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MileGate 2500/2510 and 2300/2310

Subracks of the Multi-Service Access Platform for NGN and legacy services out of one network element

MileGate 2500/2510 (left) and MileGate 2300/2310

- Two subrack sizes for different kinds of installation
- Wide range of xDSL interfaces
- Wide range of voice services
- Uplink via PDH, SDH, Ethernet
- Up to 400 Gbps backplane capacity and 20 Gbps to every slot
- Enables 1:1 redundancy of core unit and media gateway
- Native TDM and Ethernet out of one network element
- Designed for indoor and outdoor deployment
- All functions via one network management system

The subracks MileGate 2500/2510 and MileGate 2300/2310 provide comprehensive multi-service capabilities in a compact chassis.

Reliability, compact mechanical construction and flexibility were in the foreground of development activities. The subracks are designed for implementation in rough environmental conditions and can be deployed in outdoor cabinets. Core unit and media gateways are designed for redundant operation to guarantee maximum availability.

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Due to its unique hybrid backplane MileGate integrates traditional and NGN services in one network element. This way a simple and cost-effective migration is achieved. Legacy services like POTS/ISDN are combined with NGN services for Triple Play and business applications (ADSL2plus, VDSL2, SHDSL, optical Ethernet, etc.) in a single network element and uplinked to the backbone via 1/10 GbE , SDH STM-16/4/1 (STM-16 only with MileGate 2510 and 2310), or n x E1 interfaces.

Each slot is connected with two 1 GbE interfaces via the backplane to the core units (two 10 GbE interfaces with MileGate 2510/2310) for undisturbed transmission.

All services provided by MileGate can be mixed in any way. For maximum flexibility with voice services, VoIP media gateways (SIP or H.248) and traditional V5.2 interfaces are available.

For maximum flexibility with data services, a wide range of legacy data interfaces such as X.21, V.35 and G.703 are available and they can be transported over the

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Packet Switched Network with the CESoP gateway unit.

MileGate 2500/2510

This subrack offers 21 slots, 20 can be allocated with service line cards. It is designed for major access points, where a large number of subscribers are connected with different services. With its high port density, up to 1216 POTS, 1280 ADSL2plus, 672 VDSL2, 480 optical or 240 electrical Ethernet customer ports can be provided.

MileGate 2300/2310

This subrack offers 8 slots, 7 can be allocated with service line cards. It is designed for mid-size access points. It can be installed horizontal or upright as well as wall-mounted in equipment rooms in buildings or in street cabinets. Up to 384 POTS, 448 ADSL2plus, or 336 VDSL2, or 168 optical or 84 electrical Ethernet customer ports can be provided.

Safety/Redundancy

To achieve maximum availability, two core units and media gateways can be installed in every subrack. They exchange the configuration data of the services in the MIB (Management Information Base) automatically, thus in case of failure the stand-by unit can assume operation easily. This way the breakdown time, where services are not available, is reduced to a minimum.

MileGate uses distributed powering concept with onboard power supplies on each line card, gateway etc. This eliminates the risk of total breakdown caused by a failure in a central power supply.

For integration of external alarms, MileGate 2500/2510 provides 12 alarm inputs and 2 alarm outputs via the fan unit that are monitored with the network management system. MileGate 2300/2310 offers 12 alarm inputs.

Management

All services are managed centrally via the management system (UNEM) or via local management access (CLI, XML, SNMP).

Technical Data

General	**MileGate 2500/2510**		**MileGate 2300/2310**	
Number of slots (for service line cards)	Up to 20		Up to 7	
Slots for core units with redundancy	Max. 2		Max. 2	
Slots for media gateways with redundancy	Max. 2		Max. 2	
Supported FAN unit	FANU4		FANU6	
Features	**MileGate 2500**	**MileGate 2510**	**MileGate 2300**	**MileGate 2310**
System architecture	Fully modular architecture, any service at any slot			
Protective functions	Core unit and media gateway with 1:1 module redundancy			
Ethernet Backplane access per slot	2 x 1 GbE	2 x 10 GbE	2 x 1 GbE	2 x 10 GbE
SDH capabilities	Up to STM-4	Up to STM-16	Up to STM-4	Up to STM-16
Dimensions (W x D x H) and Weights	**MileGate 2500/2510**		**MileGate 2300/2310**	
Unit height	8 HU (with cable tray)		4 HU	
Without front cover	482.6 x 284 x 308.2 mm, 6,440 g		482.6 x 279.7 x 177 mm, 4,450 g	
With front cover	482.6 x 301 x 308.2 mm, 7,430 g		482.6 x 301 x 177 mm, 5,050 g	
Cable tray	482.6 x 240 x 87.1 mm, 870 g		Included with 19" adapter	
Heat deflector	482.6 x 237 x 87.8 mm, 1,580 g		Not necessary	
Type and design	19" and ETSI mounting			
Standards				
Electromagnetic compatibility	EN 55022, class B			
Safety	IEC/EN 60950-1			
Management				
MCST	For local management			
UNEM	For central network management			
Power Supply				
Input voltage nominal (min/max)	-48/-60 VDC (-40.5 VDC ... -72 VDC)			
Operation Environment				
Operation temperature	-25 °C ... +60 °C			
Humidity	According to class 3.2, max. 95 %, non condensing			

