



ATIS-1000647.1995(R2015)

Integrated Services Digital Network (ISDN) – Conference
Calling Supplementary Service

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ATIS-1000647.1995(R2015), *Integrated Services Digital Network (ISDN) – Conference Calling Supplementary Service*

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American National Standard
for Telecommunications –
Integrated Services Digital Network (ISDN) –
Conference Calling
Supplementary Service

Secretariat

Alliance for Telecommunications Industry Solutions

Approved May 26, 1995

American National Standards Institute, Inc.

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Foreword (This foreword is not part of American National Standard T1.647-1995.)

This is one of a series of standards on Integrated Services Digital Network (ISDN) supplementary services. This standard defines and describes the Conference Calling service capabilities in the context of the ISDN. This standard provides switching and signalling specifications to allow a served user to establish calls to multiple parties one at a time using normal call handling procedures, and then to communicate simultaneously with multiple parties, which may also communicate among themselves. This standard includes the Digital Subscriber Signalling System No. 1 (DSS1) and the Signalling System No. 7 ISDN User Part (ISUP) protocol and procedures to support these capabilities.

Service providers of the Conference Calling supplementary service 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 which use the Integrated Services Digital Network (ISDN) and Signalling 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 on Telecommunications, T1.

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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American National Standard
for Telecommunications –

Integrated Services Digital Network (ISDN) – Conference Calling Supplementary Service

1 Scope, purpose, and application

1.1 Scope and purpose

This standard is one of a series, which defines and describes supplementary services within the context of an Integrated Services Digital Network (ISDN). The interaction of this service with other ISDN services is also included. The purpose of the standard is to allow maximum compatibility among network and user owned telecommunication equipment in order to increase the attractiveness and usefulness of ISDN-based capabilities.

This standard describes the operation of the basic Conference Calling service only. Other forms of Conference Calling (e.g., “Preset”) are not described.

1.2 Application

This supplementary service applies to an ISDN and is intended to supplement the basic circuit mode call procedures in ANSI T1.607. It shall be used in conjunction with the other ANSI standards for ISDN supplementary services for a complete understanding of the interactions between this and other services.

This supplementary service is applicable to the following Bearer Services identified in ANSI T1.620 for the ISDN Basic and Primary Rate Interfaces:

- Speech;
- 3.1 kHz Audio;
- 7 kHz Audio.

2 Normative references

The following standards contain provisions which, through reference 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 revision, 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 No. 1 (DSS1)*

ANSI T1.647-1995 (R2015)

ANSI T1.610-1994, *Telecommunications – Generic procedures for the control of ISDN supplementary services*

ANSI T1.620-1991, *Telecommunications – Integrated Services Digital Network (ISDN) – Circuit-mode bearer service category description*

ANSI T1.650-1995, *Telecommunications – Integrated Services Digital Network (ISDN) – Usage of the cause information element in Digital Subscriber Signaling System No. 1 (DSS1)*

ITU-T Recommendation Q.932, *Generic procedures for the control of ISDN supplementary services, 1993¹⁾*

ITU-T Recommendation Q.950, *Digital Subscriber Signalling System No. 1 (DSS1) – Supplementary services protocols, structure and general principles, 1993¹⁾*

3 Definitions and acronyms

Throughout this document, the following terminology will be used.

3.1 Definitions

3.1.1 network: In this description, 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 local exchanges, transit exchanges, and NT2s, but does not include non-ISDN or ISDN terminals and is not limited to the “Public” network or any other particular set of equipment.

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

The following terms apply to participants in a Conference:

3.1.3 conferee: Any party other than the conference controller is called a “conferee”.

3.1.4 conference controller: When the service is invoked and the conference reaches the active state, the “served user” becomes the conference controller.

3.1.5 served user: During the invocation phase, the service is under the control of the “served user”, i.e., the one for whom the service was subscribed or, in those cases where subscription is not required, the one who invokes the service.

3.1.6 party: All participants in a conference call are considered “parties”.

The following actions may be performed by the conference controller:

3.1.7 drop: An action that clears the connection to a remote party.

3.1.8 floating: The situation where the conference calling supplementary service exists without a conference controller.

3.1.9 isolate: An action that restricts communication in both directions with a participant of the conference.

3.1.10 reattach: An action that re-establishes the communication with a participant of the conference.

3.1.11 split: An action that creates a private communication between the served user and a conferee. The private communication is a normal “two-party” call.

The following identification mechanisms are defined for Conference Calling:

3.1.12 conference ID: The served user’s (or controller’s) reference to the conference itself.

1) Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036.

3.1.13 party ID: The served user's (or controller's) reference to a particular party within the context of a call.

Observe that multiple parties may be associated with a given call, e.g., a conference call. Moreover, there may be multiple connections associated with a single party, e.g., a simultaneous voice and video call.

NOTE – This service description assumes that there exists only one connection to a given party.

The following conference states are defined for Conference Calling:

3.1.14 conference active: The state in which conference resources have been allocated to the specified conference and at least one party has a connection to the conference. That connection could be either active or held.

3.1.15 conference floating: The state in which the conference is active but without a controller. This state is possible when two or more conferees exist on an active conference and the controller successfully disconnects himself/herself.

3.1.16 conference idle: The state prior to the receipt of a “conference invocation request”, or after a particular conference has ended.

3.2 Acronyms

ASN.1	Abstract Syntax Notation One
CONF	Conference Calling supplementary service
DSS1	Digital Subscriber Signaling System No. 1
ID	Identification
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
LE	Local Exchange
NT1	Network Termination 1
NT2	Network Termination 2
SDL	Specification and Description Language
SS7	Signaling System No. 7
TA	Terminal Adaptor
TCAP	Transaction Capability Application Part
TE	Terminal Equipment
TR	Transit Exchange

4 Description of Conference Calling from the user's perspective

This clause defines Conference Calling 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 interactions between Conference Calling and other ISDN services. This clause provides a prose description and a diagrammatic description of Conference Calling in the form of a Specification and Description Language Diagram. See figure 1 for the SDL description of Conference Calling.

4.1 Description

Conference Calling is an ISDN supplementary service which allows a user to establish calls to multiple parties one at a time using normal call handling procedures, and then to communicate simultane-

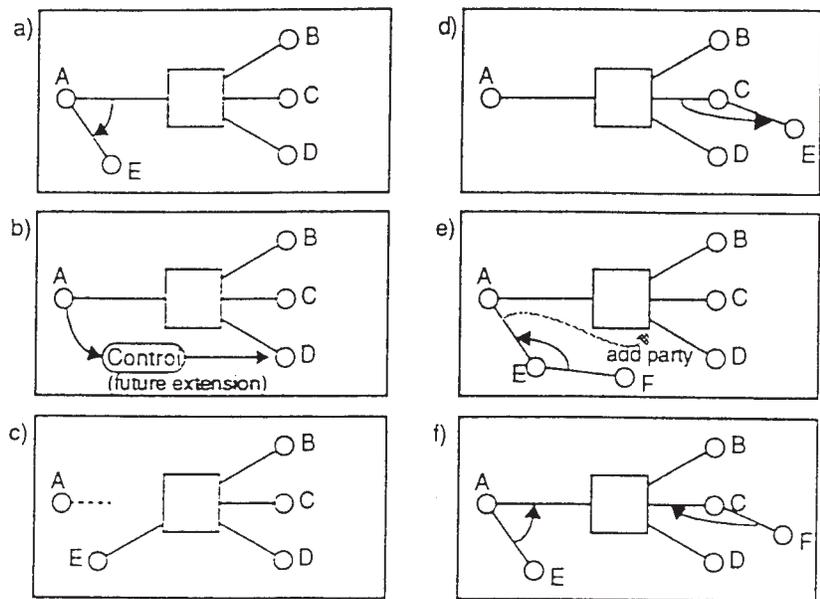


Figure 1 – Interaction of Conference Calling with Normal Call Transfer

Table 1 – Subscription options for Conference Calling

Subscription options	Values
Maximum conference size	N, where $3 \leq N \leq 127$
Default conference size	M, where $3 \leq M \leq N$
NOTE – The maximum conference size is a service provider option.	

ously with multiple parties, which may also communicate among themselves. This description deals only with the establishment and manipulation of the connections used to form a conference call.

When Conference Calling is invoked, conference resources are allocated to the served user and any calls indicated by the service request are added to the conference. Once a conference is active, parties may be added, dropped, isolated (i.e., prevented from communicating with other parties on the conference), reattached, or split (i.e., removed from the conference but remain connected to the conference controller). The controller may place his/her connection to the conference on hold, retrieve the conference, end the conference, or disconnect himself/herself from the conference.

4.2 Procedures

4.2.1 Provision/withdrawal

The Conference Calling supplementary service may be subscribed to by prior arrangements with the service provider or may be made generally available without subscription.

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

As a service provider option, Conference Calling may be offered with several subscription options and associated values. The options apply separately to each ISDN number and bearer service combination or to each terminal service profile or to each interface. The options are given in table 1.

In the case where the service is generally available, the service provider will assign values to the maximum conference size and the default conference size.

4.2.2 Normal procedures

4.2.2.1 Activation/deactivation

Activation is through subscription, or in those cases where it is generally available, the service is always active.

4.2.2.2 Invocation and operation

4.2.2.2.1 Beginning the conference call

4.2.2.2.1.1 Invocation parameters

The Conference Calling service must be invoked by the served user. The invocation request must include the “root” call identification, i.e., the call identification by which the network will determine the conference ID. This call identification may be either a new call identification or the call identification of an existing call which is to be used to form the conference.

The invocation request may include the conference size. The conference size is the intended maximum number of parties for the conference. If the served user wishes to establish a conference of a size other than the default size, the served user must request the properly-sized conference before any conferees are added to the conference.

4.2.2.2.1.2 Default parameters

If the conference size is not included in the invocation request, the conference size defaults to the served user’s default conference size specified at subscription time (if the service is provided through subscription), or to the service provider’s specified default conference size (if the service is generally available).

4.2.2.2.1.3 Procedures

a) *From the idle state:* The served user may request the Conference Calling supplementary service, and may optionally indicate in the request the identity of a conferee to be connected to the conference. The number of parties required in the conference may be indicated in the request. If the number of parties is not indicated, the default conference size shall be used.

A successful request for the Conference Calling supplementary service shall result in the network reserving conference resources capable of serving the required number of parties.

If a conferee was identified in the request, the call to that conferee shall be completed and connected to the conference. The conferee shall be notified that his/her call has been added to the conference.

b) *From an active call:* The served user may request the Conference Calling supplementary service, indicating in the request that an existing call shall be connected to the conference. The number of parties required in the conference may be indicated in the request. If the number of parties is not indicated, the default conference size shall be used.

A successful request for the Conference Calling supplementary service shall result in the network reserving conference resources capable of serving the required number of parties. The other user in the call indicated in the request for the Conference Calling supplementary service shall be connected to the conference.

If the call indicated in the request was not held by the served user, then the served user shall be connected to the conference. If the call indicated in the request was held by the served user, then the conference shall be held by the served user.

The conferee shall be notified that his/her call has been added to the conference.

4.2.2.2.2 Managing individual conferees

In the active state of the conference, the conference controller has the following options for managing conferees in association with the conference on which he/she is active.

These management procedures will be processed by the service provider whether the managed conferee is active on the conference call or has the conference call on hold.

a) *Add new conferee*: To add a call to an active conference, the controller indicates a call identification to be added directly to the conference, as well as the Conference ID itself. If the request is accepted, the party on the indicated call is immediately joined to the conference and is notified of this action when answered. The party on the incoming call, if not previously answered, is answered when joined to the conference. An outgoing call may be added to a conference prior to answer. The service provider will return a Party ID to the controller to identify the new conferee. All conferees will be notified of the successful add operation.

b) *Isolate conferee*: The conference controller may request that a specified conferee (indicated by the Party ID) be prevented from communicating with the conference but not removed from it. This does not affect the state (e.g., Active or Held) of the specified conferee's access channels (e.g., B-channels) which are nominally under the control of the specified conferee. All conferees, including the isolated party, will be notified of the successful isolate operation.

It shall be possible for the conference controller to isolate more than one conferee from a conference call that contains two or more conferees. In fact, all conferees could be isolated from the conference by the conference controller.

c) *Reattach conferee*: The conference controller may request that a specified conferee (indicated by the Party ID) be reattached to the conference. Successful execution of this command permits a previously isolated conferee to again converse with all other conferees that are connected to the conference. This does not affect the state (e.g., Active or Held) of the specified conferee's access channels (e.g., B-channels) which are nominally under the control of the specified conferee. All conferees, including the reattached party, will be notified of the successful reattach operation.

d) *Split conferee*: The conference controller may request that a specified conferee (indicated by Party ID) be removed from the conference (indicated by the Conference ID), but remain connected to the conference controller. Execution of this request requires that the controller establish a new call, since that remote user is no longer associated with the Conference Call. All conferees, including the split party, will be notified of the successful split operation upon establishment of the new call.

e) *Drop conferee*: The conference controller may request that a specified conferee (indicated by the Party ID) be disconnected from the conference and the conference controller's association with that conferee be eliminated completely. All conferees still active on the conference will be notified of the successful drop operation.

4.2.2.2.3 Managing the conference

In addition, the conference controller may manage the complete conference in any of the following ways:

a) *Hold conference*: The conference controller may request that his/her own connection to the conference be held using procedures as described in the Call Hold service. Successful execution of this command retains the existing state of conferees in relation to the conference, i.e., those who could communicate with each other may still do so and those who were in an isolated state remain in that state.

b) *Retrieve conference*: The conference controller may request that his/her connection to the conference be retrieved. Successful execution of this command retains the existing state of conferees in relation to the conference, i.e., those who could communicate with each other may still do so between themselves as well as the conference controller, and those who were in an isolated state remain in that state.

c) *Explicit request to float the conference*: The controller may request that he/she be disconnected from the conference and the conference be floated. If the number of parties that would remain after the controller has disconnected from the conference is greater than 2, and provided charging or other restrictions are not violated, the connection of the controller will be cleared and the conference will proceed to the floating state (i.e., the remaining conferees may continue to communicate). All conferees will be notified that the conference is in the floating

state. If the request is accepted, the controller will be notified that the float request is denied and the conference will remain active with the controller still connected.

The remaining conferees will stay on the conference without a controller until less than two conferees exist on the conference. In a conference without a controller, conferees may only hold, retrieve, or drop their own connections to the conference.

