ETSI TS 183 004 V1.1.1 (2006-04)

Technical Specification

Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN simulation services: Communication Diversion (CDIV); Protocol specification

Reference

DTS/TISPAN-03022-NGN-R1

Keywords

CF, supplementary services

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00   Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

Individual copies of the present document can be downloaded from:
http://www.etsi.org

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at
http://portal.etsi.org/tb/status/status.asp

If you find errors in the present document, please send your comment to one of the following services:
http://portal.etsi.org/chaircor/ETSI_support.asp

Copyright Notification

Contents

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (http://webapp.etsi.org/IPR/home.asp).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN).

1 Scope

The present document specifies the, stage three, Protocol Description of the Communications Diversion (CDIV) services, based on stage one and two of the ISDN Communication diversion supplementary services. Within the Next Generation Network (NGN) the stage 3 description is specified using the IP-Multimedia Communication Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP).

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 and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

[1] ETSI TS 181 002: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Multimedia Telephony with PSTN/ISDN simulation services".

[2] ETSI ES 283 003: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Endorsement of "IP Multimedia Call Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP) Stage 3 (Release 6)" for NGN Release 1".

[3] IETF RFC 4244: "An Extension to the Session Initiation Protocol (SIP) for Request History Information".

[4] ETSI TS 183 023: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Release 1; PSTN/ISDN simulation services; Extensible Markup Language (XML) Configuration Access Protocol (XCAP) over the Ut interface for Manipulating NGN PSTN/ISDN Simulation Services".

[5] IETF RFC 2327: "SDP: Session Description Protocol".

[6] IETF RFC 3261: "SIP: Session Initiation Protocol".

[7] IETF RFC 3966: "The tel URI for Telephone Numbers.

[8] IETF RFC 3325: "Private Extensions to the Session Initiation Protocol (SIP) for Asserted Identity within Trusted Networks".

[9] ETSI TS 183 011: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN simulation services: Anonymous Communication Rejection (ACR) and Communication Barring (CB); Protocol specification".

[10] ETSI EN 300 356-15 (V4.2.1): "Integrated Services Digital Network (ISDN); Signalling System No.7 (SS7); ISDN User Part (ISUP) version 4 for the international interface; Part 15: Diversion supplementary service [ITU-T Recommendation Q.732, clauses 2 to 5 (1999) modified]".

[11] ETSI TS 183 028: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Common Basic Communication procedures; Protocol specification".

[12] ETSI ES 282 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture Release 1".

[13]   ETSI ES 283 027: "Telecommunications and Internet converged Services and Protocols for
              Advanced Networking (TISPAN); Interworking SIP-ISUP for TISPAN-IMS".

3   Definitions and abbreviations

3.1   Definitions

For the purposes of the present document, the terms and definitions given in TS 181 002 [1] and the following apply:

escaped character: See RFC 3261 [6].

3.2   Abbreviations

For the purposes of the present document, the following abbreviations apply:

ACK	ACKnowledgement
CD	Communication Deflection
CDIV	Communication DIVersion
CFB	Communication Forwarding Busy
CFNL	Communication Forwarding on No Logged-in
CFNR	Communication Forwarding No Reply
CFU	Communication Forwarding Unconditional
HOLD	communication HOLD
IFC	Initial Filter Criteria
IMS	IP Multimedia Subsystem
IP	Internet Protocol
ISDN	Integrated Service Data Network
MCID	Malicious Communication IDentification
NGN	Next Generation Network
OCB	Outgoing Communication Barring (OCB)
OIP	Originating Identification Presentation
OIR	Originating Identification Restriction
PSTN	Public Switched Telephone Network
S-CSCF	Server-Call Session Control Function
SDP	Session Description Protocol
SIP	Session Initiation Protocol
TIP	Terminating Identification Presentation
TIR	Terminating Identification Restriction
UA	User Agent
UE	User Equipment
URI	Universal Resource Identifier
XML	eXtensible Markup Language

4   Communications Diversion (CDIV)

4.1   Introduction

The Communications Diversion (CDIV) services enables diverting user, to divert the communications addressed to
diverting user to an other destination.

4.2 Description

4.2.1 General description

The service description of the following Communication Services CFU, CFB, CFNR and CD are based on the PSTN/ISDN Supplementary Services.

Generally the following requirements should be fulfilled:

- It shall be possible for the user or the network to identify an alternative destination for an IP multimedia session or individual media of an IP multimedia session.

- It shall be possible for redirection to be initiated at various stages of an IP Multimedia session. For example:

  - Prior to the set up of an IP Multimedia session.

  - During the initial request for an IP Multimedia session (CFU).

  - During the establishment of an IP Multimedia session (CD).

- Redirection can be applied for all Multimedia sessions unconditionally or it can be caused by any of a set list of events or conditions. Typical causes could be:

  - Identity of the originating user.

  - Presence of the originating or destination party.

  - If the destination party is already in a session (CFB).

  - If the destination party is unreachable or unavailable in some other way (CFNL; CFNR).

  - If the destination party does not respond (CFNR).

  - After a specified alerting interval (CFNR).

  - User's preference on routing for specific IP Multimedia session based on the capabilities of multiple UEs sharing the same IMS service subscription.

  - The sending party, receiving party or the network on their behalf, may initiate redirection to alternative destinations.

The following services describe applications based on a subset of the above-mentioned requirements to provide user different possibilities to divert a communication.

It should be possible that a user has the option to restrict receiving communications that are forwarded.

Communication Forwarding Unconditional (CFU)

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

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

The CFB service enables a served user to have the network redirect to another user communications which are addressed to the served user's address and meet busy. The CFB service may operate on all communications, or just those associated with specified services. The served user's ability to originate communications is unaffected by the CFB supplementary service.

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

For more information on the procedures for determination of the busy condition see ES 183 028 [11].

Communication Forwarding on no Reply (CFNR)

The CFNR service enables a served user to have the network redirect to another user communications which are addressed to the served user's address, and for which the connection is not established within a defined period of time. The CFNR service may operate on all communications, or just those associated with specified services. The served user's ability to originate communications is unaffected by the CFNR supplementary service.

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

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

The CD service enables the served 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 connection is established by the served user, i.e. in response to the offered communication, or during the period that the served user is being informed of the communication. The served user's ability to originate communications is unaffected by the CD supplementary 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.

Communication Forwarding on Not Logged-in (CFNL)

The Communication Forwarding on Not Logged-in (CFNL) service enables a served user to redirect incoming communications which are addressed to the served user's address, to another user (forwarded-to address) in case the served user is not registered (logged-in). The CFNL service may operate on all communications, or just those associated with specified basic services.

As a service provider option, a subscription option can be provided to enable the served user to receive an indication that the CFNL service has been activated. This indication shall be provided when the served user logs out according to procedures described in RFC 3261 [6].

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.

4.3   Operational requirements

4.3.1   Provision/withdrawal

The CDIV services (Communication forwarding unconditional, Communication forwarding busy, Communication forwarding no reply, Communication forwarding not logged-in and Communication deflection) shall be provided after prior arrangement with the service provider.

The CDIV services shall be withdrawn at the served user's request or for administrative reasons.

The five simulation services can be offered separately with subscription options. For each subscription option, only one value can be selected. These subscription options are part of the call diversion profile for the served user. The subscription options are sown in the table 4.3.1.1.

Table 4.3.1.1: Subscription options for CDIV services

Subscription options	Value	Applicability
Served user receives notification that a communication has been forwarded.	No (default) _____ Yes	CFU CFB CFNR CD
Originating user receives notification that his communication has been diverted (forwarded or deflected).	No _____ Yes (default)	CFU CFB CFNR CFNL CD
Served user allows the presentation of his/her URI to *originating* user in diversion notification.	No _____ Yes (default)	CFU CFB CFNR CFNL CD
Served user receives reminder notification on outgoing communication that forwarding is currently activated.	No (default) _____ Yes	CFU CFB CFNR CFNL
Served user allows the presentation of his/her URI to *diverted-to* user.	No _____ Yes (default)	CFU CFB CFNR CFNL CD

The following network provider options are available for the supplementary services:

Table 4.3.1.2: Network provider options for CDIV services

Network provider option	Value	Applicability
Served user communication retention on invocation of diversion (forwarding or deflection).	Retain call to the served user until alerting begins at the diverted-to user _____ Clear call to the served user on invocation of call diversion	CFNR
Served user communication retention when forwarding is rejected at forwarded-to user.	Continue to alert the forwarding user (see note 1) _____ No action at the forwarding user (see note 2)	CFNR
Total number of all diversions for each call.	Maximum number of diverted connections (upper limit is based on operator policy)	CFU CFB CFNR CFNL CD
Call forwarding on no reply timer.	Timer duration shall be a service provider option	CFNR
NOTE 1: This applies to the retention of the communication at invocation of call forwarding.		
NOTE 2: This applies to the clearing communication option on invocation of call forwarding.		

For user configuration of the CDIV the Ut interface described in ES 282 001 [12] could be used. More detail is described in clause 4.9.

Other possibilities for provisioning could be used too like web based provisioning or pre-provisioning by the operator.

4.3.2 Requirements on the originating network side

No specific requirements are needed in the network.

4.3.3 Requirements in the network

No specific requirements are needed in the network.

4.4 Coding requirements

ES 283 003 [2] defines the messages and parameters for this simulation service. The following messages and parameters are used to support the Communication diversion service due to fulfil the requirements.

4.4.1 SIP-Messages

The following SIP messages are used due to the coding rules in ES 283 003 [2].

Table 4.4.1.1: SIP Header information for redirection

SIP Message	Ref.	SIP Header
INVITE	[3] [8] see Draft-jennings-sip-voicemail-uri-05 in Bibliography	History-Info-Header Privacy header cause-parameter in the uri-parameter
180 (Ringing)	[3] [8] see Draft-jennings-sip-voicemail-uri-05 in Bibliography	History-Info-Header Privacy header cause-parameter in the uri-parameter
181 (Call Is Being Forwarded)	[3] [8] see Draft-jennings-sip-voicemail-uri-05 in Bibliography	History-Info-Header Privacy header cause-parameter in the uri-parameter
200 (OK) response	[3] [8] see Draft-jennings-sip-voicemail-uri-05 in Bibliography	History-Info-Header Privacy header cause-parameter in the uri-parameter
302 (Moved Temporarily) (see note)	[2] see Draft-jennings-sip-voicemail-uri-05 in Bibliography	Contact header cause-parameter in the uri-parameter
NOTE: The 302 (Moved Temporarily) regarding the present document will be only used for the CD services.		

For more information on the cause-parameter is given in annex C.

4.4.2 Parameters

The Privacy header is described in ES 283 003 [2]. The present document refers for the History header to RFC 4244 [3], for the Privacy header and P.-Asserted-Identity to RFC 3325 [8] and for the Cause-Code to draft-jennings-sip-voicemail-uri-05 (see Bibliography).

4.5   Signalling requirements

4.5.1   Activation/deactivation/registration

For provisioning of the CDIV the Ut interface could be used. More detail is described in clause 4.9.

Other possibilities for provisioning could be used too like web based provisioning or pre-provisioning by the operator.

4.5.2   Invocation and operation

4.5.2.1   Actions at the originating UA

When communication diversion has occurred on the served user side and the network option "notification procedure" is used, the originating UA may receive a 181 (Call is being forwarded) response according to the procedures described in ES 283 003 [2].

The Information given by the History header could be displayed by the UA if it is a UE.

4.5.2.2   Actions at the originating P-CSCF

Procedures according to ES 283 003 [2] shall apply.

4.5.2.3   Actions at the originating S-CSCF

Procedures according to ES 283 003 [2] shall apply.

4.5.2.4   Actions at the diverting S-CSCF

Procedures according to ES 283 003 [2] shall apply.

Based on the Initial Filter Criteria (IFC) Rules a communication indicating that UE:B the served user is subscribed to the CDIV simulation services the communication is be forwarded to the AS.

   NOTE: An example of the use of IFC is shown in annex B.

4.5.2.5   Actions at the diverted to S-CSCF

Procedures according to ES 283 003 [2] shall apply.

