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Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 4-1: Synchronous Digital Hierarchy (SDH) path layer functions

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Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 4-1: Synchronous Digital Hierarchy (SDH) path layer functions

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ETSI**Postal address**

F-06921 Sophia Antipolis Cedex - FRANCE

Office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C

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Internet

secretariat@etsi.fr

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Transmission and Multiplexing (TM).

The present document is one of a family of documents that has been produced in order to provide inter-vendor and inter-operator compatibility of Synchronous Digital Hierarchy (SDH) equipment.

The present document is part 4-1 of a multi-part EN covering the generic requirements of transport functionality of equipment, as identified below:

Part 1-1: "Generic processes and performance".

Part 1-2: "General information about Implementation Conformance Statement (ICS) proforma".

Part 2-1: "Synchronous Digital Hierarchy (SDH) and Plesiochronous Digital Hierarchy (PDH) physical section layer functions".

Part 2-2: "Synchronous Digital Hierarchy (SDH) and Plesiochronous Digital Hierarchy (PDH) physical section layer functions; Implementation Conformance Statement (ICS) proforma specification".

Part 3-1: "Synchronous Transport Module-N (STM-N) regenerator and multiplex section layer functions".

Part 3-2: "Synchronous Transport Module-N (STM-N) regenerator and multiplex section layer functions; Implementation Conformance Statement (ICS) proforma specification".

Part 4-1: "Synchronous Digital Hierarchy (SDH) path layer functions".

Part 4-2: "Synchronous Digital Hierarchy (SDH) path layer functions; Implementation Conformance Statement (ICS) proforma specification".

Part 5-1: "Plesiochronous Digital Hierarchy (PDH) path layer functions".

Part 5-2: "Plesiochronous Digital Hierarchy (PDH) path layer functions; Implementation Conformance Statement (ICS) proforma specification".

Part 6-1: "Synchronization layer functions".

Part 6-2: "Synchronization layer functions; Implementation Conformance Statement (ICS) proforma specification".

Part 7-1: "Auxiliary layer functions".

Part 7-2: "Auxiliary layer functions; Implementation Conformance Statement (ICS) proforma specification".

Parts 2 to 7 specify the layers and their atomic functions.

NOTE 1: The present document does not currently address configuration management.

NOTE 2: The SDH radio equipment functional blocks are addressed by ETSI WG TM4.

Various of the above parts have previously been published as parts of ETS 300 417.

They have been converted into parts of EN 300 417 without technical changes, but some editorial changes have been necessary (e.g. references). In particular:

- Parts 2-1, 2-2 and 3-2 have been modified to take account of editorial errors present in edition 1.
- Part 1-1 has had its title change of to align with other parts published at a later date.

Also note that in the meantime parts 8-1 and 8-2 together with all parts x-3 (Abstract Test Suites) have been stopped.

This version of the present document has been published because the previous version had incorrect dates in the transposition table.

National transposition dates	
Date of latest announcement of this EN (doa):	31 August 1999
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1 Scope

