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GSM
GLOBAL SYSTEM FOR
MOBILE COMMUNICATIONS

Digital cellular telecommunications system (Phase 2+);
Explicit Call Transfer (ECT) supplementary service - Stage 2
(GSM 03.91)

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

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Contents

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Foreword

This Global System for Mobile communications Technical Specification (GTS) has been produced by the Special Mobile Group (SMG) Technical Committee (TC) of the European Telecommunications Standards Institute (ETSI).

This GTS defines stage 2 of Explicit Call Transfer (ECT) supplementary services within the digital cellular telecommunications system (Phase 2/Phase 2+).

GTS are produced by TC-SMG to enable the GSM Phase 2+ specifications to become publicly available, prior to submission for the formal ETSI standards approval procedure to become European Telecommunications Standards (ETS). This ensures the earliest possible access to GSM Phase 2+ specifications for all Manufacturers, Network operators and implementors of the Global System for Mobile communications.

The contents of this GTS are subject to continuing work within TC-SMG and may change following formal TC-SMG approval. Should TC-SMG modify the contents of this GTS it will then be republished by ETSI with an identifying change of release date and an increase in version number as follows:

Version 5.x.y

where:

    y   the third digit is incremented when editorial only changes have been incorporated in the specification;

    x   the second digit is incremented for all other types of changes, i.e. technical enhancements, corrections, updates, etc.

Reference is made within this GTS to GSM-TSs (note).

    NOTE: TC-SMG has produced documents which give the technical specifications for the implementation of the digital cellular telecommunications system. Historically, these documents have been identified as GSM Technical Specifications (GSM-TSs). These TSs may have subsequently become I-ETSs (Phase 1), or ETSs/ETSI Technical Reports (ETRs) (Phase 2). TC-SMG has also produced ETSI GSM TSs which give the technical specifications for the implementation of Phase 2+ enhancements of the digital cellular telecommunications system. These version 5.x.x GSM Technical Specifications may be referred to as GTSs.

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1 Scope

This Global System for Mobile communications Technical Specification (GTS) 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 this specification.

2 Normative references

This specification incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this specification only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

[1] GSM 01.04 (ETR 100): "European digital cellular telecommunications system (Phase 2); Abbreviations and acronyms".

[2] GSM 03.83 (ETS 300 544): "European digital cellular telecommunications system (Phase 2); Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 2".

[3] GSM 04.08 (ETS 300 557): "European digital cellular telecommunications system (Phase 2); Mobile radio interface layer 3 specification".

[4] T/S 22-21 (version 9): "Integrated Services Digital network (ISDN); Explicit Call Transfer (ECT) supplementary service; Functional capabilities and information flows".

[5] DE/SPS-6001.22 (version 9): "Integrated Services Digital network (ISDN); Explicit Call Transfer (ECT) supplementary service; Signalling System No. 7; Integrated services digital network User Part (ISUP) protocol".

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 Abbreviates

In addition to those below, abbreviations used in this specification are listed in GSM 01.04.

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

Within the authorization examinations diagram, the messages shown to and from the left are to and from the MSC.

After receiving a "invoke ECT request" the VLR will check if the Explicit Call Transfer service is provisioned for the served Subscriber. If the service is provisioned the VLR send back to the MSC "Explicit Call Transfer available". If the service is not provisioned the VLR will send back to the MSC "Explicit Call Transfer not available". When the response has been sent back to the MSC the process will return to the idle state.

Process MAF027   391_1(1)

Figure 1: Explicit Call transfer related
           authorisations examination (VLR)

Idle

Invoke ECT
request

ECT
provisionend   no

yes

set indication =   set indication =
ECT available   ECT not available

Invoke ECT
response

Idle

Idle

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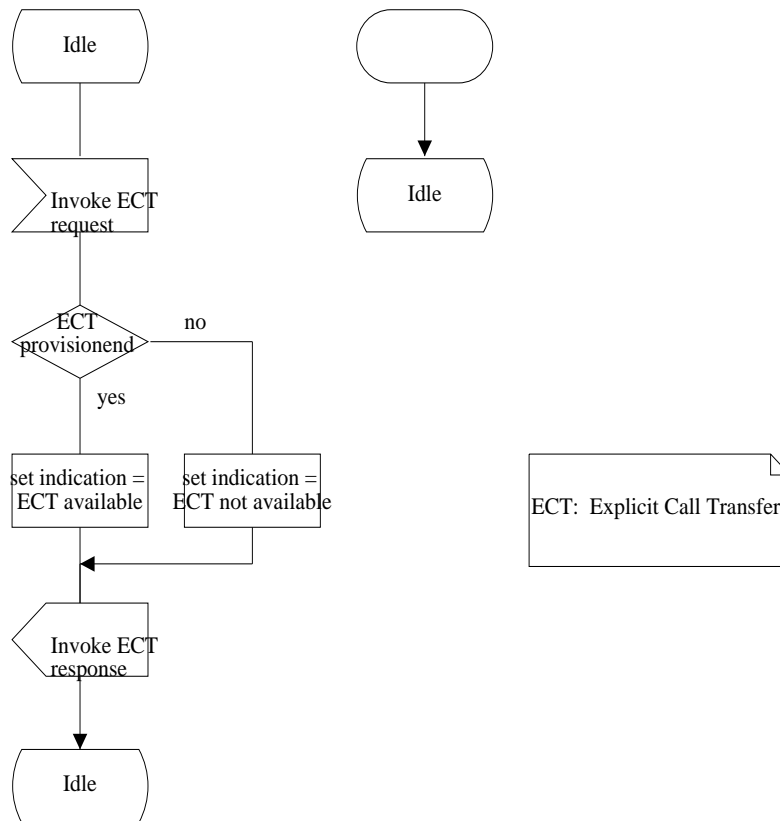
Figure 1: Explicit Call Transfer related authorizations examination (VLR)

4.2 Overall SDL-diagrams and information flows

4.2.1 General description

The overall SDL-diagrams represent the network as a whole. The overall SDL-diagrams show the status of the service as perceived by the served mobile subscriber, as well as the status as perceived by any of the other parties. Besides this, the overall SDL-diagrams show the actions to be taken by the network and the information provided by the network to the users.

Within the overall SDL-diagrams, messages to and from the served mobile subscriber are indicated to and from the left, whereas messages to and from remote parties are indicated to and from the right.