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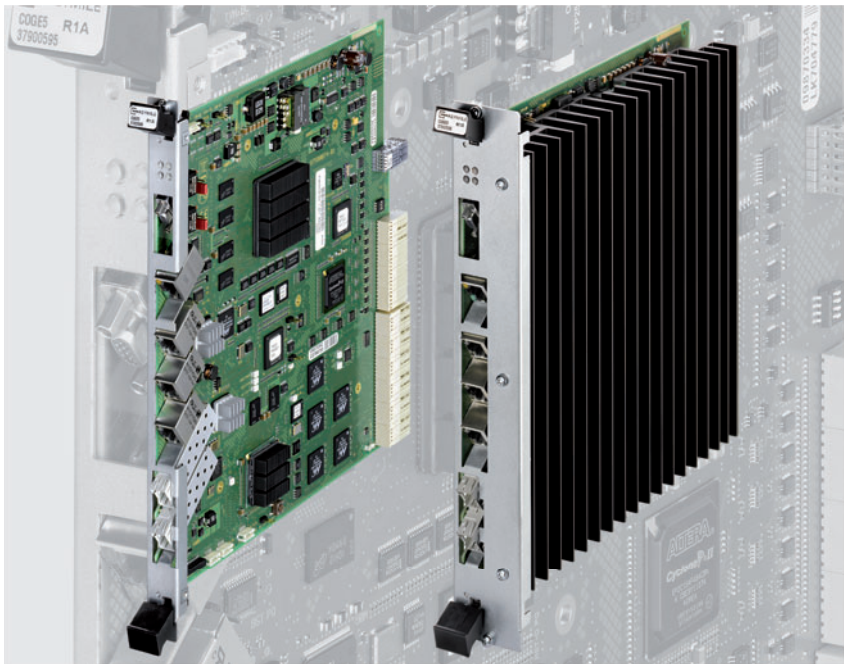
MileGate COGE5

Core unit of the Multi-Service Platform MileGate, supporting 10 Gigabit-Ethernet uplinks for ultra high bandwidth in dedicated networks



Core unit COGE5 and variant for fanless operation COGE5-F (right)

- Uplink 2 x 10GbE via SFP+ or 2 x GbE via SFP modules
- 3 ports for uplink, cascading and ring connections
- Synchronous Ethernet and IEEE 1588v2 (PTP) on all Ethernet front ports
- 1:1 equipment protection possible for maximum availability
- ERPS for Protection Switching in Ethernet rings
- Supports MileGates chassis switching architecture
- OSPF Routing for Management traffic
- MPLS-TP and IP-MPLS ready

COGE5 is a core unit for the MileGate 2310 and MileGate 2510 subracks, optimized for applications in dedicated networks. It performs all central functions of the system and data transport by providing the uplink ports for the Ethernet traffic and data synchronization.

In addition, COGE5 operates as an Ethernet switch, providing a wide range of functions, e.g. VLAN support, QoS, xSTP support and multicasting.

Interfaces

COGE5 comes with three electrical interfaces and two cages for optical SFP+ or SFP modules.

Two 10 GbE or 1 GbE uplinks can be realized as well as a redundant 1:1 connection for protection of the transmission.
The 10/100/1000BaseT interfaces can be used for cascading or ring connection with other MileGates or also for the uplink.

1:1 Equipment Protection

COGE5 can be installed redundantly in the MileGate subracks. One works in a hot standby mode and takes over operation in case a failure occurs in the active unit. This mechanism ensures highest availability of the system.

