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Technical Specification

**3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
IP Multimedia Core Network Subsystem (IMS)
Multimedia Telephony Service and supplementary services;
Stage 1
(Release 11)**



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Foreword

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1 Scope

The present document define the IMS Multimedia Telephony service and the minimum set of capabilities required to secure multi-vendor and multi-operator inter-operability for Multimedia Telephony and related Supplementary Services.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] Void
- [3] Void
- [4] 3GPP TS 22.228: "IP multimedia (IM) CN subsystem, stage 1"
- [5] ITU-T Recommendation I.210: "Principles of telecommunication services supported by an ISDN and the means to describe them".
- [6] 3GPP TS 22.041: "Operator Determined Barring (ODB)"
- [7] 3GPP TS 24.173: "IMS Multimedia Telephony Communication Service and Supplementary Services; Stage 3"
- [8] 3GPP TS 22.101: "Service principles".
- [9] 3GPP TS 22.182: "Customized Alerting Tones (CAT) Requirements; Stage 1".
- [10] 3GPP TS 22.183: "Customized Ringing Signal (CRS) Requirements; Stage 1".
- [11] ITU-T Recommendation F.703: "Multimedia Conversational Services".
- [12] 3GPP TS 22.090 : "Unstructured Supplementary Service Data (USSD); Stage 1".

3 Definitions, symbols and abbreviations

3.1 Definitions

Blacklist List of identities or identity ranges that, for one reason or another, are being denied a particular service.

Whitelist List of identities or identity ranges that are provided particular services. White list is also named VIP list.

3.2 Symbols

Void.

3.3 Abbreviations

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

3PTY	Three Party
ACR	Anonymous Communication Rejection
AOC-C	Advice Of Charge - Charging
AOC-D	Advice Of Charge - During the communication
AOC-E	Advice Of Charge - at the End of the communication
AOC-I	Advice Of Charge - Information
AOC-S	Advice Of Charge - charging information at communication Set-up time
CAT	Customized Alerting Tone
CB	Communication session Barring
CCBS	Completion of Communication sessions to Busy Subscriber
CD	Communication Deflection
CDIV	Communication DIVersion
CDIVN	CDIV Notification
CFB	Communication Forwarding Busy
CFNL	Communication Forwarding on Not Logged-in
CFNR	Communication Forwarding No Reply
CFNRc	Communication Forwarding on Subscriber Not Reachable
CFU	Communication Forwarding Unconditional
COLP	COnnected Line identification Presentation
COLR	COnnected Line identification Restriction
CONF	CONFerence
CRS	Customized Ringing Signal
CS	Circuit Switched
CUG	Closed User Group
CW	Communication Waiting
ECT	EXplicit Communication Transfer
FA	Flexible Alerting
HOLD	Communication HOLD
ICB	Incoming Communications Barring
MCID	Malicious Communication IDentification
MWI	Message Waiting Indication
OCB	Outgoing Communications Barring
OIP	Originating Identification Presentation
OIR	Originating Identification Restriction
PSAP	Public Safety Answer Point
PUI	Public User Identity
TIP	Terminating Identification Presentation
TIR	Terminating Identification Restriction

4 Service description

4.1 General Service characteristics

The IMS Multimedia Telephony Service should allow multimedia conversational communications between two or more users. It provides real time bidirectional conversational transfer of speech, video or optionally other types of data.

The IMS Multimedia Telephony communication is point to point between terminals communicating, or a terminal and a network entity. This communication is usually symmetrical, but in special cases the media components present in each direction may be different, or they may be the same but with different bit rates and Quality of Service.

An IMS Multimedia Telephony communication can start with only one type of media and additional types of media may or may not be added by the users as the communication progresses. Therefore a particular IMS Multimedia Telephony communication may consist of only one type of media, e.g. speech.

IMS Multimedia Telephony service is different from other IMS based services, such as Push to Talk over Cellular (PoC).

Its characteristics includes the following:

- IMS Multimedia Telephony is a service where speech, and speech combined with other media components, is the typical usage but the service is not limited to always include speech, it also caters for other media or combinations of media (e.g. text and video).
- The IMS multimedia telephony service includes supplementary services. The behaviour of these services is almost identical to supplementary services for CS voice (TS 11) and PSTN/ISDN.

Note: most supplementary services are active in the set-up phase. Mid session supplementary services such as session transfer and session hold exist.

- The anticipated usage model is that of traditional telephony: one user connecting to any other user, regardless of operator and access technology.
- When a supplementary service is invoked it applies to all media components of an IMS Multimedia Telephony communication. A supplementary service can be activated by the user for one or more types of media components. If one or more of these media components are present in the IMS Multimedia Telephony communication then the supplementary service is invoked.

4.2 Default media handling capabilities of IMS Multimedia Telephony service

IMS Multimedia Telephony can support many different types of media.

IMS Multimedia Telephony service includes the following standardized media capabilities:

- Full duplex speech;
- Real time video (simplex, full duplex), synchronized with speech if present;
- Text communication;
- File transfer;
- Video clip sharing, picture sharing, audio clip sharing. Transferred files may be displayed/replayed on receiving terminal for specified file formats
- Fax;
- Data (CS).

The support of each of these media capabilities is optional for a UE.

At least one common standardized format (e.g. JPEG, AMR) shall be supported per media type.

Note: IMS Multimedia Telephony service fulfills the service requirement for the Total Conversation in ITU-T F 703 [11].

The IMS Multimedia Telephony service shall support the following handling of media

- Adding, removing and modifying individual media to/from a IMS Multimedia Telephony communication

4.3 Association of Services to Time/Date

As a service option, the activation, deactivation and invocation of services may be associated with a time and/or date setting. To support roaming, the time zone may also be included.

4.4 Additional timing information

As a service option, additional timing information on current active services may be made available by the network. The content of this information is service dependant.

As a service option, the user may be allowed dynamically extend this timing for the active communication.

4.5 White / blacklist

As service provider option, activation/deactivation/invoication services may be associated with a white/black list. A list may be specific to a service or may be used by several services.

5 Service Requirements

General service requirements as specified for IMS services in [4] apply.

6 Quality of Service

General QoS requirements as specified for IMS services in [4] apply.

7 Interworking requirements

7.1 Interworking with CS domain

Standardisation of interworking between the IMS domain and the CS domain for multimedia telephony communications is provided as specified in [4].

7.2 Interworking with external networks

General interworking requirements with external networks as specified for IMS services in [4] apply.

7.3 Media Aspects on Interworking

End to end codec negotiation shall be supported. When the codec negotiation fails, transcoding should be provided as an operator option.

When transcoding applies, the quality degradation and additional latency due to decoding/encoding operation shall be minimized.

When the media plane is locally broken-out and/or locally broken-in within a visited network, the home network may instruct the visited network to perform transcoding.

To optimize the end-user experience, during the codec negotiation and subject to operator policy, a wideband codec should be preferred over a narrowband codec, subject to the capabilities of both ends.

8 Supplementary Services

8.1 General

This clause provides the description of the supplementary services applicable to IMS Multimedia Telephony service.

The behaviour of IMS supplementary services, as perceived by the user, shall be consistent with the behaviour perceived when using the equivalent supplementary services on PSTN/ ISDN and CS mobile networks.

For each supplementary service, the following is provided:

- a short service definition;
- a description of the normal operation with successful outcome.

And when applicable also:

- a description of exceptional operation or unsuccessful outcome;
- descriptions on interaction with other supplementary services applicable to IMS Multimedia Telephony service;
- consideration for interworking with the CS mobile and fixed services.

In general if a service is not mentioned within the interaction clause then there is no impact.

The support of some of these services may be mandatory or optional depending on specific country/regional regulation.

For CEPT members see annex C.

Some services are not applicable to UE accessing IMS via 3GPP accesses. See annex D.

8.2 Supplementary Services applicable to IMS Multimedia Telephony

8.2.1 Originating Identification Presentation (OIP)

8.2.1.1 Definition

The OIP service provides the terminating party with the Identity of the originating party.

The requirements for Presentation of session originating party identity shall be handled as described in [4].

8.2.1.2 Service interactions with other IMS supplementary services

8.2.1.2.1 Identification services

8.2.1.2.1.1 Originating Identification Restriction (OIR)

The requirements for the interactions between presenting and withholding the originating party's identity shall be as described in [4].

8.2.1.2.2 Diversion services

8.2.1.2.2.1 Communication Forwarding Unconditional (CFU)

When a communication has been forwarded and the forwarded-to party has been provided with the OIP service, the forwarded-to party shall receive the identity information of the original originating party, if this originating party has not subscribed to or invoked the OIR service.

8.2.1.2.2.2 Communication Forwarding Busy (CFB)

When a communication has been forwarded and the forwarded-to party has been provided with the OIP service, the forwarded-to party shall receive the identity information of the original originating party, if this originating party has not subscribed to or invoked the OIR service.

8.2.1.2.2.3 Communication Forwarding No Reply (CFNR)

When a communication has been forwarded and the forwarded-to party has been provided with the OIP service, the forwarded-to party shall receive the identity information of the original originating party, if this originating party has not subscribed to or invoked the OIR service.

8.2.1.2.2.4 Communication Forwarding on Not Logged-in (CFNL)

When a communication has been forwarded and the forwarded-to party has been provided with the OIP service, the forwarded-to party shall receive the identity information of the original originating party, if this originating party has not subscribed to or invoked the OIR service.

8.2.1.2.2.5 Communication Deflection (CD)

When a communication has been deflected and the deflected-to party has been provided with the OIP service, the deflected-to party shall receive the identity information of the original originating party, if this originating party has not subscribed to or invoked the OIR service.

8.2.1.2.2.6 Communication Forwarding on Subscriber Not Reachable (CFNRc)

When a communication has been forwarded and the forwarded-to party has been provided with the OIP service, the forwarded-to party shall receive the identity information of the original originating party, if this originating party has not subscribed to or invoked the OIR service.

8.2.1.2.2.7 Communication Diversion Notification (CDIVN)

When a communication diversion is being notified to a served user (who has subscribed for CDIV Notification) and the served user has been provided with the OIP service, then the served User shall receive the identity information of the originating party, if

- this originating party has not subscribed to or invoked the OIR service and
- the served user, has not disabled delivery of Originating Party Identity within the CDIV Notification.

8.2.1.2.3 Communication Waiting (CW)

If a party has the OIP service active and is notified that an incoming communication is waiting, then this party shall receive the identity information of the originating party, if this originating party has not subscribed to or invoked the OIR service.

8.2.1.3 Interoperability with PSTN/ISDN and mobile CS Networks

The IMS Multimedia Telephony service shall support the interoperability of the OIP service with mobile CS and PSTN/ISDN Supplementary Service CLIP and vice-versa. The scope of this interworking may result in a limited service capability (only E.164 numbers can be used in the PSTN/ISDN).

8.2.2 Originating Identification Restriction (OIR)

8.2.2.1 Definition

The Originating Identification Restriction (OIR) service enables the originating party to withhold the presentation of its asserted identity information to the terminating party.

The requirements for withholding the originators identity shall be as described in [4]. Those requirements also allow certain terminating party to override the restriction (override capability).

8.2.2.2 Service interactions with other IMS supplementary services

8.2.2.2.1 Identification services

8.2.2.2.1.1 Originating Identification Presentation (OIP)

The requirements for the interactions between presenting and withholding the originating parties' identity shall be as described in [4].

8.2.2.2.2 Diversion services

8.2.2.2.2.1 Communication Forwarding Unconditional (CFU)

When the OIR service has been invoked, the originating party's identity information shall not be presented to the forwarded-to party unless the forwarded-to party has an override capability.

8.2.2.2.2.2 Communication Forwarding Busy (CFB)

Same as for CFU.

8.2.2.2.2.3 Communication Forwarding No Reply (CFNR)

Same as for CFU.

8.2.2.2.2.4 Communication Forwarding on Not Logged-in (CFNL)

Same as for CFU.

8.2.2.2.2.5 Communication Deflection (CD)

Same as for CFU.

8.2.2.2.2.6 Communication Forwarding on Subscriber Not Reachable (CFNRc)

Same as for CFU.

8.2.2.2.2.7 Communication Diversion Notification (CDIVN)

When the OIR service has been invoked, the originating party's identity information shall not be notified to the user, who has subscribed for the CDIVN service.

8.2.2.2.3 Explicit Communication Transfer (ECT)

An originating party's restriction requirements from the original communication shall be used in order to restrict the presentation of that party's identity to any party in a transferred communication.

8.2.2.3 Interoperability with PSTN/ISDN and mobile CS Networks

The IMS Multimedia Telephony service shall support the interoperability of OIR service with the mobile CS and the PSTN/ISDN Supplementary Service CLIR and vice-versa. The scope of this interworking may result in a limited service capability. The Originating Identity Restriction information shall be conveyed from IMS to a mobile CS or a PSTN/ISDN and vice-versa. The network to which the called/terminating party is connected to is responsible to handle this service.

In case of limited interoperability the restriction, OIR/CLIR shall have precedence.

8.2.3 Terminating Identification Presentation (TIP)

8.2.3.1 Definition

The TIP service provides the originating party with the asserted identity of the terminating party. The requirements for the presentation of the terminating identity shall be as described in [4].

NOTE: See also service definition in [E-17].

8.2.3.2 Service interactions with other IMS supplementary services

8.2.3.2.1 Identification services

8.2.3.2.1.1 Terminating identification presentation restriction

The requirements for the interactions between presenting and withholding the terminating party's identity shall be as described in [4].

8.2.3.2.2 Diversion services

If forwarding party B chooses to restrict the presentation of the forwarded-to party C's identity, the originating party A shall not receive the terminating party C's identity irrespective of whether the terminating party C has TIR activated or not.

8.2.3.3 Interoperability with PSTN/ISDN and mobile CS Networks

The IMS Multimedia Telephony service shall support the interoperability of the TIP services with mobile CS and PSTN/ISDN Supplementary Service COLP and vice-versa. The scope of this interworking may result in a limited service capability

8.2.4 Terminating Identification Restriction (TIR)

8.2.4.1 Definition

The Terminating Identification Restriction (TIR) enables the terminating party to withhold presentation of its asserted identity information to the originating party.

The requirements for withholding the terminating party's identity are described in [4]. Those requirements also allow certain originating parties to override the restriction (override capability).

This service description is based on the service description described in [E-20].

8.2.4.2 Service interactions with other IMS Multimedia Telephony services

8.2.4.2.1 Identification services

8.2.4.2.1.1 Terminating Identification Presentation (TIP)

The requirements for the interactions between presenting and withholding the terminating party's identity shall be as described in [4].

8.2.4.3 Interoperability with PSTN/ISDN and mobile CS Networks

The IMS Multimedia Telephony service shall support the interoperability of the TIR services with mobile CS and PSTN/ISDN Supplementary Services and vice-versa. The scope of this interworking may result in a limited service capability.

In the case the target network does not support TIR service, the TIP information shall not be forwarded.

8.2.5 Malicious Communication IDentification (MCID)

8.2.5.1 Definition

The MCID service enables an incoming communication to be identified as malicious and registered.

This service may be available to a user only after subscription. Once the user has indicated to the network that the communication is malicious, the IMS shall register at least the following information:

- Terminating Identity Information;
- Originator Identity Information;
- Local Time and Date of the invocation in the network serving the terminating entity;

The information shall not be available to the terminating entity nor the originating entity. The information shall be under the control of the network operator.

The user may identify the communication as malicious during the alerting phase, during an ongoing communication, or for a limited period after the communication has ceased.

8.2.5.2 Service interactions with other IMS supplementary services

8.2.5.2.1 Diversion Services

The MCID service can be invoked for a diverted communication. In addition to the normal operation of the MCID service, the identity of the first diverting party shall be registered and, as a network option, the last diverting party can be registered.

8.2.5.2.1.1 Communication Forwarding No Reply (CFNR)

If the terminating party has activated CFNR, once forwarding has taken place, the forwarding party cannot invoke the MCID service.

8.2.5.2.1.2 Communication Deflection (CD)

If the terminating party has activated communication deflection, once deflection has taken place, the deflecting party cannot invoke the MCID service.

8.2.5.2.2 Explicit Communication Transfer (ECT)

The transferring party cannot invoke the malicious communication identification service on a communication after transfer of that communication has been successfully invoked.