4.5.2.6   Actions at the AS of the diverting User

4.5.2.6.1   Checking of the diversion limits

When receiving an INVITE request and the AS determines that it must divert a communication:

   1)   The AS shall check if diverting the communication exceeds the number of diversions allowed within the
         network. The number of diversions shall be calculated by the entries including a Cause parameter given by the
         History-Info header field, if the History-Info header field is present. If the number of diversions exceeds the
         given limit then the communication shall be released; and

   2)   If the Communication has already undergone one or more diversion(s), the entries in the Index entries
         parameter shall be examined to see if another diversion is allowed due to network based specified limit of
         diversions.

If the number of diversions exceed the given limit then the following response shall apply:

a) communication diversion forwarding busy a 486 (Busy here) shall be sent;

b) communication forwarding no reply, 480 (Temporarily unavailable) shall be sent;

c) communication forwarding unconditional 480 (Temporarily unavailable) shall be sent;

d) communication deflection, 480 (Temporarily unavailable) shall be sent.

NOTE: It is based on operator policy that the communication can be delivered to the latest diverting party when it is known.

In all cases a Warning header field indicating that the communication is released due to the extension of diversion hops (e.g. "Too many diversions appeared") shall be sent.

4.5.2.6.2 Setting of the diversion parameters by the AS

4.5.2.6.2.1 Overview

After checking the limit of diversions the following settings of the INVITE request shall be performed.

4.5.2.6.2.2 First diversion; no History header received

When this is the first diversion the communication has undergone, the following information is to be set in the retargeted request:

- the diverting parties address;

- the diverted-to party address;

- diversion information.

The following header fields shall be included or modified with the specified values:

a) **The Request URI** - shall be set to the public user identity where the communication is to be diverted.

b) **The History-Info Header** field - Two hist-info entries that shall be generated.

    b.1) The first entry includes the hi-targeted-to-uri of the served user.

        The privacy header "history" shall be escaped within the hi-targeted-to-uri, if:

- If the served user wishes privacy (e.g. the served user is subscribed to the OIR Service); or

- if the served used has the subscription option "Served user allows the presentation of his/her URI to diverted-to user" set to false.

        The Index is set to index = 1 according to the rules specified in RFC 4244 [3].

    b.2) The second entry includes the hi-targeted-to-uri of the address were the communication is diverted to. The index is set to index = 1.1, The Reason parameter (redirecting reason and redirecting indicator) escaped in the history-info header field shall be set according to the diversion conditions and notification subscription option.

        The mapping between the diversion conditions and the coding of the Reason parameter is as follows:

- Communication forwarding busy, the cause value "486 " as defined by draft-jennings-sip-voicemail-uri-05 (see Bibliography) shall be used;

- Communication forwarding no reply, the cause value " 408" as defined by draft-jennings-sip-voicemail-uri-05 (see Bibliography) shall be used;

- Communication forwarding unconditional, the cause value "302 as defined by draft-jennings-sip-voicemail-uri-05 (see Bibliography) shall be used";

- Communication deflection (Immediate response), the cause value " 480" as defined by draft-jennings-sip-voicemail-uri-05 (see Bibliography) shall be used";

- Communication Forwarding Not Logged in , the cause value "404" as defined by draft-jennings-sip-voicemail-uri-05 (see Bibliography) is used,

according to the rules specified in RFC 4244 [3].

c) **The To header** field - If the served user does not want to reveal its identity to the diverted-to party, then the To header shall be changed the URI where the communication is diverted to. The served user does not want to reveal its identity when one of the following conditions holds true:

- If the served user wishes privacy (e.g. the served user is subscribed to the OIR Service); or

- if the served used has the subscription option "Served user allows the presentation of his/her URI to diverted-to user" set to false.

In all other cases the To header shall not be changed.

4.5.2.6.2.3   Subsequent diversion; a History header received

When this is the second or greater diversion the communication has undergone, a new history-info entry shall be added to the History-Info header field according to the rules defined in RFC 4244 [3]. The following information has to added to the retargeted request:

- the diverted-to party address;

- diversion information.

The following header fields shall be included or modified with the specified values

a) **Request URI** - shall be set to the public user identity where the communication is to be diverted.

b) **History-Info Header** The history entry representing the served user may be modified. One history entry is added.

b.1) The history entry representing the served user privacy header "history" shall be escaped within the hi-targeted-to-uri, if:

- If the served user wishes privacy (e.g. the served user is subscribed to the OIR Service); or

- if the served used has the subscription option "Served user allows the presentation of his/her URI to diverted-to user" set to false.

If the history is already escaped with the correct privacy value no modification is needed.

In all other cases the history entry representing the served user shall not be changed.

b.2) A history entry shall be added where the hi-targeted-to-uri shall be set to the public user identity were the communication is diverted to. cause parameter (redirecting reason) escaped in the History-Info header field shall be set according to the diversion conditions and notification subscription option. The mapping between the diversion conditions and the coding of the Reason parameter is as follows:

- Communication forwarding busy, the Cause value "486" as defined by draft-jennings-sip-voicemail-uri-05 (see Bibliography) shall be used;

- Communication forwarding no reply, the Cause value "408" as defined by draft-jennings-sip-voicemail-uri-05 (see Bibliography) shall be used;

- Communication forwarding unconditional, the Cause value "302 " as defined by draft-jennings-sip-voicemail-uri-05 (see Bibliography) shall be used;

- Communication deflection (Immediate response), the Cause value "480" as defined by draft-jennings-sip-voicemail-uri-05 (see Bibliography) shall be used;

- Communication Forwarding Not Logged in, The Cause value "404" as defined by draft-jennings-sip-voicemail-uri-05 (see Bibliography) shall be used.

The Index shall be incremented according to the rules specified in RFC 4244 [3].

c) **To header**- If the served user does not want to reveal its identity to the diverted-to party, then the To header shall be changed the URI where the communication is diverted to. The served user does not want to reveal its identity when one of the following conditions holds true:

- if the served user wishes privacy (e.g. the served user is subscribed to the OIR Service); or

- if the served used has the subscription option "Served user allows the presentation of his/her URI to diverted-to user" set to false.

In all other cases the To header shall not be changed.

Table 4.5.2.6.2.2.1 shows the example of a communication path for multiple diversions.

4.5.2.6.2.2 Overview of the operation

Figure 4.5.2.6.2.2.1 shows the example of a communication path for multiple diversions.

HOP 1   HOP 2   HOP3   HOP 4   HOP 5   HOP X
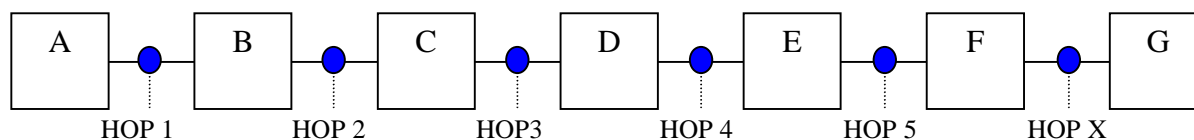
Figure 4.5.2.6.2.2.1: Originally A calls B Information transferred in the INVITE request

Table 4.5.2.6.2.2.1: Parameter information for multiple redirection

Table 4.5.2.6.2.2.1 shows which parameters and header fields that are modified in a diversion AS.

	HOP 1	HOP 2	HOP 3	HOP 4	HOP 5	HOP 6
Number Information P-Asserted-Identity Request URI hi-targeted-to-uri	A B	A C B,C	A D B,C,D	A E B,C,D,E	A F B,C,D,E,F	A G B,C,D,E,F,G
History Index added **hi-targeted-to-uri** Reason Privacy Hi-index		(1) & (2) B,C V(1); V(2) W(1); W(2) index1/Index2	(3) D(3) V(3) W(3) index3	(4) E(4) V(4) W(4) index4	(5) F(5) V(5) W(5) index5	(6) G(6) V(6) W(6) index6
V = Value regarding the rules the Reason header field (e.g. SIP cause or redirection cause) W = pivacy value (header) or (none) or no entry NOTE: The Hi-index field shall be increased by 1 due to the rules described in [4]						

4.5.2.6.3 Diversion procedures at the diverting AS

The diverting AS shall continue the communication depending on the service that is causing the diversion:

1) **Communication Forwarding Unconditional or Communication Forwarding Busy network determined user busy or Communication forwarding on Not Logged in**

The AS shall continue in the following manner:

- If the notification procedure of the originating user is supported then the originating user shall be notified as described in the clause 4.5.2.6.4.

- An INVITE request containing the diverted-to URI shall sent to the (outgoing) S-CSCF. The INVITE request shall includes the parameter information as shown in table 4.5.2.6.2.2.1 and described in clause 4.5.2.6.2.

2)   Communication Forwarding No Reply

After receiving the first 180 (Ringing) response the no reply timer (definition see clause 4.8) shall be started. If forking is provided by the S-CSCF a further received 180 (Ringing) response does not refresh the timer.

With receiving a 200 (OK) response the no reply timer shall be terminated and the call follows the Basic call procedure as described within ES 283 003 [2]. Other open early dialogs shall be terminated as described within ES 283 003 [2], clause 9.2.3.

When the no reply timer defined in clause 4.8 expires:

The dialog(s) to the diverting user shall be terminated e.g. by sending a CANCEL request or BYE request according to the rules and procedures in RFC 3261 [6].

If the notification procedure of the originating user is supported then the originating user shall be notified as described in the clause 4.5.2.6.4.

An INVITE request is sent to the (outgoing) S-CSCF towards the diverted-to user. The INVITE request includes the parameter information as shown in table 4.5.2.6.2.2.1.

3)   Communication Forwarding No Reply (ringing continues)

After receiving the first 180 (Ringing) response the no reply timer (definition see clause 4.8) shall be started. If forking is provided by the S-CSCF a further received 180 (Ringing) response does not refresh the timer.

When the no reply timer defined in clause 4.8 expires and if the notification procedures of the originating user is supported then the originating user shall be notified as described in the clause 4.5.2.6.4.

An INVITE is sent to the outgoing S-CSCF towards the diverted to user. The INVITE address message includes the parameter information as shown in table 4.5.2.6.2.2.1.

If diverting user accepts the communication after sending the INVITE request the communication path towards the diverted to user shall be released according to the rules and procedures in RFC 3261 [6].

4)   Communication Forwarding User Determined Busy

The Communication Forwarding User Determined Busy is offered to the served user when the AS:

- The received 486 Busy shall be acknowledged with a ACK.

- If the notification procedures of the originating user is supported then the originating user shall be notified as described in the clause 4.5.2.6.4.

- An INVITE message containing the diverted-to URI is sent to the outgoing S-CSCF. The INVITE address message includes the parameter information as shown in table 4.5.2.6.2.2.1.

5)   Communication Deflection immediate response

The Communication Deflection immediate response is offered to the served user.

A 302 (Moved Temporarily) response is received.

If the notification procedures of the originating user is supported then the originating user shall be notified as described in the clause 4.5.2.6.4.

An INVITE message containing the diverted-to URI is sent to the outgoing S-CSCF. The INVITE address message includes the parameter information as shown in table 4.5.2.6.2.2.1.

4.5.2.6.4 Notification procedures of the originating user (Network Option)

When Communication Diversion occurs and if the notification procedures of the originating user is supported then a 181 (Call Is Being Forwarded) response shall be sent towards the originating user. The 181 (Call Is Being Forwarded) response contains the P-Asserted-Identity header field and Privacy header field.

The P-Asserted-Identity includes the URI of the diverting user.

Additional the AS may initiate an announcement to be included towards the calling user in order to inform about the about the diversion. Announcements may be played according to procedures as are described in TS 183 028 [11].

4.5.2.6.5 Indication of communication diversion to the diverting user (network option)

One or combination of the following procedures are possible:

1) When the diverting user is registering the AS send a MESSAGE request including the information where the call is diverted too. As an Option the MESSAGE request that is be sent due to an timer value that can be provided by the user.

2) A diverting user will be informed periodically with a MESSAGE request the information where the call is diverted too.

3) A diverting user will be informed with a MESSAGE request after the diverting user has initiated a new outgoing communication. the information where the call is diverted too.

4) A diverting user could be informed via a Voicemail or Message mail system in the communication states described above in 1) to 3).

