ATIS-1000643.1998(R2013)

Integrated Services Digital Network (ISDN) – Explicit Call Transfer Supplementary Service

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ATIS-1000643.1998(R2013), *Integrated Services Digital Network (ISND) – Explicit Call Transfer Supplementary Service*

Is an American National Standard developed by the **Signaling, Architecture, and Control (SAC)** Subcommittee under the **ATIS Packet Technologies and Systems Committee (PTSC)**.

Published by

Alliance for Telecommunications Industry Solutions
1200 G Street, NW, Suite 500
Washington, DC 20005

ANSI
T1.643-1998 (R2013)
Revision and
consolidation of
ANSI T1.643-1995
and T1.643a-1996

American National Standard
for Telecommunications –

Integrated Services Digital Network (ISDN) – Explicit Call Transfer Supplementary Service

Secretariat

Alliance for Telecommunications Industry Solutions

Approved January 14, 1998

American National Standards Institute, Inc.

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Published by

American National Standards Institute, Inc.
11 West 42nd Street, New York, NY 10036

Printed in the United States of America

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Foreword (This foreword is not part of American National Standard T1.643-1998.)

This is one of a series of standards on Integrated Services Digital Network (ISDN) supplementary services. This standard defines and describes the Explicit Call Transfer service capabilities in the context of the ISDN. This standard provides switching and signaling specifications to allow a served user having two independent voice-band information calls, 64-kbit/s data calls, or multi-rate (nx64 kbit/s) data calls, to connect together the distant parties of the two calls, thereby releasing the served user from the call, in a single user-network interaction. The Explicit Call Transfer service allows the ISDN to notify the transferred parties of the transfer if the served user subscribes to this capability. This standard includes the Digital Subscriber Signaling System No. 1 (DSS1) and the Signaling System No. 7 ISDN User Part (ISUP) protocol and procedures to support these capabilities.

Service providers of Call Transfer services will find this standard to be useful in providing a consistent suite of protocols and procedures to support the service capabilities in this standard. Manufacturers of user and network equipment that use the Integrated Services Digital Network (ISDN) and Signaling System No. 7 can apply this standard to the design and development of their products.

This standard was developed by Working Groups T1S1.1 and T1S1.3 of Accredited Standards Committee T1 on Telecommunications.

This standard contains one annex, which is for information only and is not considered part of this standard

Suggestions for improvement of this standard will be welcome. These should be sent to the Alliance for Telecommunications Industry Solutions, T1 Secretariat, 1200 G Street, NW, Suite 500, Washington DC 20005.

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(R2013)

American National Standard
for Telecommunications –

Integrated Services Digital Network (ISDN) – Explicit Call Transfer Supplementary Service

1 Scope, Purpose, and Application

1.1 Scope

This standard describes the ISDN Explicit Call Transfer (ECT) Service in terms of service definition and protocol and procedures needed for implementation.

1.2 Purpose

The ECT service allows the served user having two independent calls to connect together the distant parties of the two calls, thereby releasing the served user from the call, in a single request from the user.

This standard is one of a series that defines and describes supplementary services within the context of an Integrated Services Digital Network (ISDN). This supplementary service may be made available on a demand or subscription arrangement. The interaction of this supplementary service with other ISDN services is also included. The purpose of the standard is to allow maximum compatibility among network- and user-owned telecommunications equipment in order to increase the attractiveness and usefulness of ISDN-based capabilities.

1.3 Application

This standard applies to both the ISDN Basic Rate and Primary Rate Interfaces, and is intended to supplement the basic Circuit Mode Bearer Services contained in ANSI T1.620. It should be used in conjunction with other American National Standards for ISDN supplementary services for a complete understanding of the interactions between this and other services.

This supplementary service is applicable to all of the circuit mode bearer services defined in ANSI T1.620.

2 Normative References

The following standards contain provisions which, through references in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revisions, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

ANSI T1.113-1995, *Telecommunications - Signalling System Number 7 (SS7) - Integrated Services Digital Network (ISDN) User Part*

ANSI T1.607-1990, *Telecommunications - Integrated Services Digital Network (ISDN) - Layer 3 Signaling Specification for Circuit-Switched Bearer Service for Digital Subscriber Signaling System Number 1 (DSS1)*

ANSI T1.607a-1996, *Telecommunications - Digital Subscriber Signaling System Number 1 (DSS1) – Layer 3 Signaling Specification for Circuit-Switched Bearer Services*

ANSI T1.610-1998, *Telecommunications - Generic Procedures for the Control of ISDN Supplementary Services*

ANSI T1.620-1991 (R1997), *Telecommunications - Integrated Services Digital Network (ISDN) - Circuit-Mode Bearer Service Category Description* (includes ANSI T1.620a-1992)

3 Definitions and Acronyms

Throughout this standard, the following terminology is used:

3.1 Definitions

3.1.1 controlling switch: The ISDN exchange to which User A is connected.

3.1.2 D-Channel Identifier: A value assigned by the network to represent the ISDN interface associated with the call between User A and User B. This identifier may be unique or the same for all calls on that ISDN interface.

3.1.3 network: The term *network* refers to all telecommunications equipment that has any part in processing a call or a supplementary service for the user referred to. It may include the Local Exchange, Transit Exchange, and NT2s, but does not include the ISDN terminal and is not limited to the "Public" network or any particular set of equipment.

3.1.4 service provider: This is a company, organization, administration, business, etc., that sells, administers, maintains, charges for, etc., the service. The service provider may or may not be the provider of the network.

3.1.5 User A: The served user, i.e., an ISDN TE/NT2 that is connected to an ISDN which provides ECT service.

3.1.6 User B: The user involved in a call with User A that is to be transferred to User C. User B need not be an ISDN terminal or be connected to an ISDN exchange.

3.1.7 User C: The user involved in another call with User A that the transferred user (User B) is to be connected to upon completion of ECT. User C need not be an ISDN terminal or be connected to an ISDN exchange.

3.2 Acronyms

ACM	Address Complete Message
ANM	Answer Message
ASN.1	Abstract Syntax Notation No. 1
CPG	Call Progress Message
DCI	D-Channel Identifier
DSS1	Digital Subscriber Signaling System No. 1
ECT	Explicit Call Transfer
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
MF	Multi-Frequency
NT2	Network Termination Type Two
SDL	Specification and Description Language
SS7	Signaling System No. 7
TE	Terminal Equipment
TSP	Terminal Service Profile

4 Definition of Explicit Call Transfer from the User's Perspective

This clause defines ECT in terms of procedures and other aspects visible to the user or users, without regard to the means of implementation. It describes interworking with non-ISDNs, and interaction between ECT and other ISDN supplementary services. This clause provides a prose description and a diagrammatic description of ECT in the form of a Specification and Description Language (SDL) diagram.

4.1 Description

The ECT supplementary service enables a user to transform two of that user's calls, each of which may be an incoming or an outgoing call, into a new call between the other parties of the two calls in a single request from the user. The new call between the remote Users B and C shall no longer be under User A's influence since User A will be simultaneously disconnected.

4.2 Procedures

4.2.1 Provision/Withdrawal

ECT is subscribed by User A by prior arrangements with the service provider.

Withdrawal of the service is made by the service provider upon request by the subscriber or for service provider reasons. As a service provider option, the ECT service may be offered with the subscription options as shown in Table 1.

Table 1 - Subscription Options for ECT Service per Terminal Service Profile (TSP) or per ISDN Number/Bearer Service/TSP or per Interface

Subscription Option	Value
Transferred users receive notification of transfer	No Yes
Served user receives notification of transferred call clearing	No Yes

4.2.2 Normal Procedures

4.2.2.1 Activation/Deactivation

Activation and deactivation are provided by subscription.

4.2.2.2 Invocation and Operation

The following description of the invocation and operation of the ECT service is shown in Figures 1, 2 and 3 as SDL.

Prior to invocation of the ECT service, the served user (User A) shall be associated with at least two independent calls. Then to invoke the ECT service, User A shall explicitly specify the two calls, one to User B and the other to User C, that need to be transferred. Each of these calls may be an incoming call to or an outgoing call from User A subject to specific restrictions described here and in 4.3.

ECT is not allowed unless the following conditions are met:

- One of the two calls shall be answered. The other call, if outgoing from User A, may be either answered or, as a service provider option, alerting; and must be answered if incoming to User A.
- At most one of the calls may be held by User A using call hold function.

– The two calls are of the same bearer service or of compatible bearer services. For this service, the speech and the 3.1 kHz audio bearer service are considered compatible.

Table 2 lists the allowable combinations of the conditions of the two calls, i.e., between Users A and B (AB) and between Users A and C (AC).

Table 2 - Allowable Conditions for Invocation of ECT

Case	AB Call	AC Call
1	Incoming or Outgoing, Answered, not Held	Incoming or Outgoing, Answered, not Held
2	Incoming or Outgoing, Answered, Held	Incoming or Outgoing, Answered, not Held
3	Incoming or Outgoing, Answered, not Held	Incoming or Outgoing, Answered, Held
4	Incoming or Outgoing, Answered, not Held	Outgoing, Alerting, not Held
5	Incoming or Outgoing, Answered, Held	Outgoing, Alerting, not Held
6	Incoming or Outgoing, Answered, not Held	Outgoing, Alerting, Held

NOTES

1 In this table, AB is assumed to be answered; however, the assignment of this condition is arbitrary and the allowable conditions for a given case could be reversed. For example, in case 5, the AC call could be "Incoming or Outgoing, Answered, Held" and the AB call could be "Outgoing, Alerting, not Held".

2 Incoming and outgoing are with respect to User A, i.e., calls received by and originated by User A respectively.

3 The service provider may, as an option, choose to disallow cases 4, 5, and 6.

Upon receiving the request for ECT, the network shall check that the invocation is allowable in accordance with the restrictions above. If the request is accepted, the network shall connect Users B and C together and provide an indication of acceptance to User A. After providing this indication, the network shall remove the connections between User A and the other two users.

If User C is being alerted at the time of transfer invocation request as a result of the availability of the network option described above, it shall continue to be alerted, and on answer shall be connected to User B.

If User A has subscribed to notification of transfer, the service provider shall notify Users B and C of the transfer. If User C is alerting, the notification to User C will be provided after User C has answered the call. The notification of transfer will indicate whether the other party (either User B or User C) has answered or is alerting at the time of transfer. Where a network supports the allowable conditions described in Table 2, Cases 4, 5, and 6, User B shall receive a second notification of transfer indicating that User C has answered the call.

If User A has subscribed to notification of transferred call clearing, the service provider shall notify User A when the transferred call is cleared.

4.2.3 Exceptional Procedures

4.2.3.1 Activation/Deactivation

None identified.

4.2.3.2 Invocation and Operation

An ECT request shall be rejected either if the user invoking the service has not subscribed to the ECT service, or if the allowable conditions defined in 4.2.2.2 are not met. User A shall be notified of the cause for rejection and the original calls AB and AC shall remain in the state they were in immediately before the ECT request.