If after a transfer has been completed, the transferred-to party successfully invokes the malicious communication identification service, then the network shall register the identities of all parties involved.

8.2.5.2.3 CONFerence (CONF)

The conference controller cannot invoke the malicious call identification IMS supplementary service for participants within the conference.

NOTE: To activate the malicious call identification IMS supplementary service, the conference controller should first create a private communication with the user to be identified using the malicious call identification IMS supplementary service.

If a participant invokes the malicious call identification IMS supplementary service, only information about the connection to the conference controller shall be registered. No information about the other participants shall be registered.

8.2.5.2.4 Three-Party (3PTY)

See clause 8.2.5.2.3, noting that 3PTY is a special case of CONF.

8.2.5.3 Interoperability with PSTN/ISDN Networks

The MCID service shall interoperate for all communications from a PSTN/ISDN to an IMS Network supporting IMS Multimedia Telephony service and vice-versa. The registered information shall be stored in the invoking party's network and may also be stored in the malicious party's network.

8.2.6 Anonymous Communication Rejection (ACR)

8.2.6.1 Definition

The Anonymous Communications Rejection (ACR) service allows the terminating party to reject incoming communications from originating parties that have restricted their identity presentation.

Anonymous communications rejection provides the capability for network, on behalf of the user, to reject incoming sessions from users who have restricted the presentation of their originating identity, i.e. the asserted originating identity is marked "presentation restricted".

This service description is based on the service description described in [E-14].

Optional feature

In case of ACR service,

- a whitelist should contain certified public identities or identity ranges of users, from which incoming anonymous communications are allowed whatever ACR activation state,
- a blacklist should contain certified public identities or identity ranges of users, from which incoming anonymous communications are not allowed whatever ACR activation state.

8.2.6.2 Service interactions with other IMS supplementary services

8.2.6.2.1 Identification Services

8.2.6.2.1.1 Originating Identification Presentation (OIP)

No impact, i.e. neither IMS supplementary service shall affect the operation of the other IMS supplementary service.

8.2.6.2.1.2 Originating Identification Restriction (OIR)

If the terminating party has activated the ACR service, then the OIR service causes the execution of the ACR service in accordance with the procedures in clause 8.2.6.1.

If the terminating party has the override capability according to the OIR service, then the ACR service shall not apply.

8.2.6.2.2 Diversion Services

NOTE: The precedence that ACR takes over the communication diversion services does not exclude the use of forwarding functionality in the ACR functionality itself. As an example : forwarding of anonymous communications (e.g. to a voice mailbox), as part of the ACR functionality is possible.

If the diverted-to user has activated the ACR service, then the ACR service shall take precedence over the communication diversion supplementary service i.e. the communication shall be rejected according to the ACR service.

8.2.6.2.2.1 Communication Forwarding Unconditional (CFU)

If the forwarding party has activated the ACR service, then the ACR service shall take precedence over the communication forwarding unconditional service i.e. the communication shall be rejected according to the ACR service.

8.2.6.2.2.2 Communication Forwarding Busy (CFB)

If the forwarding party has activated the ACR service, then the ACR service shall take precedence over the communication forwarding busy service i.e. the communication shall be rejected according to the ACR service.

8.2.6.2.2.3 Communication Forwarding No Reply (CFNR)

If the forwarding party has activated the ACR service:

- no impact, i.e. neither IMS supplementary service shall affect the operation of the other IMS supplementary service.

NOTE: If the originating party has restricted its identity due to the OIR service the communication will not be presented.

8.2.6.2.2.4 Communication Forwarding on Not Logged-in (CFNL)

If the forwarding party has activated the ACR service, then the ACR service shall take precedence over the communication forwarding on not logged in service i.e. the communication shall be rejected according to the ACR service.

8.2.6.2.2.5 Communication Forwarding on Subscriber Not Reachable (CFNRc)

If the forwarding party has activated the ACR service, then the ACR service shall take precedence over the communication forwarding on subscriber not reachable service i.e. the communication shall be rejected according to the ACR service.

8.2.6.2.3 Communication Waiting (CW)

If the terminating party has activated the ACR service, then the ACR service shall take precedence over the Communication Waiting service. The ACR service can be activated while a communication is waiting without changing the state of the waiting communication session.

8.2.6.2.4 Completion of Communications to Busy Subscriber (CCBS)

NOTE: A CCBS recall (from the network to the originating party) resulting from the completion of communications to busy subscribers shall not be rejected due to the application of the ACR service.

Assuming the originating party connects to the terminating party and the terminating party activates the ACR service (or has activated the ACR service), two cases are possible:

- a) The ACR service was activated by the terminating party before the originating party originates a communication:
 - No impact, i.e. no IMS supplementary service shall affect the operation of the other IMS supplementary service.

NOTE: If the originating party has restricted its identity due to the OIR service and if the terminating party is busy, the originating party will receive no busy indication, and the completion of communications to busy subscriber service will not apply. Instead the communication session attempt shall be rejected according to the normal procedures of the ACR service.

- b) The ACR service is activated by the terminating party after the originating party has activated the completion of communications to busy subscriber service on the terminating party:
 - If the terminating party activates the ACR service after the originating party has activated the completion of communications to busy subscriber service on the terminating party, then the communication resulting

from the completion of communications to busy subscriber service shall be rejected if the originating party has restricted its identity due to the OIR service.

8.2.6.3 Interoperability with PSTN/ISDN

The IMS Multimedia Telephony service shall support the interoperability of the ACR services with PSTN/ISDN Supplementary Services and vice-versa. The scope of this interworking may result in a limited service capability.

8.2.7 Communication DIVersion (CDIV)

8.2.7.1 Definition

The following Communication DIVersion services are defined:

- Communication Forwarding Unconditional (CFU).
- Communication Forwarding Busy (CFB).
- Communication Forwarding No Reply (CFNR).
- Communication Forwarding on Not Logged in (CFNL).
- Communication Deflection (CD).
- Communication Forwarding on Subscriber Not Reachable (CFNRc).
- Communication Diversion Notification (CDIVN); this service is applicable to all other CDIV services.

For all communications diversion services, a service provider option of notification of diversion may be provided to the originating party. This service provider option may also include support for the invoking user to suppress the notification.

As a service option, CDIV services may be associated with a time and/or date setting. To support roaming, the time zone may also be included.

Communication Forwarding Unconditional (CFU)

The CFU service enables a user to have the network redirect all communications to another user. The CFU service may operate on all communication, or just those associated with specified services. The user's ability to originate communications is unaffected by the CFU service. After the CFU service has been activated, communications are forwarded independent of the status of the user.

As a service provider option, a subscription option can be provided to enable the user to receive an indication that the CFU service has been activated. This indication may be provided when the user originates a communication if the CFU service has been activated for the user's identity and for the service requested for the communication.

The maximum number of diversions permitted for each communication is a service provider option. The service provider shall define the upper limit of diversions. When counting the number of diversions, all types of diversion are included.

This service description is based on the service description described in [E-1].

Communication Forwarding Busy (CFB)

The CFB service enables a user to have the network redirect communications, which would otherwise be regarded as busy, to another user. The CFB service may operate on all communications, or just those associated with specified services. The user's ability to originate communications is unaffected by the CFB service.

As a service provider option, a subscription option can be provided to enable the user to receive an indication that the CFB service has been activated. This indication may be provided when the user originates a communication if the CFB service has been activated for the user and for the service requested for the communication.

The maximum number of diversions permitted for each communication is a service provider option. The service provider shall define the upper limit of diversions. When counting the number of diversions, all types of diversion are included.

This service description is based on the service description described in [E-2].

Communication Forwarding No Reply (CFNR)

The CFNR service enables a user to have the network redirect communications, when the communication request is not responded to within a defined period of time, to another user. The CFNR service may operate on all communications, or just those associated with specified services. The user's ability to originate communications is unaffected by the CFNR service.

The CFNR service can only be invoked by the network after the communication has been offered to the user and an indication that the user has been informed of the communication request.

As a service provider option, a subscription option can be provided to enable the user to receive an indication that the CFNR service has been activated. This indication may be provided when the user originates a communication if the CFNR service has been activated for the user and for the service requested for the communication.

The maximum number of diversions permitted for each communication is a service provider option. The service provider shall define the upper limit of diversions. When counting the number of diversions, all types of diversion are included.

This service description is based on the service description described in [E-3].

As a service option, CFNR activation confirmation may include information from the network providing the public identity where the communication will be forwarded to, and the expiry time before the communication is forwarded.

As a service option, the user may be allowed to dynamically extend this timing.

Communication Forwarding on Not Logged-in (CFNL)

The Communication Forwarding on Not Logged-in (CFNL) service enables a user to redirect incoming communications, when the user is not currently registered (logged-in), to another user. The CFNL service may operate on all communications, or just those associated with specified services.

As a service provider option, a subscription option can be provided to enable the user to receive an indication that the CFNL service has been activated. This indication may be provided when the user next registers (logs in). An indication may also be provided as part of de-registration (log out).

The maximum number of diversions permitted for each communication is a service provider option. The service provider shall define the upper limit of diversions. When counting the number of diversions, all types of diversion are included.

Communication Deflection (CD)

The CD service enables the user to respond to an incoming communication by requesting redirection of that communication to another user. The CD service can only be invoked before the communication is established by the user, i.e. in response to the offered communication, or during the period that the user is being informed of the communication. The user's ability to originate communications is unaffected by the CD service.

The maximum number of diversions permitted for each communication is a service provider option. The service provider shall define the upper limit of diversions. When counting the number of diversions, all types of diversion are included.

This service description is based on the service description described in [E-4].

Communication Forwarding on Subscriber Not Reachable (CFNRc)

The CFNRc service enables a user to have the network redirect all incoming communications, or just those associated with a specific service, when called mobile subscriber's address is not reachable (e.g. there is no IP connectivity to the user's terminal, or, in the case of a mobile device, it is not in radio coverage), to another address. The CFNRc service

may operate on all communications, or just those associated with specified services. The user's ability to originate communications is unaffected by the CFNRc service.

Note: It may be affected by the reason that have triggered the loss of connectivity, e.g. in the mobile case if the mobile subscriber is de-registered, if there is radio congestion or if the mobile subscriber for example is being out of radio coverage.

As a service provider option, a subscription option can be provided to enable the user to receive an indication that the CFNRc service has been activated. This indication may be provided when the user originates a communication if the CFNRc service has been activated for the user and for the service requested for the communication.

The maximum number of diversions permitted for each communication is a service provider option. The service provider shall define the upper limit of diversions. When counting the number of diversions, all types of diversion are included.

Communication Diversion Notification (CDIVN)

The CDIVN service enables a user to receive notifications about the diversions (or forwarding) of incoming communications, post execution of at least one other CDIV service.

As a service provider option, a subscription option can be provided to enable the served user to receive an indication that the CDIVN service has been activated. This indication shall be provided when the served user originates a communication if the CDIVN service has been activated for the served user's address.

Optional feature

Lists can be used also in association to Communication Diversions (CDIV).

- a blacklist should contain public identities or identity ranges of users, from which incoming communications are not forwarded when CDIV is activated.
- a whitelist should contain public identities or identity ranges of users, from which incoming communications are forwarded when CDIV is activated.

8.2.7.2 Communication Diversion Notification enhancements

The Communication Diversion Service shall be enhanced to allow user-controlled notification of communication diversions to the diverting user. The network shall provide the user with the subscription option to control which notifications the user wants to receive and to control the rate at which notifications about the communication diversions the users wants to receive.

The network shall provide as a subscription option the notification capabilities to the served user. The user may control the rate (how frequent) and the content of the communication diversion notification in a standardised format

In order to set criteria for the notification to the user, the network shall accept parameter from the user, e.g.

- the identity of the caller (only if there is a match then information about this specific Communication Diversion will be notified to the diverting user)
- identity of the diverting-user (only if there is a match then information about this specific Communication Diversion will be notified to the diverting user)
- identity of diverted-to-party (only if there is a match then information about this specific Communication Diversion will be notified to the diverting user)
- time range of diversion (this specifies a time-range, within which all Communication Diversions would be notified to the diverting user. If present, then any communication diversion outside of this time-range shall not be notified to the diverting user)
- reason of diversion (the diverting user can select that only those communication diversions which match the herein specified reason be notified)

For triggering the notification to the user, the network shall accept parameters from the user, e.g.

- time (this specifies a time at which notifications of communication diversion are sent to the user. It may be specified within an interval-format to allow regular triggering of notifications of communication diversions which took place in that time-interval. If absent, it indicates that notifications are sent immediately when the communication diversion takes place)
- presence status (this specifies a presence state of the user, within which the user expects to receive notifications about communication diversions. If absent, it indicates that notifications are sent immediately irrespective of user's availability information)

The communication diversion notification from the network to the user may include, e.g.

- identity of the caller (this information provides information to the diverting user for identifying those communication diversions happening for this calling user's identity)
- information of diverting-user (this is required when the diverting user has multiple user identities and is interested in knowing for which specific user identity was the communication diversion triggered)
- information of the diverted-to-target (the user identity of the diverted-to user, to whom the communication is being diverted, would be informed to the diverting user)
- time of diversion (the time of the communication diversion would be informed to the diverting user. This helps the diverting user to identify and verify if indeed the communication diversions are expected at those times)
- reason for diversion (provides the diverting user information to ascertain that indeed the reason for diversion is as per his expectations)
- communication diversion rule (this information identifies the communication diversion rule of Release 1 which was set by the user, and executed to result in the communication diversion, which is being notified to the user)

If the user has not subscribed to the communication diversion notification capability or the network does not provide the subscription option to the user, the diversion notification capability of the communication diversion service of Release 1 shall apply.

8.2.7.3 Service interactions with other IMS supplementary services

8.2.7.3.1 Identification services

8.2.7.3.1.1 Originating Identification Presentation (OIP)

When a communication has been diverted and the diverted-to party has been provided with the originating identification presentation service, the diverted-to party shall receive the identity of the originating party, if this originating party has not subscribed to or invoked the originating identification restriction service.

8.2.7.3.1.2 Originating Identification Restriction (OIR)

When the originating identification restriction service has been invoked, the originating party's identity shall not be presented to the diverted-to party unless the diverted-to party has an override capability.

8.2.7.3.1.3 Terminating Identification Presentation (TIP)

When a communication has been diverted and the originating party has been provided with the terminating identification presentation service, the originating party shall receive the identity of the diverted-to party, unless the diverting user has selected the option to suppress the notification of diversion.

8.2.7.3.1.4 Terminating Identification Restriction (TIR)

If the diverting party or the diverted-to party has invoked the Terminating Identification Restriction service, then the diverted-to party's identity shall not be provided to the originating party unless the originating party has override capability.

8.2.7.3.2 Malicious Communication IDentification (MCID)

This services does not apply to UE accessing from mobile 3GPP access networks.

See clause 8.2.5.2.1.

8.2.7.3.3 Anonymous Communication Rejection (ACR)

This service does not apply to UE accessing from mobile 3GPP access networks.

See clause 8.2.6.2.2.

8.2.7.3.4 Diversion services

8.2.7.3.4.1 Communication Forwarding Unconditional (CFU)

Communication Forwarding Unconditional (CFU): Not applicable.

Communication Forwarding Busy (CFB): Invocation of the communication forwarding unconditional service shall take precedence over the CFB service.

Communication Forwarding No Reply (CFNR): Invocation of the communication forwarding unconditional service shall take precedence over the CFNR service.

Communication Forwarding on Not Logged-in (CFNL): Invocation of the communication forwarding unconditional service shall take precedence over the CFNL service.

Communication Deflection (CD): Invocation of the communication forwarding unconditional service shall take precedence over the CD service.

Communication Forwarding on Subscriber Not Reachable (CFNRc): Invocation of the communication forwarding unconditional service shall take precedence over the CFNRc service.

Communication Diversion Notification (CDIVN): No impact, as CDIVN only enables a notification of Communication Diversion Information, post execution of at least one CDIV service.

8.2.7.3.4.2 Communication Forwarding Busy (CFB)

Communication Forwarding Unconditional (CFU): Invocation of the CFU service shall take precedence over the communication forwarding busy service.

Communication Forwarding Busy (CFB): Not applicable.

Communication Forwarding No Reply (CFNR): No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

Communication Forwarding on Not Logged-in (CFNL): No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

Communication Deflection (CD): If the terminating party is not network determined user busy, then the CD service or the communication forwarding busy service can be invoked, depending on the response from the terminating party.

