

# TR 101 020 V1.2.1 (1997-06)

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*Technical Report*

## **Transmission and Multiplexing (TM); Synchronous Digital Hierarchy (SDH); SDH project status report for 1996**

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*European Telecommunications Standards Institute*

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## Foreword

This Technical Report (TR) has been produced by the ETSI Technical Committee Transmission and Multiplexing (TM).

Edition 1 of this document was published as ETR 307 [4]. The second edition is published as TR 101 020 V1.2.1, following the introduction by ETSI of new deliverable types and their associated numbering scheme.

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## Introduction

The 6th ordinary meeting of TC TM, when reviewing the TM Work Items, acknowledged that interesting and extensive work on the standardization of different aspects of Synchronous Digital Hierarchy (SDH) is progressing in STCs TM1, TM2, TM3 and TM4.

Considering the importance of this standardization area the meeting decided to create a project covering the activities related to SDH in TC TM. The terms of reference of the TC TM SDH project are given in annex B.

The present document up-dates the information on progress within the SDH standardization as it has been published in ETR 307 [3].

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# 1 Scope

This Technical Report (TR) provides a current overview of work recognized as already done or in progress within the ETSI Technical Committee Transmission and Multiplexing (TC TM) on issues covering the Synchronous Digital Hierarchy (SDH) and also it searches for compatibility with other future, current and past technologies and hierarchies. The present document will in future be modified to describe all SDH aspects to be standardized and their relationship to appropriate Work Items (WIs), and already published ETSI documents.

Also, work done in other Technical Bodies with aspects of SDH or impact on SDH will be considered and harmonized. The TBs recognized to be standardizing architecture, protocols, and interfaces being on the boundary with SDH or using SDH networks are: TC NA and parts of the former TCs BTC and TE.

NOTE: The TC list is exhaustive and will be updated with any new TC recognized.

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# 2 References

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

- [1] ETSI TC TM: "Terms of Reference for the SDH Project in TM", May 1994 - approved by the SDH Project Management Team on February 24, 1995 (reproduced in annex B).
- [2] ETR 239 (1996): "Transmission and Multiplexing (TM); List of documents relevant to SDH Transmission Equipment".
- [3] ETR 307 (1996): "Transmission and Multiplexing (TM); Synchronous Digital Hierarchy (SDH); SDH project status report for 1995".
- [4] ETS 300 417-1-1 (1996): "Transmission and Multiplexing (TM); Generic functional requirements for SDH equipment, Part 1-1: Generic processes and performance".

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# 3 Definitions and abbreviations

## 3.1 Definitions

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

**standardization aspects:** This subclause provides basic information on structuring of SDH aspects and issues to be standardized, reported or considered:

**basic and overview standards and reports:**

- SDH multiplexing structure and hierarchy;
- performance management;
- (Standardization) methods and modelling techniques.

**SDH transport network:**

- architecture:
  - structure;
  - protection;
  - tandem connection;

- interfaces:
  - network/Network Node Interface (NNI);
  - users/services/User Network Interface (UNI);
  - access networks;
  - leased lines;
- network management:
  - resources;
  - configuration;
  - alarms;
  - security;
  - accounting;
  - interfaces to other operating systems (network management);
  - performance (Quality of Service);
  - testing;

**SDH equipment:**

- Transmission media dependent interfaces and functions:
  - optical;
  - electrical;
  - radio links;
- associated equipment standards:
  - characteristics and processing of digital signals;
  - operating environment;
  - equipment practices;
  - safety;
  - testing;
- SDH equipment management:
  - information model;
  - functions, commissioning, maintenance, performance monitoring;
  - interface to Telecommunications Management Network (TMN);
  - reliability and availability;

**synchronization network:**

- transport of synchronization signals;
- synchronization of, and for, SDH network(s);
- performance of synchronization network(s);
- synchronization network management.

## 3.2 Abbreviations

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

ATM	Asynchronous Transfer Mode
ATS	Abstract Test Suite
CP	Customer Premises
DTR	Draft Technical Report
ETR	ETSI Technical Report
ETS	European Telecommunications Standard
ETSI	European Telecommunications Standards Institute
ICS	Implementation Conformance Statement
MI	Miscellaneous Item
MT	Management Team
NE	Network Element
NM	Network Management
NNI	Network Node Interface
OAM	Operations And Maintenance
ODP	Open Distributed Processing
PAC	Programme Advisory Committee
PE	Public Enquiry
PDH	Plesiochronous Digital Hierarchy
QoS	Quality of Service
SDH	Synchronous Digital Hierarchy
STC	Sub-Technical Committee
TA	Technical Assembly
TC	Technical Committee
TM	Transmission and Multiplexing
TMN	Telecommunications Management Network
UNI	User Network Interface
UAP	Unified Approval Procedure
WI	Work Item
WP	Work Programme

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## 4 Assigned Work Items (WIs)

The WIs assigned to the TC TM SDH Project can be categorized in a matrix as depicted in table 1, displaying also a number of WIs assigned to each standardization area and aspect. This allows more detailed structuring of the standardization issues than when using only the PAC (Programme Advisory Committee) keywords. Annex A contains the detailed information on the assigned WIs, structured according to the standardization areas and aspects, table 1 shows the number of associated WIs.



Table 1: Work Item (WI) matrix

Standardization areas:		A.1 General and basic issues	A.2 Network elements	A.3 Synchroni- zation networks	A.4 Access networks	A.5 Transport networks	A.6 Leased lines
<b>Standardization aspects:</b>							
<b>1</b>	<b>Architecture:</b>						
1.1	Structure (non-radio)	4	15/14	5	2	6	2
1.2	Structure (radio systems)	3	20/2		1		
1.3	Protection		(4)			6	
1.4	Tandem connection		(1)			(1)	
<b>2</b>	<b>Interfaces/Protocols:</b>						
2.1	Network Node Interface (NNI)		2/1			3	1
2.2	User Network Interface (UNI)					4	(1)
2.3	Management network interface		1				
<b>3</b>	<b>Management:</b>						
3.1	Information model		13		4	3	
3.2	OAM/fault management		2(1)		3(4)/1	2	
3.4	Resources		(1)			1	
3.5	Configuration		(2)			1	
3.6	Security		(1)				
3.7	Accounting		(1)				
<b>4</b>	<b>Performance:</b>						
4.1	Information model		1				
4.2	Quality of Service (QoS)	1	3	4		5	
4.3	Availability	1	(1)			1/1	
<b>5</b>	<b>Miscellaneous:</b>						
5.1	Equipment practice		3(6)				
5.2	Environmental engineering	1	(4)				
Legend: /Nr. - Number of WIs on testing (Nr.) - Issue covered in a common WI							
NOTE 1: The area of management network(s) is intentionally not included as it has been recognized not to be a part of SDH standardization. However, interfaces to the management and protocols to be applied are mentioned.							
NOTE 2: Some of the WIs do not handle SDH but they are related to the SDH project in terms of using the same description methodology used in TC TM and also to ensure proper interworking between different types of networks (i.e. Plesiochronous Digital Hierarchy (PDH), Asynchronous Transfer Mode (ATM), ...).							

**TM Work Items**

DTR/TM-00001, DTR/TM-00003.

**TM1 Work Items**

DE/TM-01009, DE/TM-01011, DE/TM-01015-x-y, DE/TM-01016-1, DE/TM-01016-2, DTR/TM-01018, RE/TM-01025, DTR/TM-01026, DE/TM-01033, MI/TM-01038, MI/TM-01039, DE/TM-01040, RE/TM-01042, MI/TM-01044, DE/TM-01046-2, DE/TM-01046-2, DE/TM-01046-3, DE/TM-01046-4.

**TM2 Work Items**

DE/TM-02001, MI/TM-02102, MI/TM-02103, DI/TM-02105, DI/TM-02105-1, DE/TM-02109, DE/TM-02201, DE/TM-02207, DE/TM-02208, DE/TM-02209-1, DI/TM-02209-2, DE/TM-02209-3, DI/TM-02209-4, DI/TM-02209-5, DE/TM-02209-6, DE/TM-02210-1, DE/TM-02210-2, DE/TM-02210-3, DTR/TM-02212, RE/TM-02213, RE/TM-02213-1, DE/TM-02215, DE/TM-02216, DE/TM-02217, DE/TM-02218, DE/TM-02219, DE/TM-02220, DTR/TM-02221, RE/TM-02223, DE/TM-02229, DE/TM-02230, DE/TM-02231, DE/TM-02232, DE/TM-02233, DE/TM-02234, DI/TM-02235, RE/TM-02236, DE/TM-02237, DTR/TM-02238, DTR/TM-02239.