4.2.4 Alternative Procedures

None identified.

4.3 Interworking Considerations

When interworking occurs on both calls (AB and AC) to be transferred and the calls were originated by User A, restrictions shall be placed on the ability of User A to invoke the transfer operations. This is required to prevent the unsupervised connection of two non-ISDN parties who may be served from exchanges that do not immediately forward disconnect for an incoming call.

The ISDN shall not allow User A to complete the transfer and disconnect from the calls unless at least one of the calls meets one of the following conditions:

- an off-hook non-ISDN line on an access served by the controlling switch;
- an answered ISDN call on an access served by the controlling switch;
- an incoming trunk in the answered state served by the controlling switch; or,
- an outgoing trunk in the answered state which did not encounter interworking.

If interworking with non-ISDN facilities had occurred on the original call to User B, to User C, or to both, then it may not be possible to deliver the optional notification of the transfer to the remote users. This may occur due to the User B's or User C's terminal not being an ISDN terminal or due to interworking between User A's network and User B's or User C's network. In these cases, User A's network may send the optional notification, although it may not actually be delivered to User B or User C.

4.4 Interactions with Other Supplementary Services

4.4.1 Call Waiting

There is no interaction between ECT and ISDN Call Waiting. However, the following should be noted:

- A call waiting indication may be delivered to any party independently of the invocation of ECT by that party, assuming that the party has subscribed to the Call Waiting service.
- Prior to invocation of ECT, the party may use normal Call Waiting procedures, including holding the established call to answer the waiting call.
- Following the invocation of ECT, Call Waiting indication remains and the waiting call may be handled via normal procedures.

4.4.2 Normal Call Transfer

It shall be possible for User A who is subscribed to ECT and User B who is subscribed to Normal Call Transfer to transfer the call simultaneously. That is, if User A and User B are active in an established call, User A could transfer the call to User C, and User B could transfer the call to User D. Call progress signals and other notifications shall be delivered to the appropriate party at the time the signal is received. The result of these simultaneous transfers is that User C shall be connected to User D.[1)]

Simultaneous transfers shall affect the delivery of the notifications of the transfers. For example, when User A transfers User B to User C, an optional notification of the transfer may be sent towards User B. Depending on the state of User B's attempt to transfer User A, the notification shall be delivered:

- to User B if the AB call reference is still active, i.e., User B has not completed the transfer so the call reference for the AB call is still active;

---

1) The simultaneous use of Explicit Call Transfer by User A and Normal Call Transfer, Explicit Call Transfer or Call Deflection by User B or User C may lead to violation of the interworking restrictions described in 4.3, which may result in connection of two users without sufficient network release supervision capabilities.

– to User D (the party to which User B transferred User A) if the call reference has been cleared by User B's service provider, i.e., if User B's transfer completed first, then User B's service provider has cleared the AB call reference so the notification cannot be delivered to User B.

The same condition applies to the sending from User B's service provider of a transfer notification towards User A. It shall be delivered to either User A or User C.

4.4.3 Explicit Call Transfer

It shall be possible for both users (User A and User B) in a normal call who have each subscribed to the ECT service, to simultaneously transfer the call.

The remainder of the interaction is the same as in 4.4.2.

4.4.4 Calling Line Identification Presentation

There is no interaction between ECT and Calling Line Identification Presentation.

4.4.5 Calling Line Identification Restriction

There is no interaction between ECT and Calling Line Identification Restriction.

4.4.6 User-to-User Signaling

There is no interaction between ECT and User-to-User Signaling since the AB and AC calls are treated as independent calls; therefore, user to user information associated with one call is not transferred to the other call.

4.4.7 Call Hold

User A may have held one of the calls before the transfer request is made.

It shall be possible for User B and User C to place its call to User A on hold either before or during the call transfer process invoked by User A. If the transfer request is completed before the call is retrieved by User B or User C, the resulting BC call shall still be held. If User B invoked the hold, then the retrieve function shall retrieve the call with User C. If User C placed the AC call on hold, then the retrieve function shall retrieve the call with User B.

Parties that are held by Users A, B, and C before the invocation of an ECT process and that are not involved in the transfer process, shall continue to be held (by User A, B, or C as appropriate) after the transfer process.

4.4.8 Multi-level Precedence and Preemption (MLPP)

Each connection of the transferred BC call will maintain the precedence level that was assigned when the call (AB or AC) associated with that connection was established. Thus, the call BC may consist of two connections at different precedence levels.

4.4.9 Message Waiting Indicator Control and Notification

There is no interaction between ECT and Message Waiting Indicator Control and Notification.

4.4.10 Routing, Bridging, and Transfer of Emergency Service Calls

There is no interaction between ECT and Routing, Bridging, and Transfer of Emergency Service Calls.

4.4.11 Calling Name Identification Presentation

There is no interaction between ECT and Calling Name Identification Presentation.

4.4.12 Calling Name Identification Restriction

There is no interaction between ECT and Calling Name Identification Restriction.

4.4.13 Call Deflection

There is no interaction between ECT (invoked by User A) and a call deflection service at User B or C, although a call deflection service may occur at User B, User C, or both. If User A has subscribed to the notification of transfer to the transferred users, the handling of that notification at User B or User C is dependent on the operation of the deflection service invoked by User B or User C.

If the network receives from User A an ECT request while acting on a call deflection request (where the ECT request and the call deflection request involve the same call), the network shall reject the ECT request. Likewise, if the network receives from User A a call deflection request while acting on an ECT request (where the ECT request and the call deflection request the same call), the network shall reject the call deflection request. [2)]

4.4.14 Conference Calling

A conference controller can transfer a conference call with one or more conferees to another user. However, the conference controller can not transfer control of the conference to another user. In this case, the network handles the ECT request as a request to add a new user to the conference while disconnecting the conference controller from the conference.

The network shall follow the procedures of 4.2.2 to determine whether an ECT request can be accepted. In addition, the network shall verify that the float conditions of ISDN conference calling are met before allowing the transfer (see 4.2.2.2.3 of ANSI T1.647 for the float conditions). If the float conditions are not met, the network shall reject the ECT request. If the float conditions can be met and the ECT request can be accepted, the network shall follow the procedures of 4.2.2 in accepting the ECT request (with the exception that the notification of transfer shall not be sent) and the procedures of 4.2.2.2.2 of ANSI T1.647 (for notifying users that a party was added to the conference) and 4.2.2.2.3 of ANSI T1.647 with respect to floating the conference (for notifying the users that the conference is floating).

When the conference call is floated, the network shall manage the PartyIDs and the ConferenceID in accordance with ANSI T1.647. The procedures of 4.2.2 of this standard related to the Notification of transferred call clearing to the controller are not applicable.

If the network receives a request to invoke conference calling while acting on an ECT request (involving the same call), the network shall reject the conference call request.

Conferees can invoke the ECT service in order to transfer their connection to the conference to another user after that connection has been established.

4.5 Network Capabilities for Charging

It shall be possible for the service provider to charge accurately for the service.

[2)] The simultaneous use of Explicit Call Transfer by User A and Normal Call Transfer, Explicit Call Transfer or Call Deflection by User B or User C may lead to violation of the interworking restrictions described in 4.3, which may result in connection of two users without sufficient network release supervision capabilities.

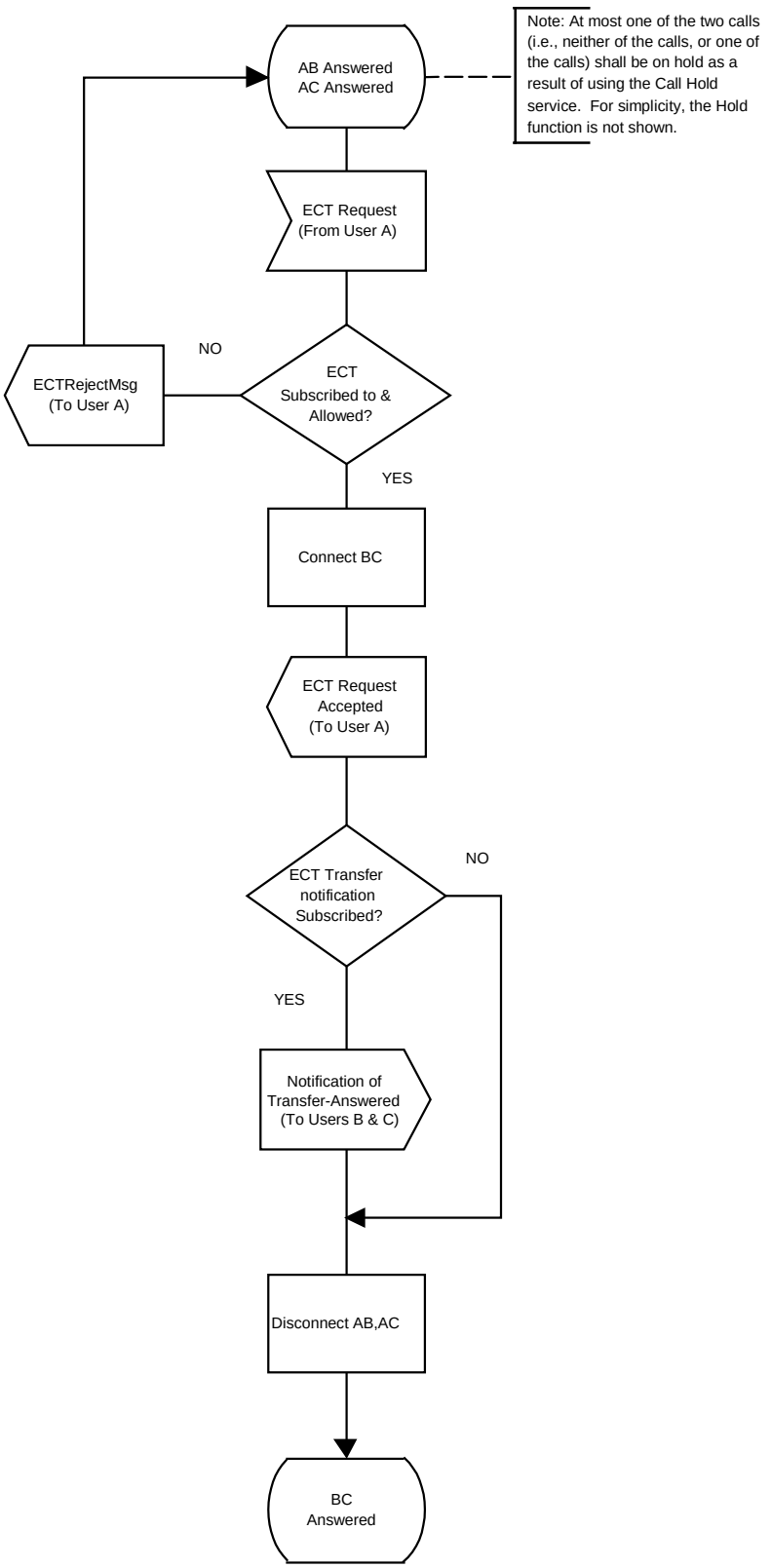


Figure 1 - Network Side SDL for ECT (AB Answered, AC Answered)

