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**Digital cellular telecommunications system (Phase 2+) (GSM);
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Stage 1
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Foreword

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

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 - 1 presented to TSG for information;
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1 Scope

The present document specifies the stage 1 description of Explicit Call Transfer (ECT) from the service subscriber's and user's points of view, in particular:

- the procedures for normal operation with successful outcome;
- the action to be taken in exceptional circumstances;
- the interaction with other supplementary services.

The present document does not deal with the Man-Machine Interface (MMI) requirements, but makes reference to the appropriate Technical Specifications.

The charging principles applied to ECT are established in the present document in terms of the charging information required to be collected. Any subsequent charging implications are outside of the scope of the present document.

Any interactions with other networks not dealt with in Clause 9 are outside the scope of 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 TS 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 22.030: " Man-Machine Interface (MMI) of the Mobile Station (MS)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following definitions apply.

Alerting state: the remote subscriber is being informed of the call (i.e. the connection has not yet been established for that call).

Answered state: the connection has been established on the call to the remote subscriber.

Subscriber A: is the served mobile subscriber, the one who has subscribed to, and invokes the Explicit Call Transfer supplementary service.

Subscriber B: is the other party in one of subscribers A's calls. By convention, in the present document it is considered that the connection has been established on this call.

Subscriber C: is the other party in another of subscribers A's calls.

Subscriber D: is the forwarded-to subscriber of call forwarded by subscriber C.

NOTE: Each of subscriber B, C and D can be a mobile or a fixed subscriber, and each of them is referred to as "remote party".

Successful invocation: The ECT supplementary service is successfully invoked if the outcome of all checks (e.g. subscription, states of calls, resources) performed by the network on the received ECT request from the served subscriber are successful.

3.2 Abbreviations

All abbreviations used within the present document are given in 3GPP TS 21.905 [1].

4 Description

The ECT supplementary service enables the served mobile subscriber (subscriber A) who has two calls, each of which can be an incoming or outgoing call, to connect the other parties in the two calls and release the served mobile subscribers own connection.

Prior to transfer, the connection shall have been established on the call between subscriber A and subscriber B. On the call between subscriber A and subscriber C, either the connection shall have been established prior to transfer, or, as a network option, transfer can occur while subscriber C is being informed of the call (i.e. the connection has not yet been established.)

4.1 Applicability to telecommunication services

This service is applicable to telephony (TS:11) only.

5 Normal operation with successful outcome

5.1 Provision

The supplementary service shall be provided after pre-arrangement with the service provider.

The provision of the Call Hold (HOLD) supplementary service is also required.

5.2 Withdrawal

The supplementary service shall be withdrawn at the subscriber request or for service provider reasons.

5.3 Registration

Not applicable.

5.4 Erasure

Not applicable.

5.5 Activation

The supplementary service shall be activated by the service provider as a result of provision.

5.6 Deactivation

The supplementary service shall be deactivated by the service provider as a result of withdrawal.

5.7 Invocation

ECT shall be invoked by the served mobile subscriber by use of a control procedure as described in TS 22.030 [2].

5.8 Normal operation

The served mobile subscriber (subscriber A) who has two calls (one with subscriber B and one with subscriber C), each of which can be an incoming call or an outgoing call, can request the invocation of the ECT supplementary service with respect to the two calls.

The connection shall have been established on one of the calls (referred to as the call between subscriber A and subscriber B).

The ECT supplementary service can be invoked after the connection has been established on the call between subscriber A and subscriber C, and in addition, as a network option, after subscriber C has been informed of the call (i.e. an outgoing call from subscriber A to subscriber C, where the connection has not yet been established).

On successful invocation of the ECT supplementary service, the two calls between subscriber A and subscriber B and between subscriber A and subscriber C respectively shall be removed from subscriber A's access (i.e. the traffic channel and the signalling channel towards subscriber A will be released) and shall be transformed into a normal call between subscriber B and subscriber C where the state of the previously held party is changed to active without a subscriber action.

The previously held party will be informed in the normal way of the retrieve procedure.

If the network option above is supported, then if subscriber C is being informed of the call from subscriber A at the time of transfer, the call shall remain in this state at subscriber C (as a network option the ringing tone will be given to subscriber B), and when the connection is established by subscriber C, subscriber C shall be connected to subscriber B.

Subscriber A will no longer have any control of the on-going call between B and C.

The network shall inform (if possible) subscriber B and subscriber C of the occasion that call transfer has happened including the state (connection established, or user being informed of the call) of the call to the other subscriber.

