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TECHNICAL SPECIFICATION

LTE;
Mission Critical Communication Interworking with Land Mobile
Radio Systems
(3GPP TS 23.283 version 16.7.0 Release 16)

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Contents

Foreword

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

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x the first digit:

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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 objective of this technical specification is to specify interworking between MC systems and LMR systems that satisfy the MCPTT requirements in 3GPP TS 22.179 [3], MCCoRe requirements in 3GPP TS 22.280 [2] and the MCData requirements (SDS only) in 3GPP TS 22.282 [4].

The present document refers to an InterWorking Function (IWF). The structure and functionality of the IWF is out of scope of the present document. The definition of reference points between the IWF and MC systems and the interactions between the IWF and MC systems are in scope of the present document.

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 22.280: "Mission Critical Services Common Requirements (MCCoRe); Stage 1".

[3]   3GPP TS 22.179: "Mission Critical Push to Talk (MCPTT); Stage 1".

[4]   3GPP TS 22.282: "Mission Critical Data services".

[5]   3GPP TS 23.280: "Common functional architecture to support mission critical services; Stage 2".

[6]   3GPP TS 23.282: "Functional architecture and information flows to support Mission Critical Data (MCData); Stage 2".

[7]   3GPP TS 23.379: "Functional architecture and information flows to support Mission Critical Push To Talk (MCPTT); Stage 2".

[8]   3GPP TS 33.180: "Security of the mission critical service"

[9]   TIA-603-D: "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards".

3   Definitions, symbols and abbreviations

3.1   Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

End-to-End Encryption: encryption that is applied by an originating terminal or client and is decrypted only by chosen terminating terminals or clients.

User homed in the IWF: is an MC service ID that represents an LMR user in the MC system.

Interworking: a means of communication between mission critical systems and LMR systems whereby MC users obtaining service from a mission critical system can communicate with LMR users who are obtaining service from one or more LMR systems.

Interworking function: adapts LMR Systems to mission critical systems via the IWF interface and supports interworking between LMR systems and mission critical systems.

Interworking group: a group, which is composed of group members from the MC system and the LMR system and defined in the MC system or the LMR system.

LMR system: the collection of applications, services, and enabling capabilities providing a land mobile radio service offering group and private communications.

LMR user: a user of a device which allows participation in an LMR system.

NOTE: The term LMR user is defined for discussion purposes only and is out of scope of the present document.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

E2EE	End-to-End Encryption
IWF	InterWorking Function
KEK	Key Encryption Key (TETRA)
KMS	Key Management Service
MC	Mission Critical
MCPTT	Mission Critical Push To Talk
LMR	Land Mobile Radio
OTAK	Over-The-Air-Key Management (TETRA)
OTAR	Over-The-Air Rekeying (P25)
P25	Project 25
SDS	Short Data Service
TETRA	TErrestrial Trunked Radio
UE	User Equipment
UKEK	Unique Key Encryption Key (P25)
URI	Uniform Resource Identifier

4 Introduction

Mission critical users currently employ a wide range of LMR mission critical Push To Talk services, and associated data capabilities where available.

The present document describes the architecture to support the interworking between the MC system and the LMR system to satisfy interworking requirements specified in 3GPP TS 22.179 [3] and 3GPP TS 22.282 [4]. Other LMR technologies may interwork as long as they conform to the present document.

The IWF, along with its LMR system, will appear as a peer interconnected MC system. This is meant as an approach for defining interactions on the IWF interface but is not intended to specify the functionality of the IWF nor meant to mandate a deployment model.

5 Assumptions and architectural requirements

5.1 Key management

Interworking requirements for key management for encrypted interworking include:

a) a mechanism to securely (i.e. authenticity, integrity, confidentiality) share an LMR E2EE traffic key for a private call sessions between a party in an MCPTT system and a party in the LMR system;

b) a mechanism to securely convey to group members, the LMR E2EE key or set of LMR E2EE keys associated with an MC service group or set of MC service groups, to be used for encryption of interworking group calls spanning the multiple systems;

c) a mechanism to securely share with temporary group members in MC systems, the LMR E2EE key(s) associated with a temporary MC service group to be used in interworking group calls spanning the multiple systems;

d) key management solutions shall not preclude the ability of an IWF to allow one or more individual Mission Critical Organizations from having sole control over and sole access to LMR E2EE traffic keys used for the entity's media traffic and users' key encryption keys (UKEKs or KEKs);

e) key management solutions shall support the ability of the IWF to decrypt/reencrypt the media traffic for zero or more groups; and,

f) for deployments where Mission Critical Organizations wish to use LMR E2EE mechanisms when interworking with LMR users:

   i) a mechanism to securely provision an MC service client with the user's UKEK or KEK; and,

   ii) a mechanism to convey LMR OTAR or OTAK message contents.

5.2 Packet format

Each LMR technology defines its own packet format for voice media transmission. For interworking sessions, there might be cases where LMR formatted media is required to be transferred between the IWF and LMR aware MCPTT clients. An example of such a case is where E2EE is used and thus the IWF is not able to decrypt the media. In such cases, media that is sent over the IWF-1 interface needs to be routed within MCPTT systems to/from LMR aware MCPTT clients using methods described in 3GPP TS 23.379 [7].

Requirements for media transmission across the IWF-1 interface include:

a) media transmission to carry the LMR formatted media between the IWF and LMR aware MCPTT clients; and

b) the MCPTT system, along with the IWF, may choose to encrypt the LMR formatted media using 3GPP mechanisms.

NOTE: The contents of the LMR formatted media is out of scope of the present document.

6 Involved business relationships

No business relationships have been identified.

7 Functional model

7.1 General

7.2 Functional model description

Figure 7.2-1 shows the functional model for the application plane for interworking between MC systems and LMR systems. Functional entities and interfaces depicted on the right-hand side of the IWF-x interfaces are defined in 3GPP TS 23.280 [5], 3GPP TS 23.379 [7], and 3GPP TS 23.282 [6].
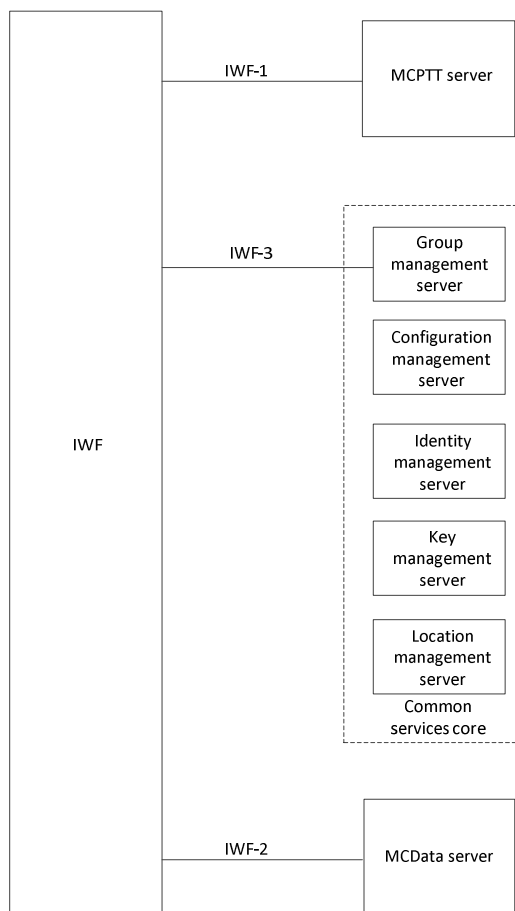
Figure 7.2-1: Functional model for application plane for interworking

7.3 Functional entities description

7.3.1 IWF

The IWF supports most of the functionality of peer MCPTT and MCData systems, with some differences, as specified in the present document. The IWF supports any necessary protocol translation and identity mapping between the MC systems and the IWF. The internal function of the IWF is out of scope of the present document.

7.4 Reference points

7.4.1 Reference point IWF-1 (between the IWF and the MCPTT server)

The IWF-1 reference point, which exists between the IWF and the MCPTT server, provides peer to peer interconnection between an LMR system and the MCPTT system. IWF-1 supports a subset of MCPTT-3 as defined in 3GPP TS 23.379 [7], with some differences, as specified in the present document. The IWF-1 interface is supported by the same signalling plane protocol(s) as defined for MCPTT-3 except as specified in the present document.

7.4.2 Reference point IWF-2 (between the IWF and the MCData server)

The IWF-2 reference point, which exists between the IWF and the MCData server, provides SDS interconnection between an LMR system and the MCData system. IWF-2 supports a subset of the functionality of MCData-SDS-1 and MCData-SDS-2, as defined in 3GPP TS 23.282 [6] with some differences, as specified in the present document. The

IWF-2 interface is supported by the same signalling plane protocol(s) as defined for MCData-3 except as specified in the present document.

7.4.3 Reference point IWF-3 (between the IWF and the group management server)

The IWF-3 reference point, which exists between the IWF and the group management server, provides group management interconnection between an LMR system and the MC service system. IWF-3 is based upon CSC-16, as defined in 3GPP TS 23.280 [5] with some differences, as specified in the present document.

8 Identities

8.1 Identity mapping

The IWF provides centralised support for interworking between an MCPTT or MCData system and an LMR system. In MCPTT systems, the identity of an LMR user is provided as an MCPTT ID, and the identity of an LMR group is provided as an MCPTT group ID, which can be used by the IWF to derive the corresponding identities used in an LMR system. Similarly, in MCData systems, the identity of an LMR user is provided as an MCData ID, and the identity of an LMR group is provided as an MCData group ID, which can be used by the IWF to derive the corresponding identities used in an LMR system.

Identities provided on IWF-x reference points are described in clause 8 of 3GPP TS 23.280 [5].

The IWF can perform the identity mapping between an MCPTT system or MCData system and an LMR system during exchange of signalling and media messages.

The assignment of a functional alias that belongs to the MC system to a user homed in the IWF enables the mapping to corresponding role-based addressing schemes applicable in the LMR system.

9 Application of functional model to deployments

No applications of functional model to deployments have been identified.

10 Procedures and information flows

10.1 Affiliation

10.1.1 Information flows for affiliation

10.1.1.1 General

The following subclauses define information flows for affiliation on the IWF-1 interface. Affiliation related information flows on reference points other than IWF-1 are defined in 3GPP TS 23.280 [5].

10.1.1.2 IWF group affiliation request

Table 10.1.1.2-1 describes the information flow IWF group affiliation request between the IWF and an MC service server and between an MC service server and the IWF.

Table 10.1.1.2-1: IWF group affiliation request

Information element	Status	Description
MC service ID	M	The MC service ID of the originator (LMR user or MC service user) who triggers the MC service group affiliation request. (see NOTE)
MC service group ID list	M	A list of one or more MC service group IDs to which the originator intends to affiliate and is defined in the destination MC service system.
MC service type	M	The type(s) of service(s) for which the request is intended (e.g. MCData or MCPTT or both)
NOTE: The IWF is configured with an MC service ID for use when the IWF is affiliating itself to the group on behalf of the LMR system.		

10.1.1.3   IWF group affiliation response

Table 10.1.1.3-1 describes the information flow IWF group affiliation response between the IWF and an MC service server and between an MC service server and the IWF.

Table 10.1.1.3-1: IWF group affiliation response

Information element	Status	Description
MC service ID	M	The MC service ID of the originator (LMR user or MC service user) who triggered the MC service group affiliation request.
MC service group ID list	M	A list of one or more MC service group IDs to which the originator intends to affiliate and is defined in the destination MC service system.
Affiliation status per MC service group ID	M	Indicates the affiliation result for every MC service group ID in the list.

10.1.1.4   IWF group de-affiliation request

Table 10.1.1.4-1 describes the information flow IWF group de-affiliation request between the IWF and an MC service server and between an MC service server and the IWF.

Table 10.1.1.4-1: IWF group de-affiliation request

Information element	Status	Description
MC service ID	M	The MC service ID of the originator (LMR user or MC service user) who triggers the MC service group de-affiliation request. (see NOTE)
MC service group ID list	M	A list of one or more MC service group IDs to which the originator intends to de-affiliate.
MC service type	M	The type(s) of service(s) for which the request is intended (e.g. MCData or MCPTT or both)
NOTE: The IWF is configured with an MC service ID for use when the IWF is de-affiliating from the group on behalf of the LMR system.		

10.1.1.5   IWF group de-affiliation response

Table 10.1.1.5-1 describes the information flow IWF group de-affiliation response between the IWF and an MC service server and between an MC service server and the IWF.

Table 10.1.1.5-1: IWF group de-affiliation response

Information element	Status	Description
MC service ID	M	The MC service ID of the originator (LMR user or MC service user) who triggers the MC service group de-affiliation request.
MC service group ID list	M	A list of one or more MC service group IDs to which the originator intends to de-affiliate.
De-affiliation status per MC service group ID	M	Indicates the de-affiliation result for every MC service group ID in the list.

10.1.2   Affiliation procedures

10.1.2.1   General

When an interworking group is defined in the MCPTT system, the LMR system (via the IWF) informs the MCPTT system of group affiliations in one of the following ways:

- Every group affiliation in the LMR system results in an affiliation sent to the MCPTT system, which contains the identity (with appropriate translation by the IWF) of the affiliating group member; or

- A group affiliation is sent on behalf of the group's LMR users (via the IWF) to the MCPTT system when the first group member affiliates to the designated group in the LMR system, and a group de-affiliation is sent on behalf of the group's LMR users (via the IWF) to the MCPTT system when the last group member de-affiliates, and no other group affiliation signalling is sent.

The first and second options may be used at the same time, such that some group members may explicitly affiliate while the IWF may affiliate on behalf of other group members.

In the second option, when the IWF is configured to affiliate on behalf of the group's LMR members then:

a) the group list in the MCPTT system contains the IWF's MCPTT ID. This ID is recognized (through configuration) as having the ability to affiliate on behalf of the group's LMR users associated with this IWF;

b) the IWF affiliates with its MCPTT ID to the group defined in the MCPTT system;

c) the MCPTT system recognizes the affiliation as being from an IWF on behalf of the group's LMR users;

d) when the IWF has affiliated to the group, the MCPTT system:

   i) considers any LMR user associated with the IWF to be affiliated to the group on which the IWF has affiliated. The IWF's users need not be listed ahead of time in the group list for this group in the MCPTT system;

   ii) allows requests such as call setup or floor request, from MCPTT IDs representing LMR users associated with the IWF for actions on the group to which the IWF has affiliated;

   iii) does not carry out an additional affiliation on behalf of LMR users when those users make call requests, and therefore does not send additional messages to those users (e.g. release messages to both the IWF affiliated identity and the LMR user identity performing the action), via the IWF, during call processing;

   iv) recognizes which LMR users are associated with the IWF because their MCPTT IDs belong to the same system as the IWF; and,

   v) uses special rules for the IWF for limits such as "Limitation of number of affiliations per user (N2)".

e) requests from LMR users to the MCPTT system are identified with their individual MCPTT IDs (as translated by the IWF):

   i) a user in the LMR system can affiliate on its own (via the IWF) as long as the user is a group member (i.e. in the group list), even if the IWF has affiliated to the group.

f) the IWF may make requests on behalf of a group's LMR users using the IWF MCPTT ID like a normal group member including, for example, group join requests for groups using the chat model;

g) the IWF is not allowed to affiliate to a group that is not configured with the IWF's MCPTT ID in the group member list; and,

h) if the IWF has not affiliated to an MCPTT group, then call requests to this group from LMR users on the system associated with the IWF, can only be accepted if the LMR user's MCPTT ID is in the group list, and has already affiliated.

10.1.2.2 Group affiliation to a group defined in the MC system

The LMR system may affiliate its group members to an interworking group defined in the MC system via the IWF.

For group regroup, the affiliated group members are automatically affiliated to the temporary group.

The signalling procedure of interworking group affiliation is described in figure 10.1.2.2-1.

Pre-conditions:

1. The group to be affiliated to is defined in the MC system.

2. The IWF is connected to and is authorized to interwork with the MC system.

3. The interworking group information is available at the IWF.

4. The mapping relationship of group and user identities between MC system and the LMR system has been configured at the IWF.

NOTE 1: For all the signalling messages passing through the IWF between the MC system and the LMR system, the IWF performs the identity conversion and protocol translation.
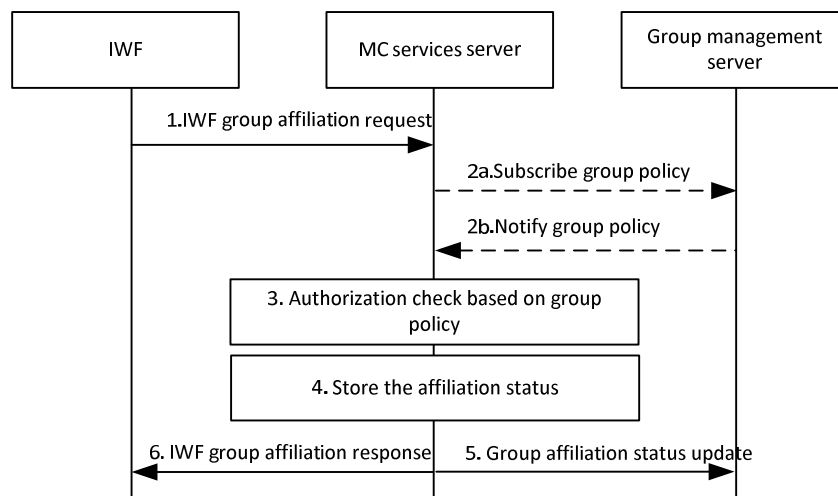
Figure 10.1.2.2-1: Group affiliation to a group defined in the MC system

1. The IWF sends an IWF group affiliation request to the MC service server on behalf of the LMR system.

2a. The MC service server checks if the group policy is locally cached. If the group policy is not locally cached on the MC service server then the MC service server requests the group policy from the group management server.

2b. The MC service server receives the group policy from the group management server.

3. Based on the group policy, the MC service server checks if the MC service group(s) is not disabled and if the user identified by the MCPTT ID supplied by the IWF is authorised to affiliate to the requested MC service group(s).

4. Based on the group policy and user subscription, the MC service server affiliates the IWF to the group. If a separate affiliation for each LMR user is expected, the status of the affiliating user is stored by the MC service

server as the status associated with an MC service ID provided by the IWF that corresponds to the identity of that LMR user. If a separate affiliation for each LMR user is not expected, an affiliation status for the group using the MC service ID provided by the IWF is stored.

5. The MCPTT server sends the group affiliation status update message to the group management server, the group management server stores and updates the group affiliation status.

6. The MC service server returns an IWF group affiliation response to the IWF.

NOTE 2: How the LMR user(s) affiliates to a group is outside the scope of the present document.

10.1.2.3 Group de-affiliation from a group defined in the MC system

The signalling procedure of interworking group de-affiliation from a group defined in the MC system is described in figure 10.1.2.3-1.

The LMR system manages the individual de-affiliation requests from the LMR users. The LMR system can de-affiliate its group members from the interworking group via the IWF.

Pre-conditions:

1. The mapping relationship of group and user identities between the MC system and the LMR system has been configured at the IWF.

2. The affiliation procedure described in subclause 10.1.2.2 was previously performed.

NOTE 1: For all the signalling messages passing through the IWF between the MC system and the LMR system, the IWF performs the identity conversion and protocol translation.
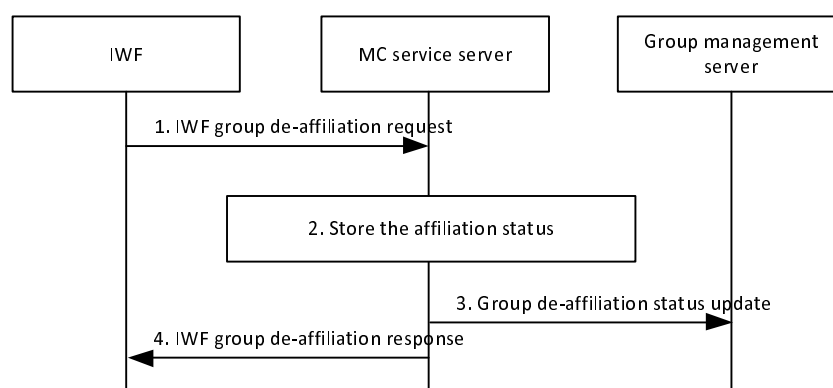
Figure 10.1.2.3-1: Group de-affiliation from group defined in the MC system

1. The IWF sends an IWF group de-affiliation request to the MC service server on behalf of the LMR system.

2. If a separate de-affiliation from each LMR user is expected and based on the group policy and user subscription, the MC service server may de-affiliate the LMR group member from the group. Further, the MC service server may store the affiliation status of the user(s) for the requested MC service group(s). If a separate de-affiliation from each LMR user is not expected, the de-affiliation signalling de-affiliates the IWF and therefore the entire LMR system from the group.

3. The MC service server sends the group de-affiliation status update message to the group management server, the group management server stores and updates the group affiliation status.

4. The MC service server returns an IWF group de-affiliation response to the IWF.

NOTE 2: How the LMR user(s) de-affiliate from a group is outside the scope of the present document.

10.1.2.4 Group affiliation to group defined in the LMR system

The MC service system may affiliate its group members to an interworking group defined in the LMR system via the IWF.

The signalling procedure of group affiliation via the IWF is described in figure 10.1.2.4-1.

Pre-conditions:

1. The group to be affiliated to is defined in the LMR system.

2. The IWF is connected to and is authorized to work with the MC system.

3. The mapping relationship of group and user identities between the MC system and the LMR system has been configured at the IWF.

NOTE 1: For all signalling messages passing through the IWF between the MC system and the LMR system, the IWF performs the identity conversion and protocol translation.
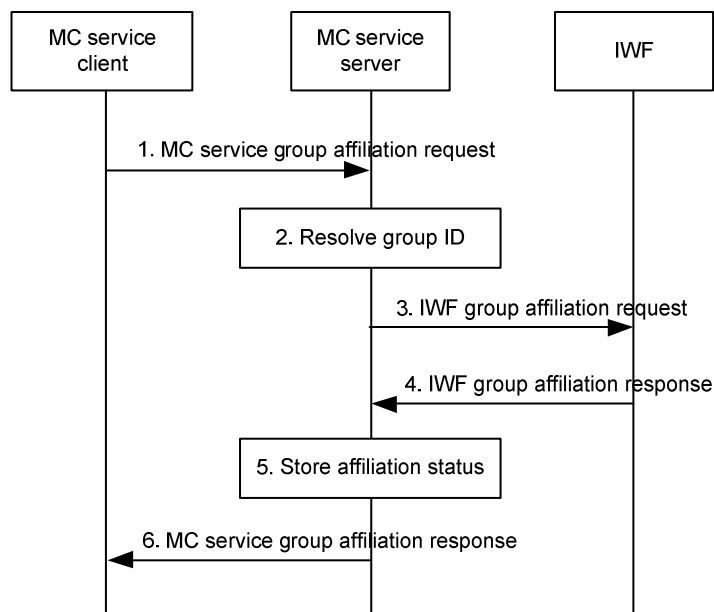
Figure 10.1.2.4-1: Group affiliation to group defined in the LMR system

1. The MC service client sends a MC service group affiliation request, including the MC service group ID(s), to the MC service server.

2. The MC service server checks if the MC service group ID(s) is an interworking group defined in the LMR system.

3. The MC service server sends an IWF group affiliation request to the IWF.

NOTE 2: The IWF can forward the request to the LMR system that could check whether the MC service client is authorized to affiliate to this interworking group.

NOTE 3: The IWF can reject the affiliation if the MC service group ID is either unknown to the IWF or not mapped to an LMR group identity in the IWF configuration.

4. The IWF returns an IWF group affiliation response to the MC service server, informing the successful affiliation to the LMR group.

5. The MC service server stores the group affiliation status of the MC service client for the requested interworking group.

6. The MC service server sends an MC service group affiliation response to the MC service client.

NOTE 4: How the affiliation is conducted on the LMR system is outside the scope of the present document.

10.1.2.5   Group de-affiliation from a group defined in the LMR system

The signalling procedure of interworking group de-affiliation from a group defined in the LMR system is described in figure 10.1.2.5-1.

The MC system manages the individual de-affiliation requests from the MC service users. The MC service system may de-affiliate its group members from the interworking group via the IWF.

Pre-conditions:

1. The mapping relationship of group and user identities between the MC service system and the LMR system has been configured at the IWF.

2. The affiliation procedure described in subclause 10.1.2.4 was previously performed.

NOTE: For all the signalling messages passing through the IWF between the MC system and the LMR system, the IWF performs the identity conversion and protocol translation.
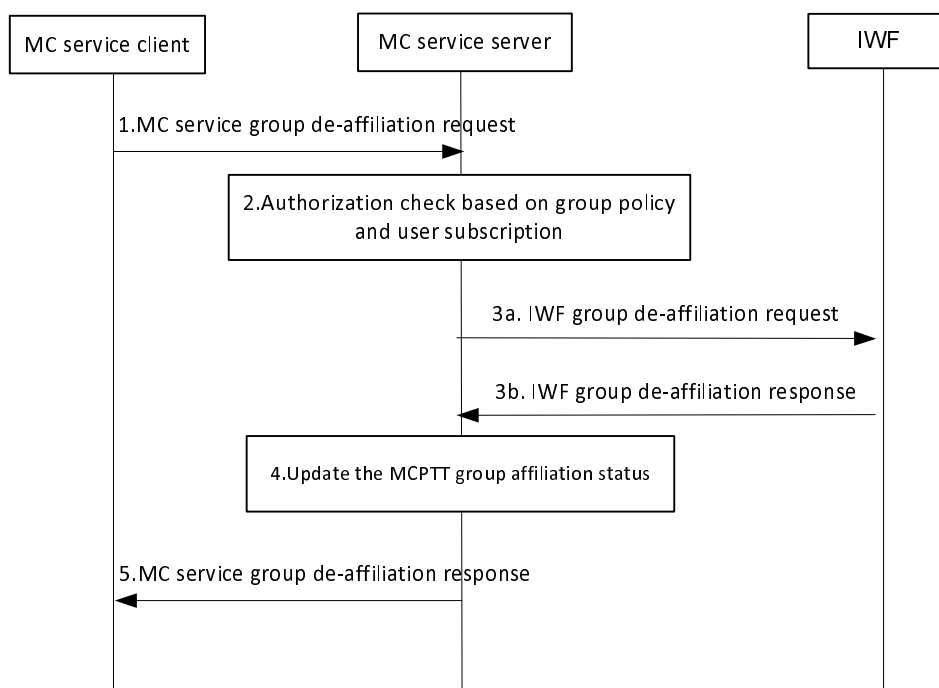
Figure 10.1.2.5-1: Group de-affiliation from a group defined in the LMR system

1. The MC service client of the MC service user sends an MC service group de-affiliation request to the MC service server. The MC service client shall provide the initiating MC service ID and the MC service group ID(s) being de-affiliated from.

2. Based on the user subscription and stored group policy, the MC service server checks if the user of the MC service client is affiliated to the requested MC service group(s). The MC service server checks if the MC service group(s) is an interworking group.

3a. If the MC service group(s) is an interworking group, the MC service server sends an IWF group de-affiliation request to the IWF.

3b. The IWF returns an IWF group de-affiliation response to the MC service server.

4. If the user of the MC service client is authorized to de-affiliate from the requested MC service group(s), the MC service server removes the affiliation status of the user for the requested MC service group(s).

5. The MC service server returns an MC service group de-affiliation response to the MC service client.

10.2 Group management

10.2.1 Information flows for group management

10.2.1.1 General

The following subclauses define information flows for group management on the IWF-1 interface. Group management related information flows on reference points other than IWF-1 are defined in 3GPP TS 23.280 [5].

10.2.1.2 IWF group regroup teardown notification

Table 10.2.1.2-1 describes the information flow IWF group regroup teardown notification between the group management server and the IWF or between the IWF and the group management server.

Table 10.2.1.2-1: IWF group regroup teardown notification

Information element	Status	Description
MC service group ID	M	MC service group ID of the temporary group which is torn down

10.2.1.3 IWF group regroup teardown notification response

Table 10.2.1.3-1 describes the information flow IWF group regroup teardown notification response between the group management server and the IWF or between the IWF and the group management server.

Table 10.2.1.3-1: IWF group regroup teardown notification response

Information element	Status	Description
MC service group ID	M	MC service group ID of the temporary group which was torn down
Result	M	Indicates success or failure of the notification

10.2.1.4 IWF group regroup request

Table 10.2.1.4-1 describes the information flow IWF group regroup request between the group management server and the IWF or between the IWF and the group management server.

Table 10.2.1.4-1: IWF group regroup request

Information element	Status	Description
MC service group ID list	M	List of constituent MC service group IDs

10.2.1.5 IWF group regroup response

Table 10.2.1.5-1 describes the information flow IWF group regroup response between the group management server and the IWF or between the IWF and the group management server.

Table 10.2.1.5-1: IWF group regroup response

Information element	Status	Description
MC service group ID	O (see NOTE)	MC service group ID of the temporary group
MC service group ID list	M	List of constituent MC service group IDs.
Result	M	Indicates whether the IWF group regroup was accepted or rejected.
NOTE: Shall be present if the Result information element indicates that the group regroup operation is successful. Otherwise MC service group ID shall not be present.		

10.2.1.6 IWF group regroup notification

Table 10.2.1.6-1 describes the information flow IWF group regroup notification between the group management server and the IWF or between the IWF and the group management server.

Table 10.2.1.6-1: IWF group regroup notification

Information element	Status	Description
MC service group ID list	M	List of constituent MC service group IDs
MC service group ID	M	MC service group ID of the temporary group
Priority level	O	Required priority level for the temporary group
Security level (see NOTE)	O	Required security level for the temporary group
NOTE: Security level refers to the configuration of media and floor control protection parameters as listed in 3GPP TS 23.280 [5]		

10.2.1.7 IWF group regroup notification response

Table 10.2.1.7-1 describes the information flow IWF group regroup notification response between the group management server and the IWF or between the IWF and the group management server.

Table 10.2.1.7-1: IWF group regroup notification response

Information element	Status	Description
MC service group ID list	M	List of constituent MC service group IDs
MC service group ID	M	MC service group ID of the temporary group
Priority level	M	Required priority level for the temporary group
Security level	M	Required security level for the temporary group

10.2.1.8 IWF group information request

Table 10.2.1.8-1 describes the IWF group information request from the IWF to the group management server or from the group management server to the IWF.

Table 10.2.1.8-1: IWF group information request

Information element	Status	Description
MC service group ID	M	The identity of the MC service group.

10.2.1.9 IWF group information response

Table 10.2.1.9-1 describes the IWF group information response from the group management server to the IWF or the IWF to the group management server.

Table 10.2.1.9-1: IWF group information response

Information element	Status	Description
MC service group ID	M	The identity of the MC service group.
MC service group provisioning information	O (see NOTE 1)	The group information retrieved from the group management server or from the IWF in the case where the IWF is performing the provision.
Result	O (see NOTE 2)	Indicates reason for failure to provide MC service group configuration information
NOTE 1: Shall be present if the request can be fulfilled.		
NOTE 2: Shall be present if the request cannot be fulfilled.		

10.2.1.10   IWF group information provision request

Table 10.2.1.10-1 describes the IWF group information provision request from the group management server to the IWF or the IWF to the group management server.

Table 10.2.1.10-1: IWF group information provision request

Information element	Status	Description
MC service group ID	M	The identity of the MC service group.
MCPTT group configuration information	M	The group information retrieved from the group management server or from the IWF in the case where the group is defined in the IWF.

10.2.1.11   IWF group information provision response

Table 10.2.1.11-1 describes the IWF group information provision response from the IWF to the group management server or from the group management server to the IWF.

Table 10.2.1.11-1: IWF group information provision response

Information element	Status	Description
MC service group ID	M	The identity of the MC service group.
Result	M	Indicates success or failure of reception, modification and storage of MC service group configuration information

10.2.1.12   IWF group information subscribe request

Table 10.2.1.12-1 describes the information flow IWF group information subscribe request from the IWF to the group management server in the MC system for cases where the MC system is the primary system of the group and from the group management server in the MC system to the IWF for cases there the IWF is the primary system of the group.

Table 10.2.1.12-1: IWF group information subscribe request

Information element	Status	Description
MC service group ID	M	MC service group ID of the group
MC services requested	O	Service(s) for which group configuration is requested; one or more of MCPTT, MCData

10.2.1.13   IWF group information subscribe response

Table 10.2.1.13-1 describes the information flow IWF group information subscribe response from the group management server in the MC system to the IWF for cases where the MC system is the primary system of the group and from the IWF to the group management server in the MC system for cases where the IWF is the primary system of the group.

Table 10.2.1.13-1: IWF group information subscribe response

Information element	Status	Description
MC service group ID	M	MC service group ID of the group
Result	M	Indicates success or failure of the subscribe request

10.2.1.14   IWF group information notify request

Table 10.2.1.14-1 describes the information flow IWF group information notify request from the group management server in the MC system to the IWF for cases where the MC system is the primary system of the group and from the IWF to the group management server in the MC system for cases where the IWF is the primary system of the group.

Table 10.2.1.14-1: IWF group information notify request

Information element	Status	Description
MC service group ID	M	MC service group ID of the group
MC service group information reference (see NOTE)	O	Reference to information stored relating to the MC service group
Group related key material (see NOTE)	O	Key material for use with the MC service group
NOTE: At least one of these information elements shall be present.		

10.2.1.15   IWF group information notify response

Table 10.2.1.15-1 describes the information flow IWF group information notify response from the IWF to the group management server in the MC system for cases where the MC system is the primary system of the group and from the group management server in the MC system to the IWF for cases there the IWF is the primary system of the group.

Table 10.2.1.15-1: IWF group information notify response

Information element	Status	Description
MC service group ID	M	MC service group ID of the group
Result	M	Indicates success or failure of the notification request

10.2.2   Group regrouping

10.2.2.1   General

The procedures in 3GPP TS 23.280 [5] are followed, but with changes required for interworking. The IWF will behave on the interface as if it is a peer MC service server with a peer group management client and peer group management server.

Exceptions to the 3GPP TS 23.280 [5] procedures are detailed in the subclauses below.

10.2.2.2   MC system initiates the group regroup

The MC system can initiate a group regroup that includes groups defined at the IWF. The IWF is informed and may reject the regroup if conditions do not allow it to support the regroup. This is described in figure 10.2.2.2-1.

Pre-conditions:

1. The group management client has retrieved the group configurations of the groups to be regrouped.

2. At least one MC service group has been defined in the MC system.

3. At least one MC service group has been defined in the IWF.
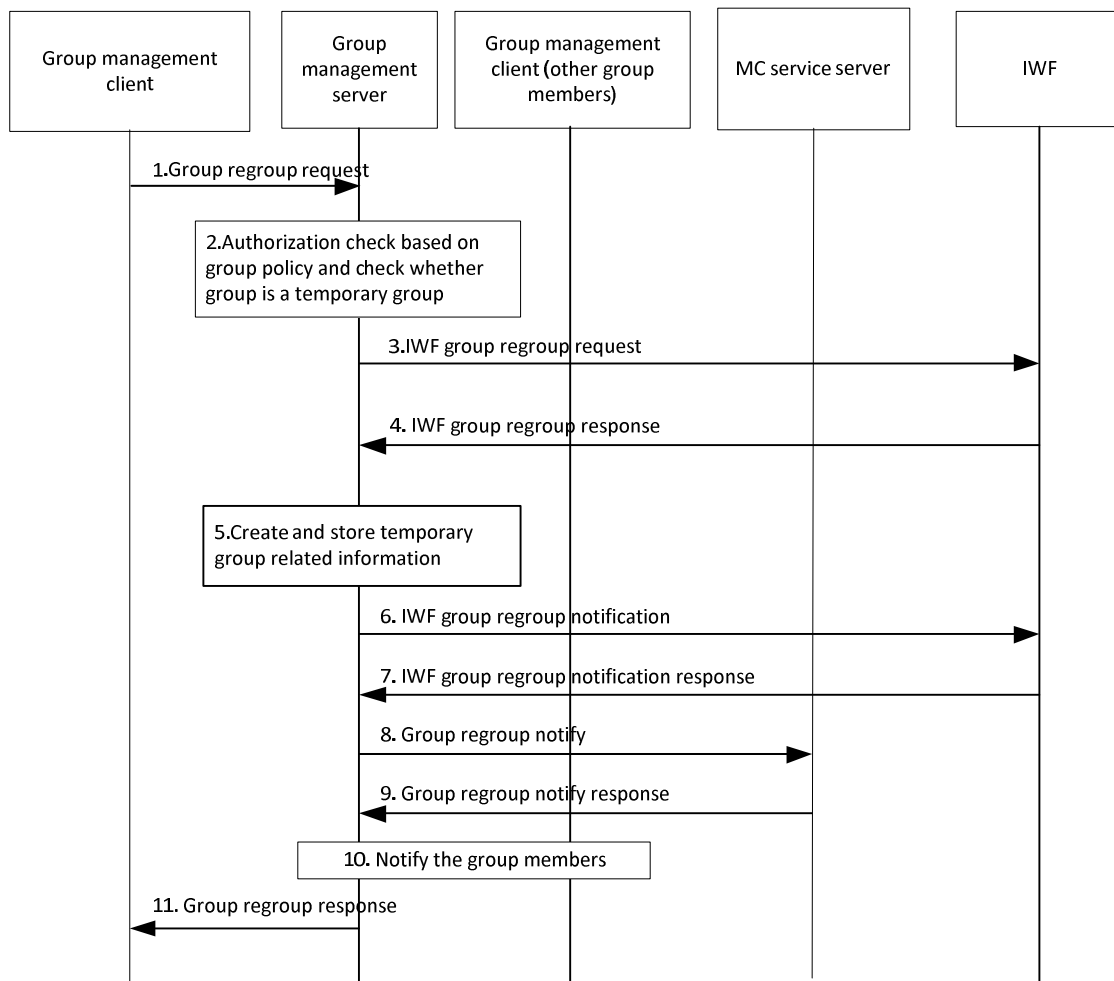
Figure 10.2.2.2-1: Group regrouping to an IWF

1. The group management client of the MC service user (e.g. dispatcher) requests group regroup operation to the group management server (which is the group management server of one of the MC service groups to be regrouped). The identities of the groups being combined shall be included in this message. The group management client may indicate the security level required for the temporary group. The group management client may indicate the priority level required for the temporary group.

2. The group management server checks whether group regroup operation is performed by an authorised MC service user, based on group policy. The group management server checks whether the group is a temporary group. If the group is a temporary group, then the group regrouping will be rejected, otherwise the group regrouping can proceed.

3. The group management server forwards the IWF group regroup request to the IWF with the information about the IWF's groups.

4. The IWF provides an IWF group regroup response. Due to security aspects concerning sharing information among different MC systems, the IWF does not share the users' information of the groups under its management to the group management server. The IWF may reject the IWF group regroup response. (e.g. if one of its constituent groups is in the emergency state or is already in a regroup, if the IWF does not support temporary groups or the IWF does not support group regrouping)

5. The group management server creates and stores the information of the temporary group, including the temporary MC service group ID, off-network information, and the MC service IDs of the groups being combined, the priority level of the temporary group, and the security level of the temporary group. If the

authorised MC service user does not specify the security level and the priority level, the group management server shall set the lower security level and the higher priority of the constituent groups.

6. The group management server notifies the IWF about its group regroup operation.

NOTE: How the IWF uses the MC service group ID that identifies the temporary group is outside the scope of the present document.

7. The IWF acknowledges the group management server.

8. The group management server notifies the MC service server of the temporary group creation with the information of the constituent groups.

9. The MC service server acknowledges the notification from the group management server.

10. The group management server notifies the MC service group members of the constituent MC service groups of the group management server, possibly with an indication of lower security level.

11. The group management server provides a group regroup response to the group management client of the authorised MC service user (e.g. dispatcher).

10.2.2.3   IWF initiates the group regroup

The procedure in 3GPP TS 23.280 [5] is followed, except for steps 1 and 2. The IWF will behave on the interface as if it is a peer MC service server with a peer group management server. This is described in figure 10.2.2.3-1.

Pre-conditions:

1. At least one MC service group has been defined in the MC system.

2. At least one MC service group has been defined in the IWF.
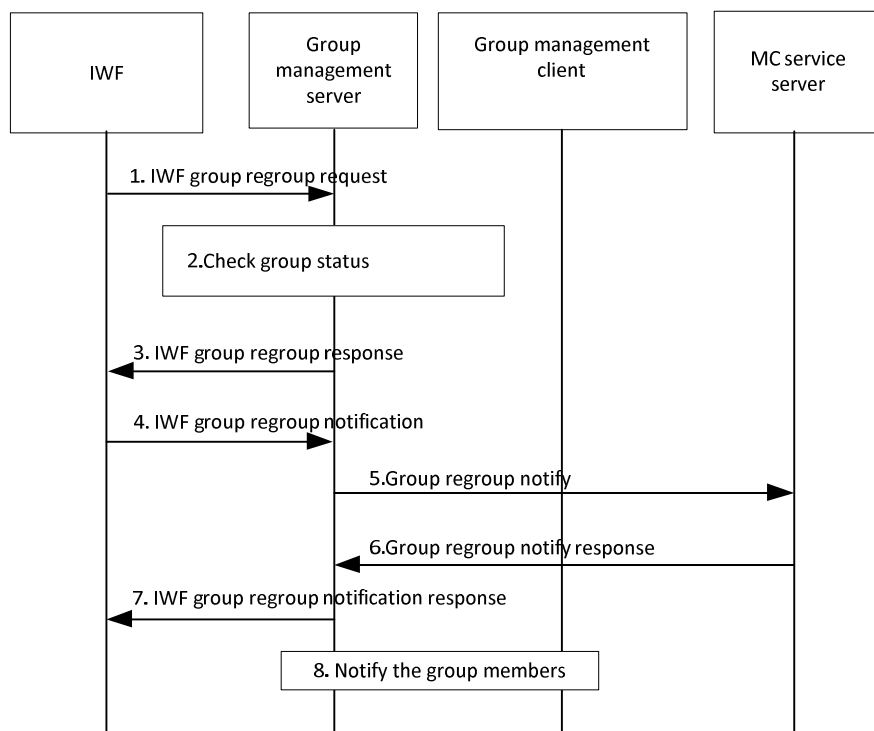
Figure 10.2.2.3-1: Group regrouping from an IWF

1. The IWF sends an IWF group regroup request to the group management server.

2. The group management server checks whether the group can be included in a temporary group.

3. The group management server provides an IWF group regroup response.

NOTE: Due to security aspects concerning sharing information among different systems, the group management server does not share the users' information of the groups under its management to the IWF.

4. The IWF notifies the group management server regarding the temporary group creation with information of the constituent groups.

5. The group management server notifies the MC service server regarding the temporary group creation with the information of the constituent groups.

6. The MC service server acknowledges the notification from the group management server. The MC service server may reject the IWF group regroup, e.g. if one of its constituent groups is already in a regroup.

7. The group management server acknowledges the notification from the IWF.

8. The group management server notifies the MC service group members of the constituent MC service groups of the group management server, possibly with an indication of a lower security level.

10.2.2.4 Ownership of the group regroup

The group management server that performs the group regroup operation owns the temporary group created by the regroup, as implied in 3GPP TS 23.280 [5].

10.2.2.5 Simultaneous group regroup requests from each side of the IWF-1 interface

To prevent routing issues and complexity that could result from regrouping the same users from both sides of the interface, the following rules can be applied:

- If group regrouping signalling using temporary groups is used on the MC system, the IWF must prevent the regroup signalling from propagating to the LMR system if the LMR system does not support regrouping;

- the IWF must handle the translation between temporary group identities on the MC system and the original interworking group identities used on the LMR system; and

- the regrouping rules in subclause 10.2.4.4 of 3GPP TS 23.280 [5] also apply.

10.2.2.6 Resolution of vocoder and encryption mode for the group regroup

If one of the LMR groups to be included in a group regroup requires the use of LMR E2EE the preferred voice codecs for an MCPTT temporary group should be LMR codecs. If any of the mission critical users to be included in this MCPTT temporary group do not support LMR E2EE or the preferred LMR codecs, voice calls using LMR E2EE will fail for those users.

NOTE 1: How the MC system determines that the temporary group needs to support LMR E2EE is outside the scope of the present document.

NOTE 2: How the MC system determines that the temporary group needs to support an LMR codec is outside the scope of the present document.

10.2.3 Group configuration for interworking

10.2.3.1 Overview

The procedures in the following subclauses describe the process for sharing group configuration from an MC system to an IWF where the IWF needs to make use of the MC service group and from an IWF to an MC system where the MC system's clients need to make use of the group. The procedures in this subclause are based upon subclause 10.2.7 in 3GPP TS 23.280 [5].

10.2.3.2　MC system provides group configuration to the IWF

Figure 10.2.3.2-1 below illustrates the case where the MC system provides the group configuration to the IWF, e.g. due to an action by an administrator or because the primary MC system of some of the MC service group members is the IWF.

Pre-conditions:

1. The MC service group is defined in the MC system.

2. One or more LMR users are members of the group.

3. The MC system of the MC service group has been configured with addressing information for the group management function in the IWF.

4. The MC system of the MC service group is authorized to provide group configuration information to the IWF.

NOTE:　The MC system of the MC service group could be configured with an address of the IWF which is a proxy address.
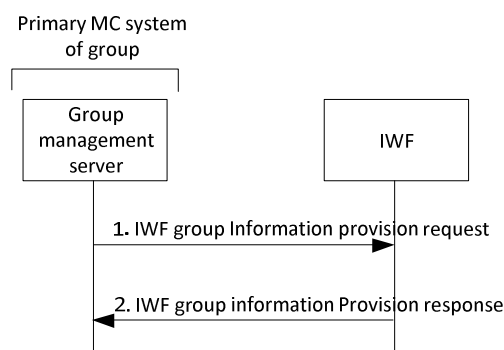
Figure 10.2.3.2-1: MC system provides group configuration to the IWF

1. The group management server in the MC system of the MC service group provides the configuration information related to the MC service group to the IWF.

2. The IWF responds to the group management server of the MC system of the MC service group that the configuration has been received and stored correctly.

10.2.3.3　IWF requests group configuration from the MC system

Figure 10.2.3.3-1 below illustrates the case where the IWF requests the group configuration from the MC system, for example because a user on the IWF is a member of the group.

Pre-conditions:

1. The MC service group is defined in the MC system.

2. One or more LMR users are members of the group.

3. The IWF does not have the configuration for the MC service group stored.

Primary MC system
of group
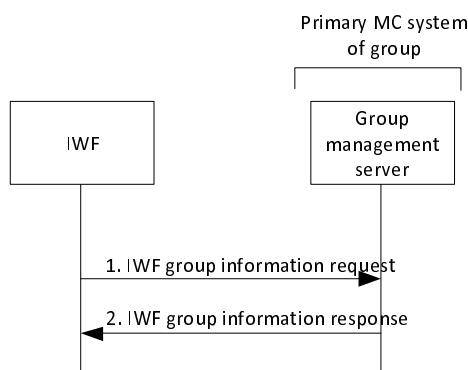
Figure 10.2.3.3-1: Partner MC system requests group configuration from primary MC system

1. The IWF requests the group configuration from the group management server in the primary MC system of the MC service group.

2. The group management server in the MC system of the MC service group provides the requested group configuration information.

10.2.3.4 IWF provides group configuration to the MC system

Figure 10.2.3.4-1 below illustrates the case where the IWF provides the group configuration to the MC system, e.g. due to an action by an administrator or because some of the IWF's MC service group members are homed on the MC system.

Pre-conditions:

1. The group is defined in the IWF.

2. One or more MC service users are members of the group.

NOTE: The group management server within the MC system is responsible for providing group configuration information to group members for whom the MC system is their serving MC system.

Primary system of
group
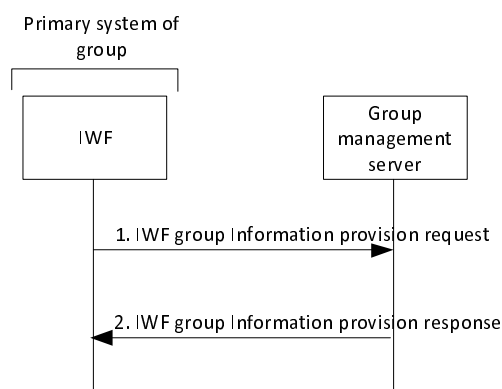
Figure 10.2.3.4-1: MC system provides group configuration to the IWF

1. The IWF provides the configuration information related to the group to the group management server in the MC system.

2. The group management server in the MC system responds to the IWF that the configuration has been received and stored correctly.

10.2.3.5 MC system requests group configuration from the IWF

Figure 10.2.3.5-1 below illustrates the case where the MC system requests the group configuration from the IWF, for example because an MC service user receiving service in the MC system has the group configured in the user profile.

Pre-conditions:

1. The MC service group is defined in the IWF.

2. One or more MC service users are members of the group.

3. The group management server in the MC system does not have the configuration for the MC service group stored.

4. The MC system has been configured with addressing information for the group management function in the IWF.

NOTE: The group management server within the MC system is responsible for providing group configuration information to MC service group members for whom the MC system is their serving MC system.
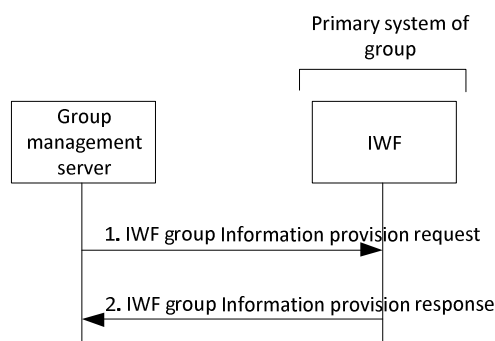
Figure 10.2.3.5-1: Partner MC system requests group configuration from primary MC system

1. The MC system requests the group configuration from the group management function in the IWF.

2. The IWF provides the requested group configuration information.

10.2.3.6 IWF subscribes to group configuration

The procedure for subscription from IWF for group configuration information to the group management server in the primary MC system of the MC service group is shown in figure 10.2.3.6-1.

Pre-conditions:

1. The MC service group is defined in its MC system.

2. One or more group members are defined in the LMR system.

3. The IWF has received group information from the GMS in the primary MC system of the MC service group.
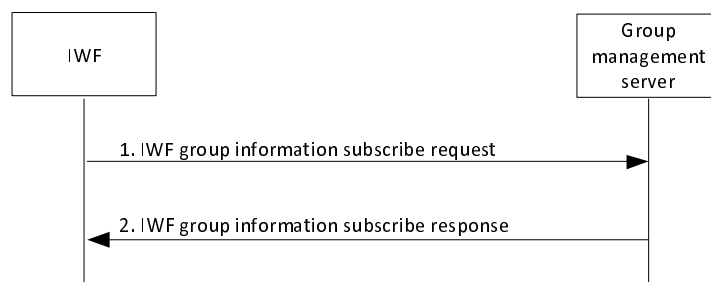
Figure 10.2.3.6-1: Subscription from the IWF to the MC system for MC service group configuration

1. The IWF subscribes to the group configuration information stored in the group management server in the primary MC system of the MC service group.

2. The group management server in the primary MC system of the MC service group sends an IWF group information subscribe response to IWF indicating success or failure of the request.

10.2.3.7 MC system notifies group configuration

The procedure for notification of group configuration information from the group management server in the primary MC system of the MC service group to the IWF is shown in figure 10.2.3.7-1.

Pre-conditions:

1. The IWF has subscribed to the group configuration information for the MC service group in the group management server in the primary MC system of the MC service group.

