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Contents

Foreword

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

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1 Scope

The present document specifies the media plane control protocols and interactions with the media needed to support Mission Critical Data (MCData) services, which are IP Connectivity, Short Data Service (SDS) and File Distribution (FD).

Mission critical communication services are services that require preferential handling compared to normal telecommunication services, e.g. in support of police or fire brigade.

The MCData service and its associated media plane control protocols can be used for public safety applications and also for general commercial applications (e.g., utility companies and railways).

The present document is applicable to User Equipment (UE) supporting MCData client functionality and to servers in the MCData system.

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 23.282: "Functional architecture and information flows to support Mission Critical Data (MCData) Stage-2".

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

[4] 3GPP TS 24.481: "Mission Critical Services (MCS) group management; Protocol Specifications".

[5] 3GPP TS 24.482: "Mission Critical Services (MCS) identity management; Protocol Specifications".

[6] 3GPP TS 24.483: "Mission Critical Services (MCS) Management Object (MO)".

[7] 3GPP TS 24.484: "Mission Critical Services (MCS) configuration management; Protocol Specifications ".

[8] 3GPP TS 24.282: "Mission Critical Services (MCS) signalling control; Protocol Specifications ".

[9] IETF RFC 2046 (November 1996): "Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types".

[10] IETF RFC 4122 (July 2005): "A Universally Unique IDentifier (UUID) URN Namespace".

[11] IETF RFC 4975 (September 2007): "The Message Session Relay Protocol (MSRP)".

[12] IETF RFC 6135 (February 2011): "An Alternative Connection Model for the Message Session Relay Protocol (MSRP)".

[13] IETF RFC 6714 (August 2012): "Connection Establishment for Media Anchoring (CEMA) for the Message Session Relay Protocol (MSRP)".

[14] IETF RFC 4976 (September 2007): "Relay Extensions for the Message Session Relay Protocol (MSRP)".

[15] 3GPP TS 33.180: "Security of mission critical services".

[16] IETF RFC 3550 (July 2003): "RTP: A Transport Protocol for Real-Time Applications".

[17] IETF RFC 3711 (March 2004): "The Secure Real-time Transport Protocol (SRTP)".

[18] 3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".

[19] IETF RFC 2784 (March 2000): "Generic Routing Encapsulation (GRE).

[20] IETF RFC 2790 (September2000): "Key and Sequence Number Extensions to GRE.

[21] IETF RFC 791 (September 1981) "INTERNET PROTOCOL".

[22] IETF RFC 8200 (July 2017) "Internet Protocol, Version 6 (IPv6) Specification".

[23] IETF RFC 8086 (March 2017) "GRE-in-UDP Encapsulation.

[24] 3GPP TS 24.501: "Technical Specification Group Core Network and Terminals; Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

3 Definitions 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].

example: text used to clarify abstract rules by applying them literally.

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].

CSK	Client-Server Key
CSK-ID	Client-Server Key Identifier
DPCK	MCData Payload Cipher Key
DPCK-ID	MCData Payload Cipher Key Identifier
DPKK	MCData Payload Protection Key
DPKK-ID	MCData Payload Protection Key Identifier
FD	File Distribution
GMK	Group Master Key
GMK-ID	Group Master Key Identifier
GRE	Generic Routing Encapsulation
KMS	Key Management Server
KPAK	KMS Public Authentication Key
MBS	Multicast/Broadcast Service
PCK	Private Call Key
PCK-ID	Private Call Key Identifier
PVT	Public Validation Token
SDS	Short Data Service
SPK	Signalling Protection Key
SPK-ID	Signalling Protection Key Identifier
SSK	Secret Signing Key

4 General

4.1 Overview

4.1.1 Short data service

The media plane control procedures, both for one-to-one and group short data services, take place for on-network only, when standalone short data is sent using media plane or when the short data is sent after an SDS session is established. In both cases the media plane is established as specified in 3GPP TS 24.282 [8].

The media plane uses the MSRP protocol as specified in RFC 4975 [11], RFC 4976 [14], RFC 6135 [12], and RFC 6714 [13].

In a standalone SDS using media plane, a single SDS message is sent by the originating MCData client as specified in this document. The procedure is terminated as specified in 3GPP TS 24.282 [8].

When an SDS session is established any MCData client with appropriate permissions, which participates this SDS session, can initiate the transmission of and SDS message until the termination of the SDS session. The termination of an SDS session is specified in 3GPP TS 24.282 [8].

An SDS message sent using media plane is carried in the body of an MSRP SEND request. The media control parameters and the data of an SDS message are carried in separate bodies in the same MSRP SEND request.

The Conversation ID,the Message ID, the optional InReplyTo message ID, the optional SDS disposition request type and the optional Application identifier are communicated by the MCData client which sends the SDS message in the media control part of the body in the MSRP SEND request. The data is carried in a separate body of the MSRP SEND request.

For standalone SDS using media plane, the disposition notification is communicated as specified in 3GPP TS 24.282 [8].

For SDS during an SDS session the disposition notification is communicated using the procuderes specified in the current document until the SDS session is terminated. After the termination of the SDS session the disposition notification, if any, is communicated as specified in 3GPP TS 24.282 [8].

4.1.2 File distribution

The media plane control procedures, both for one-to-one and group file distribution using media plane, take place for on-network only. The media plane for FD is established as specified in 3GPP TS 24.282 [8].

The media plane uses the MSRP protocol as specified in RFC 4975 [11], RFC 4976 [14], RFC 6135 [12], and RFC 6714 [13].

A file is sent using media plane by the originating MCData client as specified in this document. The procedure is terminated as specified in 3GPP TS 24.282 [8].

The Conversation ID , the Message ID, the optional InReplyTo message ID, the optional FD disposition request type, the optional Application ID, the optional Mandatory download and the optional Metadata are communicated by the MCData client which sends the file using the procedures specified in 3GPP TS 24.282 [8] while establishing the media plane.

The file is carried in the body of the MSRP SEND request as specified in this document.

The disposition notification is communicated as specified in 3GPP TS 24.282 [8].

4.1.3 Void

4.1.4 IP Connectivity

The media plane control procedures for one-to-one IP Connectivity service using media plane, take place for on-network only. The media plane for IP Connectivity is established and terminated as specified in 3GPP TS 24.282 [8].

The media plane uses the IP protocol as specified in RFC 791 [21] and RFC 8200 [22].

The IP Connectivity media plane is established by the originating MCData client as specified in this document.

IP Connectivity provides a media plane for exchange of any kind of IP data between IP applications. Once the media plane is established along with IP Connectivity the IP applications can exchange IP data.

NOTE IP Connectivity specified in the current document is not compatible with release 16.

4.2 Other considerations

When an SDS message is sent using media plane, the body included in the MSRP SEND request, which carries media control information or which carries notification information, is protected between each entity separately if protection is applied. On the other hand the body included in the MSRP SEND request which carries the data is end to end protected. The procedures for the protection of the media control information or notification or of the data are specified in this document.

When a file is is sent using media plane, the file or file portion, included in the body of the MSRP SEND request, is end to end protected. The procedure for the protection of the file is specified in this document.

5 Functional entities

5.1 General for MCData functional entities

5.1.1 SDS and FD

Media plane control is conducted between the MCData server and MCData UE. MCData server has capability functions for SDS and FD. MCData UE incorporates the MCData client. MCData user or MCData user application may feed or consume data transmitted or received via the capability functions in the MCData client. The capability function in the MCData client provides SDS and FD services.

The capability functions of the MCData server are specified for the controlling MCData function and the participating MCData function. The capability functions of the MCData UE are specified for the MCData client.

Data to be transmitted either by the MCData user or by a MCData user application using media plane shall be transmitted by the MCData client to the participating MCData function. The participating MCData function shall forward the data to the controlling MCData function. The controlling MCData function shall distribute the data to the destination MCData client for one-to-one MCData service and to the MCData clients of the affiliated group members for group MCData service via the participating MCData functions serving each destination MCData client. A participating MCData function may serve one or more MCData clients. Based on deployment, controlling MCData function may be in communication with zero, one or more participating MCData functions. If a participating MCData function is collocated with the controlling MCData function, the controlling MCData function may perform the functions of this co-located participating MCData function. In this case the controlling MCData function and this co-located participating MCData function shall act as a single entity.

In the media plane the MCData client and the controlling MCData function shall act as MSRP clients. If and when a participating MCData function is in the communication path as a separate entity between the controlling MCData function and one or more MCData clients, it shall act as an MSRP relay.

5.1.2 IP Connectivity

IP Connectivity provides a media plane for exchange of any kind of IP data between IP applications. These IP applications may reside on external non-3GPP hosts connected via an IP interface to the MCData UE that incorporates the MCData client, or they may be running on the MCData UE. The participating MCData function and the controlling MCData functions may be in the path of the data exchange between the authorized MC Data users.

5.2 Functional entities for SDS

The capability function for SDS for media plane in the MCData server is composed of SDS distribution function and the Transmission/Reception control. In the media plane the functions of SDS distribution and the Transmission/Reception control are specified for the controlling MCData function and the participating MCData function. The functions of the SDS are specified for the SDS function in MCData client.

For SDS, data is composed of short data in the form of text, hypertext, binary string or location information. Short data generated in the MCData client and sent using media plane follows the path for the originating MCData client to the terminating MCData clients as explained in clause 5.1.1.

5.3 Functional entities for FD

The capability function for FD for media plane in the MCData server is composed of FD function and the Transmission/Reception control. The file distribution over media plane functionalities in the MCData server are specified for the controlling MCData function and the participating MCData function. The functions of the FD are specified for the FD function in the MCData client.

For FD, data is composed of a file. A file provided at the MCData client and sent using media plane follows the path from the originating MCData client to the terminating MCData clients as explained in clause 5.1.1.

5.4 Functional entities for IP Connectivity

For IP Connectivity, the transmitted data may consist of any kind of IP data. IP Connectivity data sent by the MCData client using media plane follows the path from the originating MCData client to the terminating MCData client as explained in clause 5.1.2.

6 SDS media plane procedures

6.1 MCData client procedures

6.1.1 Standalone SDS via media plane

6.1.1.1 General

In a standalone SDS via media plane, upon receiving an SDS request from the user or user application the originating MCData client establishes the media plane as specified in 3GPP TS 24.282 [8]. When the media plane is established a conversation ID is associated with this SDS message.

For the procedures in clause 6.1.1.2 it is assumed that it has been verified that:

1. if standalone one to one SDS using media plane is initiated:
   a. the MCData client is allowed to transmit data;
   b. the size of the SDS message is less than or equal to maximum amount of data that the MCData user can transmit in a single request during one-to-one communication; and
   c. the size of the SDS message is less than or equal to maximum data size for SDS;

2. if standalone group SDS using media plane is initiated:

   a. the MCData client is allowed to transmit data in this group;

   b. the size of the SDS message is less than or equal to maximum amount of data that the MCData user can transmit in a single request during group communication;and

c. the size of the SDS message is less than or equal to maximum data size for SDS; and3. the size of the short data including the media plane information elements is larger than the allowed limits over MCData-SDS-1 interface using SIP reference points.

before the media plane establishment is initiated as specified in 3GPP TS 24.282[8]:

The procedures in clause 6.1.1.2 and clause 6.1.1.3 are applicable for one-to-one and group standalone SDS using media plane.

6.1.1.2 Procedures for the originating MCData client

6.1.1.2.1 Handling MSRP connection

Upon receiving an indication to establish MSRP connection for standalone SDS using media plane as the originating client, the MCData client:

1. shall act as an MSRP client according to IETF RFC 6135 [12];
2. shall act according to IETF RFC 6135 [12], as:

   a. an "active" endpoint, if a=setup attribute in the received SDP answer is set to "passive"; and

   b. an "passive" endpoint, if a=setup attribute in the received SDP answer is set to "active";

3. shall establish the MSRP connection according to the MSRP connection parameters in the SDP answer received in the SIP 200 (OK) response according to IETF RFC 4975 [11]; and
4. if acting as an "active" endpoint, shall send an empty MSRP SEND request to bind the MSRP connection to the MSRP session from the perspective of the passive endpoint according to the rules and procedures of IETF RFC 4975 [11] and IETF RFC 6135 [12].

On receiving MSRP 200 (OK) response to the first MSRP SEND request, the MCData client:

1. shall generate a SDS SIGNALLING PAYLOAD as specified in clause 6.1.1.2.2;
2. shall generate a SDS DATA PAYLOAD as specified in clause 6.1.1.2.3;
3. shall include the SDS SIGNALLING PAYLOAD and SDS DATA PAYLOAD in an MSRP SEND request as specified in clause 6.1.1.2.4; and
4. shall send the MSRP SEND request on the established MSRP connection.

If MSRP chunking is not used then on receipt of a 200 (OK) response, the MCData client shall terminate the SIP session as specified in 3GPP TS 24.282 [8].

If MSRP chunking is used, the MCData client:

1. shall send further MSRP SEND requests as necessary;
2. shall wait for a 200 (OK) response to each MSRP SEND request sent; and
3. on receipt of the last 200 (OK) response shall terminate the SIP session as specified in 3GPP TS 24.282 [8].

On receiving a non-200 MSRP response to the MSRP SEND request the MCData client shall handle the error as specified in IETF RFC 4975 [11]. To terminate the MSRP session, the MCData client:

1. if there are further MSRP chunks to send, shall abort transmission of these further MSRP chunks;
2. shall indicate to MCData user that the SDS message could not be sent; and

3. shall terminate the SIP session as specified in 3GPP TS 24.282 [8].

On receiving an indication to terminate the session from the signalling plane, the MCData client:

1. if there are further MSRP chunks to send, shall abort transmission of these further MSRP chunks and may indicate to MCData user that the SDS message could not be sent.

6.1.1.2.2 Generate signalling payload

In order to generate an SDS signalling payload, the MCData client:

1. shall generate an SDS SIGNALLING PAYLOAD message as specified in 3GPP TS 24.282 [8]; and
2. shall include the SDS SIGNALLING PAYLOAD message in an application/vnd.3gpp.mcdata-signalling MIME body as specified in 3GPP TS 24.282 [8]; and

When generating a an SDS SIGNALLING PAYLOAD message, the MCData client:

1. shall generate a SDS SIGNALLING PAYLOAD message as defined in 3GPP TS 24.282 [8]. In the SDS SIGNALLING PAYLOAD message, the MCData client:
   a. may include and set the Disposition request type IE to:
      i. "DELIVERY", if only delivery disposition is requested;
      ii. "READ", if only read disposition is requested; or
      iii. "DELIVERY AND READ", if both delivery and read dispositions are requested;
   b. shall set Date and time IE to current UTC time;
   c. shall set Conversation ID IE to a universally unique message ID generated as per IETF RFC 4122 [10];
   d. shall set Message ID IE to a universally unique message ID generated as per IETF RFC 4122 [10];
   e. if indicated that the SDS message is in reply to another SDS message then, shall include the Reply ID IE set to the message identifier of the indicated SDS message;
   f. if indicated that the target recipient of the SDS message is an application then, shall set Application Identifier IE to the application identifier; and
   g) shall set the Sender MCData user ID to its own MCData user ID as specified in clause 15.2.15 of 3GPP TS 24.282 [8].

6.1.1.2.3 Generate data payload

In order to generate SDS data payload, the MCData client:

1. shall generate a DATA PAYLOAD message as specified in 3GPP TS 24.282 [8]; and
2. shall include the DATA PAYLOAD message in an application/vnd.3gpp.mcdata-payload MIME body as specified in 3GPP TS 24.282 [8].

