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Prenos in multipleksiranje (TM) – Sinhrona digitalna hierarhija (SDH) –Struktura multipleksiranja

Transmission and Multiplexing (TM); Synchronous Digital Hierarchy (SDH); Multiplexing structure

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Foreword

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

The present document specifies the physical and electrical characteristics of hierarchical interfaces based on IUT-T Recommendation G.707 [1] but it does not intend to preclude the use of interfaces covered in other standards.

The aim of the present document is to provide inter-vendor and inter-operator compatibility.

The conformance testing requirements corresponding to the specifications contained in the present document are to be specified in a different EN.

Physical parameters for optical interfaces for the Synchronous Digital Hierarchy (SDH) are to be specified in a different standard which is under development.

National transposition dates	
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Introduction

The present document is a delta document based on ITU Recommendation G.707 [1].

1 Scope

The present document specifies the hierarchical bit rates, the multiplexing structure and the mapping schemes to be used in the transmission networks based on the Synchronous Digital Hierarchy (SDH).

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 and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-speci²fic reference, the latest version applies.

[1] ITU-T Recommendation G.707 (2000): "Network node interface for the synchronous digital hierarchy (SDH)".

NOTE: ITU-T Recommendation G.707 (2000) [1] contains some errors which were identified in the ITU. A corrigendum to the Recommendation [G.707 Corr.1p] [2] has been published by the ITU. Refer to annex A.

[2] ITU-T Recommendation G.707 Corrigendum 1 (2001).

[3] ITU-T Recommendation G.702: "Digital hierarchy bit rates".

3 Definitions, abbreviations and conventions

3.1 Definitions

For the purposes of the present document, the definitions given in clause 3 of ITU-T Recommendation G.707 [1] apply.

NOTE: In ITU-T Recommendation G.707 [1], clause 3.15, the number of the information bits k is wrongly defined. Refer to annex A.

3.2 Abbreviations

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

AIS	Alarm Indication Signal
APS	Automatic Protection Switching
ATM	Asynchronous Transfer Mode
AU-n	Administrative Unit-n
AUG	Administrative Unit Group
BIP-X	Bit Interleaved Parity-X
CRC-N	Cyclic Redundancy Check-N
DCC	Data Communication Channel
DQDB	Distributed Queue Dual Bus
FDDI	Fibre Distributed Data Interface
FEC	Forward Error Correction
HDLC	High-level Data Link Control
MS-RDI	Multiplex Section Remote Defect Indication
MS-REI	Multiplex Section Remote Error Indication
MSF-AIS	Multiplex Section FEC Alarm Indication Signal

NDF	New Data Flag
NNI	Network Node Interface
POH	Path OverHead
RDI	Remote Defect Indication
SDH	Synchronous Digital Hierarchy
SOH	Section OverHead
STM(-N)	Synchronous Transport Module (-N)
TU-n	Tributary Unit-n
TUG(-n)	Tributary Unit Group (-n)
VC-n	Virtual Container-n

3.3 Conventions

The order of transmission of information in all diagrams in ITU-T Recommendation G.707 [1] is first from left to right and then from top to bottom. Within each byte, the most significant bit is transmitted first. The most significant bit (bit 1) is illustrated at the left in all diagrams.

In clauses 4 to 10, the status of each requirement is given with reference to ITU-T Recommendation G.707 [1] with the following conventions:

Normative (N): Requirements with which it is necessary to comply in order to be able to claim compliance with the present document.

Not Relevant (N/R): Clause (of ITU-T Recommendation G.707 [1]) is not relevant to the present document.

The present document is not an equipment specification. The fact that a requirement is defined as normative does not imply that the associated function has to be implemented but means that, if implemented, the function shall be implemented in accordance with this requirement.

4 Basic multiplexing principles

The basic multiplexing principles are as given in clause 6 of ITU-T Recommendation G.707 [1] together with the following statements and modifications.

Table 1: Modifications and statements to clause 6 of ITU-T Recommendation G.707 [1]

Clause	Title	Statement
6	Basic Multiplexing principles	N/R
6.1	Multiplexing structure The basic SDH multiplexing structure shall be as described in figure 1. This SDH multiplexing structure is a subset of the SDH multiplexing structure defined in the clause 6.1 of ITU-T Recommendation G.707 [1]	
6.2	Basic frame structure	
6.2.1	Section overhead	N
6.2.2	Administrative Unit pointers	N
6.2.3	Administrative Units in the STM-N In this clause, reference to AU-3 is N/R	N
6.2.4	Maintenance signals	N
6.2.4.1	Alarm Indication Signals	
6.2.4.1.1	MS-AIS	N
6.2.4.1.2	MSF-AIS	
6.2.4.1.3	AU/TU-AIS	N
6.2.4.1.4	VC-AIS	N
6.2.4.2	Unequipped VC-n signal	
6.2.4.2.1	Case of network supporting the transport of Tandem Connection signals	N
6.2.4.2.2	Case of network not supporting the transport of Tandem Connection signals	N/R
6.2.4.3	Supervisory-unequipped VC-n signal	
6.2.4.3.1	Case of network supporting the transport of Tandem Connection signals	N
6.2.4.3.2	Case of network not supporting the transport of Tandem Connection signals	N/R
6.3	Hierarchical bit rates	N
6.4	Interconnection of STM-Ns	N
6.5	Scrambling (see note)	N
6.6	Physical specification of the NNI	N
NOTE: Figures 9-2 to 9-7 of ITU-T Recommendation G.707 [1] could lead to misinterpretation of the unscrambled bytes. Refer to annex A.		

5 Multiplexing method

The multiplexing method is as given in clause 7 of ITU-T Recommendation G.707 [1] together with the following statements and modifications.

