3GPP TS 23.091 V11.0.0 (2012-09)

Technical Specification

3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; Explicit Call Transfer (ECT) supplementary service; Stage 2 (Release 11)

The present document has been developed within the 3rd Generation Partnership Project (3GPP ™) and may be further elaborated for the purposes of 3GPP.

The present document has not been subject to any approval process by the 3GPP Organisational Partners and shall not be implemented.
This Specification is provided for future development work within 3GPP only. The Organisational Partners accept no liability for any use of this Specification.
Specifications and reports for implementation of the 3GPP ™ system should be obtained via the 3GPP Organisational Partners' Publications Offices.

Keywords
LTE, GSM, UMTS, supplementary serivce, ECT, stage 2

3GPP

Postal address

3GPP support office address
650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet
http://www.3gpp.org

Copyright Notification

No part may be reproduced except as authorized by written permission.
The copyright and the foregoing restriction extend to reproduction in all media.

© 2012, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TTA, TTC).
All rights reserved.

UMTS™ is a Trade Mark of ETSI registered for the benefit of its members
3GPP™ is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners
LTE™ is a Trade Mark of ETSI currently being registered for the benefit of its Members and of the 3GPP Organizational Partners
GSM® and the GSM logo are registered and owned by the GSM Association

Contents

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

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

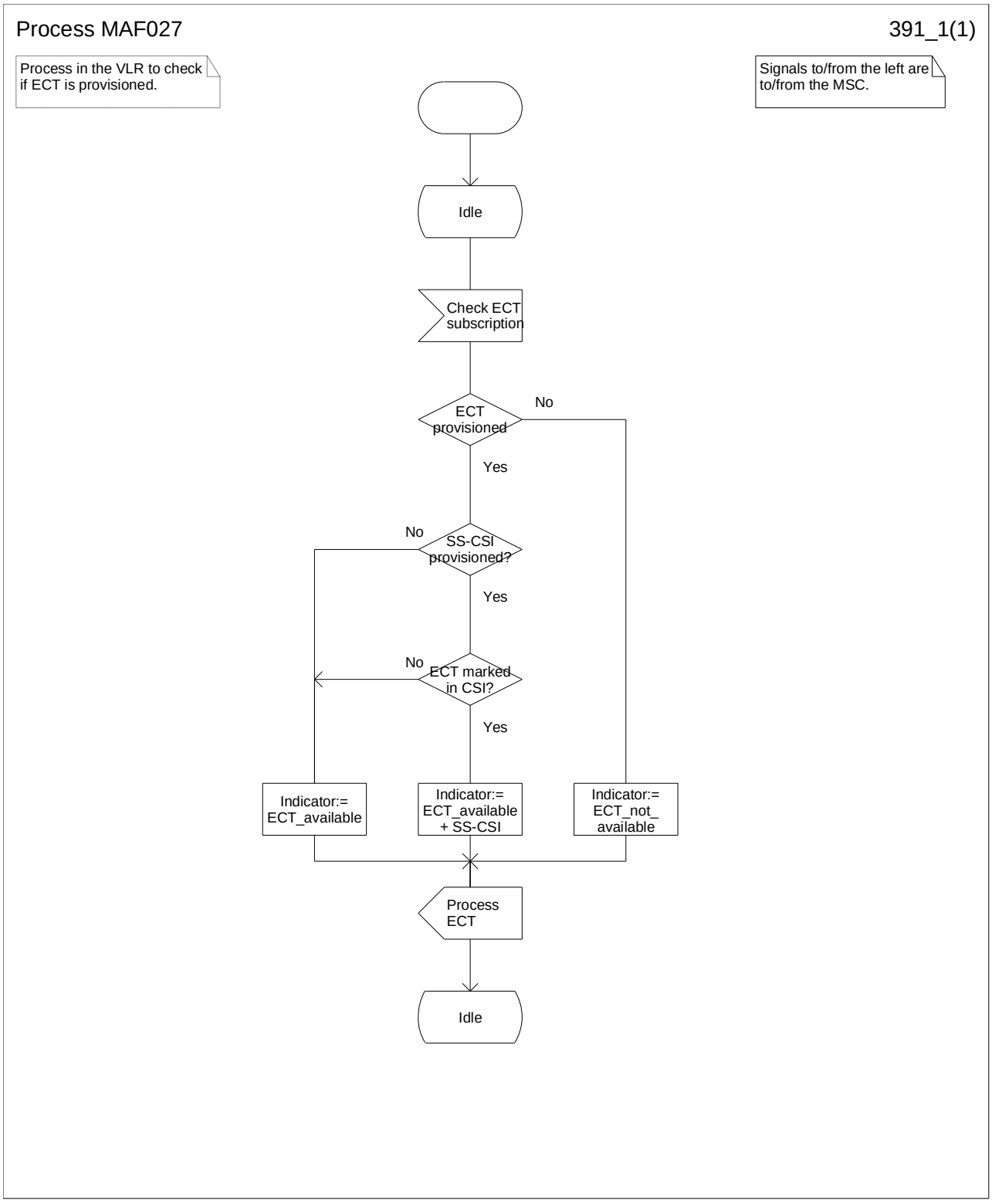


Figure 1: Explicit Call Transfer related authorizations examination (VLR)

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.