Chassis Switching Architecture

COGE5 is part of MileGates chassis switching architecture. This means that MileGate acts as one switch with one IP address and an expandable number of ports. Every inserted Ethernet card will expand the switch. With it the switch can be adapted to the local demands.

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Timing and Synchronization

The timing and synchronization functionalities include a 2 Mbps reference clock input as well as Synchronous Ethernet and IEEE 1588v2 support. These options allow for synchronous timing and a very high timing precision of sub-microseconds that are required for various applications.

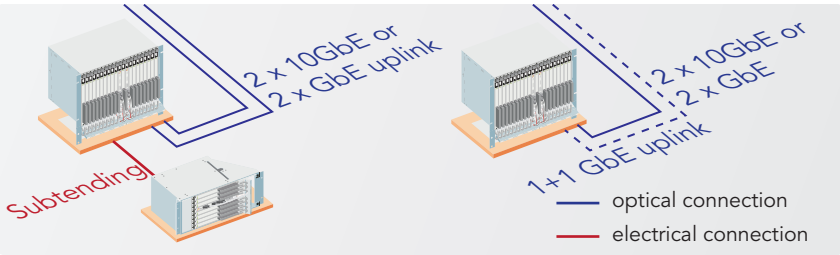

Illustration of COGE5 connections

Topologies

With the interfaces of COGE5 different network topologies can be realised. Beside the star or line topology, redundant 1+1 connections can be built for the case that a transmission route is interrupted.

Management

All services are managed centrally via the management system UNEM or via the local craft terminal ECST.

Technical Data

Interfaces COGE5	
Optical	2 x 10 GbE with SFP+ modules or GbE with SFP modules
Electrical	3 x 10/100/1000BaseT (RJ45)
Supported topologies	Star, linear chain and ring
Management	10BaseT/100BaseT and 1000BaseT
Synchronization	
Ethernet front ports	Synchronous Ethernet (future option), IEEE 1588v2 (future option)
Ethernet Functions COGE5	
VLAN services	According to IEEE 802.1Q, 4096 VLANs supported
	VLAN tag stacking (Q-in-Q), according to IEEE 802.1ad
	VLAN QoS with Class of Service (CoS) handling, according to IEEE 802.1p
	Jumbo frames supported
Spanning tree protocol	STP (Spanning Tree Protocol), according to IEEE 802.1D
	RSTP (Rapid Spanning Tree Protocol), based on IEEE 802.1w
	MSTP (Multiple Spanning Tree protocol), based on IEEE 802.1s
Protection mechanism	Ethernet Ring Protection Scheme (ERPS), according to ITU-T G.8032
MPLS	MPLS-TP and IP-MPLS ready
Multicast	IGMP v2/v3, supporting IGMPv3 snooping with proxy reporting and message suppression (future option)
Link aggregation	LACP, based on IEEE 802.3ad (future option)
Management COGE5	
Functions	Management and control of MileGate subracks and all plug-in units
	Database with management information
	Embedded software download
	Alarm collection and notification
	External alarm interfacing via backplane and management
	OSPF routing for management traffic
	Management via PDH ECC
Management interface	CLI, SNMP (future option)
Local management system	ECST
Central management system	UNEM
Power Supply	
Input voltage nominal (min/max)	-48/-60 VDC (-40.5 VDC ... -72 VDC)
Operation Environment	
Temperature range and humidity	According to MileGate environmental specifications

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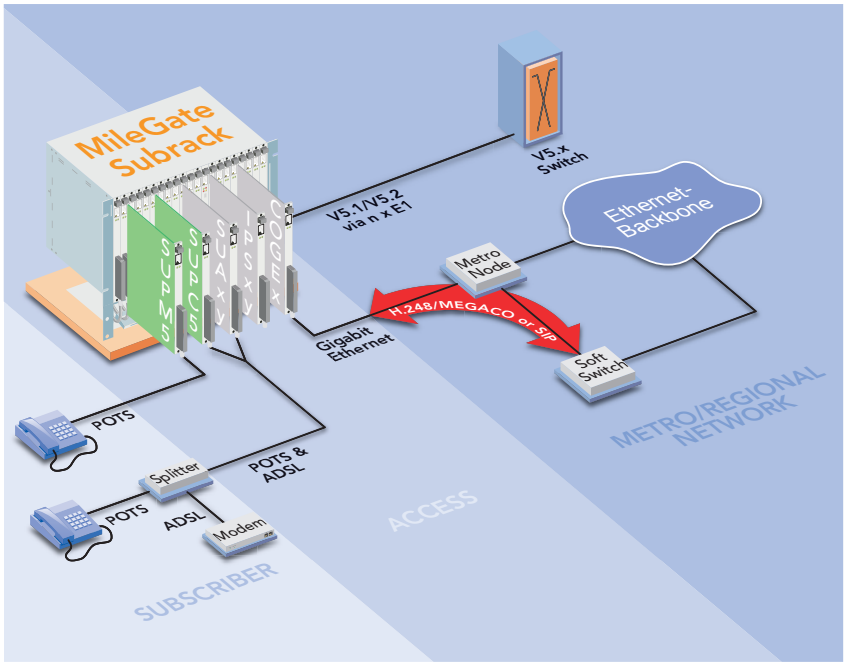
MileGate SUPM5 and SUPC5