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

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

These two dimensional states are also used in the SDLs and information flows:

-       the first dimension is a normal basic call state "active" or "call delivered";

-       the second dimension is "held" meaning that the call is set on hold.

         NOTE: The call state "call delivered" means that a ALERT message has been received in the MS, but no ANSWER MESSAGE (ANM) is 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 party calls in a new call (transferred call) is located in the MSC.

The first figures of the information flows (figures 4 and 7) show the unsuccessful case of the transfer request (check in the VLR or in the MSC fails).

The second figures (figures 5 and 8) show the successful case of the transfer request.

4.2.2 ECT (both calls answered)

After receipt of a ECT request from the served subscriber, the MSC/VLR will check if the Explicit Call Transfer supplementary service is provisioned for the served subscriber (see also MAF027).

If the ECT Supplementary Service is provisioned, then the MSC/VLR will check if the transfer is barred by virtue of call states or supplementary service interactions (see also figure 3 and subclause 4.3).

If there are no such barring causes then the MSC/VLR also checks if CUG restrictions are infringed (see also figure 3 and subclause 4.3).

If the outcome of these checks are successful and the loop prevention option is supported, an endless loop prevention check shall be performed according to T/S 22-21 (version 9) and DE/SPS6001.22 (version 9).

If the result of this check is also successful the both calls shall be connected in the MSC (without including the served subscriber in this connection), the held party will be retrieved and both remote parties will be notified that call transfer was done.

With this notification the both subscribers will be informed about the state of the other remote party in which call transfer was done ("call transferred, active") and if possible about the identity (Redirection number) of each other (for details see also subclause 4.3).

After that the served mobile subscriber will be disconnected from both calls.

If the checks fail the ECT request will be rejected and the two calls remain in the call states in which they were before ECT was attempted.

The overall SDL for Explicit Call Transfer (both calls are answered) is shown in figure 2.

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

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

Process ect_overall_1   391_2(1)

Overall SDL-diagramm
of explicit call transfer
(both calls answered)

1 (active, held)
2 (active, idle)   see TS GSM 03.83

ECT
request

for details see
also figure 1   ECT available   no
(MAF027)

yes

see figure 3   Macro
Check Conditions

failure

success

connect
both calls

Retrieve
notification
(to held party)

"call transferred, active",   Tranfer
Rdn   notification   ECT
                               (to B and C)   reject

ECT
acknowledge   1 (active, held)
                               2 (active, idle)

disconnect req
for first call
(call A-B)

disconnect req   ECT: Explicit Call Transfer
for second call   Rdn: Redirection number
(call A-C)

transferred call
(B-C)
(active, idle)

Figure 2: Overall SDL-diagram of Explicit Call Transfer (both calls answered)

Macro Check_Conditions   391_3(1)

Macro Check Conditions
checks all conditions
for Explicit Call Transfer
are fulfilled

both calls
TS 11?   no

yes

Is transfer
barred by virtue   yes
of call states

no

Is transfer barred   yes
by SS interactions

no

Loop
prevention
procedure ?

