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Universal Mobile Telecommunications System (UMTS);
LTE;
Conferencing using the IP Multimedia (IM) Core Network (CN) subsystem;
Stage 3
(3GPP TS 24.147 version 18.0.0 Release 18)**

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Contents

Foreword

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

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1 Scope

The present document provides the protocol details for conferencing within the IP Multimedia Core Network subsystem (IMS) based on the Session Initiation Protocol (SIP), SIP Events, the Session Description Protocol (SDP) and the Binary Floor Control Protocol (BFCP).

The functionalities for conference policy control (with respective standardised protocols) are felt to be essential for a complete IMS conferencing service but are not specified in this version of IMS conferencing and are for further study.

The present document does not cover the signalling between a MRFC and a MRFP.

Where possible, the present document specifies the requirements for this protocol by reference to specifications produced by the IETF within the scope of SIP, SIP Events, SDP and BFCP, either directly, or as modified by 3GPP TS 24.229. Where this is not possible, extensions to SIP are defined within the present document. The document has therefore been structured in order to allow both forms of specification.

The present document is applicable to Application Servers (ASs), Multimedia Resource Function Controllers (MRFCs), Multimedia Resource Function Processors (MRFP), Media Gateway Control Functions (MGCFs) and to User Equipment (UE) providing conferencing capabilities.

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 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 22.228: "Service requirements for the Internet Protocol (IP) multimedia core network subsystem; Stage 1".

[3] 3GPP TS 23.218: "IP Multimedia (IM) session handling; IM call model; Stage 2".

[4] 3GPP TS 24.228 Release 5: "Signalling flows for the IP multimedia call control based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3".

[5] 3GPP TS 24.229: "Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3".

[6] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".

[7] IETF RFC 3261 (June 2002): "SIP: Session Initiation Protocol".

[8] IETF RFC 4353 (February 2006): "A Framework for Conferencing with the Session Initiation Protocol (SIP)".

[9] IETF RFC 4579 (August 2006): "Session Initiation Protocol Call Control - Conferencing for User Agents".

[10] IETF RFC 6665 (July 2012): "SIP-Specific Event Notification".

[11] IETF RFC 4575 (August 2006): "A Session Initiation Protocol (SIP) Event Package for Conference State".

[12] 3GPP TS 29.228: "IP Multimedia (IM) Subsystem Cx and Dx Interfaces; Signalling flows and message contents".

[13] Void.

[14] Void.

[15] 3GPP TS 29.208: "End to end Quality of Service (QoS) signalling flows".

[16] IETF RFC 2833 (May 2000): "RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals".

[17] IETF RFC 3515 (April 2003): "The Session Initiation Protocol (SIP) Refer Method".

[18] Void.

[19] IETF RFC 3840 (August 2004): "Indicating User Agent Capabilities in the Session Initiation Protocol (SIP)".

[20] IETF RFC 3892 (September 2004): "The Session Initiation Protocol (SIP) Referred-By Mechanism".

[21] Void.

[22] Void.

[23] Void.

[24] Void.

[25] Void.

[26] Void.

[27] Void.

[28] IETF RFC 4582 (November 2006): "The Binary Floor Control Protocol (BFCP)".

[29] Void.

[30] Void.

[31] Void.

[32] Void.

[33] IETF RFC 3891 (September 2004): "The Session Inititation Protocol (SIP) "Replaces" Header".

[34] IETF RFC 5366 (October 2008): "Conference Establishment Using Request-Contained Lists in the Session Initiation Protocol (SIP)"

[35] IETF RFC 4583 (November 2006): "Session Description Protocol (SDP) Format for Binary Floor Control Protocol (BFCP) Streams".

[36] IETF RFC 5360 (October 2008): "A Framework for Consent-Based Communications in the Session Initiation Protocol (SIP)".

[37] IETF RFC 7989 (October 2016): "End-to-End Session Identification in IP-Based Multimedia Communication Networks".

[38] 3GPP TS 24.166: "3GPP IMS Conferencing Management Object (MO)".

[39] IETF RFC 7647 (September 2015): "Clarifications for the use of REFER with RFC6665".

