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SERIES Q: SWITCHING AND SIGNALLING

Digital subscriber Signalling System No. 1 – Stage 3
description for supplementary services using DSS 1

**Stage 3 description for multiparty
supplementary services using DSS 1:
Three-party Service**

ITU-T Recommendation Q.954.2

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(Previously CCITT Recommendation)

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FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation Q.954, clauses 1 and 2, was prepared by the ITU-T Study Group XI (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms “CCITT, CCIR or IFRB” or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

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 Q.954.2

STAGE 3 DESCRIPTION FOR MULTIPARTY SUPPLEMENTARY SERVICES USING DSS 1

(Helsinki, 1993)

2 Three-Party Service

2.1 Definition

The **three-Party supplementary service** enables a user to establish a three-party conversation.

2.2 Description

2.2.1 General description

The served user, who is involved in at least two calls (one active call and at least one call on hold), can join the active call and one held call into a three-way conversation by requesting the Three-Party supplementary service. Both calls shall be answered prior to the invocation of the Three-Party supplementary service.

During an active three-way conversation the served user at A can request that the service provider:

- 1) explicitly disconnects one of the parties;
- 2) terminates the three-way conversation;
- 3) creates a private communication with one of the parties.

2.2.2 Specific terminology

User

The DSS 1 protocol entity at the user side of the user-network interface.

Network

The DSS 1 protocol entity at the network side of the user-network interface.

Served user

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 invoked. This user is also referred to as “user A”.

Remote parties (user B and user C)

The parties involved in the two calls that are joined together into a three-way conversation (user A with user B, user A with user C).

Invoke component

Defined in 8.2.5.1.1/Q.932.

Return result component

Defined in 8.2.5.1.1/Q.932.

Return error component

Defined in 8.2.5.1.1/Q.932.

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2.2.3 Qualification on the applicability to telecommunication services

This supplementary service is applicable to the Telephony teleservice and the speech and 3.1 kHz audio bearer services. This supplementary service is not applicable to non-voice services.

2.2.4 States definitions

This supplementary service uses states defined for circuit basic call control procedures.

2.3 Operational requirements

2.3.1 Provision/withdrawal

The Three-Party supplementary service is subscribed to by prior arrangement with the service provider.

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

2.3.2 Requirements on the originating network side

The hold supplementary service shall be available to the served user to allow the Three-Party supplementary service to be used by the served user.

2.3.3 Requirements in the network

Not applicable.

2.3.4 Requirements on the destination network side

The hold supplementary service shall be available to the served user to allow the Three-Party supplementary service to be used by the served user.

2.4 Coding requirements

In addition to the FACILITY message, this supplementary service makes use of messages identified for circuit basic call control procedures.

This supplementary service uses the following information elements:

- facility;
- notification indicator; and
- basic call control information elements.

2.4.1 Facility information element

Table 2-1 shows the definition of the operations required for the TPY supplementary service using ASN.1 as specified in Recommendation X.208 and using the OPERATION macro as defined in Figure 4/X.219.

2.4.2 Notification indicator information element

Table 2-2 contains the additional codepoints for the three-party supplementary service which shall be employed in Octet 3 of the notification indicator information element.

2.5 Signalling requirements

2.5.1 Activation/deactivation/registration

Not applicable.

2.5.2 Invocation and operation

NOTE – It is assumed that

- the call between users A and B is Active-Held and uses Call Reference x (CR x);
- the call between users A and C is Active-Idle and uses Call Reference y (CR y).

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2.5.2.1 Beginning Three-Party Service

2.5.2.1.1 Normal operation

The served user, who is involved in at least two calls (one active call and at least one call on hold), can join the active call and one held call into a three-way conversation by requesting the Three-Party supplementary service.

TABLE 2-1/Q.954

Definition of operations and errors

CCITT-Three-Party-service-Operations { ccitt recommendation q 954 three-party (2) operations-and-errors (1) }		
DEFINITIONS ::=		
BEGIN		
EXPORTS	BeginTPY, endTPY	
IMPORTS	OPERATION FROM Remote-Operation-Notation { joint-iso-ccitt remote-operations(4)notation(0) } UsernotSubscribed,notAvailable, invalidCallState, resourceUnavailable, supplementaryServiceInteractionNotAllowed FROM General-Error-List { ccitt recommendation q 950 general-error-list (1) };	
BeginTPY ::=	OPERATION RESULT ERRORS { UsernotSubscribed,notAvailable,invalidCallState, resourceUnavailable, supplementaryServiceInteractionNotAllowed }	
EndTPY ::=	OPERATION RESULT ERRORS { invalidCallState }	
beginTPY	BeginTPY	::= 4
endTPY	EndTPY	::= 5
END		

TABLE 2-2/Q.954

Additional codepoints in the notification indicator information element

Bits	Meaning
7 6 5 4 3 2 1	
1 0 0 0 0 1 0	Conference established
1 0 0 0 0 1 1	Conference disconnected

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User A sends a FACILITY message to the network, containing the Call reference of the Active-Held call (CR x) and a beginTPY invoke component in the Facility information element. The network accepting this request shall connect the three-way path and return a FACILITY message (CR x) to user A, containing a beginTPY return result component in the Facility information element.

Then, as an option, the network can send a NOTIFY message to user B and to user C, containing a “Conference established” indication in the Notification indicator information element.

2.5.2.1.2 Exceptional procedures

2.5.2.1.2.1 At the user side

If, after having sent a FACILITY message carrying a beginTPY invoke component, user A receives a FACILITY message with a return error component or a reject component, the three-way conversation is assumed not to be activated and remains idle.

2.5.2.1.2.2 At the network side

If the network receives a FACILITY message, with the call reference of an active-idle call, containing a beginTPY invoke component, the network shall reject the three-way connection request and return a FACILITY message to user A, containing a return error component “invalid call state”.

If the network receives a FACILITY message, with the call reference of an Active-held call, containing a beginTPY invoke component that cannot be accepted, the network should reject the request and return a FACILITY message to user A, containing a return error component with one of the following:

- not subscribed;
- resource unavailable;
- not available;
- supplementary service interaction not allowed.

If, while a three-way conversation is already in operation, the network receives a FACILITY message containing a beginTPY invoke component for that same user A, the network should reject the request and return a FACILITY message to user A, containing a return error component “Supplementary service interaction not allowed”.

2.5.2.2 Managing an active three-way conversation

During an active three-way conversation:

- User A can
 - explicitly disconnect one of the parties;
 - terminate the three-way conversation;
 - create a private communication with one of the parties.
- Either of the remote parties (user B or user C) can request that the network releases it from the three-way conversation.