2. The group management server in the primary MC system of the MC service group has received and stored new group configuration information for the MC service group.
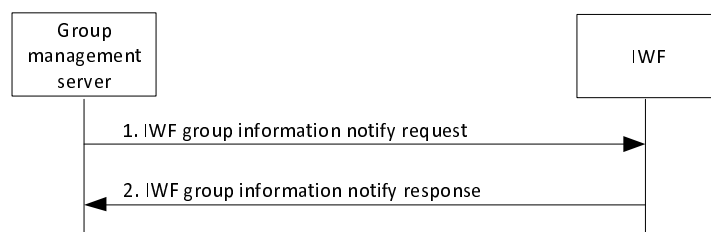
Figure 10.2.3.7-1: Notification of group configuration information to the IWF

1. The group management server in the primary MC system of the MC service group sends an IWF group information notify request to the IWF.

2. The IWF sends an IWF group information notify response to the group management server in the primary MC system of the MC service group indicating the success or failure of the notification.

10.2.3.8 MC system subscribes to group configuration

The procedure for subscription by the group management server in the MC system to the IWF for group configuration information is shown in figure 10.2.3.8-1.

Pre-conditions:

1. The group is defined in the LMR system.

2. One or more group members are defined in the MC system.

3. The group management server in the MC system has received group information from the IWF.
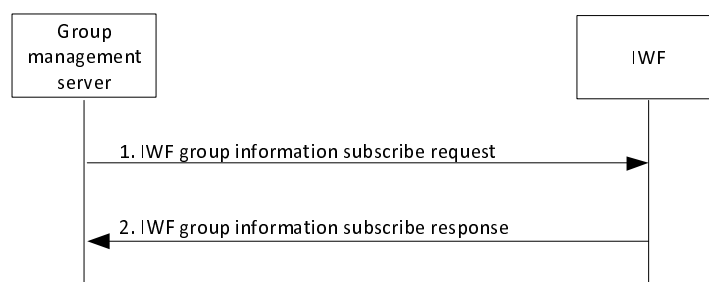
Figure 10.2.3.8-1: Subscription from the MC system to the IWF for MC service group configuration

1. The group management server of the MC system subscribes to the group configuration information stored in the IWF.

2. The IWF provides an IWF group information subscribe response to group management server of the MC system indicating success or failure of the request.

10.2.3.9 IWF notifies group configuration

The procedure for notification of group information from the IWF to the group management server in the MC system is shown in figure 10.2.3.9-1.

Pre-conditions:

1. The group management server of the MC system has subscribed to the group configuration information for the group in the IWF.

2. The IWF has new information for the group.
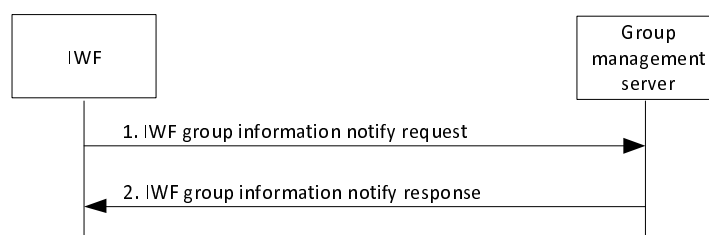
Figure 10.2.3.9-1: Notification of group configuration information to partner MC system of MC service group

1. The IWF sends an IWF group information notify request to the group management server in the MC system.

2. The group management server in the MC system sends an IWF notify group information notify response to the IWF indicating the success or failure of the notification.

10.3 Group call

10.3.1 General

The following subclauses define information flows and signaling procedures for group calls and broadcast group calls.

Where the group is defined in the MCPTT system and where the IWF has affiliated to an MCPTT group with a single affiliation on behalf of all LMR group members, only a single IWF group call request / IWF group call release request message is sent to the IWF at the commencement / release of a group call. Where the group is defined in the MCPTT system and where the IWF has passed through individual affiliations for each group member in the LMR system, the MCPTT system shall send individual IWF group call request / IWF group call release request messages to the IWF for all affiliated group members in the LMR system in accordance with primary and partner MCPTT system behaviour. In both cases, the distribution of the messages to group members in the LMR system is out of scope of the present document.

Where the group is defined in the LMR system, the IWF shall send individual IWF group call request / IWF group call release request messages to the IWF for all affiliated MCPTT group members in accordance with primary and partner MCPTT system behaviour.

10.3.2 Information flows for group call over interworking group

10.3.2.1 General

The following subclauses define information flows for group calls on the IWF-1 interface. Group call related information flows on reference points other than IWF-1 are defined in 3GPP TS 23.379 [7].

10.3.2.2 IWF group call request

Table 10.3.2.2-1 describes the information flow IWF group call request from the IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.3.2.2-1: IWF group call request information elements

Information Element	Status	Description
MCPTT ID (see NOTE 1)	M	The MCPTT ID of the calling party
MCPTT group ID	M	The MCPTT group ID of the interworking group on which the call is initiated
SDP offer	M	Media parameters of MCPTT server
Implicit floor request (see NOTE 2)	O	Indicates that the originator requests the floor.
Broadcast indicator	O	Indicates that the group call request is for a broadcast group call
Location	O	Location of the calling party
NOTE 1: If the LMR system does not provide the calling party identity when the group call is originated from the LMR system, then this information element may be set to a MCPTT ID reserved for LMR user at the IWF.		
NOTE 2: This element shall be included only when the originating client requests the floor.		

10.3.2.3 IWF group call response (IWF – MCPTT server)

Table 10.3.2.3-1 describes the information flow IWF group call response from the MCPTT server to the IWF and from the IWF to MCPTT server.

Table 10.3.2.3-1: IWF group call response information elements

Information Element	Status	Description
MCPTT ID	M	The MCPTT ID of the target MCPTT group member
MCPTT group ID	M	The MCPTT group ID of the group on which the call is requested
SDP answer	M	Media parameters selected

10.3.2.4 IWF Group-broadcast group call setup request

Table 10.3.2.4-1 describes the information flow IWF group-broadcast group call setup request from the MCPTT server to the IWF and from the IWF to the MCPTT server.

Table 10.3.2.4-1: IWF Group-broadcast group call setup request information elements

Information Element	Status	Description
MCPTT ID (see NOTE 1)	M	The MCPTT ID of the calling party
MCPTT group ID	M	The MCPTT group ID of the group on which the call is requested
SDP offer	M	Media parameters of MCPTT clients
Implicit floor request (see NOTE 2)	O	Indicates that the originating client requests the floor
Location	O	Location of the calling party
NOTE 1: If the LMR system does not provide the calling party identity when the group-broadcast group call setup request is originated from the LMR system, then this information element may be set to a MCPTT ID reserved for the LMR user at the IWF. NOTE 2: This element shall be included only when the originating client requests the floor.		

10.3.2.5 IWF Group-broadcast group call setup response

Table 10.3.2.5-1 describes the information flow IWF group-broadcast group call setup response from the IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.3.2.5-1: IWF Group-broadcast group call setup response information elements

Information Element	Status	Description
MCPTT ID	M	The MCPTT ID of the calling party
MCPTT group ID	M	The MCPTT group ID of the group on which the call is requested
SDP answer	M	Media parameters selected

10.3.2.6 IWF Group-broadcast group call release request

Table 10.3.2.6-1 describes the information flow IWF group-broadcast group call release request from the MCPTT server to the IWF and from the IWF to the MCPTT server.

Table 10.3.2.6-1: IWF Group-broadcast group call release request information elements

Information Element	Status	Description
MCPTT ID	M (see NOTE)	The MCPTT ID of the MCPTT group member
MCPTT group ID	M	The MCPTT group ID of the group on which the call is released
NOTE: If the LMR system does not provide the calling party identity when the group-broadcast group call release request is originated from the LMR system, then this information element may be set to a MCPTT ID reserved for the LMR user at the IWF.		

10.3.2.7   IWF group-broadcast group call release response

Table 10.3.2.7-1 describes the information flow IWF group-broadcast group call release request from the IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.3.2.7-1: IWF Group-broadcast group call release response information elements

Information Element	Status	Description
MCPTT ID	M	The MCPTT ID of the target MCPTT group member
MCPTT group ID	M	The MCPTT group ID of the group on which the call is released

10.3.2.8   IWF group join request

Table 10.3.2.8-1 describes the information flow IWF group join request from the IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.3.2.8-1: IWF group join request information elements

Information Element	Status	Description
MCPTT ID	M	The MCPTT ID of the originator of the request. (see NOTE 1)
MCPTT group ID	M	The MCPTT group ID of the group to which the group communication is requested
SDP offer	M	Media parameters of originator
Implicit floor request (see NOTE 2)	O	Indicates that the originating client requests the floor.
NOTE 1: The IWF is configured with an MCPTT ID for use when the IWF is affiliating itself to the group on behalf of the LMR system. NOTE 2: This element is included only when the originating client requests the floor.		

10.3.2.9   IWF group join response

Table 10.3.2.9-1 describes the information flow group join response from the MCPTT server to the IWF and from the IWF to the MCPTT server.

Table 10.3.2.9-1: IWF group join response information elements

Information Element	Status	Description
MCPTT ID	M	The MCPTT ID of the originator of the request. (see NOTE)
MCPTT group ID	M	The MCPTT group ID of the group to which the group communication is requested
SDP answer	M	Media parameters selected
NOTE: The IWF is configured with an MCPTT ID for use when the IWF is affiliating itself to the group on behalf of the LMR system.		

10.3.2.10 IWF group call leave request

Table 10.3.2.10-1 describes the information flow IWF group call leave request from the MCPTT server to the IWF and from the IWF to the MCPTT server.

Table 10.3.2.10-1: IWF group call leave request information elements

Information Element	Status	Description
MCPTT ID	M	The MCPTT ID of the MCPTT group member
MCPTT group ID	M	The MCPTT group ID of the group from which the user is leaving

10.3.2.11 IWF group call leave response

Table 10.3.2.11-1 describes the information flow IWF group call leave response from the IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.3.2.11-1: IWF group call leave response information elements

Information Element	Status	Description
MCPTT ID	M	The MCPTT ID of the MCPTT group member
MCPTT group ID	M	The MCPTT group ID of the group from which the user is leaving

10.3.2.12 IWF group call release request

Table 10.3.2.12-1 describes the information flow IWF group call release request from the IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.3.2.12-1: IWF group call release request information elements

Information element	Status	Description
MCPTT ID (NOTE)	O	The MCPTT ID of the initiating MCPTT group member
MCPTT group ID	M	The MCPTT group ID of the group on which the call is released
Release reason	O	The reason why the call is released
NOTE: This IE is not included if the group call release is initiated by the server (e.g. due to timeout)		

10.3.2.13 IWF group call release response

Table 10.3.2.13-1 describes the information flow IWF group call release response from the IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.3.2.13-1: IWF group call release response information elements

Information Element	Status	Description
MCPTT ID	M	The MCPTT ID of the target MCPTT group member
MCPTT group ID	M	The MCPTT group ID of the group on which the call is released.

10.3.2.14 IWF pre-configured regroup request

Table 10.3.2.14-1 describes the information flow IWF pre-configured regroup request from the IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.3.2.14-1 IWF pre-configured regroup request information elements

Information Element	Status	Description
MCPTT ID	M	The MCPTT ID of the requester
MCPTT group ID	M	MCPTT group ID of the regroup group
MCPTT group ID	M	MCPTT group ID of the MCPTT group from which configuration is to be taken
MCPTT group ID list	O (see NOTE)	List of MCPTT groups to be regrouped into the pre-configured regroup group
MCPTT ID list	O (see NOTE)	List of MCPTT IDs to be regrouped into the pre-configured user regroup group
NOTE: One and only one of these shall be present.		

10.3.2.15 IWF pre-configured regroup response

Table 10.3.2.15-1 describes the information flow IWF pre-configured regroup response from IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.3.2.15-1 IWF pre-configured regroup response information elements

Information Element	Status	Description
MCPTT ID	M	The MCPTT ID of the requester of the regrouping operation
MCPTT group ID	M	MCPTT group ID of the regroup group
Result	M	Result of the regrouping operation

10.3.2.16 IWF pre-configured regroup cancel request

Table 10.3.2.16-1 describes the information flow pre-configured regroup cancel request from the IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.3.2.16-1 IWF pre-configured regroup cancel request information elements

Information Element	Status	Description
MCPTT ID	M	The MCPTT ID of the requester
MCPTT group ID	M	MCPTT group ID of the regroup group

10.3.2.17   IWF pre-configured regroup cancel response

Table 10.3.2.17-1 describes the information flow IWF pre-configured regroup cancel response from the IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.3.2.17-1 IWF pre-configured regroup cancel response information elements

Information Element	Status	Description
MCPTT ID	M	The MCPTT ID of the requester of the regroup removal
MCPTT group ID	M	MCPTT group ID of the regroup group
Result	M	Result of the regroup removal operation

10.3.2.18   IWF pre-configured regroup reject (IWF – MCPTT server, MCPTT server - IWF)

Table 10.3.2.18-1 describes the information flow IWF pre-configured regroup reject from the IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.3.2.18-1 IWF pre-configured regroup reject information elements

Information Element	Status	Description
MCPTT group ID	M	MCPTT group ID of the regroup group
Reject reason	M	Reason for rejecting the regrouping operation

10.3.3   Pre-arranged group call

10.3.3.1   General

The subclauses 10.3.3.2 and 10.3.3.3 describe the group call setup between the MCPTT system and the LMR system on an interworking group defined in the MCPTT system. The subclauses 10.3.3.4 and 10.3.3.5 describe the group call setup between the MCPTT system and the LMR system on an interworking group defined in the LMR system. The subclause 10.3.3.7 describes the late entry procedures and subclause 10.3.3.8 describes the group call release procedures. Group calls can use MC media encryption between the IWF and the MCPTT clients as described in 3GPP TS 33.180 [8]. A call that uses an LMR vocoder may use LMR E2EE if the calling and called parties have previously been provisioned with the appropriate LMR E2EE keys.

The procedures in the present subclause are applicable to the following non-broadcast group call types: pre-configured group regroup calls, pre-configured user regroup calls and group regroup calls.

   NOTE: MC media encryption is independent of LMR E2EE techniques. MC media encryption can be applied in addition to LMR E2EE.

10.3.3.2   Group call setup initiated by MCPTT user on an interworking group defined in MCPTT system

In this procedure, an MCPTT user is initiating a group call on an interworking group defined in the MCPTT system. The signalling procedure is described in figure 10.3.3.2-1.

This subclause is based upon subclause for pre-arranged group call setup in 3GPP TS 23.379 [7], subclause 10.6.2.3.1.1.2.

Pre-conditions:

1. The interworking group information is known at the MCPTT server and the IWF by configuration or group creation. The interworking group has been defined in the MCPTT system.

2. MCPTT client 1 and MCPTT client 2 are registered and their respective users are authenticated and authorized to use the MCPTT service.

3. The users in this interworking group have been affiliated to the group.

4. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.

NOTE 1: For all the signalling messages passing through the IWF between the MCPTT system and the LMR system, the IWF performs the identity conversion and protocol translation.

Figure 10.3.3.2-1: Group call setup initiated by MCPTT user on an interworking group defined in MCPTT system

1. MCPTT user at MCPTT client 1 initiates a group call for the selected interworking group identified by MCPTT group ID.

2. MCPTT client 1 sends a group call request to the MCPTT server.

3. MCPTT server checks whether the user of MCPTT client 1 is authorized to initiate a group call on the selected interworking group.

4. MCPTT server proceeds group call setup procedures towards the affiliated MCPTT system users as described in 3GPP TS 23.379 [7].

5. MCPTT server sends IWF group call request(s) towards the IWF. If the IWF has affiliated to this group on behalf of the group's LMR users, only one IWF group call request message is sent to the IWF. If the MCPTT server has received individual affiliations from the group's LMR users, an individual IWF group call request is sent (to the IWF) for each affiliated LMR user.

NOTE 2: How the LMR users are called is outside the scope of the present document.

NOTE 3: Steps 4 and 5 can occur in any order.

6. The IWF returns IWF group call response(s) to the MCPTT server. If E2EE is specified, then the MCPTT users and the LMR users shall use the same codec. If E2EE is not specified, the MCPTT users and the LMR users can use different codecs and transcoding is needed at the IWF.

7. The MCPTT server sends group call response to the MCPTT client 1 about successful call establishment.

8. The group call on the interworking group has successfully established media plane for communication and any user can transmit media. The MCPTT system where the interworking group is defined is the controlling system of the group call and manages the floor control.

10.3.3.3   Group call setup initiated by LMR user on an interworking group defined in MCPTT system.

In this procedure, an LMR user is initiating a group call on an interworking group defined in the MCPTT system. The signalling procedure is described in figure 10.3.3.3-1.

This subclause is based upon subclause for pre-arranged group call setup in 3GPP TS 23.379 [7], subclause 10.6.2.3.1.1.2.

Pre-conditions:

1. The interworking group information is known at the MCPTT server and the IWF by configuration or group creation. The interworking group has been defined in MCPTT system.

2. MCPTT client 1 and MCPTT client 2 are registered and their respective users are authenticated and authorized to use the MCPTT service.

3. The users in this interworking group have been affiliated to the interworking group.

4. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.

5. LMR user initiates a group call.

NOTE 1: For all the signalling messages passing through the IWF between the MCPTT system and the LMR system, the IWF performs the identity conversion and protocol translation.
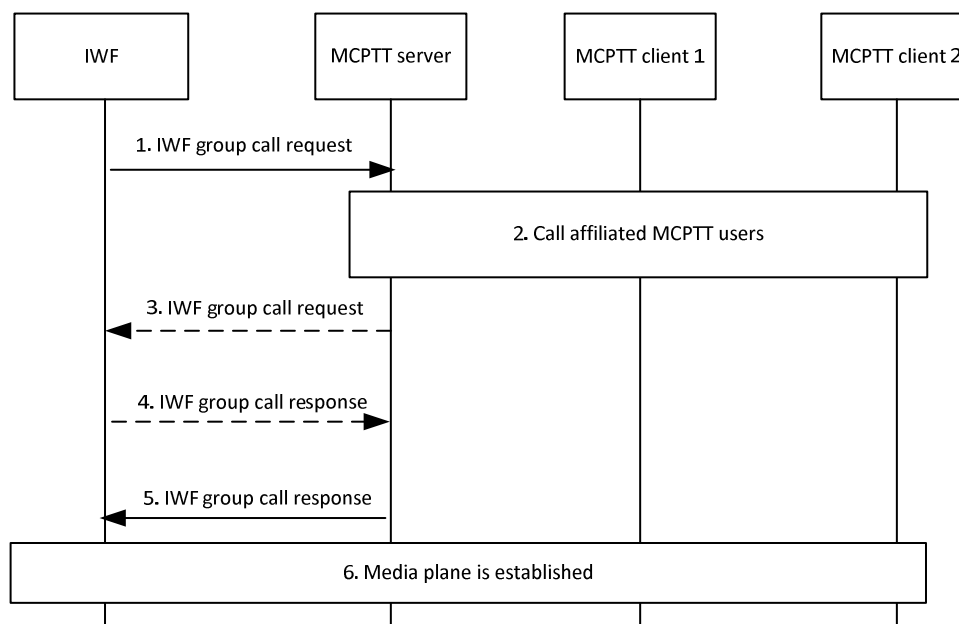
Figure 10.3.3.3-1: Group call initiated by LMR user on an interworking group defined in MCPTT system

1. The IWF sends an IWF group call request to the MCPTT server for call establishment. If floor control is requested by the calling LMR user, an indication of implicit floor request is included. If the group call request contains an implicit floor request it may also include location information.

2. MCPTT server calls the affiliated users from MCPTT system as described in 3GPP TS 23.379 [7]. If E2EE is specified, then the MCPTT users and the LMR users shall use the same codec. If E2EE is not specified, the MCPTT users and the LMR users can use different codecs and transcoding is needed at the IWF.

3. If the group has other affiliated LMR users than the calling party and the MCPTT server has received individual affiliations from those LMR users, an individual IWF group call request is sent to the IWF for each affiliated LMR user.

NOTE 2: Steps 2 and 3 can occur in any order.

NOTE 3: How the LMR users from the LMR system are being called is outside the scope of the present document.

4. The IWF returns IWF group call response(s) to the MCPTT server.

5. The MCPTT server confirms the successful establishment of the group call by sending an IWF Group call response to the IWF.

NOTE 4: How the group call response is returned to the initiating LMR user is outside the scope of the present document.

6. The interworking group call has successfully established media plane for communication and any user can transmit media. The MCPTT system where the interworking group is defined is the controlling system of the group call and manages the floor control.

NOTE 5: How the floor control is managed in the LMR system is outside the scope of the present document.

10.3.3.4 Group call setup initiated by MCPTT user on an interworking group defined in the LMR system

In this procedure, an MCPTT user is initiating a group call on an interworking group defined in the LMR system. The signalling procedure is described in figure 10.3.3.4-1.

This subclause is based upon subclause for Pre-arranged group call setup in 3GPP TS 23.379 [7], subclause 10.6.2.3.1.1.2.

Pre-conditions:

1. The interworking group information is known at the MCPTT Server and the IWF by configuration or group creation. The interworking group has been defined in the LMR system.

2. MCPTT client 1 and MCPTT client 2 are registered and their respective users are authenticated and authorized to use the MCPTT service.

3. The users in this interworking group have been affiliated to the group.

4. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.

NOTE 1: For all the signalling messages passing through the IWF between the MCPTT system and the LMR system, the IWF performs the identity conversion and protocol translation.

Figure 10.3.3.4-1: Group call initiated by MCPTT user on an interworking group defined in the LMR system

1. MCPTT user at MCPTT client 1 initiates a group call on the selected interworking group identified by MCPTT group ID.

2. MCPTT client 1 sends a group call request to the MCPTT server.

3. As the interworking group is defined in the LMR system the MCPTT server sends an IWF group call request to the IWF.

4. The IWF sends individual IWF group call request(s) to the MCPTT server for each affiliated MCPTT user in the group, in this example scenario to the user in MCPTT client 2.

NOTE 2: How the LMR users are called is outside the scope of the present document.

5. The MCPTT server sends a group call request to the MCPTT client 2.

6. The MCPTT client 2 acknowledges towards the MCPTT server by sending a group call response.

7. The MCPTT server acknowledges towards the IWF by sending an IWF group call response.

8. The IWF sends an IWF group call response to the MCPTT server to acknowledge the IWF group call request received in step 3.

9. The MCPTT server sends a group call response to the initiating MCPTT user. If E2EE is specified, then the MCPTT users and the LMR users shall use the same codec. If E2EE is not specified, the MCPTT users and the LMR users can use different codecs and transcoding is needed at the IWF.

10. The group call over the interworking group has successfully established media plane for communication and any user can transmit media. The LMR system where the interworking group is defined is the controlling system of the group call and manages the floor control.

10.3.3.5 Group call setup initiated by LMR user on an interworking group defined in the LMR system.

In this procedure, an LMR user is initiating a group call on an interworking group defined in the LMR system. The signalling procedure is described in figure 10.3.3.5-1.

This subclause is based upon subclause for Pre-arranged group call setup in 3GPP TS 23.379 [7], subclause 10.6.2.3.1.1.2.

Pre-conditions:

1. The interworking group information is known at the MCPTT Server and the IWF by configuration or group creation. The interworking group has been defined in the LMR system.

2. MCPTT client 1 and MCPTT client 2 are registered and their respective users are authenticated and authorized to use the MCPTT service.

3. The users in this interworking group have been affiliated to the group.

4. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.

5. LMR user initiates a group call.

NOTE 1: For all the signalling messages passing through the IWF between the MCPTT system and the LMR system, the IWF performs the identity conversion and protocol translation.

Figure 10.3.3.5-1: Group call initiated by LMR user on an interworking group defined in the LMR system

1. The IWF sends an IWF group call request(s) to the MCPTT server for call establishment. An individual IWF group call request is sent to the MCPTT server for each affiliated MCPTT user in the group, in this example scenario to the users in MCPTT clients 1 and 2. If floor control is requested by the calling LMR user, an indication of implicit floor request is included. If the group call request contains an implicit floor request it may also include location information.

2. MCPTT server sends a group call request(s) to the target MCPTT user(s) as described in 3GPP TS 23.379 [7].

3. MCPTT client(s) receiving the group call request, acknowledge towards the MCPTT server by sending a group call response.

4. The MCPTT server acknowledges the IWF group call request(s) by sending a IWF group call response(s) to the IWF. If E2EE is specified, then the MCPTT users and the LMR users shall use the same codec. If E2EE is not specified, the MCPTT users and the LMR users can use different codecs and transcoding is needed at the IWF.

NOTE 2: How the IWF group call response(s) is handled in the IWF / LMR system and how the other LMR users are being called is outside the scope of the present document.

5. The interworking group call has successfully established media plane for communication and any user can transmit media. The LMR system where the interworking group is defined is the controlling system of the group call and manages the floor control.

10.3.3.6   Encrypted group call with transcoding

Pre-conditions:

1. An MCPTT session is established between an MCPTT client, the interworked LMR system (represented by the IWF), and the MCPTT server.

2. There is an ongoing media transmission.

3. An SDP negotiation has occurred between the IWF and MCPTT Server to establish both the vocoder and the security parameters for the call.

4. The IWF is configured to perform transcoding of voice media and has obtained key material from the MCPTT system using the procedures in 3GPP TS 33.180 [8].
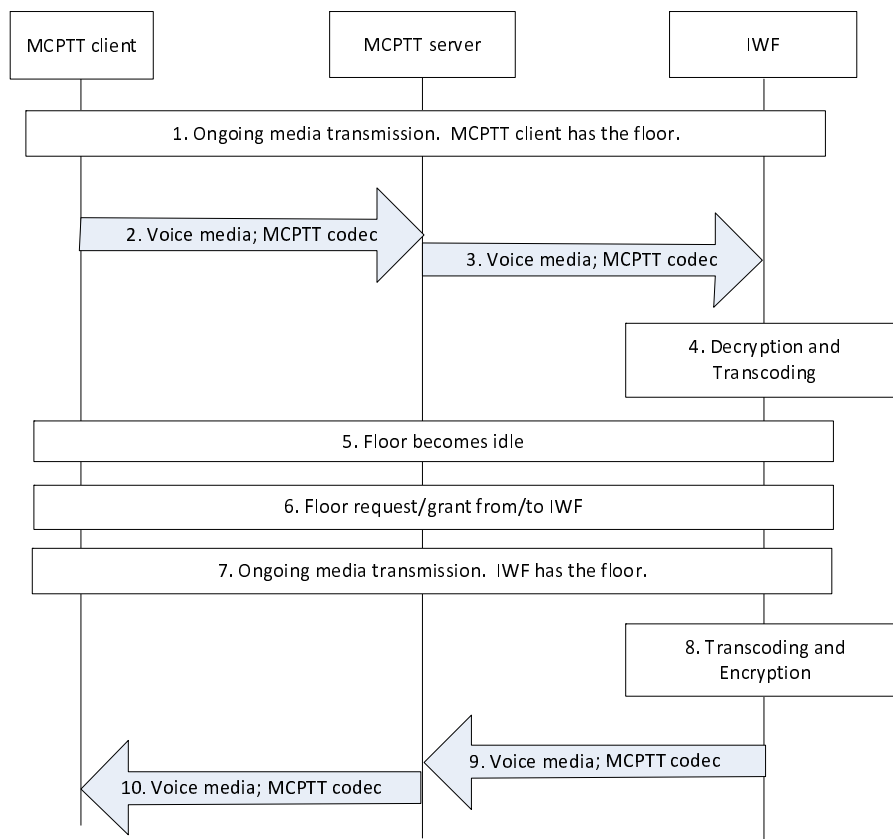
Figure 10.3.3.6-1: Encrypted group call with transcoding

1. The MCPTT client has been given the floor and is transmitting voice media.

2. The MCPTT client encodes audio using a codec defined for the MCPTT group, encrypts the encoded voice using procedures in 3GPP TS 33.180 [8], and forwards the encrypted voice media to the MCPTT server.

3. The MCPTT server forwards the encrypted voice media to other participants in the group call including the IWF.

4. The IWF decrypts the voice media from the MCPTT client using the procedures in 3GPP TS 33.180 [8]. The IWF transcodes the voice to a LMR codec. If needed, the IWF re-encrypts the transcoded voice media using LMR security procedures (these are out-of-scope of this specification), and forwards the voice media to the LMR system.

NOTE: Where transcoding occurs is outside the scope of this specification. In this procedure, it is assumed to take place internal to the IWF.

5. Sometime later the floor becomes idle.

6. The LMR system (represented by the IWF in figure 10.3.3.6-1) requests and is granted the floor.

7. The IWF has been given the floor and is transmitting voice media.

8. The IWF receives voice media from the LMR system. If the voice media is encrypted, the IWF decrypts the voice media using LMR security procedures (these are out-of-scope of this specification). The IWF transcodes the voice to the group's MCPTT codec. The IWF re-encrypts the transcoded voice using the procedures in 3GPP TS 33.180 [8].

9. The IWF forwards the voice media to the MCPTT server.

10. The MCPTT server forwards the voice media to other participants in the group call.

10.3.3.7 Late Entry

10.3.3.7.1 General

Late Entry for an ongoing interworking group call is triggered by a successful group affiliation procedure from the participating system.

    NOTE: These procedures apply to all types of group calls, including, for example, emergency call, imminent peril call and broadcast call.

10.3.3.7.2 Group call late entry on an interworking group defined in the MCPTT system

In this procedure, the group affiliation from IWF triggers a late entry procedure in the MCPTT system. The signalling procedure is described in figure 10.3.3.7.2-1.

For the first affiliating LMR user, this procedure is applicable for both IWF affiliation options (see subclauses 10.1.2.1 and 10.3.1). For the following LMR users affiliating to the same group, this procedure is triggered only if the IWF passes through individual affiliations for each group member.

This subclause is based upon subclauses in 3GPP TS 23.379 [7] for:

- Late entry for pre-arranged group call, subclause 10.6.2.3.1.1.4, and

- Group call for an MCPTT group defined in partner MCPTT system, subclause 10.6.2.4.3.1.

Pre-conditions:

1. The interworking group information is known at the MCPTT server and the IWF by configuration or group creation. The interworking group has been defined in the MCPTT system.

2. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.

3. There is an on-going group call in the interworking group involving MCPTT clients 1 and 2.

4. First LMR user affiliates to the interworking group.

    NOTE 1: For all the signalling messages passing through the IWF between the MCPTT system and the LMR system, the IWF performs the identity conversion and protocol translation.
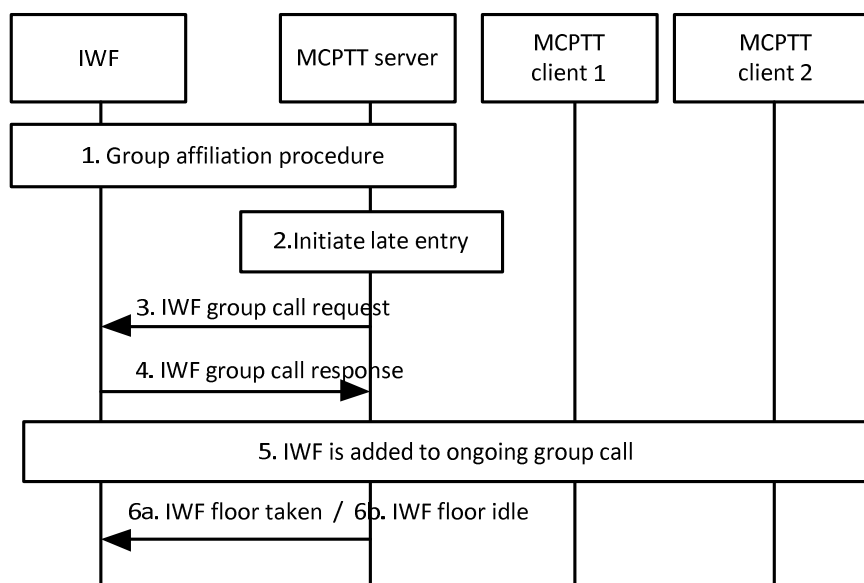
Figure 10.3.3.7.2-1: Group call late entry on an interworking group defined in the MCPTT system

1. The IWF triggers a group affiliation towards the MCPTT server (see subclause 10.1.2.2).

2. The MCPTT server initiates a group call late entry for an interworking group.

3. The MCPTT server sends an IWF group call request to the IWF.

NOTE 2: How the IWF delivers the group call request to the LMR system is out of the scope of the present document.

4. The IWF confirms the group call request by sending IWF group call response to the MCPTT server.

5. The IWF (and the LMR user) is successfully added to the ongoing group call and MCPTT users at MCPTT client 1 and MCPTT client 2 may be notified about the LMR user joining the group call.

6. If the floor has been granted to another user, the MCPTT server sends a IWF floor taken (6a) to the IWF. If the floor is not granted to any party, an IWF floor idle (6b) is sent to the IWF.

10.3.3.7.3 Group call late entry on an interworking group defined in the LMR system

In this procedure, the group affiliation from MCPTT system triggers a late entry procedure in the LMR system. The signalling procedure is described in figure 10.3.3.7.3-1.

This procedure describes the affiliation and late entry of the first MCPTT user into the interworking group, but it is applicable also for all subsequent MCPTT users' affiliations to the same group.

This subclause is based upon subclauses in 3GPP TS 23.379 [7] for:

- Late entry pre-arranged group call, subclause 10.6.2.3.1.1.4, and

- Group call setup involving groups from multiple MCPTT systems, subclause 10.6.2.4.1.1.

Pre-conditions:

1. The interworking group information is known at the MCPTT server and the IWF by configuration or group creation. The interworking group has been defined in the LMR system.

2. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.

3. There is an on-going group call in the interworking group, involving only LMR users.

NOTE 1: For all the signalling messages passing through the IWF between the MCPTT system and the LMR system, the IWF performs the identity conversion and protocol translation.
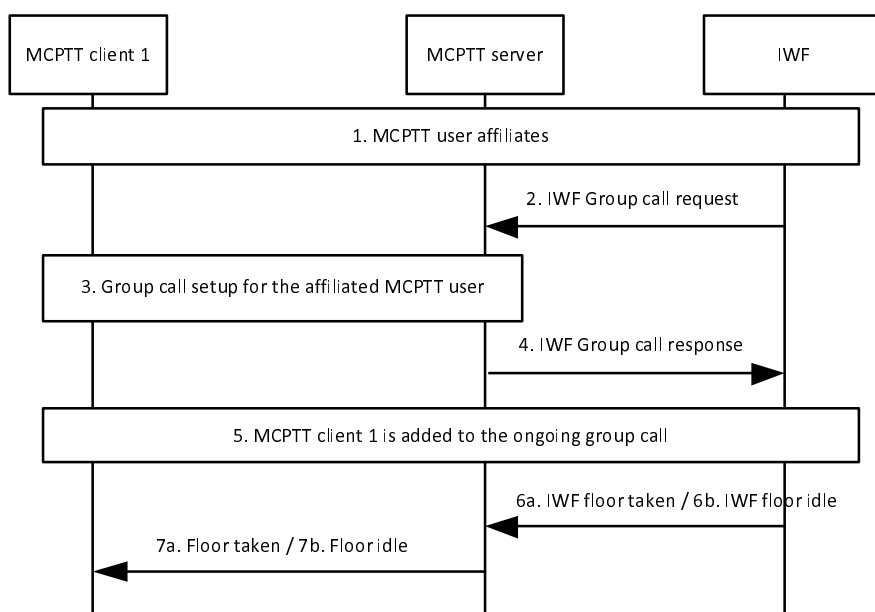
Figure 10.3.3.7.3-1: Group call late entry on an interworking group defined in the LMR system

1. MCPTT user (client 1) affiliates to the group (see subclause 10.1.2.4).

NOTE 2: How the IWF delivers the affiliation to LMR system and how the LMR system handles the late entry is out of scope of the present document.

2. The IWF sends an IWF group call request to the MCPTT server.

3. The MCPTT server triggers a group call setup procedure for the newly affiliated user in MCPTT client 1, as described in 3GPP TS 23.379 [7].

4. The MCPTT server confirms the successful establishment of the group call by sending IWF group call response to the IWF. If E2EE is specified, then the MCPTT users and the LMR users shall use the same codec. If E2EE is not specified, the MCPTT users and the LMR users can use different codecs and transcoding is needed at the IWF.

5. MCPTT client 1 is successfully added to the ongoing group call.

6. If the floor has been granted to another user, the IWF sends an IWF floor taken (6a) to the MCPTT server. If the floor is not granted to any party, an IWF floor idle (6b) is sent.

7. The MCPTT server sends Floor taken (7a) or Floor idle (7b) to the newly affiliated user in MCPTT client 1, as described in 3GPP TS 23.379 [7].

10.3.3.8 Interworking group call release

10.3.3.8.1 General

The procedures in this subclause define the cases where the group host server releases an ongoing interworking group call for all the participants of that group.

If the group host server is an MCPTT server, the release conditions are described in 3GPP TS 23.379 [7], subclause 10.6.2.4.1.2.

If the group host server is an LMR system, represented by an IWF, the release conditions are outside the scope of the present document.

10.3.3.8.2 Group call release on an interworking group defined in the MCPTT system

In this procedure, the MCPTT system is releasing a group call on an interworking group defined in the MCPTT system. The signalling procedure is described in figure 10.3.3.8.2-1.

This subclause is based upon subclause 10.6.2.4.1.2 Group call release in 3GPP TS 23.379 [7].

Pre-conditions:

1. The interworking group information is known at the MCPTT server and the IWF by configuration or group creation. The interworking group has been defined in the MCPTT system.

2. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.

3. There is an on-going group call involving the IWF and MCPTT clients 1 and 2.

NOTE 1: For all the signalling messages passing through the IWF between the MCPTT system and the LMR system, the IWF performs the identity conversion and protocol translation.
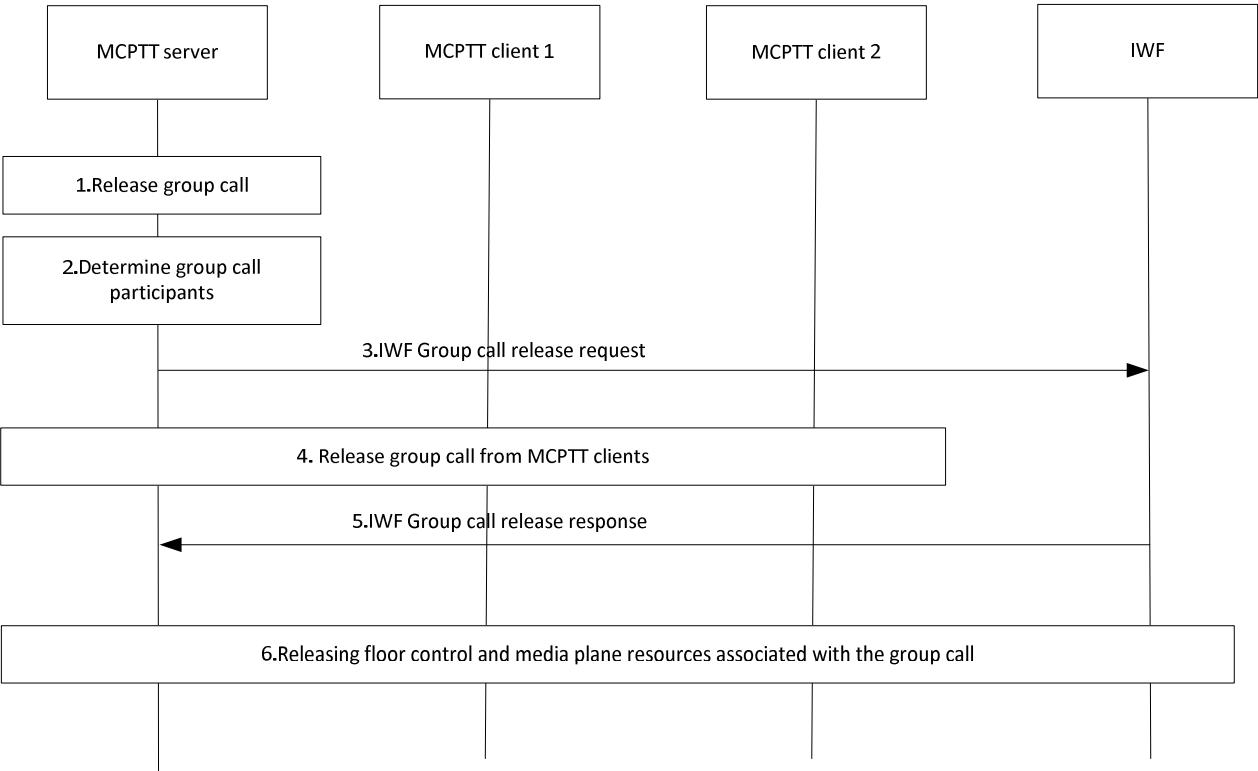
Figure 10.3.3.8.2-1: Group call release initiated by MCPTT system on an interworking group

1. The MCPTT server initiates a group call release on an interworking group.

NOTE 2: The MCPTT server may decide to release the group call for different reasons, see subclause 10.6.2.4.1.2 in 3GPP TS 23.379 [7].

2. The MCPTT server identifies the participants of the ongoing group call, at least one of them being an LMR user, represented by an IWF.

3. The MCPTT server sends IWF group call release request(s) to the IWF. If the IWF has affiliated to this group on behalf of the group's LMR users, only one IWF group call release request message is sent to the IWF. If the MCPTT server has received individual affiliations from the group's LMR users, an individual IWF group call release request is sent (to the IWF) for each affiliated LMR user.

NOTE 3: How the group call release request(s) is(are) forwarded to the LMR system is out of scope of the present document.

4. The MCPTT server sends the (MCPTT) group call release request(s) to the group's MCPTT users, as described in 3GPP TS 23.379 [7].

NOTE 4: Steps 3 and 4 can occur in any order.

5. The IWF confirms the IWF group call release request(s) received in step 3 by IWF group call release response(s) to the MCPTT server.

6. The MCPTT client 1, client 2 and the IWF have successfully released the floor control and media plane resources associated with the group call that is released.

10.3.3.8.3 Group call release on an interworking group defined in the LMR system
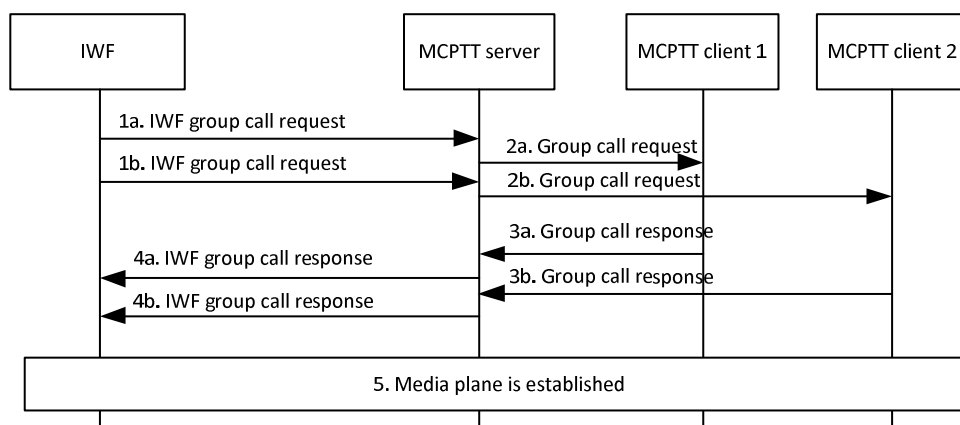
In this procedure, the LMR system is releasing a group call on an interworking group defined in the LMR system. The signalling procedure is described in figure 10.3.3.8.3-1.

This subclause is based upon subclause 10.6.2.4.1.2 Group call release in 3GPP TS 23.379 [7].

Pre-conditions:

1. The interworking group information is known at the MCPTT server and the IWF by configuration or group creation. The interworking group has been defined in the LMR system.

2. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.

3. There is an on-going group call involving the IWF and MCPTT clients 1 and 2.

4. The LMR system initiates release of the group call.

NOTE 1: The reasons for the LMR system's decision to release the group call are out of scope of the present document.

NOTE 2: For all the signalling messages passing through the IWF between the MCPTT system and the LMR system, the IWF performs the identity conversion and protocol translation.
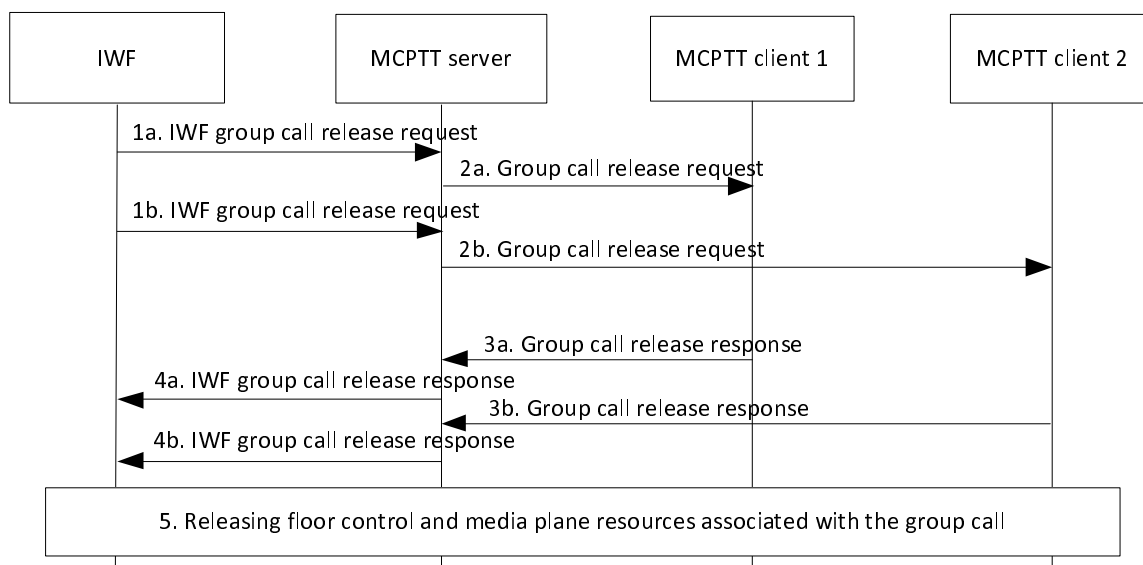
Figure 10.3.3.8.3-1: Group call release initiated by LMR system on an interworking group defined in the LMR system

1. The IWF sends IWF group call release requests to the MCPTT server. An individual IWF group call release request is sent for each MCPTT user in the call.

2. The MCPTT server forwards the release requests to the group's MCPTT users (in this example to users in MCPTT clients 1 and 2), as described in 3GPP TS 23.379 [7].

3. The MCPTT clients respond with group call release response(s).

4. The MCPTT server confirms the IWF group call release requests received in step 1 by IWF group call release responses to the IWF.

5. The MCPTT client 1, client 2 and the IWF have successfully released the floor control and media plane resources associated with the group call that is released.

10.3.4 Group broadcast

10.3.4.1 General

A broadcast group call is a special group call where the initiating user expects no response from the receiving users so that when the transmission is complete, so is the call. The initiating user can be an MCPTT user or can be an LMR user.

The group-broadcast group is defined as a set of groups, not a set of users. The user that originates the group-broadcast group call is the only one transmitting media during this call.

The group-broadcast group is defined with a hierarchy. For example, groups A and B may be subordinate to a group-broadcast group. All subordinate groups belonging to a group-broadcast group are defined either in the MCPTT system or the LMR system.

10.3.4.2 Group-broadcast group call procedure with an interworking group where the group-broadcast group is defined in the MCPTT system

3GPP TS 23.379 [7], subclause 10.6.2.5.2.1 describes the procedure for a group-broadcast group call within a single MCPTT system. The present procedure describes a group-broadcast group call that includes the IWF.

In this procedure, the MCPTT server is initiating the broadcast and is the owner of the group-broadcast group.

The procedure shows the case where the call is initiated by a MCPTT user. However, if the override feature is enabled, then the call originator may be overridden.

Figure 10.3.4.2-1 illustrates the procedure for group-broadcast group call establishment (the group-broadcast group is defined in the MCPTT system).

Pre-conditions:

1. The group (e.g. A) to which MCPTT client 2 and the IWF are members is a subordinate group of the group-broadcast group (i.e., the group-broadcast group was defined with group A as a subordinate group).

2. The group (e.g. A) currently has an on-going MCPTT group call that is not an MCPTT emergency group call.

3. The call initiator of the group-broadcast group is a member of another group (e.g., X, not group A) which is also a subordinate group of the group-broadcast group (i.e., the group-broadcast group was defined with group X as a subordinate group).

4. The group-broadcast group and its subordinate groups are defined in the same group management server and served by the same MCPTT server.
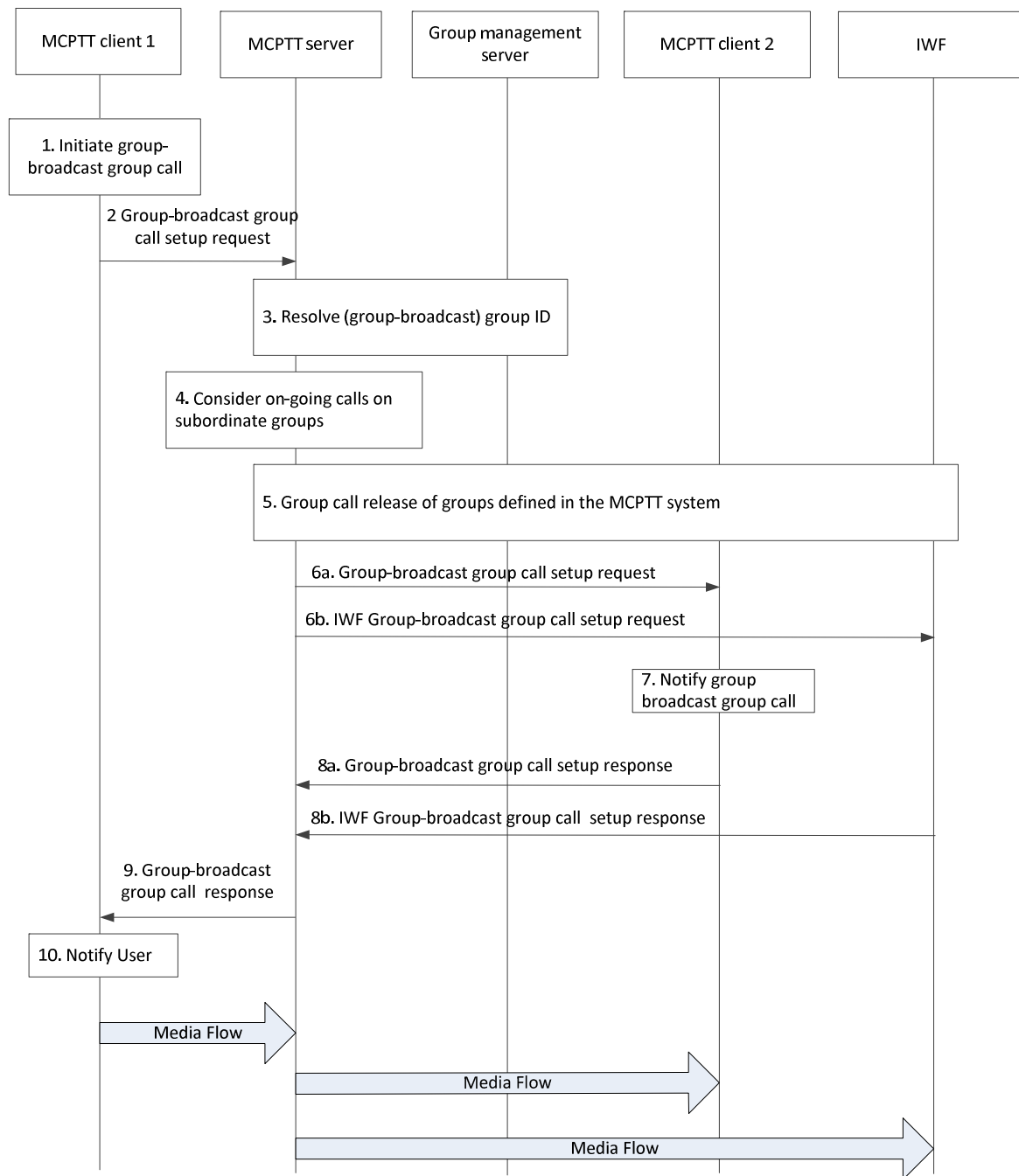
Figure 10.3.4.2-1: Group-broadcast group call involving IWF (group-broadcast group is defined in the MCPTT system)

1. MCPTT user at MCPTT client 1 initiates the group-broadcast group call setup procedure.

2. The MCPTT client 1 sends a group-broadcast group call request to the MCPTT server.

3. The MCPTT server needs to resolve the group-broadcast group ID into its subordinate groups in order to contact the affiliated MCPTT users of those subordinate groups.