When generating a a DATA PAYLOAD message, the MCData client:

1. shall generate a SDS DATA PAYLOAD message as defined in 3GPP TS 24.282 [8]. In the SDS DATA PAYLOAD message, the MCData client:
   a. shall set Number of payloads IE to the total number of payloads being sent; and
   b. for each payload, shall include Payload IE. In the Payload IE:
      i. shall set Payload content type to "TEXT", or "BINARY", or "HYPERLINKS", or "LOCATION" according to the payload type; and
      ii. shall set Payload data IE to actual payload.

6.1.1.2.4 Generate MSRP SEND for SDS message

The MCData client shall take the procedures in clause 6.4.1 into consideration when generating MSRP SEND messages.

The MCData client shall generate MSRP SEND for SDS message requests according to IETF RFC 4975 [11].

When generating an MSRP SEND for SDS message request containing an SDS SIGNALLING PAYLOAD message and an SDS DATA PAYLOAD message, the MCData client

1. shall set To-Path header according to the MSRP URI(s) received in the answer SDP;
2. shall include two MIME bodies in accordance with clause 6.4.1 where:
    a. in the first body the Content-Type header field is set to "application/vnd.3gpp.mcdata-signalling" and the generated SDS SIGNALLING PAYLOAD message is included; and
    b. in the second body the Content-Type header field is set to "application/vnd.3gpp.mcdata-payload" and the generated SDS DATA PAYLOAD message is included.

When generating an MSRP SEND for SDS message request containing only an SDS DATA PAYLOAD message, the MCData client:

1. shall set To-Path header according to the MSRP URI(s) received in the answer SDP;
2. shall set the Content-Type as "application/vnd.3gpp.mcdata-payload"; and
3. shall set the body of the MSRP SEND request to the generated SDS DATA PAYLOAD message.

When generating an MSRP SEND for SDS message request containing only an SDS SIGNALLING PAYLOAD, the MCData client.

1. shall set To-Path header according to the MSRP URI(s) received in the answer SDP;
2. shall set the Content-Type as "application/vnd.3gpp.mcdata-signalling"; and
3. shall set the body of the MSRP SEND request to the generated SDS SIGNALLING PAYLOAD message.

6.1.1.3 Procedures for the terminating MCData client

6.1.1.3.1 Handling MSRP connection

Upon receiving an indication to establish MSRP connection for standalone SDS using media plane as the terminating client, the MCData client:

1. shall act as an MSRP client according to IETF RFC 6135 [12];
2. shall act either as an active endpoint or as an passive endpoint to open the transport connection, according to IETF RFC 6135 [12];
3. shall establish the MSRP connection according to the MSRP connection parameters in the SDP offer received in the SIP INVITE request according to IETF RFC 4975 [11];
4. if acting as an "active" endpoint, shall send an empty MSRP SEND request to bind the MSRP connection to the MSRP session from the perspective of the passive endpoint according to the rules and procedures of IETF RFC 4975 [11] and IETF RFC 6135 [12];

Once the MSRP connection is established, the MCData client:

1. on receipt of an MSRP request in an MSRP session, shall follow the rules and procedures defined in IETF RFC 4975 [11] and in IETF RFC 6714 [13];
2. If an MSRP SEND request indicates the use of chunking, shall wait until all further MSRP SEND requests for the remaining chunks have been received and shall reassemble the entire set of MSRP requests into the MCData standalone message before delivering the content to the application; and

3. shall handle the received content as described in clause 6.1.1.3.2.

6.1.1.3.2 Handling received content and disposition requests

The MCData client:

1. shall decode the contents of the application/vnd.3gpp.mcdata-signalling MIME body;
2. shall decode the contents of the application/vnd.3gpp.mcdata-payload MIME body;
3. if the SDS SIGNALLING PAYLOAD message contains a new Conversation ID, shall instantiate a new conversation with the Message ID in the SDS SIGNALLING PAYLOAD identifying the first message in the conversation thread;
4. if the SDS SIGNALLING PAYLOAD message contains an existing Conversation ID and:
   a. if the SDS SIGNALLING PAYLOAD message does not contain an InReplyTo Message ID, shall use the Message ID in the SDS SIGNALLING PAYLOAD to identify a new message in the existing conversation thread; and
   b. if the SDS SIGNALLING PAYLOAD message contains an InReplyTo Message ID, shall associate the message to an existing message in the conversation thread as identified by the InReplyTo Message ID in the SDS SIGNALLING PAYLOAD and use the Message ID in the SDS SIGNALLING PAYLOAD to identify the new message;
5. shall identify the number of Payload IEs in the DATA PAYLOAD message from the Number of Payloads IE in the DATA PAYLOAD message;
6. if the SDS SIGNALLING PAYLOAD message does not contain an Application identifier IE:
   a. shall determine that the payload contained in the DATA PAYLOAD message is for user consumption;
   b. may notify the MCData user; and
   c. shall render the contents of the Payload IE(s) to the MCData user;
7. if the SDS SIGNALLING PAYLOAD message contains an Application identifier IE:
   a. shall determine that the payload contained in the DATA PAYLOAD message is not for user consumption;
   b. shall not notify the MCData user;
   c. if the Application identifier value is unknown, shall discard the SDS message; and
   d. if the Application identifier value is known, shall deliver the contents of the Payload IE(s) to the identified application; and
8. if SDS Disposition request type IE is present in the SDS SIGNALLING PAYLOAD message received in clause 6.1.1.3.1 then, shall send a disposition notification as described in 3GPP TS 24.282 [8] clause 9.2.1.3.

6.1.2 Short data during an SDS session

6.1.2.1 General

In a SDS session, upon receiving an SDS request from the user or user application the originating MCData client establishes the media plane as specified in 3GPP TS 24.282 [8].

The procedure in clause 6.1.2.2 and clause 6.1.2.3 are applicable for one-to-one and group SDS session.

Any MCData user with appropriate permissions, originator of the SDS session or not, can send a SDS message during the SDS session.

A client which is not permitted to transmit data should not use the procedure in clause 6.1.2.2 and clause 6.1.2.3.

6.1.2.2 Procedures for the originating MCData client

6.1.2.2.1 Handling MSRP connection

Upon receiving an indication to establish MSRP connection for SDS session as the originating MCData client, the MCData client:

1. shall act as an MSRP client according to IETF RFC 6135 [12];
2. shall act according to IETF RFC 6135 [12], as:
   a. an "active" endpoint, if a=setup attribute in the received SDP answer is set to "passive"; and
   b. an "passive" endpoint, if a=setup attribute in the received SDP answer is set to "active";
3. shall establish the MSRP connection according to the MSRP connection parameters in the SDP answer received in the SIP 200 (OK) response according to IETF RFC 4975 [11];
4. if acting as an "active" endpoint, shall send an empty MSRP SEND request to bind the MSRP connection to the MSRP session from the perspective of the passive endpoint according to the rules and procedures of IETF RFC 4975 [11] and IETF RFC 6135 [12];

Once the MSRP session is established, the MCData client:

1. on receipt of an MSRP request in the MSRP session, shall follow the rules and procedures defined in IETF RFC 4975 [11] and in IETF RFC 6714 [13];
2. If an MSRP SEND request indicates the use of chunking, shall wait until all further MSRP SEND requests for the remaining chunks have been received and shall reassemble the entire set of MSRP requests into the MCData SDS message before delivering the content to the application; and
3. shall handle the received content as described in clause 6.1.2.6.

On receiving MSRP 200 (OK) response to the first MSRP SEND request, the MCData client can generate and send an SDS message as specified in clause 6.1.2.4, or can generate and send an SDS disposition notification for a received SDS message as specified in clause 6.1.2.5, if requested.

Received content and disposition requests shall be handled as specified in clause 6.1.2.6.

6.1.2.2.2 Void

6.1.2.2.3 Void

6.1.2.2.4 Void

6.1.2.3 Procedures for the terminating MCData client

6.1.2.3.1 Handling MSRP connection

Upon receiving an indication to establish MSRP connection for SDS session as the terminating MCData client, the MCData client:

1. shall act as an MSRP client according to IETF RFC 6135 [12];
2. shall act either as an active endpoint or as an passive endpoint to open the transport connection, according to IETF RFC 6135 [12];
3. shall establish the MSRP connection according to the MSRP connection parameters in the SDP offer received in the SIP INVITE request according to IETF RFC 4975 [11];
4. if acting as an "active" endpoint, shall send an empty MSRP SEND request to bind the MSRP connection to the MSRP session from the perspective of the passive endpoint according to the rules and procedures of IETF RFC 4975 [11] and IETF RFC 6135 [12];

Once the MSRP session is established, the MCData client:

1. on receipt of an MSRP request in the MSRP session, shall follow the rules and procedures defined in IETF RFC 4975 [11] and in IETF RFC 6714 [13];

2. If an MSRP SEND request indicates the use of chunking, shall wait until all further MSRP SEND requests for the remaining chunks have been received and shall reassemble the entire set of MSRP requests into the MCData SDS message before delivering the content to the application; and

3. shall handle the received content as described in clause 6.1.2.6.

On receiving MSRP 200 (OK) response to the first MSRP SEND request sent as "active" endpoint, or after sending MSRP 200 (OK) response to the first MSRP SEND request received as "passive" endpoint, the MCData client can generate and send an SDS message as specified in clause 6.1.2.4, or can generate and send an SDS disposition notification for a received SDS message as specified in clause 6.1.2.5, if requested.

Received content and disposition requests shall be handled as specified in clause 6.1.2.6.

6.1.2.3.2 Void

6.1.2.4 Sending SDS message

An MCData client is allowed to send a one-to-one SDS message only if:

1. the <allow-transmit-data> element of an <actions> element is present with a value "true" (see the MCData user profile document in 3GPP TS 24.484 [7]);

2. the size of the SDS message is less than or equal to the value of the <max-data-size-sds-bytes> element in the MCData service configuration document as specified in 3GPP TS 24.484 [7]; and

3. the size of the SDS message is less than or equal to the value of <MaxData1To1> element of the MCData user profile document (see the MCData user profile document in 3GPP TS 24.484 [7]).

An MCData client is allowed to send a group SDS message only if:

1. the <mcdata-allow-transmit-data-in-this-group> element of an <action> element is present with a value "true" as defined in the MCData group document for this MCData group as specified in 3GPP TS 24.481 [4];

2. the size of the SDS message is less than or equal to the value contained in the <mcdata-on-network-max-data-size-for-SDS> as defined in the MCData group document for this MCData group as specified in 3GPP TS 24.481 [4]; and

3. the size of the SDS message is less than or equal to the value contained in the <mcdata-max-data-in-single-request> element of the <entry> element of the MCData group document for this MCData group as specified in 3GPP TS 24.481 [4].

If the above-mentioned conditions satisfy, the MCData client:

1. shall generate an SDS SIGNALLING PAYLOAD as specified in clause 6.1.1.2.2;

2. shall generate an SDS DATA PAYLOAD as specified in clause 6.1.1.2.3;

3. shall include the SDS SIGNALLING PAYLOAD and SDS DATA PAYLOAD in an MSRP SEND request as specified in clause 6.1.1.2.4, with the following clarification:

   a. shall set To-Path header according to the MSRP URI in the received SDP; and

4. shall send the MSRP SEND request on the established MSRP connection.

6.1.2.5 SDS Notification

6.1.2.5.1 Sending SDS Notification

To send an SDS disposition notification, the MCData client:

1. shall generate a SDS NOTIFICATION as specified in clause 6.1.2.5.2;
2. shall include the SDS NOTIFICATION in an MSRP SEND request as specified in clause 6.1.2.5.3, with the following clarification;
   a. shall set To-Path header according to the MSRP URI in the received SDP; and
3. shall send the MSRP SEND request on the established MSRP connection.

If MSRP chunking is used, the MCData client:

1. shall send further MSRP SEND requests as necessary.

On receiving a non-200 MSRP response to the MSRP SEND request the MCData client shall handle the error as specified in IETF RFC 4975 [11]. To terminate the MSRP session, the MCData client:

1. if there are further MSRP chunks to send, shall abort transmission of these further MSRP chunks; and
2. shall indicate to MCData user that the SDS message or the SDS disposition notification could not be sent.

6.1.2.5.2 Generate SDS NOTIFICATION

In order to generate an SDS notification, the MCData client:

1. shall generate an SDS NOTIFICATION message as specified in 3GPP TS 24.282 [8]; and
2. shall include the SDS NOTIFICATION message in an application/vnd.3gpp.mcdata-signalling MIME body as specified in 3GPP TS 24.282 [8].

When generating an SDS NOTIFICATION message, the MCData client:

1. if sending a delivered notification, shall set the SDS disposition notification type IE as "DELIVERED";
2. if sending a read notification, shall set the SDS disposition notification type IE as "READ";
3. if sending a delivered and read notification, shall set the SDS disposition notification type IE as "DELIVERED AND READ";
4. if the SDS message could not be delivered to the user or application (e.g. due to lack of storage), shall set the SDS disposition notification type IE as "UNDELIVERED";
5. shall set the Date and time IE to the current time;
6. shall set the Conversation ID to the value of the Conversation ID that was received in the SDS message;
7. shall set the Message ID to the value of the Message ID that was received in the SDS message;
8. if the SDS message was destined for the user, shall not include an Application ID IE;
9. if the SDS message was destined for an application, shall include an Application ID IE set to the value of the Application ID that was included in the SDS message; and
10. shall set the Sender MCData user ID to its own MCData user ID as specified in clause 15.2.15 of 3GPP TS 24.282 [8].

6.1.2.5.3 Generate MSRP SEND for SDS disposition notification

The MCData client shall generate MSRP SEND requests for SDS disposition notification according to IETF RFC 4975 [11].

When generating an MSRP SEND request for SDS disposition notification containing an SDS NOTIFICATION message, the MCData client

1. shall set To-Path header according to the MSRP URI(s) received in the answer SDP;
2. shall set the content type as Content-Type = "application/vnd.3gpp.mcdata-signalling"; and

3. shall set the body of the MSRP SEND request to the generated SDS NOTIFICATION message.

6.1.2.6 Handling received content and disposition requests

Upon receiving an SDS message, the MCData client:

1. shall follow the procedure defined in clause 6.1.1.3.2, with the following clarification:

   a. if SDS Disposition request type IE is present in the received SDS SIGNALLING PAYLOAD message then, shall send an SDS disposition notification as described in clause 6.1.2.5.

Upon receiving an SDS disposition notification, the MCData client:

1. shall decode the contents of the application/vnd.3gpp.mcdata-signalling MIME body; and
2. shall deliver the notification to the user or application.

6.2 Participating MCData function procedures

6.2.1 Standalone SDS via media plane

6.2.1.1 General

For a standalone SDS via media plane, the media plane is established between the originating MCData client and the originating participating MCData function, the originating participating MCData function and the controlling MCData function, the controlling MCData function and the terminating participating MCData function(s) and each terminating participating MCData function and the terminating MCData client(s) as specified in 3GPP TS 24.282 [8].

The procedures in clause 6.2.1.4 and clause 6.2.1.5 are applicable for one-to-one and group standalone SDS using media plane.

6.2.1.2 Establishing MSRP session to receive standalone SDS message

To receive a SDS message over MSRP, the participating MCData function:

1. shall act according to IETF RFC 6135 [12], as:

   a. an "passive" endpoint, if a=setup attribute in the sent SDP answer was set to "passive"; and

   b. an "active" endpoint, if a=setup attribute in the sent SDP answer was set to "active"; and

2. shall establish an MSRP connection according to the MSRP connection parameters in the sent SDP answer response as described in IETF RFC 4976 [14].

