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Technical Specification

**Telecommunications and Internet converged Services and
Protocols for Advanced Networking (TISPAN);
PSTN/ISDN simulation services:
Explicit Communication Transfer (ECT);
Protocol specification**



Reference

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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 Explicit Communication transfer (ECT) simulation service, based on stage one and two of the ISDN ECT supplementary service. Within the Next Generation Network (NGN) the stage 3 description is specified using the IP-Multimedia Call 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.
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- [1] ETSI ES 283 003: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Call Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP) Stage 3 [3GPP TS 24.229 (Release 7), modified]".
- [2] IETF RFC 3515: "The Session Initiation Protocol (SIP) Refer Method".
- [3] IETF RFC 3892: "The Session Initiation Protocol (SIP) Referred-By Mechanism".
- [4] IETF RFC 3891: "The Session Initiation Protocol (SIP) "Replaces" Header".
- [5] ETSI ES 283 027: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Endorsement of the SIP-ISUP Interworking between the IP Multimedia (IM) Core Network (CN) subsystem and Circuit Switched (CS) networks".
- [6] IETF RFC 3261: "SIP: Session Initiation Protocol".
- [7] ETSI TS 183 033: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia; Diameter based protocol for the interfaces between the Call Session Control Function and the User Profile Server Function/Subscription Locator Function; Signalling flows and protocol details [3GPP TS 29.228 and 3GPP TS 29.229]".
- [8] ETSI TS 183 010: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Signalling Control Protocol; Communication HOLD (HOLD); PSTN/ISDN simulation services".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

ECT Session Identifier URI: PSI created and inserted by a ECT AS that resolves to the AS itself

NOTE: If this URI contains correlation information it shall not reveal identity information about any party involved in the transfer.

transferee: party being transferred to the transfer target

transferor: party initiating the transfer

transfer target: party that the existing communication is transferred to

NOTE: After transfer the transferee and the transfer target are in communication with each other.

3.2 Abbreviations

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

3GPP	3 rd Generation Partnership Project (www.3gpp.org)
ACR	Anonymous Communication Rejection
AS	SIP Application Server
BGCF	Border Gateway Control Function
CDIV	Communication DIVersion
CONF	CONFerence
CSCF	Call Session Control Function
ECT	Explicit Communication transfer
GRUU	Globally Routable User agent URI
HOLD	communication HOLD
IBCF	Interconnect Border Control Function
I-CSCF	Interrogating-CSCF
IETF	Internet Engineering Task Force
IFC	Initial Filter Criteria
ISDN	Integrated Services Digital Network
MCID	Malicious Call IDentification
MGCF	Media Gateway Control Function
OCB	Outgoing Communication Barring
OIP	Originating Identification Presentation
OIR	Originating Identification presentation Restriction
P-CSCF	Proxy-CSCF
PSTN	Public Switch Telephone Network
S-CSCF	Serving-CSCF
SIP	Session Initiation Protocol
TIP	Terminating Identification Presentation
TIR	Terminating Identification presentation Restriction
UE	User Equipment

4 Explicit Communication Transfer (ECT)

4.1 Introduction

The service provides a party involved in a communication to transfer that communication to a third party.

4.2 Description

4.2.1 General description

The Explicit Communication transfer (ECT) service provides a party involved in a communication to transfer that communication to a third party.

There are three actors active in a transfer, they are acting in the following roles: *transferor*, the party that initiates the transfer of the active communication that it has with the transferee. *transferee*, the party which stays in the communication which is transferred. *transfer target*, the party which the communication is transferred to and which replaces the transferor in the communication.

Assumption is that initially the transferee and the transferor are involved in a communication. In the present document the party that originated the original communication before transfer is tagged with UE-A, the party that terminated the original communication before transfer is tagged UE-B. The party that is newly introduced into communication with the transferee, e.g. the transfer Target is tagged UE-C.

There are two initial situations possible in which transfer shall be possible:

- The transferor has no ongoing communication with the transfer Target. (Blind/Assured transfer).
- The transferor has a (consultation) communication with the transfer Target. (Consultative transfer).

The transferor AS takes care that it remains in the signalling path even after the communication is transferred, this allows:

- Classical charging models.
- Anonimization of the transfer Target.

4.3 Operational requirements

4.3.1 Provision/withdrawal

The ECT service may be provided after prior arrangement with the service provider or be generally available.

4.3.2 Requirements on the transferor network side

No specific requirements are needed in the network.

4.3.3 Requirements on the transferee network side

No specific requirements are needed in the network.