4. The MCPTT server then needs to consider any on-going group calls on those subordinate groups because this may affect the behaviour for what happens next. In this case a group call exists on a subordinate group. Thus, the MCPTT users involved in the group call on this subordinate group.

5. The MCPTT server performs group call release procedures of groups defined in the MCPTT system as described in subclause 10.3.3.8.2.

6. A group-broadcast group call request is sent to MCPTT client 2 and an IWF group-broadcast group call request to the IWF. If the IWF has affiliated to this group on behalf of the group's LMR users, only one IWF group-broadcast group call request is sent to the IWF. If the MCPTT server has received individual affiliations from the group's LMR users, an individual IWF group-broadcast group call request is sent (to the IWF) for each affiliated LMR user.

NOTE 1: How the group-broadcast group call request(s) is(are) forwarded to the LMR system is out of scope of the present document.

7. MCPTT client 2 is notified of the incoming group-broadcast group call.

NOTE 2: How LMR user(s) is(are) notified of the incoming group-broadcast group call is outside the scope of the present document.

8. MCPTT client 2 and the IWF respond to the IWF group-broadcast group call request by sending an IWF group-broadcast group call response. If the IWF has affiliated to this group on behalf of the group's LMR users, only one IWF group-broadcast group call response is sent to the MCPTT server. If the MCPTT server has received individual affiliations from the group's LMR users, an individual IWF group-broadcast group call response is sent (to the MCPTT server) for each affiliated LMR user.

9. The MCPTT server responds to MCPTT client 1 (the call initiator) that the group-broadcast group call has been established by sending a group-broadcast group call response.

10. The MCPTT client 1 notifies its user that the user can begin transmitting using the group-broadcast group call resources.

Once the user of MCPTT cleint 1 completes transmitting, the group-broadcast group call is released.

10.3.4.3 Group-broadcast group call procedure with an interworking group where the group-broadcast group is defined in the LMR system

3GPP TS 23.379 [7], subclause 10.6.2.5.2.1 describes the procedure for a group-broadcast group call within a single MCPTT system. The present procedure describes a group-broadcast group call that includes the IWF.

In this procedure, the IWF is the owner of the group-broadcast group and is initiating the group-broadcast group call.

The procedure only shows the case where the call is initiated by a MCPTT user. However, if the override feature is enabled, then the call originator may be overridden.

Figure 10.3.4.3-1 illustrates the procedure for group-broadcast group call establishment (the group-broadcast group is defined in the LMR system).

Pre-conditions:

1. The group (e.g. A) to which MCPTT client 2 is a member is a subordinate group of the group-broadcast group (i.e., the group-broadcast group was defined with group A as a subordinate group).

2. The group (e.g. A) currently has an on-going MCPTT group call that is not an MCPTT emergency group call.

3. The call initiator, MCPTT client 1, of the group-broadcast group is a member of another group (e.g., X, not group A) which is also a subordinate group of the group-broadcast group (i.e., the group-broadcast group was defined with group X as a subordinate group).

4. The group-broadcast group and its subordinate groups are defined in the IWF.
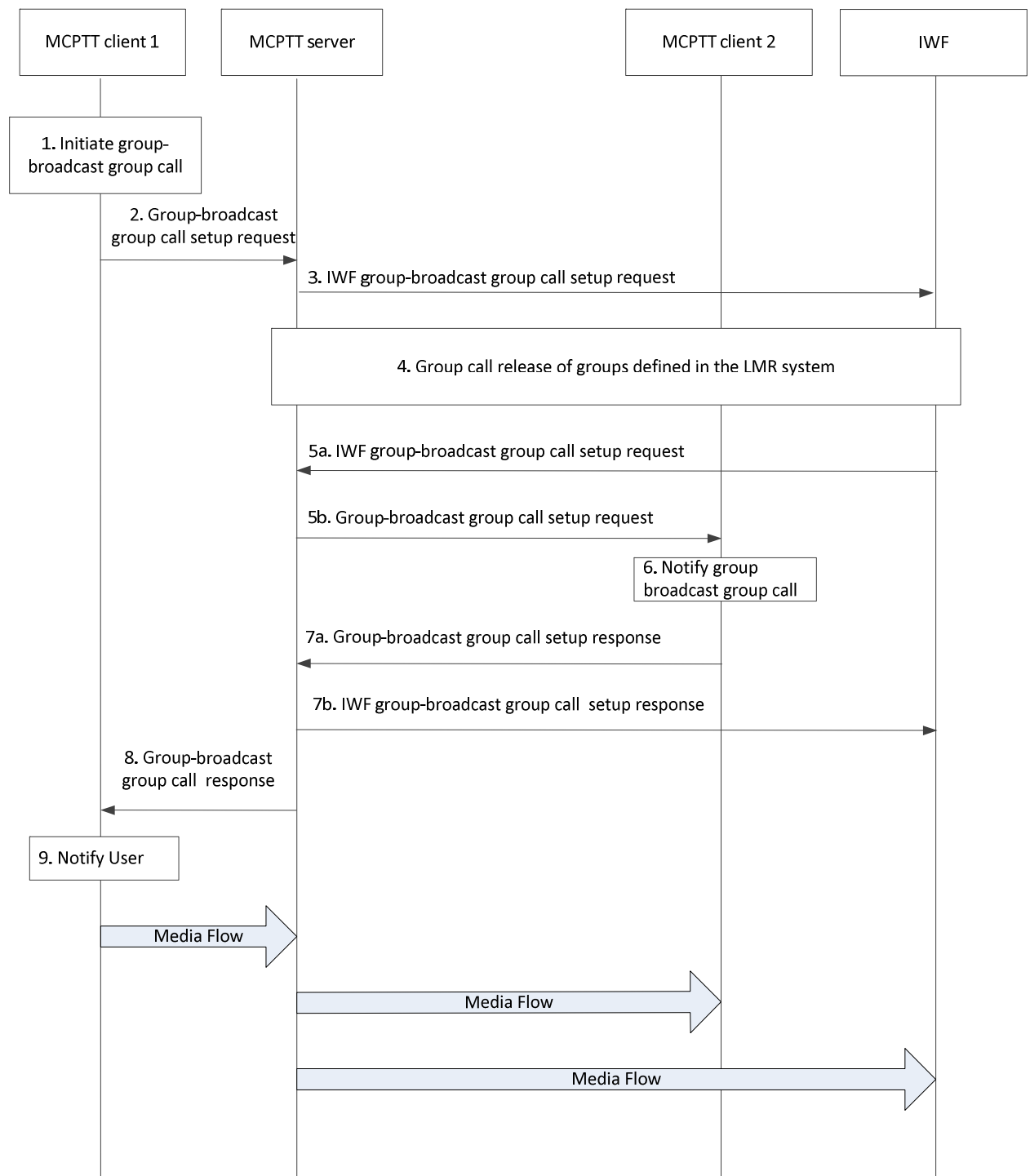
Figure 10.3.4.3-1: Group-broadcast group call involving IWF (group-broadcast group defined in the LMR system)

1. MCPTT user at MCPTT client 1 initiates the group-broadcast group call setup procedure.

2. The MCPTT client 1 sends a group-broadcast group call request to the MCPTT server.

3. As the group-broadcast group is defined in the LMR system the MCPTT server sends an IWF group-broadcast group call setup request to the IWF.

4. The IWF performs group call release procedures of groups defined in the LMR system as described in subclause 10.3.3.8.3.

5. The IWF issues a group-broadcast group call setup request to establish the group-broadcast call.

6. The MCPTT user of MCPTT client 2 is notified.

NOTE: How LMR user(s) is(are) notified of the incoming group-broadcast group call is outside the scope of the present document.

7. Optionally, MCPTT client 2 respond with a group-broadcast group call response to the MCPTT server and then to the IWF.

8. The MCPTT server responds to MCPTT client 1 (the call initiator) that the group-broadcast group call has been established by sending a group-broadcast group call response.

9. The MCPTT client 1 notifies its user that the user can begin transmitting using the group-broadcast group call resources.

Once the user of MCPTT client 1 completes transmitting, the group-broadcast group call is released.

10.3.4.4 Group-broadcast group call release with an interworking group procedure where the group-broadcast group is defined in the MCPTT system

When the call originator has completed transmitting, the group-broadcast group call is ended and the resources are released.

Figure 10.3.4.4-1 illustrates the procedure for group-broadcast group call release (the group-broadcast group is defined in the MCPTT system).

Pre-conditions:

1. An on-going group-broadcast group call involving MCPTT client 1, the MCPTT client 2 and the IWF exists.
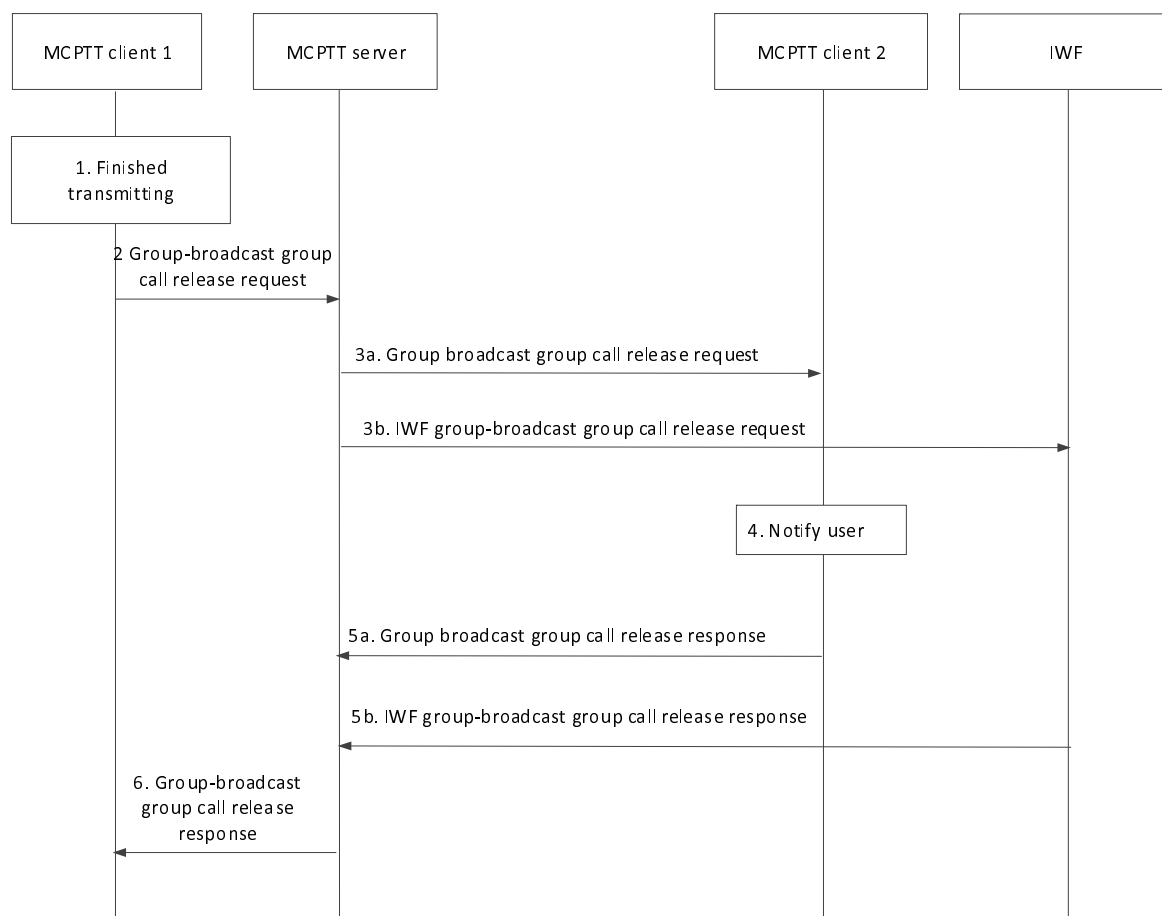
Figure 10.3.4.4-1: Group-broadcast group call transmission ended (group-broadcast group is defined in the MCPTT system)

1. MCPTT user on MCPTT client 1 finished transmitting.

2. A group-broadcast group call release request is sent to the MCPTT server of the group-broadcast group.

3. The MCPTT users of MCPTT client 2 and the IWF of the group-broadcast group's subordinate groups are sent a group-broadcast group call release request. If the IWF has affiliated to this group on behalf of the group's LMR users, only one IWF group-broadcast group call release request is sent to the IWF. If the MCPTT server has received individual affiliations from the group's LMR users, an individual IWF group-broadcast group call request is sent (to the IWF) for each affiliated LMR user.

4. MCPTT client 2 and the IWF notify their users that the group-broadcast group call has ended.

NOTE:　How LMR user(s) is(are) notified that the group-broadcast group call has ended is outside the scope of the present document.

5. MCPTT client 2 and the IWF respond to confirm the release of the group-broadcast group call by sending a group-broadcast group call release response. If the IWF has affiliated to this group on behalf of the group's LMR users, only one IWF group-broadcast group call release response is sent to the MCPTT server. If the MCPTT server has received individual affiliations from the group's LMR users, an individual IWF group-broadcast group call response is sent (to the MCPTT server) for each affiliated LMR user.

6. The MCPTT server sends a group-broadcast group call release response indicating to the initiator that the call is now ended.

10.3.4.5 Group-broadcast group call release with an interworking group procedure where the group-broadcast group is defined in the LMR system

When the call originator has completed transmitting, the group-broadcast group call is ended and the resources are released.

Figure 10.3.4.5-1 illustrates the procedure for group-broadcast group call release (the group-broadcast group defined in the LMR system).

Pre-conditions:

1. An on-going group-broadcast group call involving MCPTT client 1, the MCPTT client 2 and the IWF exists.
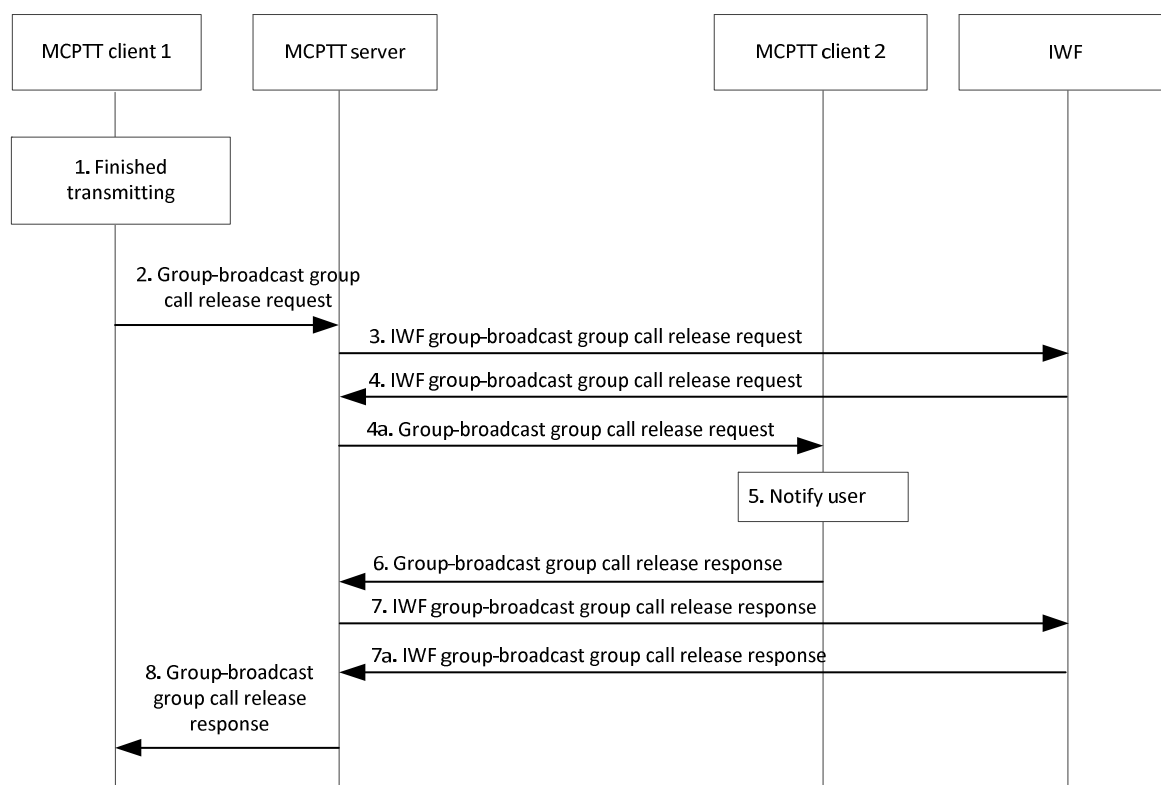
Figure 10.3.4.5-1: Group-broadcast group call transmission ended (group-broadcast group defined in the LMR system)

1. The MCPTT user on MCPTT client 1 finished transmitting.

2. A group-broadcast group call release request is sent to the MCPTT server.

3. As the group-broadcast group is defined in the LMR system the MCPTT server sends an IWF group-broadcast group call release request to the IWF.

4. The IWF sends an IWF group-broadcast group call release request to the MCPTT server hosting client 2. The MCPTT server sends the group-broadcast group call release request to MCPTT client 2.

5. MCPTT client 2 is notified that the group-broadcast group call has ended.

NOTE: How LMR user(s) is(are) notified that the group-broadcast group call has ended is outside the scope of the present document.

6. MCPTT client 2 responds to confirm the release of the group-broadcast group call by sending a group-broadcast group call release response.

7. The MCPTT server sends an IWF group-broadcast group call release response to the IWF. The IWF becomes aware that MCPTT client 2 has confirmed the group-broadcast group call release and replies with another IWF group-broadcast group call release response back to the MCPTT server to trigger step 8.

8. The MCPTT server sends a group-broadcast group call release response indicating to the initiator that the group-broadcast group call is now ended.

10.3.4.6 Broadcast group regroup call using pre-configured group

10.3.4.6.1 General

The temporary group created using a pre-configured group can be a broadcast group or a non-broadcast group.

A broadcast group regroup call using pre-configured groups can be achieved by first regrouping users into a pre-configured group regroup, making the broadcast group call on the pre-configured group, and then cancelling the pre-configured group regroup.

10.3.4.6.2 Broadcast group regroup call using pre-configured group the MCPTT system

The broadcast group regroup call procedure using pre-configured group allows an authorized MCPTT user to initiate a broadcast call to a set of MCPTT groups, which are regrouped only for the duration of the broadcast call. The regroup is cancelled at the end of the broadcast call to prevent users from talking back on the pre-configured group regroup. This procedure requires that the authorized MCPTT user is a group member of at least one of the MCPTT groups included in the regroup operation.

Figure 10.3.4.6.2-1 illustrates the procedure to initiate a broadcast group regroup call using a pre-configured MCPTT regroup group owned by the MCPTT system. For simplicity, no receiving clients are shown.

Pre-conditions:

- The MCPTT client is registered with the MCPTT service.

- The MCPTT group identity and group configuration for the pre-configured group regroup have been pre-configured in the MCPTT client and the IWF. The MCPTT client and the IWF have received the relevant security related information to allow them to communicate in the pre-configured group regroup.

- The MCPTT client is authorized to initiate a pre-configured group regroup using the pre-configured group regroup procedure.

- The MCPTT client is aware of a suitable pre-configured group whose configuration has been pre-configured in the IWF and the MC service UEs of the MCPTT users who will be regrouped.

- The MCPTT client is affiliated to group 1.

- The IWF is affiliated to one or more of MCPTT group 1, 2 or 3.

- The pre-configured group regroup is homed in the MCPTT server.

- The IWF is home to at least one group that's a constituent group of the pre-configured group regroup.

MCPTT client	MCPTT server	IWF

1. Preconfigured group regroup procedure

2.Broadcast group call

3. Preconfigured group regroup cancellation
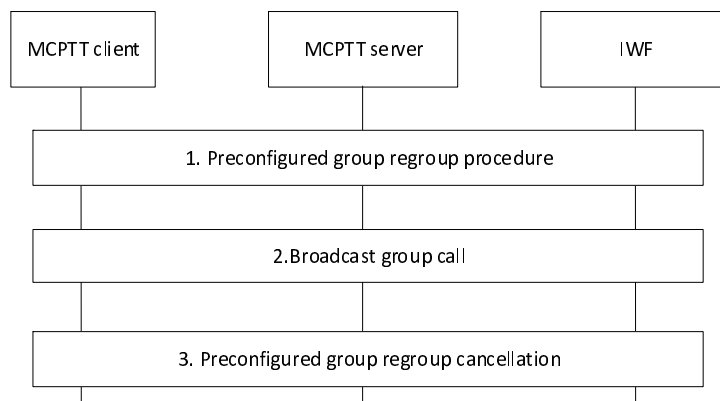
Figure 10.3.4.6.2-1: Broadcast group regroup call using pre-configured group in the MCPTT system

1. The authorized user of the MCPTT client initiates the pre-configured group regroup formation procedure using pre-configured groups as specified in subclause 10.3.7.1. MCPTT groups 1, 2, and 3 are regrouped into group 4.

2. The MCPTT user at the MCPTT client performs the broadcast group call procedure as specified in subclause 10.3.4.

3. The MCPTT client initiates the pre-configured group regroup cancellation procedure using pre-configured groups as specified in subclause 10.3.7.1.

10.3.4.6.3 Broadcast group regroup call using pre-configured group in the IWF

The broadcast group regroup call procedure using a pre-configured group allows an IWF user to initiate a broadcast call to a set of MCPTT groups, which are regrouped only for the duration of the broadcast call.

Figure 10.3.4.6.3-1 illustrates the procedure to initiate a broadcast group regroup call using a pre-configured group owned by the IWF.

Pre-conditions:

- MCPTT clients 1 and 2 are registered with the MCPTT service.

- The MCPTT group identity and group configuration for the pre-configured group regroup have been pre-configured in MCPTT clients 1 and 2, and MCPTT clients 1 and 2 have received the relevant security related information to allow them to communicate in the pre-configured group regroup.

- MCPTT client 1 is affiliated to group 1, MCPTT client 2 is affiliated to group 2. Group 3 is used as the pre-configured group regroup.

- The pre-configured group regroup is homed in the IWF.

- The MCPTT server is home to at least one group that's a constituent group of the pre-configured group regroup.
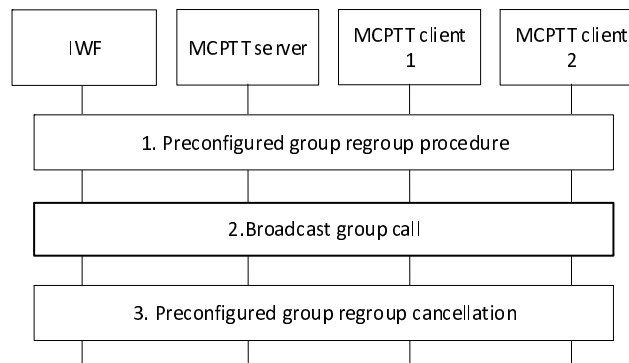
Figure 10.3.4.6.3-1: Broadcast group regroup call using pre-configured group in the IWF

1. The IWF initiates the group regroup formation procedure using pre-configured groups as specified in subclause 10.3.7.1. MCPTT groups 1 and 2 are regrouped into group 3.

2. The IWF performs the broadcast group call procedure as specified in subclause 10.3.4.

3. The IWF initiates the pre-configured group regroup cancellation procedure using pre-configured groups as specified in subclause 10.3.7.1.

10.3.5   Chat group call

10.3.5.1   General

This subclause is based upon subclause for chat group call in 3GPP TS 23.379 [7], subclause 10.6.2.3.1.2. For LMR systems that do not support the concept of chat groups, the IWF might still adapt its calls to the MCPTT chat model.

10.3.5.2   MCPTT user initiated chat group call in an interworking group defined in LMR system

In this procedure, an MCPTT user initiates a chat group call in an interworking group defined in the LMR system. The signalling procedure is described in figure 10.3.5.2-1.

Pre-conditions:

1. The interworking group information is known at the MCPTT server and the IWF by configuration or group creation. The interworking group has been defined in the LMR system.

2. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.

    NOTE: For all the signalling messages passing through the IWF between the MCPTT system and the LMR system, the IWF performs the identity conversion and protocol translation.
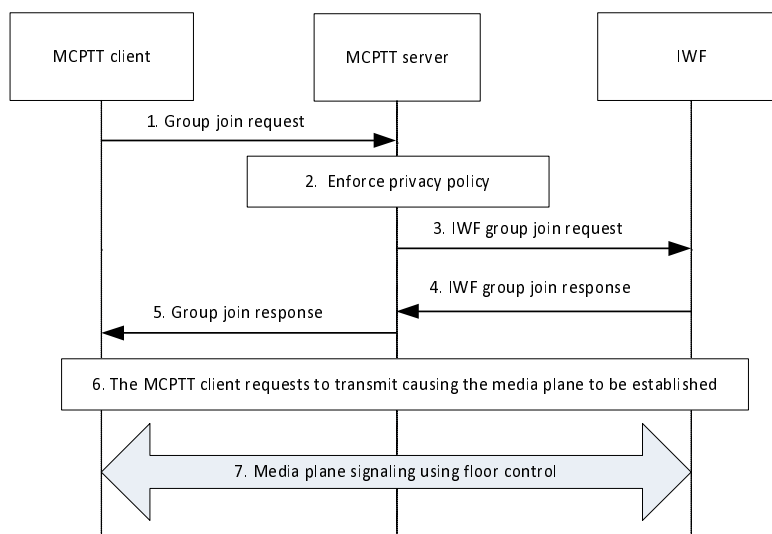
Figure 10.3.5.2-1: MCPTT user initiated chat group call in an interworking group defined in the LMR system

1. MCPTT user of the MCPTT client indicates to join the group communication for the group. The MCPTT client joins the group by sending a group join request to the MCPTT server. If there is a request to transmit, then the group join request contains an indication of an implicit floor request and the location of the joining party if required.

2. The MCPTT server inspects the Group join request for presence of location information of the calling party. If location information is included in the join request, the MCPTT server checks the privacy policy (authorisation to provide location information to other MCPTT users on a call when talking, as defined in 3GPP TS 23.379 [7] Annex A.3) of the requesting MCPTT user to decide if the user's location information may be provided to other MCPTT users on the call and the IWF.

3. The MCPTT server notices that the interworking group is defined in the LMR system and forwards the group join request with or without location depending on the outcome of the privacy check as an IWF group join request to the IWF.

4. The IWF replies with an IWF group join response indicating the acceptance of the group join request and also returns the IWF selected media parameters for the chat group call in the IWF group join response.

5. The MCPTT server forwards the IWF group join response to the MCPTT client as a group join response.

6. If the MCPTT client requests to transmit, the MCPTT server establishes the media plane (if not already established) for the call.

7. Floor control will continue to be used by the floor participants associated with the MCPTT client and the IWF for the duration of the call. Media plane signalling using floor control will be used for subsequent calls for the group as long as one or more users are affiliated.

10.3.5.3   LMR user initiated chat group call in an interworking group defined in MCPTT system

In this procedure, an LMR user initiates a chat group call in an interworking group defined in the MCPTT system. The signalling procedure is described in figure 10.3.5.3-1.

Pre-conditions:

1. The interworking group information is known at the IWF by configuration. The interworking group has been defined in the MCPTT system.

2. MCPTT user 1 and MCPTT user 2 have previously joined (affiliated) to the group.

3. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.

4. LMR user initiates a join to the group.

NOTE: For all the signalling messages passing through the IWF between the MCPTT system and the LMR system, the IWF performs the identity conversion and protocol translation.
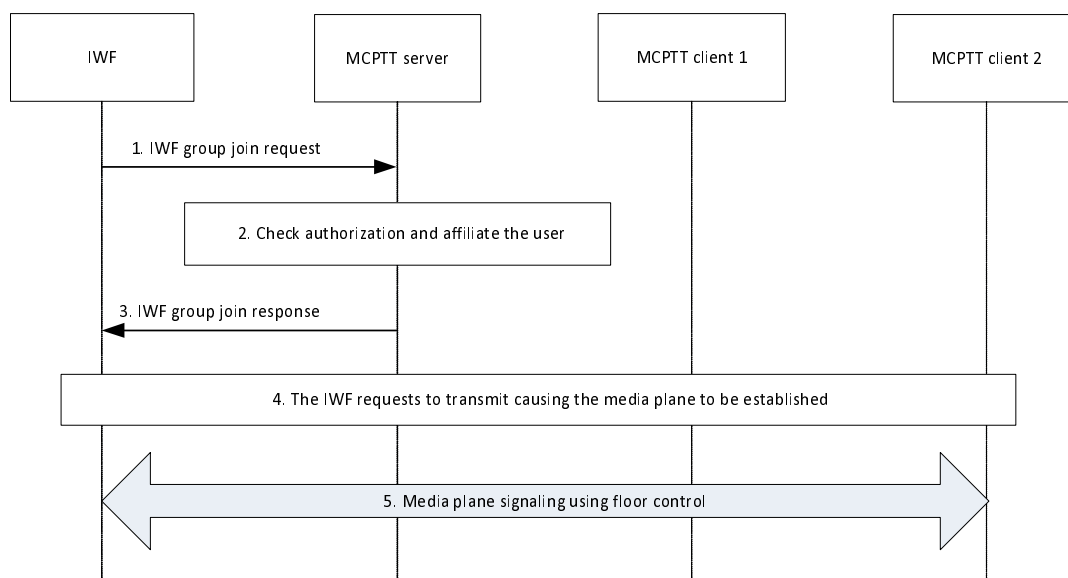
Figure 10.3.5.3-1: LMR user initiated chat group call in an interworking group defined in the MCPTT system

1. The IWF sends an IWF group join request to the MCPTT server. The request to join may contain location information of the transmitting party. If there is a request to transmit, then the IWF group join request contains an indication of an implicit floor request and the location of the joining party if required.

2. The MCPTT server checks whether the MCPTT ID is authorized to affiliate to the group. MCPTT server generates an implicit affiliation if the MCPTT ID is not already affiliated to the group.

3. The MCPTT server replies with a group join response indicating the acceptance of the group join request and also returns the MCPTT server selected media parameters for the chat group call in the IWF group join response.

4. If the IWF requests to transmit, the MCPTT server establishes the media plane (if not already established) for the call.

5. Floor control will continue to be used by the floor participants associated with MCPTT client 1, MCPTT client 2 and the IWF for the duration of the call. Media plane signalling using floor control will be used for subsequent calls for the group as long as one or more users are affiliated.

10.3.5.4 Release chat group call on an interworking group defined in the LMR system

This procedure describes the case where the LMR system releases an ongoing MCPTT chat group call on an interworking group defined in the LMR system, for all the participants of that group call. The signalling procedure is described in figure 10.3.5.4-1.

Pre-conditions:

1. A chat group call is ongoing involving an MCPTT client and the IWF.

2. The LMR system initiates release of the chat group call.
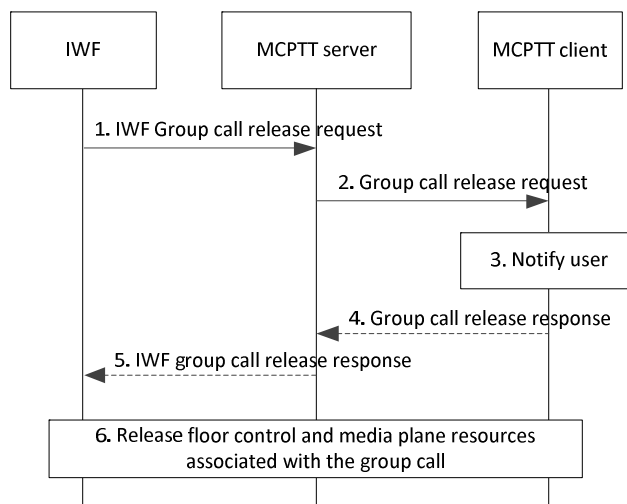
Figure 10.3.5.4-1: Release chat group call on an interworking group defined in the LMR system

1. The IWF sends an IWF group call release request to the MCPTT server. An individual IWF group call release request is sent for each MCPTT user in the call.

2. MCPTT server forwards the release request(s) to the group's MCPTT users, as described in 3GPP TS 23.379 [7].

3. MCPTT users are notified about the release of the group call.

4. Optionally, the MCPTT client confirms the group call release request received in step 2 with a group call release response to the MCPTT server.

5. The MCPTT server forwards the group call release response to the IWF as an IWF group call release response.

6. The MCPTT client and the IWF release the floor control and media plane resources associated with the chat group call that is released. Successful release of the chat group call does not affect the status of affiliation of any of the clients.

10.3.5.5 Release chat group call on an interworking group defined in the MCPTT system

This procedure describes the case where the MCPTT server releases an ongoing MCPTT chat group call, on an interworking group defined in the MCPTT system, for all the participants of that group call, since at least one of the conditions for release are met e.g. due to hang time expiry, last participant leaving, second last participant leaving, initiator leaving, or the number of affiliated MCPTT group members is below the minimum number permitted.

The signalling procedure is described in figure 10.3.5.5-1.

Pre-conditions:

1. A chat group call is ongoing involving MCPTT clients 1, 2 and the IWF.
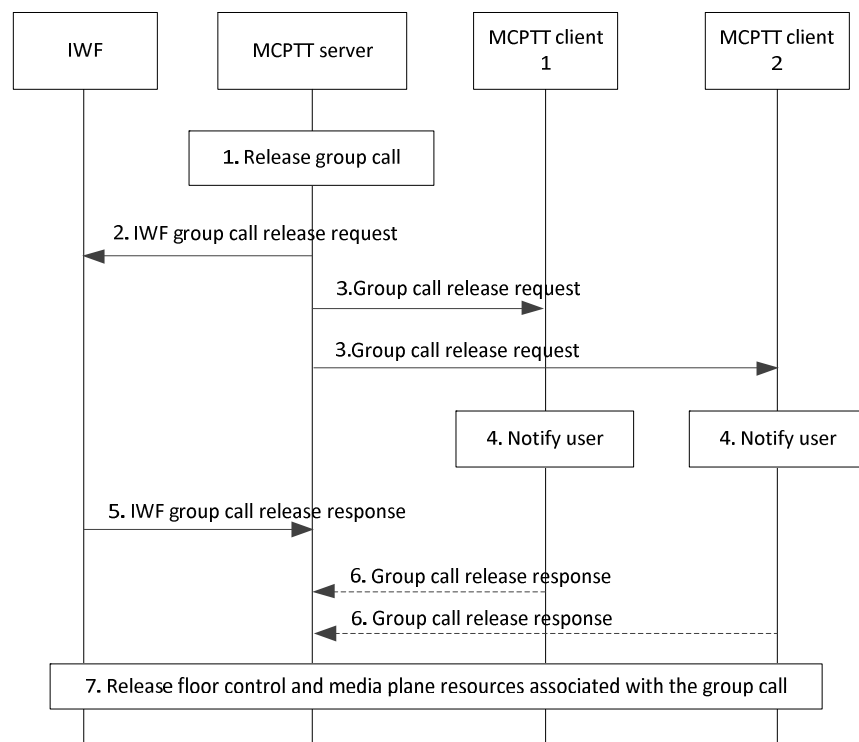
Figure 10.3.5.5-1: Release chat group call on an interworking group defined in the MCPTT system

1. The MCPTT server decides to release the MCPTT chat group call which is ongoing e.g., due to hang time expiry, last participant leaving, second last participant leaving, initiator leaving, or minimum number of affiliated MCPTT group members are not present.

2. The MCPTT server sends an IWF group call release request to the IWF to release the ongoing session. If the IWF has joined itself to this group on behalf of all the group's LMR users, only one IWF group call release request message is sent to the IWF. If the MCPTT server has received individual joins from the group's LMR users, an individual IWF group call release request is sent to the IWF for each joined LMR user.

3. The MCPTT server sends a group call release request towards each MCPTT participant of the ongoing group call.

4. The MCPTT users are notified about the release of the group call.

5. The IWF confirms the IWF group call release request(s) received in step 2 by IWF group call release response(s) to the MCPTT server.

6. Optionally, the MCPTT client(s) receiving a group call release request may send a group call release response to the MCPTT server.

7. MCPTT client 1, client 2 and the IWF release the floor control and media plane resources associated with the chat group call that is released. Successful release of the chat group call does not affect the status of affiliation of any of the clients.

10.3.5.6   void

10.3.5.7   void

10.3.5.8   Newly joined MCPTT group member of a group defined in the LMR system

Procedures in figure 10.3.5.8-1 are those for a group member entering an ongoing MCPTT group call, i.e. performing a late entry.

Pre-conditions:

1. The MCPTT client is registered and the MCPTT user has been authenticated and authorized to use the MCPTT service.

2. There is an ongoing group call on the group homed on the LMR system.

3. The MCPTT client has not yet joined the group call.

4. The MCPTT user indicates to join the group call.
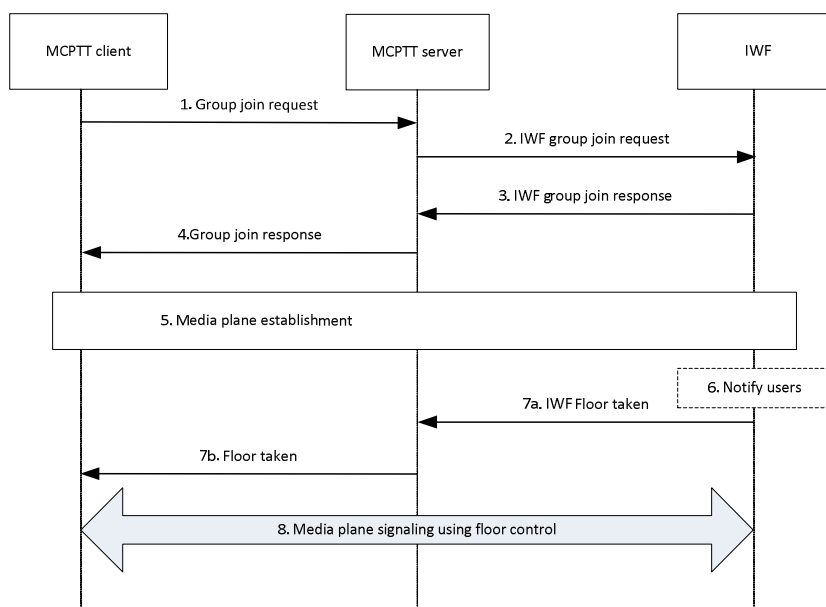
Figure 10.3.5.8-1: Late entry of a newly joined MCPTT group member

1. The MCPTT client sends a group join request with the MCPTT group ID of the desired group to the MCPTT server. If there is a request to transmit, then the group joint request contains an indication of an implicit floor request.

2. The MCPTT server forwards the request to the IWF.

3. The IWF replies with a group join response indicating the acceptance of the group join request.

4. The MCPTT server forwards the response to the MCPTT client.

5. The IWF establishes the media plane with the MCPTT client.

6. The IWF may notify its users that an MCPTT user has joined the group.

7 a. The IWF sends an IWF floor taken (for the current talker) to the MCPTT server if the floor has been taken.

7b. The MCPTT responds to any incoming IWF floor taken message by forwarding a floor taken message to the MCPTT client.

8. Floor control will continue to be used by the floor participants.

10.3.5.9 Newly joined LMR group member of a group defined in the MCPTT system

Procedures in figure 10.3.5.9-1 are those for the IWF entering an ongoing MCPTT group call, i.e. performing a late entry.

Pre-conditions:

1. MCPTT user 1 and MCPTT user 2 have previously joined to the group.

2. MCPTT users using MCPTT client 1 and MCPTT client 2 are in an ongoing group call.

3. The IWF has not yet joined the group call.
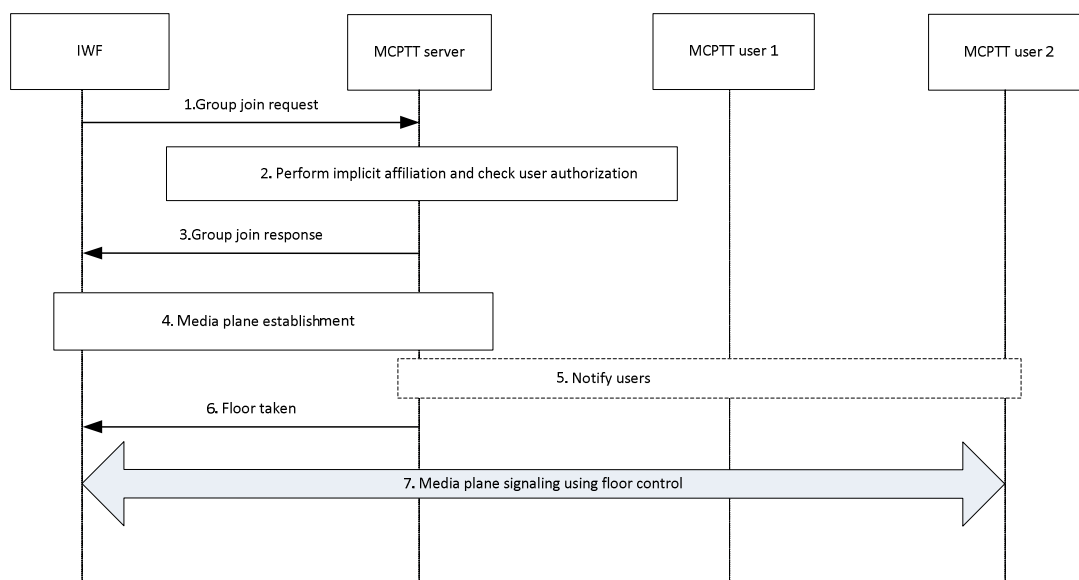
Figure 10.3.5.9-1: Late entry of a newly joined LMR group member

1. The IWF sends a group join request with the MCPTT group ID of the desired group and either using the MCPTT ID corresponding to the LMR group member or using the pre-configured MCPTT ID for use when the IWF is affiliating itself on behalf of the group's LMR users. If there is a request to transmit, then the group join request contains an indication of an implicit floor request. If the group join request includes an implicit floor request it may also include location information.

2. The MCPTT server receives the group join request. MCPTT server generates an implicit affiliation using the MCPTT ID used by the IWF (if the IWF or the LMR user is not already affiliated to the group) and verifies that IWF is authorized to affiliate to the group.

3. The MCPTT server replies with a group join response indicating the acceptance of the group join request.

4. The MCPTT server establishes the media plane between the IWF and the MCPTT server.

5. MCPTT users at MCPTT client 1 and MCPTT client 2 may be notified about the IWF joining the group call.

6. The MCPTT server sends a floor taken (for the current talker) to the IWF.

7. Floor control will continue to be used by the floor participants associated with MCPTT client 1, MCPTT client 2 and the IWF.

10.3.5.10   MCPTT client returning to coverage on a group homed in the LMR system

Procedures in figure 10.3.5.10-1 are those for an MCPTT client returning to coverage during an ongoing MCPTT chat group call.

Pre-conditions:

1. The MCPTT user using an MCPTT client is in an ongoing chat group call when the MCPTT client goes out of radio coverage.
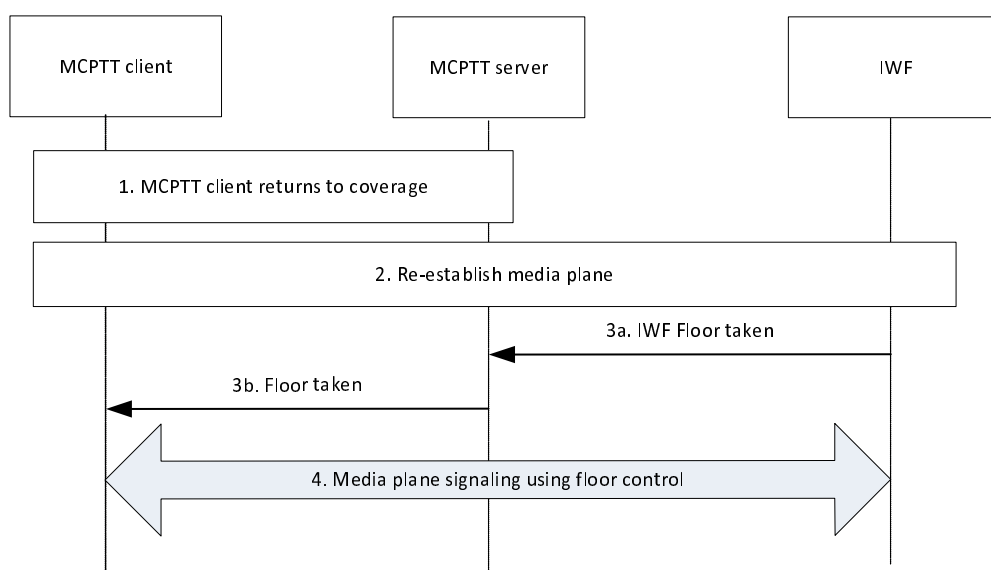
Figure 10.3.5.10-1: Late entry of a MCPTT client returning from out of coverage

1. The MCPTT client or MCPTT server detects that MCPTT client has returned to coverage.

NOTE: How the MCPTT client or MCPTT server detects that the client has returned to coverage is out of scope of the present document.

2. The media plane between the MCPTT client and the IWF are re-established using media plane control signalling

3a. The IWF sends an IWF floor taken to the MCPTT server if anyone currently has the floor.

3b. The MCPTT server forwards a floor taken message to the MC Client if anyone currently has the floor.

4. Floor control will continue to be used by the floor participants.

10.3.6   Exiting group call due to de-affiliation

10.3.6.1   General

The following procedures are applicable both for the pre-arranged and chat group calls.

10.3.6.2 Exiting group call defined in the LMR system due to de-affiliation

Procedures in figure 10.3.6.2-1 are the signalling control plane procedures for the IWF requesting a newly de-affiliated MCPTT user to leave an ongoing MCPTT group call.

Pre-conditions:

1. The MCPTT group is previously defined on the IWF with MCPTT users affiliated to that group. At least one user is an LMR user represented by an MCPTT ID.

2. An MCPTT user on the MCPTT client and an LMR user via the IWF, are on an ongoing call.
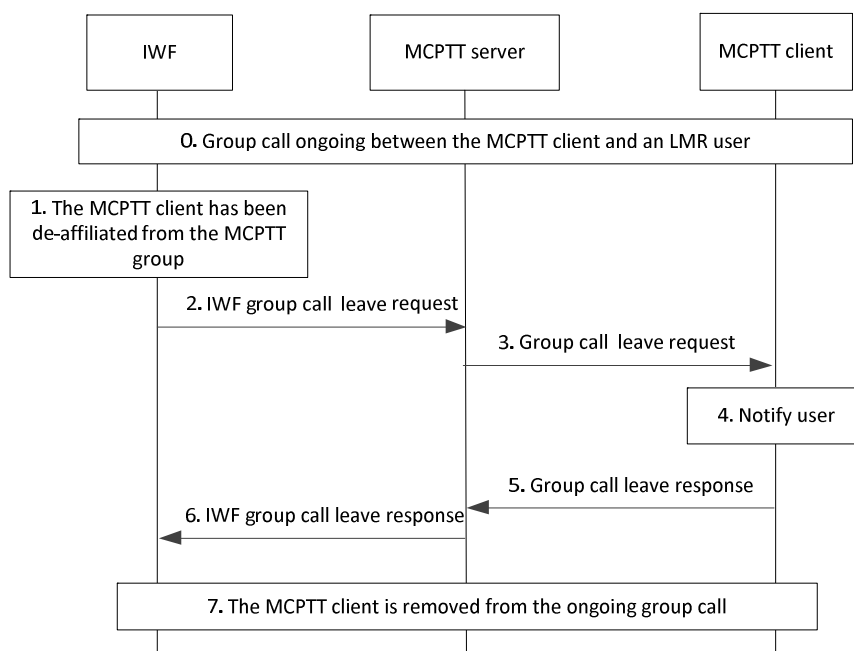
Figure 10.3.6.2-1: Exiting MCPTT group call due to de-affiliation

1. The MCPTT client is de-affiliated.

2. The IWF sends an IWF group call leave request to the MCPTT client via the MCPTT server.

3. The MCPTT server forwards the IWF group call leave request as a group call leave request to the MCPTT client.

4. The MCPTT user at the MCPTT client is notified about leaving the group call.

5. The MCPTT client sends the group call leave response to the MCPTT server and leaves the group call.

6. The MCPTT server forwards the group call leave response to the IWF as an IWF group call leave response.

7. The MCPTT client is now removed from the ongoing group call.

10.3.6.3 Exiting group call defined in the MCPTT system due to de-affiliation

Procedures in figure 10.3.6.3-1 are the signalling control plane procedures for the MCPTT server requesting a newly de-affiliated LMR user to leave an ongoing MCPTT group call.

Pre-conditions:

1. The MCPTT group is previously defined on the group management server with MCPTT users affiliated to that group. At least one user is an LMR user represented by an MCPTT ID.

2. An MCPTT user on the MCPTT client and an LMR user via the IWF, are on an ongoing call.
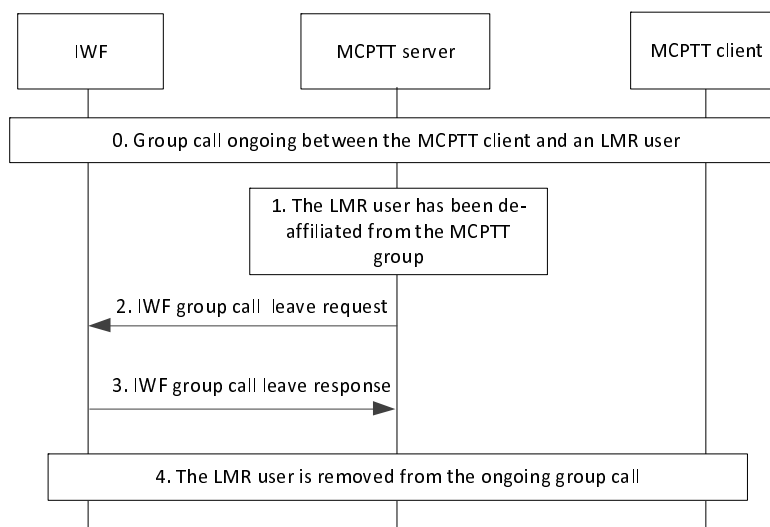
Figure 10.3.6.3-1: Exiting MCPTT group call due to de-affiliation

1. The LMR user represented by the IWF has been de-affiliated.

2. The MCPTT server sends an IWF group call leave request to the LMR user via the IWF.

3. The IWF sends an IWF group call leave response to the MCPTT server and leaves the group call.

4. The LMR user represented by the IWF is now removed from the ongoing group call.

10.3.7 Group regroup with pre-configured group

10.3.7.1 General

A group regroup may be achieved by regrouping MCPTT groups into a new regroup group which uses the configuration of a separate pre-configured MCPTT group. The MCPTT group configuration needs to be provided to the relevant MCPTT group members of the MCPTT groups that will be regrouped in advance of the regrouping operation.

NOTE 1: A pre-configured group which is intended only to provide configuration for the pre-configured group regroup process is identified by a parameter in group configuration described in 3GPP TS 23.280 [5].

