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ElectroMagnetic Compatibility and Radio Spectrum Matters (ERM); Enhanced Radio
MEssage System (ERMES); Part 7: Operation and maintenance aspects

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Foreword

This second edition European Telecommunication Standard (ETS) has been produced by the Electromagnetic compatibility and Radio spectrum Matters (ERM) Technical Committee of the European Telecommunications Standards Institute (ETSI).

This ETS comprises seven parts with the generic title "Electromagnetic compatibility and Radio spectrum Matters (ERM) Enhanced Radio MESSage System (ERMES)". The title of each part is listed below:

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

This part, ETS 300 133-7, specifies the network management of the Enhanced 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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IPRs essential or potentially essential to this ETS may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETR 314: "Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards", which is available **free of charge** from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<http://www.etsi.fr/ipr>).

Pursuant to the ETSI Interim IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETR 314 (or the updates on <http://www.etsi.fr/ipr>) which are, or may be, or may become, essential to this ETS.

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1 Scope

This European Telecommunication Standard (ETS), describes the operations and maintenance aspects of the Enhanced 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 the present document 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 (1997): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Enhanced Radio MESSAGE System (ERMES) Part 3: Network aspects".
- [2] ETS 300 133-2 (1997): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Enhanced Radio MESSAGE System (ERMES) Part 2: Service aspects".
- [3] ITU-T Recommendation M.60: "Maintenance terminology and definitions".
- [4] ITU-T Recommendation G.106: "Terms and definitions related to quality of service availability and reliability".
- [5] ITU-T Recommendation M.20: "Maintenance philosophy for telecommunication networks".
- [6] ITU-T Recommendation M.30 (1990): "Principles for a telecommunication management network".
- [7] ITU-T Recommendation X.219: "Remote operations: model, notation and service definitions".
- [8] ITU-T Recommendation X.217: "Association control service definition for open systems interconnection".
- [9] ITU-T Recommendation X.213: "Network service definition for open systems interconnection".
- [10] ITU-T Recommendation X.208: "Specification of abstract syntax notation one (ASN.1)".
- [11] ITU-T Recommendation X.209: "Specification of basic encoding rules for abstract syntax notation one (ASN.1)".

3 Definitions, abbreviations and symbols

3.1 Definitions

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

basic Operations System Functions (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 Operations and Maintenance Centre (OMC) - Base Station (BS): The functional interface between the operations and maintenance centre and a base station.

interface OMC - Paging Area Controller - Operations System (PAC-OS): The functional interface between the operations and maintenance centre and the operations system of a paging area controller.

interface OMC - Paging Network Controller - Operations System (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 Paging Network Controller (PNC), the Paging Area Controller (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: A system which 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 (OSF): Functions performed by the operations system. The OSFs process information related to telecommunication management to support and/or control the realization 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 Address Code (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.

3.2 Abbreviations

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

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
ERMES	Enhanced Radio Message System
FSI	Frequency Subset Indicator
FSN	Frequency Subset Number
GA	Geographical Area
HW	HardWare
LCN	Local Communication Network
MD	Mediation Device
ME	Maintenance Entity
MEF	Maintenance Entity Function
MF	Mediation Function
MHS	Message Handling System
NE	Network Element
NE	Network Entity
NEF	Network Element Function
NM	Network Management
O&M	Operations and Maintenance
OMC	Operations and Maintenance Centre
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

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

3.3 Symbols

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

ACK/NACK	Positive/Negative acknowledgement
I2	Interface PAC-BS
I3	Interface PNC-PAC
IOMC	Interface OMC-OMC

4 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 the present document.

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 Operations 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.

OS and MD 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, performance management and performance management are described in annex B along with Network Management Functions (NMFs) contained in the network elements and the OSFs.

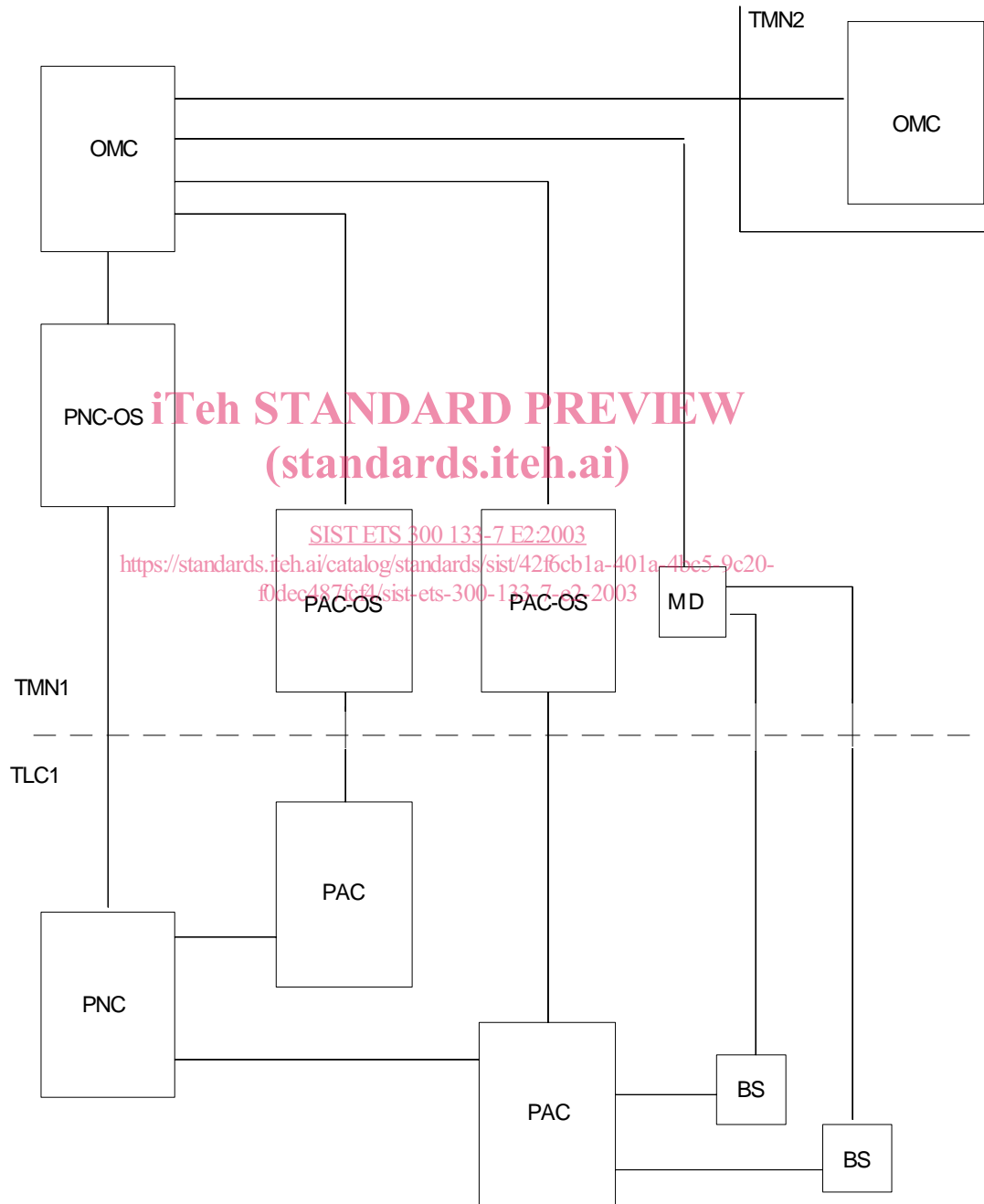


Figure 1: ERMES system functional architecture