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TECHNICAL SPECIFICATION

Digital cellular telecommunications system (Phase 2+) (GSM);
Universal Mobile Telecommunications System (UMTS);
Explicit Call Transfer (ECT) supplementary service;
Stage 3
(3GPP TS 24.091 version 14.0.0 Release 14)

GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS

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Foreword

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Contents

Foreword

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

This TS specifies the procedures used at the radio interface for normal operation, registration, erasure, activation, deactivation, invocation and interrogation of call transfer supplementary services within the 3GPP system.

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 this TS, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version 3.y.z

where:

x   the first digit:

1   presented to TSG for information;

2   presented to TSG for approval;

3   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 specification;

1   Scope

The present document gives the stage 3 description of the call transfer supplementary services.

The present document specifies the procedures used at the radio interface (Reference point Um as defined in 3GPP TS 24.002) for normal operation, registration, erasure, activation, deactivation, invocation and interrogation of call transfer supplementary services. Provision and withdrawal of supplementary services is an administrative matter between the mobile subscriber and the service provider and cause no signalling on the radio interface.

In 3GPP TS 24.010 the general aspects of the specification of supplementary services at the layer 3 radio interface are given.

3GPP TS 24.080 specifies the formats and coding for the supplementary services.

Definitions and descriptions of supplementary services are given in 3GPP TS 22.004, 3GPP TS 22.08x and 3GPP TS 22.09x-series. 3GPP TS 22.091 is related specifically to call transfer supplementary services.

The technical realization of supplementary services is described in 3GPP TS 23.011, 3GPP TS 23.08x and 3GPP TS 23.09x-series. 3GPP TS 23.091 is related specifically to call transfer supplementary services.

The procedures for Call Control, Mobility Management and Radio Resource management at the layer 3 radio interface are defined in 3GPP TS 24.007 and 3GPP TS 24.008.

The following supplementary services belong to the call transfer supplementary services and are described in the present document:

-      Explicit Call Transfer   (ECT) (see clause 4).

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: "Vocabulary for 3GPP Specifications".

[2]   3GPP TS 22.004: "General on supplementary services".

[3]   3GPP TS 22.030: "Man-Machine Interface (MMI) of the Mobile Station (MS)".

[4]   3GPP TS 22.081: "Line identification supplementary services - Stage 1".

[5]   3GPP TS 22.082: "Call Forwarding (CF) supplementary services - Stage 1".

[6]   3GPP TS 22.083: "Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 1".

[7]   3GPP TS 22.084: "MultiParty (MPTY) supplementary services - Stage 1".

[8]   3GPP TS 22.085: "Closed User Group (CUG) supplementary services - Stage 1".

[9]   3GPP TS 22.086: "Advice of Charge (AoC) Supplementary Services - Stage 1".

[10]   3GPP TS 22.088: "Call Barring (CB) supplementary services - Stage 1".

[11]   3GPP TS 22.090: "Unstructured Supplementary Service Data (USSD)- Stage 1".

[12]   3GPP TS 22.091: "Explicit Call Transfer (ECT)".

[13]   3GPP TS 23.011: "Technical realization of supplementary services".

[14]   3GPP TS 23.081: "Line identification supplementary services - Stage 2".

[15]   3GPP TS 23.082: "Call Forwarding (CF) supplementary services - Stage 2".

[16]   3GPP TS 23.083: "Call Waiting (CW) and Call Hold (HOLD) supplementary services - Stage 2".

[17]   3GPP TS 23.084: "MultiParty (MPTY) supplementary services - Stage 2".

[18]   3GPP TS 23.085: "Closed User Group (CUG) supplementary services - Stage 2".

[19]   3GPP TS 23.086: "Advice of Charge (AoC) supplementary services - Stage 2".

[20]   3GPP TS 23.088: "Call Barring (CB) supplementary services - Stage 2".

[21]   3GPP TS 23.090: "Unstructured supplementary services operation - Stage 2".

[22]   3GPP TS 23.091: "Explicit Call Transfer (ECT) supplementary service - Stage 2".

[23]   3GPP TS 24.002: "GSM-UMTS Public Land Mobile Network (PLMN) access reference configuration".

[24]   3GPP TS 24.007: "Mobile radio interface signalling layer 3; General aspects".

[25]   3GPP TS 24.008: "Mobile radio interface layer 3 specification".

[26]   3GPP TS 24.010: "Mobile radio interface layer 3; Supplementary services specification; General aspects".

[27]   3GPP TS 24.080: "Mobile radio interface layer 3 supplementary services specification; Formats and coding".

3   Abbreviations

The abbreviations used in the present document are listed in 3GPP TR 21.905.

4   Explicit Call Transfer (ECT)

4.1   Normal operation

The Explicit Call Transfer (ECT) function should be invoked in association with two existing calls which one is answered and in the held state and the other is answered and active or alerting.

