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Recommendation

ITU-T F.740.6 (09/2023)

SERIES F: Non-telephone telecommunication services

Multimedia services

Reference framework and requirements for Internet protocol multimedia subsystem early media and extension service system

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Recommendation ITU-T F.740.6

Reference framework and requirements for Internet protocol multimedia subsystem early media and extension service system

Summary

Recommendation ITU-T F.740.6 specifies the requirements of the Internet protocol multimedia subsystem (IMS) early media and extension service (EMES) system. It defines the reference framework and requirements for network, user equipment (UE), and security of the system. It also describes several typical application scenarios including:

– playing the early media before the called party alerting;
– playing the early media during the called party alerting;
– playing the early media when the call is failed;
– playing the media after the call is answered;
– playing the media during the release of the call;
– interactive scenarios.

History *

Edition	Recommendation	Approval	Study Group	Unique ID
1.0	ITU-T F.740.6	2023-09-13	16	11.1002/1000/15616

Keywords

Customized alerting tones, customized ringing signal, early media, early media and extension service, EMES, IMS, ring back tone, ringing tone.

* To access the Recommendation, type the URL https://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID.

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Reference framework and requirements for Internet protocol multimedia subsystem early media and extension service system

1 Scope

This Recommendation aims to spread the early media and extension service (EMES) and help users access cultural contents with non-discriminatory treatment through short videos played in the service. The Recommendation defines the reference framework and network requirements, user equipment (UE) requirements, and security requirements of the EMES system.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T H.264] Recommendation ITU-T H.264 (2021), *Advanced video coding for generic audiovisual services*.

[ITU-T H.265] Recommendation ITU-T H.265 (2023), *High efficiency video coding*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 IP multimedia subsystem [b-3GPP TS 23.002]: The IP multimedia subsystem comprises all core network elements for provision of IP multimedia services comprising audio, video, text, chat, etc., and a combination of them delivered over the packet switched domain.

3.1.2 early media [b-IETF RFC 3960]: Early media refers to media (e.g., audio and video) that is exchanged before a particular session is accepted by the called user.

3.1.3 precondition [b-IETF RFC 3312]: A precondition is a set of constraints about the session which are introduced in the offer. The recipient of the offer generates an answer, but does not alert the user or otherwise proceed with session establishment. That only occurs when the preconditions are met. This can be known through a local event (such as a confirmation of a resource reservation), or through a new offer sent by the caller.

3.2 Terms defined in this Recommendation

This Recommendation defines the following term:

3.2.1 early media and extension service (EMES): A value-added service of call service, which is based on the additional media services related to the process of call service, such as early media and announcement media. EMES takes customized media content play and/or presents as the main service form, and introduces an interactive function, information service and other extended services in the process of media content play.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AMR-WB	Adaptive Multi-Rate Wideband
CAT	Customized Alerting Tones
CRS	Customized Ringing Signal
EMEP	Early Media and Extension service Platform
EMES	Early Media and Extension Service
EVS	Enhance Voice Services
HD	High Definition
HPLMN	Home Public Land Mobile Network
IMS	IP Multimedia Subsystem
SDP	Session Description Protocol
SIM	Subscriber Identity Module
SIP	Session Initiation Protocol
UE	User Equipment
VPLMN	Visited Public Land Mobile Network
XR	Extended Reality

5 Conventions

In this Recommendation:

The keywords "is required to" indicate a requirement which must be strictly followed and from which no deviation is permitted if the conformance to this document is to be claimed.

The keywords "is recommended" indicate a requirement which is recommended but not absolutely required. Thus, this requirement need not be present to claim conformance.

The keywords "is not recommended" indicate a requirement which is not recommended but which is not specifically prohibited. Thus, conformance with this specification can still be claimed even if this requirement is present.

In clause 8, mandatory requirements are labelled starting with R-, and recommended (i.e., optional) requirements are labelled starting with RR-.

6 Overview

Service innovation is the key to the competitiveness of telecom carriers. In some countries, the early media and extension service (EMES) serves as one of the service innovations based on 4G/5G. The customized audio ring-back tone as a traditional type of the EMES is popular because it plays the customized music when the calling party is waiting for the call answer. The customized video ring-back tone, as one of new types of the EMES, changes the early media during the called party alerting when the calling users can enjoy a short video, rather than just audio, while waiting for the answer to the call. The world witnessed a rapid growth in EMES and as of the end of April 2023, it has over 740 million subscribers and is supported by more than 1 billion smart phones. There is then a good opportunity to build telecom carriers' short video ecosystem based on the service.

