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SERIES I: INTEGRATED SERVICES DIGITAL
NETWORK

Service capabilities – Supplementary services in ISDN

**Call offering supplementary services:
Call Transfer**

ITU-T Recommendation I.252.1

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation I.252.1 was published in Fascicle III.7 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

2 In this Recommendation, the expression “Administration” is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Recommendation I.252.1

CALL OFFERING SUPPLEMENTARY SERVICES: CALL TRANSFER (CT)

(Melbourne, 1988)

Introduction

The purpose of this Recommendation is to provide the stage 1 description of the method defined in Recommendation I.130 using the means given in Recommendation I.210.

Supplementary services are described by a prose definition and description (step 1.1) and by a dynamic description (step 1.3). The application of the attribute technique (step 1.2), as defined in Recommendation I.140, for supplementary services is for further study.

This Recommendation describes the following Call Offering supplementary services:

- I.252.1 Call Transfer (CT)
- I.252.2 Call Forwarding Busy (CFB)
- I.252.3 Call Forwarding No Reply (CFNR)
- I.252.4 Call Forwarding Unconditional (CFU)
- I.252.5 Call Deflection (CD) (Note)
- I.252.6 Line Hunting (LH)

Note – This service having been identified now requires further study; its description is not yet included.

1 I.252.1 – Call Transfer

1.1 *Definition*

The Call Transfer supplementary service enables a user to transfer an established (i.e. active) call to a third party. For the original call, the “served user” (see § 1.2.2) may have been either the calling or called party (i.e. the call may have been either incoming or outgoing). This service differs from the Call Diversion (i.e. Call Forwarding) supplementary services in that the latter deal only with incoming calls that have not yet reached the “fully-established” state, whereas in the case of Call Transfer an established end-to-end connection exists.

1.2 *Description*

1.2.1 *General description*

Three methods of Call Transfer are identified. One, called “Normal” Call Transfer, is described in § 1.3.2 below. The two others are described in § 1.3.4. Although the invocation of these various methods differ, the essential operation of Call Transfer is to transform the served user’s established call into a new call between the other party on the established call and a third party. It should be noted that, in a Three-Party Service call, there are several stages at which the served user can effectively transfer the call. These are described in the Three-Party Service description.

1.2.2 *Specific terminology*

1.2.2.1 *Served user, other parties*

During the invocation and active phases, the service is under the control of the “served user”, i.e. the one for whom the service was subscribed. This user is also referred to as “user A”. Other parties associated with this service are defined as follows:

- user B is the other party in the original call ($A \leftrightarrow B$);
- user C is the “third party” – the other party in the subsequent call ($A \rightarrow C$).

1.2.3 *Qualifications on the applicability to telecommunication services*

This supplementary service is considered meaningful when applied to the Telephony teleservice and the speech and 3.1 kHz audio bearer service. Furthermore, it may also be meaningful when applied to other services.

1.3 *Procedures*

1.3.1 *Provision/withdrawal*

The Call Transfer supplementary service is subscribed to by prior arrangements with the service provider. Subscription can be made for “Normal Call Transfer” and/or for either of the alternate procedures (i.e. “Single-Step Call Transfer” or “Explicit Call Transfer”) offered by the service provider.

Withdrawal of the service is made by the service provider upon request by the subscriber or for service provider reasons.

1.3.2 *Normal procedures*

1.3.2.1 *Activation/deactivation/registration*

None identified.

1.3.2.2 *Invocation and operation*

The served user, user A, can transform an established call with user B into (effectively) a call from user B to a third party, user C. When the served user (user A) asks the service provider to begin the “Normal” Call Transfer, the service provider puts the already established call (with user B) on hold. User A then proceeds to establish the second call (to user C). Upon request from user A to complete the Call Transfer, the service provider would connect users B and C together while removing the connections between user A and the other two users. (The extent to which the service provider re-uses the resources from the $A \leftrightarrow B$ and $A \rightarrow C$ calls to form the $B \rightarrow C$ call is a service provider option.)

Note – In the resulting call $B \rightarrow C$, user C will have all the relevant characteristics of the called party, but user B will not necessarily have all the characteristics of the calling party, depending on whether user B called user A and also depending on which service or supplementary service is under consideration.

In some networks, user A can request completion of the Call Transfer either during or after the establishment of the connection to user C.

The service provider will optionally notify users B and C of the transfer and, depending on interworking conditions and the supplementary services subscribed to by users B and C, will indicate to user B the number of user C and will indicate to user C the number of user B.

1.3.3 *Exceptional procedures*

1.3.3.1 *Activation/deactivation/registration*

None identified.

