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SERIES Y: GLOBAL INFORMATION
INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS
AND NEXT-GENERATION NETWORKS

Next Generation Networks – Service aspects: Service
capabilities and service architecture

Service requirements and functional models for customized multimedia ring services

Recommendation ITU-T Y.2214

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Recommendation ITU-T Y.2214

Service requirements and functional models for customized multimedia ring services

Summary

Customized multimedia ring (CMR) is a set of services. CMR consists of customized ring-back tone service and customized ringing tone service. CMR enables a service provider to deliver customized multimedia ring-back tone to the calling party and ringing tone to the called party. Recommendation ITU-T Y.2214 describes the CMR concept, service requirements and CMR functional models in call server-based, IP multimedia subsystem-based and converged network environments.

FOREWORD

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1 Scope

Customized multimedia ring (CMR) is a set of services that allows subscribers to customize the media used for ring tone presentation to the called/calling party. CMR consists of the customized ring-back tone (CRBT) service and the customized ringing tone (CRT) service.

From the user point of view, subject to the media capability of the terminals, the user experience of the service is similar across various network environments, but from the service architecture perspective, each environment has its own functional models and requirements.

This Recommendation provides:

– CMR general description;

– CMR service requirements;

– CMR functional models in call server-based, IMS-based and converged network environments.

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.1214]   Recommendation ITU-T Q.1214 (1995), *Distributed functional plane for intelligent network CS-1.*

[ITU-T Q.1218]   Recommendation ITU-T Q.1218 (1995), *Interface Recommendation for intelligent network CS-1.*

[ITU-T Q.1290]   Recommendation ITU-T Q.1290 (1998), *Glossary of terms used in the definition of intelligent networks.*

[ITU-T Y.2012]   Recommendation ITU-T Y.2012 (2006), *Functional requirements and architecture of the NGN release 1.*

[ITU-T Y.2031]   Recommendation ITU-T Y.2031 (2006), *PSTN/ISDN emulation architecture.*

[ITU-T Y.2201]   Recommendation ITU-T Y.2201 (2007), *NGN release 1 requirements.*

[ITU-T Y.2211]   Recommendation ITU-T Y.2211 (2007), *IMS-based real-time conversational multimedia services over NGN.*

[ITU-T Y.2233]   Recommendation ITU-T Y.2233 (2008), *Requirements and framework allowing accounting and charging capabilities in NGN.*

[ITU-T Y.2271]   Recommendation ITU-T Y.2271 (2006), *Call server-based PSTN/ISDN emulation.*

[ITU-T Y.2701]   Recommendation ITU-T Y.2701 (2007), *Security requirements for NGN release 1.*

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 application server [ITU-T Y.2271]: A unit that interacts with the call server and the user profile server to support service execution.

3.1.2 call server [ITU-T Y.2271]: The core element of a CS-based PSTN/ISDN emulation component, which is responsible for call control, media resource control, call routing, user profile and subscriber authentication, authorization and accounting. Depending on its role, the behaviour of the call server may be different.

3.1.3 functional entity [ITU-T Y.2012]: An entity that comprises an indivisible set of specific functions. Functional entities are logical concepts, while groupings of functional entities are used to describe practical, physical implementations.

3.1.4 intelligent peripheral (IP) [ITU-T Q.1290]: A physical entity that implements a specialized resource function.

3.1.5 media [ITU-T Y.2012]: One or more of audio, video, or data.

3.1.6 media server [ITU-T Y.2271]: A network element providing the media resource processing function for telecommunication services in NGN.

3.1.7 media stream [ITU-T Y.2012]: A media stream can consist of audio, video, or data, or a combination of any of them. Media stream data conveys user or application data (i.e., a payload) but not control data.

3.1.8 PSTN/ISDN emulation [ITU-T Y.2271]: Provides PSTN/ISDN service capabilities and interfaces using adaptation to an IP infrastructure.

NOTE – Not all service capabilities and interfaces have to be present to provide an emulation.

3.1.9 service control point (SCP) [ITU-T Q.1290]: A physical entity in the intelligent network that implements a service control function.

3.1.10 service logic [ITU-T Q.1290]: A sequence of processes/functions used to support a specific service.

NOTE – As examples, service logic can consist of the functionality provided by the application related functions (e.g., AS-FE [ITU-T Y.2012], SCP of intelligent network (IN) [ITU-T Q.1218]) and service control functions (e.g., S-CSC-FE [ITU-T Y.2012], CCF/SSF of call server [ITU-T Y.2031], SCP/SSP of intelligent network (IN) [ITU-T Q.1218]).

3.1.11 service switching point (SSP) [ITU-T Q.1290]: The physical entity that implements the service switching function.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 application level convergence: Act of sharing the application related part of the service logic across different networks in the converged environment, while every network invokes the service independently.

NOTE – As an example, AS-FE [ITU-T Y.2012] can be shared in the IMS and call server-based converged environment.

3.2.2 customized ring-back tone (CRBT): A ring-back tone that is customized by the called party or the calling party.

NOTE – A customized ring-back tone may, e.g., be a picture, a piece of recorded or composed music, greeting words, voice, advertisement or video.

3.2.3   customized ringing tone (CRT): A ringing tone that is customized by the calling party or the called party.

NOTE – A customized ringing tone may, e.g., be a picture, a piece of recorded or composed music, greeting words, voice, advertisement or video.

3.2.4   home network: The network of the service provider to which a given subscriber is subscribed.

3.2.5   media box: A collection of ring tones.

3.2.6   ring tone: A tone which is either ring-back tone or ringing tone.

3.2.7   ring-back tone: A tone, which is played to the calling party during establishment of a communication indicating that the called party is being alerted.

3.2.8   ringing tone: A tone, which is played to the called party as an incoming communication indication during establishment of a communication.

3.2.9   ring tone library: A personal repository which stores the ring tone data dedicated for an individual CMR subscriber.

3.2.10   ring tone server: A server in which ring tones are stored.

NOTE 1 – A user equipment can interact with the ring tone server, via for example HTTP, to download ring tones.

NOTE 2 – Ring tone server can act as an application in NGN in accordance with clause 7 of [ITU-T Y.2012].

3.2.11   service control level convergence: Act of sharing the application related part as well as the service control part of the service logic across different networks in the converged environment.

NOTE – As an example, CCF/SSF of call server [ITU-T Y.2031] or SSP of intelligent network (IN) [ITU-T Q.1218] can act as a service control functional entity in the call server/PSTN converged environment.

3.2.12   visited network: The network providing service to a user when the user roams outside the home network.

4   Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AG	Access Gateway
AGCF	Access Gateway Control Function
AS	Application Server
AS-FE	Application Support Functional Entity
CBT	Customized Background Tone
CCF	Call Control Function
CFB	Communication Forwarding on Busy
CFNR	Communication Forwarding on No Reply
CFU	Communication Forwarding Unconditional
CMR	Customized Multimedia Ring
CRBT	Customized Ring-Back Tone
CRT	Customized Ringing Tone
CS	Call Server

IMS	IP Multimedia Subsystem
IN	Intelligent Network
INAP	Intelligent Network Application Part
IP	Intelligent Peripheral
ISDN	Integrated Services Digital Network
IVR	Interactive Voice Response
LS	Local Switch
MGCF	Media Gateway Control Function
MRCF	Media Resource Control Function
MRC-FE	Media Resource Control Functional Entity
MRP-FE	Media Resource Processing Functional Entity
NGN	Next Generation Network
OIR	Originating Identification Restriction
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RTF	Ring Tone Filtering
S-CSC-FE	Serving Call Session Control Functional Entity
SCP	Service Control Point
SG-FE	Signalling Gateway Functional Entity
SMS	Short Message Service
SSF	Service Switching Function
SSP	Service Switching Point
SUP-FE	Service User Profile Functional Entity
TMG-FE	Trunking Media Gateway Functional Entity
UI	User Interface
WAP	Wireless Application Protocol

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 conformance to this Recommendation is to be claimed.

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

The keywords "can optionally" indicate an optional requirement which is permissible, without implying any sense of being recommended. This term is not intended to imply that the vendor's implementation must provide the option and the feature can be optionally enabled by the network operator/service provider. Rather, it means the vendor may optionally provide the feature and still claim conformance with the specification.

Additionally, this Recommendation uses the following conventions:

– The term 'MRC/MRP-FE' represents MRC-FE and MRP-FE.

– The terms 'calling party' and 'User A' are used interchangeably depending on the context.

– The terms 'called party' and 'User B' are used interchangeably depending on the context.

– The terms 'user' and 'subscriber' are used interchangeably for CRBT and CRT services depending on the context.

6 General description

This clause provides an overview of CRBT and CRT services in accordance with [ITU-T Y.2211]. Use cases of CRBT and CRT services are provided in Appendix I. For other CMR-related services and features, see Appendix II.

6.1 Customized multimedia ring (CMR)

Customized multimedia ring is a set of services that allows subscribers to customize the media used for ring tone presentation to the called/calling party. It includes CRBT and CRT services. The media may be audio, video, text, image or a combination of these, which can be customized by the subscribers.

6.1.1 Customized ring-back tone (CRBT) service

The following text is intended to describe the service and not define it. It was developed to assist in the development of the related service requirements and functional models.

The CRBT service is a service by which NGN enables the subscriber to customize the ring-back tone which is played to the calling party. Customized ring-back tone service plays a customized ring-back tone to the calling party instead of the traditional ring-back tone during the communication establishment process according to communication information and subscriber's preference.

6.1.2 Customized ringing tone (CRT) service

The following text is intended to describe the service and not define it. It was developed to assist in the development of the related service requirements and functional models and requirements.

The CRT service is a service by which NGN enables the subscriber to customize the ringing tone which is played to the called party. The CRT content will be provided to the called party only if it is allowed by the called party. CRT service plays a customized ringing tone to the called party during the communication establishment process according to communication information and subscriber's preference.

7 CMR service requirements

This clause identifies the CMR service requirements in the context of NGN. Clause 7.1 provides the CRBT service requirements, while clause 7.2 gives the CRT service requirements. Appendix III identifies basic operation scenarios regarding CRBT and CRT services.

