THE IMS

IP MULTIMEDIA CONCEPTS AND SERVICES, THIRD EDITION

Miikka Poikselkä
Nokia Siemens Networks, Finland

Georg Mayer
Nokia, Finland

WILEY
A John Wiley and Sons, Ltd., Publication

This edition first published 2009

Registered office

John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, United Kingdom

For details of our global editorial offices, for customer services and for information about how to apply for permission to reuse the copyright material in this book please see our website at www.wiley.com.

Library of Congress Cataloging-in-Publication Data

Poikselka, Miikka.
The IMS : IP multimedia concepts and services / Miikka Poikselka, Georg Mayer. – 3rd ed.
p. cm.
Rev. ed. of: IMS / Miikka Poikselka ... [et al.]. 2006
Includes bibliographical references and index.
ISBN 978-0-470-72196-4 (cloth)
1. Multimedia communications. 2. Wireless communication systems. 3. Mobile communication systems. I. Mayer, Georg, 1970- II. IMS. III. Title.
TK5105.15.P65 2008
621.382′12 – dc22

2008032207

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library

ISBN 978-0-470-72196-4 (H/B)

Typeset in 10/12 Times by Laserwords Private Limited, Chennai, India
Printed and bound in Great Britain by CPI Antony Rowe, Chippenham, Wiltshire

The P-CSCF is tasked to relay session and media-related information to the PCRF when an operator wants to apply policy and charging control. Based on the received information the PCRF is able to derive authorized IP QoS information and charging rules that will be passed to the access gateway (e.g. GGSN). This concept is covered in Section 3.10. Moreover, via the PCRF and P-CSCF the IMS is able to deliver IMS charging correlation information to the access network and, similarly, via the PCRF and P-CSCF the IMS is able to receive access charging correlation information from the access network. This makes it possible to merge charging data records coming from the IMS and access networks in the billing system. How this is done is shown in Section 3.11.7.

P-CSCF plays an important role in IMS emergency session handling as the P-CSCF is tasked to detect emergency requests in all possible cases. P-CSCF is expected to reject emergency attempts based on operator policy (e.g. user is attempting to make emergency call via home P-CSCF when roaming) or based on network capability (P-CSCF or the rest of the IMS core is pre-Release 7 which do not support IMS functionality.

2.2.1.2 Interrogating Call Session Control Function (I-CSCF)

Interrogating Call Session Control Function (I-CSCF) is a contact point within an operator's network for all connections destined to a subscriber of that network operator. There are three unique tasks assigned for the I-CSCF:

- Obtaining the name of the next hop (either S-CSCF or application server) from the Home Subscriber Server (HSS).
- Assigning an S-CSCF based on received capabilities from the HSS. The assignment of the S-CSCF will take place when a user is registering with the network or a user receives a SIP request while they are unregistered from the network but has services related to an unregistered state (e.g., voice mail). This procedure is described in more detail in Section 3.9.
- Routing incoming requests further to an assigned S-CSCF or the application server (in the case of public service identity see Section 12.11).

2.2.1.3 Serving Call Session Control Function (S-CSCF)

Serving Call Session Control Function (S-CSCF) is the focal point of the IMS as it is responsible for handling registration processes, making routing decisions and maintaining session states and storing the service profile(s). When a user sends a registration request it will be routed to the S-CSCF, which downloads authentication data from the HSS. Based on the authentication data it generates a challenge to the UE. After receiving the response and verifying it the S-CSCF accepts the registration and starts supervising the registration status. After this procedure the user is able to initiate and receive IMS services. Moreover, the S-CSCF downloads a service profile from the HSS as part of the registration process and delivers user (e.g. information about implicitly registered identities see Section 3.3) and device specific information to the registered UE see Section 3.5.6).

A service profile is a collection of user-specific information that is permanently stored in the HSS. The S-CSCF downloads the service profile associated with a particular public user identity (e.g., joe.doe@ims.example.com) when this particular public user identity

is registered in the IMS. The S-CSCF uses information included in the service profile to decide when and, in particular, which application server(s) is contacted when a user sends a SIP request or receives a request from somebody. Moreover, the service profile may contain further instructions about what kind of media policy the S-CSCF needs to apply – for example, it may indicate that a user is only allowed to use audio and application media components but not video media components.

The S-CSCF is responsible for key routing decisions as it receives all UE-originated and UE-terminated sessions and transactions. When the S-CSCF receives a UE-originating request via the P-CSCF it needs to decide if application servers are contacted prior to sending the request further on. After possible application server(s) interaction the S-CSCF either continues a session in IMS or breaks to other domains (CS or another IP network). When the UE uses a Mobile Station ISDN (MSISDN) number to address a called party then the S-CSCF converts the MSISDN number (i.e., a tel URL) to SIP Universal Resource Identifier (URI) format prior to sending the request further, as the IMS does not route requests based on MSISDN numbers. Similarly, the S-CSCF receives all requests which will be terminated at the UE. Although, the S-CSCF knows the IP address of the UE from the registration it routes all requests via the P-CSCF, as the P-CSCF takes care of SIP compression and security functions. Prior to sending a request to the P-CSCF, the S-CSCF may route the request to an application server(s), for instance, checking possible redirection instructions. Figure 2.7 illustrates the S-CSCF's role in routing decisions.