6.2.1.3 Establish MSRP session to send standalone SDS message

To send a SDS message over MSRP, the participating MCData function:

1. shall act according to IETF RFC 6135 [12], as:

   a. an "active" endpoint, if a=setup attribute in the received SDP answer is set to "passive"; and

   b. an "passive" endpoint, if a=setup attribute in the received SDP answer is set to "active"; and

2. shall establish the MSRP connection according to the MSRP connection parameters in the received SDP answer response as described in IETF RFC 4976 [14].

6.2.1.4 Procedures for the originating participating MCData function

6.2.1.4.1 Establish MSRP session with the originating MCData client

The originating participating MCData function should establish the MSRP session with the originating MCData client as specified in clause 6.2.1.2.

6.2.1.4.2 Establish MSRP session with the controlling MCData function

The originating participating MCData function should establish the MSRP session with the controlling MCData function as specified in clause 6.2.1.3.

6.2.1.4.3 Handling of received MSRP messages

Upon receiving an MSRP SEND request from the originating MCData client, the originating participating MCData function:

1. if in a standalone one-to-one SDS using media plane, shall verify the SDS message size is less than or equal to <MacData1To1> element of the MCData user profile document for the originating MCData client (see the MCData user profile document in 3GPP TS 24.484 [7]);
2. if the verifications in 1 above fails, shall send the MSRP response with the error code 403 to the originating MCData client and shall not continue with the rest of the procedure;
3. if an MSRP connection is not established with the controlling MCData function then, shall establish the MSRP connection as specified in clause 6.2.1.4.2. Otherwise, shall use the existing MSRP connection; and
4. shall forward the received MSRP SEND request to the controlling MCData function according to the rules and procedures of IETF RFC 4975 [11].

Upon receiving an MSRP 200 (OK) response from the controlling MCData function, the participating MCData function shall forward the MSRP 200 (OK) response to the originating MCData client according to the rules and procedures of IETF RFC 4975 [11].

Upon receiving an error MSRP response from the controlling MCData function, the participating MCData function shall forward the error MSRP response to the originating MCData client according to the rules and procedures of IETF RFC 4975 [11].

6.2.1.5 Procedures for the terminating participating MCData function

6.2.1.5.1 Establish MSRP session with the controlling MCData function

The terminating participating MCData function should establish the MSRP session with the controlling MCData function as specified in clause 6.2.1.2.

6.2.1.5.2 Establish MSRP session with the terminating MCData client

The terminating participating MCData function should establish MSRP session to terminating MCData client as specified in clause 6.2.1.3.

6.2.1.5.3 Handling of received MSRP messages

Upon receiving an MSRP SEND request from the controlling MCData function, the terminating participating MCData function:

1. shall generate and send a MSRP 200 (OK) response for the received MSRP SEND request to the controlling MCData function, according to the rules and procedures of IETF RFC 4975 [11]; and
2. shall forward the received MSRP SEND request to the terminating MCData client according to the rules and procedures of IETF RFC 4975 [11].

Upon receiving an error MSRP response from the terminating MCData client, the participating MCData function shall forward the error MSRP response to the originating MCData client according to the rules and procedures of IETF RFC 4975 [11].

6.2.2 Short data during an SDS session

6.2.2.1 General

For a one-to-one or group SDS session, the media plane is established between the originating MCData client and the originating participating MCData function, the originating participating MCData function and the controlling MCData function, the controlling MCData function and the terminating participating MCData function(s) and each terminating participating MCData function and the terminating MCData client(s) as specified in 3GPP TS 24.282 [8]. The procedures in clause 6.2.2.4 and clause 6.2.2.5 are applicable for one-to-one and group SDS session.

6.2.2.2 Establishing MSRP session to receive SDS message

To receive a SDS message over MSRP, the participating MCData function:

1. shall act according to IETF RFC 6135 [12], as:
   a. an "passive" endpoint, if a=setup attribute in the sent SDP answer was set to "passive"; and
   b. an "active" endpoint, if a=setup attribute in the sent SDP answer was set to "active"; and
2. shall establish an MSRP connection according to the MSRP connection parameters in the sent SDP answer response as described in IETF RFC 4976 [14].

6.2.2.3 Establish MSRP session to send SDS message

To send a SDS message over MSRP, the participating MCData function:

1. shall act according to IETF RFC 6135 [12], as:
   a. an "active" endpoint, if a=setup attribute in the received SDP answer is set to "passive"; and
   b. an "passive" endpoint, if a=setup attribute in the received SDP answer is set to "active"; and
2. shall establish the MSRP connection according to the MSRP connection parameters in the received SDP answer response as described in IETF RFC 4976 [14].

6.2.2.4 Procedures for the originating participating MCData function

6.2.2.4.1 Establish MSRP session with the originating MCData client

The originating participating MCData function should establish the MSRP session with the originating MCData client as specified in clause 6.2.2.2.

6.2.2.4.2 Establish MSRP session with the controlling MCData function

The originating participating MCData function should establish the MSRP session with the controlling MCData function as specified in clause 6.2.2.3.

6.2.2.4.3 Handling of received MSRP messages

Upon receiving an MSRP SEND request from the originating MCData client, the originating participating MCData function:

1. if an MSRP connection is not established with the controlling MCData function then, shall establish the MSRP connection as specified in clause 6.2.2.4.2. Otherwise, shall use the existing MSRP connection; and

2. shall forward the received MSRP SEND request to the controlling MCData function according to the rules and procedures of IETF RFC 4975 [11].

Upon receiving an MSRP 200 (OK) response from the controlling MCData function, the participating MCData function shall forward the MSRP 200 (OK) response to the originating MCData client according to the rules and procedures of IETF RFC 4975 [11].

Upon receiving an error MSRP response from the controlling MCData function, the participating MCData function shall forward the error MSRP response to the originating MCData client according to the rules and procedures of IETF RFC 4975 [11].

6.2.2.5 Procedures for the terminating participating MCData function

6.2.2.5.1 Establish MSRP session with the controlling MCData function

The terminating participating MCData function should establish the MSRP session with the controlling MCData function as specified in clause 6.2.2.2.

6.2.2.5.2 Establish MSRP session with the terminating MCData client

The terminating participating MCData function should establish MSRP session to terminating MCData client as specified in clause 6.2.2.3.

6.2.2.5.3 Handling of received MSRP messages

Upon receiving an MSRP SEND request from the controlling MCData function, the terminating participating MCData function:

1. shall generate and send a MSRP 200 (OK) response for the received MSRP SEND request to the controlling MCData function, according to the rules and procedures of IETF RFC 4975 [11]; and
2. shall forward the received MSRP SEND request to the terminating MCData client according to the rules and procedures of IETF RFC 4975 [11].

Upon receiving an error MSRP response from the terminating MCData client, the participating MCData function shall forward the error MSRP response to the originating MCData client according to the rules and procedures of IETF RFC 4975 [11].

6.3 Controlling MCData function procedures

6.3.1 Standalone SDS via media plane

6.3.1.1 General

The controlling MCData function plays a key role in anchoring the media between the originating MCData client and the terminating MCData client. Hence controlling MCData function maintains a MSRP session with all the active MCData clients.

The procedures in clause 6.3.1.2 and clause 6.3.1.3 are applicable for both, one-to-one and group standalone SDS using media plane.

6.3.1.2 Establishing MSRP session

6.3.1.2.1 MSRP session establishment with originating MCData client

To establish the MSRP connection with the originating MCData client, the controlling MCData function performs below procedures:

1. shall act as an MSRP client and establish TLS connection with the originating participating MCData function, if exists, otherwise the originating MCData client, according to the rules and procedures as described in IETF RFC 4975 [11];

2. shall act as an MSRP client to send MSRP SEND requests according to the rules and procedures described in IETF RFC 6135 [12];

3. shall act as an "passive" endpoint according to the rules and procedures described in IETF RFC 6135 [12];

4. shall establish the MSRP connection with originating MCData client, according to the rules and procedures described in IETF RFC 6135 [12]; and

5. as a passive endpoint, shall wait for MSRP SEND request on established MSRP connection, to bind the MSRP connection to the MSRP session according to the rules and procedures of IETF RFC 4975 [11] and IETF RFC 6135 [12].

6.3.1.2.2 MSRP session establishment with terminating MCData client

To establish the MSRP connection with the terminating MCData client, the controlling MCData function performs below procedures:

1. shall act as an MSRP client and establish TLS connection with the terminating participating MCData function, if exists, otherwise the terminating MCData client, according to the rules and procedures as described in IETF RFC 4975 [11];

2. shall act as an MSRP client to send MSRP SEND requests according to the rules and procedures described in IETF RFC 6135 [12];

3. shall act according to IETF RFC 6135 [12], as:

   a. an "active" endpoint, if a=setup attribute in the received SDP answer is set to "passive"; and

   b. an "passive" endpoint, if a=setup attribute in the received SDP answer is set to "active";

4. shall establish the MSRP connection with each terminating MCData client identified in the 3GPP TS 24.282 [8], according to the rules and procedures described in IETF RFC 6135 [12]; and

5. if acting as an "active" endpoint, shall send an empty MSRP SEND request on each established MSRP connection, to bind the MSRP connection to the MSRP session according to the rules and procedures of IETF RFC 4975 [11] and IETF RFC 6135 [12].

6.3.1.3 Handling of received MSRP messages

Upon receiving a MSRP SEND request from the originating participating MCData function, the controlling MCData function:

1. if in a standalone one-to-one SDS using media plane, shall verify the SDS message size is less than or equal to <max-data-size-sds-bytes> element in the MCData service configuration document as specified in 3GPP TS 24.484 [7];

2. if in a standalone group SDS using media plane shall verify:

   a. the SDS message size is less than or equal to <mcdata-max-data-in-single-request> element of the MCData group document for the (see the MCData group document in 3GPP TS 24.481 [4]); and

   b. the SDS message size is less than or equal to <mcdata-on-network-max-data-size-for-SDS> element of the MCData group document (see the MCData group document in 3GPP TS 24.481 [4]);

3. if the verifications in either 1 or 2 a or 2 b above fails, shall send the MSRP response with the error code 403 to the MCData client which sent the SDS message and shall not continue with the rest of the procedure;

4. shall generate and send a MSRP 200 (OK) response for the received MSRP SEND requests to the originating participating MCData function, according to the rules and procedures of IETF RFC 4975 [11]; and

5. shall forward the received MSRP SEND requests to each terminating MCData client with which a successful MSRP connection was established, according to the rules and procedures of IETF RFC 4975 [11]. Following clarifications apply to the generated MSRP SEND request:

   a. shall modify the To-Path header according to the MSRP URI received in the answer SDP from the MCData client in accordance with rules and procedures of IETF RFC 4975 [11]; and

   b. shall modify the From-Path header to the controlling MCData function's own MSRP URI, according to the rules and procedures of IETF RFC 4975 [11].

6.3.2 Short data during SDS session

6.3.2.1 General

6.3.2.2 Establishing MSRP session

6.3.2.2.1 MSRP session establishment with originating MCData client

To establish the MSRP connection with the originating MCData client, the controlling MCData function performs below procedures:

1. shall act as an MSRP client and establish TLS connection with the originating participating MCData function, if exists, otherwise the originating MCData client, according to the rules and procedures as described in IETF RFC 4975 [11];

2. shall act as an MSRP client to send MSRP SEND requests according to the rules and procedures described in IETF RFC 6135 [12];

3. shall act as an "passive" endpoint according to the rules and procedures described in IETF RFC 6135 [12];

4. shall establish the MSRP connection with originating MCData client, according to the rules and procedures described in IETF RFC 6135 [12]; and

5. acting as a "passive" endpoint, shall wait for MSRP SEND request on established MSRP connection, to bind the MSRP connection to the MSRP session according to the rules and procedures of IETF RFC 4975 [11] and IETF RFC 6135 [12].

6.3.2.2.2 MSRP session establishment with terminating MCData client

To establish the MSRP connection with the terminating MCData client, the controlling MCData function performs below procedures:

1. shall act as an MSRP client and establish TLS connection with the terminating participating MCData function, if exists, otherwise the terminating MCData client, according to the rules and procedures as described in IETF RFC 4975 [11];

2. shall act as an MSRP client to send MSRP SEND requests according to the rules and procedures described in IETF RFC 6135 [12];

3. shall act according to IETF RFC 6135 [12], as:

   a. an "active" endpoint, if a=setup attribute in the received SDP answer is set to "passive"; and

   b. an "passive" endpoint, if a=setup attribute in the received SDP answer is set to "active";

4. shall establish the MSRP connection with each terminating MCData client identified in the 3GPP TS 24.282 [8], according to the rules and procedures described in IETF RFC 6135 [12]; and

5. if acting as an "active" endpoint, shall send an empty MSRP SEND request on each established MSRP connection, to bind the MSRP connection to the MSRP session according to the rules and procedures of IETF RFC 4975 [11] and IETF RFC 6135 [12].

6.3.2.3 Handling of received MSRP messages

Upon receiving a MSRP SEND request from the originating participating MCData function, the controlling MCData function:

1. shall generate and send a MSRP 200 (OK) response for the received MSRP SEND requests to the originating participating MCData function, according to the rules and procedures of IETF RFC 4975 [11]; and
2. shall forward the received MSRP SEND requests to each terminating MCData client with which a successful MSRP connection was established, according to the rules and procedures of IETF RFC 4975 [11]. Following clarifications apply to the generated MSRP SEND request:
   a. shall modify the To-Path header according to the MSRP URI received in the answer SDP from the MCData client in accordance with rules and procedures of IETF RFC 4975 [11]; and
   b. shall modify the From-Path header to the controlling MCData function's own MSRP URI, according to the rules and procedures of IETF RFC 4975 [11].

6.4 General

6.4.1 Handling of MIME bodies in MSRP SEND messages

The MCData client and MCData server shall support several MIME bodies in MSRP SEND requests as specified in IETF RFC 4975 [11].

When the MCData client or the MCData server sends a MSRP SEND that contains more than one MIME body, the MCData client or the MCData server:

1) shall, as specified in IETF RFC 2046 [9], include one Content-Type header field with the value set to multipart/mixed and with a boundary delimiter parameter set to any chosen value;
2) for each MIME body:
   a) shall insert the boundary delimiter;
   b) shall insert the Content-Type header field with the MIME type of the MIME body; and
   c) shall insert the content of the MIME body; and
3) shall insert a final boundary delimiter.

When the MCData client or the MCData server sends an MSRP SEND containing only one MIME body, the MCData client or the MCData server:

1) shall include a Content-Type header field set to the MIME type of the MIME body; and
2) shall insert the content of the MIME body.

6.5 SDS delivery using MBMS

6.5.1 General Description (non-normative)

The procedures for group SDS delivery using MBMS via the media plane can be seen as extensions of the procedures for group SDS session delivery using unicast. The procedures of the originating client, originating participating function and controling function are those used for unicast session delivery for group SDS. Only the terminating participating function and the terminating client are involved in MBMS delivery functionality for group SDS.

The procedures assume that consistent with 3GPP TS 24.282 [8], an SDS session has already been established and the originating and terminating MCData clients have already completed successfully the SDP offer/answer negotiation. It is further assumed that the terminating MCData participating function has already sent an MBMS bearer announcement message providing information about the MBMS bearer and subchannel intended for MBMS delivery and that the

terminating MCData client has received and processed the MBMS bearer announcement message, as described in 3GPP TS 24.282 [8].

During the SDS session, the terminating MCData participating function intercepts MSRP SEND messages arriving from the originating side, and, after eliminating duplicates, encapsulates them unchanged as payload in (S)RTP/UDP/IP (see IETF RFC 3711 [17]) packets and transmits them on an MBMS bearer towards the terminating MCData client. Upon reception, the terminating MCData client decapsulates the payload and processes it as an MSRP SEND message within the SDS session, arriving from the originating side.