If less than two parties remain on the conference at the time explicit request to float the conference is requested, the controller will be notified that the float request is denied and the conference would remain in the state which existed prior to the request.

If one or more parties are isolated, the network shall reject a float request.

If only two conferees remain on a floating conference, the network may convert the conference to a normal two-way call for better utilization of network resources.

d) *Call clearing by served user*: A “call clearing” request from the conference controller will disconnect the controller from the conference, and may, in some cases, result in ending the conference. From the controller’s perspective, this disconnect procedure is identical to those of basic call control.

If float conditions (e.g., charging) are satisfied, then the conference goes to the floating state. All conferees will be notified that the conference is in the floating state. Otherwise the conference ends (see point e below). When conference floating cannot be performed, instead of the controller being notified, disconnect processing continues with the release of conference resources.

e) *Terminate the conference*: The conference controller may explicitly request that the conference be terminated, i.e.,

- that every party associated with the particular conference be disconnected;
- that all conference resources be de-allocated; and
- that all knowledge of the conference call, including the Call ID, be removed.

4.2.2.2.4 Possible actions by conferees

In the active state of the conference, any conferee may:

- Hold and retrieve the conferee’s connection to the conference as per Call Hold supplementary service procedures;
- Disconnect the conferee’s connection to the conference as per basic call control call clearing procedures. An indication is provided to the controller and to the active conferees;
- Invoke the Conference Calling supplementary service (i.e., on his/her connection to the existing conference, thus forming a “chain” of conference).

4.2.3 Exceptional procedures

4.2.3.1 Activation/deactivation

None identified.

4.2.3.2 Invocation and operation

4.2.3.2.1 Beginning the conference call

If a user tries to invoke Conference Calling and the service provider cannot accept that request, the service provider will deny the request and notify the user of the reason for denial. Reasons for failure are:

- service not subscribed;
- resources cannot be allocated;
- indicated conference size is larger than the subscribed maximum conference size;
- invocation is made in an invalid call state.

4.2.3.2.2 Managing individual conferees

Exceptional procedures relating to managing individual conferees are as follows:

a) *Add new conferee*: If the network cannot satisfy an “Add New Conferee” request (e.g., if the conference call has been cleared, if the specified Conference ID is not valid, or if the maximum number of conferees allowed has already been reached) the conference controller will receive indication that the request is denied, with the reason for failure.

b) *Isolate conferee*: If no Party ID is included in a “Isolate Conferee” request, notification of failure is returned to the conference controller. Also, a Drop Conferee request would be rejected if the Party ID, indicated in the request, identified a non-existent or no longer active conferee on the conference.

If the controller sends an “Isolate Conferee” request concerning a conferee which is already isolated, the network shall react as if the party was successfully isolated.

c) *Reattach conferee*: If the controller sends a “Reattach Conferee” request concerning a conferee which is already attached, the network shall react as if the party was successfully reattached. Also, a Reattach request would be rejected if the Party ID, indicated in the request, identified a non-existent or no longer active conferee on the conference.

d) *Split conferee*: If no Party ID is included in a “Split Conferee” request, notification of failure is returned to the conference controller. Also, the Split Conferee request shall be rejected if the Party ID indicated in the request identified a non-existent or no longer active conferee on the conference.

The Split Conferee request may be rejected by the network if the creation of a new connection to the conference controller would exceed the maximum number of calls allowed on the conference controller’s interface.

e) *Drop conferee*: A “Drop Conferee” request would be rejected if the Party ID, indicated in the request, identified a non-existent or no longer active conferee on the conference, or if no Party ID is present and the last conferee added is not identifiable.

4.2.3.2.3 Managing the conference

Exceptional procedures relating to managing individual conferees are as follows:

a) *Hold and retrieve the conference*: See the Call Hold supplementary service description. If the user is not subscribed to the Hold supplementary services, the user may not put its connection to the conference on hold. Normal B-channel availability procedures apply.

b) *Explicit request to float the conference*: If the network cannot disconnect the conference because the conference is no longer active or it is floating and the conference controller is no longer attached to it, then the request will be rejected with an indication provided to the conference controller for the reason of failure. In these cases, the float request is not still active on the “conference” after the request is rejected.

If one or more parties are isolated, the network shall reject a float request.

c) *Call clearing by served user*: If the network cannot disconnect the conference (e.g., the conference is no longer active or it is floating and the conference controller is no longer attached to it), then the request will be rejected with an indication provided to the conference controller for the reason of failure.

d) *Terminate the conference*: If the network cannot terminate the conference (e.g., the conference is no longer active or it is floating and the conference controller is no longer attached to it), then the request will be rejected with an indication provided to the conference controller for the reason of failure.

4.2.3.2.4 Possible actions by conferees

The following exceptional procedures apply:

a) *Hold and retrieve the conferee’s connection to the conference*: The Hold supplementary service procedures apply.

b) *Disconnect the conferee's connection to the conference:* The basic call control call clearing procedures apply.

4.2.4 Alternate procedures

There are no alternate procedures identified.

4.3 Interworking considerations

No interworking situations exist over and above those required for communications with respect to the basic service. It is required that the conference controller be in an ISDN. The operation of this service is unaffected by the nature (i.e., ISDN or non-ISDN) of the conferees' connections.

The delivery of notifications associated with Conference Calling to non-ISDN conferees may not be possible.

4.4 Capabilities for charging

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

4.5 Interactions with other supplementary services

If a conferee uses, during the conference, a supplementary service or other function that generates a notification to the conference controller, this notification shall be sent to the conference controller with the Party ID of the party it applies to.

4.5.1 Call Waiting

If the conference controller requests to add a Call Waiting to the conference, the network will complete the connection and add the party to the conference using the procedures of 4.2.2.2a.

4.5.2 Call Hold

Parties in a conference (i.e., the conference controller or a conferee) may place their connection on hold and later retrieve it. If the conference call is held or retrieved by the conference controller, no notification associated with hold shall be sent to the conferees.

4.5.3 Multi-Level Precedence and Preemption

All connections to the conferees are processed at a precedence equal to that precedence selected by the conference controller. If a conferee is preempted, the controller is notified of the preemption. When the controller is preempted, all conferees are notified and the conference is released.

4.5.4 User-to-User Signaling

User-to-User Signaling in association with call establishment and call termination shall not be available in conjunction with a conference.

4.5.5 Message Waiting Indicator Control and Notification

There are no interactions between Conference Calling and Message Waiting Indicator Control and Notification.

4.5.6 Calling Line Identification Presentation

There are no interactions between Conference Calling and Calling Line Identification Presentation.

4.5.7 Calling Line Identification Restriction

There are no interactions between Conference Calling and Calling Line Identification Restriction.

4.5.8 Normal Call Transfer

a) *Conference controller:* A conference controller may transfer the conference to a party not in the conference, but "control" cannot be transferred (figure 1a). The transfer of control of a conference to another party in the conference is an anticipated future extension (figure 1b) not yet included in this service description. As a result, the conference controller will disconnect himself/herself from the conference (figure 1c) which may result in the conference entering a floating state if floating conditions are satisfied.

b) *Conferee*: A conferee should be able to transfer his/her connection to a conference to another party (figure 1d).

c) *Any Party*: Any Party on a conference may transfer calls, or receive transferred calls, that are independent from the conference. A conference controller can add a call transferred to him/her using the add new conferee procedure (figure 1e).

A conference controller can transfer a call to a conference (figure 1f). (This is functionally identical to the case shown in figure 1a). A conferee may transfer an incoming call that has reached the active state to a conference (figure 1f), but this results in the conferee being disconnected from the conference, as in the case shown in figure 1d; it is not a form of add new conferee.

Calls may be transferred to any party of a conference while that party has the conference on hold. A conferee receiving a transferred call would not be able to add the transferred party to the conference. A conference controller receiving a transferred call would be able to use the add new conferee procedure to add this new party to the conference.

4.5.9 Calling Name Identification Restriction

There are no interactions between Conference Calling and Calling Name Identification Restriction.

4.5.10 Calling Name Identification Presentation

There are no interactions between Conference Calling and Calling Name Identification Presentation.

4.5.11 Call Deflection

There are no interactions between Conference Calling and Call Deflection.

4.5.12 Explicit Call Transfer

The procedures described in 4.5.8 apply.

4.5.13 Conference Calling

A user may be involved as the conference controller separately in two conferences. However, the user may not add either of these conferences to the other conference.

5 Functional capabilities and information flows for the Conference Calling service

This clause identifies the functionality split among the network elements and user equipments which support the Conference Calling supplementary service. It shows each of the configurations of equipment which is supported by this standard and the allocation of functions to each piece of network equipment. There may be other configurations which could be supported by these standardized procedures. This standard does not preclude the use of other procedures not described herein for the support of the configurations identified nor does it preclude other configurations.

5.1 Network and user equipment

The network and user equipment configurations shown are based on the “functional groupings” defined in ANSI T1.615. While these functional groupings may correspond to actual physical entities, actual implementations may incorporate more than one of these functional groupings.

A summary of the functional groupings as used in this standard is as follows:

- TE Terminal Equipment – in the configurations, this could be a TE1 (ISDN Terminal) or a TA (Terminal Adaptor)/TE2 (non-ISDN Terminal) combination.
- NT2 Network Termination 2 – in the configurations, this could be a PBX, multiplexer, key system, etc.
- LE Local Exchange – in the configurations, this is the switch in the public network to which “users” (TEs or NT2s) are connected.
- TR Transit Exchange – in the configurations, this is a switch in the public network which provides connections between Local Exchanges.

5.2 Protocols

In this standard, the protocols used between the functional groupings, when the functional groupings are implemented as separate physical entities, are as follows:

TE to LE: DSS1, as described in ANSI T1.607 and ANSI T1.610

NT2 to LE: DSS1, as described in ANSI T1.607 and ANSI T1.610

LE to LE: SS7 ISUP, as described in ANSI T1.113

LE to TR: SS7 ISUP, as described in ANSI T1.113

It is not the intent of this standard to specify the protocol used between a TE and an NT2. This may be a standardized protocol or any protocol which provides the necessary information transfer to support the service. However, when the NT2 provides the service, it is assumed that the TE is an ISDN access.

For interworking cases, the protocols used for TR to non-ISDN LEs or TRs may be any protocol which provides the necessary information transfer to support the service, or a portion of the service as noted. For termination to non-ISDN parties, the protocol used for LE to non-ISDN interface may be any protocol which provides the necessary information transfer.

5.3 Supported configurations

The equipment configurations supported by this standard are depicted in figure 2. Each configuration in figure 2 identifies which equipment functions as the conference controller and the conferees, as defined in clause 3. The equipment providing the Conference Calling service, i.e., the conference bridge, is highlighted with double lines. Equipment and interfaces not covered by this standard are shown with dashed lines.

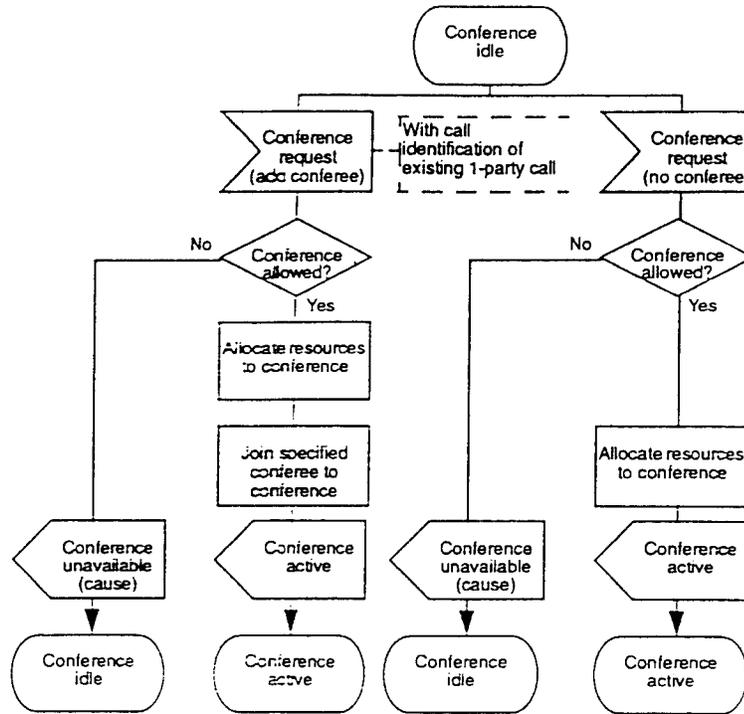
In each case in which a TR is shown, additional configurations having no TR or having multiple TRs are also possible. In each case in which an NT2 is shown, any configuration of equipments "behind" that NT2 is possible, including other NT2s or no additional equipment.

In each case, there will be a variable number of conferees. For simplicity, only one is shown here (referred-to as "Conferee"); all other conferees would be supported by a similar configuration. Conferees may or may not be on an ISDN interface.

5.4 Information flows

Information flows for the configurations identified in 5.3, cases "a" and "b" are given in figure 3 to figure 14. Case "c" is not considered within this standard. Each figure shows, in time sequences from top to bottom, the information exchanges (messages) for one specific case for one type of configuration. Each horizontal line represents an information transfer and shows:

- above the line, a generic name for the message;
- below the line, the actual name of the message and significant contents as found in clauses 6 or 7.



Note - Indications of change in state (i.e., held, disconnect, etc.) of the conference shall be provided to the conference controller. Notifications to conferees are not shown in the SDLs. The Hold and Retrieve functions are not shown because they are not an integral part of the Conference Calling service.