The present document specifies a library of basic building blocks and a set of rules by which they are combined in order to describe transport functionality of equipment. The library comprises the functional building blocks needed to completely specify the generic functional structure of the European Transmission Hierarchies. Equipment which is compliant with the present document shall be describable as an interconnection of a subset of these functional blocks contained within the present document. The interconnections of these blocks shall obey the combination rules given. The generic functionality is described in EN 300 417-1-1 [6].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- STANDARD PREVIEW
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- SIST EN 300 417-4-1 V1.1.3:2003
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- Transmission and Multiplexing (TM); Functional characteristics of 2 048 kbit/s interfaces"
- [1] ETS 300 147: "Transmission and Multiplexing (TM); Synchronous Digital Hierarchy (SDH); Multiplexing structure".
 - [2] ETS 300 166 (1993): "Transmission and Multiplexing (TM); Physical and electrical characteristics of hierarchical digital interfaces for equipment using the 2 048 kbit/s - based plesiochronous or synchronous digital hierarchies".
 - [3] ETS 300 167: "Transmission and Multiplexing (TM); Functional characteristics of 2 048 kbit/s interfaces".
 - [4] ETS 300 216: "Network Aspects (NA); Metropolitan Area Network (MAN); Physical layer convergence procedure for 155,520 Mbit/s".
 - [5] ETS 300 337: "Transmission and Multiplexing (TM); Generic frame structures for the transport of various signals (including Asynchronous Transfer Mode (ATM) cells and Synchronous Digital Hierarchy (SDH) elements) at the ITU-T Recommendation G.702 hierarchical rates of 2 048 kbit/s, 34 368 kbit/s and 139 264 kbit/s".
 - [6] EN 300 417-1-1: "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 1-1: Generic processes and performance".
 - [7] EN 300 417-3-1: "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 3-1: Synchronous Transport Module-N (STM-N) regenerator and multiplex section layer functions".
 - [8] EN 300 417-6-1: "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 6-1: Synchronization distribution layer functions".
 - [9] ITU-T Recommendation G.823: "The control of jitter and wander within digital networks which are based on the 2 048 kbit/s hierarchy".
 - [10] IEEE Standard 802.6: "Information technology-Telecommunications and information exchange between systems-Local and metropolitan area networks-Specific requirements-Part 6: Distributed Queue Dual Bus (DQDB) access method and physical layer specifications".
 - [11] ITU-T Recommendation O.151: "Error performance measuring equipment operating at the primary rate and above".

[12] ITU-T Recommendation O.181: "Equipment to assess error performance on STM-N interfaces".

3 Definitions, abbreviations and symbols

3.1 Definitions

The functional definitions are described in EN 300 417-1-1 [6].

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

A	Adaptation function
AcSL	Accepted Signal Label
AcTI	Accepted Trace Identifier
ADM	Add-Drop Multiplexer
AI	Adapted Information
AIS	Alarm Indication Signal
AP	Access Point
APId	Access Point Identifier
APS	Automatic Protection Switch
ARCH	ARCHitecture
ATM	Asynchronous Transfer Mode
AU	Administrative Unit
AUG	Administrative Unit Group
AU-n	Administrative Unit, level n
Avp	ATM virtual path
BER	Bit Error Ratio
BIP	Bit Interleaved Parity
BIP-N	Bit Interleaved Parity, width N
C	Connection function
CI	Characteristic Information
CK	ClocK
CLR	CLeaR
CM	Connection Matrix
CP	Connection Point
CRC	Cyclic Redundancy Check
CS	Clock Source
D	Data
DCC	Data Communications Channel
DEC	DECrement
DEG	DEGraded
DEGM	DEGraded Monitor period
DEGTHR	DEGraded THreshold
DS	Defect Second
DSTATUS	Data STATUS
DTYPE	Data TYPE
EBC	Errored Block Count
ECC	Embedded Communications Channel
ECC(x)	Embedded Communications Channel, layer x
EDC	Error Detection Code
EDCV	Error Detection Code Violation
EMF	Equipment Management Function
EQ	EQuipment
ES	Electrical Section
ES	Errored Second
EXER	EXERcise