NOTE 1: Since MSRP chunking is supported for unicast delivery, it is also supported for MBMS delivery.

NOTE 2: If SRTP (see IETF RFC 3711 [17]), rather than RTP, is used to security protect packets sent on MBMS bearer, MuSiK (see 3GPP TS 24.482 [5] and 3GPP TS 33.180 [15]) may be employed to provide protection in addition to the security mechanisms that protect the unicast MSRP traffic.

NOTE 3: Whether unicast or MBMS delivery are used is up to the terminating participating function, which can use listening status reports from the MCData clients, the presence or absence of the DELIVERED disposition in SDS, as well as other information, to decide on an individual MCData client and SDS basis. At any time during a session, the terminating participating server can toggle between unicast and MBMS delivery.

6.5.2 Procedures for the terminating MCData client

6.5.2.1 Handling the MSRP connection

The terminating MCData client shall execute the procedure for MSRP connection establishment described in clause 6.1.2.3.1.

6.5.2.2 Receiving Map Group To Bearer and Unmap Group To Bearer

While MBMS delivery is expected, the terminating MCData client shall monitor the general purpose MBMS subchannel.

When receiving a Map Group To Bearer message over the general purpose MBMS subchannel, the MBMS interface in the MCData client:

1) shall associate the TMGI in the TMGI field, the MBMS subchannel for media with the MCData group identity in the MCData Group ID field; and

2) shall start or continue the procedure described in clause 6.5.2.3.

When receiving the Unmap Group To Bearer message referring to the current communication over a MBMS subchannel, the MBMS interface in the MCData client:

1) shall remove the association between the TMGI, the MBMS subchannel for media in the group session identified by the MCData Group ID field, if such an association exists; and

2) shall cease monitoring the associated MBMS bearer and subchannel for media and, if the SDS session is still ongoing, shall resume or continue SDS delivery via media plane over unicast.

6.5.2.3 Receiving media packets

The terminating MCData client shall:

1. while MBMS delivery is expected, the terminating MCData client shall monitor the MBMS bearer and subchannel indicated by the Map Group To Bearer message; and

2. for each received (S)RTP media packet, until a SIP BYE is received or until an implementation dependent timeout occurs:

   a. decapsulate the payload out of the (S)RTP packet and, if SRTP rather than RTP is used (see IETF RFC 3711 [17]), decrypt and validate the payload;

b. if the media packet was received via an MBMS bearer with the TMGI associated to the group, accept the payload as correctly destined for the terminating MCData client, regardless of whether or not the To-Path header of the MSRP SEND message in the payload matches the terminating MCData client's MSRP URI (i.e. the MSRP URI provided in the answer SDP to the controlling function during the MSRP session establishment, in accordance with rules and procedures of IETF RFC 4975 [11]); and

c. process the payload as a received MSRP SEND message according to clause 6.1.2.3.1, in the context of the media flow formed by previously received MSRP SEND messages, whether delivered via unicast or via MBMS.

6.5.3 Procedures for the terminating MCData participating function

6.5.3.1 Establishing MSRP session

The terminating MCData participating function:

1. shall establish an MSRP session with the controlling MCData function according to clause 6.2.2.5.1; and
2. shall establish an MSRP session with the terminating MCData client according to clause 6.2.2.5.2.

6.5.3.2 Sending Map Group To Bearer and Unmap Group To Bearer

The terminating MCData participating function:

1. shall build a Map Group To Bearer message (see clause 11.2.4) to include:
   a. the TMGI of the MBMS bearer to carry the traffic;
   b. the identifier of the media stream; and
   c. the MCData Group identifier field; and
2. shall send (repetitively, at short, implementation dependent time intervals) the Map Group To Bearer message over the general purpose MBMS subchannel.

When the session ends, the terminating MCData participating function shall build the corresponding Unmap Group To Bearer message (see clause 11.2.5) and shall send it over the general purpose MBMS subchannel.

6.5.3.3 Receiving media packets intended for a terminating MCData client

When receiving an MSRP SEND message that the terminating participating server considers qualified for MBMS delivery and is destined to one of the MCData clients listening to the MBMS subchannel, the participating MCData function:

NOTE 1: An MSRP SEND message that does not qualify for MBMS delivery or is not destined to an MCData client listening to the MBMS subchannel is handled as an MSRP SEND message to be delivered over unicast (see clause 6.2.1.5.3).

1. shall generate and send an MSRP 200 (OK) response for the received MSRP SEND message to the controlling MCData function, according to the rules and procedures of IETF RFC 4975 [11];
2. shall check if the media packet that encapsulates the MSRP SEND message is already sent over the MBMS subchannel or not;
3. if the media packet is already sent over the MBMS subchannel, shall discard the MSRP SEND message; and
4. otherwise:
   a. shall build an (S)RTP/UDP/IP (see IETF RFC 3711 [17]) media packet with the IP address and UDP port number indicated in the sent Map Group To Bearer message and with the received MSRP SEND message as payload, security protected if SRTP is used, per IETF RFC 3711 [17] and 3GPP TS 33.180 [15]; and
   b. shall transmit the built (S)RTP/UDP/IP packet on the MBMS bearer identified by the TMGI indicated in the sent Map Group To Bearer message.

NOTE 2: To save over-the air resources, the terminating MCData participating function releases or reduces the bandwidth of the unicast downlink bearers used for unicast SDS delivery. However, to enable the ability of rapid switching between unicast and MBMS delivery, the terminating MCData participating function can keep the unicast bearers intact.

Upon receiving error MSRP responses (see IETF RFC 4975 [11]) from the terminating MCData client, the terminating MCData participating function shall forward the error MSRP responses towards the originating MCData client.

6.6 SDS delivery using MBS

All steps of clause 6.5 apply also for MBS, with the clarification that terminology mapping specified in annex X applies.

7 FD media plane procedures

7.1 MCData client procedures

7.1.1 General

For file distribution, upon receiving a request from the user or user application the originating client establishes the media plane as specified in 3GPP TS 24.282 [8].

The procedures in clause 7.1.2 and clause 7.1.3 are applicable for one-to-one and group file distribution.

A MCData client which is not permitted to transmit data should not use the procedure in clause 7.1.2.

7.1.2 Originating MCData client procedures

7.1.2.1 Handling MSRP connection

Upon receiving an indication to establish MSRP connection for file distribution as the originating client, the MCData client:

1. shall act as an MSRP client according to IETF RFC 6135 [12];
2. shall act according to IETF RFC 6135 [12], as:
   a. an "active" endpoint, if a=setup attribute in the received SDP answer is set to "passive"; and
   b. an "passive" endpoint, if a=setup attribute in the received SDP answer is set to "active";
3. shall establish the MSRP connection according to the MSRP connection parameters in the SDP answer received in the SIP 200 (OK) response according to IETF RFC 4975 [11]; and
4. if acting as an "active" endpoint, shall send an empty MSRP SEND request to bind the MSRP connection to the MSRP session from the perspective of the passive endpoint according to the rules and procedures of IETF RFC 4975 [11] and IETF RFC 6135 [12].

On receiving MSRP 200 (OK) response to the first MSRP SEND request, the MCData client can send the file. To send the file, the MCData client:

1. shall generate MSRP SEND for file distribution request according to IETF RFC 4975 [11]. When generating an MSRP SEND, the MCData client:
   a. shall set To-Path header according to the MSRP URI(s) received in the answer SDP;
   b. shall set the Content-Type header field = to "application/vnd.3gpp.mcdata-file"; and

c. shall include in the body of the MSRP SEND request the MSRP payload. The MSRP payload is set to the file or part of the file.

2. shall send the MSRP SEND request(s) on the established MSRP connection.

If MSRP chunking is used, the MCData client:

1. shall send further MSRP SEND requests containing the file as necessary;
2. shall wait for a 200 (OK) response to each MSRP SEND request sent; and
3. on receipt of the last 200 (OK) response shall terminate the SIP session as specified in 3GPP TS 24.282 [8].

On receiving a non-200 MSRP response to the MSRP SEND request the MCData client shall handle the error as specified in IETF RFC 4975 [11]. To terminate the MSRP session, the MCData client:

1. if there are further MSRP chunks to send, shall abort transmission of these further MSRP chunks;
2. shall indicate to MCData user that the file could not be distributed; and
3. shall terminate the SIP session as specified in 3GPP TS 24.282 [8].

7.1.3 Terminating MCData client procedures

7.1.3.1 Handling MSRP connection

Upon receiving an indication to establish MSRP connection for file distribution as the terminating client, the MCData client:

1. shall act as an MSRP client according to IETF RFC 6135 [12];
2. shall act either as an active endpoint or as an passive endpoint to open the transport connection, according to IETF RFC 6135 [12];
3. shall establish the MSRP connection according to the MSRP connection parameters in the SDP offer received in the SIP INVITE request according to IETF RFC 4975 [11];
4. if acting as an "active" endpoint, shall send an empty MSRP SEND request to bind the MSRP connection to the MSRP session from the perspective of the passive endpoint according to the rules and procedures of IETF RFC 4975 [11] and IETF RFC 6135 [12];

Once the MSRP session is established, the MCData client:

1. on receipt of an MSRP request in the MSRP session, shall follow the rules and procedures defined in IETF RFC 4975 [11] and in IETF RFC 6714 [13];
2. If an MSRP SEND request indicates the use of chunking, shall wait until all further MSRP SEND requests for the remaining chunks have been received and shall reassemble the entire set of MSRP requests into the file before delivering the content to the application; and
3. shall handle the received content as described in clause 7.1.3.2.

7.1.3.2 Handling received content and disposition requests

Upon receiving a file, the MCData client:

1. shall decode the contents of the application/vnd.3gpp.mcdata-file MIME body; and
2. once all the chunks of the file are successfully received, shall indicate to the signalling plane that the file download is completed.

7.2 Participating MCData function procedures

7.2.1 General

For a one-to-one or group file distribution, the media plane is established between the originating MCData client and the originating participating MCData function, the originating participating MCData function and the controlling MCData function, the controlling MCData function and the terminating participating MCData function(s) and each terminating participating MCData function and the terminating MCData client(s) as specified in 3GPP TS 24.282 [8]. The procedures in clause 7.2.2 and clause 7.2.3 are applicable for one-to-one and group file distribution.

7.2.2 Establishing MSRP session to receive the file

To receive a file over MSRP, the participating MCData function:

1. shall act according to IETF RFC 6135 [12], as:
   a. an "passive" endpoint, if a=setup attribute in the sent SDP answer was set to "passive"; and
   b. an "active" endpoint, if a=setup attribute in the sent SDP answer was set to "active"; and
2. shall establish an MSRP connection according to the MSRP connection parameters in the sent SDP answer response as described in IETF RFC 4976 [14].

7.2.3 Establish MSRP session to send the file

To send a file over MSRP, the participating MCData function:

1. shall act according to IETF RFC 6135 [12], as:
   a. an "active" endpoint, if a=setup attribute in the received SDP answer is set to "passive"; and
   b. an "passive" endpoint, if a=setup attribute in the received SDP answer is set to "active"; and
2. shall establish the MSRP connection according to the MSRP connection parameters in the received SDP answer response as described in IETF RFC 4976 [14].

7.2.4 Originating participating MCData function procedures

7.2.4.1 Establish MSRP session with the originating MCData client

The originating participating MCData function should establish the MSRP session with the originating MCData client as specified in clause 7.2.2.

7.2.4.2 Establish MSRP session with the controlling MCData function

The originating participating MCData function should establish the MSRP session with the controlling MCData function as specified in clause 7.2.3.

7.2.4.3 Handling of received MSRP messages

Upon receiving an MSRP SEND request from the originating MCData client, the originating participating MCData function:

1. if an MSRP connection is not established with the controlling MCData function then, shall establish the MSRP connection as specified in clause 7.2.4.2. Otherwise, shall use the existing MSRP connection; and
2. shall forward the received MSRP SEND request to the controlling MCData function according to the rules and procedures of IETF RFC 4975 [11].

Upon receiving an MSRP 200 (OK) response from the controlling MCData function, the participating MCData function shall forward the MSRP 200 (OK) response to the originating MCData client according to the rules and procedures of IETF RFC 4975 [11].

Upon receiving an error MSRP response from the controlling MCData function, the participating MCData function shall forward the error MSRP response to the originating MCData client according to the rules and procedures of IETF RFC 4975 [11].

7.2.5 Terminating participating MCData function procedures

7.2.5.1 Establish MSRP session with the controlling MCData function

The terminating participating MCData function should establish the MSRP session with the controlling MCData function as specified in clause 7.2.2.

7.2.5.2 Establish MSRP session with the terminating MCData client

The terminating participating MCData function should establish MSRP session to terminating MCData client as specified in clause 7.2.3.

7.2.5.3 Handling of received MSRP messages

Upon receiving an MSRP SEND request from the controlling MCData function, the terminating participating MCData function:

1. shall generate and send a MSRP 200 (OK) response for the received MSRP SEND request to the controlling MCData function, according to the rules and procedures of IETF RFC 4975 [11]; and
2. if the indication to store the received file for later delivery is received from the signaling plane, the participating function:

   a) shall receive and store the file; and

   b) shall indicate to the signalling plane that the file download is completed as specified in 3GPP TS 24.282 [8] clause 10.2.5.3.4;

   otherwise:

   a) shall forward the received MSRP SEND request to the terminating MCData client according to the rules and procedures of IETF RFC 4975 [11].

Upon receiving an error MSRP response from the terminating MCData client, the participating MCData function shall forward the error MSRP response to the originating MCData client according to the rules and procedures of IETF RFC 4975 [11].

7.3 Controlling MCData function procedures

7.3.1 General

7.3.2 Establishing MSRP session

7.3.2.1 MSRP session establishment with originating MCData client

To establish the MSRP connection with the originating MCData client, the controlling MCData function performs below procedures:

1. shall act as an MSRP client and establish TLS connection with the originating participating MCData function, if exists, otherwise the originating MCData client, according to the rules and procedures as described in IETF RFC 4975 [11];

2. shall act as an MSRP client to send MSRP SEND requests according to the rules and procedures described in IETF RFC 6135 [12];

3. shall act as an "passive" endpoint according to the rules and procedures described in IETF RFC 6135 [12];

4. shall establish the MSRP connection with originating MCData client, according to the rules and procedures described in IETF RFC 6135 [12]; and

5. acting as a "passive" endpoint, shall wait for MSRP SEND request on established MSRP connection, to bind the MSRP connection to the MSRP session according to the rules and procedures of IETF RFC 4975 [11] and IETF RFC 6135 [12].

7.3.2.2 MSRP session establishment with terminating MCData client

To establish the MSRP connection with the terminating MCData client, the controlling MCData function performs below procedures:

1. shall act as an MSRP client and establish TLS connection with the terminating participating MCData function, if exists, otherwise the terminating MCData client, according to the rules and procedures as described in IETF RFC 4975 [11];

2. shall act as an MSRP client to send MSRP SEND requests according to the rules and procedures described in IETF RFC 6135 [12];

3. shall act according to IETF RFC 6135 [12], as:

   a. an "active" endpoint, if a=setup attribute in the received SDP answer is set to "passive"; and

   b. an "passive" endpoint, if a=setup attribute in the received SDP answer is set to "active";

4. shall establish the MSRP connection with each terminating MCData client identified in the 3GPP TS 24.282 [8], according to the rules and procedures described in IETF RFC 6135 [12]; and

5. if acting as an "active" endpoint, shall send an empty MSRP SEND request on each established MSRP connection, to bind the MSRP connection to the MSRP session according to the rules and procedures of IETF RFC 4975 [11] and IETF RFC 6135 [12].

