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Foreword

This European Telecommunication Standard (ETS) has been produced by the Paging Systems (PS) Technical Committee of the European Telecommunications Standards Institute (ETSI).

This ETS comprises seven parts with the generic title "Paging systems; European Radio Message System (ERMES)". The title of each part is listed below:

- ETS 300 133-1: "Part 1 - General aspects"
- ETS 300 133-2: "Part 2 - Service aspects"
- ETS 300 133-3: "Part 3 - Network aspects"
- ETS 300 133-4: "Part 4 - Air interface specification"
- ETS 300 133-5: "Part 5 - Receiver conformance specification"
- ETS 300 133-6: "Part 6 - Base station specification"
- ETS 300 133-7: "Part 7 - Operation and maintenance aspects"

This part, ETS 300 133-7, specifies the network management of the European Radio Message System (ERMES) system, specifically the Operations and Maintenance (O&M) aspects, including performance and Quality of Service (QOS) management.

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1 Scope

This part of the seven part European Telecommunication Standard (ETS) 300 133 describes the operations and maintenance aspects of the European Radio Message System (ERMES). It defines and describes the architecture of the telecommunication management network and also the network management functions. Telecommunication management network entities and the functional interfaces between these entities and the network elements are defined and described.

2 Normative references

This ETS incorporates by dated or 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 300 133-3 (1992): "Paging systems; European Radio Message System (ERMES) Part 3: Network aspects".

[2] ETS 300 133-2 (1992): "Paging systems; European Radio Message System (ERMES) Part 2: Service aspects".

[3] CCITT Recommendation M.60 "Maintenance terminology and definitions".

[4] CCITT Recommendation G.106: "Terms and definitions related to quality of service availability and reliability".

[5] CCITT Recommendation M.21: "Principles for a maintenance philosophy and considerations for maintenance strategy for telecommunication services".

[6] CCITT Recommendation M.20: "Maintenance philosophy for telecommunication networks".

[7] CCITT Recommendation M.30 (1990): "Principles for a telecommunication management network".

[8] CCITT Recommendation M.36: "Principles for the maintenance of ISDNs".

[9] CCITT Recommendation Q.795: "Operations, Maintenance and Administration Part (OMAP)".

[10] CCITT Recommendation X.219: "Remote operations: model, notation and service definitions".

[11] CCITT Recommendation X.217: "Association control service definition for open systems interconnection".

[12] CCITT Recommendation X.213: "Network service definition for open systems interconnection".

[13] CCITT Recommendation X.208: "Specification of abstract syntax notation one (ASN.1)".

[14] CCITT Recommendation X.209: "Specification of basic encoding rules for abstract syntax notation one (ASN.1)".

3 Definitions

For the purposes of this part of ETS 300 133, the following definitions shall apply.

Basic OSF: the operations system function which controls a network element.

Data communication function: the means for telecommunication management data exchange between function blocks.

ERMES Telecommunication Management Network (TMN): the operations and maintenance part of the overall ERMES paging network.

Interface OMC - BS: the functional interface between the operations and maintenance centre and a base station.

Interface OMC - PAC-OS: the functional interface between the operations and maintenance centre and the operations system of a paging area controller.

Interface OMC - PNC-OS: the functional interface between the operations and maintenance centre and the operations system of a paging network controller.

IOMC (OMC - OMC): the interface between different network operators' OMCs.

Maintenance: the technical, administrative and supervisory actions intended to keep an item in, or restore it to, a state in which it can perform its defined function.

Maintenance entity (ME): an equipment of the telecommunication network which is defined between two or more interfaces as an object of the network management strategy. The main MEs are the PNC, the PAC and the BS.

Mediation device: a stand alone device which performs mediation functions.

Mediation functions: functions which act on information passing between network element functions and operator system functions. Major mediation functions include communication control, protocol conversion and data handling, communication of primitive functions, processes involving decision making and data storage.

Network element: an element of the operator network.

Network operations system: performs the network basis telecommunication management network application functions by communicating with the basic operations system functions.

Operations: the combination of technical and administrative actions that enables an item to perform a given function.

Operations and maintenance centre: the control and data collection entity associated with a telecommunication management network.

Operations system: the stand alone system which performs operations system functions.