If the network option above is supported, then after connection is established on a call which was transferred whilst subscriber C was being informed of that call, subscriber B shall be informed that the connection has been established on the call to subscriber C.

The line identity of subscriber B shall be indicated to subscriber C as specified in subclauses 8.1 through 8.4.

The line identity of subscriber C shall be indicated to subscriber B as specified in subclauses 8.1 through 8.4, either:

- at the time of transfer, if the connection had been established between subscriber A and subscriber C; or
- when subscriber B is informed that the connection has been established to subscriber C, if this occurs after transfer.

5.9 Interrogation

Not applicable.

5.10 Charging requirements

The charging principles applicable prior to the served mobile subscribers invocation of ECT, shall also apply after the ECT supplementary service is successfully invoked, i.e. the same charging information will continue to be collected after invocation as before. The charging information for both calls shall contain an indication of successful invocation of ECT.

NOTE: There is no additional charging requirement on the interchange signalling capabilities.

6 Exception procedures or unsuccessful outcome

If a mobile subscriber tries to invoke the call transfer service while not subscribed to or the network cannot provide ECT supplementary service for some other reason, an indication shall be provided to the mobile subscriber to notify the mobile subscriber with the reason of failure.

The call state is not affected and the established connection shall remain in the state prior to the request.

In the case where:

- the two calls are incompatible with the ECT request, i.e. either one of them or both are not belonging to the service TS:11 (telephony);
- if the network option is not supported and the call state is not compatible with the request, e.g. one call is not answered

the request shall be rejected by the network and the subscriber shall be notified with the reason.

The call state is not affected and the established connection shall remain in the state prior to the request.

The request for the ECT supplementary service shall be rejected if, as a network option, the network can determine that the resulting connection would contain no subscriber who is able to terminate the call.

NOTE: It may not be possible to decide if the resulting connection would have such a subscriber, e.g. when interworking between different versions of signalling systems occurs. In such cases, as a network option, the request for the ECT supplementary service may be accepted, or rejected. If the request for the ECT supplementary service is accepted in this case, the network may employ other means to control this situation (e.g. time supervision). The procedures for this are outside the scope of the present document.

7 Alternate procedures

For further study.

8 Interaction with other supplementary services

8.1 Calling Line Identification Presentation (CLIP)

If subscriber A originated the call between subscribers A and B, and subscriber B subscribes to CLIP, subscriber C's identity shall be presented to subscriber B, subject to subscriber C's line identification restrictions (see subclauses 8.2 and 8.4). If the connection has been established on the call between subscribers A and C before ECT is invoked, subscriber C's identity shall be presented when ECT is invoked. If the connection is established on the call between subscribers A and C after ECT is invoked, subscriber C's identity shall be presented when the connection on that call is established.

If subscriber A originated the call between subscribers A and C, and subscriber C subscribes to CLIP, subscriber B's identity shall be presented to subscriber C, subject to subscriber B's line identification restrictions (see subclauses 8.2 and 8.4) when ECT is invoked.

8.2 Calling Line Identification Restriction (CLIR)

If subscriber B originated the call between subscribers A and B, and subscriber B subscribes to CLIR, presentation of subscriber B's identity to subscriber C shall be controlled by that subscription. Subscriber B's serving network may also provide information on the cause of no CLI.

If subscriber C originated the call between subscribers A and C, and subscriber C subscribes to CLIR, presentation of subscriber C's identity to subscriber B shall be controlled by that subscription. Subscriber C's serving network may also provide information on the cause of no CLI.

8.3 Connected Line Identification Presentation (COLP)

If subscriber B originated the call between subscribers A and B, and subscriber B subscribes to COLP, subscriber C's identity shall be presented to subscriber B, subject to subscriber C's line identification restrictions (see subclauses 8.2 and 8.4). If the connection has been established on the call between subscribers A and C before ECT is invoked, subscriber C's identity shall be presented when ECT is invoked. If the connection is established on the call between subscribers A and C after ECT is invoked, subscriber C's identity shall be presented when the connection on that call is established.

If subscriber C originated the call between subscribers A and C, and subscriber C subscribes to COLP, subscriber B's identity shall be presented to subscriber C, subject to subscriber B's line identification restrictions (see subclauses 8.2 and 8.4) when ECT is invoked.

8.4 Connected Line Identification Restriction (COLR)

If subscriber A originated the call between subscribers A and B, and subscriber B subscribes to COLR, presentation of subscriber B's identity to subscriber C shall be controlled by that subscription.