No   Yes

Result of   failure
Loop Check

success

success   failure

Figure 3: Macro Check Conditions

```
MSa              MSCa           VLRa         MSCb           MSb           LEc           TEc
 ┌┐               ┌┐             ┌┐           ┌┐             ┌┐            ┌┐            ┌┐
 │ A-B (active, held) / A-C (active, idle)   │ │           │ │           │ │           │ │
 │ │              │ │            │ │          │ │           │ │           │ │           │ │
 │ │   ECT request│ │            │ │          │ │           │ │           │ │           │ │
 │ │─────────────>│ │ info request│ │         │ │           │ │           │ │           │ │
 │ │              │ │───────────>│ │          │ │           │ │           │ │           │ │
 │ │              │ │            │MAF027       │ │           │ │           │ │           │ │
 │ │              │ │  info ack  │ │          │ │           │ │           │ │           │ │
 │ │              │ │<───────────│ │          │ │           │ │           │ │           │ │
 │ │              │OR1:N         │ │          │ │           │ │           │ │           │ │
 │ │    ECT rej   │ │            │ │          │ │           │ │           │ │           │ │
 │ │<─────────────│ │            │ │          │ │           │ │           │ │           │ │
 │ │              │ │            │ │          │ │           │ │           │ │           │ │
 │ A-B (active, held) / A-C (active, idle)   │ │           │ │           │ │           │ │
 │ │              │ │            │ │          │ │           │ │           │ │           │ │
 │ │              │ │            │ │          │ │           │ │           │ │           │ │
```
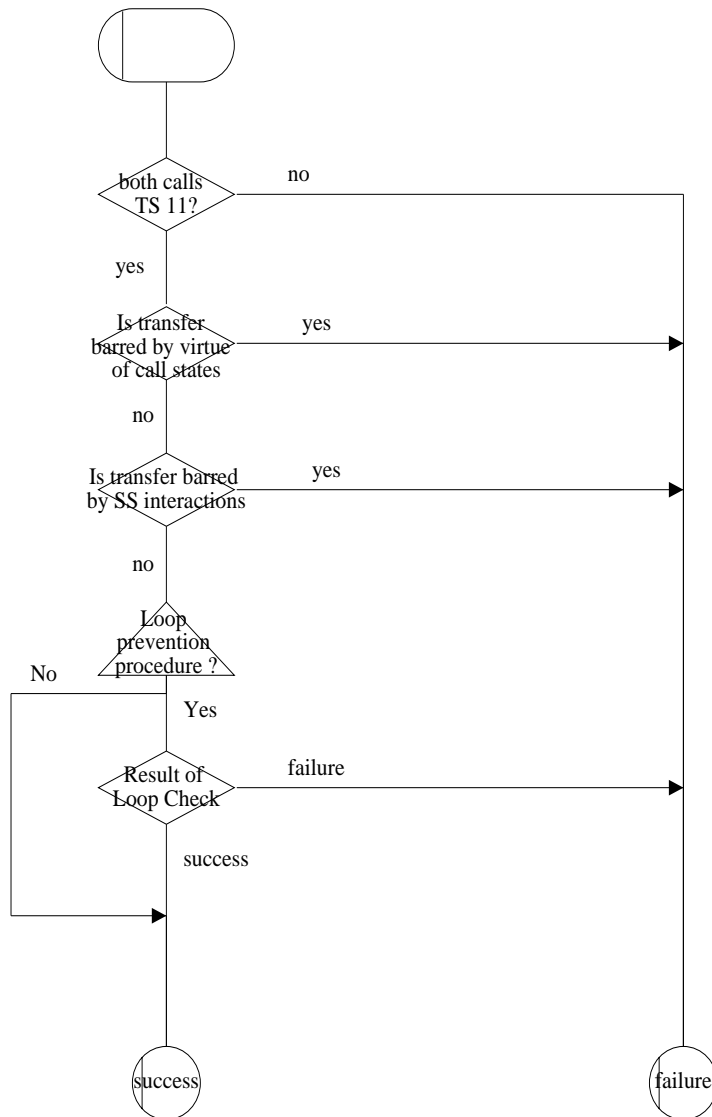
        NOTE: OR1: Checks in VLR and MSC ok? (Y: yes N: no).
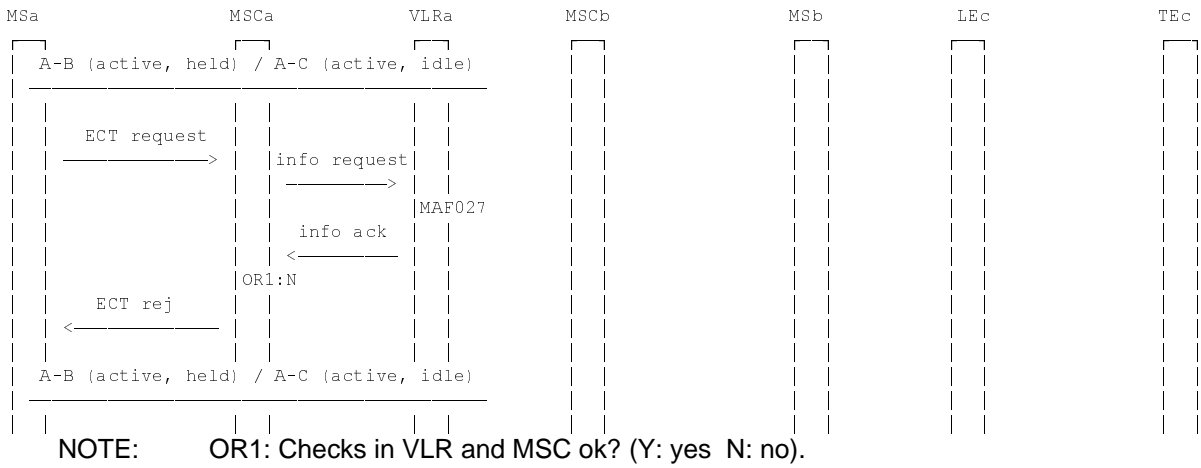
Figure 4: Information flow for failed explicit call transfer request (both calls answered)

```
MSa              MSCa           VLRa         MSCb           MSb           LEc           TEc
 ┌┐               ┌┐             ┌┐           ┌┐             ┌┐            ┌┐            ┌┐
 │ A-B (active, held) / A-C (active, idle)   │ │           │ │           │ │           │ │
 │ │              │ │            │ │          │ │           │ │           │ │           │ │
 │ │   ECT request│ │            │ │          │ │           │ │           │ │           │ │
 │ │─────────────>│ │ info request│ │         │ │           │ │           │ │           │ │
 │ │              │ │───────────>│ │          │ │           │ │           │ │           │ │
 │ │              │ │            │MAF027       │ │           │ │           │ │           │ │
 │ │              │ │  info ack  │ │          │ │           │ │           │ │           │ │