Communication Forwarding on Subscriber Not Reachable (CFNRc): If the terminating party is network determined busy, then CFB shall take precedence over CFNRc. Otherwise, if the terminating party is not network determined user busy, then there is no impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

Communication Diversion Notification (CDIVN): No impact, as CDIVN only enables a notification of Communication Diversion Information, post execution of at least one CDIV service.

8.2.7.3.4.3 Communication Forwarding No Reply (CFNR)

Communication Forwarding Unconditional (CFU): Invocation of the CFU service shall take precedence over the communication forwarding no reply service.

Communication Forwarding Busy (CFB): No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

Communication Forwarding No Reply (CFNR): Not applicable.

Communication Forwarding on Not Logged-in (CFNL): No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

Communication Deflection (CD): No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

NOTE: If the network indicates the arrival of an incoming communication to the terminating party, then the CD service, or the communication forwarding no reply service can be invoked, depending on the response, or lack of response, from the terminating party.

Communication Forwarding on Subscriber Not Reachable (CFNRc): No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

Communication Diversion Notification (CDIVN): No impact, as CDIVN only enables a notification of Communication Diversion Information, post execution of at least one CDIV service.

8.2.7.3.4.4 Communication Forwarding on Not Logged-in (CFNL)

Communication Forwarding Unconditional (CFU): Invocation of the communication forwarding unconditional service shall take precedence over the CFNL service.

Communication Forwarding Busy (CFB): No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

Communication Forwarding No Reply (CFNR): No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

Communication Forwarding on Not Logged-in (CFNL): Not applicable.

Communication Deflection (CD): No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

Communication Forwarding on Subscriber Not Reachable (CFNRc): No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

Communication Diversion Notification (CDIVN): No impact, in case of CFNL activation, the CDIVN service will buffer the Communication Diversion Notification information and notify the user, when the user logs in again. The Communication Diversion Information will be buffered for a time-period configurable by the User and/or the provider.

8.2.7.3.4.5 Communication Deflection (CD)

Communication Forwarding Unconditional (CFU): Invocation of the CFU service shall take precedence over the communication deflection service.

Communication Forwarding Busy (CFB): If the terminating party is not network determined user busy, then the communication deflection service or the CFB service can be invoked, depending on the response from the terminating party.

Communication Forwarding No Reply (CFNR): No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

NOTE: If the network indicates the arrival of an incoming communication to the terminating party, then the communication deflection service, or the CFNR service can be invoked, depending on the response, or lack of response, from the terminating party.

Communication Forwarding on Not Logged-in (CFNL): No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

Communication Deflection (CD): Not applicable.

Communication Forwarding on Subscriber Not Reachable (CFNRc): No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

Communication Diversion Notification (CDIVN): No impact, as CDIVN only enables a notification of Communication Diversion Information, post execution of at least one CDIV service.

8.2.7.3.4.6 Communication Forwarding on Subscriber Not Reachable (CFNRc)

Communication Forwarding Unconditional (CFU): Invocation of the communication forwarding unconditional service shall take precedence over the CFNRc service.

Communication Forwarding Busy (CFB): If the terminating party is network determined busy, then CFB shall take precedence over CFNRc. Otherwise, if the terminating party is not network determined user busy, then there is no impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

Communication Forwarding No Reply (CFNR): No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

Communication Forwarding on Not Logged-in (CFNL): No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

Communication Deflection (CD): No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

Communication Forwarding on Subscriber Not Reachable (CFNRc): Not applicable.

Communication Diversion Notification (CDIVN): No impact, in case of CFNRc activation, the CDIVN service will buffer the Communication Diversion Notification information and notify the user, until the time the User is reachable again. The Communication Diversion Information will be buffered for a time-period configurable by the User and/or the provider.

Explicit Communication Transfer (ECT)

No interaction, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

Other services:

Communication Forwarding on Mobile Subscriber Not Reachable (CFNRc) shall interact with the following IMS supplementary services in exactly the same way as described for Communication Forwarding No Reply (CFNR):

Originating Identification Presentation (OIP)
 Originating Identification Restriction (OIR)
 Terminating Identification Presentation (TIP)
 Terminating Identification Restriction (TIR)
 Communication Diversion (CDIV); Communication Forward Unconditional
 Communication Diversion (CDIV); Communication Deflection
 Communication Diversion (CDIV); Communication Forward On not Logged-in
 Communication Hold (HOLD)
 Communication Barring (CB)
 Message Waiting Indication (MWI)
 Conference (CONF)

8.2.7.3.4.7 Communication Diversion Notification (CDIVN)

Communication Forwarding Unconditional (CFU): No impact, as CDIVN only enables a notification of Communication Diversion Information, post execution of at least one CDIV service.

Communication Forwarding Busy (CFB): No impact, as CDIVN only enables a notification of Communication Diversion Information, post execution of at least one CDIV service.

Communication Forwarding No Reply (CFNR): No impact, as CDIVN only enables a notification of Communication Diversion Information, post execution of at least one CDIV service.

Communication Forwarding on Not Logged-in (CFNL): No impact, in case of CFNL activation, the CDIVN service will buffer the Communication Diversion Notification information and notify the user, when the user logs in again. The Communication Diversion Information will be buffered for a time-period configurable by the User and/or the provider.

Communication Deflection (CD): No impact, as CDIVN only enables a notification of Communication Diversion Information, post execution of at least one CDIV service.

Communication Forwarding on Subscriber Not Reachable (CFNRc): No impact, in case of CFNRc activation, the CDIVN service will buffer the Communication Diversion Notification information and notify the user, until the time the User is reachable again. The Communication Diversion Information will be buffered for a time-period configurable by the User and/or the provider.

8.2.7.3.5 Communication Waiting (CW)

Communication Forwarding Unconditional (CFU): CW has no impact on CFU. The communication will be forwarded without regard to the terminating party's state. A forwarded-to party may have communication waiting service and this will be activated if busy.

A forwarded communication can result in the communication waiting service.

Communication Forwarding Busy (CFB): No impact, i.e. neither service shall affect the operation of other service. A forwarded communication can result in the communication waiting service.

NOTE: If the terminating party is Network Determined User Busy, the communication waiting service is not be invoked, and the CFB service is invoked if it was activated.

Communication Forwarding No Reply (CFNR): If the terminating party has activated the CFNR service, then a waiting communication shall still be offered. If the CFNR timer expires before an answer is received then the CFNR service shall be invoked and the communication shall be forwarded and communication waiting ceased.

A forwarded communication can result in the communication waiting service.

Communication Forwarding on Not Logged-in (CFNL): No impact.

NOTE: If a party with an active communication waiting logs out, the all active and offered communication would be released.

Communication Deflection (CD): When receiving the communication waiting indication, terminating party can invoke the CD service. A deflected communication can result in the communication waiting service.

Communication Forwarding on Subscriber Not Reachable (CFNRc): No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

8.2.7.3.6 Communication Barring (CB)

8.2.7.3.6.1 Outgoing communication barring-fixed

If the outgoing communication barring-fixed service has already been activated, a request to activate any CDIV service shall be rejected if the forwarding party's communication to the diverted-to party would be barred by the outgoing communication barring-fixed service.

If the CDIV service was activated before the activation of the outgoing communication barring-fixed service, the outgoing communication barring-fixed service can still be activated. When the two services have already been activated, a request to invoke the CDIV service shall be rejected if the forwarding party's communication to the diverted-to party would be barred by the outgoing communication barring-fixed service at the time of the invocation attempt of the CDIV service.

8.2.7.3.6.2 Outgoing communication barring-user controlled

If the outgoing communication barring-user controlled service has already been activated, a request to activate any CDIV service shall be rejected if the forwarding party's communication to the diverted-to party would be barred by the outgoing communication barring-user controlled service.

If the CDIV service was activated before the activation of the outgoing communication barring-user controlled service, the outgoing communication barring-user controlled service can still be activated. When the two services have already been activated, a request to invoke the CDIV service shall be rejected if the forwarding party's communication to the diverted-to party would be barred by the outgoing communication barring-user controlled service at the time of the invocation attempt of the CDIV service.

8.2.7.3.7 Completion of Communications to Busy Subscriber (CCBS)

CCBS recalls shall never be diverted. They shall be provided to the original originating party.

8.2.7.3.8 Advice Of Charge (AOC)

8.2.7.3.8.1 Charging information at the End of the communication (AOC-E)

Originating party: No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

Forwarding party: When a communication is forwarded and the forwarding party is charged for the forwarded part of the communication, then as a network option, the charging information can be transferred to the forwarding user when the communication is terminated provided that the served user has subscribed to the advice of charge: charging information at the end of the communication service with the value of the subscription option set to "for all communications automatically".

8.2.7.4 Interoperability with PSTN/ISDN and CS mobile networks

The IMS Multimedia Telephony service shall support the interoperability of the CDIV service with mobile CS and PSTN/ISDN Supplementary Services and vice-versa. The scope of this interworking may result in a limited service capability. The CLI information of the originating party as well as further CLI information (first redirected address, last redirected address) may be provided to the final called party, if the network allows this.

8.2.8 Communication Waiting (CW)

8.2.8.1 Definition

The Communication Waiting (CW) service enables a terminating party to be informed at the time that a new communication is requested, and that no resources are available for that incoming communication.

The user has then the choice of accepting, rejecting or ignoring the incoming communication.

The maximum number of communications that may be waiting is a service provider option.

If the current number of communications waiting is equal to the maximum, then any new attempted incoming communication request shall be rejected with a busy cause.

This service description is based on the service description described in [E-6] and [E-5].

As a service option, the communication waiting indication may also include the expiry time. As a service option, the user may be allowed to dynamically extend this timing.

8.2.8.2 Service interactions with other IMS supplementary services

8.2.8.2.1 Anonymous Communication Rejection (ACR)

If the terminating party has activated the ACR service, then the ACR service shall take precedence over the Communication Waiting service. The ACR service can be activated while a communication is waiting without changing the state of the waiting communication session.

8.2.8.2.2 Diversion services

The interactions between Communication Waiting and Communication Diversion services are described in clause 8.2.7.2.5 of the present document.

8.2.8.2.3 Completion of Communications to Busy Subscriber (CCBS)

If a subscriber to the completion of communications to busy subscriber service places a communication to a terminating party who has subscribed to the CW service, and the terminating party is provided the communication waiting indication, then invocation of completion of communications to busy subscriber service cannot occur.

8.2.8.3 Interoperability with PSTN/ISDN

No requirements.

8.2.9 Communication HOLD (HOLD)

8.2.9.1 Definition

The communication HOLD service enables a user to suspend media within a session, and resume that media at a later time.

Each party in a communication can hold and retrieve the communication independently from the other party. This also applies when a communication involves more than two parties (e.g. CONF).

This service description is based on the service description described in [4], dealing about the user ability to suspend and resume a session.

The use of HOLD on an emergency call, by a user that is not the PSAP, shall be precluded.

8.2.9.2 Service interactions with other IMS supplementary services

8.2.9.2.1 CONFerence (CONF)

A, B and C are in a conference that was created by B invoking the CONF service. B can interrupt their own participation in the conference by using the HOLD service. When B does this, A and C shall not receive the HOLD notification and are not prevented from carrying on their conversation

8.2.9.2.2 Three-Party (3PTY)

See clause 8.2.9.2.1, noting that 3PTY is a special case of CONF.

8.2.9.3 Interoperability with PSTN/ISDN and CS mobile networks

The IMS Multimedia Telephony service shall support the interoperability of the HOLD service with mobile CS and PSTN/ISDN Supplementary Services and vice-versa. The scope of this interworking may result in a limited service capability.

8.2.10 Communication Barring (CB)

8.2.10.1 Definition

The group of Communication Restriction Services includes two services:

- Outgoing Communications Barring (OCB).

This service allows a user to bar certain categories of outgoing communications. The network shall provide the capability for a user to select a set of categories (e.g. identities or range of identities) for barring. The type of barring is chosen by the user at provision time, and shall be valid for all outgoing communications. The network shall provide the

capability for the user to bar outgoing communications based on user defined identities or identity ranges. Barring of an outgoing communication for a specific identity, a number of specific identities, or a range of identities shall be dependent on an entry in a OCB identity list held in the network. This list shall either be a "black list" or "white list". A "black list" shall contain the identities or identity ranges to be barred by the network for outgoing communications. A "white list" shall contain the identities or identity ranges that shall be allowed by the network for outgoing communications, i.e. all identities not in the "white list" shall be barred.

The ability of the served user to receive communications and to originate emergency communications shall be unaffected by OCB.

This service description is based on the service description described in [E-15] and [E-16].

- Incoming Communications Barring (ICB).

This service allows a user to bar certain categories of incoming communications. The service also allows the user to have the barring of incoming communications activated always or only during certain conditions. The network shall provide the capability for a user to select from a set of categories (e.g. identities or range of identities) for barring. Barring of an incoming communication shall be dependent on an entry in an ICB identity list held in the network. This list shall be a "black list" which contains the identities or identity ranges to be barred by the network for incoming communications. The type of barring is chosen by the user at provision time and may be valid for all incoming communications, or be limited to a specific service group or certain conditions (e.g. when the user is roaming).

The ability of the served user to set-up outgoing communications shall be unaffected by ICB.

The ICB service includes a roaming condition. The roaming condition is set to true when the served user is roaming.

- ICB enhancement of dynamic blocking of incoming communications

As a service option, the dynamic blocking of incoming communications service facilitates a terminating users register of unwanted callers within the network for barring future incoming communications from the unwanted callers either permanently or for a temporary period or for a maximum lifetime which is set by the network operator. As an option, an additional "dynamic black list" may be provided, which is different compared to the standard ICB list. If this additional "dynamic black list" is provided, the user shall have the option to activate and deactivate that list independent of the already existing standard ICB list.

The following information shall be stored by the network for dynamic blocking of incoming calls:

Actual Identity of caller: This is the network asserted identity of the caller.

Start and end date for barring: This specifies the duration of block. If not provided, it implies the caller should be barred permanently or for a maximum lifetime which is set by the network operator.

Additionally, the following information may be provided by the user and to be associated with the actual identity:

- **Reason:** This specifies the reason for blocking or an alias, e.g. "Telemarketer". This field may assist the subscriber to manage their block list.
- **Published Identity of caller:** This may be the actual identity of caller or 'private' or 'anonymous' if the caller has opted for privacy.

NOTE: The unwanted caller may have requested privacy e.g. by subscribing to OIR service which prevents the calling identity being shown to the called user. In these cases the called user may just see "Anonymous" or "Unknown". However the called party can still invoke caller ID blocking since the network knows the true identity of the caller. To facilitate the management of the list of blocked callers, the user may use the reason field to identify the blocked caller.

The network shall never reveal an identity withheld using privacy, OIR, or other mechanisms (i.e. list management must use the published identity).

As an option and subject to the network operator policy, the network shall notify (e.g. announcement) the blocked originating user (unwanted user), that the called user has set an incoming communication barring for his identity.

Subject to the network operator policy, the subscriber may request notification of communication barrings within the network in addition to subscribing to the dynamic blocking of incoming communications service.

NOTE 1: The contents of information received as part of notification for the dynamic blocking of incoming communications, could be the same as the ones, that are registered as part of communication barring.

NOTE 2: Off-line management of the barring list (e.g. via a web page) may be provided as a service option.

NOTE 3: Where required by regulation, this enhanced service may be used to block calls from a previously malicious caller.

8.2.10.2 Service interactions with other IMS supplementary services

8.2.10.2.1 Diversion services

8.2.10.2.1.1 Communication Forwarding Unconditional (CFU)

If the OCB service has already been activated, a request to activate the communication forwarding unconditional service shall be rejected if the user's communication to the forwarded-to user would be barred by the OCB service at the time of the activation attempt of the communication forwarding service.

If the communication forwarding unconditional service was activated before the activation of the OCB service, the OCB service can still be activated. When the two services have already been activated, a request to invoke the communication forwarding unconditional service shall be rejected if the forwarding party's communication to the forwarded-to party would be barred by the OCB service at the time of the invocation attempt of the communication forwarding unconditional service..

8.2.10.2.1.2 Communication Forwarding Busy (CFB)

If the OCB service has already been activated, a request to activate the communication forwarding busy service shall be rejected if the forwarding party's communication to the forwarded-to party would be barred by the OCB service at the time of the activation attempt of the communication forwarding service.

