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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

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

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
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Contents

Foreword

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1 Scope

The present document identifies and standardises the most important and strategic contexts in the physical architecture for the management of PLMNs. It serves as a framework to help define a telecom management physical architecture for a planned PLMN and to adopt standards and provide products that are easy to integrate.

The requirements identified in the present document are applicable to all further development of 3GPP Telecom Management specifications as well as the development of PLMN Management products. The present document can be seen as guidance for the development of all other Technical Specification addressing the management of PLMNs, except TS 32.101 [2].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] ITU-T Recommendation M.3010 (2000): "Principles for a Telecommunications management network".

[2] 3GPP TS 32.101: "Telecommunication management; Principles and high level requirements".

[3] Void.

[4] ITU-T Recommendation X.200 (1994): "Information technology - Open Systems Interconnection - Basic Reference Model: The basic model".

[5] 3GPP TS 32.150: "Telecommunication management; Integration Reference Point (IRP) Concept and definitions".

[6] Void.

[7] Void.

[8] Void.

[9] TMF GB910: "Smart TMN Telecom Operations Map (Release 2.1)". http://www.tmforum.org

[10] TMF GB909: "Smart TMN Technology Integration Map (Issue 1.1)". http://www.tmforum.org

[11] ITU-T Recommendation M.3013 (2000): "Considerations for a telecommunications management network".

[12] 3GPP TS 23.002: "Network architecture".

[13] 3GPP TS 23.101: "General UMTS Architecture".

[14] 3GPP TS 32.111-x: "Telecommunication management; Fault Management;".

[15] OMG: "Unified Modelling Language Specification, Version 1.4, September 2001". http://www.omg.org/technology/documents/formal/uml.htm

[16] ITU-T Recommendation M.3060/Y.2401 (2006): 'Principles for the Management of Next Generation Networks '.

[17] ETSI TS 188 001 V1.2.1 TISPAN; "NGN management; Operations Support Systems Architecture".

[18] ITU-T Recommendation Y.2011 (2004), "General principles and general reference model for Next Generation Networks".

[19] ITU-T Recommendation Y.2001 (2004), "General overview of NGN".

[20] ITU-T M.3050.x series (2004),"TMN Enhanced Telecom Operations Map (eTOM)".

3 Definitions and abbreviations

3.1 Definitions

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

architecture: organisational structure of a system or component, their relationships, and the principles and guidelines governing their design and evolution over time

closed interfaces: privately controlled system/subsystem boundary descriptions that are not disclosed to the public or are unique to a single supplier

de facto standard: standard that is widely accepted and used but that lacks formal approval by a recognised standards organisation

Information Service (IS): Defined in 3GPP TS 32.150 [5].**interface standard:** standard that specifies the physical or functional interface characteristics of systems, subsystems, equipment, assemblies, components, items or parts to permit interchangeability, interconnection, interoperability, compatibility, or communications

interoperability: ability of two or more systems or components to exchange data and use information

intra-operability: ability to interchange and use information, functions and services among components within a system

Integration Reference Point (IRP): Defined in 3GPP TS 32.150 [5].

Managed Object: Defined in 3GPP TS 32.150 [5].

management infrastructure: Defined in TS 32.101 [2]. **market acceptance:** means that an item has been accepted in the market as evidenced by annual sales, length of time available for sale, and after-sale support capability.

modular: pertaining to the design concept in which interchangeable units are employed to create a functional end product.

module: interchangeable item that contains components. In computer programming, a program unit that is discrete and identifiable with respect to compiling, combining with other modules, and loading is called a module.

Network Resource Model (NRM): Defined in 3GPP TS 32.150 [5].

Next Generation Networks Management (NGNM): Planning, provisioning, installation, maintenance, operation and administration of next generation telecommunications equipment for transmission or control of resources and services within NGN transport and service strata. NGNM is defined by ITU-T [16].

NGN service stratum: that part of the NGN which provides the user functions that transfer service-related data and the functions that control and manage service resources and network services to enable user services and applications.