If subscriber A originated the call between subscribers A and C, and subscriber C subscribes to COLR, presentation of subscriber C's identity to subscriber B shall be controlled by that subscription.

8.5 Call Forwarding Unconditional (CFU)

No impact.

8.6 Call Forwarding on mobile subscriber Busy (CFB)

Where a network supports the option to transfer a call for which the connection has been established to a subscriber C to which the connection has not yet been established, the transferred call will be forwarded to a forwarded-to subscriber D if the CFB condition at subscriber C (i.e. UDUB) applies.

For a call that is forwarded due to CFB after ECT is invoked, the sending of line identities to subscriber B and forwarded-to subscriber D respectively shall correspond to what is specified for the B and C subscribers in subclauses 8.1 through 8.4, i.e. replacing 'subscriber C' with 'the forwarded-to subscriber D' in the text.

8.7 Call Forwarding on No Reply (CFNRy)

The CFNRy timer at C is not restarted after the transfer has taken place.

Where a network supports the option to transfer a call for which the connection has been established to a subscriber C to which the connection has not yet been established, the transferred call will be forwarded to a forwarded-to subscriber D if the call forwarding no reply timer expires.

For a call that is forwarded due to CFNRy after ECT is invoked, the sending of line identities to subscriber B and forwarded-to subscriber D respectively shall correspond to what is specified for the B and C subscribers in subclauses 8.1 through 8.4, i.e. replacing 'subscriber C' with 'the forwarded-to subscriber D' in the text.

8.8 Call Forwarding on mobile subscriber Not Reachable (CFNRc)

No impact.

8.9 Call Waiting (CW)

No impact, any party may receive a CW indication before, during or after the calls are transferred.

NOTE: After execution of ECT the served subscribers access is free for receiving calls without a CW indication.

If subscriber A has one active, one held and one waiting call, then once ECT of the held and active calls has been successfully completed, subscriber A shall be offered the normal notification that there is a new call, as for a normal terminating call.

If the call to subscriber C meets the waiting state at C, the subscriber B shall be informed after successful transfer about the waiting status at subscriber C.

8.10 Call Hold (HOLD)

No impact, if either subscriber B or C have put their call to the served subscriber A on hold prior to the transfer, the resulting transferred call shall remain on hold by that subscriber. In this case the remote parties shall not be informed of the held state on the call.

8.11 Multi-party (MPTY) service

A served mobile subscriber who has invoked MPTY supplementary service is not allowed to invoke the ECT supplementary service.

This is due to the fact that the MPTY functionality can not be subject to call transfer at all.

Any of the remote parties is allowed to invoke ECT.

8.12 Closed User Group (CUG)

The two calls shall use the same closed user group for the transfer to be successful.

NOTE: Closed user group restrictions between subscribers will have been checked when the first call is established. Similarly, closed user group restrictions between subscribers will have been checked when established the second call.

8.13 Advice of Charge (AoC)

Served mobile subscriber:

- if call transfer is successfully accepted by the network, subscriber A will be disconnected, and therefore AoC processing at subscribers A Mobile Station will be stopped;
- for the combination AoC charging level and ECT, it is strongly recommended not to subscribe to both supplementary services at the same time.

Remote mobile subscriber:

- any AoC service at the remote sides will continue to calculate the charging information according to the original call.

8.14 Barring of All Outgoing Calls (BAOC)

No impact.

8.15 Barring of all Outgoing International Calls (BOIC)

No impact.

NOTE: If transfer occurs successfully at subscriber A, the barring programs at the remote subscribers cannot be checked again.

8.16 Barring of all Outgoing International Calls except those direct to the Home PLMN Country (BOIC-exHC)

No impact.

NOTE: If transfer occurs successfully at subscriber A, the barring programs at the remote subscribers cannot be checked again.

8.17 Barring of All Incoming Calls (BAIC)

No impact.

8.18 Barring of Incoming Calls when roaming outside the home PLMN country (BIC-Roam)

No impact.

8.19 Call Transfer (CT)

No impact.

The ECT supplementary service can be invoked simultaneously by the users on a call for which the connection has been established, but this is not regarded as a normal situation. The network will not be required to prevent this occurring, but likewise cannot guarantee that the indications supplied to the users involved will be sensible to those users. There can be more than one indication generated due to multiple invocations of the ECT supplementary service and the arrival of such indications is dependent on the timing of their invocation by the users involved in the call. The network shall transfer these indications when they are generated.