7.1 CRBT service requirements

7.1.1 CRBT general requirements

The following requirements and recommendations apply in general:

Requirements

– NGN is required to allow users to subscribe/unsubscribe to the CRBT service, to activate/deactivate the CRBT service and to update the CRBT service settings, e.g., to change his/her active CRBT.

– NGN is required to allow the calling party to experience the CRBT set by the called CRBT service subscriber.

– NGN is required to allow the CRBT to override the default ring-back tone towards the calling party.

– NGN is required to support charging for the CRBT service.

– NGN is required to allow the called party to pre-configure the CRBT service. The preconfigured service is played upon receipt of an incoming communication notification. This may be based upon the calling party identity.

– NGN is required to allow the calling party to experience the CRBT set by the called CRBT service subscriber, both when the calling party is within its home network or a visited network.

– When the called party answers the communication, the CRBT is required to stop or continue to play during the conversation, depending on the operator or the user preferences.

– When the called party is notified about an incoming communication, NGN is required to allow the called party to send an indication to the CRBT service which CRBT to play to the calling party. This CRBT indication has priority over a pre-configured CRBT.

– When the CBRT is playing, NGN is required to allow the calling party to stop it, subject to service provider policy, and then the calling party shall experience the default alerting tone for the duration of the communication establishment.

   NOTE 1 – The default alerting tone may be a CRBT selected by the NGN provider (e.g., in the event of CRBT stop).

– NGN is required to allow the calling user to copy the CRBT of the called user as his or her own, while the CRBT is being played. The prerequisites are that the called user has enabled CRBT sharing, if applicable, for that instance of CRBT and that both users are subscribers to the same NGN provider.

   NOTE 2 – A CRBT might also be copied offline, via e.g., web interface, but that functionality is out of scope of this Recommendation.

   NOTE 3 – The expression "to copy the CRBT" does not necessarily mean that the CRBT is actually copied. It may also mean that a purchase request is being sent to the CRBT service provider.

Recommendations

– NGN is recommended to have the capability to store multiple CRBTs per CRBT service subscriber.

– CRBT service is recommended to not negatively affect the conversation between the calling and the called parties, e.g., no voice/video clipping, no longer communication set-up time.

– NGN is recommended to allow the subscriber to search, try and then configure the CRBT content according to the CRBT subscriber profile.

– NGN is recommended to inform the user about status and changes in his or her CRBT service, e.g., close expiry date for the CRBT service or a particular CRBT content.

NOTE 4 – This information may be provided by existing means such as SMS and web access.

–   NGN is recommended to allow the calling party to reject the CRBT service based on specific parameters, e.g., time, the identity of the called party, users' status.

–   NGN is recommended to allow a CRBT subscriber to subscribe to a CRBT service for which some of the ring-back tones are provided by a third party provider.

–   The calling party's NGN provider is recommended to be able to configure which CRBT should have priority, the one set by the called or the calling CRBT service subscriber. The calling party's NGN provider is required to be able to take into account the calling CRBT service subscriber's preferences. By default, if no preference is set, the CRBT set by the calling party has priority.

7.1.2   CRBT service procedures

7.1.2.1   Provisioning and withdrawal

The CRBT service can be provisioned and withdrawn by the NGN provider on a per subscriber basis.

If the CRBT service is not provisioned, NGN is required that the called party does not experience content of CRBT, and NGN is recommended that the calling party experiences the default ring-back tone.

NOTE – Procedures for provisioning and withdrawal are out of scope of this Recommendation.

7.1.2.2   Activation

When a subscriber activates his or her CRBT service, NGN is required to allow the subscriber to specify which CRBT a calling party may experience, or use NGN provider's default setting.

After a subscriber has activated his or her CRBT service, NGN is recommended to allow a calling party to experience the CRBT that was chosen by the subscriber.

7.1.2.3   Deactivation

After a subscriber has deactivated his or her CRBT service, NGN is recommended to allow a calling party to experience the default ring-back tone.

7.1.2.4   Update

When a subscriber updates his or her CRBT service configuration, the updated CRBT service configuration overwrites the existing one.

7.1.3   CRBT service configuration

The following requirements and recommendations apply:

a)   NGN is recommended to allow the CRBT subscriber to configure the CRBT service according to the CRBT subscriber profile based on the following parameters:

   i)   CRBT content descriptor – Pointing to the right content or combination of contents (e.g., personal prompt plus chosen music/video track).

   ii) CRBT timing descriptor – Time of day, day of week, specific date and intervals based on each of those parameters.

   iii) User (called/calling party) descriptor – User identifier (or group identifier of users), user presence, user location, CRBT user charging mode.

      NOTE 1 – As location information may be restricted in some instances, the default user location may be set to "unknown".

      NOTE 2 – Multiple parameters can be used in combination (e.g., by user descriptor and CRBT timing descriptor).

b)   NGN is recommended that the CRBT service select the appropriate CRBT according to the CRBT subscriber profile.

c)   NGN is required to provide the capability of operation, administration, and maintenance (OAM) for the CRBT service in accordance with [ITU-T Y.2201].

d)   NGN is required to provide the capability of content management for the CRBT service in accordance with [ITU-T Y.2201].

7.1.4   CRBT content

CRBT content can be provided by a (content and/or NGN) provider and/or by the subscriber itself. CRBT content may be dynamically created, possibly taking into account information available in the NGN, e.g., calling and/or called user's location and/or presence information.

7.1.4.1   CRBT content handling

The CRBT service is required to handle the content according to media types as follows:

–   Streaming media, e.g., voice and video

–   Static media, e.g., picture, website (like blog website), electronic business card.

7.2   CRT service requirements

7.2.1   CRT general requirements

The following requirements, recommendations, and optional requirements apply in general:

Requirements

–   NGN is required to allow the service user to subscribe/unsubscribe to the service, activate/deactivate the service, update the settings, e.g., to change his or her active CRT.

–   NGN is required to allow the CRT service to override the default ringing signal towards the called party.

–   NGN is required to allow the called party to experience the CRT set by the called service subscriber.

–   NGN is required to allow the called party to experience the CRT set by the calling service subscriber.

–   NGN is required to charge for the CRT service and the related contents.

–   If the CRT cannot be played for some reason (for example, the CRT system fails, or the CRT content expiry is up), NGN is required to allow the called party to experience the default ringing signal instead of the CRT.

–   When the called party answers the communication, the CRT service is required to stop or continue to play during the conversation, depending on the operator or the user preferences. By default, if no preference is set, when the called party answers the communication, the CRT is required to stop.

–   When the calling party is setting up a communication, NGN is required to allow the calling party to send an indication to the CRT service logic, which CRT to play to the called party.

–   NGN is required to allow the called party to have the capability to copy the CRT of the calling party as his or her own CRT while the CRT is being played. The prerequisites are that the calling party has enabled CRT sharing, if applicable, for that instance of CRT and that both parties are subscribers to the same NGN provider.

      NOTE 1 – A CRT might also be copied offline, via e.g., web interface, but that functionality is out of scope of this Recommendation.

      NOTE 2 – The expression "to copy the CRT" does not necessarily mean that the CRT is actually copied. It may also mean that a purchase request is being sent to the CRT service provider.

–   NGN is required to allow the CRT service to send CRT to the called party on a per communication basis.

–   NGN is required to allow the CRT subscriber to send an indication to the CRT service logic, which multimedia information to play to the called party (e.g., when the called party is notified about an incoming communication, the CRT subscriber can send an indication to the CRT service logic, which CRT content to play to the called party).

Recommendations

–   NGN is recommended to have the capability to store multiple CRTs per service subscriber.

–   CRT service is recommended not to negatively affect the conversation between calling and called parties, e.g., no voice/video clipping.

–   NGN is recommended to allow the subscriber to search, try and then configure the CRT content according to the CRT subscriber profile.

–   NGN is recommended to allow a CRT subscriber to subscribe to a CRT service for which some of the ringing tones are provided by a third party provider.

–   The called party's NGN provider is recommended to configure which CRT has priority, the one set by the called or the calling CRT service subscriber. The called party's NGN provider is required to take into account the called CRT service subscriber's preferences. By default, if no preference is set, the CRT set by the called party has priority.

Optional requirement

–   When the multimedia CRT fails to be played (e.g., in conditions such as when network congestion occurs), the voice CRT can optionally be played instead, if possible.

7.2.2   CRT service procedures

7.2.2.1   Provisioning and withdrawal

The CRT service can be provisioned and withdrawn by the NGN provider on a per subscriber basis.

If the CRT service is not provisioned, NGN is required that the called party does not experience the content of CRT, and NGN is recommended that the called party experiences the default ringing tone.

NOTE – Procedures for provisioning and withdrawal are out of scope of this Recommendation.

7.2.2.2   Activation

When a subscriber activates its CRT service, NGN is required to allow the subscriber to specify which CRT a called user should experience, or use the NGN provider's default setting.

After a subscriber has activated its CRT service, NGN is recommended that a called user experiences the CRT that was chosen by the subscriber.

7.2.2.3   Deactivation

After a subscriber has deactivated his or her CRT service, NGN is required that a called user experiences the default ringing signal.

7.2.2.4   Update

When a subscriber updates its CRT service configuration, the updated CRT service configuration overwrites the existing one.

7.2.3 CRT service configuration

The following requirements and recommendations apply:

a)   NGN is recommended to allow the CRT subscriber to configure the CRT service according to the CRT subscriber profile based on the following parameters:

    i)   CRT content descriptor – Pointing to the right content or combination of contents (e.g., personal prompt plus chosen music/video track);

    ii)   CRT timing descriptor – Time of day, day of week, specific date and intervals based on each of those parameters;

    iii)   User (called/calling party) descriptor – User identifier (or group identifier of users), user presence, user location, CRT user charging mode.

      NOTE 1 – As location information may be restricted in some instances, the default user location may be set to "unknown".