**TM3 Work Items**

DE/TM-03001, DE/TM-03002, DTR/TM-03006, DE/TM-03007, RE/TM-03013, DTR/TM-03016, DE/TM-03017-x, DTR/TM-03024, DTR/TM-03025, RE/TM-03029, RE/TM-03030, DTR/TM-03031, DTR/TM-03041, DE/TM-03042, RE/TM-03045, RE/TM-03056, MI/TM-03058, MI/TM-03059, MI/TM-03060, DTR/TM-03062, DE/TM-03064, RTR/TM-03066, DE/TM-03067, RTR/TM-03070, RE/TM-03071, DE/TM-03072, DE/TM-03073, DE/TM-03074, RTR/TM-03075, DTR/TM-03076, DE/TM-03077, DE/TM-03078, DE/TM-03079, DTR/TM-03080.

**TM4 Work Items**

DE/TM-04001, DE/TM-04003, DE/TM-04005, MI/TM-04008, MI/TM-04009, DTR/TM-04010, DE/TM-04011, DE/TM-04013, DE/TM-04016, DTR/TM-04017, DTR/TM-04021, DE/TM-04022, DE/TM-04026-1, DE/TM-04026-2, DE/TM-04026-3, DE/TM-04027, DE/TM-04028, DE/TM-04029, RTR/TM-04030, DTR/TM-04032-1, DTR/TM-04032-2, DE/TM-04033, DE/TM-04037, DE/TM-04041, DE/TM-04043, MI/TM-04048, DE/TM-04051, DE/TM-04052, DE/TM-04053, DE/TM-04054.

NOTE: Where suffixes such as "-x" or "-x-y" are shown, this indicates all parts or sub-parts are relevant.

Work Item progress during 1996						
Published	New Wis	Stopped	On PE	PE resolved	On UAP	On Vote
20	27	4	3	15	2	2

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## 5 SDH project coordination issues and activities

There have been three major issues for co-ordination during the activity in 1996 continuing from 1995:

- joint work on methodology of functional modelling in STC TM4 with methodology used in STC TM1;
- alignment of methodology of description of Implementation Conformance Statement (ICS) proforma specifications used in STC TM1 with new guidelines developed within the TC MTS causing slip in delivery time of some WIs within STC TM1 (ETS 300 417-x-2, where x = 1 to 8);
- alignment of methodology of management issues used within TM1 and TM2 and the coordination of work on management issues: TM2 will define a top level processing for fault, performance monitoring and configuration while TM1 will define the low level processing associated with the atomic functions. A continuing joint TM1/TM2 work is planned to begin in January 1997.

Alignment of methodology of functional modelling for ATM equipment with methodology used in ETS 300 417-1-1 [4] within TM1 is an additional related issue with respect that one of the transport server layers for ATM might be a one of the optical or electrical SDH layers.

Details on activities and co-ordination issues within the SDH Project are available from the ETSI Secretariat.

## Annex A:

### Work items considered within the ETSI TC TM SDH project

The following work items ETR 239 [2] and ETR 307 [3] are actually informative documents and therefore not considered to be a part of any of the indicated standardization areas.

Work Item Doc number Status	Title	Scope
DTR/TM-01018 <b>ETR 239</b> Published 1996	<b>List of documents relevant to SDH transmission equipment</b>	This ETR contains lists of references of SDH related documents from ETSI, ITU and other standardization bodies.
DTR/TM-00001 <b>ETR 307</b>  Published 08/96	<b>Synchronous Digital Hierarchy (SDH); SDH status report for 1995</b>	This ETR provides a current overview of work recognized as already done or in progress within the ETSI TC TM on issues covering the Synchronous Digital Hierarchy (SDH) and also it searches for compatibility with other future, current and past technologies and hierarchies. The ETR shall in future describe all SDH aspects to be standardized and their relationship to appropriate (WIs), and already published standards (ETs) and reports (ETRs).

**Status:**

Indicates the current status within the approval process (or publication date) or the planned STC approval date.

**Scope:**

The scope texts of the assigned WIs in tables below are taken (if available) from the original documents or from the WI sheets. In some case not full text is displayed to show only the quintessence of the work considered within the document. It has been recognized that this presentation will help to better recognize the gaps and overlaps within the standardization work.

When the scope text is missing, the relevant text is not written yet or it has been created within another TC or the scope is self explaining from the title (in the case of testing).

The WIs covering testing issues (ICS, ATS) are not presented as a special standardization aspect but are supposed to be a part of the associated function.

## A.1 Generic and basic issues

### A.1.1 Architecture

#### A.1.1.1 Structure and functions

Work Item Doc number Status	Title	Scope
DE/TM-03001, RE/TM-03013  <b>ETS 300 147,</b> <b>ETS 300 147</b> <b>Edition 2</b>  Published 03/92, Published 01/95	<b>Synchronous Digital Hierarchy (SDH) Multiplexing structure</b>	This ETS specifies the hierarchical bit rates, the multiplexing structure and the mapping schemes to be used in the transmission networks based on Synchronous Digital Hierarchy (SDH).
RE/TM-03045  <b>ETS 300 147</b> <b>Edition 3</b>  Published 04/97	<b>SDH multiplexing structure</b>	This amendment to ETS 300 147 will take account if changes in the ITU as a result of the publication of ITU-T Recommendation G.707 (3/96) "Network node interface for the synchronous digital hierarchy" which replaces former ITU-T Recommendations G.707, G.708 and G.709.
DE/TM-03007  <b>ETS 300 337</b>   Published 02/95	<b>Generic frame structures for the transport of various signals (including ATM cells and 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</b>	This ETS specifies generic frame structures for the transport of various signals at the ITU-T Recommendation G.702 hierarchical rates of 2 048 kbit/s, 34 368 kbit/s and 139 264 kbit/s. The support of Asynchronous Transfer Mode (ATM) cells and Synchronous Digital Hierarchy (SDH) Tributary Units (TUs) in the Plesiochronous Digital Hierarchy (PDH) bit rates is covered in this ETS. Functions specific to the support of ATM cells performed in the transmitter and receiver are not part of this interface standard but are given for information in annex A.
RE/TM-03056  <b>ETS 300 337</b> <b>Edition 2</b>  Published 06/97	<b>Maintenance of ETS 300 337 (DE/TM-03007)</b>	id.

### A.1.1.2 Structure functions of radio systems

Work Item Doc number Status	Title	Scope
DTR/TM-04021 <b>TM-TR 004</b>  Published 07/95	<b>Synchronous Digital Hierarchy (SDH) aspects regarding Digital Radio-relay Systems</b>	Future digital radio-relay systems (DRRS) have to support the SDH defined by the ITU-T. Study Group 9 of the ITU-R in its Final Meeting in Sept. 89 has approved a New Report (1190) dealing with general aspects of DRRS in an SDH Network and containing a list of items which need further study.
NOTE 1: To be re-published in 1997, without any technical changes (to allow referencing), as TR 101 035 V1.1.2 (RTR/TM-04021a).		
DTR/TM-04032-1  <b>TM TR 006-01</b>  Published 08/96	<b>Specification of digital radio-relay systems characteristics - generic standard Part 1: General aspects and Point-to-Point equipment parameters</b>	This TC-TR defines the major standardizable issues for DRRS in order to maintain a generic format for the editorial and technical contents. It is also essential to maintain a common understanding of the reasons behind the way certain parameters are defined among the various DRRS standards, which deal with the same general topics and may differ from each other merely from the point of view of numerical requirements. This TC-TR therefore also explains the reasoning behind why the parameters in DRRS standards are defined in the way they are. This TC-TR aims to cover every issue that may be required.
NOTE 2: To be re-published in 1997, without any technical changes (to allow referencing), as TR 101 036-01 V1.1.2 (RTR/TM-04032-01a).		
DTR/TM-04032-2 <b>TR 101 036-02</b>  05/97	<b>Specification of digital radio-relay systems characteristics - generic standard. Part 2: Additional parameters for Point-to-Multipoint equipment</b>	id.

## A.1.2 Interfaces/protocols

For further study.

## A.1.3 Management

For further study.

## A.1.4 Performance

### A.1.4.1 Information model

For further study.

### A.1.4.2 Quality of Service (QoS)

Work Item Doc number Status	Title	Scope
MI/TM-04008  continuous	<b>Activity on error performance and availability</b>	To express TM4 considerations on performance and availability standards to TM2 and ITU-R Study Groups (continuous activities).

## A.1.5 Miscellaneous

### A.1.5.1 Equipment practice

For further study.

