

ETSI TS 123 091 V17.0.0 (2022-04)



**Digital cellular telecommunications system (Phase 2+) (GSM);
Universal Mobile Telecommunications System (UMTS);
Explicit Call Transfer (ECT) supplementary service;
Stage 2
(3GPP TS 23.091 version 17.0.0 Release 17)**



Reference

RTS/TSGC-0423091vh00

Keywords

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 - APE 7112B
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

Important notice

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at www.etsi.org/deliver.

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

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

If you find a security vulnerability in the present document, please report it through our
Coordinated Vulnerability Disclosure Program:

<https://www.etsi.org/standards/coordinated-vulnerability-disclosure>

Notice of disclaimer & limitation of liability

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or other professional standard and applicable regulations.

No recommendation as to products and services or vendors is made or should be implied.

No representation or warranty is made that this deliverable is technically accurate or sufficient or conforms to any law and/or governmental rule and/or regulation and further, no representation or warranty is made of merchantability or fitness for any particular purpose or against infringement of intellectual property rights.

In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2022.
All rights reserved.

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are 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 (<https://ipr.etsi.org/>).

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, 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.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

Legal Notice

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities. These shall be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between 3GPP and ETSI identities can be found under <http://webapp.etsi.org/key/queryform.asp>.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Contents

Intellectual Property Rights	2
Legal Notice	2
Modal verbs terminology.....	2
Foreword.....	4
1 Scope	5
2 References	5
3 Definitions and abbreviations.....	5
3.1 Definitions	5
3.2 Abbreviations	6
4 Explicit Call Transfer (ECT).....	6
4.1 Functions	6
4.2 SDL diagrams and information flows	8
4.2.1 General description	8
4.2.2 ECT (both calls answered).....	8
4.2.3 ECT (one call answered, the other alerting)	11
4.3 Interaction with other supplementary services	14
4.3.1 Line Identification services.....	14
4.3.2 Call Forwarding Unconditional (CFU)	16
4.3.3 Call Forwarding on mobile subscriber Busy (CFB)	17
4.3.3.1 Call Forwarding on mobile subscriber Busy due to Network Determined User Busy (NDUB).....	17
4.3.3.2 Call Forwarding on mobile subscriber Busy due to User Determined User Busy (UDUB)	17
4.3.4 Call Forwarding on No Reply (CFNRy).....	18
4.3.5 Call Forwarding on mobile subscriber Not Reachable (CFNRc).....	18
4.3.6 Call Waiting (CW).....	18
4.3.7 Call Hold (HOLD).....	18
4.3.8 Multi Party (MPTY)	18
4.3.9 Closed User Group (CUG)	18
4.3.10 Advice of Charge (AoC) services	19
4.3.11 Call Barring services.....	19
4.3.12 Explicit Call Transfer (ECT)	19
4.4 Information stored in the HLR	19
4.5 State transition model.....	19
4.6 Transfer of information from the HLR to the VLR.....	20
4.7 Information stored in the VLR	20
4.8 Handover	20
Annex A: Change history	21
History	22

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document gives the stage 2 description of the call transfer supplementary services.

Only one call transfer supplementary service has been defined, this is the Explicit Call Transfer (ECT) supplementary service, and is described in the present document.

2 References

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

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

- [1] 3GPP TR 21.905: "3G Vocabulary".
- [2] 3GPP TS 23.083: "Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 2".
- [3] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols - Stage 3".
- [4] EN 300 368: "Integrated Services Digital network (ISDN); Explicit Call Transfer (ECT) supplementary service; Functional capabilities and information flows".
- [5] EN 300 356-14: "Integrated Services Digital network (ISDN); Signalling System No. 7; ISDN User Part (ISUP) version 3 for the international interface; Part 14: Explicit Call Transfer (ECT) supplementary service".
- [6] 3GPP TS 23.011: "Technical realization of Supplementary Services".
- [7] 3GPP TS 23.018: "Basic Call Handling".

3 Definitions and abbreviations

3.1 Definitions

First call: One of the subscriber A calls (answered).

Notification Indicator (NI): Indicates to each remote party in which state of the other remote party ECT was performed (active, alerting).

Redirection Number (Rdn): Includes the presentation indicator and the directory number of the other remote party.

Second call: The other subscriber A call (answered or alerting).

Subscriber A (PARTY A): The served mobile subscriber - the one who has subscribed to, and invokes the ECT Supplementary Service.

Subscriber B (PARTY B): The other party in the subscriber A first call.

Subscriber C (PARTY C): The other party in the subscriber A second call.

Subscriber D (PARTY D): The forwarded-to party when the call is forwarded by the subscriber C.

Transferred call: The resulting call after successful explicit call transfer between B and C.

3.2 Abbreviations

In addition to those below, abbreviations used in the present document are listed in 3GPP TR 21.905 [1].

ECT:	Explicit Call Transfer supplementary service
LI:	Line Identity
NI:	Notification Indicator
Rdn:	Redirection number
RdnB:	Redirection number of party B
RdnD:	Redirection number of party D

4 Explicit Call Transfer (ECT)

4.1 Functions

The following function has been identified for the explicit call transfer service:

MAF027

Explicit Call Transfer related authorizations examination

The ability of a PLMN component to determine the authorizations relating to explicit call transfer. See figure 1.