4.3.4 Requirements on the transfer target network side

No specific requirements are needed in the network.

4.4 Coding requirements

A user agent that wishes to use the ECT service (to act as a transferor):

- Shall support the REFER method as a client as specified in RFC 3515 [2].
- Shall support the Referred-By header as specified in RFC 3892 [3].
- Shall support Replaces header field as specified in RFC 3891 [4].

A user agent that is the transferred party in a communication transfer (acts as the transferee):

- Shall support the REFER method as a server as specified in RFC 3515 [2].
- Shall support the Referred-By header as specified in RFC 3892 [3].
- Shall support Replaces header field as specified in RFC 3891 [4].

A user agent that is the transfer target in a communication transfer:

- May support the Referred-By header as a client as specified in RFC 3892 [3].
- May support the Replaces header as a client as specified in RFC 3891 [4].

4.5 Signalling requirements

4.5.1 Activation/deactivation

The ECT service is activated at provisioning and deactivated at withdrawal.

4.5.1A Registration/erasure

The ECT service requires no registration. Erasure is not applicable.

4.5.1B Interrogation

Interrogation of ECT is not applicable.

4.5.2 Invocation and operation

4.5.2.1 Actions at the transferor UE

A UE that initiates a transfer operation, shall:

- Issue a REFER request in the original communications dialog, where:
 - The request URI shall contain the SIP URI of the transferee as received in the Contact header field.
 - The Refer-To header field shall indicate the public address of the transfer Target.
 - If the transferor UE has a (consultation) communication with the transfer Target, a Replaces header field parameter shall be added to the Refer-To URI together with a Require=replaces header field parameter.
 - The Referred-By header field may indicate the identity of the transferor.

After the REFER request is accepted by the other end with a 202 (Accepted) response, the transferor UE should get notifications of how the transferee's communication setup towards the transfer Target is progressing.

When a NOTIFY request is received on the REFER dialog that indicates that the transferee and the transfer Target have successfully setup a communication, the transferor UE may terminate the original communication with the transferee UE, by sending a BYE message on the original dialog.

4.5.2.2 Actions at the transferor P-CSCF

Basic communication procedures according to ES 283 003 [1] shall apply.

4.5.2.3 Actions at the transferor S-CSCF

Basic communication procedures according to ES 283 003 [1] shall apply.

4.5.2.4 Actions at the transferor AS

4.5.2.4.1 Invocation of ECT service

4.5.2.4.1.1 Prerequisite for invocation of the ECT service

For ECT to be provided to end users acting as transferor, the end user's AS providing ECT shall be in the signalling path for all communications.

4.5.2.4.1.2 Determine whether the ECT applies

The transferor AS is the one executing the ECT service logic, which is invoked by the transferor sending a special REFER request.

4.5.2.4.1.2.1 REFER request received on a separate dialog

ECT does not apply in this case.

NOTE: That transfer could be initiated by REFER request on a separate dialog when the network supports GRUU. Since this is currently not specified in ES 283 003 [1], REFER on separate dialogs can not be used for transfer of communication.

4.5.2.4.1.2.2 REFER request received in the to be transferred dialog

In order to know whether ECT service applies on a REFER request send by the served user, the following criteria shall apply before the ECT logic is executed:

- The REFER request's request-URI (transferee) is targeted at the same UE instance that is involved in the dialog.
- The REFER request's Refer-To header contains a URI so that the method constructed from the URI according to RFC 3261 [6] is equal to INVITE.

Any REFER request that does not comply with these criteria shall not invoke the ECT service and is depending on operator policy:

- Rejected.
- Handled by another service.
- Proxied on.

4.5.2.4.1.2.3 Actions of ECT when invoked with a transfer request

When a REFER request is received that invokes the ECT service (see clause 4.5.2.4.1), ECT service shall perform the following actions:

- 1) Create a new ECT Session Identifier URI addressed to this AS. The URI shall be created in such a way that a new dialog set up towards this URI can be easily correlated with the current REFER dialog.
- 2) The AS stores the value of the Refer-To header field (transfer Target) from the REFER request and links it to the ECT Session Identifier URI.

- 3) The AS Replaces the Refer-To header field with the ECT Session Identifier URI (this ensures that the transferor AS remains in the loop when the transferee sets up the communication with the transfer Target).
- 4) If a Referred-By header is available in the request, the AS verifies if the provided Referred-By header contains a valid identity of the served user. If not it will replace the Referred-By header with a valid value matching the REFER request's P-Asserted-Identity.
- 5) If no Referred-By header is available in the request a Referred-By header is added that matches the REFER method's P-Asserted-Identity.
- 6) The AS sends the REFER request on to the transferee using basic communication procedures ES 283 003 [1].