If the communication forwarding busy service was activated before the activation of the OCB service, the OCB service can still be activated. When the two services have already been activated, a request to invoke the communication forwarding busy service shall be rejected if the forwarding party's communication to the forwarded-to party would be barred by the OCB service at the time of the invocation attempt of the communication forwarding busy service.

8.2.10.2.1.3 Communication Forwarding No Reply (CFNR)

If the OCB service has already been activated, a request to activate the communication forwarding no reply service shall be rejected if the forwarding party's communication to the forwarded-to party would be barred by the OCB service at the time of the activation attempt of the communication forwarding service.

If the communication forwarding no reply service was activated before the activation of the OCB service, the OCB service can still be activated. When the two services have already been activated, a request to invoke the communication forwarding no reply service shall be rejected if the forwarding party's communication to the forwarded-to party would be barred by the OCB service at the time of the invocation attempt of the communication forwarding no reply service.

8.2.10.2.1.4 Communication Forwarding on Not Logged-in (CFNL)

If the OCB service has already been activated, a request to activate the communication forwarding no registration service shall be rejected if the forwarding party's communication to the forwarded-to party would be barred by the OCB service at the time of the activation attempt of the communication forwarding service.

If the communication forwarding on Not Logged-in service was activated before the activation of the OCB service, the OCB service can still be activated. When the two services have already been activated, a request to invoke the communication forwarding on Not Logged-in service shall be rejected if the forwarding party's communication to the forwarded-to party would be barred by the OCB service at the time of the invocation attempt of the communication forwarding on Not Logged-in service.

8.2.10.2.1.5 Communication Deflection (CD)

If the OCB service has been activated, a request to invoke the communication deflection service shall be rejected if the deflecting party's communication to the deflected-to party would be barred by the OCB service at the time of the invocation attempt of the communication deflection service.

8.2.10.3 Interoperability with PSTN/ISDN and CS mobile networks

The IMS Multimedia Telephony service shall support the interoperability of the CB service with mobile CS and PSTN/ISDN Supplementary Service CB and with ODB [6], and vice-versa. The scope of this interworking may result in a limited service capability.

8.2.11 Completion of Communications to Busy Subscriber (CCBS)

8.2.11.1 Definition

The CCBS service enables originating party, encountering a busy terminating party, to have the communication completed without having to make a new communication attempt when the terminating party becomes free.

When originating party requests the CCBS service, the network will monitor for terminating party becoming free.

When terminating party becomes free then the network will wait a short time in order to allow the resources to be re-used for originating a communication. If the resources are not re-used by terminating party within this time, then the network will automatically inform originating party that terminating party has become free. Originating party can generate the CCBS communication to terminating party.

When originating party accepts the CCBS recall, then the network will automatically generate a CCBS communication to terminating party.

NOTE: A service provided to terminating party which prevents the registration of CCBS requests is outside the scope of the present document.

During CCBS recall, information shall be provided which indicates a CCBS recall. The information provided in the original communication attempt shall be included in the CCBS recall.

This service description is based on the service description described in [E-9].

As a service option, the time to expiry of the CCBS and the terminating party identity may be provided by the network, either at successful activation, or as a result of an interrogation.

8.2.11.2 Service interactions with other IMS supplementary services

8.2.11.2.1 Identification services

8.2.11.2.2 Anonymous Communication Rejection (ACR)

A CCBS recall (from the network to the originating party) resulting from the completion of communications to busy subscribers shall not be rejected due to the application of the ACR service.

Assume the originating party connects to the terminating party and the terminating party activates the ACR service or has activated the ACR service:

- The ACR service is activated by the terminating party after the originating party has activated the completion of communications to busy subscriber service on the terminating party:
 - If the terminating party activates the ACR service after the originating party has activated the completion of communications to busy subscriber service on the terminating party, then the communication resulting from the completion of communications to busy subscriber service shall be rejected if the originating party has restricted its identity due to the OIR service.

8.2.11.2.3 Communication DIVersion (CDIV)

CCBS recalls shall never be diverted. They shall be provided to the original originating party.

CCBS can not be activated on a diverted communication.

8.2.11.2.4 Communication Waiting (CW)

NOTE: For a waiting communication, terminating party is not considered as busy.

If the Communication Waiting indication cannot be provided at the terminating party, originating party will receive busy indication and can invoke the CCBS service to terminating party.

CCBS requests in the terminating party's CCBS queue shall only be processed if there are no communications waiting.

8.2.11.2.5 Communication HOLD (HOLD)

No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

NOTE 1: When receiving a CCBS communication indication, originating party may invoke the communication hold service in order to make interface resources available for the establishment of the CCBS communication.

NOTE 2: When originating party is busy or CCBS busy and is notified that terminating party is free, invocation of the communication hold service will not result in the CCBS communication being established.

8.2.11.2.6 Communication Barring (CB)

The originating party calls the terminating party who is busy, and then the originating party invokes CCBS. If the originating party then invokes OCB before the terminating party becomes free, the CCBS communication may be rejected due to the OCB invocation.

8.2.11.2.7 Completion of Communications to Busy Subscriber (CCBS)

A user can be both an "originating party" and a "terminating party" simultaneously, i.e. that user can have activated the CCBS service and have CCBS requests outstanding whilst at the same time that user can be the destination of CCBS requests from other users.

If a user receives a CCBS recall while that terminating party's CCBS queue is being processed, then the CCBS recall shall take priority over the handling of the terminating party's CCBS queue. The handling of CCBS requests activated by this user shall have priority over the handling of CCBS requests activated by other users on this user.

If one of the user's CCBS requests matures as a result, then the user shall be provided a CCBS recall or notification. The terminating party idle guard timer, if running, shall be cancelled.

8.2.11.2.8 Advice Of Charge services (AOC)

Charging information can be provided for the original communication, and for the resulting CCBS communication.

8.2.11.3 Interoperability with PSTN/ISDN

The IMS Multimedia Telephony service shall support the interoperability of the CCBS service with PSTN/ISDN Supplementary Service CCBS and vice-versa. The scope of this interworking may result in a limited service capability.

8.2.12 Message Waiting Indication (MWI)

8.2.12.1 Definition

The MWI service enables the network, upon the request of a controlling user to indicate to the receiving user, that there is at least one message waiting. The indication is sent to the receiving user when a message is deposited. Optionally, the

network may send an indication to the user that there are no more unread message in the mail box. This indication may be send when the last unread message is read.

NOTE: As an example, a voice message is stored by the network for a particular user. The network then provides the MWI to the user to indicate there is a message for retrieval. Having received this indication, the receiving user can subsequently access the mail box, to listen to the message.

The means by which the receiving user accesses and manages the mail box voice message service are outside the scope of the present document.

This service description is based on the service description described in [E-13].

8.2.12.2 Service interactions with other services

8.2.12.2.1 Diversion services

8.2.12.2.1.1 Communication Forwarding Unconditional (CFU)

The MWI shall never be diverted.

8.2.12.2.1.2 Communication Forwarding Busy (CFB)

Same as CFU.

8.2.12.2.1.3 Communication Forwarding No Reply (CFNR)

Same as CFU.

8.2.12.2.1.4 Communication Forwarding on Not Logged-in (CFNL)

The MWI shall never be diverted. The indication shall be provided to the owning identity on re-registering.

8.2.12.3 Interoperability with PSTN/ISDN and CS mobile networks

There is no interoperability with mobile CS and PSTN/ISDN because MWI is a local service.

8.2.13 CONFERENCE (CONF)

8.2.13.1 Definition

The CONF service enables a user to participate in and control a simultaneous communication involving a number of users.

When the CONF service is invoked, conference resources are allocated to the served user.

Once a conference is active, users can join and leave a conference, and remote users can be added to or removed from the conference.

This service description is based on the service description described in [E-7] and [E-8].

Conference participants can request to be informed of these actions. This information can include details beyond that described in [E-7] and [E-8], about other participants including their identity.

The use of CONF on an emergency call, by a user that is not the PSAP, shall be precluded.

8.2.13.2 Service interactions with other IMS supplementary services

8.2.13.2.1 Diversion services

No impact, i.e. neither IMS supplementary service shall affect the operation of the other IMS supplementary service.

8.2.13.2.2 CONFerence (CONF)

A user can be involved as the conference controller separately in more than one conference. However, the user cannot add any conference to another conference.

The CONFerence service shall provide a similar user experience as the circuit switched Multiparty supplementary service but with multimedia capabilities.

8.2.13.2.3 Advice Of Charge services (AOC)

No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service. Communication diversion.

NOTE: Every communication within the CONF service may be charged according to the normal communication procedures. Special arrangements (e.g. conference initiator may be charged for other parties' communications in the conference) are out of scope of the present specification.

8.2.13.2.4 Originating Identification Restriction (OIR)

The OIR service shall take precedence as required in [4].

NOTE: A conference participant joining with an active OIR therefore has no details that can be included in any conference notifications.

8.2.13.2.5 Terminating Identification Restriction (TIR)

The TIR service shall take precedence as required in [4].

NOTE: A conference participant added with an active TIR therefore has no details that can be included in any conference notifications.

8.2.13.2.6 Three-Party (3PTY)

See clause 8.2.13.2.2, noting that 3PTY is a special case of CONF.

8.2.13.3 Interoperability with PSTN/ISDN and CS Mobile networks

The IMS Multimedia Telephony service shall support the interoperability of the CONF service with mobile CS and PSTN/ISDN Supplementary Services and vice-versa. The scope of this interworking may result in a limited service capability.

8.2.14 Advice Of Charge (AOC)

8.2.14.1 Definition

AOC is a group of services as follows:

- Advice Of Charge: charging information at communication Set-up time (AOC-S);

The advice of charge at communication set-up service provides the user with information about the charging rates at the time of communication establishment or during the communication in the case of charging rates changes. The charge information provided relates to the charges incurred on the network to which the served user is attached.

This service description is based on the service description described in [E-10] for AoC-S on a permanent mode.

- Advice Of Charge: charging information During the communication (AOC-D);

The advice of charge during the communication service enables the user to receive information on the recorded charges for a communication during the active phase of the communication. The provided charging information may be exchanged between different operator domain if those operators have interconnect agreements to do so.

This service description is based on the service description described in [E-11] for AoC-S on a permanent mode.

- Advice Of Charge: charging information at the End of the communication (AOC-E)

The advice of charge at end of communication service provides the user with charging information for a communication when the communication is terminated. Dependent on the option chosen at the time of subscription, the information can be sent for all communications, or on a per communication basis. The charge information provided relates to the charges incurred on the network to which the served user is attached.

This service description is based on the service description described in [E-12] for AoC-S on a permanent mode.

8.2.14.2 Service interactions with other IMS supplementary services

8.2.14.2.1 Diversion services

Originating party: No impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

Forwarding party: When a communication is forwarded and the forwarding party is charged for the forwarded part of the communication, then as a network option, the charging information can be transferred to the forwarding user when the communication is terminated.

8.2.14.2.2 Completion of Communications to Busy Subscriber (CCBS)

Charging information shall be provided for the original communication, and for the resulting CCBS communication.

8.2.14.2.3 CONFERENCE (CONF)

No impact, i.e. neither IMS supplementary service shall affect the operation of the other IMS supplementary service.

8.2.14.3 Interoperability with PSTN/ISDN

The IMS shall support the interoperability of the AOC service with PSTN/ISDN Supplementary Services and vice-versa. The scope of this interworking may result in a limited service capability.

8.2.15 Explicit Communication Transfer (ECT)

8.2.15.1 Definition

The ECT service enables a transferring party A to transform two of that party's communications (e.g. an active communication and a communication on hold, to parties B and C), each of which can be an incoming communication or an outgoing communication, into a new communication between party B and party C.

Prior to transfer, the media session shall have been established on the communication between transferring party A and party B. On the communication between transferring party A and party C, either the media session shall have been established prior to transfer, or, as a service provider option, transfer can occur while the communication to party C is requested or being established (i.e. the media session has not yet been established).

The minimum requirement should be to perform an "immediate" communication transfer for an incoming communication, without waiting on a response from party C. The service should be applicable independent of whether party B and party C are IMS users or not.

This service description is based on the service description described in [E-18].

The use of ECT on an emergency call, by a user that is not the PSAP, shall be precluded.

8.2.15.2 Service interactions with other IMS supplementary services

8.2.15.2.1 Identification services

8.2.15.2.1.1 Terminating Identification Restriction (TIR)

A terminating party's restriction requirements from the original communication shall be used in order to restrict the presentation of that party's identity to the other user in a transferred communication.

NOTE: If the media flow(s) is established on the communication to party C after transfer, the presentation of the identity of party C shall be restricted according to party C's Terminating identification restriction service (i.e. as for the normal operation of the Terminating identification restriction service).

8.2.15.2.2 Communication Barring (CB)

In case the transferring party A has outgoing communication barring active towards party C, transferring party A's request for communication transfer of party B to party C shall also be barred, if it occurs in relation to the establishment of the communication to C.

8.2.15.2.3 CONFERENCE (CONF)

The conference controller cannot transfer the conference to another party.

NOTE: Conferees can invoke the ECT service in order to transfer their connection to the conference to another party after that connection has been established.

8.2.15.2.4 Advice Of Charge (AOC)

8.2.15.2.4.0 General

This services does not apply to UE accessing from mobile 3GPP access networks.

8.2.15.2.4.1 Advice Of Charge at communication Set-up (AOC-S)

When party A transfers a communication, AOC-S shall be considered as completed.

For party B and party C, no impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

8.2.15.2.4.2 Advice Of Charge During the communication (AOC-D)

When party A transfers a communication and has activated AOC-D, the charge up to that time shall be sent as a subtotal charge for that communication. The AOC-D service shall then be considered as completed.

NOTE: If party A had activated the AOC-D, then party A will receive information separately for both of the communications.

For party B and party C, no impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

8.2.15.2.4.3 Advice Of Charge at the End of a communication (AOC-E)

If a party A is charged for the transferred part of the communication and has activated the AOC-E, then either:

- a) the charging information shall be sent to party A when the transferred communication is terminated; or
- b) when the communications are transferred, party A shall be informed that charging information is not available. The AOC-E shall then be considered as completed.

For party B and party C, no impact, i.e. this IMS supplementary service should not affect any other IMS supplementary service.

8.2.15.2.5 Explicit Communication Transfer (ECT)

The ECT service can be invoked simultaneously by any of the parties on an active communication, but this is not regarded as a normal situation. The network shall not explicitly prevent this occurring.

Therefore, both parties (party A and party B) in a normal communication, who have each subscribed to the ECT service, can simultaneously transfer the communication. That is, if party A and party B are involved in a communication on which the connection has been established, party A can transfer the communication to party C and party B can transfer the communication to another party.

NOTE: Mechanisms which prevent the ECT service from resulting in a connection which contains no parties able to terminate the communication may result in rejection of simultaneous requests to invoke the ECT service by the parties involved in the communication.

8.2.15.3 Interoperability with PSTN/ISDN and CS mobile networks

No restrictions.

8.2.16 Reverse charging

8.2.16.1 Definition

The reverse charging at communication set up time service allows the terminating party to be charged for the entire communication. Only usage based charges can be applied to the terminating party. The service shall be requested by the originating party at communication set up time. The terminating party must receive an explicit indication of a reverse charge communication request.

This service description is based on the service description described in [E-19].

8.2.16.2 Service interactions with other IMS supplementary services

None.

8.2.16.3 Interoperability with PSTN/ISDN

The IMS Multimedia Telephony service shall support the interoperability of Reverse Charging with the PSTN/ISDN and vice-versa.

8.2.17 Closed User Group (CUG)

8.2.17.1 Definition

The CUG service enables users to form groups of members, whose communication profile is restricted for incoming and outgoing communications. Members of a specific CUG can communicate among themselves but not, in general, with users outside the group.

Specific CUG members can have additional capabilities that allow them to initiate outgoing communications to users outside the group, and/or to accept incoming communications from users outside the group. Specific CUG members can have additional restrictions that prevent outgoing communications to other members of the CUG, or prevent incoming communications from other members of the CUG.

A closed user group consists of a number of members from one or more public, and/or private networks. Identification of each member shall be according to the requirements in [8]. A specific user may be a member of one or more CUGs. Subscription to a closed user group shall be defined for all communication services, or in relation to one, or to a list of communication services.