Location: VLR

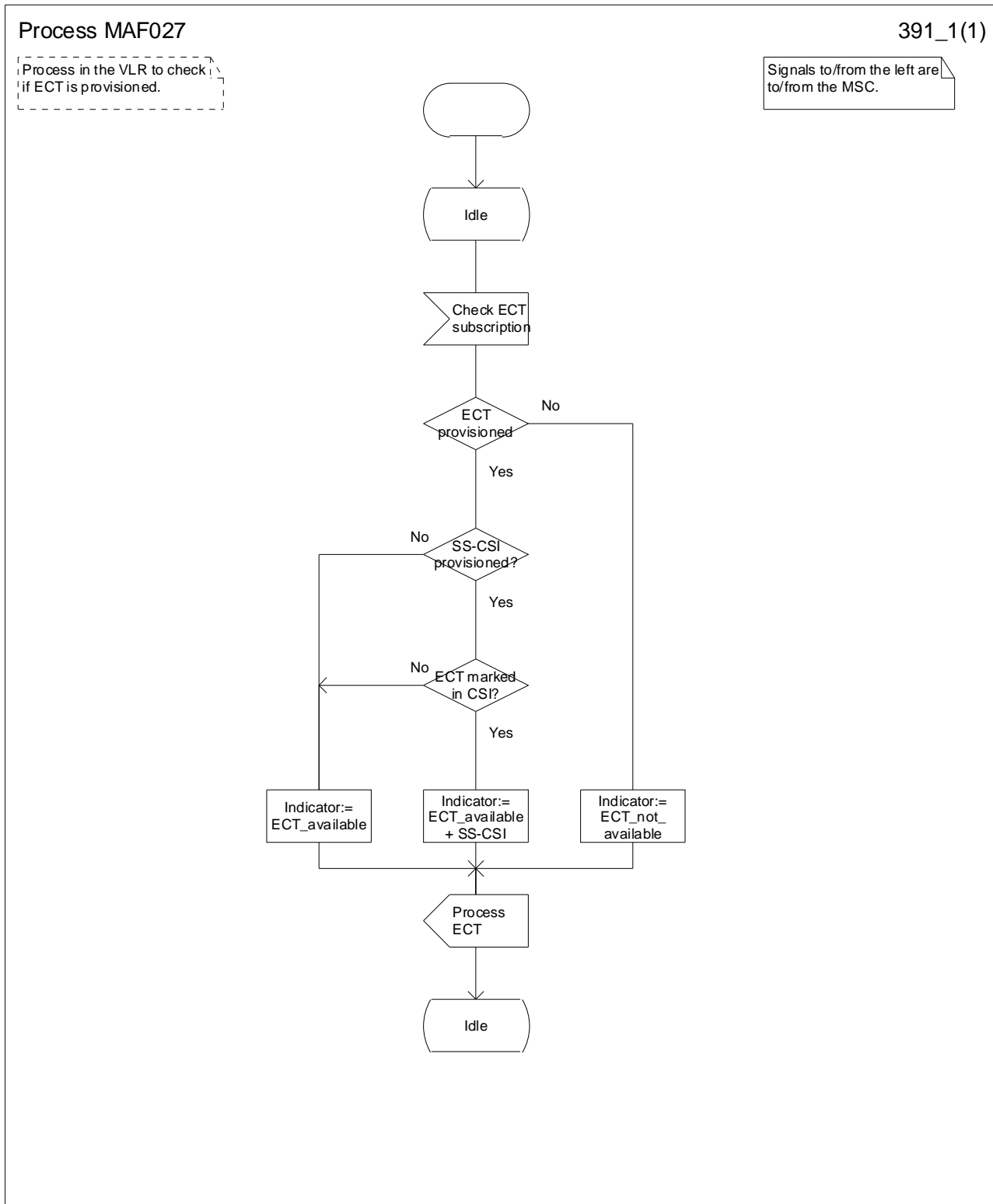


Figure 1: Explicit Call Transfer related authorizations examination (VLR)

4.2 SDL diagrams and information flows

4.2.1 General description

The procedures `Handle_ECT_Active` and `Handle_ECT_Alerting` show the behaviour of the service as perceived by the served mobile subscriber and by any of the other parties involved in the transfer. These procedures and the macro `Check_ECT` show the actions to be taken by the network and the information provided by the network to the users.

The following states for the invocation of the ECT supplementary service are defined:

- a) First Call (Active, Held), Second Call (Active, Idle);
- b) First Call (Active, Held), Second Call (Call Delivered, Idle).

NOTE: The call state "call delivered" means that an ALERTING message has been sent to the MS, but no ANSWER Message (ANM) has been received.

In the information flows it is assumed that the served subscriber is a mobile subscriber and that the other parties are mobile or fixed subscribers.

Party A is the subscriber controlling the Explicit Call Transfer Call (served mobile subscriber). Party B is the first remote party called. Party C is the second remote party called.

The served party is disconnected by the generic disconnect/release procedure after a successful transfer request. The connection of the remote parties in a new call (transferred call) is located in the served subscriber's MSC.

The information flows in figures 4 and 7 show the unsuccessful case (i.e. the check in the VLR or in the MSC fails).

The information flows in figures 5 and 8 show the successful case.

4.2.2 ECT (both calls answered)

The SDL for the procedure `Handle_ECT_Active` (Explicit Call Transfer - both calls have been answered) is shown in figure 2.

The checks of whether Explicit Call Transfer is barred or not are shown in figure 3.

The corresponding information flows are given in figure 4 and figure 5.