The EMES is one of the digital culture related services with the advanced digital multimedia technologies, IP multimedia subsystem (IMS) and 4G/5G technologies, etc. The EMES supports the

creation, dissemination and representation of digital culture products. The popular contents of short video played in the EMES are digital cultural contents, such as music, film, drama, animation, etc. The EMES is usually applied to cultural dissemination scenarios, such as public service propagation, cultural tourism promotion, popular music video spreading, film and television drama sharing, weather forecasts, epidemy notices, etc. It is conducive to meeting the people's demand for digital cultural contents, promoting the production of digital culture contents, and facilitating the development of digital culture industry and ecology.

It supports the exchange and sharing of diverse cultures worldwide via short videos containing digital culture contents played in IMS calls when the EMES are applied. Short videos played in the EMES can help users access cultural contents without discrimination. It also supports subscribers of the EMES allowing them to share their culture and learn from others, which, in the end, may perhaps make the world a better place.

A number of telecom carriers in Asia, Europe and Africa have launched customized video ring-back tone service operations or plan to deploy this service.

This Recommendation defines network requirements, UE requirements, and security requirements of the EMES system, which will help telecom carriers provide EMES faster and help to achieve interoperability among different telecom carriers.

The development and deployment of 5G and other new technologies are expected to introduce new features to the EMES, such as the requirements to support HD video and XR video, and interactive videos are also described in this Recommendation.

7 A reference framework of EMES system

The EMES is generally based on the IP multimedia subsystem (IMS) services and multimedia content services and ecology. The EMES service system includes the service management subsystem and service provision subsystem, which work together to provide this service. The service management subsystem includes business management, content management, user management, operation management and access service server. The EMES service provision subsystem includes the early media and extension service platform (EMEP) media resource server, EMEP application server, IMS network and user equipment (UE). The requirements for the service provision subsystem are defined in clause 8 and the requirements for the service management subsystem are out of the scope of the Recommendation.

A reference framework of EMES system is shown in Figure 1.

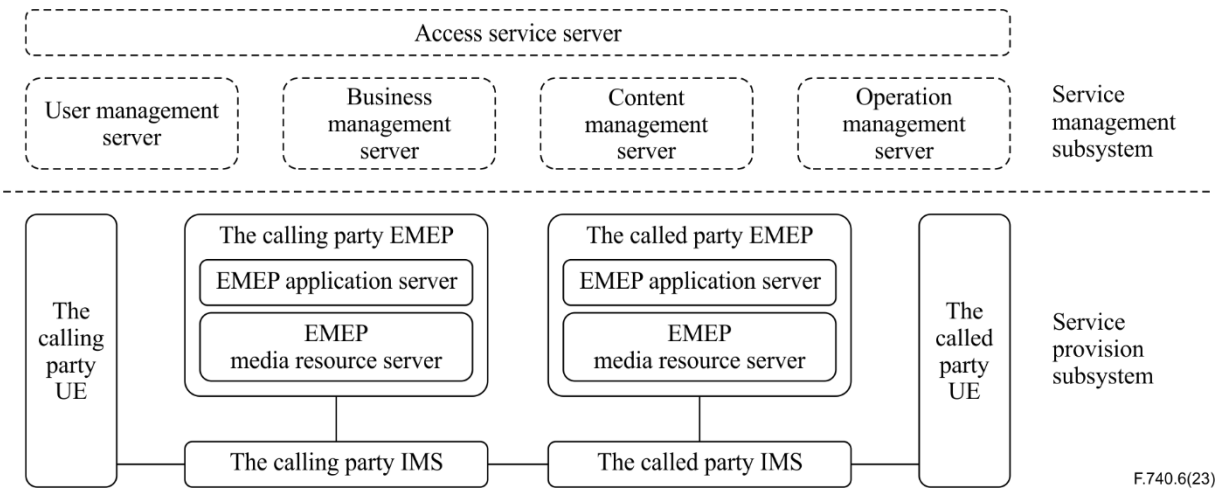

Figure 1 – Reference framework of EMES system

Service management subsystem:

– User management server: It provides user data management, and user service management functions including user authentication, user order, user content, user settings, etc.

– Business management server: It provides basic business management functions including service management, product management, tariff management, cash settlement management, etc., as well as business support management including process management, capability integration, etc.

– Content management server: It provides content copyright operation management functions including copyright content introduction, release, library management, etc., as well as application content operation and management functions including application content production, review, transcoding, release, library management, etc.

– Operation management server: It provides basic revenue management including billing and settlement, accounting revenue and expenditure, etc., marketing management including resource and activity management, and operation and maintenance management functions, etc.

– Access service server: It provides various user service portals, user service apps and other personnel access service functions, as well as various system access service functions.

