3GPP TR 23.864 V0.6.0 (2003-04)

Technical Report

3rd Generation Partnership Project; Technical Specification Group Services and Sytem Aspects; Commonality and Interoperability between IMSs; (Release 6)

Keywords
<keyword[, keyword]>

3GPP

Postal address

3GPP support office address
650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet
http://www.3gpp.org

Contents

Foreword 4
1 Scope 5
2 References 5
3 Definitions, symbols and abbreviations 5
3.1 Definitions 5
3.2 Symbols 6
3.3 Abbreviations 6
4 Key architectural items 6
4.0 Introduction 6
4.1 IP Connectivity Network Capabilities 6
4.1.1 Requirements for Service Based Local Policy 7
4.1.2 Support of IP Multimedia Subsystem (IMS) in WLAN 3GPP Interworking System 8
4.2 Backwards compatibility 8
4.3 General architectural considerations 8
4.4 User and service profile 8
4.5 QoS and Service-Based Local Policy 8
4.5.1 Service Based Local Policy functions 9
4.5.2 Policy Decision Function 9
4.5.3 Policy Enforcement Function 9
4.6 UE and ISIM/USIM 10
4.7 IP version issues 10
4.8 Security 10
4.9 Charging 10
4.10 Bearer level considerations 10
4.11 SIP Compression 11
4.12 Emergency calls 11
4.13 Documentation and Terminology aspects 11
Annex <A>: <Annex title> 12
A.1 Heading levels in an annex 12
Annex <X>: Change history 13

Foreword

This Technical Report has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document defines the key architectural items that are the building blocks for achieving commonality and interoperability between IMSs that possibly use different IP Connectivity Networks. Specific IP-connectivity access network technologies and their details are not within the scope of the present document.It is expected that one solution will be developped and finetuned for each of these architectural items. The present Technical Report serves as a placeholder for the solutions under development. When the solution reaches maturity, Change Requests against the relevant Technical Specifications will be raised.

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] 3GPP TR 41.001: "GSM Release specifications".

[2] 3GPP TR 21 912 (V3.1.0): "Example 2, using fixed text".

[3] 3GPP TSG SA WG2 approved CR#280 on TS 23.228 in tdoc S2-030939 " Re-organization of IMS specifications to better reflect aspects of interoperability and commonality between IP Multimedia Systems using different IP-Connectivity Networks"

[4] 3GPP TS 26.235: “Packet Switched Conversational Multimedia Applications; Default Codecs”

[5] 3GPP TS 23.234: "3GPP system to Wireless Local Area Network (WLAN) Interworking; System Description”

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions given in TS 21.905 and the following apply.

Commonality between IMSs: a common IP Multimedia CN Subsystem over any access network that provides the IP Connectivity capabilities required.

Interworking: allows communication between users of different networks and systems.

Interworking of the IMS with other networks: allows an IMS user to communicate with users of non-IMS networks. For example, interworking of the IMS with the PSTN allows IMS users to communicate with PSTN users.

Interoperability between IMSs: means interworking between IP Multimedia CN Subsystems without (or with minimal) restrictions on the services, which can be used by users of the different IP Multimedia CN Subsystems.

IMS Boundary Point: an entity which performs both IMS specific functionalities and non-IMS specific functionalities.

IMS specific function: A function that is specified only for IMS usage and depends on IMS specific characteristics

Non IMS specific function: A function that is not required by IMS or a function that is not exclusive for IMS.

3.2 Symbols

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

<symbol> <Explanation>

3.3 Abbreviations

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

IMS	IP Multimedia Core Network Subsystem
P-CSCF	Proxy Call Session Control Function
QoS	Quality of Service
SBLP	Service Based Local Policy

4 Key architectural items

4.0 Introduction

The IMS access independence work defines the key functional items that are the building blocks for IMS access independence. And this work should attempt to:

- Define the IMS Boundary Points at the edge of the IMS network to differentiate between the IMS specific functionality and non-IMS specific functionality.

The consequence of this work should be:

- Maximise easy adoption (Plug & Play) of the IMS network to different IP Connectivity Networks.
- Allow the changes and developments inside IMS and outside IMS network to be independent therefore achieve minimum or free of the impact between each other.

4.1 IP Connectivity Network Capabilities

Editor's note: This clause is planned to contain considerations on certain IP connectivity network capabilities that may effect the architecture work on IMS commonality and interoperability. E.g.: IPv6 capability, mobility (Mobile-IPv6), Security, QoS, Charging, etc…

No assumptions are made about the QoS capabilities of the IP Connectivity Network.