[40] IETF RFC 4796 (February 2007): "The Session Description Protocol (SDP) Content Attribute".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TS 21.905 [1], and the following apply:

Conferencing AS: an Application Server that supports functionality specific to a SIP conference focus

Ad-hoc conference: An unscheduled conference that is created on-the-fly by a conference participant.

The following terms and definitions given in 3GPP TS 23.228 [2] apply (unless otherwise specified):

Public Service Identity
Three-way session

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.228 [6] subclauses 4.3.3.1 and 4.6 apply:

IP-Connectivity Access Network (IP-CAN)

The following terms and definitions given in RFC 4353 [8] apply (unless otherwise specified):

Conference
Conference-Aware Participant
Conference notification service
Conference Policy
Conference-Unaware Participant
Conference URI
Focus
Mixer
Participant
Tightly Coupled Conference

The following terms and definitions given in RFC 4579 [9] apply (unless otherwise specified):

Conference Factory URI

For the purposes of the present document, the following terms and definitions given in RFC 3840 [19] apply:

Feature parameter

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.002 [2] subclauses 4.1.1.1 and 4a.7 apply:

Call Session Control Function (CSCF)
Home Subscriber Server (HSS)
Media Gateway Control Function (MGCF)
Multimedia Resource Function Controller (MRFC)
Multimedia Resource Function Processor (MRFP)

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.218 [5] subclause 3.1 apply:

Filter criteria
Initial filter criteria
Initial request
Subsequent request

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.228 [7] subclauses 4.3.3.1 and 4.6 apply:

Interrogating-CSCF (I-CSCF)

Proxy-CSCF (P-CSCF)
Public user identity
Serving-CSCF (S-CSCF)

For the purposes of the present document, the following terms and definitions given in 3GPP TR 21.905 [1] apply:

User Equipment (UE)

For the purposes of the present document, the following terms and definitions given in RFC 4582 [28] apply:

Floor
Floor chair
Floor control server
Floor participant

3.2 Abbreviations

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

AMR	Adaptive Multi-Rate
AS	Application Server
BFCP	Binary Floor Control Protocol
CN	Core Network
CSCF	Call Session Control Function
FQDN	Fully Qualified Domain Name
HSS	Home Subscriber Server
I-CSCF	Interrogating CSCF
IM	IP Multimedia
IMS	IP Multimedia CN subsystem
IP	Internet Protocol
IP-CAN	IP-Connectivity Access Network
MGCF	Media Gateway Control Function
MRFC	Multimedia Resource Function Controller
MRFP	Multimedia Resource Function Processor
P-CSCF	Proxy CSCF
PSI	Public Service Identity
S-CSCF	Serving CSCF
SDP	Session Description Protocol
SIP	Session Initiation Protocol
TLS	Transport Layer Security
UE	User Equipment
VBC	Volume Based Charging

4 Conferencing overview

The basic services for the IP Multimedia core network Subsystem (IMS), as defined in 3GPP TS 24.229 [5], allow a user to initiate, modify and terminate media sessions based on the Session Initiation Protocol, as defined in RFC 3261 [7]. Although these basic mechanisms already allow multi party calls, more sophisticated services for communication between multiple parties can be made available by the network.

The conferencing service provides the means for a user to create, manage, terminate, join and leave conferences. It also provides the network with the ability to give information about these conferences to the involved parties.

The network operator or the user may apply membership and media policies to a conference. The functionality for conference policy control (with a respective standardised protocol) is felt to be essential for a complete IMS conferencing service but is not specified in this version of IMS conferencing and is for further study.

Conferencing applies to any kind of media stream by which users may want to communicate, this includes e.g. audio and video media streams as well as instant message based conferences or gaming. Floor control, as part of the conferencing service offers control of shared conference resources at the MRFP using BFCP.

The framework for SIP conferences is specified in RFC 4353 [8].

The architecture for the 3GPP conference service is specified in 3GPP TS 23.228 [6] and 3GPP TS 23.218 [3].

The present document specifies the usage of SIP, SDP and BFCP to realize 3GPP conference service based on the protocols specified by the IETF defined conference service as per RFCs listed in clause 2. However, since the IETF conference service has various scenarios and features as described in RFC 4353 [8], 3GPP conference service is a subset of the above IETF defined conference service.

Loosely coupled conferencing is outside the scope of this release of the IMS conferencing service.