4.5.2.4.2 Subsequent procedures

4.5.2.4.2.1 Actions of ECT when invoked again by the transferred communication

When an INVITE is received targeted at the ECT Session Identifier URI created earlier when the served user requested transfer of an ongoing communication, ECT shall perform the following actions:

- 1) Replace the request URI with the stored transfer Target URI linked to the specific ECT Session Identifier URI.
- 2) If a Referred-By header is available in the request, the AS verifies if the provided Referred-By header contains a valid identity of the served user. If not it will replace the Referred-By header with a valid value matching the REFER request's P-Asserted-Identity.
- 3) If no Referred-By header is available in the request a Referred-By header is added that matches the REFER request's P-Asserted-Identity.

NOTE: If needed the AS may generate charging events to charge for the extra leg.

- 4) The INVITE request is forwarded towards the transfer Target using basic communication procedures ES 283 003 [1].

4.5.2.5 Actions at the transferee UE

When a REFER request is received in the context of a call transfer scenario (see clause 4.5.2.4.1), the transferee UE shall perform the following steps:

- 1) apply the procedure for holding the active communication with the transferor as described in TS 183 010 [8] clause 4.5.2.1; and
- 2) apply normal REFER handling procedures according to ES 283 003 [1].

4.5.2.6 Actions at the transferee S-CSCF

Basic communication procedures according to ES 283 003 [1] shall apply.

4.5.2.7 Actions at the transferee AS

4.5.2.7.1 Determine whether the ECT applies

See clause 4.5.2.4.1 on the criteria that determine that a REFER request is to be treated as a request for transfer of an existing communication.

4.5.2.7.2 Actions of ECT when invoked with a transfer request

When a REFER request is received in the context of a call transfer scenario (see clause 4.5.2.4.1), it shall perform the following steps:

- 1) Store the value of the Refer-To header field (used later to correlate the new communication with this REFER dialog).

- 2) Forward the request to the transferee according to basic communication procedures ES 283 003 [1].

4.5.2.7.3 Actions of ECT when invoked again by the transferred communication

When an INVITE is received targeted at the SIP URI stored earlier when a transfer request was received targeted at the served user (transferee), ECT shall perform the following actions:

- 1) Optionally the AS may generate charging events:
 - a) To charge for the original communication between the transferee and the transferor, in case the transferee was the originating party in the original communication.
 - b) To switch of charging in case the transferee was the terminating party in the original communication.
- 2) The INVITE is forwarded towards the transfer Target using basic communication procedures ES 283 003 [1].

4.5.2.8 Void

4.5.2.9 Actions at the incoming I-CSCF

Basic communication procedures according to ES 283 003 [1] shall apply.

4.5.2.10 Actions at the outgoing IBCF

Basic communication procedures according to ES 283 003 [1] shall apply.

4.5.2.11 Actions at the incoming IBCF

Basic communication procedures according to ES 283 003 [1] shall apply.

4.5.2.12 Actions at the BGCF

Basic communication procedures according to ES 283 003 [1] shall apply.

4.5.2.13 Actions at the MGCF

Basic communication procedures according to ES 283 003 [1] and ES 283 027 [5] shall apply.

Upon reception of a REFER request the MGCF generates a 403 Forbidden response. See ES 283 027 [5].

4.5.2.14 Actions at the transfer target's S-CSCF

Basic communication procedures according to ES 283 003 [1] shall apply.

4.5.2.15 Actions at the transfer target's AS

Basic communication procedures according to ES 283 003 [1] shall apply.

4.5.2.16 Actions at the transfer target's P-CSCF

Basic communication procedures according to ES 283 003 [1] shall apply.

4.5.2.17 Actions at the transfer target's UE

Basic communication procedures according to ES 283 003 [1] shall apply.

4.6 Interaction with other services

4.6.1 Communication HOLD (HOLD)

No impact.

4.6.2 Terminating Identification Presentation (TIP)

No impact.

4.6.3 Terminating Identification Restriction (TIR)

Transferor AS:

- TIR privacy settings shall be enforced on the Referred-By header carried in INVITE.

4.6.4 Originating Identification Presentation (OIP)

No impact.