NOTE 2: The configuration may alternatively be taken from any MCPTT group that has been configured in the IWF and the user profile of all the relevant MCPTT users who will be regrouped.

NOTE 3: Pre-configured group regroups may be defined according to the organizational structure of a mission critical organization, or by some other means which allows the MCPTT client of an authorized user and the IWF to be aware of an appropriate pre-configured group regroup for sets of MCPTT groups that will be regrouped together.

The pre-configured MCPTT group that provides the configuration is not used as the pre-configured group regroup itself, it only provides configuration for one or more pre-configured group or user regroup. The MCPTT group ID of the pre-configured group regroup is provided by the authorized user or the IWF (for the case where the IWF owns the pre-configured group regroup) when the pre-configured group regrouping is carried out.

The pre-configured group regroup can be specified to be a broadcast or non-broadcast type according to the configuration of the MCPTT group whose configuration is specified by the pre-configured group regroup request. The broadcast type of pre-configured group regroup is used for one-way communication where only an authorized user or the IWF (for the case where the IWF owns the pre-configured group regroup) is allowed to transmit and all other regroup members are only allowed to receive the communication (e.g. a call from a dispatcher to all regroup members). The non-broadcast type is used for two-way communication where all regroup members can transmit and receive (i.e, the pre-configured group regroup call behaves like a normal non-broadcast group call).

These procedures provide a regrouping service for MCPTT only and are independent of group regrouping procedures specified in subclause 10.2.2. If one of the MCPTT groups that has been requested for regrouping by means of this procedure has already been regrouped by the group regrouping procedure specified in 3GPP TS 23.280 [5] or subclause 10.2.2, the request for regrouping shall be rejected. The rules for regrouping set forth in subclause 10.2.2.5 apply.

10.3.7.2 Regroup formation using pre-configured group

10.3.7.2.1 Regroup formation using pre-configured group initiated in the MCPTT system

Figure 10.3.7.2.1-1 illustrates the procedure to initiate a regroup procedure using a pre-configured MCPTT regroup group, where at least one of the groups to be regrouped is configured in the IWF. The group management server in the MCPTT system of the regroup group shares the necessary security related parameters together with the group configuration of the pre-configured group regroup with the group management server in the IWF; the MCPTT system does not need to be aware of the group members of the pre-configured group regroup that are receiving service in the IWF.

The procedure takes place prior to the establishment of a group call to the pre-configured group regroup.

In this procedure, any gateway MC servers between the IWF and the MCPTT system are not shown.

Pre-conditions:

- The MCPTT client is authorized to initiated a pre-configured group regroup procedure, and is receiving MCPTT service in the MCPTT system.

- The MCPTT group identity and group configuration for the pre-configured group regroup have been pre-configured in the IWF, and the IWF has received the relevant security related information to allow communication in the pre-configured group regroup.

- In order to be aware whether the group is regrouped, the MCPTT server is subscribed to the group configuration in GMS.

- The GMS has subscribed group dynamic data as specified in subclause 10.1.5.5.1 from the MCPTT server within the same MCPTT system using the procedures defined in subclause 10.1.5.6 in 3GPP TS 23.280 [5].

- The IWF is affiliated to one or more of the MCPTT groups that will be regrouped; and/or, the IWF may own one or more of MCPTT groups to be regrouped.

- The pre-configured group regroup is homed in the MCPTT server.

- The IWF is home to at least one group that's a constituent group of the pre-configured group regroup.

NOTE 1: The IWF has the configuratiton information contained in the pre-configured group regroup, which is normally because at least one member of the pre-configured group regroup is homed on the IWF.
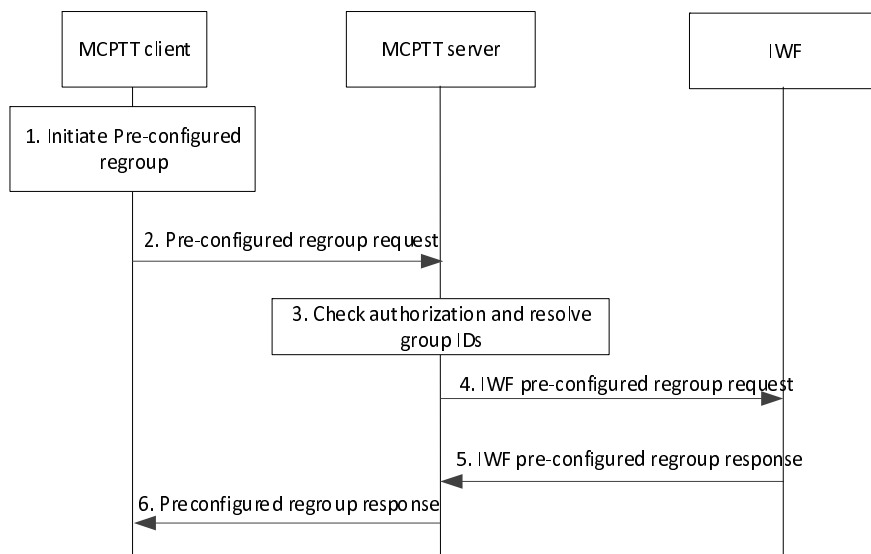
Figure 10.3.7.2.1-1: Regroup procedure using pre-configured group initiated in the MCPTT system

1. The authorized user of the MCPTT client initiates the pre-configured group regroup procedure, specifying the list of MCPTT groups to be regrouped including MCPTT group 1, the MCPTT group ID of the pre-configured group regroup and the MCPTT group ID of the group from which configuration information for the pre-configured group regroup is to be taken.

2. The MCPTT client sends the pre-configured regroup request to the MCPTT server.

3. The MCPTT server checks that the MCPTT client is authorized to initiate a pre-configured group regroup procedure, and resolves the group identities of the MCPTT groups requested in step 1. The MCPTT server also checks which group members are affiliated to the requested MCPTT groups that are homed in the MCPTT system. The MCPTT server identifies any partner systems or IWFs which are the group home systems for MCPTT groups identified in the list of groups to be regrouped. The MCPTT server may retrieve the configuration for the regroup group from the GMS if that configuration information is not already known to the MCPTT server.

NOTE 2: This procedure does not require that that the authorized user of the MCPTT client is a group member of the MCPTT groups listed in the pre-configured group regroup request, or that the authorized user of the MCPTT client is an affiliated group member of any of the listed MCPTT groups.

4. The MCPTT server sends an IWF pre-configured regroup requests to the IWF.

NOTE 3: Only group members that are affiliated to the MCPTT groups that are to be regrouped are sent a pre-configured regroup request.

5. The IWF sends an IWF pre-configured regroup response to the MCPTT server. The IWF may reject the IWF group regroup response. (e.g. if one of its constituent groups is in the emergency state or is already in a regroup, if the IWF does not support temporary groups or the IWF does not support group regrouping)

6. The MCPTT server sends the pre-configured regroup response to the MCPTT client.

After the pre-configured group regrouping procedure, the regrouping remains in effect until explicitly cancelled by the procedure in subclause 10.3.7.3.

Participation by the IWF in the ongoing pre-configured group regroup persists until the IWF is no longer affiliated to any of the regrouped groups.

10.3.7.2.2 Regroup formation using pre-configured group initiated in the IWF

Figure 10.3.7.2.2-1 illustrates the procedure to initiate a pre-configured group regroup procedure using a pre-configured MCPTT group, where at least one of the groups to be regrouped is configured in an MCPTT system. The group management server in the IWF shares the necessary security related parameters together with the group configuration of the MCPTT regroup group with the group management server in the MCPTT system and the group management server in the MCPTT system distributes this configuration including those security parameters to its served MCPTT users according to the procedures in 3GPP TS 23.280 [5] subclause 10.2.7; the IWF does not need to be aware of the list of group members of the pre-configured group regroup that are receiving service in the MCPTT system. The group can have multiple MCPTT clients, but only one MCPTT client involved in the session is shown for simplicity.

The procedure takes place prior to the establishment of a group call to the pre-configured group regroup.

In this procedure, any gateway MC servers between the IWF and the MCPTT system are not shown.

Pre-conditions:

- The MCPTT client is an affiliated member of MCPTT group 1 where MCPTT group 1 is defined in the MCPTT system.

- The MCPTT group identity and group configuration for the pre-configured group regroup have been pre-configured in the MCPTT client, and the MCPTT client has received the relevant security related information to allow communication in the pre-configured group regroup.

- The pre-configured group regroup is homed in the IWF.

- The MCPTT system is home to at least one group that's a constituent group of the pre-configured group regroup.

NOTE 1: The MCPTT system has the configuratiton information contained in the pre-configured group, which is normally because at least one member of the preconfigured group is homed on the MCPTT system.
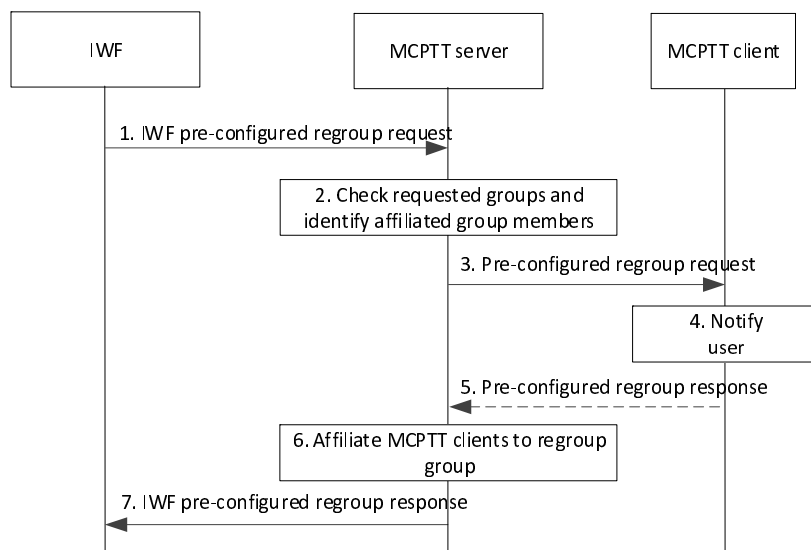
Figure 10.3.7.2.2-1: Regroup procedure using pre-configured group initiated in the IWF

1. The IWF initiates the pre-configured group regroup procedure, specifying the list of MCPTT groups to be regrouped including MCPTT group 1, the MCPTT group ID of the pre-configured group regroup and the MCPTT group ID of the group from which configuration information for the pre-configured group regroup is to be taken. The IWF sends the IWF pre-configured regroup request to the MCPTT server in the partner MCPTT system.

2. The MCPTT server checks the status of any MCPTT groups hosted by itself, and identifies affiliated group members of any of the identified MCPTT groups (both MCPTT groups that are hosted in the MCPTT system

and MCPTT groups that are hosted in the IWF) that are receiving MCPTT service in the MCPTT system, which includes the MCPTT client.

3. The MCPTT server sends a pre-configured regroup request to the MCPTT client.

NOTE 2: Only group members that are affiliated to the MCPTT groups that are to be regrouped are sent a pre-configured regroup request.

4. The MCPTT client notifies the user of the regrouping.

5. The MCPTT client 2 may send the pre-configured regroup response to the MCPTT server to acknowledge the regrouping action. This acknowledgement is not sent in response to a multicast transmission of the pre-configured regroup request.

6. The MCPTT server affiliates the regrouped MCPTT client to the pre-configured group regroup.

7. The MCPTT server sends an IWF pre-configured regroup response to the IWF.

After the pre-configured group regrouping procedure, the regrouping remains in effect until explicitly cancelled by the procedure in subclause 10.3.7.3.

MCPTT client participation in the ongoing pre-configured group regroup persists until the MCPTT client is no longer affiliated to any of the regrouped groups.

MCPTT client affiliation to the pre-configured group regroup may cease when the clients MCPTT service ceases, e.g. when the UE is powered down, or by the client performing a log-off operation.

10.3.7.3 Regroup cancellation using pre-configured group regroup

10.3.7.3.1 Regroup cancellation using pre-configured group initiated in the MCPTT system

Figure 10.3.7.3.1-1 illustrates the procedure to cancel a regrouping that uses a pre-configured MCPTT regroup group where there the regroup had been initiated in the MCPTT system.

Pre-conditions:

- The IWF has been regrouped into the pre-configured group regroup.

- The MCPTT client is authorized to cancel a pre-configured group regroup.

- The GMS has subscribed to the group dynamic data specified in 3GPP TS 23.280 [5] subclause 10.1.5.5.1 from the MCPTT server as specified in 3GPP TS 23.280 [5] subclause 10.1.5.6.
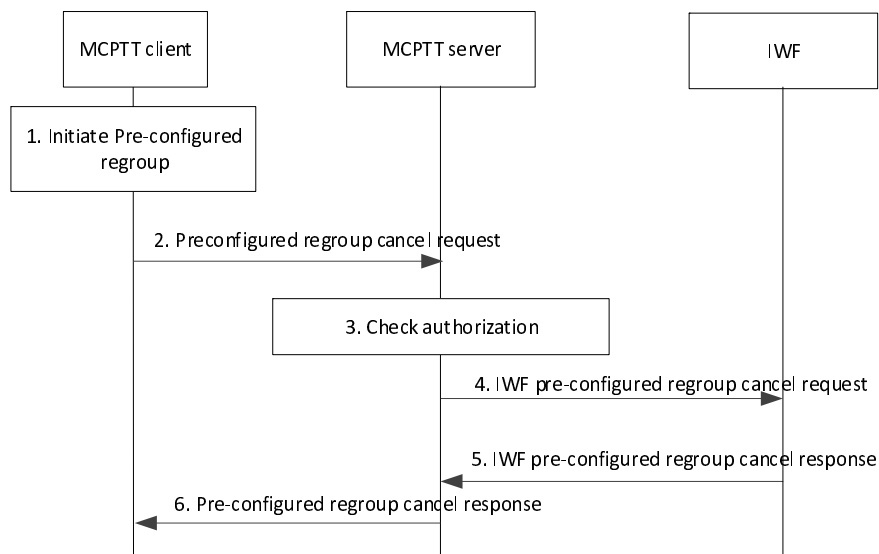
Figure 10.3.7.3.1-1: Regroup cancellation using pre-configured group initiated in the MCPTT system

1. The authorized user of the MCPTT client initiates the cancellation of the pre-configured group regroup.

2. The MCPTT client sends the pre-configured regroup cancel request to the MCPTT server, specifying the MCPTT group ID of the regroup group.

3. The MCPTT server checks that the MCPTT client is authorized to cancel a pre-configured group regroup.

4. The MCPTT server sends the IWF pre-configured regroup cancel request to the IWF.

5. The IWF sends the IWF pre-configured regroup cancel response to the MCPTT server. The IWF may reject the IWF group regroup response. (e.g. if one of its constituent groups is in the emergency state or is already in a regroup, if the IWF does not support temporary groups or the IWF does not support group regrouping)

6. The MCPTT server sends a pre-configured regroup cancel response to the MCPTT client.

10.3.7.3.2 Regroup cancellation using pre-configured group initiated in the IWF

Figure 10.3.7.3.2-1 illustrates the procedure to cancel a regrouping that uses a pre-configured MCPTT group where the regroup is initiated in the IWF. Only one MCPTT group member is shown for simplicity.

Pre-conditions:

- The MCPTT client has been regrouped into a pre-configured group regroup, and is receiving MCPTT service in the MCPTT system.
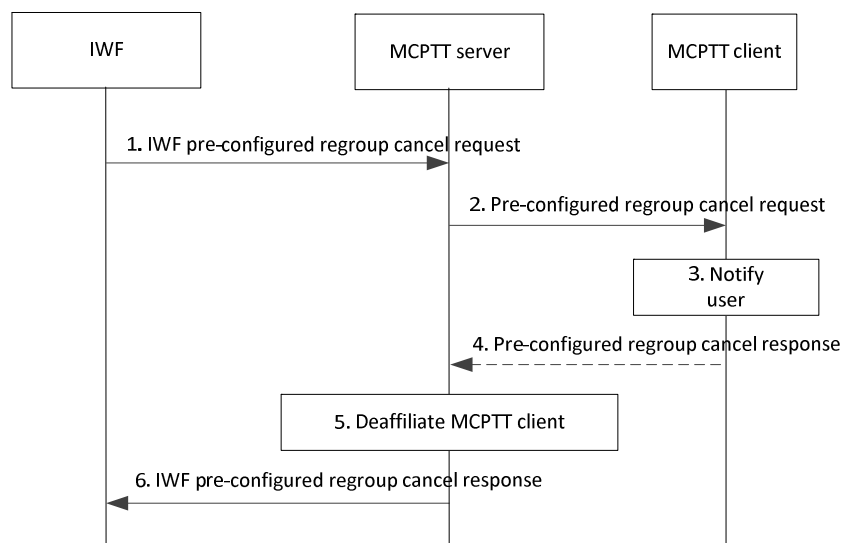
Figure 10.3.7.3.2-1: Cancel pre-configured group regroup procedure using pre-configured group in the MCPTT system

1. The IWF initiates the cancellation of the regrouping that uses a pre-configured MCPTT group. The IWF sends the IWF pre-configured regroup cancel request to the MCPTT server, specifying the MCPTT group ID of the regroup group.

2. The MCPTT server sends the pre-configured regroup cancel request to the MCPTT client.

3. The MCPTT client notifies the user of the cancellation of the pre-configured group regrouping.

4. The MCPTT client may send the pre-configured regroup remove response to the MCPTT server to acknowledge the cancellation of the pre-configured group regrouping. This acknowledgement is not sent in response to a multi-cast transmission of the pre-configured regroup cancel request.

5. The MCPTT server de-affiliates the MCPTT client from the pre-configured group regroup.

6. The MCPTT server sends the IWF pre-configured regroup cancel response to the IWF.

10.3.7.4 Regroup rejection using pre-configured group

10.3.7.4.1 Regroup rejection using pre-configured group for regroup initiated in the MCPTT system

Figure 10.3.7.4.1-1 illustrates the case where the procedure to initiate a pre-configured group regroup procedure with an MCPTT system and an IWF using a pre-configured MCPTT group described in subclause 10.3.7.3.1 commences, but where the request for the regroup is rejected by the IWF, for example because one of the groups hosted by the IWF is already regrouped by other group regrouping procedures.

In this procedure, any gateway MC servers between the IWF and the MCPTT system are not shown.

Pre-conditions:

- The MCPTT client is authorized to initiate a pre-configured group regroup procedure.

- The MCPTT group identity and group configuration for the pre-configured group regroup have been pre-configured in the IWF, and the IWF has received the relevant security related information to allow communication in the pre-configured group regroup.

- In order to be aware whether the group is regrouped, the MCPTT server is subscribed to the group configuration in GMS.

- The GMS has subscribed group dynamic data as specified in subclause 10.1.5.5.1 from the MCPTT server within the same MCPTT system using the procedures defined in subclause 10.1.5.6 in 3GPP TS 23.280 [5].

- The IWF is affiliated to one or more of the MCPTT groups that will be regrouped; and/or, the IWF may own one or more of MCPTT groups to be regrouped.

Figure 10.3.7.4.1-1: Regroup rejection using pre-configured group for group initiated in the MCPTT system

1. The authorized user of the MCPTT client initiates the pre-configured group regroup procedure, specifying the list of MCPTT groups to be regrouped including MCPTT group 1, the MCPTT group ID of the pre-configured group regroup and the MCPTT group ID of the group from which configuration information for the pre-configured group regroup is to be taken.

2. The MCPTT client sends the pre-configured regroup request to the MCPTT server.

3. The MCPTT server checks that the MCPTT client is authorized to initiate a pre-configured group regroup procedure, and resolves the group identities of the MCPTT groups requested in step 1. The MCPTT server also checks which group members are affiliated to the requested MCPTT groups that are homed in the MCPTT system. The MCPTT server identifies any partner systems or IWFs which are the group home systems for MCPTT groups identified in the list of groups to be regrouped. The MCPTT server may retrieve the configuration for the pre-configured group regroup from the GMS if that configuration information is not already known to the MCPTT server.

NOTE: This procedure does not require that that the authorized user of the MCPTT client is a group member of the MCPTT groups listed in the regroup request, or that the authorized user of the MCPTT client is an affiliated group member of any of the listed MCPTT groups.

4. The MCPTT server sends the IWF pre-configured regroup requests to the IWF.

5. The IWF sends a pre-configured regroup reject to the MCPTT server, indicating the reason for rejection, for example because one or more of the MCPTT groups has already been regrouped by another group regrouping procedure, either internal to the IWF or in an MCPTT system.

6. The MCPTT server sends a pre-configured regroup reject to the MCPTT client, indicating the reason for the rejection.

10.3.7.4.2 Regroup rejection using pre-configured group for regroup initiated in the IWF

Figure 10.3.7.4.2 1 illustrates the case where the procedure to initiate a regroup procedure with an MCPTT system and an IWF using a pre-configured MCPTT group described in subclause 10.3.7.3.2 commences, but where the request for

the pre-configured group regroup is rejected by the MCPTT system, for example because one of the groups hosted by the MCPTT system is already regrouped by other group regrouping procedures.

In this procedure, any gateway MC servers between the IWF and the MCPTT system are not shown.

Pre-conditions:

- The MCPTT client is an affiliated member of MCPTT group 1 where MCPTT group 1 is defined in the MCPTT system.

- The MCPTT group identity and group configuration for the pre-configured group regroup have been pre-configured in the MCPTT client, and the MCPTT client has received the relevant security related information to allow communication in the pre-configured group regroup.
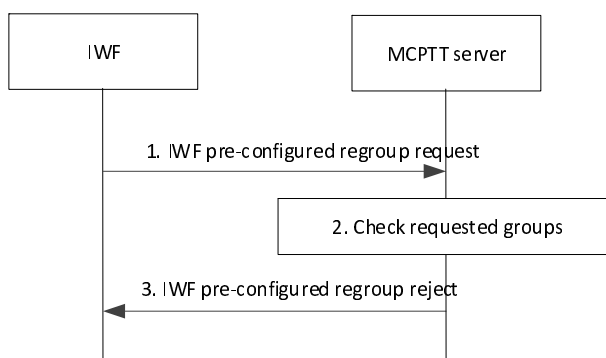
Figure 10.3.7.4.2-1: Regroup rejection using pre-configured group for group initiated in the IWF

1. The IWF initiates the pre-configured group regroup procedure, specifying the list of MCPTT groups to be regrouped including MCPTT group 1, the MCPTT group ID of the pre-configured group regroup and the MCPTT group ID of the group from which configuration information for the pre-configured group regroup is to be taken. The IWF sends the IWF pre-configured regroup request to the MCPTT server.

2. The MCPTT server checks the status of any MCPTT groups hosted by that MCPTT server, and determines that one or more requested MCPTT groups has already been regrouped by another group regrouping procedure.

3. The partner MCPTT server sends an IWF pre-configured regroup reject to the IWF, indicating the reason for rejection.

10.3.7.5 Pre-configured regroup update procedures

10.3.7.5.1 MCPTT client PTTs on MCPTT group during an in-progress pre-configured group regroup

Figure 10.3.7.5.1-1 illustrates the procedure when a user attempts to set up a MCPTT group call on a group involved in an in-progress pre-configured group regroup, homed in the IWF.

Pre-conditions:

- The MCPTT client is an affiliated member of MCPTT group A that is part of an in-progress pre-configured group regroup with MCPTT groups B and C. MCPTT groups A, B and C can be homed in either the IWF or the MCPTT system.

- MCPTT group D is being used as the pre-configured group regroup. MCPTT group D is homed in the IWF.

- The MCPTT client has missed the pre-configured regroup request message (e.g. poor signalling conditions, race condition).
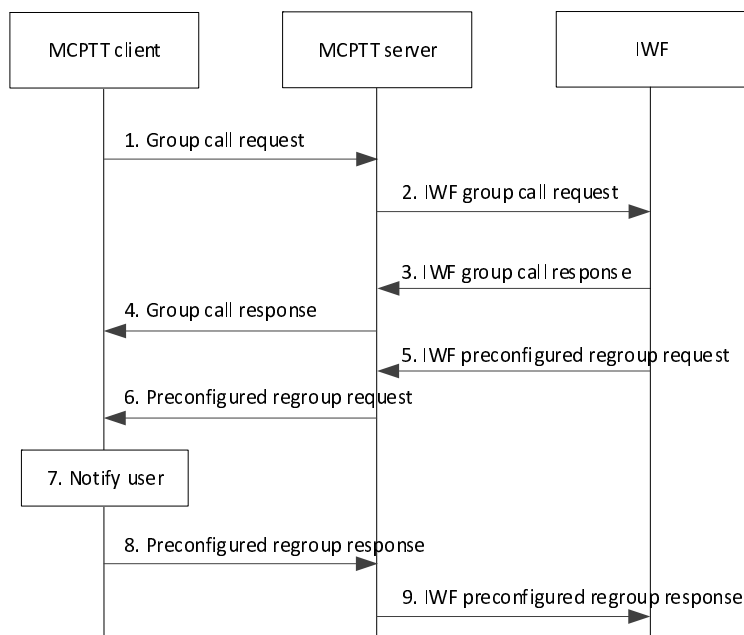
Figure 10.3.7.5.1-1: Procedure for MCPTT client PTTs on MCPTT group during an in-progress pre-configured group regroup

1. The MCPTT client attempts to start a call on MCPTT group A. The MCPTT client sends a group call request message to the MCPTT server containing MCPTT group A as the target group.

2. The MCPTT server forwards the request to the IWF as an IWF group call request.

3. The IWF sends an IWF group call response to the MCPTT server indicating that the call set up is denied because the group is part of an in-progress pre-configured group regroup.

4. The MCPTT server forwards the response to the MCPTT client as a group call response.

5. The IWF sends an IWF pre-configured regroup request to the MCPTT server containing MCPTT group D, the group ID of the pre-configured group regroup.

6. The MCPTT server forwards the request to the MCPTT client as a pre-configured regroup request.

7. The MCPTT client notifies the user of the group call set up failure and of the regrouping procedure.

NOTE 1: Step 5 can occur prior to step 4 and step 7 can occur after step 4.

8. The MCPTT client sends the pre-configured regroup response to the MCPTT server to acknowledge the regrouping action.

9. The MCPTT server forwards the response to the IWF as an IWF pre-configured regroup response. The IWF affiliates the regrouped MCPTT client to the pre-configured group regroup.

NOTE 2: If there is a call currently in progress on the pre-configured group regroup then this MCPTT client can be added to the call using the late entry procedure. If there is no call currently in progress, then the MCPTT user can retry the group call set up.

10.3.7.6 Call request on pre-configured regroup group after group regroup has been cancelled

10.3.7.6.1 MCPTT client PTTs on pre-configured regroup group after group regroup has been cancelled

Figure 10.3.7.6.1-1 illustrates the procedure when an MCPTT user attempts to set up a MCPTT group call on a pre-configured regroup group after the pre-configured MCPTT group regroup has been cancelled.

Pre-conditions:

- The MCPTT client is a member of MCPTT group A that was part of an in-progress pre-configured group regroup with MCPTT groups B and C that has been cancelled. MCPTT group D was used as the pre-configured regroup group. MCPTT group D is homed in the IWF.

- The MCPTT client has missed the pre-configured regroup cancel request message (e.g. poor signalling conditions, race condition).
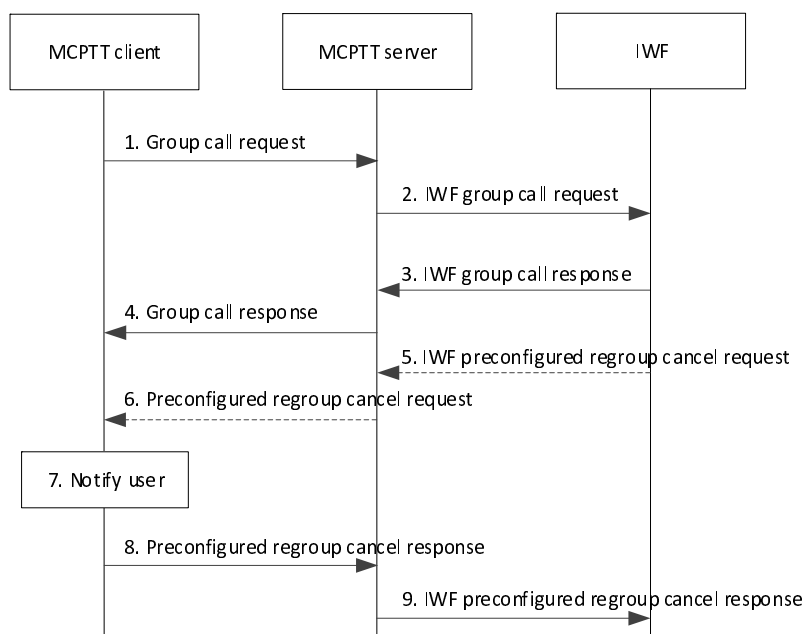
Figure 10.3.7.6.1-1: Procedure for MCPTT client PTTs on pre-configured regroup group after the group regroup is cancelled

1. The MCPTT client attempts to start a call on MCPTT group D, the pre-configured regroup group. The MCPTT client sends a group call request message to the MCPTT server containing MCPTT group D as the target group.

2. The MCPTT server forwards the request to the IWF as an IWF group call request.

NOTE 1: The pre-configured regroup group D can be a group in the MCPTT client's profile, and the MCPTT client can be a member of group D.

3. The IWF sends an IWF group call response to the MCPTT server indicating that the call set up is denied because the group regroup is no longer active.

4. The MCPTT server forwards the response to the MCPTT client as a group call response

NOTE 2: In the following, steps 5, 6, 8 and 9 are optional.

5. The IWF sends an IWF pre-configured regroup cancel request to the MCPTT server.

6. The MCPTT server forwards the request as a pre-configured regroup cancel request to the MCPTT client.

NOTE 3: This message should be sent over unicast.

7. The MCPTT client notifies the user of the group call set up failure and of the regrouping cancellation.

8. The MCPTT client sends a pre-configured regroup cancel response to the MCPTT server to acknowledge the regrouping cancellation.

9. The MCPTT server forwards the response to the IWF as an IWF pre-configured regroup cancel response.

10.3.7.7   Adding newly affiliated user to a pre-configured group regroup

10.3.7.7.1   Adding newly affiliated MCPTT user to a pre-configured group regroup

Figure 10.3.7.7.1-1 illustrates the procedure to add a newly affiliated MCPTT user to an in-progress pre-configured group regroup operation.

Pre-conditions:

- The MCPTT client is a member of, but not yet affiliated with, a MCPTT group that is part of an in-progress pre-configured group regroup operation.

- The MCPTT group identity and group configuration for the regroup MCPTT group has been pre-configured in the MCPTT client, and the MCPTT client has received the relevant security related information to allow it to communicate in the pre-configured group regroup.
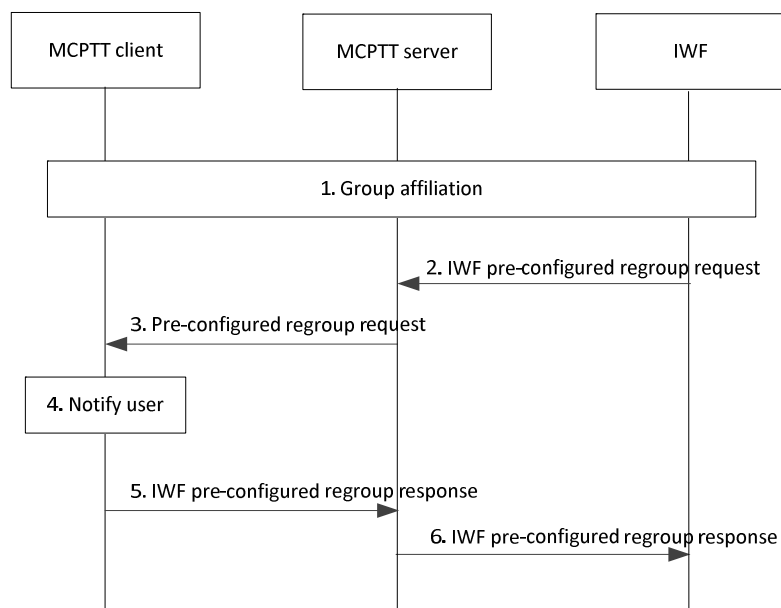
Figure 10.3.7.7.1-1: Procedure to add a newly affiliated user to a pre-configured group regroup

1. The MCPTT client affiliates to an MCPTT group that is currently part of an in-progress pre-configured group regroup. The affiliation follows the procedure in subclause 10.1.2.4.

2. The IWF sends an IWF pre-configured regroup request to the MCPTT server.

3. The MCPTT server sends a pre-configured regroup request to the MCPTT client.

4. The MCPTT client notifies the user of the regrouping.

5. The MCPTT client may send the pre-configured regroup response to the MCPTT server to acknowledge the regrouping action. These acknowledgements are not sent in response to a multicast transmission of the pre-configured regroup request.

6. The MCPTT server sends an IWF pre-configured regroup response to the IWF. The IWF affiliates the MCPTT client to the group regroup.

10.3.7.7.2 Adding newly affiliated user homed in the IWF to a pre-configured group regroup

Figure 10.3.7.7.2-1 illustrates the procedure to add a newly affiliated user homed in the IWF to an in-progress pre-configured group regroup operation.

Pre-conditions:

- The LMR user is a member of, but not yet affiliated to, an MCPTT group that is part of an in-progress pre-configured group regroup operation.

- The MCPTT group identity and group configuration for the pre-configured group regroup has been pre-configured in the IWF, and the IWF has received the relevant security related information to allow it to communicate in the pre-configured group regroup.
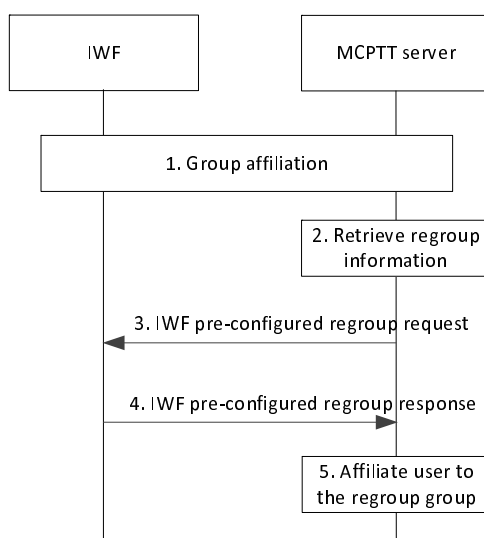
Figure 10.3.7.7.2-1: Procedure to add a newly affiliated user to a pre-configured regroup

1. The IWF affiliates to an MCPTT group that is currently part of an in-progress pre-configured group regroup. The affiliation follows the procedure in subclause 10.1.2.2.

2. The MCPTT server retrieves the MCPTT group ID of the pre-configured group regroup and the MCPTT group ID of the group from which configuration information for the pre-configured group regroup is to be taken.

3. The MCPTT server sends an IWF pre-configured regroup request to the IWF.

4. The IWF sends an IWF pre-configured regroup response to the MCPTT server to acknowledge the regrouping action.

5. The MCPTT server affiliates the IWF to the group regroup.

10.3.8 User regroup with pre-configured group

10.3.8.1 General

A user regroup may be achieved by regrouping MCPTT users into a new regroup group which uses the configuration of a separate pre-configured MCPTT group. The MCPTT regroup group configuration needs to be provided to the relevant MCPTT users who will be regrouped in advance of the regrouping operation. A pre-configured user regroup may

contain users homed in the IWF and the IWF may host pre-configured user regroups which may contain members homed in an MCPTT system.

NOTE 1: A pre-configured group which is intended only to provide configuration for the pre-configured user regroup process is identified by a parameter in group configuration described in 3GPP TS 23.280 [5].

NOTE 2: The configuration may alternatively be taken from any MCPTT group that has been configured in the user profile of all of the relevant MCPTT users who will be regrouped and that has also been configured to the IWF for the case where the pre-configured user regroup contains members homed in the IWF.

The pre-configured user regroup that provides the configuration is not used as the pre-configured user regroup itself, it only provides configuration for one or more pre-configured user regroups. The MCPTT group ID of the pre-configured user regroup is provided by the originating authorized user or the originating IWF when the pre-configured user regrouping is carried out.

10.3.8.2 Pre-configured user regroup formation

10.3.8.2.1 Pre-configured user regroup formation by the MCPTT system

Figure 10.3.8.2.1-1 illustrates the procedure to initiate a pre-configured user regroup procedure using a pre-configured user regroup. The procedure takes place prior to the establishment of a group call to the pre-configured user regroup.

Pre-conditions:

- MCPTT clients 2 and 3 are registered with the MCPTT service.

- An MCPTT group that will be used for configuration of the pre-configured user regroup has been pre-configured in MCPTT clients 2 and 3 and the IWF, and MCPTT clients 2 and 3 and the IWF have received the relevant security related information to allow them to communicate in the pre-configured user regroup.

- MCPTT client 1 is authorized to initiated a pre-configured user regroup using the pre-configured user regroup procedure.

- MCPTT client 1 is aware of a suitable pre-configured group whose configuration has been pre-configured in the MC service clients of the MCPTT users who will be regrouped.

- The pre-configured user regroup is homed in the MCPTT server.
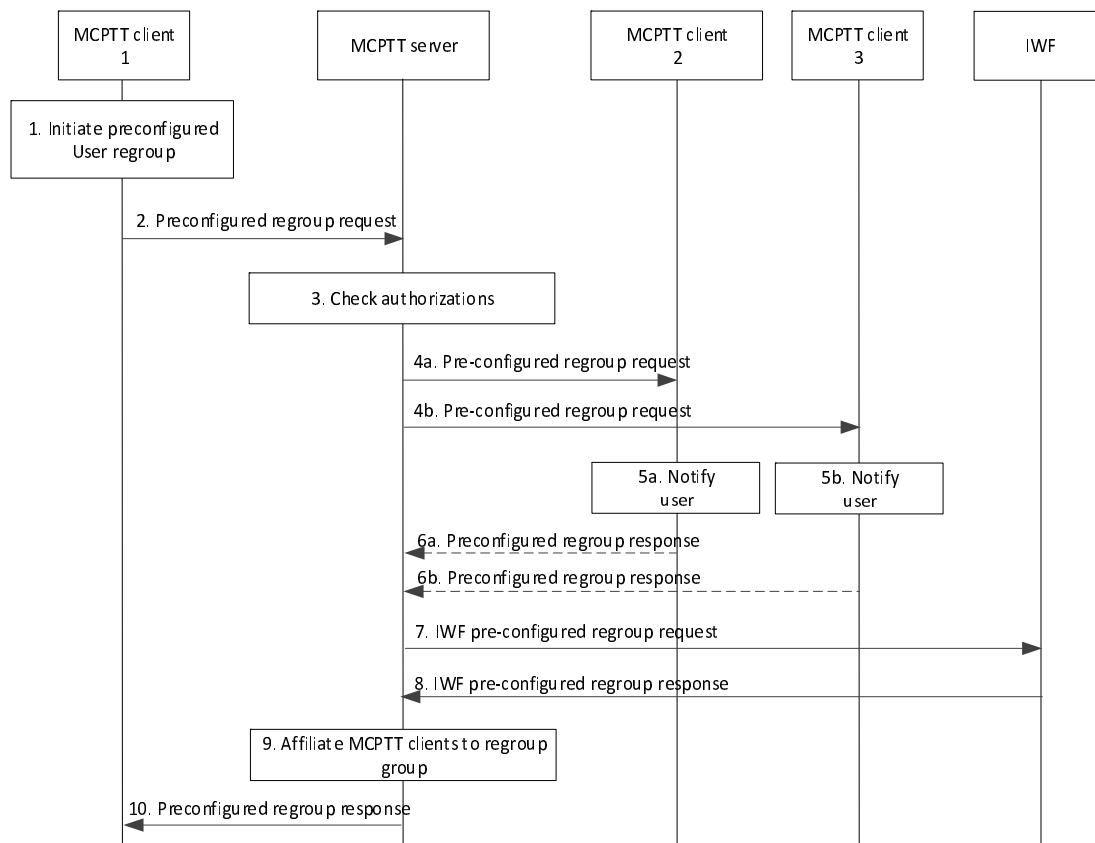
Figure 10.3.8.2.1-1: User regroup procedure using pre-configured group by the MCPTT system

1. The authorized user of MCPTT client 1 initiates the pre-configured user regroup procedure, specifying the list of MCPTT users to be regrouped (MCPTT clients 2, 3 and one or more IWF users), the MCPTT group ID of the pre-configured user regroup, and the MCPTT group ID of the group from which configuration information for the pre-configured user regroup is to be taken.

2. MCPTT client 1 sends the pre-configured regroup request to the MCPTT server. The request indicates the list of users to be included in the regroup operation.

3. The MCPTT server checks that MCPTT client 1 is authorized to initiate a pre-configured user regroup procedure.

NOTE 1: MCPTT clients and users homed in the IWF can be involved in multiple user and group regroups simultaneously.

4. The MCPTT server sends the pre-configured regroup requests to MCPTT clients 2 and 3 in steps 4a and 4b respectively.

5. MCPTT clients 2 and 3 notify their users of the regrouping in steps 4a and 4b respectively.

6. MCPTT clients 2 and 3 may send the pre-configured regroup response to the MCPTT server to acknowledge the regrouping action. These acknowledgements are not sent in response to a multicast transmission of the pre-configured regroup request.

7. The MCPTT server sends the IWF an IWF pre-configured regroup request.

8. The IWF sends the MCPTT server and IWF pre-configured regroup response.

9. The MCPTT server affiliates the regrouped MCPTT clients and the IWF to the pre-configured user regroup.

10. The MCPTT server sends a pre-configured user regroup response to MCPTT client 1.

NOTE 2: After the pre-configured user regrouping procedure, the regrouping remains in effect until explicitly cancelled by the procedure in subclause 10.3.8.3.1.

10.3.8.2.2 Pre-configured user grop regroup formation by the IWF

Figure 10.3.8.2.2-1 illustrates the procedure for the IWF to initiate a pre-configured user regroup procedure using a pre-configured MCPTT group. The procedure takes place prior to the establishment of a pre-configured user regroup call to the pre-configured user regroup. For simplicity, only one receiving MCPTT client is shown.

Pre-conditions:

- The MCPTT client is registered with the MCPTT service.

- An MCPTT group that will be used for configuration of the pre-configured user regroup has been pre-configured in the MCPTT client and the IWF, and the MCPTT client has received the relevant security related information to allow it to communicate in the pre-configured user regroup.

- The pre-configured user regroup is homed in the IWF.
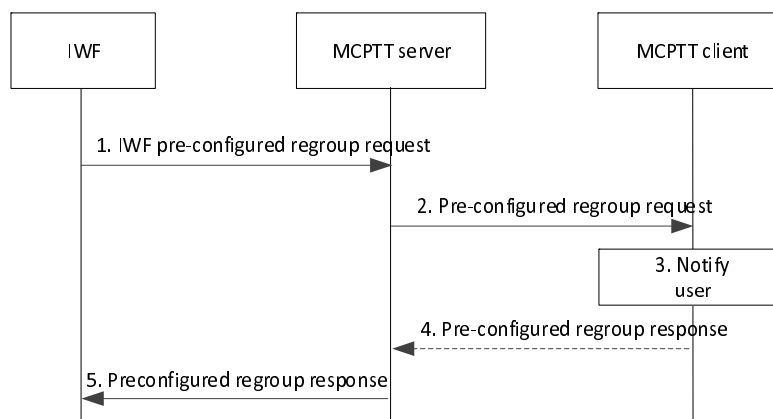
Figure 10.3.8.2.2-1: User regroup procedure using pre-configured group by the IWF

1. The IWF initiates the pre-configured user regroup, the IWF sends an IWF pre-configured regroup request to the MCPTT server. The request indicates the list of users to be included in the regroup operation, that are homed in the MCPTT system.

NOTE 1: MCPTT clients and users homed in the IWF can be involved in multiple user and group regroups simultaneously.

2. The MCPTT server sends the pre-configured regroup request to the MCPTT client.

3. The MCPTT client notifies the MCPTT users of the regrouping.

4. The MCPTT client may send the pre-configured regroup response to the MCPTT server to acknowledge the regrouping action. These acknowledgement is not sent in response to a multicast transmission of the pre-configured regroup request.

5. The MCPTT server sends an IWF pre-configured regroup response to the IWF.

NOTE 2: After the pre-configured user regroup procedure, the regrouping remains in effect until explicitly cancelled by the procedure in subclause 10.3.8.3.2.

10.3.8.3   Pre-configured user regroup cancellation

10.3.8.3.1   Pre-configured user regroup cancellation by the MCPTT system

Figure 10.3.8.3.1-1 illustrates the procedure to cancel a pre-configured user regroup that uses a pre-configured MCPTT group. For simplicity, only one receiving MCPTT client is shown.

Pre-conditions:

- MCPTT client 2 and at least one user homed in the IWF have been regrouped into the pre-configured user regroup.

- MCPTT client 1 is authorized to cancel a pre-configured user regroup that uses a pre-configured MCPTT group.
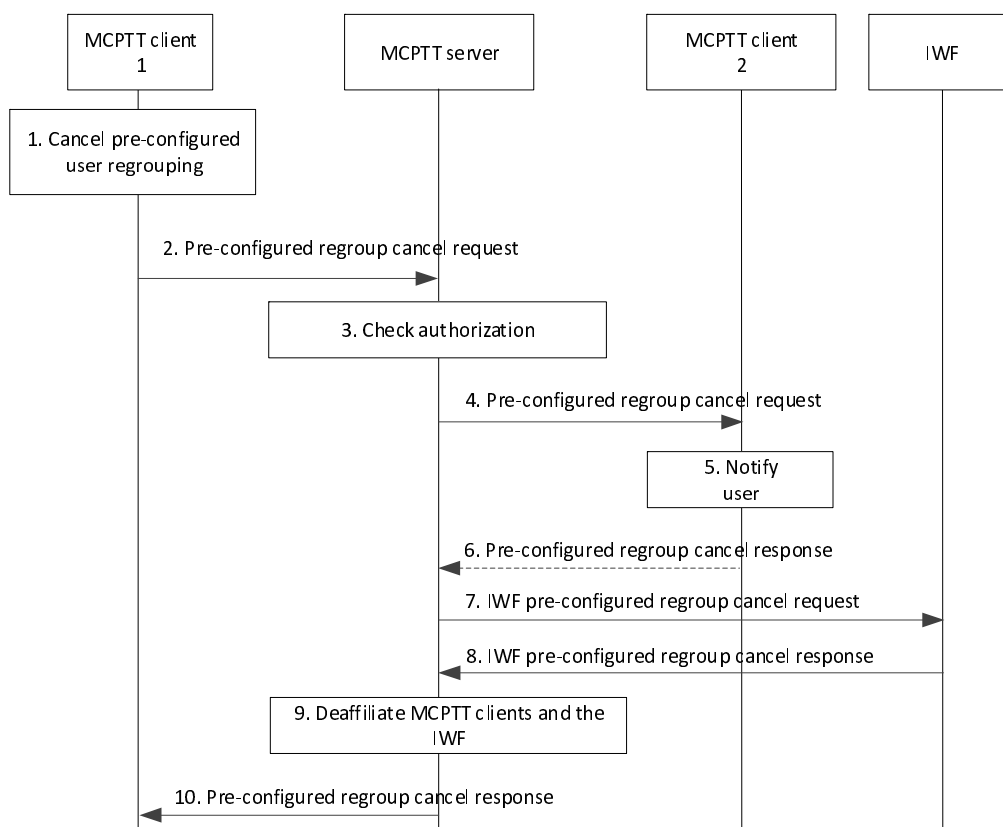
Figure 10.3.8.3.1-1: Cancel pre-configured user regroup procedure by the MCPTT system

1. The authorized user of MCPTT client 1 initiates the cancellation of the pre-configured user regroup that uses a pre-configured MCPTT group.

2. MCPTT client 1 sends the pre-configured regroup cancel request to the MCPTT server, specifying the MCPTT group ID of the pre-configured user regroup.

3. The MCPTT server checks that MCPTT client 1 is authorized to cancel a pre-configured user regroup.

4. The MCPTT server sends the pre-configured regroup cancel requests to MCPTT client 2.

5. MCPTT clients 2 notifies the MCPTT user of the cancellation of the pre-configured user regroup.

6. MCPTT client 2 may send the MCPTT server a pre-configured regroup cancel response. This acknowledgement is not sent in response to a multicast transmission of the pre-configured regroup cancel request.

7. The MCPTT server sends the IWF an IWF pre-configured regroup cancel request.

8. The IWF sends the MCPTT server an IWF pre-configured regroup cancel response.

9. The MCPTT server de-affiliates MCPTT clients 2 and 3 from the pre-configured user regroup.

10. The MCPTT server sends a pre-configured regroup cancel response to MCPTT client 1.

10.3.8.3.2 Pre-configured user regroup cancellation by the IWF

Figure 10.3.8.3.2-1 illustrates the procedure to cancel a pre-configured user regroup that uses a pre-configured MCPTT group. For simplicity, only one receiving MCPTT client is shown.

Pre-conditions:

- An MCPTT client and at least one user homed in the IWF have been regrouped into the pre-configured user regroup.
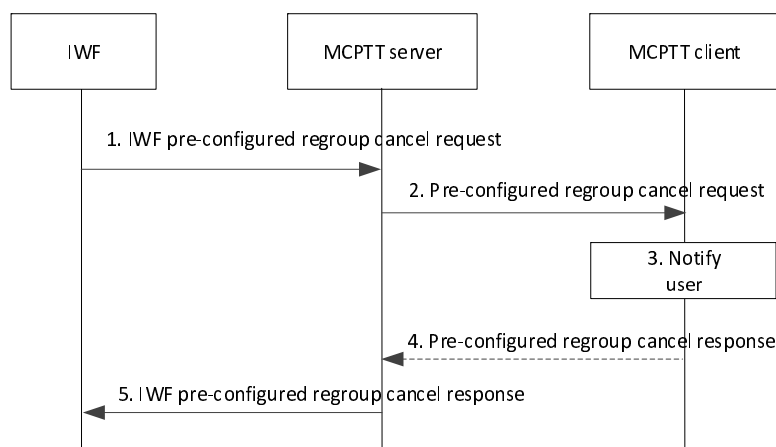
Figure 10.3.8.3.2-1: Cancel pre-configured pre-configured user regroup procedure by the IWF

1. The IWF initiates the cancellation of the pre-configured user regroup. The IWF sends the pre-configured regroup cancel request to the MCPTT server, specifying the MCPTT group ID of the pre-configured user regroup.

2. The MCPTT server sends the pre-configured regroup cancel requests to the MCPTT client.

3. The MCPTT client notifies the MCPTT user of the cancellation of the pre-configured user regroup.

4. The MCPTT client may send the MCPTT server a pre-configured regroup cancel response. This acknowledgement is not sent in response to a multicast transmission of the pre-configured regroup cancel request.

5. The MCPTT server sends an IWF pre-configured regroup cancel response to the IWF.

10.4 Private call

10.4.1 Information flows for private calls

10.4.1.1 General

The following subclauses define information flows for private calls on the IWF-1 interface. Private call related information flows on reference points other than IWF-1 are defined in 3GPP TS 23.379 [7].

10.4.1.2   IWF private call request

Table 10.4.1.2-1 describes the information flow IWF private call request from the MCPTT server to the IWF and from the IWF to the MCPTT server.

Table 10.4.1.2-1: IWF private call request information elements

Information Element	Status	Description
MCPTT ID	M	The MCPTT ID of the calling party
MCPTT ID	M	The MCPTT ID of the called party
Use floor control indication	M	This element indicates whether floor control will be used for the private call.
SDP offer	M	Media parameters of MCPTT client.
Encryption Algorithm	O	Encryption algorithm to use for the call. The field can also indicate whether the encryption algorithm choice is determined from information in the media stream.
Encryption mode	M	Whether E2EE will be used.
Requested commencement mode	O	An indication of the commencement mode to be used.
Implicit floor request (see NOTE)	O	An indication that the user is also requesting the floor.
Location	O	Location of the calling party
NOTE: This element shall be included only when the originating client requests the floor.		