Service provision subsystem:

– EMEP application server: It provides basic service functions including IMS network signalling access, IMS call session management, IMS call flow control, out-of-band receiving and sending number processing, etc., and EMES service processing functions including service management subsystem interface, service data management, service scenario parsing, service scenario logic processing, service scenario flow processing, media negotiation control, and media play control, etc.

– EMEP media resource function: It provides basic service functions including IMS network media interface, media capability management, session management interface, media negotiation management, media play control interface, media file play, media stream transmission, media interaction service, and in-band receiving and receiving number processing, etc., and EMES service processing functions including service management subsystem interface and media file management.

– IMS network: It provides basic service functions including IMS user terminal registration, IMS call flow control, public media negotiating and transcoding, media data anchoring and forwarding, network boundary protocol conversion, etc., and EMES service processing functions including service subscribing and triggering, service scenario status indication, service scenario media negotiation and play and media interaction service.

– The calling and the called party UE: Provide basic service functions including mobile/fixed network access, IMS network registration, IMS audio and video call, etc., and EMES service processing functions including service capability indication, service signalling procedure processing, service media processing, service media display, and terminal user interface interaction.

8 Requirements for EMES service provision

8.1 Requirements for the network

8.1.1 Requirements for the EMEP

– R-NER-001: The EMEP is required to support related signalling procedures, media negotiations and media playing.

– R-NER-002: The EMEP is required to support the audio codec AMR-WB and the video codec H.264 specified in [ITU-T H.264].

– RR-NER-003: The EMEP is recommended to support the audio codec EVS and the video codec ITU-T H.265 specified in [ITU-T H.265].

– RR-NER-004: The EMEP is recommended to support HD video, XR video and interactive media in a certain network condition for the voice and video call over IMS.

– R-NER-005: The EMEP is required to support call state processing and service provision on the EMES.

– RR-NER-006: The EMEP is recommended to support the provision of the EMES to the UE that supports the EMES when the precondition mechanism is not supported on the peer UE.

– RR-NER-007: The EMEP is recommended to support the processing and transmission of messages related to interactive functions.

– RR-NER-008: The EMEP is recommended to support a data channel for applying multimedia media including image, text, etc., and for applying interactive functions.

8.1.2 Requirements for the IMS

– R-NER-008: The IMS is required to support triggering the EMES and transferring related parameters to the EMEP.

– R-NER-009: The IMS is required to support providing the call state so that the EMEP can provide the EMES which is applicable to the corresponding state.

– R-NER-010: The IMS is required to support precondition mechanism which can ensure the video experience for the EMES in IMS call.

– R-NER-011: The IMS is required to support the audio codec AMR-WB and the video codec ITU-T H.264 specified in [ITU-T H.264].

– RR-NER-012: The IMS is recommended to support the audio codec EVS and the video codec ITU-T H.265 specified in [ITU-T H.265].

– RR-NER-013: The IMS is recommended to support the EMES across IMS networks of different telecom carriers.

– RR-NER-014: The IMS is recommended to support roaming, i.e., if a user is in VPLMN, the EMEP in both HPLMN and VPLMN can provide EMES to the user based on telecom carriers' policy.

– R-NER-015: The IMS is required to support processing and forwarding of related media lines and header fields.

– RR-NER-016: The IMS is recommended to support transparent transmission of messages related to interactive functions, in cross-domain interworking scenarios.

– RR-NER-017: The IMS is recommended to support data channel for applying multimedia media such as image, text, etc., and for applying interactive functions.

8.2 Requirements for the UE

8.2.1 Requirements for signalling processing

– R-UER-001: The UE is required to support related signalling procedures, media negotiations between the UE and other entities of IMS for EMES.

– RR-UER-002: The UE is recommended to support the processing and transmission of messages related to interactive functions.

8.2.2 Requirements for media play

– R-UER-003: The UE is required to support playing the audio and/or video media for the EMES.

– RR-UER-004: The UE is recommended to support playing the image/text/other types of media for the EMES.

– R-UER-005: The UE is required to support the audio codec AMR-WB and the video codec ITU-T H.264 specified in [ITU-T H.264].

– RR-UER-006: The UE is recommended to support the audio codec enhance voice services (EVS) and the video codec ITU-T H.265 specified in [ITU-T H.265].

8.2.3 Requirements for media player

– R-UER-007: The UE is required to support video media display for the EMES, such as landscape, portrait and full-screen display, as well as landscape and portrait content display.

– R-UER-008: The UE is required to support video media play of the EMES in non-video call without starting local camera.

– RR-UER-009: The UE is recommended to support video media play of the EMES in video call without displaying local camera image.

– RR-UER-010: The UE is recommended to support the display of call status-related text of prompts.

– R-UER-011: The UE is required to play the EMES media without negative affect on answering calls.