Figure 2 – Overall SDL diagram of Conference Calling

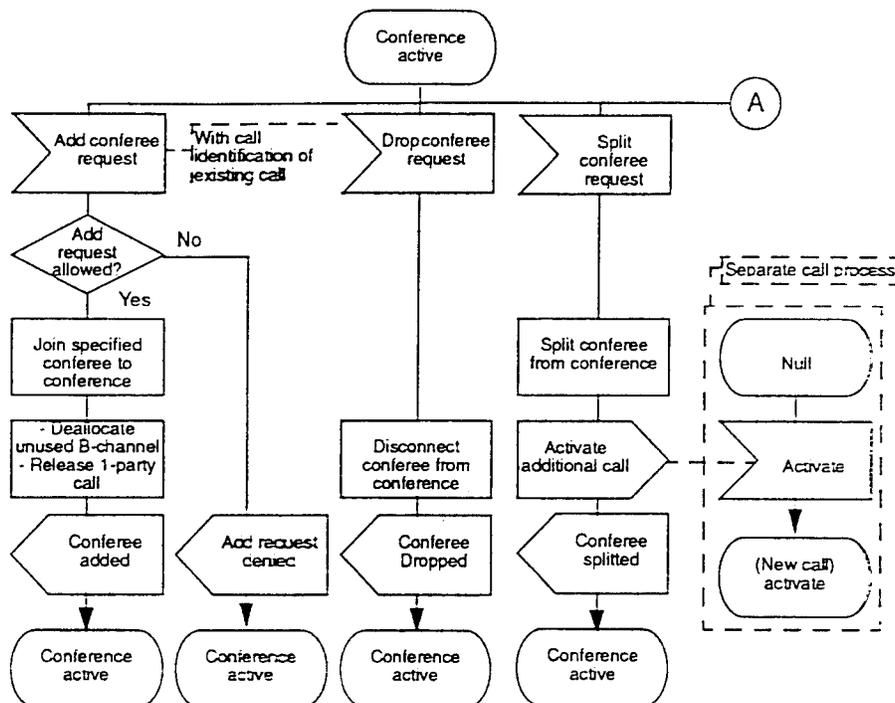


Figure 2 (sheet 2 of 4)

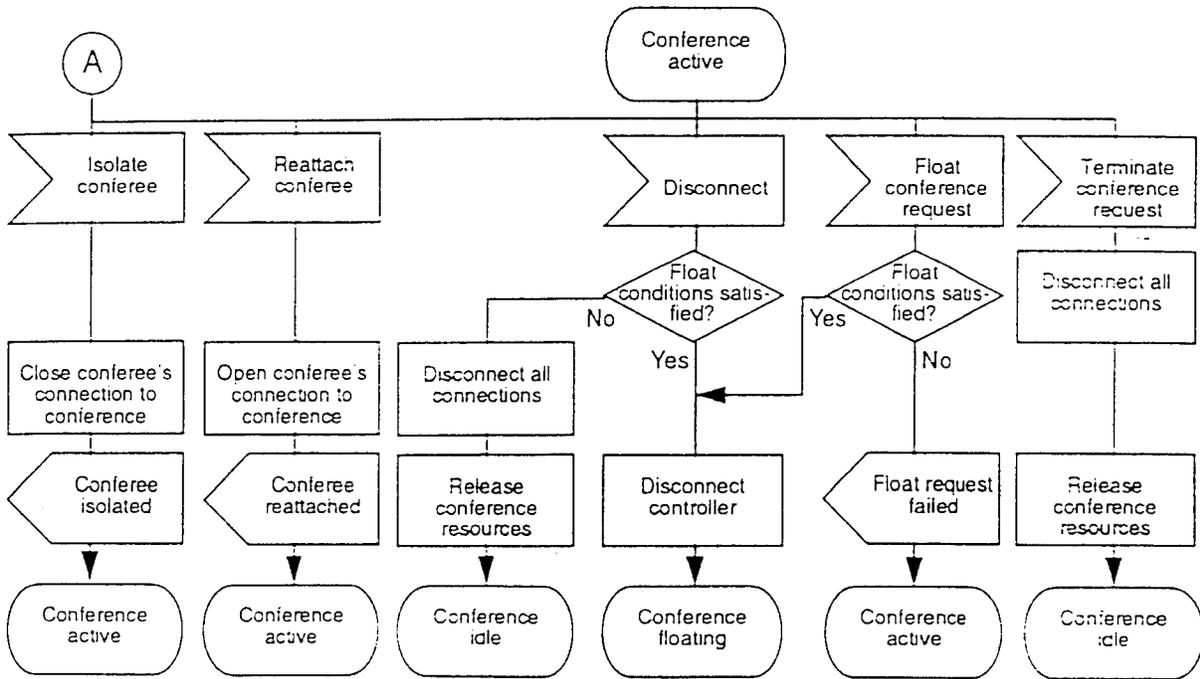


Figure 2 (sheet 3 of 4)

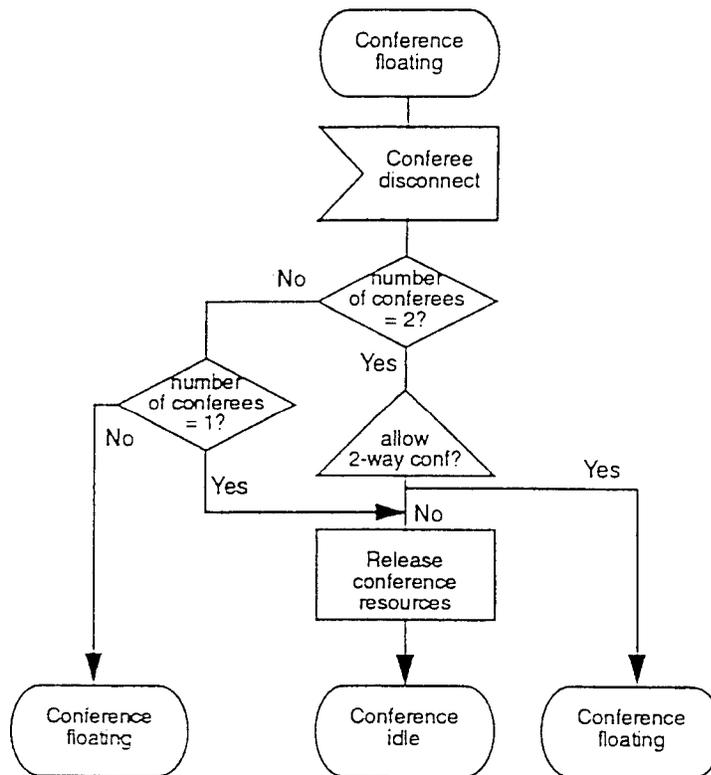


Figure 2 (sheet 4 of 4)

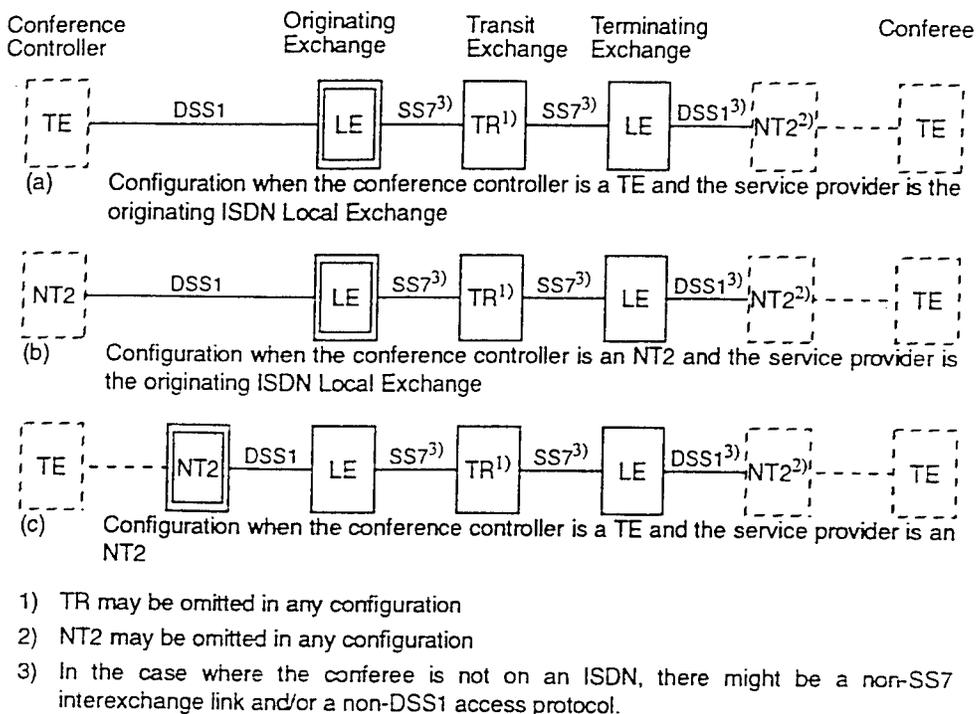


Figure 3 – Configurations of equipment for the Conference Calling service

The information flows are drawn assuming an ISDN access at the conference controller and at the conferees, and assuming that the conference bridge is an LE. For a non-ISDN access at the conferees (either because of a lack of a DSS1 interface or because of no SS7 connectivity), the flow is the same, except that the messages indicated with dashed lines to and from the access would not be present, unless the non-ISDN provides some other standardized or non-standardized method of passing such information. In the case where no such information delivery mechanism exists, there will be no notifications sent to the conferees.

NOTE – In the following information flows, the identifiers x and n are used to identify the conferees. If, for example, a conference has conferees 1, 2, 3, 4, and 5 and conferee 3 is disconnected, then x represents conferee 3 and n represents conferees 1, 2, 4, and 5.

6 Switching and signaling specification for the Conference Calling service at the user/network interface

6.1 Formats and codings

This clause identifies the D-channel call control messages, information elements, codepoints and the ASN.1 description of the operations and errors needed for the Conference Calling supplementary service.

6.1.1 Messages

In addition to basic call control messages, the NOTIFY and FACILITY messages are used for Conference Calling, as defined respectively in ANSI T1.607 and ANSI T1.610.

6.1.2 Information elements

In addition to the normal information elements used for basic call control, the Notification indicator and the Facility information elements are used for Conference Calling, as defined in ANSI T1.610.

All information elements used in this standard are in codeset 0, as described in ANSI T1.607.

The Cause information element and associated cause values used by the Conference Calling supplementary service are described in ANSI T1.650.

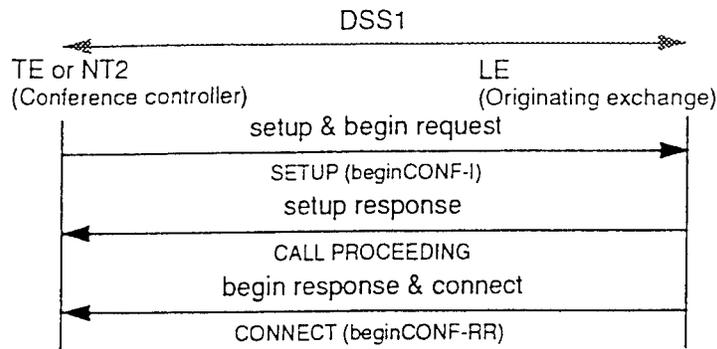


Figure 4 – Beginning the conference from the idle state

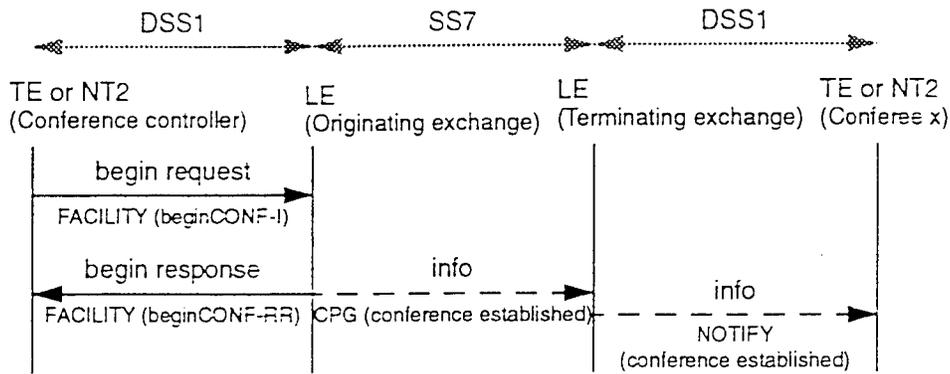
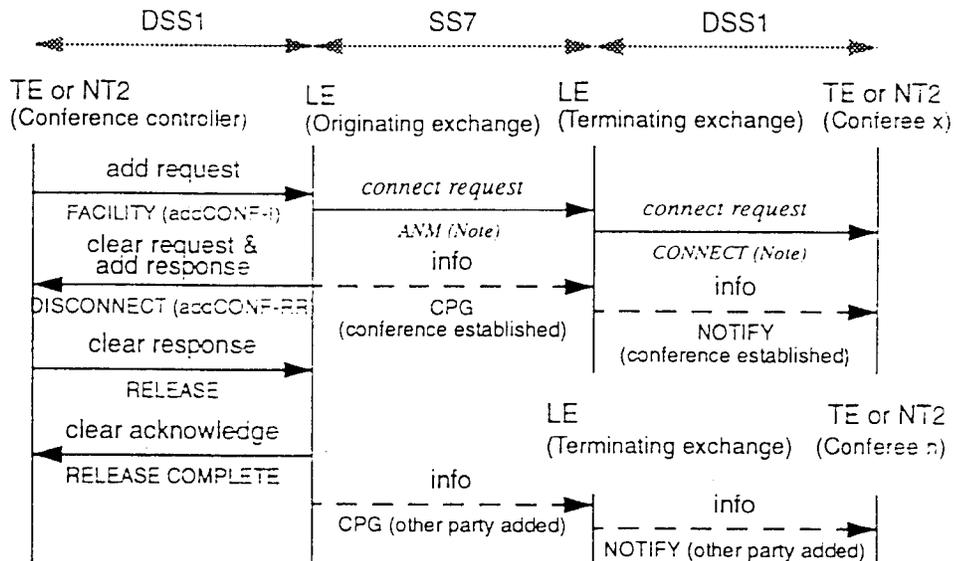


Figure 5 – Beginning the conference from an active call



Note - This message is only required if the incoming call was not already connected to the controller.

