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SERIES Q: SWITCHING AND SIGNALLING

Signalling requirements and protocols for the NGN –
Service and session control protocols – supplementary
services

**Signalling requirements and protocol profiles
for NGN customized ringing tone service**

Recommendation ITU-T Q.3611

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Recommendation ITU-T Q.3611

Signalling requirements and protocol profiles for NGN customized ringing tone service

Summary

Recommendation ITU-T Q.3611 specifies the signalling requirements and protocol profiles for next generation network (NGN) customized ringing tone (CRT).

Source

Recommendation ITU-T Q.3611 was approved on 29 June 2009 by ITU-T Study Group 11 (2009-2012) under Recommendation ITU-T A.8 procedures.

Keywords

Call server, CRT, IMS, NGN, SDP, SIP.

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Recommendation ITU-T Q.3611

Signalling requirements and protocol profiles for NGN customized ringing tone service

1 Scope

This Recommendation specifies signalling requirements and protocol profiles for NGN customized ringing tone (CRT) service. This Recommendation also contains signalling flows.

The CRT service is defined in the next generation network (NGN), including IP multimedia subsystem (IMS) and call-server based networks. This Recommendation is based on [b-ITU-T Y.2214] and covers in this version only the signalling requirements and protocol profiles for the presentation features of CRT. The capability for the CRT filtering features is for further study.

This Recommendation covers the protocol profiles over user network interface (UNI) and network-to-network interface (NNI) based on [ITU-T Q.3402] and [ITU-T Q.3401], respectively. Detailed protocol profiles for other interfaces may be subject to future specifications.

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 Q.763] Recommendation ITU-T Q.763 (1999), *Signalling System No. 7 –ISDN User Part formats and codes*.
- [ITU-T Q.3401] Recommendation ITU-T Q.3401 (2007), *NGN NNI signalling profile (Protocol Set 1)*; Amendment 1 (2008).
- [ITU-T Q.3402] Recommendation ITU-T Q.3402 (2008), *NGN UNI signalling profile (Protocol Set 1)*.
- [ITU-T T.81] Recommendation ITU-T T.81 (1992) | ISO/IEC 10918-1:1994, *Information technology – Digital compression and coding of continuous-tone still images – Requirements and guidelines*.
- [ITU-T Y.2012] Recommendation ITU-T Y.2012 (2006), *Functional requirements and architecture of the NGN release 1*.
- [ITU-T Y.2701] Recommendation ITU-T Y.2701 (2007), *Security requirements for NGN release 1*.
- [IETF RFC 2616] IETF RFC 2616 (1999), *Hypertext Transfer Protocol – HTTP/1.1*.
- [IETF RFC 3261] IETF RFC 3261 (2002), *SIP: Session Initiation Protocol*.
- [IETF RFC 3262] IETF RFC 3262 (2002), *Reliability of Provisional Responses in the Session Initiation Protocol (SIP)*.
- [IETF RFC 3311] IETF RFC 3311 (2002), *The Session Initiation Protocol (SIP) UPDATE Method*.

- [IETF RFC 3372] IETF RFC 3372 (2002), *Session Initiation Protocol for Telephones (SIP-T), Context and Architectures*.
- [IETF RFC 3515] IETF RFC 3515 (2003), *The Session Initiation Protocol (SIP) Refer Method*.
- [IETF RFC 3959] IETF RFC 3959 (2004), *The Early Session Disposition Type for the Session Initiation Protocol (SIP)*.
- [IETF RFC 3960] IETF RFC 3960 (2004), *Early Media and Ringing Tone Generation in the Session Initiation Protocol (SIP)*.
- [IETF RFC 5009] IETF RFC 5009 (2007), *Private Header (P-Header) Extension to the Session Initiation Protocol (SIP) for Authorization of Early Media*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following term defined elsewhere:

3.1.1 early media [IETF RFC 3959]: The media (e.g., audio and video) that is exchanged before a particular session is accepted by the called user.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 called CRT service subscriber: The called party who subscribes to the called party configured CRT service.

3.2.2 calling CRT service subscriber: The calling party who subscribes to the CRT service.