### A.1.5.2 Environmental engineering

Work Item Doc number Status	Title	Scope
T/TR 02-12(A)RV <b>ETR 035</b> Published 07/92	<b>Environmental engineering - Guidance and terminology</b>	

---

## A.2 Network element areas

### A.2.1 Architecture

#### A.2.1.1 Structure and functions

Work Item Doc number Status	Title	Scope
DTR/TM-01026 <b>ETR 268</b> Published 04/96	<b>Physical aspects of SDH long-haul systems for 10 Gbit/s capacity</b>	The technical possibilities of 10 Gbit/s long-haul systems at 1 310 nm and 1 550 nm shall be investigated, taking into account: methods for overcoming fibre dispersion limitations; TDM and TDM & WDM procedures and application of Optical Fibre Amplifiers (OFA). Impact on existing or new standards shall be pointed out.
DE/TM-01015-1-1 <b>ETS 300 417-1-1</b> Published 01/96	<b>Transmission and Multiplexing (TM); Generic functional requirements for SDH equipment, Part 1-1: Generic processes and performance</b>	This ETS specifies a library of basic building blocks and a set of rules by which they may be combined in order to describe a digital transmission equipment. The library comprises the functional building blocks needed to specify completely the generic functional structure of the European digital transmission hierarchy. In order to be compliant with this ETS, equipment needs to be describable as an interconnection of a subset of these functional blocks contained within this ETS. The interconnections of these blocks shall obey the combination rules given. This ETS specifies both the components and the methodology that should be used in order to specify SDH equipment; it does not specify an individual SDH equipment as such.
RE/TM-01042 <b>ETS 300 417-1-1 Edition 2</b> 06/99	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 1-1: Generic processes and performance, Amendment to ETS 300 417-1-1</b>	Generic functional requirements for all types of SDH equipment based on a functional decomposition approach with rules for combining functions to form equipment. Specific layers are described in parts 2 to 8, Amendment 1.
		(continued)

## Structure and functions (continued)

Work Item Doc number Status	Title	Scope
DE/TM-01015-2-1 <b>ETS 300 417-2-1</b>  Published 04/97.	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 2-1: Physical section layer functions</b>	This ETS specifies a library of basic building blocks and a set of rules by which they are combined in order to describe a digital transmission equipment. The library of a subset of these functional blocks contained within this ETS. The interconnection of these comprises the functional building blocks needed to completely specify the generic functional structure of the European Digital Transmission Hierarchy. Equipment which is compliant with this standard must be describable as an interconnection blocks must obey the combination rules given. The generic functionality is described in the main body document ETS 300 417-1-1.
DE/TM-01015-3-1 <b>ETS 300 417-3-1</b>  Vote 9713 ended 03/97. On hold pending clarification of comments.	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 3-1: STM-N regenerator and multiplex section layer functions</b>	Same as Part 2.
DE/TM-01015-4-1 <b>ETS 300 417-4-1</b>  Vote 9713 ended 03/97. On hold pending clarification of comments.	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 4-1: SDH path layer functions</b>	Same as Part 2.
DE/TM-01015-5-1 <b>ETS 300 417-5-1</b> PE 9724 ends 06/97.	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 5-1: PDH path layer functions</b>	Same as Part 2.
DE/TM-01015-6-1 <b>ETS 300 417-6-1</b>  STC approved 01/97	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 6-1: Synchronization distribution layer functions</b>	This ETS specifies a library of basic synchronization distribution building blocks and a set of rules by which they are combined in order to describe a digital transmission equipment. The library comprises the functional building blocks needed to completely specify the generic functional structure of the European Digital Transmission Hierarchy. Equipment which is compliant with this standard must be describable as an interconnection of a subset of these functional blocks contained within this ETS. The interconnection of these blocks must obey the combination rules given. The generic functionality is described in the main body document ETS 300 417-1-1. The specification method is based on functional decomposition of the equipment into atomic, compound and major compound functions. The equipment is then described by its Equipment Functional Specification (EFS), which lists the constituent atomic and compound functions, etc.
		(continued)

## Structure and functions (continued)

Work Item Doc number Status	Title	Scope
DE/TM-01015-8-1 <b>ETS 300 417-8-1</b> 06/99	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Part 8-1: Major compound functions</b>	Same as Part 2.
DE/TM-01016-1-1 10/97	<b>Specification for ATM transmission equipment; Part 1: Functional Characteristics</b>	The definition of the functional requirements of transmission equipment providing transport and cross-connection for AM cells.
DE/TM-01016-2-1 02/98	<b>Specification for ATM transmission equipment; Part 2: Functional model for the transfer and layer management plane</b>	The definition of the functional requirements of transmission equipment providing transport and cross-connection for ATM cells. To ensure compatibility between equipment by identifying mandatory functions for interworking.  SDH PM note: The physical layer functions are covered within the ETS 300 417-2-1.
DE/TM-01046-1 12/98	<b>Generic functional requirements for optical equipment; Part 1: Generic processes and performance</b>	To give the generic functional requirements or optical equipment and provide a library of basic building blocks and a set of rules by which they are combined to describe optical transmission equipment. This Part 1 describes the generic processes and performance aspects of optical equipment.
DE/TM-01046-2 12/98	<b>Generic functional requirements for optical equipment; Part 1: Optical channel layer functions</b>	To give the generic functional requirements or optical equipment and provide a library of basic building blocks and a set of rules by which they are combined to describe optical transmission equipment. This Part 2 describes the functions associated with the optical channel layer.
DE/TM-01046-3 12/98	<b>Generic functional requirements for optical equipment; Part 3: Optical multiplex section layer functions</b>	To give the generic functional requirements or optical equipment and provide a library of basic building blocks and a set of rules by which they are combined to describe optical transmission equipment. This Part 3 describes the functions associated with the optical multiplex section layer.
DE/TM-01046-4 12/98	<b>Generic functional requirements for optical equipment; Part 4: Optical amplifier section layer functions</b>	To give the generic functional requirements or optical equipment and provide a library of basic building blocks and a set of rules by which they are combined to describe optical transmission equipment. This Part 4 describes the functions associated with the optical amplifier section layer.
DE/TM-01015-1-2 <b>ETS 300 417-1-2</b> Published 10/96	<b>Transmission and Multiplexing (TM); Generic functional requirements for Synchronous Digital Hierarchy (SDH) equipment; Part 1-2: General information about Implementation Conformance Statement (ICS) proforma</b>	As per title.
		(continued)



## Structure and functions (continued)

Work Item Doc number Status	Title	Scope
DE/TM-01015-2-2 <b>ETS 300 417-2-2</b> review of PE 112	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Physical section layer functions Implementation Conformance Statement (ICS) proforma</b>	As per title.
DE/TM-01015-3-2 <b>ETS 300 417-3-2</b> review of PE 112	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; STM-N regenerator and multiplex section layer functions Implementation Conformance Statement (ICS) proforma</b>	As per title.
DE/TM-01015-4-2 <b>ETS 300 417-4-2</b> 10/97	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; SDH path layer functions Implementation Conformance Statement (ICS) proforma</b>	As per title.
DE/TM-01015-5-2 <b>ETS 300 417-5-2</b> 01/98	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; PDH path layer functions Implementation Conformance Statement (ICS) proforma</b>	As per title.
DE/TM-01015-6-2 <b>ETS 300 417-6-2</b> 01/99	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Synchronization distribution layer functions Implementation Conformance Statement (ICS) proforma</b>	As per title.
DE/TM-01015-8-2 <b>ETS 300 417-8-2</b> 02/00	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Compound and major compound functions Implementation Conformance Statement (ICS) proforma</b>	As per title.
DE/TM-01015-1-3 <b>ETS 300 417-1-3</b> 01/99	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Generic processes and performance Abstract Test Suite (ATS)</b>	As per title.
		(continued)

## Structure and functions (concluded)

Work Item Doc number Status	Title	Scope
DE/TM-01015-2-3 <b>ETS 300 417-2-3</b> 10/98	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Physical section layer functions Abstract Test Suite (ATS)</b>	As per title.
DE/TM-01015-3-3 <b>(ETS 300 417-3-3)</b> 09/99	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; STM-N regenerator and multiplex section layer functions Abstract Test Suite (ATS)</b>	As per title.
DE/TM-01015-4-3 <b>ETS 300 417-4-3</b> 03/00	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; SDH path layer functions Abstract Test Suite (ATS)</b>	As per title.
DE/TM-01015-5-3 <b>ETS 300 417-5-3</b> 09/00	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; PDH path layer functions Abstract Test Suite (ATS)</b>	As per title.
DE/TM-01015-6-3 <b>ETS 300 417-6-3</b> 12/00	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Synchronization distribution layer functions Abstract Test Suite (ATS)</b>	As per title.
DE/TM-01015-8-3 <b>ETS 300 417-8-3</b> 06/01	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Compound and major compound functions Abstract Test Suite (ATS)</b>	As per title.

