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**SERIES Y: GLOBAL INFORMATION
INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS
AND NEXT-GENERATION NETWORKS**

**Next Generation Networks – Service aspects: Service
capabilities and service architecture**

Functional model and service scenarios for QoS-enabled mobile VoIP service

Recommendation ITU-T Y.2237



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Recommendation ITU-T Y.2237

Functional model and service scenarios for QoS-enabled mobile VoIP service

Summary

Recommendation ITU-T Y.2237 introduces a functional model and service scenarios for QoS-enabled mobile VoIP service in WiFi, 3G, and mobile WiMAX networks. In this Recommendation, mobile VoIP service is assumed to be provided by application of Layer 2 authentication and make-before-break based service continuity in the transport stratum.

The functional model used for the description of service scenarios provided in this Recommendation is based on components and entities defined in Recommendation ITU-T Y.2012 covering user terminal, networks and media handling related aspects.

History

Edition	Recommendation	Approval	Study Group
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Mobile WiMAX, mobility, VoIP, WiFi, 3G.

FOREWORD

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Recommendation ITU-T Y.2237

Functional model and service scenarios for QoS-enabled mobile VoIP service

1 Scope

This Recommendation introduces a functional model and service scenarios related to the support of QoS-enabled mobile voice over IP (VoIP) service in WiFi, 3G, and mobile WiMAX networks. More specifically, this Recommendation provides a description of:

- a functional model applicable to the context of QoS-enabled mobile VoIP service;
- service scenarios related to the provision of QoS-enabled mobile VoIP service:
 - in a single operator's network which supports either WiFi, 3G or mobile WiMAX;
 - in multiple operator's networks, each supporting a different wireless network, e.g., a WiFi, mobile WiMAX or 3G wireless network;
 - in a single operator's network where the user terminal moves between different wireless access networks.

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.1706] Recommendation ITU-T Q.1706/Y.2801 (2006), *Mobility management requirements for NGN*.
- [ITU-T Q.1707] Recommendation ITU-T Q.1707/Y.2804 (2008), *Generic framework of mobility management for next generation networks*.
- [ITU-T Q.1708] Recommendation ITU-T Q.1708/Y.2805 (2008), *Framework of location management for NGN*.
- [ITU-T Y.2001] Recommendation ITU-T Y.2001 (2004), *General overview of NGN*.
- [ITU-T Y.2012] Recommendation ITU-T Y.2012 (2006), *Functional requirements and architecture of the NGN*.
- [ITU-T Y.2014] Recommendation ITU-T Y.2014 (2008), *Network attachment control functions in next generation networks*.
- [ITU-T Y.2018] Recommendation ITU-T Y.2018 (2009), *Mobility management and control framework and architecture within the NGN transport stratum*.
- [ITU-T Y.2111] Recommendation ITU-T Y.2111 (2008), *Resource and admission control functions in next generation networks*.
- [ITU-T Y.2201] Recommendation ITU-T Y.2201 (2009), *Requirements and capabilities for ITU-T NGN*.
- [ITU-T Y.2701] Recommendation ITU-T Y.2701 (2007), *Security requirements for NGN release 1*.

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[ITU-T Y.2702] Recommendation ITU-T Y.2702 (2008), *Authentication and authorization requirements for NGN release 1*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 functional entity [ITU-T Y.2012]: An entity that comprises an indivisible set of specific functions. Functional entities are logical concepts, while groupings of functional entities are used to describe practical, physical implementations.

3.1.2 functional model [b-ITU-R M.1224]: A model which identifies and defines functional entities and relationships between these functional entities.

3.1.3 host-based mobility [ITU-T Y.2018]: A mode of operation whereby the mobile UE takes an active role in the provision of mobility service at layer 3, in particular by contacting the mobile service provider directly to invoke this service after gaining network access.

3.1.4 location identifier (LID) [ITU-T Q.1707]: A topological location identifier of a user equipment (UE). An IP address can be used as a location identifier.

3.1.5 network-based mobility [ITU-T Y.2018]: A mode of operation whereby the mobile UE does not take an active role in the provision of mobility service at layer 3.