 │ │              │ │<───────────│ │          │ │           │ │           │ │           │ │
 │ │              │OR1:Y         │ │          │ │           │ │           │ │           │ │
 │ │              │ │            │ │          │ │           │ │           │ │           │ │
 │ │    connect calls            │ │          │ │           │ │           │ │           │ │
 │ │              │ │            │ │          │ │           │ │           │ │           │ │
 │ │              │ notification (retrieve)   │ │           │ │           │ │           │ │
 │ │              │ │──────────────────────> │ notification (retr)       │ │           │ │
 │ │              │ │            │ │          │ │──────────>│ │           │ │           │ │
 │ │              │ notification (ECT)        │ │           │ │           │ │           │ │
 │ │              │ │──────────────────────> │ notification (ECT)        │ │           │ │
 │ │              │ │  (active, Rdn)          │ │──────────>│ │           │ │           │ │
 │ │              │ │            │ │          │ │  (active, Rdn)          │ │           │ │
 │ │              │ notification (ECT)        │ │           │ │           │ │           │ │
 │ │              │ │──────────────────────────────────────────────────> │ notification(ECT)
 │ │              │ │  (active, Rdn)          │ │           │ │           │ │──────────>│ │
 │ │              │ │            │ │          │ │           │ │  (active, Rdn)          │ │
 │ │   ECT ack    │ │            │ │          │ │           │ │           │ │           │ │
 │ │<─────────────│ │            │ │          │ │           │ │           │ │           │ │
 │ │ disc req A-B  │ │           │ │          │ │           │ │           │ │           │ │
 │ │<─────────────│ │            │ │          │ │           │ │           │ │           │ │
 │ │  NORMAL DISCONNECTION A-B   │ │          │ │           │ │           │ │           │ │
 │ │              │ │            │ │          │ │           │ │           │ │           │ │
 │ │ disc req A-C  │ │           │ │          │ │           │ │           │ │           │ │
 │ │<─────────────│ │            │ │          │ │           │ │           │ │           │ │
 │ │  NORMAL DISCONNECTION A-C   │ │          │ │           │ │           │ │           │ │
 │ │              │ │            │ │          │ │           │ │           │ │           │ │
 │ B-C (active, idle)           │ │          │ │           │ │           │ │           │ │
 │ │──────────────│ │           │ │          │ │           │ │           │ │           │ │
 │ │              │ │            │ │          │ │           │ │           │ │           │ │
```
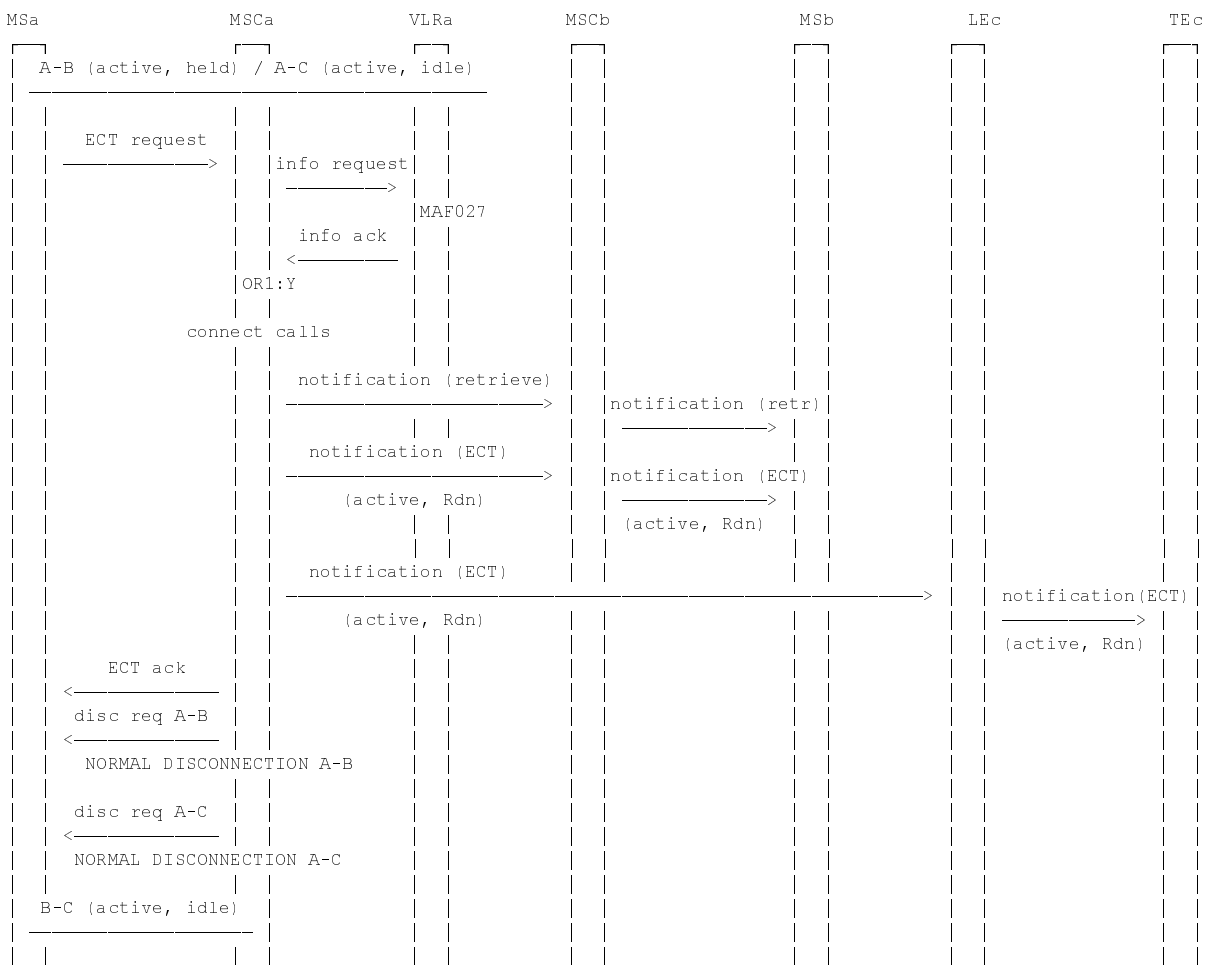
        NOTE: OR1: Checks in VLR and MSC ok? (Y: yes N: no).