Operations systems functions: functions performed by the operations system. The OSFs process information related to telecommunication management to support and/or control the realisation of various telecommunication management functions.

Paging area controller - operations system: the basic operations system dealing with the paging area controller.

Paging network controller - operations system: the basic operations system dealing with the paging network controller.

PNC throughput: the number of elementary operations performed by a PNC in a time unit. The term "elementary operation" indicates the processing of an AdC or an information request message or a complete message. The throughput offers an idea of load distribution within the network. It can be used for singling out network bottle-necks, hence giving information for management and design purposes.

Quality Of Service (QOS): a combination of traffic performance, availability, service integrity, service support and service operability.

Telecommunication management network: the operations and maintenance part of an operator network. It provides management functions to the telecommunication network and offers communications between itself and the telecommunication network.

Work station function: the function providing communications between function blocks and the user.

4 Abbreviations

ACK/NACK	Positive/Negative acknowledgement
ACSE	Association Control Service Element
AdC	Address Code
ASN	Abstract Syntax Notation
BS	Base Station
DCF	Data Communication Functions
DCN	Data Communication Network
EOM	End of Message
FSI	Frequency Subset Indicator
FSN	Frequency Subset Number
GA	Geographical Area
HW	Hardware
I2	Interface PAC-BS
I3	Interface PNC-PAC
IOMC	Interface OMC-OMC
LCN	Local Communication Network
MD	Mediation Device
ME	Maintenance Entity
MEF	Maintenance Entity Function
MHS	Message Handling System
MF	Mediation Function
MMI	Man Machine Interface
NE	Network Element
NEF	Network Element Function
NM	Network Management
NMF	Network Management Function
OMC	Operations and Maintenance Centre
O&M	Operations and Maintenance
OS	Operations System
OSF	Operations System Functions
OSI	Open System Interconnect
PA	Paging Area
PAC	Paging Area Controller
PAC-OS	Paging Area Controller - Operations System
PDU	Protocol Data Unit
PNC	Paging Network Controller
PNC-H	Paging Network Controller - Home
PNC-I	Paging Network Controller - Input
PNC-OS	Paging Network Controller - Operations System
PNC-T	Paging Network Controller - Transmit
PSPDN	Packet Switched Public Data Network
PSTN	Public Switched Telephone Network
QAF	Q-Adapter Function
QOS	Quality of Service

ROSE	Remote Operations Service Element
RF	Radio Frequency
RP	Reference Point
SDU	Service Data Unit
SEF	Support Entity Function
SW	Software
TLC	Telecommunication
TMN	Telecommunication Management Network
TO	Tone Only
TX	Transmitter
WSF	Work-Station Function

5 ERMES telecommunication management network architecture

The ERMES system functional architecture is shown in figure 1. The telecommunication (TLC) and Telecommunication Management Network (TMN) environments are clearly separated.

The network management actions and functions required to support this network can be grouped in three categories:

- operations;
- maintenance;
- performance and Quality of Service (QOS) management.

A further category covering network administration is the responsibility of individual network operators and does not come within the scope of this specification.

Within each operator network the following network elements are the object of operations and maintenance actions:

- the Paging Network Controller (PNC);
- the Paging Area Controller (PAC);
- the Base Station (BS);
- the interconnection links.

Three classes of Operations System Functions (OSFs) can be identified in the network. The basic OSFs are associated with a particular network element. The network OSFs are responsible for management actions involving the entire network. The service OSFs are responsible for transactions between operator networks and interaction with service providers.

The entities which deal with the TMN part of the operator network are Operations and Maintenance Centre (OMC), PNC-OS, PAC-OS and Mediation Device (MD). In particular:

- the OMC deals with the network Operation System (OS) and service OS functions. The OMC controls all the Operations and Maintenance (O&M) functions in the operator network and exchanges data with other OMCs;

- the PNC-OS and PAC-OS deal with the basic OSFs related to the associated telecommunication entity;

- the MD handles the mediation functions for the connected BSs. It implements concentration, distribution and protocol conversion.

OSs and MDs can be functionally separated from the related network elements and they may be implemented together.

Each OS can have its own database where information about the entity status is stored. If lower level entities exist, some O&M information about them should also be stored in the database. This database may also contain information required by the telecommunication network.