The following figure depicts the functional split for SIP based conferences between the AS, the MRFC and the MRFP.

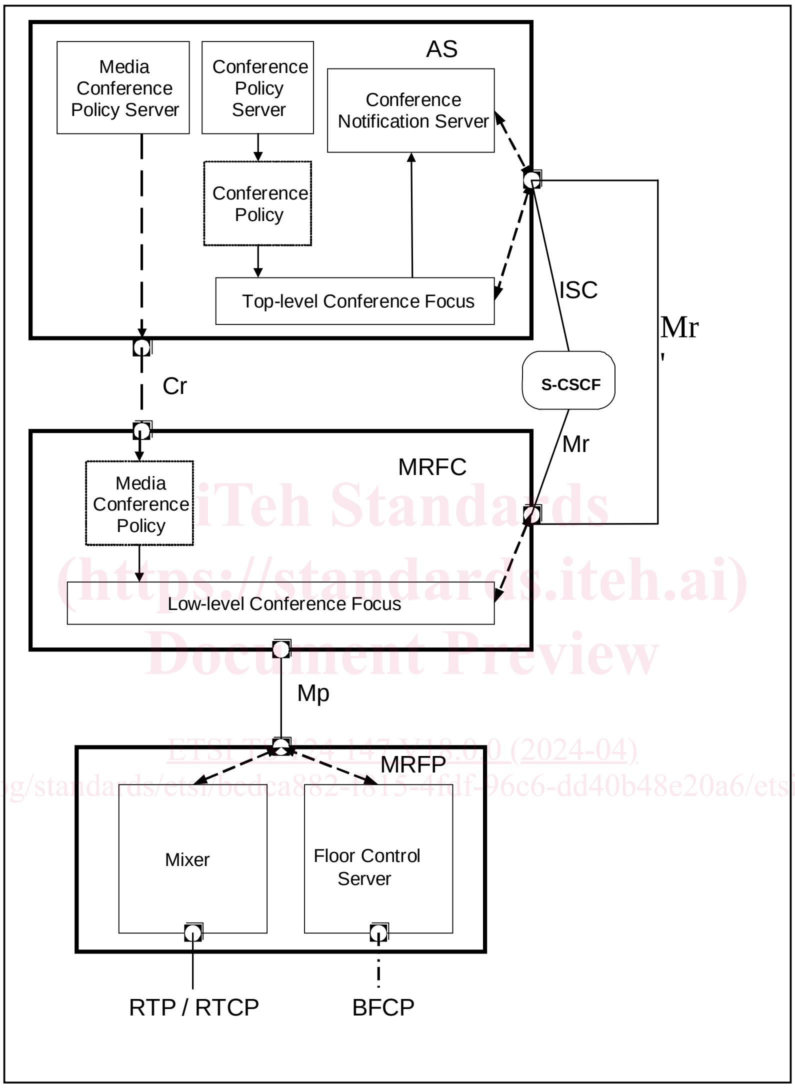

Figure 4.1: Functional split between the AS, MRFC and MRFP

The conference policy, conference notification server and top-level focus as specified in RFC 4353 [8] subclause 6 are located in the AS.

The MRFC has a conference policy and focus as specified in RFC 4353 [8] subclause 6.3.

The mixer and floor control server are located in the MRFP.

5 Protocol using SIP and SIP events for conferencing

5.1 Introduction

Void

5.2 Functional entities

5.2.1 User Equipment (UE)

For the purpose of SIP based conferences, the UE shall implement the role of a Conference participant as described in subclause 5.3.1.

5.2.2 Media Resource Function Controller (MRFC)

For the purpose of SIP based conferences, the MRFC shall support the procedures for ad-hoc conferencing as described in subclause 5.8 of 3GPP TS 24.229 [5] and the procedures for media control of ad-hoc conferencing described in subclause 10.3 of 3GPP TS 24.229 [5]

For the purpose of SIP based conferences, the MRFC shall regard the MRFP as a mixer, as described in RFC 4353 [8].

5.2.3 Conferencing Application Server (AS)

For the purpose of SIP based conferences, the conferencing AS shall implement the role of a conference focus, as described in subclause 5.3.2 and as a conference notification service, as described in subclause 5.3.3. The conferencing AS may implement the role of a conference participant as described in subclause 5.3.1.