The Mobile Station (MS) invokes the service by sending a FACILITY message to the network containing the ECT request (ECT request). This ECT request indicates to the network that the mobile subscriber wishes the two calls to be connected together. The MS shall not change the basic call state or the auxiliary state of either call when sending ECT request.

The network will normally accept the ECT request and connect the two calls, indicates the success of the ECT request to the served subscriber and disconnect afterwards the served mobile subscriber from both calls (see figure 1).

If the ECT request is not accepted, the network will indicate the error to the served subscriber (see figure 1) and leaves the two calls to the condition it was in prior to the ECT request. The network confirms with the same transaction identifier. The detailed coding of the different error values are specified in 3GPP TS 24.080. Which error value is used in which error case is described below.

During the ECT operation the MS shall run a timer T_{ECT}. This timer is started when the operation is sent, and stopped when a response is received from the network. If this timer expires the MS shall assume that the operation has failed, locally release the invokeID, and may re-attempt the operation or inform the user of the failure.

4.2 Explicit Call Transfer invocation

MS   Network

FACILITY (TI A-B/A-C)

-->

Facility (Invoke = ExplicitCT)

DISCONNECT/RELEASE/RELEASE COMPLETE (TI A-B/A-C)

<---

Facility (Return result)

DISCONNECT/RELEASE/RELEASE COMPLETE (TI A-C/A-B)

<---

FACILITY (TI A-B/A-C)

<- -- - - - - - - -- - - - - -

Facility (Return error (Error))

FACILITY (TI A-B/A-C)

<- - - - - - -- -- - - - - - - -- - - - - -

Facility (Reject (Invoke_problem))

Figure 1: Invocation of Explicit Call Transfer

NOTE: A-B/A-C indicates a choice. The Transaction Identifier (TI) used for the invocation of ECT shall be that of the active/answered call or of the held call.
A-C/A-B indicates the TI of the other call.

In the following table, the use of the different error values is described:

Table 1: Error values

Error	Error case
IllegalSS-Operation	- operation violates the general rules applicable to the service - different calls and either off them or two are not TS 11 (telephony) - one or both of the calls are in the wrong call states - having only one call or one call is clearing - creation of a traffic channel loop
SS-ErrorStatus	- the served subscriber has not subscribed to ECT
SS-NotAvailable	- SS is not available in current location area
SS-Incompatibility	- SS-Interaction violation
FacilityNotSupported	- Facility not supported in VPLMN
SystemFailure	- problems in an entity or network resources
ResourcesNotAvailable	- problems to allocate resources
CallBarred	- contravention with the active barring program

4.3 Notification to the remote parties

If the network received a non-zero SS Screening indicator from the remote party's MS the network shall send a notification to the remote party indicating that the call has been transferred and towards the previously-held party to indicate that he is now retrieved.

If the network did not receive a non-zero SS Screening indicator from the remote party's MS it shall not send a notification.

The content of the Notification Indicator and the Redirection Number in detail is given in 3GPP TS 23.091 and the coding in 3GPP TS 24.080. For the following it is assumed that the Line Identities of the remote parties are available and allowed to be presented to the remote parties.

4.3.1 Notification to the held remote party

If ECT was invoked in the active state the previous-held remote party will be notified at the invocation of ECT (see figure 2).

```
MS                                                                                              Network
                                      FACILITY (TI held call)
  <--------------------------------------------------------------------------------------------------
        Facility (Invoke = NotifySS (SS-Code = HOLD, CallOnHold-Indicator = CallRetrieved),
                              Invoke = NotifySS (SS-Code = ECT,
               ECT-Indicator (ECT-CallState = active, Rdn = RemotePartyNumber of C)))
```

Figure 2: Notification of invocation (at active state) to held remote party

If ECT was invoked in the alerting state the previous-held remote party will be notified at the invocation of ECT (figure 3) and again at the receipt of the ANSWER message from the previous-alerting remote party (figure 4).

```
MS                                                                                              Network
                                      FACILITY (TI held call)
   <-------------------------------------------------------------------------------------------------
        Facility (Invoke = NotifySS (SS-Code = HOLD, CallOnHold-Indicator = CallRetrieved),
             Invoke = NotifySS (SS-Code = ECT, ECT-Indicator (ECT-CallState = alerting)))
```

Figure 3: Notification of invocation (at alerting state) to held remote party

```
MS                                                                                              Network
                                  FACILITY (TI previous held call)
   <-------------------------------------------------------------------------------------------------
        Facility (Invoke = NotifySS (SS-Code = ECT, ECT-Indicator (ECT-CallState = active,
                              Rdn = RemotePartyNumber of C)))
```

Figure 4: Notification to the previous-held remote party at receipt of the ANSWER message by the previous-alerting remote party

4.3.2 Notification to the active or alerting remote party

```
MS                                                                                              Network
                                FACILITY (TI active or alerting call)
    <------------------------------------------------------------------------------------------------
         Facility (Invoke = NotifySS (SS-Code = ECT, ECT-Indicator (ECT-CallState = active,
                              Rdn = RemotePartyNumber of B)))
```

Figure 5: Notification of invocation to previous-active or previous-alerting remote party

4.4 Activation and deactivation

Activation and deactivation of ECT cause no signalling on the radio path.