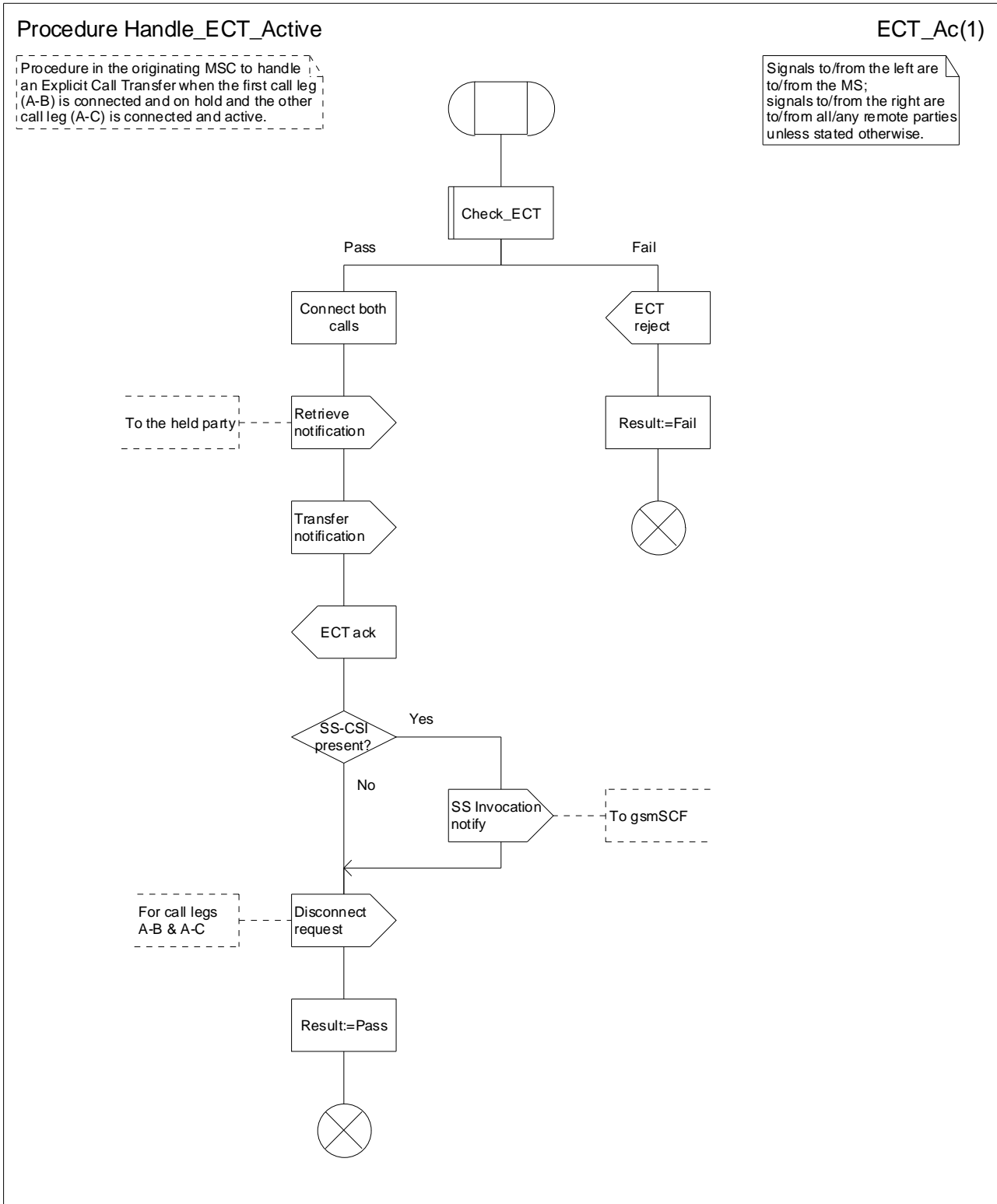


Figure 2: Procedure Handle_ECT_Active

Macrodefinition Check_ECT

1(1)

Macro in the originating MSC to check if an Explicit Call Transfer can be performed.

