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Integrated Services Digital Network (ISDN); Signalling System No.7; Message Transfer Part (MTP) protocol Tester (MT)

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ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE
Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE
X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

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

Contents

Foreword 5

1 Scope 7

2 Normative references 7

3 Definitions 7

4 Abbreviations 7

5 General 8

6 MTP Tester (MT) 10
6.1 Functions 10
6.1.1 Objectives and scope 10
6.1.2 Main functions 11
6.1.3 Architectural model 11
6.1.4 Functional roles 11
6.1.4.1 Generator role 11
6.1.4.2 Turn-around role 11
6.1.5 Identification of test sequences at a node 11
6.1.6 Message rate considerations 12
6.2 Procedures 12
6.2.1 Test set-up 12
6.2.1.1 Test request 12
6.2.1.2 Test acceptance 12
6.2.1.2.1 By the turn-around tester 12
6.2.1.2.2 By the generator 13
6.2.1.3 Test refusal 13
6.2.1.4 Timer T1 expiry 13
6.2.2 Procedures during the test 13
6.2.2.1 At the generator 13
6.2.2.2 At the turn-around tester 13
6.2.2.3 Response to missequencing 13
6.2.3 Test termination 14
6.2.3.1 By the generator 14
6.2.3.2 By the turn-around tester 14
6.2.3.3 Test termination acknowledgement 14
6.2.4 Reaction to MTP management primitives and MTP restart 14
6.2.4.1 MTP-PAUSE caused by unavailability of a destination 14
6.2.4.1.1 At the generator side 14
6.2.4.1.2 At the turn-around side 15
6.2.4.2 MTP-RESUME 15
6.2.4.3 MTP-STATUS 15
6.3 State transition matrix 15
6.4 Formats and codes 24
6.4.1 Header codes 24
6.4.1.1 Test control 24
6.4.1.2 Test traffic 24
6.4.2 Timers 25
6.4.3 Interface requirements 25

Annex A (informative): Procedure SDL diagrams 26

Annex B (informative): Bibliography 39

History 40

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Signalling Protocol and Switching (SPS) Technical Committee of the European Telecommunications Standards Institute (ETSI).

This ETS details exceptions and clarifications to ITU-T Recommendation Q.755 defining the protocol testers to be used as an aid when performing validation testing of an implementation or compatibility testing between implementations.

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Date of adoption:	19 September 1997
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1 Scope

This European Telecommunication Standard (ETS) specifies the Message Transfer Part (MTP) protocol Tester (MT) to be used as an aid when testing the MTP of Signalling System No.7.

This tester applies to all MTP implementations conforming with ETS 300 008-1 [1] regardless of its date of issue, as long as they provide the equivalent of the MTP primitives, and the Service Indicator (SI) of the MT is supported.

This ETS draws upon ITU-T Recommendation Q.750 [2] for architectural considerations of the relationship between the MT and Signalling System No.7 management (OMAP), and upon ETS 300 008 [1] for the specification of the MTP.

NOTE: The applicability of the MTP tester to broadband MTPs according to EN 301 004-1 is outside the scope of this ETS.

2 Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] ETS 300 008-1: "Integrated Services Digital Network (ISDN); Signalling System No.7; Message Transfer Part (MTP) to support international interconnection (Part 1: Protocol specification)".

[2] ITU-T Recommendation Q.750 (1993): "Overview of Signalling System No.7 management".

3 Definitions

For the purposes of this ETS, the following definition applies:

MTP Service Access Point instance (SAPi): The interface between an MTP user and the MTP, used to access a particular MTP network.

4 Abbreviations

For the purposes of this ETS, the following abbreviations apply:

AE	Application Entity
ASE	Application Service Element
CF	Control Function
DPC	Destination PC
GPC	Generating PC
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
LME	Level Management Entity
LMI	Level Management Interface
MAP	Mobile Application Part
MIB	Management Information Base
MSU	Message Signal Unit
MT	MTP protocol Tester
MTP	Message Transfer Part
OMAP	Operations, Maintenance and Administration Part
OMASE	OMAP ASE
OPC	Originating PC
OSI	Open Systems Interconnection
PC	Point Code

SAP	Service Access Point
SAPi	SAP instance
SCCP	Signalling Connection Control Part
SDL	Specification and Description Language
SI	Service Indicator
SIF	Signalling Information Field
SLS	Signalling Link Selection
SP	Signalling Point
SSNo.7	Signalling System No.7
TC	Transaction Capabilities
TMN	Telecommunications Management Network
TPC	Turn-around PC
TUP	Telephony User Part

