm	
		50 kOhm	
		100 kOhm	
	b-GND	Not Used	Alarm threshold resistance between b-wire and ground.
		10 kOhm	
		20 kOhm	
		30 kOhm	
		40 kOhm	
		50 kOhm	
		100 kOhm	
Line Test Alarm Thresholds, Foreign DC Voltage	a-b	Not Used	Alarm threshold foreign DC voltage between a-wire and b-wire.
		10 V	
		20 V	
		30 V	
		40 V	
		50 V	
		60 V	
	a-GND	Not Used	Alarm threshold foreign DC voltage between a-wire and ground.
		10 V	
		20 V	
		30 V	
		40 V	
		50 V	
		60 V	
	b-GND	Not Used	Alarm threshold foreign DC voltage between b-wire and ground.
		10 V	
		20 V	
		30 V	
		40 V	
		50 V	
		60 V	

Table 42: AP: / unit-x, Configuration - Line Test Alarm Thresholds (continued)

Operation Name	Parameter Name	Range	Description / Details
Line Test Alarm Thresholds, Foreign AC Voltage	a-b	Not Used	Alarm threshold foreign AC voltage between a-wire and b-wire.
		5 Veff	
		10 Veff	
		20 Veff	
		30 Veff	
		40 Veff	
	a-GND	Not Used	Alarm threshold foreign AC voltage between a-wire and ground.
		5 Veff	
		10 Veff	
		20 Veff	
		30 Veff	
		40 Veff	
	b-GND	Not Used	Alarm threshold foreign AC voltage between b-wire and ground.
		5 Veff	
		10 Veff	
		20 Veff	
		30 Veff	
		40 Veff	
Line Test Alarm Thresholds, Noise	Noise	Not Used	Alarm threshold noise level between a-wire and b-wire.
		40 -dBm	
		30 -dBm	
		20 -dBm	
		10 -dBm	

8.2.4 AP: / unit-x, Fault Management

For the a description of the general aspects of the

- "Fault Management - Status", and
- "Fault Management - Configuration"

management functions, please refer to [302] User Guide "XMC25/XMC23/XMC22". The following table lists the fault causes of the current AP.

Table 43: AP: / unit-x, Fault Management

ID	Fault Cause	Event Type	Traffic Affecting	Default Severity	Description
SWM	Software Mismatch	Equipment Alarm	☐	Minor	The running ESW does not match the assigned ESW.
SSWNA	Scheduled Software Not Available	Equipment Alarm	☐	Minor	The ESW that is scheduled for installation is not available on the unit. Make sure that the ESW is downloaded to the unit.

Table 43: AP: / unit-x, Fault Management (continued)

ID	Fault Cause	Event Type	Traffic Affecting	Default Severity	Description
SWIN	Software Incompatible With Network Element	Equipment Alarm	☑	Major	The running ESW is not compatible with the version required by the NE type or version.
PRC	PBUS Resource Conflict	Processing Error Alarm	☑	Major	The PBUS access circuit of another TDM unit in the subrack is defective. Remove or unassign the other TDM units in the subrack one by one until the alarm is cleared. Replace the defective unit.
EQM	Equipment Malfunction	Equipment Alarm	☐	Critical	The SUPM1 controller detects any anomalies on the unit, e.g. a voltage is missing, a chip does not respond, etc.
RSF	Ring Supply Failure	Equipment Alarm	☐	Critical	Ring Supply Failure.
TEL	Temperature Exceeds Limit	Environmental Alarm	☑	Warning	The temperature measured on the SUPM1 unit exceeds 70°C, SUPM1 reaches overheat state 1.
TEU	Temperature Unacceptable	Environmental Alarm	☐	Major	The temperature measured on the SUPM1 unit exceeds 85°C, SUPM1 reaches overheat state 2.
SHT	Shutdown Time-Out	Communication Alarm	☐	Major	30 minutes after starting the shutdown function on the unit layer, applied via the EM, this alarm will remind you that at least one user port is still unlocked.
HWIC	Hardware Incompatible With Configuration	Equipment Alarm	☑	Major	The plugged HW is not compatible with the unit configuration HW stored in the database. You may need to change the HW or re-create the configuration for the unit.
SWIC	Software Incompatible With Configuration	Equipment Alarm	☑	Major	The ESW running on the unit is not compatible with the unit configuration stored in the database. You may need to upgrade, or downgrade the ESW, or re-create the configuration with the currently running ESW.
GSW	General Software Alarm	Equipment Alarm	☐	Major	An ESW internal error has been detected that might inhibit the ESW from running correctly.
MFA	Maintenance Function Active	Communication Alarm	☑	Warning	A maintenance function has been activated by the operator from the unit status.
UNAV	Unit Not Available	Equipment Alarm	☑	Critical	The unit that is configured is either not plugged or not recognized due to a failure.
NSW	No Application Software	Equipment Alarm	☑	Major	There is no application ESW installed on the unit, or the application ESW has not yet finished its boot process.
UNAS	Unit Not Assigned	Equipment Alarm	☐	Warning	The unit is not assigned and cannot be configured. To assign the unit, execute the “Assign” command in the “Main” function of the unit.
UIC	Unit Incompatible	Equipment Alarm	☑	Major	The inserted unit is not compatible with the assigned unit.