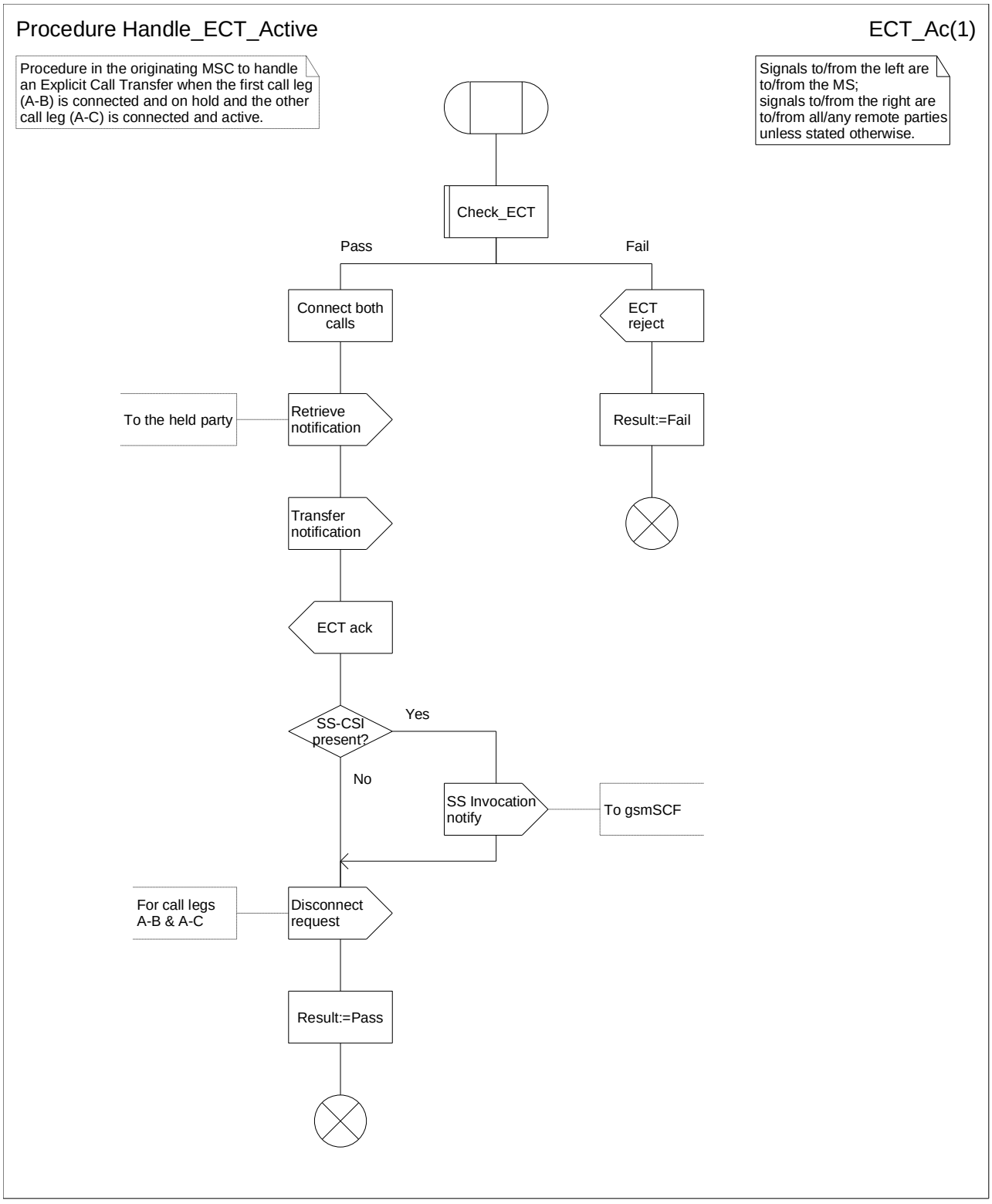


Figure 2: Procedure