

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Q.1763/Y.2803

(10/2007)

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INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS
AND NEXT-GENERATION NETWORKS

Next Generation Networks – Generalized mobility

FMC service using legacy PSTN or ISDN as the fixed access network for mobile network users

ITU-T Recommendation Q.1763/Y.2803



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ITU-T Recommendation Q.1763/Y.2803

FMC service using legacy PSTN or ISDN as the fixed access network for mobile network users

Summary

In a fixed-mobile convergence (FMC) network environment, convergence between legacy PSTN and ISDN and mobile networks is a typical example of a pre-IMS FMC network environment. ITU-T Recommendation Q.1763/Y.2803 defines the service features, service architecture, and capability requirements of the convergence service between legacy PSTN and ISDN and mobile networks. An example of the implementation of the converged service is provided.

Source

ITU-T Recommendation Q.1763/Y.2803 was approved on 29 October 2007 by ITU-T Study Group 19 (2005-2008) under the ITU-T Recommendation A.8 procedure.

Keywords

Fixed-mobile convergence, Intelligent Network, ISDN, mobile network, PSTN.

FOREWORD

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ITU-T Recommendation Q.1763/Y.2803

FMC service using legacy PSTN or ISDN as the fixed access network for mobile network users

1 Scope

This Recommendation describes the service features, service architecture and capability requirements for using the legacy PSTN or ISDN as a fixed access network for mobile network users (PAM service) and provides an example of the implementation of the PAM service.

Mechanisms to support the basic voice and video telephony services are described.

The mobile networks discussed in this Recommendation refer specifically to GSM/UTRAN [ITU-T Q.1741] networks and ANSI-41/cdma2000 [ITU-T Q.1742] 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.1224] ITU-T Recommendation Q.1224 (1997), *Distributed functional plane for intelligent network Capability Set 2*.
- [ITU-T Q.1701] ITU-T Recommendation Q.1701 (1999), *Framework for IMT-2000 networks*.
- [ITU-T Q.1702] ITU-T Recommendation Q.1702 (2002), *Long-term vision of network aspects for systems beyond IMT-2000*.
- [ITU-T Q.1711] ITU-T Recommendation Q.1711 (1999), *Network functional model for IMT-2000*.
- [ITU-T Q.1741] ITU-T Recommendations Q.1741-series:
- Q.1741.1 (2002), *IMT-2000 references to release 1999 of GSM evolved UMTS core network with UTRAN access network*.
 - Q.1741.2 (2002), *IMT-2000 references to release 4 of GSM evolved UMTS core network with UTRAN access network*.
 - Q.1741.3 (2003), *IMT-2000 references to release 5 of GSM evolved UMTS core network*.
 - Q.1741.4 (2005), *IMT-2000 references to release 6 of GSM evolved UMTS core network*.
- [ITU-T Q.1742] ITU-T Recommendations Q.1742-series:
- Q.1742.1 (2002), *IMT-2000 references to ANSI-41 evolved core network with cdma2000 access network*.
 - Q.1742.2 (2003), *IMT-2000 references (approved as of 11 July 2002) to ANSI-41 evolved core network with cdma2000 access network*.
 - Q.1742.3 (2004), *IMT-2000 references (approved as of 30 June 2003) to ANSI-41 evolved core network with cdma2000 access network*.

- Q.1742.4 (2005), *IMT-2000 references (approved as of 30 June 2004) to ANSI-41 evolved core network with cdma2000 access network.*
- Q.1742.5 (2006), *IMT-2000 references (approved as of 31 December 2005) to ANSI-41 evolved core network with cdma2000 access network.*
- Q.1742.6 (2007), *IMT-2000 references (approved as of 31 December 2006) to ANSI-41 evolved core network with cdma2000 access network.*

[ITU-T Q.1761] ITU-T Recommendation Q.1761 (2004), *Principles and requirements for convergence of fixed and existing IMT-2000 systems.*

[ITU-T Q.1762] ITU-T Recommendation Q.1762/Y.2802 (2007), *Fixed-mobile convergence general requirements.*

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

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

3.1.2 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 shut down 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.