Table 43: AP: / unit-x, Fault Management (continued)

ID	Fault Cause	Event Type	Traffic Affecting	Default Severity	Description
PWRSVE	Battery Power Saving	Equipment Alarm	☑	Critical	Power saving is active on the unit, i.e. it is kept in the “reset” state during battery power backup.

8.2.5 AP: / unit-x, Status

8.2.5.1 AP: / unit-x, Status - General

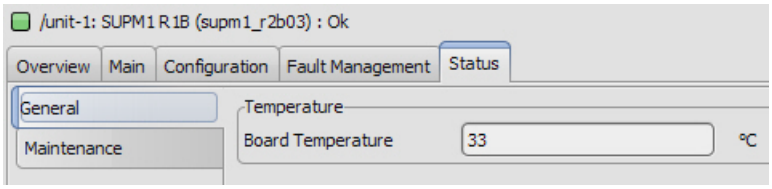


Table 44: AP: / unit-x, Status - General

Operation Name	Parameter Name	Range	Description / Details
Temperature	Board Temperature	-50 … 150 °C	Indicates the actual unit temperature in degree Celsius.

8.2.5.2 AP: / unit-x, Status - Maintenance

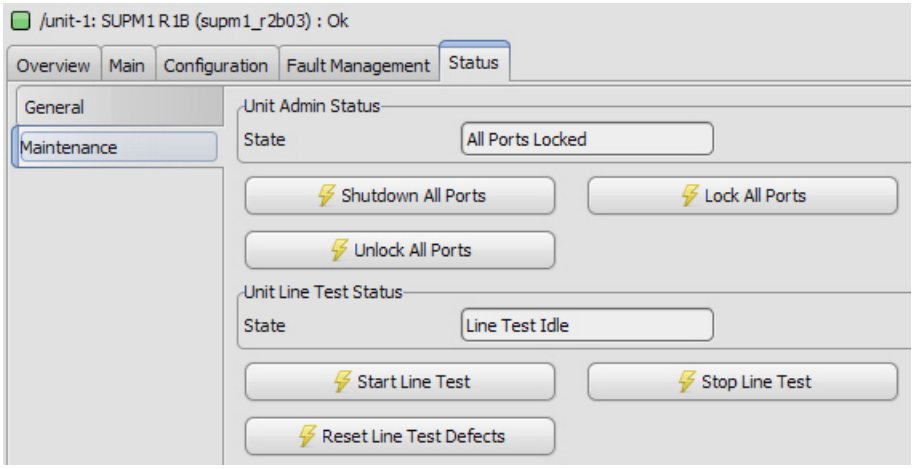


Table 45: AP: / unit-x, Status - Maintenance

Operation Name	Parameter Name	Range	Description / Details
Unit Admin Status	State [a]	Some Ports Unlocked	At least one port is unlocked.
		All Ports Locked	All ports on the unit are in the locked state.
Shutdown All Ports[b]			Shutdown all enabled user ports. The user ports are blocked (locked state) as soon as the subscriber state “idle” has been detected.
Lock All Ports [b]			Lock all enabled user ports. The user ports are blocked (locked state) immediately after confirmation of the warning message.

Table 45: AP: / unit-x, Status - Maintenance (continued)

Operation Name	Parameter Name	Range	Description / Details
Unlock All Ports [b]			Unlock all enabled user ports. Ports that have been blocked previously are unblocked (unlocked state) with this command.
Unit Line Test Status	State [c]	Line Test Idle	No line-test is active.
		Line Test Running	A line-test is active
Start Line Test			Start a manual line-test on all enabled user ports.
Stop Line Test			Stop any ongoing cyclic or manual line-tests.
Reset Line Test Defects			Reset the line-test defects and alarms of all cyclic or manual line-tests.

a. The unit admin status displays the combined X.731 administrative state of all user ports. Note: This property is only available for the V5CAS mode of operation.
b. This command is only available for the V5CAS mode of operation.
c. The unit line-test state displays the combined test state of all user ports.