POTS line card supports high density POTS configurations in legacy and Next Generation Access Networks



MileGate POTS delivery in legacy and NGN Access Networks

- High density line card
- Up to 912 POTS interfaces per subrack with only 15 slots used in conjunction with VoIP gateways
- Compatible in SIP, H.248 and V5.1/V5.2 networks
- On-board splitter for an easy interconnection with ADSL services
- Enhanced line test functions
- All functions out of one network management system

With up to 912 POTS lines out of one 19" subrack, operators can deliver highly profitable voice services in the last mile - either as stand-alone service or in combination with high-speed Internet access via ADSL2plus or VDSL2.

General

The SUPx5 provides 64 feature-rich POTS interfaces that connect traditional telephone subscribers to the telecommunication networks. This universal line cards supports the POTS requirements of different countries world wide. The SUPx5 cards are compatible for voice delivery in the access networks of Next Generation Networks (NGN) and Public Switched Telephone Network (PSTN).

POTS in NGN and PSTN Networks

With the available VoIP Media Gateways in MileGate, POTS services can be directly integrated in VoIP network architectures. In order to achieve maximum interoperability, MileGate also provides an SIP-based and an H.248-based VoIP Media Gateway, where the protocol can be changed with a software download. Recognising the operation of PSTN network continues, the V5.1/V5.2 Gateway in MileGate connects the POTS services to exisiting Class 5 switches in the PSTN network.

This allows network operators to choose the optimum solution for their network or to migrate to other standards if required in the future.

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COMBO Solution SUPC5 makes things easier

The COMBO solution on the MileGate is another deployment method that suits operators who generally deliver both, POTS and ADSL services on each subscriber line. It offers a scalable and easy delivery of POTS and ADSL/2/2plus services to end users with simple and flexible installation. Equipped with on-board splitters and furnished with Y-cables, the solution simplifies the wiring at the IP-MSAN locations, saves port usage on the DDF (Digital Distribution Frame) and eliminates the external CO splitter installation. Moreover, it provides full flexibility of services deployment in both COMBO and POTS.

Enhanced Line Test Functions

The integrated line test function on the SUPx5 is an extremely powerful tool used by operators to pre-qualify a subscriber line remotely as well as to perform fault isolation. The line tests can be launched remotely from the Network Operation Centre. This simplifies the operation processes and reduces operational cost in the whole sales lifecycle of a POTS service. They can be activated either automatically (cyclic test) or manually (on-demand test), giving operators the freedom to test as required.

One Management

The management of the SUPx5 is integrated in the MCST/UNEM management system. By having ONE element manager for all types of services, operators will accelerate the provisioning process. This powerful and easy-to-use element manager ensures more efficient OAM&P (Operation, Administration, Maintenance and Provisioning) and lower operational costs.

Technical Data

General	
Unit name	SUPM5, SUPC5 (with on-board splitters)
Number of POTS ports	64
Mode of Operation	
Softswitches	H.248/MEGACO (via IPSMx) or SIP (via IPSSx)
Class 5 switches	V5.2 (via PCOM1 and PCOM2), V5.1 (via PCOM2)
Other modes	MELCAS (MCAS), phone-exchange, phone-phone automatic ring down
Services	
Analog voice	Supported
Fax/Modem	Supported
Analog Line Parameters	
Line impedance	Configurable
Voice encoding	A-law
Ringing	Supported; on-board ringer
Dialling	DTMF (preferred) and Pulse
Offhook loop current	15 to 45 mA
Pulse metering	12/16 kHz (preferred with SUPM5)
Polarity reversal	Supported
Call progress tones	Supported in conjunction with IPSMx/IPSSx
Maximum cable length (Ø 0.6 mm)	SUPM5: 11.3 km, SUPC5: 3-4 km
Integrated Line Tests	
Isolation tests	Supported
Foreign AC/ DC voltage tests	Supported
Noise tests	Supported
Capacity tests	Supported
Test execution	Cyclic or on-demand
Management	
MCST	For local management
UNEM	For central management
Power Supply	
Input voltage nominal (min/max)	-48/-60 V DC (-40.5 V DC ... -72 V DC)
Operation Environment	
Temperature range and humidity	According to MileGate environmental specifications