NGN transport stratum: that part of the NGN which provides the user functions that transfer data and the functions that control and manage transport resources to carry such data between terminating entities.

open specifications: public specifications that are maintained by an open, public consensus process to accommodate new technologies over time and that are consistent with international standards

open standards: widely accepted and supported standards set by recognised standards organisation or the commercial market place. These standards support interoperability, portability, and scalability and are equally available to the general public at no cost or with a moderate license fee.

open systems strategy: focuses on fielding superior telecom capability more quickly and more affordably by using multiple suppliers and commercially supported practices, products, specifications, and standards, which are selected based on performance, cost, industry acceptance, long term availability and supportability, and upgrade potential.

physical architecture: minimal set of rules governing the arrangement, interaction, and interdependence of the parts or elements whose purpose is to ensure that a conformant system satisfies a specified set of requirements. The physical architecture identifies the services, interfaces, standards, and their relationships. It provides the technical guidelines for implementation of systems upon which engineering specifications are based and common building blocks are built.

PLMN Organisation: see 3GPP TS 32.101 [2].

plug&play: term for easy integration of HW/SW

portability: the ease with which a system, component, data, or user can be transferred from one hardware or software environment to another

proprietary specifications: specifications, which are exclusively owned by a private individual or corporation under a trademark or patent, the use of which would require a license

reference model: a generally accepted abstract representation that allows users to focus on establishing definitions, building common understandings and identifying issues for resolution. For TMN Systems acquisitions, a reference model is necessary to establish a context for understanding how the disparate technologies and standards required to implement TMN relate to each other. A reference model provides a mechanism for identifying the key issues associated with applications portability, modularity, scalability and interoperability. Most importantly, reference models will aid in the evaluation and analysis of domain-specific architectures.

scalability: capability to adapt hardware or software to accommodate changing workloads

service specific entities: entities dedicated to the provisioning of a given (set of) service(s). The fact that they are implemented or not in a given PLMN should have limited impact on all the other entities of the PLMN.

Solution Set (SS): Defined in 3GPP TS 32.150 [5].

specification: document that prescribes, in a complete, precise, verifiable manner, the requirements, design, behaviour, or characteristics of a system or system component

standard: document that establishes uniform engineering and technical requirements for processes, procedures, practices, and methods. Standards may also establish requirements for selection, application, and design criteria of material.

standards based architecture: architecture based on an acceptable set of open standards governing the arrangement, interaction, and interdependence of the parts or elements that together may be used to form a TMN System, and whose purpose is to insure that a conformant system satisfies a specified set of requirements.

Support IOC: defined in TS 32.150 [5].

system : any organised assembly of resources and procedures united and regulated by interaction or interdependence to accomplish a set of specific functions

System Architecture (SA): description, including graphics, of systems and interconnections providing for or supporting management functions. The SA defines the physical connection, location, and identification of the key nodes, circuits, networks, platforms, etc., and specifies system and component performance parameters. It is constructed to satisfy Operational Architecture requirements per standards defined in the Physical Architecture. The SA shows how multiple systems within a subject area link and inter-operate, and may describe the internal construction or operations of particular systems within the architecture.

3.2 Abbreviations

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

3G	3rd Generation
AAA	Authentication, Authorisation and Accounting
AN	Access Network
AS	Application Server
ATM	Asynchronous Transfer Mode
AUC	Authentication Centre
B2B	Business-to-Business
BG	Border Gateway
BGCF	Breakout Gateway Control Function
BM-SC	Broadcast-Multicast Service Centre
BSC	Base Station Controller
BSS	Base Station Subsystem
BTS	Base Transceiver Station
C2B	Customer-to-Business
CAMEL	Customised Applications for Mobile network Enhanced Logic
CBC	Cell Broadcast Center
CBS	Cell Broadcast Service
CMIS	Common Management Information Service
CMISE	Common Management Information Service Element
CN	Core Network
CORBA	Common Object Request Broker Architecture
CRF	Charging Rules Function
CS	Circuit Switched
CSCF	Call Session Control Function
DCN	Data Communication Network
DECT	Digital Enhanced Cordless Telecommunications
DSS1	Digital Subscriber System 1
EIR	Equipment Identity Register
EM	Element Manager
E-OS	Element Management Layer-Operations System
F/W	Firewall
FM	Fault Management
FTAM	File Transfer, Access and Management
GCR	Group Call Register
GDMO	Guidelines for the Definition of Managed Objects
GGSN	Gateway GPRS Support Node
GMLC	Gateway Mobile Location Center
GMSC	Gateway MSC
GPRS	General Packet Radio Service
GTT	Global Text Telephony
HLR	Home Location Register
HMI	Human Machine Interface
HSS	Home Subscriber Server
HTTP	HyperText Transfer Protocol
HW	Hardware
I-CSCF	Interrogating CSCF
IBCF	Interconnection Border Control Function
IDL	Interface Definition Language
IIOP	Internet Inter-ORB Protocol
IMS	IP Multimedia Subsystem