8.3 AP: / unit-x / port-y

8.3.1 AP: / unit-x, Overview

For a description of the

- "Overview - Alarms",
- "Overview - Cross Connections", and
- "Overview - CTP"

management functions, please refer to [302] User Guide "XMC25/XMC23/XMC22".

8.3.2 AP: / unit-x / port-y, Main

8.3.2.1 AP: / unit-x / port-y, Main - General

For a description of the

- "Main - General"

management function, please refer to [302] User Guide "XMC25/XMC23/XMC22".

8.3.2.2 AP: / unit-x / port-y, Main - Admin And Oper Status

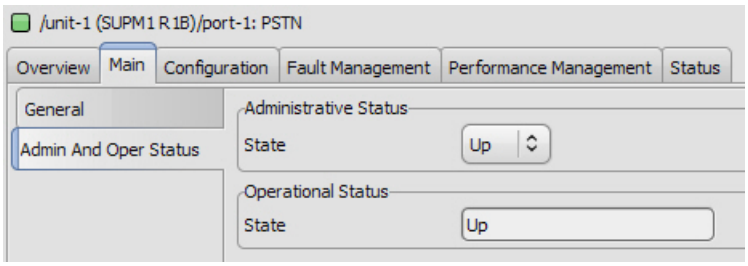


Table 46: AP: / unit-x / port-y, Main - Admin And Oper Status

Operation Name	Parameter Name	Range	Description / Details
Administrative Status	State	Up	Set the IETF administrative status of the port.
		Down	
Operational Status	State	Up	Display of the IETF operational status of the port.
		Down	
		Testing	
		Unknown	
		Dormant	
		Not Present	
		Lower Layer Down	

8.3.3 AP: / unit-x / port-y, Configuration

8.3.3.1 AP: / unit-x / port-y, Configuration - General

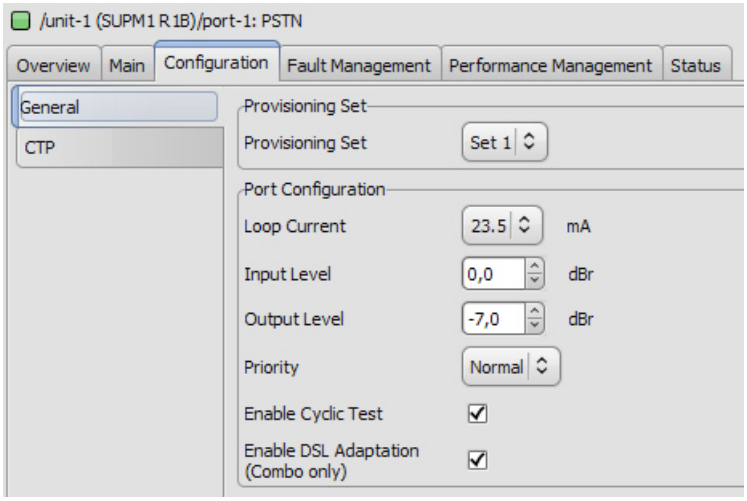


Table 47: AP: / unit-x / port-y, Configuration - General

Operation Name	Parameter Name	Range	Description / Details
Provisioning Set	Provisioning Set	Set 1	Port assignment to one of the predefined provisioning sets. Provisioning sets are defined on the unit configuration AP.
		Set 2	
Port Configuration	Loop Current	15 mA	Select the appropriate loop current.
		19.5 mA	
		23.5 mA	
		30 mA	
		39 mA	
		45 mA	
	Input Level	-4.0 … 0.0 … 4.0 dBr, step 0.5	Analogue input level referred to 0 dBr in the digital domain.
	Output Level	-10.0 … -7.0 … 0.0 dBr, step 0.5	Analogue output level referred to 0 dBr in the digital domain.
	Priority	Normal	High priority subscribers are able to do new calls also when the SUPM1 unit is in overheat state 1 or in power state 2. Refer to section 5.12 Thermal Management (on page 58) and to section 5.13 Power Management (on page 59). In the V5CAS and MCAS direct line operation modes, maximum 3 high priority subscribers can be configured per unit. In all other operation modes the priority configuration has no effect.
		High	
	Enable Cyclic Test	☑	Cyclic line-tests are only performed if this parameter is set to true.
		☐	
	Enable DSL Adaptation (Combo only)	☑	This property is ignored by the SUPM1 unit.
		☐	