## A.2.1.2 Structure and functions of radio systems

Work Item Doc number Status	Title	Scope
RTR/TM-04030 <b>ETR 019 Edition 2</b>  Published 08/96	<b>High capacity digital radio systems carrying 2 x STM-1 SDH signals in frequency bands with 40 MHz channel spacing</b>	This ETR provides proposals for a new generation of high capacity Digital Radio-relay Systems carrying 2xSTM-1 SDH signals in frequency bands with 40 MHz channel spacing.
DE/TM-04011 <b>ETS 300 430</b>  TM4 reviewed 10/95 (PE67)	<b>High capacity digital radio-relay systems carrying 1 x Synchronous Transport Module-level 1 (1 x STM-1) signals operating in the 18 GHz frequency band with channel spacing of 55 MHz</b>	This ETS specifies parameters for digital radio-relay systems with a capacity of 1 x Synchronous Transport Module-level 1 (1 x STM-1) designed to operate in the 17,7 to 19,7 GHz band. The channel spacing between adjacent co-polar channels shall be 55 MHz. Operation in the Co-Channel Dual Polarized (CCDP) mode with orthogonal polarizations is also foreseen. Systems considered in this ETS should be able to respect ITU-R high grade performance objectives, i.e. ITU-R Recommendation 634 and 695, ITU-T Recommendation G.821 and the forthcoming performance objectives derived from ITU-T Recommendation G.826 by ITU-R Study Group 9.
DE/TM-04013 <b>ETS 300 431</b>  Published 09/96	<b>Digital fixed point-to-point radio link equipment operating in the frequency range 24,25 GHz to 29,50 GHz</b>	This ETS defines the minimum technical requirements for terrestrial digital radio-relay systems operating in the frequency range 24,25 GHz to 29,50 GHz. Digital systems covered by this ETS are intended to be used for point-to-point connections in local and regional networks at data rates between 2 Mbit/s and 155 Mbit/s. Typical applications include: a) network extensions; b) customer connections; c) inter-cellular links. For digital systems, with capacities up to 34 Mbit/s, two types of equipment are specified: Grade A equipment, intended for applications where moderate frequency congestion is envisaged; Grade B equipment, intended for applications where higher nodal capacity is required.
DE/TM-04016 <b>ETS 300 639</b>  Published 10/96	<b>Sub STM-1 digital radio-relay systems (DRRS) operating in the 13 GHz, 15 GHz and 18 GHz frequency band</b>	Standardization of sub-STM-1 digital radio-relay systems.
DE/TM-04028 <b>ETS 300 635</b>  Published 10/96	<b>SDH radio specific functional blocks for transmission of M-times STM-N</b>	This ETS defines functional blocks specific to the Digital Radio-relays Systems (DRRS) which use the Synchronous Digital Hierarchy (SDH) for transmitting M-times STM-N signal.
DE/TM-04029 <b>ETS 300 785</b> PE 111 ended 11/96	<b>SDH radio specific functional blocks for transmission of M-times Sub STM-1</b>	This ETS defines functional blocks specific to the Digital Radio-relays Systems (DRRS) which use the Synchronous Digital Hierarchy (SDH) for transmitting sub-STM-1 rate (51,84 Mbit/s) signal.
DE/TM-04005 <b>ETS 300 234</b>  Published 07/95	<b>High capacity digital radio-relay systems carrying 1 x STM-1 signal and operating in frequency bands with about 30 MHz channel spacing and alternated arrangements</b>	This ETS specifies parameters for digital radio-relay systems with a channel capacity of 1 STM-1 designed to operate in defined bands up to 15 GHz utilizing approximately 30 MHz between adjacent cross-polar channels. As regards the STM-1 signal the Section Overhead (SOH) processing is covered in a separate ETSI STC TM 4 document (a report on SDH aspects) and in ITU-R Recommendation 750.

(continued)

## Structure and functions of radio systems (continued)

Work Item Doc number Status	Title	Scope
DE/TM-04022 <b>ETS 300 638</b>  Published 11/96	<b>Fixed point-to-point radio link equipment for the transmission of digital signals and analogue video signal operating at frequency bands with 20 MHz alternate channel spacing</b>	This ETS covers the minimum performance requirements for terrestrial fixed services radio-communications equipment, as given below, in bands in the frequency ranges 10 GHz and 14 GHz using 20 MHz channel spacing. The standardization includes the following specifications: transmitter and receiver characteristics; baseband and RF interface characteristics; diversity system characteristics. As regards SDH systems, the SOH processing is covered in a separate ETSI TM4 document (Report on SDH aspects) and in ITU-R Recommendation 750.
DE/TM-04027 <b>ETS 300 432</b>  TM 4 reviewed 11/95 (PE67)	<b>High capacity digital radio-relay systems carrying 1 x STM-1 signal operating in the 18 GHz frequency band with channel spacing of 110 MHz</b>	This ETS specifies parameters for digital radio-relay systems with a capacity of 1 x STM-1 designed to operate in the 17,7 to 19,7 GHz band. The channel spacing between adjacent co-polar channels shall be 110 MHz. Operation in the Co-Channel Dual Polarized (CCDP) mode with orthogonal polarizations is also foreseen.
DE/TM-04033 <b>ETS 300 786</b> PE 112 ended 12/96	<b>Sub STM-1 digital radio-relay systems - copolar channel spacing of 14 MHz in the 13, 15 and 18 GHz band</b>	This ETS covers equipment for transmission of sub-STM-1 digital signals with a VC-3 payload capacity.
DES/TM-04010  STC approved 06/96	<b>High capacity digital radio-relay systems carrying SDH signals (1 x STM-1) in frequency band with about 30 MHz channel spacing and using co-channel (orthogonal) arrangements</b>	Extension of existing ITU-R channel arrangements to include CCDP working required.
DEN/TM-04041  05/97	<b>High capacity digital radio-relay systems 4 x STM-1 (STM-4) in a 40 MHz radio frequency channel using co-channel dual polarized operation CCDP</b>	This ETS will specify technical parameters for high capacity digital radio-relay systems operating in frequency bands with 40 MHz channel spacing e.g. 4 GHz, 5 GHz, 6 GHz and 11 GHz bands transmitting four STM-1 (STM-4) per 40 MHz RF-channel by using both polarizations in the co-channel dual polarized mode operation. The system is intended for operation on trunk routes.
DE/TM-04001, RE/TM-04024 <b>ETS 300 197, ETS 300 197 Amendment 1</b>  Published 04/94, Published 04/95	<b>Parameters for radio-relay systems for the transmission of digital signals and analogue video signals operating at 38 GHz</b>	This ETS covers the minimum performance requirements for terrestrial fixed services radiocommunications equipment, as given below, in the frequency band 37 GHz to 39,5 GHz. One of the main applications for the 38 GHz frequency bands will be for providing connection of the base stations of mobile telecommunication systems to the network. This will introduce the need for large quantities of links either for Global System for Mobile communications (GSM) or, furthermore, for Digital Communications System 1800 (DCS 1800). To fulfil this requirement, specific designs of equipment, suitable for large-scale production, will need to be produced.
RE/TM-04053 <b>ETS 300 197/prA2 Edition 1</b> Published 03/97	<b>Parameters for radio-relay systems for the transmission of digital signals and analogue video signals operating at 38 GHz</b>	This is intended to become a harmonized standard, the reference of which is intended to be published in the Official Journal of the European Communities referencing the EMC Directive. This amendment implements the changes necessary to convert ETS 300 197 into a harmonized standard.
		(continued)

## Structure and functions of radio systems (concluded)

Work Item Doc number Status	Title	Scope
REN/TM-04052 <b>EN 300 197 V1.2.1</b>  STC Approved 11/96	<b>Digital Radio Relay Systems (DRRS); DRRS parameters for the transmission of digital signals and analogue video signals operating at 38 GHz</b>	As per title.
DE/TM-04003 <b>ETS 300 198</b> Published 04/94	<b>Parameters for radio-relay systems for transmission of digital signals and analogue signals operating at 23 GHz</b>	This ETS covers the minimum performance parameters for terrestrial fixed services radio communication equipment below, in the frequency band 21,2 GHz to 23,6 GHz.
RE/TM-04054 <b>ETS 300 198/prA1 Edition 1</b>  Published 03/97	<b>Parameters for radio relay systems for the transmission of digital signals and analogue video signals operating at 23 GHz</b>	This is intended to become a harmonized standard, the reference of which is intended to be published in the Official Journal of the European Communities referencing the EMC Directive. This amendment implements the changes necessary to convert ETS 300 198 into a harmonized standard.
REN/TM-04051 <b>EN 300 198 V1.2.1</b>  STC Approved 11/96	<b>Digital Radio Relay Systems (DRRS); DRRS parameters for the transmission of digital signals and analogue video signals operating at 23 GHz</b>	As per title.
DE/TM-04026-1  05/97	<b>Conformance testing for digital radio-relay systems Part 1: P-P equipment parameters</b>	This ETS describes the parameters to be tested and appropriate test methods to ensure conformance of equipment to the relevant ETSI TM4 standards.
DE/TM-04026-2  10/97	<b>Conformance testing for digital radio-relay systems Part 2: Additional parameters for P-MP equipment</b>	This ETS describes the parameters to be tested and appropriate test methods to ensure conformance of equipment to the relevant ETSI TM4 standards.
DE/TM-4026-3  05/97	<b>Conformance testing for digital radio-relay systems Part 3: Antenna specific parameters</b>	This ETS describes the parameters to be tested and appropriate test methods to ensure conformance of equipment to the relevant ETSI TM4 standards.
DTR/TM-04017 <b>TM TR 005</b>  Published 04/96	<b>TMN aspects regarding digital radio-relay systems (DRRS)</b>	At present the scope of this report covers all radio-relay systems. It is intended that this scope will be reviewed on the basis of future contributions. WP's scope and application field text: To identify parameters and functionality relevant to TMN aspect of DRRS. SDH PM note: Waiting for electronic version.
MI/TM-04048  continuous	<b>Description of SDH radio specific functionalities using DE/TM-1015 (ETS 300 417) methodology</b>	New.