2.5.2.2.1 Normal operation

2.5.2.2.1.1 To explicitly disconnect one of the parties

To disconnect one of the parties, user A shall send a DISCONNECT message to the network, containing the appropriate call reference:

- On receipt of a DISCONNECT message containing CR x (that call was in the “active-held” auxiliary state), the network shall return a RELEASE message to the user, release the three-way connection and all resources associated with the call A ↔ B. This results in a simple active call between users A and C. In addition, and as an option, a NOTIFY message containing the notification indicator coded as “Conference disconnected” can be sent to user C.

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- On receipt of a DISCONNECT message containing CR y (that call was in the “active-idle” auxiliary state), the network shall return a RELEASE message to the user, release the three-way connection and all resources associated with the call A ↔ C, and reserve a B-channel for the user. In addition, and as an option, a NOTIFY message containing the notification indicator coded as “Conference disconnected” can be sent to user B.

Furthermore, user A shall send a RETRIEVE message containing CR x to the network, in order to retrieve the held call between A and B. The network shall then follow the hold procedures. This results in a simple active call between users A and B.

2.5.2.2.1.2 To terminate the three-way conversation

To terminate the three-way conversation, user A shall send two DISCONNECT messages to the network:

- for the first DISCONNECT message, see the procedures described in 2.5.2.2.1.1;
- for the second DISCONNECT message, normal call clearing procedures apply (see Recommendation Q.931).

2.5.2.2.1.3 To create a private communication with one of the parties

To create a private communication with one of the other parties, user A shall send a FACILITY message to the network, containing the call reference of one of the two calls, and a endTPY invoke component in the Facility information element. The network accepting this request shall return a FACILITY message to user A, containing a endTPY return result component in the Facility information element. As an option, the network can also send a NOTIFY message to the remote users, containing a Notification indicator information element coded as “Conference disconnected”.

In addition, as the call A ↔ B is still Active-held and the call A ↔ C still active-Idle, if user A wants to create a private communication with user B, user A shall send a HOLD message containing CR y, and then a RETRIEVE message containing CR x. Then the hold and retrieve procedures shall apply.

2.5.2.2.2 Exceptional procedures

2.5.2.2.2.1 At the user side

If user A, involved in an active three-way conversation, has sent to the network a FACILITY message carrying a endTPY invoke component, and receives a FACILITY message with a return error component or a reject component, the three-way conversation will remain activated.

2.5.2.2.2.2 At the network side

If the network receives a FACILITY message containing a endTPY invoke component for a call reference which is not involved in an active three-way conversation, the network should return a FACILITY message to the user, containing a return error component “invalid call state”.

2.5.2.3 Remote users request during the three-way conversation

To release from the three-way conversation:

User B (or C) sends a DISCONNECT message to the network. On receipt of this request, the network shall release the three-way connection and apply normal call clearing procedures regarding that call. The B-channel at user A interface is retained for the remaining call.

As an option, the network can also send a NOTIFY message to the other remote user, containing a notification indicator information element coded as “conference disconnected”.

2.6 Interactions with other supplementary services

2.6.1 Call Waiting

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

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2.6.2 Call Transfer

If the served user requests to transfer a call and this call is already involved in a three-way conversation as requested by the served user, the network shall apply the procedure described in 2.5.2.1.2, indicating the error “Supplementary service interaction not allowed”.

2.6.3 Connected Line Identification Presentation

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

2.6.4 Connected Line Identification Restriction

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

2.6.5 Calling Line Identification Presentation

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

2.6.6 Calling Line Identification Restriction

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

2.6.7 Closed User Group

If the CUG restrictions are not met, the network shall apply the procedure described in 2.5.2.1.2.2 indicating the error “supplementary service interaction not allowed”.

2.6.8 Conference Calling

2.6.8.1 Add-on Conference

If the served user requests to join two calls and one of the calls is a conference call established by the served user, the network shall apply the procedure described in 2.5.2.1.2.2 indicating the error “supplementary service interaction not allowed”.

2.6.8.2 Meet-me Conference

If the service provider is able to identify that a call belongs to a meet-me conference, then it shall take the appropriate measures to prevent a meet-me conference call from being joined with another call into a three-way conversation. For rejection of the three-way conversation request, the network shall apply the procedure described in 2.5.2.1.2.2 indicating the error “supplementary service interaction not allowed”.

2.6.9 Direct-Dialling-In

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

2.6.10 Call diversion services

2.6.10.1 Call Forwarding Busy

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

2.6.10.2 Call Forwarding No Reply

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

2.6.10.3 Call Forwarding Unconditional

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

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2.6.10.4 Call Deflection

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

2.6.11 Line Hunting

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

2.6.12 Three-Party Service

If the served user requests to join two calls and one of the calls is already involved in a three-way conversation as established by the served user, the network shall apply the procedure described in 2.5.2.1.2.2 indicating the error “supplementary service interaction not allowed”.

2.6.13 User-to-User Signalling

User-to-user signalling services 1, 2 and 3 are offered according to Q.931 procedures. The routing of UUI between users A and B, and between users A and C, uses the associated call references.

2.6.14 Multiple Subscriber Number

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

2.6.15 Call Hold

If the three-way conversation is held or retrieved, no Notify message shall be sent to the remote users.

2.6.16 Advice of Charge

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

2.6.17 Sub-addressing

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

2.6.18 Terminal Portability

If the 3TPY served user requests the terminal portability supplementary service, the network shall reject this request in a SUSPEND REJECT message indicating the error “Facility rejected”.

2.6.19 Completion of Calls to Busy Subscriber

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

2.6.20 Malicious Call Identification

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

2.6.21 Reverse Charging

For further study.

2.6.22 Multi-Level Precedence and Preemption

The interaction of three-way conversation with MLPP is specified in the DSS 1 MLPP service description (see 3/Q.955).

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2.7 Interactions with other networks

2.7.1 Interaction with non-ISDNs

Users B and C belonging to a non-ISDN may not be notified of changes occurring.