Figure 6 – Adding a call to a conference

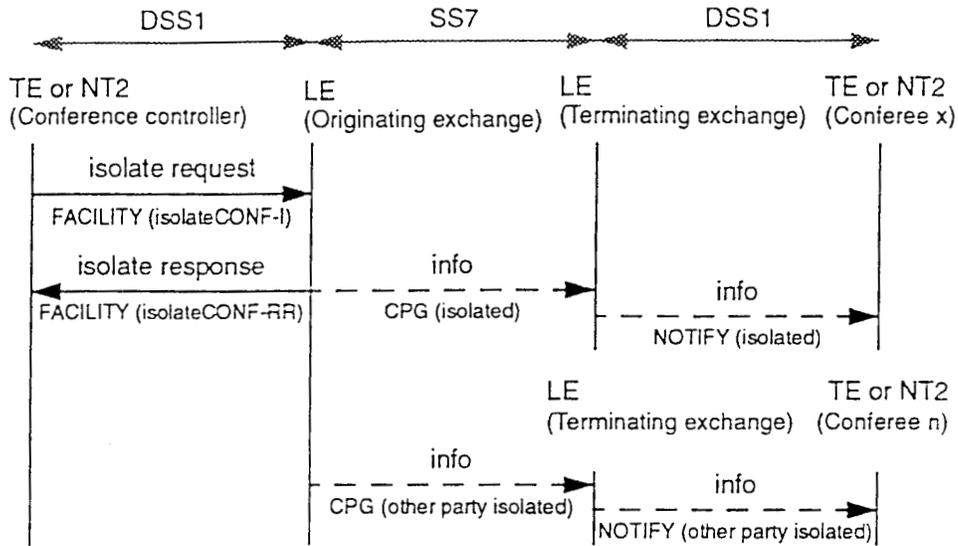


Figure 7 – Isolate a conferee from a conference

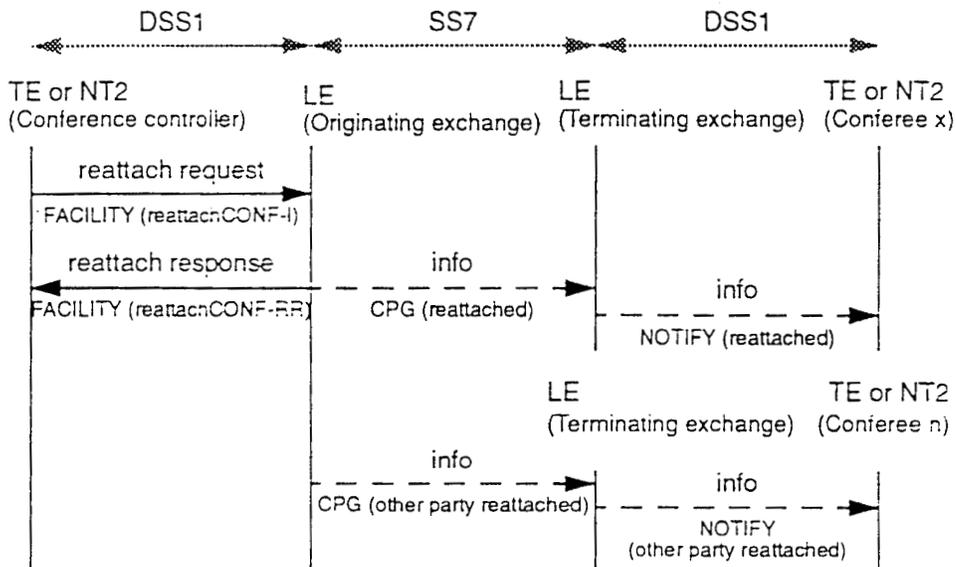


Figure 8 – Reattach a conferee to a conference

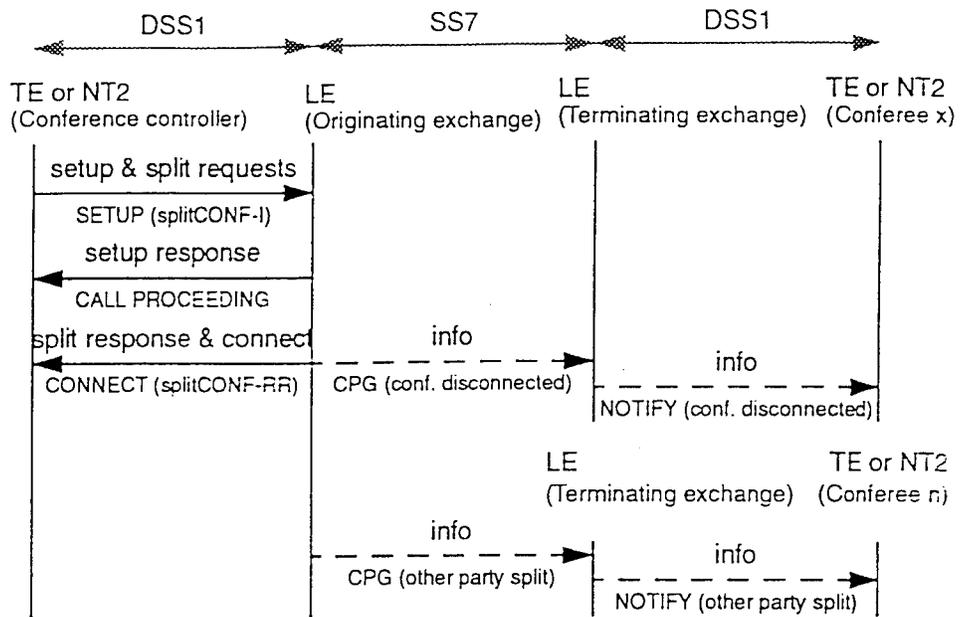


Figure 9 – Split a conferee from a conference

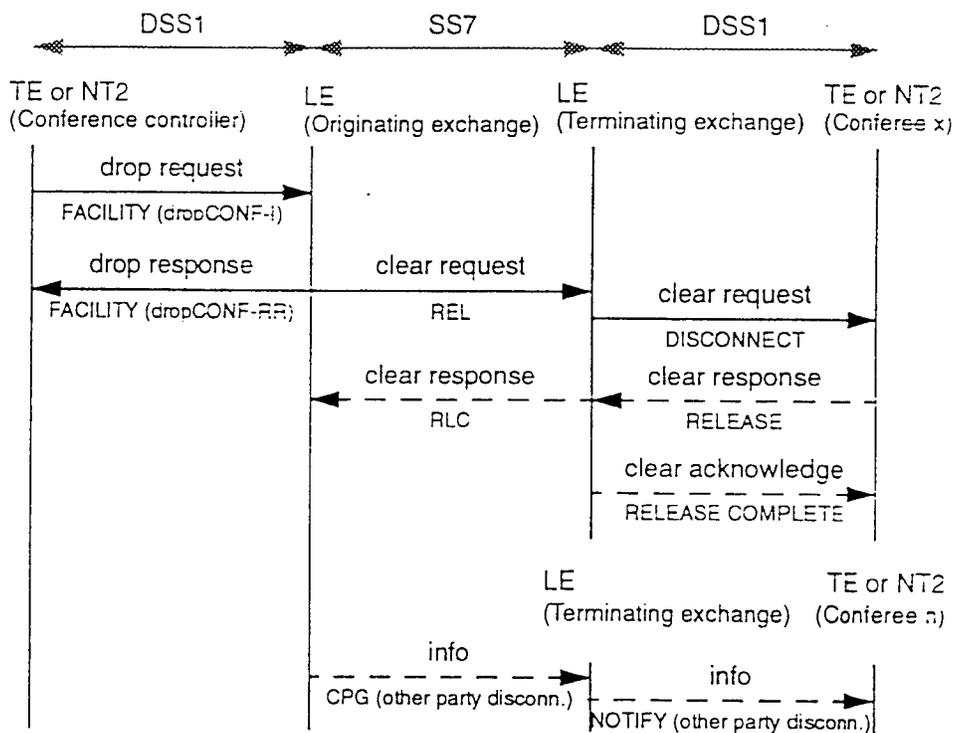


Figure 10 – Disconnect a conferee by served user

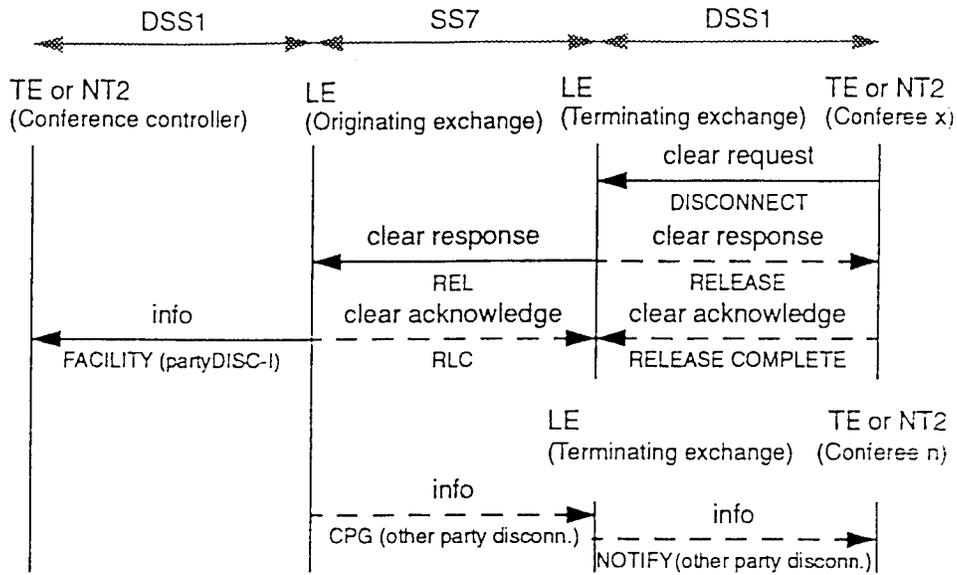


Figure 11 – Disconnect by conferee

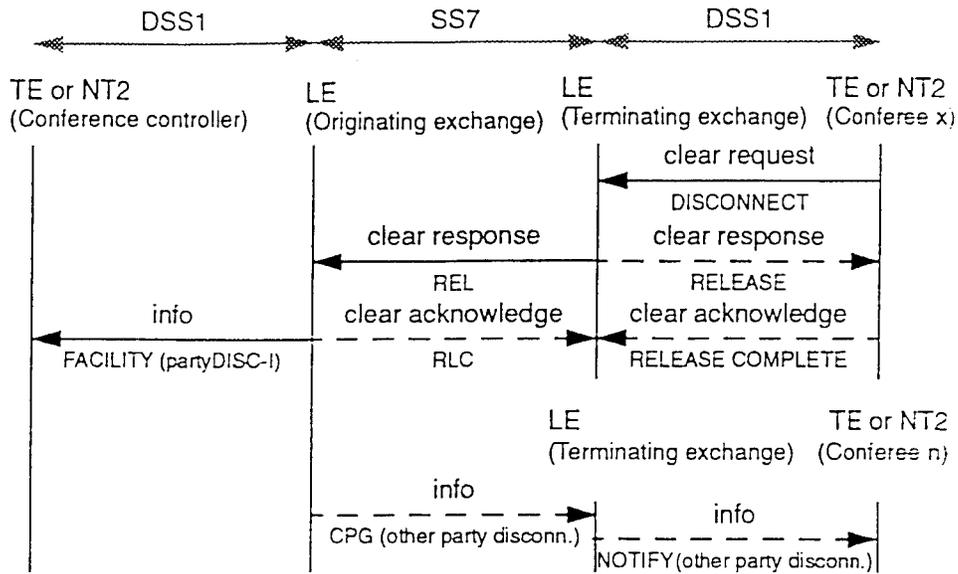


Figure 12 – Terminate the conference

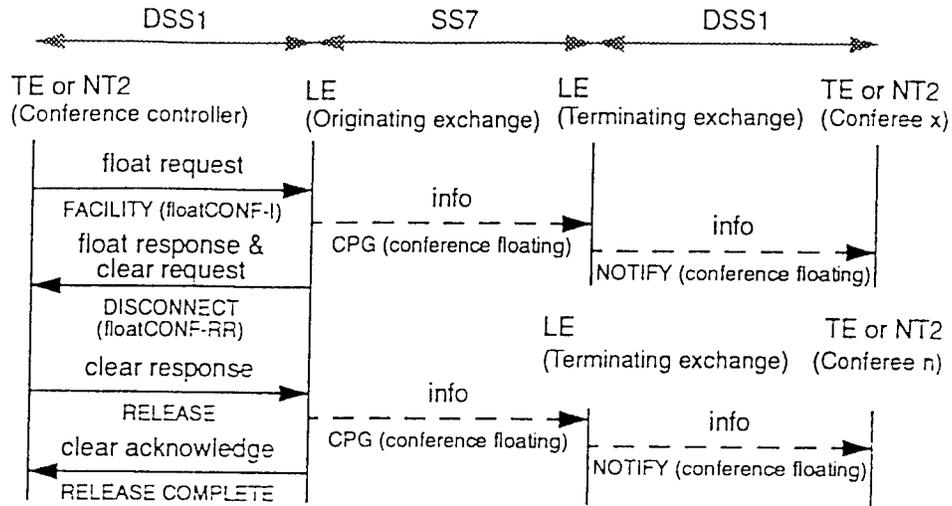


Figure 13 – Explicit request to float the conference

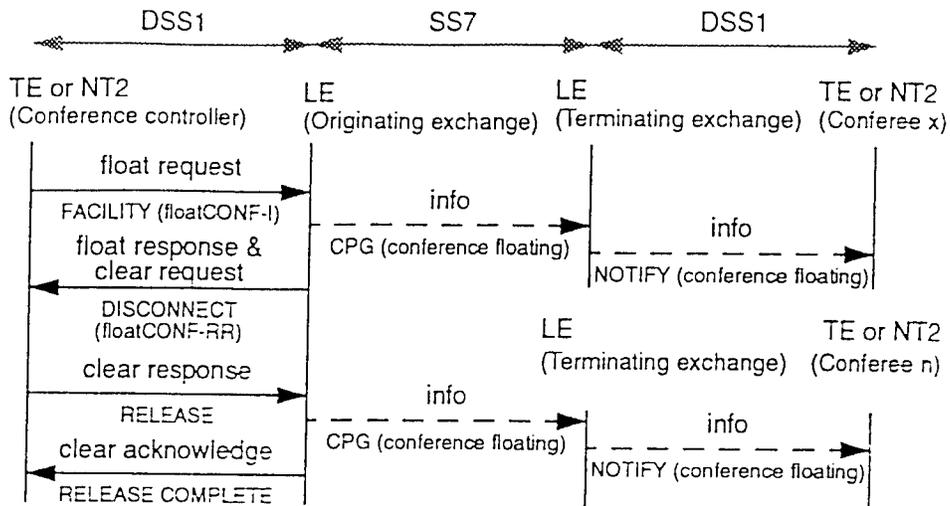


Figure 14 – Call clearing by served user when floating is allowed

6.1.3 Codepoints

6.1.3.1 Notification description in the Notification indicator information element

The following codepoints in the notification description field of the Notification indicator information element are defined for the purpose of the Conference Calling supplementary service:

<u>7</u>	<u>6</u>	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	
0	0	0	0	0	1	1	Discriminator for extension to ASN.1 encoded component (see 6.1.3.2)
1	0	0	0	0	1	0	Conference established, i.e., the user takes part in a multiparty call
1	0	0	0	0	1	1	Conference disconnected, i.e., the user takes part in a normal two party call
1	0	0	0	1	0	0	Other party added
1	0	0	0	1	0	1	Isolated
1	0	0	0	1	1	0	Reattached
1	0	0	0	1	1	1	Other party isolated
1	0	0	1	0	0	0	Other party reattached
1	0	0	1	0	0	1	Other party split
1	0	0	1	0	1	0	Other party disconnected
1	0	0	1	0	1	1	Conference floating
1	0	0	1	1	1	1	Conference floating, served user preempted

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 purpose of the Conference Calling supplementary service:

Conference-Add-On-Notifications

{ ccitt recommendation q 954 conference-add-on (1) extended-notifications (2) }

DEFINITIONS ::=

BEGIN

EXPORTS partyIdNotification;

IMPORTS NOTIFICATION FROM Notification-Indicator-IE-Data-Structure
 { ccitt recommendation q 932 notification-data-structure (6) }
 PartyId FROM Conference-Add-On-Operations { ccitt recommendation q 954
 conference-add-on-operations-and-errors (1) }

PartyIdNotification ::= NOTIFICATION
 ARGUMENT PartyId

partyIdNotification PartyIdNotification ::= 1

END--of Conference-Add-On-Notifications

6.1.4 Definition of operations and errors

Conference-Add-On-Operations

{ ccitt recommendation q 954 conference-add-on-operations-and-errors (1) }

DEFINITIONS ::=

BEGIN

EXPORTS beginCONF, addCONF, splitCONF, dropCONF, isolateCONF, reattachCONF,
 partyDISC, floatCONF, endCONF, illConferenceId, illPartyId,
 numberOfPartiesExceeded, notActive, notAllowed, PartyId, ConferenceId, ConfSize;

```

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

BeginCONF ::= OPERATION
              ARGUMENT ConfSize OPTIONAL
              RESULT    SEQUENCE {
                          Conferenceld,
                          PartyId OPTIONAL}
              ERRORS    {userNotSubscribed, notAvailable, resourceUnavailable,
                          invalidCallState}

AddCONF ::= OPERATION
              ARGUMENT Conferenceld
              RESULT    PartyId
              ERRORS    {illConferenceld, numberOfPartiesExceeded, notAllowed,
                          supplementaryServiceInteractionNotAllowed, invalidCallState}

SplitCONF ::= OPERATION
              ARGUMENT SEQUENCE {
                          Conferenceld,
                          PartyId}
              RESULT
              ERRORS    {illConferenceld, illPartyId}

DropCONF ::= OPERATION
              ARGUMENT PartyId
              RESULT
              ERRORS    {illPartyId, notActive}

IsolateCONF ::= OPERATION
              ARGUMENT PartyId
              RESULT
              ERRORS    {illPartyId, notActive}

ReattachCONF ::= OPERATION
              ARGUMENT PartyId
              RESULT
              ERRORS    {illPartyId, notActive}

PartyDISC ::= OPERATION
              ARGUMENT PartyId
              RESULT
              ERRORS    {illPartyId, notActive}

FloatCONF ::= OPERATION
              ERRORS    {notActive, notAllowed}

```

EndCONF ::= OPERATION
 ERRORS {notActive}

IIIConferenceld ::= ERROR

IIIPartyId ::= ERROR

NumberOfPartiesExceeded ::= ERROR

NotActive ::= ERROR

NotAllowed ::= ERROR

PartyId ::= INTEGER(0..127)

Conferenceld ::= INTEGER(0..127)

PartyId ::= INTEGER(0..127)

ConfSize ::= INTEGER(0..127)

--Conference operation values

beginCONF BeginCONF ::= 40

addCONF AddCONF ::= 41

splitCONF SplitCONF ::= 42

dropCONF DropCONF ::= 43

isolateCONF IsolateCONF ::= 44

reattachCONF ReattachCONF ::= 45

partyDISC PartyDISC ::= 46

floatCONF FloatCONF ::= 47

endCONF EndCONF ::= 48

--Conference error values

illConferenceld IIIConferenceld ::= 28

illPartyId IIIPartyId ::= 29

numberOfPartiesExceeded NumberOfPartiesExceeded ::= 30

notActive NotActive ::= 31

notAllowed NotAllowed ::= 32

END--of Conference-Add-On-Operations

6.2 Support assumptions

6.2.1 Assumptions on the terminal equipment

The terminal equipment is expected to support the Common information element functional procedures as described in ANSI T1.610.

6.2.2 Assumption on the network

6.2.2.1 Originating network

There is no applicable assumption on the originating network.

6.2.2.2 Destination network

There is no applicable assumption on the destination network.

6.2.3 Service state and timers

6.2.3.1 States

The call states associated with basic call control according to ANSI T1.607 shall apply. No other DSS1 states are used to describe the Conference Calling supplementary service.

6.2.3.2 Timers

No specific additional timers are required for the Conference Calling supplementary service.

6.3 Procedures for Conference Calling

Where the text in the following subclauses refers to an “xxxx” invoke component, an invoke component is meant with its operation value set to the value of operation “xxxx.”

6.3.1 Activation and 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

The NOTIFY message, when applicable as described in the following subclauses, is always sent after the call reached the active call state (N10).

6.3.2.1.1 Beginning the conference from the idle state

To request a conference (i.e., without an initial conferee), the served user shall send a SETUP message to the network including a Facility information element and a Bearer capability information element. The Facility information element shall contain a beginCONF-Invoke component. This component may contain a ConfSize parameter indicating the maximum number of conferees. If this parameter is not provided, then the network shall set the conference size to a network dependent value. The Bearer capability information element shall indicate an appropriate bearer capability with regard to the applicability of the Conference Calling service. If no called party number information is included in the SETUP message, the network shall respond immediately with the CONNECT message, otherwise the normal basic call procedures apply according to ANSI T1.607.

When the network responds with a CONNECT message, it shall include a beginCONF-Return-Result component in a Facility information element. This component shall contain a Conferenceld parameter. The Conferenceld is used in some operations defined in the following subclauses to identify the conference explicitly. The PartyId shall be included in this component if the called party number information was included in the SETUP message.

When the user receives a correctly encoded beginCONF-Return-Result component, the user shall accept the provided information, save the included Conferenceld (and Party ID if included).

The procedures used to request a conference are completely independent from other calls.

In the case where a party is added simultaneously with the conference request, the network shall send a NOTIFY message to the conferee with a Notification indicator information element indicating that this conferee has been added to the conference (“Conference established”).

6.3.2.1.2 Beginning the conference from an active call

To request a conference, the served user shall send a FACILITY message to the network indicating the call reference of the existing call and including a Facility information element. This Facility information element shall contain a beginCONF-Invoke component. This component may contain a ConfSize parameter indicating the maximum number of conferees. If this parameter is not provided, then the network shall determine the maximum conference size according to 4.2.2.2.1.2.

If the request is accepted, the network shall send a beginCONF-Return-Result component to the served user in a FACILITY message. This component shall contain a Conferenceld and a PartyId parameter. The Conferenceld shall be used in some operations to identify the conference explicitly. The PartyId shall be used in subsequent operations to identify the conferee of the original call.

When the user receives a correctly encoded beginCONF-Return-Result component, the user shall accept the provided information, save the included Conferenceld and PartyId parameter.

The procedures to generate PartyId are outside the scope of this standard. The requirements, with respect to PartyId, are that a PartyId used to identify a conferee shall not be used again until the conferee identified by this PartyId has been dropped from the conference, i.e., a PartyId shall be unique within the context of a single conference.

The network shall send a NOTIFY message to the conferee with a Notification indicator information element indicating that this conferee has been added to the conference (“Conference established”).

6.3.2.1.3 Adding a conferee

To add a new party, the connection to the conference may be either in the (Active, Idle) state or in the (Active, Held) state. For incoming calls, the connection to the party to be added shall be either in the Call Received (N7), Incoming Call Proceeding (N9) or Active (N10) call state, and in the Idle or Held auxiliary state. For outgoing calls, the connection to the party to be added shall be either in the Outgoing Call Proceeding (N3) (where PROGRESS message indicating interworking has been sent to the served user), Call Delivered (N4) or Active (N10) call state, and in the or Held auxiliary call state.

The served user shall send a FACILITY message to the network indicating the call reference of the call to be added and including an addCONF-Invoke component. This component contains a ConferenceId parameter indicating the conference.

If the network accepts the request, the network shall send a DISCONNECT message, or if the call is on hold, a RELEASE message, to the served user containing a Facility information element with an addCONF-Return-Result component and continue call clearing according to ANSI T1.607. This component contains a PartyId. This PartyId shall be used in subsequent operations to identify the added conferee. The first clearing message shall contain a Cause information element indicating cause #16 “Normal call clearing” and a location of “public network serving the local user.”

If a call is still in the establishment phase, i.e., the Call Received (N7) or the Incoming Call Proceeding (N9) call state, when the request to add a party to the conference is received in a FACILITY message, the network shall complete the connection to the conferee according to normal procedures described in ANSI T1.607.

When the user receives a correctly encoded addCONF-Return-Result component, the user shall accept the provided information and save the included PartyId.

The procedures to generate PartyId are outside the scope of this standard. The requirements with respect to PartyId are that a PartyId used to identify a conferee shall not be used again until the conferee identified by this PartyId has been dropped from the conference, i.e., a PartyId shall be unique within the context of a single conference.

The network shall send a NOTIFY message to the added conferee with a Notification indicator information element indicating that it has been added to the conference (“Conference established”).

The network shall send a NOTIFY message to all other conferees with a Notification indicator information element indicating that a new conferee has been added to the conference (“Other party added”).

6.3.2.1.4 Isolate a conferee

To isolate a conferee, the served user shall send an isolateCONF-Invoke component to the network in a FACILITY message. The component includes a PartyId parameter identifying the conferee to be isolated.

To indicate a successful operation, the network shall send an isolateCONF-Return-Result component to the served user in a FACILITY message. The network shall prevent the exchange of information between the isolated user and other parties.

When the user receives a correctly encoded isolateCONF-Return-Result component, the user shall accept the provided information.

The network shall send a NOTIFY message to the isolated conferee with a Notification indicator information element indicating that it has been isolated from the conference (“Isolated”).

The network shall send a NOTIFY message to all other conferees with a Notification indicator information element indicating that a conferee has been isolated (“Other party isolated”).

6.3.2.1.5 Reattach a conferee

To reattach an (isolated) conferee, the served user shall send a reattachCONF-Invoke component to the network in a FACILITY message. The component shall include a PartyId parameter identifying the conferee to be reattached.

To indicate a successful operation, the network shall send a reattachCONF-Return-Result component to the served user in a FACILITY message. The network shall re-enable the exchange of information between the reattached user and the other parties.

When the user receives a correctly encoded reattachCONF-Return-Result component, the user shall accept the provided information.

The network shall send a NOTIFY message to the reattached conferee with a Notification indicator information element indicating that it has been reattached to the conference (“Reattached”).

The network shall send a NOTIFY message to all other conferees with a Notification indicator information element indicating that a conferee has been reattached (“Other party reattached”).

6.3.2.1.6 Splitting a conferee

To split a conferee, that may be isolated, the served user shall send a SETUP message to the network including a Facility information element and a Bearer capability information element. The Facility information element shall contain a splitCONF-Invoke component. This component contains a Conferenceld parameter identifying the conference and a PartyId parameter identifying the conferee to be split. The Bearer capability information element shall indicate an appropriate bearer capability with regard to the applicability of the Conference Calling supplementary service. The Called party number and Called party subaddress information elements shall be omitted by the user. Further, the normal basic call procedures apply according to ANSI T1.607.

To indicate a successful operation, the network shall send a splitCONF-Return-Result component to the served user in the CONNECT message and release the related PartyId; the PartyId may be used to identify future conferees.

When the user receives a correctly encoded splitCONF-Return-Result component, the user shall accept the provided information, release the PartyId included in the splitCONF-Invoke component.

The network shall send a NOTIFY message to the split conferee with a Notification indicator information element indicating that it has been split from the conference “Conference disconnected.”

The network shall send a NOTIFY message to all other conferees with a Notification indicator information element indicating that a conferee has been split (“Other party split”).

6.3.2.1.7 Disconnect (drop) a conferee

To disconnect a conferee, the served user shall send a dropCONF-Invoke component to the network in a FACILITY message. The component includes a PartyId parameter identifying the conferee to be disconnected.

If a dropCONF-Invoke component is accepted by the network, the network shall initiate call clearing procedures according to ANSI T1.607 and shall send a dropCONF-Return-Result component to the served user in a FACILITY message.

When the user receives a correctly encoded dropCONF-Return-Result component, the user shall accept the provided information.

The PartyId shall be released by the user and the network, and may be used to identify future conferees.

At any time, a conferee may disconnect from the conference by using the call clearing procedures according to ANSI T1.607.

To indicate the served user that such a conferee has been removed from the conference, the network shall send a partyDISC-Invoke component in a FACILITY message to the served user with a parameter indicating the PartyId associated with this conferee, after the conferee is disconnected from the conference bridge.

On sending the partyDISC-Invoke component, the network shall release the PartyId; the PartyId may be used to identify future conferees. On receiving the partyDISC-Invoke component, the user shall release the PartyId.

When a conferee is disconnected, the network shall send a NOTIFY message to all other conferees with a Notification indicator information element indicating that a conferee has been disconnected ("Other party disconnected").

6.3.2.1.8 Terminate the conference

To terminate the conference, the served user shall clear the connection to the conference bridge by sending a FACILITY message to the network containing a Facility information element with an endCONF-Invoke component.

The network shall send a DISCONNECT message to the served user containing a Facility information element with an endCONF-Return-Result component and continue clearing according to ANSI T1.607. The first clearing message sent to the served user shall contain a Cause information element indicating cause #16, "Normal call clearing" and a location of "public network serving the local user."