3.2.3 CRT service user: The called party who experiences the CRT service.

3.2.4 early media for CRT: Early media that are delivered to the called party with the media contents configured by the service subscriber. It can be generated by the originating network or the terminating network, depending on the location of service subscriptions.

3.1.5 icon ring tone server (IRT server): Icon ring tone server (IRT) stores the ringing tone media such as audio, video and picture files. The IRT server behaves as a web server and can be provided by content providers or operators. A user terminal can interact with the IRT server via, for example, HTTP, to download the ringing tone media.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AS	Application Server
AS-FE	Application Support Functional Entity
AVP	Audio Video Profile
CDIV	Communication DIVersion
CFNR	Call Forwarding on No Reply
CRT	Customized Ringing Tone
CSN	Circuit Switched Network
ECT	Explicit Communication Transfer
HOLD	Communication HOLD

HTTP	HyperText Transfer Protocol
IAM	Initial Address Message
IBC-FE	Interconnection Border Gateway Control Functional Entity
I-CSC-FE	Interrogating Call Session Control Functional Entity
IMS	IP Multimedia Subsystem
IRT	Icon Ring Tone
MGC-FE	Media Gateway Control Functional Entity
MRC-FE	Media Resource Control Functional Entity
MRFC	Media Resource Function Controller
MRP-FE	Media Resource Processing Functional Entity
NGN	Next Generation Network
NNI	Network-to-Network Interface
OIP	Originating Identification Presentation
OIR	Originating Identification Restriction
P-CSC-FE	Proxy Call Session Control Functional Entity
RTCP	RTP Control Protocol
RTP	Real-Time Transport Protocol
S-CSC-FE	Serving Call Session Control Functional Entity
SDP	Session Description Protocol
SIP	Session Initiation Protocol
SIP UA	SIP User Agent
SUP-FE	Service User Profile Functional Entity
TIP	Terminating Identification Presentation
TIR	Terminating Identification Restriction
UAC	User Agent Client
UAS	User Agent Server
UDP	User Datagram Protocol
UE	User Equipment
UE-A	User Equipment for user A
UE-B	User Equipment for user B
UNI	User-to-Network Interface
URL	Uniform Resource Locator
UII	User-to-User Information

5 CRT service and architecture

5.1 General description

The customized ringing tone (CRT) service provides the called party with the calling party's customized ringing tone. The service can be subscribed by the calling party or the called party. The service is invoked to provide customized ringing tone to the called party, according to the service configuration. The CRT contents can be multimedia representing avatar, business card, etc. The calling party subscribed to CRT is always triggered at the originating network's service system. Otherwise, the called party subscribed to CRT is always triggered at the terminating network's service system.

To protect the called party from possible malicious CRT contents, the network should provide the capability for the called party to reject CRT (e.g., reject CRT unconditionally, for unknown parties, for black listed parties, etc.). The capability for the CRT filtering features is for further study.

5.2 General architecture

The CRT service is defined and provided in the NGN architecture, which is either IMS-based or call-server based. Figure 5-1 shows a general architecture that is compliant with [ITU-T Y.2012] for providing the CRT service based on IMS and call-server networks, respectively.