      NOTE 2 – Multiple parameters can be used in combination (e.g., by user descriptor and CRT timing descriptor).

b)   NGN is recommended that the CRT service select the appropriate CRT according to the CRT subscriber profile.

c)   NGN is required to provide the capability of operation, administration, and maintenance (OAM) for the CRT service in accordance with [ITU-T Y.2201].

d)   NGN is required to provide the capability of the content management for the CRT service in accordance with [ITU-T Y.2201].

e)   NGN is recommended to provide the capability for the called/forwarded party to reject the CRT provided by the calling party according to some rules:

    i)   reject all CRT, unconditionally;

    ii)   reject CRT for unknown parties and accept all known parties;

    iii)   reject CRT for parties identified as malicious information in a black list and accept all others;

    iv)   prompt the user to accept/reject CRT only for unknown parties and accept CRT of all others (default);

    v)   prompt the user to accept or reject CRT for each incoming communication (e.g., to present CRT or not).

7.2.4 CRT content

CRT content can be provided by a (content and/or NGN) provider and/or by the subscriber itself. CRT content may be dynamically created, possibly taking into account information available in the NGN, e.g., calling and/or called user's location and/or presence information.

7.2.4.1 CRT content handling

The CRT service is required to handle the content according to media types as follows:

–   Streaming media, e.g., voice and video

–   Static media, e.g., picture, website (like blog website), electronic business card.

8 CMR functional models

8.1 Introduction

CMR functional models describe the functional entities interaction to support CMR in different environments.

NOTE 1 – CRBT/CRT content is offered according to the network and terminal capability (e.g., legacy terminals receive only audio).

Regarding the description of CMR functional models provided in this clause, the following applies:

– For the call server-based environment, ring tones are provided to legacy terminals.

– For the IMS-based environment, in addition to legacy terminals, ring tones are provided to NGN terminals.

– For the converged network environments, ring tones are provided to legacy terminals and/or NGN terminals.

NOTE 2 – Legacy terminals (e.g., traditional PSTN phones) are terminals which are not attached via a NGN UNI but via a PSTN/ISDN like UNI.

In the context of this clause, it is considered that legacy terminals are not capable of handling customized ringing tones (CRT).

NOTE 3 – In the following clauses, the terms "call" (used in the context of call server, PSTN/IN, and converged environments) and "call/session" (used in the context of IMS environment) are used interchangeably with the term "communication".

8.2 CMR functional models in call server-based environment

NOTE 1 – CMR functional model to support CRT service in call server-based environment is not addressed, given that legacy terminals are considered not capable of supporting the CRT service.

Figure 1 shows a CMR functional model to support CRBT service (CRBT service functional model) in call server-based environment. This functional model is in accordance with clause 6 of [ITU-T Y.2031].

In this functional model, call server, in conjunction with AS-FE and MRP-FE, provides the CRBT service to the legacy terminals connected via an access gateway. The AS-FE allocates MRP-FE resources to play ring-back tone to subscribers.
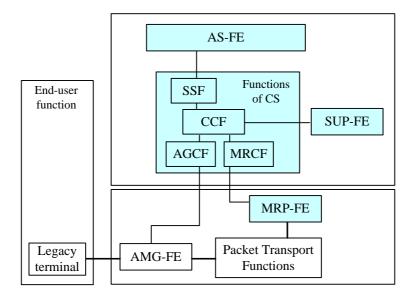

Figure 1 – CRBT service functional model in CS-based environment

In call server-based environment, the following functional entities are involved in providing the CRBT service. For detailed description of functional entities, see [ITU-T Y.2271].

–   *Call server (CS)*

The core element of a CS-based PSTN/ISDN emulation component, which is responsible for call control, media resource control, call routing, user profile and subscriber authentication, authorization and accounting. Call server comprises CCF, RF, SSF, SPF, SIF, AGCF, MRCF, and MGCF as internal functions. For detailed description, see also clause 6 of [ITU-T Y.2031].

–   *Application support functional entity (AS-FE)*

AS-FE is a core component to implement CRBT service logic. It responds to service request, inquires ring tones based on call information and subscriber's preference, and controls media negotiation.

–   *Media resource processing functional entity (MRP-FE)*

MRP-FE stores media files, interacts with AS-FE and provides ring tones to users. For legacy terminals, media files are converted to audio streams (e.g., audio extraction from other media formats), and then offered to the calling party.

–   *Service user profile functional entity (SUP-FE)*

The subscribers' subscription information and ring tone playing rules (as user profile) may be stored in SUP-FE (alternatively, they may be local to CS).

When the call server receives a call to User B, the call server checks whether User B is a CRBT service user according to the subscriber's subscription information (which may be obtained from CS locally or SUP-FE). If User B is a CRBT subscriber, the call server triggers the CRBT service to AS-FE according to the service provider policy (e.g., trigger the service after receiving ringing indication from User B). Then AS-FE instructs the call server to establish a media connection of User A with MRP-FE, and notifies MRP-FE to play the corresponding ring-back tone. When User B answers the call, the call server notifies AS-FE to stop CRBT and connect User A with User B.

NOTE 2 – For typical information flows, see clause IV.1.

8.3   CMR functional models in IMS-based environment

Figure 2 shows the CMR functional model in IMS-based environment. This functional model is in accordance with clause 9 of [ITU-T Y.2012].
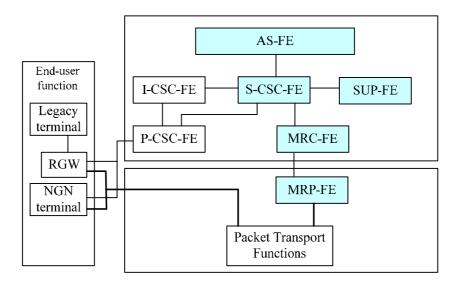
Figure 2 – CMR functional model in IMS-based environment

In IMS-based environment, the following functional entities are involved to provide the CMR. For detailed description of functional entities, see [ITU-T Y.2012].

– *Serving call session control functional entity (S-CSC-FE)*

S-CSC-FE handles functionalities related to session control and routing of session messages. S-CSC-FE establishes, monitors, supports and releases multimedia sessions and manages the user's service interactions. S-CSC-FE interacts with AS-FE to provide CMR.

– *Service user profile functional entity (SUP-FE)*

The subscribers' subscription information and ring tone playing rules (as user profile) are stored in SUP-FE.

– *Application support functional entity (AS-FE)*

AS-FE is a core component to implement CRBT/CRT service logic. It responds to CRBT/CRT service request, inquires ring tones based on call information and subscriber's preference, and controls media negotiation.

– *Media resource control functional entity (MRC-FE)*

MRC-FE controls media resource processing functional entity (MRP-FE) by operating as a media resource control function. MRC-FE allocates MRP-FE ring tones to play to CMR users.

– *Media resource processing functional entity (MRP-FE)*

MRP-FE stores media files, interacts with AS-FE and provides ring tones to users.

8.3.1   CRBT service functional model in IMS-based environment

In this functional model, when S-CSC-FE receives a call/session to User B, S-CSC-FE checks whether User B is a CRBT service subscriber according to the subscription information in the SUP-FE. If User B is a CRBT subscriber, S-CSC-FE triggers the CRBT service to AS-FE, and then AS-FE instructs MRC-FE/MRP-FE to establish media connection with User A and play ring-back tone to User A according to service provider policy (e.g., play ring-back tone after receiving ringing indication from User B). When User B answers the incoming call/session, AS-FE instructs MRC/MRP-FE to stop the CRBT and the call/session is established between User A and User B.

NOTE – For typical information flows, see clause IV.2.

8.3.2 CRT service functional model in IMS-based environment with ring tones stored in MRP-FE

In this scenario, ringing tones are stored in MRP-FE. Under the control of AS-FE, MRP-FE plays ringing tones to the users through media streams.
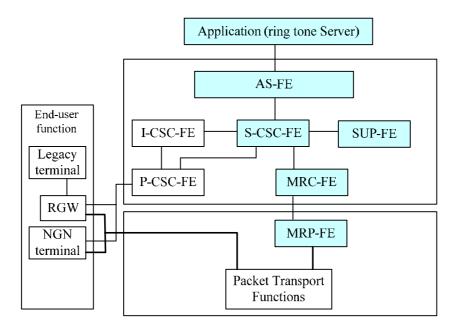
When S-CSC-FE receives a call/session to User B, S-CSC-FE checks whether User A is a CRT service subscriber according to the subscription information in SUP-FE. If User A is a CRT subscriber, S-CSC-FE triggers CRT service to AS-FE, and then AS-FE instructs MRC/MRP-FE to establish media connection with User B and play ringing tone to User B according to service provider policy (e.g., play ringing tone after receiving ringing indication from User B). When User B answers the incoming call/session, AS-FE instructs MRC/MRP-FE to stop the CRT and the call/session is established between User A and User B.
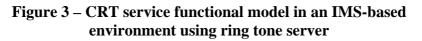
NOTE – For typical information flows, see clause IV.3.

8.3.3 CRT service functional model in IMS-based environment with ring tones stored in ring tone server

In this scenario, ringing tones are stored in a ring tone server instead of MRP-FE. Users interact with the ring tone server, via for example HTTP, to download ringing tones. In this model, the ring tone server acts as an application in accordance with clause 7 of [ITU-T Y.2012].

Figure 3 shows the CRT service functional model in IMS-based environment using ring tone server.

Figure 3 – CRT service functional model in an IMS-based environment using ring tone server

When S-CSC-FE receives a call/session to User B, S-CSC-FE checks whether User A is a CRT service subscriber according to the subscription information in SUP-FE. If User A is a CRT subscriber, S-CSC-FE triggers CRT service to AS-FE, and then AS-FE sends the address (e.g., URL address) of the ringing tone stored in the ring tone server to User B. User B downloads the related ringing tone from the ring tone server and then plays the CRT until User B answers the incoming call/session.

NOTE – For typical information flows, see clause IV.4.

8.4 CMR functional models in a converged environment

CMR functional models in a converged environment deal with both application level convergence and service control level convergence.