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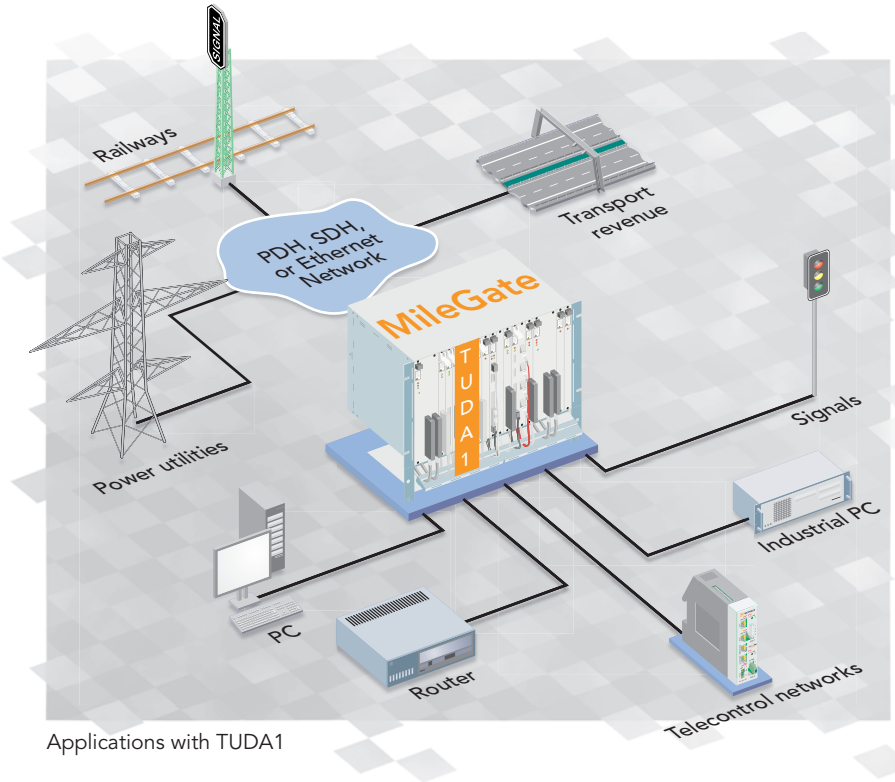
MileGate TUDA1

The serial interface unit brings powerful functions and high flexibility for TDM data applications on the MileGate platform



Applications with TUDA1

- 4 independent configurable serial ports on one single unit
- Configurable as V.35, X.24/V.11, V.24/V.28, RS-485,
- Additional Ethernet interface
- Point-to-multipoint and multipoint-to-multipoint connections
- Centralized conferencing
- Section protection (SNCP)
- 1+1 end-to-end path protection
- 1+1 equipment protection
- Shared protection ring
- Performance monitoring
- All functions from one network management system

TUDA1 provides different types of data interfaces on one unit, configurable via the network management system. With it you can connect a wide range of data terminal equipment, with different interface types and data rate requirements to only one unit in one slot. This improves subrack space utilization and optimises your investment.

Enhanced data service capabilities in MileGate

This unit addresses the specific needs of data service suppliers.

TUDA1 has access to MileGate's TDM bus, which provides 128 x E1 cross-connect capability. Each TUDA1 port has 2 Mbps access to the TDM bus. Low and high speed data interfaces can be configured on TUDA1.

Low speed interfaces intended for connection to controllers, valves or detectors as well as high-speed interfaces for large bandwidth applications, such as connections to routers or modems, are available. In conjunction with the 2 Mbps interface unit LOMI8, TUDA1 can also be used as a data interface to E1 channel converter, allowing up to 52 converters in one single MileGate.

A comprehensive set of protection mechanisms is available in TUDA1, covering end-to-end traffic protection and section protection for point-to-point applications, plus 1+1 equipment protection for redundancy of service units.