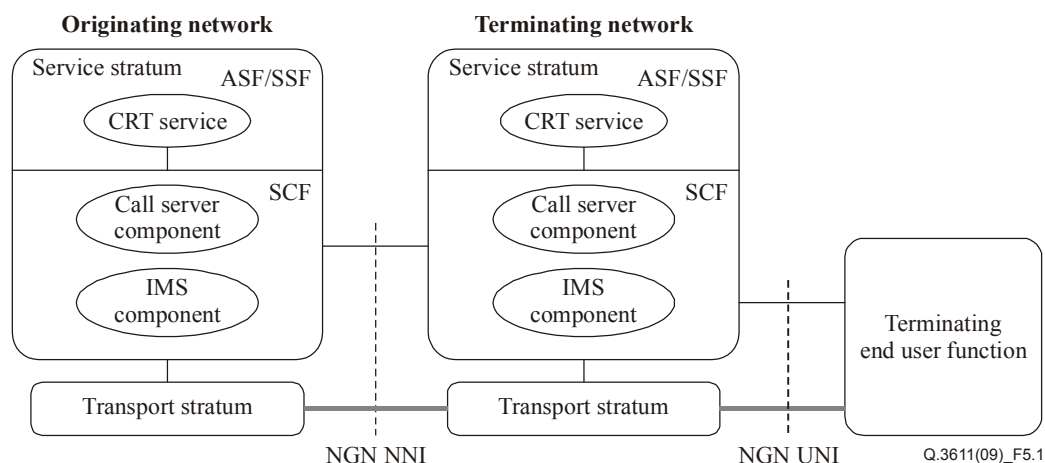


Figure 5-1 – CRT service functional architecture

5.3 Possible CRT service architectures

Originating IMS-based and call-server based possible service architectures for the CRT service are shown in Figures 5-2 and 5-3, respectively. The terminating IMS-based possible scenarios for the calling party configured CRT service are shown in Figure 5-4.

These figures show general scenarios assuming that the originating network is different from the terminating network. Although the functional architectures are different for IMS- and call-server based networks, the service control mechanisms are identical.