Handle_ECT_Active

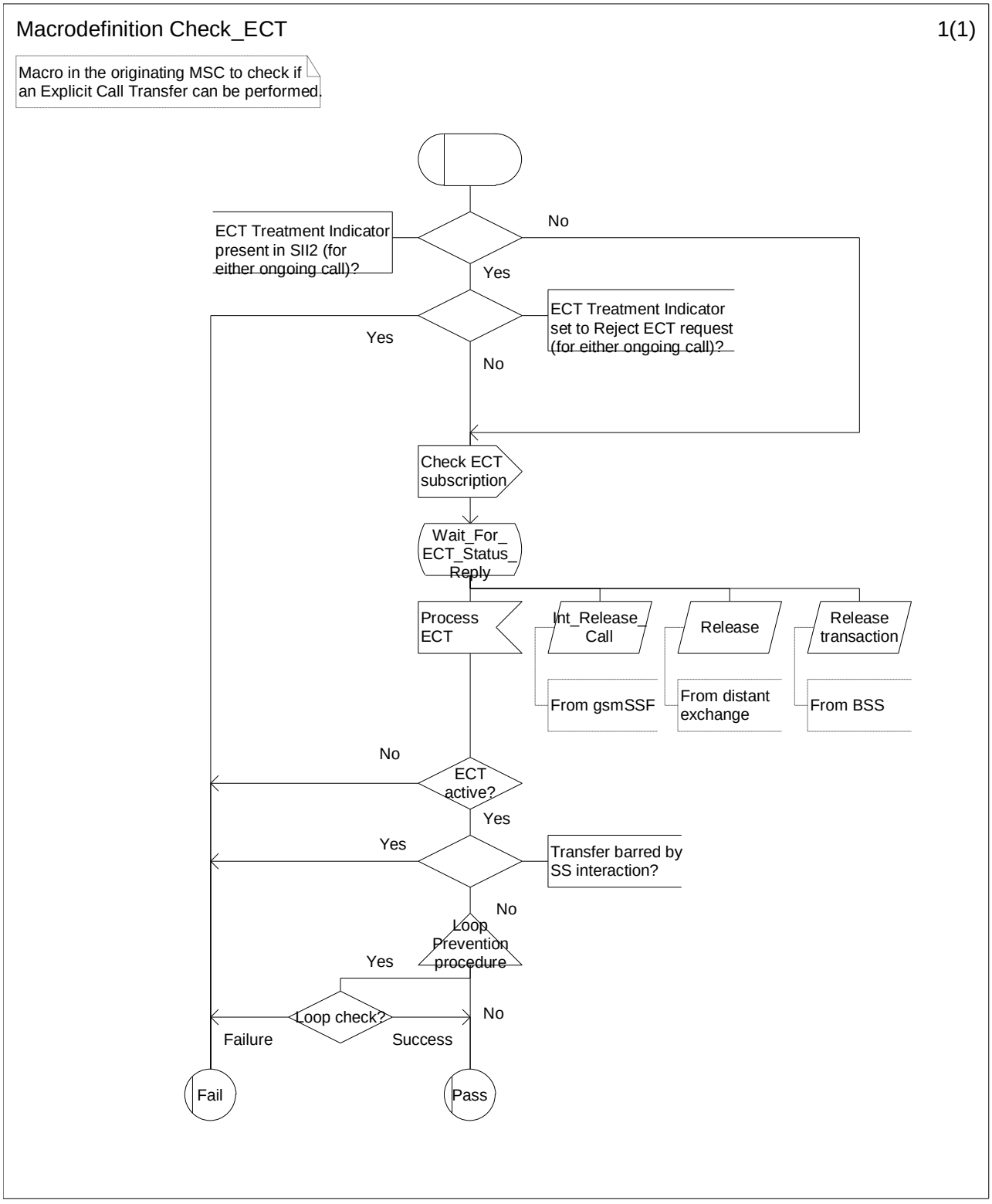