10.4.1.3   IWF private call response

Table 10.4.1.3-1 describes the information flow IWF private call response from the MCPTT server to the IWF and from the IWF to the MCPTT server.

Table 10.4.1.3-1: IWF private call response information elements

Information Element	Status	Description
MCPTT ID	M	The MCPTT ID of the calling party
MCPTT ID	O	The MCPTT ID of the called party
Acceptance confirmation	O	An indication whether the user has positively accepted the call.
SDP answer	M	Media parameters selected
Result	M	Result of the IWF private call request: success or failure
Encryption Algorithm(s) response	O	A list of one or more alternative encryption algorithm(s) to use for the call.
Use floor control indication response	O	This element indicates whether the floor control indication in the request is acceptable.
Implicit floor request response	O	This element indicates whether the indication that the user is also requesting the floor in the request is acceptable.

10.4.1.4   IWF ringing

Table 10.4.1.4-1 describes the information flow IWF ringing from the MCPTT server to the IWF and from the IWF to the MCPTT server.

Table 10.4.1.4-1: IWF ringing information elements

Information Element	Status	Description
MCPTT ID	M	The MCPTT ID of the calling party
MCPTT ID	M	The MCPTT ID of the called party
Ringing indication	O	Indication to the caller.

10.4.1.5   IWF call end request

Table 10.4.1.5-1 describes the information flow IWF call end request from the MCPTT server to the IWF and from the IWF to the MCPTT server.

Table 10.4.1.5-1: IWF call end request information elements

Information Element	Status	Description
MCPTT ID	M	The MCPTT ID of the calling party
MCPTT ID	M	The MCPTT ID of the called party

10.4.1.6   IWF call end response

Table 10.4.1.6-1 describes the information flow IWF call end response from the IWF to the MCPTT server.

Table 10.4.1.6-1: IWF call end response information elements

Information Element	Status	Description
MCPTT ID	M	The MCPTT ID of the responding party

10.4.2   Private call setup in automatic commencement mode

10.4.2.1   MCPTT user initiating an MCPTT private call

In this procedure, an MCPTT user is initiating an MCPTT private call (automatic commencement mode) for communicating with a user in an LMR system, with or without floor control enabled.

This subclause is based on the procedure for private call setup in automatic commencement mode – MCPTT users in multiple MCPTT systems described in 3GPP TS 23.379 [7], subclause 10.7.2.3.1.

In figure 10.4.2.1-1, an MCPTT client initiates establishment of an MCPTT private call with an LMR user.

Pre-conditions:

1. The calling MCPTT user has selected automatic commencement mode for the call;

2. The MCPTT client is registered to the MCPTT service, as per procedure in subclause 10.2 in 3GPP TS 23.379 [7].
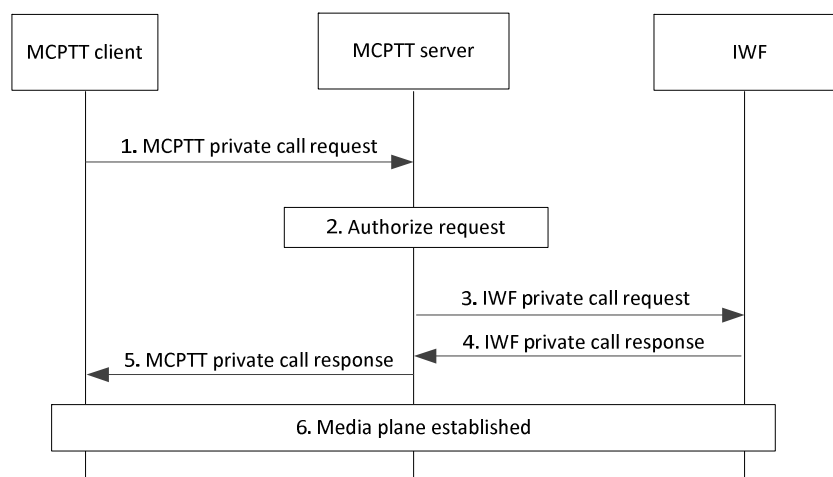
Figure 10.4.2.1-1: Private call setup in automatic commencement mode, initiated by an MCPTT user

1. The MCPTT user at the MCPTT client initiates an MCPTT private call. The MCPTT client sends an MCPTT private call request towards the MCPTT server. The MCPTT private call request contains the MCPTT IDs corresponding to the calling MCPTT party and called LMR party and an SDP offer containing one or more media types. The following parameters are also included that describe the MCPTT client's choices:

   - the encryption algorithm;

   - the encryption mode (encrypted or not);

   - an indication of whether the MCPTT client is requesting the floor, and if the MCPTT client is requesting the floor, location information of the calling MCPTT client may be provided;

   - requested commencement mode (automatic in this case); and

   - an indication of whether the call is to be full or half duplex (whether to establish floor control).

2. The MCPTT server checks whether the MCPTT user at the MCPTT client is authorized to initiate the private call. Because the IWF private call request is requesting automatic commencement mode, the MCPTT server also checks whether the MCPTT user at the MCPTT client is authorized to initiate a call in automatic commencement mode. If location information was included in the MCPTT private call request, the MCPTT server also checks the privacy policy (authorisation to provide location information to other MCPTT users on a call when talking, as defined in 3GPP TS 23.379 [7] Annex A.3) of the requesting MCPTT user to decide if the user's location information may be provided to other MCPTT users on the call and the IWF.

3. If authorized, the MCPTT server sends the IWF private call request that may or may not include location of the requestor, depending on the outcome of the privacy check towards the IWF, including the original parameters and offering the same media types or a subset of the media types contained in the initial received request as per 3GPP TS 23.379 [7].

NOTE: How the IWF private call request is forwarded to the LMR system is out of scope of the present document.

4. The IWF sends an IWF private call response to the MCPTT server, indicating that the IWF does support one of the requested media types. The response indicates success or failure. If the indication is failure, the response may include one or more alternatives to the parameter values contained in step 3.

5. The MCPTT server forwards the MCPTT private call response to the MCPTT client. If the result parameter indicates success, then the MCPTT client proceeds to step 6. Otherwise, if the parameters returned in the MCPTT private call response are acceptable to the MCPTT client, then the MCPTT client can send a new MCPTT private call request with the new parameters and behaves according to those parameters. The calling MCPTT user may be notified of the change in parameters, for example, that the call is to be without floor

control. The MCPTT user can choose to end the call rather than continue with the new parameters. If the parameters returned are not acceptable to the MCPTT client, then the call fails.

6. The MCPTT client has successfully established media plane for communication to the IWF and either end can transmit media. The MCPTT system initiating the call is responsible of granting the floor, solving competing floor requests and issuing floor revoked indications.

10.4.2.2 LMR user initiating a private call with MCPTT user

In this procedure, an LMR user is initiating a private call (in automatic commencement mode) for communicating with a user in MCPTT system, with or without floor control enabled.

This subclause is based on the procedure for private call setup in automatic commencement mode – MCPTT users in multiple MCPTT systems described in 3GPP TS 23.379 [7], subclause 10.7.2.3.1.

In figure 10.4.2.2-1, an LMR user initiates establishment of a private call with an MCPTT user.

Pre-conditions:

1. The calling LMR user has selected automatic commencement mode for the call;

2. The MCPTT client is registered to the MCPTT service, as per procedure in subclause 10.2 in 3GPP TS 23.379 [7].

3. The LMR user at the LMR system has initiated a private call towards an MCPTT user.

NOTE 1: Private call operation between the LMR user and the IWF are out of scope of the present document.
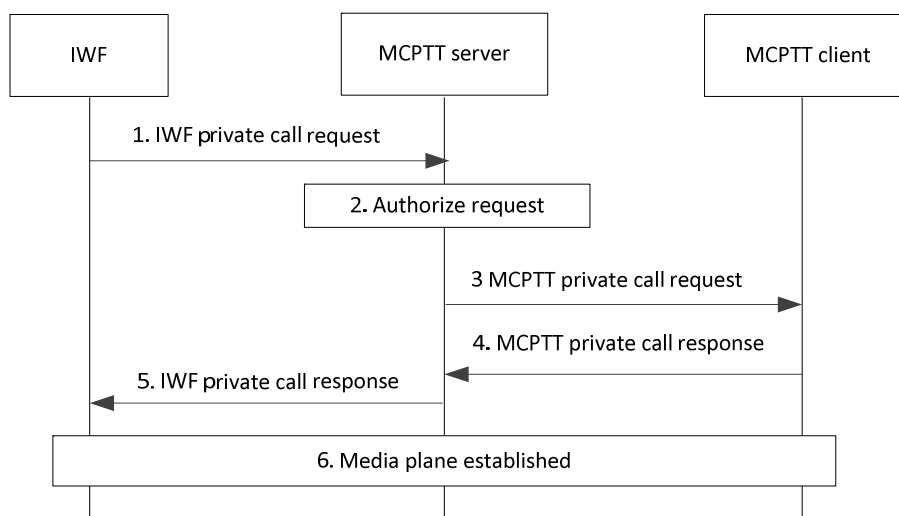
Figure 10.4.2.2-1: Private call setup in automatic commencement mode, initiated by an LMR user

1. The IWF sends an IWF private call request towards the MCPTT server. The IWF private call request contains the MCPTT IDs corresponding to the calling LMR party and the called MCPTT party and an SDP offer containing one or more media types. The following parameters are also included that describe the MCPTT client's choices:

    - the encryption algorithm;

    - the encryption mode (encrypted or not);

    - an indication of whether the LMR user is requesting the floor, and if the MCPTT client is requesting the floor, location information of the calling MCPTT client may be provided;

    - requested commencement mode (automatic in this case); and

- an indication of whether the call is to be full or half duplex (whether to establish floor control).

2. The MCPTT server checks whether the MCPTT user at the MCPTT client is authorized and able to receive the private call. Because the IWF private call request is requesting automatic commencement mode, the MCPTT server also checks whether the MCPTT user at the MCPTT client is authorized to receive a call in automatic commencement mode.

3. If authorized, the MCPTT server sends the MCPTT private call request towards the MCPTT client, including the original parameters with or without the location of the calling party and offering the same media types or a subset of the media types contained in the initial received request as per 3GPP TS 23.379 [7].

4. The MCPTT client sends an MCPTT private call response to the MCPTT server indicating that the MCPTT client does support one of the requested media types. The response indicates success or failure. If the indication is failure, the response may also include one or more alternatives to the parameter values contained in step 3.

5. The MCPTT server sends the IWF private call response to the IWF offering the same media type as that sent in step 4. If the parameters returned are not acceptable to the IWF, then the call fails. If the parameters returned in the IWF private call response are different but acceptable to the IWF, then the IWF can send a new IWF private call request with the new parameters starting with step 1, which is to essentially restart the call. If there is no change of parameter, then the call proceeds to step 6.

NOTE 2: The calling LMR user may be notified of the change in parameters, for example, that the call is to be without floor control.

6. The MCPTT client has successfully established media plane for communication to the IWF and either end can transmit media. The LMR system initiating the call is responsible of granting the floor, solving competing floor requests and issuing floor revoked indications.

10.4.3 Private call setup in manual commencement mode

10.4.3.1 MCPTT user is initiating an MCPTT private call

In this procedure, an MCPTT user is initiating an MCPTT private call (manual commencement mode) for communicating with an LMR user via an IWF, with or without floor control enabled.

This subclause is based on the procedure for private call setup in manual commencement mode – MCPTT users in multiple MCPTT systems described in 3GPP TS 23.379 [7], subclause 10.7.2.3.2.

In figure 10.4.3.1-1, an MCPTT client initiates establishment of an MCPTT private call with an LMR user.

Pre-conditions:

1. The calling MCPTT user has selected manual commencement mode for the call.

2. The MCPTT client is registered to the MCPTT service, as per procedure in subclause 10.2 in 3GPP TS 23.379 [7].
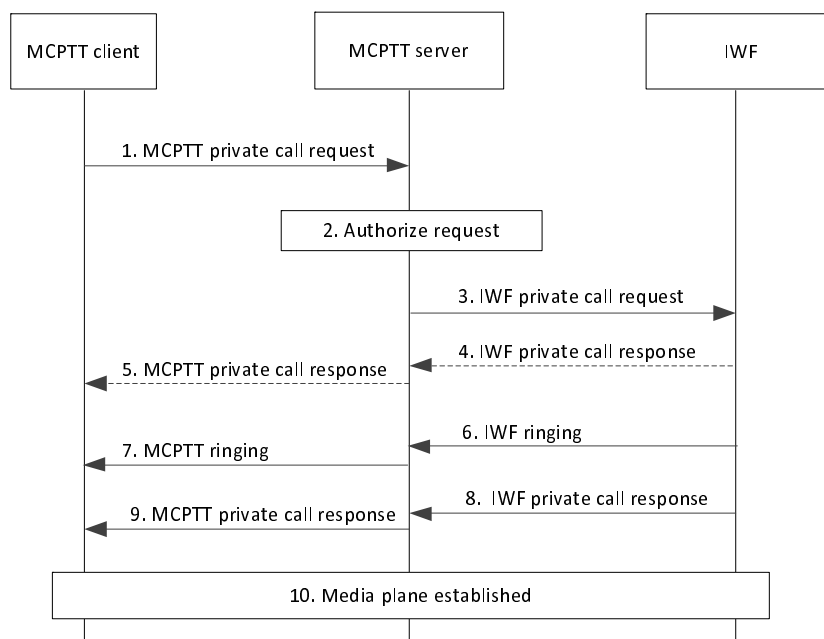
Figure 10.4.3.1-1: Private call setup in manual commencement mode – initiated by an MCPTT user

1. The MCPTT user at the MCPTT client would like to initiate an MCPTT private call. The MCPTT client sends an MCPTT private call request towards the MCPTT server. The MCPTT private call request contains the MCPTT IDs corresponding to the calling MCPTT party and called LMR party and an SDP offer containing one or more media types. The following parameters are also included that describe the MCPTT client's choices:

  - the encryption algorithm;

  - the encryption mode (encrypted or not);

  - an indication of whether the MCPTT client is requesting the floor;

  - requested commencement mode (manual in this case), and if the MCPTT client is requesting the floor, location information of the calling MCPTT client may be provided; and

  - an indication of whether the call is to be full or half duplex (whether to establish floor control).

2. The MCPTT server checks whether the MCPTT user at the MCPTT client is authorized to initiate the private call. Because the IWF private call request is requesting manual commencement mode, the MCPTT server also checks whether the MCPTT user at the MCPTT client is authorized to initiate a call in manual commencement mode. If location information was included in the MCPTT private call request, the MCPTT server also checks the privacy policy (authorisation to provide location information to other MCPTT users on a call when talking, as defined in 3GPP TS 23.379 [7] Annex A.3) of the requesting MCPTT user to decide if the user's location information may be provided to other MCPTT users on the call and the IWF.

3. If authorized, the MCPTT server sends the IWF private call request towards the IWF, including the original parameters that may or may not include location of the requestor, depending on the outcome of the privacy check, and offering the same media types or a subset of the media types contained in the initial received request as per 3GPP TS 23.379 [7].

NOTE: How the IWF private call request is forwarded to the LMR system is out of scope of the present document.

4. The IWF may report failure with an IWF private call response to the MCPTT server. The response may include one or more alternatives to the parameter values contained in step 3. If the IWF does not report failure, the process proceeds with step 6.

5. The MCPTT server forwards the MCPTT private call response to the MCPTT client. If the result parameter indicates failure, the MCPTT client may abandon the call. If the parameters in the MCPTT private call response are acceptable to the MCPTT client, then the MCPTT client can send a new MCPTT private call request with the new parameters to the MCPTT server and behaves according to those parameters. The calling user may be notified of the change in parameters, for example, that the call is to be without floor control. The calling user may choose to end the call rather than continue with the new parameters.

6. The receiving IWF sends an IWF ringing to the MCPTT server while waiting for the call to be accepted.

7. The MCPTT server forwards the MCPTT ringing to the MCPTT client. The MCPTT client may indicate to the MCPTT user that the LMR user has been notified, e.g. by producing ringback audio.

8. Once the call has been accepted by the called user, the IWF sends an IWF private call response to the MCPTT server. The IWF private call response indicates that the IWF does support one of the requested media types.

9. The MCPTT server forwards the MCPTT private call response to the MCPTT client. The MCPTT client may indicate to the MCPTT user that the call is connected, e.g. by stopping the ringback audio.

10. The MCPTT client has successfully established media plane for communication to the IWF. The MCPTT system initiating the call is responsible of granting the floor and solving the competing floor requests, and floor revoked indications.

10.4.3.2   LMR user initiating a private call with MCPTT user

In this procedure, an LMR user is initiating a private call (in manual commencement mode) for communicating with an MCPTT user via an IWF, with or without floor control enabled.

This subclause is based on the procedure for private call setup in manual commencement mode – MCPTT users in multiple MCPTT systems described in 3GPP TS 23.379 [7], subclause 10.7.2.3.2.

In figure 10.4.3.2-1, an LMR user initiates establishment of a private call with an MCPTT user.

Pre-conditions:

1. The calling LMR user has selected manual commencement mode for the call.

2. The MCPTT client is registered to the MCPTT service, as per procedure in subclause 10.2 in 3GPP TS 23.379 [7].

3. The LMR user at the LMR system has initiated a private call towards an MCPTT user.

NOTE 1: Private call operation between the LMR user and the IWF are out of scope of the present document.
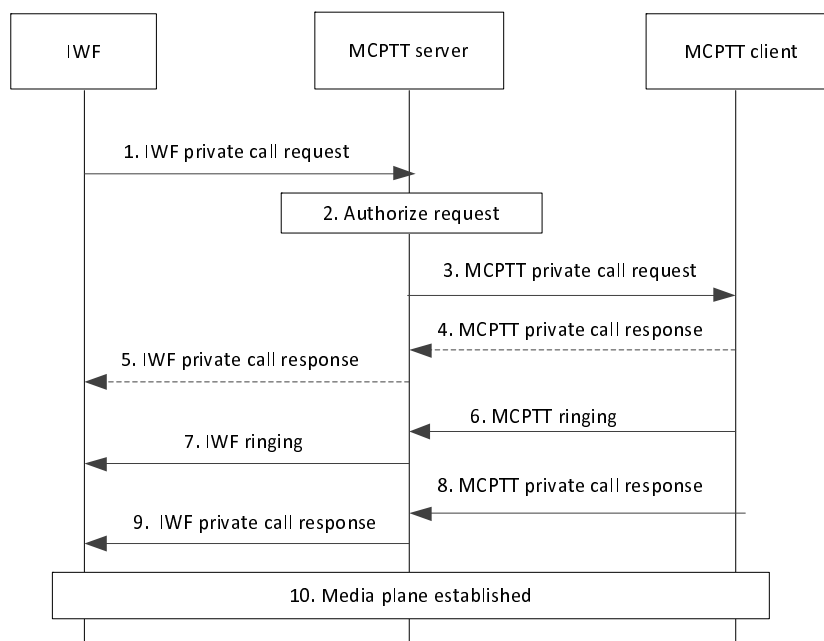
Figure 10.4.3.2-1: Private call setup in manual commencement mode, initiated by an LMR user

1. The IWF sends an IWF private call request towards the MCPTT server. The IWF private call request contains the MCPTT IDs corresponding to the calling LMR party and called MCPTT party and an SDP offer containing one or more media types. The following parameters are also included that describe the IWF's choices:

   - the encryption algorithm;

   - the encryption mode (encrypted or not)

   - an indication of whether the LMR user is requesting the floor, and if the MCPTT client is requesting the floor, location information of the calling MCPTT client may be provided;

   - requested commencement mode (manual in this case); and

   - an indication of whether the call is to be full or half duplex (whether to establish floor control).

2. The MCPTT server checks whether the MCPTT user at the MCPTT client is authorized and able to receive the private call. Because the IWF private call request is requesting manual commencement mode, the MCPTT server also checks whether the MCPTT user at the MCPTT client is authorized to receive a call in manual commencement mode.

3. If authorized, the MCPTT server sends the MCPTT private call request towards the MCPTT client, including the original parameters with or without the location of the calling party and offering the same media types or a subset of the media types contained in the initial received request as per 3GPP TS 23.379 [7].

NOTE 2: How the IWF private call request is forwarded to the LMR system is out of scope of the present document.

4. The MCPTT client may report failure with an MCPTT private call response to the MCPTT server. The response may include one or more alternatives to the parameter values contained in step 3. If the MCPTT client does not report failure, the process proceeds with step 6.

5. The MCPTT server forwards the MCPTT private call response to the IWF. If the result parameter indicates failure, the IWF may abandon the call. If the parameters in the IWF private call response are acceptable to the IWF, then the IWF can send a new IWF private call request with the new parameters to the MCPTT server and behaves according to those parameters. The IWF may choose to end the call rather than continue with the new parameters.

6. The MCPTT client sends an MCPTT ringing to the MCPTT server while waiting for the call to be accepted by the MCPTT user.

7. The MCPTT server sends an IWF ringing to IWF the while waiting for the call to be accepted.

8. Once the call has been accepted by the called user, the MCPTT client sends an MCPTT private call response to the MCPTT server. The IWF private call response indicates that the IWF does support one of the requested media types.

9. The MCPTT sends the IWF private call response to the IWF.

10. The MCPTT client has successfully established media plane for communication to the IWF. The LMR system initiating the call is responsible of granting the floor, solving competing floor requests and issuing floor revoked indications.

10.4.4   Private call release

10.4.4.1   MCPTT client initiated

The procedure describes the case where an MCPTT client requests release of an ongoing MCPTT private call (with or without floor control) that was established in either of the two commencement modes (manual or automatic). This subclause is based upon the subclauses for MCPTT private call release in 3GPP TS 23.379 [7], subclauses 10.7.2.2.3.1 and 10.7.2.3.3.

Procedures in figure 10.4.4.1-1 are the basic signalling control plane procedures for the MCPTT client initiating the release of an ongoing interworked private call.

Pre-conditions:

1. The MCPTT user on the MCPTT client is already registered for receiving MCPTT service and is involved in a private call with an LMR user via the IWF with or without floor control and established either in manual or automatic commencement mode, as described in subclause 10.4.2 and subclause 10.4.3.
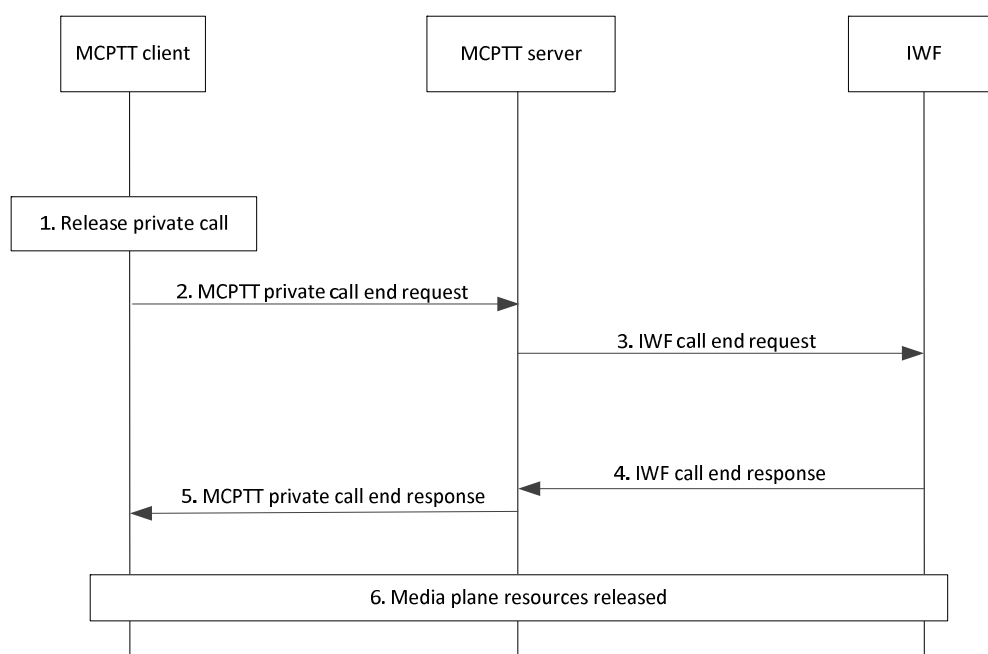
Figure 10.4.4.1-1: Private call release – client initiated

1. The user at the MCPTT client would like to release an ongoing interworked private call with the LMR user.

2. The MCPTT client sends an MCPTT private call end request towards the MCPTT server (via SIP core) for tearing down the private call with the other client.

3. The MCPTT server sends the corresponding IWF call end request towards the IWF, addressed to the MCPTT client ID specified in the original MCPTT private call end request.

NOTE: The LMR user is also notified about the release of the private call. How the LMR user is notified is outside the scope of the present document.

4. The IWF acknowledges the IWF call end request with an IWF call end response sent towards the MCPTT server.

5. After receiving the MCPTT private call end request acknowledgement from the IWF, the MCPTT server generates an acknowledgement for the MCPTT client's MCPTT private call end request.

6. The MCPTT client and the IWF release all the media plane resources used for the private call. Further, if the private call was established with floor control, floor control resources are released and the MCPTT client cannot make further requests for floor control or send media.

10.4.4.2   MCPTT server initiated

The procedure describes the case where an MCPTT server terminates an ongoing interworked private call (with or without floor control) that was established in either of the two commencement modes (manual or automatic). The conditions causing the MCPTT server to terminate the call could include expiry of the MCPTT administrator configured maximum duration for MCPTT private calls or expiry of the maximum time permitted for an MCPTT private call without transmission/reception. This subclause is based upon the subclauses for MCPTT private call release in 3GPP TS 23.379 [7], subclauses 10.7.2.2.3.2 and 10.7.2.3.3.

Procedures in figure 10.4.4.2-1 are the basic signalling control plane procedures for the MCPTT server initiating termination of an ongoing interworked private call.

Pre-conditions:

1. The MCPTT user on the MCPTT client is already registered for receiving MCPTT service and is involved in a private call with an LMR user via the IWF with or without floor control and established either in manual or automatic commencement mode, as described in subclause 10.4.2 and subclause 10.4.3.
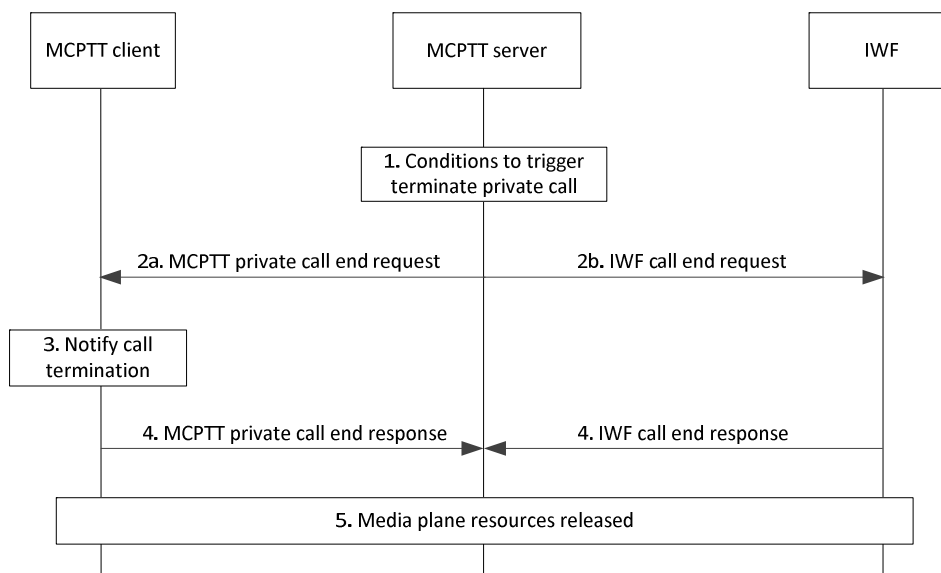
Figure 10.4.4.2-1: End private call – server initiated

1. Upon conditions to terminate call e.g., MCPTT administrator configured maximum duration for MCPTT private calls expiry or time out due to MCPTT private call without transmission/reception, the MCPTT server decides to initiate termination of an ongoing interworking private call between the MCPTT client and the LMR user.

2a. The MCPTT server sends an MCPTT private call end request towards the MCPTT client (via SIP core) for tearing down the private call.

2b. The MCPTT server sends a corresponding IWF call end request towards the MCPTT client identity associated with the LMR user

3. The MCPTT user at the MCPTT client is notified about the termination of the private call.

NOTE: The LMR user is also notified about the termination of the private call. How the LMR user is notified is outside the scope of the present document.

4. The MCPTT client and the IWF acknowledge the request.

5. The MCPTT client and the IWF release all the media plane resources used for the private call. Further, if the private call was established with floor control, floor control resources are released and the MCPTT client cannot make further requests for floor control or send media.

10.4.4.3   LMR user initiated

The procedure describes the case where either an LMR user or the LMR system is requesting to release an ongoing interworked private call (with or without floor control) and the call established in either of the two commencement modes (manual or automatic). This subclause is based upon the subclauses for MCPTT private call release in 3GPP TS 23.379 [7], subclauses 10.7.2.2.3.1 and 10.7.2.3.3.

Procedures in figure 10.4.4.3-1 are the basic signalling control plane procedures for the LMR user, via the IWF, initiating the release of an ongoing interworked private call.

Pre-conditions:

1. The MCPTT user on the MCPTT client is already registered for receiving MCPTT service and is involved in a private call with an LMR user via the IWF with or without floor control and established either in manual or automatic commencement mode, as described in subclause 10.4.2 and subclause 10.4.3.
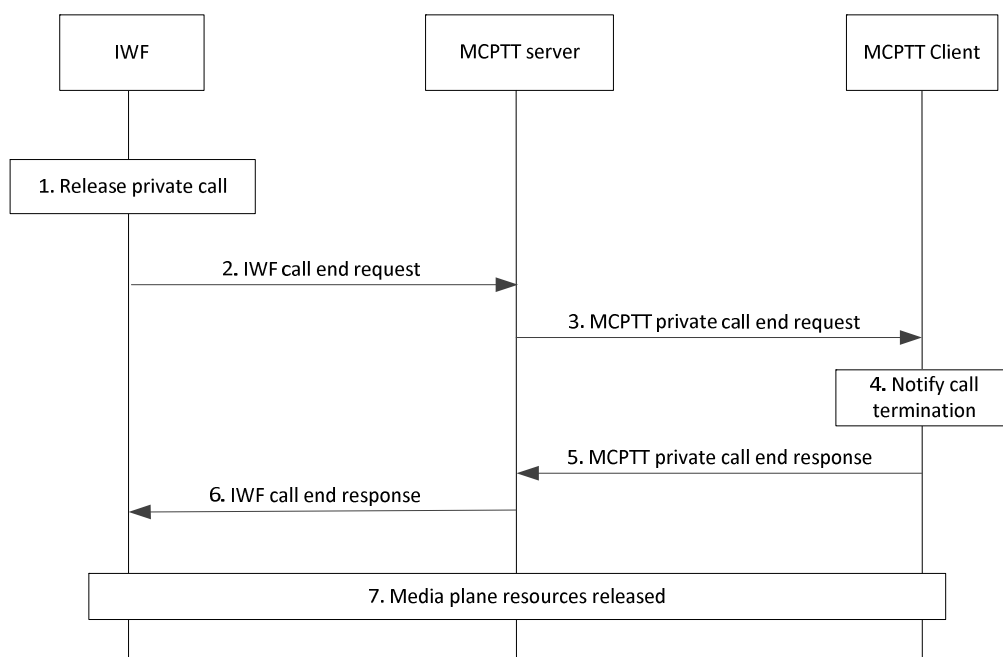
Figure 10.4.4.3-1: Private call release – IWF initiated

1. The LMR system would like to release an ongoing interworked private call with the MCPTT user.

2. The IWF sends an IWF call end request towards the MCPTT server for tearing down the private call with the MCPTT client.

3. The MCPTT server sends the corresponding MCPTT private call end request towards the MCPTT client specified in the original IWF call end request.

4. The MCPTT user is notified about the release of the private call.

5. The MCPTT client acknowledges the MCPTT private call end request.

6. After receiving the MCPTT private call end request acknowledgement from the MCPTT client, the MCPTT server generates an acknowledgement for the IWF's IWF call end request.

7. The MCPTT client and the IWF release all the media plane resources used for the private call. Further, if the private call was established with floor control, floor control resources are released and the MCPTT client cannot make further requests for floor control or send media.

10.4.5 Encryption of private calls

Private calls can use MC media encryption (see 3GPP TS 33.180 [8]) between the IWF and the MCPTT client. A private call that uses an LMR vocoder may use LMR E2EE if the calling and called parties have previously been provisioned with the appropriate LMR E2EE keys.

NOTE: MC media encryption is independent of LMR E2EE techniques. MC media encryption can be applied in addition to LMR E2EE.

10.5 Floor control

10.5.1 General

Floor control for interworking applies to both private call and group call.

Floor control involving a single MCPTT server is described in 3GPP TS 23.379 [7]. Floor control involving multiple MCPTT servers is also described in 3GPP TS 23.379 [7] in that a primary MCPTT server is interconnected to a partner MCPTT server. Subclause 10.5.2 describes information flows for floor control between an MCPTT server and an IWF, and are based on those defined for interconnection in 3GPP TS 23.379 [7]. Subclause 10.5.3 describes aspects of floor control that apply to interworking groups and interworking private calls. Subclauses 10.5.4/10.5.6 and 10.5.5/10.5.7 describe general cases of floor control on an interworking group defined in the LMR system and in the MCPTT system respectively, where the partner system has been configured to apply/not apply local filtering of floor control requests before communicating with the primary system. Subclauses 10.5.9 and 10.5.10 describe general cases of floor control in a private call, where the controlling role is taken by the LMR system and the MCPTT system respectively.

10.5.2 Information flows for floor control

10.5.2.1 General

The following sections describe information flows for interworking floor control.

In the following information flows the MCPTT ID represents the LMR user, the IWF, or the MCPTT user depending on the interworking methods being used and the message source/destination.

10.5.2.2 IWF floor request

Table 10.5.2.2-1 describes the information flow IWF floor request, from the IWF to the MCPTT floor control server and from the MCPTT floor control server to the IWF, which is used to request the floor for media transfer.

Table 10.5.2.2-1: IWF floor request

Information element	Status	Description
MCPTT ID	M	Requester identity
Floor priority	M	Priority of the request
Source identifier	O	Identifies the communication, e.g. by identifying the media flow within a media multiplex, present only if media multiplexing
Location	O	Location information of requester

10.5.2.3   IWF floor granted

Table 10.5.2.3-1 describes the information flow IWF floor granted, from the IWF to the MCPTT floor control server and from the MCPTT floor control server to the IWF, which is used to indicate that a request for floor is granted and media transfer is possible.

Table 10.5.2.3-1: IWF floor granted

Information element	Status	Description
MCPTT ID	M	Granted party identity
Duration	M	The time for which the granted party is allowed to transmit
Source identifier	O	Identifies the communication, e.g. by identifying the media flow within a media multiplex, present only if media multiplexing
Acknowledgement required	O	Indicates if acknowledgement from the floor participant is required

10.5.2.4   IWF floor rejected

Table 10.5.2.4-1 describes the information flow IWF floor rejected, from the IWF to the MCPTT floor control server and from the MCPTT floor control server to the IWF, which is used to indicate that a request for the floor is rejected.

Table 10.5.2.4-1: IWF floor rejected

Information element	Status	Description
MCPTT ID	M	Rejected party identity
Source identifier	O	Identifies the communication, e.g. by identifying the media flow within a media multiplex, present only if media multiplexing
Rejection cause	O	Indicates the cause for floor rejection
Acknowledgement required	O	Indicates if acknowledgement from the floor participant is required

10.5.2.5   IWF floor request cancel

Table 10.5.2.5-1 describes the information flow IWF floor request cancel, from the IWF to the MCPTT floor control server and from the MCPTT floor control server to the IWF, which is used to request cancelling the floor request from the floor request queue.

Table 10.5.2.5-1: IWF floor request cancel

Information element	Status	Description
MCPTT ID	M	Identity for the requester
List of MCPTT IDs	M	Target identity (Identities) whose floor request is to be cancelled
Source identifier	O	Identifies the communication, e.g. by identifying the media flow within a media multiplex, present only if media multiplexing

10.5.2.6   IWF floor request cancel response

Table 10.5.2.6-1 describes the information flow IWF floor request cancel response, from the IWF to the MCPTT floor control server and from the MCPTT floor control server to the IWF, which is used to indicate the response for the floor request cancellation.

Table 10.5.2.6-1: IWF floor request cancel response

Information element	Status	Description
MCPTT ID	M	Identity of party that initiated the cancellation request
Source identifier	O	Identifies the communication, e.g. by identifying the media flow within a media multiplex, present only if media multiplexing
Acknowledgement required	O	Indicates if acknowledgement from the floor participant is required

10.5.2.7 IWF floor request cancel notify

Table 10.5.2.7-1 describes the information flow IWF floor request cancel notify, from the IWF to the MCPTT floor control server and from the MCPTT floor control server to the IWF, which is used to indicate the floor request is cancelled by the administrator/floor control server.

Table 10.5.2.7-1: IWF floor request cancel notify

Information element	Status	Description
MCPTT ID	M	Identity of the administrator
Source identifier	O	Identifies the communication, e.g. by identifying the media flow within a media multiplex, present only if media multiplexing
Acknowledgement required	O	Indicates if acknowledgement from the floor participant is required

10.5.2.8 IWF floor idle

Table 10.5.2.8-1 describes the information flow IWF floor idle, from the IWF to the MCPTT floor control server and from the MCPTT floor control server to the IWF, which is used to indicate that a session is in idle status, i.e. the floor is not granted to any party.

Table 10.5.2.8-1: IWF floor idle

Information element	Status	Description
Source identifier	O	Identifies the communication, e.g. by identifying the media flow within a media multiplex, present only if media multiplexing
Acknowledgement required	O	Indicates if acknowledgement from the floor participant is required

10.5.2.9 IWF floor release

Table 10.5.2.9-1 describes the information flow IWF floor release, from the IWF to the MCPTT floor control server and from the MCPTT floor control server to the IWF, which is used to indicate the media transfer is completed and the floor is released.

Table 10.5.2.9-1: IWF floor release

Information element	Status	Description
MCPTT ID	M	Identity of party that released the floor
Source identifier	O	Identifies the communication, e.g. by identifying the media flow within a media multiplex, present only if media multiplexing

10.5.2.10   IWF floor taken

Table 10.5.2.10-1 describes the information flow IWF floor taken, from the IWF to the MCPTT floor control server and from the MCPTT floor control server to the IWF, which is used to indicate the floor is granted to another MCPTT user.

Table 10.5.2.10-1: IWF floor taken

Information element	Status	Description
MCPTT ID	M	Identity for the granted party
Source identifier	O	Identifies the communication, e.g. by identifying the media flow within a media multiplex, present only if media multiplexing
Permission to request the floor	O	Indicates whether receiving parties are allowed to request the floor or not (e.g. broadcast call).
Acknowledgement required	O	Indicates if acknowledgement from the floor participant is required
Location	O	Location information of the granted party

10.5.2.11   IWF floor revoked

Table 10.5.2.11-1 describes the information flow IWF floor revoked, from the IWF to the MCPTT floor control server and from the MCPTT floor control server to the IWF, which is used to indicate the floor is revoked from its current holder (the floor participant who was granted the floor).

Table 10.5.2.11-1: IWF floor revoked

Information element	Status	Description
MCPTT ID	M	Revoked party identity
Source identifier	O	Identifies the communication, e.g. by identifying the media flow within a media multiplex, present only if media multiplexing
Acknowledgement required	O	Indicates if acknowledgement from the floor participant is required

10.5.2.12   IWF floor acknowledgement

Table 10.5.2.12-1 describes the information flow IWF floor acknowledgement, from the IWF to the MCPTT floor control server and from the MCPTT floor control server to the IWF, which is used to provide an acknowledgement if the acknowledgement is required in the received floor control message.

NOTE: The floor acknowledgement flow can be sent by the floor control server after each floor control information flow that includes an indication that an acknowledgement is required.

Table 10.5.2.12-1: IWF floor acknowledgement

Information element	Status	Description
MCPTT ID	M	Identity of the sender.

10.5.2.13   IWF queue position request

Table 10.5.2.13-1 describes the information flow IWF queue position request, from the IWF to the MCPTT floor control server and from the MCPTT floor control server to the IWF, which is used to request the position in the floor request queue. The MCPTT server and the MCPTT client that support queuing of the floor control requests shall support this information flow.

Table 10.5.2.13-1: IWF queue position request

Information element	Status	Description
MCPTT ID	M	Identity of party whose floor position is requested
Source identifier	O	Identifies the communication, e.g. by identifying the media flow within a media multiplex, present only if media multiplexing

10.5.2.14   IWF queue position info

Table 10.5.2.14-1 describes the information flow IWF queue position info, from the IWF to the MCPTT floor control server and from the MCPTT floor control server to the IWF, which is used to indicate the floor request is queued and the queue position to the floor requesting UE.

Table 10.5.2.14-1: IWF queue position info

Information element	Status	Description
MCPTT ID	M	Identity of party whose floor position is provided
Queue position info	M	Position of the queued floor request in the queue
Source identifier	O	Identifies the communication, e.g. by identifying the media flow within a media multiplex, present only if media multiplexing
Acknowledgement required	O	Indicates if acknowledgement from the floor participant is required

10.5.2.15   IWF unicast media stop request

Table 10.5.2.15-1 describes the information flow IWF unicast media stop request, from the IWF to the MCPTT floor control server and from the MCPTT floor control server to the IWF, which is used to indicate that the unicast media flow of the designated communication does not need to be sent to the client indicated by the MCPTT ID.

Table 10.5.2.15-1: IWF unicast media stop request

Information element	Status	Description
MCPTT ID	M	Identity of the requester
Source identifier	O	Identifies the communication whose media flow is to be stopped, e.g. by identifying the media flow within a media multiplex, present only if media multiplexing

10.5.2.16   IWF unicast media resume request

Table 10.5.2.16-1 describes the information flow IWF unicast media resume request, from the IWF to the MCPTT floor control server and from the MCPTT floor control server to the IWF, which is used by the floor control server to request that the unicast media flow of the designated communication is to be sent to the client indicated by the MCPTT ID.

Table 10.5.2.16-1: IWF unicast media resume request

Information element	Status	Description
MCPTT ID	M	Identity of the requester
Source identifier	O	Identifies the communication whose media flow is to be resumed, e.g. by identifying the media flow within a media multiplex, present only if media multiplexing

10.5.2.17   IWF floor talker ID update

Table 10.5.2.17-1 describes the information flow IWF floor talker ID update, from the IWF to the MCPTT floor control server and from the MCPTT floor control server to the IWF, which is used to indicate that the talker ID has changed for the current MCPTT user granted the floor.

Table 10.5.2.17-1: IWF floor talker ID update

Information element	Status	Description
MCPTT ID	M	Identity for the party using the floor
Source identifier	O	Identifies the communication, e.g. by identifying the media flow within a media multiplex, present only if media multiplexing

10.5.3   Interworking floor control

3GPP TS 23.379 [7], subclause 10.9.1.4.1 describes floor control involving groups in multiple MCPTT systems where floor control arbitration resides with the primary MCPTT server and all floor control messages are routed to that primary MCPTT server. The group is homed on the primary MCPTT server.

An interworking group can be homed on the MCPTT server or on the LMR system. When the group is homed on the MCPTT server the floor control server is on this MCPTT server. When the group is homed on the LMR system the floor control server is represented by the IWF.

The primary MCPTT system of an MCPTT group is defined by configuration and identified by the MC service group ID.

3GPP TS 23.379 [7], subclause 10.9.1.4.2 describes floor control involving groups in multiple MCPTT systems where the partner MCPTT system filters its MCPTT users' floor requests before communicating with the floor control server of the primary MCPTT system. When an MCPTT system is interworking with an IWF, depending on where the group is homed the MCPTT server, or the IWF can filter floor control requests in the same way as an interconnected MCPTT system.

In a private call, one of the IWF or MCPTT server acts as the controlling floor control server within the call, and manages arbitration of floor control requests received from both users in the call. The entity (MCPTT server or IWF) that does not fulfil the controlling role shall send all floor control requests from its served call participant to the controlling floor control server without filtering.

NOTE: Allocation of controlling floor control server functionality to the MCPTT server or IWF may be according to the system within which the call originated, or by some other means.

10.5.4   Floor override without using floor revoked on an interworking group

This procedure describes the case where a transmitting radio cannot be signalled that the floor has been taken or revoked. Within the context of interworking between MCPTT and LMR systems, this condition can occur due to both MCPTT and LMR users obtaining the floor simultaneously, or the floor granted to an LMR user is taken by an MCPTT user.

Figure 10.5.4-1 shows the high-level procedure where an MCPTT session is already established between the floor participants (with floor granted to an LMR user represented by the IWF) and the floor control server (with an override based on priority and configured to permit the transmission of overridden floor participant from the IWF). The group is defined in the MCPTT system and the MCPTT Server is the floor control server. Only two UEs involved in the session are shown for simplicity.

Pre-conditions:

1. The MCPTT floor control server has been configured to support override.

2. The override supported in this case permits both the overridden floor participant and the overriding floor participant to be transmitting.

3. An MCPTT session is established between an MCPTT client, the interworked system, and MCPTT server.

4. Session is ongoing.
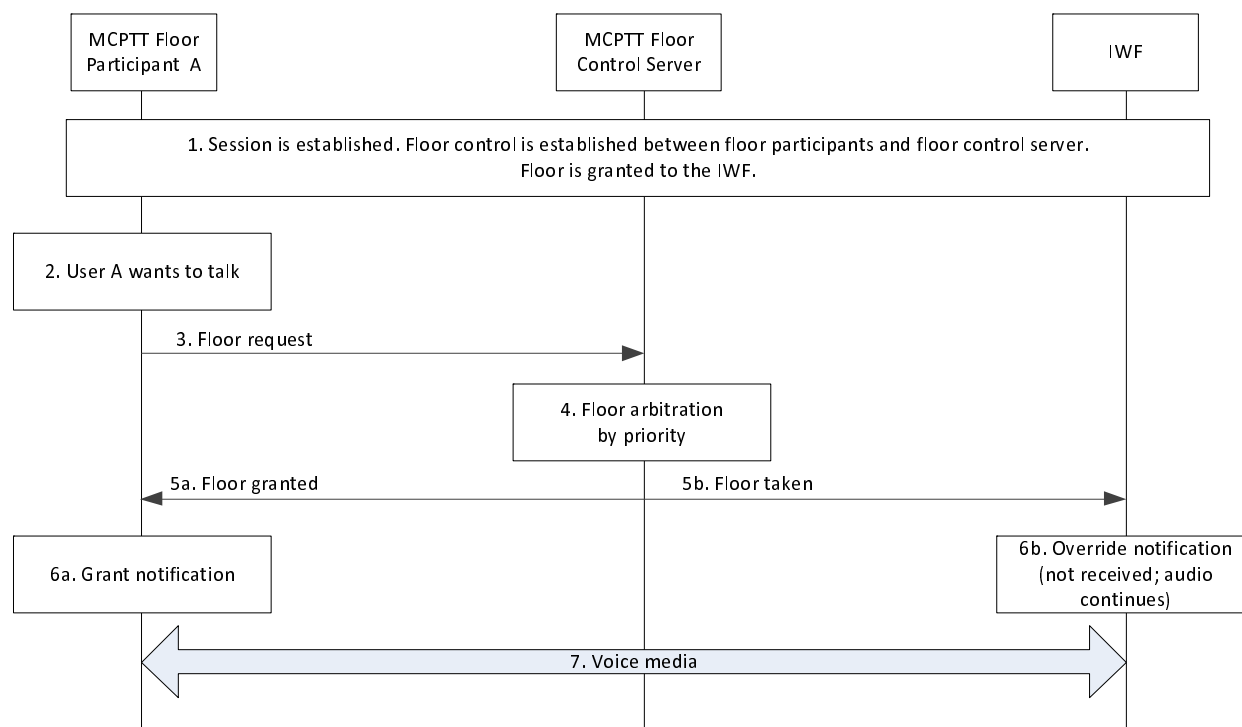
Figure 10.5.4-1: Floor override (overridden continues to transmit) during an interworking session

1. It is assumed that the floor participant B (represented by the IWF in figure 10.5.4-1) has been given the floor and is transmitting voice media.

2. Floor participant A, having a floor priority which is relatively higher than that of floor participant B, wants to send voice media over the session.

3. Floor participant A sends a floor request message to the floor control server.

4. The floor control server determines to accept the floor request from floor participant A based on arbitration result e.g., according to the floor priority information that is received in the floor request message.

5a. Floor control server responds with a floor granted message to floor participant A.

5b. Floor control server sends a floor taken message to the other floor participants (via the IWF). Floor participant B continues transmitting the (overridden) voice media transmission.

NOTE 1:   All other floor participants (not shown) that are part of this group call receive a floor taken message, so that the other floor participants learn who the newly granted talker (overriding) is.

6a. The floor granted causes the user of floor participant A to be notified.

6b. Floor participant B cannot be notified of the status because it is unable to receive the message and continues transmitting.

7. Floor participant A (overriding) starts sending voice media over the session established beforehand.

NOTE 2:   Floor participant B is still sending voice (overridden). The list of floor participants that receive the overriding, overridden, or both transmissions is based on configuration.

NOTE 3:   When floor participant A stops transmitting, if floor participant B is still sending voice, then the floor is granted back to floor participant B and audio is routed to all current floor participants.

10.5.5   Floor control on an interworking group homed in the LMR system

Figure 10.5.5-1 shows the procedure for floor control on an interworking group homed in the LMR system. Simultaneous floor requests are included to show various aspects of interworking floor control.

Pre-conditions:

1. The interworking group is homed in the LMR system.

2. The MCPTT server is configured to locally filter competing floor control requests before communicating with the IWF.

3. MCPTT client 1, MCPTT client 2, and LMR users (represented by the IWF) are affiliated to that group.

4. An interworking group call is ongoing involving MCPTT users and LMR users (represented by the IWF). The floor is currently idle.
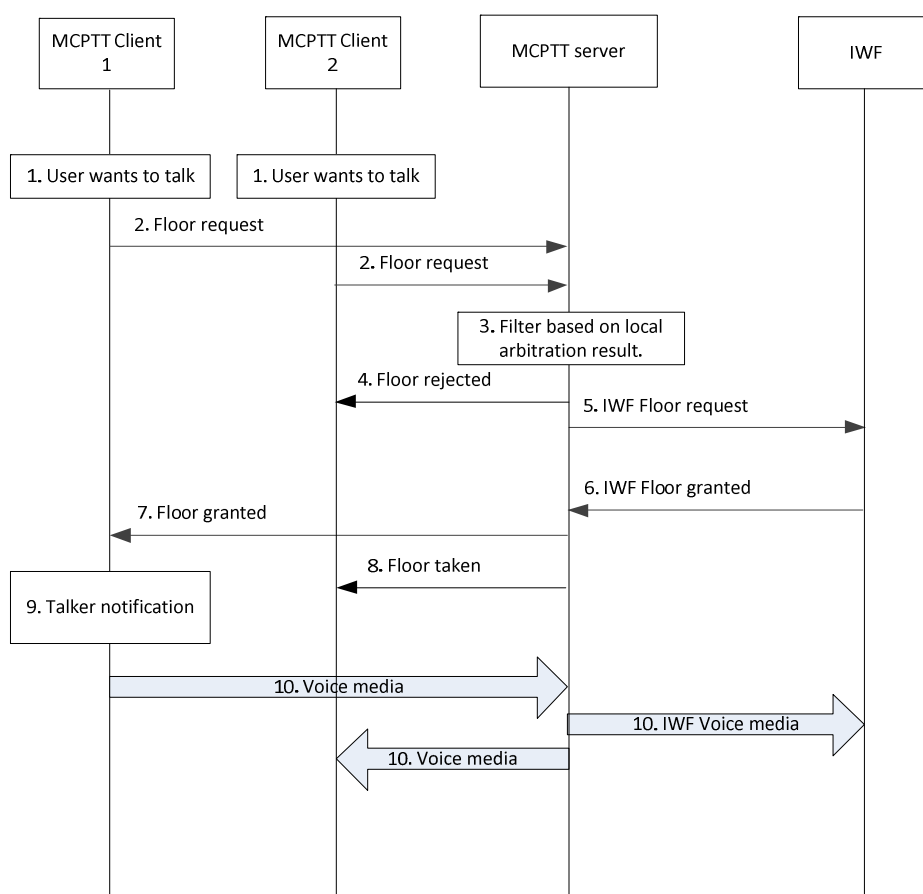
Figure 10.5.5-1: Floor control on a group homed in the LMR system

1. The users of MCPTT Client 1 and MCPTT Client 2 both want to send voice media over the session.

2. MCPTT Clients 1 and 2 send floor request messages to the floor control server.

3. The MCPTT floor control server determines to accept the floor request from MCPTT Client 1 based on local arbitration results (e.g., according to priority information versus the competing request from MCPTT client 2).