2.7.2 Procedures for interworking with private ISDNs

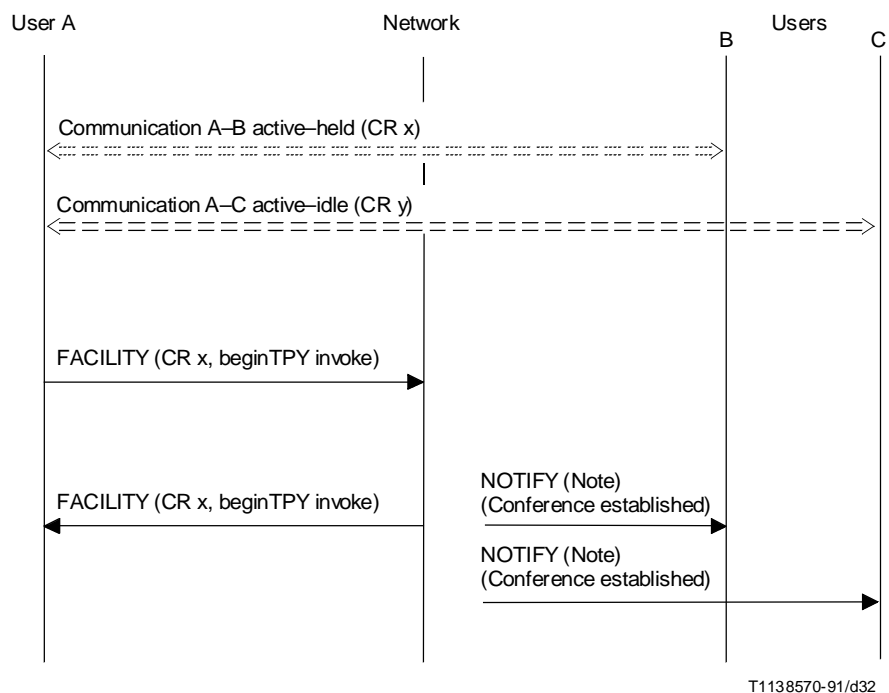
The procedures described in 2.5 are not appropriate for private networks to request the Three-Party supplementary service as provided by the public network.

Appropriate notifications sent by a private ISDN should be transferred through a public ISDN to the remote user.

If the remote user resides in a private ISDN, the public network shall send the notifications to the private ISDN according to the procedures of 2.5.

2.8 Signalling flows

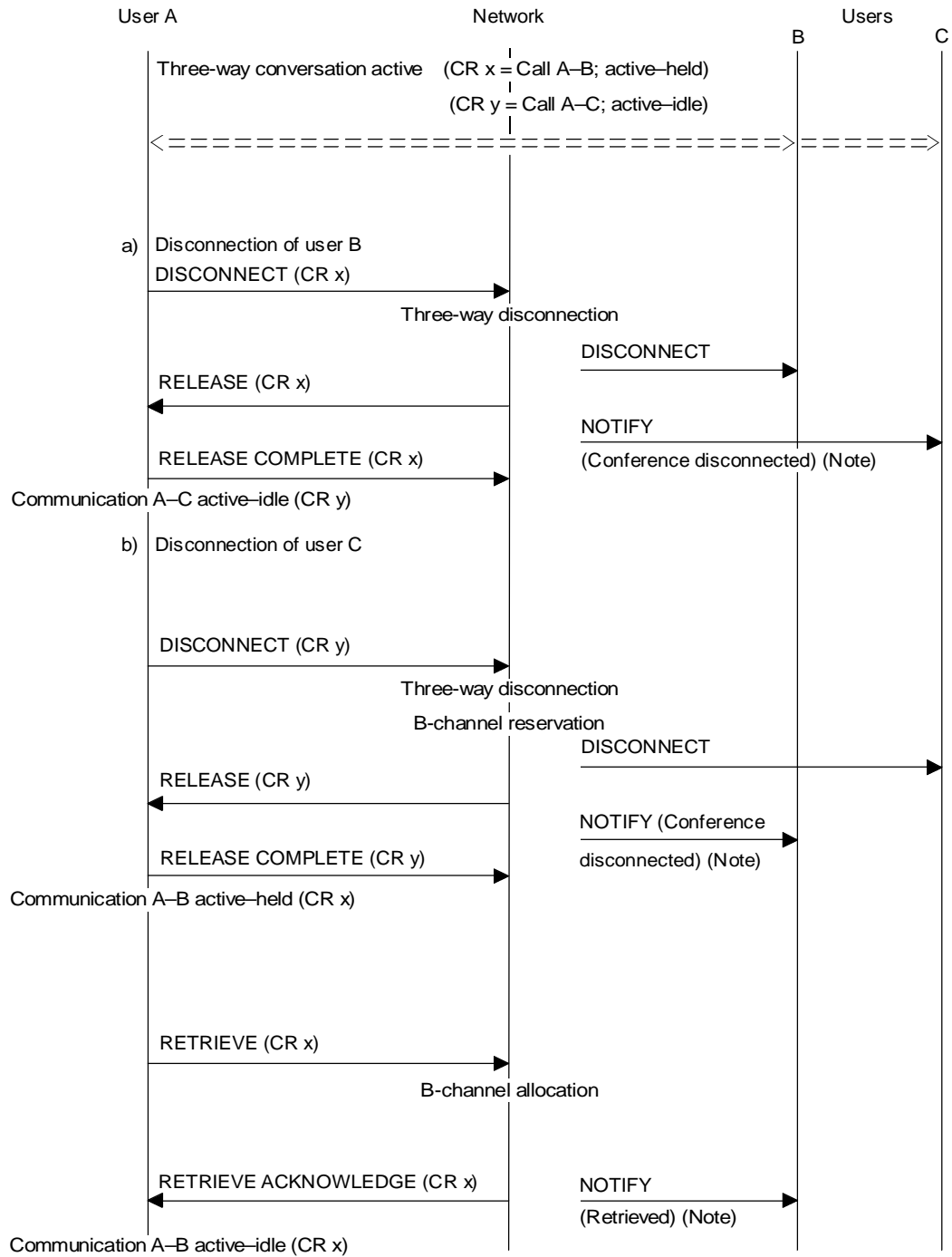
See Figures 2-1 to 2-5.



NOTE – The sending of notification is optional.

FIGURE 2-1/Q.954
Three-way conversation request

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T1138580-91/d33

NOTE – The sending of notification is optional.