The description of information text contained in the MESSAGE request is out of scope of the present document.

4.5.2.7 Actions at the AS of the diverted to User

The AS shall store the History Header of an incoming Request.

If a 180, 181 or 200 response does not contain a History header field, the AS shall include the stored History header field and if diverted to user is subscribed to the TIR service the Privacy header field of all responses the priv-value of the last entry in the History header field shall be set to "history".

NOTE: A response including no History header Field is coming from an untrusted entity or the History header field is not included due to the privacy status within the SIP request.

4.5.2.8 Void

4.5.2.9 Actions at the incoming I-CSCF

Procedures according to ES 283 003 [2] shall apply.

4.5.2.10 Actions at the outgoing IBCF

Procedures according to ES 283 003 [2] shall apply.

4.5.2.11 Actions at the incoming IBCF

Procedures according to ES 283 003 [2] shall apply.

4.5.2.12 Actions at the BGCF

Basic call procedures according to ES 283 003 [2] shall apply.

The interworking with other NGN is described in clauses 4.7.3 and 4.7.4.

4.5.2.13 Actions at the MGCF

Procedures according to ES 283 003 [2] shall apply.

The interworking is described in clause 4.7.1.

4.5.2.14 Actions at the destination P-CSCF

Procedures according to ES 283 003 [2] shall apply.

4.5.2.15 Actions at the diverted to UA

Procedures according to ES 283 003 [2] shall apply.

4.5.2.16 Actions at the diverting UA

Procedures according to ES 283 003 [2] shall apply.

4.6 Interaction with other services

4.6.1 Communication Hold (HOLD)

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

4.6.2 Terminating Identification Presentation (TIP)

A P-Asserted-Identity and History header field received in the diverting AS is passed unmodified to the originating entity. The originating S-CSCF is responsible of the interpretation of the privacy header field.

4.6.3 Terminating Identification Restriction (TIR)

A P-Asserted-Identity and History header field received in the diverting AS is passed unmodified to the originating entity. The originating CSCF is responsible of the interpretation of the privacy header field.

If the served (diverting) user selects the option that the originating user is notified, but without the diverted-to number, then the AS shall not send the connected user's identity when the communication is answered, unless the originating user has an override capability.

4.6.4 Originating Identification Presentation (OIP)

When a communication has been diverted and the diverted-to user has been provided with the originating identification presentation simulation service, the S-CSCF of the diverted-to user shall sent the number of the original originating user, if this originating user has not subscribed to or invoked the originating identification restriction simulation service.

4.6.5 Originating Identification Restriction (OIR)

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

4.6.6 Conference calling (CONF)

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

4.6.7 Communication Diversion Services (CDIV)

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

4.6.8   Malicious Communication Identification (MCID)

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

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

If the user where the communication is forwarded to has subscribed to a call barring service "inhibition of incoming forwarded communication" the procedures described in TS 183 011 [9] shall take precedence.

If the user is subscribed to an Outgoing Communication Barring (OCB) service that includes the forwarded communication the OCB shall take precedence. The CDIV service has to check if the forwarded to number is restricted and release the communication in such a case.

4.6.10   Explicit Communication Transfer (ECT)

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

4.7   Interactions with other networks

4.7.1   Interaction with PSTN/ISDN

In case of interaction with networks which do not provide any notification of the communication diversion or communication redirection information (e.g. redirection counter) in the signalling system, the communication continues according to the basic call procedures.

4.7.1.1   Interworking at the O-MGCF

For the mapping of IAM to the INVITE Message no additional procedures beyond the basic call and interworking procedures are needed.

With regard to the backward messages the following mapping is valid.

Table 4.7.1.1.1: Mapping of SIP messages to ISUP messages

←Message sent to ISUP	←Message Received from SIP	
ACM indicating call forwarding	181 (Call Is Being Forwarded)	See table 4.7.1.1.6
CPG indicating call forwarding (see note)	181 (Call Is Being Forwarded)	See table 4.7.1.1.7
ACM indicating ringing	180 (Ringing)	See table 4.7.1.1.8
CPG indicating Alerting (see note)	180 (Ringing)	See table 4.7.1.1.9
ANM	200 (OK)	See table 4.7.1.1.10
CON	200 (OK) (Neither a 181 (Call Is Being Forwarded) nor a 180 (Ringing) was sent)	See table 4.7.1.1.10
NOTE: A CPG will be sent if a ACM was already send.		

   NOTE: The mapping of the basic Messages is shown in ES 283 027 [13].

Table 4.7.1.1.2: Mapping of History-Info Header to ISUP Redirection number

Source SIP header field and component	Source Component value	Redirection number	Derived value of parameter field
Hi-target-to-uri of the last History-Info entry appropriate global number portion of the URI, assumed to be in form "+" CC + NDC + SN.	CC	Nature of address indicator	If CC is equal to the country code of the country where I-IWU is located AND the next ISUP node is located in the same country, then set to "national (significant) number" else set to "international number".
	CC, NDC, SN	Address signals	If NOA is "national (significant) number" then set to NDC + SN. If NOA is "international number" then set to CC + NDC + SN.

Table 4.7.1.1.3: Mapping of History-Info Header to ISUP Redirection number restriction indicator

Source SIP header field and component	Source Component value	Redirection number restriction indicator	Derived value of parameter field
Privacy, priv-value component	"history"	Redirection number restriction indicator	Presentation restricted
	Privacy header field absent or "none"		Presentation allowed or absent

Table 4.7.1.1.4: Mapping of History-Index to ISUP Call Diversion Information

Source SIP header field and component	Source Component value	Call Diversion Information	Derived value of parameter field
Privacy, priv-value component	history	Notification subscription options	If the priv-value history is set for the History-Info Header or to the hist-info element entries concerning the redirecting and diverted to uri then *presentation not allowed* shall be set. If the priv-value history is set only to the hist-info element concerning the redirecting uri then *presentation allowed without redirection number shall be set.*
	Privacy header field absent or "none"		*Presentation allowed with redirection number*
		Original redirection reasons	*Unknown*
Hi-index		Redirection Counter	Index entries which are caused by communication diversion shall be counted
Cause Value in History Index; cause-param = "cause" EQUAL Status-Code	**Cause value**	Call diversion information	**Redirecting Reason**
	404		Unknown
	302		Unconditional
	486		User busy
	408		No reply
	480		Deflection immediate
	503		Mobile subscriber not reachable

Table 4.7.1.1.5: Mapping of History Index to ISUP Event Information

Source SIP header field and component	Source Component value	Event Information	Derived value of parameter field
		Event indication	Shall be set to ALERTING if mapped from a 180 (Ringing)
			Shall be set to PROGRESS if mapped from a 181 (Call Is Being Forwarded)
Cause Value in History Index; cause-param = "cause" EQUAL Status-Code	486		Call forwarded on busy (national use)
	408		Call forwarded on no reply (national use)
	302 302		Call forwarded unconditional (national use)

Table 4.7.1.1.6: Mapping of 181 (Call Is Being Forwarded) → ACM

Source SIP header field and component	Source Component value	ISUP Parameter or IE	Derived value of parameter field
181 (Call Is Being Forwarded)		ACM	
		Optional backward call indicators	Bit B call diversion may occur
		Generic notification indicators	Call is diverting
History Header	See table 4.7.1.1.2	Redirection number	See table 4.7.1.1.2
Priv-value	See table 4.7.1.1.3	Redirection number restriction indicator	See table 4.7.1.1.3
Priv-value	See table 4.7.1.1.4	Call diversion information *Notification subscription options*	See table 4.7.1.1.4
History Index	Reason Header: Reason = (see Draft-jennings-sip-voicemail-uri-05 in Bibliography) See table 4.7.1.1.4	Call diversion information	Redirecting Reason See table 4.7.1.1.4

Table 4.7.1.1.7: Mapping of 181 (Call Is Being Forwarded)→ CPG if ACM was already sent

Source SIP header field and component	Source Component value	ISUP Parameter or IE	Derived value of parameter field
181 (Call Is Being Forwarded)		CPG	
		Optional backward call indicators	Bit B call diversion may occur
		Generic notification indicators	Call is diverting
Cause Value in History Index; cause-param = "cause" EQUAL Status-Code	486	Event indicator	CFB (national use)
	408 (see note)		CFNR (national use)
	302		CFU (national use)
			PROGRESS
History Header	See table 4.7.1.1.2	Redirection number	See table 4.7.1.1.2
Priv-value	See table 4.7.1.1.3	Redirection number restriction indicator	See table 4.7.1.1.3
Priv-value	See table 4.7.1.1.4	Call diversion information *Notification subscription options*	See table 4.7.1.1.4
Cause Value in History Index; cause-param = "cause" EQUAL Status-Code	See table 4.7.1.1.4	Call diversion information *Redirecting Reason*	See table 4.7.1.1.4
NOTE: This appears in the cases of CFNR.			

**Table 4.7.1.1.8: Mapping of 180 (Ringing) → ACM if no 181 (Call Is Being Forwarded)
was received before**

Source SIP header field and component	Source Component value	ISUP Parameter or IE	Derived value of parameter field
180 (Ringing)		ACM	
History Header	If Index indicate that there is a call forwarding.	Optional backward call indicators	Bit B call diversion may occur
History Header	If Index indicate that there is a call forwarding.	Generic notification indicators	Call is diverting
History Header	See table 4.7.1.1.2	Redirection number	See table 4.7.1.1.2
Priv-value	See table 4.7.1.1.3	Redirection number restriction indicator	See table 4.7.1.1.3
Priv-value	See table 4.7.1.1.4	Call diversion information *Notification subscription options*	See table 4.7.1.1.4
Cause Value in History Index; cause-param = "cause" EQUAL Status-Code	See table 4.7.1.1.4	Call diversion information *Redirecting Reason*	See table 4.7.1.1.4

The mapping described within table 4.7.1.1.1 can only appear if the communication has already undergone a Call Forwarding in the ISDN/PSTN and the 180 is the first provisional response sent in backward direction.

The IWU can indicate the call diversion in the mapping of 180 (Ringing) to CPG in fact if the response before was a 181.

**Table 4.7.1.1.9: Mapping of 180 (Ringing) → CPG if a 181 (Call Is Being Forwarded)
was received before**

Source SIP header field and component	Source Component value	ISUP Parameter or IE	Derived value of parameter field
180 (Ringing)		CPG	
		Optional backward call indicators	Call diversion may occur
		Generic notification indicators	Call is diverting
History-header		Event indicator	ALERTING
History Header	See table 4.7.1.1.2	Redirection number	See table 4.7.1.1.2
Priv-value	See table 4.7.1.1.3	Redirection number restriction indicator	See table 4.7.1.1.3
Priv-value	See table 4.7.1.1.4	Call diversion information *Notification subscription options*	See table 4.7.1.1.4
Cause Value in History Index; cause-param = "cause" EQUAL Status-Code	See table 4.7.1.1.4	Call diversion information *Redirecting Reason*	See table 4.7.1.1.4

The mapping in table 4.7.1.1.1 appears when already a 181 was mapped to an 180. Therefore the statemachine of the MGCF knows that a CDIV is in Progress.

Table 4.7.1.1.10: Mapping of 200 (OK) response

Source SIP header field and component	Source Component value	ISUP Parameter or IE	Derived value of parameter field
200 (OK) response		ANM/CON	
History Header	See table 4.7.1.1.2	Redirection number	See table 4.7.1.1.2
Priv-value	See table 4.7.1.1.3	Redirection number restriction indicator	See table 4.7.1.1.3

4.7.1.1.1 Void

4.7.1.1.2 Call forwarding within the ISUP Network appeared

The following Scenario shows if a Call Forwarding appears in the ISUP/PSTN Network and the redirected Number is within the SIP Network. Table 4.7.1.1.2.1 should be seen as example.

For the mapping of 180 (Ringing) and 200 (OK) response OK to the regarding ISUP messages and parameters no additional procedures beyond the basic call procedures are needed.

