



SLOVENSKI STANDARD
SIST ETS 300 612-1 E1:2003
01-december-2003

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Digital cellular telecommunications system (Phase 2) (GSM); Network Management (NM); Part 1: Objectives and structure of network management (GSM 12.00)

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Ta slovenski standard je istoveten z: **ETS 300 612-1 Edition 1**
SIST ETS 300 612-1 E1:2003
<https://standards.iteh.ai/catalog/standards/sist/88404ba0-2296-4804-93c7-e6abf60fe89/sist-ets-300-612-1-e1-2003>

ICS:

33.070.50	Globalni sistem za mobilno telekomunikacijo (GSM)	Global System for Mobile Communication (GSM)
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SIST ETS 300 612-1 E1:2003 **en**

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EUROPEAN
TELECOMMUNICATION
STANDARD

ETS 300 612-1

August 1996

Source: ETSI TC-SMG

Reference: DE/SMG-061200P

ICS: 33.060.50

Key words: Digital cellular telecommunications system, Global System for Mobile Communications (GSM)

GSM
GLOBAL SYSTEM FOR
MOBILE COMMUNICATIONS
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SIST ETS 300 612-1 E1:2003
e6abf50f1e89/sist-ets-300-612-1-e1-2003

**Digital cellular telecommunications system (Phase 2);
Network Management (NM);
Part 1: Objectives and structure of Network Management
(GSM 12.00)**

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Foreword

This European Telecommunication Standard (ETS) was produced by the Special Mobile Group (SMG) Technical Committee of the European Telecommunications Standards Institute (ETSI).

This ETS provides the conceptual and methodological framework for the definition of a standardized approach to the management of a PLMN within the Digital cellular telecommunications system. This ETS corresponds to GSM technical specification, GSM 12.00, version 4.5.1 and is part 1 of a 2 part ETS as described below:

GSM 12.00 **ETS 300 612-1: "Digital cellular telecommunication system (Phase 2); Network Management (NM); Part 1: Objectives and structure of Network Management".**

GSM 12.01 ETS 300 612-2: "Digital cellular telecommunication system (Phase 2); Network Management (NM); Part 2: Common aspects of GSM Network Management".

NOTE: TC-SMG has produced documents which give technical specifications for the implementation of the Digital cellular telecommunications system. Historically, these documents have been identified as GSM Technical Specifications (GSM-TSS). These specifications may subsequently become I-ETSs (Phase 1), or European Telecommunication Standards (ETSS)(Phase 2), whilst others may become ETSI Technical Reports (ETRs). These ETSI-GSM Technical Specifications are, for editorial reasons, still referred to in this ETS.

Transposition dates	
Date of adoption of this ETS:	31 August 1996
Date of latest announcement of this ETS (doa):	30 November 1996
Date of latest publication of new National Standard or endorsement of this ETS (dope):	31 May 1997
Date of withdrawal of any conflicting National Standard (dow):	31 May 1997

Introduction

The goals of implementing a Public Land Mobile Network (PLMN) and its continued effective operation, administration and maintenance are important issues. The creation of a system for the management of a PLMN, implemented according to the specification series 01 to 11 and the open, multi-vendor environment, demands a level of standardization of the inter-connectivity of the management components and their functionality. A system for Operation, Administration and Maintenance (OAM), using concepts of telecommunications management networks (TMN), potentially provides for a suitable degree of management integration in achieving these goals.

Approach

In order to achieve the above aim, the GSM 12 series of specifications has been devised, taking into account the following:

- GSM system philosophy, as given by the GSM 01 to 11 series of specifications, which define key functional areas.
- Relevant standardization work on network management and open systems management (as well as its realization, Telecommunications Management Network, TMN) already carried out by ISO, CCITT, ETSI etc.
- Existing operator and manufacturer experience in the management (i.e. operating, maintaining, administering) of telecommunication networks.