8.2.4 Requirements for interaction

– RR-UER-012: The UE is recommended to support the interactive functions in all playing scenarios of the EMES, including displaying buttons such as "Like" and "Copy" in the planned area of the video window and reporting the user's operations on the relevant buttons to the network side.

– RR-UER-013: The UE is recommended to support the display of the corresponding animation effect in the video window according to the user's operations and the messages related to interactive functions.

– RR-UER-014: The UE is recommended to support a data channel for applying multimedia such as image, text, etc., and for applying interactive functions.

8.2.5 Requirements for capability indication

– R-UER-015: The UE is required to support carrying the capability indication such as a video media feature tag in signalling messages when the specific capability is supported.

8.3 Security requirements

– R-SER-001: It is required that the EMES contents be played to the user without negatively affecting the general call service.

– RR-SER-002: It is not recommended that the EMES contents be played to users that do not allow the EMES.

– R-SER-003: It is required for the EMEP to support authority security management, provide users with an authentication mechanism to ensure user authority and prevent unauthorized user access.

– R-SER-004: It is required for EMEP to ensure system security and have some necessary anti-risk capabilities such as preventing virus attacks.

– R-SER-005: It is required for the EMEP to use hierarchical access control capabilities for man-machine interface commands, restrict unauthorized access and error access, and ensure data security and integrity.
– R-SER-006: It is required that the various operation and maintenance functions of the EMES system cannot endanger the security and integrity of the information stored and the information being transmitted.

Appendix I

EMES scenarios

(This appendix does not form an integral part of this Recommendation.)

This clause describes the typical application scenarios of IMS EMES.

I.1 Playing scenarios

I.1.1 Playing the early media before the called party alerting

Applying video/image/text/other types of media (excluding audio media in general) to the calling party before the called party alerting.

NOTE – The relationships among EMES content, EMES tone content and media are shown in Figure I.1-1. It is noteworthy that the video EMES tone content generally contains video media without audio media, but can also contain both audio and video media based on the telecom carrier's policy, and the image EMES tone content contains image media, and so on.

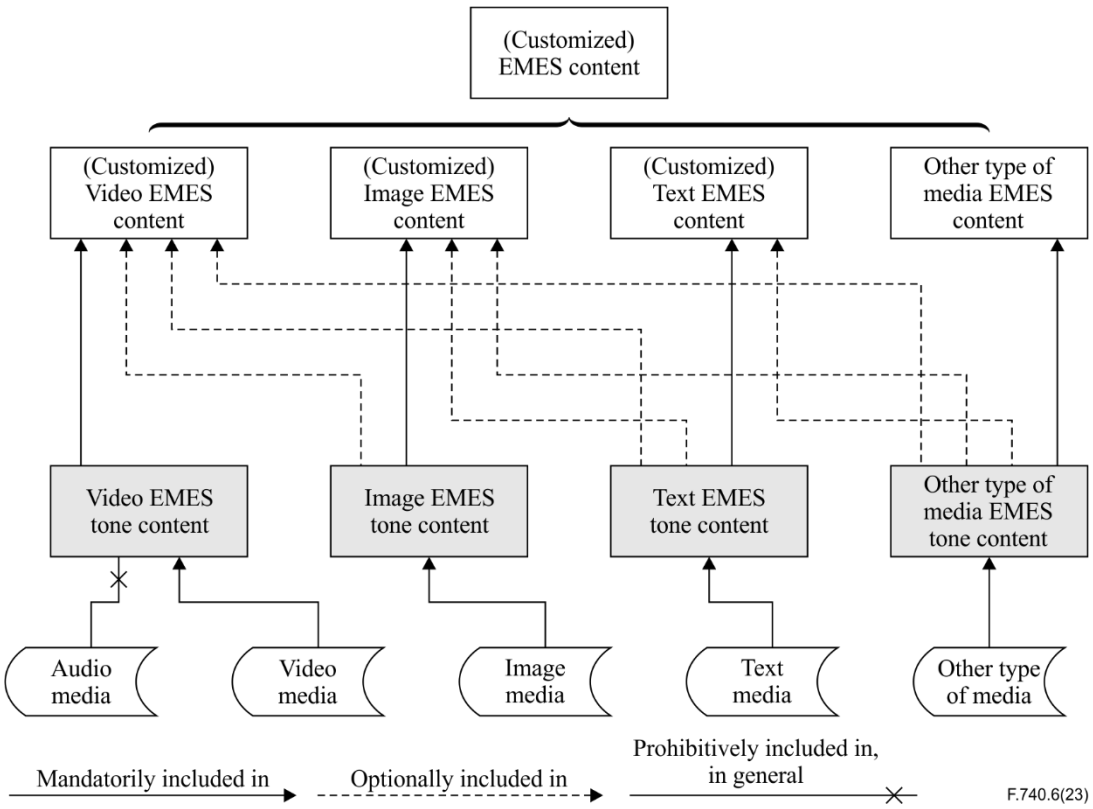

Figure I.1-1 – Relationship among EMES content, EMES tone content and media (for the playing scenario I.1.1)

Before the called party alerts, the customized EMES contents are played to the calling party. In parallel, some prompt texts such as "Calling…" are shown above the EMES contents for notifying the calling party of the current call state.