Therefore, both mobile subscribers (subscriber A and subscriber B) in a normal call, who have each subscribed to the ECT supplementary service, can simultaneous transfer the call. That is, if subscriber A and subscriber B are involved in a call on which the connection has been established, subscriber A can transfer the call to user C and subscriber B can transfer the call to user D.

NOTE: Mechanisms which prevent the ECT supplementary service from resulting in a connection which contains no subscriber able to terminate the call may result in rejection of simultaneous requests to invoke the ECT supplementary service by the subscribers involved in the call.

9 Interworking considerations

The operation of this supplementary service is not affected by the nature of the far end of the connections.

NOTE: In some networks the indication to the remote parties about the invocation of ECT may not be supported.

Annex A (informative): Deviations of PLMN ECT to the ISDN specifications of ECT

A.1 Subclause 4.1 Applicability to telecommunication services

This service is applicable to Telephony (TS:11) only.

NA1 states: applicable to all circuit switched basic telecommunication services.

A.2 Subclause 5.8 Normal operation

The NOTE describing the Call Hold scenario is not included in the 3GPP stage 1 specifications.

In 3GPP specifications there a explicit explanation that the previously held party shall be informed of the retrieve procedure.

NA1: there is no explicit description of this procedure.

In 3GPP specifications there is no explicit exchange of the subaddress of the remote parties after the successful transfer defined.

NA1 states: After the successful transfer of the call, the subscriber B and subscriber C can deliver if supplied their subaddress to the other subscriber.

A.3 Subclause 6 Exception procedures or unsuccessful outcome

In the case where:

- the two calls are incompatible with ECT (either one of them or both are not Telephony service);
- the call state is not compatible with the request, e.g. one call is not answered;
- etc. (for further study).

the request will be rejected by the network and the subscriber will be notified of the cause.

NA1 states: It is the responsibility of the served user to ensure that the two calls are compatible.

A.4 Subclause 8.6 and 8.7

NA1: There is no special definition of the impact of the interaction between CFB and CFNRy and ECT on the line identification supplementary services.

A.5 Annexes

Annex A is missing in the ISDN specification.

Annex B (normative): Cross Phase compatibility

As a operator option it is possible to support also the invocation of ECT by using Unstructured Supplementary Service Data (USSD).

The USSD string used should be the same as the standardised MMI code (4 SEND) for ECT.

The network shall send an indication towards the user if ECT was invoked successfully or unsuccessfully, though the mechanism for this indication is not specified.

If a remote party uses a non-ECT mobile station they may not receive the ECT notification.

Annex C (informative): Change history

Change history											
TSG SA#	SA Doc.	SA1 Doc	Spec	CR	Rev	Rel	Cat	Subject/Comment	Old	New	Work Item
Jun 1999			GSM 02.91					Transferred to 3GPP SA1	7.0.0		
SA#04			22.091			R99				3.0.0	
SP-05	SP-99479	S1-99637	22.091	001		R99	D	Editorial changes for alignment	3.0.0	3.0.1	
SP-09	SP-000377	S1-000587	22.091	002		R99	F	CR on CLI presentation modifications	3.0.1	3.1.0	
SP-11	SP-010065	S1-010258	22.091			Rel-4		Transferred to 3GPP Release 4	3.1.0	4.0.0	
SP-16	SP-020267	S1-021043	22.091			Rel-5		Updated from Rel-4 to Rel5	4.0.0	5.0.0	
SP-26	SP-040744	S1-040997	22.091			Rel-6		Updated from Rel-5 to Rel-6	5.0.0	6.0.0	
SP-36			22.091			Rel-7		Updated from Rel-6 to Rel-7	6.0.0	7.0.0	
SP-42	-	-				Rel-8		Updated from Rel-7 to Rel-8	7.0.0	8.0.0	
SP-46	-	-	-	-	-	-	-	Updated to Rel-9 by MCC	8.0.0	9.0.0	
2011-03	-	-	-	-	-	-	-	Update to Rel-10 version (MCC)	9.0.0	10.0.0	
2012-09	-	-	-	-	-	-	-	Updated to Rel-11 by MCC	10.0.0	11.0.0	
2014-10	-	-	-	-	-	-	-	Update to Rel-12 version (MCC)	11.0.0	12.0.0	
2015-12	-	-	-	-	-	-	-	Updated to Rel-13 by MCC	12.0.0	13.0.0	
2017-03	-	-	-	-	-	-	-	Updated to Rel-14 by MCC	13.0.0	14.0.0	

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