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The MileGate platform with TUDA1 also offers a shared protection ring mechanism for protection of point-to-multipoint and multipoint-to-multipoint connections in a ring topology.

Interface flexibility

TUDA1 provides four serial interface ports that can be individually configured via the networks management system in order to cover several types of applications. Each port can be configured as:

- V.35
- X.24/V.11
- V.24/V.28
- RS-485 (2- and 4-wire mode)

An additional Ethernet interface, configurable as a bridge, is also available on TUDA1.

The access to the TDM bus is non-blocking, all interfaces can be used in parallel.

Supplementary features

In addition to the different types of interfaces supported, TUDA1 offers extra features to enhance data services provisioning:

- Section protection (SNCP)
- 1+1 end-to-end path protection
- Point-to-multipoint and multipoint-to-multipoint connections
- Centralised conferencing
- Shared protection ring
- 1+1 equipment protection (core functionality/conferencing)
- Performance monitoring

These attributes add even more advantages for data services deployed from a MileGate network.

Built-in transmission solution

TUDA1, in conjunction with MileGate, provides a complete solution for data services. With its wide range of available interfaces, the MileGate can easily be deployed in any type of existing network infrastructure. Data services provided via TUDA1 can be multiplexed and transmitted to the network using the TDM, SDH, and Ethernet (via CEOP1) transport technologies of the MileGate platform.

Technical Data

Ports	
5 interfaces (connector type)	4 serial (METRAL) + 1 x 10/100BaseT (RJ45)
Serial Interface Types	
Configurable multi-protocol interfaces	V.35, X.24/V.11, V.24/V.28, RS-485 (2-wire and 4-wire mode)
Data Rates Supported	
Sub-rates	0.6 ... 38.4 kbps asynchronous and 0.6 ... 56 kbps synchronous
n x 64 kbps	64 ... 1,984 kbps (n = 1 ... 31) synchronous
Transparent	0 ... 600 kbps with oversampling
Ethernet Features	
Bridging	MAC-to-PPP or MAC-to-HDLC bridging (MAC encapsulation) with learning transport of VLAN tagged frames
Supplementary Features	
Protections	Section protection (SNCP), 1+1 end-to-end path protection, Shared protection ring, 1+1 equipment protection
Connection types	Point-to-point, point-to-multipoint, multipoint-to-multipoint, centralized conferencing
Performance monitoring	According to ITU-T G.826
Management	
MCST	For local management
UNEM	For central management
Power Supply	
Input voltage nominal (min/max)	-48/-60 V DC (-40.5 V DC ... -72 V DC)
Operation Environment	
Temperature range and humidity	According to MileGate environmental specifications

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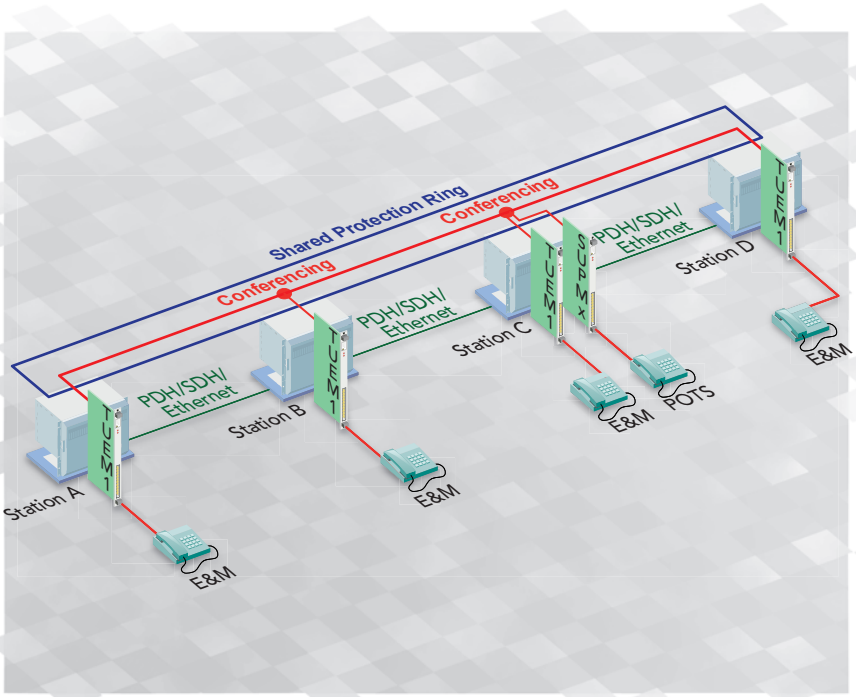
MileGate TUEM1