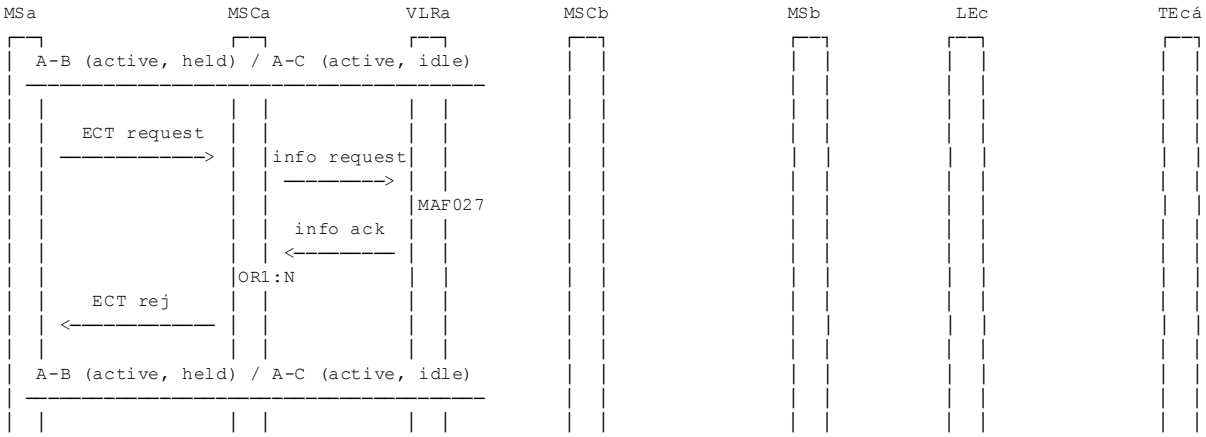
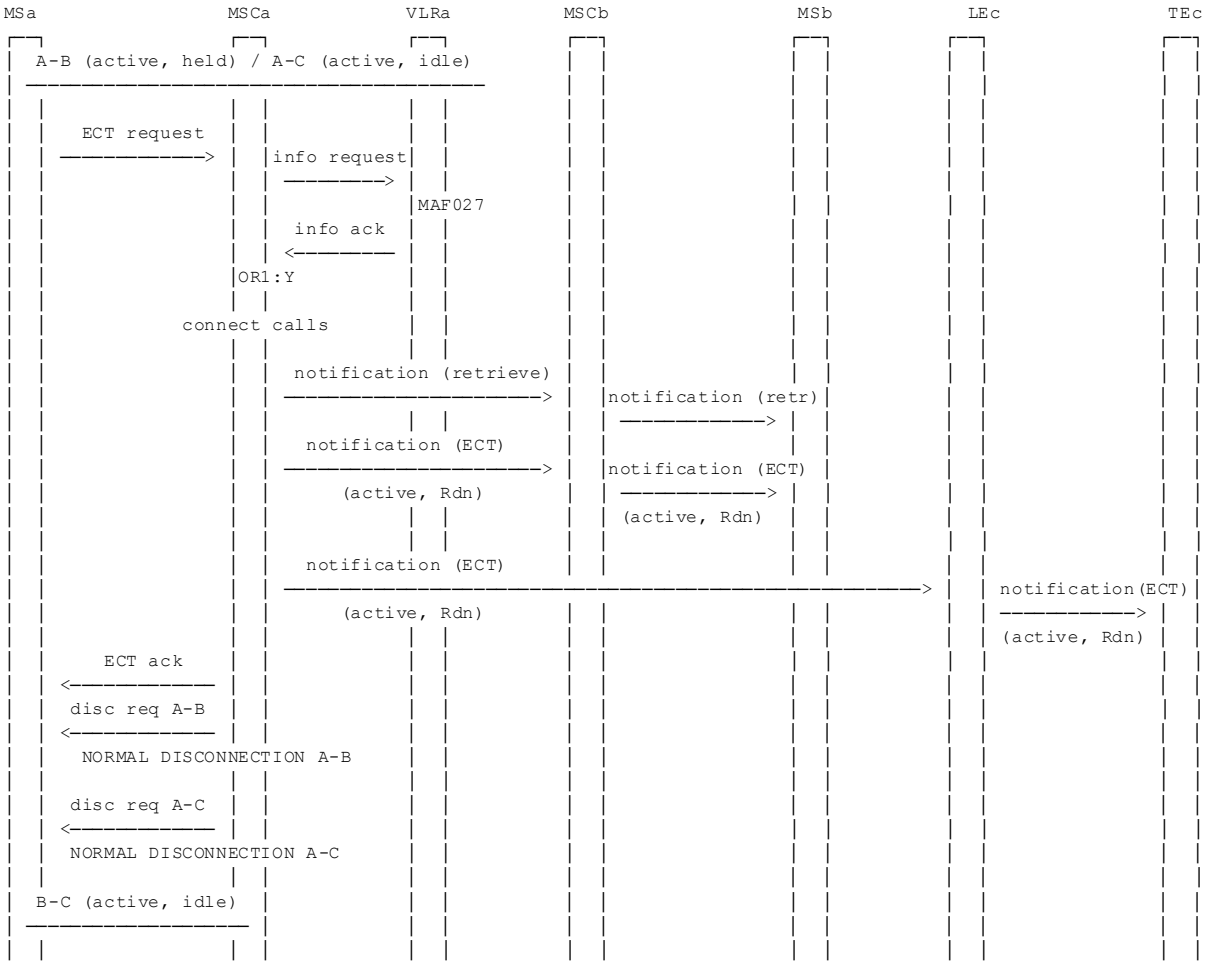