Table 4.7.1.1.2.1: Mapping of IAM with SIP INVITE

ISUP Parameter or IE	Derived value of parameter field	SIP component	Value
IAM		INVITE	
Redirecting number		History Header	hi-targeted-to-uri
Nature of address indicator:		hi-targeted-to-uri	Add CC (of the country where the IWU is located) to Generic Number Address Signals then map to user portion of URI scheme used. **Addr-spec** "+" CC NDC SN mapped to user portion of URI scheme used
	"*national (significant) number*"		
	"*international number*"		Map complete Redirection number Address Signals to user portion of URI scheme used.
Address Signals	If NOA is "*national (significant) number*" then the format of the Address Signals is: NDC + SN If NOA is "*international number*" then the format of the Address Signals is: CC + NDC + SN	hi-targeted-to-uri	"+" CC NDC SN mapped to userinfo portion of URI scheme used
Redirecting number	APRI	Privacy Header	Priv-value
	"presentation restricted"		"*History*"-Index"
	"presentation allowed"		Privacy header field absent or "none"
Redirecting Information	Redirection indicator	Privacy Header	Priv-value
	Call diverted		"none"
	Call diverted, all redirection info presentation restricted		"*History*"-Index"
Redirecting Information	Redirection counter 1 to 5	History Index	Number of diversions are sown due to the number of Index Entries
Redirecting Information		Cause Value in History Index; cause-param = "cause" EQUAL Status-Code	**Cause value**
	unknown		404
	unconditional		302
	User Busy		486
	No reply		408
	Deflection during alerting		487
	Deflection immediate response		480
	Mobile subscriber not reachable		503
Original Called Party Number	*See* Redirecting number	History Header	URI of first Index entry of History Header
Original Called Party Number	APRI	Privacy Header	Priv-value
	"presentation restricted"		"*history*"
	"presentation allowed"		"*none*"

ETSI

4.7.1.2 Interworking at the I-MGCF

Table 4.7.1.2.1: Mapping of ISUP to SIP Massages

→Message sent to SIP	→Message Received from BICC/ISUP
INVITE	IAM

Table 4.7.1.2.2: Mapping of History-Info Header to ISUP Redirecting number

Source SIP header field and component	Source Component value	Redirecting number	Derived value of parameter field
Hi-target-to-uri appropriate global number portion of the URI, assumed to be in form "+" CC + NDC + SN	CC	Nature of address indicator	If CC is equal to the country code of the country where I-IWU is located AND the next ISUP node is located in the same country, then set to "national (significant) number" else set to "international number"
	CC, NDC, SN	Address signals	If NOA is "national (significant) number" then set to NDC + SN. If NOA is "international number" then set to CC + NDC + SN
Privacy Header , priv-value component In History-Info header field of the 2nd latest Entry or as header itself (see note)	"history"	APRI	"presentation restricted"
	Privacy header field absent or "none"		"presentation allowed"
NOTE: It is possible that a entry of the In History itself is marked as restricted or the whole History header.			

Table 4.7.1.2.3: Mapping of History Header to ISUP Redirection Information

Source SIP header field and component	Source Component value	Redirection Information	Derived value of parameter field
Privacy, priv-value component of the History In History-Info header field of the last two History-Info Entries or as header itself (Note)	*"history"* for the whole History header or for the last two index entries	Redirection indicator	*Call diverted, all redirection info presentation restricted*
	Privacy header field absent or "*none*"		*Call diverted*
		Original redirection reasons	*Unknown*
Cause Value in History Index; cause-param = "cause" EQUAL Status-Code	**Cause value**	Call diversion information	***Redirecting Reason***
	404		Unknown/not available
	302		Unconditional
	486		User busy
	408		No reply
	480		Deflection immediate response
	487		Deflection during alerting
	503		Mobile subscriber not reachable
NOTE: In History-Info header field of the 2nd latest Entry or as header itself.			

Table 4.7.1.2.4: Mapping of History-Info Header to ISUP Original Called number

Source SIP header field and component	Source Component value	Original called number	Derived value of parameter field
		Numbering Plan Indicator	"*ISDN (Telephony) numbering plan (Recommendation E.164)*"
Hi-target-to-uri of 1st History-Info entry appropriate global number portion of the URI, assumed to be in form "+" CC + NDC + SN	CC	Nature of address indicator	If CC is equal to the country code of the country where I-IWU is located AND the next ISUP node is located in the same country, then set to "national (significant) number" else set to "international number"
	CC, NDC, SN	Address signals	If NOA is "national (significant) number" then set to NDC + SN. If NOA is "international number" then set to CC + NDC + SN

Table 4.7.1.2.5: Mapping of INVITE to IAM

INVITE		IAM	
History Header	See table 4.7.1.2.2	Redirecting number	See table 4.7.1.2.2
History-Info Header	See table 4.7.1.2.3	Redirecting Information	See table 4.7.1.2.3
History Index	Index number for Redirecting number	Redirecting Information	Redirection counter = Value Index number for Redirecting number If Value > 5 then release Call
	Cause value	Redirecting Information	***Redirecting Reason***
	404		Unknown/not available
	302		Unconditional
	486		User busy
	408		No reply
	480		Deflection immediate response
	487		Deflection during alerting
	503		Mobile subscriber not reachable
To header and first Index entry of History Header	Redirecting number <sip:oCdPN@UA2?> index=1 ;	Original Called Party Number	*See* Redirecting number
Privacy Header	Priv-value	Original Called Party Number	APRI
	"history"		"presentation restricted"
	Privacy header field absent or "none"		"presentation allowed"

Table 4.7.1.2.7: Mapping of ISUP to SIP Massages

←Message sent to SIP	←Message Received from BICC/ISUP
180 (Ringing)	ACM indicating ringing
180 (Ringing)	CPG indicating ringing
200 (OK)	ANM
200 (OK)	CON

In the ISUP destination Exchange of the diverted-to user (see EN 300 356-15 [10]) only the Redirection Number Restriction parameter shall be included into the ACM, CPG, ANM or CON message. Therefore only the mapping of this parameters are sown in the following table.

Table 4.7.1.2.8: Mapping of ISUP Redirection Number Restriction Parameter to History-Info Header

ISUP Parameter or IE	Derived value of parameter field	SIP component	Value
Redirection number restrictionparameter			
	presentation restricted		"History" and "id"
	Presentation allowed or absent		Privacy header field absent or "none"

A received CPG shall be mapped t a 180 (Ringing) if the CPC indicates a Alerting is due to the mapping ruled defined within the basic call.

4.7.2   Interaction with PSTN/ISDN Emulation

The Interaction with PSTN/ISDN Emulation is for further study.

4.7.3   Interaction with external IP networks

ES 283 003 [2] specifies the procedures used by a UE compliant to the TISPAN SIP profile to communicate with an external SIP device possibly lacking TISPAN SIP profile capabilities.

4.8   Parameter values (timers)

4.8.1   No reply timer

No reply timer: 20 to 40 sec.

4.9   Service Configuration

4.9.1   Structure of the XML Document

Communication Diversion documents are subtrees of the *simservs* document specified in TS 183 023 [4]. As such, Communication Diversion documents use the XCAP application usage in TS 183 023 [4].

In addition to the considerations and constraints defined by the *simservs* document TS 183 023 [4], we define the additional constraints and considerations for the Communication Diversion subtree:

XML schema: Implementations in compliance with the present document shall implement the XML schema defined in clause 4.9.2.

Data semantics: The semantics of the communication diversion XML configuration document is specified in clause 4.9.1.

An instance of the simulation services configuration containing a communication diversion configuration document.

```
<?xml version="1.0" encoding="UTF-8"?>
<simservs
   xmlns="urn:org:etsi:ngn:params:xml:ns:simservs"
   xmlns:cp="urn:ietf:params:xml:ns:common-policy"
   xmlns:ocp="urn:oma:params:xml:ns:common-policy">
   <communication-diversion active="true">
        rule set
   </communication-diversion>
</simservs>
```

The communication diversion service contains a rule set, that specifies how the communication diversion service shall react to external stimuli.

4.9.1.1   Communication Diversion Element

The communication diversion configuration is contains a ruleset. The rule set reuses the syntax as specified by the common policy draft (see IETF draft-ietf-geoprive-common-policy-06.txt in Bibliography).

```
<communication-diversion active="true">
    <cp:ruleset>
         rule1
         rule2
    </cp:ruleset>
</communication-diversion>
```

In general the following procedure applies:

When the service processes a set of rules it shall start with the first rule and test if its conditions are all true, if this is the case the rule matches and the specified action shall be executed.

When the rule does not match the following rule shall be selected and the same procedure repeated, until a matching rule is found or the set of remaining rules is empty.

However not all rules can be matched at the same moment in the call. Some conditions imply that rules that carry them are checked at specific events in the call, for example the no-answer condition only holds when the called party does not answer after a while. In this case the same procedure shall apply as above with the modification that the set of rules to process contains only the rules applicable for that specific network event.

In clause 4.9.1.3 all allowed conditions are specified, normally rules are evaluated at communication setup time, for conditions where this is not the case this is explicitly indicated.

The shown "active" attribute is inherited from the simservType from TS 183 023 [4], its meaning is also specified in TS 183 023 [4].

4.9.1.2   Communication Diversion Rules

The Communication Diversion service is configured with an ordered set of forwarding rules. The XML Schema reuses the rule syntax as specified by the common policy draft (see IETF draft-ietf-geoprive-common-policy-06.txt in Bibliography). The rules take the following form:

```
<cp:rule id="rule66">
    <cp:conditions>
         condition1
         condition2
    </cp:conditions>
    <cp:actions>
        <forward-to>
            <target>
                targetAddress1
            </target>
            <notify-caller>true</notify-caller>
        </forward-to>
    </cp:actions>
</cp:rule>
```

When the service processes a set of rules it shall start with the first rule and test if its conditions are all true, if this is the case the rule matches and the specified action is executed. When a rule matches remaining rules in the rule set shall be discarded. Applied to the fragment above this means that only if the expression (*condition1* AND *condition2*) evaluates to true that then the *rule66* matches and the forward-to action is executed.

When the rule does not match the following rule shall be selected and the same procedure repeated, until a matching rule is found or the set of remaining rules is empty.

The "id" attribute value of a rule shall uniquely identify the rule within a rule set. This can be used in XCAP usage to address one specific rule.

4.9.1.3   Communication Diversion Rule Conditions

The following conditions are allowed by the XML Schema for the communication diversion service:

busy: This condition evaluates to true when the called user is busy. In all other cases the condition evaluates to false. Rules with this condition are evaluated when a busy indication is received from the called party.

not-registered: This condition evaluates to true when the called user is not registered. In all other cases the condition evaluates to false.

presence-status: This condition evaluates to true when the called user's current presence activity status is equal to the value set for this condition. In all other cases the condition evaluates to false.

cp:identity: This condition evaluates to true when the *calling* user's identity matches with the value of the identity element. The interpretation of all the elements of this condition is described in OMA-TS-XDM-Core-V1-0 (see Bibliography). In all other cases the condition evaluates to false.

anonymous: This condition evaluates to true when the P-Asserted-Identity of the calling user is not provided or privacy restricted.

cp:sphere: Not applicable in the context of the Communication Diversion service.

cp:validity: Specifies a period. The condition evaluates to true when the current time is within the validity period expressed by the value of this condition. In all other cases the condition evaluates to false.

media: When the incoming call request for certain media, the forwarding rule can decide to forward the call for this specific media. This condition evaluates to true when the value of this condition matches the media field in one of the "m=" lines in the SDP (RFC 2327 [5]) offered in an INVITE (RFC 3261 [6]).

no-answer: This condition evaluates to true when the called user does not answer. In all other cases the condition evaluates to false. Rules with this condition are evaluated when a no-answer timeout is detected.

rule-deactivated: This condition always evaluates to false. This can be used to deactivate a rule, without loosing information. By removing this condition the rule can be activated again.

ocp:external-list: This condition evaluates to true when the calling users identity is contained in an external resource list to which the value of external-list refers. The exact interpretation of this element is specified in OMA-TS-XDM-Core-V1-0 (see Bibliography).

ocp:other-identity: Not applicable in the context of communication diversion service.