On sending the DISCONNECT message, the network shall make the conference unavailable, i.e., all subsequent operations invoked for this conference by the user shall be responded to with the appropriate return error component specifying "notActive". On completion of call clearing (e.g., sending or receiving the RELEASE COMPLETE message associated with clearing the connection), the network shall release the PartyId associated with each conferee, and shall release the Conferenceld associated with the conference. The Conferenceld shall be available for reuse on other conferences.

On completion of call clearing (e.g., sending or receiving the RELEASE COMPLETE message associated with clearing the connection), the user shall release the PartyId associated with each conferee, and shall release the Conferenceld associated with the conference.

On a successful clearing of the call to the conference, the network shall start to clear the calls to the conferees by means of basic call clearing procedures according to ANSI T1.607.

6.3.2.1.9 Explicit request to float the conference

To disconnect its connection, the served user shall send a floatCONF-Invoke component to the network in a FACILITY message. To indicate that this request is accepted, i.e., the floating conditions are met (see 4.2.2.2.3), the network shall send a floatCONF-Return-Result component in a DISCONNECT message. Call clearing shall proceed according to ANSI T1.607. The first clearing message sent to the served user shall contain a Cause information element indicating cause value #16, "Normal call clearing" and a location of "public network serving the local user."

On clearing completion (e.g., sending or receiving the RELEASE COMPLETE message associated with clearing the connection), the user shall release the PartyId associated with each remote user, and shall release the Conferenceld associated with the conference.

The network shall send a NOTIFY message to all conferees with a Notification indicator information element indicating that the conference is in a floating situation ("Conference floating").

The network shall release the PartyId associated with each conferee, and shall release the Conferenceld associated with the conference. The Conferenceld shall be available for reuse on other conferences.

6.3.2.1.10 Call clearing by served user

To clear its connection to the network, the served user shall proceed according to ANSI T1.607.

On receiving the DISCONNECT message, the network shall make the conference unavailable to the served user, i.e., all subsequent operations invoked for this conference by the user shall be responded to with the appropriate return error component specifying “notActive.”

If the conditions for floating are met (see 4.2.2.2.3), then the network shall continue call clearing to the served user but the Conference Calling supplementary service will continue until one conferee is left.

On clearing completion (e.g., sending or receiving the RELEASE COMPLETE message associated with clearing the connection), the user shall release the PartyId associated with each conferee, and shall release the Conferenceld associated with the conference.

The network shall send a NOTIFY message to all remote users with a Notification indicator information element coded as “Conference floating.”

The network shall release the PartyId associated with each conferee, and shall release the Conferenceld associated with the conference. The Conferenceld shall be available for reuse on other conferences.

6.3.2.2 Exceptional procedures

6.3.2.2.1 Beginning the conference from the idle state

If the user is not subscribed to the Conference Calling supplementary service, the network shall start the basic call clearing procedures as defined in ANSI T1.607. The RELEASE COMPLETE message sent by the network to the served user shall contain a Facility information element with a beginCONF-Return-Error component indicating the error “userNotSubscribed.” Furthermore, this message shall contain a Cause information element indicating cause value #31, “Normal, unspecified” and a location of “public network serving the local user.”

If the user is not subscribed to the basic service as requested in the SETUP message, the network shall start the basic call clearing procedures as defined in ANSI T1.607.

If the user indicates an inappropriate bearer capability, the network shall start the basic call clearing procedures as defined in ANSI T1.607. One of the messages sent by the network to the served user shall contain a Facility information element with a beginCONF-Return-Error component indicating the error “notAvailable.” Furthermore, this message shall contain a Cause information element indicating cause value #31 “Normal, unspecified” and the location of “public network serving the local user.”

If the network cannot accept the operation because the conference size as requested by the user exceeds the size supported by the network, the network shall start the basic call clearing procedures as defined in ANSI T1.607. One of the messages sent by the network to the served user shall contain a Facility information element with a beginCONF-Return-Error component indicating the error “numberOfPartiesExceeded.” Furthermore, this message shall contain a Cause information element indicating cause #31 “Normal, unspecified” and a location of “public network serving the local user.”

If the network receives a beginCONF-Invoke component whilst not in the Active call state (N10) and not in the Null call state (N0), the network shall send a beginCONF-Return-Result component to the served user in a FACILITY message indicating the error “invalidCallState.”

6.3.2.2.2 Beginning the conference from an active call

If the user is not subscribed to the Conference Calling supplementary service, the network shall send a beginCONF-Return-Error component to the served user in a FACILITY message. The error value shall be coded as “userNotSubscribed.”

If the network cannot accept the operation because the conference size exceeds the allowable maximum as defined in 4.2.2.2.1.2, the network shall send a beginCONF-Return-Error component indicating the error “numberOfPartiesExceeded” to the served user in a FACILITY message.

If the user indicates an inappropriate bearer capability, the network sends a beginCONF-Return-Error component indicating “notAvailable” to the served user in a FACILITY message.

6.3.2.2.3 Adding a conferee

If the Conferenceld used is not associated with the served user, the network shall send an addCONF-Return-Error component to the served user in a FACILITY message. The error value shall be coded as “illConferenceld.”

NOTE – This error could also occur as a result of routing constraints.

If the network cannot accept this conferee because the maximum number of parties has been reached, the network shall send an addCONF-Return-Error component to the served user in a FACILITY message. The error value shall be coded as “numberOfPartiesExceeded.”

If the network receives an addCONF-Invoke component for a call reference value that is not in a valid call state as described in 6.3.2.1.3, the network shall send an addCONF-Return-Error component indicating the error “invalidCallState” to the served user in a FACILITY message.

If the network cannot accept this operation for any other reason, the network shall send an addCONF-Return-Result-Error component to the served user in a FACILITY message. The error value shall be coded as “notAllowed.”

6.3.2.2.4 Isolate a conferee

If the PartyId used is not associated with a conferee, the network shall send an isolateCONF-Return-Error component to the served user in a FACILITY message. The error value shall be coded as “illPartyId.”

If the network cannot accept this operation because the conference has not successfully been established, the network shall send an isolateCONF-Return-Error component to the served user in a FACILITY message. The error value shall be coded as “notActive.”

If the conferee indicated in the isolateCONF-Invoke component is already isolated, then the network shall not treat this as an error but shall return an isolateCONF-Return-Result component to the served user in a FACILITY message.

6.3.2.2.5 Reattach a conferee

If the PartyId is not associated with a conferee, the network shall send a reattachCONF-Return-Error component to the served user in a FACILITY message. The error value shall be coded as “illPartyId.”

If the network cannot accept this operation because the conference has not successfully been established, the network shall send a reattachCONF-Return-Error component to the served user in a FACILITY message. The error value shall be coded as “notActive.”

If the conferee indicated in the reattachCONF-Invoke component is already reattached, then the network shall not treat this as an error, but return a reattachCONF-Return-Result component to the served user in a FACILITY message.

6.3.2.2.6 Splitting a conferee

If the Conferenceld used is not associated with the served user, the network shall send to the served user a RELEASE COMPLETE message containing a splitCONF-Return-Error component. The error value shall be coded as “illConferenceld.” Furthermore, this message shall contain a Cause information element indicating cause value #29, “Facility rejected” and a location of “public network serving the local user.”

If the PartyId used is not associated with a party, the network shall send to the served user a RELEASE COMPLETE message containing a splitCONF-Return-Error component. The error value shall be coded as “illPartyId.” Furthermore, this message shall contain a Cause information element indicating cause value #29, “Facility rejected” and a location of “public network serving the local user.”

6.3.2.2.7 Disconnect (drop) a conferee

If the PartyId is not associated with a party, the network shall send a dropCONF-Return-Error component to the served user in a FACILITY message. The error value shall be coded as "illPartyId."

If the network receives a dropCONF-Invoke component in a message with a call reference not associated with a conference, the network shall send a dropCONF-Return-Error component to the served user. The error value shall be coded as "notActive."

6.3.2.2.8 Terminate the conference

If the network receives an endCONF-Invoke component in a message with a call reference not associated with a conference, the network shall send an endCONF-Return-Error component to the served user. The error value shall be coded as "notActive."

If the connection between the served user and the conference is being cleared for some reason, then the conference shall be terminated.

6.3.2.2.9 Explicit request to float the conference

If the network cannot accept this operation because the floating conditions are not met (see 4.2.2.2.3), the network shall send an endCONF-Return-Error component in a FACILITY message to the served user. The error value shall be coded as "notAllowed."

If the network receives an endCONF-Invoke component in a message with a call reference not associated with a conference, the network shall send an endCONF-Return-Error component in a FACILITY message to the served user. The error value shall be coded as "notActive."

6.3.2.2.10 Call clearing by served user

If the conditions for floating are not met, then the network shall continue call clearing to the served user and start to clear the calls to the conferee by means of basic call clearing procedures according to ANSI T1.607.

On clearing completion (e.g., sending or receiving the RELEASE COMPLETE message associated with the clearing connection), the user and the network shall release the PartyId associated with each conferee, and shall release the Conferenceld associated with the conference.

When the served user clears its connection to the network, and when the floating conditions are met, the network shall send a NOTIFY message to all conferees with a Notification indicator information element indicating that the conference is in a floating situation ("Conference floating").

6.3.3 Interworking with private ISDNs

This subclause describes the DSS1 signalling between an NT2 and an LE.

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

When the service provider resides in a private network and conferees in the public network, if the private network sends notifications for conference, the private network shall send the notification codepoints defined in this standard to the public network in NOTIFY messages when appropriate.

6.4 DSS1 interactions with other supplementary services

If a remote conferee uses, during the conference, a supplementary service or other function that generates a notification to the conference controller, this notification shall be sent to the conference controller. The Notification indicator information element, with the notification description coded as "discriminator for extension to ASN.1 encoded component", shall include the PartyIdNotification extended notification, as defined in 6.1.3.2 and using the extended notification mechanism for the Notification indicator information element as defined in ANSI T1.610, indicating the PartyId of the conferee pertaining to the notification.

6.4.1 Call Waiting

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

6.4.2 Call Hold

If the conference call is held or retrieved by the conference controller, no NOTIFY message with notification description "remote hold" or "remote retrieval" shall be sent to the conferees.

6.4.3 Multi-Level Precedence and Preemption

If a conferee is preempted, then after the conferee has been disconnected from the conference, the network shall include cause value #8, "preemption" as an encapsulated ANSI T1.607 information element in a Facility information element in the FACILITY message sent to the conference controller. See 8.2.3.1.3 of ANSI T1.610 for the encapsulation procedures. The normal procedures for call clearing of a conferee will apply, as described in 6.3.2.1.7.

When the served user is preempted, and the floating conditions are satisfied, the NOTIFY message sent to all conferees shall contain a Notification indication information element with notification description coded to "conference floating, served user preempted." If the floating conditions are not satisfied, the network shall start to clear the calls to the conferees by means of the basic call clearing procedures of ANSI T1.607.

6.4.4 User-to-User Signaling

On calls which are established to potential conferees outside the conference, service 1 is available during call set-up according to normal service 1 procedures.

When the call becomes part of a conference, service 1 is not available. No specific notification shall be sent to the conferee in this case. The user-to-user information shall be discarded according to normal procedures described in ANSI T1.621.

6.4.5 Message Waiting Indicator Control and Notification

The DSS1 procedures for Conference Calling do not interact with the DSS1 procedures of the Message Waiting Indicator Control and Notification supplementary service.

6.4.6 Calling Line Identification Presentation

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

6.4.7 Calling Line Identification Restriction

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

6.4.8 Normal Call Transfer

If, as a result of a conference call being transferred or a call being transferred to a conference, another party is added to a now floating conference call, the network shall apply the "adding a party" notification procedures described in 6.3.2.1.3 for the new added conferee and the other conferees. The network shall also apply the floating notification procedures to all remote conferees as described in 6.3.2.1.9. The network may place the two notifications in a single or in two NOTIFY messages.

6.4.9 Calling Name Identification Restriction

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

6.4.10 Calling Name Identification Presentation

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

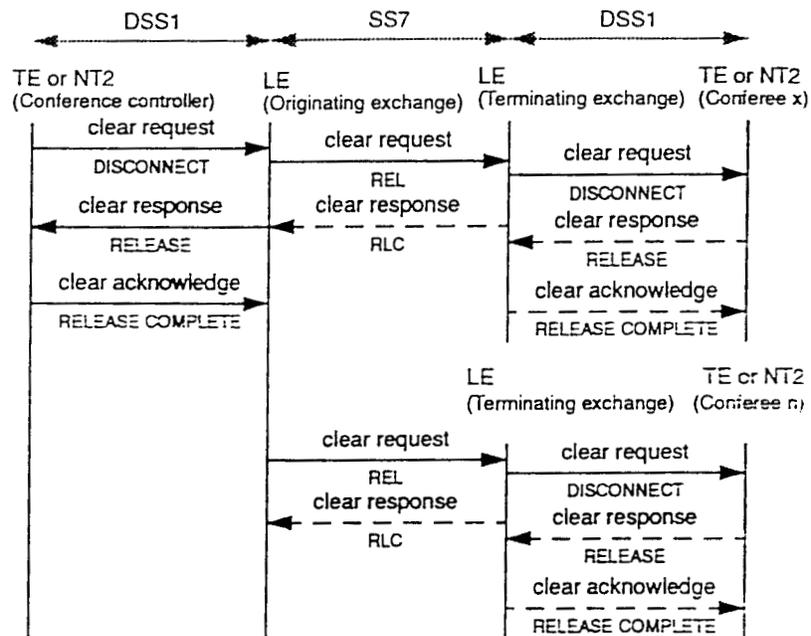


Figure 15 – Call clearing by served user when floating is not allowed

6.4.11 Call Deflection

The DSS1 procedures for Conference Calling do not interact with the DSS1 procedures of the Call Deflection supplementary service.

6.4.12 Explicit Call Transfer

If, as a result of a conference call being transferred or a call being transferred to a conference, another party is added to a now floating conference call, the network shall apply the “adding a party” notification procedures described in 6.3.2.1.3 for the new added conferee and the other conferees. The network shall also apply the floating notification procedures to all remote conferees as described in 6.3.2.1.9. The network may place the two notifications in a single or in two NOTIFY messages.

6.4.13 Conference Calling

If the conference controller adds an existing conference to another conference by sending an addCONF-Invoke component, the network shall send an addCONF-Return-Result-Error component to the served user in a FACILITY message. The error value shall be coded as “notAllowed.”