Figure 3: Macro Check_ECT



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.

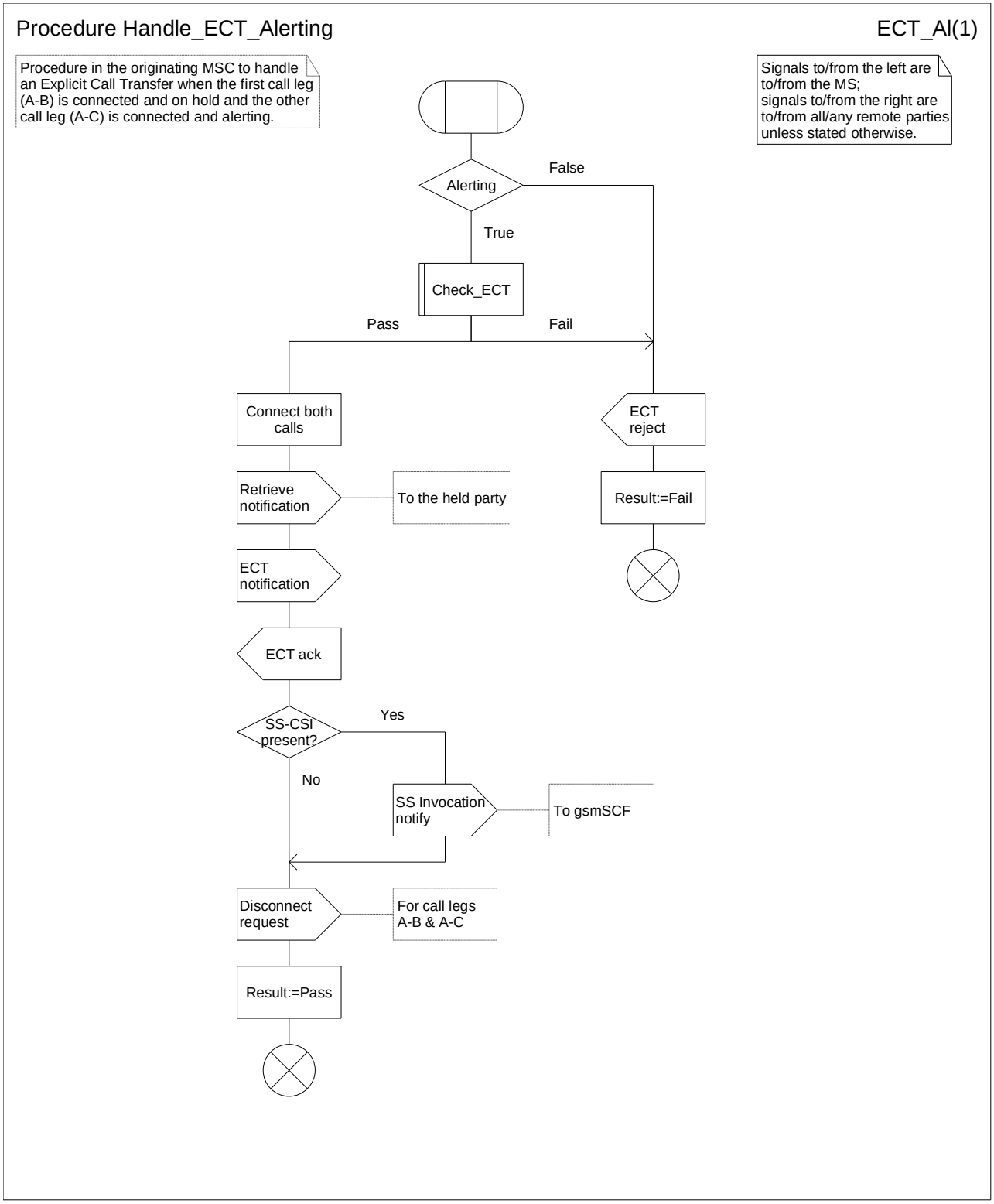
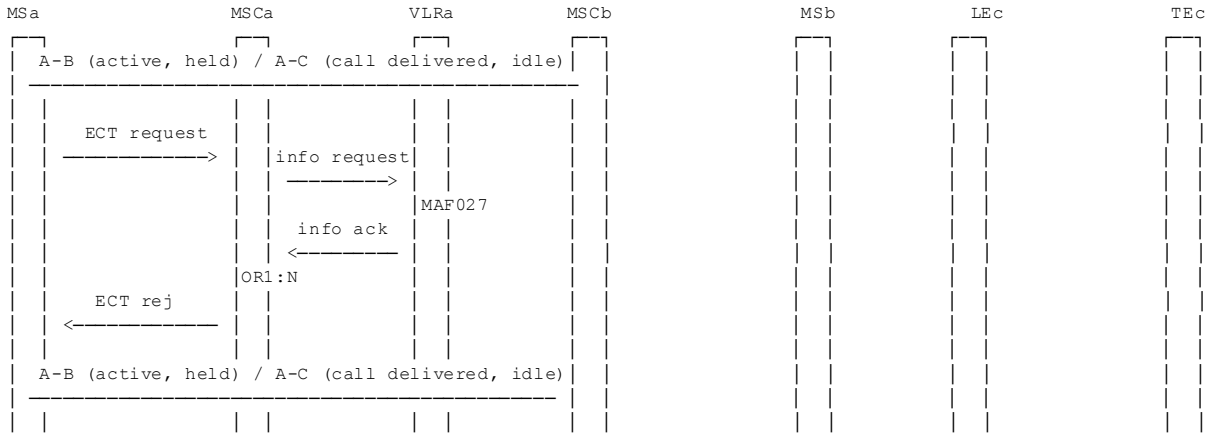
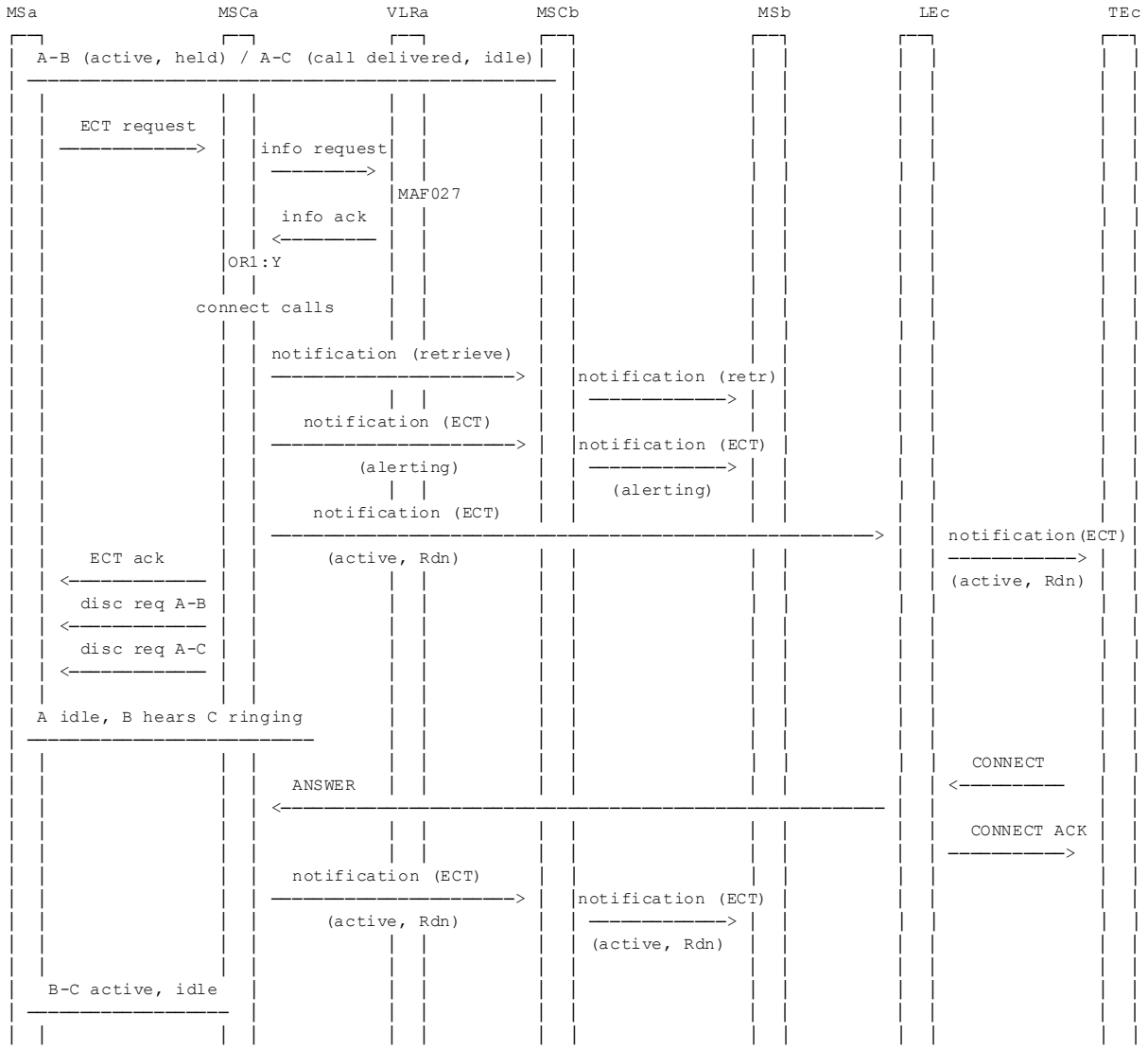