When the called party alerts, the customized EMES contents may be stopped and switched to the customized alerting tones (CAT) contents, or the customized video EMES tone contents which contains audio and video media, the customized image/text/other types of media EMES tone contents, may continue to be played as CAT contents based on the telecom carrier's policy.

Including 2 sub-scenarios:

– The EMES contents played to the calling party are customized by the called party.

– The EMES contents played to the calling party are customized by the calling party.

When the called party has customized EMES contents, the telecom carrier needs to set the priority of the EMES contents customized by the calling and the called party based on the telecom carrier's policy.

I.1.2 Playing the early media during the called party alerting

Including 2 sub-scenarios:

a) Applying audio/video ring tone to the calling party during the called party's alerting.

NOTE 1 – If the customized audio/video ring back tone is played to the calling party, we can call it CAT.

NOTE 2 – The relationship among CAT content, CAT tone content and media is shown in Figure I.1-2.

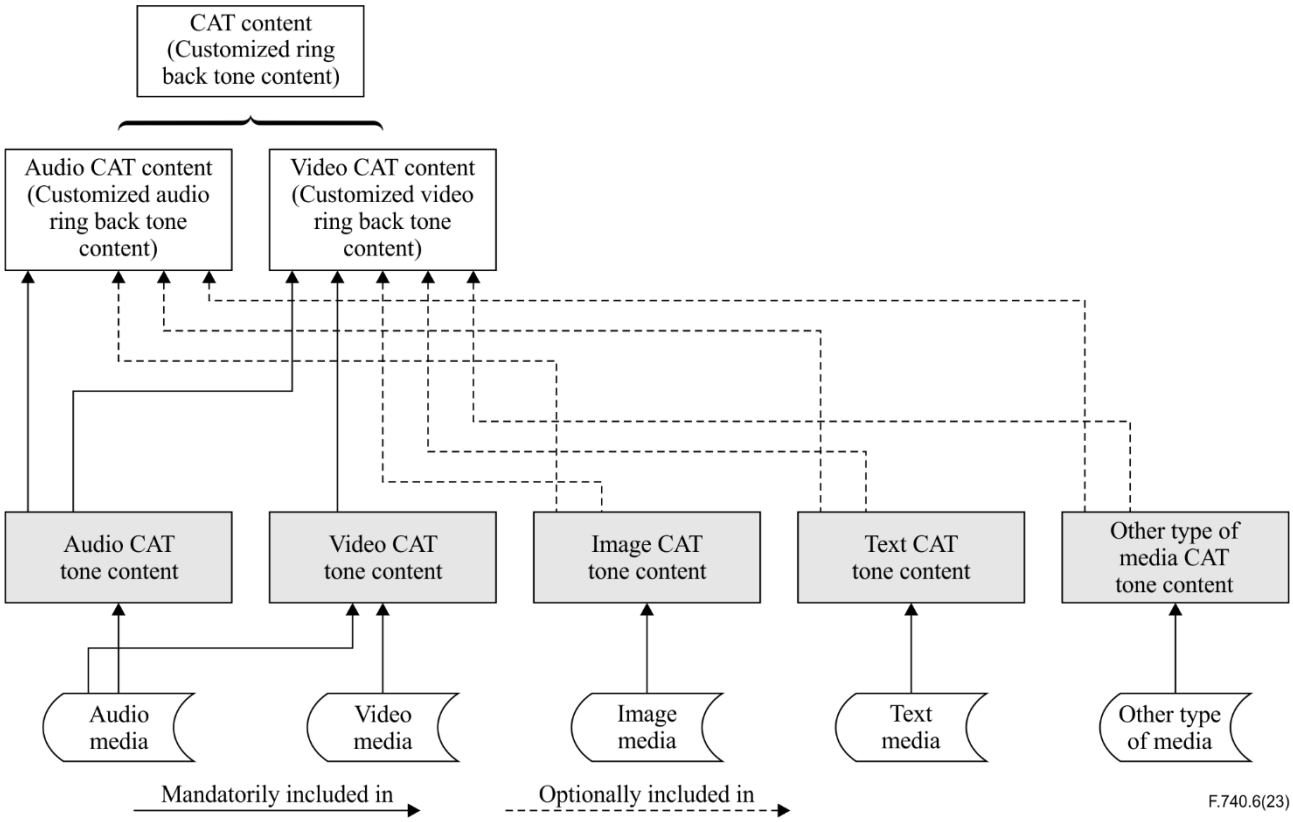

Figure I.1-2 – Relationship for CAT content, CAT tone content and media

When the called party alerts, the CAT contents are played to the calling party. In parallel, some prompt texts such as "The called party alerting" or "Call is waiting" are shown above the CAT contents for notifying the calling party of the current call state.