FIGURE 2-2/Q.954
User A request to explicitly disconnect one of the parties

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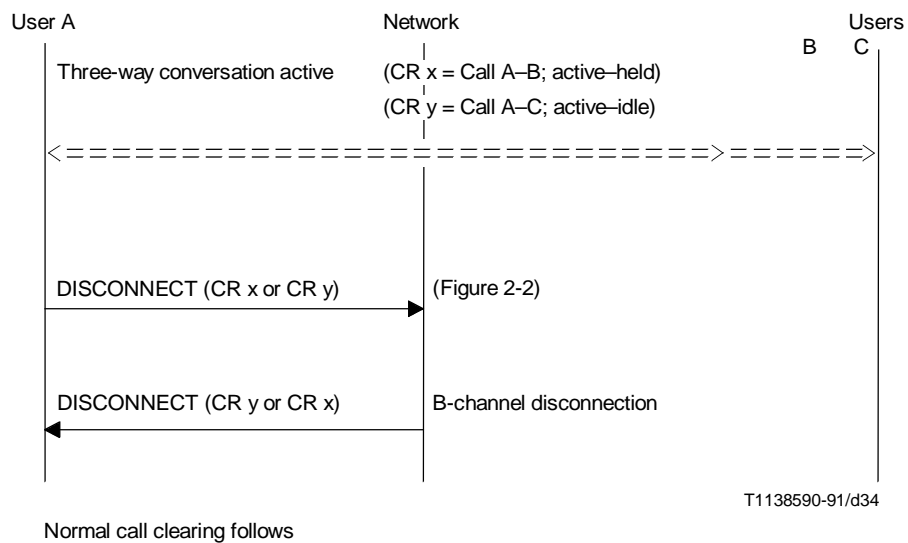
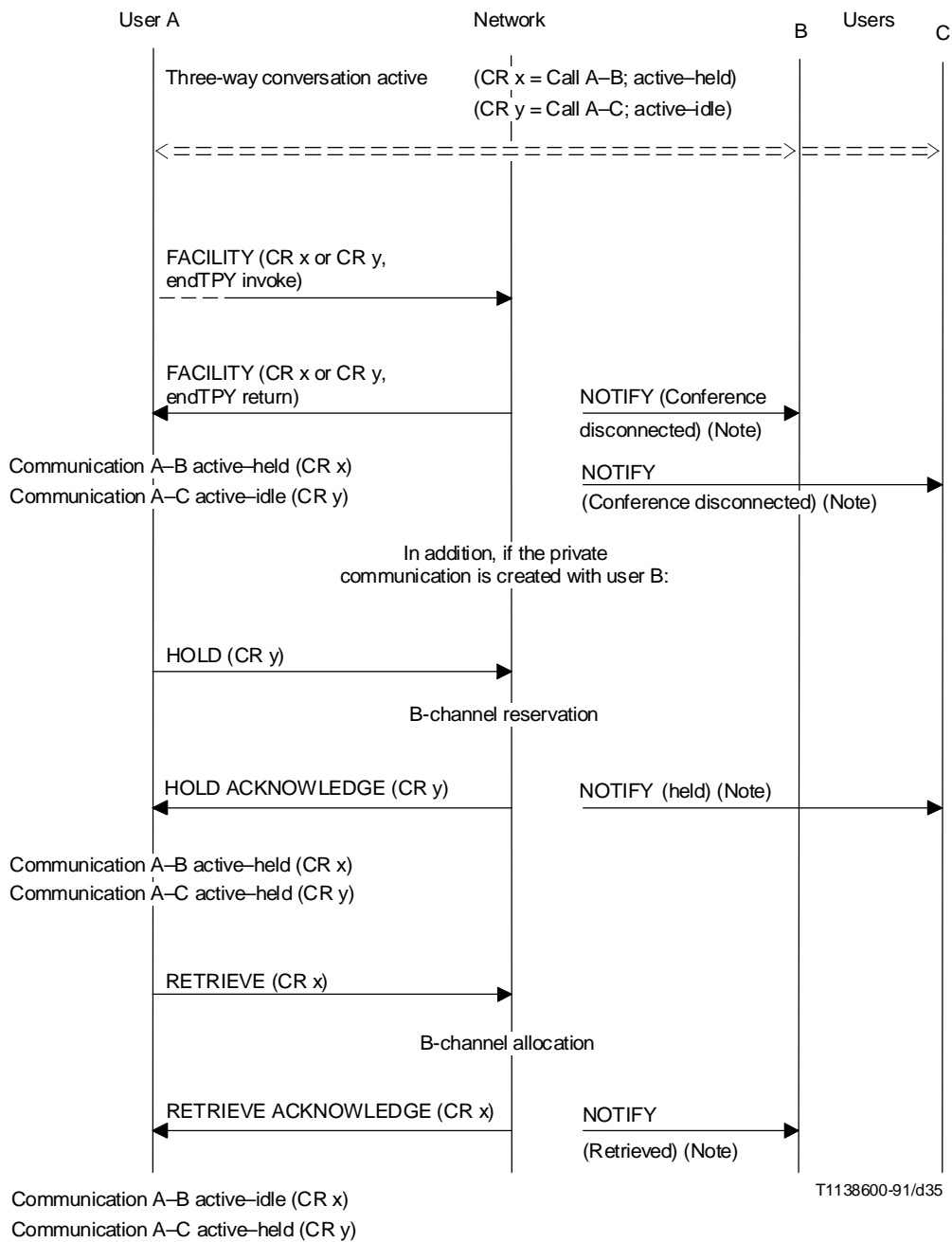


FIGURE 2-3/Q.954
User A requests to terminate the three-way conversation

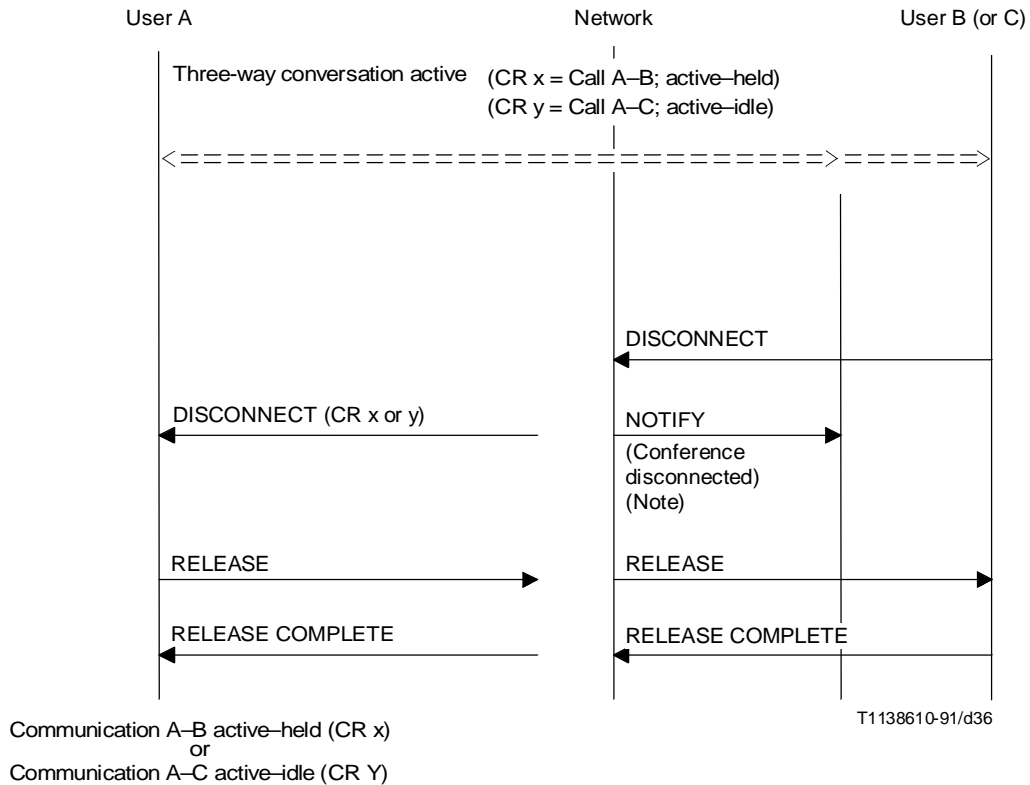
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NOTE – The sending of notification is optional.