Figure 4 shows the general concept of the CMR functional model in a converged environment. The figure deals with both application level convergence and service control level convergence in an environment where different communication control platforms coexist (converged environments). In case of application level convergence, IMS-based and call server-based environments share the same service logic residing in AS-FE, but use their own service control network for service invocation. On the other hand, service control level convergence does not only share the same service logic but also unifies the service control for service invocation. As an example, in an environment where PSTN and call server coexist (PSTN/CS converged environment), call server can provide service control functions and AS-FE can host application related functions of the service logic for both call server users and PSTN users.
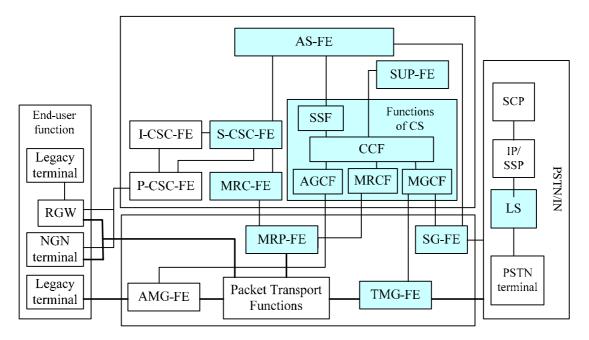

Figure 4 – General CMR functional model in a converged environment

NOTE – In Figure 4, shaded entities in different communication control platforms are most likely entities to be used in the corresponding converged environment. The following clauses describe the specific converged models.

8.4.1 Functional models with application level convergence

8.4.1.1 CRBT service functional model in PSTN/CS converged environment

To provide CRBT service, the call server based PSTN/ISDN emulation component can make use of capabilities provided by traditional intelligent network (IN). Figure 5 shows the functional model, in which the interworking functional entities SG-FE and TMG-FE, and some PSTN/IN functional entities, intelligent peripheral (IP) and SCP, are used to provide the CRBT service in PSTN/call server converged environment with application level convergence. In this functional model, SCP/IP realizes the application level convergence.

For details on call server based PSTN/ISDN emulation, see clause 6 of [ITU-T Y.2031]. For details on IN functional component descriptions and interfaces, see [ITU-T Q.1214] and [ITU-T Q.1218], respectively.
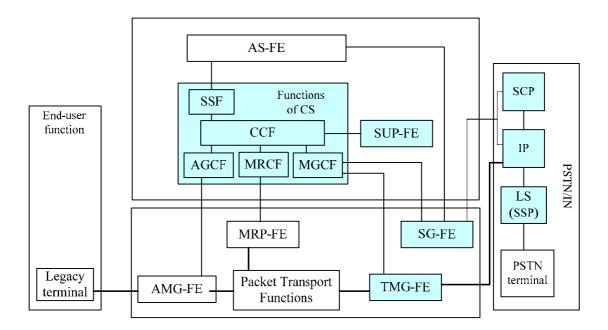
Figure 5 – CRBT service functional model in PSTN/CS converged environment with application level convergence

In this functional model, SCP implements the CRBT service logic (including subscription information and routing information of IP) and IP stores and plays the CRBT media. Call server is required to support IN trigger criteria and standard IN interface to SCP via SG-FE. Call server acts as an SSP for the legacy terminals and triggers the service to SCP. Local switch (LS) contains PSTN/IN SSP for the PSTN terminals and triggers the service to SCP.

When the call server or local switch receives a call to User B, the call server or local switch checks whether User B is a CRBT service subscriber according to the subscription information. If User B is a CRBT subscriber, the call server or SSP triggers the service to SCP to get the routing information of IP. Call server or local switch routes the call to IP according to service provider policy (e.g., route the call to IP after receiving ringing indication from User B) to play ring-back tone to User A. IP plays ring-back tone to User A under the control of SCP. When User B answers the incoming call, SCP instructs IP to stop the CRBT and the call is established between User A and User B.

NOTE – For typical information flows, see clause IV.5.

8.4.1.2   CRBT service functional model in IMS/CS converged environment

In an environment where IMS and call server coexist (IMS/CS converged environment), AS-FE is responsible for service logic and MRP-FE implements the media resource processing function. In this functional model, AS-FE realizes the application level convergence.

Figure 6 shows the CRBT service functional model in IMS/call server converged environment with application level convergence.
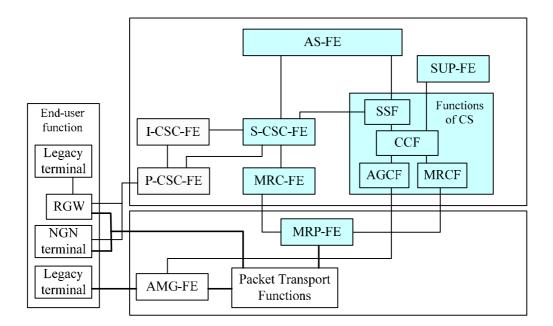
Figure 6 – CRBT service functional model in IMS/CS converged environment with application level convergence

In this functional model, the CRBT service is triggered to AS-FE via IMS or call server communication control platform independently.

When S-CSC-FE or call server receives a call to User B, S-CSC-FE or call server checks whether User B is a CRBT service subscriber according to the subscription information in SUP-FE. If User B is a CRBT subscriber, under the control of AS-FE, MRP-FE establishes a media connection with User A and plays ring-back tone to User A according to service provider policy (e.g., play ring-back tone after receiving ringing indication from User B). Finally, when User B answers the incoming call, AS-FE instructs MRP-FE to stop the CRBT and the call is established between User A and User B.

NOTE – For typical information flows, see clause IV.2.

8.4.2 Functional models with service control level convergence

8.4.2.1 CRBT service functional model in PSTN/CS converged environment with service control on PSTN side

Figure 7 shows the functional model, in which the interworking functional entities SG-FE and TMG-FE and some PSTN/IN functional entities, IP/SSP and SCP, are used to provide the CRBT service in PSTN/CS converged environment with service control level convergence and with service control on the PSTN side.

In this functional model, IP/SSP realize the service control level convergence. The IP and the SSP are integrated into a single functional block called IP/SSP in Figure 7. The SSP function within IP/SSP implements the service trigger function and IP within IP/SSP implements the media resource function.

For details on call server based PSTN/ISDN emulation, see clause 6 of [ITU-T Y.2031]. For details on IN functional components description and interfaces, see [ITU-T Q.1214] and [ITU-T Q.1218], respectively.
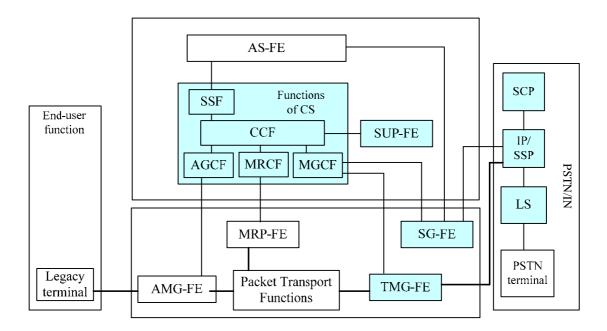
**Figure 7 – CRBT service functional model in PSTN/CS converged
environment with service control on PSTN side**

In this functional model, IP/SSP triggers the CRBT service to SCP for both call server (via SG-FE)
and PSTN users. IP/SSP plays ring-back tones to call server (via TMG-FE) and PSTN users under
control of SCP.

When the call server or local switch receives a call to User B, the call server or local switch checks
whether User B is a CRBT service subscriber according to the service information (e.g., access
number, subscription information and routing information of IP). If User B is a CRBT subscriber,
the call server (via SG-FE) or local switch initiates the service request to SSP. SSP triggers the
CRBT service to SCP. Then SCP instructs IP/SSP to play the corresponding ring-back tone. When
User B answers the incoming call, the call server or local switch notifies SCP. SCP instructs the
IP/SSP to stop CRBT and the call is established between User A and User B.

NOTE – For typical information flows, see clause IV.6.

8.4.2.2 CRBT service functional model in PSTN/CS converged environment with service control on call server side

In this scenario, both the call server and PSTN terminals access the service logic implemented by
AS-FE.

Figure 8 shows the CRBT service functional model in PSTN/CS converged environment with
service control level convergence and with service control on the call server side.
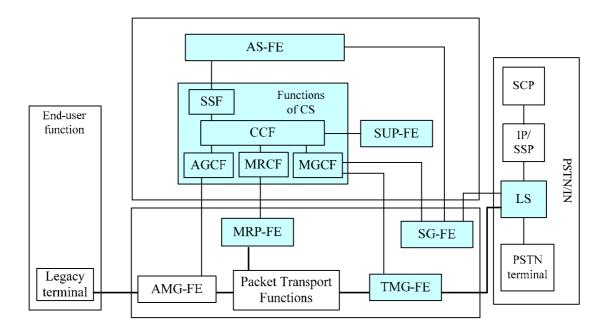
Figure 8 – CRBT service functional model in PSTN/CS converged environment with service control on call server side

In this functional model, the call server realizes the service control level convergence. PSTN terminals access the service via the call server through the interworking functional entities TMG-FE and SG-FE.

When the call server receives a call to User B originated from PSTN or locally, the call server checks whether User B is a CRBT service subscriber according to the subscriber's subscription information (which may be obtained from CS locally or SUP-FE). If User B is a CRBT subscriber, the call server triggers the CRBT service to AS-FE. Then AS-FE instructs the call server to establish media connection with User A and notifies MRP-FE to play ring-back tone to User A. When User B answers the incoming call, the call server notifies the AS-FE and AS-FE instructs the MRP-FE to stop the CRBT to User A.

NOTE 1 – For typical information flows, see clause IV.7.

NOTE 2 – For the CRBT service functional model in an environment where PSTN, call server and IMS co-exist (PSTN/CS/IMS converged environment), see Appendix V.

9 CMR QoS aspects

CMR QoS support is required to be in accordance with the requirements identified in [ITU-T Y.2201].

10 CMR security aspects

CMR security support is required to be in accordance with the requirements identified in [ITU-T Y.2701].

11 CMR charging aspects

CMR charging support is required to be in accordance with the requirements identified in [ITU-T Y.2233]. It is required that triggering of both online and offline CMR charging events be enabled. It is also required to enable transfer of CMR-related charging information to the billing system.

Appendix I

CMR use cases

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

This appendix describes use cases related to CRBT service and CRT service.