7.3.3 Handling of received MSRP messages

Upon receiving a MSRP SEND request from the originating participating MCData function, the Controlling function:

1. shall generate and send a MSRP 200 (OK) response for the received MSRP SEND requests to the originating participating MCData function, according to the rules and procedures of IETF RFC 4975 [11]; and

2. shall forward the received MSRP SEND requests to each terminating MCData client with which a successful MSRP connection was established, according to the rules and procedures of IETF RFC 4975 [11]. Following clarifications apply to the generated MSRP SEND request:

   a. shall modify the To-Path header according to the MSRP URI received in the answer SDP from the MCData client in accordance with rules and procedures of IETF RFC 4975 [11]; and

   b. shall modify the From-Path header to the controlling MCData function's own MSRP URI, according to the rules and procedures of IETF RFC 4975 [11].

7.4 FD using MBMS delivery via MB2 interface

7.4.1 General Description

The procedures for group FD using MBMS delivery via the MB2 interface can be seen as extensions of the procedures for group FD media delivery using unicast. The procedures of the originating client, originating participating function and controling function are those used for unicast session delivery for group FD. Only the terminating participating function and the terminating client are involved in MBMS delivery over MB2 interface functionality for group FD.

The procedures assume that consistent with 3GPP TS 24.282 [8], an MSRP session has already been established and the originating and terminating MCData clients have already completed successfully the SDP offer/answer negotiation. It is further assumed that the terminating MCData participating function has already sent an MBMS bearer announcement message providing information about the MBMS bearer and subchannel intended for MBMS delivery and that the terminating MCData client has received and processed the MBMS bearer announcement message, as described in 3GPP TS 24.282 [8].

During the session, the terminating MCData participating function intercepts MSRP SEND messages arriving from the originating side, and, after eliminating duplicates, encapsulates them unchanged as payload in (S)RTP/UDP/IP (see IETF RFC 3711 [17]) packets and transmits them on an MBMS bearer towards the terminating MCData client. Upon reception, the terminating MCData client decapsulates the payload and processes it as an MSRP SEND message within the MSRP session, arriving from the originating side.

NOTE 1: Since MSRP chunking is supported for unicast delivery, it is also supported for MBMS delivery.

NOTE 2: If SRTP (see IETF RFC 3711 [17]), rather than RTP, is used to securely protect packets sent on MBMS bearer, MuSiK (see 3GPP TS 24.282 [8] and 3GPP TS 33.180 [15]) may be employed to provide protection in addition to the security mechanisms that protect the unicast MSRP traffic.

NOTE 3: The terminating participating function, which can use listening status reports from the MCData clients, the presence, absence or content of the FILE DOWNLOAD COMPLETED report, as well as other information, decides whether to use unicast or MBMS delivery on an individual MCData client and file basis. At any time during a session, the terminating participating server can toggle between unicast and MBMS delivery.

7.4.2 Procedures for the terminating MCData client

7.4.2.1 Handling the MSRP connection

The terminating MCData client shall execute the procedure for MSRP connection establishment described in clause 7.1.3.1.

7.4.2.2 Receiving Map Group To Bearer and Unmap Group To Bearer

While MBMS delivery is expected, the terminating MCData client shall monitor the general purpose MBMS subchannel.

When receiving a Map Group To Bearer message over the general purpose MBMS subchannel, the MBMS interface in the MCData client:

1) shall associate the TMGI in the TMGI field, the MBMS subchannel for media with the MCData group identity in the MCData Group ID field; and

2) shall start or continue the procedure described in clause 7.4.2.3.

When receiving the Unmap Group To Bearer message referring to the current communication over a MBMS subchannel, the MBMS interface in the MCData client:

1) shall remove the association between the TMGI, the MBMS subchannel for media in the group session identified by the MCData Group ID field, if such an association exists; and

2) shall cease monitoring the associated MBMS bearer and subchannel for media and, if the MSRP session is still ongoing, shall resume or continue file delivery via media plane over unicast.

7.4.2.3 Receiving media packets

The terminating MCData client shall:

1. while MBMS delivery is expected, monitor the MBMS bearer and subchannel indicated by the Map Group To Bearer message; and

2. for each received (S)RTP media packet, until a SIP BYE is received or until an implementation dependent timeout occurs:

a. decapsulate the payload out of the (S)RTP packet and, if SRTP rather than RTP is used (see IETF RFC 3711 [17]), decrypt and validate the payload;

b. if the media packet was received via an MBMS bearer with the TMGI associated to the group, accept the payload as correctly destined for the terminating MCData client, regardless of whether or not the To-Path header of the MSRP SEND message in the payload matches the terminating MCData client's MSRP URI (i.e. the MSRP URI provided in the answer SDP to the controlling function during the MSRP session establishment, in accordance with rules and procedures of IETF RFC 4975 [11]); and

c. process the payload as a received MSRP SEND message during the established MSRP session, according to clause 7.1.3.1, in the context of the media flow formed by previously received MSRP SEND messages, whether delivered via unicast or via MBMS.

7.4.3 Procedures for the terminating MCData participating function

7.4.3.1 Establishing MSRP sessions

The terminating MCData participating function:

1. shall establish an MSRP session with the controlling MCData function according to clause 7.2.5.1; and
2. shall establish an MSRP session with the terminating MCData client according to clause 7.2.5.2.

7.4.3.2 Sending Map Group To Bearer and Unmap Group To Bearer

The terminating MCData participating function:

1. shall build a Map Group To Bearer message (see clause 11.2.4) to include:
   a. the TMGI of the MBMS bearer to carry the traffic;
   b. the identifier of the media stream; and
   c. the MCData Group identifier field; and
2. shall send (repetitively, at short, implementation dependent time intervals) the Map Group To Bearer message over the general purpose MBMS subchannel.

When the MSRP session with the terminating MCData client (see clause 7.4.3.1) ends, the terminating MCData participating function shall build the corresponding Unmap Group To Bearer message (see clause 11.2.5) and shall send it over the general purpose MBMS subchannel.

7.4.3.3 Receiving media packets intended for a terminating MCData client

When receiving an MSRP SEND message that the terminating participating function considers qualified for MBMS delivery and is destined to one of the MCData clients listening to the MBMS subchannel, the terminating participating MCData function:

NOTE 1: An MSRP SEND message that does not qualify for MBMS delivery or is not destined to an MCData client listening to the MBMS subchannel is handled as an MSRP SEND message to be delivered over unicast (see clause 7.2.5.3).

1. shall generate and send an MSRP 200 (OK) response for the received MSRP SEND message to the controlling MCData function, according to the rules and procedures of IETF RFC 4975 [11];
2. shall check if the media packet that encapsulates the MSRP SEND message is already sent over the MBMS subchannel or not;
3. if the media packet is already sent over the MBMS subchannel, shall discard the MSRP SEND message; and
4. otherwise:

a. shall build an (S)RTP/UDP/IP (see IETF RFC 3711 [17]) media packet with the IP address and UDP port number indicated in the sent Map Group To Bearer message and with the received MSRP SEND message as payload, security protected if SRTP is used, per IETF RFC 3711 [17] and 3GPP TS 33.180 [15]; and

b. shall transmit the built (S)RTP/UDP/IP packet on the MBMS bearer identified by the TMGI indicated in the sent Map Group To Bearer message.

NOTE 2: To save over-the air resources, the terminating MCData participating function releases or reduces the bandwidth of the unicast downlink bearers used for unicast file delivery. However, to enable the ability of rapid switching between unicast and MBMS delivery, the terminating MCData participating function can keep the unicast bearers intact.

Upon receiving error MSRP responses (see IETF RFC 4975 [11]) from the terminating MCData client, the terminating MCData participating function shall forward the error MSRP responses towards the originating MCData client.

7.5 FD using MBS delivery via MCData-FD interface

All steps of clause 7.4 apply also for MBS except different interfaces, with the clarification that terminology mapping specified in annex X applies.

8 Communication release media plane procedures

When communication is released by the MCData client or by the MCData server, as specified in 3GPP TS 24.282 [8], for an SDS or FD session which uses the media plane, the related MSRP session and the TCP or TLS connections used for this MSRP session shall also be released.

9 Coding

9.1 General

SDS and FD over media plane messages are coded according to MSRP as specified in RFC 4975 [11] both for short data and disposition notification. The body of an MSRP message includes SDS specific messages of a file.

9.2 SDS specific messages

SDS specific messages used for on-network SDS using media plane are SDS SIGNALLING PAYLOAD message, DATA PAYLOAD message and SDS NOTIFICATION message. The message structures and the format of the information elements are specified in clause 15 of 3GPP TS 24.282 [8]

10 Media plane security aspects

10.1 General

Media plane security provides integrity and confidentiality protection for the MCData media information and media plane control information transmitted using media plane. Media plane security also provides the authentication of MCData media information.

The media plane security is based on 3GPP MCData security solution including key management as defined in 3GPP TS 33.180 [15].

NOTE: In 3GPP TS 33.180 [15] media information is denoted as MCData Data Payload and media plane control information is denoted as MCData Data signalling Payload.

Various keys and associated key identifiers protect the media information and media plane control information carried in the body of an MSRP SEND message.

The media plane control information may be:

1. SDS SIGNALLING PAYLOAD; or
2. SDS NOTIFICATION.

The media information may be:

1. DATA PAYLOAD; or
2. File or file portion.

In an on-network MCData communication for an MCData group, if protection of media is negotiated, the GMK and the GMK-ID of the MCData group shall be used for protecting the media sent and received by MCData clients.

In an on-network one-to-one MCData communication, if protection of media is negotiated, the PCK and the PCK-ID shall be used for protecting the media sent and received by MCData clients.

If protection of media control information sent using unicast between the MCData client and the participating MCData function serving the the MCData client is negotiated, the CSK and the CSK-ID shall be used for protecting the media control information sent and received using unicast by the MCData client and by a participating MCData function.

If protection of media control information between the participating MCData function and the controlling MCData function is configured, the SPK and the SPK-ID shall be used for protecting the media control information sent and received between the participating MCData function and the controlling MCData function.

The GMK and the GMK-ID are distributed to the MCData clients using the group document subscription and notification procedure specified in 3GPP TS 24.481 [4].

The PCK and the PCK-ID are generated by the MCData client initiating the standalone one-to-one SDS using media plane or one-to-one SDS session or one-to-one FD using media plane and provided to the MCData client receiving the SIP signalling according to 3GPP TS 24.282 [8].

The CSK and the CSK-ID are generated by the MCData client and provided to the participating MCData function serving the MCData client using SIP signalling according to 3GPP TS 24.282 [8].

The SPK and the SPK-ID are configured in the participating MCData function and the controlling MCData function.

The key material for creating and verifying the authentication signature (SSK, PVT and KPAK) is provisioned to the MCData clients by the KMS as specified in 3GPP TS 33.180 [15].

10.2 Derivation of master keys for media and media control

Each MCData Payload Protection Key (DPPK) (i.e. GMK, PCK, CSK, SPK) and its associated key identifier DPPK-ID (i.e. GMK-ID, PCK-ID, CSK-ID, SPK -ID) described in clause 10.1 shall be used to derive a MCData Payload Cipher Key (DPCK) and its associated DPCK-ID as specified in 3GPP TS 33.180 [15].

DPCK and DPCK-ID shall be used in the protection of media or media plane control information as specified in 3GPP TS 33.180 [15].

10.3 Protection of media and media control and authentication of media

10.3.1 General

The media information may be protected. Protection shall be applied as specified in clause 8.5.4 in 3GPP TS 33.180 [15].

The media control information may be protected. Protection shall be applied as specified in clause 8.5.4 in 3GPP TS 33.180 [15].

MCData media information or protected MCData media information may also be authenticated as specified in clause 8.5.5 in 3GPP TS 33.180 [15].

10.3.2 The MCData client

A MCData client transmitting media information shall protect the media information using the related DPPK and DPPK-ID according to the negotiatd protection method. For one-to-one communication PCK and PCK-ID shall be used as DPPK and DPPK-ID. For group communication GMK and GMK-ID shall be used as DPPK and DPPK-ID.

A MCData client transmitting media information or protected media information shall use the key material provisioned by the KMS when generating the authentication signature.

A MCData client which receives protected media information shall decrypt and check the integrity of the protected media using the related DPPK and DPPK-ID according to the negotiated protection method.

A MCData client which receives signed media information or signed and protected media information shall verify the signature by using the signature, the identity of the originating MCData client and the KPAK provisioned by the KMS.

A MCData client transmitting media control information shall protect the media control information using CPK and CPK-ID if media control information protection is negotiated.

A MCData client which receives protected media control information shall decrypt and check the integrity of the protected media control information using CPK and CPK-ID.

10.3.3 The participating MCData function

A participating MCData function which receives protected media information shall forward it to the next entity without any additional action related to the security framework.

A participating MCData function, when receiving a protected media control information from a MCData client shall decrypt and integrity check the protected media control using the CSK and CSK-ID negotiated with the MCData client which has sent the media control. Then, the participating MCData function shall forward the media control information to the controlling MCData function by protecting the media control information using SPK and SPK-ID, if protection is configured between the participating MCData function and the controlling MCData function.

A participating MCData function, when receiving a protected media control information from the controlling MCData function shall decrypt and integrity check the protected media control information using the SPK and SPK-ID configured between the participating MCData function and the controlling MCData function. Then, the participating MCData function shall forward the media control information to the destination MCData client by protecting the media control information using the CSK and CSK-ID if protection is negotiated between the participating MCData function and the MCData client.

10.3.4 The controlling MCData function

A controlling MCData function which receives protected media information shall forward it to the next entity without any additional action related to the security framework.

A controlling MCData function, when receiving a protected media control information from a participating MCData function shall decrypt and integrity check the protected media control information using the SPK and SPK-ID configured between the participating MCData function and the controlling MCData function. Then, the controlling MCData function shall forward the media control information to the participating MCData function serving the destination MCData client by protecting the media control information using SPK and SPK-ID, if protection is configured between the participating MCData function and the controlling MCData function.

11 Communication using MBMS

11.1 Control messages sent over MBMS bearers

11.1.1 General

The control messages sent over MBMS bearers by MCData participating function and specified in the present document are based on the (S)RTCP Application Packets (SRTCP: APP), as defined in IETF RFC 3550 [16] and IETF RFC 3711 [17], but the control messages do not conform to the rules for compound RTCP packets or RTCP packet transmission.

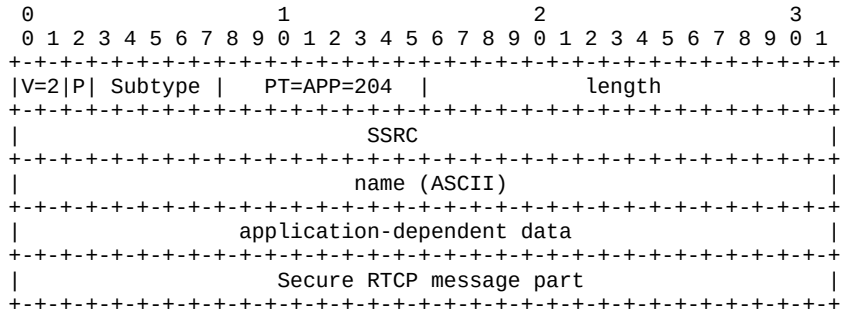
Each MBMS control message is one (S)RTCP: APP packet. These RTCP: APP packets are not to be sent in compound RTCP packets, but more than one MBMS control message can be sent in a single IP packet.