1.3.3.2 *Invocation and operation*

The service request would be rejected if the user invoking the service has not subscribed to the Call Transfer service (or the requested service option). The user would be notified of the cause for rejection and the original call $A \leftrightarrow B$ would remain in the state it was in before the transfer request was received.

If user A’s attempt to establish a connection to user C is unsuccessful, (e.g. user C is busy), user A will be so informed and will be able either to retrieve the original call $A \leftrightarrow B$ or to attempt a new connection (e.g. to C or to another party) (see Figure 3/I.252).

The transfer request would be rejected if the network is unsuccessful in connecting users B and C (e.g. when user C is busy, when there is network congestion, or when transfer restrictions are violated). The user would be notified of the cause for rejection and the two calls would remain in the states they were in before the request was received.

1.3.4 *Alternative procedures*

1.3.4.1 *Activation/deactivation/registration*

None identified.

1.3.4.2 *Invocation and operation*

1.3.4.2.1 *Single-Step Call Transfer*

In this procedure, the served user can transfer an established call (with user B) to another user (user C) without first establishing a call to user C. When invoking a Single-Step Call Transfer, the served user would indicate to the service provider the address of user C. The service provider would then establish a connection between users B and C, and disconnect the served user, user A, from the original call with user B. It should be noted that the service provider is not required to reinstate the call $A \leftrightarrow B$ if a Single-Step Call Transfer to user C fails. It is also necessary to notify user B of the progress of the establishment of the call to user C, particularly if the call $A \leftrightarrow B$ cannot be reinstated.

1.3.4.2.2 *Explicit Call Transfer*

In this procedure, the served user A puts the already established call (with user B) on hold and then proceeds to establish another call (to user C) or to accept an incoming call (from user C). If user A's attempt to establish a connection to user C is unsuccessful (e.g. user C is busy), user A will be so informed and will be able either to retrieve the original call $A \leftrightarrow B$ or to attempt a new connection (e.g. to user C or to another party) (see Figure 4/I.252).

User A then explicitly requests that the call with user B be transferred to user C. [By contrast, in the Normal Call Transfer procedure, the service provider "knows" that the two calls ($A \leftrightarrow B$ and $A \rightarrow C$) are related; requesting completion of Normal Call Transfer for call $A \rightarrow C$ implicitly means "connect user C with user B".] The remainder of the procedures are identical to Normal Call Transfer (with the possible exception of the failure procedures.)

1.4 *Network capabilities for charging*

This Recommendation does not cover charging principles. Future Recommendations in the D-Series are expected to contain that information.

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

1.5 *Interworking requirements*

User B and user C may not be able to receive each other's address if one (or both) of the calls exits from the ISDN network. The different scenarios are shown in the following tables. The tables assume that B is the originator of the call to A. The network may not be able to recognize user identification if one or both of the calls requires interworking with non-ISDN network(s).

For illustrative purposes, assume that user B originates a call to user A, and user A initiates the call transfer service to connect user B to user C. The different scenarios are shown in the following tables:

- i) Users A, B and C are in ISDN

Address information available to	Address of A	Address of B	Address of C
User A	–	YES	YES
User B	YES	–	YES
User C	YES	YES	–

ii) Users A and B are in ISDN. User C is in another network

Address information available to	Address of A	Address of B	Address of C
User A	–	YES	YES
User B	YES	–	YES
User C	NO	NO	–

iii) Users A and C are in ISDN. User B is in another network

Address information available to	Address of A	Address of B	Address of C
User A	–	NO	YES
User B	YES	–	NO
User C	YES	NO	–

iv) User A is in ISDN. Users B and C are in another network

Address information available to	Address of A	Address of B	Address of C
User A	–	NO	YES
User B	YES	–	NO
User C	NO	NO	–

1.6 *Interaction with other supplementary services*

1.6.1 *Call Waiting*

Assume served user A has an established call with user B and wishes to transfer user B to user C, and users A, B and C all have subscribed to the Call Waiting Service. If a call from user D is received while:

i) user A is invoking Normal Call Transfer

- If user D calls user A at any time before A requests the completion of the transfer of user B to user C, then user A shall receive a call waiting indication. When user B is transferred to user C, a B-channel would normally become idle, enabling user A to accept the waiting call.
- If user D calls user B, then user B can use normal call waiting procedures to accept the waiting call (preferably once the transfer to user C is completed). If user B had a call waiting indication while the call was established with user A, the call waiting indication shall not be affected by the transfer of user B to user C.
- If user D calls user C during the transfer process (i.e. while user C is engaged on an active call with user A), the call waiting indication shall be presented to user C. User C could then use Normal Call Waiting procedures to accept the waiting call (preferably once the call transfer is completed).