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

4.2.3   ECT (one call answered, the other alerting)

In this case, generally the same procedures will apply as in the other case (both calls answered). The same checks shall be performed and if all checks are fulfilled both calls shall be connected together (without including the served subscriber in this connection). After the connection of the both calls, both subscriber (B and C) will be notified about the call transfer invocation in the same way as in the case where the two calls are answered.

The transfer notification to the subscriber B will include the information that the transfer was done in the altering state of subscriber C ("call transferred, alerting"). After receipt of the answer message from subscriber C, the Subscriber B will be notified again, indicating that answer has taken place subsequent to the alerting transfer ("call transferred, active").

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

The corresponding information flows are given in figure 7 and figure 8.
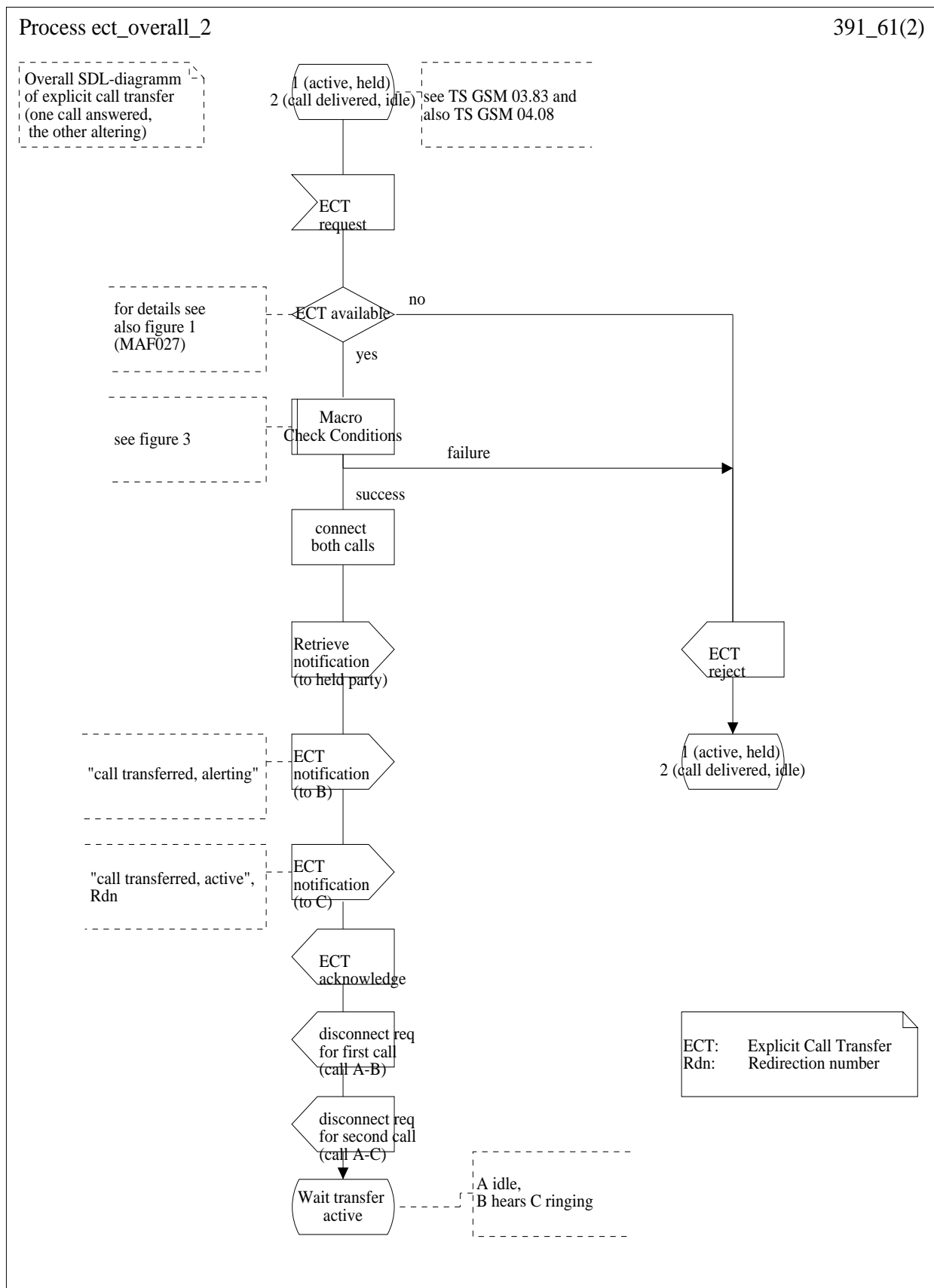
Process ect_overall_2   391_61(2)

Figure 6: Overall SDL-diagram of explicit call transfer (one call answered, the other alerting)
(page 1 of 2)

Process ect_overall_2   391_62(2)

Overall SDL-diagramm
of explicit call transfer
(one call answered,
the other altering)

Wait transfer
active

ANSWER

"call transferred, active",   ECT
Rdn   notification
                                (to B)

ECT: Explicit Call Transfer
Rdn :   Redirection number

tranferred call
(B-C)
(active, idle)