11.1.2 SRTCP: APP format for control messages sent over MBMS bearers

The definition of the fields in the SRTCP APP packet is found in IETF RFC 3550 [16] and IETF RFC 3711 [17].

Table 11.1.2-1 shows the RTCP APP packet format used for control messages sent over MBMS bearers.

Table 11.1.2-1: MBMS control message format



P

The padding bit P is set to '0'.

Subtype:

The Subtype values in use by MCData are defined in table 11.2.2-1.

length

The length field in the RTCP header is the length of the packet in 32-bit words, not counting the first 32-bit word in which the length field resides.

NOTE: The length field can indicate message size longer than specified in this version of the protocol. This can be the case e.g., if message is of later version of this protocol.

SSRC

The content of this field is described for each MBMS control message separately.

Name

The 4-byte ASCII string in the RTCP header is used to define the set of MBMS control messages for MCData, to be unique with respect to other APP packets that may be sent over the MBMS bearer. For MCData, the name string is "MCDM" (Mission Critical Data over MBMS).

Application-dependent data

The application-dependent data contains zero or more application specific data fields. The format for these fields is described in clause 11.1.3.

This part is encrypted if SRTCP is used.

Secure RTCP message part

The content of the secure RTCP message part is the "tail" appended to the RTCP packet per IETF RFC 3711 [17].

11.1.3 Application specific data field

Each application specific data field is composed of:

1. a field ID which is one octet long;
2. a length value which is:
   - one octet long, if the field ID is less than 192; and
   - two octets long, if the field ID is equal to or greater than 192;
3. a field value. The length in octets of the field value is indicated in the length value; and
4. a padding. The padding is zero, one, two, or three octets long. The value of the padding octet(s) is set to zero by sender and ignored by receiver.

An application specific data field is always a multiple of 4 octets long.

Table 11.1.3-1 shows the application dependent data field structure when the field ID is less than 192. Table 11.1.3-2 shows the application dependent data field structure when the field ID is equal to or greater than 192.

Table 11.1.3.-1: Application specific data field structure when the field ID is less than 192

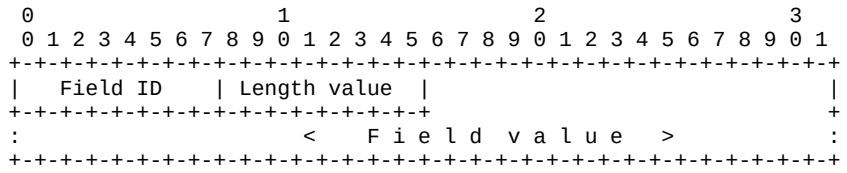
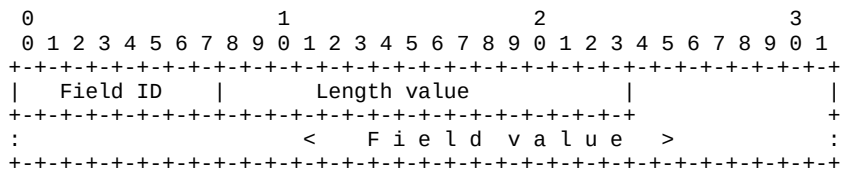


Table 11.1.3.-2: Application specific data field structure when the field ID is equal to or greater than 192



11.2 MBMS Subchannel Control

11.2.1 General

The MBMS subchannel control messages shall be coded as described in clause 11.1.2.

For the MBMS subchannel control protocol used for MCData the ASCII name string shall be: "MCDM".

The list of MBMS subchannel control messages can be found in the clause 11.2.2.

The MBMS subchannel control specific fields are specified in clause 11.2.3.

11.2.2 MBMS subchannel control messages

Table 11.2.2-1 provides a list of MBMS subchannel control protocol messages.

Table 11.2.2-1: MBMS subchannel control protocol messages

Message name	Subtype	Reference	Direction
Map Group To Bearer	00000	clause 11.2.4	Server → client
Unmap Group To Bearer	00001	clause 11.2.5	Server → client
Application Paging	00010	clause 11.2.6	Server → client
Bearer Announcement	00011	clause 11.2.7	Server → client
NOTE: The participating MCData function is the server and the MCData client is the client.			

11.2.3 MBMS subchannel control specific fields

11.2.3.1 Introduction

This clause describes the MBMS subchannel control specific data fields.

The MBMS subchannel control specific data fields are contained in the application-dependent data of the MBMS subchannel control message. The MBMS subchannel control specific data fields follow the syntax specified in clause 11.1.3.

Table 11.2.3.1-1 lists the available fields including the assigned Field ID.

Table 11.2.3.1-1: MBMS subchannel control specific data fields

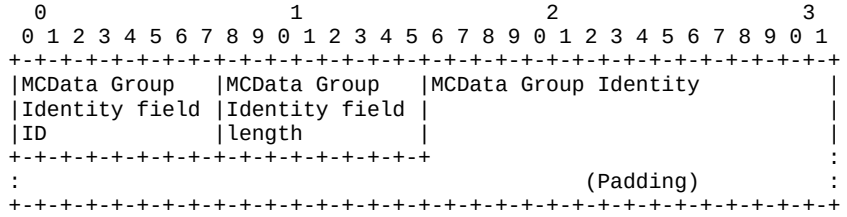
Field name	Field ID		Description
	Decimal	Binary	
MBMS Subchannel	000	00000000	Clause 11.2.3.3
TMGI	001	00000001	Clause 11.2.3.4.
MCData Group ID	002	00000010	Clause 11.2.3.2
Monitoring State	003	00000011	Subcaluse 11.2.3.5

11.2.3.2 MCData Group ID field

The MCData Group ID field contains a SIP URI identifying the MCData group to which the MBMS subchannel control messages applies.

Table 11.2.3.2-1 describes the coding of the MCData Group Identity field.

Table 11.2.3.2-1: MCData Group Identity field coding



The <MCData Group Identity field ID> value is a binary value and shall be set according to table 11.2.3.1-1.

The <MCData Group Identity length> value is a binary value indicating the length in octets of the <MCData Group Identity> value item except padding.

<MCData Group Identity> value contains the MCData group identity as defined in 3GPP TS 24.282 [8] and is in URI format (ASCII string).

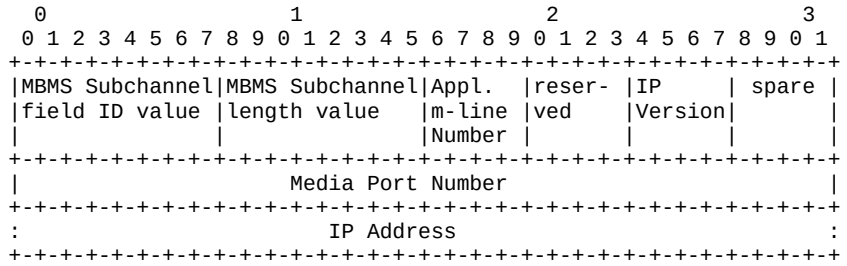
If the length of the <MCData Group Identity> value is not (2 + multiple of 4) bytes, the <MCData Group Identity> value shall be padded to (2 + multiple of 4) bytes. The value of the padding bytes should be set to zero. The padding bytes shall be ignored.

11.2.3.3 MBMS Subchannel field

The MBMS Subchannel field identifies the MBMS subchannel to use.

Table 11.2.3.3-1 describes the coding of the MBMS Subchannel field.

Table 11.2.3.3-1: MBMS Subchannel field coding



The <MBMS Subchannel field ID> value is a binary value and shall be set according to table 11.2.3.1-1.

The <MBMS Subchannel length> value is a binary value indicating the total length in octets of the <Appl. m-line Number> value, reserved, <IP Version> value, spare, <Media Port Number> value and <IP address> items.

The <Appl. m-line Number> value shall consist of 4 bit parameter giving the number of the "m=application" m-line in the SIP MESSAGE request announcing the MBMS bearer described in 3GPP TS 24.282 [8].

The "reserved" 4 bits shall be set to "0000".

The <IP version> value indicates the IP version:

'0' IP version 4

'1' IP version 6

All other values are reserved for future use.

The "spare" 4 bits shall be set to "0000".

The <Port Number> value is a 32-bit binary value giving the port to be used. The <Media Port Number> value is always present in the MBMS Subchannel field.

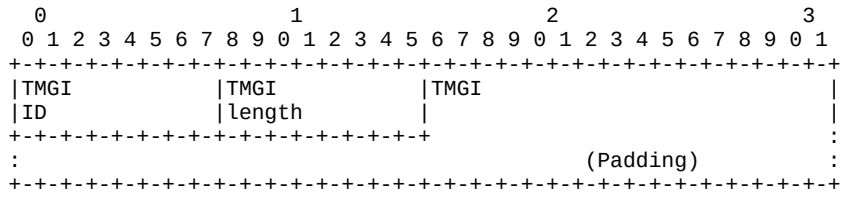
The <IP Address> value is:

1. a 32 bit binary value containing the IP v4 address if the <IP version> indicates that the <IP Address> value is a IP v4 Address; or
2. four 32-bit words that together forms a 128 bit binary value representing the IP v6 address, if the <IP version> indicates that the <IP Address> value is a IP v6 Address.

11.2.3.4 TMGI field

Table 11.2.3.4-1 describes the coding of the TMGI field.

Table 11.2.3.4-1: TMGI field coding



The <TMGI field ID> value is a binary value and shall be set according to table 11.2.3.1-1.

The <TMGI length> value is a binary value indicating the length in octets of the <TMGI> value item except padding.

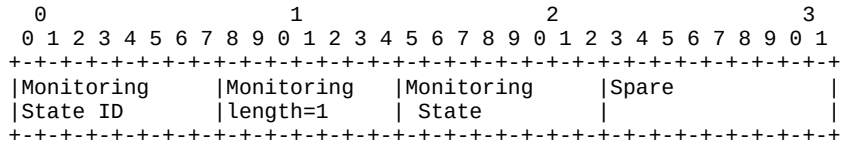
The <TMGI> value is coded as described in 3GPP TS 24.008 [18] clause 10.5.6.13 excluding the Temporary Mobile Group Identity IEI and Length of Temporary Mobile Group Identity contents (octet 1 and octet 2 in 3GPP TS 24.008 [18] clause 10.5.6.13).

If the length of the <TMGI> value is not (2 + multiple of 4) bytes, the <TMGI> value shall be padded to (2 + multiple of 4) bytes. The value of the padding bytes should be set to zero. The padding bytes shall be ignored.

11.2.3.5 Monitoring state

Table 11.2.3.5-1 describes the coding of the Monitoring State field.

Table 11.2.3.5-1: Monitoring State field coding



The <Monitoring State ID> value is a binary value and shall be set according to table 11.2.3.1-1.

The <Monitoring State length> value is a binary value indicating the length in octets of the <Monitoring State> value item. The field is set to 1.

The <Monitoring State> value is a binary value where the following values are defined:

'0' Monitoring is inactive

'1' Monitoring is active

All other values are reserved for future use.

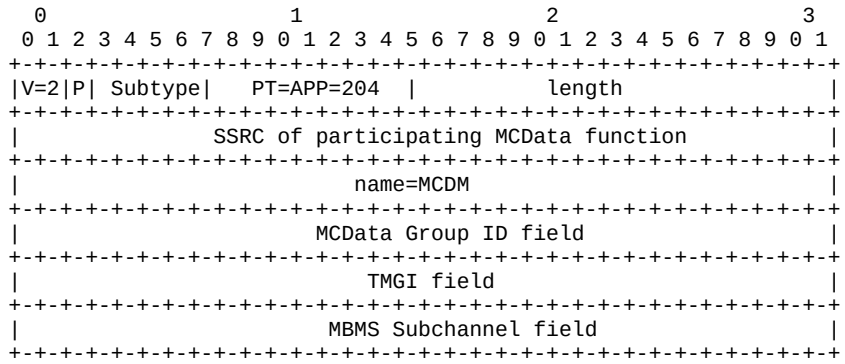
The "spare" bits are set to zero.

11.2.4 Map Group To Bearer message

The Map Group To Bearer message is sent by the participating function when the media associated with the group starts being transmitted on the MBMS bearer and, potentially, multiple times while the transmission is ongoing.

Table 11.2.4-1 shows the content of the Map Group To Bearer message.

Table 11.2.4-1: Map Group To Bearer message



With the exception of the three first 32-bit words, the order of the fields are irrelevant.

Subtype:

The Subtype shall be set according to table 11.2.3.1-1.

length:

The length shall be set to the total number of 32-bit words in the message minus one.

SSRC:

The SSRC field shall carry the SSRC of the participating MCData function.

The SSRC field shall be coded as specified in IETF RFC 3550 [16].

MCData Group ID:

The MCData Group ID field is coded as described in clause 11.2.3.2.

TMGI:

The TMGI field is coded as described in clause 11.2.3.4.

MBMS Subchannel:

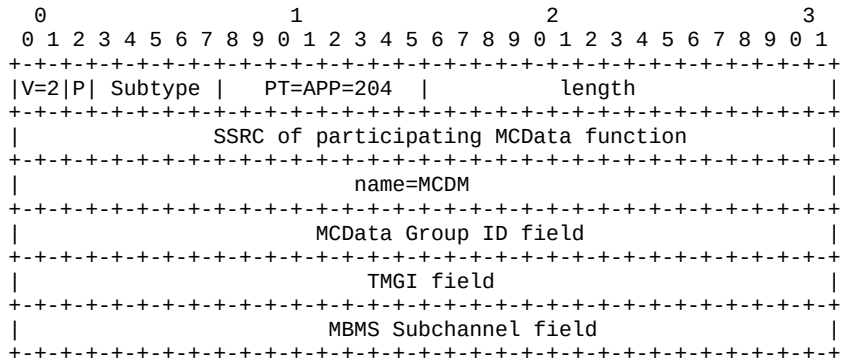
The MBMS Subchannel field is coded as described in clause 11.2.3.3.

11.2.5 Unmap Group To Bearer message

The Unmap Group To Bearer message is sent by the participating function when media associated with the group stops being sended on the bearer. The message may be repeated several times immediately after.

Table 11.2.5-1 shows the content of the Unmap Group To Bearer message.

Table 11.2.5-1: Unmap Group To Bearer message



With the exception of the three first 32-bit words, the order of the fields are irrelevant. MCData Group ID field is mandatory. Including the TMGI field and the MBMS Subchannel field is optional, but if one of those fields is included the other one also needs to be included.

Subtype:

The Subtype shall be coded according to table 11.2.3.1-1.

length:

The length shall be set to the total number of 32-bit words in the message minus one.

SSRC:

The SSRC field shall carry the SSRC of the participating MCData function.

The SSRC field shall be coded as specified in IETF RFC 3550 [16].

MCData Group ID:

The MCData Group ID field is coded as described in clause 11.2.3.2.

TMGI:

The TMGI field is coded as described in clause 11.2.3.4.

MBMS Subchannel:

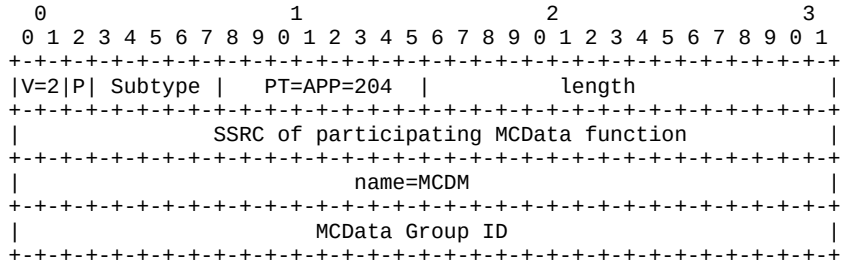
The MBMS Subchannel field is coded as described in clause 11.2.3.3.