Also including 2 sub-scenarios:

i) The CAT contents played to the calling party are customized by the called party.

When the called party has no customization or cannot play the CAT contents customized by the called party for other reasons, the CAT contents can also be provided by the telecom carrier, such as news, weather, entertainment, and other information, etc.

When the called party is in a call and the call waiting function is triggered, the CAT contents or common call waiting announcement tone is played to the calling party based on the telecom carrier's policy.

ii) The CAT contents played to the calling party are customized by the calling party.

When the calling party has no customization or cannot play the CAT contents customized by the calling party for other reasons, the CAT contents can also be provided by the telecom carrier, such as news, weather, entertainment, and other information, etc.

When the called party is in a call and the call waiting function is triggered, the CAT contents or common call waiting announcement tone is played to the calling party based on the telecom carrier's policy.

When the called party has customized CAT contents, the telecom carrier needs to set the priority of the CAT contents customized by the calling and the called party based on the telecom carrier's policy.

b) Applying video/image/text/other types of media ringing tone to the called party in place of or in conjunction with local ring for alerting.

NOTE 3 – If the customized video/image/text/other types ringing tone played to the called party, we can call it CRS.

NOTE 4 – The relationship among customized ringing signal (CRS) content, CRS tone content and media is shown in Figure I.1-3. It is noteworthy that the video CRS tone content generally contains audio and video media but can also contain video media without audio media, and the image CRS tone content contains image media, and so on.

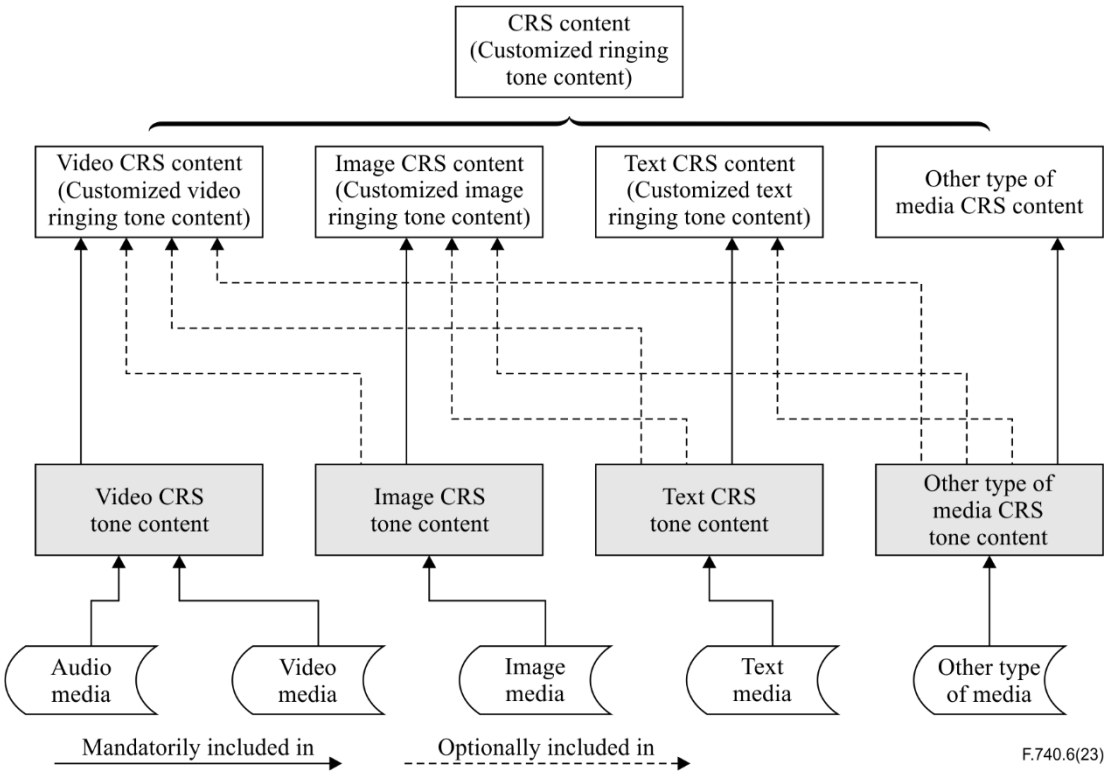

Figure I.1-3 – Relationship for CRS content, CRS tone content and media

When one number of the dual SIM dual active UE is in a call and the other number receives a new call, the common call waiting alerting tone rather than the CRS contents is played to the called party, to avoid excessive impact on the current call.