It is a deployment issue to ensure that the QoS capabilities in the IP Connectivity Network are sufficient to support the service set offered by the operator.

Whether and how to ensure that services are not invoked on IP Connectivity networks which do not have the QoS capabilities to support them requires further study. The possibilities below have been suggested. Other possibilities may also exist.

- The P-CSCF may apply policies to limit the user to the supported service set for a given IP Connectivity Network, or
- The UE should not activate services if it cannot obtain the necessary QoS from the IP Connectivity Network

Whether the P-CSCF needs to know, or how the P-CSCF determines which IP Connectivity Network is being used, or how the UE determines the QoS available from the IP Connectivity Network is for further study."

4.1.1 Requirements for Service Based Local Policy

The following capabilities may be supported by the IP Connectivity network in order to enable Service Based Local Policy. (The exact capabilities that are required depend on the mode in which Service Based Local Policy is used as described below.)

1a. The ability to inform the IMS when a resource reservation is requested in the IP Connectivity Network

1b. The ability to act on an authorisation decision received from the IMS in response to the indication in 1a. The decision contains an upper bound on the QoS for the resource reservation.

2. The ability to provide the IMS with correlation information identifying the charging information associated with the resource reservation identified in 1a above.

3. The ability act on revocations of the authorisations sent by the IMS

4. The ability to inform the IMS when a resource reservation is removed in the IP connectivity network

The capabilities 1 to 4 exist in Release 5 for GPRS. The following capabilities are speculative: they do not exist for any 3GPP-specified IP connectivity network and are dependent on the outcome of investigations in Release 6.

5. The ability to provide Diffserv Edge Functions for individual IP flows configured based on the policy information from the IMS.

6. The ability to provide the IMS with correlation information identifying the charging information associated with an individual IP flow

Service Based Local Policy, if supported at all, may operate in several modes:

A) Authorisation & Charging Correlation

SBLP operates essentially as described in Release 5, performing resource authorisation and correlation of charging information.

B) Authorisation Only

SBLP allows resource authorisation in the IP Connectivity Network to be controlled by the IMS, but there is no support for charging correlation.

C) Charging correlation only

SBLP allows correlation of charging for IP Connectivity Network resources with the IMS session, but does not support any control of resource authorisation.

In each of these modes, the operation of SBLP could be either:

- ***Reservation-based***, in which the granularity of authorisation and charging correlation is a single resource reservation in the IP connectivitiy network
- ***IP flow based***, in which the granularity of authorisation and charging correlation is a single IP flow identified by the IMS

Reservation-based Authorisation requires capabilities (1), (3) and (4).

Reservation-based Charging Correlation required capabilities (1a) and (2)

IP flow based Authorisation requires capability (5)

IP flow based Charging Correlation requires capability (6)

Combinations of these SBLP functions require the appropriate combination of IP connectivity network capabilities.

Where Service Based Local Policy is used in reservation-based modes, then resource reservation signalling in the IP-connectivity network must support either:

- Complete specification of the IP flows which will use the resource (uplink and downlink) in terms of standard IP flow classifiers, or
- Carriage of Flow Ids as defined for IMS Release 5

Where Service Based Local Policy is used in reservation-based modes, the IP connectivity network must support carriage of a media authorisation token (see RFC3313) in association with signalling for resource reservation/allocation.

4.1.2 Support of IP Multimedia Subsystem (IMS) in WLAN 3GPP Interworking System

Editor's note: This clause is planned to contain certain access network capability requirements for 3GPP WLAN subscribers to access IMS that may affect the architecture work on WLAN 3GPP interworking . E.g.: IPv6 capability, mobility (Mobile-IPv6), Security, QoS, Charging, etc…

IMS is accessed via Packet Data Gateway of the WLAN 3GPP interworking system [5]. The Wi reference point of the 3GPP WLAN Interworking architecture can be mapped to the IMS Mb reference point.

4.2 Backwards compatibility

The possible architectural enhancements for IMS access independence shall be backwards compatible with the IMS architecture specified in Rel5 to the farthest extent possible.

4.3 General architectural considerations

Editor's note: This clause is planned to identify the access specific "parts" and the possible split of access-specific and access independent "parts" of IMS functional elements, where applicable.