4.6.5 Originating Identification Restriction (OIR)

For the transferor AS the following applies:

- OIR privacy settings shall be enforced on the Referred-By header carried in REFER request.
- For the other transferee AS and the transfer Target AS there is no impact.

4.6.6 CONFerence Calling (CONF)

No impact.

4.6.7 Communication DIVersion Services (CDIV)

No impact.

4.6.8 Malicious Communication IDentification (MCID)

No impact.

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

For the transferor AS the following applies:

- Shall not accept transfer requests with a transfer Target that is barred by the served users Outgoing Communication Barring (OCB) rules.
- For the transferee AS and the transfer Target AS there is no impact.

4.7 Interactions with other networks

4.7.1 Interaction with PSTN/ISDN

Interaction with PSTN/ISDN is defined in ES 283 027 [5].

4.7.2 Interaction with PSTN/ISDN Emulation

No impact.

4.7.3 Interaction with external IP Network

Interaction with external IP networks are performed according to ES 283 003 [1].

4.8 Parameter values (timers)

No specific timers are required.

4.9 Service configuration

Not applicable.

Annex A (informative): Signalling flows

A.1 Blind transfer

Figure A.1 signalling flow shows a blind transfer scenario, whereby the REFER request is sent on the existing INVITE dialog between A and B.