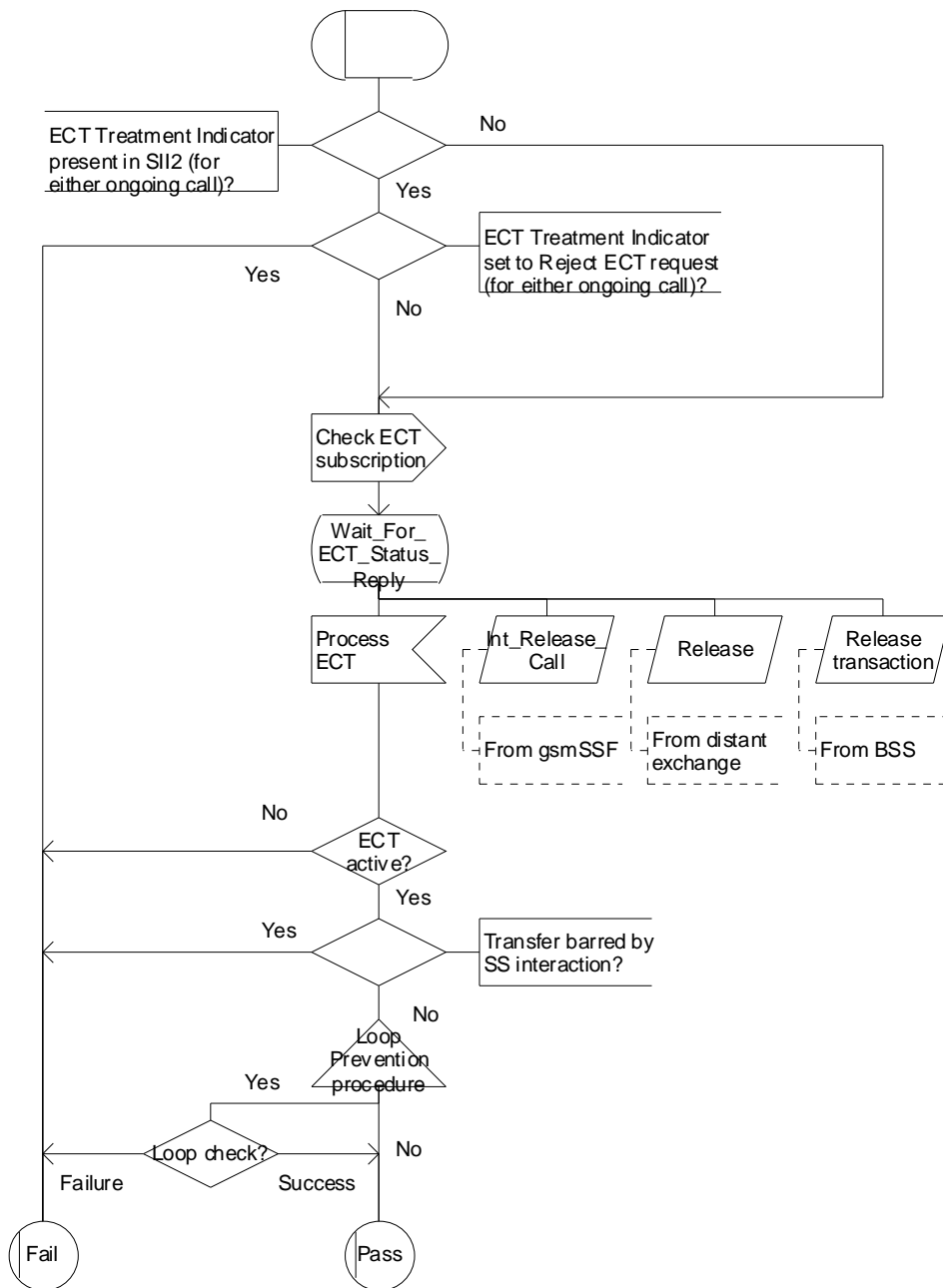
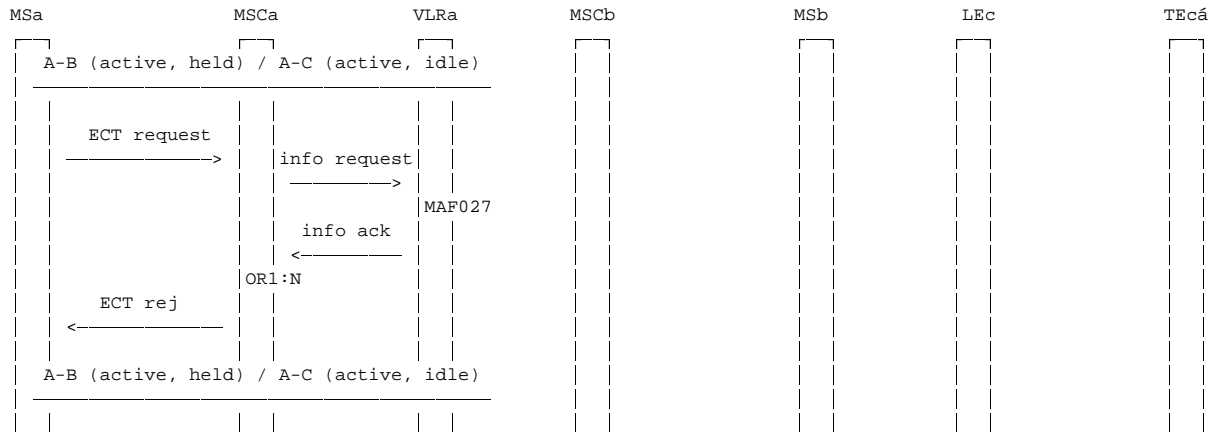
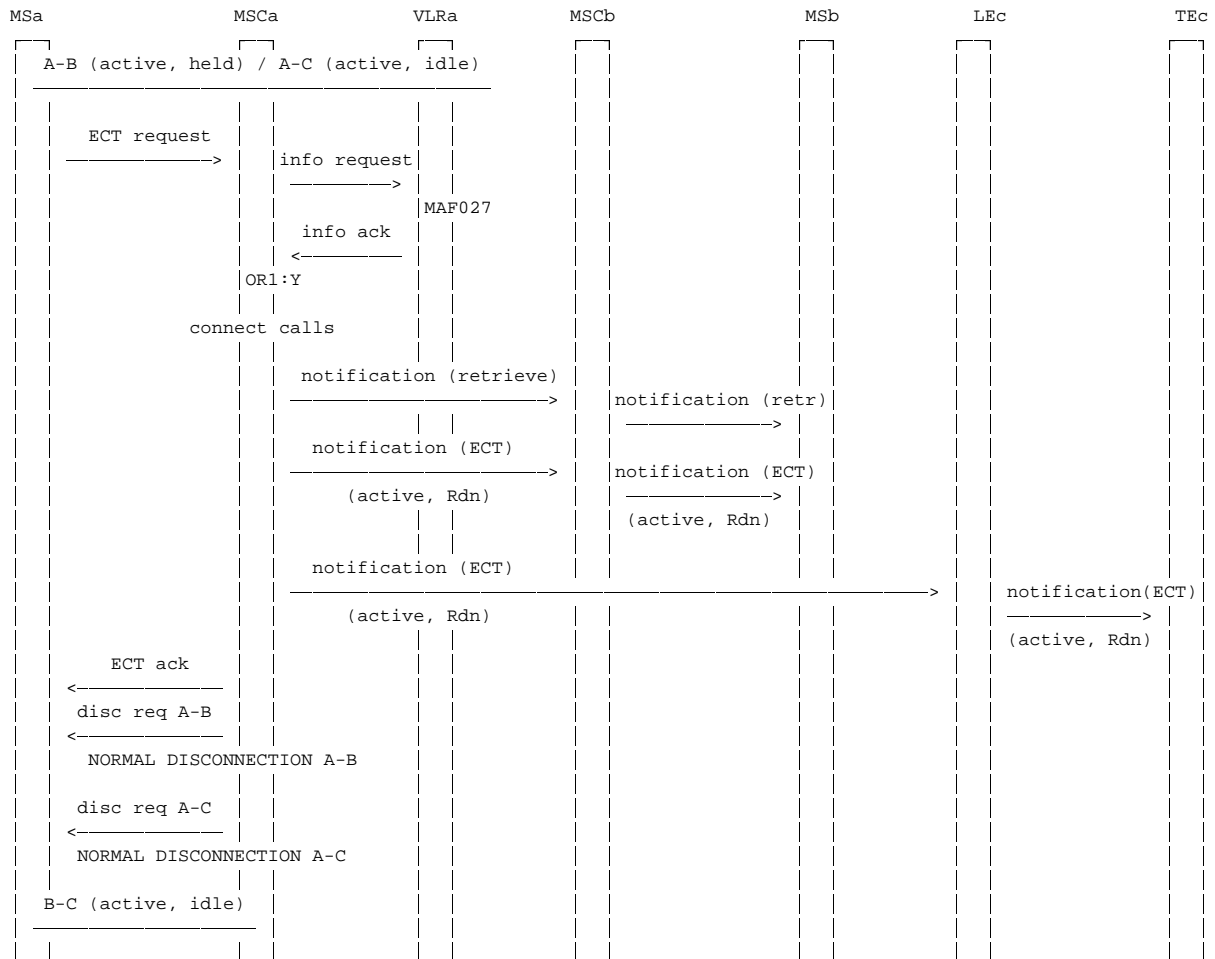


Figure 3: Macro Check_ECT



NOTE: OR1: Checks in VLR and MSC ok? (Y: yes N: no).

Figure 4: Information flow for failed explicit call transfer request (both calls answered)



NOTE: OR1: Checks in VLR and MSC ok? (Y: yes N: no).

Figure 5: Information flow for successful explicit call transfer (both calls answered)

4.2.3 ECT (one call answered, the other alerting)

The SDL for the procedure Handle_ECT_Alerting (Explicit Call Transfer - one call answered, the other alerting) is shown in figure 6.

The checks of whether Explicit Call Transfer is barred or not are shown in figure 3.

The corresponding information flows are given in figure 7 and figure 8.