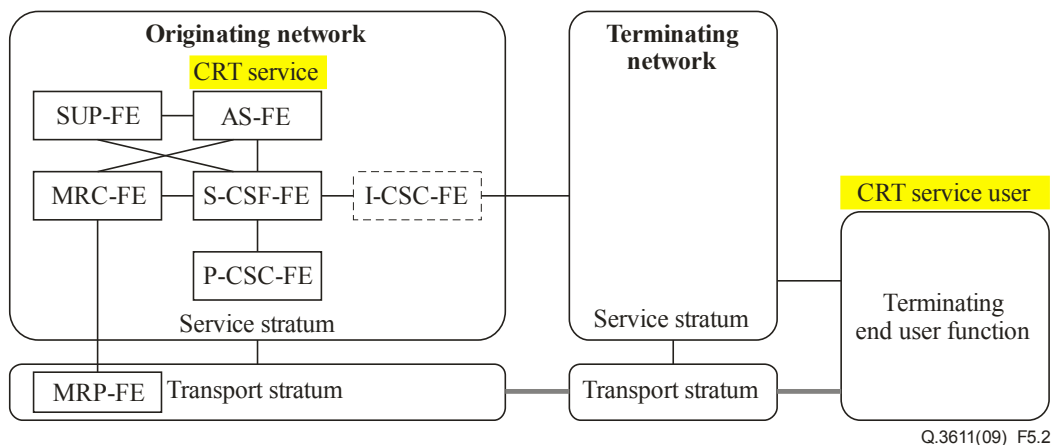


Figure 5-2 – Originating IMS-based CRT service architecture

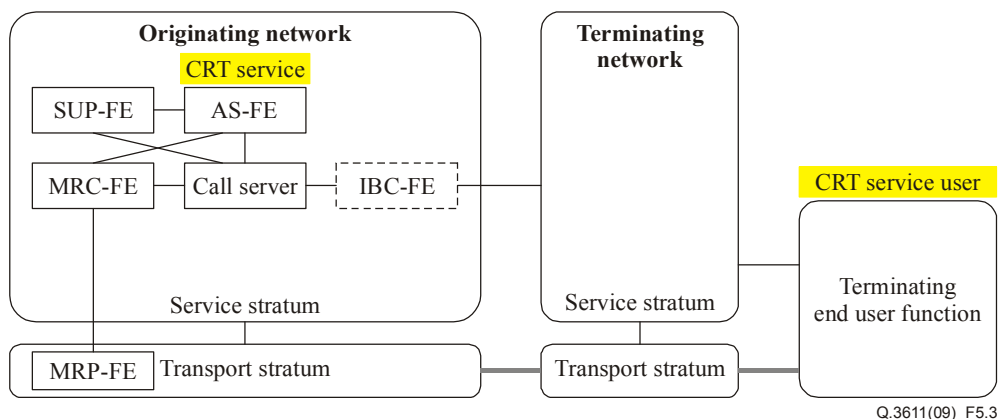


Figure 5-3 – Originating call-server based CRT service architecture

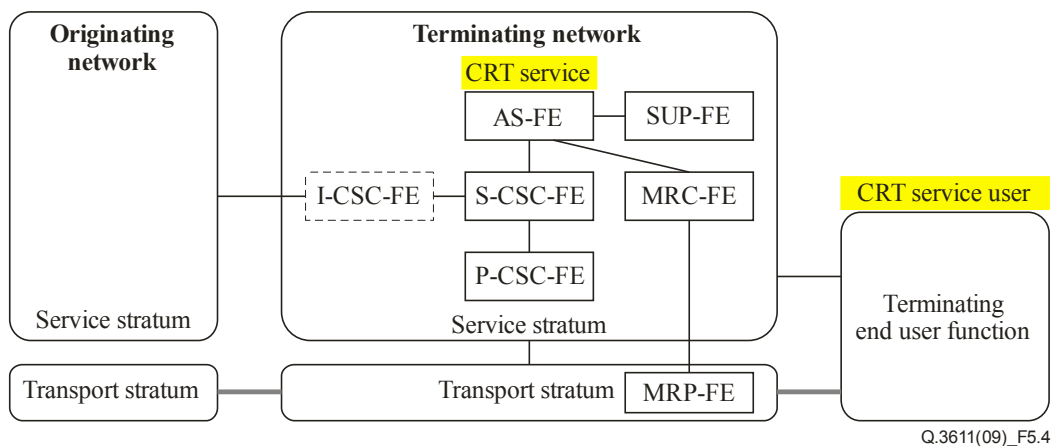


Figure 5-4 – Terminating IMS-based CRT service architecture

6 Service models

There are three models for ringing tone generations. The CRT service is provided based on at least one of these service models, and can be provided with more than one model.

Gateway model

is to establish early media sessions in the same way as regular sessions, using an offer/answer exchange. The gateway model consists of managing early media sessions using offer/answer exchanges in reliable provisional exchanges, PRACKs, and

UPDATES [IETF RFC 3960]. In case of non-reliable provisional exchanges, re-INVITE can be used.

Application server model is to establish early media by distinguishing early sessions from regular sessions by using the early-session option tag. By indicating support of the early-session disposition type in the user agent server (UAS), the user agent client (UAC) knows that offer/answer exchanges for early media (early-session disposition type) are kept separate from regular media (session disposition type) [IETF RFC 3960].

HTTP model is to provide the web URL of the subscriber's repository for CRT contents to be presented during early session. This information is filled by and delivered from the CRT service system, within the initial INVITE.

7 Media formats

In order to guarantee a certain level of early media support and compatibility between the calling and called party terminals, appropriate media formats shall be negotiated or selected to play the CRT contents.

7.1 Audio

If audio is supported, the codec list shall be as specified in clause 8.1 of [ITU-T Q.3401] and [ITU-T Q.3402].

7.2 Video

If video is supported, the codec list shall be as specified in clause 8.1 of [ITU-T Q.3401] and [ITU-T Q.3402].

7.3 Text

If plain text is supported, any character encoding (charset) that contains a subset of the logical characters (e.g., Unicode [b-Unicode]) may be used.

7.4 Still image

If still image is supported, JPEG encoding in compliance with [ITU-T T.81] shall be supported. In addition, the interchange format described in [b-JFIF] may be used with JPEG. Other encoding formats (e.g., GIF ([b-GIF87a], and [b-GIF89a]), or PNG ([b-IETF RFC 2083])) may be supported.

8 Signalling requirements

The following clauses describe the signalling requirements for providing CRT services in each functional entity.

8.1 Requirements for the terminating UE

8.1.1 Requirements for supporting CRT on gateway model

If the terminating user equipment (UE) receives an initial INVITE request, and wishes to receive early media, it should:

- a) Send out SDP answer via a response bearing a 18x code to the initial INVITE request towards the originating side, or
- b) Send SDP answer in the response of UPDATE [IETF RFC 3311] method.

8.1.2 Requirements for supporting CRT on application server model

If the terminating UE wishes to receive early media authorization descriptions, as described in [IETF RFC 3959], when it receives the initial INVITE request which has set the "early-session" option tag in the Require header field, it shall reply with a normal provisional response bearing a 18x code indicating that the terminating UE supports early-session disposition type SDP and should set the "100rel" option tag in the Require header field.