I.1 CRBT service

I.1.1 Default ring-back tone set by operator

Short description:

The default ring-back tone set by the operator is the ring-back tone provided by the service provider or operator as soon as a user subscribes to the CRBT service. A default ring-back tone will be automatically played to replace the common ring-back tone if the user has not set any ring-back tone, indicating that the user has subscribed to the service.

Pre-conditions:

Sally has just subscribed to the service.

Sally has not set any ring-back tone yet.

Service flow:

Joe sends a communication request to Sally.

When Sally's phone is alerting, Joe hears a special ring-back tone rather than the common beeping tone.

Sally answers the incoming communication request and has a conversation with Joe.

I.1.2 Default ring-back tone set by subscriber

Short description:

The default ring-back tone set by the subscriber is the one that a user selects to play in the absence of a special setting, any time, and regardless of the identity of the caller number.

Pre-conditions:

Sally has subscribed to the service.

Sally finds a music file from the existing ring-back tones database via a web portal, after she audits it and confirms her choice, Sally sets it as a default ring-back tone.

Service flow:

Joe sends a communication request to Sally.

When Sally's phone is alerting, Joe enjoys the music ring-back tone Sally has set.

Sally answers the incoming communication request and has a conversation with Joe.

I.1.3 Distinctive ring-back tone for calling party

Short description:

Users can set some personal ring-back tones for special callers. After the ring-back tones are set successfully, the identity of the caller is determined and the corresponding pre-configured music/video segment is played as the ring-back tone.

Pre-conditions:

Sally has subscribed to the service.

Sally sets different songs for different friends according to their phone numbers. She sets the song 'Hotel California' for Joe and the song 'Here I am' for Bob.

Service flow:

Joe sends a communication request to Sally.

When Sally's phone is alerting, Joe enjoys hearing the 'Hotel California' melody.

Bob sends a communication request to Sally.

When Sally's phone is alerting, Bob enjoys hearing the 'Here I am' melody.

I.1.4   Random/sequential playback

Short description:

Users can establish a personal ring-back tone group, each of which can involve several ring-back tones. For the playback of ring-back tones in the ring-back tone group, users can set the ring-back tone playback rule: random playback or sequential playback.

Pre-conditions:

Sally has subscribed to the service.

Sally sets a personal ring-back tone group for Joe, and she sets the ring-back tone with sequential playback rule.

Service flow:

Joe sends a communication request to Sally.

When Sally's phone is alerting, Joe enjoys a set of songs one after the other during the same alerting state.

1.1.5   Ring-back tone presentation

Short description:

Users can present ring-back tones to other users in many ways (web, WAP, dialling of a voice access number). Ring-back tone presentation means that User A presents the rights of using a ring-back tone to User B.

Pre-conditions:

Joe and Sally have subscribed to the service.

Service flow:

Joe pre-listens to the ring-back tones.

Joe finds a ring-back tone that Sally enjoys, Joe presents the ring-back tone to Sally, and Joe pays for the ring-back tone.

Sally owns the rights of using the ring-back tone.

I.1.6   Copying ring-back tones

Short description:

User can copy the ring-back tones being used by other users in many ways. When User A desires to duplicate the ring-back tone being used by User B, User A copies the ring-back tone of User B (via the web, WAP, dialling of a voice access number, etc.).

Pre-conditions:

Sally has subscribed to the service.

Joe has subscribed to the service.

Service flow:

Copying while the communication is active:

Sally sends a communication request to Joe.

Sally enjoys the ring-back tone very much when Joe's phone is alerting.

Sally presses a key on her terminal to indicate that she wants to duplicate this ring-back tone.

The ring-back tone is stored in her personal ring-back tone library (if any).

Copying after the communication has ended:

Sally sends a communication request to Joe.

Sally enjoys the ring-back tone very much when Joe's phone is alerting.

After Sally finishes the conversation with Joe, she tries to duplicate that ring-back tone to her personal ring-back tones library (if any) via the web portal.

Sally provides the information of the communication that just happened with Joe to the portal.

The portal gives her a confirmation of successful duplication.

I.1.7   "Intro" ring-back tone

Short description:

A user can set a special ring-back tone to be played before or after normal ring-back tone. The intro ring-back tone and normal ring-back tone will be selected and played as the ring-back tone to the calling party in sequence.

Pre-conditions:

Joe has subscribed to the CRBT service and has set a song as ring-back tone.

Joe has set his recorded voice message "happy new year" as the intro CRBT on the website.

Service flow:

Sally sends a communication request to Joe.

When Joe's phone is alerting, Sally enjoys "happy new year" first and then the songs.

I.1.8   Ring-back tone filtering

Short description:

A user sends a communication request to another user who subscribes to the CRBT service. When the called party is alerting, the calling party can enjoy or reject the ring-back tone pre-configured by the called party according to the calling party's filters.

Pre-conditions:

Joe has subscribed to the CRBT service and has set a piece of video as ring-back tone.

Sally has set CRBT filters (e.g., if the called party is included in her CRBT black list, the CRBT is filtered and not presented to Sally).

Service flow:

Sally sends a communication request to Joe.

It is determined that Sally wants to filter the CRBT set by Joe according to Sally's filters.

When Joe's phone is alerting, Sally will not see the video and optionally she will experience the default ring in her terminal.

Joe answers the incoming communication request and has a conversation with Sally.

I.1.9   CRBT presentation as CBT

Short description:

A ring-back tone can be played to the calling party or both parties after establishment of the communication according to the principal's (e.g., called party/calling party, operators) preferences.

Pre-conditions:

Joe has subscribed to the service.

Joe sets a special song for Sally in a way that the song will be played to both of them as background music after establishment of the communication.

Service flow:

Joe sends a communication request to Sally.

When Sally's phone is alerting, Joe enjoys the special song that Sally has set for him.

Sally answers the incoming communication request and has a conversation with Joe.

Sally and Joe both enjoy the special song during the communication as background music.

I.1.10   Stopping/pausing/resuming ring-back tones

Short description:

The user can stop/pause/resume the ring-back tones during the communication being used by other users in many ways. When User A desires to stop/pause/resume the ring-back tone being used by User B, User A can stop/pause/resume the playing of the ring-back tone according to the key-press information during the communication (e.g., DTMF way).

Pre-conditions:

Sally has subscribed to the service.

Joe has subscribed to the service.

Service flow:

Pausing/resuming while the communication is active:

Sally sends a communication request to Joe.

Sally enjoys the ring-back tone very much when Joe's phone is alerting, but she has to mute the ring-back tone at that time, and she does not want to miss the ring-back tone.

Sally presses a key on her terminal to indicate that she wants to pause this ring-back tone and resume it later.

The ring-back tone is paused by MRC/MRP-FE.

Sally wants to resume this ring-back tone and presses a key on her terminal.

The ring-back tone is resumed by MRC/MRP-FE, and Sally can enjoy the ring-back tone again.

I.2   CRT service

I.2.1   Playing ringing tone

Short description:

The user who subscribes to the service sends a communication request to a user. When the called party is alerting, the called party can enjoy a ringing tone which can be audio, video, text or image, pre-configured by the calling party.

Pre-conditions:

Sally has subscribed to the service.

Sally has set a special image and a piece of video as ringing tone.

Service flow:

Sally sends a communication request to Joe.

When Joe's phone is alerting, Joe can see the video.

Joe answers the incoming communication request and has a conversation with Sally.

I.2.2   Ringing tone filtering

Short description:

A user who subscribes to CRT service sends a communication request to another user. When the called party is alerting, the called party can enjoy or reject the ringing tone pre-configured by the calling party according to the called party's filters.

Pre-conditions:

Sally has subscribed to the CRT service and has set a piece of video as ringing tone.

Joe has set CRT filters (e.g., if it is during work time (9:00-17:00), the CRT is filtered and not presented to Joe).

Service flow:

Sally sends a communication request to Joe at 10:00.

It is determined that Joe wants to filter CRT according to Joe's filters.

When Joe's phone is alerting, Joe will not see the video and, optionally, he will experience the default ring in his terminal.

Joe answers the incoming communication request and has a conversation with Sally.

I.2.3   CRT presentation as CBT

Short description:

A ringing tone can be played to the called party or both parties after establishment of the communication according to the principal's (e.g., called party/calling party, operators) preferences.

Pre-conditions:

Joe has subscribed to the service.

Joe sets a special song for Sally in a way that the song will be played to both of them as background music after establishment of the communication.

Service flow:

Joe sends a communication request to Sally.

When Sally's phone is alerting, Sally enjoys the special song that Joe has set for her.

Sally answers the incoming communication request and has a conversation with Joe.

Sally and Joe both enjoy the special song during the communication as background music.

I.2.4 Stopping ringing tone

Short description:

A user who subscribes to the CRT service sends a communication request to another user. When the called party is alerting, the called party can stop the ringing tones during the communication. When the called party desires to stop the ringing tone being played by MRC/MRP-FE, the called party stops the playing of the ringing tone, according to the key-press information during the communication (e.g., DTMF way).

Pre-conditions:

Sally has subscribed to the CRT service and has set a piece of video as ringing tone.

Service flow:

Sally sends a communication request to Joe.

Joe cannot enjoy the ringing tone subscribed by Sally for some reasons, and he does not want to reject or answer the communication right now.

Joe presses a key on his terminal to indicate that he wants to stop this ringing tone.

The ringing tone is stopped by MRC/MRP-FE, and Joe's terminal is muted, Sally is waiting for Joe to pick up the phone.

Joe answers the incoming communication request and has a conversation with Sally.

I.3 Interaction

I.3.1 CRBT service interaction with supplementary services

I.3.1.1 Interactions with CFU/CFB

Short description:

If User A sends a communication request to User B and CFU/CFB (communication forwarding unconditional/communication forwarding on busy) diverts the original communication request to User C, and User C is subscribed to the CRBT service, User A will enjoy the ring-back tone pre-configured by User C.

Pre-conditions:

Sally subscribes to the CRBT service, and pre-configures the ring-back tones.

Bob subscribes to the CFB service, and his forwarding number is Sally's phone number.