This service description is based on the ISDN service description described in [E-22].

8.2.17.2 Service interactions with other IMS supplementary services

8.2.17.2.1 Diversion services

8.2.17.2.1.1 Communication Forwarding Unconditional (CFU)

CUG restrictions shall be checked and met for the communication between the originating party and the forwarding party. The information of a CUG applied by the IMS Multimedia Telephony service on the original communication shall be used for the communication forwarding and by this means CUG restrictions shall be checked and met for the communication between the originating party and the forwarded-to party.

In the case of multiple forwarding, CUG restrictions between the originating party and the forwarding party have to be checked and met at each intermediate forwarding point. In addition, CUG restrictions between the originating party and forwarded-to party shall be met end-to-end.

The outgoing communication barring information of the forwarding party shall not be used to determine whether the communication can be forwarded.

The CUG information sent to the "forwarded-to" destination shall be the same CUG information of the originating party that was sent from the originating network.

8.2.17.2.1.2 Communication Forwarding Busy (CFB)

See interactions with CFU 8.2.17.2.1.1

8.2.17.2.1.3 Call Forwarding No Reply (CFNR)

See interactions with CFU 8.2.17.2.1.1

NOTE: CUG restrictions were checked and met for the communication between the originating party and the forwarding party when the communication was offered to the forwarding party.

8.2.17.2.1.4 Communication Forwarding on Not Logged-in (CFNL)

See interactions with CFU 8.2.17.2.1.1

8.2.17.2.1.5 Communication Forwarding on Subscriber Not Reachable (CFNRc).

See interactions with CFU 8.2.17.2.1.1

8.2.17.2.1.6 Communication Deflection (CD)

The information of a CUG applied on the original communication shall be used for the deflected part of the communication and by this means CUG restrictions shall be checked and met for the communication between the originating party and the deflected-to party.

In the case of multiple deflections, CUG restrictions between the originating party and the deflecting party have to be checked and met at each intermediate deflecting point. In addition, CUG restrictions between the originating party and deflected-to party shall be met end-to-end.

When a communication is deflected, a new check of the CUG restrictions between the originating party and the deflected-to party is made at the "deflected-to" destination. The CUG information sent to the "deflected-to" destination is the same CUG information of the originating party that was sent from the originating network.

The outgoing communication barring information of the deflecting party shall not be used to determine whether the communication can be deflected.

NOTE: CUG restrictions were checked and met for the communication between the originating party and the deflecting party when the communication was offered to the deflecting party.

8.2.17.2.2 Explicit Communication Transfer (ECT)

The two communications shall use the same CUG for the transfer to be successful.

NOTE: CUG restrictions between users will have been checked when the first communication is established. Similarly, CUG restrictions between users will have been checked when establishing the second communication.

8.2.17.2.3 Three-Party (3PTY)

For the successful invocation of the three party service any CUG restrictions applied to one communication shall match with any CUG restrictions applied to the other communication.

8.2.17.2.4 CONFerence (CONF)

When the communication involving the first conferee is added to the conference, then the conference shall assume the CUG of that communication.

In order to add a subsequent communication to the conference, then the CUG of that communication shall be checked against the CUG of the conference.

8.2.17.3 Interoperability with PSTN/ISDN

The IMS Multimedia Telephony service shall support the interoperability of the CUG service with the PSTN/ISDN and vice versa.No restrictions.

8.2.18 Three-Party (3PTY)

8.2.18.1 Definition

The 3PTY service enables a user to establish, participate in and control a simultaneous communication involving a number of users.

The 3PTY service can be invoked by the served user who is involved in at least two calls (one active communication and at least one held communication), each of which may be an incoming or outgoing communication.

The connections shall be established on each of the two communications prior to the invocation of the 3PTY service.

3PTY communication setup is equivalent to a three party conference created on request of the served user from existing communication sessions, this is equivalent to three party conference creation in CONF, For this reason 3PTY can be seen as a special case of CONF and most of service interactions for CONF apply also to 3PTY.

This service description is based on the service description described in [E-21].

8.2.18.2 Service interactions with other IMS supplementary services

8.2.18.2.1 Terminating Identification Presentation (OIR)

See clause 8.2.13.2.4, noting that 3PTY is a special case of CONF.

8.2.18.2.2 Terminating Identification Restriction (TIR)

See clause 8.2.13.2.5, noting that 3PTY is a special case of CONF.

8.2.18.2.3 Three-Party (3PTY)

A, B and C are in a three-way conversation that was created by B invoking the 3PTY service. A can create a second three-way conversation involving the original three-way conversation and D by invoking the 3PTY service.

8.2.18.2.4 CONFerence (CONF)

A, B and C are involved in a conference that was created by B invoking the CONF service. A can create a three-way conversation involving the original conference call and D by invoking the 3PTY service.

NOTE: It is FFS whether there is a conflict with the requirement expressed by 8.2.13.2.2, considering that 3PTY is just a special case of CONF.

8.2.18.3 Interoperability with PSTN/ISDN

The IMS Multimedia Telephony service shall support the interoperability of the 3PTY service with PSTN/ISDN supplementary service 3PTY and vice-versa. The scope of this interworking may result in a limited service capability.

8.2.19 Flexible Alerting (FA)

8.2.19.1 Definition

Flexible Alerting (FA) causes a call to a Pilot Identity to branch the call into several legs to alert several FA group members simultaneously. The first leg to be answered is connected to the calling party. The other call legs are abandoned.

FA group members are alerted by dialling the public addressable identity (e.g. Public User Identity) associated with the FA group (i.e., a E.164 number or a SIP URI), which is referred to as the Pilot Identity. The Pilot Identity maps to a set of public addressable identities (e.g. PUI or GRUU) where each identity references a member of the FA group. The FA group consists of a list of identities, and can be configured by the user or the operator.

In FA, there are two configuration options for busy indication: Single User Busy, and Multiple User Busy. The configuration of the option for a particular FA group shall be performed by the operator.

- For Single User Busy, the FA Group returns a busy indication if any group member indicates busy before the call is answered.

- For Multiple User Busy, the FA Group returns a busy indication if all accessible members indicate busy.

8.2.19.2 Service interactions with other IMS supplementary services

8.2.19.2.1 Identification services

8.2.19.2.1.1 Terminating Identification Presentation (TIP)

If an originating call from a user has TIP activated, the termination identification is the FA Pilot Identity.

8.2.19.2.1.2 Terminating Identification Restriction (TIR)

If the FA Pilot Identity has TIR activated, the termination identification is not presented.

8.2.19.2.1.3 Originating Identification Presentation (OIP)

If the FA Pilot Identity has OIP activated, incoming calls to the FA Pilot Identity apply OIP to the members of the FA group.

8.2.19.2.1.4 Originating Identification Restriction (OIR)

No impact, i.e. neither service shall affect the operation of the other service.

8.2.19.2.2 Diversion services

8.2.19.2.2.1 Communication Forwarding Unconditional (CFU)

CFU takes precedence over FA. CFU of the FA Pilot Identity shall apply to calls to the Pilot Identity when CFU is active.

CFU for the FA pilot identity takes precedence over CFU of the individual FA members. That is, if both the FA pilot identity and an FA member have CFU active, CFU treatment is determined by the FA pilot identity.

8.2.19.2.2.2 Communication Forwarding Busy (CFB)

CFB of the FA Pilot Identity shall apply to calls to the Pilot Identity when CFB is active and the FA group is considered to be busy.

CFB for the FA pilot identity takes precedence over CFB of the individual FA members. That is, if both the FA pilot identity and an FA member have CFB active, CFB treatment is determined by the FA pilot identity.

8.2.20 Personal Network Management (PNM)

8.2.20.1 Definition

Personal Network Management (PNM) as specified in TS22.259 allows a user to manage her UEs in regard to terminating services according to preferences set by the user, capabilities and availabilities of devices.

Note: Fixed network terminals could become subject of PNM

8.2.20.2 Service interactions with other IMS supplementary services

Invocation of supplementary services for terminating services applicable to the active UE take precedence over invocation of supplementary service applicable to the called UE. There is no impact on specified interaction among supplementary services once invoked.

There is no impact on the registration, erasure, activation, deactivation and interrogation of supplementary services.

8.2.21 Customized Alerting Tone (CAT)

8.2.21.1 Definition

The Customized Alerting Tone Service (CAT service) is an operator specific service by which an operator enables the subscriber to customize the alerting tone which is played to the calling party. The requirements for CAT within IMS shall be as described in [9].

8.2.21.2 Service interactions with other IMS supplementary services

8.2.21.2.1 Identification services

8.2.21.2.1.1 Originating Identification Restriction (OIR)

The interaction between CAT and the OIR supplementary services shall be as described in [9].

8.2.21.2.1.2 Terminating Identification Restriction (TIR)

The interaction between CAT and the TIR supplementary services shall be as described in [9].

8.2.21.2.2 Diversion services

8.2.21.2.2.1 Communication Forwarding Unconditional (CFU)

The interaction between CAT and the CFU supplementary services shall be as described in [9].

8.2.21.2.2.2 Communication Forwarding Busy (CFB)

The interaction between CAT and the CFU supplementary services shall be as described in [9].

8.2.21.2.2.3 Communication Forwarding on Not Reachable (CFNRc)

The interaction between CAT and the CFNRc supplementary services shall be as described in [9]

8.2.21.2.2.4 Communication Forwarding No Reply (CFNR)

The interaction between CAT and the CFNR supplementary services shall be as described in [9].

8.2.21.2.3 Communication Waiting (CW)

The interaction between CAT and the CW supplementary services shall be as described in [9].

8.2.21.2.4 Explicit Communication Transfer (ECT)

The interaction between CAT and the ECT supplementary services shall be as described in [9].

8.2.22 Customized Ringing Signal (CRS)

8.2.22.1 Definition

The Customized Ringing Signal (CRS service) is an operator specific service by which an operator enables the subscriber to customize the ringing signal which is played to the called party. The requirements for CRS within IMS shall be as described in [10].

8.2.22.2 Service interactions with other IMS supplementary services

8.2.22.2.1 Identification services

8.2.22.2.1.1 Originating Identification Restriction (OIR)

The interaction between CRS and the OIR supplementary services shall be as described in [10].

8.2.22.2.1.2 Originating Identification Presentation (OIP)

The interaction between CRS and the OIP supplementary services shall be as described in [10].

8.2.22.2.2 Diversion services

8.2.22.2.2.1 Communication Forwarding Unconditional (CFU)

The interaction between CRS and the CFU supplementary services shall be as described in [10].

8.2.22.2.2.2 Communication Forwarding Busy (CFB)

The interaction between CRS and the CFU supplementary services shall be as described in [10].

8.2.22.2.2.3 Communication Forwarding on Not Reachable (CFNRc)

The interaction between CRS and the CFNRc supplementary services shall be as described in [10].

8.2.22.2.2.4 Communication Forwarding No Reply (CFNR)

The interaction between CRS and the CFNR supplementary services shall be as described in [10].

8.2.22.2.3 Communication Waiting (CW)

The interaction between CRS and the CW supplementary services shall be as described in [10].

8.2.22.2.4 Explicit Communication Transfer (ECT)

The interaction between CRS and the ECT supplementary services shall be as described in [10].

8.2.23 Completion of Communications on No Reply (CCNR)

8.2.23.1 Definition

The CCNR service enables the originating party, encountering a terminating party who does not answer the communication (No Reply), to have the communication completed without having to make a new communication attempt when the terminating party becomes not busy after having initiated an activity.

When the originating party requests the CCNR service, the network will monitor for the terminating party becoming not busy after having initiated an activity.

When the terminating party becomes not busy after having initiated an activity, then the network will wait a short time in order to allow the resources to be re-used for originating a communication. If the resources are not re-used by the terminating party within this time, then the network will automatically recall the originating party.

When the originating party accepts the CCNR recall, then the network will automatically generate a CCNR call to the terminating party.

NOTE: A service provided to the terminating party which prevents the registration of CCNR requests is outside the scope of the present document.

During CCNR recall, information shall be provided which indicates a CCNR recall. The information provided in the original communication attempt shall be included in the CCNR recall.

This service description is based on the service description described in [E-23].

8.2.23.2 Service interactions with other IMS supplementary services

8.2.23.2.1 Identification services

8.2.23.2.1.1 Originating Identification Presentation (OIP)

No impact, i.e. neither service shall affect the operation of the other service.

NOTE: If the originating party accepts a CCNR recall, the resulting CCNR call is a basic communication and the terminating party can receive originating identification presentation.

8.2.23.2.1.2 Originating Identification Restriction (OIR)

No impact, i.e. neither service shall affect the operation of the other service.

NOTE: If the originating party has invoked originating identification restriction and the terminating party accepts a CCNR recall, then the resulting CCNR call is a basic communication and the terminating party will not receive the originating identification of the originating party.

8.2.23.2.1.3 Terminating Identification Presentation (TIP)

No impact, i.e. neither service shall affect the operation of the other service.

8.2.23.2.1.4 Terminating Identification Restriction (TIR)

No impact, i.e. neither service shall affect the operation of the other service.

8.2.23.2.2 Advice Of Charge services (AOC)

Charging information can be given for the original communication, and for the resulting CCNR communication.

8.2.23.2.3 Communication Waiting (CW)

CCNR requests in the CCNR queue of the terminating party shall only be processed if there are no communications waiting. In other situations there is no impact between the CW and the CCNR service.

8.2.23.2.4 Communication HOLD (HOLD)

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

NOTE 1: When receiving a CCNR recall indication, the originating party may invoke the communication hold service in order to make interface resources available for the establishment of the CCNR communication.

NOTE 2: When the originating party is busy or CCNR busy and is notified that the terminating party is not busy, invocation of the communication hold service will not result in the CCNR communication being established.

8.2.23.2.5 Explicit Communication Transfer (ECT)

No impact, i.e. neither service shall affect the operation of the other service.

8.2.23.2.6 Closed User Group (CUG)

Closed user group information from the original communication shall also be included in the CCNR communication.

NOTE: Closed user group information is not included in the check for a compatible terminal. If a terminal performs an internal closed user group check and uses the closed user group information provided on a communication to determine whether, or not, to inform the user of the incoming communication, then such a terminal may react positively to the check for a compatible terminal due to the absence of closed user group information, but due to the internal closed user group check such a terminal may then not inform the user of the arrival of the resulting CCNR call.

8.2.23.2.7 Completion of communications services

8.2.23.2.7.1 Completion of Communications to Busy Subscriber (CCBS)

A user can be both an originating party and a terminating party simultaneously, i.e. that user can have activated the CCNR service or the completion of communications to busy subscriber (CCBS) service and have CCNR requests or CCBS requests outstanding whilst at the same time that user can be the destination of CCNR requests or CCBS requests from other users.

CCBS requests and CCNR requests against the same terminating party shall be queued in the same queue.

If a user receives a CCNR recall or CCBS recall (i.e. as originating party) while that user's queue as terminating party is being processed, then the CCNR recall or CCBS recall shall take priority over the handling of that user's queue. The handling of CCNR requests and CCBS requests activated by this user (i.e. as originating party) shall have priority over the handling of CCNR requests and CCBS requests activated by other users on this user (i.e. as terminating party).

If one of the user's CCNR requests can be processed, then this user (see first paragraph) shall be given a CCNR recall or notification as described in [E-23] clause 5. The served user's terminating party idle guard timer, if running, shall be cancelled. The processing of CCBS requests shall be according to the requirements of the CCBS supplementary service.

If a network supports the option to retain CCNR requests (see [E-23] clause 5.3.3.1 b)), then CCBS requests shall be retained when a CCBS call encounters a busy destination.

If the network checks for identical requests in the user's queue, the check shall include both CCNR requests and CCBS requests.

If an originating party has a CCBS recall pending on arrival of a CCNR recall, this should be treated in the same way as in the case where the originating party is CCNR busy (see [E-23] clause 5.2.3 and clause 5.3.3.2 b)).

8.2.23.2.7.2 Completion of Communications on No Reply (CCNR)

A user can be both a originating party and a terminating party simultaneously, i.e. that user can have activated the CCNR service and have CCNR requests outstanding whilst at the same time that user can be the destination of CCNR requests from other users.

If a user receives a CCNR recall while that user's CCNR queue as terminating party is being processed, then the CCNR recall shall take priority over the handling of the CCNR queue. The handling of CCNR requests activated by this user shall have priority over the handling of CCNR requests activated by other users on this user.