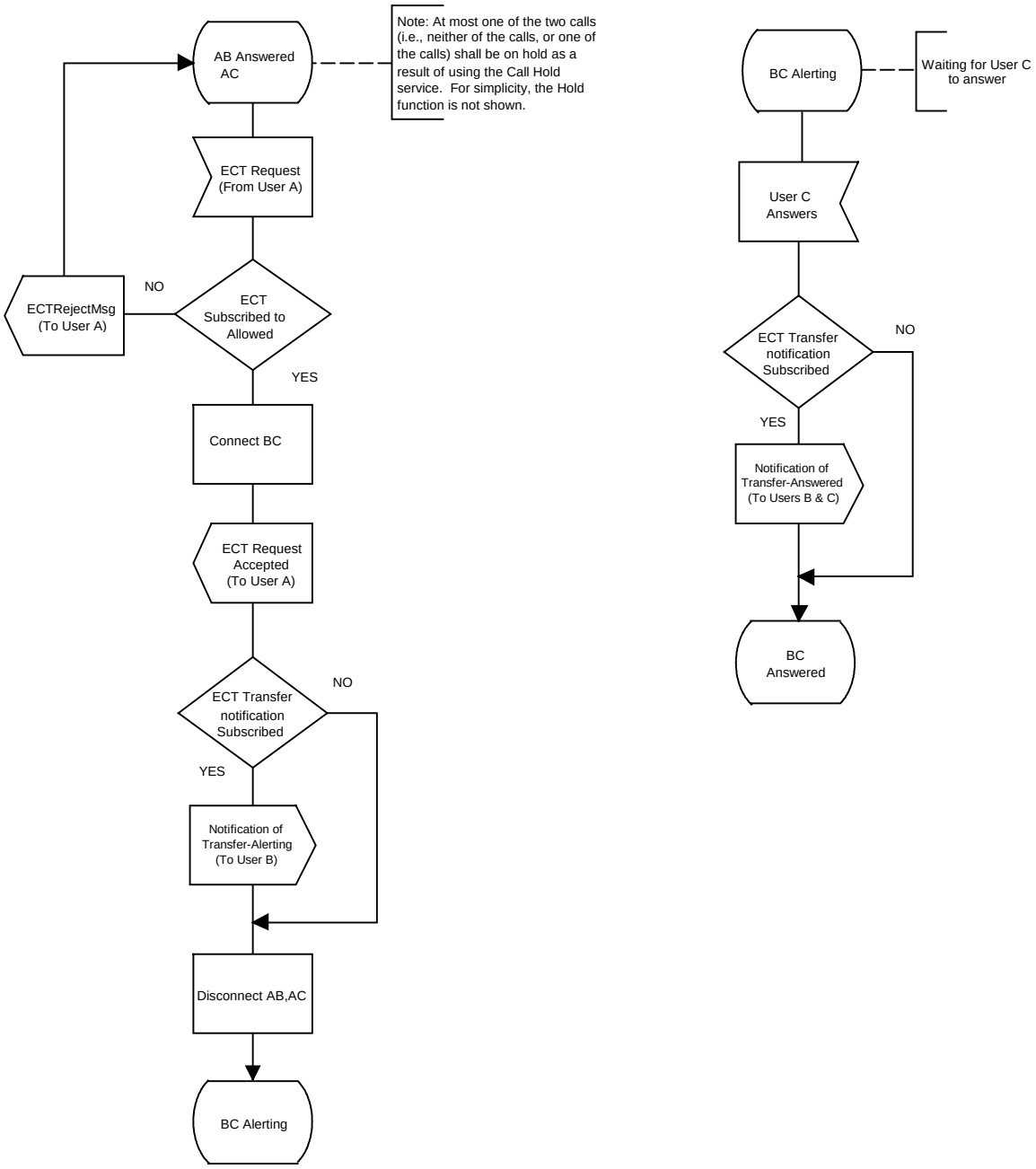


Figure 2 - Network Side SDL for ECT (AB Answered, AC Alerting)

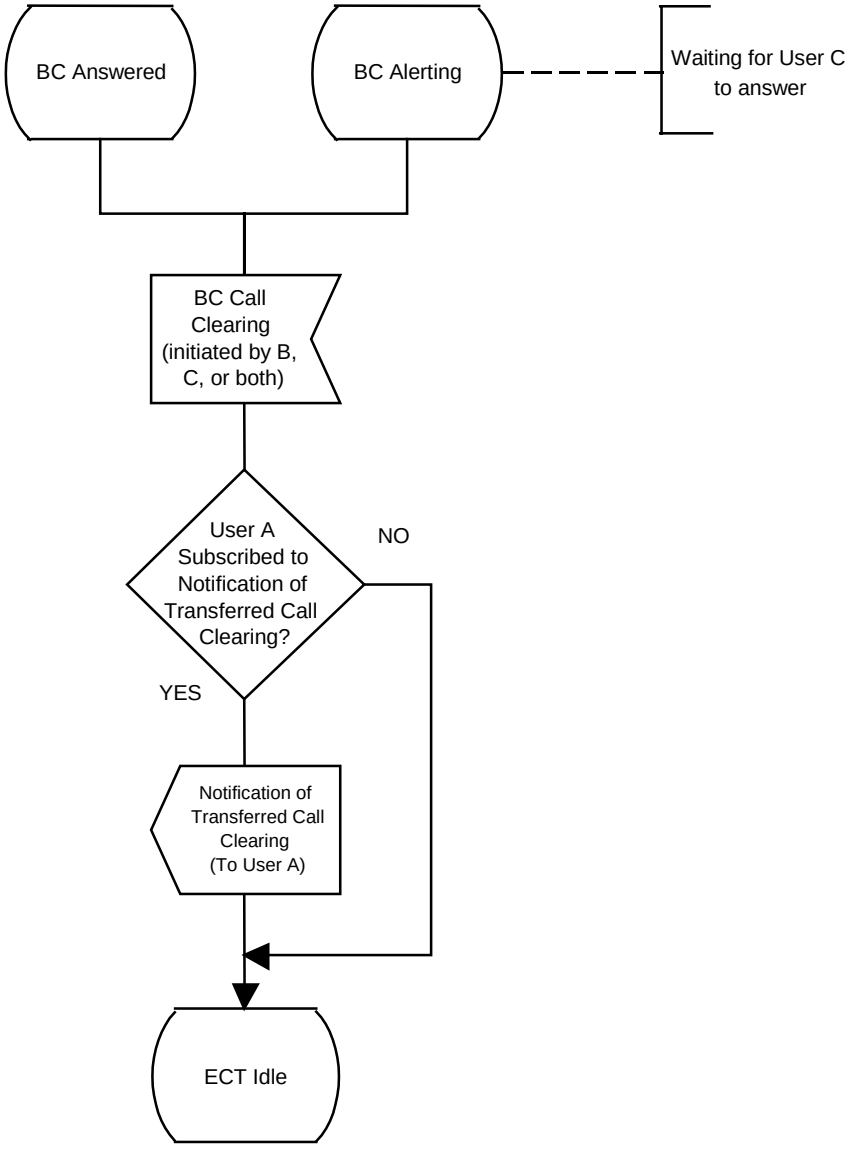


Figure 3 - Network Side SDL for ECT (Transferred Call Clearing)

5 Functional capabilities and information flows

This clause identifies a way of dividing the overall functionality for the ECT service into functional units, each of which could be placed in one location. The overall functionality results from communication between the functional units (called "entities") using information flows, which are also identified in this clause. An information flow is an abstraction, which is subsequently realized in clauses 6 through 8 by means of additions to existing signaling system messages or by new messages. Finally, this clause identifies several ways in which the functional entities of the ECT service can be located in specific network or user equipment.

5.1 Functional entity model

This clause identifies a way of partitioning the ECT service functionality into functional entities and identifies actions that occur in each functional entity. Each functional entity is an abstract representation that could be implemented in more than one kind of telecommunication equipment (e.g., in terminal equipment, in a local switching machine, or in a database). Functional entities may be combined in a single piece of telecommunications equipment and, for some scenarios, may not exist at all. Figure 4 shows the functional entity model for the ECT service.

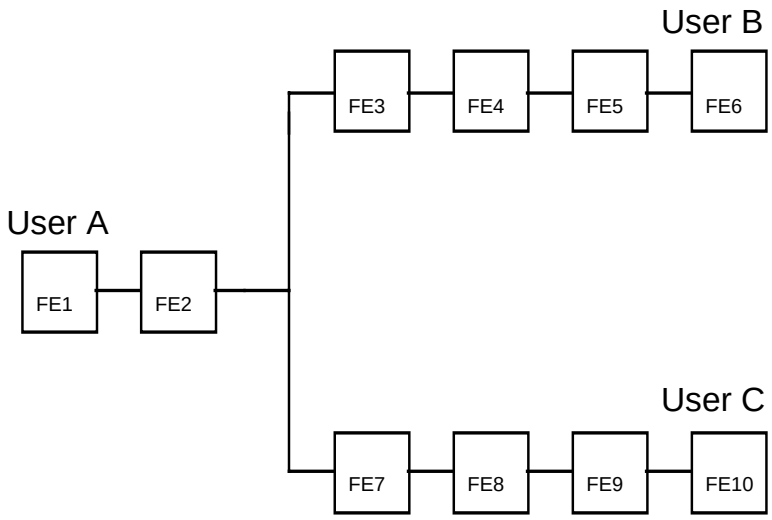


Figure 4 - Functional Entity Model

5.1.1 Description of Functional Entity 1

Functional Entity 1 provides the following functionality:

– Accesses the service-providing capabilities of FE2 by way of service requests by issuing an ECT request.

– Receives and processes functional indications relating to a service request from FE2 and relays them to User A. FE1 receives an ECT confirmation or rejection.

– On receipt of a clearing indication from FE2 of either the AB or AC call (caused by the completion of the explicit call transfer process), informs (relays this to) User A.

5.1.2 Description of Functional Entity 2

Functional Entity 2 provides the following functionality:

1) On receipt of an ECT request from FE1:

   a) FE2 verifies that:

      – User A has subscribed to the ECT service;

      – the transfer service applies to the bearer service of the AB and AC calls;

      – one of the two calls is answered. The other call, if outgoing from User A, may be either answered or, as a service provider option, alerting; and must be answered if incoming to User A;

      – at most one of the calls may be held by User A using call hold function;

      – the bearer service of the AB call is compatible with the bearer service of the new AC call; and

   b) after making the above checks, FE2 determines whether to accept or reject the request from FE1.