Also including 2 sub-scenarios:

i) The CRS contents played to the called party are customized by the called party.

The video/image/text/other types of media CAT tone contents can be played to both the calling party and the called party, to enhance the called party's awareness of the CAT of the called party.

ii) The CRS contents played to the called party are customized by the calling party, to share the identity information of the calling party with the called party.

When the called party has customized CRS contents, the telecom carrier needs to set the priority of the video CRS contents customized by the calling and the called party based on the telecom carrier's policy.

I.1.3 Playing the early media when the call is failed

Applying audio/video/image/text/other types of media to the calling party in place of or in conjunction with traditional audio announcement tone when call is rejected or cancelled.

NOTE – The relationship for EMES content, EMES tone content and media is shown in Figure I.1-4. It is noteworthy that the audio EMES tone content contains audio media, the video EMES tone content generally contains audio and video media but can also contain video media and no audio media based on the telecom carrier's policy, and the image EMES tone content contains image media, and so on.

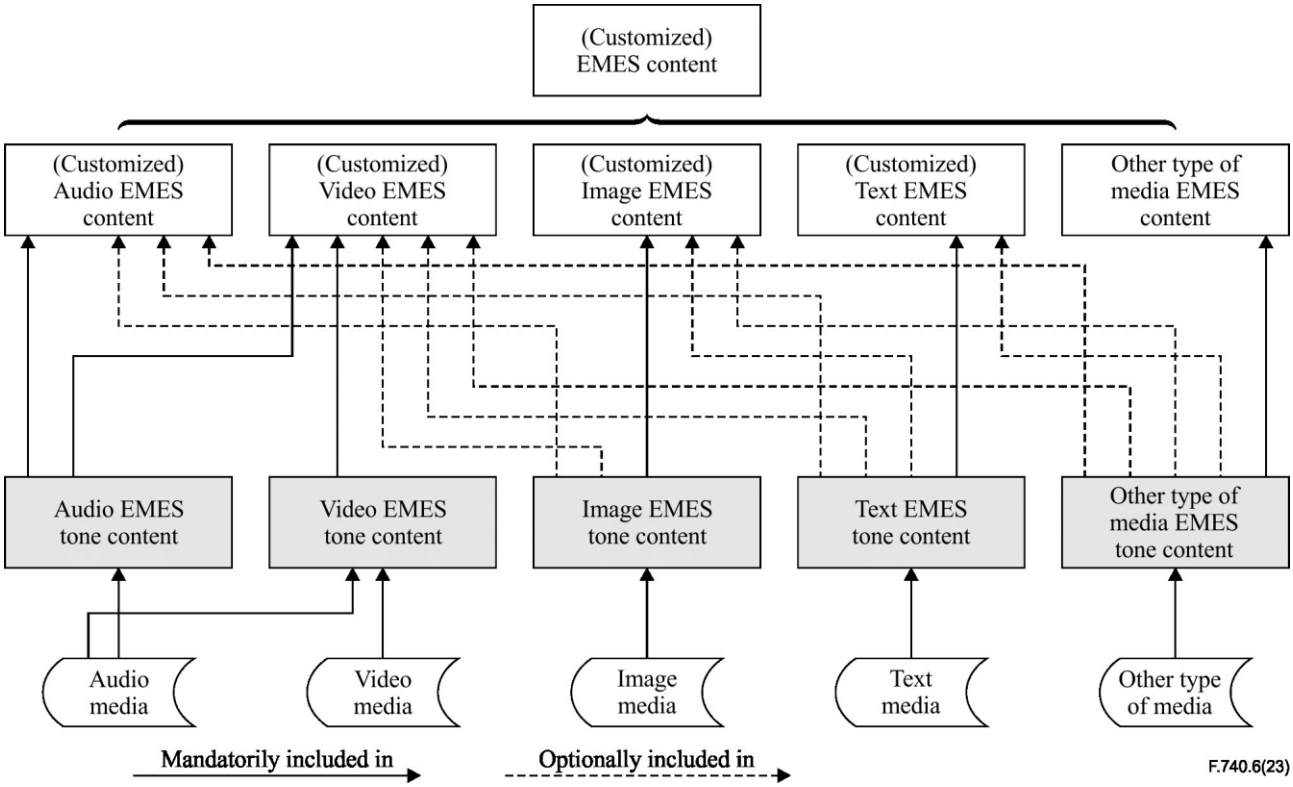

Figure I.1-4 – Relationship for EMES content, EMES tone content and media (for the playing scenario I.1.3, I.1.4, and I.1.5)

Including 2 sub-scenarios:

– The EMES contents played to the calling party are customized by the called party.