EXTCMD	EXTernal CoMmanD
ExTI	Expected Trace Identifier
F_B	Far-end Block
FAS	Frame Alignment Signal
FOP	Failure Of Protocol
FORCEDN	FORCE Down
FS	Frame Start signal
FSw	Forced Switch
HEC	Header Error Control
HO	Hold Off (used in HOTime)
HOB	Head Of Bus
HOVC	Higher Order Virtual Container
HP	Higher order Path
ID	IDentifier
IF	In Frame state
IM	In Multiframe state
INC	INCrement
incAIS	incoming AIS
LC	Link Connection
LO	Lockout Of protection
LOA	Loss Of Alignment; generic for LOF, LOM, LOP
LOF	Loss Of Frame
LOM	Loss Of Multiframe
LOP	Loss Of Pointer
LOS	Loss Of Signal
LOVC	Lower Order Virtual Container
LSS	Loss of Sequence Structure
LSTATUS	Link STATUS
LTC	Loss of Tandem Connection
MC	Matrix Connection
MCF	Message Communications Function
MDT	Mean Down Time
mei	maintenance event information
MFAS	Multi Frame Alignment Signal
MFS	Multi-Frame Start
MI	Management Information
MO	Managed Object
MON	MONitored
MP	Management Point
MS	Multiplex Section
MS1	STM-1 Multiplex Section
MS16	STM-16 Multiplex Section
MS4	STM-4 Multiplex Section
MSB	Most Significant Bit
MSOH	Multiplex Section OverHead
MSP	Multiplex Section Protection
MSPG	Multiplex Section Protection Group
MSw	Manual Switch
MTIE	Mean Time Interval Error
N.C.	Not Connected
N_B	Near-end Block
N1[x][y]	bit x (x=7,8) of byte N1 in frame y (y=1..76)
N2[x][y]	bit x (x=7,8) of byte N2 in frame y (y=1..76)
NC	Network Connection
NCI	No CRC-4 multiframe Indication
NDF	New Data Flag
NE	Network Element
NMON	Not MONitored
NNI	Network Node Interface
NU	National Use (bits, bytes)

NUx	National Use, bit rate order x
OAM	Operation, Administration and Management
ODI	Outgoing Defect Indication
OEI	Outgoing Error Indication
OF	Outgoing Far-end
OF_B	Outgoing Far-end VC Block
OFS	Out of Frame Second
OH	OverHead
ON	Outgoing Near-end
OOF	Out Of Frame state
OOM	Out Of Multiframe state
OPER	OPERation
OS	Optical Section
OSF	Outgoing Signal Fail
OSI(x)	Open Systems Interconnection, layer x
OW	Order Wire
P	Protection
P_A	Protection Adaptation
P_C	Protection Connection
P_TT	Protection Trail Termination
P0_31c	1 984 kbit/s layer
P0s	synchronous 64 kbit/s layer
P11x	1 544 kbit/s layer (transparent)
P12s	2 048 kbit/s PDH path layer with synchronous 125 μ s frame structure according to ETS 300 167 [12]
P12x	2 048 kbit/s layer (transparent)
P22e	8 448 kbit/s PDH path layer with 4 plesiochronous 2 048 kbit/s
P22x	8 448 kbit/s layer (transparent)
P31e	34 368 kbit/s PDH path layer with 4 plesiochronous 8 448 kbit/s
P31s	34 368 kbit/s PDH path layer with synchronous 125 μ s frame structure according to ETS 300 337 [13]
P31x	34 368 kbit/s layer (transparent)
P32x	44 736 kbit/s layer (transparent)
P4e	139 264 kbit/s PDH path layer with 4 plesiochronous 34 368 kbit/s
P4s	139 264 kbit/s PDH path layer with synchronous 125 μ s frame structure according to ETS 300 337 [13]
P4x	139 264 kbit/s layer (transparent)
PDH	Plesiochronous Digital Hierarchy
PJE	Pointer Justification Event
PLM	PayLoad Mismatch
PM	Performance Monitoring
Pn	Plesiochronous signal, level n
POH	Path OverHead
ppm	part per million
PRBS	Pseudo Random Binary Sequence
PRC	Primary Reference Clock
PROT	PROTection
PS	Protection Switching
PSC	Protection Switch Count
PTR	PoinTeR
QOS	Quality Of Service
RD	ReaD
RDI	Remote Defect Indicator
REI	Remote Error Indicator
RFI	Remote Failure Indicator
RI	Remote Information
RP	Remote Point
RS	Regenerator Section
RS1	STM-1 Regenerator Section
RS16	STM-16 Regenerator Section