## A.2.2 Interfaces/protocols

### A.2.2.1 Network Node Interface (NNI)

Work Item Doc number Status	Title	Scope
DE/TM-01011, RE/TM-01025  <b>ETS 300 232, ETS 300 232 Amendment 1</b>  Published 06/93, Published 03/96	<b>Optical interfaces for equipment and systems relating to the Synchronous Digital Hierarchy, Amendment 1</b>	This ETS specifies the optical interfaces for equipment and systems relating to the Synchronous Digital Hierarchy (SDH).
DE/TM-01033        10/98	<b>Synchronous cross connect equipment 64, n x 64 kbit/s and 2 Mbit/s cross connect connection rate - 2 048, 8 448, 34 368, and 139 264 kbit/s PDH access ports and 155 520 kbit/s SDH access ports</b>	This ETS describes requirements of 64, n x 64 kbit/s and 2 Mbit/s cross connect equipment for use in digital leased line networks. It covers equipment having PDH access ports at 2 048, 8 448, 34 368, and 139 264 kbit/s and SDH access port at 155 520 kbit/s.
DEN/TM-01040    stopped	<b>Conformance Testing of optical interface parameter values for equipment and systems relating to the SDH</b>	As per title.

### A.2.2.2 User Network Interface (UNI)

For further study.

### A.2.2.3 Management network interfaces

Work Item Doc number Status	Title	Scope
DE/TM-02001  <b>ETS 300 150</b>      Published 12/92	<b>Protocol suites for Q interfaces for management of transmission systems</b>	This ETS defines the characteristics of protocol suites for Q interfaces for transmission systems/equipment, as defined in ITU-T Recommendation M.3010 and G.773. Protocol suites for Q interfaces for other systems/equipment are to be specified in other ETSs. The interfaces will support bidirectional data transfer for the management of telecommunications systems. This ETS defines: the layer services; the layer protocols; the application service elements and protocols; the conformance requirements to be met by an implementation of these interfaces.

## A.2.3 Management aspects

### A.2.3.1 Information model

Work Item Doc number Status	Title	Scope
DE/TM-02201 <b>ETS 300 304</b> Published 11/94	<b>Synchronous Digital Hierarchy (SDH) information model for the Network Element (NE) view</b>	This ETS defines the information model to be used at the interface between Network Elements (NEs) and management systems, for the management of SDH NEs.
RE/TM-02213 <b>ETS 300 304 Edition 2</b> Published 02/97	<b>SDH information model for the Network Element (NE) view; Maintenance and enhancement of ETS 300 304</b>	This ETS defines the information model to be used at the interface between Network Elements (NEs) and management systems, for the management of SDH NEs.
DE/TM-02213-1 <b>ETS 300 304 Edition 2 Amendment 1</b> 04/97	<b>SDH information model for the Network Element (NE) view; Maintenance and enhancement of ETS 300 304 Edition 2</b>	Provides modifications, additions and enhancements to the ETS 300 304 Edition 2.
DE/TM-02218 <b>ETS 300 645</b> Review of PE 105	<b>SDH radio-relay Network Element information model for the use on Q-interfaces</b>	This ETS defines the information model to be used at the interface between network elements and management systems, for the management of radio-relays equipment which use the SDH.
DEN/TM-02236 <b>EN 300 645 V1.2.1</b> 09/97	<b>SDH radio-relay Network Element information model for the use on Q-interfaces</b>	To revise the information model which describes in object oriented terms model for management of radio-relay network elements in order to align ETS 300 645 with ITU-T Recommendation G.774-08.
DE/TM-02208 <b>ETS 300 371</b> Published 11/94	<b>Plesiochronous Digital Hierarchy (PDH) information model for the Network Element (NE) view</b>	This ETS defines the information model to be used at the interface between NEs and management systems, for the management of equipment which use PDH including PDH interfaces of SDH network elements.
RE/TM-02223 <b>ETS 300 371 Edition 2</b> Published 10/96	<b>Plesiochronous Digital Hierarchy (PDH) information model for the Network Element (NE) view, Edition 2</b>	Provides modifications, additions and enhancements to the ETS 300 371. Each new or modified item is described in a separate section.
DE/TM-02219 <b>ETS 300 413</b>  Published 05/95	<b>Multiplex section protection information model for the Network Element (NE) view</b>	This ETS provides an information model, as related to the multiplex section protection function for the SDH as defined in ITU-T Recommendation G.707, G.708 and G.709. This ETS identifies the TMN object classes required for the management of the protection function for SDH NEs. These objects are relevant to information exchanged across standardized interfaces defined in the ITU-T Recommendation M.3010 TMN architecture. This ETS applies to SDH NEs which support the Multiplex Section Protection switching function, as defined in ITU-T Recommendation G.783. Performance monitoring requirements for multiplex section protection (for the management of SDH equipment with this capability) are provided in ITU-T Recommendation G.784, however, the information model which supports these can be found in ITU-T Recommendation G.774-01.
		(continued)

## Information model (concluded)

Work Item Doc number Status	Title	Scope
REN/TM-02229 <b>EN 300 413 V1.2.1</b> 04/97	<b>Enhancement of the ETS 300 413</b>	To maintain and enhance the information model for Management of SDH Multiplex Section Protection contained in the ETS 300 413.
DE/TM-02216 <b>ETS 300 493</b> Published 06/96	<b>Synchronous Digital Hierarchy (SDH) information model of the Sub Network Connection Protection (SNCP) for the Network Element (NE) view</b>	This ETS addresses the management of the automatic protection switching within network element at the high and low order path layers. It covers the Sub Network Connection Protection (SNCP) as described in Recommendation G.803.
DE/TM-02220 <b>ETS 300 484</b> Published 09/96	<b>Connection Supervision Function (HCS/LCS) for the Network Element view</b>	This ETS defines the information model to be used at the interface between network elements and management systems, for the management of network elements which use the connection supervision function (HCS/LCS). The HCS and LCS functional blocks (connection supervision) are specified as optional components and a standardized modelling at the Q3 interface is provided by the proposed draft ETS. The connection supervision functionality is included into subclasses of SDH connection termination points.
DE/TM-02217 <b>ETS 300 412</b> Published 05/95	<b>Payload configuration information model for the Network Element (NE) view</b>	This ETS provides an information model for the payload configuration management of SDH networks. This model describes the managed object classes and their properties for the payload configuration function as related to SDH NEs. These objects are useful to describe information exchanged across interfaces defined in ITU-T Recommendation M.3010 Telecommunications Management Network (TMN) architecture for the management of the payload configuration function.



### A.2.3.2 Operation And Maintenance (OAM)/fault management

Work Item Doc number Status	Title	Scope
DE/TM-02210  stopped	<b>Management of SDH transmission equipment</b>	The purpose of this ETS is to specify the requirements for management of SDH equipment. It is intended to be a comprehensive document summarizing ITU-T Recommendation and ETSI standards. The TMN provides management functions which cover the planning, installation, operations, administration, maintenance and provisioning of telecommunications networks and services. ITU-T Recommendation M.3010 proposes five management functional areas identified as follows: Fault management; Performance management; Configuration management; Security management; and Accounting management. According to these five types of management areas, this ETS should provide guidance and supporting information for the definition of object-oriented models within SDH equipment.
DEN/TM-02210-1  03/97	<b>Management of SDH transmission equipment; Part 1: Introduction</b>	Introduction to functional specification for all management aspects for SDH equipment and the mapping between the atomic functions and the information model.
DEN/TM-02210-2  09/97	<b>Management of SDH transmission equipment; Part 2: Functional description</b>	Production of the features and functional specification for all management aspects of SDH equipment.
DEN/TM-02210-3  04/98	<b>Management of SDH transmission equipment; Part 3: Link between atomic functions and information model</b>	Definition of the relation between the management related aspects of the transport atomic functions and the information model for the management of SDH network elements.

## A.2.4 Performance

### A.2.4.1 Information model

Work Item Doc number Status	Title	Scope
DE/TM-02215 <b>ETS 300 411</b>  Published 05/95	<b>Performance monitoring information model for the Network Element (NE) view</b>	This ETS provides an information model for the performance monitoring of SDH network. This model describes the managed object classes and their properties for the performance monitoring function, as defined in ITU-T Recommendation G.784 and as related to SDH NEs. These objects are useful to describe information exchanged across interfaces defined in ITU-T Recommendation M.3010 Telecommunications Management Network (TMN) architecture for the management of the performance monitoring function.  This ETS defines the object model based on ITU-T Recommendation Q.822 according to the requirements described in ITU-T Recommendation G.784 and M.2120. This model uses generic mechanism defined in ITU-T Recommendation Q.822.
DEN/TM-02234  04/97	<b>Synchronous Digital Hierarchy (SDH); Unidirectional performance monitoring for the network element view</b>	Definition of an information model for unidirectional performance management.
DEN/TM-02232  09/97	<b>Radio specific performance monitoring information model for SDH Radio-relay Network Element (NE)</b>	New. As per title.