The condition elements that are not taken from the common policy schema (see IETF draft-ietf-geoprive-common-policy-06.txt in Bibliography) or oma common policy schema (see OMA-TS-XDM-Core-V1-0 in BIbliography) are defined in the simservs document schema specified in [4].

4.9.1.4   Communication Diversion Rule Actions

The action supported by the communication service can is forwarding of calls. For this the forward-to action has been defined. The forward-to action takes the following elements:

target: Specifies the address of the forwarding rule. It should be a valid SIP URI (RFC 3261 [6]) or TEL URL (RFC 3966 [7]).

notify-caller: An optional element that can be used to disable the default behaviour that the caller is notified that the call is being forwarded.

reveal-identity-to-caller: An optional element that can be used to disable the default behaviour that the caller is notified that the call is being forwarded receives the diverting parties identity information.

notify-served-user: An optional element that can be used to enable that the served user is notified that calls are being forwarded. Default this is switched off.

notify-served-user-on-outbound-call: An optional element that can be used to enable that the served user is notified that calls are being forwarded when he makes a call attempt. Default this is switched off.

reveal-identity-to-target: An optional element that can be used to disable the default behaviour that the diverted-to party receives identity information of the diverting party.

4.9.2   XML Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/200 (OK) response1/XMLSchema"
       xmlns:ss="urn:org:etsi:ngn:params:xml:ns:simservs"
       xmlns:cp="urn:ietf:params:xml:ns:common-policy"
       xmlns:ocp="urn:oma:params:xml:ns:common-policy"
       targetNamespace="urn:org:etsi:ngn:params:xml:ns:simservs"
       elementFormDefault="qualified"
       attributeFormDefault="unqualified">
   <!-- incluse simulation service commons -->
   <xs:include schemaLocation="simservs.xsd"/>
   <!-- import common policy definitions -->
   <xs:import namespace="urn:ietf:params:xml:ns:common-policy" schemaLocation="common-policy.xsd"/>
   <!-- import OMA common policy extensions -->
   <xs:import namespace="urn:oma:params:xml:ns:common-policy" schemaLocation="oma-common-
policy.xsd"/>
   <!-- communication diversion rule set based on the common policy rule set.-->
   <xs:element name="communication-diversion" substitutionGroup="ss:absService">
       <xs:annotation>
           <xs:documentation>This is the communication diversion configuration
document.</xs:documentation>
       </xs:annotation>
       <xs:complexType>
           <xs:complexContent>
               <xs:extension base="ss:simservType">
                   <xs:sequence>
                       <!-- add service specific elements here-->
                       <xs:element ref="cp:ruleset" minOccurs="0"/>
                   </xs:sequence>
               </xs:extension>
               <!-- service specific attributes can be defined here -->
           </xs:complexContent>
       </xs:complexType>
   </xs:element>
   <!-- communication diversion specific extensions to IETF common policy conditions-->
   <xs:element name="not-registered" type="ss:empty-element-type"/>
           substitutionGroup="cp:condition"/>
   <xs:element name="busy" type="ss:empty-element-type"/>
           substitutionGroup="cp:condition"/>
   <xs:element name="presence-status" type="ss:presence-status-activity-type"/>
           substitutionGroup="cp:condition"/>
   <xs:element name="no-answer" type="ss:empty-element-type"/>
           substitutionGroup="cp:condition"/>
   <xs:element name="media" type="ss:media-type"/>
           substitutionGroup="cp:condition"/>
   <xs:element name="rule-deactivated" type="ss:empty-element-type"/>
           substitutionGroup="cp:condition"/>

   <!-- communication diversion specific extensions to IETF common policy actions-->
   <xs:element name="forward-to" type="ss:forward-to-type"/> substitutionGroup="cp:action"/>