If one of the user's CCNR requests can be processed as a result, then this user (see first paragraph) shall be given a CCNR recall or notification as described in [E-23] clause 5. The served user's terminating party idle guard timer, if running, shall be cancelled.

8.2.23.2.8 CONFerence (CONF)

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.2.23.2.9 Communication DIVersion (CDIV)

8.2.23.2.9.1 General

CCNR recalls shall not be diverted. They shall be given to the originating party at the originating party's original location.

8.2.23.2.9.2 Communication Forwarding Unconditional (CFU)

For CFU activated by user B before user A requests CCNR:

- If user B has activated CFU, and the forwarded communication results in a communication completion on no reply condition at user C, user A shall be informed that CCNR is possible at user C. If user A activates CCNR and subsequently activates CFU, the CCNR recall shall be given to user A at his original location. As a network option, in case of a diversion at user B, user A shall not be informed that CCNR is possible.

For CFU activated by user B after user A requests CCNR on user B:

- If user B activates CFU after user A has activated CCNR on user B, then the CCNR request shall be cancelled and a notification "CCNR cancelled" shall be sent to the user A. As a network option, the CCNR request shall be suspended until user B deactivates CFU. If the service duration timer expires before user B deactivates CFU, the CCNR request shall be cancelled.

8.2.23.2.9.3 Communication Forwarding Busy (CFB)

For CFB activated by user B before user A requests CCNR:

- If user B has activated the communication forwarding busy service and is busy, and the forwarded communication results in a call-completion on no reply condition at user C, user A shall be informed that CCNR is possible at user C.

For CFB activated by user B after user A requests CCNR on user B:

- If user B activates the communication forwarding busy service after user A has activated the CCNR service on user B, the communication forwarding busy service shall not be invoked for the CCNR communication.

8.2.23.2.9.4 Communication Forwarding No Reply (CFNR)

For CFNR activated by user B before user A requests CCNR:

- If user B has activated the communication forwarding on no reply service and does not answer the communication, and the forwarded communication results in a communication-completion on no reply condition at user C, user A shall be informed that CCNR is possible at user C. As a network option, user A shall be informed that CCNR at user B is possible.

For CFNR activated by user B after user A requests CCNR on user B:

- If user B activates the communication forwarding on no reply service after user A has activated the communication forwarding on no reply service on user B, a CCNR communication from user A which encounters a no reply condition at user B shall be treated as follows:

- the procedures of CCNR shall be applied; or
- the communication shall be forwarded as a normal communication.

8.2.23.2.9.5 Communication Forwarding on Not Logged in (CFNL)

For CFNL activated by user B before user A requests CCNR:

- If user B has activated the communication forwarding not registered service and is not logged in, and the forwarded communication results in a communication completion on no reply condition at user C, user A shall be informed that CCNR is possible at user C.
As a network option, user A shall be informed that CCNR at user B is possible.

For CFNL activated by user B after user A requests CCNR on user B:

- If user B activates the communication forwarding not registered service after user A has activated CCNR on user B, then the CC request shall be cancelled and a notification "CCNR cancelled" shall be sent to the user A. As a network option, the CCNR request shall be suspended until user B deactivates CFNL. If the service duration timer expires before user B deactivates CFNL, the CCNR request shall be cancelled.

8.2.23.2.9.6 Communication Deflection (CD)

For the originating user A:

- If a communication to the called user B is deflected to user C by the CD service and results in a communication completion on no reply condition at user C, user A shall be informed that CCNR is possible at user C. A CCNR recall shall not be deflected.

For the called user B:

- A CCNR call shall not be deflected.

8.2.23.2.10 Malicious Communication Identification (MCID)

No impact, i.e. neither service shall affect the operation of the other service.

8.2.23.2.11 Anonymous Communication Rejection and Communication Barring (ACR/CB)

No impact, i.e. neither service shall affect the operation of the other service.

8.2.23.2.12 Message Waiting Indication (MWI)

No impact, i.e. neither service shall affect the operation of the other service.

8.2.23.2.13 Flexible Alerting (FA)

No impact, i.e. neither service shall affect the operation of the other service.

8.2.23.2.14 Customized Alerting Tones (CAT)

No impact, i.e. neither service shall affect the operation of the other service.

8.2.23.3 Interoperability with PSTN/ISDN

The IMS Multimedia Telephony service shall support the interoperability of the CCNR service with PSTN/ISDN Supplementary Service CCNR and vice-versa. The scope of this interworking may result in a limited service capability.

8.2A Supplementary Services applicable to IMS Multimedia Telephony without equivalent in non-IMS networks

8.2A.1 Completion of Communications on Not Logged-in (CCNL)

8.2A.1.1 Definition

The CCNL service enables the originating party, encountering a terminating party who is not registered, to have the communication completed without having to make a new communication attempt when the terminating party registers again.

When the originating party requests the CCNL service, the network will monitor for the terminating party registering again.

As a service provider option only originating parties who are listed in the terminating party's whitelist are allowed to request the CCNL service.

NOTE: The administration of the terminating party's whitelist is out of scope of this document.

When the terminating party registers again, then the network will wait a short time in order to allow the terminating party to originate a communication. If no communication is originated by the terminating party within this time, then the network will automatically recall the originating party. As a service provider option the terminating user's acceptance of the CCNL request shall be required before the originating party will be recalled. When the originating party accepts the CCNL recall, then the network will automatically generate a CCNL call to the terminating party.

When the terminating party is busy or not logged-in upon arrival of the CCNL call, the original CCNL request shall retain its position in the queue, and the remaining period in which the CCNL request remains valid shall not be changed by this event.

During CCNL recall, information shall be provided which indicates a CCNL recall. The information provided in the original communication attempt shall be included in the CCNL recall.

8.2A.1.2 Service interactions with other IMS supplementary services

8.2A.1.2.1 Identification services

8.2A.1.2.1.1 Originating Identification Presentation (OIP)

No impact, i.e. neither service shall affect the operation of the other service.

NOTE: If the originating party accepts a CCNL recall, the resulting CCNL call is a basic communication and the terminating party can receive originating identification presentation.

8.2A.1.2.1.2 Originating Identification Restriction (OIR)

No impact, i.e. neither service shall affect the operation of the other service.

NOTE: If the originating party has invoked originating identification restriction and the terminating party accepts a CCNL recall, then the resulting CCNL call is a basic communication and the terminating party will not receive the originating identification of the originating party.

8.2A.1.2.1.3 Terminating Identification Presentation (TIP)

No impact, i.e. neither service shall affect the operation of the other service.

8.2A.1.2.1.4 Terminating Identification Restriction (TIR)

No impact, i.e. neither service shall affect the operation of the other service.

8.2A.1.2.2 Advice Of Charge services (AOC)

Charging information can be given for the original communication, and for the resulting CCNL communication.

8.2A.1.2.3 Communication Waiting (CW)

CCNL requests in the CCNL queue of the terminating party shall only be processed if there are no communications waiting. In other situations there is no impact between the CW and the CCNL service.

8.2A.1.2.4 Communication HOLD (HOLD)

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

NOTE 1: When receiving a CCNL recall indication, the originating party may invoke the communication hold service in order to make interface resources available for the establishment of the CCNL communication.

NOTE 2: When the originating party is busy or CCNL busy and is notified that the terminating party is available, invocation of the communication hold service will not result in the CCNL communication being established.

8.2A.1.2.5 E2Aplicit Communication Transfer (ECT)

No impact, i.e. neither service shall affect the operation of the other service.

8.2A.1.2.6 Closed User Group (CUG)

Closed user group information from the original communication shall also be included in the CCNL communication.

NOTE: Closed user group information is not included in the check for a compatible terminal. If a terminal performs an internal closed user group check and uses the closed user group information provided on a communication to determine whether, or not, to inform the user of the incoming communication, then such a terminal may react positively to the check for a compatible terminal due to the absence of closed user group information, but due to the internal closed user group check such a terminal may then not inform the user of the arrival of the resulting CCNL call.

8.2A.1.2.7 Completion of communications services (CC)

The following Completion of Communications services are defined: Completion of Communications to Busy Subscriber (CCBS), Completion of Communications on No Reply (CCNR) and Completion of Communications on Not Logged-in (CCNL)

A user can be both an originating party and a terminating party simultaneously, i.e. that user can have activated CC services and have CC requests outstanding whilst at the same time that user can be the destination of CC requests from other users.

CC requests against the same terminating party shall be queued in the same queue.

If a user receives a CCNL recall (i.e. as originating party) while that user's queue as terminating party is being processed, then the CCNL recall shall take priority over the handling of that user's queue. The handling of CCNL requests activated by this user (i.e. as originating party) shall have priority over the handling of CC requests activated by other users on this user (i.e. as terminating party).

If one of the user's CCNL requests can be processed, then this user shall be given a CCNL recall or a notification. The served user's terminating party idle guard timer, if running, shall be cancelled. The processing of CCBS or CCNR requests shall be according to the requirements of the CCBS or CCNR supplementary services.

If the network checks for identical requests in the user's queue, the check shall include CCNL, CCNR and CCBS requests.

If an originating party has a CCBS or CCNR recall pending on arrival of a CCNL recall, this should be treated in the same way as in the case where the originating party is CCNL busy. In this case, the CCNL request shall be suspended until user A becomes neither busy nor CCNL busy.

8.2A.1.2.8 CONFerence (CONF)

No impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

8.2A.1.2.9 Communication DIVersion (CDIV)

8.2A.1.2.9.1 General

CCNL recalls shall not be diverted.

8.2A.1.2.9.2 Communication Forwarding Unconditional (CFU)

For CFU activated by user B before user A requests CCNL:

- If user B has activated CFU, and the forwarded communication results in a communication completion on not logged-in condition at user C, user A shall be informed that CCNL is possible at user C. If user A activates CCNL and subsequently activates CFU, the CCNL recall shall be given to user A.
As a network option, in case of a diversion at user B, user A shall not be informed that CCNL is possible.

For CFU activated by user B after user A requests CCNL on user B:

- If user B activates CFU after user A has activated CCNL on user B, then the CCNL request shall be cancelled and a notification "CCNL cancelled" shall be sent to the user A.
As a network option, the CCNL request shall be suspended until user B deactivates CFU. If the service duration timer $e2Apires$ before user B deactivates CFU, the CCNL request shall be cancelled.

8.2A.1.2.9.3 Communication Forwarding Busy (CFB)

For CFB activated by user B before user A requests CCNL:

- If user B has activated the communication forwarding busy service and is busy, and the forwarded communication results in a call-completion on not logged-in condition at user C, user A shall be informed that CCNL is possible at user C.
As a network option, in case of a diversion at user B, user A shall not be informed that CCNL is possible.

For CFB activated by user B after user A requests CCNL on user B:

- If user B activates the communication forwarding busy service after user A has activated the CCNL service on user B, the communication forwarding busy service shall not be invoked for the CCNL communication.

8.2A.1.2.9.4 Communication Forwarding No Reply (CFNR)

For CFNR activated by user B before user A requests CCNL:

- If user B has activated the communication forwarding on no reply service and does not answer the communication, and the forwarded communication results in a communication-completion on not logged-in condition at user C, user A shall be informed that CCNL is possible at user C.
As a network option, in case of a diversion at user B, user A shall not be informed that CCNL is possible.

For CFNR activated by user B after user A requests CCNL on user B:

- If user B activates the communication forwarding on no reply service after user A has activated CCNL on user B, then the CCNL request shall be cancelled and a notification "CCNL cancelled" shall be sent to the user A.
As a network option, the CCNL request shall be suspended until user B deactivates CFNR. If the service duration timer $e2Apires$ before user B deactivates CFNR, the CCNL request shall be cancelled.

8.2A.1.2.9.5 Communication Forwarding on Not Logged in (CFNL)

For CFNL activated by user B before user A requests CCNL:

- If user B has activated the communication forwarding not registered service and is not logged in, and the forwarded communication results in a communication completion on not logged-in condition at user C, user A

shall be informed that CCNL is possible at user C.

As a network option, user A shall be informed that CCNL at user B is possible.

For CFNL activated by user B after user A requests CCNL on user B:

- If user B activates the communication forwarding not registered service after user A has activated the communication forwarding on not logged-in service on user B, a CCNL communication from user A which encounters a not logged in condition at user B shall be treated as follows:
 - the procedures of CCNL shall be applied; or
 - the communication shall be forwarded as a normal communication.

8.2A.1.2.9.6 Communication Deflection (CD)

For the originating user A:

- If a communication to the called user B is deflected to user C by the CD service and results in a communication completion on not logged-in condition at user C, user A shall be informed that CCNL is possible at user C. A CCNL recall shall not be deflected.

For the called user B:

- A CCNL call shall not be deflected.

8.2A.1.2.10 Malicious Communication Identification (MCID)

No impact, i.e. neither service shall affect the operation of the other service.

8.2A.1.2.11 Anonymous Communication Rejection and Communication Barring (ACR/CB)

No impact, i.e. neither service shall affect the operation of the other service.

8.2A.1.2.12 Message Waiting Indication (MWI)

No impact, i.e. neither service shall affect the operation of the other service.

8.2A.1.2.13 Fle2Aible Alerting (FA)

No impact, i.e. neither service shall affect the operation of the other service.

8.2A.1.2.14 Customized Alerting Tones (CAT)

No impact, i.e. neither service shall affect the operation of the other service.

8.2A.1.3 Interoperability with PSTN/ISDN

Not applicable.

8.3 Concepts associated with IMS supplementary services

8.3.1 Administration of supplementary services

Provision, Withdrawal, Registration, Erasure, Activation, Deactivation and Invocation shall be as defined in ITU-T Recommendation I.210 [5].

Users shall be able to register, activate, deactivate, withdraw, interrogate and reconfigure IMS supplementary services via the UE, or web portals.

8.3.2 Unstructured SS data operations

The Multimedia Telephony Service shall provide a consistent service experience to the user for mobile initiated USSD operations in MMI mode and reserved for HPLMN use, according to TS 22.090 [12].

Note: Network initiated USSD operations – MMI mode and USSD operations – application mode are not supported.

8.3.3 Network Announcement and Tones Insertion

The Multimedia Telephony Service shall be able to play network announcements or tones to the subscriber at any time during a session.

If there is an appropriate bilateral agreement, the home network shall be able to instruct the visited network to play a network announcement or tone to the subscriber at any time during a session.

8.4 Use of authorization option in relation to IMS supplementary services

8.4.1 Definition

Some IMS supplementary services (e.g. communication session barring) can be offered to a user with the subscription option of authorization to control the service. When this option is selected, every action (related to that IMS supplementary service), such as registration, erasure, activation or deactivation is performed by the user with concurrent authentication.

8.4.2 Description

When the subscription option authorized control of a IMS supplementary service is provided, authentication handling is supported by the network.

8.4.3 Management - normal procedures and successful outcome

8.4.3.1 Provision of authorization

Each IMS supplementary service which requires authorization to control this service may be offered with the subscription option authorized control of the IMS supplementary service. The values of this option may be:

- user authentication;
- by the service provider.

8.4.3.2 Withdrawal of authorization

Authorization may be withdrawn for administrative reasons or due to subscription modification.

8.4.3.3 Authentication requirements

The network shall provide, and allow the user to maintain, the authentication credentials.

9 IMS Multimedia Telephony with Enhanced Voice

The IMS Multimedia Telephony with Enhanced Voice should fulfill the following requirements:

- IMS Multimedia Telephony with Enhanced Voice should allow for significantly improved quality of user experience compared to IMS Multimedia Telephony with pre-Rel-10 voice services.
- It should be possible to achieve significantly better service quality than is possible with both Rel-9 3GPP narrowband and wideband voice services.
- IMS Multimedia Telephony with Enhanced Voice should be deployable in an efficient manner.
- IMS Multimedia Telephony with Enhanced Voice should efficiently use the transmission resource access and transport networks. It should also allow possibility to implement the new services on low-cost devices and network equipment with limited computational resource. With regard to transmission efficiency, it should exceed that of the pre-Rel-10 3GPP wideband voice service.
- Transcoding should be avoided as much as possible. If transcoding cannot be avoided, voice conversational quality degradation should be as limited as possible.
- The best possible quality should be delivered to all participants in conference calls.