### A.2.4.2 Quality of Service (QoS)

Work Item Doc number Status	Title	Scope
MI/TM-02103  12/96	<b>Contribution to the development of Recommendation M.21xx series</b>	To influence the work of SG 4/5 in the further development of Recommendation M.550. The study has two phases: 1) PDH and SDH POH used to derive ES and SES of G.821. 2) PDH and SDH POH used to derive parameters in G.826.
DEN/TM-04037  05/97	<b>System performance monitoring parameters of SDH digital radio-relay systems</b>	ETS describing the additional parameters relevant for performance monitoring of SDH DRRS and giving guidance on the generation of performance notifications.
DE/TM-03017-5 <b>ETS 300 462-5</b>  Published 09/96	<b>Timing characteristics of slave clocks suitable for operation in SDH equipment</b>	This ETS outlines requirements for timing devices used in synchronizing network equipment that operates according to the principles governed by the SDH. These requirements apply under the normal environmental conditions specified for SDH equipment. Typical SDH equipment contains a slave clock linked to a master, or a primary reference clock. In general the SDH Equipment Clock (SEC) will have multiple reference inputs. In the event that all links between the master and the slave clock fail, the equipment should be capable of maintaining operation (holdover) within prescribed performance limits.

## A.2.5 Miscellaneous

### A.2.5.1 Equipment practice

Work Item Doc number Status	Title	Scope
DE/TM-01015-7-1 <b>ETS 300 417-7-1</b> 06/98	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Generic functional requirements for SDH equipment, Part 7-1: Auxiliary layer functions</b>	No text.
DE/TM-01015-7-2 <b>ETS 300 417-7-2</b> 10/99	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Auxiliary layer functions Implementation Conformance Statement (ICS) proforma</b>	No text.
DE/TM-01015-7-3 <b>ETS 300 417-7-3</b> 03/01	<b>Transmission and Multiplexing (TM); Generic requirements of transport functionality of equipment; Auxiliary layer functions Abstract Test Suite (ATS)</b>	No text.

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## A.3 Synchronization networks area

### A.3.1 Architecture

#### A.3.1.1 Structure and functions

Work Item Doc number Status	Title	Scope
DE/TM-03017-1 <b>ETS 300 462-1</b> Published 04/97	<b>Definitions and terminology for synchronization networks</b>	This part of the ETS specifies the definitions, abbreviations, symbols and diagrammatic conventions used in the other parts of the family of ETSs.
DE/TM-03017-2 <b>ETS 300 462-2</b>  Published 09/96	<b>Synchronization network architecture</b>	This ETS specifies the architectural principles that should be applied for the design of synchronization networks that are suitable for the synchronization of SDH and PDH networks. It supports the construction of synchronization that supports both the short term stability requirements of SDH networks and the long term stability requirements of PDH networks. It applies to the design of new synchronization networks. It does not characterize existing PDH synchronization networks.

(continued)

## Structure and functions (concluded)

Work Item Doc number Status	Title	Scope
DE/TM-03077 <b>ETS 300 462-7</b> 10/98	<b>Generic requirements for synchronization networks; Conformance testing</b>	Conformance testing for ETS 300 462 parts 1 to 6.
DEN/TM-03078 10/98	<b>Asynchronous Transfer Mode (ATM); Network synchronization</b>	To define the Network synchronization requirements for Asynchronous Transfer Mode (ATM).
DTS/TM-03080 10/98	<b>Synchronization network engineering</b>	Guidelines for the practical use of the ETS 300 462 series and studies of network wide applications for SSM.

### A.3.2 Interfaces/protocols

For further study.

### A.3.3 Management

For further study.

### A.3.4 Performance

#### A.3.4.1 Information model

For further study.

#### A.3.4.2 Quality of Service (QoS)

Work Item Doc number Status	Title	Scope
DE/TM-03017-6 <b>ETS 300 462-6</b>  PE 9722 ended 05/97	<b>Timing characteristics of primary reference clocks</b>	This document outlines requirements for Primary Reference Clocks (PRC's) suitable for synchronization supply to SDH and PDH equipment. These requirements apply under the normal environmental conditions specified for digital equipment.
DE/TM-03017-4 <b>ETS 300 462-4</b>  PE 9722 ended 05/97	<b>Timing characteristics of slave clocks suitable for synchronization supply to SDH and PDH equipment</b>	This ETS outlines requirements for timing devices called Synchronization Supply Units used in synchronizing network equipment such as the SDH transport network and the PSTN network. The requirements in this ETS apply under normal environmental conditions specified for equipment.

(continued)

## Quality of Service (QoS) (concluded)

Work Item Doc number Status	Title	Scope
DE/TM-03017-3 <b>ETS 300 462-3</b>  Published 01/97	<b>Control of jitter and wander within synchronization networks</b>	This ETS outlines requirements for the control of jitter and wander within Synchronization Networks that are constructed according to the architectural principles described in ETS 300 462-2. A Synchronization Network that complies with the Network Limits for jitter and wander specified in this ETS will be suitable for the synchronization of SDH and PSTN networks. It combines the short term stability requirements of SDH network with the long term stability requirements of the PSTN. Values specified in this ETS refer to the design of new Synchronization Networks. They do not necessarily represent the performance of existing PSTN Synchronization Networks.
DEN/TM-03079  10/98	<b>Partitioning of the network jitter and wander budgets</b>	Define the available jitter and wander budgets to be allocated to different network domains.

### A.3.5 Miscellaneous

For further study.

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## A.4 Access networks area

### A.4.1 Architecture

#### A.4.1.1 Structure and functions

Work Item Doc number Status	Title	Scope
DTS/TM-03024  10/97	<b>Generic functional architecture for access networks</b>	Identify the generic architectural aspects of the access network, as defined in Annex to TM-TR 002, including the evolutionary path to B-band.
DE/TM-01009 <b>ETS 300 681</b>  Published 06/97	<b>Optical distribution network for OANs</b>	This ETS defines the Optical Distribution Network (ODN) which is that part of the Optical Access Network (OAN) between the Optical Network Unit (ONU) and the Optical Line Terminal (OLT). The ODN specified in this ETS has a passive distribution function. It shall be able to provide: Future Proof Cable Plant; Easily Maintainable Network; Compatibility; Network Structure; Transport Capacity, means to allow integration of Interactive and Distributive Services; Availability.

(continued)

## Structure and functions (concluded)

Work Item Doc number Status	Title	Scope
DEN/TM-04043  (work transferred to EP BRAN - WI to be advised)  10/97	<b>Digital radio systems for broadband local access network connections</b>	New. This standard will cover point-to-multipoint systems which provide broadband connections to customers (i.e. in the local access network). The links will be bi-directional and the equipment would typically (although not necessarily) provide an asymmetrical link (i.e. such that the data rates in the two directions are different). Typical applications include Interactive Multimedia, Video Transmission, high bandwidth data transmission, etc.
RTS/TM-03075  <b>TS 101 012 V1.2.1</b> 12/97	<b>Broadband Integrated Services Digital Network (B-ISDN) access</b>	Functional and management requirements for the B-ISDN access to the local network applicable from the first ATM node (V) up to the User-Network Interface (T).

### A.4.2 Interfaces/protocols

For further study.

### A.4.3 Management

#### A.4.3.1 Information model

For further study.

#### A.4.3.2 Operation And Maintenance(OAM)/fault management

Work Item Doc number Status	Title	Scope
DE/TM-02209-1  <b>ETS 300 736-1</b> Stopped	<b>Operation and maintenance of optical access networks - Information model</b>	Study Operation and Maintenance requirements for Optical Access Network.  SDH PM note: New WI, no text available.
DI/TM-02209-2  <b>I-ETS 300 736-2</b> Stopped	<b>Operation and maintenance of optical access networks: Common fragment</b>	This ETS provides the Common Fragment for an Information Model for the Operations and Maintenance of Optical Access Networks and it defines Managed Objects to model the Common Aspects of OANs.
DE/TM-02209-3  <b>ETS 300 736-3</b> Stopped	<b>Operation and maintenance of optical access networks: Transmission fragment (Element view)</b>	This ETS provides the Network Fragment for an Information Model for the Operations and Maintenance of Optical Access Networks and it defines Managed Objects to model the Common Aspects of OANs.
DTR/TM-02238  04/97	<b>Operation and maintenance of optical access networks: Transmission fragment (Element view)</b>	This TR covers the content of ETS 300 736-3 which has been stopped.
DI/TM-02209-4  <b>I-ETS 300 736-4</b> Stopped	<b>Operation and maintenance of optical access networks: Transmission fragment (Network view)</b>	This ETS provides the Network Fragment for an Information Model for the Operations and Maintenance of Optical Access Networks and it defines Managed Objects to model the Network Level management of OANs.