Figure 6: Overall SDL-diagram of explicit call transfer (one call answered, the other alerting)
(page 2 of 2)

```
MSa            MSCa          VLRa         MSCb            MSb          LEc          TEc
┌─┐            ┌─┐           ┌─┐          ┌─┐             ┌─┐          ┌─┐          ┌─┐
│ │ A-B (active, held) / A-C (call delivered, idle)│ │  │ │          │ │          │ │
│ ├──────────────────────────────────────────────┤ │  │ │          │ │          │ │
│ │            │ │           │ │          │ │             │ │          │ │          │ │
│ │   ECT request │ │        │ │          │ │             │ │          │ │          │ │
│ ├────────────→ │ │info request│ │       │ │             │ │          │ │          │ │
│ │            │ │ ├──────────→ │ │        │ │             │ │          │ │          │ │
│ │            │ │           │MAF027       │ │             │ │          │ │          │ │
│ │            │ │  info ack │ │          │ │             │ │          │ │          │ │
│ │            │ │ ├←──────── │ │          │ │             │ │          │ │          │ │
│ │            │ │OR1:N      │ │          │ │             │ │          │ │          │ │
│ │   ECT rej  │ │           │ │          │ │             │ │          │ │          │ │
│ │←────────── │ │           │ │          │ │             │ │          │ │          │ │
│ │            │ │           │ │          │ │             │ │          │ │          │ │
│ │ A-B (active, held) / A-C (call delivered, idle)│ │  │ │          │ │          │ │
│ ├──────────────────────────────────────────────┤ │  │ │          │ │          │ │
│ │            │ │           │ │          │ │             │ │          │ │          │ │
```
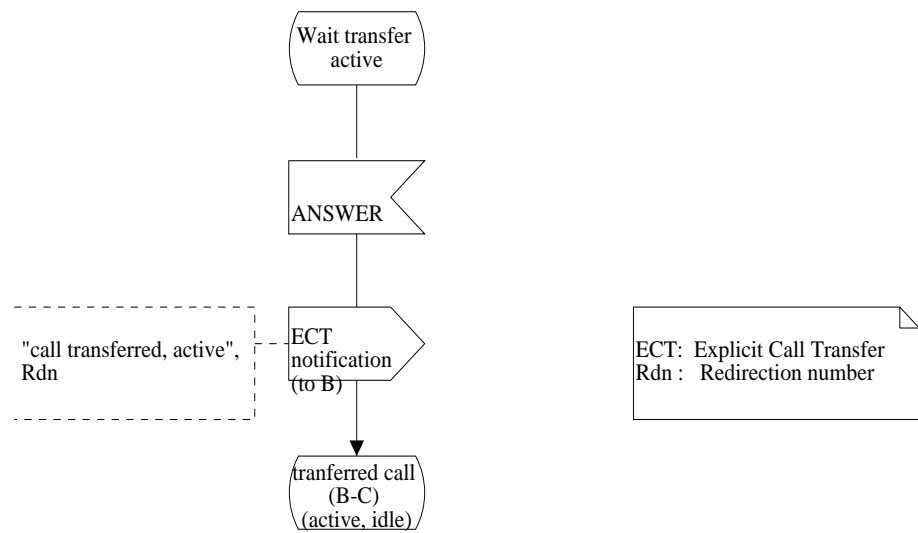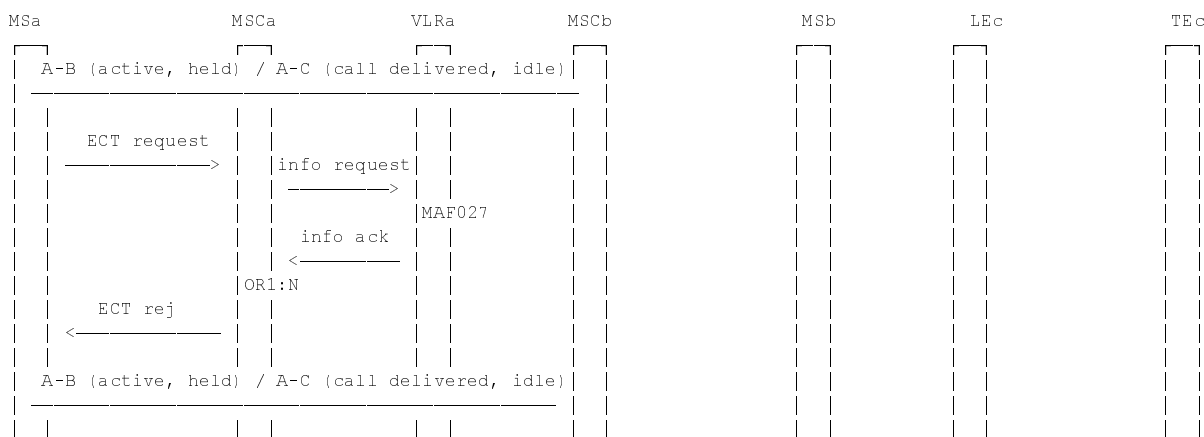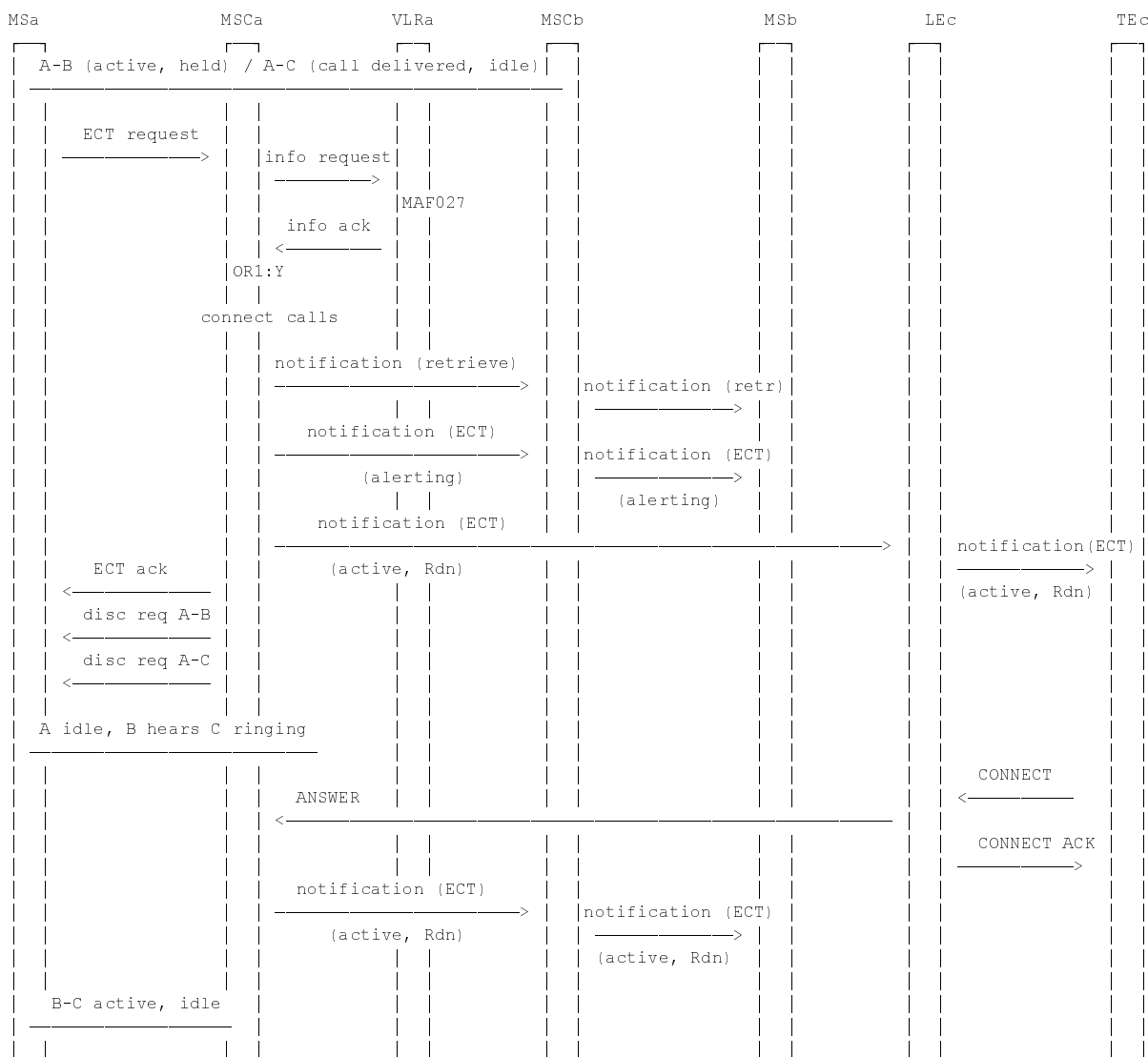
NOTE: OR1: Checks in VLR and MSC ok? (Y: yes N: no).