8.3.3.2 AP: / unit-x / port-y, Configuration - CTP

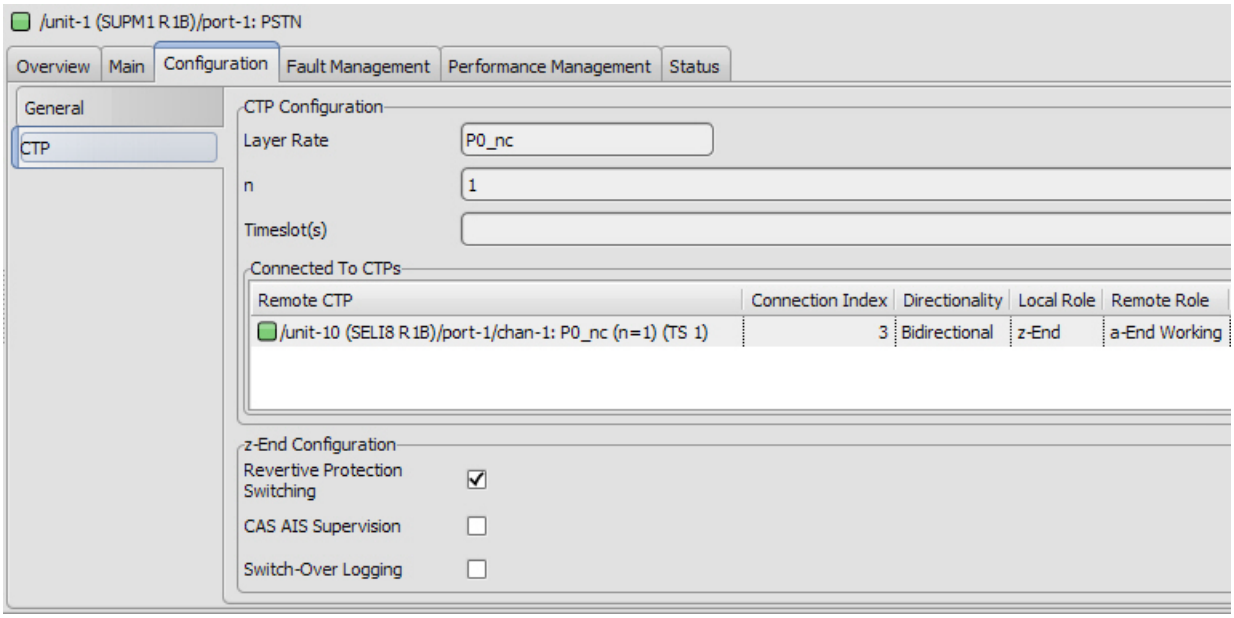


Table 48: AP: / unit-x / port-y, Configuration - CTP

Operation Name	Parameter Name	Range	Description / Details
CTP Configuration	Layer Rate	P0_nc	Layer rate of the connection termination point is P0_nc, i.e. n x 64 kbit/s. The layer rate property of a SUPM1 port is fixed to P0_nc.
		P12	Layer rate of the connection termination point is P12, i.e. 2048 kbit/s.
	n	0 … 2 characters	Number of timeslots in case of P0_nc. The possible range is from 1 to 32. The number of time slots of a SUPM1 port is fixed to 1.
	Timeslot(s)	0 … 64 characters	Used timeslots in a structured P12 in case of P0_nc, e.g. 1 … 31. The timeslot(s) property of a SUPM1 port is empty.
Connected CTP	Remote CTP	<MO address>	Address string of a connections remote end. Without a connection the parameter is empty
	Connection Index	0 … 65‘535	Index of a connection assigned to the port. Without a connection the parameter is empty
	Directionality	Bidirectional	Directionality of the connection.
		Unidirectional	
	Local Role	z-End	The port is the ending point of a connection. Please refer to [314] User Guide “TDM Services and Cross Connections in XMC20”
		a-End Working	The port is the working starting point of a protected or unprotected connection.
		a-End Protecting	The port is the protecting starting point of a protected connection.