FIGURE 2-4/Q.954
User A request to create a private communication with one of the parties

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NOTE – The sending of notification is optional.

FIGURE 2-5/Q.954

User B (or C) request to release it from the three-way conversation

2.9 Parameter values

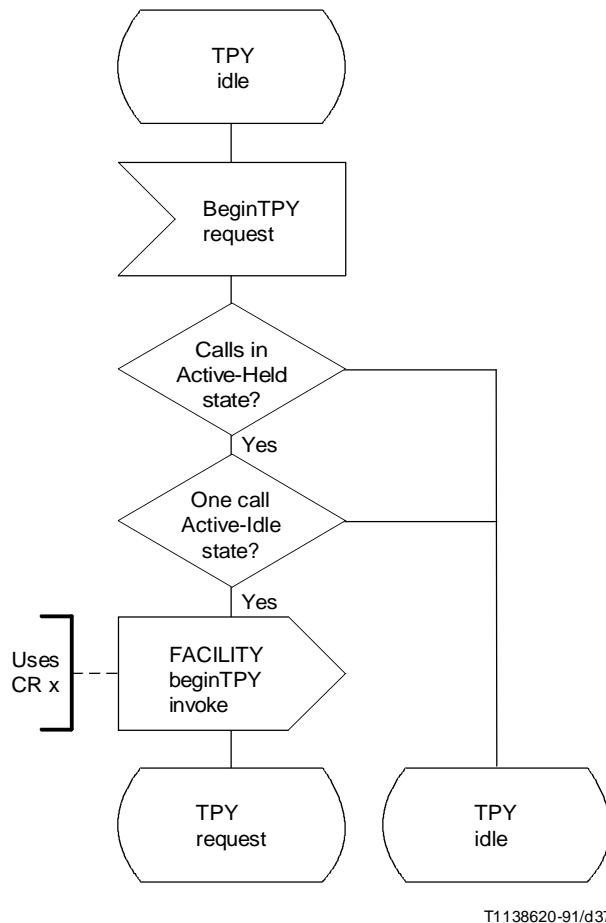
None identified.

2.10 Dynamic description

The dynamic descriptions are specified in Figures 2-6 and 2-7.

Figure 2-6 shows the user side SDLs.

Figure 2-7 shows the network side SDLs.



NOTE – Two basic calls are involved in the TPY:

- one Active-Held call: CR x; and
- one Active-Idle call: CR y.

FIGURE 2-6/Q.954 (sheet 1 of 4)
User side SDL

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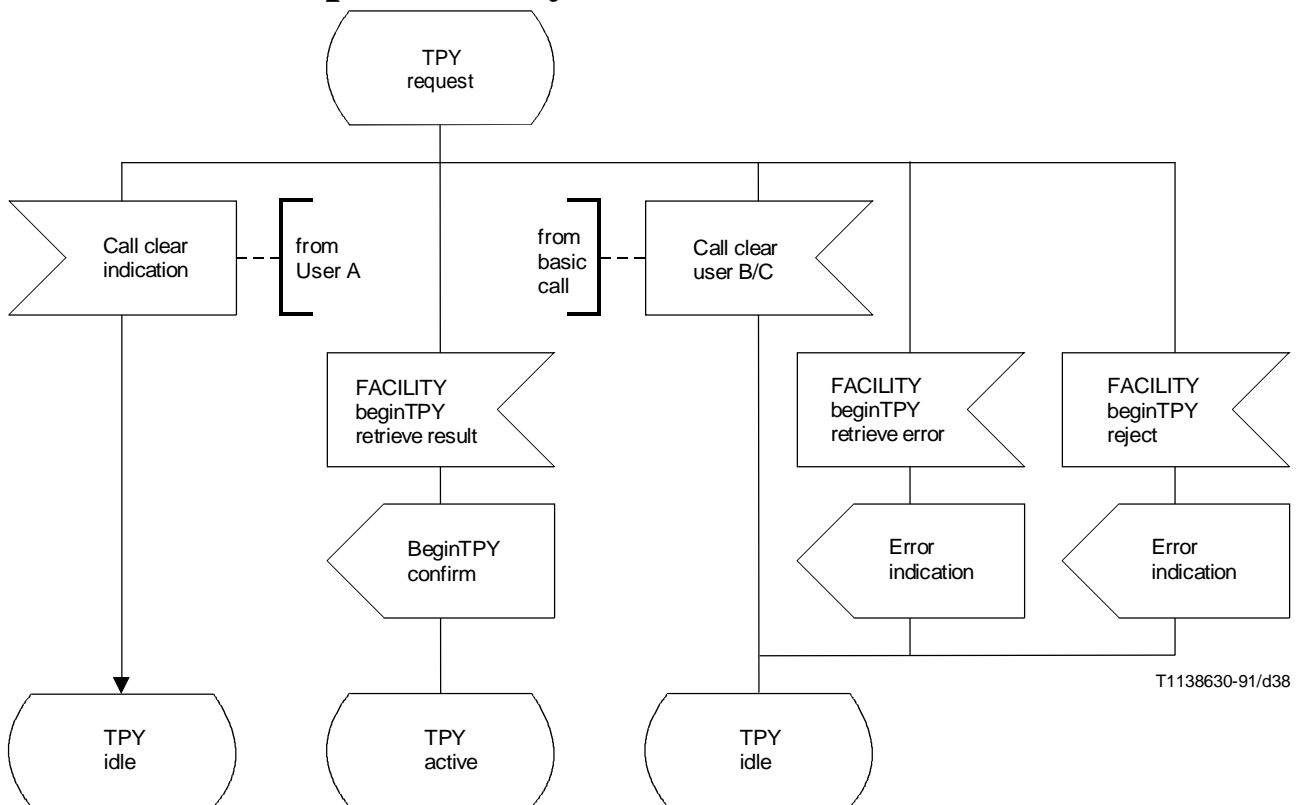