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

```
MSa            MSCa          VLRa         MSCb            MSb          LEc          TEc
┌─┐            ┌─┐           ┌─┐          ┌─┐             ┌─┐          ┌─┐          ┌─┐
│ │ A-B (active, held) / A-C (call delivered, idle)│ │  │ │          │ │          │ │
│ ├──────────────────────────────────────────────┤ │  │ │          │ │          │ │
│ │            │ │           │ │          │ │             │ │          │ │          │ │
│ │   ECT request │ │        │ │          │ │             │ │          │ │          │ │
│ ├────────────→ │ │info request│ │       │ │             │ │          │ │          │ │
│ │            │ │ ├──────────→ │ │        │ │             │ │          │ │          │ │
│ │            │ │           │MAF027       │ │             │ │          │ │          │ │
│ │            │ │  info ack │ │          │ │             │ │          │ │          │ │
│ │            │ │ ├←──────── │ │          │ │             │ │          │ │          │ │
│ │            │ │OR1:Y      │ │          │ │             │ │          │ │          │ │
│ │            │ │           │ │          │ │             │ │          │ │          │ │
│ │         connect calls    │ │          │ │             │ │          │ │          │ │
│ │            │ │           │ │          │ │             │ │          │ │          │ │
│ │            │ │ notification (retrieve) │ │            │ │          │ │          │ │
│ │            │ ├──────────────────────────→ │notification (retr)│   │ │          │ │
│ │            │ │           │ │          │ ├──────────────→ │ │       │ │          │ │
│ │            │ │  notification (ECT)    │ │             │ │          │ │          │ │
│ │            │ ├──────────────────────────→ │notification (ECT)│    │ │          │ │
│ │            │ │        (alerting)      │ ├──────────────→ │ │       │ │          │ │
│ │            │ │           │ │          │ │    (alerting)  │ │       │ │          │ │
│ │            │ │  notification (ECT)    │ │             │ │          │ │          │ │
│ │            │ ├────────────────────────────────────────────────────→ │notification(ECT)│
│ │   ECT ack  │ │        (active, Rdn)   │ │             │ │          ├──────────→ │ │
│ │←────────── │ │           │ │          │ │             │ │          │ (active, Rdn)│ │
│ │   disc req A-B │ │       │ │          │ │             │ │          │ │          │ │
│ │←────────── │ │           │ │          │ │             │ │          │ │          │ │
│ │   disc req A-C │ │       │ │          │ │             │ │          │ │          │ │
│ │←────────── │ │           │ │          │ │             │ │          │ │          │ │
│ │            │ │           │ │          │ │             │ │          │ │          │ │
│ │ A idle, B hears C ringing│ │          │ │             │ │          │ │          │ │
│ ├──────────────────────────┤ │          │ │             │ │          │ │          │ │
│ │            │ │           │ │          │ │             │ │          │ CONNECT     │ │
│ │            │ │           │ │          │ │             │ │          │ ←────────── │ │
│ │            │ │      ANSWER │ │        │ │             │ │          │ │          │ │
│ │            │ ├←──────────────────────────────────────────────────── │ │          │ │
│ │            │ │           │ │          │ │             │ │          │ CONNECT ACK │ │
│ │            │ │           │ │          │ │             │ │          ├──────────→ │ │
│ │            │ │  notification (ECT)    │ │             │ │          │ │          │ │
│ │            │ ├──────────────────────────→ │notification (ECT)│    │ │          │ │
│ │            │ │        (active, Rdn)   │ ├──────────────→ │ │       │ │          │ │
│ │            │ │           │ │          │ │    (active, Rdn)│ │      │ │          │ │
│ │ B-C active, idle │ │     │ │          │ │             │ │          │ │          │ │
│ ├──────────────────┤ │     │ │          │ │             │ │          │ │          │ │
│ │            │ │           │ │          │ │             │ │          │ │          │ │
```