Table 48: AP: / unit-x / port-y, Configuration - CTP (continued)

Operation Name	Parameter Name	Range	Description / Details
	Remote Role	z-End	The CTP at the connections remote end is the ending point of a connection. Please refer to [314] User Guide "TDM Services and Cross Connections in XMC20"
		a-End Working	The CTP at the connections remote end is the working starting point of a protected or unprotected connection.
		a-End Protecting	The CTP at the connections remote end is the protecting starting point of a protected connection.
z-End Configuration	Revertive Protection Switching	☑	Enable revertive protection switching.
		☐	The z-End will preferably select the working a-End.
	CAS AIS Supervision	☑	Use CAS AIS as protection switching criterion.
		☐	
	Switch-Over Logging	☑	Enable the logging of the protection switch-over events.
		☐	

8.3.4 AP: / unit-x / port-y, Fault Management

For the a description of the general aspects of the

- "Fault Management - Status", and
- "Fault Management - Configuration"

management functions, please refer to [302] User Guide "XMC25/XMC23/XMC22". The following table lists the fault causes of the current AP.

Table 49: AP: / unit-x / port-y, Fault Management

ID	Fault Cause	Event Type	Traffic Affecting	Default Severity	Description
EQM	Equipment Malfunction	Equipment Alarm	☐	Critical	This alarm shows that a subscriber circuit on the SUPM1 is out of order. Such a fault is detected during an internal HW check.
OVL	Overload	Equipment Alarm	☑	Major	This alarm occurs if a subscriber line chip set reports any overload condition, e.g. a too high temperature.
MFA	Maintenance Function Active	Communication Alarm	☑	Warning	A maintenance function has been activated by the operator from the port status.
TSF	Trail Signal Failure	Communication Alarm	☑	Major	Trail signal fail (TSF) from the P12 transport unit is active, or CAS AIS active. In a protected connection the working AND the protecting path have failed.
RTSF	Redundant Trail Signal Failure	Communication Alarm	☑	Minor	Trail signal fail (TSF) from the P12 transport unit is active, or CAS AIS active. In a protected connection the working OR the protecting path has failed. In an unprotected connection this fault cause is not applicable.

Table 49: AP: / unit-x / port-y, Fault Management (continued)

ID	Fault Cause	Event Type	Traffic Affecting	Default Severity	Description
GLC	Ground Leakage Current	Equipment Alarm	☐	Minor	In the **on-hook** state the alarm is activated if the leakage current from the b-wire to ground exceeds the current threshold of 17 mA for 4 seconds. This corresponds to an impedance of about 3100 Ω. The alarm is cleared if the leakage current falls below 17 mA for 4 seconds. In the **off-hook** state the alarm is activated if the leakage current from the a-wire or the b-wire to ground exceeds the current threshold of 17 mA for 4 seconds. This corresponds to an impedance of about 500 Ω between the a-wire and ground and about 900 Ω between the b-wire and ground. The alarm is cleared if the subscriber goes on-hook and the leakage current falls below 17 mA for 4 seconds. Note: Pressing the Ground Key for more than 4 seconds creates the “Ground Leakage Current” alarm, independent if the Ground Key affects the a-wire or the b-wire.
LNF	Line Fault	Equipment Alarm	☐	Minor	This is a summary alarm for all line-test alarms.
WSC	A/B-Wire Short Circuit	Equipment Alarm	☑	Major	This alarm is driven by the permanent line checks and indicates that the a-wire is shorting to $-V_{BAT}$ continuously or that the b-wire is shorting to ground continuously. The alarm is activated if the short circuit persists for 7 seconds. After removal of the short circuit the alarm remains active for another 30 seconds. Note: Pressing the Ground Key for more than 7 seconds creates the “A/B-Wire Short Circuit” alarm.
ABSC	A-B-Wire Short Circuit	Equipment Alarm	☑	Major	This alarm is driven by the permanent line checks and indicates the presence of a short circuit between the a-wire and the b-wire, i.e. the differential voltage is < 5V.
FRV	Foreign Voltage	Equipment Alarm	☑	Major	This alarm is driven by the permanent line checks and indicates the presence of foreign voltages e.g. from mains on a subscriber line.

WARNING **Hazardous voltages. Risk of electric shock!**

With an active FRV alarm there is a risk of hazardous voltages! Mains voltage of 115VAC or 230VAC is a danger to life.

Please note:

The monitoring of the TSF and RTSF alarms is disabled by default.