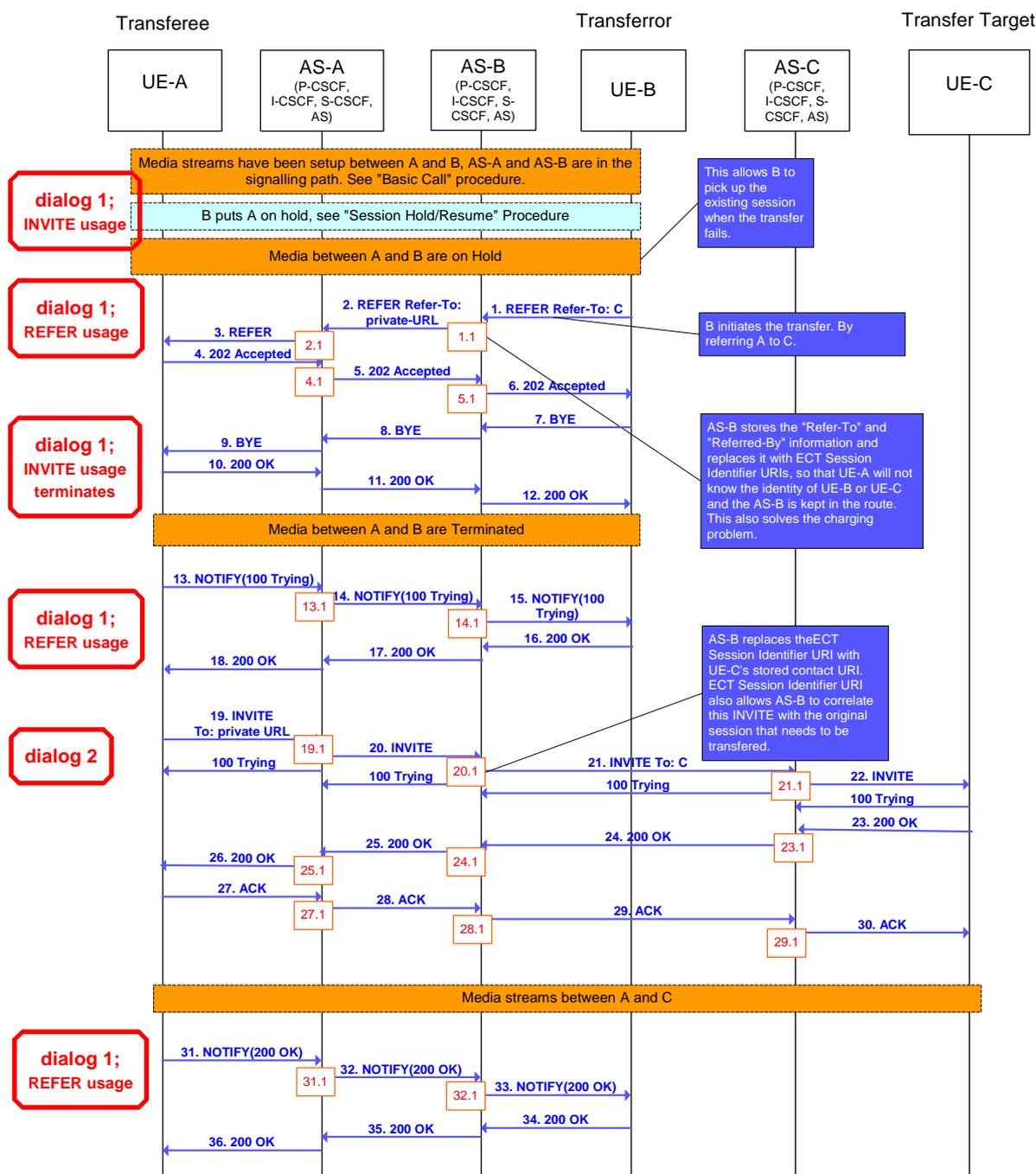


Figure A.1: Blind transfer

1. A multimedia session exists between A-B. B initiates transfer A to C, by sending REFER request To: UE-A with Referred-To: UE-C, Referred-By: UE-B. The REFER request is send in the existing dialog that between A and B.
- 1.1 Upon reception of the REFER request, AS-B must check whether there is no outgoing call barring active from B to C. Because B is charged for the call from B-C when A is referred to C, when outgoing call barring is active from B-C the REFER request is rejected.

AS-B checks whether B is allowed to transfer calls, if it is allowed to transfer the call then AS-B generates a ECT Session Identifier URI, addressed to itself, with the new destination information and billing information that will be needed for the new session. It replaces the Refer-To value with the ECT Session Identifier URI. This ensures that:

AS-B will remain in the loop.
2. The REFER request is sent on to AS-A.
- 2.1 AS-A checks whether it is allowed to transfer A.
3. The REFER request is sent on to A by AS-A.
4. The REFER request is accepted by A's UE.
- 4.1, 7.1, 31.1 AS-A can use result messages and notifications caused by the REFER request to track success of refer and take appropriate actions. The AS-A can ensure that header fields that where replaced with other content are recreated with the original content on the way back.
- 5.1, 8.1, 32.1 AS-B can use this to track success of the REFER request and take appropriate actions. The AS-B can ensure that header fields that where replaced with other content are recreated with the original content on the way back.
7. Since the REFER request was accepted in 6. UE-B terminates the existing INVITE dialog by sending a BYE to UE-A.
19. The UE-A initiates a new session by sending an INVITE request to AS-B's ECT Session Identifier URI (which represents UE-C).
- 19.1 AS-A routes the INVITE request to AS-B using the AS-B's ECT Session Identifier URI using normal SIP routing procedures. Normal charging from A to B applies.
- 20.1 Upon receiving the INVITE request to the ECT Session Identifier URI that was inserted by the AS-B, the AS-B replaces it with the Request URI of C and creates an INVITE targeted towards UE-C.

In this scenario it can be assumed that there is no active outgoing call barring towards UE-C, because the REFER was accepted by AS-B. The ECT Session Identifier URI has a limited validity time to ensure that no future barring is violated. For now it is assumed that this is enough.

Also the Referred-By: header field is verified or filled in with the original uncodified values. Then the INVITE request is forwarded to UE-C using normal routing procedures.
- 21.1, 23.1 Normal terminating services apply for UE-C. The call will be treated as a call from A-C regarding call policies.
- 25.1 AS-A. Normal response handling applies.
- 27.1 AS-A. Normal ACK handling applies.
- 28.1 AS-B replaces all codified values and ECT Session Identifier URI 's with stored values.

A.2 Consultative transfer

Figure A.2 signalling flow shows a consultative transfer scenario:

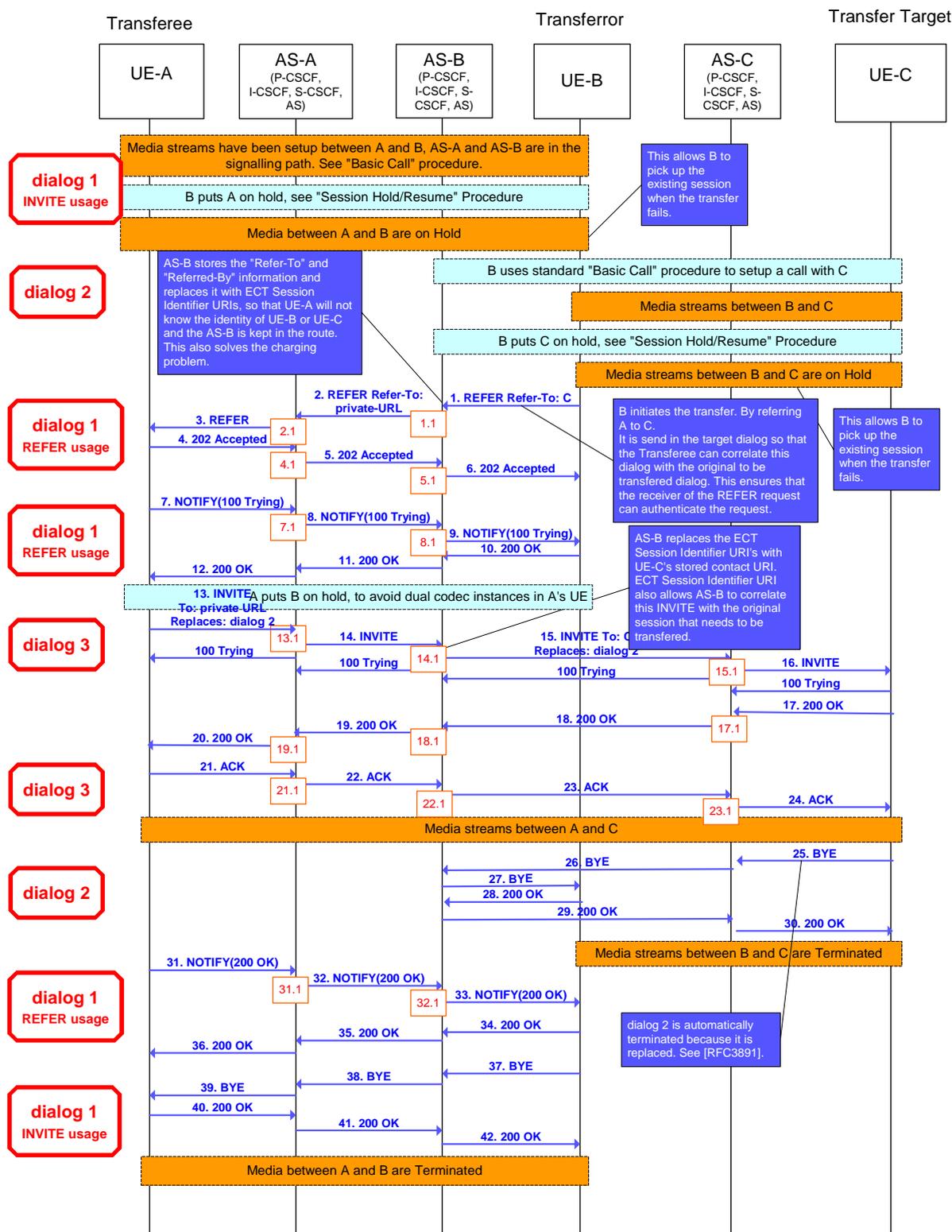


Figure A.2: Consultative transfer

1. A multimedia session exists between A-B and between B-C. B initiates transfer A to C, by sending REFER method To: UE-A GRUU with the Referred-To: UE-C?Replaces=dialog2, Referred-By: UE-B. The REFER reuses the dialog that exists from A-B.
- 1.1 Upon reception of the REFER operation AS-B must check whether there is no outgoing call barring active from B to C. Because B is charged for the call from B-C when A is referred to C, when outgoing call barring is active from B-C the REFER is rejected.

AS-B checks whether B is allowed to transfer calls, if it is allowed to transfer the call then AS-B generates a ECT Session Identifier URI, addressed to itself, with the new destination information and billing information that will be needed for the new session. It replaces the Refer-To value with the ECT Session Identifier URI. This ensures that AS-B will remain in the loop.
2. The REFER to method is sent on to AS-A.
- 2.1 AS-A checks whether it is allowed to transfer A.
3. Refer is sent on to A by AS-A.
- 4.1, 7.1, 31.1 AS-A can use result messages and notifications caused by REFER to track success of REFER and take appropriate actions. The AS-A can ensure that header fields that were replaced with other content are recreated with the original content on the way back.
- 5.1, 8.1, 32.1 AS-B can use this to track success of REFER and take appropriate actions. The AS-B can ensure that header fields that were replaced with other content are recreated with the original content on the way back.
13. UE-A initiates a new session by sending an INVITE to AS-B's ECT Session Identifier URI (which represents UE-C). And inserts a Replaces: header field that will allow the new session to take the place of the existing session between B and C.
- 13.1 AS-A checks whether A is allowed to use the Replace extension and routes the INVITE to AS-B using the AS-B's ECT Session Identifier URI using normal SIP routing procedures. Normal charging from A to B applies.
- 14.1 Upon receiving the INVITE to the ECT Session Identifier URI that was inserted by the AS-B, the AS-B replaces the Request URI and creates an INVITE targeted towards UE-C's.