TUEM1 offers E&M VF interfaces with onboard conferencing function for dedicated networks



Analogue telephone network with conferencing and shared protection ring

- 8 x 2- or 4-wire E&M VF interfaces
- Compatible and interoperable with UMUX cards NEMCA, NEMSG and MAGI8
- Scalable conferencing on board for 32 participants per unit and 10 parties
- Enables different topologies
- Various protection functions
- Built-in maintenance functions for network debugging
- All functions from one network management system

TUEM1 integrates traditional services in the MileGate platform. Important functions for dedicated networks such as E&M voice telephony and conferencing can be offered with TUEM1 in only one unit.

Thanks to the access to MileGate's hybrid Ethernet-TDM backplane, services offered with TUEM1 can be transmitted via all transport network technologies. For that MileGate offers interfaces towards PDH, SDH and Ethernet/IP networks.

E&M VF Interface – TUEM1

TUEM1 is equipped with eight voice interfaces with a telephony bandwidth of 300 Hz to 3.4 kHz with separate E&M signaling interfaces. Each voice channel is configurable in 2-wire or 4-wire mode and offers two E&M signaling channels.

Conferencing Engine

The onboard conferencing engine enables various applications and network topologies so that legacy telephony services can be combined and integrated in a modern telecommunication network.

Distributed and centralized voice conferences with a maximum of 32 participants per unit and up to 10 parties with maximal 17 participants each can be set up.

Protection Functions

TUEM1 supports different protection mechanisms, ensuring that the delivered service persists in case of a failure in subnetworks:

- Network protection: 1+1 path protection and 1+1 subnetwork connection protection (SNCP/I)

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- Unit protection: 1:1 equipment protection

Flexible Topologie

With the TUEM1, operators of dedicated networks can build a variety of applications in different network topologies.

Applications which can be addressed by TUEM1 in a Point-to-Point network topology:

- Analogue telephony networks with E&M
- Connection of analogue train radio
- Interexchange trunking connection

Applications which can be addressed by TUEM1 in a Point-to-Multipoint network topology:

- Analogue telephony networks with conferencing
- Analogue telephony networks with conferencing and Shared Protection Ring

An application which can be addressed by TUEM1 in a Multipoint-to-Multipoint (Omnibus) network topology is analogue telephony conferencing with and without Shared Protection Ring

One Management

The management of the TUEM1 is integrated in the MCST/UNEM management system. By having one element manager for all types of services, operators will accelerate the provisioning process. The element manager ensures efficient OAM&P (Operation, Administration, Maintenance and Provisioning) and lower operational costs.

Technical Data

E&M Interface	
Analogue voice interface	2-wire, 4-wire
Number of analogue voice interfaces	8
Signalling interfaces	E&M 8 x 2
Signalling interface types	Type I to Type V
Conference Engine	
Conferences	Linear addition of the voice signals, wired-AND addition of the CAS signalling signals
Conference type	Multipoint-to-multipoint, point-to-multipoint
Number of conferences	Up to 10
Number of participants per conference	Up to 17
Number of participants per unit	Up to 32
Analogue Voice Interface	
Coding	A-Law according to ITU-T G.711
Performance characteristics	According to ITU-T G.712
Impedance in the voice band	600 ohms balanced and floating (2-wire input/output, 4-wire input, 4-wire output)
Bandwidth	300 … 3400 Hz
Protection	
Supported protection mechanism	1+1 path protection 1+1 SNCP/I protection 1:1 equipment protection
Management	
MCST	For local management
UNEM	For central management
Power Supply	
Input voltage nominal (min/max)	-48/-60 V DC (-40.5 V DC ... -72 V DC)
Operation Environment	
Temperature range and humidity	According to MileGate environmental specifications

