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INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS
AND NEXT-GENERATION NETWORKS

Next Generation Networks – Generalized mobility

Fixed mobile convergence with a common IMS session control domain

Recommendation ITU-T Y.2808

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**GLOBAL INFORMATION INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS AND NEXT-
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GLOBAL INFORMATION INFRASTRUCTURE

General	Y.100–Y.199
Services, applications and middleware	Y.200–Y.299
Network aspects	Y.300–Y.399
Interfaces and protocols	Y.400–Y.499
Numbering, addressing and naming	Y.500–Y.599
Operation, administration and maintenance	Y.600–Y.699
Security	Y.700–Y.799
Performances	Y.800–Y.899

INTERNET PROTOCOL ASPECTS

General	Y.1000–Y.1099
Services and applications	Y.1100–Y.1199
Architecture, access, network capabilities and resource management	Y.1200–Y.1299
Transport	Y.1300–Y.1399
Interworking	Y.1400–Y.1499
Quality of service and network performance	Y.1500–Y.1599
Signalling	Y.1600–Y.1699
Operation, administration and maintenance	Y.1700–Y.1799
Charging	Y.1800–Y.1899
IPTV over NGN	Y.1900–Y.1999

NEXT GENERATION NETWORKS

Frameworks and functional architecture models	Y.2000–Y.2099
Quality of Service and performance	Y.2100–Y.2199
Service aspects: Service capabilities and service architecture	Y.2200–Y.2249
Service aspects: Interoperability of services and networks in NGN	Y.2250–Y.2299
Numbering, naming and addressing	Y.2300–Y.2399
Network management	Y.2400–Y.2499
Network control architectures and protocols	Y.2500–Y.2599
Future networks	Y.2600–Y.2699
Security	Y.2700–Y.2799
Generalized mobility	Y.2800–Y.2899
Carrier grade open environment	Y.2900–Y.2999

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Recommendation ITU-T Y.2808

Fixed mobile convergence with a common IMS session control domain

Summary

Recommendation ITU-T Y.2808 describes principles, service and network capabilities, and architectures for IP multimedia subsystem (IMS) based fixed-mobile convergence (FMC).

Source

Recommendation ITU-T Y.2808 was approved on 29 June 2009 by ITU-T Study Group 13 (2009-2012) under Recommendation ITU-T A.8 procedures.

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Convergence, fixed, fixed-mobile convergence (FMC), IP multimedia subsystem (IMS), international mobile telecommunication (IMT), mobile.

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CONTENTS

Page

1	Scope	1
2	References.....	1
3	Definitions	2
3.1	Terms defined elsewhere	2
3.2	Terms defined in this Recommendation.....	3
4	Abbreviations and acronyms	3
5	Conventions	5
6	IMS based FMC architecture.....	5
7	NGN domain model and convergence levels	6
7.1	IMS-based NGN reference model	6
7.2	Principles of IMS-based service convergence.....	8
7.3	Convergence levels.....	8
8	IMS-based FMC capabilities	10
8.1	Service-level convergence and service continuity	10
8.2	Session-control level convergence and convergence services	14
8.3	Security capabilities.....	15
8.4	Public services capabilities.....	16
9	Service level convergence architecture and FMC functions	17
9.1	Architecture and FMC functions for PS-PS service continuity.....	17
9.2	Architecture and FMC functions for PS-CS service continuity	19
	Appendix I – Architecture of the current converged network	21
I.1	3GPP architecture	21
I.2	3GPP2 architecture	23
I.3	3GPP evolved packet system.....	24
I.4	VCC architecture	27
	Appendix II – Transport level convergence.....	29
	Bibliography.....	30

ITU-T Y.2808 2009

Recommendation ITU-T Y.2808

Fixed mobile convergence with a common IMS session control domain

1 Scope

This Recommendation describes the principles, service and network capabilities, and architectures for IP multimedia subsystem (IMS) based fixed-mobile convergence (FMC).

This Recommendation describes a network architecture that uses IMS to provide the same set of services to user terminals, regardless of whether they use fixed or mobile access network technologies, and ensures service continuity when the point of attachment of the terminal changes between different access network technologies.