6.5 Signaling flow diagrams for Conference Calling

Figures 15 – 28 use the identifiers “x” and “n” to identify conferees. If, for example, a conference has conferees 1, 2, 3, 4 and 5, and conferee 3 is disconnected, then “x” represents conferee 3 and “n” represents conferees 1, 2, 4 and 5.

The following definitions are used in figures 15 – 28:

- CR: Call Reference
- FIE: Facility information element
- NIE: Notification indicator information element
- Cid: Conference Identification
- Pid: Party Identification
- Inv: Invoke component
- Ret-Res: Return-Result component

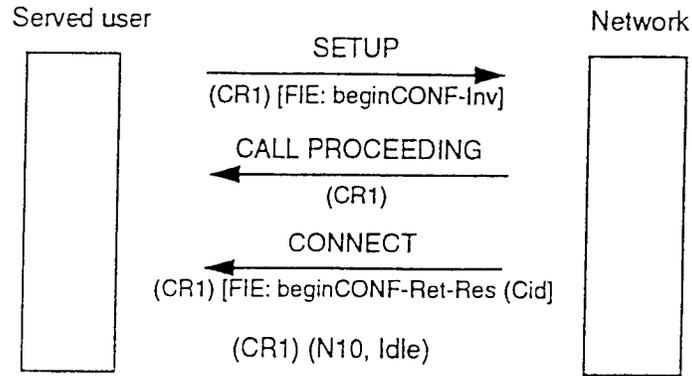


Figure 16 – Starting the conference from the idle state

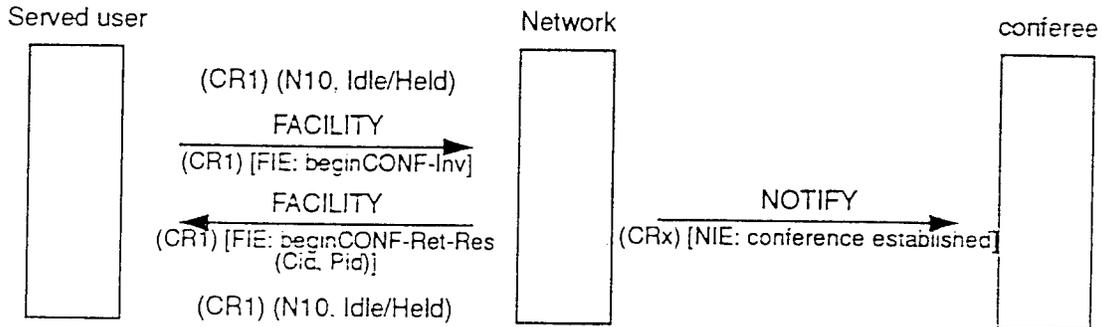


Figure 17 – Beginning a conference from an Active call

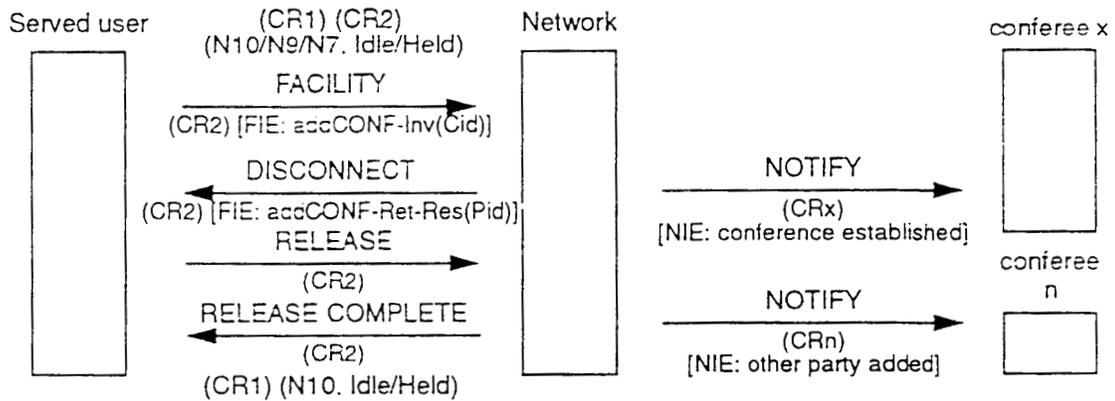
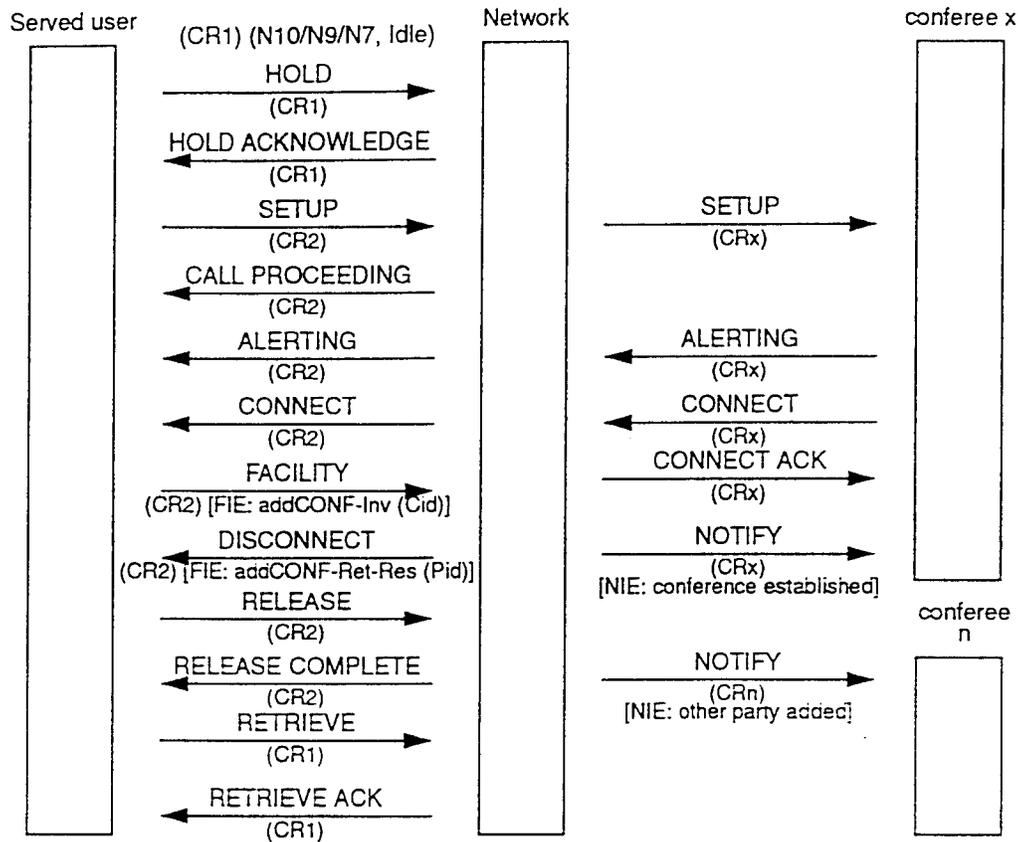


Figure 18 – Adding a call to the conference



Note - This flow diagram makes use of the Call Hold supplementary service and is not an essential part of the Conference Calling supplementary service. It is only included here as an example of how both services may be used together.