11.2.6 Application Paging message

The Application Paging message is sent by the participating function when an existing media transmission is to be switched to unicast bearers or when a new media transmission is to be started on unicast bearers.

Table 11.2.6-1 shows the content of the Application Paging message.

Table 11.2.6-1: Application Paging message



With the exception of the three first 32-bit words, the order of the fields is irrelevant.

Subtype:

The Subtype shall be coded according to table 11.2.2-1.

length:

The length shall be set to the total number of 32-bit words in the message minus one.

SSRC:

The SSRC field shall carry the SSRC of the participating MCData function.

The SSRC field shall be coded as specified in IETF RFC 3550 [16].

MCData Group ID:

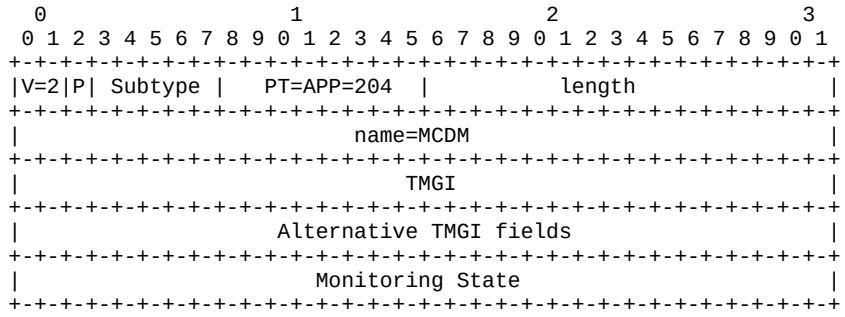
The MCData Group ID field is coded as described in clause 11.2.3.2.

11.2.7 Bearer Announcement message

The Bearer Announcement message is sent by the participating function on an MBMS bearer for application control messages. It may be sent by the participating function in order to achieve a faster setup of the MBMS bearer.

Table 11.2.7-1 shows the content of the Bearer Announcement message.

Table 11.2.7-1: Bearer Announcement message



With the exception of the three first 32-bit words and the internal order of the TMGI field and the Alternative TMGI fields, the order of the fields is irrelevant.

Subtype:

The subtype shall be coded according to table 11.2.3.1-1.

length:

The length shall be set to the total number of 32-bit words in the message minus one.

TMGI:

The TMGI field is coded as described in clause 11.2.3.4. This field is mandatory.

Alternative TMGI:

Zero or more alternative TMGI fields are coded as described in clause 11.2.3.4. This field is coded immediately after the TMGI field.

Monitoring State:

The monitoring state field is coded as described in clause 11.2.3.5.

11.2.8 Handling of unknown messages and fields

When an RTCP APP message is received, the receiver shall:

1) ignore the whole message, if the combination of name and subtype is unknown;
2) ignore the whole message if it is too short or has errors in the mandatory fields;
3) ignore the unspecified fields in the message (e.g. specified in future version of the protocol); and
4) ignore the syntactically incorrect optional fields.

11A Communication using MBS

11A.1 Control messages sent over MBS session

11A.1.1 General

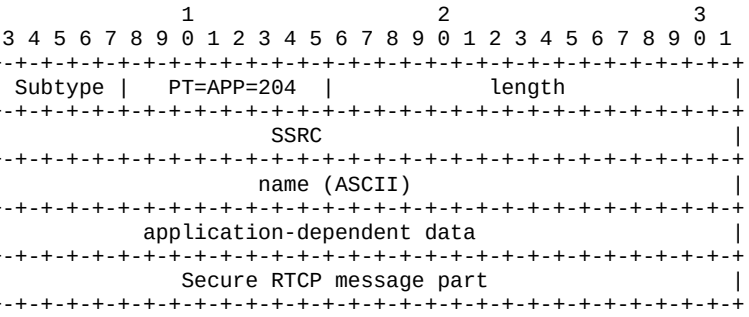
Clause 11.1.1 apply also for MBS, with the clarification that terminology mapping specified that references to 4G MBMS corresponds to be references to 5G MBS.

11A.1.2 SRTCP: APP format for control messages sent over MBS sessions

The definition of the fields in the SRTCP APP packet is found in IETF RFC 3550 [16] and IETF RFC 3711 [17].

Table 11A.1.2-1 shows the RTCP APP packet format used for control messages sent over MBS sessions.

Table 11A.1.2-1: MBS control message format



P

The padding bit P is set to '0'.

Subtype:

The Subtype values in use by MCData are defined in table 11A.2.2-1.

length

The length field in the RTCP header is the length of the packet in 32-bit words, not counting the first 32-bit word in which the length field resides.

NOTE: The length field can indicate message size longer than specified in this version of the protocol. This can be the case e.g., if message is of later version of this protocol.

SSRC

The content of this field is described for each MBS control message separately.

Name

The 4-byte ASCII string in the RTCP header is used to define the set of MBS control messages for MCData, to be unique with respect to other APP packets that may be sent over the MBS session. For MCData, the name string is "MCDS" (Mission Critical Data over MBS).

Application-dependent data

The application-dependent data contains zero or more application specific data fields. The format for these fields is described in clause 11A.1.3.

This part is encrypted if SRTCP is used.

Secure RTCP message part

The content of the secure RTCP message part is the "tail" appended to the RTCP packet per IETF RFC 3711 [17].

11A.1.3 Application specific data field

Clause 11.1.3 apply also for MBS.

11.2A MBS Subchannel Control

11A.2.1 General

The MBS subchannel control messages shall be coded as described in clause 11A.1.2.

For the MBS subchannel control protocol used for MCData the ASCII name string shall be: "MCDS".

The list of MBS subchannel control messages can be found in the clause 11A.2.2.

The MBS subchannel control specific fields are specified in clause 11A.2.3.

11A.2.2 MBS subchannel control messages

Table 11A.2.2-1 provides a list of MBS subchannel control protocol messages.

Table 11A.2.2-1: MBS subchannel control protocol messages

Message name	Subtype	Reference	Direction
MapGroupToSessionStream	00000	clause 11A.2.4	Server → client
UnMapGroupToSessionStream	00001	clause 11A.2.5	Server → client
MBS Application Paging	00010	clause 11A.2.6	Server → client
Session Announcement	00011	clause 11A.2.7	Server → client
NOTE: The participating MCData function is the server and the MCData client is the client.			

11A.2.3 MBS subchannel control specific fields

11A.2.3.1 Introduction

This clause describes the MBS subchannel control specific data fields.

The MBS subchannel control specific data fields are contained in the application-dependent data of the MBS subchannel control message. The MBS subchannel control specific data fields follow the syntax specified in clause 11A.1.3.

Table 11A.2.3.1-1 lists the available fields including the assigned Field ID.

Table 11A.2.3.1-1: MBS subchannel control specific data fields

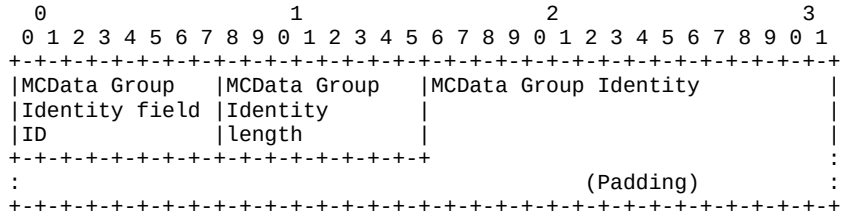
Field name	Field ID		Description
	Decimal	Binary	
MBS Subchannel	000	00000000	Clause 11A.2.3.3
MBS Session ID	001	00000001	Clause 11A.2.3.4.
MCData Group ID	002	00000010	Clause 11A.2.3.2
Monitoring State	003	00000011	Subcaluse 11A.2.3.5

11A.2.3.2 MCData Group ID field

The MCData Group ID field contains a SIP URI identifying the MCData group to which the MBS subchannel control messages applies.

Table 11A.2.3.2-1 describes the coding of the MCData Group Identity field.

Table 11A.2.3.2-1: MCData Group Identity field coding



The <MCData Group Identity field ID> value is a binary value and shall be set according to table 11A.2.3.1-1.

The <MCData Group Identity length> value is a binary value indicating the length in octets of the <MCData Group Identity> value item except padding.

<MCData Group Identity> value contains the MCData group identity as defined in 3GPP TS 24.282 [8] and is in URI format (ASCII string).

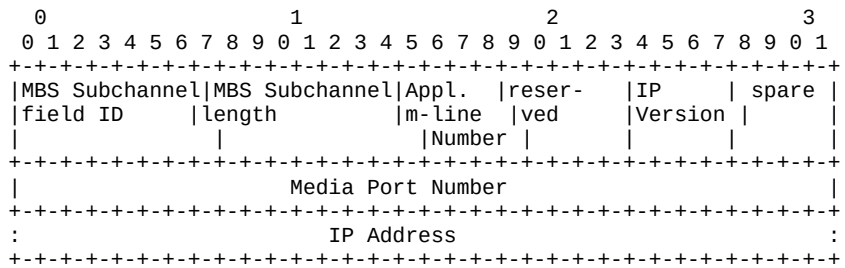
If the length of the <MCData Group Identity> value is not (2 + multiple of 4) bytes, the <MCData Group Identity> value shall be padded to (2 + multiple of 4) bytes. The value of the padding bytes should be set to zero. The padding bytes shall be ignored.

11A.2.3.3 MBS Subchannel field

The MBS Subchannel field identifies the MBS subchannel to use.

Table 11A.2.3.3-1 describes the coding of the MBS Subchannel field.

Table 11A.2.3.3-1: MBS Subchannel field coding



The <MBS Subchannel field ID> value is a binary value and shall be set according to table 11A.2.3.1-1.

The <MBS Subchannel length> value is a binary value indicating the total length in octets of the <Appl. m-line Number> value, reserved, <IP Version> value, spare, <Media Port Number> value and <IP address> items.

The <Appl. m-line Number> value shall consist of 4 bit parameter giving the number of the "m=application" m-line in the SIP MESSAGE request announcing the MBS session described in 3GPP TS 24.282 [8].

The "reserved" 4 bits shall be set to "0000".

The <IP version> value indicates the IP version:

'0' IP version 4

'1' IP version 6

All other values are reserved for future use.

The "spare" 4 bits shall be set to "0000".

The <Port Number> value is a 32-bit binary value giving the port to be used. The <Media Port Number> value is always present in the MBS Subchannel field.

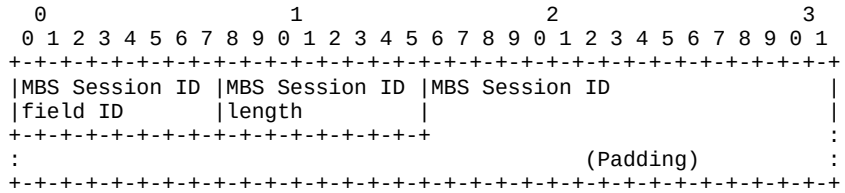
The <IP Address> value is:

1. a 32 bit binary value containing the IP v4 address if the <IP version> indicates that the <IP Address> value is a IP v4 Address; or
2. four 32-bit words that together forms a 128 bit binary value representing the IP v6 address, if the <IP version> indicates that the <IP Address> value is a IP v6 Address.

11A.2.3.4 MBS Session ID field

Table 11A.2.3.4-1 describes the coding of the MBS Session ID field.

Table 11A.2.3.4-1: MBS Session ID field coding



The <MBS Session ID field ID> value is a binary value and shall be set according to table 11A.2.3.1-1.

The <MBS Session ID length> value is a binary value indicating the length in octets of the <MBS Session ID> value item except padding.

The <MBS Session ID> value is coded as described in 3GPP TS 24.501 [24] clause 10.5.6.1 figure 9.11.4.30.2.

If the length of the <MBS Session ID> value is not (2 + multiple of 4) bytes, the <MBS Session ID> value shall be padded to (2 + multiple of 4) bytes. The value of the padding bytes should be set to zero. The padding bytes shall be ignored.

11A.2.3.5 Monitoring state

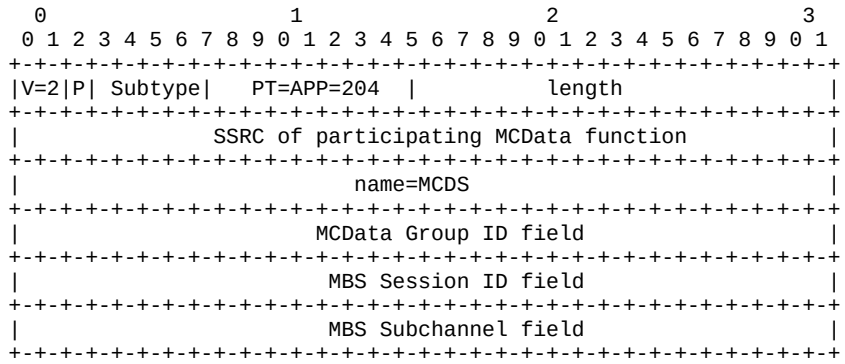
Clause 11.2.3.5 apply also for MBS.

11A.2.4 MapGroupToSessionStream message

The MapGroupToSessionStream message is sent by the participating function when the media associated with the group starts being transmitted on the MBS session and, potentially, multiple times while the transmission is ongoing.

Table 11A.2.4-1 shows the content of the MapGroupToSessionStream message.

Table 11A.2.4-1: MapGroupToSessionStream message



With the exception of the three first 32-bit words, the order of the fields are irrelevant.

Subtype:

The Subtype shall be set according to table 11A.2.3.1-1.

length:

The length shall be set to the total number of 32-bit words in the message minus one.

SSRC:

The SSRC field shall carry the SSRC of the participating MCData function.

The SSRC field shall be coded as specified in IETF RFC 3550 [16].

MCData Group ID:

The MCData Group ID field is coded as described in clause 11A.2.3.2.

MBS Session ID:

The MBS Session ID field is coded as described in clause 11A.2.3.4.

MBS Subchannel:

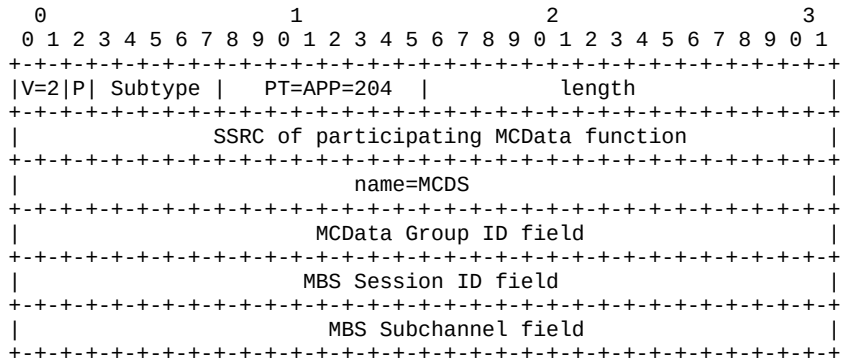
The MBS Subchannel field is coded as described in clause 11A.2.3.3.

11A.2.5 UnMapGroupFromSessionStream message

The UnMapGroupFromSessionStream message is sent by the participating function when media associated with the group stops being sended on the session. The message may be repeated several times immediately after.

Table 11A.2.5-1 shows the content of the UnMapGroupFromSessionStream message.

Table 11A.2.5-1: UnMapGroupFromSessionStream message



With the exception of the three first 32-bit words, the order of the fields are irrelevant. MCData Group ID field is mandatory. Including the MBS Session ID field and the MBS Subchannel field is optional, but if one of those fields is included the other one also needs to be included.