2) If an ECT request from FE1 is accepted, FE2:

   a) depending on the subscription option of User A, may send a notification indication towards Users B and C indicating that a transfer is in progress;

   b) connects Users B and C; sends an indication of a successful transfer to FE1; and

   c) initiates and processes call clearing to FE1 for the AB call and the AC call.

3) If an ECT request from FE1 is not accepted, FE2 sends an ECT rejection to FE1.

4) When the transferred call clears, depending on the subscription option of User A, FE2 may send a notification to FE1 indicating that the transferred call has been cleared.

5.1.3 Description of Functional Entities 3, 4, 5, 7, 8, and 9

These functional entities provide the functional support of transit exchanges, local exchanges, and NT2s and they receive optional notifications from FE2 that the AB or AC calls are being transferred, and, optionally relay this notification towards User B or User C as appropriate. Upon receipt of a clearing indication from FE6 or FE10, these functional entities relay this indication to FE2.

5.1.4 Description of Functional Entity 6

Functional Entity 6 provides the following functionality:

– Receives optional notifications that the AB call is being transferred from FE2 and relays this notification information to User B, if possible.

– To clear the transferred call on behalf of User B, FE6 initiates a clearing indication towards FE2.

5.1.5 Description of Functional Entity 10

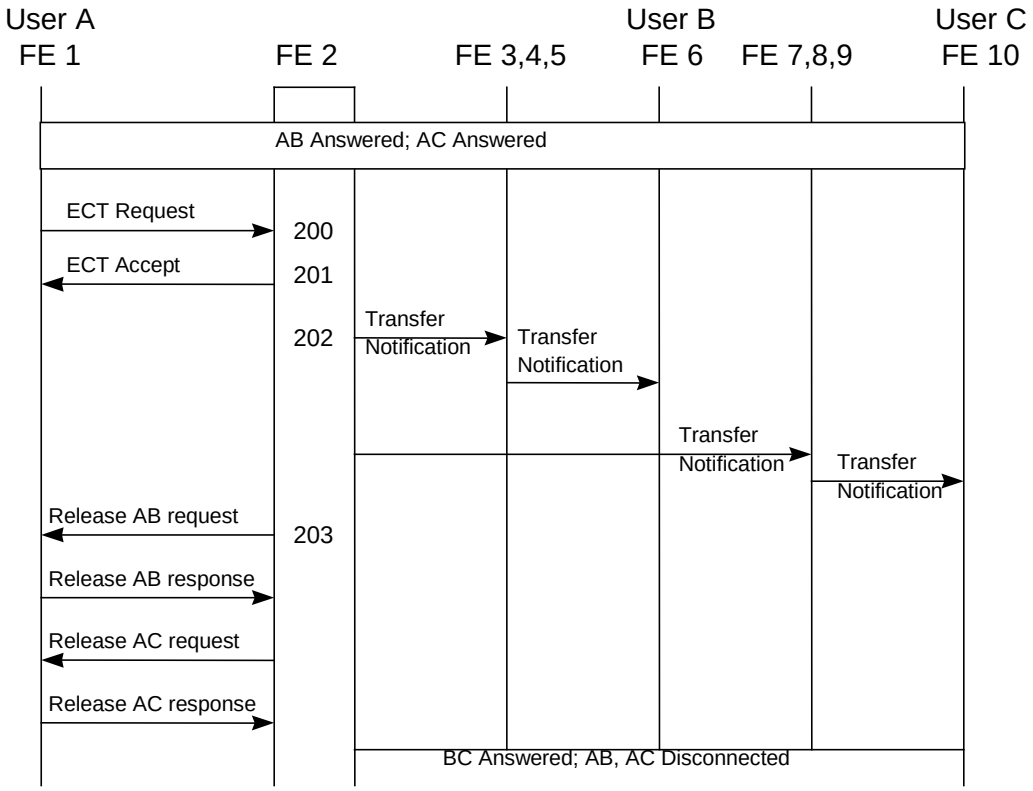
Functional Entity 10 provides the following functionality:

– Receives optional notifications that the AC call is being transferred from FE2 and, optionally, relays this notification information to User C, if possible.

– To clear the transferred call on behalf of User C, FE10 initiates a clearing indication towards FE2.

5.2 Information Flow Models for the ECT Service

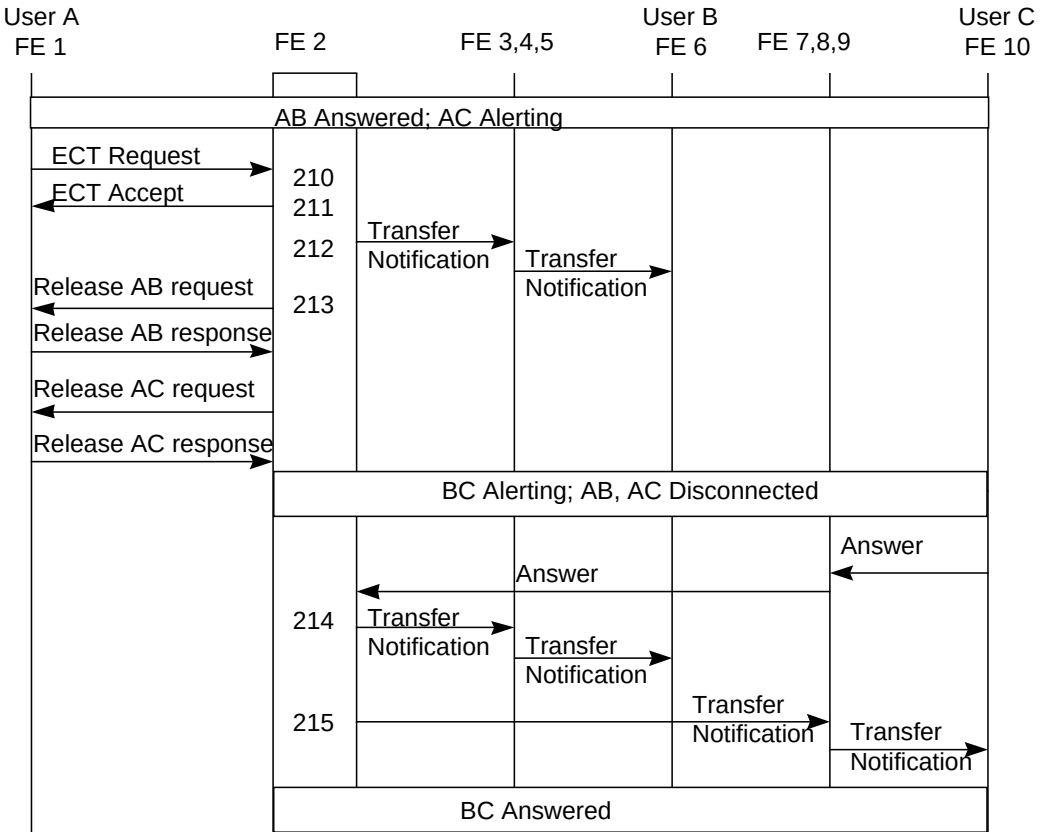
Figures 5, 6, and 7 in this clause provide a high level view of the sequence and type of information passed between functional entities, and the actions performed within the functional entities to support ECT.



Functional Entity Actions

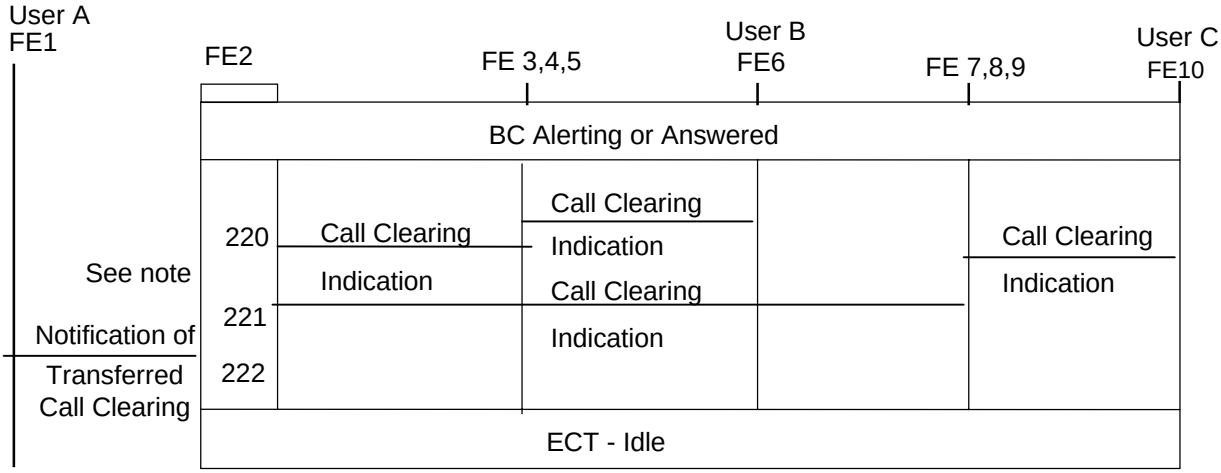
200	Performs checks based on receiving an ECT Request
201	Acceptance or Rejection of ECT Request
202	Optional notification of Transfer-Active may be sent to Users B and C
203	Initiates and processes the clearing of AB call and AC call

Figure 5 - Information Flow Model for ECT (AB Answered, AC Answered)



Functional Entity Actions	
210	Performs checks based on receiving an ECT Request
211	Acceptance or Rejection of ECT Request
212	Optional Notification of Transfer-Alerting may be sent to User B
213	Initiates and processes the clearing of AB call and AC call
214	Optional Notification of Transfer-Answered may be sent to User B
215	Optional Notification of Transfer-Answered may be sent to User C

Figure 6 - Information Flow Model for ECT (AB Answered, AC Alerting)



Functional Entity Actions	
220	Call clearing indication received from User B
221	Call clearing indication received from User C
222	Optional Notification of Transferred Call Clearing may be sent to User A

NOTE - FE2 may receive call clearing indication from User B, User C, or both (as shown) in the case of clear collision.

Figure 7 - Information Flow Model for ECT (Transferred Call Clearing)

5.3 Allocation of Functions to Equipment

Table 3 identifies a number of different plans, called "scenarios", for allocating the functional subdivision of the ECT service to specific network or user equipment. Each scenario implicitly identifies which protocol is used by the ECT service information flows. Functional Entities 3, 4, 5, 7, 8, and 9 may or may not exist for the identified scenarios.