Within the Rel5 IMS architecture three main IMS boundary point can be identified. These are entities that perform both the IMS specific functionalities and non-IMS specific functionalities. These are

- Home Subscriber System (HSS),
- Policy Decision Functions (PDF) within P-CSCF
- User Equipment

For HSS, its IMS functionality is to provide IP multimedia functionality to support control functions for IM subsystem, such as the CSCF It is needed to enable subscriber usage of the IM CN subsystem services. This IP multimedia functionality can be independent of the access network used to access the IM CN subsystem. The Non-IMS functionalities include the subset of HLR functionality required by the PS and CS domain.

For PDF, its IMS-specific functionality includes support for Service Based Policy control for IMS sessions.

For the UE, the IMS-specific functionality includes the IMS SIP application, and the IMS-specific IP-Connectivity Network related functions (e.g. signaling PDP Context). Non-IMS-specific functionalities include the support of generic IP-Connectivity Network functions.

WLAN–3GPP interworking provides interface to the entry point for accessing the IM CN Subsystem.

4.4 User and service profile

Editor's note: If needed, this clause is planned to contain the architectural solution on user profile and HSS-related concepts.

4.5 QoS and Service-Based Local Policy

Editor's note: This clause is planned to contain the architectural concepts for IMS commonality and interoperability related to Service-Based Local Policy (Go interface) and end-to-end QoS.

The Release 6 work on IMS Commonality shall include study of whether and how SBLP can be extended so that it can operate using generic layer 3 functionality (i.e. based on IP flows, not related to PDP context management). This may include cases where there is no layer 3 request for bearer resources, for example in networks where Quality of Service is based on Diffserv. In these cases identification of the policy/charging requirements is needed to determine the network functionality required.

4.5.1 Service Based Local Policy functions

Service Based Local Policy performs two functions:

- Correlation of access resource usage with an application level session instance. This allows charging for the resources used for a particular session to be based on features of the session, rather than simply resource usage. For example, the resources used at the called party could be charged to the calling party ("A party pays model").
- Network control of the QoS authorised for resources to be linked to a session instance

4.5.2 Policy Decision Function

The PDF interacts with a Policy Enforcement Function (PEF) within the IP Connectivity Network over the Go reference point.

4.5.3 Policy Enforcement Function

This is a logical function which is required to exist within any IP Connectivity Network which supports Service Based Local Policy. The location of the Policy Enforcement Function within the IP Connectivity Network is out of scope of this document.

The Policy Enforcement Function interacts with the IMS over the Go reference point. The capabilities of a Policy Enforcement Function are specified along with the specification of a particular IP Connectivity Network.

When a new IP Connectivity Network is identified for IMS, if there is new functionality required for this IP connectivity network, then the Go reference point and protocol may need to be extended to support the Policy Enforcement Function capabilities of that network. The Policy Decision Function in the IMS shall be able to determine the capabilities available at a Policy Enforcement Function without requiring prior knowledge of the particular IP Connectivity Network technology (e.g. by negotiation with that PEF).

Note: IP Connectivity Networks defined outside 3GPP may support different interfaces for the purpose of policy control. Interaction between the PDF and such networks is out of scope of 3GPP.

The policy control interactions between the PDF and PEF over the Go reference point should be at a harmonized layer and independent of the access technologies of the IP Connectivity Network. In this case the PEF will be responsible for translating this policy control to the appropriate bearer layer specific control.

The relationship between PDF and PEF is illustrated in the following diagram:

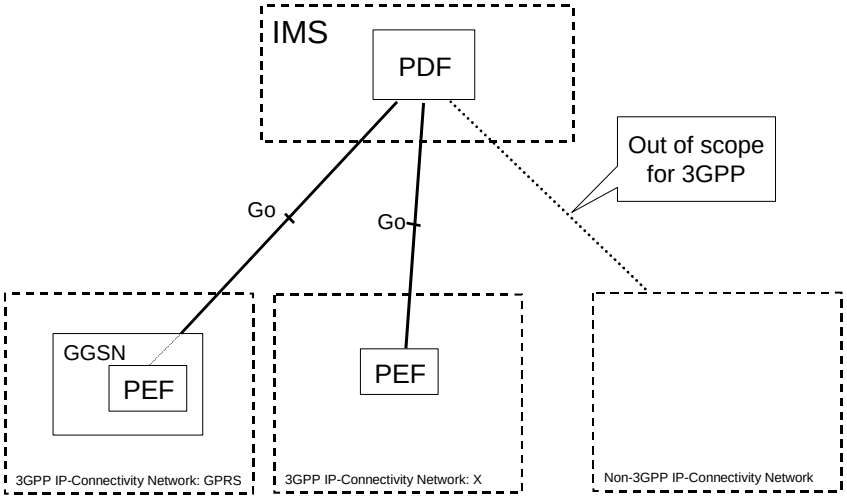

Figure 4.1 - The relationship between PDF and PEF

3GPP IP connectivity networks in this picture encompass those networks where the PEF is specified by 3GPP.