3.2 Terms defined in this Recommendation

There are no terms defined in this Recommendation.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

2G	Second Generation
3G	Third Generation
AP	Access Point
AuC	Authentication Centre
CAMEL	Customized Applications for Mobile network Enhanced Logic
CAP	CAMEL Application Protocol
CCF	Call Control Function
CDMA	Code Division Multiple Access
CLI	Calling Line Identity
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
CS	Circuit Switched

CSI	CAMEL Subscription Information
DTMF	Dual Tone Multiple Frequency
FE	Functional Entity
FMC	Fixed-Mobile Convergence
FSK	Frequency Shift Keying
GMSC	Gateway Mobile Switching Centre
GSM	Global System for Mobile communications
HLR	Home Location Register
HSS	Home Subscriber Server
IMSI	International Mobile Station Identity
IMT-2000	International Mobile Telecommunications – 2000
IN	Intelligent Network
IP	Intelligent Peripheral
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
LE	Local Exchange
MAP	Mobile Application Protocol
MD5	Message-Digest algorithm 5
MS	Mobile Station
MSC	Mobile Switching Centre
MSISDN	Mobile Station International ISDN Number
MSN	Multiple Subscriber Number
N-CSI	Network CAMEL Subscription Information
PAM	PSTN Access for Mobile users
POTS	Plain Old Telephone Service
PSTN	Public Switched Telephone Network
RAN	Radio Access Network
RNS	Radio Network Subsystem
SAC	Service Access Code
SCF	Service Control Function
SCP	Service Control Point
SHA-1	Secure Hash Algorithm 1
SHA-256	Secure Hash Algorithm 256
SLA	Service Level Agreement
SRF	Specialized Resource Function
SSF	Service Switching Function
SSP	Service Switching Point

T-CSI	Terminating CAMEL Subscription Information
UMTS	Universal Mobile Telecommunication System
UPT	Universal Personal Telecommunication
UTRAN	Universal Terrestrial Radio Access Network
VLR	Visitor Location Register
WIN	Wireless Intelligent Network

5 Conventions

In this Recommendation, references to "mobile network" should be read as applying equally to GSM/UTRAN [ITU-T Q.1741] networks and ANSI-41/cdma2000 [ITU-T Q.1742] networks.

In addition:

- "he" should be read as gender neutral, that is referring to "he" or "she" as appropriate; and
- "his" should similarly be read as gender neutral.

6 Service features

The PAM service provides a mobile user with access to voice and video telephony services utilizing the PSTN/ISDN via an available access point (AP) with an appropriate dual mode mobile terminal. Whether the AP is connected to the legacy network via a PSTN analogue or an ISDN access interface does not affect the service from the PAM user's point of view.

The dual mode dual radio mobile terminal provides the user the accesses to the legacy PSTN/ISDN and mobile networks using a single terminal.

6.1 Service numbering

The PAM service supports two types of numbering:

- The user is identified by a discrete PAM service number (referred to as a "fixed PAM service number" which may be in the form of, e.g., an UPT number). The fixed PAM service number is used separately from the user's mobile number (MSISDN). The fixed PAM service number is used to make and receive calls when the user is being provided service by means of a PSTN/ISDN access, while the mobile number (MSISDN) is used when the user is being provided service by means of a mobile network access.
- The user is identified by his MSISDN, which is also his PAM service number, independent of whether he is being provided service by a PSTN access or a mobile network access.

6.2 Service subscription

The user needs to subscribe to the PAM service in advance.

- When the fixed PAM service number is used, the subscription information is as follows:
 - a fixed PAM service number assigned by the provider;
 - a user identity assigned by the provider which links to the PAM service number of the user;
 - the user's associated MSISDN for re-routing the terminating call to the mobile network in case the call is not possible to be completed through the PSTN/ISDN;
 - the service access code (SAC) of PAM service which corresponds to the PAM service controlling point of the home network.

- When a MSISDN is used as the PAM service number, the subscription information is as follows:
 - the user's IMSI;
 - a user identity assigned by the provider which links to the IMSI of the user terminal;
 - the service access code (SAC) of PAM service which corresponds to the PAM service controlling point of the home network;
 - the PAM service subscription to be registered in the user's service profile (in the HLR/AuC (HSS)).

6.3 Registration and authentication for legacy fixed network access

The mobile user needs to register at a fixed network access point before making and receiving calls. Authentication is mandatory when a mobile user requests legacy PSTN/ISDN access.