The abbreviations used in Table 3 are as follows:

FE	Functional Entity	LE	Local Exchange
NT2	Network Termination Type 2	TE	Terminal Equipment
TR	Transit Exchange		

Table 3 - Allocation of Functions to Equipment

Scenario	FE1	FE2	FE3	FE4	FE5	FE6	FE7	FE8	FE9	FE10
1	TE	LE	TR	LE	NT2	TE	TR	LE	NT2	TE
2	NT2	LE	TR	LE	NT2	TE	TR	LE	NT2	TE

6 Switching and Signaling Specification at the User-Network Interface

This clause contains the detailed specifications of switching and signaling capabilities for the ECT service. It identifies the Digital Subscriber Signaling System No. 1 (DSS1) messages and procedures needed to support the functional entity actions for the scenarios described in clause 5.

6.1 Formats and Coding

This subclause identifies the D-channel call control messages, information elements, and code points needed for the ECT Service.

6.1.1 Messages

Table 4 lists the ANSI T1.607 and ANSI T1.610 layer 3 DSS1 messages that are used for the control of the ECT service and for user notifications.

Table 4 - DSS1 Messages for Support of ECT

Purpose	Messages
Service invocation and control	FACILITY (ANSI T1.610)
Notification	NOTIFY (ANSI T1.607)

6.1.1.1 NOTIFY Message

The appropriate Notification Description, "call transfer - alerting" or "call transfer - active", contained in the Notification indicator information element may be sent to a party on a call with a transferring party (i.e., users B or C) in a NOTIFY message to indicate that their call is being transferred. This message may be sent in the user-to-network direction when the ECT service is provided by an NT2.

The Notification Description, “discriminator for extension to ASN.1 encoded component”, along with the Notification data structure indicating "transferred call clearing" may be sent to the served user (i.e., user A) in a NOTIFY message to indicate when a call that was previously transferred has cleared. This message shall be sent in the network-to-user direction using a point-to-point data link connection at layer 2 and the dummy call reference at layer 3.

6.1.2 Information Elements

In addition to the information elements used for basic call control, the Notification indicator and the Facility information elements will be used for ECT, as defined in ANSI T1.610.

6.1.3 Code Points

6.1.3.1 Notification Description in Notification Indicator Information Element

See 8.2.8 of ANSI T1.610 for the coding of the Notification indicator information element.

During invocation of ECT, the notification description (Octet 3) of the Notification indicator information element sent to transferred users shall be coded as "call transfer - alerting" when the opposite party is in the alerting state, and "call transfer - active" when the opposite party is in the active state.

During notification of transferred call clearing, the notification description (Octet 3) of the Notification indicator information element sent to the served user shall be coded as “discriminator for extension to ASN.1 encoded component” with the Notification data structure (Octet 4) encoded as specified in 6.1.3.2.

6.1.3.2 Notification Data Structure in the Notification Indicator Information Element

The following ASN.1 description of the Notification data structure in the Notification indicator information element is defined for the purposes of the notification of call clearing function of the ECT supplementary service:

```
Explicit-Call-Transfer-Notifications

DEFINITIONS::=

BEGIN

EXPORTS       transferredCallClearing;

IMPORTS       NOTIFICATION FROM Notification-Indicator-IE-Data-Structure
              { ccitt recommendation q 932 notification-data-structure (6) }

TransferredCallClearing ::= NOTIFICATION
                            ARGUMENT callTag

callTag  CallTag ::= CHOICE {
              [1] IMPLICIT INTEGER (1-120,000)
              [2] OCTET STRING (SIZE(1..12)) }

-- the call tag is a unique value which identifies the transferred call that has
-- cleared. The choice of structure of the call tag is service provider dependent.

transferredCallClearing  TransferredCallClearing ::= {1 2 840 10005 2 1}

-- the notification value is an object identifier in number form which represents:
-- ISO (1), member-body (2), us (840), t1-610 (10005), notifications (2),
-- transferred call clearing (1)
END--of Explicit-Call-Transfer-Notifications
```

6.1.3.3 Protocol Profile in Facility Information Element

For ECT, the “ROSE” protocol profile as defined in ANSI T1.610 for the Facility information element shall be used.

6.1.4 Definition of Operations and Errors

The Abstract Syntax Notation (ASN.1) representation of the operation for the Functional protocol of ECT Services is given in this clause. The representation is as follows:

```
--begin Enhanced Explicit Call Transfer ASN.1 definition

Enhanced-Explicit-Call-Transfer-Operations

DEFINITIONS::=

BEGIN
```

```
EXPORTS        enhancedExplicitEctExecute,
               linkIdNotAssignedByNetwork,
               dCINotAssignedByNetwork;

IMPORTS        OPERATION, ERROR FROM Remote-Operation-Notation
               { joint-iso-ccitt remote-operations(4) notation(0) }
               notAvailable,  notSubscribed,
               supplementaryServiceInteractionNotAllowed,
               invalidCallState, notAllowed
               FROM General-Errors
               { ccitt recommendation q 950 general-error-list(1) };

EnhancedExplicitEctExecute ::= OPERATION
               ARGUMENT SEQUENCE {
                                    linkID,

-- linkID contains the call reference value and the call reference flag of the AB
-- call

                                    dChannelIdentifier OPTIONAL }

-- dChannelIdentifier parameter is included when invoking a transfer across interfaces and
-- identifies the ISDN interface associated with the AB call

                          RESULT

-- The return of a Return Result component is an acknowledgment of a successful outcome of
-- the explicit transfer operation.

                          ERRORS {notSubscribed,
                                    supplementaryServiceInteractionNotAllowed,
                                    notAvailable, invalidCallState, notAllowed,
                                    linkIdNotAssignedByNetwork, dCINotAssignedByNetwork

DClRequest := OPERATION

               RESULT dChannelIdentifier

               ERRORS { notAvailable }

 LinkIdNotAssignedByNetwork  ::=  ERROR

 DCINotAssignedByNetwork ::= ERROR

 linkID ::= INTEGER (-32768 .. 32767)

 dChannelIdentifier ::= OCTET STRING (SIZE(1 .. 4))

 SetCallTag ::= OPERATION
          ARGUMENT CHOICE {
          [1] IMPLICIT INTEGER (1-120,000)
          [2] OCTET STRING (SIZE(1 .. 12)) }

-- the call tag is a unique value which identifies the transferred call that has
-- cleared. The choice of structure of the call tag is service provider dependent
```

enhancedExplicitEctExecute EnhancedExplicitEctExecute ::= {1 2 840 10005 0 8}

dCIRequest DCIRequest ::= {1 2 840 10005 0 9}

setCallTag SetCallTag ::= {1 2 840 10005 0 10}

linkIdNotAssignedByNetwork LinkIdNotAssignedByNetwork ::= 61

dClNotAssignedByNetwork DCINotAssignedByNetwork ::= {1 2 840 10005 1 1}

END

6.2 Support Assumptions

6.2.1 Assumptions on the Terminal Equipment

This standard defines procedures and the associated protocol that are specific for ECT. The terminal equipment shall support the delivery of the following indications:

Sent to the served user: notification that ECT service was successfully invoked or rejected and optional notification that the transferred call has cleared.

Sent to User B and User C: optional notification that transfer has occurred.

6.2.2 Assumptions on the Network

The network serving the transferring user shall maintain the parameters defined in Table 1 to indicate whether notification of transfer should be delivered to a user that has been transferred and whether notification of transferred call clearing should be delivered to the served user.

6.2.3 Service States and Timers

No states or timers beyond those defined in ANSI T1.607 are needed for the ECT service operation.

6.3 Procedures for Explicit Call Transfer

This subclause specifies the detailed switching and signaling procedures for the invocation, notification, operation, and control of the ECT service.

6.3.1 Activation/Deactivation

No signaling procedures are required for the activation and deactivation of this supplementary service.

6.3.2 Invocation and Operation

6.3.2.1 Normal Procedures

To use the ECT service, the served user (User A) is involved in two calls prior to ECT invocation, one call to User B and one call to User C. The AB call shall be in the active (N10) state, and the AC call shall be in the active (N10) state; or, as a network option, in the outgoing call proceeding (N3) state where a PROGRESS message indicating interworking has been returned to the served user, or in the call delivered (N4) state. At most one of the AB and AC calls shall be in the *held* auxiliary state. As a result of these conditions, a total of six sets of initial conditions are valid at invocation time. These sets of initial call states are listed in Table 5.

Table 5 - Valid Invocation States

Case	(AB Basic Call State, AB Auxiliary State)	(AC Basic Call State, AC Auxiliary State)
1	(active, idle)	(active, idle)
2	(active, held)	(active, idle)
3	(active, idle)	(active, held)
4	(active , idle)	(N4 or N3* , idle)
5	(active, held)	(N4 or N3* , idle)
6	(active, idle)	(N4 or N3* , held)

NOTE - In this table, AB call is assumed to be "active"; however, the assignment of this condition is arbitrary and the allowable conditions for a given case could be reversed. For example, in case 5, the AC call could be "(active, held)" and the AB call could be "(N4 or N3, idle)".

*where a PROGRESS message indicating interworking has been returned to the served user.

To invoke ECT, User A explicitly requests that the call with User B be transferred to User C. The ECT request may be initiated by the served user sending to the network a FACILITY message containing:

a) a Call reference information element indicating the call reference value of the AC call to be transferred;

b) a Facility information element containing an Invoke component. The Invoke component shall have a national-specific operation value of #8 "enhancedExplicitEctExecute", and shall specify as a parameter the linkID identifying the call reference value and the call reference flag of the AB call. The coding of “enhancedExplicitEctExecute” operation value uses object identifiers. The national-specific operation value for the “enhancedExplicitEctExecute” operation is defined with an ISO object identifier in the number form as {1 2 840 10005 0 8}. In the name form, this object identifier can also be written as {iso member-body us ansi-t1-610 operations enhancedExplicitEctExecute}. The linkID shall be coded as a one- or two-octet parameter. The most significant bit of the linkID parameter shall be coded as the call reference flag. The remaining bits shall be coded as the call reference value. If the AB call is on a different ISDN interface than the AC call, the DChannelIdentifier (DCI) parameter shall also be included. The DCI shall be coded as a four-octet parameter identifying the ISDN interface associated with the AB call. The procedure for obtaining the DCI value is discussed in 6.3.2.2.

Upon receipt of the FACILITY message including the transfer request, the network shall check that:

– the served user has subscribed to the ECT service, and it is available;

– the transfer service applies to the bearer capabilities of the AB and AC calls;

– the AB call is in the active (N10) state;

– the AC call is in the active (N10) state; or, as a network option in the outgoing call proceeding (N3) state where a PROGRESS message indicating interworking has been returned to the served user, or in the call delivered (N4) state.

– at most one of the AB and AC calls is held by User A;

– the bearer capability of the AB call is compatible with the bearer capability for the AC call;

– if a DCI is included, the identifier value represents a valid ISDN interface for which a call transfer is allowed.