8.3.5 AP: / unit-x / port-y, Performance Management

For the a description of the general aspects of the performance management (PM) functions, please refer to [302] User Guide “XMC25/XMC23/XMC22”.

The following counter group is available for the SUPM1 ports:

- “Protection” group, see section 8.3.5.1 AP: / unit-x / port-y, Performance Management - Protection (on page 87),

The following counter intervals are available, depending of the counter group:

Table 50: PM counter interval availability

Counter interval	Protection
User Counter	yes
History 15min	yes
History 24h	yes
Alarm 15min	no
Alarm 24h	no

8.3.5.1 AP: / unit-x / port-y, Performance Management - Protection

Table 51: PM group: Protection

PM parameter	Description
Switch-Over	The protection switch-over count gives information about the number and distribution of protection switching events.

8.3.6 AP: / unit-x / port-y, Status

8.3.6.1 AP: / unit-x / port-y, Status - Maintenance

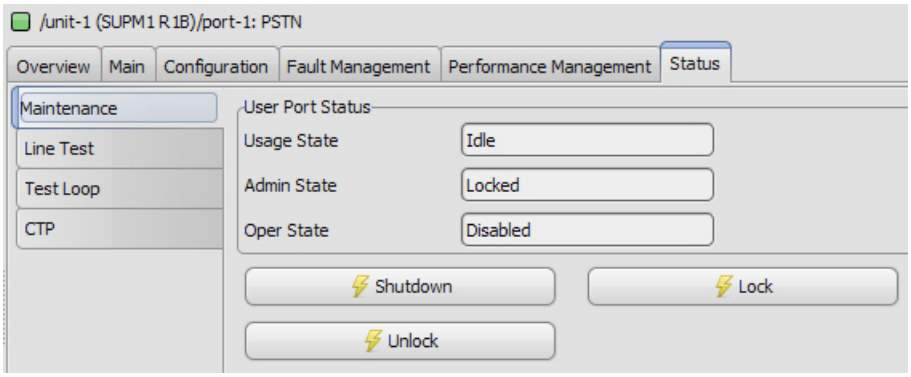


Table 52: AP: / unit-x / port-y, Status - Maintenance

Operation Name	Parameter Name	Range	Description / Details
User Port Status [a]	Usage State	Busy Idle	Note: In the MCAS mode of operation, the usage state is only valid when the IETF operational state is up.
	Admin State	Locked Shutting Down Unlocked	X.731 administrative status. In the non-V5CAS operation modes the Admin State is “Unlocked”.
	Oper State	Disabled Enabled Undefined	X.731 operational status. In the non-V5CAS operation modes the Oper State is derived from the CAS AIS state: - “Enabled” without AIS - “Disabled” with AIS
Shutdown [b]			Shutdown the user port. The port is blocked as soon as the usage state “idle” has been detected. Administrative state = locked.
Lock [b]			Lock the user port. The port is blocked immediately. Administrative state = locked.
Unlock [b]			Unlock the user port. The port is unblocked with this command. Administrative state = unlocked.

a. The actual user port status is controlled by the local exchange, the subscriber or the management system. Please refer to section 5.5 Port States (on page 43).
b. This command is only available for the V5CAS mode of operation.