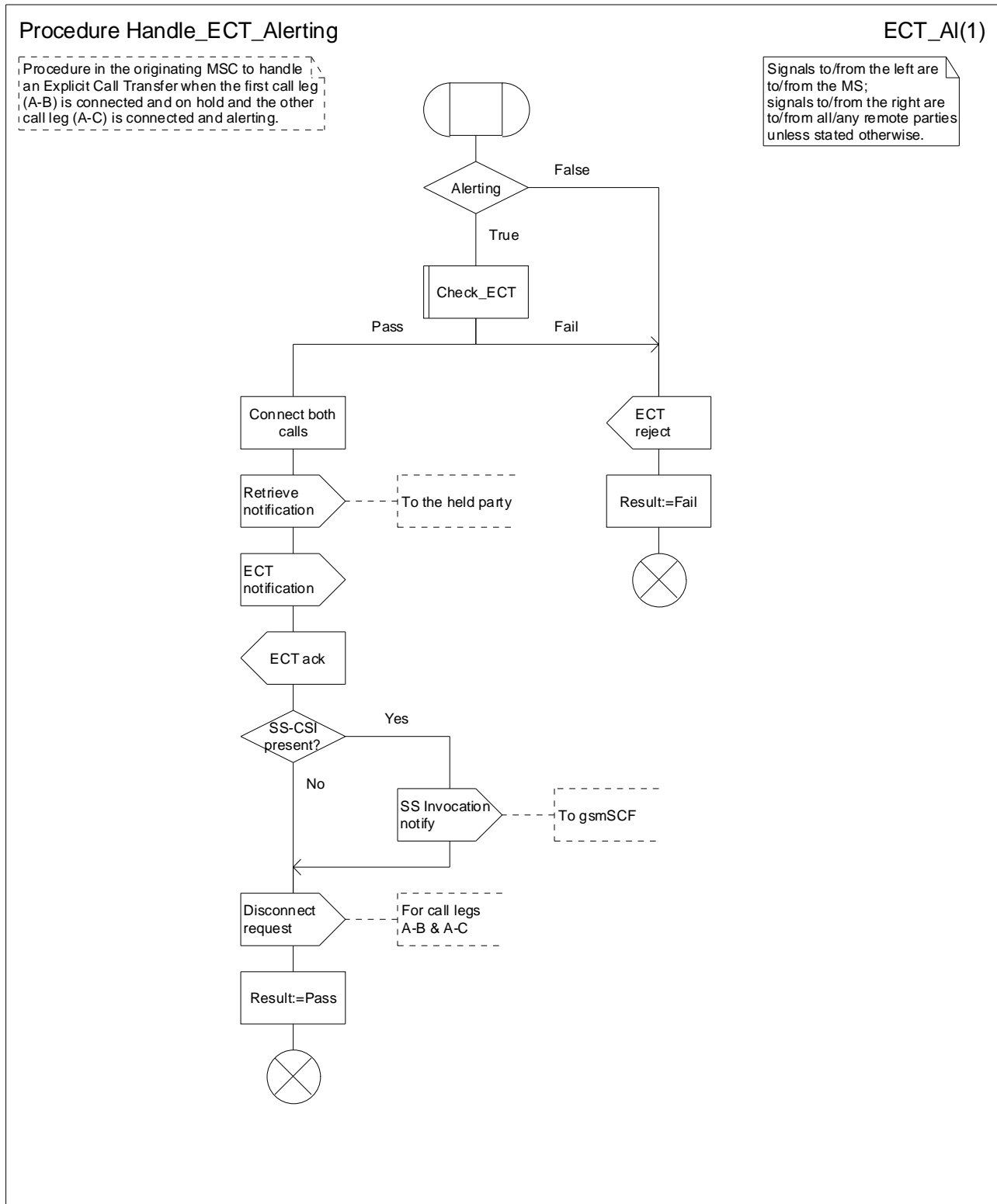
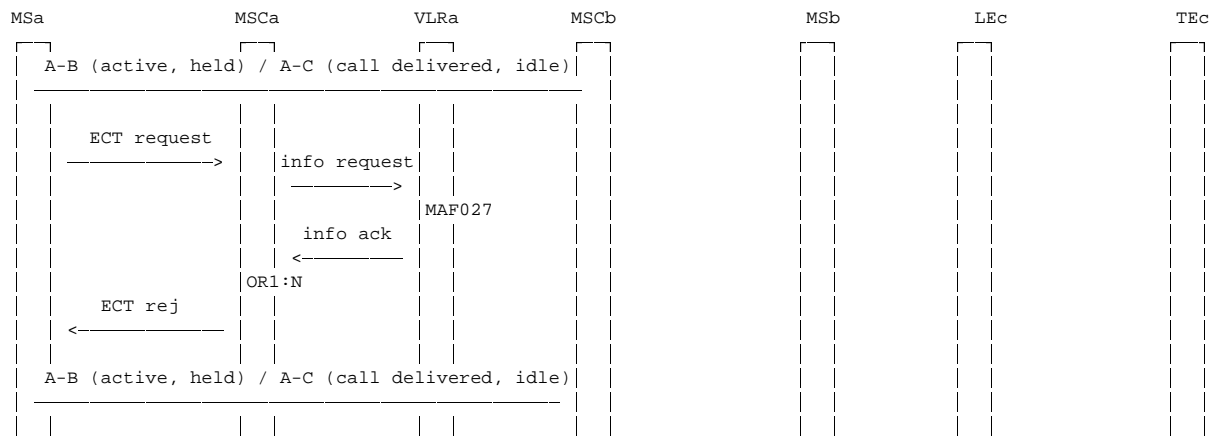
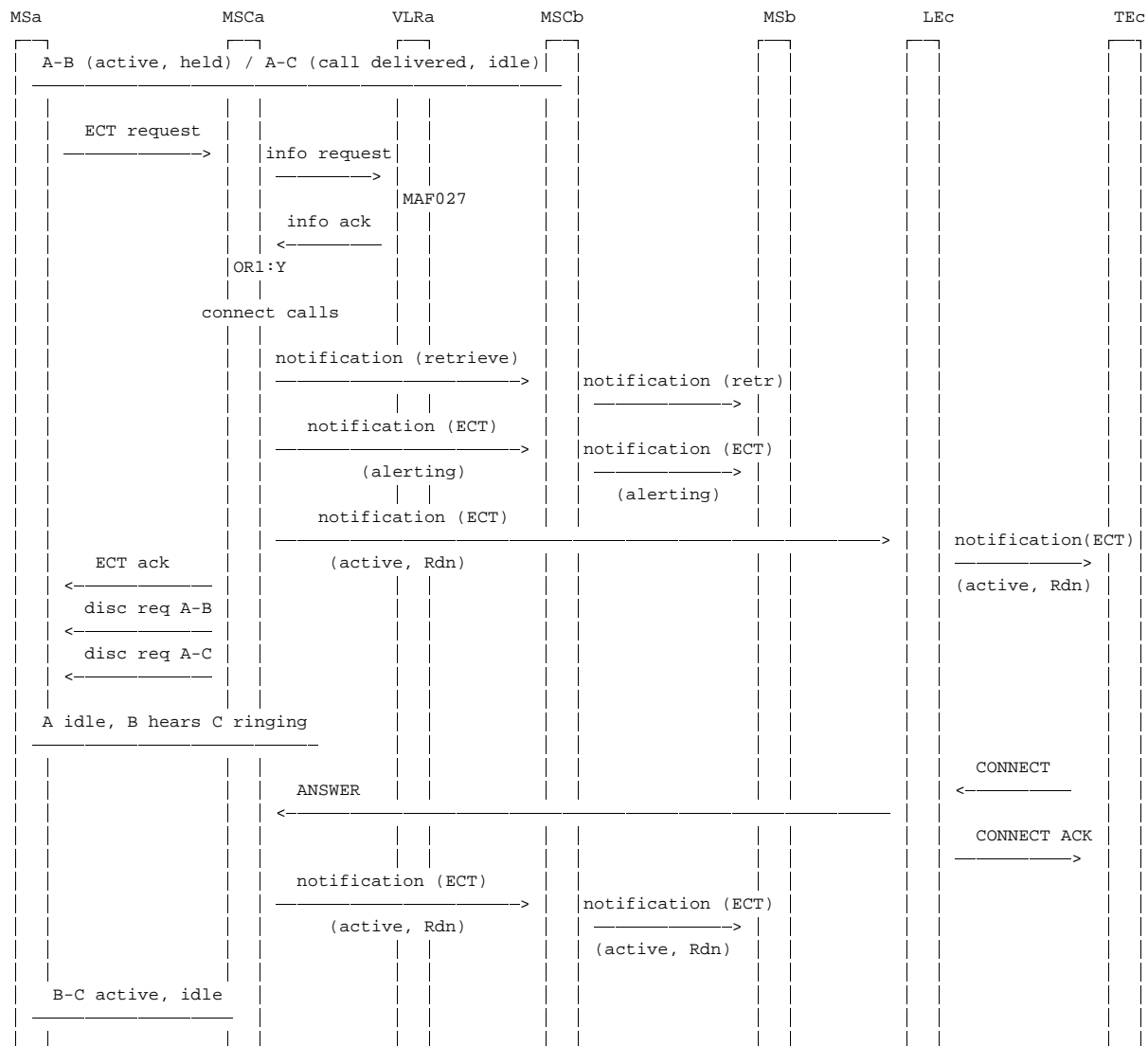