Annex A (informative): General terminal guidelines

A.1 Service state indication

It is considered useful to indicate to the user the current state, notably the activated state of those services which can lead to communications not being offered. For example, an active CFU results in no communication being presented.

Generally speaking any "not usual" state of a service should be indicated on the terminal: CFU activated, CW deactivated, OIR in permanent mode activated, etc.

In the case of services which can be remotely controlled from another terminal or a server, the terminal should receive this information from the network.

Annex B (informative): Service interactions table

Table B.1 summarizes the service interactions between pairs of IMS supplementary services, as identified in section 8 of this document.

Each case of the table represents the scenario where services on the horizontal row heading are invoked when services on the vertical column heading are already active.

The case is filled with one of three possible options: character "Y" indicates interaction has been identified between the corresponding service pair and described in the present document, character "N" indicates no interaction has been identified and no information is provided in the present document, '-' is for scenarios which are not applicable.

Table B.1: Identified service interactions between pairs of IMS supplementary services

	OIP	OIR	TIP	TIR	MID	AC	CFU	CFB	CFNR	CFNL	CD	CFNRc	CDIVN	CW	HOLD	CB	CCBS	MWI	CONF	AOC	ECT	RC	CUG	3PTY
Originating Identification Presentation (OIP)	-	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N
Originating Identification Restriction (OIR)	Y	-	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N
Terminating Identification Presentation (TIP)	N	N	-	Y	N	N	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
Terminating Identification Restriction (TIR)	N	N	Y	-	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N
Malicious Communication Identification (MCID)	N	N	N	N	-	N	Y	N	Y	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N
Anonymous Communication Rejection (ACR)	N	N	N	N	N	-	Y	Y	Y	Y	N	Y	N	Y	N	N	Y	N	N	N	N	N	N	N
Communication Forwarding Unconditional (CFU)	Y	Y	Y	N	N	Y	-	Y	Y	Y	Y	Y	N	N	N	Y	Y	Y	N	Y	N	N	Y	N
Communication Forwarding Busy (CFB)	Y	Y	Y	N	N	Y	Y	-	N	N	Y	Y	N	see note	N	Y	Y	Y	N	Y	N	N	Y	N
Communication Forwarding No Reply (CFNR)	Y	Y	Y	N	Y	Y	Y	N	-	N	N	N	N	Y	N	Y	Y	Y	N	Y	N	N	Y	N
Communication Forwarding on Not Logged-In (CFNL)	Y	Y	Y	N	N	Y	Y	N	N	-	N	N	N	N	N	Y	Y	Y	N	Y	N	N	Y	N
Communication Deflection (CD)	Y	Y	Y	N	Y	Y	Y	Y	N	N	-	N	N	Y	N	Y	Y	Y	N	Y	N	N	Y	N
Communication Forwarding on Subscriber Not Reachable (CFNRc)	Y	Y	Y	N	Y	Y	Y	Y	N	N	N	-	N	Y	N	Y	Y	Y	N	N	N	N	Y	N
Communication Diversion Notification (CDIVN)	Y	Y	N	N	N	N	N	N	N	N	N	N	-	N	N	N	N	N	N	N	N	N	N	N
Communication Waiting (CW)	Y	N	N	N	N	Y	N	see note	Y	N	Y	Y	N	-	N	N	Y	N	N	N	N	N	N	N
Communication Hold (HOLD)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	-	N	N	N	N	N	N	N	N	Y
Communication Barring (CB)	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	N	N	-	Y	N	N	N	Y	N	N	N
Completion of Communications to Busy Subscriber (CCBS)	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	N	Y	N	N	N	N
Message Waiting Indication (MWI)	N	N	N	N	N	N	Y	Y	Y	Y	N	Y	N	N	N	N	N	-	N	N	N	N	N	N

	OIP	OIR	TIP	TIR	MID	AC	CFU	CFB	CFNR	CFNL	CD	CFNRc	CDIVN	CW	HOLD	CB	CCBS	MWI	CONF	AOC	ECT	RC	CUG	3PTY
Conference (CONF)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	N	Y	N
Advice of Charge (AOC)	N	N	N	N	N	N	Y	Y	Y	Y	Y	N	N	N	N	N	Y	N	Y	-	N	N	N	N
Explicit Communication Transfer (ECT)	N	Y	N	N	Y	N	N	N	N	N	N	N	N	N	N	Y	N	N	Y	Y	Y	N	Y	N
Reverse Charging (RC)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	-	N	N
Closed User Group (CUG)	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	Y	N	Y	N	-	N
Three-Party (3PTY)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	Y	Y

NOTE: It is not permitted to have both CW and CFB active at the same time for a particular user.

Annex C (normative): IMS Multimedia Telephony supplementary services applicable to the fixed access

The following services have been split into 3 categories applicable to CEPT members:

- **Mandatory services:** selected services that must form the basis of any set of services considered applicable to IMS Multimedia Telephony service. These are considered to meet the requirements of regulation concerning the processing of personal data and the protection of privacy in the electronic communications sector.
- **Recommended services:** selected services that offer service providers with a transition from CS mobile and fixed services to IMS Multimedia Telephony service.
- **Optional services:** other services.

Mandatory services

Originating Identification Presentation (OIP)
Originating Identification Restriction (OIR)
Terminating Identification Presentation (TIP)
Terminating Identification Restriction (TIR)
Malicious Communication Identification (MCID)
Anonymous Communication Rejection (ACR)

Recommended services

Communication DIVersion (CDIV)
Communication Waiting (CW)
Communication HOLD (HOLD)
Communication Barring (CB)
Completion of Communications to Busy Subscriber (CCBS)
Completion of Communications on No Reply (CCNR)
Message Waiting Indication (MWI)

Optional services

CONference (CONF)
Advice Of Charge (AOC)
Explicit Communication Transfer (ECT)
Reverse charging
Closed User Group (CUG)
Three-Party (3PTY)
Flexible Alerting (FA)
Customized Alerting Tone (CAT)
Customized Ringing Signal (CRS)

Completion of Communications on Not Logged in (CCNL)

Annex D (normative): IMS Multimedia Telephony supplementary services applicable to the mobile 3GPP access

Only these services apply to UEs using a mobile 3GPP access:

Originating Identification Presentation (OIP)

Originating Identification Restriction (OIR)

Terminating Identification Presentation (TIP)

Terminating Identification Restriction (TIR)

Communication Diversion (CDIV)

Communication Hold (HOLD)

Communication Barring (CB)

Message Waiting Indication (MWI)

Conference (CONF)

Explicit Communication Transfer (ECT)

Completion of Communications on Not Logged in (CCNL)

Communication Waiting (CW)

NOTE: Communication Waiting service may be provided entirely by means of an equivalent feature in the UE. In this case this service does not need to be supported by the network.

Completion of Communications to Busy Subscriber (CCBS)

Completion of Communications on No Reply (CCNR)

Personal Network Management (PNM)

Customized Alerting Tone (CAT)

Customized Ringing Signal (CRS)

Additionally, EN 301 082 (OCB-fixed) does not apply to 2G and 3G Mobile terminals, for which the functionality is specified by means of Operator Determined Barring [6] and not through supplementary services.

Annex Da (normative): Network determined user busy.

The capability of network determined user busy is a network option.

The network may determine busy conditions at the time an incoming IMS Multimedia Telephony session is about to be offered.

The conditions for network determined user busy are identified, on a per subscription basis, based on the availability of limited resources assigned to the terminating user, or due to other information such as presence.

The conditions for network determined "user busy" include:

- the maximum number of total communications permitted has been reached;
- the maximum number of simultaneous media streams supported at the given subscriber's interface(s) has been reached;
- the maximum bandwidth supported at the given subscriber's interface(s) has been reached.
- subscriber making himself "busy" in a subscriber profile, involved in the incoming multimedia telephony session.

The network determined user busy condition may be used to trigger certain services (e.g. Call Forwarding on Busy, Call Waiting on Busy), or reject the session, or both. If the session rejection is propagated back to the originator, a "user busy" indication must be provided as the cause of the rejection.

In addition, a further condition, "approaching network determined user busy" that is related to the Network determined user busy condition, may be provided. This condition may be used to trigger certain services (e.g. Call Waiting). However, this condition is not a busy condition and shall not cause a "user busy" indication being sent towards the session originator.

The conditions for approaching network determined user busy are identified, on a per subscription basis, based on the availability of limited resources assigned to the terminating user.

The conditions for approaching network determined user busy include:

- a pre-determined number, or less, of communications are available (i.e. the maximum number of communications minus the current number); or
- a pre-determined number, or less, of simultaneous media streams available (i.e. the maximum number of simultaneous media streams minus the current number); or
- a certain limit in the bandwidth used at the given subscriber's interface(s) has been reached.

Annex Db (informative): services classification applicable to Inter IMS Network-to-Network Interface (II-NNI).

The goal of this informative annex is to improve the service interconnection at II-NNI. The classification of services may simplify the cooperation between interconnecting networks but remains optional.

Db.1 High Priority Category

List of services with high priority to be supported at II-NNI (it is recommended to be able to deliver these services at II-NNI). These services have technical impact the II-NNI:

- Basic Voice,
- Originating Identification Presentation (OIP),
- Originating Identification Restriction (OIR),
- Incoming Communication Barring (ICB) – including Anonymous Communication Rejection (ACR),
- Advice Of Charge (AOC),
- Communication DIVersion (CDIV) – Call DIV signaling information saying that this call has been already diverted.
- Malicious Communication Identification (MCID),
- Communication HOLD (HOLD),
- Communication Waiting (CW).

Db.2 Medium Priority Category

List of services with medium priority to be supported at II-NNI (it is recommended that interconnecting parties agree on using these services before planning to open them at II-NNI). These services have technical impact the II-NNI:

- Terminating Identification Presentation (TIP),
- Terminating Identification Restriction (TIR),
- Message Waiting Indication (MWI),
- Completion of Communications to Busy Subscriber (CCBS),
- Completion of Communications on Non Reply (CCNR),
- Explicit Communication Transfer (ECT),
- Closed User Group (CUG),
- Personal Network Management (PNM),
- Three-ParTY (3PTY),
- CONference (CONF),
- User to User service.

Db.3 Low Priority Category

List of services with low priority that have no identified impact on II-NNI (the delivery of these services is inside of originating network):

- Flexible Alerting (FA),
- Outgoing Communication Barring (OCB),
- Customized Alerting Tone (CAT),
- Customized Ringing Signal (CRS)
- Call Completion Not Logged In (CCNL).

Annex Dc (normative): Enterprise IP-PBX Supplementary Services to support 3GPP Voice Interworking

Dc.1 General

The services in this annex are the services that could be supported in an enterprise IP-PBX environment. These are provided in order to support implementation of interworking between an Enterprise IP-PBX and IMS. 3GPP UEs that are designed to work in an Enterprise environment could support these types of supplementary services.

Dc.2 Individual Line Services

Dc.2.1 Introduction

IP-PBX features are generally classified as either Individual Line or Group Line Services. Individual Line services are applicable to individual Enterprise users (aka "lines" or "extensions"). Group Services, in contrast, are applicable to groups of users.

Dc.2.2 Call Transfer (Unattended, Attended & Early Attended)

This is based on Explicit Communications Transfer (ECT) as described in Section 8.2.15.

In a Unattended Call Transfer, an ongoing call is transferred to a 3rd party by one of the parties (called the transferring party) without checking the status of the 3rd party. This is supported as a service provider option of ECT in Section 8.2.15.

In an attended call transfer (sometimes called Supervised Call Transfer) the ongoing call is placed on hold by the transferring party, another call is established between the transferring party and the party to whom the call is proposed to be transferred, and then the call is (or may be, depending on the result of that discussion) transferred to that party. This is effectively a combination of the Communication HOLD service defined in section 8.2.9 and ECT defined in Section 8.2.15.

In an Early Attended Call Transfer the ongoing call is placed on hold and the transferring party waits to hear the 3rd party's phone ring. Once the transferring party hears ring tone, he transfers the call. This is supported as a service provider option of ECT in Section 8.2.15.

Dc.2.3 Multi-party Ad-hoc Conference with Rosters

Multi-party and Conference Calls provide communications between multiple users. Such calls may or may not be arranged in advance. Multi-party calls not arranged in advance are termed "ad hoc".

Conference calls generally involve multiple parties, so the terms *multi-party call* and *conference call* are in some senses synonymous. Conventionally, the term *conference call* refers to a call that is arranged in advance by a moderator or host who has special privileges (e.g., can mute and un-mute other participants), with logistics communicated e.g., through email or a calendar system. To participate in a conference call one typically calls a number associated with a conferencing server.

An Ad Hoc Multi-party call is usually not pre-arranged and participants are generally all "equal" (they can mute and un-mute themselves). There may or may not be a conferencing server involved.

The list of participants in a multi-party / conference call is known as the roster. The IP-PBX may have the ability to supply the roster to the device of any participant.

Dc.2.4 Call Forwarding

Call Forwarding, or Communications Diversion (CDIV), is defined in Section 8.2.7. Call Forwarding Activation is an action on the part of the user to change the call forwarding behaviour of his device; e.g., by activating or deactivating forwarding to a pre-designated number, or changing the forwarded to number.

Call forwarding (aka Communications Diversion or CDIV) is provided to incoming calls based on the called party's status and service configuration. It may be invoked for the reasons summarized below. Call forwarding for other reasons is not precluded, as a network option.

1. Call Forward on Busy - Call Forwarding is invoked because the called party's line is not able to accept the incoming call (e.g., it is in use, or off hook).

This is known as Communication Forwarding Busy (CFB) in Section 8.2.7.1.

2. Call Forward on No Answer - Call Forwarding is invoked after the called party is alerted a configured number of times without response.

This is known as Communication Forward on No Reply (CFNR) in Section 8.2.7.1.

3. Call Forward Unconditional - Call Forwarding is enabled by the user (e.g., prior to leaving the office) so that all subsequent calls will be immediately forwarded to the specified destination. This configuration typically remains in effect until manually cancelled. The forwarded line may indicate that it is in this state by issuing a special dial tone (e.g., "stutter dial tone") when the receiver is taken off hook. Call Forward Unconditional may be invoked using special key sequences (Vertical Service Codes), e.g., *72 in North America or *21* in Europe, followed by the forward-to number; or via a special button or soft key on the device.

This is known as Communication Forwarding Unconditional (CFU) in Section 8.2.7.1.

4. Call Forward on Do Not Disturb - similar to call forward unconditional, but invoked by pressing the Do Not Disturb button or soft key. Most devices will visually display that they are in the Do Not Disturb state. Pressing the Do Not Disturb button or soft key while in the Do Not Disturb state, causes the line to exit this state.

This is known as Communication Deflection (CD) in Section 8.2.7.1.

Dc.2.5 Single Number Reach (SNR)

The Single Number Reach (SNR) capability allows calls to a IP-PBX extension to be picked up on or transferred to, alternate devices such as a home phone or mobile phone.

In the case of a call incoming to the number associated with the IP-PBX extension, the IP-PBX will normally ring that line first. If it is unanswered, the IP-PBX will ring one or more alternate numbers.

An in-progress call may be "pushed to" a pre-configured alternate device by pressing a special button or key sequence on the device with which the IP-PBX extension number is associated. Similarly it can be "pulled back" to that device.

Dc.2.6 Do Not Disturb (DND)

The Do Not Disturb (DND) function prevents calls from being terminated to an extension for which DND is activated.

Calls to an extension for which DND is activated may be directed to a pre-assigned extension (e.g., a secretary), receive a busy signal, or receive an indication that the called party is busy. In some IP-PBXs the call may be allowed through to the extension but displayed differently (e.g., with a visual indication, but without ringing). It may be possible to circumvent the called party's DND status by policy (e.g., the called party's boss can "get through") or by entering a circumvention code.

Dc.2.7 Immediate Divert (to messaging system)

The Immediate Divert function allows a call to be connected to a messaging system (typically a voice mail system). The call may be active, on hold or in the process of being established. The messaging system may be associated with the party invoking the Immediate Divert function or (if they differ) with the original called party. When the call is in the process of being established this is known as Communication Diversion (CDIV) as defined in Section 8.2.7. When the call is active or on hold, this is known as Explicit Communication Transfer (ECT) as defined in Section 8.2.15.

Immediate Divert is invoked by a special key, softkey or key sequence depending on the capability of the device. The IP-PBX typically informs the diverted party that the call has been diverted, and to whose messaging system the diverted party is now speaking.