In this scenario it can be assumed that there is no active outgoing call barring towards UE-C, because UE-B was able to setup a call to UE-C in the first place. However when there was no consultation call to UE-C, there is an issue but this is solved at the initial reception of the REFER from UE-C and not at this stage.

Also the Referred-By: and Replaces: header field are filled in with the original uncodified values. The INVITE is forwarded to UE-C using normal routing procedures.
- 15.1, 17.1 Normal terminating services apply for UE-C. The call will be treated as a call from A-C regarding call policies. AS-C checks whether the Replace mechanism is used.
- 19.1 AS-A. Normal response handling applies.
- 21.1 AS-A. Normal ACK handling applies.
- 22.1 AS-B replaces all codified values and the ECT Session Identifier URI with stored values.
25. UE-C terminates dialog 2 as consequence of normal Replace procedures according to RFC 3891 [4].

Annex B (informative): Example of filter criteria

B.1 Example of filter criteria for ECT

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

When the initial request matches the conditions of the next unexecuted IFC rule for the served user which points to the ECT service, the communication is forwarded to the AS.

An example of an Initial Filter Criteria (IFC) Trigger Point configurations under the assumption that the ECT service is a standalone service that can be invoked by a very specific triggerpoint active at the destination S-CSCF:

- Method="INVITE"

NOTE 1: The coding of the Initial Filter Criteria is described in TS 183 033 [7].

NOTE 2: When the REFER is sent on an existing dialog, no IFC processing will be performed, because this is a subsequent request on an existing dialog. It follows that when this scenario should be supported, that then all signalling shall be traversed through the AS.

Annex C (informative): Example charging model

C.1 Example of B REFER's A to C

This scenario is added to show that the solution presented in the present document is able to support classical charging models. Assumption in this scenario is that A originated the original call and is thus charged for the initial A-B communication.

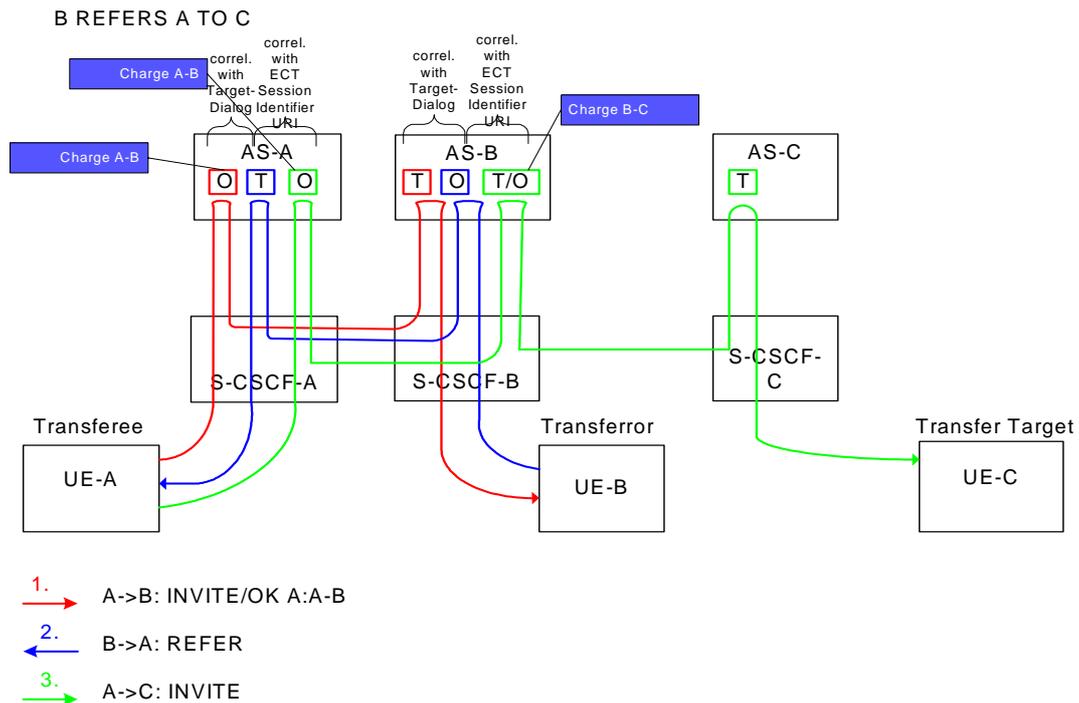


Figure C.1: Example of B REFER's A to C

Table C.1

Initial Session Initiated By	Initial Session A-B	Transferred Session Transfer Target tC
A=Transferee	Transferee (A): A-B	Transferee (A): A-B Transferror (B): B-C
A=Transferror	Transferror (A): A-B	Transferror (A): A-B Transferror (A): A-C

C.2 Example of A REFER's B to C

This scenario is added to show that the solution presented in the present document is able to support classical charging models. Assumption in this scenario is that A originated the original call and is thus charged for initial A-B communication.