Figure 6: Procedure Handle_ECT_Alerting



NOTE: OR1: Checks in VLR and MSC ok? (Y: yes N: no).

Figure 7: Information flow for failed explicit call transfer request (one call answered, the other alerting)



NOTE: OR1: Checks in VLR and MSC ok? (Y: yes N: no).

Figure 8: Information flow for successful explicit call transfer (one call answered, the other alerting)

4.3 Interaction with other supplementary services

4.3.1 Line Identification services

Tables 1 to 4 indicate the information to be provided in the Notification Indicator (NI) and the Redirection Number (Rdn) when the subscribers B and C are notified. Call states refer to the situation before ECT invocation. At that time one of the calls is on hold.

If user B was the called subscriber in the call A-B, table 1 applies to the information supplied to subscriber C. If user B was the calling subscriber in the call A-B, table 2 applies to the information supplied to subscriber C.

Mobile subscriber A has an active call to subscriber B and:

- puts the active call on hold and calls subscriber C, table 3 applies to the information supplied to subscriber B;
- receives and accepts a call from subscriber C (by putting B on Hold), table 4 applies to the information supplied to subscriber B.

Table 1: Mobile subscriber A was calling subscriber B, puts B on hold and calls subscriber C

Call states	COLR indication received from subscribers B's network	Information provided to C
A-B Active A-C Active / Alerting	Indicated "allowed"	At time of transfer: NI: "call transferred, active" Rdn: PI = allowed, LI of B
A-B Active A-C Active / Alerting	Indicated "restricted"	At time of transfer: NI: "call transferred, active" Rdn: PI = restricted (note 1)
A-B Active A-C Active / Alerting	No indication received (e.g. interworking)	At time of transfer: NI: "call transferred, active" Rdn: PI = not available

Table 2: Mobile subscriber A was called by subscriber B, puts B on hold and calls subscriber C

Call states	CLIR indication received from subscribers B's network	Information provided to C
A-B Active A-C Active / Alerting	Indicated "allowed"	At time of transfer: NI: "call transferred, active" Rdn: PI = allowed, LI of B
A-B Active A-C Active / Alerting	Indicated "restricted"	At time of transfer: NI: "call transferred, active" Rdn: PI = restricted (note 1)
A-B Active A-C Active / Alerting	No indication received (e.g. interworking)	At time of transfer: NI: "call transferred, active" Rdn: PI = not available

NOTE 1: If the subscriber C has CLIP Override Category then the following information is carried in the Redirection number: PI = restricted, LI of B.

Table 3: Mobile subscriber A puts the call to B on hold and calls subscriber C

Call states	COLR indication received from subscribers C's network	Information provided to B
A-B Active A-C Active	Indicated "allowed"	At time of transfer: NI: "call transferred, active" Rdn: PI = allowed, LI of C
A-B Active A-C Active'	Indicated "restricted"	At time of transfer: NI: "call transferred, active" Rdn: PI = restricted (note 2)
A-B Active A-C Active	No indication received (e.g. interworking)	At time of transfer: NI: "call transferred, active" Rdn: PI = not available
A-B Active A-C Alerting	Indicated "allowed" at receipt of CONNECT by subscriber C	At time of transfer: NI: "call transferred, alerting" At subscribers C CONNECT: NI: "call transferred, active" Rdn: PI = allowed, LI of C
A-B Active A-C Alerting	Indicated "restricted" at receipt of CONNECT by subscriber C	At time of transfer: NI: "call transferred, alerting" At subscribers C CONNECT: NI: "call transferred, active" Rdn: PI = restricted (note 2)
A-B Active A-C Alerting	No indication received at receipt of CONNECT by subscriber C (e.g. interworking)	At time of transfer: NI: "call transferred, alerting" At subscribers C CONNECT: NI: "call transferred, active" Rdn: PI = not available

Table 4: Mobile subscriber A was called by subscriber C and accepts the call by putting subscriber B on hold

Call states	CLIR indication received from subscriber C's network	Information provided to B
A-B Active A-C Active	Indicated "allowed"	At time of transfer: NI: "call transferred, active" Rdn: PI = allowed, LI of C
A-B Active A-C Active	Indicated "restricted"	At time of transfer: NI: "call transferred, active" Rdn: PI = restricted (note 2)
A-B Active A-C Active	No indication received (e.g. interworking)	At time of transfer: NI: "call transferred, active" Rdn: PI = not available

NOTE 2: If the subscriber B was called by subscriber A and has CLIP Override Category, or if subscriber B called subscriber A and has COLP Override Category then the following information is carried in the Redirection number: PI = restricted, LI of C

4.3.2 Call Forwarding Unconditional (CFU)

No impact.