  <!-- communication diversion specific type declarations -->
  <xs:complexType name="forward-to-type">
      <xs:sequence>
          <xs:element name="target" type="ss:target-type"/>
          <xs:element name="notify-caller" type="xs:boolean" default="true" minOccurs="0"/>
      </xs:sequence>
  </xs:complexType>
  <xs:complexType name="target-type">
      <xs:choice>
          <xs:element name="identity" type="xs:anyURI"/>
      </xs:choice>
  </xs:complexType>
  <xs:simpleType name="media-type" final="list restriction">
      <xs:restriction base="xs:string"/>
  </xs:simpleType>
  <xs:simpleType name="presence-status-activity-type" final="list restriction">
      <xs:restriction base="xs:string"/>
  </xs:simpleType>
  <xs:complexType name="empty-element-type"/>
</xs:schema>
```

Annex A (informative):
Signalling Flows

A.1   Normal cases

A.1.1   Communication Forwarding unconditional
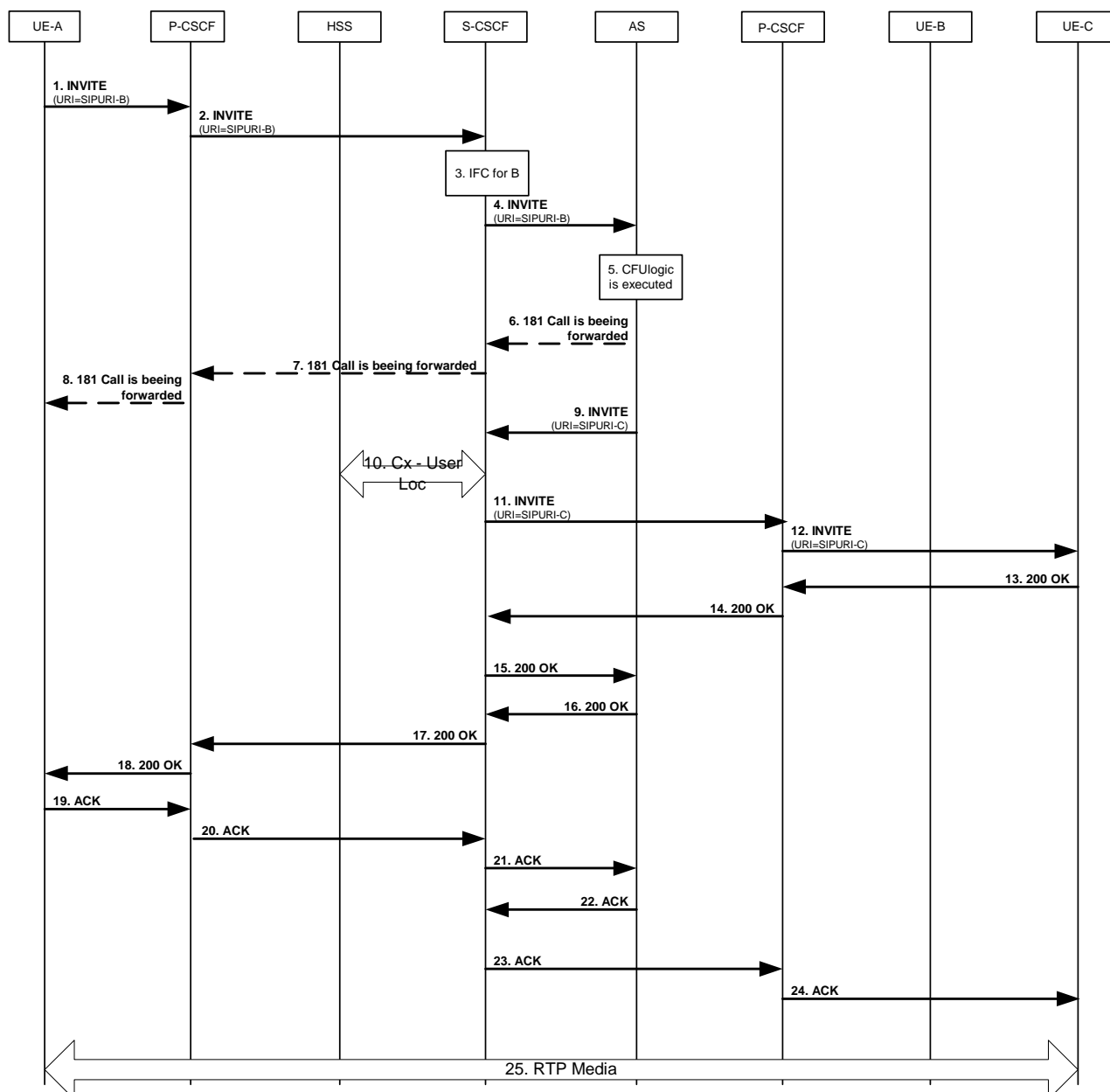

Figure A.1: CFU AS based normal case

User B has activated the CFU service.

User A is sending a communication request towards User B:

1 to 2) Initial INVITE request towards user B. The URI-B is subscribed to the CFU service.

3 to 4) The based on the IFC the INVITE is forwarded to the AS.

5) Procedures for CFU are executed.

6 to 8) A 181 may be send towards the User A indicating that the communication is diverted.

9) A Invite including URI-C as destination is sent back to the S-CSCF. Additional the History Header is included.

   History-Info: <sip:User-B@example.com>;index=1,
   <sip:User-C@example.com;\target=sip: User-B%40example.com;\ cause=302>index=1.1.

10) S-CSCF looks up to the HSS to identify the location of User-C.

11 to 12) The communication is routed towards User-C.

13 to 18) The 200 OK is sent Back to the User-A.

19 to 24) The ACK is send back to User-B.

25) RTP media is established.

A.1.2 Communication Deflection

The flow below describes the Immediate CD feature the only difference compared to a regular CD is that in the regular CD case the "302 (Moved Temporarily) Moved Temporarily" is preceded by a "180 (Ringing) Ringing".
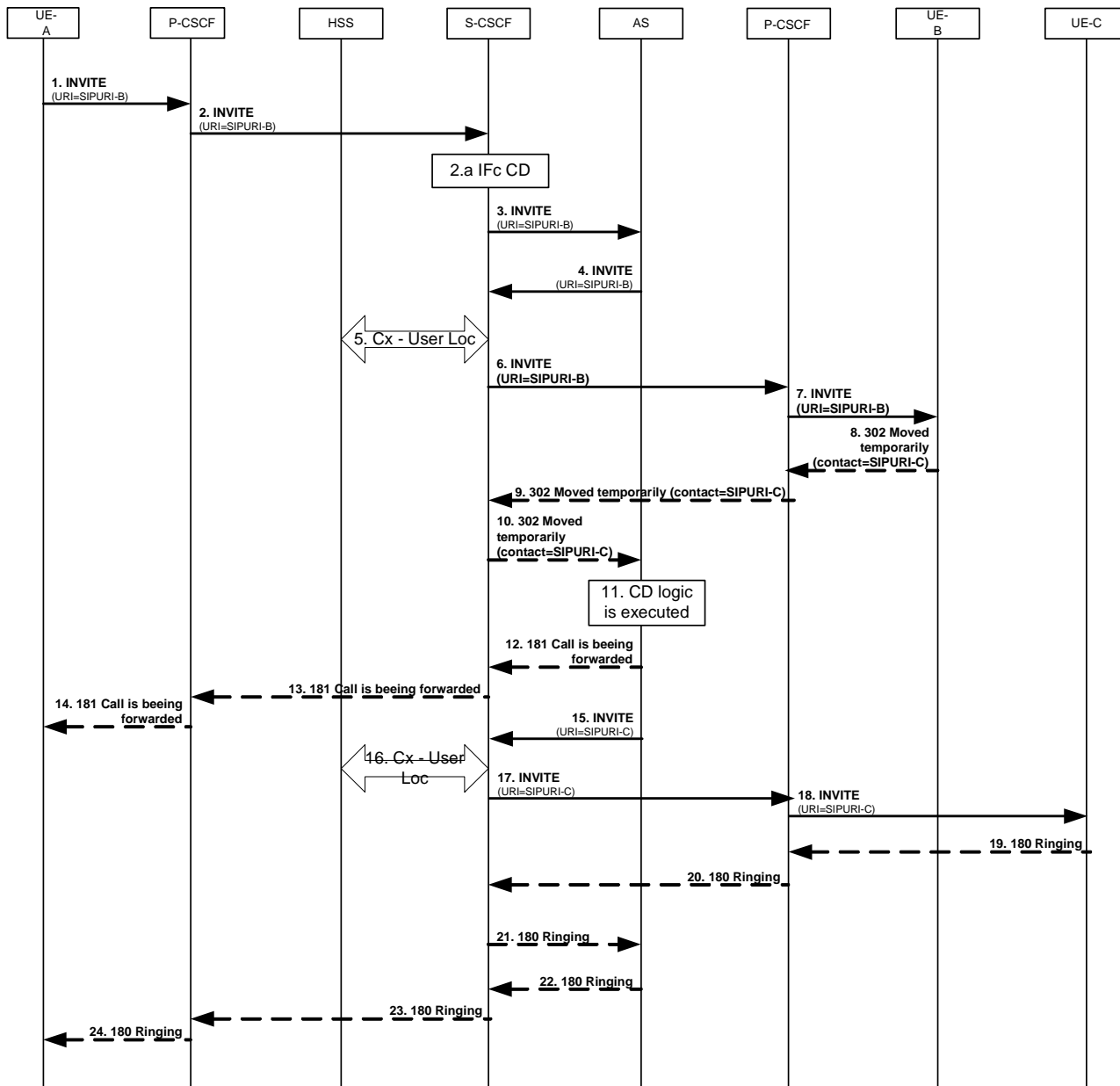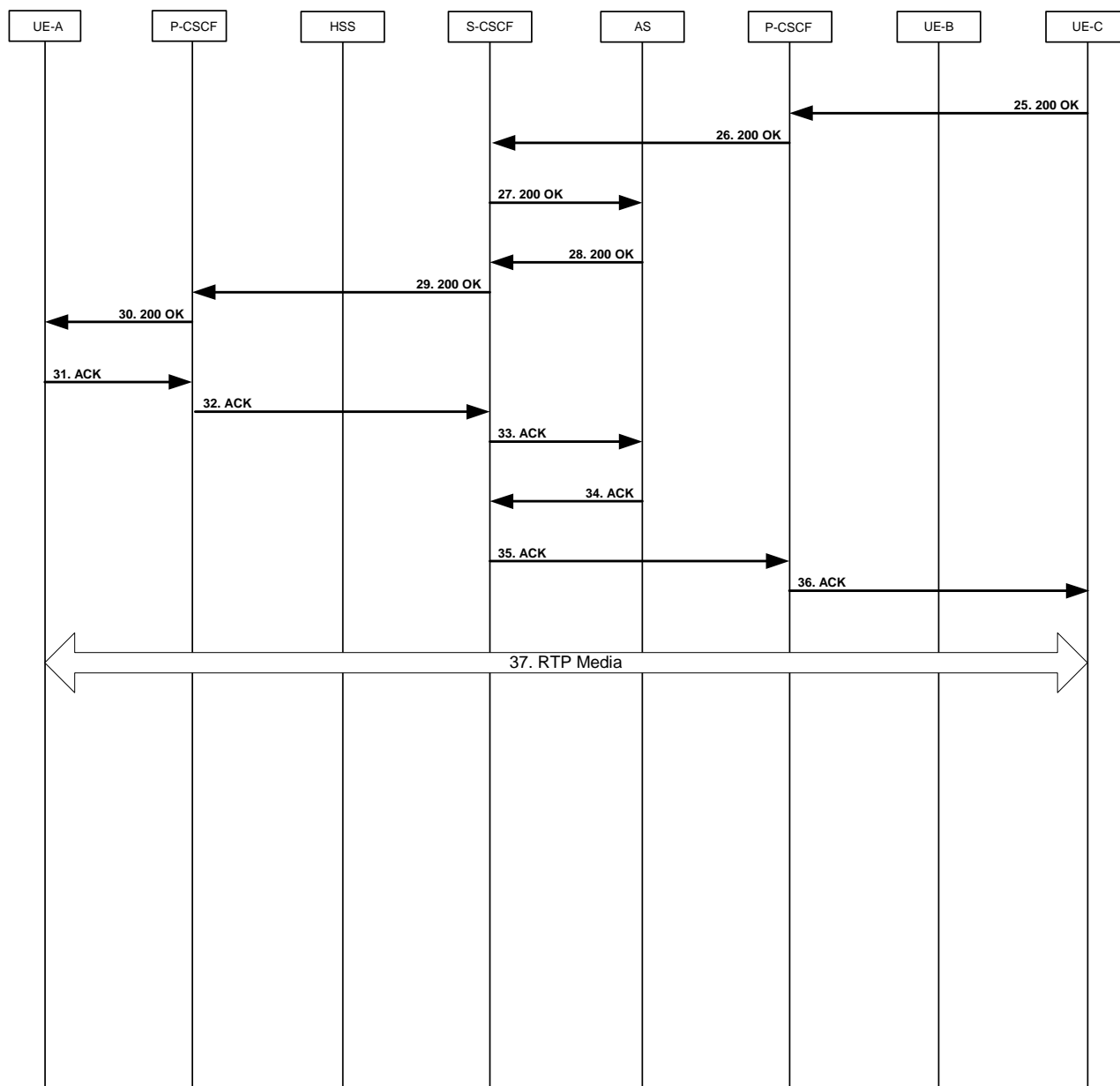

Figure A.2a

Figure A.2b

User B has activated the CD service.

User A is sending a communication request towards User B:

   1 to 2)   Initial INVITE request towards user B. The URI-B is subscribed to the CFU service.

   2a to 3)   The based on the IFC the INVITE is forwarded to the AS.

   4 to 7)   The INVITE is forwarded to user B due to normal communication procedures.

   8 to 10)   A 302 with a contact header including the URI of the forwarded to user is end back to the AS.

   11)   The CD logic is executed.

   12 to 14)   A 181 may be send towards the User A indicating that the communication is diverted.

15 to 18) A Invite including URI-C as destination is sent back to the S-CSCF. Additional the History Header is included.

History-Info: <sip:User-B@example.com>;index=1,
         <sip:User-C@example.com;\target=sip: User-B%40example.com;\ cause=480>index=2.

19 to 24) A 180 is sent back to the originating user including a history header as shown above. If no restriction is given the diverted to user will be presented at the UE of user A.