When the call is in one of in the following states: the called party's UE powered off, the called party unreachable (out of service area), the called party busy, the called party's number not in service, etc, the EMES contents (information shall be conveyed accurately and without ambiguity) play in place of or in conjunction with the general network prompt tone to enrich network perception. In parallel, some prompt texts such as "the called party

power off" related to the states are shown above the EMES contents for notifying the calling party the current call state.

– The EMES contents played to the calling party are customized by the calling party.

When the call is in one of in the following states: the called party's UE powered off, the called party unreachable (out of service area), the called party busy, the called party's number not in service, unallocated (unassigned) number, the calling party's number not in service, etc, the EMES contents (information shall be conveyed accurately and without ambiguity) play in place of or in conjunction with the general network prompt tone to enrich network perception. In parallel, some prompt texts such as "the called party power off" related the states are shown above the EMES contents for notifying the calling party the current call state.

When the called party has customized the EMES contents, the telecom carrier needs to set the priority of the EMES contents customized by the calling and the called party based on the telecom carrier's policy.

I.1.4 Playing the media after the call is answered

Applying audio/video/image/text/other types of media to the participators during the established call, including:

NOTE 1 – Same as the Note in clause I.1.3.

NOTE 2 – When video in the EMES and video of the call occur simultaneously, they can be displayed via different layouts and in windows without conflict.

– Play the EMES contents (to the specific participators) customized by the operating participator or the operated participator, the subscriber or served user, the called or calling party, etc., when a call is held, muted, EMES is activated, etc.

– Play the EMES contents (to the specific participators) customized by the participator doing the operation or the participators being operated on, subscriber or served user, called or calling party, etc., in parallel with audio conversation, when EMES is activated, etc.

– Resume playing at a breakpoint. The calling party can continue to play the audio/video/image/text/other types of media CAT tone contents customized by the called or calling party that was interrupted due to off-hook.

Use case:

1) User A calls user B.
2) During alerting, a video CAT tone content is played to user A.
3) When user B accepts the call with audio call, the video CAT tone content may be continued to be played to user A with/without audio media based on the telecom carrier's policy and user's configuration, and maybe allow user A to close the video window of the CAT.

– Resume playing at a breakpoint. The called party can continue to play the video/image/text/other types of media CRS tone contents customized by the called or calling party that was interrupted due to off-hook.

I.1.5 Playing the media during the release of the call

Applying audio/video/image/text/other types of media to the calling or called party during the release of the call.

NOTE – Same as the Note in clause I.1.3.

– Play the EMES contents (to the calling or called party) customized by the called or calling party during the release of the call.

– Resume playing at a breakpoint, the calling party can continue to play the audio/video/image/text/other types of media CAT tone contents customized by the called or calling party that was interrupted due to off-hook/hang-up, and the calling party can continue to play the audio/video/image/text/other types of media EMES tone contents in the call that was interrupted due to hang-up.

  Use case:

  1) User A calls user B.
  2) During alerting, a video CAT tone content is played to user A.
  3) When user B answers the call, the video CAT tone content may continue to be played to user A with/without audio media based on the telecom carrier's policy and user's configuration, and maybe allow user A to close the video window of the CAT.
  4) If user A does not close the video window of the CAT, when user B hangs up the call, the CAT video may continue to play to user A.

– Resume playing at a breakpoint The called party can continue to play the video/image/text/other types of media CRS tone contents customized by the called or calling party that was interrupted due to off-hook/hang-up, and the called party can continue to play the audio/video/image/text/other types of media EMES tone contents in the call that was interrupted due to hang-up.

I.2 Interactive scenarios

Applying interactive functions in the above playing scenarios, such as users performing social operations (e.g., "Like", "Dislike", "Comment", etc.), service setting operations (e.g., "Copy", "Get reward", "Get more" for entering other service portals, etc.), etc.

Wherein, the interactive functions include the calling or called user directly operates hotspot areas on the terminal screen, such as clicking a button or double-clicking the screen, to initiate interactive operations with the EMEP while watching EMES content.

Use case:

1) A customer uses a smartphone to call a business.
2) During the ringing stage, a customized video of the business is played to the customer.
3) While the video is playing, a menu of interactive actions represented by some icons or buttons is displayed as an overlay on the top of the video window, enabling the customer to select the menu.

The user preference is expressed by the menu selection, for instance the customer can select to become a member of the business or to navigate the business website.

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