FIGURE 2-6/Q.954 (sheet 2 of 4)

User side SDL

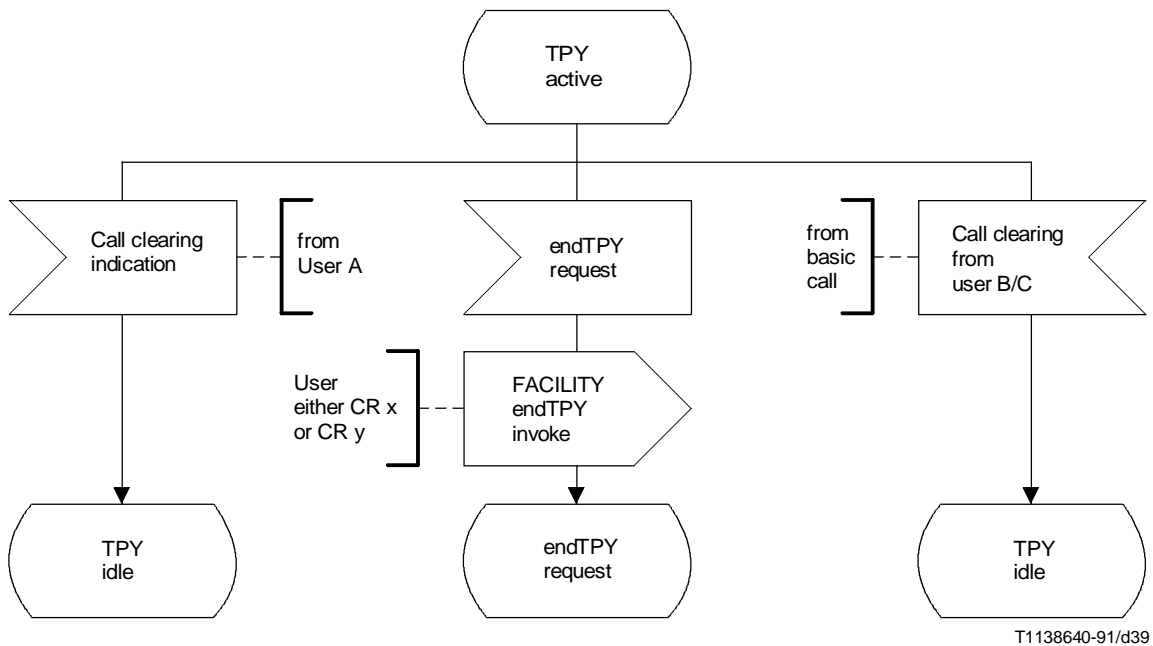
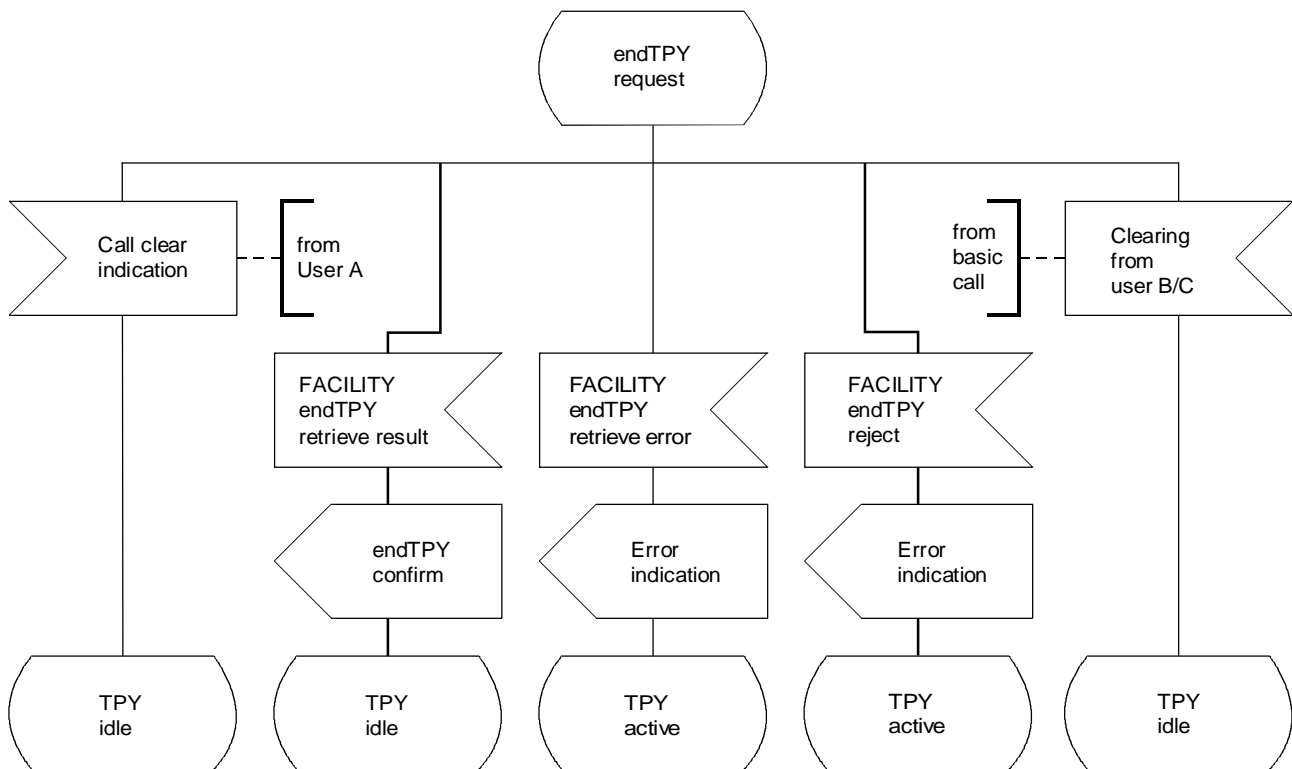


FIGURE 2-6/Q.954 (sheet 3 of 4)