INAP	Intelligent Network Application Part
IP	Internet Protocol
IRP	Integration Reference Point
IS	Information Service
ISDN	Integrated Services Digital Network
IWU	Inter Working Unit
LCS	Location Services
LLA	Logical Layered Architecture
LMU	Location Measurement Unit
MBMS	Multimedia Broadcast Multicast Service
MD	Mediation Device
ME	Mobile Equipment
MGCF	Media Gateway Control Function
MIB	Management Information Base
MMI	Man-Machine Interface
MML	Man-Machine Language
MMS	Multimedia Messaging Service
MNP	Mobile Number Portability
MNP-SRF	Mobile Number Portability/Signalling Relay Function
MRF	Multimedia Resource Function
MRFC	Multimedia Resource Function Controller
MRFP	Multimedia Resource Function Processor
MSC	Mobile service Switching Centre
MT	Mobile Termination
NE	Network Element
NGN	Next Generation Networks
NGNM	Next Generation Networks Management
NM	Network Manager
N-OS	Network Management Layer-Operations System
NPDB	Number Portability Database
NR	Network Resource
NRM	Network Resource Model
NSS	Network Switching Subsystem
NW	Network
OMG	Object Management Group
OS	Operations System
OSA	Open Services Access
OSF	Operations System Functions
P-CSCF	Proxy CSCF
PDH	Plesiochronous Digital Hierarchy
PS	Packet Switched
PSA	Product Specific Applications
PSS	Packet Switched Service
PSTN	Public Switched Telephone Network
QA	Q-Adapter
QoS	Quality of Service
RNC	Radio Network Controller
RNS	Radio Network System
RSVP	Resource ReserVation Protocol
S-CSCF	Serving CSCF
SDH	Synchronous Digital Hierarchy
SEF	Service Element Function
SGSN	Serving GPRS Support Node
SGW	Signalling Gateway
SIM	Subscriber Identity Module
SLA	Service Level Agreement
SLF	Subscription Locator Function
SMI	Structure of Management Information
SMLC	Serving Mobile Location Center
SMS	Short Message Service
SNM	Sub-Network Manager
SNMP	Simple Network Management Protocol

SS	Solution Set
SS7	Signalling System No. 7
SW	Software
TA	Terminal Adapter
TE	Terminal Equipment
TEF	Transport Element Function
TM	Telecom Management
TMN	Telecommunications Management Network as defined in ITU-T Recommendation M.3010 [1]
TrGW	Transition Gateway
UE	User Equipment
UML	Unified Modelling Language
USAT	USIM/SIM Application Toolkit
USIM	UMTS Subscriber Identity Module
UTRA	Universal Terrestrial Radio Access
UTRAN	Universal Terrestrial Radio Access Network
VHE	Virtual Home Environment
VLR	Visitor Location Register
WAG	WLAN Access Gateway
WBEM	Web Based Enterprise Management
WS	WorkStation

4 General

4.1 PLMN Telecom Management

4.1.1 3GPP Reference Model

A 3GPP System is made of the following components:

- one or more Access Networks, using different types of access techniques (GSM, UTRA, DECT, PSTN, ISDN, ...) of which at least one is UTRA;
- one or more Core Networks;
- one or more Intelligent Node Networks, service logic and mobility management, (IN, GSM ...);
- one or more transmission networks (PDH, SDH etc) in various topologies (point-to-point, ring, point-to-multipoint etc) and physical means (radio, fibre, copper, etc.).

The 3GPP system components have signalling mechanisms among them (DSS1, INAP, MAP, SS7, RSVP, etc.).

From the service perspective, the 3GPP system is defined to offer:

- service support transparent to the location, access technique and core network, within the bearer capabilities available in one particular case;
- user to terminal and user to network interface (MMI) irrespective of the entities supporting the services required (VHE);
- multimedia capabilities.

4.1.2 3GPP Provisioning Entities

Two major entities, which cover the set of 3GPP functionalities involved in the provision of the 3GPP services to the user, are identified as follows:

- **Home Environment:** This entity holds the functionalities that enable a user to obtain 3GPP services in a consistent manner regardless of the user's location or the terminal used.
- **Serving Network:** This entity provides the user with access to the services of the Home Environment.