- ii) user A is invoking Single-Step Call Transfer
 - User A may receive a call waiting indication any time before or during the transfer invocation. Once the Single-Step Call Transfer is invoked, then user A is disconnected from user B, thus, causing a B-channel to normally become idle, enabling user A to accept the waiting call.
 - User B may receive a call waiting indication any time before or during the transfer invocation. User B could then use Normal Call Waiting procedures to accept the waiting call (preferably once the transfer is completed). If the transfer is not successful (e.g. user C is busy), then user B would normally release the call, causing a B-channel to become idle and enabling user B to accept the waiting call.
 - If the call from user D arrives at user C's serving office after the call from A, user C would receive a call waiting indication. The call waiting indication shall not be affected by the transfer of user B to user C. User C could then use Normal Call Waiting procedures to accept the waiting call (preferably once the transfer is completed). If the call from user D arrives before the call from user A, the call from user A will receive call waiting treatment.
- iii) user A is invoking Explicit Call Transfer
 - The interaction for users A, B, or C with call waiting are the same as for i) above.

1.6.2 Call Transfer

It shall be possible for both users (user A and user B) in a normal call, who have each subscribed to the Call Transfer Service, to simultaneously transfer the call. That is, if user A and user B are active in an established call, user A could transfer the call to a user C and user B could transfer the call to a user D. Call progress signals and other notifications will be delivered to the appropriate party at the time the signal is received. See Figure 1/I.252.

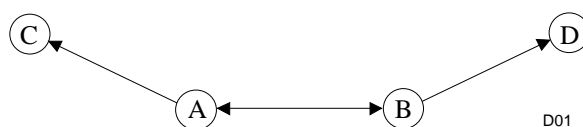


FIGURE 1/I.252

1.6.3 Connected Line Identification Presentation (COLP)

Assume that user A has an established call with user B and wishes to transfer this call with user B to user C. Except in the case where user C prohibits the presentation of his/her number, user C's number shall be presented:

- to user B upon the successful completion of the transfer to user C (independent of the type of transfer procedure invoked by user A) provided that user B has subscribed to COLP;
- to user A when user A is using the Normal or Explicit Call Transfer procedures and has subscribed to COLP. The reached party's number will not be presented to user A if user A invokes the Single-Step Call Transfer procedure.

Note – Number presentation may not be possible if interworking with a non-ISDN network is involved in the call transfer.

1.6.4 Connected Line Identification Restriction (COLR)

Assume that a user A has an established call with a user B and wishes to transfer this call with user B to a user C.

If user C has subscribed to COLR, then user A shall not receive user C's number when user A invokes any Call Transfer procedure and user B shall not receive user C's number during the transfer of user B to user C.

1.6.5 *Calling Line Identification Presentation (CLIP)*

For Normal and Explicit Call Transfers, user A shall have his number presented to user C and user B shall have his number presented to user C unless:

- 1) user A or B has number presentation restrictions; or
- 2) the call transfer process requires interworking with a non-ISDN network.

For Single-Step Call Transfer, if user C has subscribed to CLIP he shall receive the number of user B unless:

- 1) User B has address presentation restrictions; or
- 2) the call transfer process requires interworking with a non-ISDN network.

User C may also receive user A's address as a "redirecting party" unless:

- 1) User A has address presentation restrictions; or
- 2) the call transfer process requires interworking with a non-ISDN network.

1.6.6 *Calling Line Identification Restriction (CLIR)*

Assume that a user A has an established call with a user B and wishes to transfer this call with user B to a user C.

If user A has subscribed to CLIR, then user C shall not receive a calling number when user A invokes any Call Transfer procedure. If user B has subscribed to CLIR, then user C shall not receive a calling number during the transfer of user B to user C.

1.6.7 *Closed User Group (CUG)*

The intention of CUG is to allow some connections and prohibit others; call transfer must not compromise this intention.

Assume that a user A has an established call with user B and wishes to transfer this call with user B to a user C. When considering CUG requirements and restrictions, the transfer process (all three procedures) should be considered as three separate call processings:

- 1) when users A and B established their original connection, if user A and/or user B was a member of a CUG, then CUG requirements must have been met before the two parties were connected;
- 2) when user A invokes a transfer procedure, both user A and user C must meet CUG requirements before the call can be completed, if either user A or user C is a member of a CUG;
- 3) finally, the transfer connection of user B to user C must first meet all CUG requirements (if either user B and/or user C is a member of a CUG) before the two parties can establish communications.