5 General

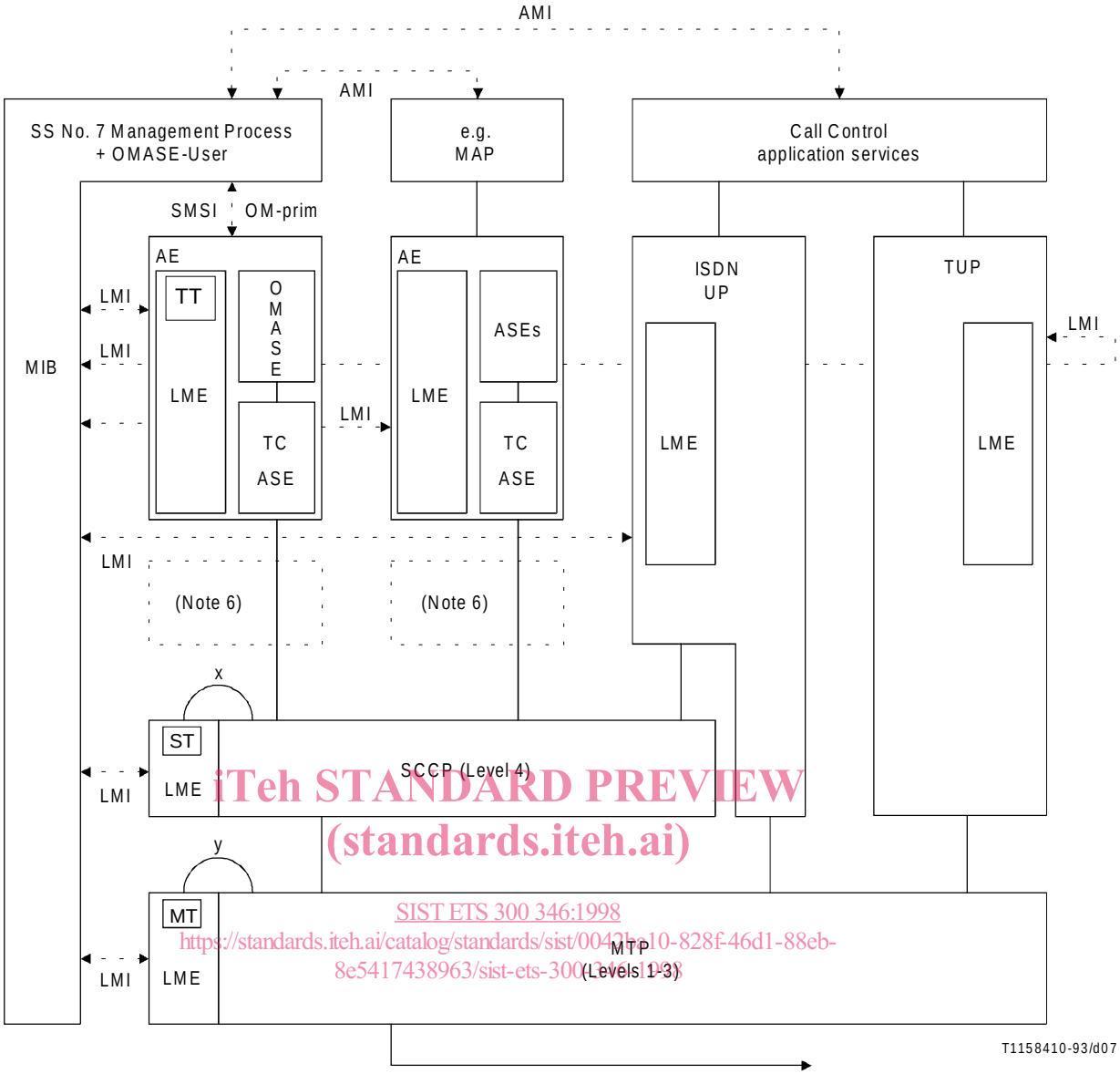
The protocol tester may be used as an aid when testing the Message Transfer Part (MTP) of Signalling System No.7 between two implementations. The tester's main function is simulation of an ordinary user part, as seen from the MTP, for the generation of test traffic.