– If the network determines that the request can be accepted, the network shall then:

a) Connect Users B and C.

b) Confirm the transfer service invocation by returning a FACILITY or DISCONNECT message to the served user using the call reference value of the AC call. The returned message shall include a Facility information element containing a Return Result component with a national-specific operation value of #8 "enhancedExplicitEctExecute".

The network shall optionally (based on the notification of transferred call clearing subscription option defined in Table 1) include in the same message an Invoke component with the national-specific operation value of #10 “setCallTag”, and shall specify as a parameter a call tag value to be used to identify the transferred call during notification of transferred call clearing. The coding of “setCallTag” operation value uses object identifiers. The national-specific operation value for the “setCallTag” operation is defined with an ISO object identifier in number form, as {1 2 840 10005 0 10}. In the name form this object identifier can also be written as {iso member-body us ansi-t1-610 operations setCallTag}. Note that a single call tag value is sufficient to identify the transferred call (applies to both transferred call legs AB and AC).

c) Optionally (based on the notification of transfer subscription option defined in Table 1), send a NOTIFY message to Users B and C containing a Notification indicator information element with a Notification description value of #106 "call transfer - active", or #105 "call transfer - alerting" if the opposite party is being alerted. The NOTIFY message shall be held to the alerting user (User C) until the call has been answered. Another NOTIFY message will be sent to User B with a Notification description value of #106 "call transfer - active" when User C answers the call.

d) Clear the served user's call, if this has not already been initiated, with User B by sending a DISCONNECT message to the served user with the call reference value of the call with User B, and containing a Cause information element with a Cause value #16, "Normal call clearing". After the network sends the DISCONNECT message to the served user (User A), normal call clearing procedures for the AB call as described in 5.3.4 of ANSI T1.607 are followed.

e) In addition, the network shall initiate normal clearing of the AC call, if this has not already been initiated, by sending to the served user a DISCONNECT message with the call reference value of the call with User C and containing a Cause information element with a Cause value #16, "Normal call clearing". After the network sends the DISCONNECT message to the served user, normal call clearing procedures for the AC call as described in 5.3.4 of ANSI T1.607 are followed.

Note that if one of the AB or AC calls was in the *held* auxiliary state, (e.g., the Call Hold service) by the served user when the ECT request was made, then the normal clearing of the respective call, if not already initiated, shall begin with the network sending a RELEASE message instead of a DISCONNECT message. In this case, the Return Result and/or Invoke components that are allowed to be included in the DISCONNECT message, as described in the steps above, shall instead be provided in a FACILITY or RELEASE message.

When the transferred call clears, the network shall optionally (based on the notification of transferred call clearing subscription option defined in Table 1), send a NOTIFY message to User A containing a Notification indicator information element with a Notification description value of #3 “discriminator for extension to ASN.1 encoded component” with the Notification data structure (Octet 4) encoded as specified in 6.1.3.2. The national-specific notification value for “transferredCallClearing” is defined with an ISO object identifier in numbers form as {1 2 840 10005 2 1}. In the name form, this object identifier can also be written as {iso member-body us ansi-t1-610 notifications transferredCallClearing}. The call tag value sent in the NOTIFY message shall match the call tag value assigned to the transferred call when ECT was successfully invoked. This message shall be sent using a point-to-point data link connection at layer 2 and the dummy call reference at layer 3.

6.3.2.2 Procedures for Obtaining a D-Channel Identifier (DCI)

Before an explicit call transfer request can be issued that involves calls on two different ISDN interfaces, User A must have the DCI associated with the AB call.

The user shall request a DCI from the network by sending to the network on the ISDN interface associated with the AB call a FACILITY message containing:

a) a Call reference information element indicating the call reference value of the AB call to be transferred;

b) a Facility information element containing an Invoke component with the national-specific operation value of #9 “dCIRequest”. The coding of “dCIRequest” operation value uses object identifiers. The national-specific operation value for the “dCIRequest” is defined with an ISO object identifier in numbers form as {1 2 840 10005 0 9}. In name form, this object identifier can also be written as {iso member-body us ansi-t1-610 operations dCIRequest}. The Facility information element shall be sent in a call-associated message as described in ANSI T1.610.

Upon receiving the dCIRequest Invoke component, the network shall return a FACILITY message containing a Facility information element having a Return Result Component including the DCI, if one is available for the interface. If the network does not have a DCI assigned to that ISDN interface, the network shall return a FACILITY message containing a Facility information element having a Return Error component with Error Value #3, “notAvailable”.

6.3.2.3 Exceptional Procedures

When User A initiates an ECT request, the network shall detect the following errors and respond by rejecting the request by returning a FACILITY message containing a Facility information element with either

- a Reject component and an appropriate Problem Tag and Problem Code; or,
- a Return Error component and an appropriate Error Value.

Errors that may be detected are:

a) The service cannot be provided due to network resource limitations. The network shall reject the explicit call transfer service request by sending to the served user a Facility information element in a FACILITY message containing a Reject component with a Problem Tag #129, "Invoke-problem" and Problem Value #3, "Resource-limitation".

b) User A has not subscribed to the service, or the service does not apply to the bearer capability of the AB and AC calls. The network shall reject the service request by sending to User A a Facility information element in a FACILITY message containing a Return Error component with Error Value #0 "Not subscribed".

c) When both calls are in the *held* auxiliary state, the network shall reject the request by sending to User A a Facility information element in a FACILITY message containing a Return Error component with Error Value #10, "Supplementary service interaction not allowed".

d) The bearer capability of the AB call is not compatible with that of the AC call. The network shall reject the request by sending to User A a Facility information element in a FACILITY message containing a Return Error component with Error Value #3, "Not available".

e) The initial call states are invalid for ECT service invocation, e.g., the call to User C was not established, or the call has not reached the outgoing call proceeding (N3) state where a PROGRESS message indicating interworking has been returned to the served user, or call delivered (N4) state, or the active (N10) state, or the call reference value specified in the invocation is not an allocated call reference for User A, or both the AB and AC calls are alerting, or just AC is alerting but the network does not allow either call to be alerting. The network shall reject the request by sending to User A a Facility information element in a FACILITY message containing a Return Error component with Error Value #7, "Invalid Call State".

f) Either User B or User C is in the process of clearing its call with the served user. The network shall reject the request by sending to User A a Facility information element in the FACILITY message containing a Return Error component with Error Value #7, "Invalid call state". The connection to the

remaining party shall stay in the state it was in with the served user prior to the sending of the ECT request.

g) If the linkID received in the FACILITY message invoking ECT is invalid, i.e., does not correspond to the allocated call reference value on the ISDN interface identified by the dChannelIdentifier parameter (if included) or on the same ISDN interface if the dChannelIdentifier parameter is not included, then the network shall reject the request by sending to User A a Facility information element in a FACILITY message containing Return Error component with Error Value #61, "linkID not assigned by network".

h) If an invalid dChannelIdentifier parameter is received in the FACILITY message, i.e., does not identify an ISDN interface for which a call transfer is allowed, then the network shall reject the request by sending to User A a Facility information element in a FACILITY message containing Return Error component with Error Value #32, “Not Allowed”.

i) If an unassigned dChannelIdentifier parameter is received in the FACILITY message, i.e., does not correspond to an assigned ISDN interface in the network, then the network shall reject the request by sending to User A a Facility information element in a FACILITY message containing Return Error component with national-specific Error Value #1, “D-Channel identifier not assigned by the network”. The coding of the error value for “D-Channel identifier not assigned by the network” uses object identifiers. The national-specific error value for the “D-Channel identifier not assigned by the network” is defined with an ISO object identifier in numbers form as {1 2 840 10005 1 1}. In name form, this object identifier can also be written as {iso member-body us ansi-t1-610 errors dCINotAssignedByNetwork}.

For all but case (f) specified above, upon receipt of the Facility information element in a FACILITY message with the reject or return error component, User A shall return to a condition where the AB and AC calls were before the service was invoked, and the ECT operation shall be canceled.

6.3.3 Interworking with Private ISDNs

This subclause describes the DSS1 signaling between an NT2 and a LE.

If the served user, residing in a private network requests the ECT supplementary service, as provided by the public network, the procedures of 6.3.2 shall apply.

Where the service provider resides in a private network and one or both of the transferred users reside in the public network, if the private network sends notification of transfer, the private network shall send a Notification indicator information element encoded as defined in 6.1.3 to the public network in NOTIFY message(s) when appropriate.

6.4 DSS1 Interactions with Other Supplementary Services

6.4.1 Call Waiting

The DSS1 procedures for ECT do not interact with the DSS1 procedures of the Call Waiting supplementary service.

6.4.2 Normal Call Transfer

For the scenario described in 4.4.2, a NOTIFY message shall be sent to User B if the call reference is not cleared for the AB call; otherwise, a NOTIFY message carrying the Notification indicator information element shall be sent to User D.

6.4.3 Explicit Call Transfer

For the scenario described in 4.4.3, a NOTIFY message shall be sent to User B if the call reference is not cleared for the AB call; otherwise, a NOTIFY message carrying the Notification indication information element will be sent to User D.

6.4.4 Calling Line Identification Presentation

The DSS1 procedures for ECT do not interact with the DSS1 procedures of the Calling Line Identification Presentation supplementary service.

6.4.5 Calling Line Identification Restriction

The DSS1 procedures for ECT do not interact with the DSS1 procedures of the Calling Line Identification Restriction supplementary service.

6.4.6 User-to-User Signaling

If a User-to-user information element (UUIE) is received from User B or User C after successful ECT invocation, the UUIE shall be discarded.

6.4.7 Call Hold

The DSS1 procedures for ECT do not interact with the DSS1 procedures of the Call Hold supplementary service.

6.4.8 Multi-level Precedence and Preemption (MLPP)

The DSS1 procedures for ECT do not interact with the DSS1 procedures of the MLPP supplementary service.

6.4.9 Message Waiting Indicator Control and Notification (MWICN)

The DSS1 procedures for ECT do not interact with the DSS1 procedures of the MWICN supplementary service.

6.4.10 Routing, Bridging, and Transfer of Emergency Service Calls

The DSS1 procedures for ECT do not interact with the DSS1 procedures of the Routing, Bridging, and Transfer of Emergency Service Calls supplementary service.

6.4.11 Calling Name Identification Presentation

The DSS1 procedures for ECT do not interact with the DSS1 procedures of the Calling Name Identification Presentation supplementary service.

6.4.12 Calling Name Identification Restriction

The DSS1 procedures for ECT do not interact with the DSS1 procedures of the Calling Name Identification Restriction supplementary service.

6.4.13 Call Deflection

If the network receives an ECT request from the user while acting on a Call Deflection request from the same user (involving the same call), the network shall reject the ECT request. The network shall send to User A a Facility information element in a FACILITY message containing an enhancedExplicitECTExecute Return Error component with Error Value #10 “supplementaryServiceInteractionNotAllowed”.