4. The user of MCPTT client 2 is notified that their floor request was rejected.

5. Since the group is homed in the LMR system the MCPTT floor control server forwards the floor request to the IWF for final floor control determination. The IWF performs floor arbitration in conjunction with the LMR system (not shown). The IWF determines that the floor can be granted to the MCPTT user.

6. The IWF sends a floor granted message to the MCPTT floor control server.

7. The MCPTT floor control server sends a floor granted message to MCPTT client 1.

8. The MCPTT floor control server sends a floor taken message to MCPTT client 2 to notify the user of who is granted the floor.

9. MCPTT Client 1 notifies the user that he/she has been granted the floor and may begin speaking.

10. MCPTT Client 1 begins sending voice media over the established session. The media is distributed to affiliated group members including the IWF.

10.5.6   Floor control on an interworking group homed in the MCPTT system

Figure 10.5.6-1 shows the procedure for floor control on an interworking group homed in the MCPTT system, and the LMR system is configured for local floor control request filtering. Simultaneous floor requests are included to show various aspects of interworking floor control.

Pre-conditions:

1. The interworking group is homed in the MCPTT system.

2. The interworking group is previously defined on the group management server.

3. MCPTT client 1, MCPTT client 2, and LMR users (represented by the IWF) are affiliated to that group.

4. An interworking group call is ongoing involving MCPTT users and LMR users (represented by the IWF). The floor is currently idle.
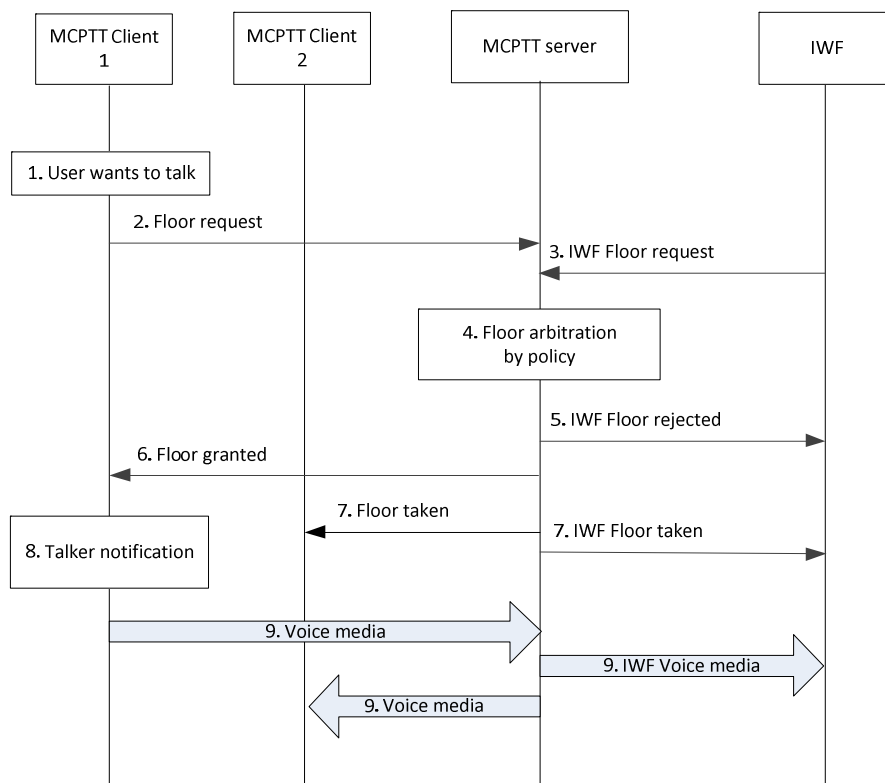
Figure 10.5.6-1: Floor control on a group homed in the MCPTT system

1. The user of MCPTT Client 1 wants to send voice media over the session. At the same time a user in the LMR system (represented by the IWF) wants to also send voice media over the session.

2. MCPTT Client 1 sends a floor request message to the MCPTT floor control server.

3. The IWF sends a floor request message to the MCPTT floor control server.

NOTE: If multiple LMR users want to speak, it is assumed that the LMR system has arbitrated these requests based on local policies and only presents one floor request to the MCPTT system.

4. Since the group is homed in the MCPTT system the MCPTT floor control server performs final floor control determination. In this case the MCPTT floor control server determines to accept the floor request from MCPTT Client 1 based on local policy and arbitration results (e.g., according to time of arrival of the request versus the competing request from the IWF).

5. The IWF is notified that its floor request was rejected.

6. The MCPTT floor control server sends a floor granted message to MCPTT client 1.

7. The MCPTT floor control server sends a floor taken message to both MCPTT client 2 and the IWF to inform them of who is granted the floor.

8. MCPTT Client 1 notifies the user that he/she has been granted the floor and may begin speaking.

9. MCPTT Client 1 begins sending voice media over the established session. The media is distributed to affiliated group members including the IWF.

10.5.7 Floor control without local filtering on an interworking group defined in the LMR system

Figure 10.5.7-1 shows the procedure for floor control on an interworking group defined in the LMR system where local filtering is not performed by the MCPTT server. Simultaneous floor requests are included to show various aspects of interworking floor control.

Pre-conditions:

1. The interworking group is defined in the LMR system.

2. The MCPTT system is configured to send competing floor control requests to the LMR system (represented by the IWF) for floor control arbitration.

3. MCPTT client 1, MCPTT client 2, and LMR users are affiliated to that group.

4. An interworking group call is ongoing involving MCPTT users and LMR users. The floor is currently idle.
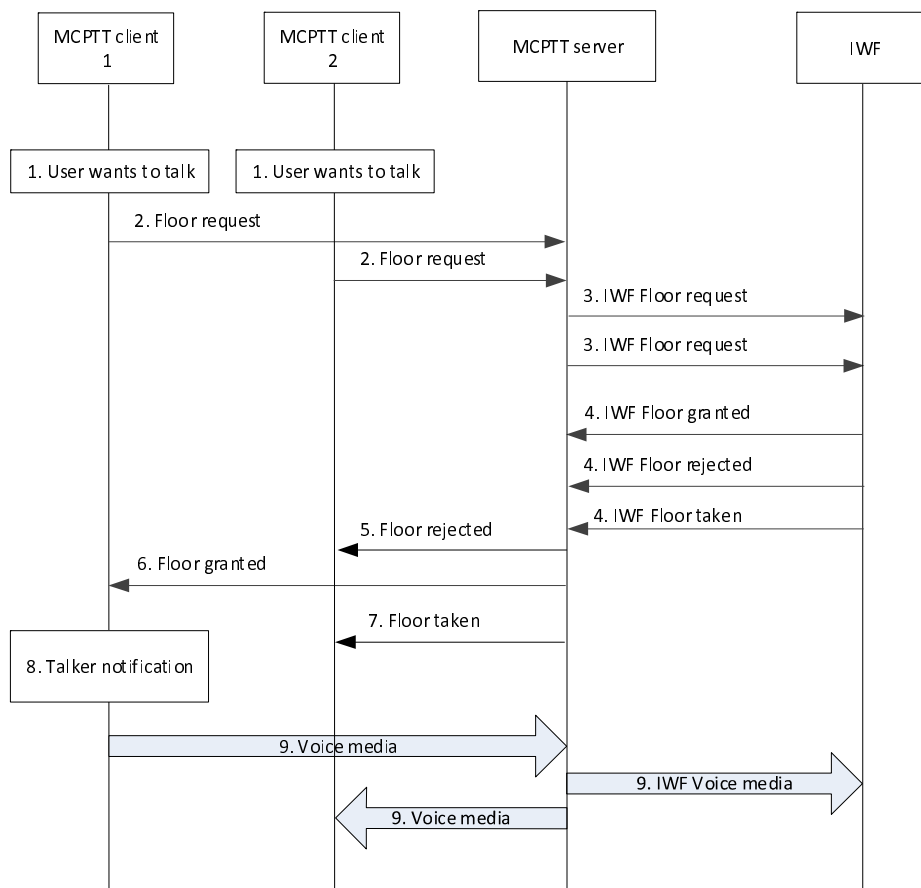
Figure 10.5.7-1: Floor control without local filtering on a group defined in the LMR system

1. The users of MCPTT client 1 and MCPTT client 2 both want to send voice media over the session.

2. MCPTT clients 1 and 2 send floor request messages to the MCPTT floor control server.

3. Since the group is defined in the LMR system the MCPTT floor control server forwards these floor requests to the IWF for final floor control determination. The IWF performs floor arbitration in conjunction with the LMR system (not shown). The IWF determines that the floor can be granted to MCPTT client 1.

4. The IWF sends an IWF floor granted message for MCPTT client 1, an IWF floor rejected message for MCPTT client 2, and an IWF floor taken message for MCPTT client 2 to the MCPTT floor control server.

NOTE: If other MCPTT clients are affiliated to this group, the IWF sends an IWF floor taken message to the MCPTT floor control server for each one of them.

5. The MCPTT floor control server sends a Floor rejected message to MCPTT client 2 to notify the user that his/her floor request was rejected.

6. The MCPTT floor control server sends a Floor granted message to MCPTT client 1.

7. The MCPTT floor control server sends a Floor taken message to MCPTT client 2 to notify the user of who is granted the floor.

8. MCPTT client 1 notifies the user that he/she has been granted the floor and may begin speaking.

9. MCPTT client 1 begins sending voice media over the established session. The media is distributed to affiliated group members including the IWF.

10.5.8 Floor control without local filtering on an interworking group defined in the MCPTT system

Figure 10.5.8-1 shows the procedure for floor control on an interworking group defined in the MCPTT system where local filtering is not performed by the LMR system. Simultaneous floor requests are included to show various aspects of interworking floor control.

Pre-conditions:

1. The interworking group is defined in the MCPTT system.

2. MCPTT client 1, MCPTT client 2, and LMR users are affiliated to that group.

3. The LMR system (represented by the IWF) is configured to send all competing floor control requests to the MCPTT system for floor control arbitration.

4. The IWF is not affiliating on behalf of LMR users. All LMR group affiliations are passed through the IWF to the MCPTT server.

5. An interworking group call is ongoing involving MCPTT users and LMR users. The floor is currently idle.
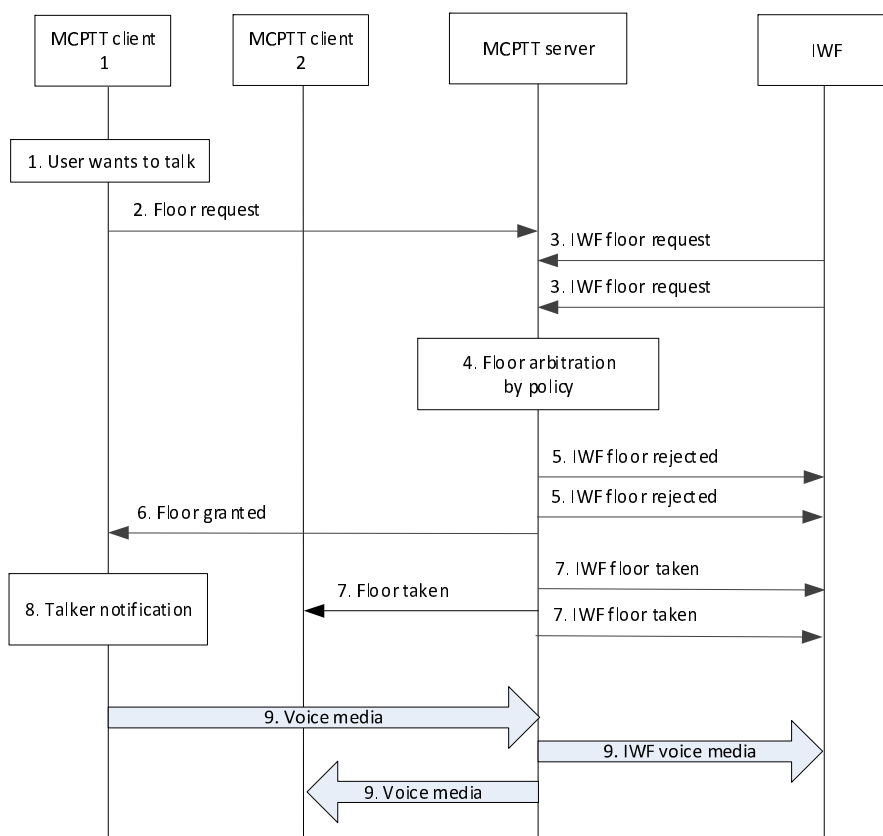
Figure 10.5.8-1: Floor control without local filtering on a group defined in the MCPTT system

1. The user of MCPTT client 1 wants to send voice media over the session. At the same time multiple users in the LMR system (represented by the IWF) want to also send voice media over the session.

2. MCPTT client 1 sends a floor request message to the MCPTT floor control server.

3. The IWF sends floor request messages to the MCPTT floor control server for each LMR user requesting the floor. In this case two LMR users are requesting the floor. These floor requests contain the MCPTT ID of the LMR user (converted by the IWF).

4. Since the group is defined in the MCPTT system the MCPTT floor control server performs final floor control determination. In this case the MCPTT floor control server determines to accept the floor request from MCPTT client 1 based on local policy and arbitration results (e.g., according to priority of the request versus the competing requests from the IWF).

5. The IWF is notified that its floor requests were rejected. The MCPTT floor control server sends an IWF floor rejected message to the IWF for each floor request.

6. The MCPTT floor control server sends a floor granted message to MCPTT client 1.

7. The MCPTT floor control server sends floor taken messages to MCPTT client 2 and the IWF to inform them of who is granted the floor. In this case a floor taken message is sent to the IWF corresponding to each affiliated LMR user.

NOTE: If the IWF has affiliated to this group on behalf of the group's LMR users, only one IWF floor taken message is sent to the IWF.

8. MCPTT client 1 notifies the user that he/she has been granted the floor and may begin speaking.

9. MCPTT client 1 begins sending voice media over the established session. The media is distributed to affiliated group members including the LMR users.

10.5.9 Floor control in private call controlled by the LMR system

Figure 10.5.9-1 shows a procedure for a private call with floor control where the LMR system controls the floor. A request for transmission by the MCPTT user while the LMR user has the floor is rejected by the IWF, to show various aspects of interworking floor control.

Pre-conditions:

1. A private call has been set up between an LMR user and MCPTT client 1.

2. The LMR system is controlling the floor, via the IWF.

3. MCPTT client 1 has the floor.
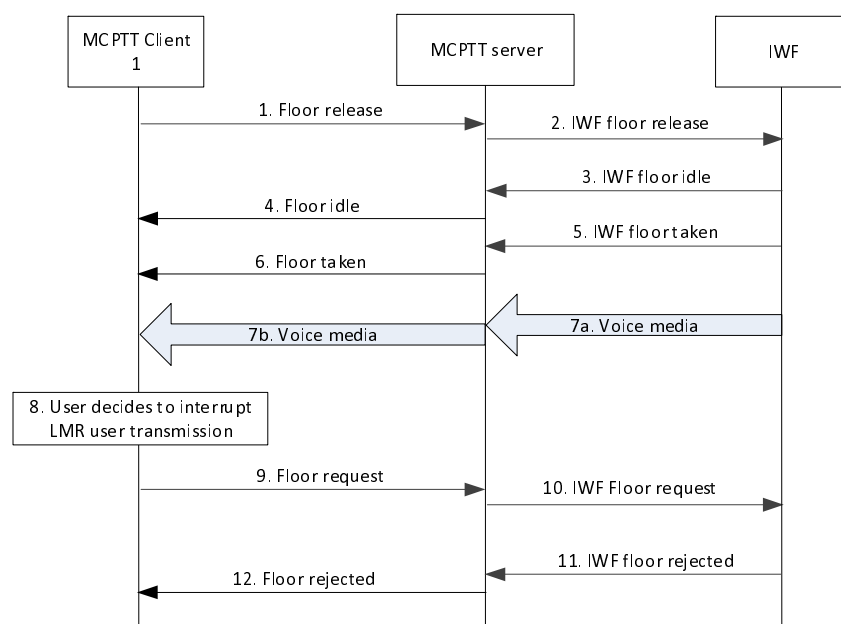
Figure 10.5.9-1: Floor control with control by the LMR system

1. The user of MCPTT Client 1 finishes transmission and MCPTT client 1 releases the floor.

2. The MCPTT server informs the IWF of the floor release.

3. The IWF indicates that the floor is now idle.

4. MCPTT client 1 is informed that the floor is idle.

5. The IWF indicates that the floor has been taken by the LMR user.

6. The MCPTT server informs MCPTT client 1 that the floor has been taken by the LMR user.

7. Media flows from the LMR user to the IWF (7a) and on to MCPTT client 1 (7b).

8. The user of MCPTT client 1 decides to interrupt the transmission from the LMR user.

9. MCPTT Client 1 sends a floor request with an appropriate priority to request interruption of the transmission from the LMR user.

10. The MCPTT server forwards the floor request to the IWF.

11. The LMR system rejects the request, and the IWF informs the MCPTT server of the rejection.

NOTE: The reason that the request is rejected is outside the scope of the present document.

12. The MCPTT server informs MCPTT client 1 that the request for interruption has been rejected.

10.5.10   Floor control in private call controlled by the MCPTT system

Figure 10.5.10-1 shows a procedure for a private call with floor control where the MCPTT system controls the floor. A request for transmission by the LMR user while the MCPTT user has the floor is accepted by the MCPTT server, to show various aspects of interworking floor control.

Pre-conditions:

1. A private call has been set up between the LMR user and MCPTT client 1.

2. The MCPTT server is controlling the floor.

3. The floor is idle.
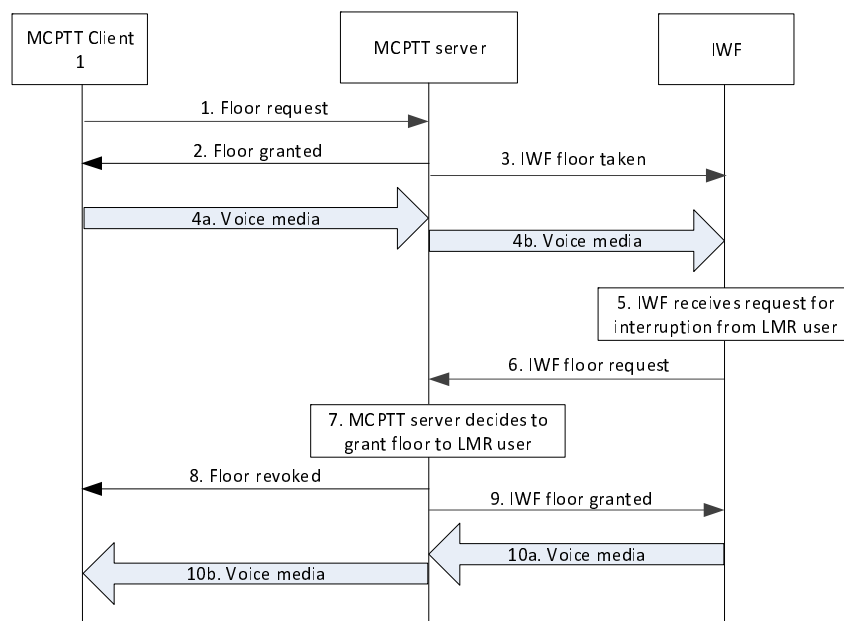
Figure 10.5.10-1: Floor control with control by the MCPTT system

1. MCPTT Client 1 requests the floor.

2. The MCPTT server grants the floor to MCPTT Client 1.

3. The MCPTT server informs the IWF that the floor has been granted to MCPTT client 1.

NOTE 1: Step 3 may occur before or after step 2.

4. MCPTT client 1 sends voice media to the MCPTT server (4a) which forwards the voice media to the IWF (4b).

5. The LMR user decides to interrupt the transmission from MCPTT client 1, and the IWF is informed.

6. The IWF sends a floor request to the MCPTT server with sufficient priority to interrupt MCPTT client 1.

7. The MCPTT server decides to allow the interruption from the LMR user, based on the priority of the request and on configuration.

8. The MCPTT server informs MCPTT Client 1 that the transmission permission has been revoked.

9. The floor is granted to the LMR user via the IWF.

NOTE 2: Step 9 may occur before or after step 8.

10. Voice media is sent from the LMR user via the IWF to the MCPTT server (10a) and on to MCPTT client 1 (10b).

10.6 Emergency and imminent peril

10.6.1 Information flows for emergency and imminent peril

10.6.1.1 IWF emergency group call request

Table 10.6.1.1-1 describes the information flow IWF emergency group call request from the IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.6.1.1-1: IWF emergency group call request information elements

Information Element	Status	Description
MCPTT ID	M	The identity of the calling party
MCPTT group ID	M	The MCPTT group ID on which the call is to be conducted
Emergency indicator	M	Indicates that the group call request is an MCPTT emergency call
Alert indicator	O	May be used to indicate that an emergency alert is to be sent
Location	O	Location, if available
Implicit floor request (see NOTE)	O	Indicates that the originating client requests the floor
NOTE: This element shall be included only when the originating client requests the floor.		

10.6.1.2 IWF emergency group call response

Table 10.6.1.2-1 describes the information flow IWF emergency group call response from the MCPTT server to the IWF and from the IWF to the MCPTT server.

Table 10.6.1.2-1: IWF emergency group call response information elements

Information Element	Status	Description
MCPTT ID	M	The identity of the calling party
MCPTT group ID	M	The MCPTT group ID on which the call is to be conducted
Result	M	The IWF emergency group call request may be rejected.

10.6.1.3 IWF imminent peril group call request

Table 10.6.1.3-1 describes the information flow IWF imminent peril group call request from the IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.6.1.3-1: IWF imminent peril group call request information elements

Information Element	Status	Description
MCPTT ID	M	The identity of the calling party
MCPTT group ID	M	The MCPTT group ID on which the call is to be conducted
Imminent peril indicator	M	Indicates that the group call request is an imminent peril call
Location	O	Location, if available
Implicit floor request (see NOTE)	O	Indicates that the originating client requests the floor
NOTE: This element shall be included only when this information flow is from the client to the server and the originator requests the floor.		

10.6.1.4 IWF imminent peril group call response

Table 10.6.1.4-1 describes the information flow IWF imminent peril group call response from the IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.6.1.4-1: IWF imminent peril group call response information elements

Information Element	Status	Description
MCPTT ID	M	The identity of the calling party
MCPTT group ID	M	The MCPTT group ID on which the call is to be conducted
Result	M	The IWF imminent peril group call request may be rejected.

10.6.1.5 IWF in-progress imminent peril group state cancel request

Table 10.6.1.5-1 describes the information flow IWF in-progress imminent peril group state cancel request from the MCPTT server to the IWF.

Table 10.6.1.5-1: IWF in-progress imminent peril group state cancel request information elements

Information Element	Status	Description
MCPTT ID	M	The identity of the cancelling party
MCPTT group ID	M	The MCPTT group ID on which the in-progress imminent peril state is to be cancelled

10.6.1.6 IWF in-progress imminent peril group state cancel response

Table 10.6.1.6-1 describes the information flow IWF in-progress imminent peril group state cancel response from the IWF to the MCPTT server.

Table 10.6.1.6-1: IWF in-progress imminent peril group state cancel response information elements

Information Element	Status	Description
MCPTT ID	M	The identity of the cancelling party
MCPTT group ID	M	The MCPTT group ID on which the in-progress imminent peril state is to be cancelled

10.6.1.7 IWF emergency alert request

Table 10.6.1.7-1 describes the information flow IWF emergency alert request from the IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.6.1.7-1: IWF emergency alert request information elements

Information Element	Status	Description
MCPTT ID	M	The identity of the alerting party
MCPTT group ID	M	The MCPTT group ID with which the alert is associated
Organization name	O	The alerting MCPTT user's mission critical organization name.
Location	O	The alerting MCPTT client's location

10.6.1.8 IWF emergency alert response

Table 10.6.1.8-1 describes the information flow IWF emergency alert response from the IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.6.1.8-1: IWF emergency alert response information elements

Information Element	Status	Description
MCPTT ID	M	The identity of the alerting party
MCPTT group ID	M	The MCPTT group ID with which the alert is associated

10.6.1.9 IWF emergency alert cancel request

Table 10.6.1.9-1 describes the information flow IWF emergency alert cancel request from the IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.6.1.9-1: IWF emergency alert cancel request information elements

Information Element	Status	Description
MCPTT ID	M	MCPTT user identity of the cancelling party
MCPTT ID (see NOTE)	O	MCPTT user identity whose emergency alert is to be cancelled
MCPTT group ID	M	The MCPTT group ID with which the alert is associated
Group's in-progress emergency alert cancel request	O	Requests cancellation of the in-progress emergency alert of the group
NOTE: This information shall be present if the message is requesting cancellation of another MCPTT user's alert. If not present, then the alert of the MCPTT ID of the cancelling party is being cancelled		

10.6.1.10 IWF emergency alert cancel response

Table 10.6.1.10-1 describes the information flow IWF emergency alert cancel response from the IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.6.1.10-1: IWF emergency alert cancel response information elements

Information Element	Status	Description
MCPTT ID	M	The identity of the cancelling party
MCPTT group ID	M	The MCPTT group ID with which the alert is associated

10.6.1.11 IWF in-progress emergency group state cancel request

Table 10.6.1.11-1 describes the information flow IWF in-progress emergency group state cancel request from the IWF to the MCPTT server and from the MCPTT server to the IWF.

Table 10.6.1.11-1: IWF in-progress emergency group state cancel request information elements

Information Element	Status	Description
MCPTT ID	M	The identity of the cancelling party
MCPTT group ID	M	The MCPTT group ID on which the MCPTT in-progress emergency state is to be cancelled.
Alert indicator	O	Indicates whether the emergency alert of the cancelling party is to be cancelled

10.6.1.12 IWF in-progress emergency group state cancel response

Table 10.6.1.12-1 describes the information flow IWF in-progress emergency group state cancel response from the MCPTT server to the IWF and from IWF to MCPTT server.

Table 10.6.1.12-1: IWF in-progress emergency group state cancel response information elements

Information Element	Status	Description
MCPTT ID	M	The identity of the cancelling party
MCPTT group ID	M	The MCPTT group ID on which the MCPTT in-progress emergency in-progress is to be cancelled.

10.6.2 Emergency calls

10.6.2.1 General

This subclause addresses various aspects of emergency call interworking.

Where the group is defined in the MCPTT system and where the IWF has affiliated to an MCPTT group with a single affiliation on behalf of all LMR group members, only a single IWF emergency group call request / IWF in-progress emergency group state cancel request message is sent to the IWF at the commencement / release of an emergency group call. Where the group is defined in the MCPTT system and where the IWF has passed through individual affiliations for each group member in the LMR system, the MCPTT system shall send individual IWF emergency group call request / IWF in-progress emergency group state cancel request messages to the IWF for all affiliated group members in the LMR system in accordance with primary and partner MCPTT system behaviour. In both cases, the distribution of the messages to group members in the LMR system is out of scope of the present document.

Where the group is defined in the LMR system, the IWF shall send individual IWF emergency group call request / IWF in-progress emergency group state cancel request messages to the IWF for all affiliated MCPTT group members in accordance with primary and partner MCPTT system behaviour.

10.6.2.2 Emergency group call

10.6.2.2.1 Emergency group call setup initiated by a user in the LMR system on an interworking group defined in the MCPTT system

Figure 10.6.2.2.1-1 shows the procedure for an emergency group call setup initiated by a user in the LMR system. The figure is based upon the figure for emergency calls in 3GPP TS 23.379 [7], subclause 10.6.2.6.1.1. This scenario assumes that the group is an interworking group defined in the MCPTT system.

NOTE 1: For simplicity, a single MCPTT server is shown in place of a user home MCPTT server and a group hosting MCPTT server.

NOTE 2: The emergency interworking call procedures reuse the information flows defined 3GPP TS 23.379 [7].

Pre-conditions:

1. The MCPTT group is an interworking group defined in the MCPTT system

2. MCPTT client 1 and MCPTT client 2 are affiliated to that MCPTT group.

3. The IWF is connected to and is authorized to interwork with the MCPTT system.

4. The mapping relationship of group and user identities between MCPTT system and LMR system has been configured at the IWF.

5. LMR user initiates an emergency group call.
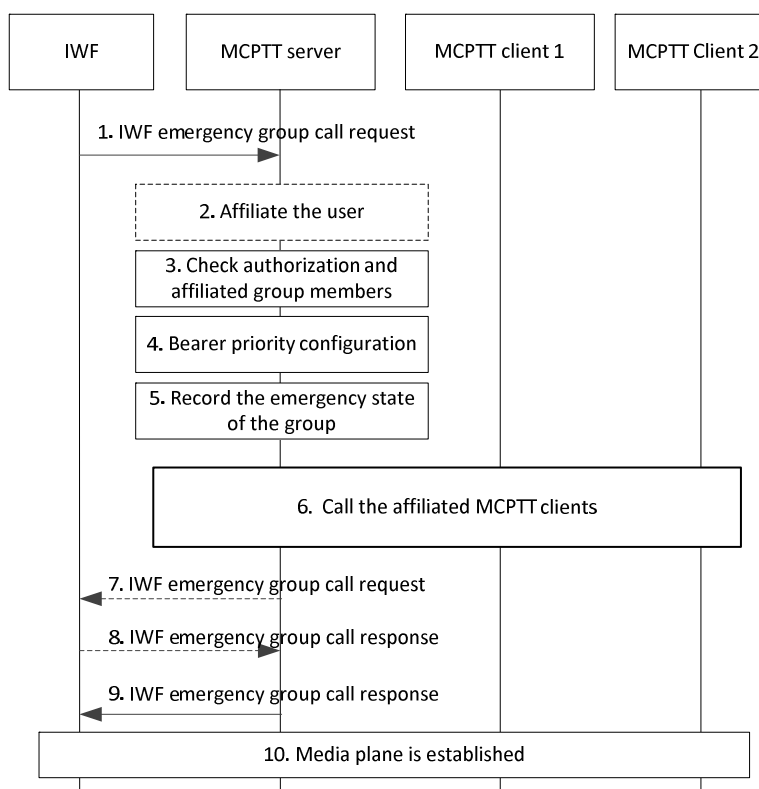
Figure 10.6.2.2.1-1: Emergency group call setup, initiated by LMR user on an interworking group defined in the MCPTT system

1. The IWF sends an IWF emergency group call request including a MCPTT group ID to the MCPTT server. The request contains an indication of the MCPTT emergency. The IWF may indicate in its request that an MCPTT emergency alert is to be sent when initiating an MCPTT emergency group call. The request may contain an indication of an implicit floor request.

2. The MCPTT server implicitly affiliates the MCPTT ID of the LMR user to the MCPTT emergency group if the user is not already affiliated. If the IWF is configured to affiliate on behalf of all of its group members in a single affiliation step, the MC service server affiliates the IWF instead of an individual MC service ID.

3. The MCPTT server checks whether the MCPTT ID of the LMR user is authorized for initiation of MCPTT emergency calls on the indicated MCPTT group. If authorized, it resolves the MCPTT group ID to determine the members of that MCPTT group and their affiliation status.

4. The MCPTT server configures the priority of the underlying bearers for all MCPTT participants in the MCPTT group. All successive calls during the MCPTT group's in-progress emergency state will receive the adjusted bearer priority.

5. The MCPTT server records the emergency state of the group. Once an MCPTT emergency call has been initiated, the MCPTT group is in an in-progress emergency state until that state is cancelled.

NOTE 3: The IWF actions for priority are out of scope of the present document.

6. MCPTT server sends the MCPTT emergency group call request towards the MCPTT clients of each of those affiliated MCPTT group members as defined in 3GPP TS 23.379 [7].

7. If the group has other affiliated LMR users than the calling party and the MCPTT server has received individual affiliations from those LMR users, an individual IWF emergency group call request is sent (to the IWF) for each affiliated LMR user.

8. The IWF returns IWF emergency group call response(s) to the MCPTT server.

9. The MCPTT server sends the IWF emergency group call response to the IWF (as a response to the request received in step 1) to inform of the successful MCPTT emergency group call establishment.

NOTE 4: How the LMR group members are called within the LMR system is out scope of the present document.

NOTE 5: Step 9 can occur at any time following step 5, but at the latest following step 8 depending on the conditions to proceed with the call.

10. The LMR users via the IWF and the affiliated MCPTTs have successfully established media plane for communication. The MCPTT system where the interworking group is defined is the controlling system of the group call.

10.6.2.2.2 Emergency group call setup initiated by a user in the MCPTT system on an interworking group defined in MCPTT system

Figure 10.6.2.2.2-1 shows the procedure for an emergency group call setup initiated by a user in the MCPTT system. The figure is based upon the figure for emergency group call in 3GPP TS 23.379 [7], subclause 10.6.2.6.1.1. This scenario assumes that the MCPTT group is an interworking group defined in the MCPTT system.

NOTE 1: For simplicity, a single MCPTT server is shown in place of a user home MCPTT server and a group hosting MCPTT server.

NOTE 2: The emergency interworking group call procedures reuse the information flows defined 3GPP TS 23.379 [7].

Pre-conditions:

1. The MCPTT group is an interworking group defined in the MCPTT system.

2. MCPTT client 2 is affiliated to the MCPTT group.

3. The IWF is connected to and is authorized to interwork with the MCPTT system.

4. The mapping relationship of group and user identities between MCPTT system and LMR system has been configured at the IWF.

5. The initiating MCPTT client 1 has been provisioned with the MCPTT group that has been designated via provisioning as the MCPTT emergency group.

NOTE 3: Alternatively, the client could have been provisioned for emergency behaviour on the selected group.

Figure 10.6.2.2.2-1: Emergency group call setup, initiated by MCPTT user on an interworking group defined in the MCPTT system

1. An MCPTT user initiates an emergency group call. MCPTT client 1 sets its MCPTT emergency state. The MCPTT emergency state is retained until explicitly cancelled.

2. The MCPTT client sends an MCPTT emergency group call request to the MCPTT server. The request contains an indication of the MCPTT emergency. The MCPTT client may indicate in its request that an MCPTT emergency alert is to be sent when initiating an MCPTT emergency group call. The request may contain an indication of an implicit floor request.

3. The MCPTT server implicitly affiliates MCPTT client 1 to the emergency group if the client is not already affiliated.

4. The MCPTT server checks whether the MCPTT user of the MCPTT client 1 is authorized for initiation of MCPTT emergency calls on the indicated interworking group. If authorized, it resolves the MCPTT group ID to determine the members of that MCPTT group and their affiliation status.

5. The MCPTT server configures the priority of the underlying bearers for all participants in the MCPTT group.

NOTE 4: Successive calls during the group's in-progress emergency state will all receive the adjusted bearer priority.

6. The MCPTT server records the in-progress emergency state of the group. The MCPTT server also records the identity of the MCPTT user that initiated the MCPTT emergency group call until the MCPTT emergency is cancelled. Once an MCPTT emergency group call has been initiated, the MCPTT group is considered to be in an in-progress emergency state until that state is cancelled.

7. The MCPTT server sends an IWF emergency group call request to IWF. If the IWF has affiliated to this group on behalf of the group's LMR users, only one IWF emergency group call request message is sent to the IWF. If the MCPTT server has received individual affiliations from the group's LMR users, an individual IWF emergency group call request is sent (to the IWF) for each affiliated LMR user.

8. IWF responds with the IWF emergency group call response(s) to MCPTT server to inform of the successful MCPTT emergency call establishment.

NOTE 5: How the LMR group members are called within the LMR system is out of scope of the present document.

NOTE 6: Steps 7 to 8 can occur at any time between steps 5 and 10.

NOTE 7: IWF actions for priority are out of scope of the present document.

9. The MCPTT server sends the MCPTT emergency group call request towards the MCPTT clients of each of those affiliated MCPTT group members as defined in 3GPP TS 23.379 [7].

10. The MCPTT server sends an MCPTT emergency group call response to the MCPTT client to inform of the successful MCPTT emergency call establishment.

NOTE 8: Step 10 can occur at any time following step 8, but at the latest following step 9, depending on the conditions to proceed with the call.

11. The LMR users via the IWF and the affiliated MCPTT clients have successfully established media plane for communication. The MCPTT system where the interworking group is defined is the controlling system of the group call.

10.6.2.2.3 Emergency group call setup initiated by a user in the LMR system on an interworking group defined in the LMR system

Figure 10.6.2.2.3-1 shows the procedure for an emergency group call setup initiated by a user in the LMR system. The figure is based upon the figure for emergency group call in 3GPP TS 23.379 [7], subclause 10.6.2.6.1.1. This scenario assumes that the MCPTT group is an interworking group defined in the LMR system.

NOTE 1: The emergency interworking group call procedures reuse the information flows defined 3GPP TS 23.379 [7].

Pre-conditions:

1. The MCPTT group is an interworking group defined in the LMR system.

2. MCPTT client 1 and MCPTT client 2 are affiliated to that group.

3. The IWF is connected to and is authorized to interwork with the MCPTT system.

4. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.

5. LMR user initiates an emergency group call.

Figure 10.6.2.2.3-1: Emergency group call setup, initiated by LMR user on an interworking group defined in the LMR system

1. The IWF sends an IWF emergency group call request(s) to the MCPTT server. An emergency group call request is sent individually for each affiliated MCPTT user in the group. The request contains an indication of the MCPTT emergency.

NOTE 2: IWF actions for priority are out of scope of the present document.

2. The MCPTT server configures the priority of the underlying bearers and sends the MCPTT emergency group call request(s) as defined in 3GPP TS 23.379 [7].

NOTE 3: Successive calls during the MCPTT group's in-progress emergency state will all receive the adjusted bearer priority.

3. The MCPTT clients respond with MCPTT emergency group call response to the MCPTT server.

4. The MCPTT server sends the IWF emergency group call response(s) to the IWF to inform of the successful MCPTT emergency call establishment.

NOTE 4: How the LMR group members are called within the LMR system is out of scope of the present document.

5. The LMR users via the IWF and the affiliated MCPTT clients have successfully established media plane for communication. The LMR system where the interworking group is defined is the controlling system of the group call.

10.6.2.2.4 Emergency group call setup initiated by a user in the MCPTT system to an interworking group defined in the LMR system

Figure 10.6.2.2.4-1 shows the procedure for an emergency group call initiated by a user in the MCPTT system. The figure is based upon the figure for MCPTT emergency group call in 3GPP TS 23.379 [7], subclause 10.6.2.6.1.1. This scenario assumes that the MCPTT group is an interworking group defined in the LMR system.
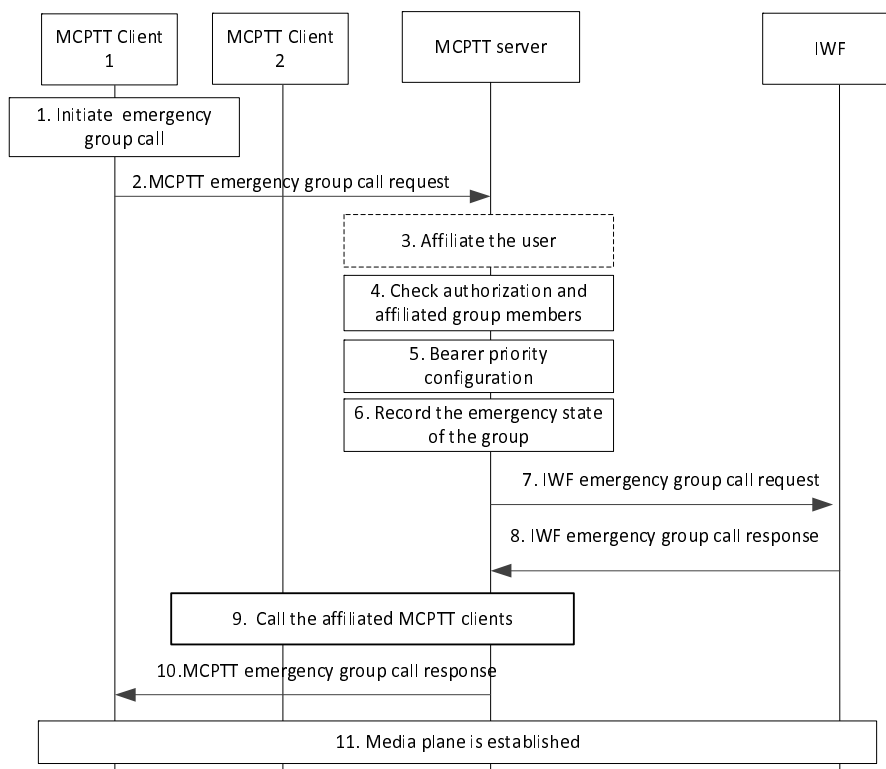
NOTE 1: The emergency interworking group call procedures reuse the information flows defined 3GPP TS 23.379 [7].

Pre-conditions:

1. The MCPTT group is an interworking group defined in the LMR system.

2. MCPTT client 2 is affiliated to the MCPTT group.

3. The IWF is connected to and is authorized to interwork with the MCPTT system.

4. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.
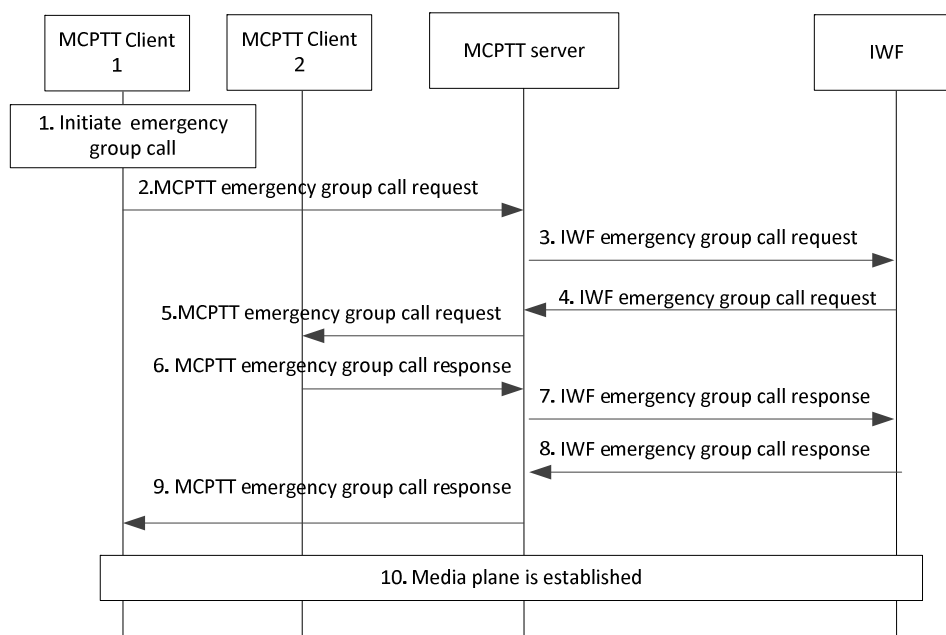
Figure 10.6.2.2.4-1: Emergency group call setup, initiated by MCPTT user to an interworking group defined in the LMR system

1. An MCPTT user initiates an emergency group call.

2. The MCPTT client sends an MCPTT emergency group call request to the MCPTT server. The request contains an indication of the MCPTT emergency. The MCPTT client may indicate in its request that an MCPTT emergency alert is to be sent when initiating an MCPTT emergency group call. The request may contain an indication of an implicit floor request.

3. The MCPTT server configures the priority of the underlying bearer and sends an IWF emergency group call request to the IWF.

4. The IWF sends an individual IWF emergency group call request to the MCPTT server for each affiliated MCPTT group member, in this example to a user in MCPTT client 2.

NOTE 2: How the LMR group members are called within the LMR system is outside the scope of the present document.

NOTE 3: All successive calls during the MCPTT group's in-progress emergency state will receive the adjusted bearer priority.

NOTE 4: IWF actions for priority are out of scope of the present document.

5. The MCPTT server configures the priority of the underlying bearer and sends an MCPTT emergency group call request towards the MCPTT clients as defined in 3GPP TS 23.379 [7].

6. The MCPTT client responds with MCPTT emergency group call response, as defined in 3GPP TS 23.379 [7].

7. The MCPTT server responds to the IWF emergency group call request(s), received in step 4, with IWF emergency group call response(s).

8. The IWF sends an IWF emergency group call response to the MCPTT server, as a response to the request received in step 3, to inform of the successful MCPTT emergency group call establishment.

9. The MCPTT server sends MCPTT emergency group call response to the initiating user in MCPTT client 1.

NOTE 5: Step 8 can occur at any time following step 3, but at the latest following step 7.

10. The LMR users (via the IWF) and the affiliated MCPTT clients have successfully established media plane for communication. The LMR system where the interworking group is defined is the controlling system of the group call.
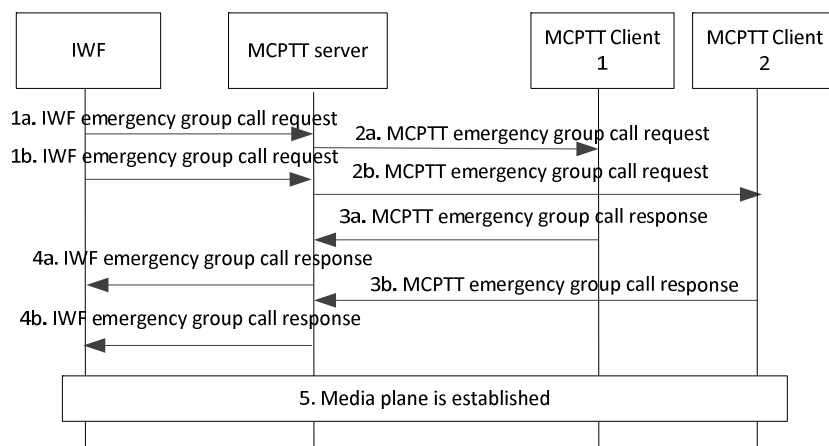
10.6.2.3 In-progress emergency group state cancel of an interworking group

10.6.2.3.1 LMR user initiated in-progress emergency group state cancel of an interworking group defined in the MCPTT system

Figure 10.6.2.3.1-1 shows the procedure for an in-progress emergency group state cancel initiated by an LMR user. The figure is based upon the figure for MCPTT in-progress emergency group state cancel in 3GPP TS 23.379 [7], subclause 10.6.2.6.1.3.

NOTE 1: For simplicity, a single MCPTT server is shown in place of a user home MCPTT server and a group hosting MCPTT server.

NOTE 2: The information flows between MCPTT client and MCPTT server are defined 3GPP TS 23.379 [7].

NOTE 3: The end of an MCPTT emergency group call does not cancel the MCPTT group's in-progress emergency group state. It is explicitly cancelled by an authorized user by this procedure.

Pre-conditions:

1. The MCPTT group is in an in-progress emergency group state.

2. The MCPTT group is an interworking group defined in the MCPTT system.

3. The MCPTT client is affiliated to the MCPTT group.

4. The IWF is connected to and is authorized to interwork with the MCPTT system.

5. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.

6. An LMR user initiates in-progress emergency group state cancel of an interworking group.
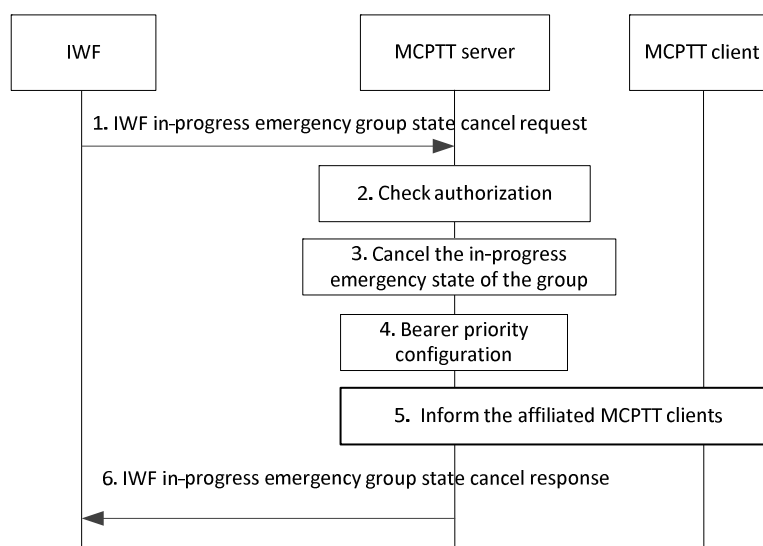
Figure 10.6.2.3.1-1: LMR user initiated in-progress emergency group state cancel of an interworking group defined in the MCPTT system

1. The IWF sends an IWF in-progress emergency group state cancel request to the MCPTT server. The IWF in-progress emergency group state cancel request may carry an indication that the emergency alert of the user is also being cancelled.

2. The MCPTT server checks that the initiator of the request is authorized to cancel the in-progress emergency group state of the group.

3. The MCPTT server cancels the in-progress emergency group state of the MCPTT group. If the emergency alert of the user is also requested to be cancelled, the MCPTT server cancels the emergency alert of the user.

4. The MCPTT server adjusts the priority of the underlying bearer; priority treatment is no longer required.

5. The MCPTT server handles the MCPTT in-progress emergency group state cancel request towards the affiliated MCPTT clients as defined in 3GPP TS 23.379 [7], subclause 10.6.2.6.1.3.

6. The MCPTT server sends an IWF in-progress emergency group state cancel response to the IWF to confirm the IWF in-progress emergency group state cancel request.

NOTE 4: Step 6 can occur at any time following step 3.

10.6.2.3.2   MCPTT user initiated in-progress emergency group state cancel of an interworking group defined in the MCPTT system

Figure 10.6.2.3.2-1 shows the procedure for an in-progress emergency group state cancel initiated by an MCPTT user. The figure is based upon the figure for MCPTT in-progress emergency group state cancel in 3GPP TS 23.379 [7], subclause 10.6.2.6.1.3.

NOTE 1: For simplicity, a single MCPTT server is shown in place of a user home MCPTT server and a group hosting MCPTT server.

NOTE 2: The information flows between an MCPTT client and an MCPTT server are defined 3GPP TS 23.379 [7].

NOTE 3: The end of the MCPTT emergency group call does not cancel the MCPTT group's in-progress emergency group state. It is explicitly cancelled by an authorized user by this procedure.