The above requirements insure that CUG security is not violated. They prevent, for example, a user A who meets CUG requirements with user C from transferring a user B who does not meet CUG requirements with user C.

1.6.8 *Conference Calling*

Refer to Recommendation I.254, § 1.6.2, interaction with Call Transfer.

1.6.9 *Direct-Dialling-In*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

1.6.10 *Call Diversion (i.e. Call Forwarding Services)*

In general, if the served user attempts to establish a call to a party that is forwarding calls, the forwarded-to party will be alerted and may be transferred to. Specific procedures are described below.

The count for the number of forwarding “hops” should be cleared each time a call transfer occurs.

Assume that a user A has an established call with a user B and wishes to transfer this call with user B to a user C:

1.6.10.1 *Call Forwarding Busy (CFB)*

User C, which has subscribed to CFB, may be busy on another call when user A’s call is received. The call from user A would then be routed to another user D. For Normal and Explicit Call Transfers, user A would, in general, be aware of the forwarding and could make a decision as to whether or not the transfer of user B should be completed to the forwarded-to user D. For Single-Step Call transfer, user B would be connected to the forwarded-to user D.

1.6.10.2 *Call Forwarding No Reply (CFNR)*

User C, who has subscribed to CFNR, may have a free access but does not answer user A’s call. Upon expiration of the CFNR timer, user A’s call would be routed to another user D. For Normal and Explicit Call Transfers, user A would, in general, be aware of the forwarding and could make a decision as to whether or not the transfer of user B should be completed to the forwarded-to user D. For Single-Step Call Transfer, user B would be connected to the forwarded-to user D.

1.6.10.3 *Call Forwarding Unconditional (CFU)*

If user C has subscribed to CFU, then user A’s call will be routed to another user D. For Normal and Explicit Call Transfers, user A would, in general, be aware of the forwarding and could make a decision as to whether or not the transfer of user B should be completed to the forwarded-to user D. For Single-Step Call Transfer, user B would be connected to the forwarded-to user D.

1.6.11 *Line Hunting*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

1.6.12 *Three-Party Service*

The forms of call transfer given in Table 1/I.252 are applicable to the indicated states of Three-Party Service.

TABLE 1/I.252

Three-party service state	Call transfer		
	Normal	Single-step	Explicit
Active/held	YES	NA	YES
Three-way conversation	YES a)	NA	NA

a) See Figure 4/I.254, three-party service dynamic description.

1.6.13 *User-to-User Signalling (UUS)*

Prior to transfer: Prior to beginning a transfer user A can employ UUS services 1, 2 and 3 normally.

During transfer: UUS services 1, 2 and 3 are only allowable between user A and user B and/or between user A and user C. User-to-user information (UUI) sent by user B will be delivered to user A, not user C. UUI cannot be transferred between users B and C during this time. The delivery of service 3 UUI cannot be guaranteed during transfer.

After completion of transfer: Only if user B and user A both request service(s) 1, 2 and/or 3, is that service(s) available for use between users B and C after the transfer is completed. If user A did not request a given service in the set-up to user C, user B will be informed that he can no longer employ that service on this call. If user A requested a particular service in the set-up to user C, but the service was not requested by user B in the initial set-up message to user A, user C will be informed at the completion of the transfer that he can no longer employ the service.

Note 1 – The procedures to be followed if transfer of charge is permitted are for further study.

Note 2 – The procedures to be followed if the number of allowable messages has been reached by any party are for further study.

1.6.14 *Multiple Subscriber Number*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

1.6.15 *Call Hold*

Parties held by users A, B and C, before invoking a transfer process will continue to be held by the parties after the transfer process. For example, if user B places his call to user A on hold during user A's transfer of the call to user C, the resulting call from user B to user C shall remain held by user B until it is retrieved by user B. The only exception to this is the Explicit Call Transfer procedure when user A transfers user B to user C. In this case, user B will no longer be held by user A after the transfer is completed.

Special case: Assume users A and B were in an active call and user A places user B on hold, and user B places user A on hold. If user A transfers user B to user C by invoking the Explicit Call Transfer procedure, then the transfer shall take effect with the resulting call between users B and C remaining held by user B and the held call between user A to user B shall be discarded (i.e. user B cannot retrieve user A after the transfer).

1.6.16 *Advice of Charge*

Refer to Recommendation I.256, §§ 2.1.6.2, 2.2.6.2, 2.3.6.2, Interaction with Call Transfer.

1.7 *Dynamic description*

The dynamic description of this service is shown in Figure 2/I.252.

