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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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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, sub-part 1 of a multi-part deliverable 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: "Equipment management and auxiliary layer functions";
- Part 9-1: "Synchronous Digital Hierarchy (SDH) concatenated path layer functions; Requirements".

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

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

- Parts 2-1 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, 8-2 and 8-3 have been stopped.

National transposition dates	
Date of adoption of this EN:	12 October 2001
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[SIST EN 300 417-4-1 V1.2.1:2003](https://standards.iteh.ai/catalog/standards/sist/5107108f-f8f0-41e2-ad66-c21afa68b315/sist-en-300-417-4-1-v1-2-1-2003)

<https://standards.iteh.ai/catalog/standards/sist/5107108f-f8f0-41e2-ad66-c21afa68b315/sist-en-300-417-4-1-v1-2-1-2003>

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.

- [1] ETSI EN 300 147: "Transmission and Multiplexing (TM); Synchronous Digital Hierarchy (SDH); Multiplexing structure".
- [2] ETSI EN 300 166: "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] ETSI EN 300 167: "Transmission and Multiplexing (TM); Functional characteristics of 2 048 kbit/s interfaces".
- [4] ETSI ETS 300 216 (1992): "Network Aspects (NA); Metropolitan Area Network (MAN); Physical layer convergence procedure for 155,520 Mbit/s".
- [5] ETSI 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] ETSI EN 300 417-1-1: "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 1-1: Generic processes and performance".
- [7] ETSI EN 300 417-6-1: "Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 6-1: Synchronization layer functions".
- [8] ITU-T Recommendation G.823: "The control of jitter and wander within digital networks which are based on the 2 048 kbit/s hierarchy".
- [9] IEEE Standard 802.6: "IEEE Standard for 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".
- [10] ITU-T Recommendation O.151 (10/92): "Error performance measuring equipment operating at the primary rate and above".
- [11] ITU-T Recommendation O.181: "Equipment to assess error performance on STM-N interfaces".
- [12] ITU-T Recommendation G.706: "Frame alignment and cyclic redundancy check (CRC) procedures relating to basic frame structures defined in Recommendation G.704".

- [13] ETSI EN 301 163-2-1: "Transmission and Multiplexing (TM); Generic requirements of Asynchronous Transfer Mode (ATM) transport functionality within equipment; Part 2-1: Functional model for the transfer and layer management plane".

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
AI	Adapted Information
AIS	Alarm Indication Signal
AP	Access Point
APS	Automatic Protection Switch
ARCH	ARCHitecture
ATM	Asynchronous Transfer Mode
AU	Administrative Unit
Avp	ATM virtual path
BIP	Bit Interleaved Parity
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
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
EDC	Error Detection Code
EDCV	Error Detection Code Violation
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
FS	Frame Start signal
FSw	Forced Switch
HEC	Header Error Control
HO	Hold Off (used in HOTime)

HOB	Head Of Bus
ID	IDentifier
IM	In Multiframe state
INC	INCrement
LC	Link Connection
LO	Lockout Of protection
LOF	Loss Of Frame
LOM	Loss Of Multiframe
LOP	Loss Of Pointer
LOS	Loss Of Signal
LSS	Loss of Sequence Structure
LSTATUS	Link STATUS
LTC	Loss of Tandem Connection
MC	Matrix Connection
MFP	MultiFrame Present
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
MSP	Multiplex Section Protection
MSw	Manual Switch
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
NU	National Use (bits, bytes)
ODI	Outgoing Defect Indication
OEI	Outgoing Error Indication
OF	Outgoing Far-end
OF_B	Outgoing Far-end VC Block
OH	OverHead
ON	Outgoing Near-end
OOM	Out Of Multiframe state
OPER	OPERation
OS	Optical Section
OSF	Outgoing Signal Fail
OW	Order Wire
P	Protection
P_A	Protection Adaptation
P_C	Protection Connection
P_TT	Protection Trail Termination
P0s	synchronous 64 kbit/s layer
P11x	1 544 kbit/s layer (transparent)
P12s	2 048 kbit/s PDH path layer with synchronous 125 µs frame structure according to EN 300 167 [3]
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 µs frame structure according to ETS 300 337 [5]
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 µs frame structure according to ETS 300 337 [5]
P4x	139 264 kbit/s layer (transparent)
PDH	Plesiochronous Digital Hierarchy
PDL	Path Data Link
PJE	Pointer Justification Event
PLM	PayLoad Mismatch
POH	Path OverHead
ppm	part per million
PRBS	Pseudo Random Binary Sequence
PRC	Primary Reference Clock
PROT	PROTection
PS	Protection Switching
RD	ReaD
RDI	Remote Defect Indicator
REI	Remote Error Indicator
RFI	Remote Failure Indicator
RI	Remote Information
RS	Regenerator Section
RS1	STM-1 Regenerator Section
RxSL	Received Signal Label
RxTI	Received Trace identifier
S11	VC-11 path layer
S11D	VC-11 tandem connection sublayer
S11P	VC-11 protection sublayer
S12	VC-12 path layer
S12D	VC-12 tandem connection sublayer
S12P	VC-12 protection sublayer
S2	VC-2 path layer
S2D	VC-2 tandem connection sublayer
S2P	VC-2 protection sublayer
S3	VC-3 path layer
S3D	VC-3 tandem connection sublayer
S3P	VC-3 protection sublayer
S4	VC-4 path layer
S4D	VC-4 tandem connection sublayer
S4P	VC-4 protection sublayer
SD	synchronization distribution layer, Signal Degrade
SDH	Synchronous Digital Hierarchy
SF	Signal Fail
Sk	Sink
SNC	Sub-Network Connection
SNC/I	Inherently monitored Sub-Network Connection protection
SNC/N	Non-intrusively monitored Sub-Network Connection protection
SNC/S	Sublayer monitored Sub-Network Connection protection
So	Source
SOH	Section OverHead
SR	Selected Reference
SSD	Server Signal Degrade
SSF	Server Signal Fail
STM	Synchronous Transport Module
STM-N	Synchronous Transport Module, level N
SW	SWitching
TC	Tandem Connection
TI	Timing Information
TI	Trace Identifier
TIM	Trace Identifier Mismatch
TIMdis	Trace Identifier Mismatch disable
TM	Transmission_Medium, Transmission & Multiplexing
TMN	Telecommunications Management Network
TP	Timing Point
TPmode	Termination Point mode