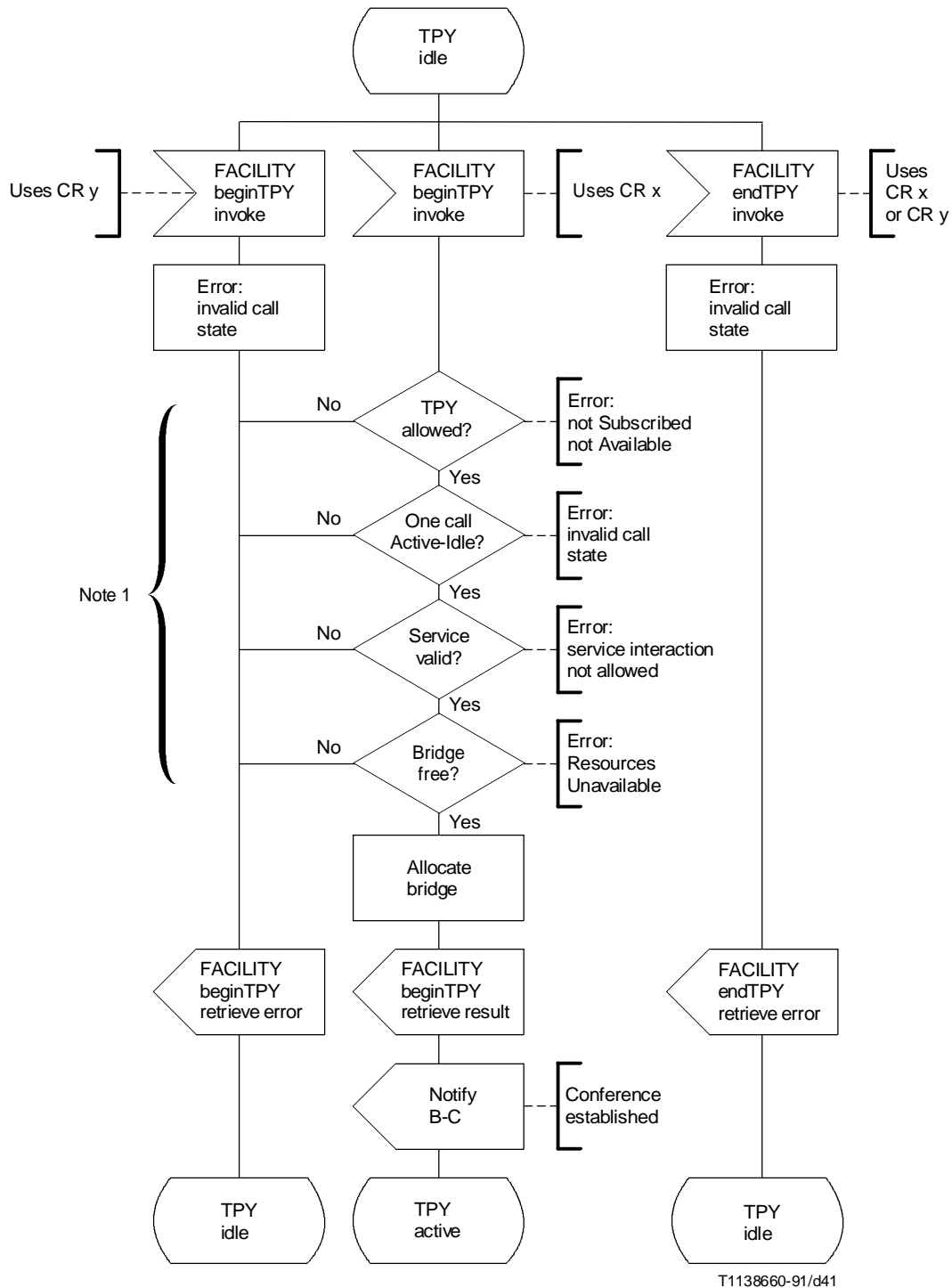
User side SDL



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FIGURE 2-6/Q.954 (sheet 4 of 4)
User side SDL

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T1138660-91/d41

NOTES

- 1 The order of these tests is implementation dependent.
- 2 Two basic calls are involved in the TPY:
 - one Active-Held call: CR x; and
 - one Active-Idle call: CR y.

FIGURE 2-7/Q.954 (sheet 1 of 2)

Network side SDL

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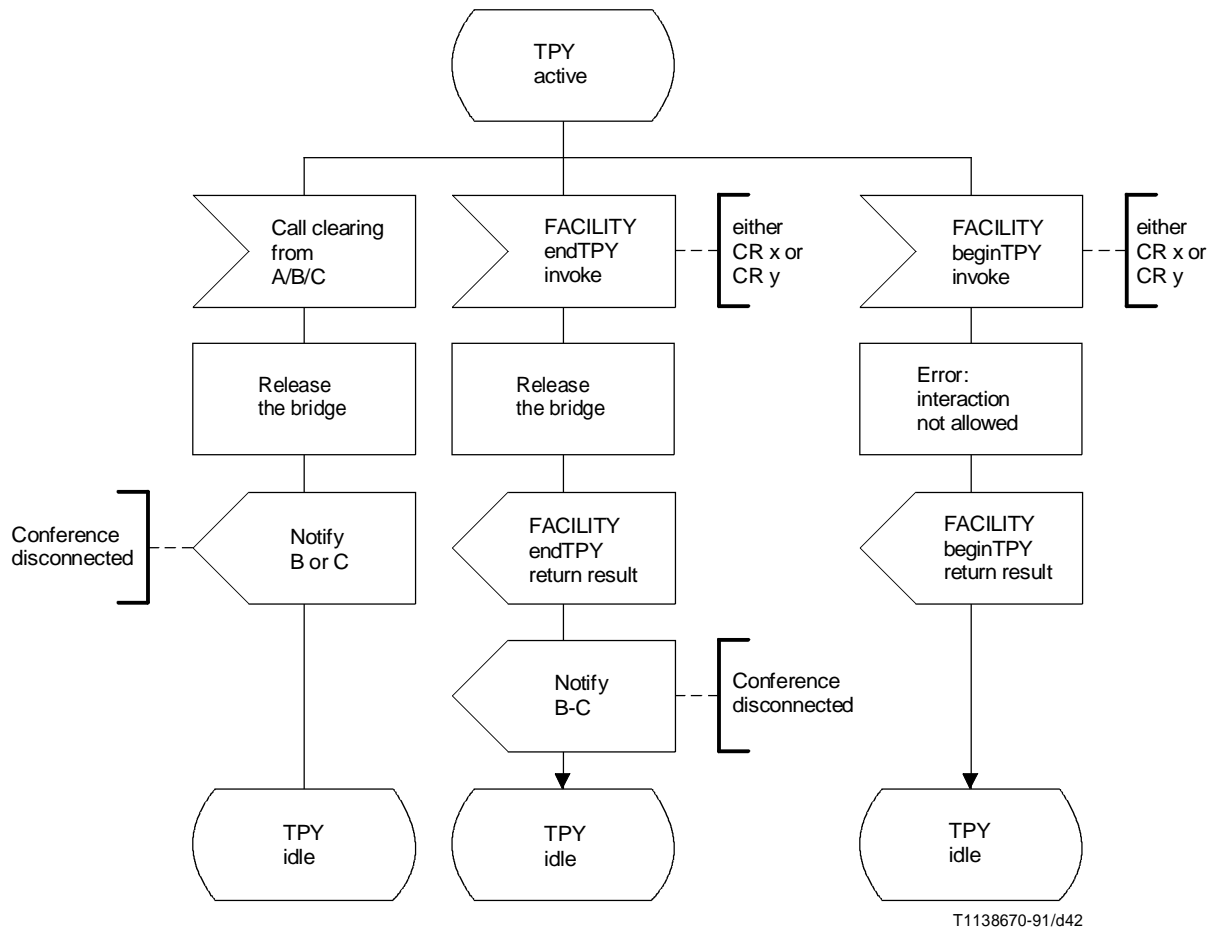