Dc.2.8 Shared-line Features (remote-in-use, call-Barge)

A shared line is a telephone number associated with multiple devices at the same time. A set of devices sharing the same number is called a Shared Line Group. This is a variant of the Closed User Group defined in Section 8.2.17. The Call Barge function allows a user to join an in-progress call in which it and one of the currently participating devices are members of the same Shared Line Group.

Call Barge is only possible from device 'A' if at least one device in the same Shared Line Group as 'A' has a call in progress. This status may be indicated to the user of device 'A' by the IP-PBX.

Dc.2.9 Callback

The Callback function notifies a user when the party to whom a call was previously attempted, becomes available. It is effectively the combination of Communication Completion on Busy (CCBS) and Communication Completion on No Reply (CCNR) defined in Sections 8.2.11 and 8.2.23.

If IP-PBX user 'A' attempts to call IP-PBX user 'B' but the call fails, e.g., because user B's line was busy or the call was unanswered, user 'A' may invoke the Callback function. Doing so causes the IP-PBX to monitor B's status, and notify user A when user B becomes available. For example if B's line was previously off hook, he will be deemed available when he next goes on hook.

Dc.2.10 Connected Name and Number Display

This feature allows the device to display the name and/or telephone number of both current parties on a 2-party call.

This feature uses the Connected Line ID Presentation (COLP/COLR) and Connected Name Presentation (CONP/CONR) services to allow or restrict presentation of this information on a call by call basis.

This feature requires that the IMS or the IP-PBX maintains the name associated with Enterprise specific identities (short numbers).

Dc.2.11 Call Whisper

Call Whisper identifies to the called party, information about the caller (e.g., the caller ID, and the telephone number the caller dialed) while the caller continues to hear ringing. This information allows the called party to know how to greet the caller, and/or whether to accept the call. This is an optional service described in section 7.5.1 of TS 22.228 [4].

This capability is often used when multiple non-geographic numbers (e.g., toll free numbers) are used to route calls to the same directory number. For example a call center may take calls for many companies, and the receptionists need to greet the caller differently based on the company to which the call is related. It can also be used in a FMC scenario where e.g., a call to either the fixed or the mobile device will cause both to ring. The implementation will typically translate the called number into a pre-defined phrase (e.g., "this call is for Acme Rockets" or "this call is for your mobile"). The format of the "whisper" may vary (e.g., audio vs. visual presentation) depending on the capabilities of the device.

Dc.3 Group Line Services

Dc.3.1 Introduction

A IP-PBX often provides a set of advanced services to groups of users within the Enterprise. The groups generally correspond to job functions (e.g., help desk attendants) or organizations (e.g., marketing, sales). Group Services may for example allow enhanced collaboration among group members, or allow the distribution of work across them.

Dc.3.2 Enterprise Music On Hold

Music on Hold (MOH) is played to the party whose line has been placed on hold.

The Music on Hold (MOH) feature allows users to place on-net and off-net users on hold with music that is streamed from a streaming source. In an Enterprise MOH is often used to provide information rather than music. The caller may interact with the MOH capability using simple key sequences, e.g., "enter *0 to hear about our sales, or *1 to disable this announcement". The announcement may be customized based e.g., on the number dialed. The media is typically streamed from a Music on Hold Server, which may or may not be considered part of the IP-PBX.

This is an add-on to the Communication HOLD service defined in Section 8.2.9. The network should be capable of suppressing MOH when the held party is part of a multi-party call.

Dc.3.3 Call Park

The Call Park feature allows a party involved in a call to place that call on hold on one device and resume it from another.

Traditionally Call Park has been activated using a special button (the "call park" button) or key sequence. The call is at that point transferred to an idle extension, and is said to be "parked on" that extension. The IP-PBX may provide some means of "paging" the desired party, e.g., through a public address system or via some form of messaging. The call can be resumed from any IP-PBX line, by providing the extension number on which it is "parked".

This is a variation of the Communication HOLD service defined in Section 8.2.9, where the call can be picked up from a different terminal than placed on hold.

Dc.3.4 Call Pickup/Group Pickup

Call Pickup allows a user to answer on one line or device, an incoming call directed to another line or device. Lines or devices may be assigned to groups, in which case call pickup is restricted to lines or devices in the same group. That is known as Group Pickup.

Imagine a large room with many phones and few people. One of the phones, on the far side of the room, starts to ring. Rather than walking across the room, a user can press a special button or key sequence on his own phone to transfer that call to his phone. That is Call Pickup.

In a distributed environment it may not be possible for the user to hear the other phone ringing, so an alternative alerting mechanism may be used. For example a text message could alert a user on his mobile that his office or home phone was ringing.

Annex E (informative): Bibliography references

In chapter 8 several informative references are given to provide a more complete understanding of the stage 1 definition of the IMS supplementary services developed in this TS.

These references shall be intended as general guidelines given to integrate the service descriptions of this document and are exclusively intended to be applicable in relation to stage 1 aspects. Stage 3 of Multimedia Telephony service is defined exclusively in [7].

- [E-1] ETSI ETS 300 200: "Integrated Services Digital Network (ISDN); Call Forwarding Unconditional (CFU) supplementary service; Service description".
- [E-2] ETSI EN 300 199 (V1.2.1): "Integrated Services Digital Network (ISDN); Call Forwarding Busy (CFB) supplementary service; Service description".
- [E-3] ETSI EN 300 201 (V1.2.1): "Integrated Services Digital Network (ISDN); Call Forwarding No Reply (CFNR) supplementary service; Service description".
- [E-4] ETSI ETS 300 202: "Integrated Services Digital Network (ISDN); Call Deflection (CD) supplementary service; Service description".
- [E-5] ETSI ETS 300 056: "Integrated Services Digital Network (ISDN); Call Waiting (CW) supplementary service; Service description".
- [E-6] ETSI ETS 300 139: "Integrated Services Digital Network (ISDN); Call Hold (HOLD) supplementary service; Service description".
- [E-7] ETSI ETS 300 183: "Integrated Services Digital Network (ISDN); Conference call, add-on (CONF) supplementary service; Service description".
- [E-8] ETSI ETS 300 164: "Integrated Services Digital Network (ISDN); Meet-Me Conference (MMC) supplementary service; Service description".
- [E-9] ETSI EN 300 357 (V1.2.1): "Integrated Services Digital Network (ISDN); Completion of Calls to Busy Subscriber (CCBS) supplementary service; Service description".
- [E-10] ETSI ETS 300 178: "Integrated Services Digital Network (ISDN); Advice of Charge: charging information at call set-up time (AOC-S) supplementary service; Service description".
- [E-11] ETSI ETS 300 179: "Integrated Services Digital Network (ISDN); Advice of Charge: charging information during the call (AOC-D) supplementary service; Service description".
- [E-12] ETSI ETS 300 180: "Integrated Services Digital Network (ISDN); Advice of Charge: charging information at the end of the call (AOC-E) supplementary service; Service description".
- [E-13] ETSI EN 300 650 (V1.2.1): "Integrated Services Digital Network (ISDN); Message Waiting Indication (MWI) supplementary service; Service description".
- [E-14] ETSI EN 301 798 (V1.1.1): "Services and Protocols for Advanced Networks (SPAN); Anonymous Call Rejection (ACR) Supplementary Service; Service description".
- [E-15] ETSI EN 301 082 (V2.1.1): "Integrated Services Digital Network (ISDN); Outgoing Call Barring-Fixed (OCB-F) supplementary service; Service description".
- [E-16] ETSI EN 301 084 (V2.1.1): "Integrated Services Digital Network (ISDN); Outgoing Call Barring-User Controlled (OCB-UC) supplementary service; Service description".
- [E-17] ETSI ETS 300 094 V2.1.1 (2000-06): "Integrated Services Digital Network (ISDN); Connected Line Identification Presentation (COLP); supplementary service; Service description".
- [E-18] ETSI EN 300 367 V1.2.1 (1998-10): "Integrated Services Digital Network (ISDN); Explicit Call Transfer (ECT) supplementary service; Service description".
- [E-19] ITU-T Recommendation I.256.3 (08/92): "Integrated Services Digital Network (ISDN); general structure and service capabilities; Reverse Charging".
- [E-20] ETSI ETS 300 095 ed.1 (1992-01): "Integrated Services Digital Network (ISDN); Connected Line Identification Restriction (COLR) supplementary service; Service description".
- [E-21] ETSI ETS 300 186 ed.1 (1993-07): "Integrated Services Digital Network (ISDN); Three-Party (3PTY) supplementary service; Service description".

- [E-22] ETSI ETS 300 136 (March 1992): "Integrated Services Digital Network (ISDN); Closed User Group (CUG) supplementary service; Service description".
- [E-23] ETSI EN 301 134 (October 1998): "Integrated Services Digital Network (ISDN); Completion of Calls on No Reply (CCNR) supplementary service; Service description".

Annex F (informative): Change history

Change history											
TSG SA#	SA Doc.	SA1 Doc	Spec	CR	Rev	Rel	Cat	Subject/Comment	Old	New	WI
2006-02			22.173					First skeleton		0.0.1	
2006-02		SA1#31	22.173					Updated with text from TR 22.973 v1.1.0	0.0.1	0.1.0	
SP-31			22.173					Agreed to be sent to SA #31 for information	0.1.0	1.0.0	
2006-04	SA1#32	S1-060549	22.173					Update at SA1#32, including S1-060386, S1-060509, S1-060547, S1-060543.	1.0.0	1.1.0	
2006-04	SA1#32	S1-060628	22.173					Raised to 2.0.0 for presentation to SA #32	1.1.0	2.0.0	
2006-06	SP-32	SP-060310	22.173	-	-			Approved at SA #32	2.0.0	7.0.0	
2006-10	SP-33	SP-060471	22.173	0001	-			CR to 22.173 to remove the editor's note in the Conf supplementary service	7.0.0	7.1.0	MITE
2006-10	SP-33	SP-060471	22.173	0002	-			Requirements of setting the priority of IMS supplementary services	7.0.0	7.1.0	MITE
SP-34	SP-060761	S1-061400	22.173	0003	-	Rel-7	F	A133-01; removal of requirement to align supplementary service requirements	7.1.0	7.2.0	MITE
SP-34	SP-060761	S1-061436	22.173	0005	-	Rel-7	F	Clarification on media components	7.1.0	7.2.0	MTSI-REQ
SP-35	SP-070117	S1-070250	22.173	0006	1	Rel-7	F	Clarification on supplementary services	7.2.0	7.3.0	MTSI-REQ
SP-37	SP-070660	S1-071293	22.173	0008	4	Rel-8	B	TISPAN MMTEL R8 for Common IMS	7.3.0	8.0.0	TISMMTE L-R8
SP-38	SP-070846	S1-071788	22.173	0011	1	Rel-8	B	Network determined user busy	8.0.0	8.1.0	CIMS8-TIS
SP-38	SP-070847	S1-071862	22.173	0010	1	Rel-8	D	Editorial modifications	8.0.0	8.1.0	TISMMTE LR8
SP-38	SP-070847	S1-071865	22.173	0013	3	Rel-8	B	Media Handling Interworking	8.0.0	8.1.0	TMMTEL
SP-39	SP-080044	S1-080260	22.173	0016	2	Rel-8	B	Flexible Alerting service	8.1.0	8.2.0	CIMS_3G PP2
SP-39	SP-080041	S1-080179	22.173	0017	1	Rel-8	F	Addition of a missing requirement from Rel-7	8.1.0	8.2.0	TEI8
SP-40	SP-080297	S1-080586	22.173	0019	1	Rel-8	A	Adding and removing media during a multimedia service session	8.2.0	8.3.0	TEI7
SP-40	SP-080307	S1-080757	22.173	0020	3	Rel-8	F	Clarifications on media interworking for IMS Multimedia telephony	8.2.0	8.3.0	MMTEL-R8
SP-41	SP-080496	S1-082407	22.173	0021	2	Rel-8	D	Editorial modifications	8.3.0	8.4.0	TEI8
SP-42	SP-080770	S1-083188	22.173	0032	1	Rel-8	F	retrieval the settings of IMS supplementary services	8.4.0	8.5.0	TEI8
SP-42	SP-080770	S1-084422	22.173	0033	3	Rel-8	F	Changing the attributes of individual media during an IMS Multimedia Telephony communication	8.4.0	8.5.0	MMTel
SP-42	SP-080770	S1-083439	22.173	0036	3	Rel-8	F	Correction of interaction of SS and emergency callback	8.4.0	8.5.0	TEI8
SP-42	SP-080768	S1-084149	22.173	0049	-	Rel-8	C	Addition of IMS CAT to IMS Multimedia Telephony service	8.4.0	8.5.0	CIMS_3G PP2
SP-42	SP-080770	S1-084423	22.173	0052	2	Rel-8	F	Applicability of PNM to MMTel	8.4.0	8.5.0	MMTel
SP-42	SP-080777	S1-083213	22.173	0038	2	Rel-9	B	Association of Services to Time/Date	8.5.0	9.0.0	eMMTel
SP-42	SP-080777	S1-083216	22.173	0040	3	Rel-9	B	Add additional timing information	8.5.0	9.0.0	eMMTel

SP-42	SP-080777	S1-084383	22.173	0046	3	Rel-9	B	White / Black list	8.5.0	9.0.0	eMMTel
SP-42	SP-080777	S1-084382	22.173	0048	2	Rel-9	C	Enhancements for ICB	8.5.0	9.0.0	eMMTel
SP-42	SP-080776	S1-084328	22.173	0050	1	Rel-9	C	Addition of IMS CRS to IMS Multimedia Telephony service	8.5.0	9.0.0	TEI9
SP-43	SP-090083	S1-090184	22.173	0052	1	Rel-9	F	Corrections to dynamic blocking of incoming communications	9.0.0	9.1.0	eMMTel
SP-44	SP-090372	S1-091295	22.173	0054	2	Rel-9	A	Alignment CR: Completion of Communications on No Reply	9.1.0	9.2.0	TEI9
SP-45	SP-090478	S1-093295	22.173	0055	3	Rel-9	D	Introduce reference to Total Conversation in IMS Multimedia Telephony	9.2.0	9.3.0	eMMTel
SP-45	SP-090478	S1-093355	22.173	0057	1	Rel-9	F	Correction of applicabilities	9.2.0	9.3.0	TEI9
SP-45	SP-090486	S1-093372	22.173	0056	1	Rel-10	B	Completion of Communications on Not Logged-in (CCNL)	9.2.0	10.0.0	CCNL
SP-46	SP-090837	S1-094498	22.173	0063	3	Rel-10	A	Correction of CDIV interactions	10.0.0	10.1.0	TEI8
SP-46	SP-090846	S1-094479	22.173	0060	1	Rel-10	D	Correction of numbering	10.0.0	10.1.0	TEI10
SP-46	SP-090846	S1-094495	22.173	0064	1	Rel-10	B	ICS Enhancements	10.0.0	10.1.0	TEI10
SP-46	SP-090846	S1-094281	22.173	0059	2	Rel-10	B	Time extension	10.0.0	10.1.0	TEI10
Note: version 10.1.0 wrongly shows "10.0.0" on cover page and Change History was not updated (but all CRs implemented).											
SP-47	SP-100190	S1-100072	22.173	0066	-	Rel-10	B	Enhanced voice services	10.1.0	10.2.0	EVS_Cod ec
SP-48	SP-100437	S1-101107r	22.173	0068	2	Rel-11	B	USSD Simulation Service	10.2.0	11.0.0	USS1
SP-49	SP-100583	S1-102011	22.173	0069	-	Rel-11	B	IMS Roaming Enhancements	11.0.0	11.1.0	OSCAR
SP-51	SP-110163	S1-110430	22.173	0071	1	Rel-11	A	Supplementary services classification on IL-NNI	11.1.0	11.2.0	TEI10
SP-53	SP-110632	S1-112375	22.173	0074	3	Rel-11	B	Supplementary Services for Support of Enterprise IP-PBX	11.2.0	11.3.0	VINE
SP-54	SP-110807	S1-113394	22.173	0078	1	Rel-11	A	ACR correction	11.3.0	11.4.0	IMSTSS
SP-60	SP-130195	S1-133196	22.173	0091	-	Rel-11	F	Removal of IMS Emergency Callback requirements from Rel-11	11.4.0	11.5.0	TEI11