Once the user is authenticated and registered, he is provided voice and video communication using the PSTN/ISDN via the fixed network access point at which he is registered consistent with the limitations related to the capabilities of the access point and the terminal device being used.

The mobile user deregisters when he leaves the access point.

6.4 Call handling

The service supports two different treatments for incoming and outgoing calls according to the service number used.

6.4.1 User assigned a discrete PAM service number

When using a fixed PAM service number separately assigned from the MSISDN, the handling of the call is as follows:

- *Originating call*

If the user is currently registered at an AP, the originating call will be handled through the PSTN/ISDN when the fixed network access is available. The fixed PAM service number is presented as the calling party number to the called party, and the call is treated according to the service subscription associated with the fixed PAM service number. The call is charged against the fixed PAM service number. If the fixed network access is not available (i.e., the AP that the user is registered at encounters an all fixed access circuits busy situation), the call will be handled through the mobile network, if available, as a normal mobile originating call. The MSISDN is displayed as the calling party number and the call is treated according to the service subscription associated with the MSISDN in the mobile network. The call is charged against the MSISDN.

If the user is currently not registered for fixed network access, the originating call will be handled through the mobile network, if available, as a normal mobile originating call. The MSISDN is displayed as the calling party number and the call is treated according to the service subscription associated with the MSISDN in the mobile network. The call is charged against the MSISDN.

The user is provided with visibility of the selection of the radio access (PAM AP or mobile network) used for the originating call.

- *Terminating call*

When a call is placed to a fixed PAM service number, there will first be a check for whether the PAM user is registered at an AP. If so, the call will be delivered via the PSTN/ISDN to the AP at which the PAM user is currently registered, and the call is treated according to the service subscription associated with the fixed PAM service number. If call completion through the PSTN/ISDN fails (e.g., all the access circuits to the AP are busy),

the call will be forwarded to the mobile network using the MSISDN and the call is treated according to the service subscription associated with the MSISDN.

If the user is currently not registered at an AP, a call to a fixed PAM service number will be forwarded to the mobile network using the MSISDN as the forwarded-to number and the call is treated according to the service subscription associated with the MSISDN.

Charging to the originating party will not be affected when a call is forwarded from the PSTN to the MSISDN of the terminating party.

A call to the MSISDN associated with the PAM user is delivered to the mobile network as a normal mobile terminating call.

6.4.2 MSISDN as the PAM service number

When using the MSISDN as the PAM service number, the handling of the call is as follows:

- *Originating call*

If the user is currently registered at an AP, an originating call will be handled through the PSTN/ISDN when the fixed network access is available. If the fixed network access is not available (i.e., the AP the user is registered with is busy), the call will be handled through the mobile network, if available, as a normal mobile originating call. Whether the call is handled through the legacy PSTN/ISDN, or through the mobile network, the MSISDN is presented as the calling party number to the called party, and the call is treated according to the service subscription associated with the MSISDN. The call is charged against the MSISDN.

If the user is currently not registered at an AP, the originating call will be handled through the mobile network, if available, as a normal mobile originating call. The MSISDN is displayed as the calling party number and the call is treated according to the service subscription associated with the MSISDN in the mobile network. The call is charged against the MSISDN.

The user is provided with visibility of the selection of the radio access (PAM AP or mobile network) used for the originating call.

- *Terminating call*

When a call is placed to the MSISDN of a subscriber who subscribes to the PAM service, there will first be a check for whether the MSISDN is registered at an AP. If so, the call will be delivered via the PSTN/ISDN to the AP at which the MSISDN subscriber is currently registered. If call completion via the AP fails (e.g., the access lines to the AP are busy), the call will be forwarded through the mobile network using the MSISDN. Whether the call is handled through the legacy PSTN/ISDN or through the mobile network, the call is treated according to the service subscription associated with the MSISDN. Charging to the originating party will not be affected when a call is forwarded from the PSTN/ISDN to the MSISDN on the mobile network of the terminating party.

If the user is currently not registered at an AP, a call to a MSISDN will be delivered through the mobile network directly and the call is treated according to the service subscription associated with the MSISDN.

6.5 Extent of mobility provided by PAM service

Only nomadism is supported.

When the user is in an active call, the call is interrupted in the following cases:

- the user moves to a different AP; or
- the user changes from an AP to using mobile network access or vice versa.