3.1.6 persistent location identifier (PLID) [ITU-T Q.1708]: A location identifier that does not change even when a mobile user equipment (MUE) moves across different access networks or IP subnets.

3.1.7 seamless service [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.

3.1.8 service continuity [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.

3.1.9 temporary location identifier (TLID) [ITU-T Q.1708]: A location identifier that changes when a mobile user equipment (MUE) moves across different access networks or IP subnets.

3.1.10 terminal mobility [ITU-T Q.1706]: This is the mobility for those scenarios where the same terminal equipment is moving or is used at different locations. 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.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 persistent IP address: An IP address that does not change even when a user equipment moves across different access networks or IP subnets.

NOTE – A persistent IP address can be used as a persistent location identifier; see clause 3.1.6.

3.2.2 temporary IP address: An IP address that changes when a user equipment moves across different access networks or IP subnets.

NOTE – A temporary IP address can be used as a temporary location identifier; see clause 3.1.9.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

3G	Third Generation wireless system
AAA	Authentication Authorization Accounting
ABG-FE	Access Border Gateway Functional Entity
AM-FE	Access Management Functional Entity
AN-FE	Access Node Functional Entity
AR-FE	Access Relay Functional Entity
AP	Access Point
BSC	Base Station Controller
CSCF	Call Session Control Function
DNS	Domain Name Server
EN-FE	Edge Node Functional Entity
FRA	Functional Requirements and Architecture
HA	Home Agent
HDC-FE	Handover Decision and Control Functional Entity
HSS	Home Subscriber Server
IBG-FE	Interconnection Border Gateway Functional Entity
I-CSC-FE	Interrogating-Call Session Control Functional Entity
IMS	IP Multimedia Subsystem
IP	Internet Protocol
L2	Layer 2
L2HEF	Layer 2 Handover Execution Function
L3	Layer 3
L3HEF	Layer 3 Handover Execution Function
MAC	Media Access Control
MLM-FE	Mobile Location Management Functional Entity
MMCF	Mobility Management and Control Functions
NACF	Network Attachment Control Functions
NAC-FE	Network Access Configuration Functional Entity
OUT	Originating User Terminal
P-CSCF	Proxy-Call Session Control Function
P-CSC-FE	Proxy Call Session Control Functional Entity
PDA	Personal Digital Assistant
PD-FE	Policy Decision Functional Entity
QoS	Quality of Service
RACF	Resource and Admission Control Functions



RAS	Radio Access Station
SAA-FE	Service Authentication and Authorization Functional Entity
S-CSC-FE	Serving-Call Session Control Functional Entity
SCF	Service Control Functions
SIP	Session Initiation Protocol
SL-FE	Subscription Locator Functional Entity
SUP-FE	Service User Profile Functional Entity
TAA-FE	Transport Authentication and Authorization Functional Entity
TRC-FE	Transport Resource Control Functional Entity
TUT	Terminating User Terminal
UT	User Terminal
VoIP	Voice over Internet Protocol
WiFi	Wireless Fidelity
WiMAX	Worldwide interoperability for Microwave Access
WLAN	Wireless Local Area Network

5 Conventions

None.

6 Overview

In this Recommendation, mobile voice over IP service is assumed to be a seamless service as defined in clause 3.1.7, i.e., a VoIP service that is implemented such that it will ensure that mobile users will not experience any service disruptions while changing the point of attachment. Mobile VoIP service requires the support of service continuity for terminal mobility taking into account network conditions (e.g., the number of user sessions, mobility events and bandwidth consumption) and users' requirements.

QoS enabled mobile VoIP service is a mobile VoIP service which has the characteristic of ensuring the QoS when the user terminal moves, e.g., changes from one access point to another one. This service requires some form of adaptation in order to support service continuity when users' requirements and network conditions mismatch. Adaptation may include negotiation/renegotiation of network QoS and/or terminal parameters (e.g., codec change/adaptation).

When the user terminal moves between different networks, network QoS parameters may either be maintained or adapted. Network QoS parameters include information such as IP layer available bandwidth, maximum packet transfer delay, jitter, packet loss rate, burst loss rate, packet delay variation tolerance, packets per second, etc.