FIGURE 2-7/Q.954 (sheet 2 of 2)
Network side SDL

Appendix I (referred to in clause 2)

Diagrammatic description of coding requirements

(This appendix does not form an integral part of this Recommendation)

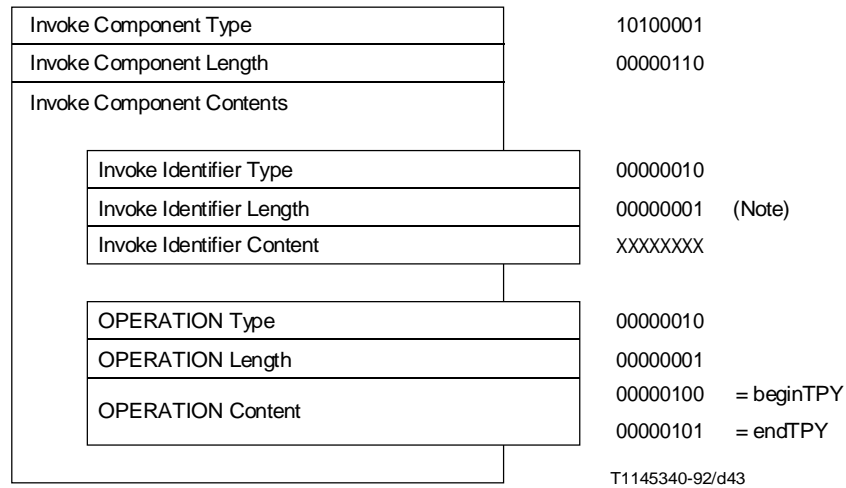
Example component structures for the Three-Party supplementary service are shown in Figures I.1, I.2 and I.3.

In case of discrepancies between this appendix and 2.4.1, 2.4.1 is considered as the prime source.

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I.1 Invoke components

See Figure I.1.



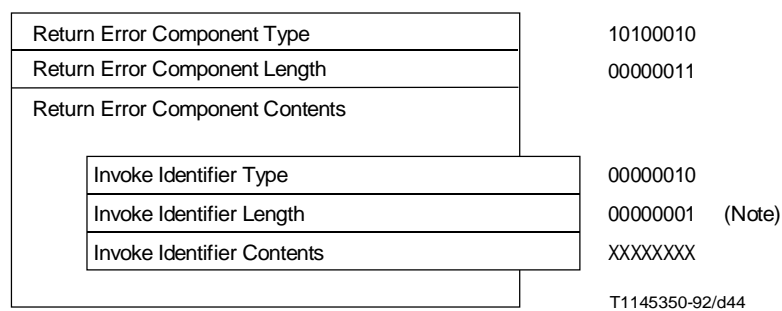
NOTE – The length of the invoke identifier is either 1 or 2 octets.

FIGURE I.1/Q.954

BeginTPY and endTPY invoke components

I.2 Return result components

See Figure I.2.



NOTE – The length of the invoke identifier is either 1 or 2 octets.

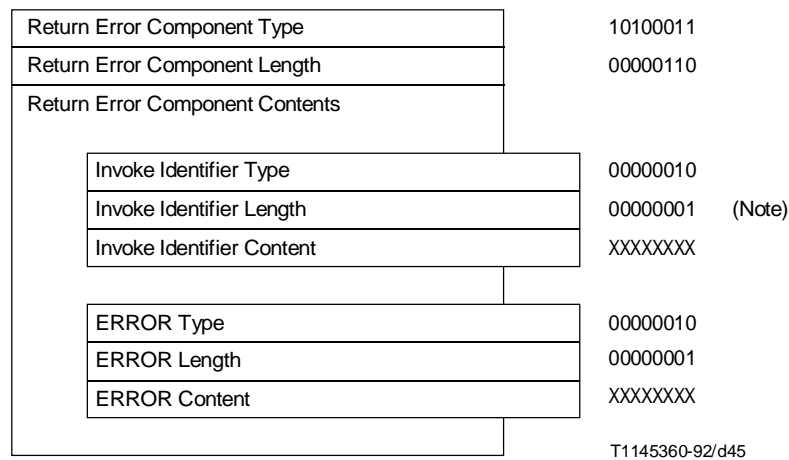
FIGURE I.2/Q.954

BeginTPY and endTPY return result components

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I.3 Return error components

See Figure I.3.



NOTE – The length of the invoke identifier is either 1 or 2 octets.

FIGURE I.3/Q.954

BeginTPY and endTPY return error components

References

- [1] CCITT Recommendation, *Generic procedures for the control of ISDN supplementary services*, Rec. Q.932, 1992.
- [2] CCITT Recommendation *ISDN user-network interface layer 3 specification for basic call control*, Rec. Q.931, 1992.
- [3] CCITT Recommendation *ISDN 64 kbit/s circuit mode switched bearer services*, Rec. Q.71, 1988.
- [4] CCITT Recommendation *Specification of abstract syntax notation one (ASN.1)*, Rec. X.208 1988.
- [5] CCITT Recommendation *Remote operations: model, notation and service definition*, Rec. X.219, 1992.
- [6] CCITT Recommendation *SDL specification description language*, Rec. Z.100, 1992.
- [7] CCITT Recommendation *Stage 2 description for multiparty supplementary services*, Rec. Q.84, 1992.
- [8] CCITT Recommendation *Stage 3 description for additional information transfer supplementary services using DSS 1*, Rec. Q.957, 1992.
- [9] CCITT Recommendation *Stage 3 description for call completion supplementary services using DSS 1*, Rec. Q.953, 1992.
- [10] CCITT Recommendation *Stage 3 description for community of interest supplementary services using DSS 1*, Rec. Q.955, 1992.

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Add-on Conference, 5

Beginning Three-Party Service, 2

Facility information element, 2

Managing an active three-way conversation, 3

Meet-me Conference, 5

Notification indicator information element, 2

Remote users request during the three-way conversation, 4

To terminate the three-way conversation, 3