The architecture employs the functional entities groupings defined in [ITU-T Y.2021] for IMS related entities, and [ITU-T Y.2012] for non-IMS related entities functionality. This Recommendation details IMS FMC specific architectural entities requirements which are generically defined in [ITU-T Y.2012] and [ITU-T Y.2021].

Although this Recommendation is focused on future IMS-based networks, some legacy fixed network requirements are also addressed.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- | | |
|------------------|---|
| [ITU-T Q.1707] | Recommendation ITU-T Q.1707/Y.2804 (2008), <i>Generic framework of mobility management for next generation networks</i> . |
| [ITU-T Q.1741.5] | Recommendation ITU-T Q.1741.5 (2008), <i>IMT-2000 references to Release 7 of GSM-evolved UMTS core network</i> . |
| [ITU-T Q.1742.5] | Recommendation ITU-T Q.1742.5 (2006), <i>IMT-2000 references (approved as of 31 December 2005) to ANSI-41 evolved core network with cdma2000 access network</i> . |
| [ITU-T Q.1761] | Recommendation ITU-T Q.1761 (2004), <i>Principles and requirements for convergence of fixed and existing IMT-2000 systems</i> . |
| [ITU-T Q.1762] | Recommendation ITU-T Q.1762/Y.2802 (2007), <i>Fixed-mobile convergence general requirements</i> . |
| [ITU-T Y.2012] | Recommendation ITU-T Y.2012 (2006), <i>Functional requirements and architecture of the NGN release 1</i> . |
| [ITU-T Y.2014] | Recommendation ITU-T Y.2014 (2008), <i>Network attachment control functions in next generation networks</i> . |
| [ITU-T Y.2021] | Recommendation ITU-T Y.2021 (2006), <i>IMS for Next Generation Networks</i> . |
| [ITU-T Y.2031] | Recommendation ITU-T Y.2031 (2006), <i>PSTN/ISDN emulation architecture</i> . |

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 convergence [ITU-T Q.1761]: Coordinated evolution of formerly discrete networks towards uniformity in support of services and applications.

3.1.2 discrete mobility [ITU-T Q.1761]: See "Nomadism".

3.1.3 discrete terminal mobility [ITU-T Q.1761]: Ability to have discrete mobility using the same terminal.

3.1.4 fixed mobile convergence [ITU-T Q.1762]: In a given network configuration, the capabilities that provide services and application to the end user defined in Recommendation ITU-T Y.2091 regardless of the fixed or mobile access technologies being used and independent of the user's location. In the NGN environment (ITU-T Y.2011), it means to provide NGN services to end users regardless of the fixed or mobile access technologies being used.

3.1.5 handover [b-ITU-T Q.1706]: The ability to provide services with some impact on their service level agreements to a moving object during and after movement.

3.1.6 home network [b-ITU-T Q.1706]: The network to which a mobile user is normally connected, or the service provider with which the mobile user is associated, and where the user's subscription information is managed.

3.1.7 mobility [ITU-T Q.1761]: Ability to provide services irrespective of changes that may occur by user/terminal's activities. The user is able to change his network access point, as he moves, without interrupting his current service session, i.e., handovers are possible. In some situations, the handover may lead to a briefly suspended service session or it may require a change in the level of service provided as a consequence of the capabilities of the new access point to which the user has become connected through the handover process.

3.1.8 mobility management [b-ITU-T Q.1706]: The set of functions used to provide mobility. These functions include authentication, authorization, location updating, paging, download of user information and more.

3.1.9 nomadism [ITU-T Q.1761]: Ability of the user to change his network access point after moving; when changing the network access point, the user's service session is completely stopped and then started again, i.e., there is no handover possible. It is assumed that the normal usage pattern is that users shutdown their service session before moving to another access point or changing terminal. This is the mobility alluded to in the case of fixed mobile convergence.

3.1.10 personal mobility [ITU-T Q.1761]: Ability of a user to access telecommunication services at any terminal on the basis of a personal identifier, and the capability of the network to provide those services according to the user's service profile.

NOTE – Personal mobility involves the network capability to locate the terminal associated with the user for the purposes of addressing, routing and charging of the user's calls.

3.1.11 roaming [b-ITU-T Q.1706]: The ability for a user to function in a serving network different from the home network.