In addition, the S-CSCF is able to send accounting-related information to the Online Charging System for online charging purposes (i.e., supporting pre-paid subscribers).

2.2.2 *Emergency Call Session Control Function (E-CSCF)*

E-CSCF is a dedicated functionality to handle IMS emergency requests such as sessions towards police, fire brigade and ambulance. The main task of E-CSCF is to select an

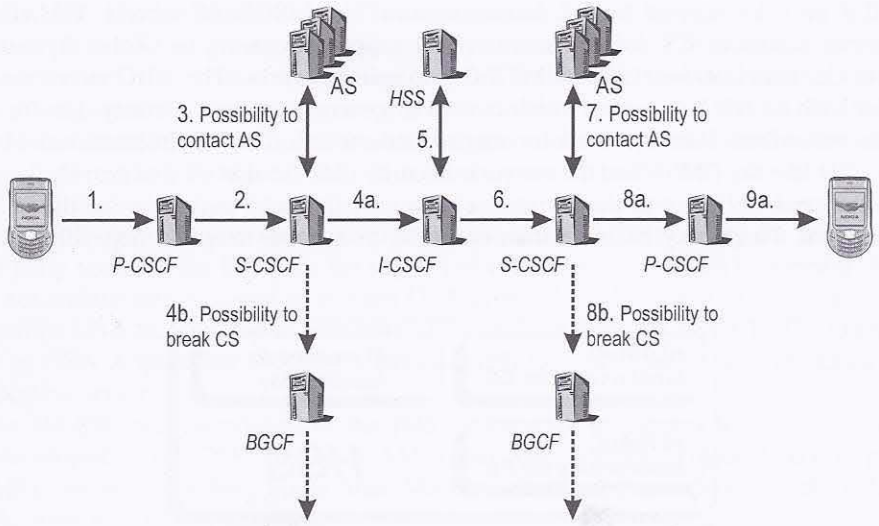

Figure 2.7 S-CSCF routing and basic IMS session setup

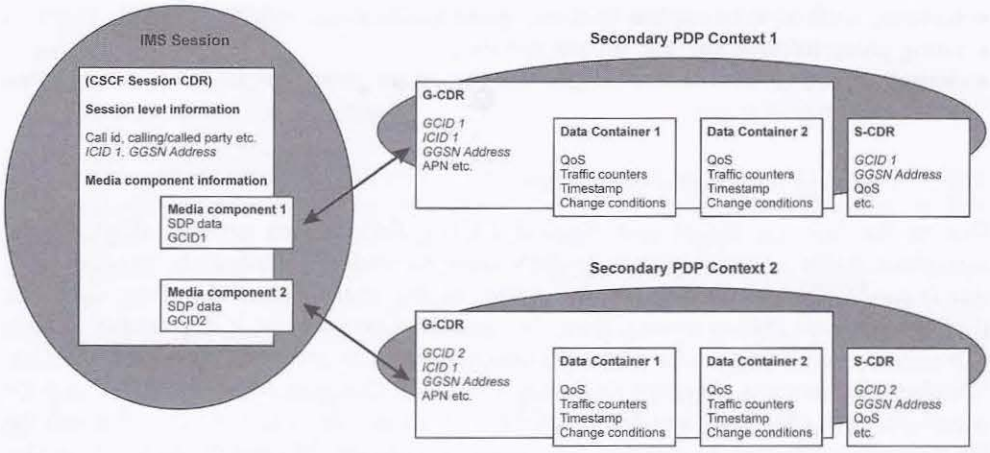

Figure 3.20 IMS charging correlation

with which it is associated: for example, an ICID assigned for session establishment is valid until session termination, etc. We can see from Figure 3.21 that IMS and GPRS charging identifiers are exchanged when the bearer is authorized. In addition, Figure 3.21 indicates when accounting requests are sent to the CDF. The address of the CDF is distributed during registration or, alternatively, it is configured in IMS entities.

3.12 User Profile

3.12.1 Introduction

A user profile is a collection of user-specific information that is permanently stored in the HSS and downloaded to the S-CSCF when the S-CSCF needs to execute service for registered or un-registered user. The user profile contains at least one private user identity and single service profile. Figure 3.22 depicts the general structure of a user profile [3GPP TS 29.228]. The private user identity is described in Section 3.5.2, but it should be understood that a user profile may contain more than one private user identity, if e.g. a user is using a shared public user identity as described in Section 3.7. Figure 3.4 shows that a single IMS subscription may contain multiple service profiles; this allows different treatment for different public user identities as explained in Section 3.5.3.

Operator assigns a user profile when a user obtains an IMS subscription from an operator. The profile is transferred from the HSS to an assigned S-CSCF in two user data-handling operations – Server-Assignment-Answer (SAA) and Push-Profile-Request (PPR) – as described in Sections 2.3.5.1 and 2.3.5.2. The service profile is carried in one Diameter AVP, where it is included as an Extensible Markup Language (XML) document. The service profile is further divided into four parts:

- public identification;
- core network service authorization;

DOCKET ALARM

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts

Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research

With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips

Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS
Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS
Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS
Sync your system to PACER to automate legal marketing.