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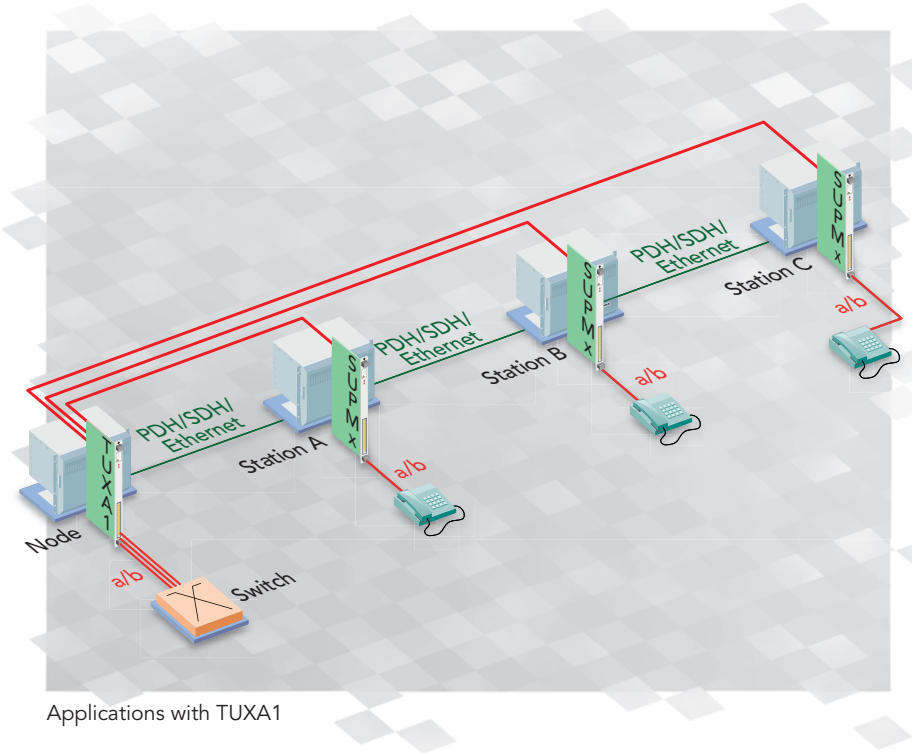
MileGate TUXA1

POTS unit with 12 Foreign eXchange Office (FXO) ports



Applications with TUXA1

- 12-port FXO 2-wire ports for the connection of remote subscriber
- DTMF and pulse dialling
- CLIP support
- Supports 1+1 path protection
- Configurable voice levels
- Configurable signalling Bits
- Configurable line impedance
- All functions from one network management system

The POTS FXO unit TUXA1 provides up to 12 FXO ports for the connection of remote subscriber. Its wide range of configurable parameters ensure easy and reliable interoperation with a large variety of exchanges.

With the multi-service capabilities of MileGate, TUXA1 signalling and voice data can be transmitted via PDH, SDH or Ethernet.

Voice Function

TUXA1 converts voice and signalling from the exchange for the digital transmission in the access network and recreates voice and signalling from the digital access network for the analogue exchange interface.

Legacy Voice Services in an NGN Infrastructure

In connection with the circuit-emulation unit CEOP1 in MileGate, the TUXA1 supports the transport of legacy voice and signalling data via packet networks, using one single platform.

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Protection Functions

TUXA1 supports different protection mechanisms, ensuring that the delivered service persists in case of a failure in subnetworks:

- 1+1 path protection (LTP)
- Subnetwork connection protection (SNCP/I)

Built-in Transmission Solution

TUXA1, in conjunction with MileGate, provides a complete solution for FXO voice services. With its wide range of available interfaces, the MileGate can easily be deployed in any type of existing network infrastructure. Voice services provided via TUXA1 can be transmitted to the network using the TDM, SDH, and Ethernet (with circuit emulation) transport technologies of the MileGate platform.

One Management

The management of the TUXA1 is integrated in the MCST/UNEM management system. By having one element manager for all types of services, operators will accelerate the provisioning process. This powerful and easy-to-use element manager ensures more efficient OAM&P (Operation, Administration, Maintenance and Provisioning) and lower operational costs.

Technical Data

General	
Number of FXO interfaces	12
Voice and Configuration Parameters	
CLIP	Supported
Input voice level	Configurable
Output voice level	Configurable
Line impedance	Configurable (8 commonly used impedances)
CAS pattern	Configurable for upstream and downstream signalling
Downstream Signalling	
Polarity reversal	supported
Ringing	Supported
Metering pulse	12 kHz and 16 kHz
Upstream Signalling	
Dialling	DTMF and pulse
On/Off-hook	Supported
Hook flash	Supported
Earth key	Supported
Protection	
1+1 path protection (LTP)	Supported
SNCP/I	Supported
Management	
MCST	For local management
UNEM	For central management
Power Supply	
Input voltage nominal (min/max)	-48/-60 VDC (-40.5 VDC ... -72 VDC)
Operation Environment	
Temperature range and humidity	According to MileGate environmental specifications

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