ITU-T Recommendations I.320 and I.321 specify the ISDN protocol reference model to be used. User plane (U-plane), Control plane (C-plane) and Management plane (M-plane) are identified. The layering principles apply in each of these planes. The U-plane provides the user information flow transfer with associated controls. The C-plane handles the call and connection control information. The M-plane is divided into two portions, the Layer Management functions and the Plane Management functions. Plane Management performs management functions related to a system as a whole, it provides co-ordination between all the planes and has no layered structure. The Layer Management part of the M–plane contains Layer Management Entities (LMEs). Each of these entities provides management functions relating to resources and parameters residing in its associated protocol layer. Layer Management handles the operation and maintenance information flows. The interface between adjacent layers within a plane and between the Layer Management Entity and its associated layer have to be defined in terms of service primitives. The interface between the Layer Management Entities and Plane Management does not need to be specified, it is implementation dependent.

For Signalling System No.7, the **Level Management Entity** is defined by analogy with the Layer Management Entity of ITU-T Recommendations I.320 and I.321. This is to account for the different positions of the boundaries between Signalling System No.7 lower layers and those of Open Systems Interconnection (OSI) (e.g. the upper part of the MTP is level 3 in Signalling System No.7, the SCCP is level 4, but both would be within layer 3 if the OSI model strictly applied). For Signalling System No.7 MTP, the term LME is taken to mean "Level Management Entity".

Thus the MT is contained in the LME of the MTP (MTP LME).

In this ETS, the service primitives between MTP LME and the MTP are described, as well as the procedures, the messages and the MT substructure. It is necessary to define the information flow across the interface between the Plane Management (MIB) and the MT (shown as the lowest Level Management Interface (LMI) in figure 1) and so this is done in terms of signals which are required to control the concerned testing functions and report results (see figure 1, which is a copy of figure 5/Q.750).



NOTES

1 Dotted lines (but not boxes) denote direct management interfaces. Only the SMSI [see note 5 below] is realized with primitives.

2 The LMI (Level Management Interface) is not a subject for standardization.

3 The AMI (Application Management Interface) is not a subject for standardization.

4 The items managed by OMAP can be regarded as conceptually resident in the MIB.

5 The SMSI is the systems management service interface, the OM primitives are defined for use over it for managed object functions defined in Recommendation Q.753.

6 OSI layers 4, 5 and 6 are null in SS No. 7. TC forms the bottom of OSI layer 7, SCCP the top of OSI layer 3 (but is in SS No. 7 level 4).

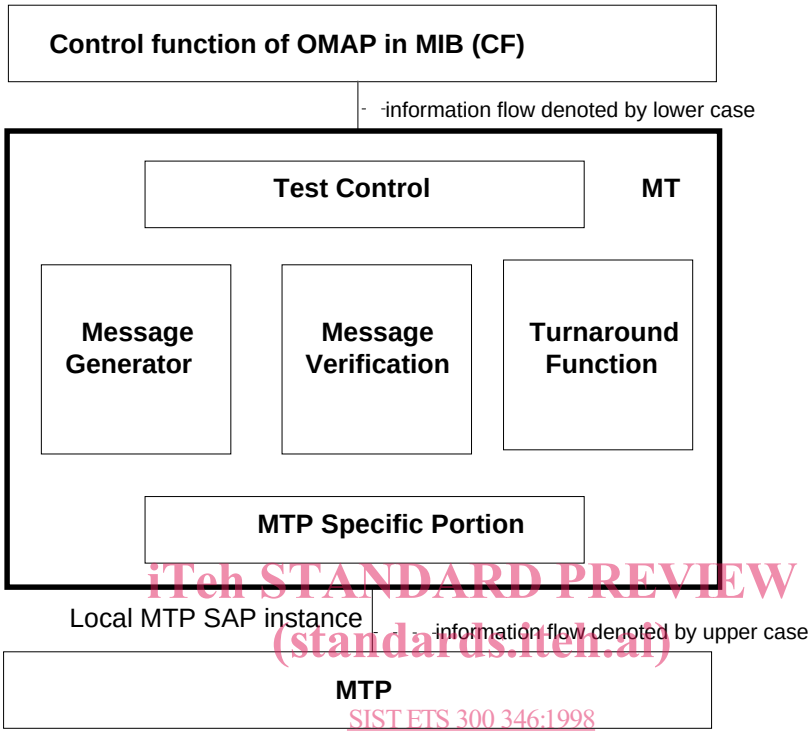
7 Interface x uses sub-system number to test the SCCP using the SCCP Tester (ST), interface y uses SIO to test the MTP using the MTP Tester (MT). The TC Test Responder (TT) has its own SSN, conceptually it resides in the OMAP LME.