Accordingly, this ETS, and the other specifications of the 12-series, should adhere to the following guidelines:

- There should be internal consistency of the 12 series with the relevant system aspects given in 01 to 11 series Specifications, so that a commonly agreed view of the realization of a PLMN emerges.
- Avoidance of "re-writing" existing recommendations and specifications, but only referencing those applicable as far as possible. However, to ensure harmony with any such existing documents, some general items, such as definitions and figures may be reproduced within the 12 series if they are deemed important or helpful in establishing a common understanding.
- Analysis of current network management concepts and experience both with a top-down and bottom-up approach, so that a comprehensive and realistic management concept emerges.

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1 Scope

This European Telecommunication Standard (ETS) provides the conceptual and methodological framework for the definition of a standardized approach to the management of a PLMN. (This framework is elaborated in the remainder of the 12-series specifications) It introduces concepts developed for the management of telecommunications networks by other standards groups, discusses their use in the context of the management of a PLMN, defines a complete context for PLMN management information and identifies the developments of other management models which can be beneficially employed in the global and integrated management of a PLMN.

This ETS also describes the methodology to be employed in the definition of the standardization activity and the scale of the results which are expected to be achieved.

PLMN management is described in terms of the objectives for the Operator enterprise. Relationships exist between network management functionality and functionality required to support the enterprise model. While the definition of the enterprise model is outside of the scope of this series of ETSs, an understanding of the requirements is necessary so as to provide the underlying network management procedures.

Field of application

The concept of the Telecommunications Management Network (TMN) has developed as the result of a demand for a common management approach to the management of the diversity of equipment types, functionality and service provision inherent in modern telecommunications networks. This diversity is also apparent in a PLMN and the adoption of the TMN concept can provide a common management methodology for:

- public and private networks (including mobile);
 - transmission terminals;
 - transmission systems;
 - restoration systems;
 - operations systems and their peripherals;
 - digital and analogue exchanges;
 - area networks;
 - circuit and packet switched networks;
 - signalling terminals and systems;
 - bearer services and teleservices;
 - software provided by or associated with telecommunications services;
 - software applications;
 - associated support systems;
 - the TMN itself.
- (For a comprehensive view of the field of application of the TMN, refer to CCITT Recommendation M.3010 [1])

By extension, the field of application includes radio base station systems and all other components of the PLMN.

Typically a PLMN is a telecommunications system consisting of several functional units necessary to perform mobile telecommunications services. These functional units include:

- Location Registers (LR);
 - Home Location Register(s) (HLR);
 - Visitor Location Register(s) (VLR);
- Mobile-services Switching Centre(s) (MSC);
- Base Station Systems (BSS);
- Mobile Stations (MS);
- Equipment Identity Register (EIR);
- Authentication Centre (AUC);
- Inter-working units;
- Transcoders;
- Transmission equipment;
- Echo Suppression equipment.

NOTE: several of the above mentioned functional units may be collocated or even be accommodated in the same physical implementation.

1.1 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] | CCITT Recommendation M.3010 (1992): "Principles for a Telecommunications Management Network (TMN)". |
| [2] | CCITT Recommendation X.701 (ISO IS 10040) (1992): "Information technology - Open Systems Interconnection - Systems Management Overview". |
| [3] | Draft ETR DTR/NA-043207: "Overview of Telecommunications Management Network (TMN) standards". |
| [4] | CCITT Recommendation X.200 (1992): " - Information technology - Open Systems Interconnection - Reference Model of Open Systems Interconnection for CCITT Applications". |
| [5] | CCITT Recommendation M.3020 (M.meth) (1992): "TMN Interface Specification Methodology". |
| [6] | CCITT Recommendation M.3200 (M.app) (1992): "TMN Management Services: Introduction". |
| [7] | CCITT Recommendation M.3400 (M.func) (1992): "TMN Management Functions". |
| [8] | CCITT Recommendation M.3100 (M.gnm) (1992): "Generic Network Information Model". |
| [9] | CCITT Recommendation X.720 (ISO 10165-1) (1992): "Information technology - Open Systems Interconnection - Structure of management information: System Management Information Model". |
| [10] | CCITT Recommendation X.721 (ISO 10165-2) (1992): "Information technology - Open Systems Interconnection - Structure of management information: Definition Of Management Information". |
| [11] | CCITT Recommendation X.722 (ISO 10165-4) (1992): "Information technology - Open Systems Interconnection - Structure of management information: Guidelines For The Definition Of Managed Objects". |