If the network receives a Call Deflection request from the user while acting on an ECT request from the same user (involving the same call), the network shall reject the Call Deflection request. The network shall send to User A a Facility information element in a FACILITY message containing an Error Value #32 “notAllowed” in the callRerouting Return Error component.

6.4.14 Conference Calling

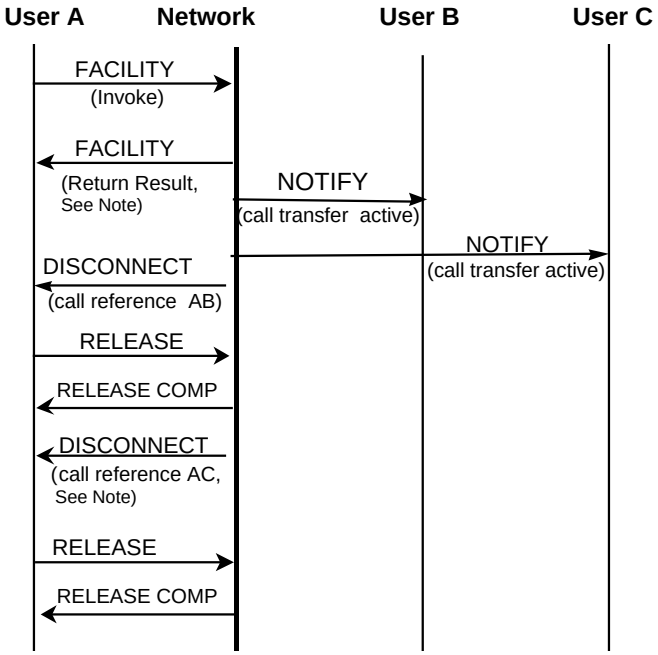
If the network receives an ECT request from the user where one of the calls is a conference call, the network shall follow the procedures of 6.3 to determine whether the ECT request can be accepted. In addition, the network shall verify that the float conditions of ISDN conference calling are met before allowing the transfer (see 4.2.2.2.3 of ANSI T1.647 for the float conditions). If the float conditions cannot be met, the network shall reject the ECT request by sending to User A a Facility information element in a FACILITY message containing an enhancedExplicitECTExecute Return Error component with an Error Value #32, "notAllowed". If the float conditions can be met and the ECT request can be accepted, the network shall follow the procedures of 6.3 in accepting the ECT request (with the exception that the notification of transfer shall not be sent) and the procedures of 6.3.2.1.3 of ANSI T1.647 (for notifying users that a party was added to the conference) and 6.3.2.1.9 of ANSI T1.647 with respect to floating the conference (for notifying the users that the conference is floating).

Since the conference call is floated, the network shall also follow the procedures of 6.3.2.1.9 of ANSI T1.647 for managing the PartyIDs associated with the conferees and the ConferenceID associated with the conference. The procedures of 6.3 of this standard related to the Notification of transferred call clearing to the controller are not applicable.

If the network receives a request to initiate a conference while acting on an ECT request (involving the same call), the network shall reject the conference request. The network shall send to User A a Facility information element in a FACILITY message containing a beginCONF Return Error component with Error Value #3 "notAvailable".

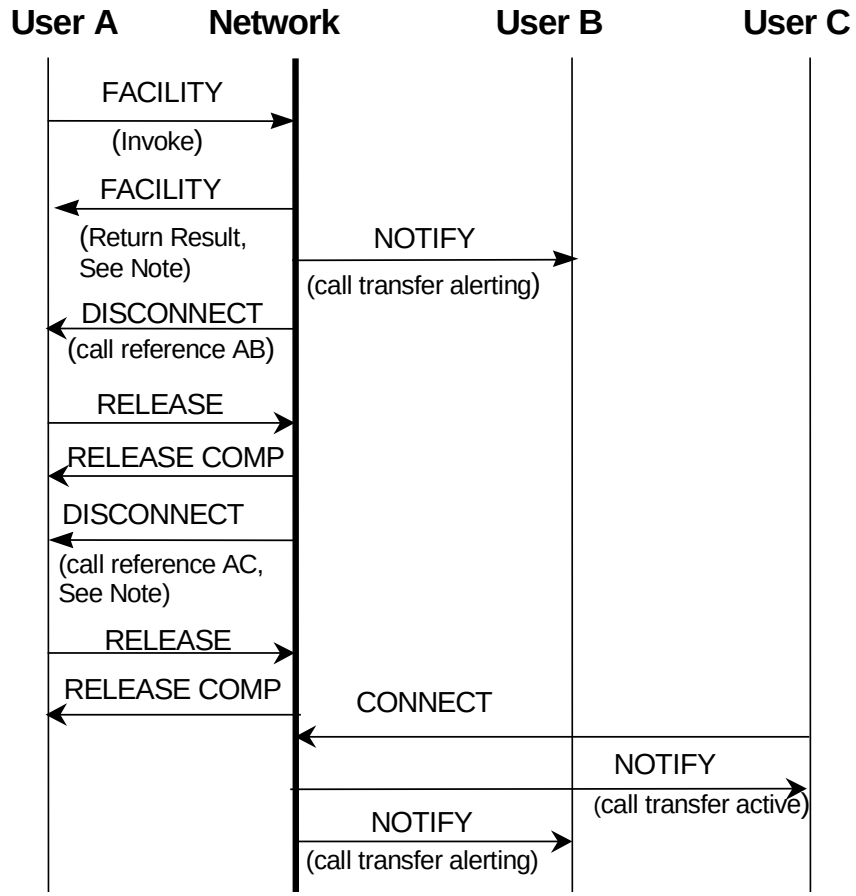
6.5 Flow diagrams for ECT operations

Figures 8 and 9 are provided to describe the normal transport of the notification of transfer of the transferred party. Figure 10 is provided to describe the normal transport of the notification of transferred call clearing to the served user.



NOTE – As an alternative to responding with a FACILITY message, the Return Result may be sent by the network to User A in the DISCONNECT message that is used to clear the AC call.

Figure 8 - ECT Invocation with Both AB and AC Calls Answered



NOTE – As an alternative to responding with a FACILITY message, the Return Result may be sent by the network to User A in the DISCONNECT message that is used to clear the call.

Figure 9 - ECT Invocation with AB Call Answered and AC Call Alerting

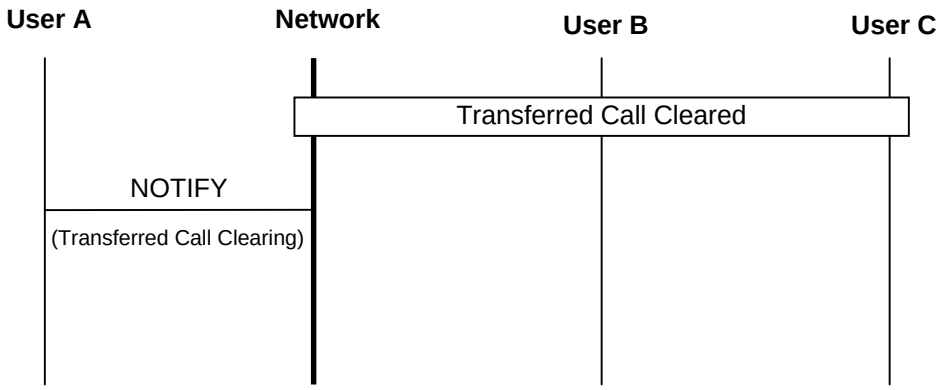


Figure 10 - ECT Notification of Served User of Transferred Call Clearing

7 Switching and Signaling Specification for ECT at Interexchange Interface

Only the ISDN User Part (ISUP) protocol has been identified in association with Signaling System No. 7 (SS7) procedures supporting ECT. No Transaction Capabilities Application Part (TCAP) procedures have been identified for this service.

The functional description, formats and codes, and general procedures for ISUP are contained in ANSI T1.113.

7.1 Formats and Coding for ECT

7.1.1 Messages

ISUP messages are described in detail in ANSI T1.113.

No new ISUP messages are required for this service. An indication that the service has been invoked may be carried in the existing ISUP message, Call Progress (CPG).

7.1.2 Parameters

There is only one parameter associated with this service. When notification of transfer is to be sent, the Notification Indicator parameter is used in the CPG message, to carry the indication to the transferred party (User B and User C) that the call is being transferred at the exchange serving User A.

The Notification Indicator parameter field is coded as shown in Table 6.

Table 6 - Notification Indicator Subfield

Notification	Code	Call state
Call transfer, alerting	1 1 0 1 0 0 1	alerting
Call transfer, active	1 1 0 1 0 1 0	answered

This coding is consistent with that of the ANSI T1.607 Notification Indicator information element to simplify the interworking of DSS1 and SS7.

7.2 Procedures for Explicit Call Transfer

There are no identified TCAP procedures associated with the ECT service. Subclause 7.2.1 details the ISUP procedures to provide notification of transfer to the remote party. Subclause 7.2.2 provides error treatment.

7.2.1 ISUP Procedures

If notification of transfer is supported, then notification of transfer shall be provided for both calls involved in the transfer. The notification for each call shall be treated independently using the procedures described below.

7.2.1.1 Invocation and Operation

The following call configurations are applicable before ECT is invoked.

a) Both calls (calls AB and AC) are answered;
b) Call AB is answered and call AC is alerting.

When the ECT is invoked, the following signaling information is exchanged between the originating and each destination switch depending on the call configuration applied.

If ECT supplementary service is invoked when call configuration (a) is applied, the originating local exchange shall send to each destination local exchange a CPG message with the Notification Indicator parameter, set to "call transfer, active." The event indicator field of the mandatory event information parameter shall be coded "notification for supplementary services." The event presentation restricted indicator field shall be coded "no indication."

If ECT supplementary service is invoked when call configuration (b) is applied, the originating local exchange shall send to User B's destination local exchange, a CPG message with the Notification Indicator parameter set to "call transfer, alerting". When an ANM is received at the originating local exchange a CPG is sent to Users B's and C's destination local exchange with the notification indicator parameter set to "call transfer, active". The event indicator field of the mandatory event information parameter shall be coded "notification for supplementary services." The event presentation restricted indicator field shall be coded "no indication."

7.2.1.2 Procedures at the Remote Exchange

If the CPG message containing the Notification Indicator parameter coded as in 7.2.1.1 is received at the exchange serving the transferred party (e.g., User B), the exchange shall inform the transferred party in accordance with the user-network interface protocol.

7.2.2 Error Treatment

The notification to the remote party should be sent to the remote party via SS7 only if ECT is successfully invoked by the served user. No notification shall be sent if the invocation attempt is unsuccessful and the two original calls shall remain.

7.3 Interactions with Other Supplementary Services

7.3.1 Call Waiting

The SS7 procedures for ECT service do not interact with the SS7 procedures of the Call Waiting service.