Pre-conditions:

1. MCPTT group is in an in-progress emergency group state.

2. The MCPTT group is an interworking group defined in the MCPTT system.

3. MCPTT client 2 is affiliated to that MCPTT group.

4. The IWF is connected to and is authorized to interwork with the MCPTT system.

5. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.
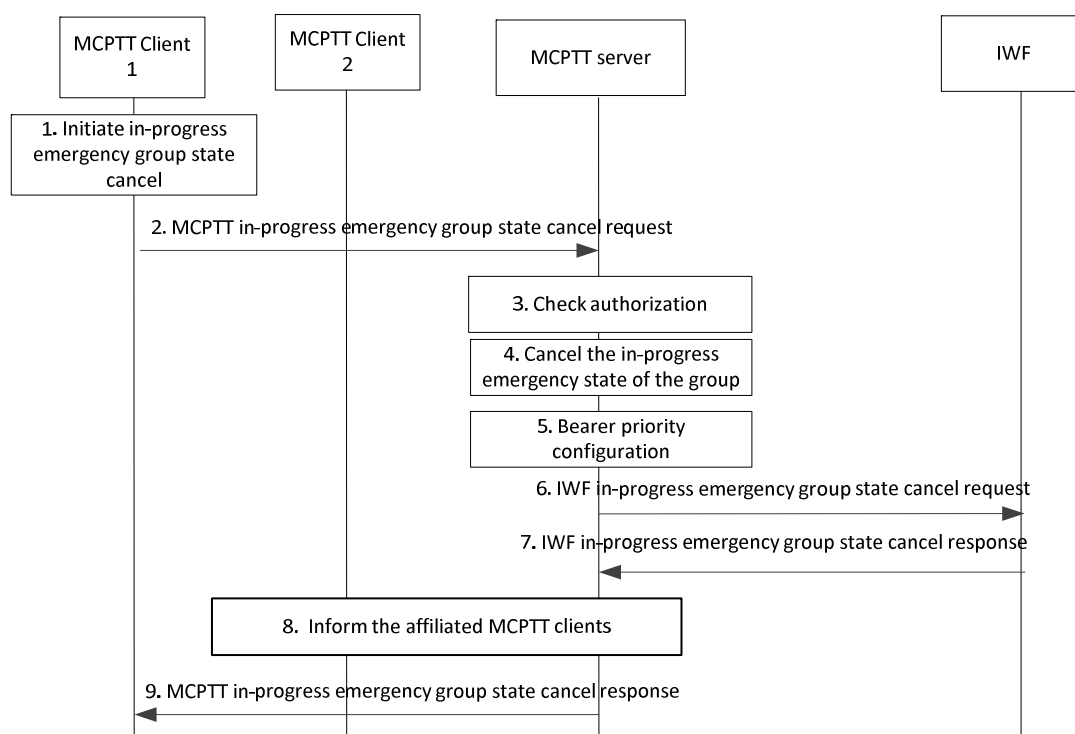
Figure 10.6.2.3.2-1: MCPTT user initiated in-progress emergency group state cancel of an interworking group defined in MCPTT system

1. The MC user of MCPTT client 1 initiates in-progress emergency group state cancel of an interworking group.

2. The MCPTT client sends an MCPTT in-progress emergency group state cancel request to the MCPTT server. The request may carry an indication that the emergency alert of the user is also being cancelled.

3. The MCPTT server checks that the initiator of the request is authorised to cancel the in-progress emergency group state of the group.

4. The MCPTT server cancels the in-progress emergency group state of the MCPTT group. If the emergency alert of the user is also requested to be cancelled, the MCPTT server cancels the emergency alert of the user.

5. The MCPTT server adjusts the priority of the underlying bearer; priority treatment is no longer required.

6. The MCPTT server sends the IWF in-progress emergency group state cancel request to the IWF.

NOTE 4: IWF actions for cancelling in-progress emergency group state are out of scope of the present document.

7. The IWF sends the IWF in-progress emergency group state cancel response to the MCPTT server to confirm the IWF in-progress emergency group state cancel request.

8. The MCPTT server handles the MCPTT in-progress emergency group state cancel request towards the affiliated MCPTT clients as defined in 3GPP TS 23.379 [7], subclause 10.6.2.6.1.3.

9. The MCPTT server sends the MCPTT in-progress emergency group state cancel response to the MCPTT client 1 to confirm the MCPTT in-progress emergency group state cancel request.

NOTE 5: Step 9 can occur at any time following step 4, depending on the conditions to proceed with the call.

10.6.2.3.3 LMR user initiated in-progress emergency group state cancel of an interworking group defined in an LMR system

Figure 10.6.2.3.3-1 shows the procedure for an in-progress emergency group state cancel initiated by an LMR user.

NOTE 1: The information flows between MCPTT client and MCPTT server are defined 3GPP TS 23.379 [7].

NOTE 2: The end of an MCPTT emergency group call does not cancel the MCPTT group's in-progress emergency group state. It is explicitly cancelled by an authorized user by this procedure.

Pre-conditions:

1. MCPTT group is in an in-progress emergency group state.

2. The MCPTT group is an interworking group defined in the LMR system.

3. The MCPTT client is affiliated to the MCPTT group.

4. The IWF is connected to and is authorized to interwork with the MCPTT system.

5. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.

6. An LMR user initiates in-progress emergency group state cancel of an interworking group.
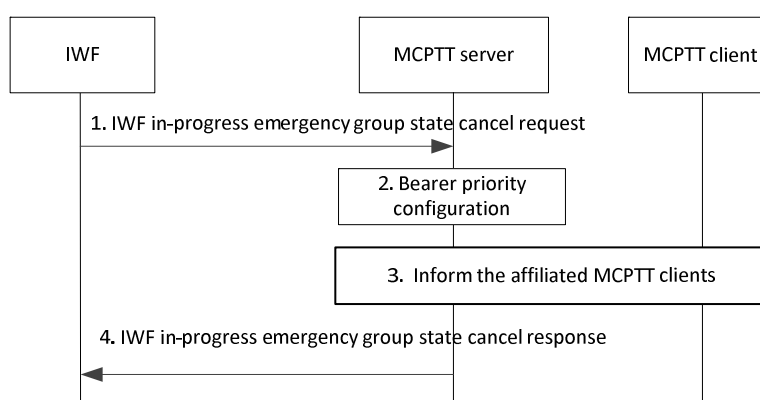
Figure 10.6.2.3.3-1: LMR user initiated in-progress emergency group state cancel of an interworking group defined in the LMR system

1. The IWF sends an IWF in-progress emergency group state cancel request to the MCPTT server.

2. The MCPTT server adjusts the priority of the underlying bearer; priority treatment is no longer required.

3. The MCPTT server handles the MCPTT in-progress emergency group state cancel request towards the affiliated MCPTT clients as defined in 3GPP TS 23.379 [7], subclause 10.6.2.6.1.3.

4. The MCPTT server sends an IWF in-progress emergency group state cancel response to the IWF to confirm the IWF in-progress emergency group state cancel request.

NOTE 3: Step 4 can occur at any time following step 1, depending on the conditions to proceed with the call.

10.6.2.3.4 MCPTT user initiated in-progress emergency group state cancel of an interworking group defined in an LMR system

Figure 10.6.2.3.4-1 shows the procedure for an in-progress emergency group state cancel initiated by an MCPTT user. The figure is based upon the figure for MCPTT in-progress emergency group state cancel in 3GPP TS 23.379 [7], subclause 10.6.2.6.1.3.

NOTE 1: The information flows between an MCPTT client and an MCPTT server are defined 3GPP TS 23.379 [7].

NOTE 2: The end of the MCPTT emergency group call does not cancel the MCPTT group's in-progress emergency group state. It is explicitly cancelled by an authorized user by this procedure.

Pre-conditions:

1. MCPTT group is in an in-progress emergency group state.

2. The MCPTT group is an interworking group defined in the LMR system.

3. MCPTT client 2 is affiliated to that MCPTT group.

4. The IWF is connected to and is authorized to interwork with the MCPTT system.

5. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.
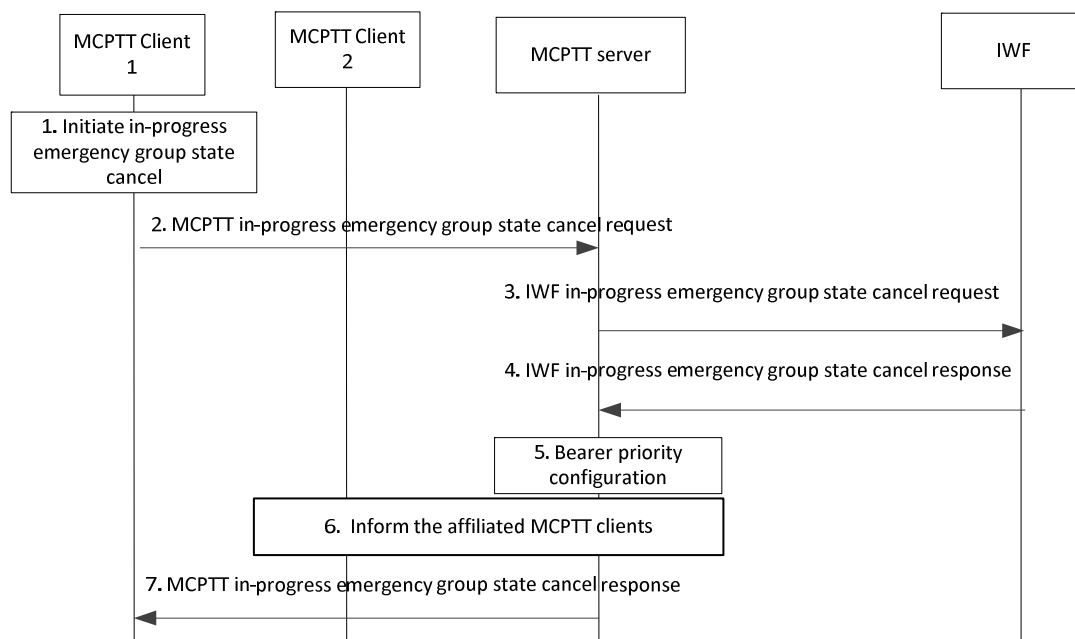
Figure 10.6.2.3.4-1: MCPTT user initiated in-progress emergency group state cancel of an interworking group defined in the LMR system

1. The MC user of MCPTT client 1 initiates in-progress emergency group state cancel of an interworking group.

2. An MCPTT client sends an MCPTT in-progress emergency group state cancel request to the MCPTT server. The request may carry an indication that the emergency alert of the user is also being cancelled.

3. The MCPTT server sends the IWF in-progress emergency group state cancel request to the IWF.

NOTE 3: IWF actions for checking authorization and cancelling in-progress emergency group state are out of scope of the present document.

NOTE 4: The LMR system can also reject the request.

4. The IWF sends the IWF in-progress emergency group state cancel response to the MCPTT server to confirm the IWF in-progress emergency group state cancel request.

5. The MCPTT server adjusts the priority of the underlying bearer; priority treatment is no longer required.

6. The MCPTT server handles the MCPTT in-progress emergency group state cancel request towards the affiliated MCPTT clients as defined in 3GPP TS 23.379 [7], subclause 10.6.2.6.1.3.

7. The MCPTT server sends the MCPTT in-progress emergency group state cancel response to the MCPTT client 1 to confirm the MCPTT in-progress emergency group state cancel request.

NOTE 5: Step 7 can occur at any time following step 4, depending on the conditions to proceed with the call.

10.6.2.4 Losing audio

For LMR systems where a user cannot be pre-empted, the IWF identifies the audio as losing audio to the system. Subclause 10.5 is applicable to losing audio during emergency calls as well as non-emergency calls.

10.6.2.5 Default emergency group

In MCPTT, the user's profile determines whether an emergency is raised on the user's currently selected group or on a configured default emergency group. It's up to the IWF and the LMR system to which it is connected to determine what group the emergency is raised on and whether an alert is also sent when the emergency is raised. From the perspective of the MCPTT system, all emergency behavior by the IWF on behalf of its users mapped to MCPTT shall comply with behaviors defined in 3GPP TS 23.379 [7]. The implementation shall ensure that emergency related parameters of a group or private call are adhered to. For example, an MC service group must be configured in the MC sevice group managment system for emergency alerts in order for an emergency alert to be sent on it. This can be enforced through proper configuration of both LMR and MCPTT systems or can be enforced at run time by the IWF.

10.6.2.6 Emergency private call

An emergency private call to an LMR user will have emergency priority for the portion of the call transported in the MCPTT system and the LTE EPS but will not receive priority on the LMR system in LMR systems that do not support emergency treatment for private calls.

10.6.2.7 LMR systems that do not track group emergencies

The MCPTT system tracks the emergency state of every group. In interworked LMR systems that do not track the emergency state of groups, only a UE in emergency state will be given emergency priority on the LMR system when talking. For any user talking on an emergency group, the portion of the call transported by the MCPTT system will receive emergency priority.

10.6.3 Imminent peril calls

10.6.3.1 General

This subclause addresses various aspects of imminent peril call interworking.

LMR systems do not support imminent peril. Imminent peril calls can be propagated into the LMR system by the IWF as normal group calls or emergency group calls. The decision of the LMR group call type is outside the scope of the present document.

Where the group is defined in the MCPTT system and where the IWF has affiliated to an MCPTT group with a single affiliation on behalf of all LMR group members, only a single IWF imminent peril group call request / IWF imminent peril cancel request message is sent to the IWF at the commencement / cancel of an imminent peril group call. Where the group is defined in the MCPTT system and where the IWF has passed through individual affiliations for each group member in the LMR system, the MCPTT system shall send individual IWF imminent peril group call request / IWF imminent peril cancel request messages to the IWF for all affiliated group members in the LMR system in accordance with primary and partner MCPTT system behaviour. In both cases, the distribution of the messages to group members in the LMR system is out of scope of the present document.

Where the group is defined in the LMR system, the IWF shall send individual IWF imminent peril group call request / IWF imminent peril cancel request messages to the MCPTT server for all affiliated MCPTT group members in accordance with primary and partner MCPTT system behaviour.

10.6.3.2 Imminent peril group call initiated by an MCPTT user on an interworking group

Figure 10.6.3.2-1 shows the procedure for an imminent peril group call initiated by a user in the MCPTT system. The figure is based upon the figure for imminent peril group call in 3GPP TS 23.379 [7], subclause 10.6.2.6.2.1.

NOTE 1: For simplicity, a single MCPTT server is shown in place of a user home MCPTT server and a group hosting MCPTT server.

NOTE 2: The imminent peril interworking group call procedures reuse the information flows defined in 3GPP TS 23.379 [7].

Pre-conditions:

1. The initiating MCPTT client 1 has been provisioned with an MCPTT group that has been designated in the provisioning to be used for imminent peril communications

2. The MCPTT group is an interworking group defined in the MCPTT system.

3. MCPTT client 2 is affiliated to the MCPTT group.

4. The IWF is connected to, and is authorized to, interwork with the MCPTT system.

5. At least one LMR user has affiliated to the MCPTT group.

6. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.

NOTE 3: For all the signalling messages passing through the IWF between the MCPTT system and the LMR system, the IWF performs the identity conversion and protocol translation.
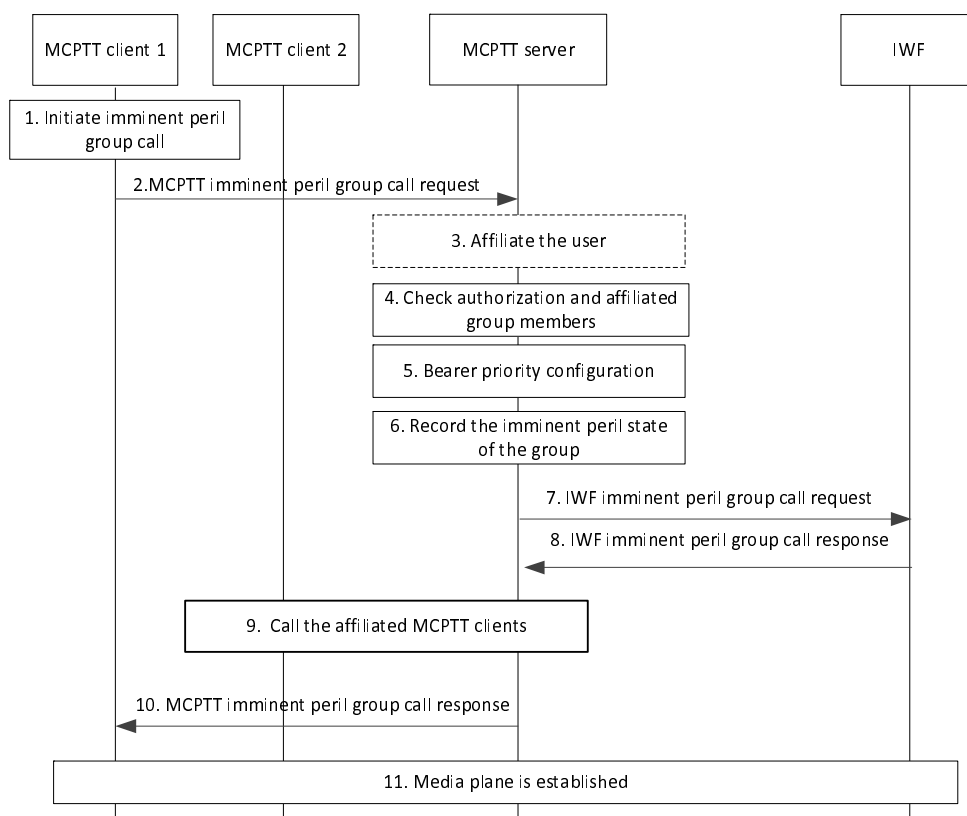
Figure 10.6.3.2-1: Imminent peril group call initiated by a MCPTT user to an interworking group defined in the MCPTT system

1. An MCPTT user initiates an imminent peril group call.

2. The MCPTT client sends an MCPTT imminent peril group call request to the MCPTT server. The request contains an indication of the in-progress imminent peril. The request may also contain an indication of an implicit floor request and may also contain the location of the calling party.

3. The MCPTT server implicitly affiliates MCPTT client 1 to the imminent peril group if the client is not already affiliated.

4. The MCPTT server checks whether the MCPTT user of MCPTT client 1 is authorized for initiation of imminent peril group calls on the indicated interworking group defined in the MCPTT system. If authorized, it resolves the MCPTT group ID to determine the members of that MCPTT group and their affiliation status. The MCPTT server also checks the privacy policy (authorisation to provide location information to other MCPTT users on a call when talking, as defined in 3GPP TS 23.379 [7] Annex A.3) of the requesting MCPTT user to decide if the user's location information may be provided to other MCPTT users on the call and the IWF.

5. The MCPTT server configures the priority of the underlying bearers for all participants in the MCPTT group.

NOTE 4: Successive calls during the in-progress imminent peril state will all receive the adjusted bearer priority.

6. The MCPTT server records the imminent peril state of the group. The MCPTT server also records the identity of the MCPTT user that initiated the imminent peril group call until the in-progress imminent peril state is cancelled. Once an imminent peril group call has been initiated, the MCPTT group is considered to be in an in-progress imminent peril state until that state is cancelled.

7. The MCPTT server sends the IWF imminent peril group call request(s) to the IWF. If the IWF has affiliated to this group on behalf of the group's LMR users, only one IWF imminent peril group call request message is sent to the IWF. If the MCPTT server has received individual affiliations from the group's LMR users, an individual IWF imminent peril group call request is sent to the IWF for each affiliated LMR user.

8. The IWF responds with the IWF imminent peril group call response(s) to MCPTT server to inform of the successful MCPTT imminent peril call establishment.

NOTE 5: The IWF can reject the request if it does not support imminent peril group calls. IWF actions for priority are out of scope of the present document.

NOTE 6: How the LMR group members are called within the LMR system is out of scope of the present document.

9. The MCPTT server sends the imminent peril group call request towards the MCPTT clients of each of those affiliated MCPTT group members. The request contains an indication of the in-progress imminent peril. MCPTT users are notified of the incoming imminent peril call. The MCPTT clients acknowledge the imminent peril call request as specified in 3GPP TS 23.379 [7].

10. The MCPTT server sends the MCPTT imminent peril group call response to the MCPTT user 1 to inform the successful imminent peril call establishment.

NOTE 7: Step 10 can occur at any time following step 5, and prior to step 11 depending on the conditions to proceed with the imminent peril call.

11. The LMR users via the IWF and the affiliated MCPTT clients have successfully established the media plane for communication. The MCPTT system, where the interworking group is defined, is the controlling system of the group call.

10.6.3.3 Group call initiated by a user in the LMR system on an interworking group in imminent peril state

Figure 10.6.3.3-1 shows the procedure for a group call initiated by an LMR user (represented by the IWF) on an interworking group where the group is currently in imminent peril state within the MCPTT system.

NOTE 1: For simplicity, a single MCPTT server is shown in place of a user home MCPTT server and a group hosting MCPTT server.

NOTE 2: The imminent peril interworking group call procedures reuse the information flows defined in 3GPP TS 23.379 [7].

Pre-conditions:

1. The MCPTT group is previously defined on the group management server with MCPTT client 1, MCPTT client 2, and LMR users (represented by the IWF) affiliated to that MCPTT group.

2. The IWF is connected to, and is authorized to interwork with, the MCPTT system.

3. The interworking group information is available at the IWF.

4. The interworking group is currently in imminent peril state within the MCPTT system.

5. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.

6. LMR user initiates a group call.

NOTE 3: For all the signalling messages passing through the IWF between the MCPTT system and the LMR system, the IWF performs the identity conversion and protocol translation.
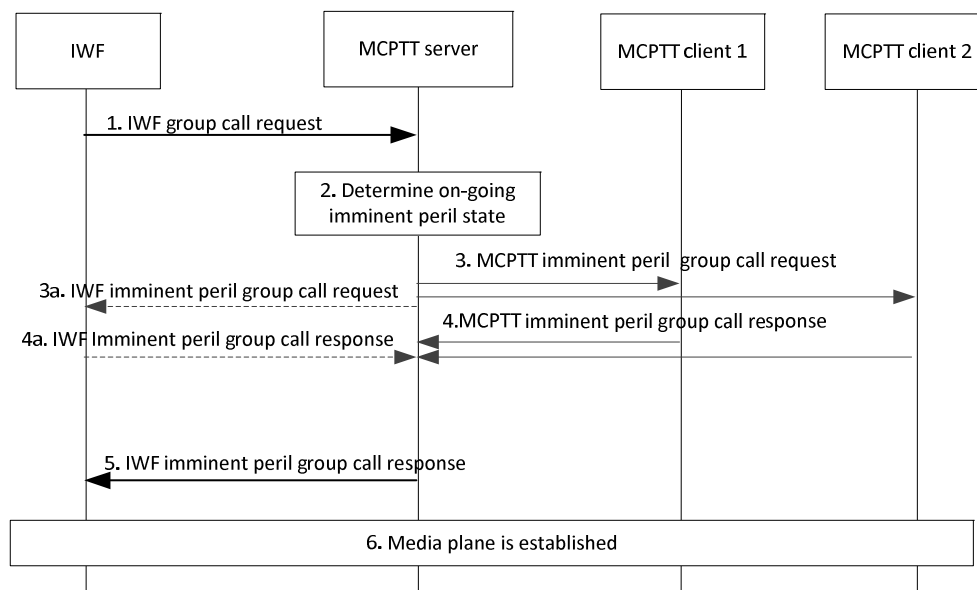
Figure 10.6.3.3-1: Group call initiated by a user in the LMR system on an interworking group in imminent peril state

1. The IWF does not track the imminent peril state of the group and sends an IWF group call request including an MCPTT group ID to the MCPTT server for call establishment. If floor control is requested by the calling LMR user, an indication of implicit floor request is included and the location information of the requestor if required.

2. The MCPTT server determines that the MCPTT group is currently in imminent peril state.

3. The MCPTT server converts the request and sends an MCPTT imminent peril group call request to all of the affiliated MCPTT clients.

3a. If the group has other affiliated LMR users than the calling party and the MCPTT server has received individual affiliations from those LMR users, an individual IWF imminent peril group call request is sent to the IWF for each affiliated LMR user.

4. The receiving MCPTT clients send the MCPTT imminent peril group call response to the MCPTT server to acknowledge the MCPTT imminent peril group call request. For a multicast call, these acknowledgements are not sent.

4a. The IWF returns IWF imminent peril group call response(s) to the MCPTT server.

5. The MCPTT server sends the IWF imminent peril group call response message to the IWF.

6. The LMR users (via the IWF) and the affiliated MCPTT clients have successfully established the media plane for communication. The MCPTT system where the interworking group is defined is the controlling system of the group call.

The IWF, MCPTT client 1, and MCPTT client 2 continue with the MCPTT group call, which receives adjusted bearer priority within the MCPTT system due to the MCPTT group being in imminent peril state.

NOTE 4: IWF actions for priority are out of scope of the present document.

10.6.3.4 In-progress imminent peril state cancel on an interworking group

This procedure describes the case where an authorized MCPTT user cancels an interworking group's in-progress imminent peril state.

Figure 10.6.3.4-1 shows the procedures for the MCPTT client cancelling an interworking group's in-progress imminent peril state.

NOTE 1: The end of an imminent peril call does not cancel the MCPTT group's in-progress imminent peril state. It is explicitly cancelled by an authorized user.

NOTE 2: For simplicity, a single MCPTT server is shown in place of a user home MCPTT server and a group hosting MCPTT server.

NOTE 3: The in-progress imminent peril interworking group state cancel procedures reuse the information flows defined 3GPP TS 23.379 [7].

Pre-conditions:

1. The MCPTT group is previously defined on the group management server with MCPTT client 1, MCPTT client 2, and LMR users (represented by the IWF) affiliated to that MCPTT group.

2. The IWF is connected to, and is authorized to interwork with, the MCPTT system.

3. The interworking group information is available at the IWF.

4. The interworking group is currently in in-progress imminent peril state within the MCPTT system and has prioritized bearer support.

5. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.

NOTE 4: For all the signalling messages passing through the IWF between the MCPTT system and the LMR system, the IWF performs the identity conversion and protocol translation.

6. MCPTT client 1 previously initiated the imminent peril group call.
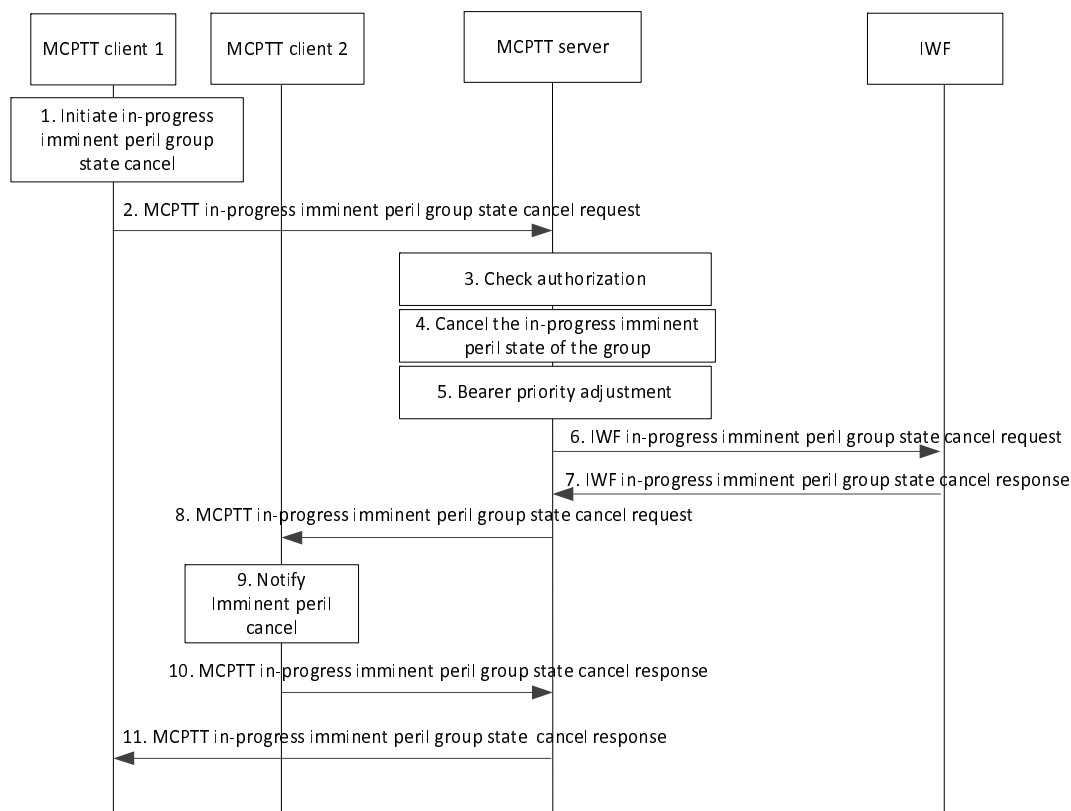
Figure 10.6.3.4-1: In-progress imminent peril group state cancel on an interworking group

1. The user at the MCPTT client 1 initiates an in-progress imminent peril state cancel.

2. MCPTT client 1 sends an MCPTT in-progress imminent peril group state cancel request to the MCPTT server.

3. The MCPTT server checks whether the MCPTT user 1 at MCPTT client 1 is authorized to cancel the in-progress imminent peril group state.

4. The MCPTT server cancels/resets the in-progress imminent peril group state.

5. The MCPTT server adjusts the priority of the underlying bearer; priority treatment is no longer required.

6. The MCPTT server sends an IWF in-progress imminent peril group state cancel request(s) to the IWF. If the IWF has affiliated to this group on behalf of the group's LMR users, only one IWF in-progress imminent peril group state cancel request is sent to the IWF. If the MCPTT server has received individual affiliations from the group's LMR users, an individual IWF in-progress imminent peril group state cancel request is sent (to the IWF) for each affiliated LMR user.

7. The IWF sends the IWF in-progress imminent peril group state cancel response(s) to the MCPTT server.

NOTE 5: The IWF responds even if it does not support imminent peril group calls. IWF actions for priority are out of scope of the present document.

8. The MCPTT server sends an MCPTT in-progress imminent peril group state cancel request to the MCPTT group members.

NOTE 6: Steps 6 and 8 can occur in any order following step 5.

9. MCPTT group members are notified of the in-progress imminent peril group state cancel.

10. MCPTT client 2 sends the MCPTT in-progress imminent peril group state cancel response to the MCPTT server to acknowledge the in-progress MCPTT in-progress imminent peril group state cancel request. For a multicast scenario, this acknowledgement is not sent.

11. The MCPTT server sends the MCPTT in-progress imminent peril group state cancel response to the MCPTT client 1 to confirm the MCPTT in-progress imminent peril group state cancel request.

NOTE 7: Step 11 can occur at any time following step 5.

10.6.4 Emergency alerts

10.6.4.1 Emergency alert initiated by LMR user

In this procedure, an LMR user is initiating an emergency alert via the IWF. Figure 10.6.4.1-1 shows the procedure for an emergency alert initiated by a user in the LMR system. This subclause is based upon subclause for MCPTT emergency alerts in 3GPP TS 23.379 [7], subclause 10.6.2.6.3.1.

Pre-conditions:

1. The MC service group is previously defined on the group management server with MC service client 1 and MC service client 2 affiliated to that MC service group.

2. The IWF is connected to and is authorized to interwork with the MC service system.

3. The MC service group information is available at the IWF, including information that the MC service group is an interworking group (defined in the LMR system or MC the system).

4. The mapping relationship of group and user identities between the MC service system and the LMR system has been configured at the IWF.

5. The IWF may or may not have carried out an explicit affiliation procedure with the MC service group.

6. An emergency alert is requested on the LMR system.

NOTE 1: For all signalling messages passing through the IWF between the MC service system and the LMR system, the IWF performs identity conversion and protocol translation.
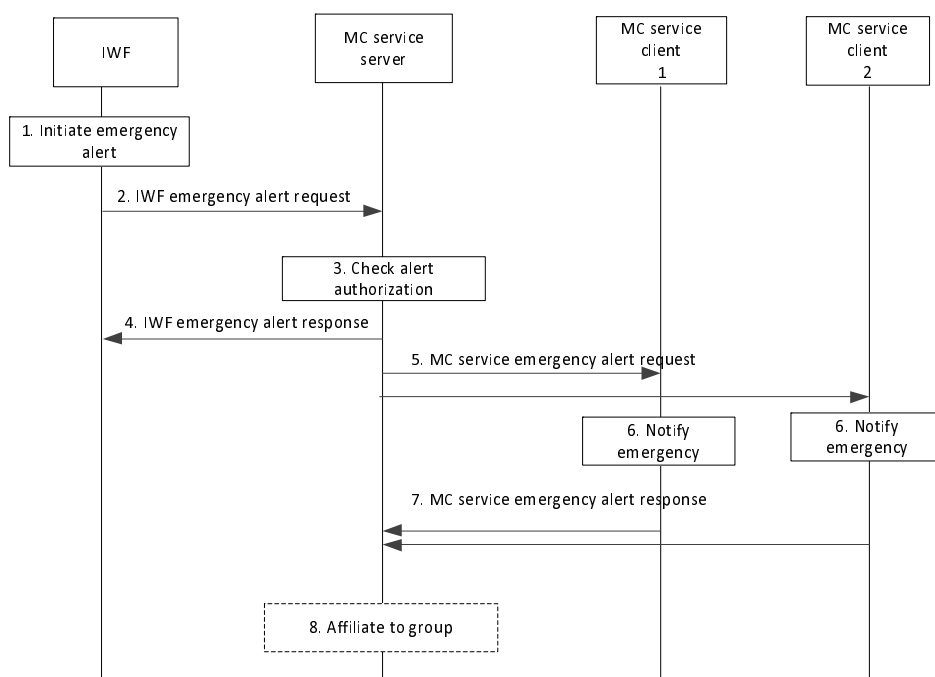
Figure 10.6.4.1-1 MC service emergency alert initiated by LMR user

1. The LMR user initiates an emergency alert.

NOTE 2: How the IWF determines the emergency condition from the LMR system is out of scope of the present document.

2. The IWF sends an IWF emergency alert request to the designated MC service server. If the location of the LMR user is not available to the IWF, the IWF emergency alert request shall contain an indication that location is not available.

3. MC service server checks whether the MC service user ID that represents the LMR user is authorized for initiation of MC service emergency alerts for the indicated MC service group. The MC service server determines the affiliation status of the group members.

4. The MC service server sends an IWF emergency alert response to the IWF to confirm the IWF emergency alert request.

NOTE 3: Sending the IWF emergency alert request without making a request to also start an emergency call does not put the group into an ongoing emergency condition.

5. The MC service server sends an MC service emergency alert request towards the MC service clients of each of those affiliated MC service group members. The MC service emergency alert request message shall contain the following information: Location, MC service ID and MC service group ID (i.e., MC service user's selected MC service group or dedicated MC service emergency group, as per MC service group configuration) and the MC service user's mission critical organization name.

6. MC service users are notified of the MC service emergency.

7. The receiving MC service clients send an MC service emergency alert response to the MC service server to acknowledge the MC service emergency alert request.

8. If the group is an interworking group defined in the MC system, the MC service server implicitly affiliates the individual MC service ID of the LMR user to the emergency group if not already affiliated. If the IWF is configured to affiliate on behalf of all of its group members in a single affiliation step, the MC service server affiliates the IWF ID instead of an individual MC service ID.

NOTE 4: Step 8 can be performed any time after step 3 but at the latest immediately after step 7.

NOTE 5: MC service group calls made to this MC service group will be established as emergency calls if this MC service group has an ongoing emergency condition.

NOTE 6: Sending the emergency alert does not put the other UEs in the group into an emergency state.

10.6.4.2   Emergency alert initiated by MC service user

In this procedure, an MC service user is initiating an emergency alert that is delivered to the LMR system via the IWF. Figure 10.6.4.2-1 shows the procedure for an emergency alert initiated by a user in the MC service system. This subclause is based upon subclause for MCPTT emergency alerts in 3GPP TS 23.379 [7], subclause 10.6.2.6.3.1.

Pre-conditions:

1. The MC service group is previously defined on the group management server with MC service client 1 and MC service client 2 affiliated to that MC service group.

2. The IWF is connected to and is authorized to interwork with the MC service system.

3. The MC service group information is available at the IWF, including information that the MC service group is an interworking group (defined in the LMR system or the MC system).

4. The mapping relationship of group and user identities between the MC system and the LMR system has been configured at the IWF.

NOTE 1: For all signalling messages passing through the IWF between the MC system and the LMR system, the IWF performs identity conversion and protocol translation.
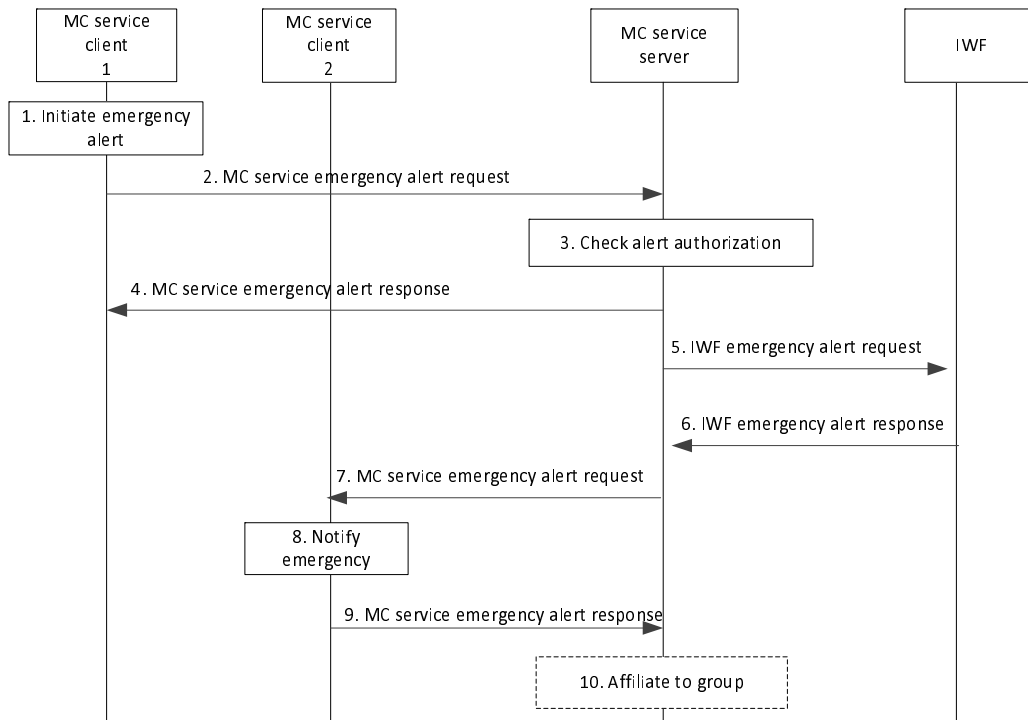
Figure 10.6.4.2-1 MC service emergency alert initiated by MC service user

1. The MC service user 1 initiates an emergency alert.

2. MC service client 1 sends an MC service emergency alert request to the MC service server.

3. The MC service server resolves the group ID, determines the affiliation status of the group members and checks whether the IWF should be informed. In this scenario, the group has affiliated members that are homed on the IWF, thus the IWF shall be involved. MC service server also checks whether the MC service user ID is authorized to initiate MC service emergency alerts for the indicated MC service group.

4. The MC service server sends an MC service emergency alert response to the MC service client 1 to confirm the MC service emergency alert request.

NOTE 2: Sending the emergency alert without making a request to also start an emergency call does not put the group into an ongoing emergency condition.

5. MC service server sends an IWF emergency alert request to the IWF. If the location of the MC service client 1 is not available, the IWF emergency alert request shall contain an indication that location is not available. If the IWF has affiliated to this group on behalf of the group's LMR users, only one IWF emergency alert request is sent to the IWF. If the IWF has sent individual affiliations for each of its LMR users, the MC service server sends an IWF emergency alert request via the IWF to each affiliated LMR group member.

6. The IWF sends an IWF service emergency alert response to the MC service server to confirm the IWF emergency alert request(s).

7. The MC service server sends an MC service emergency alert request towards the MC service clients of each of those affiliated MC service group members. The MC service emergency alert request message shall contain the following information: Location, MC service ID and MC service group ID (i.e., MC service user's selected MC service group or dedicated MC service emergency group, as per MC service group configuration) and the MC service user's mission critical organization name.

8. MC service users are notified of the MC service emergency.

9. The receiving MC service clients send an MC service emergency alert response to the MC service server to acknowledge the MC service emergency alert.

10. The MC service server implicitly affiliates the MC service client 1 to the emergency group if it is not already affiliated.

NOTE 3: Step 10 can be performed any time after step 3. Steps 5 and 7 can be performed in which ever order.

NOTE 4: MC service group calls made to this MC service group will be established as emergency calls if the MC service group has an ongoing emergency condition.

NOTE 5: Sending an emergency alert does not put the other UEs in the group into an emergency state.

10.6.5 Emergency alert cancellation

10.6.5.1 Emergency alert cancellation of an LMR user

In this procedure, an LMR user is cancelling the emergency alert. Figure 10.6.5.1-1 shows the procedure for emergency alert cancellation of a user in the LMR system. This subclause is based upon subclause for MCPTT emergency alert cancel in 3GPP TS 23.379 [7], subclause 10.6.2.6.3.2.

Pre-conditions:

1. The MC service group information is available at the IWF, including information that the MC service group is an interworking group (defined in the LMR system or the MC system).

2. The LMR user had previously successfully initiated an emergency alert via the IWF.

3. The MC service client 1 and MC service client 2 are affiliated to the MC service group.

4. The MC service server may have carried out an explicit or implicit affiliation procedure of the LMR user to the MC service group.

5. The mapping relationship of group and user identities between the MC service system and the LMR system has been configured at the IWF.

6. The LMR user initiates an emergency alert cancel.

NOTE 1: For all the signalling messages passing through the IWF between the MC service system and the LMR system, the IWF performs the identity conversion and protocol translation.
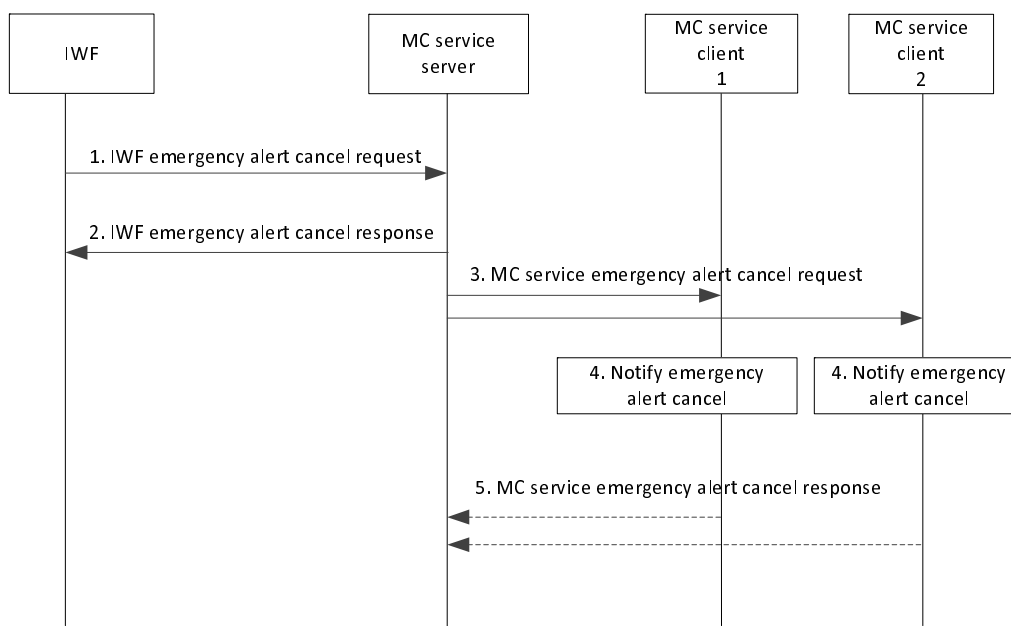
Figure 10.6.5.1-1 MC service emergency alert cancellation of an LMR user

1. The IWF sends an IWF emergency alert cancel request to the MC service group to which the IWF had previously successfully sent the IWF emergency alert request on behalf of the LMR user.

NOTE 2: The IWF emergency alert cancel request may carry an indication to also request that the in-progress emergency state on the group is to be cancelled.

2. The MC service server sends the IWF emergency alert cancel response to the IWF to confirm the IWF emergency alert cancellation.

3. The MC service server sends an MC service emergency alert cancel request to the MC service clients of the affiliated MC service group members.

4. MC service users are notified of the MC service emergency alert cancellation of the LMR user.

5. The receiving MC service clients send the MC service emergency alert cancel response to the MC service server to acknowledge the MC service emergency alert cancel request. For a multicast call scenario, these acknowledgements are not sent.

NOTE 3: Steps 2 and 3 can be performed in which ever order.

10.6.5.2 Emergency alert cancellation of an MC service user

In this procedure, an MC service user is cancelling the emergency alert. Figure 10.6.5.2-1 shows the procedure for emergency alert cancellation from a user in the MC service system. This subclause is based upon subclause for MCPTT emergency alerts in 3GPP TS 23.379 [7], subclause 10.6.2.6.3.2.

Pre-conditions:

1. The MC service group information is available at the IWF, including information that the MC service group is an interworking group (defined in the LMR system or the MC system).

2. The MC service client 1 had previously successfully initiated an MC service emergency alert request.

3. The MC service client 1 is still in the emergency state.

4. The MC service client 2 is affiliated to the MC service group.

5. The MC service server may have carried out an explicit or implicit affiliation procedure of the LMR user with the MC service group.

6. The mapping relationship of group and user identities between the MC service system and the LMR system has been configured at the IWF.

NOTE 1: For all the signalling messages passing through the IWF between the MC service system and the LMR system, the IWF performs the identity conversion and protocol translation.
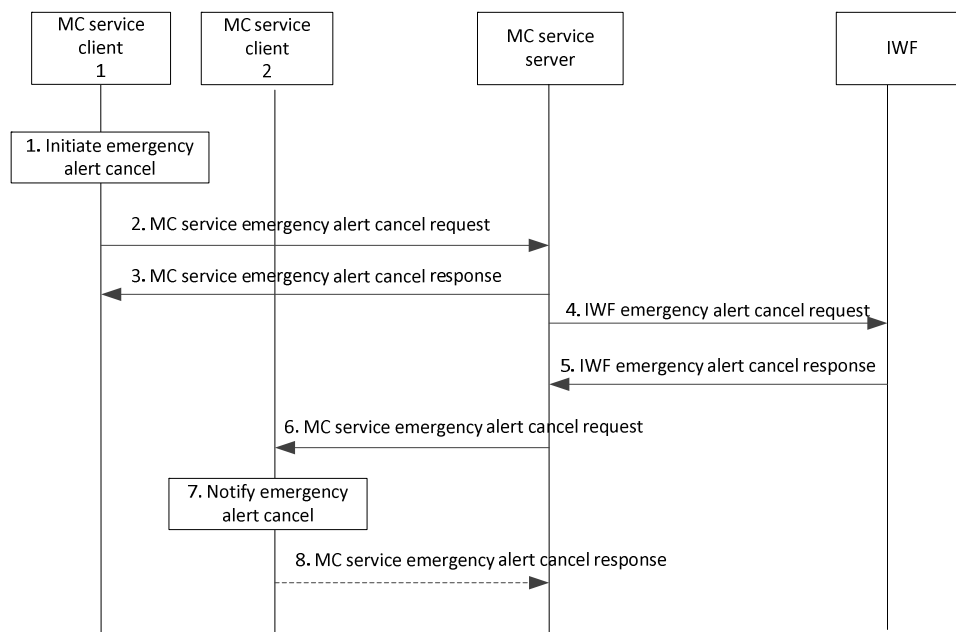
Figure 10.6.5.2-1 MC service emergency alert cancellation of an MC service user

1. The user at the MC service client 1 initiates an emergency alert cancel.

NOTE 2: The MC service emergency alert cancel request may carry an indication that the in-progress emergency state on the group is to be cancelled.

2. MC service client 1 requests the MC service server to send an MC service emergency alert cancel to the MC service group to which MC service client 1 had previously sent the emergency alert request. The MC service server resolves the group ID, determines the affiliation status of the group members and checks whether the IWF should be informed. In this scenario, the group has affiliated members that are homed on the IWF, thus the IWF shall be involved.

3. The MC service server sends the MC service emergency alert cancel response to the MC service client 1 to confirm the MC service emergency alert cancel request. MC service client 1 resets its emergency state.

4. The MC service server sends an IWF emergency alert cancel request(s) to the IWF. If the IWF has affiliated to this group on behalf of the group's LMR users, only one IWF emergency alert cancel request message is sent to the IWF. If the MCPTT server has received individual affiliations from the group's LMR users, an individual IWF emergency alert cancel request message is sent to the IWF for each affiliated LMR user.

5. The IWF sends an IWF emergency alert cancel response(s) to the MC service server to acknowledge the IWF emergency alert cancel request(s).

6. The MC service server sends an MC service emergency alert cancel request towards the MC service clients of the affiliated MC service group members.

7. MC service users are notified of the MC service emergency alert cancellation of MC service client 1.

8. The receiving MC service clients send the MC service emergency alert cancel response to the MC service server to acknowledge the MC service emergency alert cancel request. For a multicast call scenario, these acknowledgements are not sent.

NOTE 3: Steps 3 and 4 can be performed in which ever order.

10.7   Codec

10.7.1   Information flows for codec

10.7.1.1   IWF codec reconciliation request

Table 10.7.1.1-1 describes the information flow IWF codec reconciliation request from the IWF to the MCPTT server.

Table 10.7.1.1-1: IWF codec reconciliation request

Information element	Status	Description
MCPTT group ID	M	The MCPTT group ID for which a codec change is requested.
Codec type	M	Type of the requested codec

10.7.1.2   IWF codec reconciliation response

Table 10.7.1.2-1 describes the information flow IWF codec reconciliation response from the MCPTT server to the IWF.

Table 10.7.1.2-1: IWF codec reconciliation response

Information element	Status	Description
MCPTT group ID	M	The MCPTT group ID for which a codec change was requested.
Result	M	Result indicates success or failure of the requested codec change.

10.7.2   IWF transcoding

The IWF can be used to transcode voice packets in transit between the LMR and MCPTT systems. In this scenario, the MCPTT system can operate its own vocoder type and the LMR system can operate its own vocoder type. The type of vocoder used on the LMR side is outside the scope of the present document.

When operating in this mode, the IWF converts voice media formats between the two sides. Vocoder negotiation is according to procedures in the present document.

10.7.3   Codec negotiation by the LMR system

10.7.3.1   Description

An MCPTT group may be configured to use an LMR speech codec, such that speech can be carried end to end between all group members in both LMR and MCPTT system without transcoding.

An LMR system can support more than one speech codec; for example P25 supports both a full rate and a half rate speech codec. Circumstances within the LMR system might require that the codec in use within a group is changed according to the needs of the LMR system.

Figure 10.7.3.1-1 below illustrates a procedure which allows the LMR system to change the speech codec within an MCPTT group that is connected to the LMR system via the IWF.

Pre-conditions:

1. Group members have affiliated to the MCPTT group in both the LMR system and in the MCPTT system

2. A permitted LMR codec has been negotiated for use by MCPTT group members

3. MCPTT group members support the requested second LMR speech codec

NOTE 1: The exception condition created if the IWF does not support trancoding and the MCPTT client does not support the requested LMR codec is outside the scope of the present document.