(continued)

## Operation And Maintenance(OAM)/fault management (concluded)

Work Item Doc number Status	Title	Scope
DI/TM-02209-5 <b>I-ETS 300 736-5</b> Stopped	<b>Operation and maintenance of optical access networks: Equipment fragment</b>	This ETS provides the Equipment Fragment for an Information Model for the Operations and Maintenance of Optical Access Networks and it defines Managed Objects to model the Equipment Aspects of OANs.
DE/TM-02209-6 <b>ETS 300 736-6</b> Stopped	<b>Operation and maintenance of optical access networks: Testing fragment</b>	This work will produce the Testing Fragment for the OAM of OANs. SDH PM note: New WI, no text available.
DTR/TM-02239  04/97	<b>Operation and maintenance of optical access networks: Test and performance fragment</b>	This TR covers the content of ETS 300 736-6 which has been stopped.
DES/TM-02235  04/97	<b>Service provisioning ensemble of access networks</b>	This will produce an ensemble of DE/TM-02209 for service provisioning.

### A.4.4 Performance

For further study.

### A.4.5 Miscellaneous

For further study.

## A.5 Transport networks area

### A.5.1 Architecture

#### A.5.1.1 Structure and functions

Work Item Doc number Status	Title	Scope
DTR/TM-03016 <b>ETR 085</b>  Published 07/93	<b>Generic functional architecture of transport network</b>	This ETR describes the functional architecture of transport networks in a technology independent way. The generic functional architecture of transport networks should be taken as the basis for a harmonized set of functional architecture standards for ATM, SDH, and PDH networks and corresponding management standards, performance analysis and equipment specification.
MI/TM-03058  new, 07/99	<b>Maintenance of the generic functional architecture of transport networks (harmonization of generic architectures) ETR 085</b>	Describes the functional architecture of transport networks in a technology independent way. Envisaged to be a reference description of generic functional architecture of transport networks to be taken as the basis of a harmonized set of functional architecture standards for ATM, SDH, PDH network layers and corresponding management standards, performance analysis and equipment specification. Issues related to asymmetrical and point-to-multipoint trails to be described.
MI/TM-03059  new, 07/99	<b>Functional architecture of synchronous digital hierarchy (SDH) transport networks</b>	Describes the SDH-specific aspects of functional architecture transport networks. Makes strong reference to the generic architecture developed in ETR 085 and ETR 085 Edition 2 (stopped).
MI/TM-03060  new, 07/99	<b>Functional architecture ATM transport networks</b>	Describes the ATM-specific aspects of functional architecture transport networks. Makes strong reference to the generic architecture developed in ETR 085 and ETR 085 Edition 2 (stopped). Includes correspondence table with terms used in the context of B-ISDN protocol reference model.
DTR/TM-03006 <b>ETR 114</b>  Published 11/93	<b>Functional architecture of Synchronous Digital Hierarchy (SDH) Transport networks</b>	This ETR covers the functional architecture and network issues of transport networks as applied to Synchronous Digital Hierarchy (SDH)-based networks. It is firmly based upon ITU-T Recommendation G.803 and the generic functional architecture of transport networks covered under ETR 085. It also covers interconnection of Plesiochronous Digital Hierarchy (PDH)-based and SDH-based networks and evolution to SDH-based transport networks.
MI/TM-01039  completed 01/97	<b>Functional characteristics of systems using OAs: ETSI contributions to ITU-T Draft Recommendation G.10n</b>	

#### A.5.1.2 Structure radio systems

For further study.



## A.5.1.3 Protection

Work Item Doc number Status	Title	Scope
DE/TM-03042 <b>ETS 300 746</b>  Published 02/97	<b>Synchronous digital hierarchy (SDH) automatic protection switching (APS) protocols - ring and other schemes</b>	This ETS specifies the automatic protection switching (APS) requirements, switching initiation criteria, and the APS protocols of SDH shared multiplex section bidirectional self healing ring, dedicated multiplex section unidirectional self healing ring, multiplex section linear protection and path trail and subnetwork connection protection schemes. The APS protocols are specified in terms of their multiplex section or path overhead requirements, the signalling messages and their operations under various failure conditions.
RE/TM-03071 <b>ETS 300 746 Edition 2</b> 09/98	<b>Synchronous digital hierarchy (SDH); Network protection schemes; Automatic Protection Switch (APS) protocols and operation</b>	To capture additional requirements from contributions received following the completion of Edition 1. May include work left for further study in Edition 1.
DTS/TM-03025 <b>TS 101 009 V1.1.1</b>  For publication in 10/97	<b>Synchronous Digital Hierarchy (SDH) ring protection</b>	This ETR describes the functional requirements and classification of SDH protection schemes, namely SDH shared multiplex section bidirectional self healing ring, dedicated multiplex section unidirectional self healing ring, multiplex section linear protection and path trail and subnetwork connection protection schemes. The various SDH protection schemes are specified in terms of their network objectives, network architectures, functional modelling and network operations.
RTS/TM-03070 <b>TS 101 009 V1.2.1</b>  09/98	<b>Synchronous Digital Hierarchy (SDH); Network protection schemes; Types and characteristics</b>	To capture additional information on SDH protection schemes from contributions received following completion of Edition 1. May include information related to topics listed in the living list (9/95) as well as topics already listed for further study in Edition 1. Protection for virtually concatenated signals and SNC protection using sublayer monitoring will also be considered.
DTR/TM-03041 <b>TS 101 010 V1.1.1</b>  STC approved 05/97	<b>Synchronous digital hierarchy (SDH) protection interworking - rings and other schemes</b>	This ETR describes the interworking criteria, principles, objectives, requirements and architectures of protection interconnection between SDH shared multiplex section bidirectional self healing ring, dedicated multiplex section unidirectional self healing ring, multiplex section linear protection and path trail and subnetwork connection protection schemes. The SDH protection interconnection scenarios between the same and different protection schemes are described.
RTS/TM-03075 <b>TS 101 012 V1.2.1</b> 12/97	<b>Report on network restoration</b>	To study alternative network restoration techniques and their application, including centralized versus distributed restoration and pre-planned versus dynamic operation (including algorithms). Interworking between restoration and protection schemes will be considered.

## A.5.2 Interface aspects

### A.5.2.1 Network Node Interface (NNI)

Work Item Doc number Status	Title	Scope
DE/TM-03002 <b>ETS 300 166</b>  Published 08/93	<b>Physical and electrical characteristics of hierarchical digital interfaces for equipment using the 2 048 kbit/s - based plesiochronous or synchronous digital hierarchies</b>	This ETS describes the requirements for the physical and electrical parameters of interfaces based on ITU-T Recommendation G.702, G.703 and G.707 for interconnection of digital network elements: 1. in-station (i.e. for distances below a few hundred metres); 2. using metallic (symmetrical or coaxial) pairs; 3. at 64, 2 048, 8 448, 34 368 and 139 264 kbit/s hierarchical levels of the PDH and at the first level of the SDH (STM-1 at 155 520 kbit/s). This ETS also describes the requirements for the physical and electrical parameters of the 2 048 kHz synchronization interface.
MI/TM-01038  12/96	<b>Optical interfaces for SDH; ETSI contributions to ITU-T Draft Recommendation G.scs</b>	SDH PM note: New WI, no text available.
MI/TM-01044  12/98	<b>ETSI contributions to ITU-T on draft Recommendation G.mcs</b>	New.

### A.5.2.2 User-Network Interface (UNI)

Work Item Doc number Status	Title	Scope
DE/NA-52511 <b>ETS 300 299</b> Published 02/95	<b>Cell based user network access, physical layer interfaces for B-ISDN</b>	SDH PM note: Electronic version not available.
RE/TM-03030 <b>ETS 300 299 Edition 2</b>  Published 06/97	<b>Cell-based user network access physical layer interface for B-ISDN applications</b>	This ETS defines the physical layer interface to be applied to the $S_B$ and $T_B$ reference points of the reference configuration of the B-ISDN cell based UNI at 155 520 kbit/s and 622 080 kbit/s. It addresses separately the physical media and the transmission system used at these interfaces and addresses also the implementation of UNI related OAM functions.
RE/TM-03029 <b>ETR 300 300 Edition 2</b>  Published 04/97	<b>SDH based user network access, Physical layer interfaces for B-ISDN applications</b>	This ETS defines the physical layer interface to be applied to the $S_B$ and $T_B$ reference points of the reference configuration of the B-ISDN cell based UNI at 155 520 kbit/s and 622 080 kbit/s. It addresses separately the physical media and the transmission system used at these interfaces and addresses also the implementation of UNI related OAM functions.
DE/TM-03064 <b>ETS 300 742</b>  Published 04/97	<b>Physical layer UNI for 2 Mbit/s ATM signals</b>	This ETS defines the physical layer interface to be applied to the $S_B$ and $T_B$ reference points of the reference configuration of the B-ISDN cell based UNI at 2 048 kbit/s. It addresses separately the physical media and the transmission system used at these interfaces and addresses also the implementation of UNI related OAM functions.