Figure 19 – Adding a new call to the conference

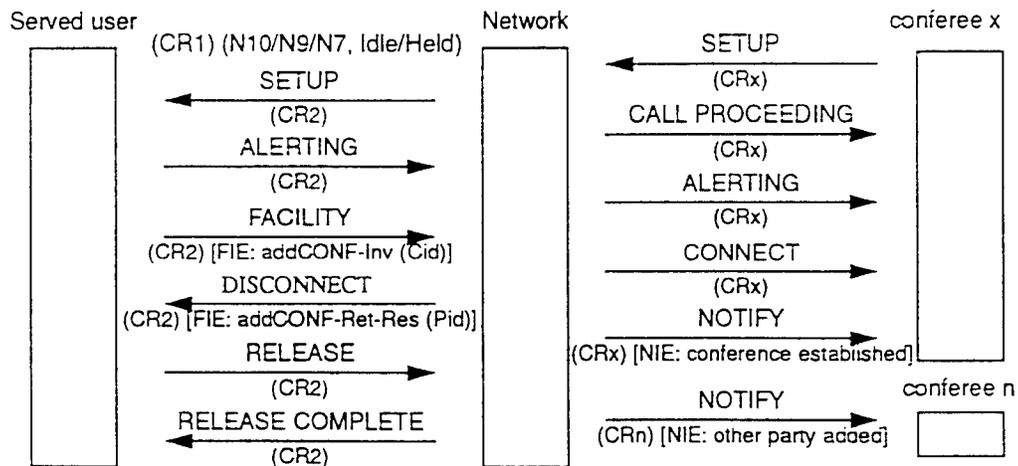


Figure 20 – Adding an incoming call to the conference

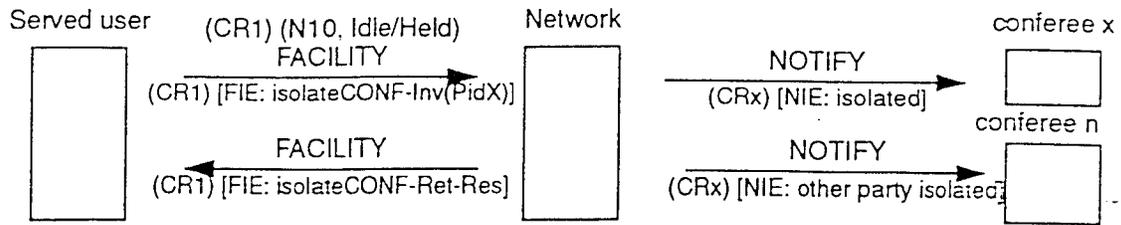


Figure 21 – Isolate a conferee

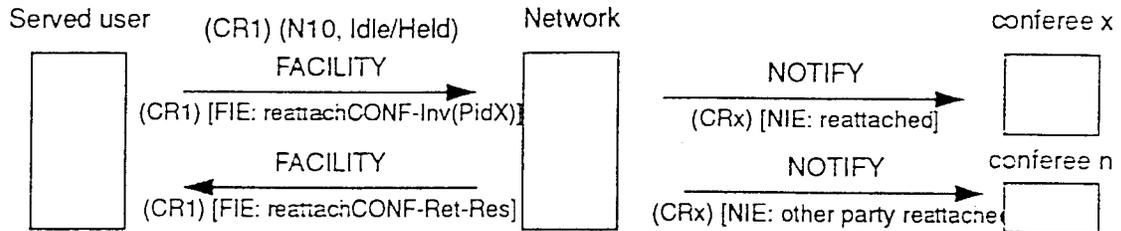


Figure 22 – Reattach a conferee

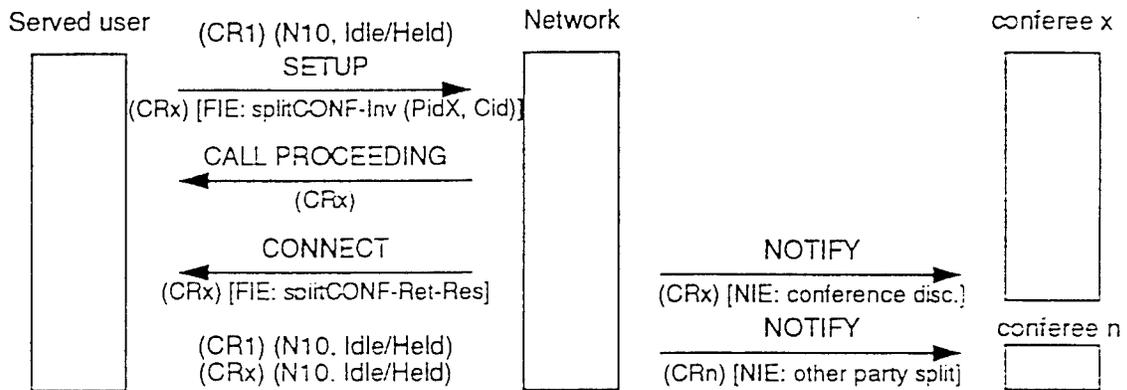


Figure 23 – Split a conferee

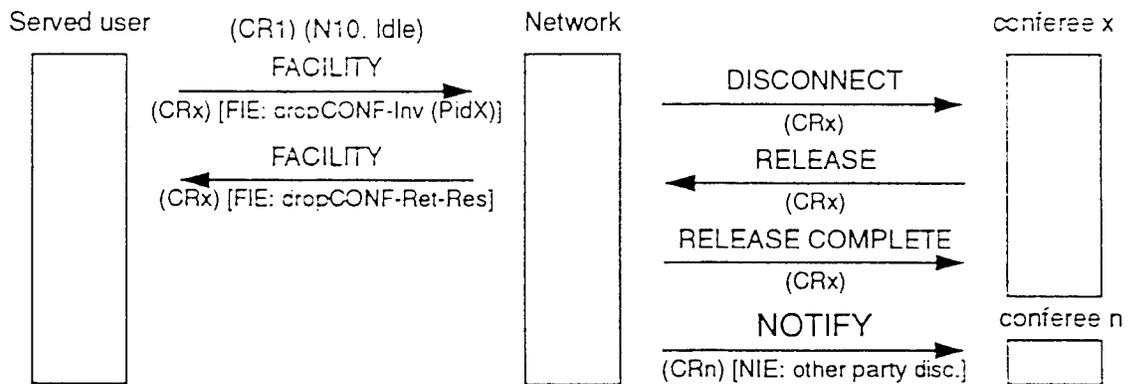


Figure 24 – Drop conferee by served user

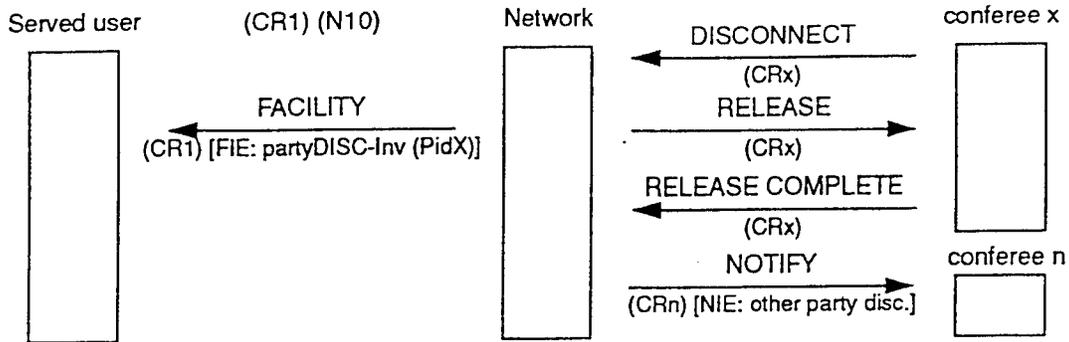


Figure 25 – Disconnect by conferee

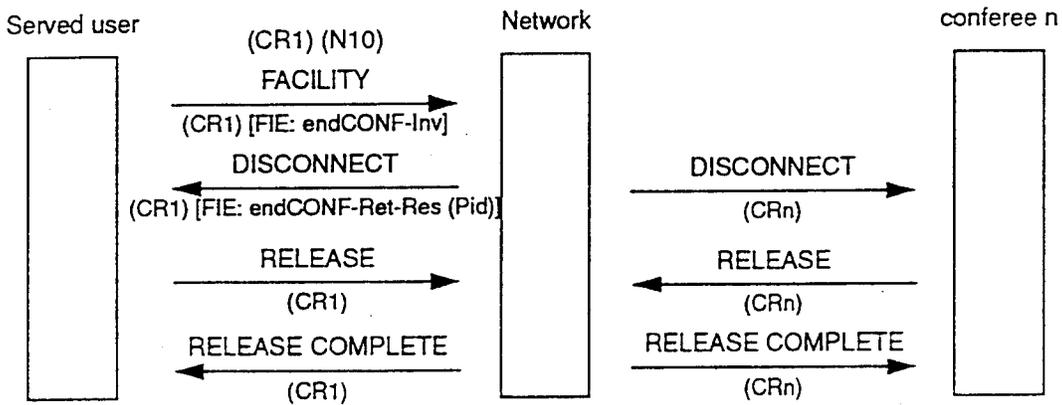


Figure 26 – Terminate the conference

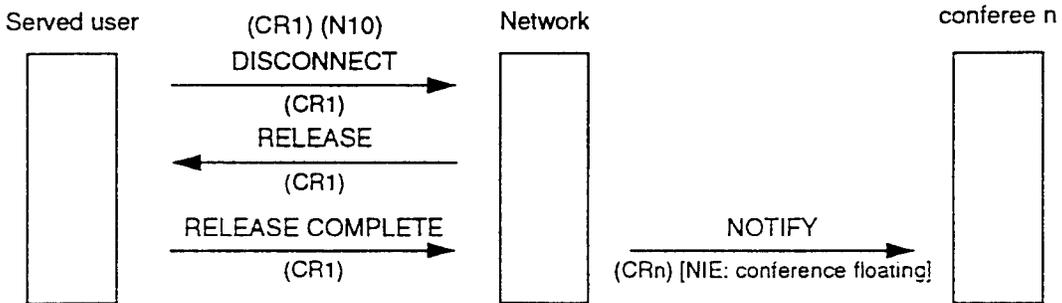


Figure 27 – Call clearing by served user when floating is allowed

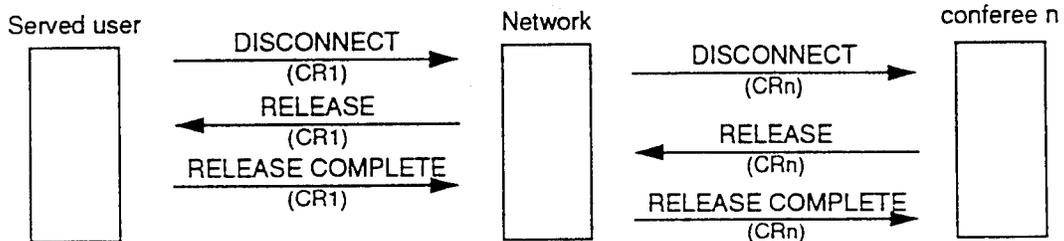


Figure 28 – Call clearing by served user when floating is not allowed

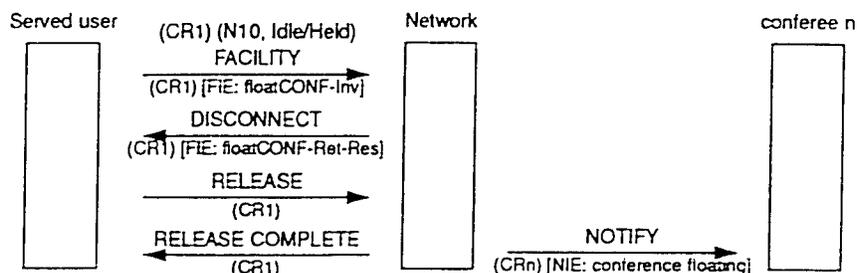


Figure 29 – Explicit request to float the conference

7 Switching and signaling specification for Conference Calling at interexchange interfaces

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

The functional description, formats and codes and general procedures for the ISDN User Part are contained in ANSI T1.113.

7.1 Formats and codings

7.1.1 Messages

ISDN User Part Messages are described in detail in ANSI T1.113.

No new ISDN-UP messages are required for this service. Notifications for service operation may be carried in the existing ISDN-UP message, Call Progress (CPG).

7.1.2 Operations, parameters, and error codes

There is only one parameter associated with this service. The Call Progress message containing the notification indicator parameter including the following new notification indicators will be sent towards the conferee when appropriate.

<u>7</u>	<u>6</u>	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	
1	0	0	0	0	1	0	Conference established, i.e., the user takes part in a multiparty call
1	0	0	0	0	1	1	Conference disconnected, i.e., the user takes part in a normal two-party call
1	0	0	0	1	0	0	Other party added
1	0	0	0	1	0	1	Isolated
1	0	0	0	1	1	0	Reattached
1	0	0	0	1	1	1	Other party isolated
1	0	0	1	0	0	0	Other party reattached
1	0	0	1	0	0	1	Other party split
1	0	0	1	0	1	0	Other party disconnected
1	0	0	1	0	1	1	Conference floating
1	0	0	1	1	1	1	Conference floating, served user preempted

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

The Event indicator shall be coded as 0000010 "Progress."

7.2 Procedures

7.2.1 Actions at the originating local exchange

The originating exchange is the exchange where the service is controlled. In cases where the Conference Calling supplementary service is initiated from an active call, the originating

exchange for the Conference Calling supplementary service is not necessarily the originating exchange for the previously established active call.

7.2.1.1 Normal operation

7.2.1.1.1 Requesting a conference from an active call and adding conferees

Upon successful request to begin the Conference from an active call, user B participating in the active call will be added to the conference. A notification "Conference established" shall be sent to user B informing that a connection to the conference is now established. The notification is conveyed in a Call Progress message (CPG).

Upon request to add a new conferee (user C) to the conference, a check is performed whether or not the maximum number of conferees is reached for that conference.

Upon the successful outcome of the add-on request, a notification "Conference established" is sent to user C informing that connection to the conference is now established. The notification is conveyed in a CPG message. A notification "Other party added" is sent in a CPG message towards all the non-affected conferees informing them that a new party is added to the conference call.

7.2.1.1.2 Isolate a party

The conference controller may request to isolate one conferee from the conference. The conferee is still connected to the conference, but communication in either direction is impossible.

A notification "Isolated" is sent to the affected conferee informing that he is isolated from the conference. The notification is conveyed in a CPG message.

A notification "Other party isolated" is sent within a CPG message towards all the non-affected conferees informing them that one party is isolated from the conference.

7.2.1.1.3 Reattach a party

The conference controller may request to reattach the isolated conferee to the conference.

A notification "Reattached" is sent to the affected conferee informing that he is reattached to the conference. The notification is conveyed in an ISUP CPG message.

A notification "Other party reattached" is sent within a CPG message towards all the non-affected conferees informing them that the isolated party is now reattached to the conference call.

7.2.1.1.4 Split a party

The conference controller may request to create a private communication with one of the conferees (splitting).

A notification "Conference disconnected" is sent to the affected conferee informing that he is connected to the conference controller only. The notification is conveyed in an ISUP CPG message.

A notification "Other party split" is sent within a CPG message towards all the non-affected conferees informing them that the conference controller has split off with another party.

7.2.1.1.5 Disconnect (drop) a party

The conference controller may request to disconnect (drop) one or more of the parties on a one at a time basis. Normal release procedures apply towards the dropped conferee(s).

A notification "Other party disconnected" is sent within a CPG message towards all the non-affected conferees informing them that another party is dropped from the conference call.

7.2.1.1.6 Disconnect by a party

A conferee may request to disconnect from the conference call. Normal release procedures apply for the leg between the conferee and the conference bridge.

A notification "Other party disconnected" is sent within a CPG message towards all the non-affected conferees informing them that another party has disconnected from the conference call.

7.2.1.1.7 Terminate the conference

The conference controller may request to release the conference call. The conference resources shall be released and normal release procedures apply towards all the conferees.

7.2.1.1.8 Explicit request to float the conference

The conference controller may explicitly request to be disconnected from the conference, and the conference be floated. The conferee will still be connected to the conference call.

A notification "Conference floating" is sent within a CPG message towards all the conferees informing them that the conference is now in a floating state, i.e., no conference controller is connected to the conference.

The conference resources shall be released when only one conferee is connected to the bridge or requirements for charging cannot be met. Normal basic call release procedures apply towards the remaining conferee.

7.2.1.1.9 Call clearing by served user

The conference controller may request to disconnect from the conference according to normal basic call procedures. If the conditions for floating are met, the served user will be disconnected from the conference bridge, but the conferees will still be connected to the conference call.

A notification "Conference floating" is sent within a CPG message towards all the conferees informing them that the conference is now in a floating state, i.e., no conference controller is connected to the conference.

The conference resources shall be released when only one conferee is connected to the bridge or requirements for charging cannot be met. Normal basic call release procedures apply towards the remaining conferee.

If conditions for floating are not met when the conference controller requests to disconnect from the conference, conference resources shall be released and normal call clearing procedures shall apply towards all the conferees.

7.2.1.2 Exceptional procedures

If the outcome of the following procedures is not successful due to any reason, the concerned call shall remain in the previous state (e.g., active or held):

Adding conferees,	Isolate party,
Reattach party,	Split party,
Disconnect (drop) party,	Disconnect by a party,
Terminate the conference,	Explicit request to float the conference,
Call clearing by served user.	

Notifications shall neither be sent to the affected nor the non-affected remote parties.

7.2.2 Actions at the transit exchange

The exchange shall transfer the messages related to the notification mechanism. No exceptional procedures are identified.

7.2.3 Actions at the destination local exchange

The exchange shall transfer the messages related to the notification mechanism to the access signalling system. No exceptional procedures are identified.

7.3 Interactions with other supplementary services

7.3.1 Call Waiting

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

7.3.2 Call Hold

No retrieve notification shall be sent to a user B put on hold and subsequently added to a conference call. The notification sent shall be "Conference established."

No hold and retrieve notifications shall be sent to the conferees when the conference controller puts the conference on hold and subsequently retrieves the conference.

Any conferee may put their connection to the conference bridge on hold and subsequently retrieve the connection. The conference controller shall be notified according to the Call Hold service. CPG messages containing Hold notifications shall not be sent towards the other (non-affected) conferees.

7.3.3 Multi-Level Precedence and Preemption

The SS7 procedures for Conference Calling do not interact with the SS7 procedures of the Multi-Level Precedence and Preemption supplementary service.

7.3.4 User-to-User Signaling

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

7.3.5 Message Waiting Indicator Control and Notification

The SS7 procedures for Conference Calling do not interact with the SS7 procedures of the Message Waiting Indicator Control and Notification supplementary service.

7.3.6 Calling Line Identification Presentation

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

7.3.7 Calling Line Identification Restriction

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

7.3.8 Normal Call Transfer

If, as a result of a conference call being transferred or a call being transferred to a conference, another party is added to a now floating conference call, the network shall apply the "adding a party" notification procedures described in 7.2.1.1.1 for the new added conferee and the other conferees. The network shall also apply the floating notification procedures to all remote conferees as described in 7.2.1.1.8.

7.3.9 Calling Name Identification Restriction

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

7.3.10 Calling Name Identification Presentation

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

7.3.11 Call Deflection

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

7.3.12 Explicit Call Transfer

If, as a result of a conference call being transferred or a call being transferred to a conference, another party is added to a now floating conference call, the network shall apply the “adding a party” notification procedures described in 7.2.1.1.1 for the new added conferee and the other conferees. The network shall also apply the floating notification procedures to all remote conferees as described in 7.2.1.1.8.

7.3.13 Conference Calling

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

8 Specification for protocol interworking

8.1 SS7/DSS1

When an ISUP notification indicator parameter is received at the destination local exchange, it shall be mapped as a DSS1 Notification indicator information element in a NOTIFY message.

When the service provider resides in a private network, the Notification indicator information elements received from the private network in the DSS1 NOTIFY message shall be mapped to the notification indicator parameter and sent in an ISUP CPG message.

8.2 ISDN/non-ISDN

No notification is passed to the conferees if they are non-ISDN users.

If the exchange has knowledge that it is working as a gateway between a version supporting the sending of notifications towards a version which does not support the sending of notifications, the Call Progress message containing the notification indicator shall be discarded.

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, *Telecommunications – Integrated Services Digital Network (ISDN) – Call Waiting supplementary service*

ANSI T1.615-1992, *Telecommunications – Digital Subscriber Signalling System No. 1 (DSS1) – Layer 3 overview*

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*

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

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ANSI T1.642-1995, *Telecommunications – Integrated Services Digital Network (ISDN) – Call Deflection supplementary service*

ANSI T1.643-1995, *Telecommunications – Integrated Services Digital Network (ISDN) – Explicit Call Transfer supplementary service*

CCITT Recommendation I.254, section 1, *Conference Calling service description, 1988¹⁾*

ITU-T Recommendation Q.84, section 1, *Stage 2 Description for multiparty supplementary services – Conference Calling (CONF), 1993¹⁾*

ITU-T Recommendation Q.734, section 1, *Stage 3 Description for multiparty supplementary services using SS No. 7 – Conference Calling, 1993¹⁾*

ITU-T Recommendation Q.954, section 1, *Stage 3 description for multiparty supplementary services using DSS1 – Conference Calling, 1993¹⁾*