8.3.6.2 AP: / unit-x / port-y, Status - Line Test

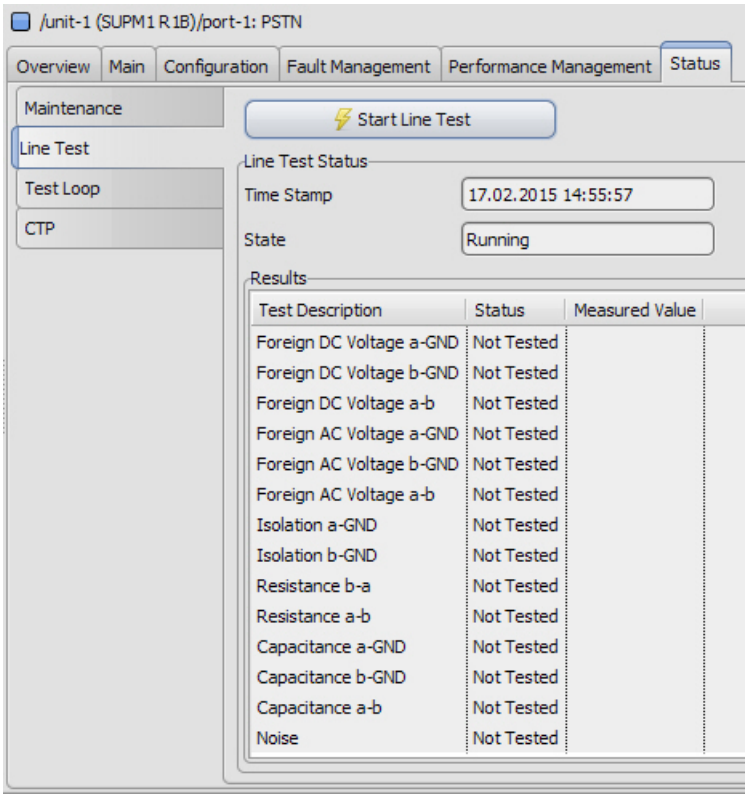


Table 53: AP: / unit-x / port-y, Status - Line Test

Operation Name	Parameter Name	Range	Description / Details
Start Line Test			Start a manual line-test on the user port.
Line Test Status	Time Stamp	DD.MM.YYYY hh:mm:ss	Date and time of the last performed line-test.
	State	Aborted	Please refer to the line-test functional description in section 5.11 Line Test (on page 52)
		Requested	
		Rejected	
		Running	
		Passed	
		Failed	
		Not Tested	
		See Results	
	Results		The line-test results comprise the Test Description, the Status and the Measured Value. Please refer to the line-test functional description in section 5.11 Line Test (on page 52)
	Results - Test Description	Foreign DC Voltage a-GND	Line-test description.
		Foreign DC Voltage b-GND	
		Foreign DC Voltage a-b	
		Foreign AC Voltage a-GND	
		Foreign AC Voltage b-GND	

Table 53: AP: / unit-x / port-y, Status - Line Test (continued)

Operation Name	Parameter Name	Range	Description / Details
		Foreign AC Voltage a-b	
		Isolation a-GND	
		Isolation b-GND	
		Resistance b-a	
		Resistance a-b	
		Capacitance a-GND	
		Capacitance b-GND	
		Capacitance a-b	
		Noise	
	Results – Status	OK	Line-test status.
		Failed	
		Not Tested	
		Untestable	
		Cleared	
	Results - Measured Value	0 … 30 characters	Line-test measured value.

8.3.6.3 AP: / unit-x / port-y, Status - Test Loop

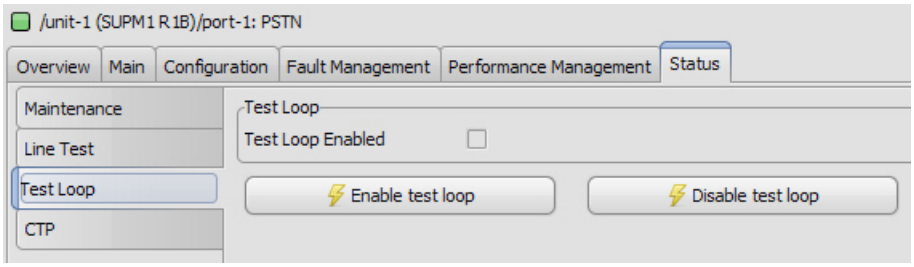


Table 54: AP: / unit-x / port-y, Status - Test Loop

Operation Name	Parameter Name	Range	Description / Details
Test Loop	Test Loop Enabled	☑	Activation state of the test loop. Please refer to the test loop functional description in section 5.6.3 Test Loop Procedure (on page 45).
		☐	
Enable test loop			Activate the loopback of the digital voice signal towards the network.
Disable test loop			Deactivate the loopback of the digital voice signal towards the network.