Subtype:

The Subtype shall be coded according to table 11A.2.3.1-1.

length:

The length shall be set to the total number of 32-bit words in the message minus one.

SSRC:

The SSRC field shall carry the SSRC of the participating MCData function.

The SSRC field shall be coded as specified in IETF RFC 3550 [16].

MCData Group ID:

The MCData Group ID field is coded as described in clause 11A.2.3.2.

MBS Session ID:

The MBS Session ID field is coded as described in clause 11A.2.3.4.

MBS Subchannel:

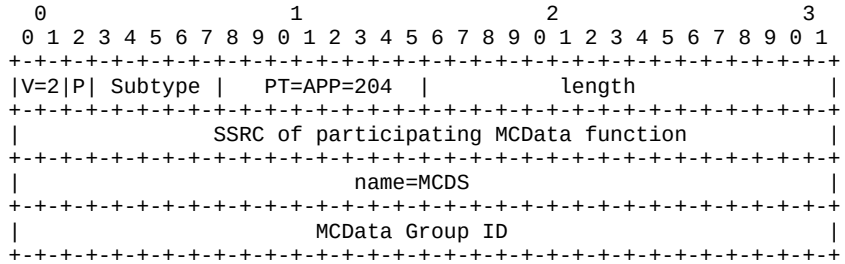
The MBS Subchannel field is coded as described in clause 11A.2.3.3.

11A.2.6 MBS Application Paging message

The MBS Application Paging message is sent by the participating function when an existing media transmission is to be switched to unicast sessions or when a new media transmission is to be started on unicast sessions.

Table 11A.2.6-1 shows the content of the MBS Application Paging message.

Table 11A.2.6-1: MBS Application Paging message



With the exception of the three first 32-bit words, the order of the fields is irrelevant.

Subtype:

The Subtype shall be coded according to table 11A.2.2-1.

length:

The length shall be set to the total number of 32-bit words in the message minus one.

SSRC:

The SSRC field shall carry the SSRC of the participating MCData function.

The SSRC field shall be coded as specified in IETF RFC 3550 [16].

MCData Group ID:

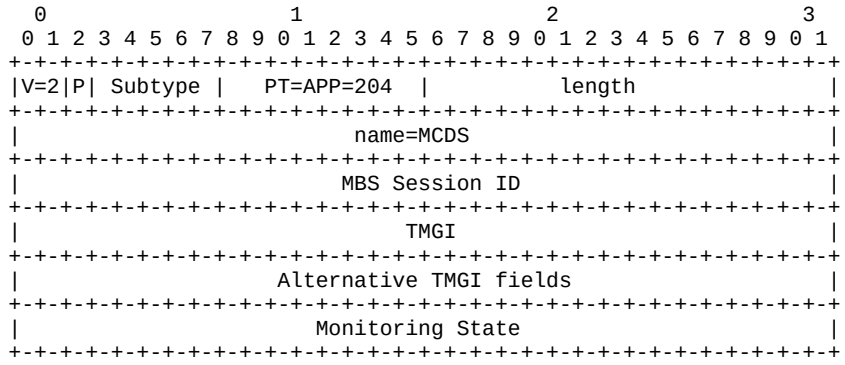
The MCData Group ID field is coded as described in clause 11A.2.3.2.

11A.2.7 SessionAnnouncement message

The Session Announcement message is sent by the participating function on an MBS session for application control messages. It may be sent by the participating function in order to achieve a faster setup of the MBS session.

Table 11A.2.7-1 shows the content of the Session Announcement message.

Table 11A.2.7-1: Session Announcement message



With the exception of the three first 32-bit words and the internal order of the MBS Session ID field and the Alternative MBS Session ID fields, the order of the fields is irrelevant.

Subtype:

The subtype shall be coded according to table 11A.2.3.1-1.

length:

The length shall be set to the total number of 32-bit words in the message minus one.

MBS Session ID:

The MBS Session ID field is coded as described in clause 11A.2.3.4. This field is mandatory.

TMGI:

The TMGI field is coded as described in clause 11.2.3.4. This field is mandatory.

Alternative TMGI:

Zero or more alternative TMGI fields are coded as described in clause 11.2.3.4. This field is coded immediately after the TMGI field.

Monitoring State:

The monitoring state field is coded as described in clause 11A.2.3.5.

11A.2.8 Handling of unknown messages and fields

When an RTCP APP message is received, the receiver shall:

1) ignore the whole message, if the combination of name and subtype is unknown;
2) ignore the whole message if it is too short or has errors in the mandatory fields;
3) ignore the unspecified fields in the message (e.g. specified in future version of the protocol); and
4) ignore the syntactically incorrect optional fields.

12 Pre-established session media plane procedures

12.1 MCData client procedure

Upon establishing one-to-one or group SDS using media plane or one-to-one or group SDS session using pre-established call, the MCData client shall follow procedures as descried in clause 6.1.

12.2 Participating MCData function procedure

Upon establishing one-to-one or group SDS using media plane or one-to-one or group SDS session using pre-established call, the participating MCData function shall follow the procedure as described in clause 6.2.

13 IP Connectivity media plane procedures

13.1 IP Connectivity client procedures

13.1.1 General

For IP Connectivity the endpoint of the media plane is an IP application that can send and receive any kind of IP messages. The IP application may reside on an external non-3GPP host connected via an IP interface to the MCData UE that incorporates the MCData client, or it may be running on the MCData UE. If the IP application resides on an external non-3GPP host, the MCData UE that incorporates the MCData client provides a second IP interface with an IP address independent of the 3GPP system for communication with the external non 3GPP host. The IP interface between the IP application the MCData UE and the MCData client is implementation specific.

13.1.2 Originating MCData client procedures

Upon receiving a request by an MCData user, or an IP packet from an IP application, the MCData client shall follow the procedure in 20.2.1 in 3GPP TS 24.282 [8]. The IP address and port number received in the SDP payload of the 200 OK response in this procedure shall be used to establish an IP tunnel. The IP tunnel shall be based on GRE-in-UDP Encapsulation as specified in IETF RFC 8086 [23], and as specified in clause 13.4. Generic Routing Encapsulation (GRE) as specified in IETF RFC 2784 [19] is used as a basis of GRE-in-UDP Encapsulation.

The MCData client shall perform encapsulation and decapsulation according to clause 13.4.

The MCData client acts as an IP relay for IP traffic between the IP application and the IP tunnel to the far endpoint. Once the IP tunnel is established, the IP applications can exchange IP data. The MCData client that receives the IP

packets from the IP application shall perform encapsulation to the tunnelling protocol adding a GRE header and a UDP header to the IP packet, and send the outgoing UDP traffic to the IP address and port present in the SDP answer. When the originating MCData client receives IP packets from the IP tunnel it shall perform de-capsulation from the tunnelling protocol, removing the UDP header and the GRE header from the received packet, before passing the IP data to the IP application.

13.1.3 Terminating MCData client procedures

The successful outcome of the procedure 20.2.2 in 3GPP TS 24.282 [8] shall be the trigger to start the establishment of the IP tunnel. The IP tunnel is based on GRE-in-UDP Encapsulation as specified in IETF RFC 8086 [23], and as specified in clause 13.4.

The MCData client shall perform encapsulation and decapsulation in accordance with clause 13.4.

The MCData client acts as an IP relay for IP traffic between the IP tunnel and the IP application. Once the IP tunnel is established, the IP applications can exchange IP data. The client that receives IP packets from the IP tunnel shall perform de-capsulation from the tunnelling protocol, removing the UDP header and the GRE header from the received packet, before passing the IP data to the IP application. When the terminating MCData client receives an IP packet from the IP application, it shall perform encapsulation to the tunnelling protocol adding a GRE header and a UDP header to the IP packet, and send the outgoing UDP traffic to the IP address and port present in the SDP offer.

13.2 Participating MCData function procedures

13.2.1 Originating procedures

If the originating participating MCData function is in the path of the data exchange between the MCData clients, it shall provide an endpoint for the UDP based communication towards the originating MCData client, and a second endpoint for UDP based communication towards the next hop of the UDP based communication in the direction of the terminating MCData client. The originating participating MCData function shall act as a relay for the UDP traffic between these two adjacent UDP communication endpoints using the IP addresses and UDP ports exchanged in the SDP offers/answers.

13.2.2 Terminating procedures

If the terminating participating MCData function is in the path of the data exchange between the MCData clients, it shall provide an endpoint for the UDP based communication towards the terminating MCData client, and a second endpoint for UDP based communication towards the next hop of the UDP based communication in the direction of the originating MCData client. The terminating participating MCData function shall act as a relay for the UDP traffic between these two adjacent UDP communication endpoints using the IP addresses and UDP ports exchanged in the SDP offers/answers.

13.3 Controlling MCData function procedures

If the controlling MCData function is in the path of the data exchange between the MCData clients, it shall provide an endpoint for the UDP based communication towards the next hop of the UDP based communication in the direction of the originating MCData client, and a second endpoint for the UDP based communication towards the next hop of the UDP based communication in the direction of the terminating MCData client. The controlling MCData function shall act as a relay for the UDP traffic between these two adjacent UDP Communication endpoints using the IP addresses and UDP ports exchanged in the SDP offers/answers.

13.4 Encapsulation of the user data in the GRE-in-UDP tunnel

The Encapsulation of the user data in the GRE-in-UDP tunnel shall be performed as defined in IETF RFC 8086 [23] with the following clarifications:

1.) UDP checksum shall be used when encapsulating in both IPv4 and IPv6;

2.) The UDP ports can be freely chosen. The port information is exchanged via SDP; and

3.) GRE keys shall not be used.

13.5 Media plane details

13.5.1 General

The media plane is used for transport of data via the GRE-in-UDP tunnel as specified in the present clause.

13.5.2 Establishing a media plane for a GRE-in-UDP tunnel

13.5.2.1 General

The MCData client and the MCData server use the SDP offer/answer mechanism in order to negotiate the establishment of the media plane for a GRE-in-UDP tunnel.

The media description ("m=" line) associated with the media plane of the GRE-in-UDP tunnel shall have the values as described in table 13.5.2.1-1.

Table 13.5.2.1-1: GRE-in-UDP tunnel media description

Media description element	Value
<media>	"application"
<port>	UDP port
<proto>	"udp"
<fmt>	"MCDATA

The format of the optional SDP fmtp attribute, when associated with the GRE-in-UDP ports, is described in clause 13.6.

The example below shows an SDP media description for MCData IP Connectivity media plane

```
m=application 20032 udp MCDATA
a=fmtp:MCDATA mcdata-ipconn
```

13.6 Session description types defined within the present document

13.6.1 General

This clause contains definitions for SDP parameters that are specific to SDP usage with MCData IP connectivity and therefore are not described in an IETF RFC.

13.6.2 SDP "fmtp" attribute for MCData IP connectivity

13.6.2.1 General

This clause defines the structure and syntax of the SDP "fmtp" attribute, when used to negotiate the ports used for GRE-in-UDP tunnel establishment.

13.6.2.2 Semantics

In an SDP offer and answer, the "mcdata-ipconn-sport" fmtp attribute is used to indicate the UDP source port of the GRE-in-UDP tunnel.

13.6.2.3 Syntax

Table 13.6.2.3-1: SDP "fmtp" attribute for the MCData IP connectivity

```
fmtp-attr-ipconn      =  "a=fmtp:" "MCDATA" SP attr-param
attr-param            =  mcdata-ipconn-s-port
mcdata-ipconn-sport   =  "mcdata-ipconn-s-port=1*(DIGIT)"
```

Annex X (Informative): Mapping of MBMS terms to MBS

In the EPS, using the MBMS procedures, in the 5GS or MBMS and 5G MBS co- existence, using the MBS procedures;

- in the MBS procedures, references to 4G "MBMS" is understood to be references to 5G "MBS";
- in the MBS procedures, "MBS session ID" corresponds to the "TMGI" in MBMS;
- in the MBS procedures, "Map Group To Session Stream" corresponds to the "Map Group To Bearer" in MBMS; and
- in the MBS procedures, "UnMap Group From Session Stream" corresponds to the "UnMap Group To Bearer" in MBMS.

Annex A (informative): Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2017-01						Initial version	0.0.0
2017-01						Implementing P-CR C1-170436 from CT1#101-bis	0.1.0
2017-03						Implementing P-CR C1-171055 and C1-171056 from CT1#102	0.2.0
2017-04						Implementing P-CR C1-171746, C1-171747, C1-171749 and C1-171818 from CT1#103	0.3.0
2017-06						Implementing P-CRs from CT1#104: C1-172229, C1-172539, C1-172540, C1-172543, C1-172550, C1-172740, and C1-172741	0.4.0
2017-06	CT-76					Version 1.0.0 created for presentation for information at CT76	1.0.0
2017-06	CT-76					Version 14.0.0 created after approval at CT76	14.0.0
2017-09	CT-77	CP-172102	0001		F	Corrections for the Overview clause	14.1.0
2017-09	CT-77	CP-172102	0002		F	Removal of Editor's Note for clause 6	14.1.0
2017-09	CT-77	CP-172102	0003	1	F	Protection of information in the media plane	14.1.0
2017-09	CT-77	CP-172102	0005	1	F	Standalone SDS via media plane, verification of configuration data in the media plane	14.1.0
2017-09	CT-77	CP-172102	0006		F	Location Information	14.1.0
2017-09	CT-77	CP-172102	0007	2	F	Restructuring SDS session and authorization checks	14.1.0
2017-12	CT-78	CP-173064	0008	1	F	Authentication of Data Payload	14.2.0
2018-06	SA-80	-	-	-	-	Update to Rel-15 version (MCC)	15.0.0
2019-12	CT-86	CP-193102	0009	1	B	Add media plane capability to support transmission / reception via MBMS in MCData	16.0.0
2019-12	CT-86	CP-193102	0010	3	B	Adding clause for media plane procedures for pre-established session for MCData	16.0.0
2020-06	CT-88e	CP-201112	0011	1	B	Media plane control in MCData for user plane SDS using MBMS	16.1.0
2020-06	CT-88e	CP-201088	0012	1	A	Adding mcdata id in signalling payload for sender of the data in MCData media plane (Session) communication	16.1.0
2020-09	CT-89e	CP-202165	0015	2	F	Media plane for IP connectivity	16.2.0
2020-12	CT-90e	CP-203196	0021		A	Correction of Content-Type description	16.3.0
2021-06	CT-92e	CP-211160	0025	1	B	MCData media plane control for FD using MBMS delivery via MB2	17.0.0
2021-09	CT-93e	CP-212149	0026	-	F	MCData - small corrections in 24.582 clause 6.5	17.1.0
2021-09	CT-93e	CP-212149	0027	1	F	MCData - adjust the To-Path header of MSRP SEND messages received over MBMS	17.1.0
2021-09	CT-93e	CP-212148	0028	1	F	Clause reference corrections in clause 7.2.1	17.1.0
2021-09	CT-93e	CP-212149	0029	1	B	Non-mandatory file download support for the file distributed using media plane	17.1.0
2022-06	CT-96	CP-221225	0032	3	F	Add support for multiple IPConn communications	17.2.0
2022-06	CT-96	CP-221247	0033	1	F	Fix wrong reference in 24.582	17.2.0
2023-03	CT-99	CP-230241	0035		F	Fix wrong reference numbers in 24.582	18.0.0
2023-06	CT-100	C1-234111	0036	5	B	Addition of 5G MBS in MCData media plane	18.1.0
2023-09	CT-101	CP-232219	0037	-	B	Decoupling of signalling and media plane for MCData IP Connectivity	18.2.0
2025-10	-	-	-	-	-	Update to Rel-19 version (MCC)	**19.0.0**

History

Document history		
V19.0.0	October 2025	Publication