(continued)

## User-Network Interface (UNI) (concluded)

Work Item Doc number Status	Title	Scope
DE/NA-53031 <b>ETS 300 216</b> Published 12/92	<b>PLCP 155M</b>	
DE/NA-53032 <b>ETS 300 272</b> Published 03/94	<b>PICS PLCP 155M</b>	
DE/NA-53033 <b>ETS 300 270</b> Published 03/94	<b>PLCP 622M</b>	
DE/NA-53034 <b>ETS 300 277</b> Published 03/94	<b>PICS PLCP 622M</b>	

## A.5.3 Management aspects

### A.5.3.1 Information model

Work Item Doc number Status	Title	Scope
DE/TM-02207 <b>I-ETS 300 810</b> PE120 ended 04/97	<b>SDH network information model</b>	Agree an information model which describes in object-oriented terms a model for management of synchronous digital networks.
DTR/TM-02212 <b>ETR 269</b>  Published 04/96	<b>Requirements for a transmission level information model</b>	This ETR describes some of the issues related to the modelling of the network layer of a transmission network, in particular those issues related to the production of interface specifications described in terms of GDMO templates using the ensemble technique. It describes the principles to be used when developing ensembles in terms of the use of G.803, the use of M.3010, the functional management architecture, the use of a standard class library, the modelling methodology to be used, the need to support multiple managers and the management capabilities to be supported. It also describes the structure required in the ensemble document and shows how this conforms to the NM Forum Ensemble specification technique.
DTR/TM-02221  09/97	<b>Application of ODP to the management of a transmission network</b>	Establish rules for the management of an SDH network taking into account the distributive aspects of management capabilities.

### A.5.3.2 Operation And Maintenance(OAM)/fault management

Work Item Doc number Status	Title	Scope
DEN/TM-02233  04/97	<b>Transport network monitoring service</b>	This service permits a client to monitor a transport resource within the client domain.
DEN/TM-02237  04/97	<b>Synchronous Digital Hierarchy (SDH); Monitoring service</b>	Application of the generic transport network monitoring service defined in DE/TM-02233 to SDH networks.

### A.5.3.3 Resources

Work Item Doc number Status	Title	Scope
DEN/TM-02230  04/97	<b>Transport network resource model</b>	To establish an ODP model for transport network resources.

### A.5.3.4 Configuration

Work Item Doc number Status	Title	Scope
DEN/TM-02231  04/97	<b>Sub-network connection configuration management</b>	To specify the management capabilities and establish a model for the configuration of sub-network connections across subnetworks.

## A.5.4 Performance aspects

### A.5.4.1 Information model

For further study.

### A.5.4.2 Quality of Service (QoS)

Work Item Doc number Status	Title	Scope
DTR/TM-03031 <b>ETR 275</b>  Published 04/96	<b>Transmission and Multiplexing (TM); Considerations on transmission delay and transmission delay values for components on connections supporting speech communication over evolving digital networks</b>	The purpose of this ETR is to examine those components which contribute to the transmission delay on connections supporting speech traffic over evolving digital networks. It provides typical values which can be used to develop echo and delay guidance documents for network operators/planners.
RTS/TM-03066 <b>TS 101 011 V1.2.1</b> 11/97	<b>Transmission delay; Hypothetical reference model and planning guidelines</b>	Maintenance and revision of ETR 275.
DEN/TM-03067  03/98	<b>Control of jitter and wander in transport networks</b>	This ETS will define the parameters and the relevant values that are required to satisfactorily control the amount of jitter and wander present at digital data interfaces. This ETS is applicable to both SDH and PDH based transport networks.
DE/TM-02109  Stopped	<b>Transmission performance for SDH section</b>	Development of an ETS concerning the transmission performance for SDH sections.
MI/TM-02102  07/98	<b>Further development of G.826: the new error performance Recommendation for international digital paths at or above the primary rate</b>	Influence the work of SG 13/4 in the further development of G.826.

### A.5.4.3 Availability

Work Item Doc number Status	Title	Scope
DI/TM-02105 <b>I-ETS 300 416</b>  Published 07/95	<b>Availability performance of path elements of international digital path</b>	This Interim ETS is applicable to international constant bit rate digital paths at or above 64 kbit/s supported by digital networks. International constant bit rate digital paths may be based on the PDH, the SDH or some other transport network such as cell-based. This ETS is generic in that it defines parameters and requirements independent of the physical transport network providing the paths. Two types of paths are considered; paths between ISCs which consist of an international portion only and paths between CPs which consist of national and international portions. These paths are referred to as "type a" and "type b" respectively. Both the national and international portions are made up of Path Elements (PEs). For the national portion of path of "type b", this ETS specifies parameters and requirements as a whole. The end-to-end availability performance of an international digital path can be calculated from the arrangement of the constituent PEs and their associated requirements.
DI/TM-02105-1 <b>I-ETS 300 416-2</b> 03/98	<b>Conformance testing specification for I-ETS 300 416</b>	SDH PM note: New WI, no text available yet.

## A.5.5 Miscellaneous

For further study.

## A.6 Leased lines area

### A.6.1 Architecture

Work Item Doc number Status	Title	Scope
DTR/TM-03062 <b>ETR 276</b>  Published 04/96	<b>Technical report on SDH leased lines</b>	This ETR has been produced in response to a mandate forwarded to ETSI by the European Commission DG III. The object of the mandate is to produce ETSs for access to SDH leased lines with STM-N network presentation at the NTP. The two parts of the mandate are firstly, an investigation of the technical feasibility and the requirements and secondly, depending on the agreement of the Commission, the production of the relevant ETS. This report addresses the first part of the mandate. The report is written in the ONP context defined in the ONP framework Directive 90/387/EEC (2) and the leased line Directive 92/44/EEC (3). It is intended that ETSs produced as a result of the second part of the mandate will be published in the indicative, non-mandatory section in the Official Journal of the European Community. The report examines the technical aspects of the standardization of SDH leased lines and details the work needed to produce the ETS. It covers the various technical options taking into account the current situation of SDH networks and their expected evolution.
DEN/TM-03072  11/97	<b>Synchronous Digital Hierarchy (SDH); SDH leased lines; Connection characteristics</b>	Specify the technical requirements and corresponding test principles for connection characteristics of SDH leased lines.
DEN/TM-03074  Stopped (merged with DEN/TM-03073 - see A.6.1 below).	<b>Synchronous Digital Hierarchy (SDH);SDH leased lines; Terminal equipment and Virtual Container (VC)-n presentation</b>	Specify the technical requirements and corresponding test principles for the VC-n presentation of SDH leased lines.

### A.6.2 Interfaces and Protocols

Work Item Doc number Status	Title	Scope
DEN/TM-03073  11/97	<b>Synchronous Digital Hierarchy (SDH); SDH leased lines; Network and terminal equipment interface and Virtual Container (VC)-n presentation</b>	Specify the technical requirements and corresponding test principles for the interface presentation of SDH leased lines.

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## Annex B: Terms of Reference for the SDH project in TM

### B.1 Objective of SDH project management

The objective of the project management activity is to ensure co-ordinated deliverables about SDH issues. The co-ordination concerns work done in TC TM and regards both timing and content of the deliverables.

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### B.2 Terms of Reference

The project manager is responsible for the following specific tasks (that is he/she carries them out him/herself or with the help of TC/STC officials and the ETSI Secretariat as he/she sees suitable):

- 1) Draft an overview document for approval by TM, containing:
  - a) a structured overview of the SDH aspects to be standardized, suitable for the following;
  - b) general scopes and purposes of the deliverables covering these aspects;
  - c) information which relations between groups of deliverables must exist;
  - d) allocation of aspects to STC (according to the general ToR for the STCs);
  - e) general prioritization.
- 2) Analyse the ongoing work for reporting to TM:
  - a) identify SDH work items;
  - b) check whether work is proper to the STC;
  - c) identify work items that are dependent on other work items;
  - d) compare planned STC completion dates and identify inconsistencies;
  - e) check work items for overlap, omission and inconsistency; consistency regarding both **the present content and the description methodology**.
- 3) Make recommendation to appropriate level based on analysis above, in particular on:
  - a) priorities of specific work items;
  - b) scope of work items, allocation to STCs;
  - c) joint activities of STCs;
  - d) specific methodologies;
  - e) numbering of ETSs (for reference in information models).
- 4) Monitor the future work and make recommendations:
  - a) monitor the implementation of accepted Recommendations (see clause B.3) and propose corrections to the appropriate body;
  - b) analyse new work items along the criteria under clause B.2;
  - c) propose new work items.

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## B.3 Work procedures

The project manager is primarily responsible to TC TM. He/She organizes the work in the most efficient way, primarily in co-operation with the STC Chairmen, the ETSI Secretariat and other officials of the TC (Chairman, PRO, Vice-Chairman, Rapporteurs) and other experts.

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## B.4 Term of office

The project manager is expected to be in office for at least two years, after which the management project may be terminated, the person may be willing and mandated to continue or other person may be mandated.

NOTE: These ToR have been approved during the first meeting of the TC TM SDH project management team on February 24, 1995 in Darmstadt, Germany.



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## Annex C: Bibliography

- ETSI/TA18(93)32: "Project-oriented management of standardization", October 1993.

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## History

<b>Document history</b>		
First Edition	August 1996	Publication as ETR 307, Edition 1
V1.2.1	June 1997	Publication