8.3.6.4 AP: / unit-x / port-y, Status - CTP

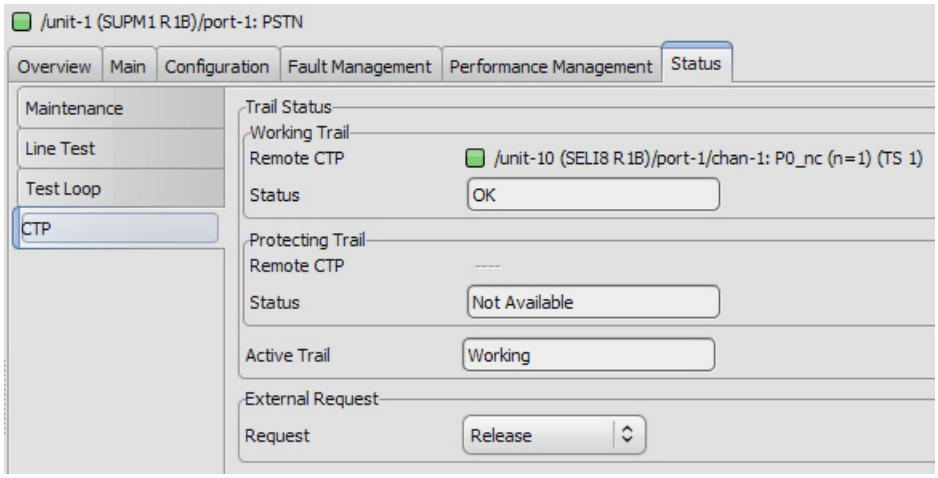


Table 55: AP: / unit-x / port-y, Status - CTP

Operation Name	Parameter Name	Range	Description / Details
Trail Status	Working Trail, Remote CTP	<MO Address>	Managed object address of the CTP (connection termination point) where the P0-nc signal is connected to, e.g. /unit-19/portgroup-1/port-1.
	Working Trail, Status	OK	No failure on the received signal.
		SF	Signal Fail status on the received signal.
		CAS AIS	CAS AIS status in the received signal, i.e. an all '1' signal.
		SD	Signal Degraded status on the received signal.
		Not Available	The status of the received signal is not available, e.g. when the CTPs role is a-end in a unidirectional connection.
	Protecting Trail, Remote CTP	<MO Address>	Managed object address of the CTP (connection termination point) where the P0-nc signal is connected to, e.g. /unit-19/portgroup-2/port-1.
	Protecting Trail, Status	OK	No failure on the received signal.
		SF	Signal Fail status on the received signal.
		CAS AIS	CAS AIS status in the received signal, i.e. an all '1' signal.
		SD	Signal Degraded status on the received signal.
		Not Available	The status of the received signal is not available, e.g. when the CTPs role is a-end in a unidirectional connection.
	Active Trail	Working	The trail from the a-end working remote CTP has been selected.
		Protecting	The trail from the a-end protecting remote CTP has been selected.
		Not Available	There is no active trail.

Table 55: AP: / unit-x / port-y, Status - CTP (continued)

Operation Name	Parameter Name	Range	Description / Details
External Request	Request	Release	Automatic trail selection.
		Force Working	Force the selector to use the trail from the a-end working remote CTP.
		Force Protecting	Force the selector to use the trail from the a-end protecting remote CTP.
		Manual Working	Prefer the trail from the a-end working remote CTP. Use this trail only if the fault status is not worse than the fault status of the protecting trail.
		Manual Protecting	Prefer the trail from the a-end protecting remote CTP. Use this trail only if the fault status is not worse than the fault status of the working trail.

9 Annex

9.1 Associated XMC20 Documents

Any version(s) and/or release(s) indicated with the below listed document titles identify the specific state of the software and/or feature set at the creation time of the present document. If the present document is published as part of a document collection, the hyperlinks might open a document valid for a newer version/release. That updated version is valid in the context of all units and features described in the document collection.

Please note:

For the HTML-based documentation site there are no interdocument hyperlinks realized yet.

→ Please find the required document via the navigation tree on the left.

[012] Release Note “XMC20”

[201] System Description “XMC20”

[202] Safety Instructions “Precautions and safety”

[301] User Guide “XMC25 Installation”

[310] User Guide “XMC23 Installation”

[322] User Guide “XMC22 Installation”

[302] User Guide “XMC25/XMC23/XMC22”

[323] User Guide “Management Communication”

[354] Quick Guide “ECST”

[355] User Manual “ECST”

[314] User Guide “TDM Services and Cross Connections in XMC20”

[340] Quick Guide “TDM Services over PDH/SDH”

[447] User Manual “COGE5, COGE5-F co5ne_r2, co5un_r2”

[410] User Manual “SELI8 seli8_r5”

[452] User Manual “VOIP1 voip1_r2”

[458] User Manual “FIL16”

[506] User Manual “XMC20 cables”

[915] Technical Bulletin “Feature Licences for XMC20”

9.2 Technical Support

Please refer to the KEYMILE Extranet (via http://www.keymile.com) for support contact information.

9.3 Product Training

Training courses are available for a wide range of KEYMILE products and applications.

For contact information, course descriptions, locations and dates, go to the Website: http://www.keymile.com, then search for “product training”.