8.1.3 Requirements for supporting CRT on HTTP model

The terminating UE shall support Alert-Info and/or Call-Info header field as specified by [IETF RFC 3261] and [IETF RFC 3960].

If the media file indicated in the Alert-Info or Call-Info header field has been downloaded, the terminating UE should play the downloaded information to override the locally generated ring information, except if the user denies or stops it.

8.1.4 Requirements for supporting multiple CRT service models

When multiple models are applied, the terminating UE may be configured to determine whether to play downloaded information only and/or early media information if different media types are involved, and if the same media type is involved, then the preference is set by the local policy.

8.1.5 Requirements when user answers the communication

For the gateway model, the terminating UE does not need to distinguish between early media and regular media before a final answer is received, so there is no requirement for the terminating UE in this case.

For the application server model, if the terminating UE uses a different media port and/or a connect address for regular media and early media, when the user answers the dialog, the UE should stop playing early media information.

If the HTTP model is applied, the terminating UE should have the local policy to determine whether to keep playing the CRT contents while conversing with the originating UE.

8.2 Requirements for the terminating P-CSC-FE

8.2.1 Requirements for supporting CRT on gateway model

The P-CSC-FE may add, remove, or modify the P-Early-Media header field within the forwarded SIP requests and responses, according to the procedures in [IETF RFC 5009].

8.2.2 Requirements for supporting CRT on application server model

The P-CSC-FE may add, remove, or modify, the early-session SDP within the forwarded SIP requests and responses, according to procedures in [IETF RFC 3959].

8.2.3 Requirements for supporting CRT on HTTP model

The P-CSC-FE may have local policy to remove, or modify the Alert-Info, and/or Call-Info header field.

8.3 Requirements for the I-CSC-FE

CRT has no impact on this FE.

8.4 Requirements for the S-CSC-FE

CRT has no impact on this FE.

8.5 Requirements for the IBC-FE

8.5.1 Requirements for supporting CRT on gateway model

The IBC-FE may add, remove, or modify the P-Early-Media header field within the forwarded SIP requests and responses, according to the operator's policy.

8.5.2 Requirements for supporting CRT on application server model

The IBC-FE may add, remove, or modify the early-session SDP within the forwarded SIP requests and responses, according to the operator's policy.

8.5.3 Requirements for supporting CRT on HTTP model

The IBC-FE may have the local policy to remove, or modify the Alert-Info, and/or Call-Info header field.

8.6 Requirements for the call server

CRT has no impact on this FE.

8.7 Requirements for the AS-FE

The requirements in this clause are for invocation and operation of the CRT service. The activation, deactivation, and configuration of the CRT service are out of scope of this Recommendation.

The AS-FE provides CRT service regardless of whether the session systems are call-server or IMS-based.

8.7.1 Requirements for providing CRT service by gateway model

The AS-FE shall apply CRT service after receiving a response bearing a 18x code with SDP answer to the initial INVITE request.

If the CRT service can be applied, the AS-FE shall:

- a) Send a CRT SDP offer via PRACK/UPDATE request towards the terminating side; and
- b) If the initial INVITE request carries a SDP offer with precondition, send the SDP answer in the response bearing a 18x code towards the originating side.

The AS-FE may not forward the originating side SDP offer in the PRACK/UPDATE request towards the terminating side.

The AS-FE may set all the media types bandwidth in the SDP towards the originating side to 0, in order to avoid RTCP error.

8.7.2 Requirements for providing CRT service by application server model

If the initial INVITE request is received, then the AS-FE shall:

- a) If the provisional response has no "early-session" option tag in the Require header field, set the "early-session" option tag in the Require header field;
- b) If the provisional response has no "100 rel" option tag in the Require header field, set the "100rel" option tag in the Require header field;
- c) Send the INVITE request towards the terminating UE.

If the INVITE request's 420 error response with "early-session" option tag in the Unsupported header field is received, it indicates that the terminating UE does not support early-session, then the AS-FE shall:

- a) Provide CRT service by gateway model or HTTP model or multi-dialogue model;