- [12] CCITT Recommendation X.730 (ISO 10164-1) (1992): "Information technology - Open Systems Interconnection - Systems Management: Object management function".
- [13] CCITT Recommendation X.731 (ISO 10164-2) (1992): "Information technology - Open Systems Interconnection - Systems Management: State Management".
- [14] CCITT Recommendation X.732 (ISO 10164-3) (1992): "Information technology - Open Systems Interconnection - Systems Management: Attributes For Representing Relationships".
- [15] CCITT Recommendation X.733 (ISO 10164-4) (1992): "Information technology - Open Systems Interconnection - Systems Management: Alarm Reporting".
- [16] CCITT Recommendation X.734 (ISO 10164-5) (1992): "Information technology - Open Systems Interconnection - Systems Management: Event Report Management Function".
- [17] CCITT Recommendation X.735 (ISO 10164-6) (1992): "Information technology - Open Systems Interconnection - Systems Management: Log Control Function".
- [18] CCITT Recommendation X.736 (ISO 10164-7) (1992): "Information technology - Open Systems Interconnection - Systems Management: Security Alarm Reporting Function".
- [19] CCITT Recommendation X.740 (ISO 10164-8) (1992): "Information technology - Open Systems Interconnection - Systems Management: Security Audit Trail Function".
- [20] CCITT Recommendation X.741 (ISO DIS 10164-9): "Information technology - Open Systems Interconnection - Systems Management: Objects And Attributes For Access Control".
- [21] CCITT Recommendation X.742 (ISO CD-10164-10): "Information technology - Open Systems Interconnection - Systems Management: Accounting Meter Function".
- [22] CCITT Recommendation X.739 (ISO DIS 10164-11) (1994): "Information technology - Open Systems Interconnection - Systems Management: Workload Monitoring Function".
- [23] CCITT Recommendation X.745 (ISO DIS 10164-12) (1994): "Information technology - Open Systems Interconnection - Systems Management: Test Management Function".
- [24] CCITT Recommendation X.738 (ISO DIS 10164-13) (1994): "Information technology - Open Systems Interconnection - Systems Management: Summarization Function".
- [25] CCITT Recommendation E.800 (1988): "Quality of Service; Concepts, Models, Objectives, Dependability Planning".
- [26] ETR 101 (GSM 02.08): "Digital cellular telecommunication system (Phase 2); Quality of service".
- [27] ETR 102 (GSM 03.05): "Digital cellular telecommunication system (Phase 2); Technical performance objectives".
- [28] ETS 300 540 (GSM 03.50): "Digital cellular telecommunication system (Phase 2); Transmission planning aspects of the speech service in the GSM Public Land Mobile Network (PLMN) system".