Service flow:

Joe sends a communication request to Bob when Bob is in a conversation.

The communication is diverted to Sally.

Joe enjoys the ring-back tone when Sally's phone is alerting.

I.3.1.2 Interactions with CFNR

Short description:

If communication forwarding on no reply (CFNR) diverts the original communication request, in which User A called User B, to User C, and both User B and User C are subscribed to the CRBT service, User A will enjoy the ring-back tone of User B, then will continue with the ring-back tone of User C.

Pre-conditions:

Sally subscribes to the CRBT service, and pre-configures the ring-back tones.

Bob subscribes to the CRBT service, and pre-configures the ring-back tones.

Bob subscribes to the CFNR service, and this forwarding number is Sally's phone number.

Service flow:

Joe sends a communication request to Bob, and occasionally Bob does not answer the communication.

The communication is diverted to Sally.

Joe enjoys Bob's ring-back tone when Bob's phone is alerting, then enjoys Sally's ring-back tone when Sally's phone is alerting.

Alternative flow:

When the communication is diverted to Sally and Sally's phone is alerting, Joe can still enjoy Bob's ring-back tone.

I.3.2   CRT service interaction with supplementary services

I.3.2.1   Interactions with OIR

Short description:

If User A is subscribed to both OIR (originating identification restriction) service and CRT service, User B cannot enjoy the ringing tone pre-configured by User A when User A sends a communication request to User B.

Pre-conditions:

Sally subscribes to the CRT service, and sets her image as ringing tone.

Sally's OIR service is active at that moment.

Service flow:

Sally sends a communication request to Joe.

Joe cannot see Sally's image.

I.3.2.2   Interactions with CFU/CFB

Short description:

If User A sends a communication request to User B and CFU/CFB diverts the original communication to User C, and User A is subscribed to the CRT service, then User C will enjoy the ringing tone pre-configured by User A.

Pre-conditions:

Sally subscribes to the CRT service, and pre-configures her image as the ringing tone.

Bob subscribes to the communication forwarding on busy (CFB) service, and his forwarding number is Joe's phone number.

Service flow:

Sally sends a communication request to Bob when Bob is in a conversation.

The communication is diverted to Joe.

Joe enjoys Sally's image when his phone is alerting.

I.3.2.3   Interactions with CFNR

Short description:

If User A sends a communication request to User B, CFNR diverts the original communication to User C, and User A is subscribed to the CRT service, then both Users B and C can enjoy the ringing tone of User A.

Pre-conditions:

Sally subscribes to the CRT service, and pre-configures her image as the ringing tone.

Bob subscribes to the CFNR service, and his forwarding number is Joe's phone number.

Service flow:

Sally sends a communication request to Bob, and occasionally Bob does not answer the communication, but Sally's image still appears in Bob's phone.

The communication is diverted to Joe.

Joe enjoys Sally's image when his phone is alerting.

Appendix II

Advanced services and service features

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

This appendix describes advanced services and service features related to CMR.

II.1 Advanced services

II.1.1 Customized background tone (CBT) service

The following text is intended to describe the service and not define it.

CBT service is a service that allows the subscriber to offer the media in addition to or in parallel with the established communication. The media includes audio, video, text, image, etc. When the communication is established, the background media is presented to both the called party and the calling party. The CBT service can be provided based on the calling or the called party's subscription information.

CBT service is required to support the same set of operations and features as supported by the CRBT and CRT services.

II.2 Advanced features

II.2.1 Ring tone adjustment

The CRBT/CRT subscriber can adjust the ring tone according to its preference. This includes changing the ring tone, adjusting the volume, and providing the control over playing status (e.g., start, pause, resume and stop) of ring tones according to the key-press information during the communication.

II.2.2 Ring tone filtering (RTF)

The users can filter ring tones to control and limit the ring tones presented to them so that the presented party can receive/reject the ring tone pre-configured by the calling/called party according to the presented party's filter. For example, for CRBT service, the users can filter the ring tones from a specific called party's ring tones which they do not want to experience and they will not be presented to the calling party. In other words, RTF at the calling party supersedes CRBT from the called party.

The ring tone filter can be customized for a specific identity group and also can be customized for specific time segments.

If the user sets a filter for a specific identity group, the customized multimedia ring tones of the calling/called party whose identity is in the specific identity group will not be played to the filterered user, instead default ring tone will be played.

If the user sets a filter for a specific time segment, the multimedia ring tones will not be played to the user in such specific time segment, instead the default ring tone will be played.

II.2.3 Presenting the ring tone as a gift

A subscriber can present the ring tones to other subscribers. The presented ring tone can be stored in the personal ring tone library (if any) of the parties who accept the presentation.

II.2.4 Copying ring tone

A subscriber can copy the ring tones selected by other subscribers.

II.2.5 Media box

Media box is a ring tone package (a collection of ring tones). Each subscriber can own one or more media boxes. A subscriber can create, delete and modify its media box(es), and configure the play sequence (e.g., randomly, consecutively) of ring tones in the media box.

II.2.6 Personal ring tone library

The CMR subscriber may own a personal library which contains its multimedia ring tones and music box(es). The subscriber is required to select the ring tone from its own library while configuring the ring playing rules.

II.2.7 Uploading the user-generated ring tone

A subscriber can create ring tones and upload them to his or her own library. The uploaded ring tone is required to comply with the format and copyright requirements of the provider providing the service using that ring tone.

II.2.8 Playing CBT instead of CRBT

The CBT subscriber as a calling party can customize CBT for ring-back tone purpose and then experience a certain CBT instead of the called party's CRBT in the communication. The CBT service receives the communication request from the calling party and then decides whether the called party is idle or not. If the called party is idle, the CBT service will override the CRBT or normal ring-back tone and play pre-selected CBT to the calling party.

Appendix III

CMR basic operation scenarios in NGN

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

This appendix describes the operation of CRBT and CRT services in different scenarios in an NGN environment.

III.1   CRBT basic operation scenarios in NGN

This clause identifies basic operation scenarios for CRBT service in an NGN environment. This description corresponds to clause 4.2.3 of [b-3GPP TS 22.182].

III.1.1   Only User B has activated the CRBT service

In the following scenarios, shown in Table III.1, it is assumed that User B has activated its CRBT service. User A is calling User B. User A has not subscribed and/or activated the CRBT service.

NOTE – The customized ring-back tone of User B is CRBT-B.

Table III.1 – Basic operation scenarios

	User B (condition)	Behaviour
1	User B, ringing	User A experiences CRBT-B.
2	User B, busy	User A experiences busy indication.
3	User B, no answer	First User A experiences CRBT-B and then the 'no answer' indication after User B's 'no answer' timer has expired.
4	User B, not reachable	User A experiences 'not reachable' indication.

III.1.2   Only User A has activated the CRBT service

In the following scenarios, shown in Table III.2, it is assumed that only User A has activated its CRBT service. User A is calling User B. User B has not subscribed and/or activated the CRBT service.

The customized ring-back tone of User A is CRBT-A.

Table III.2 – Basic operation scenarios

	User B (condition)	Behaviour
1	User B, ringing	Depending on User A settings, User A experiences either CRBT-A or the default ring-back tone.
2	User B, busy	Depending on User A settings, User A experiences either CRBT-A or the default busy tone.
3	User B, no answer	Depending on User A settings, User A experiences either CRBT-A or the default ring-back tone and then the 'no answer' indication after User B's 'no answer' timer has expired.
4	User B, not reachable	User A experiences 'not reachable' indication.

III.1.3 Both User A and User B have activated the CRBT service

In the following scenarios, shown in Table III.3, it is assumed that both User A and User B have activated the CRBT service. User A is calling User B.

The customized ring-back tone of User B is CRBT-B, the customized ring-back tone for User A is CRBT-A.

Table III.3 – Basic operation scenarios

	User B (condition)	Behaviour
1	User B, ringing	Depending on User A settings, User A experiences CRBT-A, CRBT-B or the default ring-back tone.
2	User B, busy	Depending on User A settings, User A experiences either CRBT-A or the default busy tone.
3	User B, no answer	Depending on User A settings, User A experiences either CRBT-A, CRBT-B or the default ring-back tone and then the 'no answer' indication after User B's 'no answer' timer has expired.
4	User B, not reachable	User A experiences 'not reachable' indication.

III.2 CRT basic operation scenarios in NGN

This clause identifies basic operation scenarios for the CRT service in an NGN environment. This description corresponds to clause 4.2.3 of [b-3GPP TS 22.183].

III.2.1 Only User A has activated the CRT service

In the following scenarios, shown in Table III.4, it is assumed that only User A has activated its CRT service. User A is calling User B. User B has subscribed and not activated the CRT service.

NOTE – "To activate its CRT service" means the user allows that its CRT service be experienced to others.

The CRT of User A is CRT-A.

Table III.4 – Basic operation scenarios

	User B (condition)	Behaviour
1	User B, ringing	Depending on User B settings, User B experiences either CRT-A or the default ringing tone.

III.2.2 Only User B has activated the CRT service

In the following scenario, shown in Table III.5, it is assumed that only User B has activated its CRT service. User A is calling User B. User B has not subscribed and/or activated the CRT service.

The CRT of User B is CRT-B.

Table III.5 – Basic operation scenarios

	User B (condition)	Behaviour
1	User B, ringing	User B experiences CRT-B or the default ringing tone.

III.2.3 Both User A and User B have activated the CRT service

In the following scenarios, shown in Table III.6, it is assumed that both User A and User B have activated the CRT service. User A is calling User B.

The CRT of User B is CRT-B, the CRT for User A is CRT-A.

Table III.6 – Basic operation scenarios

	User B (condition)	Behaviour
1	User B, ringing	Depending on User B settings, User B experiences CRT-A, CRT-B or the default ringing tone.
		If User B has not set any preference, User B experiences CRT-B.

Appendix IV

Example information flows for CMR functional models

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

This appendix provides information flows for CMR functional models. These information flows are only examples of how the CMR service can be provided in different scenarios.

NOTE – CRBT/CRT service can be triggered on the basis of both the calling or the called party subscription. In case of the calling party side subscription, the service is triggered in the calling party's home network. In case of the called party side subscription, the service is triggered in the called party's home network.