Note: For example in the case of Wireless LAN, the 'IP Connectivity Network' includes the Packet Data Gateway and the 3GPP AAA server, which are specified by 3GPP. If interaction between IMS and a WLAN IP Connectivity Network is between the PDF and one of these entities, then this is clearly within scope of 3GPP.

4.6 UE and ISIM/USIM

Editor's note: This clause is planned to contain the UE-related architectural concepts and ISIM/USIM related considerations to the extent applicable for SA2.

4.7 IP version issues

Editor's note: This clause is planned to look at the architectural effects of mandating IPv6 in IMS.

4.8 Security

Editor's note: This clause is planned to analyze if Rel5 IMS Security mechanisms (built on AKA) are sufficient for IMS running over any access network, or some enhancement to the current standardized security solutions are needed.

4.9 Charging

Editor's note: If needed, this clause is planned to develop architectural concepts for enhancing the charging architecture developped in Rel5.

4.10 Bearer level considerations

Editor's note: This clause is planned to contain the architectural concepts on bearer-level connectivity, e.g.: AMR support, transcoding, etc…

The default codecs for a 3GPP IMS terminal are defined by TS 26.235 [4].

These codecs or any interoperable ones are also recommendable to non-3GPP terminals(e.g.3GPP2,WLAN,etc) for the purpose of communication between users from different IP connectivity networks with the minimum transcoding process to ensure low-delay and real-time service. However, as 3GPP cannot mandate non-3GPP terminal environment, the IMS may support transcoding functionality in case the codecs residing in the terminals are different. The IMS entity that provides this functionality should be MRFP as described in Rel5.

4.11 SIP Compression

Editor's note: This clause will contain the architectural considerations on providing SIP compression over different kind of accesses (cellular, non-cellular, etc…).

Support of SIP signaling compression is mandatory for P-CSCF for IMS and UEs using a cellular access (e.g. UTRAN, GERAN, CDMA2000).

4.12 Emergency calls

Editor's note: This clause is planned to contain the architectural considerations for providing IMS Emergency calls over different access networks. This might overlap with the generic IMS Emergency call work to be conducted in Rel6.

4.13 Documentation and Terminology aspects

Editor's note: This clause is planned to address generalizing the terminologies used throughout IMS Technical Specifications. The initial goal is to find terminologies facilitating IMS commonality and interoperability over different IP-Connectivity networks.
This clause is also planned to address the possible re-organization of IMS-related Technical Specifications.

The following set of 3GPP Technical Specifications was identified as the core set subject to (re-)structuring to better facilitate IMS commonality and interoperability:

1. 3GPP TS 23.218: IP Multimedia (IM) session handling; IM call model
2. 3GPP TS 23.228: IP Multimedia Subsystem (IMS); Stage 2
3. 3GPP TS 24.229: IP Multimedia Call Control Protocol based on SIP and SDP; Stage 3
4. 3GPP TS 29.xxx: Media Gateway Controller Function (MGCF) – IM-Media Gateway (MGW) interface; Stage 3
5. 3GPP TS 29.162: Interworking between the IM CN subsystem and IP networks
6. 3GPP TS 29.163: Interworking between the IM CN subsystem and CS networks
7. 3GPP TS 29.228: IP Multimedia (IM) Subsystem Cx Interface; Signalling flows and message contents
8. 3GPP TS 29.229: Cx Interface based on the Diameter protocol; Protocol details
9. 3GPP TS 29.328: IP Multimedia Subsystem (IMS) Sh Interface; Signalling flows and message contents
10. 3GPP TS 29.329: Sh interface based on the Diameter protocol; Protocol details

TS 23.228 has been re-structured for Rel6 so that the GPRS-specific pieces of specification from all across the TS would be moved to a separate clause. Possible need for changes in access-related terminology used in the IMS level clauses of the TS have been addressed on a per-need basis within the context of the re-organization work.

The CR in [3] describes the approved version of the re-organization on TS 23.228 v6.0.1, the re-organization is reflected in TS 23.228 v6.1.0.

Annex <A>:
<Annex title>

A.1 Heading levels in an annex

Heading levels within an annex are used as in the main document, but for Heading level selection, the "A.", "B.", etc. are ignored. e.g. **A.1.2** is formatted using ***Heading 2*** style.

Annex <X>:
Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New