Every network element should contain maintenance entity functions and support entity functions involved in the transfer of maintenance information, the failure handling process and basic traffic measurements. General aspects and the philosophy of operations, maintenance and performance management are described in Annex B along with Network Management Functions (NMFs) contained in the network elements and the OSFs.

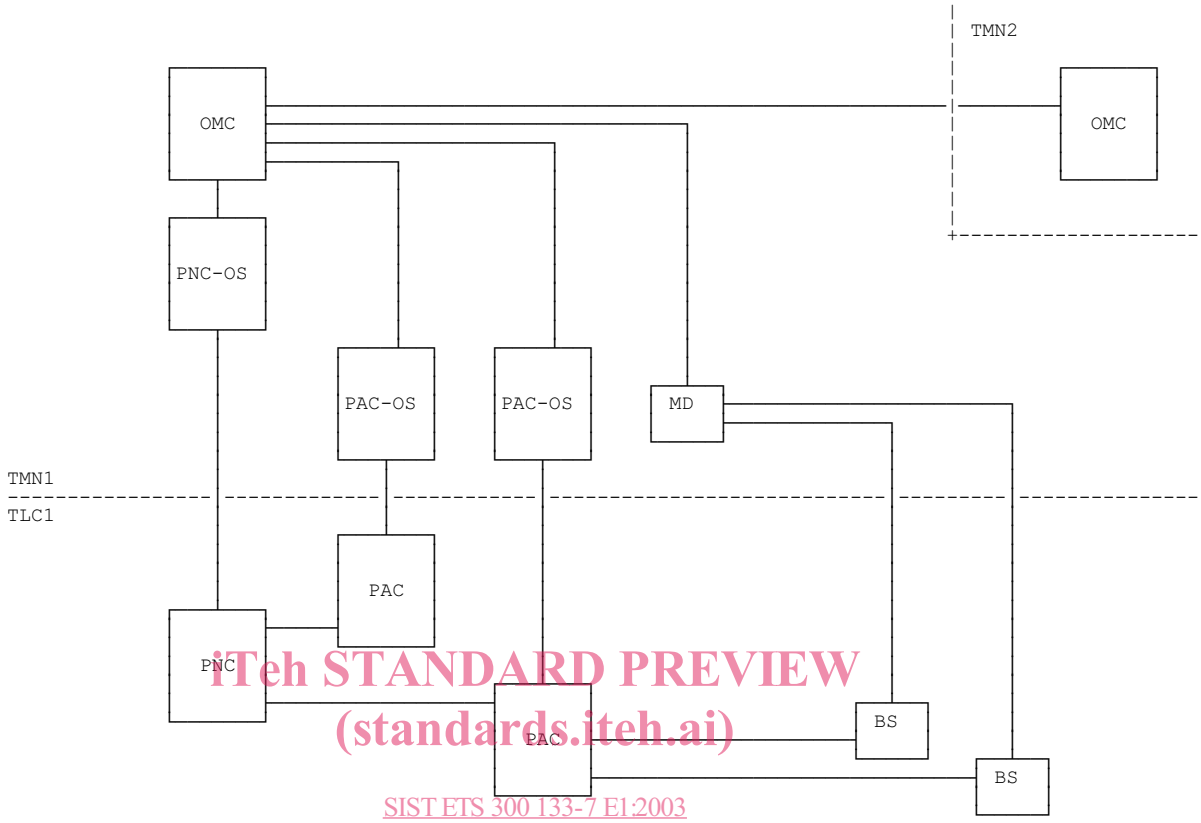

Figure 1: ERMES system functional architecture

6 Network management functions

6.1 General

The network management functions identified in Clause 5 are defined in this clause and other information which aids understanding of their characteristics and objectives, are described.

6.2 Operations

The term operations is intended to include configuration management as well as some of the more classical concepts such as status handling and recording functions.

6.2.1 Subscriber data management

Subscriber data management, as an administrative function, is mainly a network operator matter.

The subscription status database for both mobile and fixed subscribers is associated with the PNC as described in ETS 300 133-3 [1], subclauses 13.2.1 to 13.2.5.

The OMC can add or delete subscribers to the PNC database and modify the subscription status according to operator needs or user requests.

The operator may collect administrative and traffic demand data not directly related to the telecommunication process.