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 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 has 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.
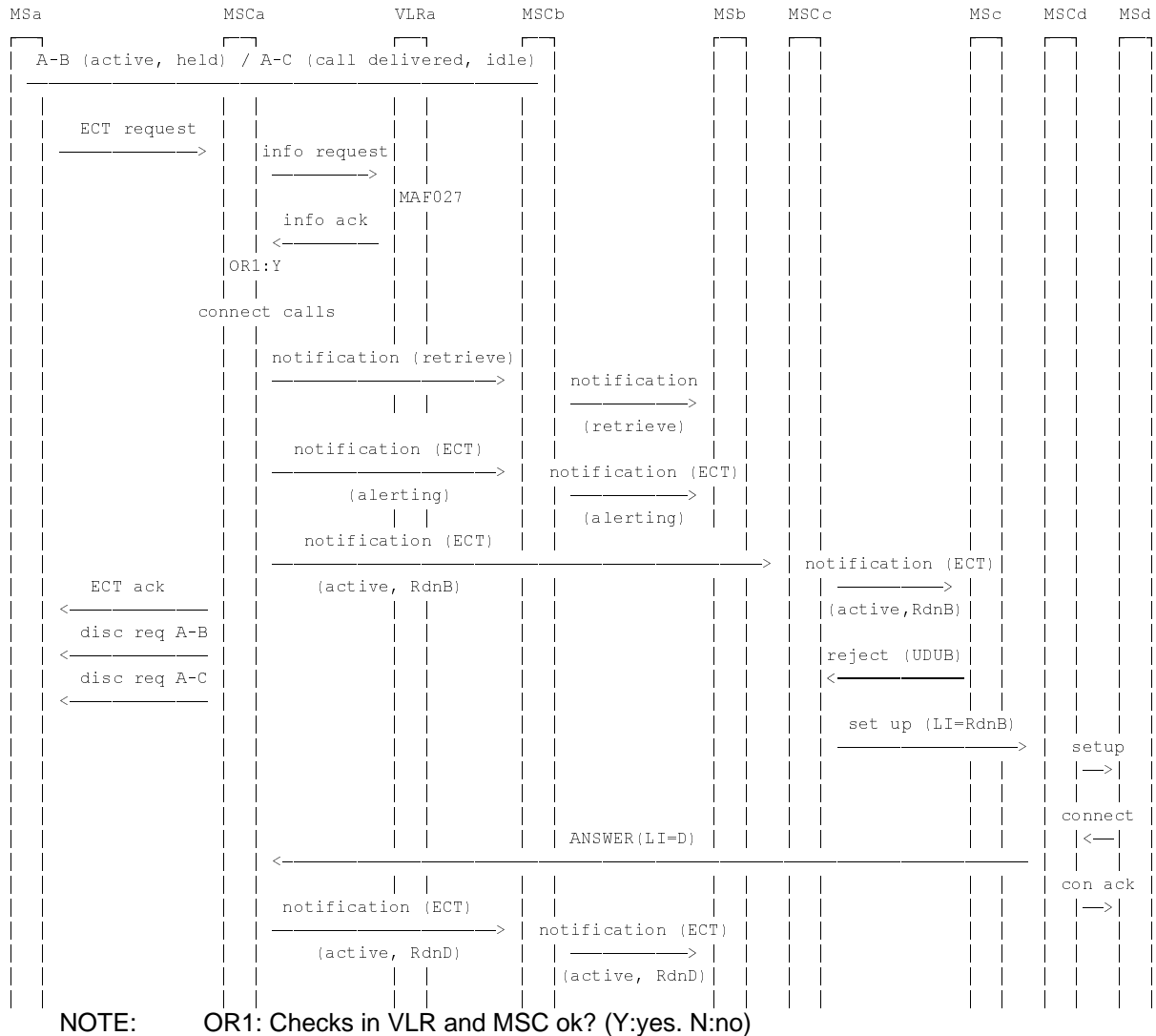
```
MSa              MSCa        VLRa       MSCb          MSb  MSCc            MSc  MSCd  MSd
 |    A-B (active, held) / A-C (call delivered, idle)  |    |   |  |         |    |    |
 | |————————————————————————————————————————————————| |    |   |  |         |    |    |
 | |                  |  |         |    |  |         |    |   |  |         |    |    |
 | |  ECT request     |  |         |    |  |         |    |   |  |         |    |    |
 | |—————————————————>|  |info request|  |         |    |   |  |         |    |    |
 | |                  |  |—————————>|    |  |         |    |   |  |         |    |    |
 | |                  |  |        |MAF027|  |         |    |   |  |         |    |    |
 | |                  |  info ack |  |    |  |         |    |   |  |         |    |    |
 | |                  |<—————————|  |    |  |         |    |   |  |         |    |    |
 | |               OR1:Y |        |  |    |  |         |    |   |  |         |    |    |
 | |                  |  |         |    |  |         |    |   |  |         |    |    |
 | |          connect calls |     |    |  |         |    |   |  |         |    |    |
 | |                  |  |         |    |  |         |    |   |  |         |    |    |
 | |       notification (retrieve)|    |  |         |    |   |  |         |    |    |
 | |       |—————————————————————>|    | notification |    |   |  |         |    |    |
 | |                  |  |         |    |—————————>|    |   |  |         |    |    |
 | |                  |  |         |    | (retrieve) |    |   |  |         |    |    |
 | |       notification (ECT) |   |    |  |         |    |   |  |         |    |    |
 | |       |—————————————————————>| notification (ECT)|    |   |  |         |    |    |
 | |          (alerting) |        |    |—————————>|    |   |  |         |    |    |
 | |                  |  |         |    | (alerting) |    |   |  |         |    |    |
 | |       notification (ECT) |   |    |  |         |    |   |  |         |    |    |
 | |       |————————————————————————————————————————————————————>| notification (ECT)|
 | |  ECT ack         |  (active, RdnB) |    |  |         |    |—————————>|    |    |    |
 |<——————————————————|  |         |    |  |         |    | (active,RdnB) |    |    |    |
 | |  disc req A-B    |  |         |    |  |         |    |         |    |    |    |
 |<——————————————————|  |         |    |  |         |    | reject (UDUB) |    |    |    |
 | |  disc req A-C    |  |         |    |  |         |    |<—————————|  |    |    |    |
 |<——————————————————|  |         |    |  |         |    |         |    |    |    |
 | |                  |  |         |    |  |         |    | set up (LI=RdnB) |    |    |
 | |                  |  |         |    |  |         |    |—————————————————>| setup |
 | |                  |  |         |    |  |         |    |         |    | |—>| |
 | |                  |  |         |    |  |         |    |         |    |    connect |
 | |                  |  |         |    | ANSWER(LI=D) |    |  |         |    | |<—| |
 | |                  |  |<———————————————————————————————————————————————————| |
 | |                  |  |         |    |  |         |    |         |    | con ack |
 | |  notification (ECT)|  |       |    |  |         |    |         |    | |—>| |
 | |—————————————————————>| notification (ECT) |    |  |         |    |    |    |
 | |      (active, RdnD) |        |    |—————————>|    |   |  |         |    |    |    |
 | |                  |  |         |    | (active, RdnD) |    |   |  |         |    |    |
 | |                  |  |         |    |  |         |    |         |    |    |    |
      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 has 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

No impact.

4.3.8 Multi Party (MPTY)

A served subscriber who has invoked MPTY Supplementary service is not allowed to invoke the Explicit Call Transfer supplementary service. This is due to the fact that the MPTY functionality can not be subject to explicit call transfer at all.

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 GSM 03.11 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.
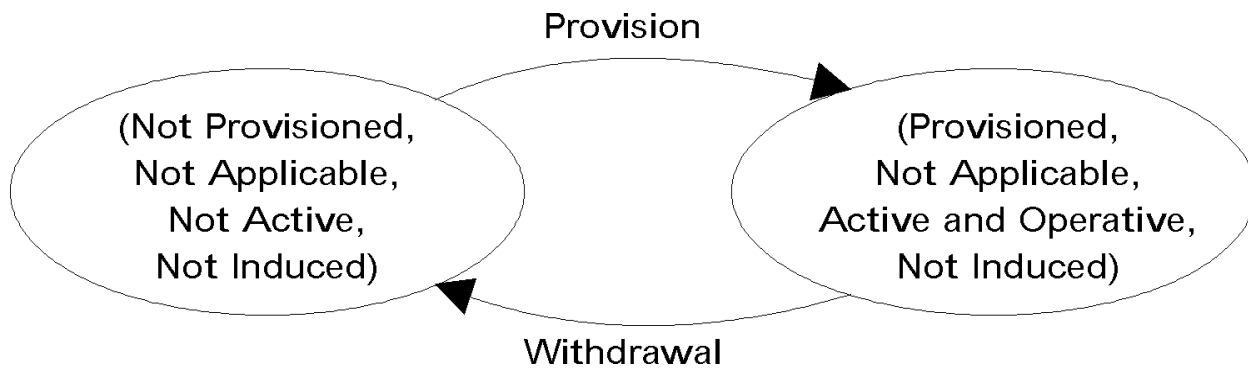
Provision

(Not Provisioned,
Not Applicable,
Not Active,
Not Induced)

(Provisioned,
Not Applicable,
Active and Operative,
Not Induced)

Withdrawal

Figure 10: State transition model

4.6   Transfer of information from HLR to 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.

History

Status of Technical Specification GSM 03.91		
Date	**Version**	**Remarks**
		No phase 1 version
June 94	1.0.0	To SMG#11 for information
April 95	4.0.0	TS approved by SMG#14
Oct 95	5.0.0	TS transferred to Phase 2+

Document history	
October 1995	Creation of Version 5.0.0
January 1996	Publication of Version 5.0.0