NOTE – This is the ability of the users to access services according to their user profile while moving outside of their subscribed home network, i.e., by using an access point of a visited network. This requires the ability of the user to get access to the visited network, the existence of an interface between home network and visited network, as well as a roaming agreement between the respective network operators.

3.1.12 seamless handover [b-ITU-T Q.1706]: It is a special case of mobility with service continuity since it preserves the ability to provide services without any impact on their service level agreements to a moving object during and after movement.

3.1.13 seamless service [b-ITU-T Q.1706]: A service that is implemented such that it will ensure that users will not experience any service disruptions while changing the point of attachment.

3.1.14 service continuity [b-ITU-T Q.1706]: The ability for a moving object to maintain ongoing service over including current states, such as user's network environment and session for a service.

3.1.15 terminal mobility [b-ITU-T Q.1706]: This is the mobility for those scenarios where the same terminal equipment is moving or is used at different locations. It includes the ability of a terminal to access telecommunication services from different locations and while in motion, and the capability of the network to identify and locate that terminal.

3.1.16 visited network [b-ITU-T Y.2091]: The network that is local to the customer in a roaming configuration.

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

2G	Second Generation
3G	Third Generation
AAA	Authentication, Authorization and Accounting
AC	Authentication Centre
AGW	Access Gateway
AKA	Authentication and Key Agreement
AN	Access Network
B2BUA	Back to Back User Agent
BRAS	Broadband Remote Access Server
CAMEL	Customized Applications for Mobile network Enhanced Logic
CAN	Connectivity Access Network
CAVE	Cellular Authentication and Voice Encryption
CMIP	Client MIP
CN	Core Network
CS	Circuit Switched
CSI	Combining CS and IMS services
CSRN	CS domain Routing Number
DSL	Digital Subscriber Line
DSLAM	Digital Subscriber Line Access Multiplexer
EPC	Evolved Packet Core
EPS	Evolved Packet System

FMC	Fixed Mobile Convergence
GERAN	GSM Edge Radio Access Network
GGSN	Gateway GPRS Supporting Node
GMSC	Gateway MSC
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System (for) Mobile (communications)
GTP	GPRS Tunnelling Protocol
HSS	Home Subscriber Server
ICS	IMS Centralized Services
IMS	IP Multimedia Subsystem
IMT-2000	International Mobile Telecommunications – 2000
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ISIM	IMS Subscriber Identity Module
ISUP	ISDN User Part
IWF	Inter-Working Function
LAN	Local Area Network
MGCF	Media Gateway Control Function
MIH	Media Independent Handover
MIIS	MIH Information Server
MIP	Mobile IP
MME	Mobility Management Entity
MMSC	MultiMedia Service Continuity
MSC	Mobile Switching Centre
MT	Mobile Terminal
NACF	Network Attachment Control Function
NASS	Network Attachment Sub-System
NAT	Network Address Translation
NIS	Network Information Server
P-CSCF	Proxy-Call Session Control Function
PCRF	Policy and Charging Resource Function
PDA	Personal Digital Assistant
PDN	Packet Data Network
PES	PSTN/ISDN Emulation Subsystem
PLMN	Public Land Mobile Network
PMIP	Proxy MIP

PS	Packet Switched
PSDN	Packet Switched Data Network
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RACF	Radio Access Control Function
RAN	Radio Access Network
RNC	Radio Network Controller
S-CSCF	Serving-Call Session Control Function
SCP	Service Control Point
SGW	Serving Gateway
SIM	Subscriber Identity Module
SMS	Short Message Service
UE	User Equipment
UICC	Universal Integrated Circuit Card
UMA	Unlicensed Mobile Access
UMTS	Universal Mobile Telecommunications System
UPE	User Plane Entity
UTRAN	UMTS Radio Access Network
VCC	Voice Call Continuity
VHE	Virtual Home Environment
VMSC	Visited MSC
VSC	Voice Service Continuity
WLAN	Wireless LAN

5 Conventions

There is no particular notation, style, presentation, or other conventions used this Recommendation.