4. The LMR system requires a change to an alternative speech codec.
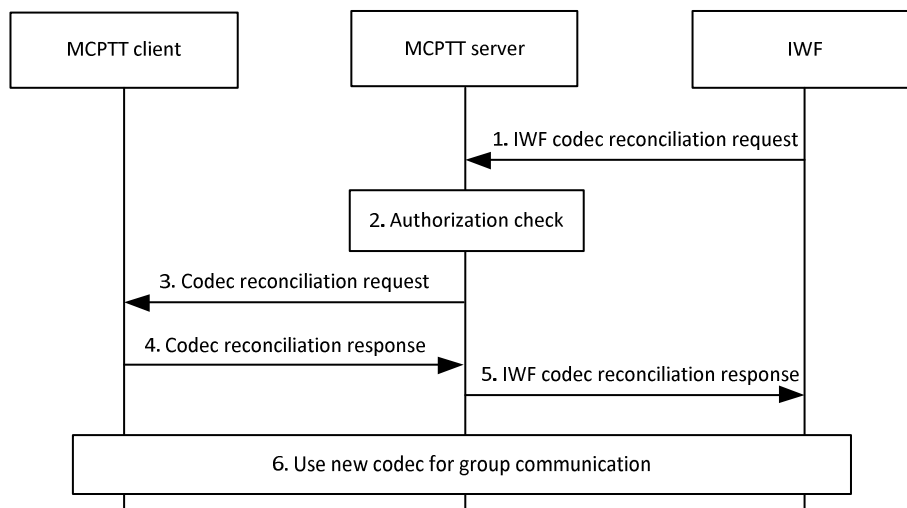
Figure 10.7.3.1-1: Codec reconciliation procedure

1. The IWF sends a codec reconciliation request to the MCPTT server on behalf of the LMR system.

2. The MCPTT server checks that the requested codec is permitted for the MCPTT group.

3. The MCPTT server sends a codec reconciliation request to all of the affilliated MCPTT client(s) to negotiate the use of the speech codec requested by the LMR system.

4. The MCPTT client replies with a codec reconciliation response to the MCPTT server, indicating acceptance of the new speech codec.

5. The MCPTT server sends a codec reconciliation response to the IWF.

6. Further transmissions in the MCPTT group use the new codec in the media plane.

NOTE 2: The time at which the new codec is first used by a transmitting party is outside the scope of the present document.

10.8 MCData short data service

10.8.1 General

The present document specifies short data service (SDS) interworking between LMR users and MCData clients using one-to-one standalone SDS messages and group standalone SDS messages. The IWF behaves as a peer MCData server to other MCData servers.

When an LMR user attempts to send an LMR message to the MCData service, the IWF converts the LMR message into a request to send an MCData SDS. The method by which the IWF converts the LMR message into a request to send an MCData SDS is outside the scope of the present document.

When the IWF receives a request to send an MCData SDS to an LMR user or a group of LMR users, the IWF converts the request into one or more LMR messages. The method by which the IWF converts the MCData SDS request into an LMR messages is outside the scope of the present document.

10.8.2   Information flows for the short data service

10.8.2.1   General

The following subclauses define information flows for MCData SDS on the IWF-2 interface. MCData SDS related information flows on reference points other than IWF-2 are defined in 3GPP TS 23.282 [6], subclause 7.4.2.1. In each case, the LMR users behind the IWF are represented by MCData IDs or a MCData group ID as appropriate and so the MCData server shall be capable of routing messages towards identities located behind the IWF.

10.8.2.2   IWF MCData standalone data request

Table 10.8.2.2-1 describes the information flow for the MCData standalone data request (in 3GPP TS 23.282 [6] subclauses 7.4.2.2.2 and 7.4.2.3.2) sent from the MCData server to the IWF and from the IWF to a MCData server.

Table 10.8.2.2-1: IWF MCData standalone data request

Information element	Status	Description
MCData ID	M	The identity of the MCData user sending data
MCData ID	M	The identity of the MCData user towards which the data is sent
Conversation Identifier (see NOTE 1)	M	Identifies the conversation
Transaction Identifier (see NOTE 1)	M	Identifies the MCData transaction
Reply Identifier	O	Identifies the original MCData transaction to which the current transaction is a reply to
Disposition Type	O	Indicates the disposition type expected from the receiver (i.e., delivered or read or both)
Payload Destination Type	M	Indicates whether the payload is for application consumption or MCData client consumption
Application identifier (see NOTE 2)	O	Identifies the application for which the payload is intended (e.g. text string, port address, URI)
Payload	M	SDS content
NOTE 1: A reserved value of the Information Element shall be defined which indicates that the sender does not support this Information Element.		
NOTE 2: The application identifier shall be included only if the payload destination type indicates that the payload is for application consumption.		

10.8.2.3   IWF MCData data disposition notification

Table 10.8.2.3-1 describes the information flow for the MCData data disposition notification sent from the IWF to the MCData server and from the MCData server to the IWF.

Table 10.8.2.3-1: IWF MCData data disposition notification

Information element	Status	Description
MCData ID	M	The identity of the MCData user towards which the notification is sent
MCData ID	M	The identity of the MCData user sending notification
Conversation Identifier (see NOTE)	M	Identifies the conversation
Disposition association	M	Identity of the original MCData transaction
Disposition	M	Disposition which is delivered, read, delivered and read, or disposition prevented by system
NOTE: A reserved value of the Information Element shall be defined which indicates that the sender does not support this Information Element.		

10.8.2.4   IWF MCData group standalone data request (IWF – MCData server)

Table 10.8.2.4-1 describes the information flow for the MCData group standalone data request (in 3GPP TS 23.282 [6] subclause 7.4.2.5.2) sent from the IWF to the MCData server when the IWF is acting as the initiating MCData client.

Table 10.8.2.4-1: IWF MCData group standalone data request (IWF – MCData server)

Information element	Status	Description
MCData ID	M	The identity of the MCData user sending data
MCData group ID	M	The MCData group ID to which the data is to be sent
Conversation Identifier (see NOTE 1)	M	Identifies the conversation
Transaction Identifier (see NOTE 1)	M	Identifies the MCData transaction
Reply Identifier	O	Identifies the original MCData transaction to which the current transaction is a reply to
Disposition Type	O	Indicates the disposition type expected from the receiver (i.e., delivered or read or both)
Payload Destination Type	M	Indicates whether the payload is for application consumption or MCData client consumption
Application identifier (see NOTE 2)	O	Identifies the application for which the payload is intended (e.g. text string, port address, URI)
Payload	M	SDS content
NOTE 1: A reserved value of the Information Element shall be defined which indicates that the sender does not support this Information Element.		
NOTE 2: The application identifier shall be included only if the payload destination type indicates that the SDS message is for application consumption.		

10.8.2.5 IWF MCData group standalone data request (MCData server - IWF)

Table 10.8.2.5-1 describes the information flow for the MCData group standalone data request (in 3GPP TS 23.282 [6] subclause 7.4.2.5.2) sent from the MCData server to the IWF when the IWF is acting as proxy for MCData clients.

Table 10.8.2.5-1: IWF MCData group standalone data request (MCData server – IWF)

Information element	Status	Description
MCData ID	M	The identity of the MCData user sending data
MCData group ID	M	The MCData group ID to which the data is to be sent
MCData ID	M	The identity of the MCData user towards which the data is sent
Conversation Identifier	M	Identifies the conversation
Transaction Identifier	M	Identifies the MCData transaction
Reply Identifier	O	Identifies the original MCData transaction to which the current transaction is a reply to
Disposition Type	O	Indicates the disposition type expected from the receiver (i.e., delivered or read or both)
Payload Destination Type	M	Indicates whether the payload is for application consumption or MCData client consumption
Application identifier (see NOTE)	O	Identifies the application for which the payload is intended (e.g. text string, port address, URI)
Payload	M	SDS content
NOTE: The application identifier shall be included only if the payload destination type indicates that the payload is for application consumption.		

10.8.2.6 IWF MCData data disposition notification(s) (MCData server to IWF)

Table 10.8.2.6-1 describes the information flow for the MCData data disposition notification(s) sent from the MCData server to the IWF when the IWF is acting as proxy for MCData client(s).

Table 10.8.2.6-1: IWF MCData data disposition notification(s) (MCData server – IWF)

Information element	Status	Description
MCData ID	M	The identity of the MCData user towards which the notification is sent
MCData ID	M	The identity of the MCData user sending notification
Conversation Identifier	M	Identifies the conversation
Disposition association	M	Identity of the original MCData transaction
Disposition	M	Disposition which is delivered, read, delivered and read, or disposition prevented by system

10.8.2.7 IWF MCData group standalone data request (IWF – MCData server)

Table 10.8.2.7-1 describes the information flow for the MCData group standalone data request (in 3GPP TS 23.282 [6] subclause 7.4.2.6.2) sent from the IWF representing the MCData client to the MCData server.

Table 10.8.2.7-1: IWF MCData group standalone data request (IWF – MCData server)

Information element	Status	Description
MCData ID	M	The identity of the MCData user sending data
MCData group ID	M	The MCData group ID to which the data is to be sent
Conversation Identifier (see NOTE 1)	M	Identifies the conversation
Transaction Identifier (see NOTE 1)	M	Identifies the MCData transaction
Reply Identifier	O	Identifies the original MCData transaction to which the current transaction is a reply to
Transaction type	M	Standalone transaction
Disposition Type	O	Indicates the disposition type expected from the receiver (i.e., delivered or read or both)
Payload Destination Type	M	Indicates whether the SDS payload is for application consumption or MCData user consumption
Application identifier (see NOTE 2)	O	Identifies the application for which the payload is intended (e.g. text string, port address, URI)
SDP offer	M	Media parameters offered
NOTE 1: A reserved value of the Information Element shall be defined which indicates that the sender does not support this Information Element.		
NOTE 2: The application identifier shall be included only if the payload destination type indicates that the SDS message is for application consumption.		

10.8.2.8 IWF MCData group standalone data request (MCData server – IWF)

Table 10.8.2.8-1 describes the information flow for the MCData group standalone data request (in 3GPP TS 23.282 [6] subclause 7.4.2.6.2) sent from the MCData server to the IWF acting as proxy for MCData client(s).

Table 10.8.2.8-1: IWF MCData group standalone data request (MCData server – IWF)

Information element	Status	Description
MCData ID	M	The identity of the MCData user sending data
MCData group ID	M	The MCData group ID to which the data is to be sent
MCData ID	M	The identity of the MCData user towards which the data is sent
Conversation Identifier	M	Identifies the conversation
Transaction Identifier	M	Identifies the MCData transaction
Reply Identifier	O	Identifies the original MCData transaction to which the current transaction is a reply to
Transaction type	M	Standalone transaction
Disposition Type	O	Indicates the disposition type expected from the receiver (i.e., delivered or read or both)
Payload Destination Type	M	Indicates whether the SDS payload is for application consumption or MCData user consumption
Application identifier (see NOTE)	O	Identifies the application for which the payload is intended (e.g. text string, port address, URI)
SDP offer	M	Media parameters offered
NOTE: The application identifier shall be included only if the payload destination type indicates that the payload is for application consumption.		

10.8.2.9 IWF MCData group standalone data response

Table 10.8.2.9-1 describes the information flow for the MCData group standalone data response (in
3GPP TS 23.282 [6] subclause 7.4.2.6.2) sent from the IWF to the MCData server and from the MCData server to the
IWF acting as proxy for other MCData clients.

Table 10.8.2.9-1: IWF MCData group standalone data response

Information element	Status	Description
MCData ID	M	The identity of the MCData user receiving data
MCData group ID	M	The MCData group ID to which the data is to be sent
MCData ID	M	The identity of the MCData user sent data
Conversation Identifier (see NOTE)	M	Identifies the conversation
SDP answer	M	Media parameters selected
NOTE: A reserved value of the Information Element shall be defined which indicates that the sender does not support this Information Element.		

10.8.3 Behaviour at the MCData Client

The MCData client interfaces with the MCData server as specified in 3GPP TS 23.282 [6].

10.8.4 Behaviour at the IWF

The IWF interfaces with the MCData server via the reference points defined in subclause 7.4 of the present document.

10.8.5 Behaviour at the MCData server

The MCData server behaves as specified in 3GPP TS 23.282 [6], with the addition that the MCData server shall route
SDS messages addressed to MCData IDs and MCData group IDs that lie behind IWFs to the appropriate IWFs.

10.8.6 MCData user one-to-one SDS request to an LMR user

10.8.6.1 Signalling control plane

The procedure for an MCData user requesting to send a signalling control plane SDS to a single LMR user is as
specified in 3GPP TS 23.282 [6] subclause 7.4.2.2 for the one-to-one standalone short data service using the signalling

control plane, with the exception that MCData client 2 is located behind the IWF. The SDS is addressed to the MCData ID that has been allocated to the LMR user. The IWF behaves as a peer MCData server.

10.8.6.2 Media plane

The procedure for an MCData user requesting to send a media plane SDS to a single LMR user is as specified in 3GPP TS 23.282 [6] subclause 7.4.2.3 for the one-to-one standalone short data service using the media plane, with the exception that MCData client 2 is located behind the IWF. The SDS is addressed to the MCData ID that has been allocated to the LMR user. The IWF behaves as a peer MCData server.

10.8.7 LMR user one-to-one SDS request to an MCData user

10.8.7.1 Signalling control plane

The procedure for an IWF requesting, on behalf of an LMR user, to send a signalling control plane SDS to a single MCData user is as specified in 3GPP TS 23.282 [6] subclause 7.4.2.2 for the one-to-one standalone short data service using the signalling control plane, with the exception that MCData client 1 is located behind the IWF. The source address of the SDS is the MCData ID that has been allocated to the LMR user. The IWF behaves as a peer MCData server.

10.8.7.2 Media plane

The procedure for an IWF requesting, on behalf of an LMR user, to send a media plane SDS to a single MCData user is as specified in 3GPP TS 23.282 [6] subclause 7.4.2.3 for the one-to-one standalone short data service using the media plane, with the exception that MCData client 1 is located behind the IWF. The source address of the SDS is the MCData ID that has been allocated to the LMR user. The IWF behaves as a peer MCData server.

10.8.8 MCData user group SDS request to an MCData group including LMR users

10.8.8.1 Signalling control plane

The procedure for an MCData user requesting to send a signalling control plane SDS to an MCData group that includes one or more LMR users is as specified in 3GPP TS 23.282 [6] subclause 7.4.2.5 for the group standalone short data service using the signalling control plane. In the case of implementation involving an IWF the difference is that one or more of the MCData clients 2 to n are located behind IWFs that have affiliated to the MCData group (see subclause 10.1.2 of the present document). The SDS is addressed to the MCData group ID. The IWF behaves as a peer MCData server. The IWF can also respond on behalf on a MCData client located behind the IWF to a disposition request with a disposition of 'disposition prevented by system' for forwarding to the originating MCData client.

10.8.8.2 Media plane

The procedure for an MCData user requesting to send a media plane SDS to an MCData group that includes one or more LMR users is as specified in 3GPP TS 23.282 [6] subclause 7.4.2.6 for the group standalone short data service using the media plane. In the case of implementation involving an IWF the difference is that one or more of the MCData clients 2 to n can be located behind IWFs that have affilated to the MCData group (see subclause 10.1.2 of the present document). The SDS is addressed to the MCData group ID. The IWF behaves as a peer MCData server. The IWF can also respond on behalf on a MCData client located behind the IWF to a disposition request with a disposition of 'disposition prevented by system' for forwarding to the originating MCData client.

10.8.9 LMR user group SDS request to an MCData group

10.8.9.1 Signalling control plane

The procedure for an IWF requesting, on behalf of an LMR user, to send a signalling control plane SDS to an MCData group is as specified in 3GPP TS 23.282 [6] subclause 7.4.2.5 for the group standalone short data service using the signalling control plane, with the exception that MCData client 1 is located behind an IWF and one or more of the

MCData clients 2 to n can be behind IWFs that have affiliated to the MCData group (see subclause 10.1.2 of the present document). The SDS is addressed to the MCData group ID. The IWF behaves as a peer MCData server to other MCData servers.

10.8.9.2 Media plane

The procedure for an IWF requesting, on behalf of an LMR user, to send a media plane SDS to an MCData group is as specified in 3GPP TS 23.282 [6] subclause 7.4.2.6 for the group standalone short data service using the media plane, with the exception that MCData client 1 is located behind an IWF and one or more of the MCData clients 2 to n can be behind IWFs that have affiliated to the MCData group (see subclause 10.1.2 of the present document). The SDS is addressed to the MCData group ID. The IWF behaves as a peer MCData server to other MCData servers.

10.9 IWF as a security gateway

10.9.1 Support for transcoding with encrypted speech

In some cases when encryption of voice media is required in the MC system, the MCPTT user(s) and the LMR user(s) can use different codecs. In these cases, transcoding is needed and before transcoding can occur, encryption applied to the voice media by the MC system needs to be removed. After transcoding, LMR encryption can be applied (out-of-scope of the present document). An IWF can perform these functions and be deployed as a security gateway between the MCPTT system and the LMR system. When the IWF removes the encryption applied by the MC system, the IWF must perform key management procedures defined in 3GPP TS 33.180 [8] to obtain the key material for the group.

10.10 Simultaneous interworked calls (on-network)

10.10.1 General

An IWF representing an LMR user may support simultaneous interworked calls for the same LMR user. The LMR user can become involved in simultaneous interworked calls when the IWF invites, joins or accepts more than one interworked call on behalf of the LMR user, or when the IWF affilates the LMR user to multiple groups. This subclause is based on the subclause for simultaneous session for MCPTT calls in 3GPP TS 23.379 [7], subclause 10.8.

> NOTE: An LMR user affiliating to multiple interworked groups with active calls via the IWF can result in the LMR user being invited simultaneously to multiple interworked calls.

How the IWF accomodates simultaneous interworked calls to a single LMR user is outside the scope of the present document.

10.11 Location

10.11.1 Location of current talker

3GPP TS 23.379 [7], subclause 10.6.2.7 describes a high-level procedure to provide the location of the current talker to all the receiving MCPTT users.

10.11.2 Location of current talker (MCPTT server to IWF)

Figure 10.11.2-1 shows the high-level procedure to for MCPTT service to provide the location information about the current talking user to all the receiving MCPTT users and the IWF.

Pre-conditions:

1. There is on-going group call involving MCPTT client 1 and MCPTT client 2 and the IWF.

2. MCPTT client 1 is the current talking user.

3. MCPTT server has obtained the location information of MCPTT client 1.
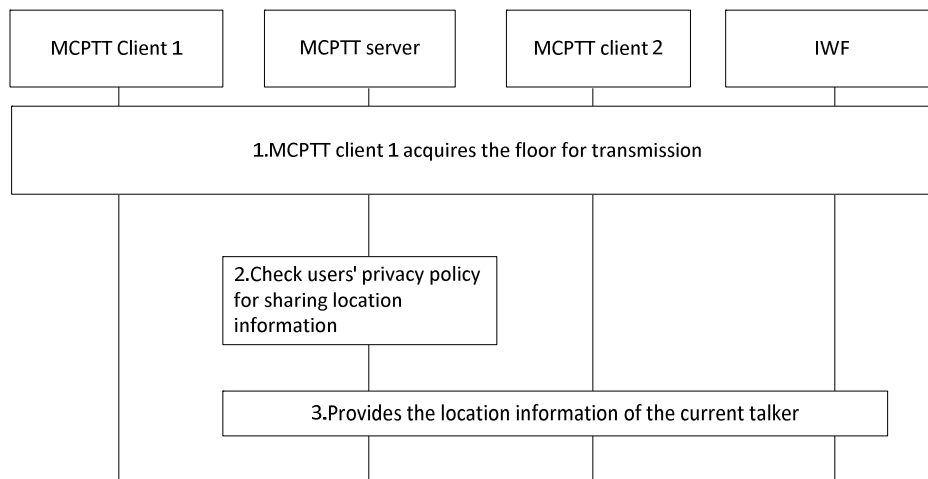
Figure 10.11.2-1: Providing location information of the current talker

1. MCPTT client 1 gets the floor to transmit voice media.

2. The MCPTT server checks the privacy policy (authorisation to provide location information to other MCPTT users on a call when talking, as defined in 3GPP TS 23.379 [7] Annex A.3) of the current talking MCPTT user to decide if the location information of MCPTT client 1 can be provided to other MCPTT users on the call.

3. If the privacy policy permits, the MCPTT server provides the location information of MCPTT client 1 to MCPTT client 2 and the IWF. The procedures for this are described in 3GPP TS 23.280 [5] subclause 10.9.3.6. Optionally, the location information may be provided in the floor taken message sent to MCPTT client 2 and the IWF according to 3GPP TS 23.379 [7] subclause 10.9.1.3.1, if the privacy policy permits.

10.11.3 Location of current talker (IWF to MCPTT server)

Figure 10.11.3-1 shows the high-level procedure to for the IWF to provide the location information about the current LMR talking user to all the receiving MCPTT users.

Pre-conditions:

1. There is on-going group call involving MCPTT client 1 and MCPTT client 2 and the IWF.

2. An LMR user is the current talking user through the IWF.

NOTE: How the MCPTT server acquires the location of the LMR user is outside the scope of the present document.
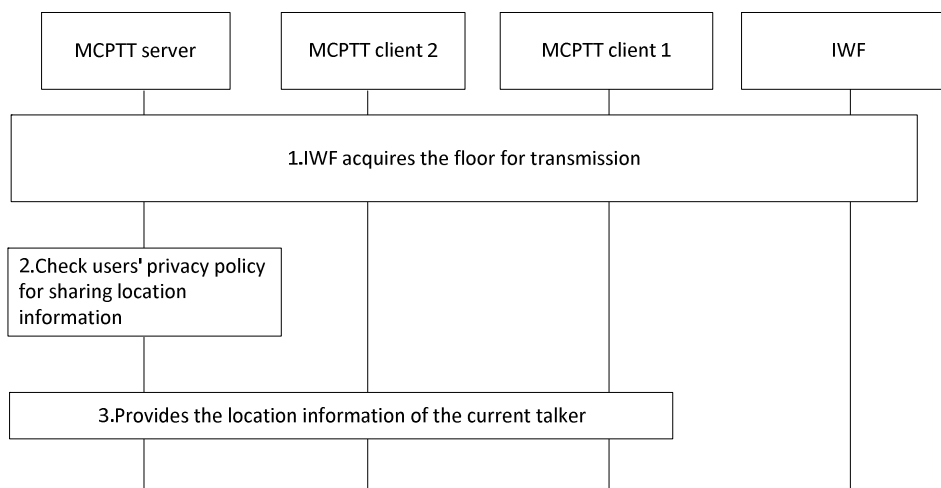
Figure 10.11.3-1: Providing location information of the current talker

1. The IWF gets the floor to transmit voice media.

2. The MCPTT server checks the privacy policy (authorisation to provide location information to other MCPTT users on a call when talking, as defined in 3GPP TS 23.379 [7] Annex A.3) of the current talking IWF user to decide if the location information of the user on the IWF can be provided to other MCPTT users on the call.

3. The MCPTT server provides the location information of the IWF user to MCPTT client 1 and MCPTT client 2. The procedures for this are described in 3GPP TS 23.280 [5] subclause 10.9.3.6. Optionally, the location information may be provided in the floor taken message sent to MCPTT client 2 and the IWF according to 3GPP TS 23.379 [7] subclause 10.9.1.3.1.

10.12 LMR security transport

10.12.1 Information flows for LMR security transport

10.12.1.1 Non-3GPP security message request

Table 10.12.1.1-1 describes the information flow non-3GPP security message request from the MC service server to the IWF, from the IWF to the MC service server, from the MC service server to the MC service client and from the MC service client to the MC service server.

Table 10.12.1.1-1: Non-3GPP security message request

Information Element	Status	Description
MC service ID	M	The identity of the MC service user
URI of LMR security functional entity	M	URI of LMR key management functional entity user profile parameter defined in 3GPP TS 23.379 [7]
LMR type	O	The LMR technology, e.g. TETRA, P25. Required when sent toward the MC service client.
Payload	M	Opaque payload. Contents and format are out of 3GPP scope.

10.12.1.2 Non-3GPP security message response

Table 10.12.1.2-1 describes the information flow non-3GPP security message response from the MC service server to the IWF, from the IWF to the MC service server, from the MC service server to the MC service client and from the MC service client to the MC service server.

Table 10.12.1.2-1: Non-3GPP security message response

Information Element	Status	Description
MC service ID	M	The identity of the MC service user
URI of LMR security functional entity	M	URI of LMR key management functional entity user profile parameter defined in 3GPP TS 23.379 [7]

10.12.2 LMR key management messages

10.12.2.1 General

This subclause defines end to end messaging to convey the non-3GPP, LMR security information opaquely (message contents are out of 3GPP's scope) across the MC system, between the IWF and the LMR aware MC service client. The end to end messasges are service independent, any MC service may support them.

10.12.2.2 MC service client initiated

Figure 10.12.2.2-1 describes the case where an MC service client sends LMR security information to the IWF.

Pre-conditions:

1. The MC service client is registered and the user is authenticated and authorized to use the MC service server.
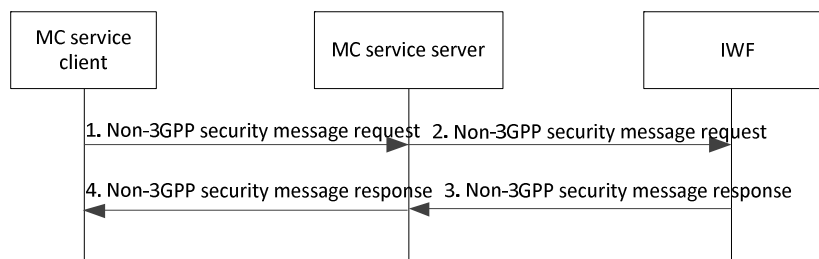
Figure 10.12.2.2-1: Non-3GPP security messaging, MC service client to the IWF

1. The MC service client sends s a non-3GPP security message request to the MC service server. The contents of the message are opaque to the MC service and are out of scope of 3GPP.

2. The MC service server forwards the contents of the non-3GPP security message request to the IWF.

3. The IWF acknowledges with a non-3GPP security message response to the MC service server.

4. The MC service server acknowledges with a non-3GPP security message response to the MC service client.

10.12.2.3 IWF initiated

Figure 10.12.2.3-1 describes the case where the IWF sends LMR security information to an MC service client.

Pre-conditions:

1. The MC service client is registered and the user is authenticated and authorized to use the MC service server.
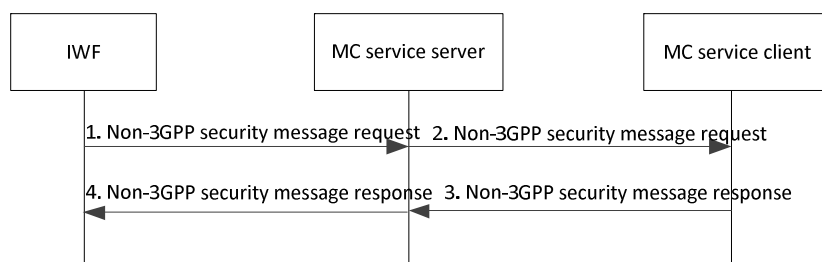
Figure 10.12.2.3-1: Non-3GPP security, from the IWF to MC service client

1. The IWF sends a non-3GPP security message request to the MC service server. The contents of the message are opaque to the MC service and are out of scope of 3GPP.

2. The MC service server forwards the contents of non-3GPP security message request to the MC service client.

3. The MC service client acknowledges with a non-3GPP security message response to the MC service server.

4. The MC service server forwards the non-3GPP security message response to the IWF.

10.13 Analogue FM/TIA-603-D and other legacy LMR interworking

10.13.1 General

An IWF representing an LMR user can support interworking with legacy analogue FM radio systems that are compliant with the TIA-603-D [9] Standard. This type of legacy LMR system is sometimes referred to as conventional FM radio.

Characteristics of legacy conventional FM radio include:

-   Voice media is conveyed without the use of a voice codec.

-   There is no possibility of end-to-end encryption between an LMR user and a MC user.

-   Group communication is possible using various means to identify a group such as a single channel / FM frequency, or sub-audible data as defined in [3]. The means for identifying groups within the legacy conventional FM system is outside the scope of the present document.

-   The ID of the talking party is generally not available. Various means to identify a talker are available in legacy conventional FM systems, but this is outside the scope of the present document.

-   Indication of call priority (e.g. emergency) is generally not available. Various means to identify priority are available in legacy conventional FM systems, but this is outside the scope of the present document.

Other legacy LMR systems such as digital conventional (e.g. P25 conventional), trunked analogue FM systems, non-standard legacy LMR systems, both conventional and trunked, can also be supported as long as they conform to the present document.

10.13.2 Interworking Concepts

Procedures defined in the present document are applicable to interworking with legacy analogue FM radio systems.

Architecture concepts for interworking are summarized below, including general information for other legacy conventional radio systems.

- The IWF is configured with knowledge of groups and users from legacy conventional LMR radio systems. Translations to MCPTT Group and MCPTT User IDs is performed by the IWF as specified in the present document. How the legacy LMR conventional system supports groups, such as mapping a group to a channel/frequency, or using a Group ID (i.e. P25 conventional), or mapping some other protocol element or tone signalling to a group is outside the scope of the present document.

- Interworking to a legacy conventional LMR system can make use of the following procedures as defined in the present document:

  - affiliation;

  - group management including group regrouping

  - group calls including pre-arranged, chat, and broadcast;

  - priority calls including emergency and imminent peril; and

  - private calls.

NOTE 1: Some analogue FM conventional LMR systems and digital conventional LMR systems support various schemes for private call. These can be supported as long as they conform to the present document.

- Interworking to a legacy conventional LMR system can make use of the following functions of the MCPTT system, as defined in the present document:

  - transcoding.

- Interworking to a legacy conventional LMR system can make use of the following functions of the MCPTT system, as defined in the present document, with some limitations:

  - caller ID / talker ID;

  - priority indication (e.g. emergency);

  - end-to-end encryption;

  - location; and

  - short data service.

NOTE 2: Some digital conventional LMR systems, such as P25 Conventional, natively support group IDs, user IDs, short data, and priority indication. In some cases, the talker ID becomes available sometime after the call starts.

NOTE 3: Some analogue FM conventional LMR systems support various schemes for caller ID, emergency, and other features (e.g. Multi-tone, Type 99). These can be supported as long as they conform to the present document. In some cases, the talker ID becomes available sometime after the call starts.

NOTE 4: Some digital conventional LMR systems, such as P25 Conventional, can support end-to-end encryption between the LMR user and a MC user. There is no possibility of end-to-end encryption between an analogue FM LMR user and a MC user.

10.13.3 Procedures

As described above, existing procedures in this document can be used for interworking with legacy conventional LMR radio systems.

The following procedures describe special cases where the MCPTT ID (i.e. talker ID) is updated during a media transmission within a call. This mechanism of updating the MCPTT ID part way through an MCPTT media transmission may be used for any MCPTT media transmission described elsewhere in the present document.

10.13.3.1 Group call with talker ID update initiated by an LMR user on an interworking group defined in the MCPTT system

In this procedure, an LMR user in a legacy conventional FM radio system initiates a group call on an interworking group defined in the MCPTT system. The talker ID is not known at the start of the call and is updated after media transmission begins. The signalling procedure is described in figure 10.13.3.1-1.

This subclause is based upon subclause for pre-arranged group call setup in 3GPP TS 23.379 [7], subclause 10.6.2.3.1.1.2.

Pre-conditions:

1. The interworking group information is known at the MCPTT server and the IWF by configuration or group creation. The interworking group has been defined in the MCPTT system.

2. MCPTT client 1 and MCPTT client 2 are registered and their respective users are authenticated and authorized to use the MCPTT service.

3. The users in this interworking group have been affiliated to the interworking group.

4. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.

5. The LMR user in a legacy conventional FM radio system initiates a group call.

NOTE 1: For all the signalling messages passing through the IWF between the MCPTT system and the LMR system, the IWF performs the identity conversion and protocol translation.

Figure 10.13.3.1-1: Group call with talker ID update initiated by an LMR user on an interworking group defined in the MCPTT system
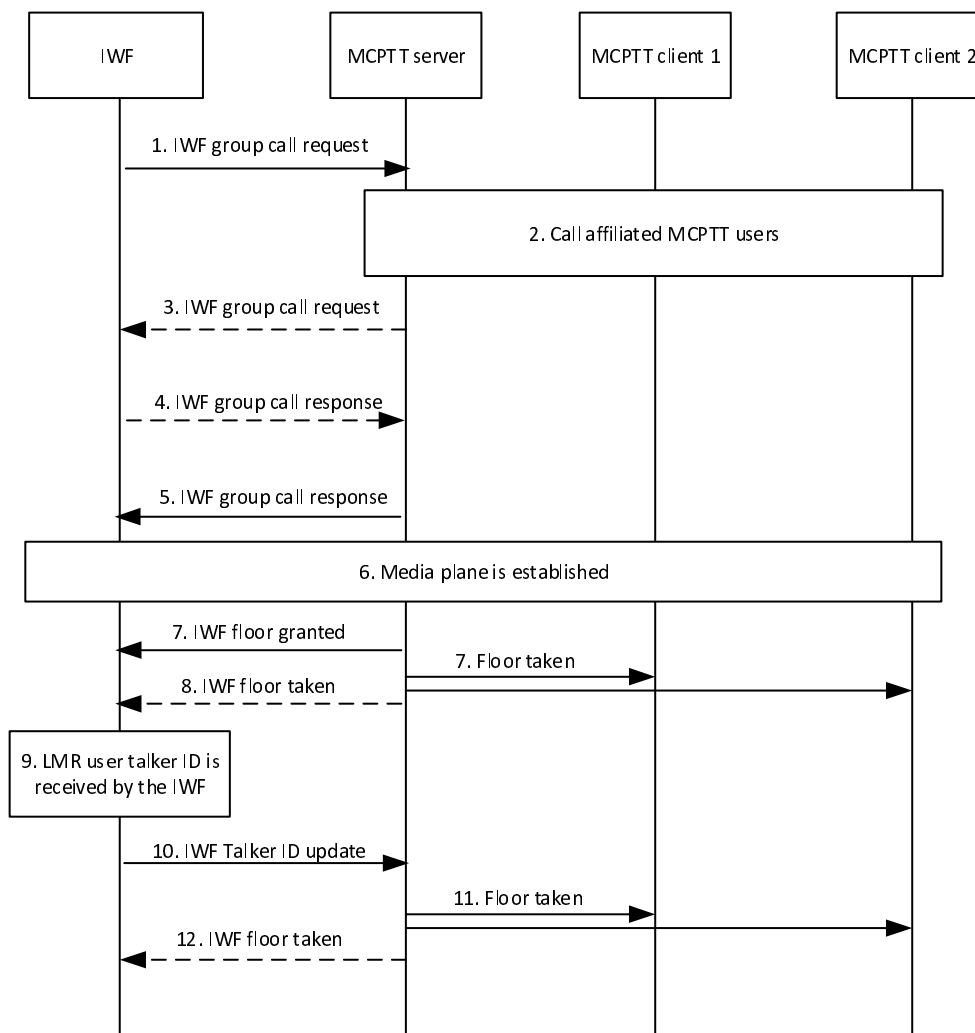
1. The IWF sends an IWF group call request to the MCPTT server for call establishment. In this case floor control is also requested and an indication of implicit floor request is included. The IWF uses its pre-configured MCPTT ID in the group call request.

2. The MCPTT server calls the affiliated users from the MCPTT system as described in 3GPP TS 23.379 [7]. The LMR user is in a legacy conventional FM radio system so E2EE is not specified, and transcoding is needed at the IWF.

3. If the group has other affiliated LMR users than the calling party and the MCPTT server has received individual affiliations from those LMR users, an individual IWF group call request is sent to the IWF for each affiliated LMR user.

NOTE 2: Steps 2 and 3 can occur in any order.

NOTE 3: How the LMR users from the LMR system are being called is outside the scope of the present document.

4. The IWF returns IWF group call response(s) to the MCPTT server.

5. The MCPTT server confirms the successful establishment of the group call by sending an IWF Group call response to the IWF.

NOTE 4: How the group call response is returned to the initiating LMR user is outside the scope of the present document.

6. The interworking group call has successfully established media plane for communication and any user can transmit media. The MCPTT system where the interworking group is defined is the controlling system of the group call and manages the floor control.

NOTE 5: How the floor control is managed in the LMR system is outside the scope of the present document.

7. Because the group call request contained an imlicit floor request, and no other users are requesting the floor, the MCPTT server sends an IWF floor granted message to the IWF confirming that the IWF has the floor. The MCPTT server also sends Floor taken messages to the affiliated users in the MCPTT system. The MCPTT ID in the floor taken messages is the pre-configured IWF MCPTT ID.

8. If the group has other affiliated LMR users than the calling party, and the MCPTT server has received individual affiliations from those LMR users, an individual IWF floor taken message is sent to the IWF for each affiliated LMR user.

9. At some time after media transfer begins, the IWF receives knowledge of the LMR user's talker ID.

NOTE 6: How the IWF learns the LMR user's talker ID is outside the scope of the present document. In some LMR conventional systems, the talker ID becomes available shortly after the start of the call; in other systems, it is not available until the end of the call.

10. The IWF sends an IWF talker ID update to the MCPTT server informing the server that a new talker is using the floor, but the floor should not be released.

11. The MCPTT server sends Floor taken messages to the affiliated users in the MCPTT system. The MCPTT ID in the floor taken messages is the new talker ID contained in the IWF talker ID update.

NOTE 7: All other floor participants (not shown) that are part of this group call receive a floor taken message, so that the other floor participants learn the identity of the newly granted talker.

12. If the group has other affiliated LMR users than the calling party, and the MCPTT server has received individual affiliations from those LMR users, an individual IWF floor taken message is sent to the IWF for each affiliated LMR user.

10.13.3.2 Group call with talker ID update initiated by an LMR user on an interworking group defined in the LMR system

In this procedure, an LMR user in a legacy conventional FM radio system initiates a group call on an interworking group defined in the LMR system. The talker ID is not known at the start of the call and is updated after media transmission begins. The signalling procedure is described in figure 10.13.3.2-1.

This subclause is based upon subclause for pre-arranged group call setup in 3GPP TS 23.379 [7], subclause 10.6.2.3.1.1.2.

Pre-conditions:

1. The interworking group information is known at the MCPTT server and the IWF by configuration or group creation. The interworking group has been defined in the LMR system.

2. MCPTT client 1 and MCPTT client 2 are registered and their respective users are authenticated and authorized to use the MCPTT service.

3. The users in this interworking group have been affiliated to the interworking group.

4. The mapping relationship of group and user identities between the MCPTT system and the LMR system has been configured at the IWF.

5. The LMR user in a legacy conventional FM radio system initiates a group call.

NOTE 1: For all the signalling messages passing through the IWF between the MCPTT system and the LMR system, the IWF performs the identity conversion and protocol translation.

Figure 10.13.3.2-1: Group call with talker ID update initiated by an LMR user on an interworking group defined in the LMR system

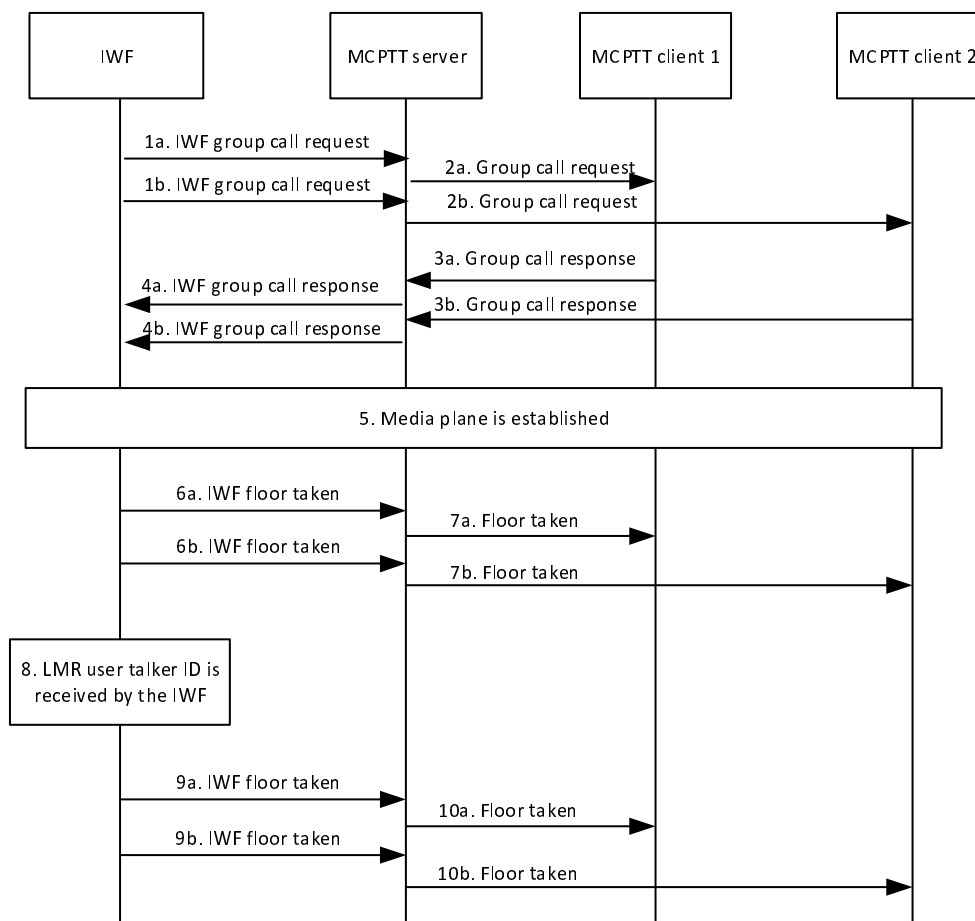1. The IWF sends an IWF group call request(s) to the MCPTT server for call establishment. An individual IWF group call request is sent to the MCPTT server for each affiliated MCPTT user in the group, in this example scenario to the users in MCPTT clients 1 and 2. In this case floor control is also requested and an indication of implicit floor request is included. The IWF uses its pre-configured MCPTT ID in the group call request.

2. The MCPTT server sends a group call request(s) to the target MCPTT user(s) as described in 3GPP TS 23.379 [7]. The LMR user is in a legacy conventional FM radio system so E2EE is not specified, and transcoding is needed at the IWF.

3. MCPTT client(s) receiving the group call request, acknowledge towards the MCPTT server by sending a group call response.

4. The MCPTT server acknowledges the IWF group call request(s) by sending an IWF group call response(s) to the IWF.

NOTE 2: How the IWF group call response(s) is handled in the IWF / LMR system and how the other LMR users are being called is outside the scope of the present document.

5. The interworking group call has successfully established media plane for communication and any user can transmit media. The LMR system where the interworking group is defined is the controlling system of the group call and manages the floor control.

NOTE 3: How the floor control is managed in the LMR system is outside the scope of the present document.

6. Because the group call request contained an implicit floor request, and no other users are requesting the floor, the IWF sends an IWF floor taken message to the MCPTT server confirming that the IWF has the floor. An individual IWF floor taken message is sent to the MCPTT server for each affiliated MCPTT user in the group, in this example scenario to the users in MCPTT clients 1 and 2.

7. The MCPTT server sends Floor taken to the target MCPTT user(s) in the MCPTT system. The MCPTT ID in the floor taken messages is the pre-configured IWF MCPTT ID.

8. At some time after media transfer begins, the IWF receives knowledge of the LMR user's talker ID.

NOTE 4: How the IWF learns the LMR user's talker ID is outside the scope of the present document. In some LMR conventional systems, the talker ID becomes available shortly after the start of the call; in other systems, it is not available until the end of the call.

9. The IWF sends an IWF floor taken to the MCPTT server informing the server that a new talker is using the floor, but the floor should not be released. An individual IWF floor taken message is sent to the MCPTT server for each affiliated MCPTT user in the group, in this example scenario to the users in MCPTT clients 1 and 2

10. The MCPTT server sends Floor taken messages to the target MCPTT user(s) in the MCPTT system. The MCPTT ID in the floor taken messages is the new talker ID contained in the IWF talker ID update.

NOTE 5: All other floor participants (not shown) that are part of this group call receive a floor taken message, so that the other floor participants learn the identity of the newly granted talker.

10.14 IWF functional alias management

NOTE: The IWF functional alias management feature has been deferred from the present document.

10.15 Enhanced status

10.15.1 General

3GPP TS 23.282 [6] clause 7.9 describes a high-level procedure to provide enhanced status information to all the receiving MCData users.

10.15.2 Preset values for enhanced status

The configuration of preset values into the group configuration data is described in 3GPP TS 23 282 [6] clause 7.9.2.

10.15.3 Enhanced status for on-network

10.15.3.1 Procedure (MCData to IWF)

The procedure for an MCData user requesting to share enhanced status to an MCData group is as specified in 3GPP TS 23.282 [6] clause 7.9.3 for the enhanced status for on-network use; one or more users using MCData clients 2-n may be LMR users behind an IWF that has affiliated to the MCData group (see clause 10.1.2 of the present document). The IWF behaves as a peer MCData server.

10.15.3.2 Procedure (IWF to MCData)

The procedure for an IWF requesting, on behalf of an LMR user, to share enhanced status to an MCData group is as specified in 3GPP TS 23.282 [6] subclause 7.9.3 for the enhanced status for on-network use, with the exception that MCData client 1 is located behind an IWF and one or more of the MCData clients 2 to n can be behind IWFs that have affiliated to the MCData group (see clause 10.1.2 of the present document). The IWF behaves as a peer MCData server to other MCData servers.

Annex A (informative):
Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2017-06	-	-	-	-	-	TS template	0.0.0
2017-07	SA6#18					Implementation of the following p-CRs approved by SA6: S6-170920, S6-170976, S6-170977, S6-170978, S6-170979, S6-170981, S6-171013, S6-171016, S6-171019, S6-171065, S6-171066, S6-171067, S6-171068, S6-171069, S6-171070, S6-171071 and S6-171072.	0.1.0
2017-10	SA6#19					Implementation of the following p-CRs approved by SA6: S6-171310, S6-171311, S6-171321, S6-171325, S6-171376, S6-171420, S6-171421, S6-171423, S6-171424, S6-171427, S6-171428, S6-171429, S6-171430, S6-171431, S6-171433, S6-171434, S6-171460, S6-171461, S6-171462 and S6-171489.	0.2.0
2017-12	SA6#20					Implementation of the following p-CRs approved by SA6: S6-171511, S6-171533, S6-171614, S6-171723, S6-171724, S6-171725, S6-171726, S6-171727, S6-171728, S6-171733, S6-171735, S6-171738, S6-171740, S6-171741, S6-171749, S6-171751, S6-171797, S6-171801, S6-171802, S6-171803, S6-171806, S6-171808, S6-171809, S6-171827, S6-171828, S6-171853, S6-171854, S6-171875	0.3.0
2017-12	SA6#20					Rapporteur's editorial changes	0.3.1
2017-12	SA#78	SP-170902				Submitted to SA#78 for information	1.0.0
2018-01	SA6#21					Implementation of the following p-CRs approved by SA6: S6-180055, S6-180108, S6-180109, S6-180171, S6-180175, S6-180190, S6-180199, S6-180200, S6-180214	1.1.0
2018-02						Editorial changes	1.1.1
2018-03	SA6#22					Implementation of the following p-CRs approved by SA6: S6-180248, S6-180347, S6-180358, S6-180361, S6-180362, S6-180363, S6-180364, S6-180374, S6-180390, S6-180440, S6-180442, S6-180444, S6-180446, S6-180447, S6-180449, S6-180450, S6-180451, S6-180452, S6-180453, S6-180454, S6-180461, S6-180462, S6-180481, S6-180491.	1.2.0
2018-03						Editorial fixes, missing LMR abbreviation from S6-180364.	1.2.1
2018-03	SA#79	SP-180159				Submitted for approval at SA#79	2.0.0
2018-04	SA#79	SP-180159				MCC Editorial update for publication after TSG SA approval (SA#79)	15.0.0
2018-06	SA#80	SP-180372	0001	2	F	Flow name update from MCPTT call end to MCPTT private call end	15.1.0
2018-06	SA#80	SP-180372	0002	1	F	Corrections to Imminent peril group call initiated by MCPTT user	15.1.0
2018-06	SA#80	SP-180372	0003	2	F	Corrections to Imminent peril group call initiated by LMR user	15.1.0
2018-06	SA#80	SP-180372	0004		F	Corrections to Imminent peril cancel	15.1.0
2018-06	SA#80	SP-180372	0005	3	F	Corrections to chat group call procedures and information flows	15.1.0
2018-06	SA#80	SP-180372	0006	1	F	Alignment of terminology emergency and imminent peril	15.1.0
2018-06	SA#80	SP-180372	0007	1	F	Alignment of terminology - pre-arranged group call	15.1.0
2018-06	SA#80	SP-180372	0008	1	F	IWF actions on Imminent peril group calls	15.1.0
2018-06	SA#80	SP-180372	0009	1	F	Corrections to emergency group call procedures	15.1.0
2018-09	SA#81	SP-180673	0017	2	F	IWF SDS fix	15.2.0
2018-09	SA#81	SP-180679	0014	1	F	IWF affiliation auth update	16.0.0
2018-09	SA#81	SP-180679	0015	1	F	IWF broadcast call fixes	16.0.0
2018-09	SA#81	SP-180679	0016	1	F	IWF alert cancel alignment	16.0.0
2018-12	SA#82	SP-181179	0019		F	IWF group call request broadcast indicator correction	16.1.0
2018-12	SA#82	SP-181179	0021	2	C	Add Implicit floor request to IWF group call request and IWF imminent peril group call request	16.1.0
2018-12	SA#82	SP-181179	0022		C	Add Location information to IWF floor request and IWF floor taken messages	16.1.0
2019-03	SA#83	SP-190076	0023	1	F	MCPTT ID in interworking floor control	16.2.0
2019-03	SA#83	SP-190076	0024	2	C	IWF alignment for talker location in requests for Group call and Group-broadcast group call setup	16.2.0
2019-03	SA#83	SP-190076	0025	1	C	IWF alignment for talker location in Chat group	16.2.0
2019-03	SA#83	SP-190076	0026	2	C	IWF alignment for talker location in Private call	16.2.0
2019-03	SA#83	SP-190076	0027	1	C	IWF alignment for talker Location related to Imminent peril groups	16.2.0
2019-03	SA#83	SP-190076	0028	1	C	IWF alignment for current talker location	16.2.0
2019-03	SA#83	SP-190076	0029	2	C	TS 23.379 alignment for late join	16.2.0
2019-03	SA#83	SP-190076	0030	2	B	Analogue FM interworking	16.2.0
2019-06	SA#84	SP-190487	0033	1	C	23.283 location with implicit floor request	16.3.0
2019-06	SA#84	SP-190488	0035	2	B	Functional Alias management for interworking between MC service system and LMR system	16.3.0
2019-09	SA#85	SP-190728	0038	4	B	IWF preconfigured groups	16.4.0
2019-09	SA#85	SP-190728	0039	4	B	IWF add user to temporary pre-configured group regroup	16.4.0
2019-09	SA#85	SP-190728	0041	2	B	IWF temporary group calls	16.4.0
2019-09	SA#85	SP-190728	0042	4	B	IWF user regroup with pre-configured group	16.4.0
2019-09	SA#85	SP-190728	0044	4	B	IWF preconfigured broadcast group calls	16.4.0
2019-09	SA#85	SP-190728	0045	2	B	IWF preconfigured broadcast group calls	16.4.0
2019-09	SA#85	SP-190728	0047	1	F	IWF identities wording correction	16.4.0

2019-09	SA#85	SP-190728	0051	1	F	Remove 10.5.2.17 Editor's Note	16.4.0
2020-09	SA#89	SP-200838	0053	1	F	Interworking private call floor control	16.5.0
2021-12	SA#94	SP-211520	0056		F	Correction to Disposition Notification handling when LMR system temporarily disables Disposition Notification	16.6.0
2022-03	SA#95	SP-220100	0060	1	F	Correction of Enhanced Status description	16.7.0

History

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