- [29] ETS 300 577 (GSM 05.05): "Digital cellular telecommunication system (Phase 2); Radio transmission and reception".
- [30] ETS 300 580-6 (GSM 06.32): "Digital cellular telecommunication system (Phase 2); Voice Activity Detection (VAD)".
- [31] CCITT Recommendation X.724 (ISO DIS 10165-6): "Information technology - Open Systems Interconnection - Structure of management information: Requirements and guidelines for implementation conformance statement proformas associated with OSI management".
- [32] CCITT draft Recommendation Q.821: "Signalling system No. 7 management - Stage 2 and stage 3 description for the Q3 interface - Alarm Surveillance".
- [33] CCITT draft Recommendation Q.822: "Signalling system No. 7 management - Stage 1, stage 2 and stage 3 description for the Q3 interface -Performance Measurement".
- [34] ISO IS 9596-2: "Information Processing Systems - Open Systems Interconnection - Management Information Protocol Specification - Part 2: Common Management Information Protocol (CMIP)".
- [35] ETR 128 (GSM 12.30): "Digital cellular telecommunication system (Phase 2); ETSI object identifier tree; Common domain; Mobile domain Operation and Maintenance (O & M) managed object registration definition".
- [36] ETS 300 612-2 (GSM 12.01): "Digital cellular telecommunication system (Phase 2); Common aspects of GSM Network Management (NM)".
- [37] ETS 300 613 (GSM 12.02): "Digital cellular telecommunication system (Phase 2); Subscriber, Mobile Equipment (ME) and services data administration".
- [38] ETS 300 614 (GSM 12.03): "Digital cellular telecommunication system (Phase 2); Security management".
- [39] ETS 300 615 (GSM 12.04): "Digital cellular telecommunication system (Phase 2); Performance data measurements".
- [40] ETS 300 616 (GSM 12.05): "Digital cellular telecommunication system (Phase 2); Subscriber related event and call data".
- [41] ETS 300 617 (GSM 12.06): "Digital cellular telecommunication system (Phase 2); GSM Network Configuration Management and Administration".
- [42] ETS 300 619 (GSM 12.11): "Digital cellular telecommunication system (Phase 2); Fault Management of the Base Station System (BSS)".
- [43] ETS 300 622 (GSM 12.20): "Digital cellular telecommunication system (Phase 2); Base Station System (BSS) Management Information".
- [44] ETS 300 623 (GSM 12.21): "Digital cellular telecommunication system (Phase 2); Network Management (NM) procedures and message on the A-bis interface".
- [45] ETS 300 624 (GSM 12.22): "Digital cellular telecommunication system (Phase 2); Interworking of GSM Network Management (NM) procedures and messages at the Base Station Controller (BSC)".

1.2 Definitions and abbreviations

Terminology is aligned with ETSI TCR-TR 003 Vocabulary of terms for TMN.

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

ADC	Administration Centre
AOM	Application of Object Management
ASN.1	Abstract Syntax Notation (number) 1
AUC	Authentication Centre
bcf	base (station) control function
BSC	Base Station Controller
BSS	Base Station System
BTS	Base Transceiver Station
DCF	Data Communication Function
DCN	Data Communication Network
EIR	Equipment Identity Register
EWOS	European Workshop on Open Systems
GDMO	Guidelines for the Definition Of Managed Objects
HLR	Home Location Register
H/W	Hardware
IMEI	International Mobile station Equipment Identity
IMSI	International Mobile Subscriber Identity
ISDN	Integrated Services Digital Network
ISO	International Standards Organization
ISP	International Standard Profile
LLA	Logically Layered Architecture
LR	Location Register
MCF	Message Communication Function
MD	Mediation Device
MF	Mediation Function
MOCS	Managed Object Conformance Statement
MS	Mobile Station
MSC	Mobile services Switching Centre
NE	Network Element
NEF	Network Element Function
NM	Network Management
NMC	Network Management Centre
NMF	OSI Network Management Forum
OAM	Operation, Administration and Maintenance
OMC	Operations and Maintenance Centre
O-O	Object-Oriented
OS	Operations System
OSF	Operations System Function
OSI	Open Systems Interconnection
pcm	pulse code modulation
PICS	Protocol Implementation Conformance Statement
PLMN	Public Land Mobile Network
QA	Q (Interface) - Adapter
QAF	Q - Adapter Function
QOS	Quality of Service
SMK	Shared Management Knowledge
S/W	Software
TMN	Telecommunications Management Network
VLR	Visitor Location Register
WS	Work Station
WSF	Work Station Function