Figure 1 illustrates a general network architecture involving two operators supporting different types of access networks, i.e., cellular access networks (such as 3G), WiFi access networks and mobile WiMAX access networks, and where users of the mobile VoIP service may move between different access networks in the same operator domain or between different operator domains.

As shown in Figure 1, NGN architectural components, i.e., service control functions (SCF), mobility management and control functions (MMCF), network attachment control functions (NACF) and resource and admission control functions (RACF), are assumed to be used for supporting the QoS enabled mobile VoIP service.

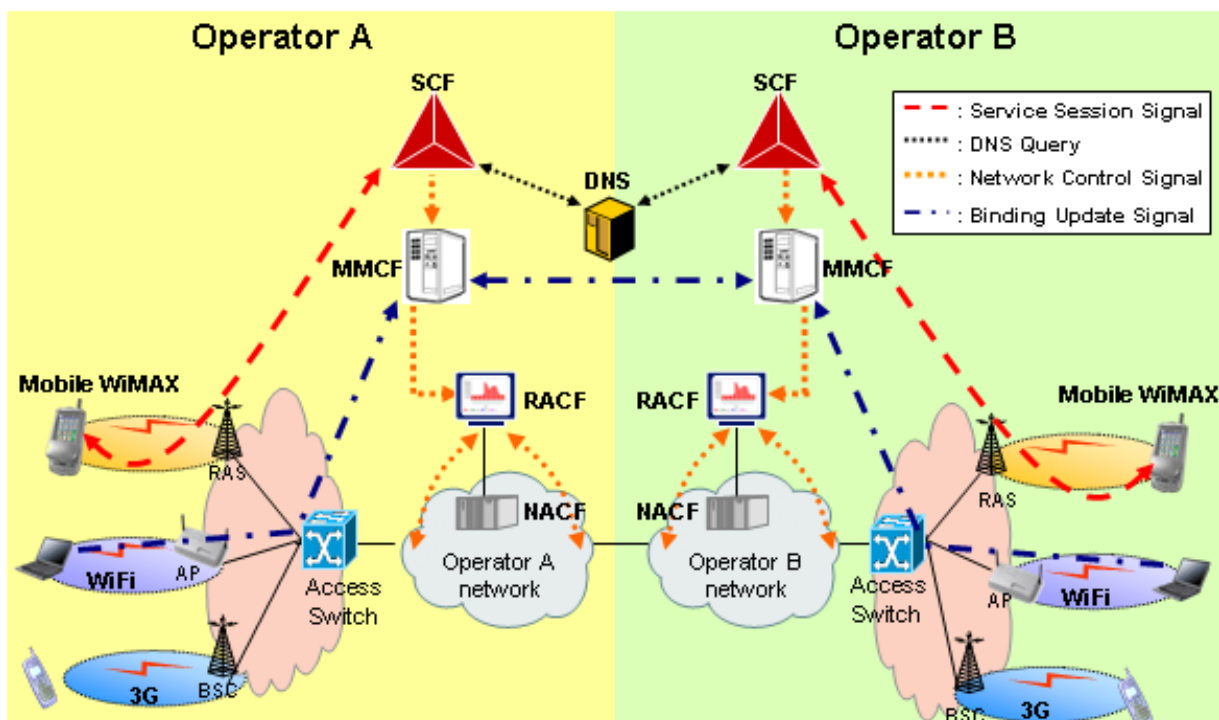


Figure 1 – General network architecture for QoS enabled mobile VoIP service

The objective of this Recommendation is to describe corresponding service scenarios for the case where QoS enabled mobile VoIP service is provided to the mobile users. The following provides the functional model used for describing the corresponding service scenarios, while clause 8 provides the overall key assumptions. Appendix I contains the detailed description of service scenarios.

7 Functional model

This clause provides a functional model for the support of QoS enabled mobile VoIP services. This functional model is based on the NGN framework architecture [ITU-T Y.2012] and reuses the functions and functional entities of RACF [ITU-T Y.2111], NACF [ITU-T Y.2014], MMCF [ITU-T Y.2018] and SCF [ITU-T Y.2012].