7.3.2 Normal Call Transfer

For the interaction described in 4.2.2, a CPG message carrying the Notification Indicator parameter set to "call transfer, active" shall be sent to User B if user has not completed the Normal Call Transfer. If User B has successfully completed the Normal Call Transfer, the CPG message will be sent to the destination exchange of User D.

7.3.3 Explicit Call Transfer

It shall be possible for both Users A and B in a normal call who have each subscribed to the ECT service to simultaneously transfer the call. The CPG message carrying the notification of transfer shall be sent to the destination exchange of User D if User B has successfully completed ECT invocation. Otherwise, it shall be sent to the destination exchange of User D.

7.3.4 Calling Line Identification Presentation

The SS7 procedures for ECT service do not interact with the SS7 procedures of the Calling Line Identification Presentation service.

7.3.5 Calling Line Identification Restriction

The SS7 procedures for ECT service do not interact with the SS7 procedures of the Calling Line Identification Restriction service.

7.3.6 User-to-User Signaling

The SS7 procedures for ECT service do not interact with the SS7 procedures of the User-to-User Signaling service.

7.3.7 Call Hold

The SS7 procedures for ECT service do not interact with the SS7 procedures of the Call Hold service.

7.3.8 Multi-Level Precedence and Preemption (MLPP)

The SS7 procedures for ECT service do not interact with the SS7 procedures of the MLPP service.

7.3.9 Message Waiting Indicator Control and Notification (MWICN)

The SS7 procedures for ECT do not interact with the SS7 procedures of the MWICN supplementary service.

7.3.10 Routing, Bridging, and Transfer of Emergency Service Calls

The SS7 procedures for ECT do not interact with the SS7 procedures of the Routing, Bridging, and Transfer of Emergency Service Calls supplementary service.

7.3.11 Calling Name Identification Presentation

The SS7 procedures for ECT do not interact with the SS7 procedures of the Calling Name Identification Presentation supplementary service.

7.3.12 Calling Name Identification Restriction

The SS7 procedures for ECT do not interact with the SS7 procedures of the Calling Name Identification Restriction supplementary service.

7.3.13 Call Deflection

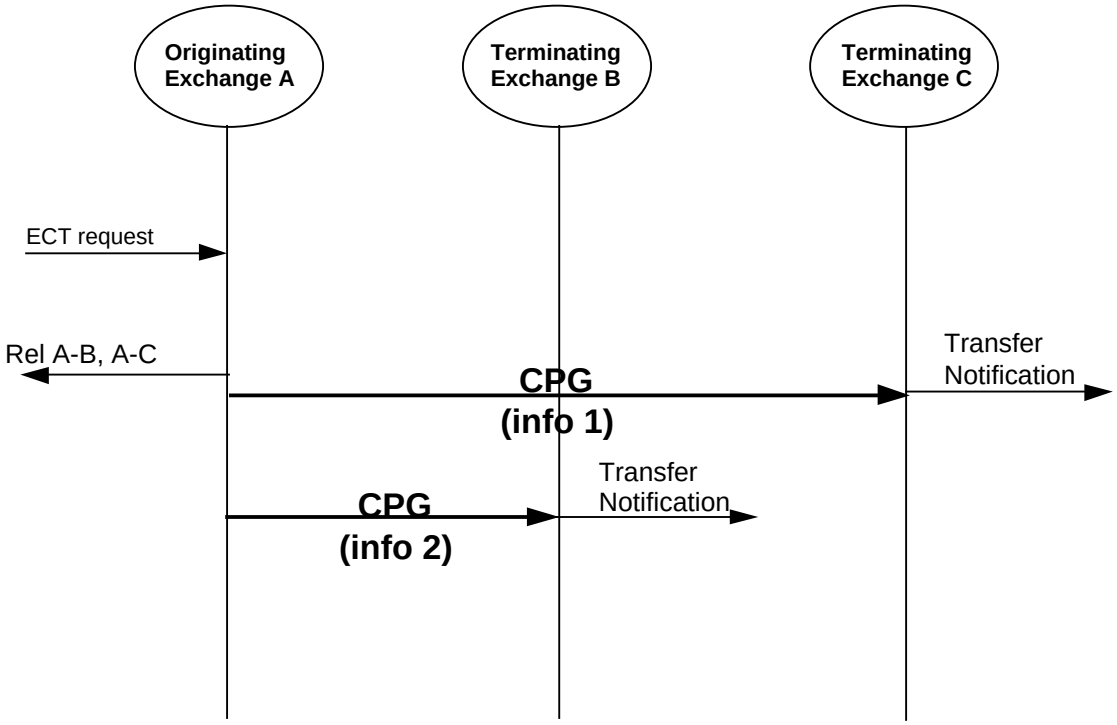
The SS7 procedures for ECT do not interact with the SS7 procedures of the Call Deflection supplementary service.

7.3.14 Conference Calling

The SS7 procedures for ECT do not interact with the SS7 procedures of the Conference Calling supplementary service.

7.4 Flow Diagrams for Explicit Call Transfer

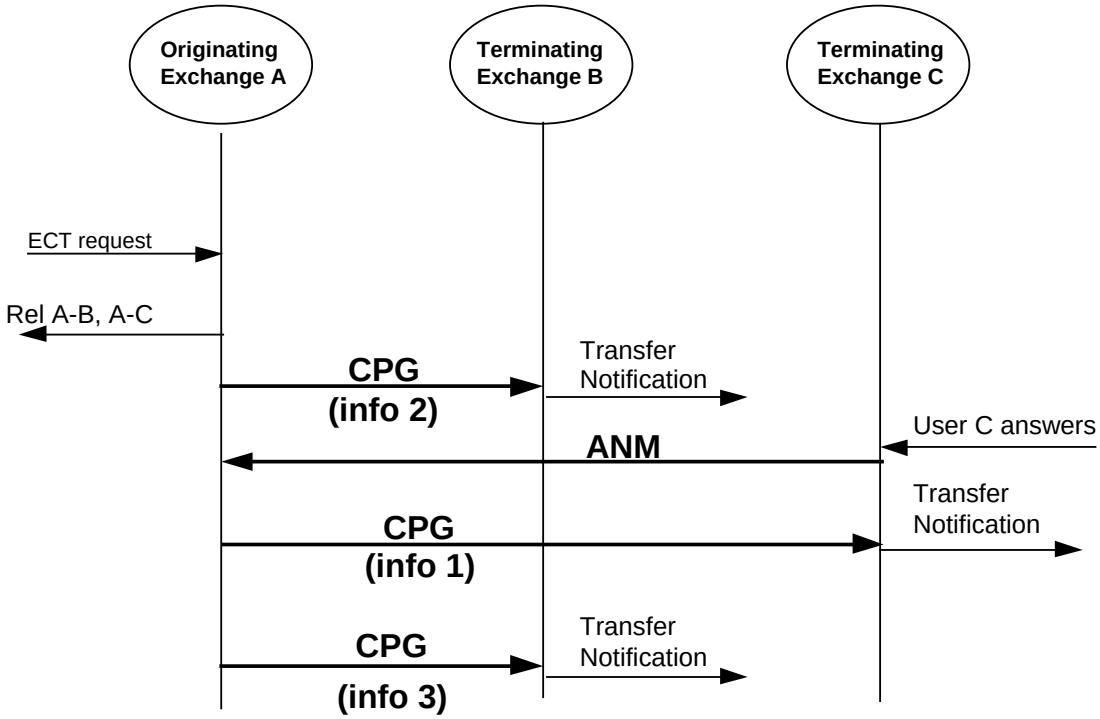
The following flow diagrams are provided to describe the normal transport of the notification of transfer to the transferred party. See 7.2 for a description of the SS7 ISUP procedures for ECT.



info 1: The notification indicator parameter is set to "call transfer, active".
info 2: The notification indicator parameter is set to "call transfer, active".

Refer to clause 6 for DSS1 signaling portion.

Figure 11 – ECT Invocation with Both Calls (AB and AC) Answered



info 1: The notification indicator parameter is set to "call transfer, active."
info 2: The notification indicator parameter is set to "call transfer, alerting."
info 3: Exchange A shall map the ANM message to a CPG message.
The notification indicator parameter is set to "call transfer, active."

Refer to clause 6 for DSS1 signaling portion.

Figure 12 - ECT Invocation with Call AB Answered and Call AC Alerting

8 Specifications for Protocol Interworking

8.1 Interworking between DSS1 and SS7

When an ECT request is received that can be honored and Users B and C are to be notified of the transfer by User A's exchange, the Notification Indicator parameter coded to either "call transferred, alerting" or "call transfer, active" shall be placed into the ISUP CPG message as described in 7.2.

At the exchanges serving User B and User C, the notification information shall be mapped from the Notification Indicator parameter received in the ISUP CPG message to the Notification indicator information element and sent in the DSS1 NOTIFY message.

Where the service provider resides in a private network and the transferred user (User B) or the transferred-to user (User C), or both, reside in the public network, the Notification indicator information element received from the private network in the DSS1 NOTIFY message (as described in 6.3.3) shall be mapped to the Notification Indicator parameter and sent in the ISUP CPG message.

8.2 Interworking between MF Signaling and SS7

If an exchange encounters interworking with MF signaling, the CPG message containing the notification information will be discarded. No further action will be taken to convey the notification of transfer to the adjacent exchange.

Annex A
(informative)

Bibliography

The publications listed here are for information only and are not essential for compliance with this standard:

ANSI T1.613-1991 (R1997), *Telecommunications - Integrated Services Digital Network (ISDN) - Call Waiting Supplementary Service*

ANSI T1.616-1992, *Telecommunications - Integrated Services Digital Network (ISDN) - Call Hold Supplementary Service*

ANSI T1.619-1992, *Telecommunications - Integrated Services Digital Network (ISDN) - Multi-Level Precedence and Preemption (MLPP) Service Capability*

ANSI T1.621-1992, *Telecommunications - Integrated Services Digital Network (ISDN) - User-to-User Signaling Supplementary Service*

ANSI T1.622-1992, *Telecommunications - Message Waiting Indicator Control and Notification Supplementary Services and Associated Switching and Signaling Specifications*

ANSI T1.625-1993, *Telecommunications - Integrated Services Digital Network (ISDN) - Calling Line Identification Presentation and Restriction Supplementary Services*

ANSI T1.628-1993, *Telecommunications - Routing, Bridging, and Transfer of Emergency Service Calls (RBTESC)*

ANSI T1.632-1993, *Telecommunications - ISDN Supplementary Service Normal Call Transfer*

ANSI T1.639-1995, *Telecommunications - Calling Name Identification Restriction*

ANSI T1.641-1995, *Telecommunications - Calling Name Identification Presentation*

ANSI T1.642-1995, *Telecommunications - Integrated Services Digital Network (ISDN) - Call Deflection Supplementary Service*

ANSI T1.647-1995, *Telecommunications - Integrated Services Digital Network (ISDN) - Conference Calling Supplementary Service*