For all the subsequent information flows, it is assumed that the CRBT service is subscribed by the called party and the CRT service is subscribed by the calling party.

IV.1   CRBT service information flows in call server-based environment

In this scenario, User A and User B are served by the call server. The call server provides the session control and triggers the service to AS-FE. AS-FE hosts the service logic. MRP-FE stores the ring-back tones and plays the ring-back tones to users as instructed by AS-FE. The detailed steps are as follows:
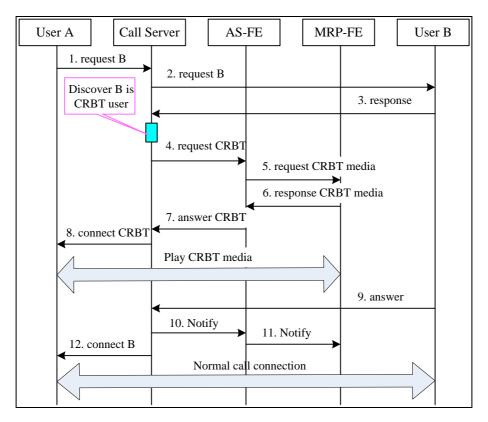
Figure IV.1 – CRBT information flows in CS-based environment

1)   User A initiates a call to User B, the call arrives at the call server which serves User B.

2)   The call server routes the call to User B.

3)   User B's terminal is ringing, and returns a response to the call server.

4)   The call server triggers CRBT service to AS-FE.

NOTE – Step 4 can happen before steps 2 and 3 (i.e., the call server first triggers the CRBT service to the AS-FE, then AS-FE indicates to the call server to route the call to User B). The call server recognizes User B as a CRBT subscriber based on the subscription information (which may be obtained from CS locally or SUP-FE). The subscription information can be used in subsequent messages to avoid re-triggering the CRBT service.

5)   AS-FE requests CRBT media from MRP-FE, according to the service logic and call information.

6)   MRP-FE returns a response with CRBT media session description.

7)   AS-FE transfers the response to the call server.

8)   The call server instructs User A to perform media negotiation and establish media stream with MRP-FE. Then User A can experience the ring-back tone pre-configured by User B.

9)   User B answers the call.

10)   The call server receives an answer message and instructs AS-FE to stop the ring-back tone.

11)   AS-FE instructs MRP-FE to stop playing the ring-back tone.

12)   The call server instructs User A to establish media stream with User B to establish the call.

IV.2   CRBT service information flows in IMS-based environment

In this scenario, User A and User B are served by IMS. S-CSC-FE provides the session control and triggers the CRBT service to AS-FE which hosts the CRBT service logic. MRP-FE stores and plays the ring-back tone to users as instructed by AS-FE via MRC-FE. The detailed steps are as follows:
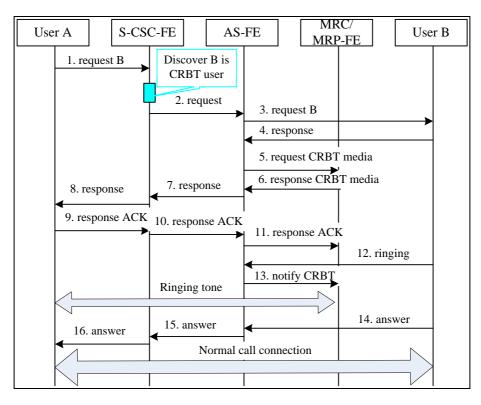

Figure IV.2 – CRBT information flows in IMS-based environment

1)   User A initiates a call/session to User B. The request message includes reliable response request indicator, terminal media capabilities, and the capability indicating User A supports early media session.

2)   The request arrives at S-CSC-FE. S-CSC-FE triggers CRBT service to AS-FE according to the initial filtering criteria (iFC).

3)   AS-FE determines that User A supports early media session according to the request message and sends a request to User B via IMS indicating support of early media session.

4)   User B returns a response, including an answer about support of User A's terminal media capabilities.

5)   AS-FE sends a request for CRBT with early media session indication to MRC/MRP-FE.

6)   MRC/MRP-FE returns the CRBT early media session description to AS-FE.

7)   AS-FE returns a response to S-CSC-FE with CRBT early media session description and User B's terminal media capabilities answer.

8)   S-CSC-FE transfers the response to User A.

9)   After successful early media negotiation, User A includes the answered early media session into response ACK and returns the response ACK to S-CSC-FE.

10)   S-CSC-FE transfers the response ACK to AS-FE.

11)   AS-FE transfers the response ACK to MRC/MRP-FE.

12)   User B is ringing, and sends a ringing message to AS-FE.

13)   AS-FE sends a notification to MRC/MRP-FE, instructing MRC/MRP-FE to play ring-back tone to User A. User A can enjoy the media pre-configured by User B.

14)   User B answers the call/session to AS-FE.

15)   In turn, AS-FE answers the call/session to S-CSC-FE.

16)   The call/session between User A and User B is established.

IV.3 CRT service information flows in IMS-based environment with ring tones stored in MRP-FE

In this scenario, User A and User B are served by IMS. S-CSC-FE provides the session control and triggers the CRT service to AS-FE which hosts the CRT service logic. MRP-FE stores and plays ringing tones to users as instructed by AS-FE via MRC-FE. The detailed steps are as follows:
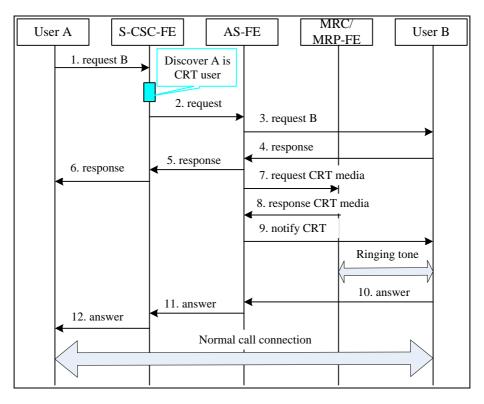

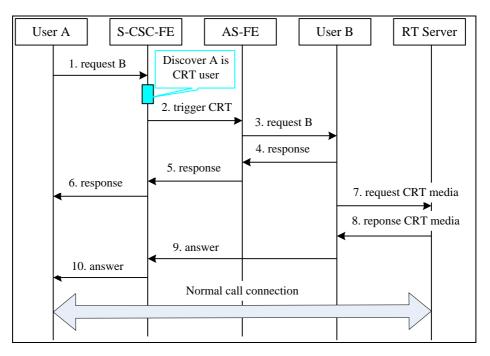**Figure IV.3 – CRT information flows in an IMS-based environment with ring tones stored in MRP-FE**

1)   User A initiates a call/session.

2)   The request arrives at S-CSC-FE. S-CSC-FE triggers CRT service to AS-FE according to the initial filtering criteria (iFC).

3)   AS-FE sends a request to User B via IMS, requiring User B to support early media session.

4)   User B terminal is ringing, and returns a response, including early media session description.

5)   AS-FE determines that User B supports early media session according to the response and returns a response to S-CSC-FE with the early media session description.

6)   S-CSC-FE transfers a response to User A.

7)   AS-FE sends a request to MRC/MRP-FE with the early media session description of User B's terminal.

8)   MRC/MRP-FE returns the negotiated early media session description to AS-FE.

9)   AS-FE sends a notification to User B terminal, including the negotiated early media session description. After successful media negotiation, User B can receive the media pre-configured by User A.

10)   User B answers the call/session to AS-FE.

11)   In turn, AS-FE answers the call/session to S-CSC-FE.

12)   The call/session between User A and User B is established.

IV.4 CRT service information flows in IMS-based environment with ring tones stored in ring tone server

These information flows describe the non-session based scenario of the CRT service where the ringing tone is downloaded by User B's terminal.

User A and User B are served by IMS. S-CSC-FE provides the session control and triggers the CRT service to AS-FE which hosts the CRT service logic. User B terminal downloads the ringing tone from an application (ring tone server) as instructed by AS-FE. The detailed steps are as follows:

Figure IV.4 – CRT information flows in IMS-based environment with ring tones stored in ring tone server

1) User A initiates a call/session.

2) The call/session request arrives at S-CSC-FE. S-CSC-FE triggers CRT service to AS-FE according to iFC.

3) AS-FE sends a new request to User B via IMS. The new request contains the CRT content address (e.g., URL) at which User A has pre-arranged a ringing tone for User B.

4) User B sends a response to S-CSC-FE.

5) AS-FE transfers the response to S-CSC-FE.

6) S-CSC-FE transfers the response to User A.

7) User B requests CRT media from the ring tone server, according to the resource address in the request message.

8) The ring tone server sends back a response to User B terminal with a picture file, and the terminal displays the picture to User B.

9) User B answers the call/session.

10) S-CSC-FE transfers the answer to User A; then the call/session between User A and User B is established.

IV.5 CRBT service information flows in PSTN/CS converged environment with application level convergence

This scenario covers the application level convergence. PSTN and call server users share the CRBT service logic hosted by SCP and invoke the CRBT service independently. IP stores and plays the ring-back tones to users. The call server users access CRBT service via TMG/SG-FE. In the specific case described below, User A and User B are served by the call server. The detailed steps are as follows:
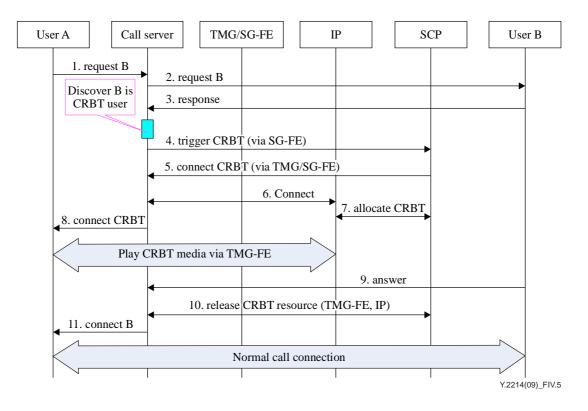

Figure IV.5 – CRBT information flows in PSTN/CS based converged environment with application level convergence

1) User A initiates a call to User B, the call arrives at the call server serving User B.