4.3.3 Call Forwarding on mobile subscriber Busy (CFB)

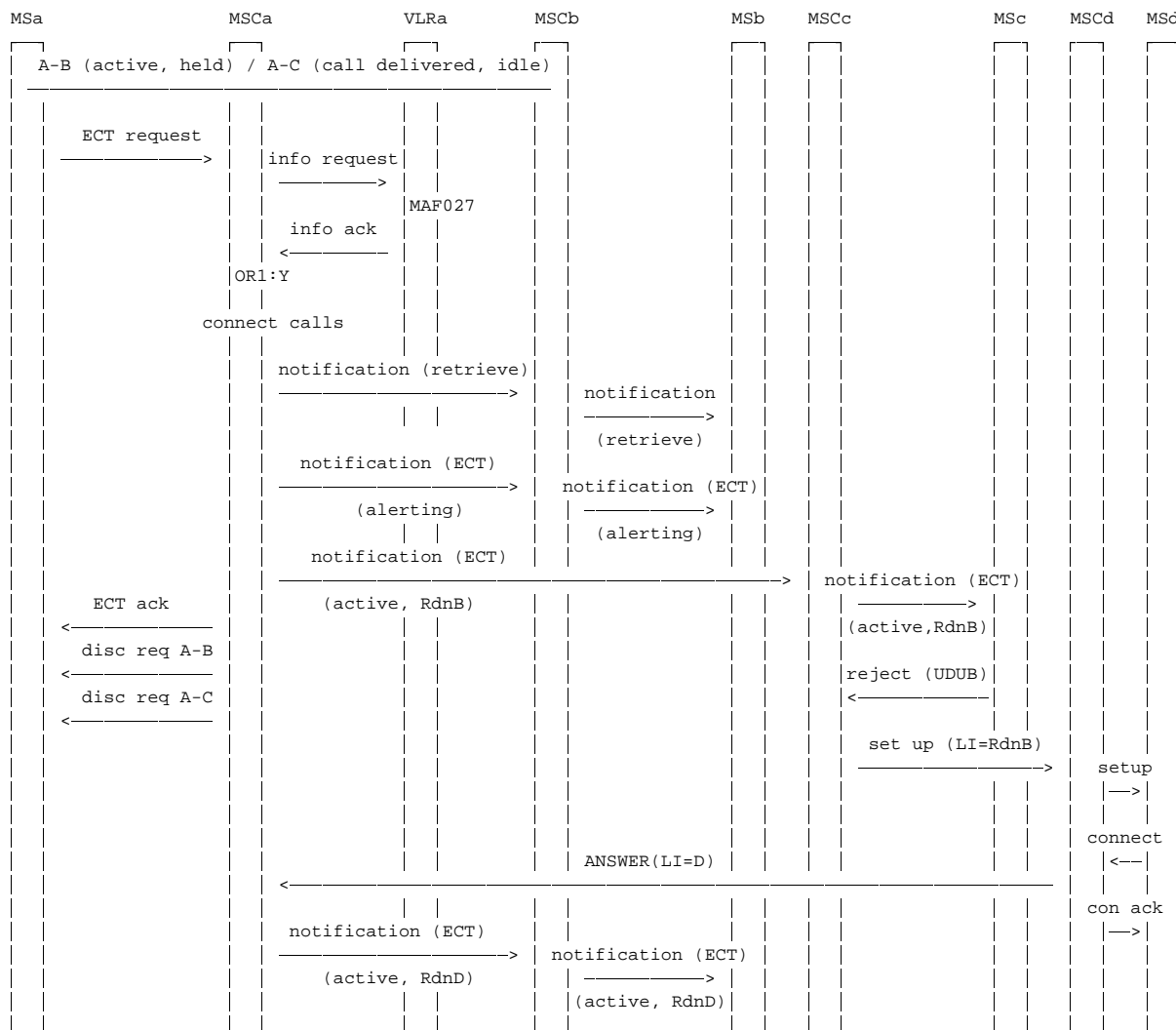
4.3.3.1 Call Forwarding on mobile subscriber Busy due to Network Determined User Busy (NDUB)

No impact.

4.3.3.2 Call Forwarding on mobile subscriber Busy due to User Determined User Busy (UDUB)

When subscriber A transfers the forwarded call there is no impact.

When subscriber C forwards the transferred call to the forwarded-to subscriber D due to UDUB the line identity information of the subscriber B that was received by the subscriber C in the ECT invocation notification shall be sent as calling line identity to the forwarded-to subscriber D instead of the line identity of the subscriber A. The corresponding information flow is given in figure 9. For the line identity information sent to the subscriber B after the call is answered by the forwarded-to subscriber D the table 5 applies.



NOTE: OR1: Checks in VLR and MSC ok? (Y: yes N: no)

Figure 9: Information flow for interaction of explicit call transfer (one call answered, the other alerting) with call forwarding

Table 5: Subscriber C forwards the transferred call to the subscriber D

Call states	COLR indication received from subscribers D's network	Information provided to B
A-B Active A-C Alerting, forwarded to D	Indicated "allowed" at receipt of CONNECT by subscriber D	At time of transfer: NI: "call transferred, alerting" At subscribers D CONNECT: NI: "call transferred, active" Rdn: PI = allowed, LI of D
A-B Active A-C Alerting, forwarded to D	Indicated "restricted" at receipt of CONNECT by subscriber D	At time of transfer: NI: "call transferred, alerting" At subscribers D CONNECT: NI: "call transferred, active" Rdn: PI = restricted (note 1)
A-B Active A-C Alerting, forwarded to D	No indication received at receipt of CONNECT by subscriber D (e.g. interworking)	At time of transfer: NI: "call transferred, alerting" At subscribers D CONNECT: NI: "call transferred, active" Rdn: PI = not available

NOTE 1: If the subscriber B was called by subscriber A and has CLIP Override Category, or if subscriber B called subscriber A and has COLP Override Category then the following information is carried in the Redirection number: PI = restricted, LI of D.