25 to 30) The 200 OK is sent Back to the User-A.

31 to 36) The ACK is send back to User-B.

37)   RTP media is established.

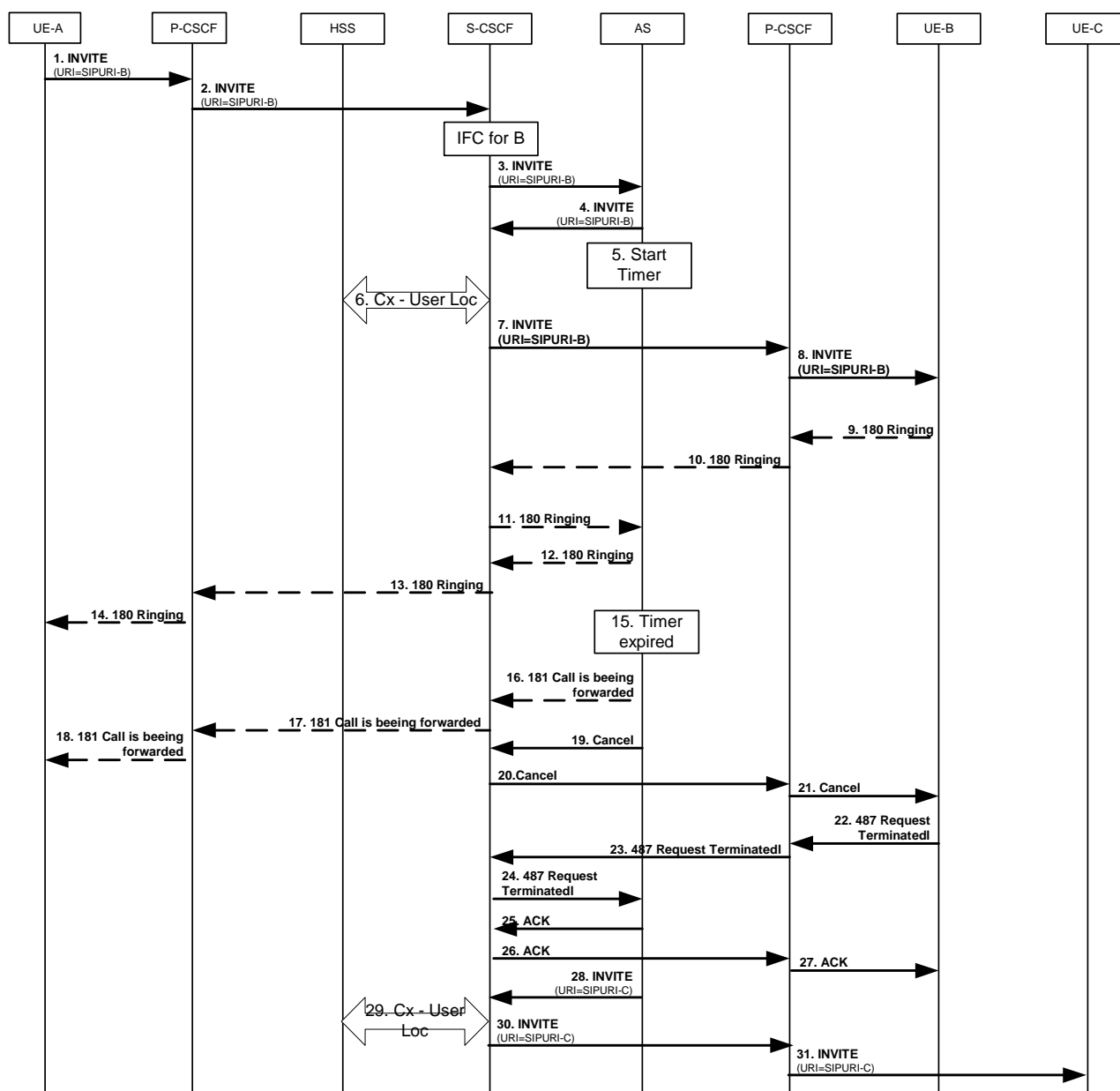# A.1.3   Communication Forwarding on non Reply
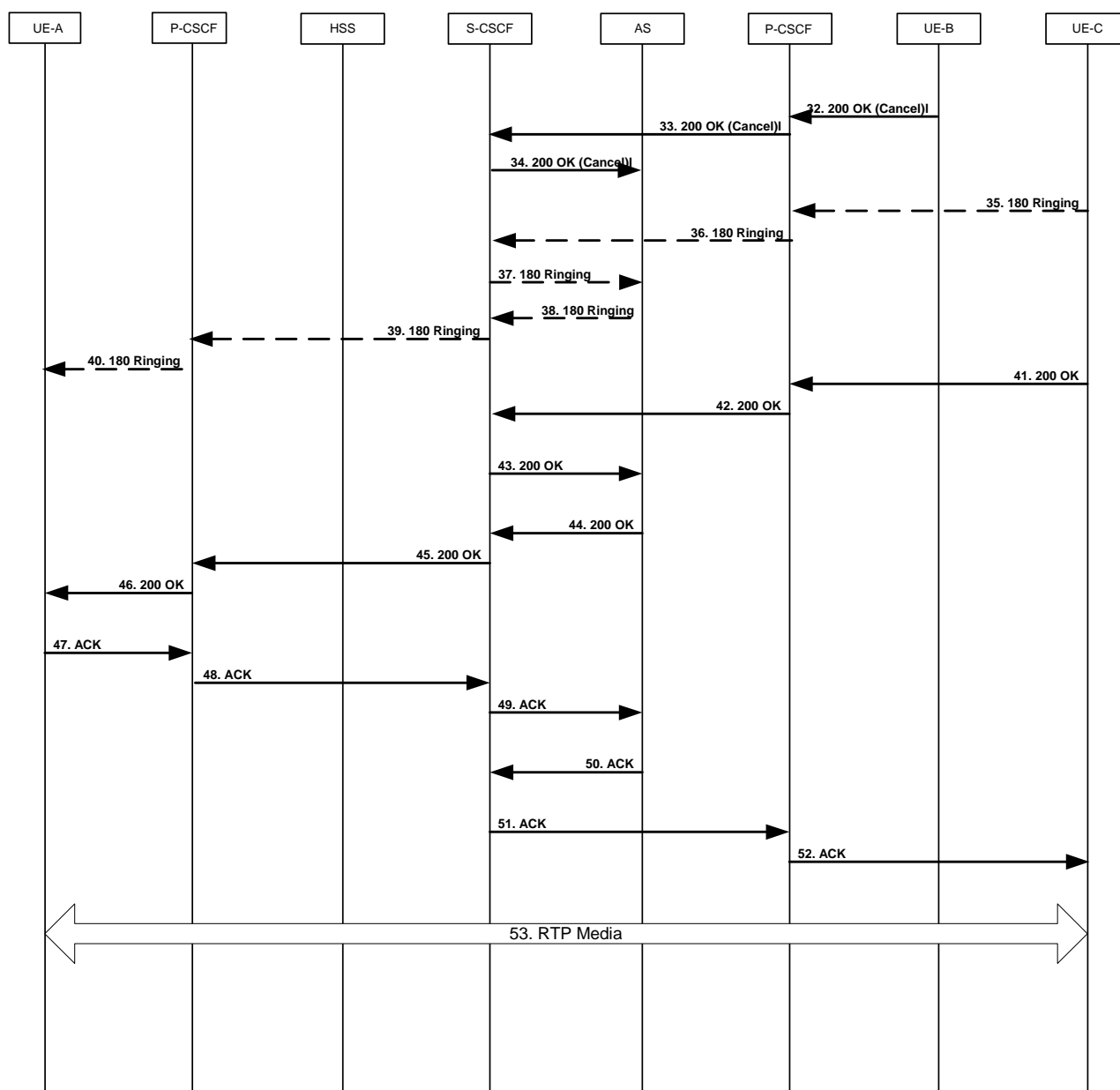

Figure A.3a

Figure A.3b

User B has activated the CFNR service.

User A is sending a communication request towards User B:

1 to 2)   Initial INVITE request towards user B. The URI-B is subscribed to the CFU service.

3)   The based on the IFC the INVITE is forwarded to the AS.

4)   he INVITE is forwarded to user B due to normal communication procedures.

5)   The non-reply timer in the AS is started.

6 to 7)   The INVITE is forwarded to user B due to normal communication procedures.

8 to 14)   A 180 is sent back to the originating user indicating that the terminating UE is ringing.

15)   The timer expires.

16 to 18) A 181 may be send towards the User A indicating that the communication is diverted.

19 to 21) To release the communication to User B the AS sends a CANCEL.

22 to 27) A 487 response with a ACK finalize the termination of the dialog between AS and UE:B.

28 to 31) A INVITE including URI-C as destination is sent back towards the UE:C. Additional the History Header
is included.

> History-Info: <sip:User-B@example.com>;index=1,
>   <sip:User-C@example.com;\target=sip: User-B%40example.com;\ cause=408> index=1.1.

32 to 34) The 200 OK for the CANCKE is sent Back to the User-A.

35 to 40) A 180 is sent back to the originating user including a history header as shown above. If no restriction is
given the diverted to user will be presented at the UE of user A.

41 to 46) The 200 OK is sent Back to the User-A.

47 to 52) The ACK is send back to User-B.

53)   RTP media is established.
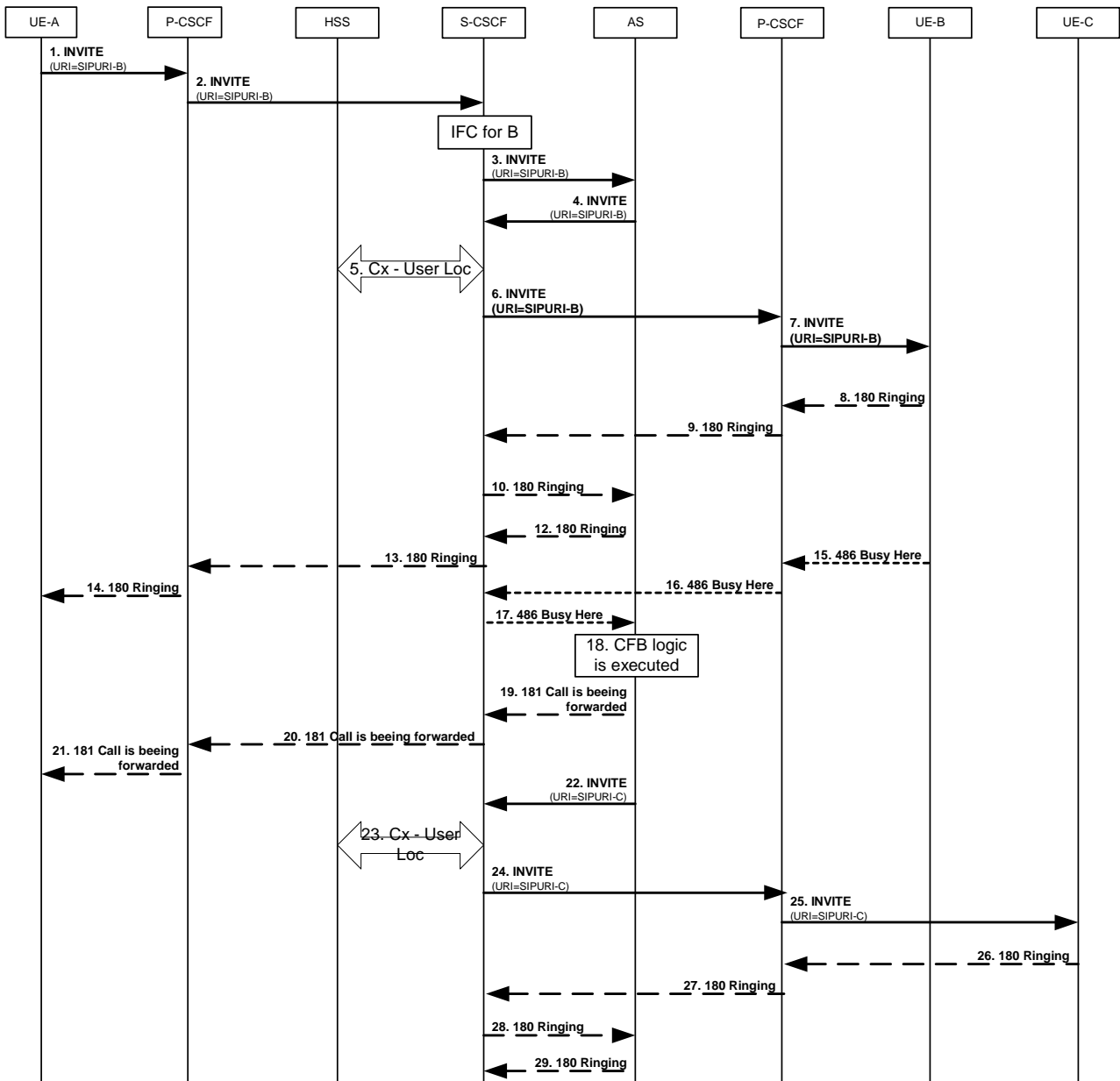
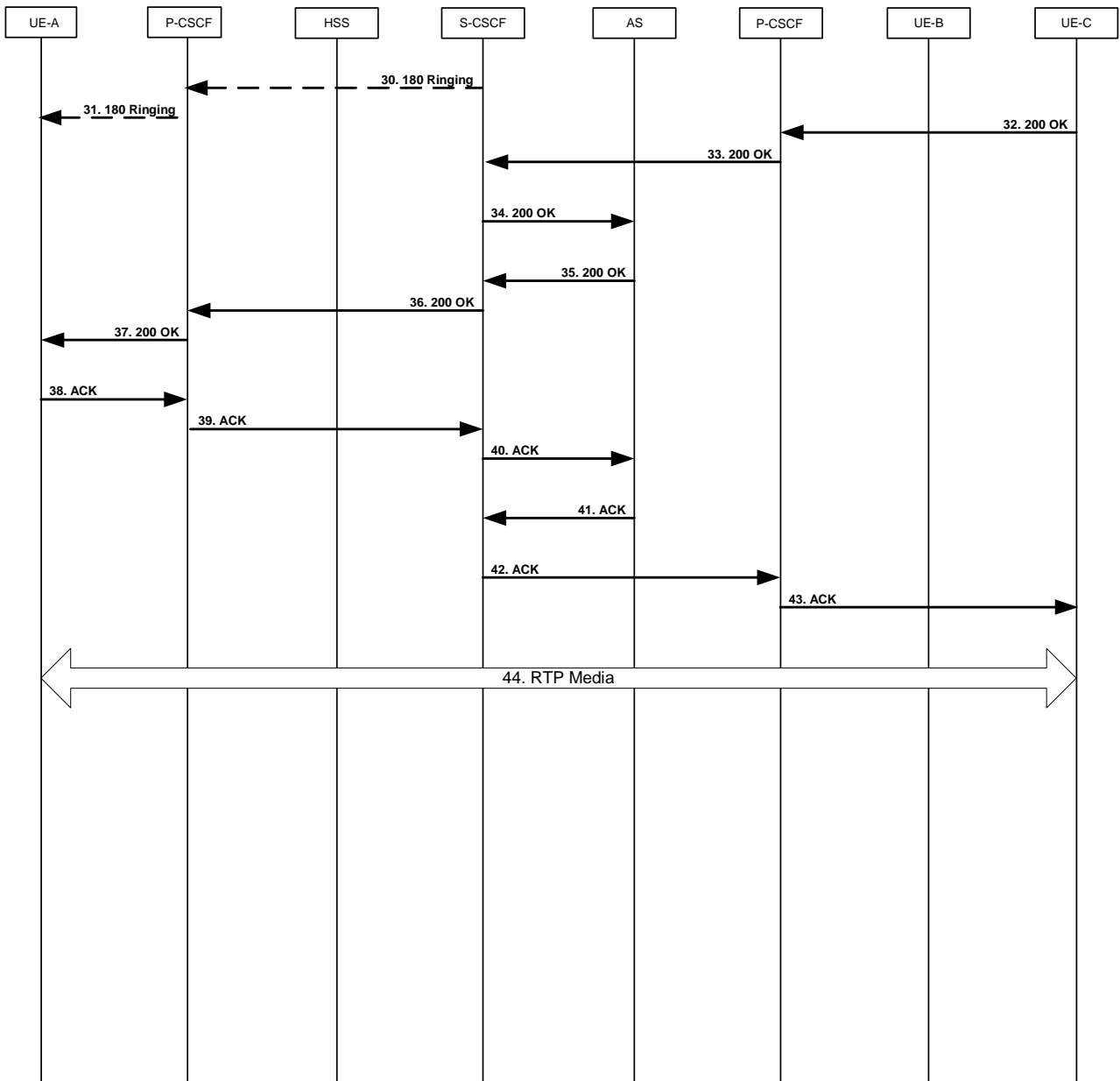## A.1.4 Communication Forwarding on Busy

Figure A.4a

UE-A	P-CSCF	HSS	S-CSCF	AS	P-CSCF	UE-B	UE-C

30. 180 Ringing

31. 180 Ringing

32. 200 OK

33. 200 OK

34. 200 OK

35. 200 OK

36. 200 OK

37. 200 OK

38. ACK

39. ACK

40. ACK

41. ACK

42. ACK

43. ACK

44. RTP Media

Figure A.4b

A.1.5   Communication Forwarding Not Logged-in (CFNL)
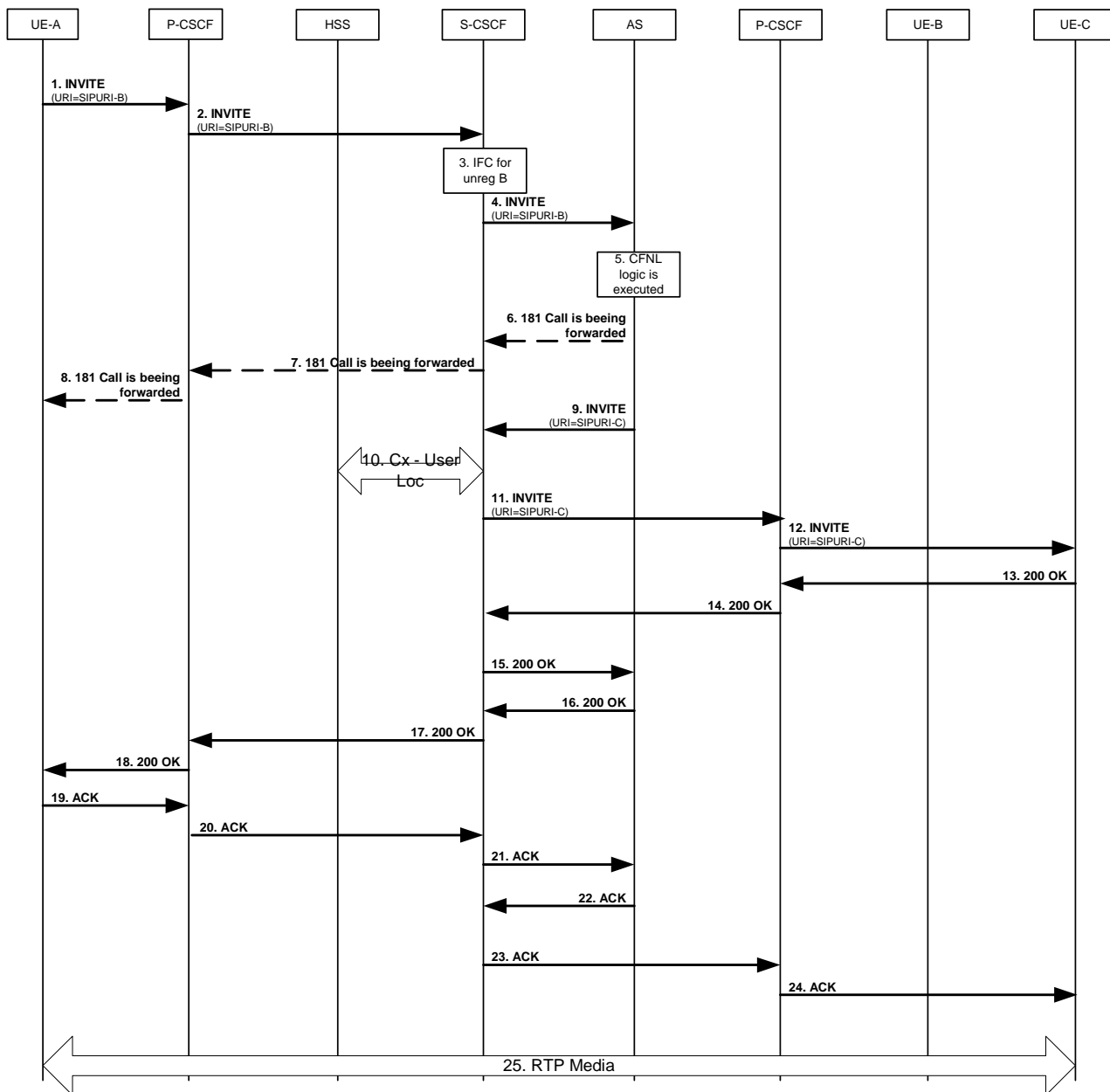

Figure A.5

A.2   Interworking

A.2.1   Communication Forwarding unconditional
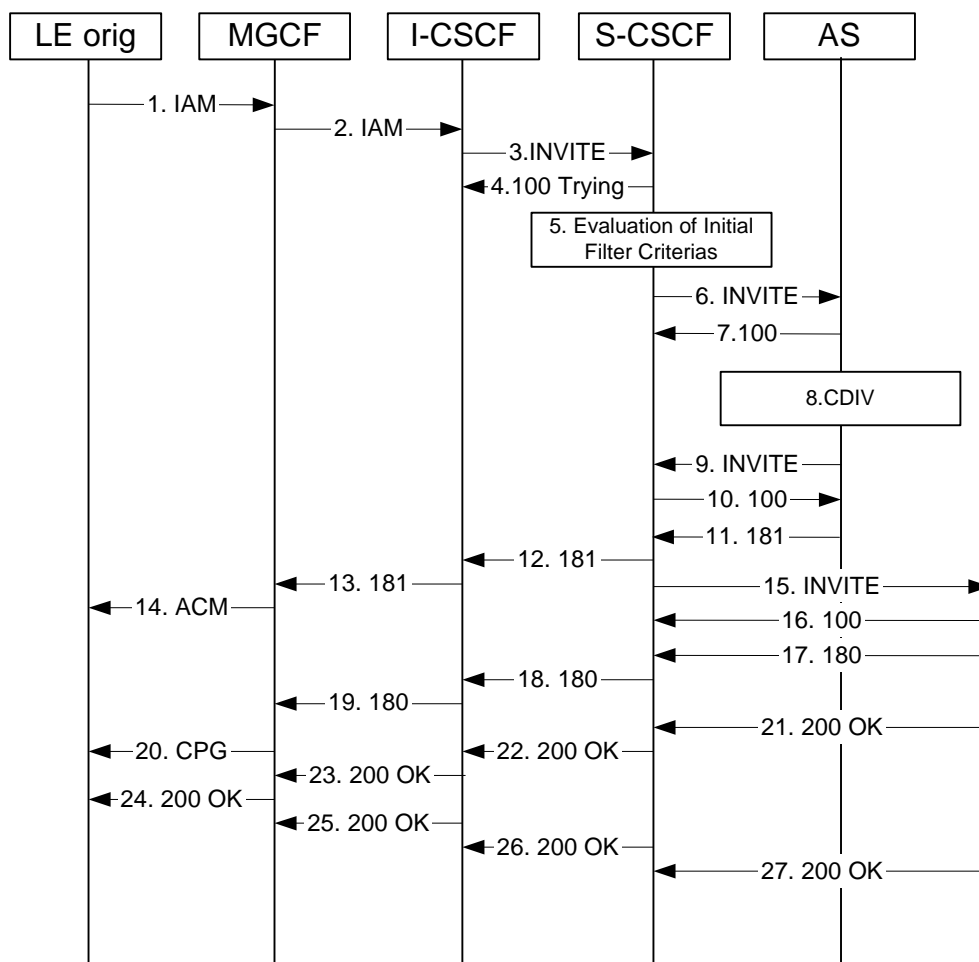

Figure A.6: Call Forwarding Unconditional
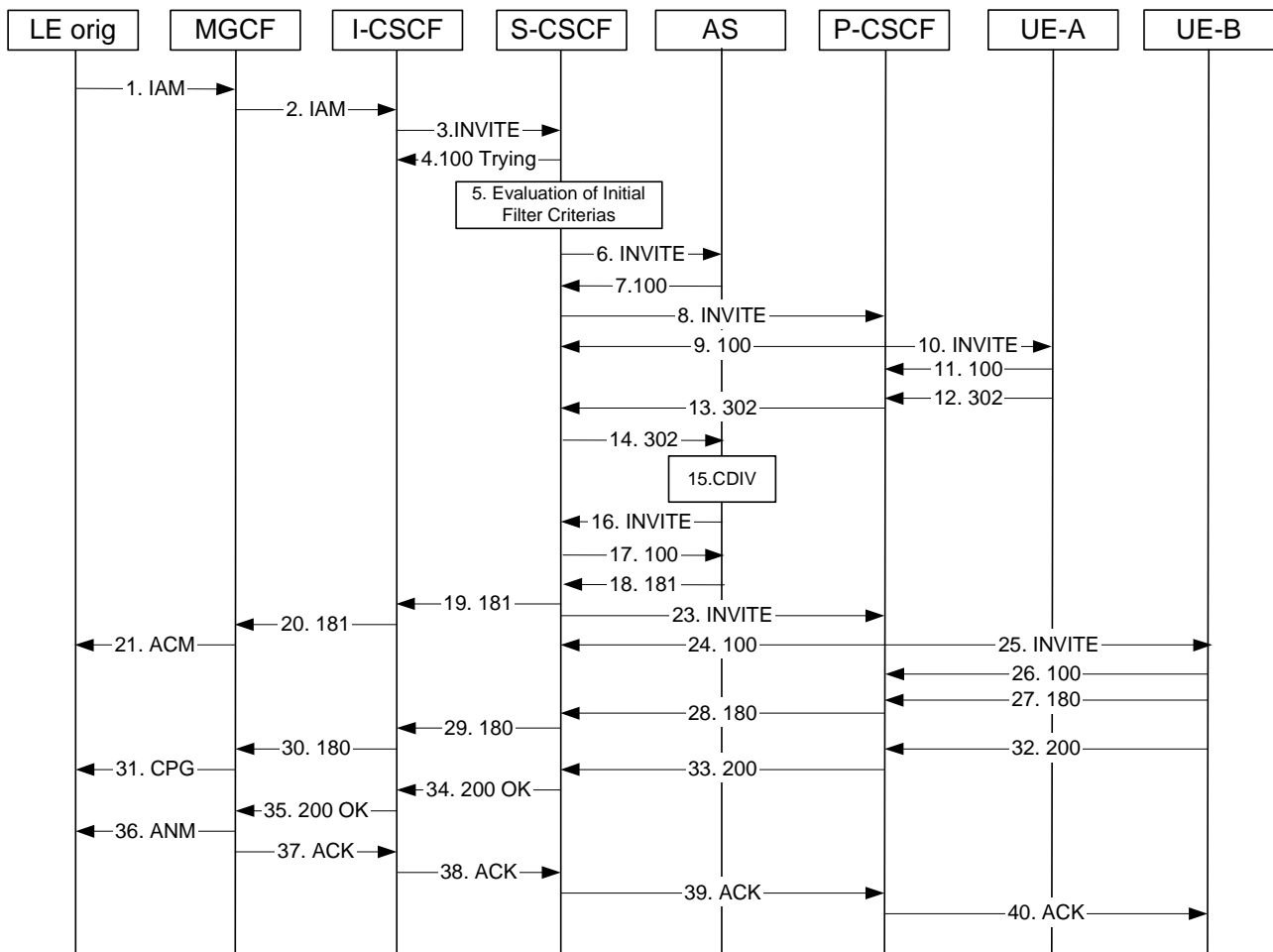
A.2.2   Communication Deflection

Figure A.7

Annex B (informative):
Example of filter criteria

This annex provides an example of a filter criterion that triggers SIP requests that are subject to initial filter criteria evaluation.

An example of an IFC when the CDIV simulation service is active at the diverting S-CSCF is:

- Method: INVITE.

Annex C (informative):
Coding considerations

This annex provides an interpretation of the coding of the cause parameter specified in draft-jennings-sip-voicemail-uri (see Bibliography).

The cause specified in draft-jennings-sip-voicemail-uri (see Bibliography) has the following syntax:

```
cause-param      =  "cause" EQUAL Status-Code
```

The Status-Code is originally specified in RFC 3261 [6] as a sequence of 3 digits. It is noted that the Status-Code simply indicates that it is composed of 3 digits, without indicating the list of possible values. In particular, Status-Code is not bound to and must not be confused with the 3 digit numbers defined for SIP responses in RFC 3261 [6]. The Status-Code is used to hold the redirecting reason.

For the purpose of legibility, the cause parameter specified in draft-jennings-sip-voicemail-uri (see Bibliography) is interpreted according to the following syntax:

```
cause-param      =  "cause" EQUAL Status-Code

Status-Code      =  "404"  ;  Unknown/Not available
                 /  "486"  ;  User Busy
                 /  "408"  ;  No Reply
                 /  "302"  ;  Unconditional
                 /  "487"  ;  Deflection during alerting
                 /  "480"  ;  Deflection during immediate response
                 /  "503"  ;  Mobile subscriber not reachable
```

Annex D (informative):
Bibliography

Draft-jennings-sip-voicemail-uri-05 (November 2005): "Session Initiation Protocol (SIP) URIs for Applications such as Voicemail and Interactive Voice Response (IVR)".

IETF draft-ietf-geoprive-common-policy-06.txt (October 2005): "A Document Format for Expressing Privacy Preferences", H. Schulzrinne et al., expires April 2006.

OMA-TS-XDM-Core-V1-0: "XML Document Management (XDM) Specification", Version 1.0.

History

Document history		
V1.1.1	April 2006	Publication