2) The call server routes the call to User B.

3) User B terminal is ringing, and returns a response to the call server.

4) The call server triggers the service to SCP according to IN principle.

5) SCP returns IP routing information and instructs the call server to connect to IP if User B is a CRBT subscriber.

   NOTE – Steps 4 and 5 can happen before steps 2 and 3.

6) The call server establishes a connection with IP via TMG/SG-FE.

7) After IP receives a connect message from the call server, IP reports connect message to SCP. Then SCP instructs IP to play the ring-back tone according to the service logic and call information.

8) The call server informs User A to connect to IP, and then User A can enjoy the ring-back tone pre-configured by User B.

9) User B answers the call.

10) When the call server receives the answer message from User B, the call server sends a request for releasing the connection with IP.

11) The call server instructs User A to connect to User B through media stream to establish the call.

IV.6   CRBT service information flows in PSTN/CS converged environment with service control on PSTN side

This scenario covers the service control level convergence where service control is on the PSTN side. The PSTN and call server networks route the CRBT request to SSP. SSP triggers the service to SCP which hosts the service logic. SCP returns the routing information of IP which stores and plays the ring-back tones to users. In the specific case described below, User A and User B are served by the call server. The detailed steps are as follows:
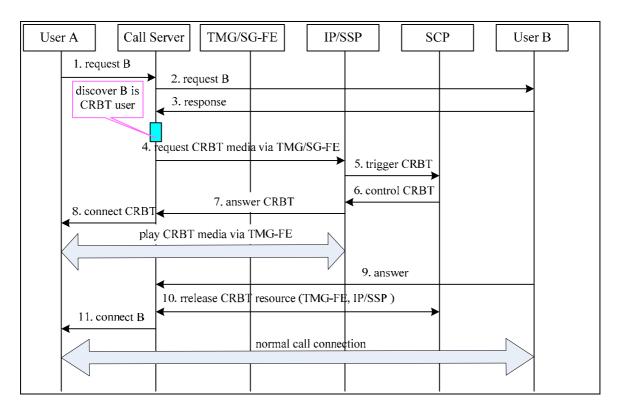

**Figure IV.6 – CRBT information flows in PSTN/CS converged
environment with service control on PSTN side**

1) User A initiates a call to User B, the call arrives at the call server serving User B.

2) The call server routes the call to User B.

3) User B terminal is ringing, and returns a response to the call server.

4) The call server sends a call request for CRBT media to the IP/SSP via the TMG/SG-FE.

5) IP/SSP triggers the CRBT service to SCP via INAP (intelligent network application part) protocol.

6) SCP returns a control message to IP/SSP to instruct to play a ring-back tone according to the service logic and call information.

7) IP/SSP sends an answer message to the call server, informing it to play the ring-back tone via the TMG/SG-FE.

8) The call server instructs User A to connect to CRBT media, and then User A can enjoy the ring-back tone pre-configured by User B.

9) User B answers the call.

10) When the call server receives an answer message, the call server sends a request for releasing the IP/SSP resources.

11) The call server instructs User A to connect to User B through media stream to establish the call.

IV.7 CRBT service information flows in a PSTN/CS converged environment with service control on call server side

This scenario covers the service control level convergence where service control is on the call server side. The PSTN and the call server route the CRBT service request to the call server. The call server triggers the CRBT service to AS-FE which hosts the service logic. MRP-FE stores and plays the ring-back tones to users. PSTN users access the service via TMG/SG-FE.

In Figure IV.7, it is assumed that:

– the calling and called parties are PSTN users

– the called party is a CRBT subscriber

– the call is relayed by the TMG/SG-FE to users (not shown)
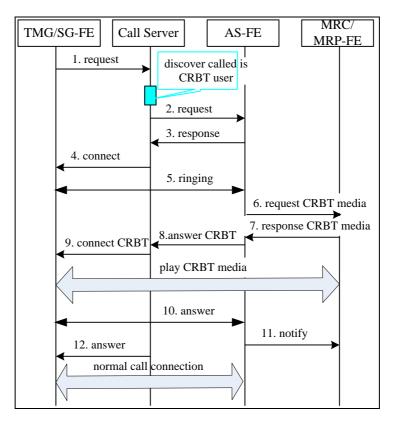
The detailed steps are as follows:

Figure IV.7 – CRBT information flows in PSTN/CS converged environment with service control on call server side

1) The call from PSTN arrives at the call server through the PSTN local switch serving the called party terminal, via TMG/SG-FE.

2) The call server triggers the CRBT service to AS-FE according to subscription and call information.

3) AS-FE returns a response, instructing the call server to connect to the called party terminal.

4) The call server sends a connect call message via the TMG/SG-FE.

5) The called party terminal is ringing, and the alerting message is reported finally to AS-FE.

6) AS-FE requests CRBT media from MRC/MRP-FE, according to the service logic and call information.

7) MRC/MRP-FE returns a response with the CRBT early media session description to AS-FE.

8) AS-FE transfers the response (along with the CRBT early media session description) as an answer to the call server.

9) The call server instructs the calling party terminal to connect to MRC/MRP-FE via TMG/SG-FE, and then the calling party can enjoy the ring-back tone pre-configured by the called party.

10) The answer message is transferred to the call server and finally to AS-FE.

11) The AS-FE instructs MRC/MRP-FE to stop playing the media.

12) The call server relays the answer message to the calling party through TMG/SG-FE to establish the call.

Appendix V

CRBT in PSTN/CS/IMS converged environment

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

Figure V.1 illustrates the case where SCP contains subscribers' ring-back tone data and the CRBT service logic. SCP interworks with the VoIP AS and NGN AS to provide CRBT service.
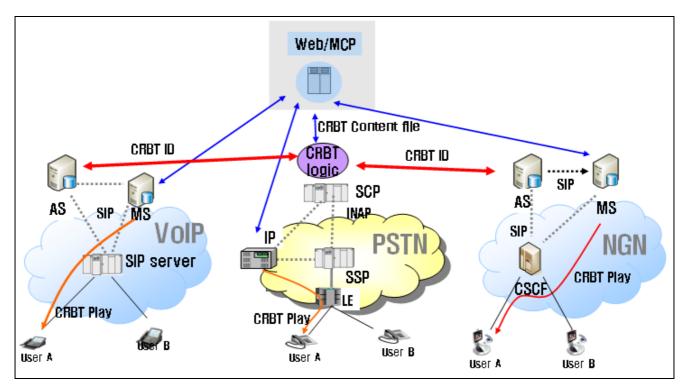

Figure V.1 – Conceptual view of CRBT service functional model in PSTN/CS/IMS converged environment

In this functional model, SCP contains the CRBT logic. Other ASes (such as VoIP AS or NGN AS) in other networks request the CRBT ID from SCP and then process the call flow. Each communication control platform (i.e., IMS, CS, and PSTN) has its own independent service architecture.

NOTE – CRBT ID as shown in Figure V.1 corresponds to the CRBT resource identifier which indicates the resource location (e.g., URL).

V.1 CRBT service functional model in PSTN/CS/IMS converged environment

Figure V.2 shows the CRBT service functional model in IMS, call server and PSTN converged environment.
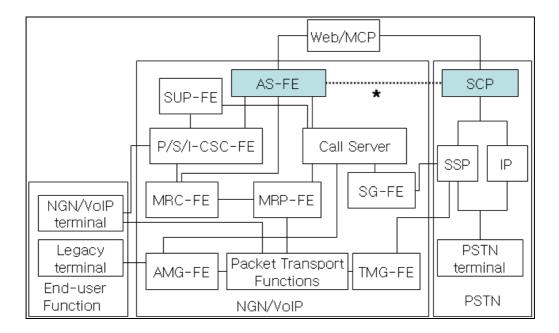
Figure V.2 – CRBT service functional model in PSTN/CS/IMS converged environment

NOTE – The reference point '*' shown in Figure V.2 between AS-FE and SCP is not defined in [ITU-T Y.2012], but it is important to indicate this interface for the purpose of this functional model.

– If the called party is served by PSTN, CRBT service is triggered to SCP. SCP processes the CRBT service logic independently of AS-FE. IP plays ring-back tones to the calling party under the control of SCP.

– If the called party is served by IMS or the call server, CSC-FE or the call server triggers the CRBT service to AS-FE. AS-FE requests resource identifier from SCP. In turn, SCP returns resource identifier to AS-FE for further processing of the service. AS-FE instructs MRC/MRP-FE to play ring-back tone to the calling party. In this case, SCP executes a part of the service logic (i.e., returns the resource identifier) and AS-FE implements the rest of the service logic (e.g., service control).

Figure V.3 shows the information flow when the called party is served by IMS.
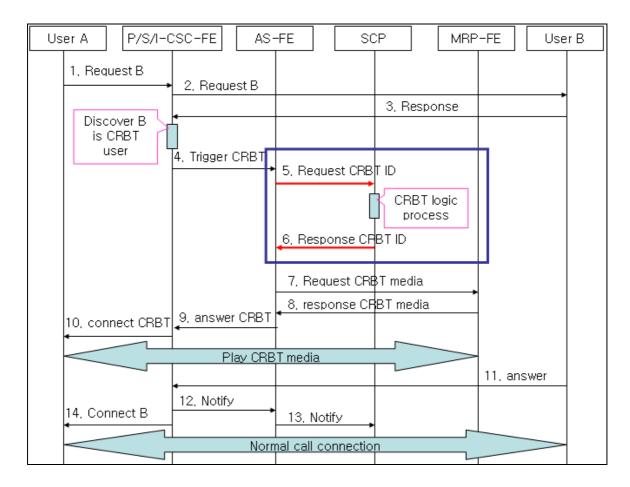
Figure V.3 – CRBT information flows in PSTN/CS/IMS converged environment

When user A calls a CRBT subscriber served by IMS, CSC-FE triggers the service to AS-FE. Then AS-FE requests CRBT ID from SCP. SCP returns CRBT ID to AS-FE. The rest of the flow sequence is similar to that of the IMS-based environment.

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