4.3.4 Call Forwarding on No Reply (CFNRy)

Same as the interaction between call forwarding on mobile subscriber busy due to UDUB and explicit call transfer as described in clause 4.3.3.2.

Figure 9 applies except that call forwarding is invoked by the CFNRy timer expiry instead of reception of reject (UDUB) message.

For the line identity information sent to the subscriber B after the call is answered by the forwarded-to subscriber D the table 5 applies.

4.3.5 Call Forwarding on mobile subscriber Not Reachable (CFNRc)

No impact.

4.3.6 Call Waiting (CW)

No impact.

4.3.7 Call Hold (HOLD)

No impact.

4.3.8 Multi Party (MPTY)

The MSC/VLR shall reject any ECT request from the served subscriber of a MPTY call.

4.3.9 Closed User Group (CUG)

Closed user group restrictions shall be met between users when the first call is set up.

Similarly, closed user group restrictions shall also be met between users when setting up the second call.

Finally, for successful explicit call transfer the served mobile subscriber must use the same CUG-Interlock code for both calls. The same rule shall be applied regardless of being two MO calls, two MT calls or one MO and one MT call.

4.3.10 Advice of Charge (AoC) services

No impact.

4.3.11 Call Barring services

No impact

4.3.12 Explicit Call Transfer (ECT)

It is required as a network option that the establishment of endless loops between subscriber A and subscriber B, both of them transferring the call to the other one, is prevented. The same loop prevention mechanism as in ISDN shall be used.

4.4 Information stored in the HLR

The following logical states are applicable for the Explicit Call Transfer service (refer to 3GPP TS 23.011 [6] for an explanation of the notation):

<u>Provisioning State</u>	<u>Registration State</u>	<u>Activation State</u>	<u>HLR Induction State</u>
(Not Provisioned,	Not Applicable,	Not Active,	Not Induced)
(Provisioned,	Not Applicable,	Active and Operative,	Not Induced)

The HLR shall store the logical state of the Explicit Call Transfer service (which shall be one of the valid states listed above) on a per subscriber basis.

4.5 State transition model

Figure 10 shows the successful cases of transition between the applicable logical states of the Explicit Call Transfer service. The state changes are caused by actions of the service provider.

Note that error cases are not shown in the diagram as they normally do not cause a state change. Additionally, some successful requests may not cause a state change and are therefore not shown in the diagram.

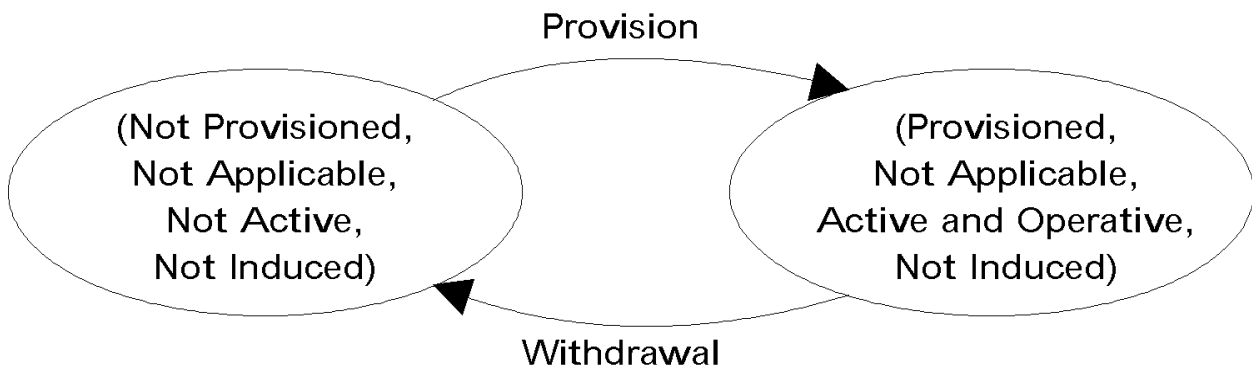


Figure 10: State transition model

4.6 Transfer of information from the HLR to the VLR

If the provisioning state for the Explicit Call Transfer service is "Provisioned" then when the subscriber registers on a VLR the HLR shall send that VLR information about the logical state of the Explicit Call Transfer service.

If the logical state of the Explicit Call Transfer service is changed while a subscriber is registered on a VLR then the HLR shall inform the VLR of the new logical state of the Explicit Call Transfer service.

4.7 Information stored in the VLR

For the supplementary service Explicit Call Transfer the VLR shall store the service state information received from the HLR.

4.8 Handover

Handover will have no impact on the control procedures and the operation of the service.

Annex A: Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
Apr 1999						Transferred to 3GPP CN1	
CN#03						Approved at CN#03	3.0.0
CN#06			001			Approved at CN#06	3.1.0
CN#09			002	1		SDL refresh	3.2.0
CN#11						Version increased from R99 to Rel-4 after CN#11	4.0.0
CN#11			003	1		Enhancement of ECT SDLs and CAMEL functionality	4.0.0
CN#16						Version increased from Rel-4 to Rel-5 after CN#16	5.0.0
CN#17			005			Correction to check of ECT treatment indicator in SII2 parameter	5.1.0
CN#26						Version increased from Rel-5 to Rel-6 after CN#26	6.0.0
CT#36						Upgraded unchanged from Rel-6	7.0.0
CT#42						Upgraded unchanged from Rel-7	8.0.0
CT#46			-	-		Update to Rel-9 version (MCC)	9.0.0
2011-03			-	-		Update to Rel-10 version (MCC)	10.0.0
2012-09			-	-		Update to Rel-11 version (MCC)	11.0.0
2014-09			-	-		Update to Rel-12 version (MCC)	12.0.0
2015-12			-	-		Update to Rel-13 version (MCC)	13.0.0
2017-03			-	-		Update to Rel-14 version (MCC)	14.0.0
2018-06			-	-		Update to Rel-15 version (MCC)	15.0.0
2020-07			-	-		Update to Rel-16 version (MCC)	16.0.0
2022-03	-	-	-	-	-	Update to Rel-17 version (MCC)	17.0.0

History

Document history		
V17.0.0	April 2022	Publication