8 The LME (Level Management Entity) is defined for management of and within each level of SS No. 7. This is conceptually where each managed item resides as far as the level is concerned.

Figure 1: Signalling System No.7 management and internal configuration of a Signalling Point (SP)

6 MTP Tester (MT)

The MT is connected to the MTP as a user part, i.e. it is identified by a service indicator. It generates test traffic messages (TEST TRAFFIC) containing a serial number (and possibly additional information) by using MTP-TRANSFER request primitives, and the MTP converts these into Message Signal Units (MSUs), with the TEST TRAFFIC in the Signalling Information Field (SIF). On reception of these messages a check is performed to verify that the messages are delivered correctly (e.g. without loss, corruption, missequencing or duplication).



NOTE 1: This model is not intended to constrain implementation.

NOTE 2: The Control Function (CF) of OMAP provides the management interface for the MT. It is used to define the test traffic message contents, to start and stop tests, to determine the action on congestion, and receive test results.

Figure 2: Architectural model of the MT

6.1 Functions

6.1.1 Objectives and scope

The main use of the MT is:

- a tool for performing routeing and bidirectionality tests for Signalling System No.7 in networks which are in service. If such verification in the international network should be needed, the MT would be the preferred message traffic generator.

The MT is also:

- a possible tool for validation testing when traffic generation is needed whilst performing tests. However, other traffic generators may be used if required when performing validation tests;

- the possible message traffic generator for compatibility tests between different network operators.

NOTE: Caution is necessary in the case of a request to generate message traffic that might cause an overload.

6.1.2 Main functions

The main function is the generation of bi-directional message test traffic, giving the possibility at the receiving node of analysing the received test traffic (i.e. detection of missequencing, duplication or loss of messages - verification of transfer delays and detection of message corruption is only possible on the generating side). Errors may be introduced in the Signalling System No.7 network (only by external means to the testers) during the transmission of message test traffic.

NOTE: Undefined or unexpected messages with SI = "MTP tester" received are discarded, optionally with a report. For the purposes of this ETS, an unexpected message is one that is not shown as input in a particular state in the Specification and Description Language (SDL) diagrams or the state transition matrix.

6.1.3 Architectural model

The OMAP architectural model is as given in figure 1, the MT model is shown in figure 2.

The MT functions are located in the MTP Level Management Entity (LME), control of the MT is located within the Management Information Base (MIB) (see ITU-T Recommendation Q.750 [2] for the network management aspects).

6.1.4 Functional roles

There are two functional roles which are defined for the MTP tester:

- the tester generating the test traffic messages; and
- the tester turning them around.

It is possible for a tester to be generating test traffic messages towards one signalling point whilst performing the turn-around role in another test to a different signalling point.

6.1.4.1 Generator role

When performing the generator role, a node uses the services of the various functional blocks within the MT (see figure 2) in the following way. The Test Control function confirms that the remote end is ready and able to start a test, then controls the duration and termination of the test. The Message Generator function generates the appropriate TEST TRAFFIC messages at the rate requested in the test set-up procedure. It also controls the compatibility between message length and the message rate requested. The Message Verification function receives the TEST TRAFFIC messages returning from the turn-around node and checks them for loss, missequencing and duplication. The generator role may also include a check for message corruption and other generator node dependent checks. The MTP Specific Portion deals with generating the MTP transfer primitives and handling the incoming MTP primitives. The Control Function of OMAP in the MIB handles test requests from TMN, test supervision and control, and the presentation and interpretation of test results.

6.1.4.2 Turn-around role

When performing the turn-around role, a node uses the services of the various functional blocks within the MT (see figure 2) in the following way. The Test Control function controls the acceptance and supervision of a test. TEST TRAFFIC messages arriving from the remote generator node are checked by the Message Verification function before being returned to the generator via the Turnaround function. The MTP Specific Portion again deals with the sending and receiving of MTP primitives. The Control Function of OMAP in the MIB deals with the test acceptance, test control and the presentation and interpretation of results.

6.1.5 Identification of test sequences at a node

A particular test sequence is identified by the remote Point Code (PC) and local MTP Service Access Point (SAP) instance. Thus it is only possible to have one test at a time running between two signalling points. The Generating Point Code (GPC), the PC corresponding to the MTP SAP instance of the generating tester, is included in the test messages as an additional security feature. Checks of the GPC are for further study.