4.5 Registration, erasure and interrogation

Registration, erasure and interrogation of ECT are not applicable.

5 Support by "old" MSs

MSs which do not explicitly support ECT are not precluded from attempting to invoke ECT. It is however, an operator option to support the invocation of ECT by these mobile stations. Where operators support this option, the mechanism employed to offer the ECT service to these MSs shall be USSD. However, it should be noted that it may not be possible using this mechanism to offer the same degree of service to the served subscriber as described in clause 4.

5.1 Explicit Call Transfer invocation

MS A invokes the service by sending a REGISTER message to the network using a call independent supplementary service (SS) transaction, with the facility information element, indicating ProcessUnstructuredSS-Request (the MMI is specified in 3GPP TS 22.030).

If the invocation of ECT is successful, then after the SS transaction has been cleared, the network shall release the CC transactions.

If the invocation of ECT is not successful, then the CC transactions shall not be released.

MS   Network
                              REGISTER (PD=SS)
--->
        Facility (Invoke = ProcessUnstructuredSS-Request (ussd-DataCodingScheme,
                    ussd-String = <ECT Invocation String>))

                          RELEASE COMPLETE (PD=SS)
<--
        Facility (Return Result = ProcessUnstructuredSS-Request (ussd-DataCodingScheme,
                    ussd-String = <Successful Text String>))

            DISCONNECT/RELEASE/RELEASE COMPLETE (TI=A-B, PD=CC)
<--

            DISCONNECT/RELEASE/RELEASE COMPLETE (TI=A-C, PD=CC)
<--

                          RELEASE COMPLETE (PD=SS)
<- -- - - - - - - -- - - - - - -
        Facility (Return Result = ProcessUnstructuredSS-Request (ussd-DataCodingScheme,
                    ussd-String = <Error Text string>))

                          RELEASE COMPLETE (PD=SS)
<- -- - - - - - - -- - - - - - -
                          Facility (Return error (Error))

                          RELEASE COMPLETE (PD=SS)
<- -- - - - - - - -- - - - - - -
                          Facility (Reject (Invoke_problem))

Figure 6: Invocation of Explicit Call Transfer for non supporting MSs

NOTE: The text strings "<Successful Text String>" and "<Error Text String>" shall be defined by the network operator. Each network shall define only one "<Successful Text String>" and only one "<Error Text string>" for each error identified in table 1.
For Phase 1 USSD the operation ProcessUnstructuredSS-Request is replaced by ProcessUnstructuredSS-Data.

5.2 Notification to the remote parties

No alternative procedures are defined for sending notifications to remote parties indicating that the call has been transferred.

Annex A (informative):
Change history

Change history						
TSG CN#	**Spec**	**Version**	**CR**	**<Phase>**	**New Version**	**Subject/Comment**
Apr 1999	GSM 04.91	6.0.0				Transferred to 3GPP CN1
CN#03	24.091			R99	3.0.0	Approved at CN#03
CN#11	24.091	3.0.0		Rel-4	4.0.0	Approved at CN#11
CN#16	24.091	4.0.0		Rel-4	4.0.1	References updated
CN#16	24.091	4.0.1		Rel-5	5.0.0	Rel-5 created after CN#16
CN#26	24.091	5.0.0		Rel-6	6.0.0	Rel-6 created after CN#26
CT#36	24.091	6.0.0		Rel-7	7.0.0	Upgraded unchanged from Rel-6
CT#42	24.091	7.0.0		Rel-8	8.0.0	Upgraded unchanged from Rel-7
2009-12	24.091	8.0.0	-	Rel-9	9.0.0	Update to Rel-9 version (MCC)
2011-03	24.091	9.0.0	-	Rel-10	10.0.0	Update to Rel-10 version (MCC)
2012-09	24.091	10.0.0	-	Rel-11	11.0.0	Update to Rel-11 version (MCC)
2014-09	24.091	11.0.0	-	Rel-12	12.0.0	Update to Rel-12 version (MCC)
2015-12	24.091	12.0.0	-	Rel-13	13.0.0	Update to Rel-13 version (MCC)
2017-03	24.091	13.0.0	-	Rel-14	14.0.0	Update to Rel-14 version (MCC)

History

Document history		
V14.0.0	March 2017	Publication