Figure 6: Procedure Handle_ECT_Alerting



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)

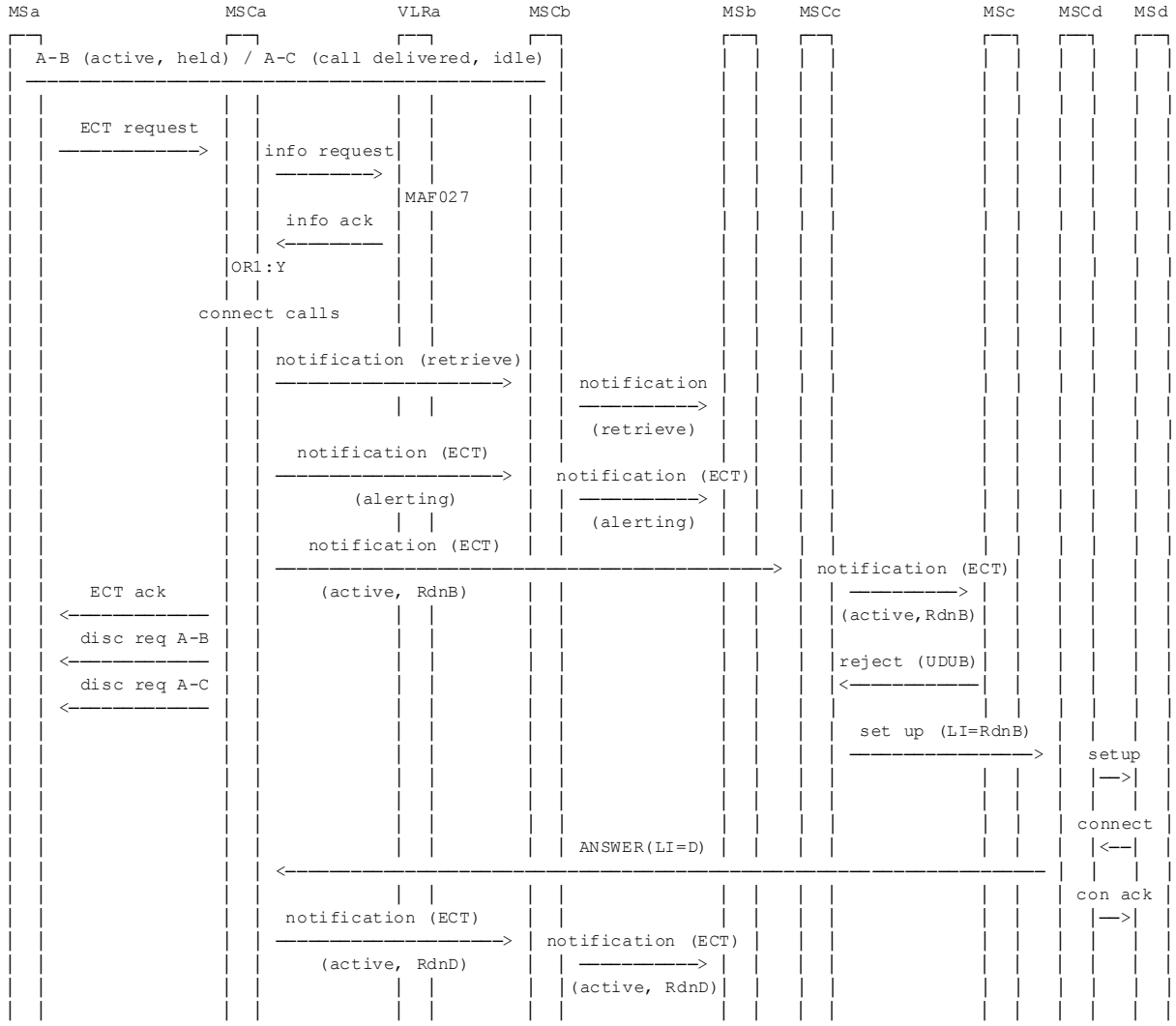
4.3.3.1 Call Forwarding on mobile subscriber Busy due to Network Determined User Busy (NDUB)