Table 2: Modifications and statements to clause 7 of ITU-T Recommendation G.707 [1]

Clause	Title	Statement
7	Multiplexing method	
7.1	Multiplexing of Administrative Units into STM-N	
7.1.1	Multiplexing of Administrative Unit Groups (AUGs) into STM-N	N
7.1.1.1	Multiplexing of AUG-N into STM-N, N=(1, 4, 16, 64, 256)	N
7.1.1.2	Multiplexing of AUG-Ns into AUG-4xN	N
7.1.2	Multiplexing of an AU-4 via AUG-1	N
7.1.3	Multiplexing of AU-3s via AUG-1	N/R
7.1.4	Multiplexing of AU-3 into STM-0	N
7.2	Multiplexing of Tributary Units into VC-4 and VC-3	
7.2.1	Multiplexing of Tributary Unit Group-3s (TUG-3s) into a VC-4	N
7.2.2	Multiplexing of a TU-3 via TUG-3	N
7.2.3	Multiplexing of TUG-2s via a TUG-3	N
7.2.4	Multiplexing of TUG-2s into a VC-3	N/R
7.2.5	Multiplexing of a TU-2 via TUG-2s	N
7.2.6	Multiplexing of TU-1s via TUG-2s	N
7.3	AU-n/TU-n numbering scheme	N
7.3.1	Numbering of AU-ns (VC-ns) in a STM-256 In this clause, reference to AU-3 is N/R	N
7.3.1.1	Numbering of AU-4s (VC-4s) in a STM-256	N
7.3.1.2	Numbering of AU-3s (VC-3s) in a STM-256	N/R
7.3.1.3	Numbering of AU-4-4cs (VC-4-4cs) in a STM-256	N
7.3.1.4	Numbering of AU-4-16cs (VC-4-16cs) in a STM-256	N
7.3.1.5	Numbering of AU-4-64cs (VC-4-64cs) in a STM-256	N
7.3.1.6	Numbering of an AU-4-256c in an STM-256	N
7.3.2	Numbering of AU-ns (VC-ns) in a STM-64 In this clause, reference to AU-3 is N/R	N
7.3.2.1	Numbering of AU-4s (VC-4s) in a STM-64	N
7.3.2.2	Numbering of AU-3s (VC-3s) in a STM-64	N/R
7.3.2.3	Numbering of AU-4-4cs (VC-4-4cs) in a STM-64	N
7.3.2.4	Numbering of AU-4-16cs (VC-4-16cs) in a STM-64	N
7.3.2.5	Numbering of an AU-4-64c in an STM-64	N
7.3.3	Numbering of AU-ns (VC-ns) in a STM-16 In this clause, reference to AU-3 is N/R	N
7.3.3.1	Numbering of AU-4s (VC-4s) in a STM-16	N
7.3.3.2	Numbering of AU-3s (VC-3s) in a STM-16	N/R
7.3.3.3	Numbering of AU-4-4cs (VC-4-4cs) in a STM-16	N
7.3.3.4	Numbering of AU-4-16c in an STM-16	N
7.3.4	Numbering of AU-ns (VC-ns) in a STM-4 In this clause, reference to AU-3 is N/R	N
7.3.4.1	Numbering of AU-4s (VC-4s) in a STM-4	N
7.3.4.2	Numbering of AU-3s (VC-3s) in a STM-4	N/R
7.3.4.3	Numbering of an AU-4-4c in an STM-4	N
7.3.5	Numbering of AU-4 (VC-4) in an STM-1 signal	N
7.3.6	Numbering of AU-3 (VC-3) in an STM-0 signal	N
7.3.7	Numbering of TU-3s in a VC-4	N
7.3.8	Numbering of TU-2s in a VC-4	N
7.3.9	Numbering of TU-12s in a VC-4	N
7.3.10	Numbering of TU-11s in a VC-4	N/R
7.3.11	Numbering of TU-2s in a VC-3	N/R
7.3.12	Numbering of TU-12s in a VC-3	N/R
7.3.13	Numbering of TU-11s in a VC-3	N/R

6 Pointers

The pointers description is as given in clause 8 of ITU-T Recommendation G.707 [1] together with the following statements and modifications.

Table 3: Modifications and statements to clause 8 of ITU-T Recommendation G.707 [1]

Clause	Title	Statement
8	Pointers	
8.1	AU-n pointer	
	In this clause, references to AU-3 pointers are not relevant	
8.1.1	AU-n pointer location	N
8.1.2	AU-n pointer value	N
8.1.3	Frequency justification	N
8.1.4	New Data Flag (NDF)	N
8.1.5	Pointer generation	N
8.1.6	Pointer interpretation	N
8.1.7	AU-4 concatenation	N
8.2	TU-3 pointer	
8.2.1	TU-3 pointer location	N
8.2.2	TU-3 pointer value	N
8.2.3	Frequency justification	N
8.2.4	New Data Flag (NDF)	N
8.2.5	Pointer generation	N
8.2.6	Pointer interpretation	N
8.3	TU-2/TU-1 pointer	
	In this clause, references to TU-11 pointer are not relevant	
8.3.1	TU-2/TU-1 pointer location	N
8.3.2	TU-2/TU-1 pointer value	N
8.3.3	TU-2/TU-1 frequency justification	N
8.3.4	New Data Flag (NDF)	N
8.3.5	TU-2/TU-1 pointer generation and interpretation	N
8.3.6	TU-2 concatenation	
8.3.7	TU-2/TU-1 sizes	N
8.3.8	TU-2/TU-1 multiframe indication byte	N
	In this clause, reference to VC-3 is not relevant	