The conferencing AS shall use the procedures for 3rd party call control as described in subclause 5.7.5 of 3GPP TS 24.229 [5] and the procedures for media control in subclause 10.2 of 3GPP TS 24.229 [5] to implement SIP based conferences.

5.2.4 Media Gateway Control Function (MGCF)

For the purpose of SIP based conferences, the MGCF shall implement the role of Conference participant as described in subclauses 5.3.1.3.2, 5.3.1.4.1, 5.3.1.5.4, 5.3.1.6.1 and 5.3.1.6.2. In addition, MGCF shall implement the functions except the "REFER" function in subclause 5.3.1.3.3.

5.3 Role

5.3.1 Conference Participant

5.3.1.1 General

In addition to the procedures specified in subclause 5.3.1, the conference participant shall support the procedures specified in 3GPP TS 24.229 [5] appropriate to the functional entity in which the conference participant is implemented.

5.3.1.2 Subscription for conference event package

The conference participant may subscribe to the conference event package, as described in RFC 4575 [11]. If the SUBSCRIBE request outside the existing INVITE dialog is rejected by a 403 (Forbidden) response, the conference participant should send a SUBSCRIBE request in the existing INVITE dialog.

If SUBSCRIBE request in the existing INVITE dialog fails, the UE should continue the conference call without conference event subscription.

NOTE: Pre-release 12 networks can support in-dialog SUBSCRIBE requests only. Sending a SUBSCRIBE in the existing dialog enables the UE to subscribe to the conference event package in this situation.

5.3.1.3 Conference creation

5.3.1.3.1 General

A conference can be created by means of SIP, as described in subclause 5.3.1.3.2 or subclause 5.3.1.3.3.

NOTE: Additionally, creation of a conference can be provided by other means.

The conference participant shall make use of the procedures for session establishment as described in subclauses 5.1.2A and 5.1.3 of 3GPP TS 24.229 [5] when creating conferences by means of SIP.

5.3.1.3.2 Conference creation with a conference factory URI

Upon a request to create a conference with a conference factory URI, the conference participant shall:

1) generate an initial INVITE request in accordance with subclause 5.1.3.1 of 3GPP TS 24.229 [5]; and

2) set the request URI of the INVITE request to the conference factory URI.

On receiving a 200 (OK) response to the INVITE request with the "isfocus" feature parameter indicated in Contact header, the conference participant shall store the content of the received Contact header as the conference URI. In addition to this, the conference participant may subscribe to the conference event package as described in RFC 4575 [11] by using the stored conference URI.

NOTE 1: A conference participant can decide not to subscribe to the conference event package for conferences with a large number of attendees, due to, e.g. the signalling traffic caused by the notifications about users joining or leaving the conference.

NOTE 2: A conference can also be created with a conference URI. The procedures for this case at the conference participant are identical to those for joining a conference, as described in subclause 5.3.1.4.1. It is not assumed that the conference participant is aware that the conference gets created in this case.

NOTE 3: The UE can discover the conference factory URI from the Management Object as defined in 3GPP TS 24.166 [38]. Further discovery mechanisms for the conference factory URI are outside the scope of the present document.

5.3.1.3.3 Three-way session creation

When a user is participating in two or more SIP sessions and wants to join together two of these active sessions to a so-called three-way session, the user shall perform the following steps.

1) create a conference at the conference focus by sending an INVITE request with the conference factory URI for the three-way session towards the conference focus, as described in subclause 5.3.1.3.2;

2) decide and perform for each of the active sessions that are requested to be joined to the three-way session, how the remote user shall be invited to the three-way session, which can either be:

   a) by performing the procedures for inviting a user to a conference by sending an REFER request to the user, as described in subclause 5.3.1.5.2; or

   b) by performing the procedures for inviting a user to a conference by sending a REFER request to the conference focus, as described in subclause 5.3.1.5.3;

3) release the active session with the user, by applying the procedures for session release in accordance with RFC 3261 [7], provided that a BYE request has not already been received, after a NOTIFY request has been received, indicating that the user has successfully joined the three-way session, i.e. including:

   a) a body of content-type "message/sipfrag" that indicates a "200 OK" response; and,

   b) a Subscription-State header set to the value "terminated"; and,