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 subclause 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 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):

Provisioning State	**Registration State**	**Activation State**	**HLR Induction State**
(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.

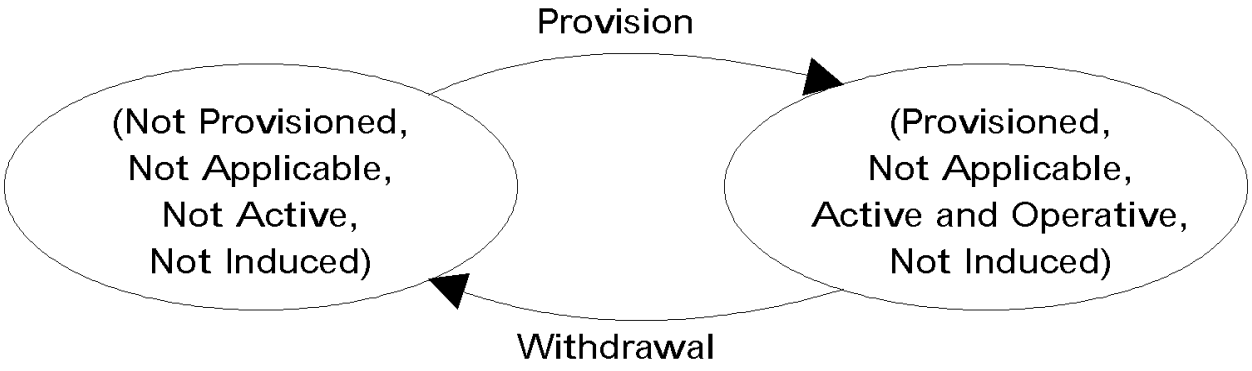


Figure 10: State transition model

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								
TSG CN#	Spec	Old Ver	CR	Rev	Phase	Cat	New Ver	Subject/Comment
Apr 1999	GSM 03.91	6.0.0						Transferred to 3GPP CN1
CN#03	23.091				R99		3.0.0	Approved at CN#03
CN#06	23.091	3.0.0	001		R99		3.1.0	Approved at CN#06
CN#09	23.091	3.1.0	002	1	R99	F	3.2.0	SDL refresh
CN#11	23.091	3.2.0			Rel-4		4.0.0	Version increased from R99 to Rel-4 after CN#11
CN#11	23.091	3.2.0	003	1	Rel-4	C	4.0.0	Enhancement of ECT SDLs and CAMEL functionality
CN#16	23.091	4.0.0			Rel-5		5.0.0	Version increased from Rel-4 to Rel-5 after CN#16
CN#17	23.091	5.0.0	005		Rel-5		5.1.0	Correction to check of ECT treatment indicator in SII2 parameter
CN#26	23.091	5.1.0			Rel-6		6.0.0	Version increased from Rel-5 to Rel-6 after CN#26
CT#36	23.091	6.0.0			Rel-7		7.0.0	Upgraded unchanged from Rel-6
CT#42	23.091	7.0.0			Rel-8		8.0.0	Upgraded unchanged from Rel-7
CT#46	23.091	8.0.0	-	-	Rel-9		9.0.0	Update to Rel-9 version (MCC)
2011-03	23.091	9.0.0	-	-	Rel-10		10.0.0	Update to Rel-10 version (MCC)
2012-09	23.091	10.0.0	-	-	Rel-10		11.0.0	Update to Rel-11 version (MCC)