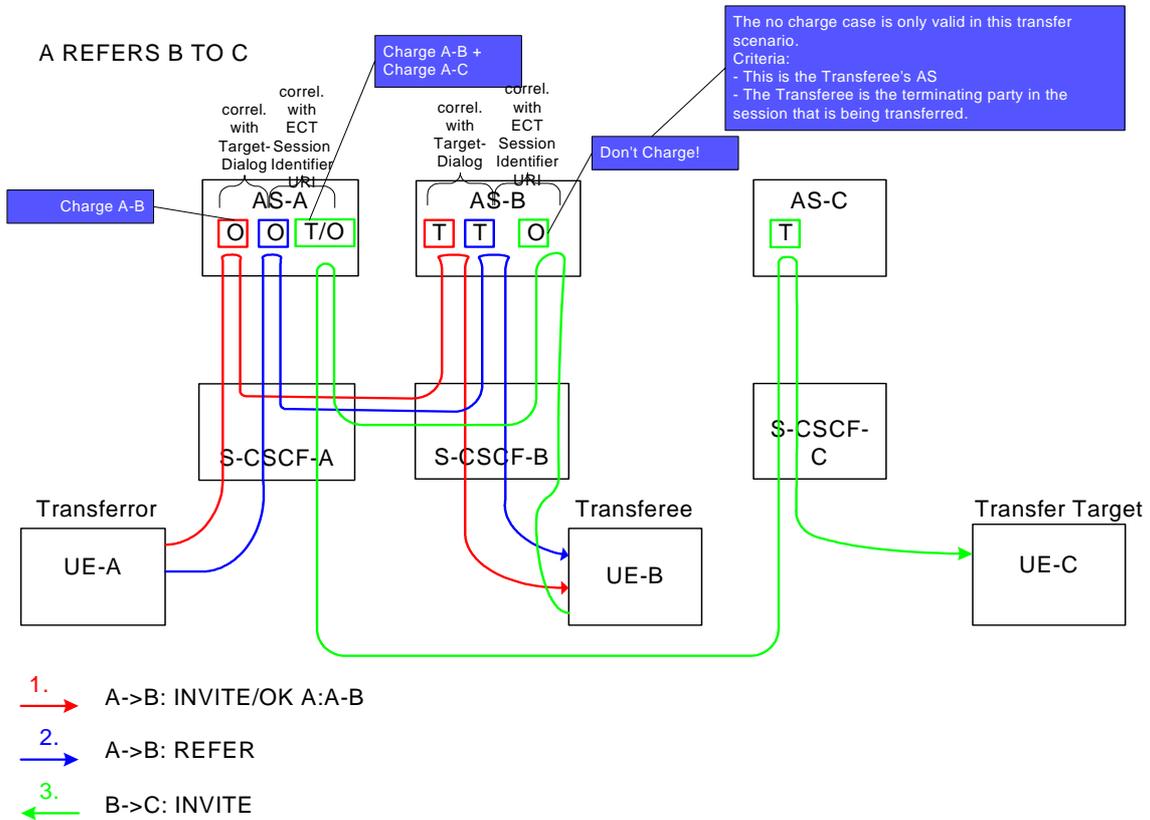


Figure C.2: Example of a REFER's B to C

Table C.2

Initial Session Initiated By	Initial Session A-B	Transferred Session Transfer Target C
A=Transferee	Transferee (A): A-B	Transferee (A): A-B Transferrer (B): B-C
A=Transferrer	Transferrer (A): A-B	Transferrer (A): A-B Transferrer (A): A-C

Annex D (informative): Bibliography

ETSI ETS 300 367: "Integrated Services Digital Network (ISDN); Explicit Call transfer (ECT) supplementary service; Service description".

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

ETSI TS 181 006: "Service and Capabilities Requirements for TISPAN NGN; Release 1".

History

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