6 IMS based FMC architecture

The long-term goal for fixed mobile convergence (FMC) is to provide users with seamless services across fixed and mobile environments. It does not matter from the user's perspective with which architecture this seamless service experience is achieved. This is however very relevant from a network operator's perspective because it impacts the architecture requirements for providing such services.

Principles and requirements for convergence of fixed and existing IMT-2000 systems described in [ITU-T Q.1761] address the opportunities, in the near to medium term, that may be enabled by providing capabilities to enable IMT-2000 roaming users to access their basic and enhanced services. In addition, fixed-mobile convergence general requirements provided in [ITU-T Q.1762] address the high-level requirements leading to the development of recommendations and implementation guidelines for the realization of fixed mobile convergence (FMC).

The high level FMC architecture defined in this Recommendation is depicted in Figure 1. The architecture assumes a common IMS service platform for the delivery of services over fixed and mobile networks.

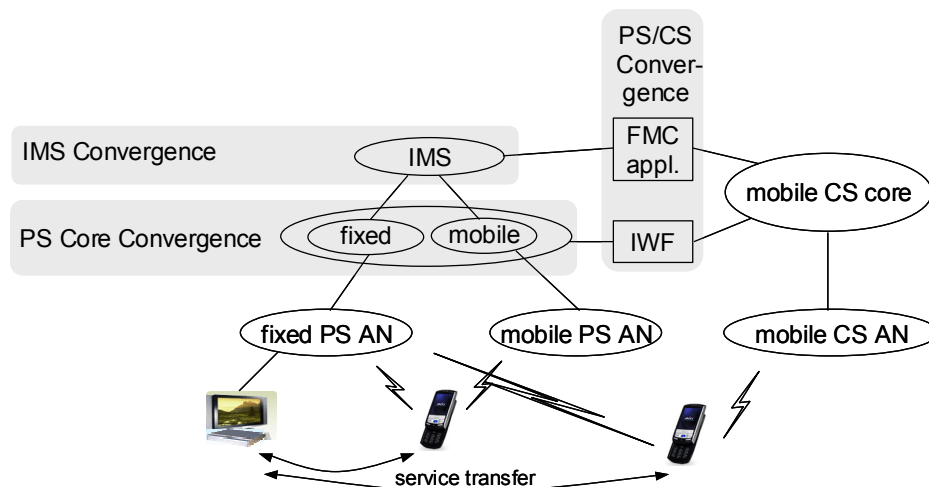


Figure 1 – High-level IMS based FMC architecture

The converged IMS platform may be used to transfer services between terminals attached to different networks based on reachability, user preferences or at the user's explicit request. It may also be used to transfer services from one access to another access in order to provide service continuity for multi-mode terminals that can attach to both fixed and mobile access points. IMS-based service level transfer and handover is studied in this Recommendation.

The alternative for service level handover is transport level handover through the use of a suitable mobility management protocol. This type of handover requires a common packet switched core where the authorization of network attachment and the quality of service (QoS) context of the attachment can be transferred from one access to another. Packet switched (PS) core convergence to enable transport level handover is studied in this Recommendation.

In view of the ubiquitous deployment of circuit switched mobile networks, this Recommendation also considers architectures to provide service continuity between an IMS controlled packet switched network and circuit switched (CS) mobile networks. This type of architecture requires specific PS/CS convergence functions to bridge the IMS controlled network and the CS network. These are represented by a service level FMC application and a transport level inter-working function (IWF), as illustrated in Figure 1. The convergence functions are drawn between the two networks to illustrate their bridging nature. These functions will, however, be contained within the IMS network, as the intent of the architecture is to reuse existing CS interfaces.

Note that IMS-based public switched telephone network (PSTN)/integrated services digital network (ISDN) emulation architecture [ITU-T Y.2031] could also be considered as an IMS-based FMC architecture, since the converged IMS may provide circuit-switched emulated services to mobile as well as PSTN/ISDN terminals. This FMC scenario is detailed in [ITU-T Y.2262] and is outside of the scope of this Recommendation.

7 NGN domain model and convergence levels

7.1 IMS-based NGN reference model

Figure 2 depicts an abstracted IMS-based NGN reference model for both fixed and mobile network environments. This model, derived from the NGN framework architecture [ITU-T Y.2012], is used in this Recommendation to describe the different levels of convergence that can be achieved.