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INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

SERVICE CAPABILITIES

IN-CALL MODIFICATION (IM)

ITU-T Recommendation I.258.2

(Previously "CCITT Recommendation")

FOREWORD

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

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

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1 (Helsinki, March 1-12, 1993).

ITU-T Recommendation I.852.2 was prepared by ITU-T Study Group 1 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the 21st February 1995.

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NOTE

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

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SUMMARY

The In-call Modification (IM) supplementary service enables a user to change within an established (i.e. active) call from one type of call characterized by one set of bearer capability, low layer and/or high layer capabilities to another type of call with another set without changing the end-to-end connection from a user/network-access point of view.

Further in-call modification(s) back to the original or to another call type shall be possible.

As a network option, the user can choose, when invoking the supplementary service, that the network automatically modifies the call back to the original call type at the end of the modified part of the connection.

IN-CALL MODIFICATION (IM)

(Geneva, 1994)

1 Definition

The **In-call Modification (IM) supplementary service** enables a user to change within an established (i.e. active) call from one type of call characterized by one set of bearer capability, low layer and/or high layer capabilities to another type of call with another set without changing the end-to-end connection from a user/network-access point of view.

Further in-call modification(s) back to the original or to another call type shall be possible.

As a network option, the user can choose, when invoking the supplementary service, that the network automatically modifies the call back to the original call type at the end of the modified part of the connection. This option is called Double IM.

When this option is not supported by the network or is not requested by the user, the invocation of IM is called Single IM.

2 Description

2.1 Possible configurations

Several configurations may occur, where IM will be used:

2.1.1 Configuration 1

At both ends of the connection, there exists at least two different single capability terminals.

2.1.2 Configuration 2 (mixed configuration)

At one end, there exists multiple capability terminal equipment and at the other end at least two single capability terminals.

In this mixed configuration, two cases can be distinguished:

–   the invocation of IM may occur at the side with the two or more terminals, so that the existing call can be continued from a second terminal;

–   the invocation of IM may also occur at the side with the multiple capability terminal equipment resulting in a transfer of the existing call to a second terminal at the other end of the connection.

2.1.3 Configuration 3

At both ends, there exists multiple capability terminals.

2.2 General description

IM shall be provided on a per call basis. It can be invoked by either the calling or the called party.

IM shall be possible also between the following bearer services:

–   speech;

–   64 kbit/s unrestricted;

–   3.1 kHz audio;

– $n \times 64$ kbit/s unrestricted.

Other bearer services are for further study.

From the service point of view (e.g. bearer service and/or the high and low layer capabilities) there is a modification of the type of call during the time-frame of the call as depicted in Figure 1.
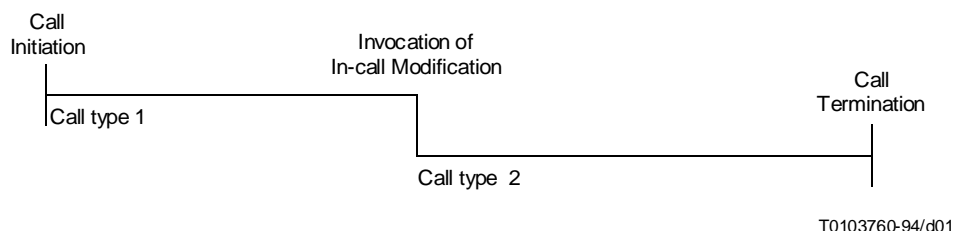

FIGURE 1/I.258.2

Invocation of in-call modification

2.3 Specific terminology

2.3.1 **terminal; terminal equipment**: The physical equipment attached to the ISDN which provides the user access to the ISDN services.

2.3.2 **terminal functions**: The functions residing in a terminal which control the network layer functions of the totality of the ISDN and the terminal equipment attached to it. Logically terminal functions form part of the user. Terminal functions are identified by low and/or high layer compatibility information.

2.3.3 **single capability terminal**: A terminal which is capable only to handle a single type of call/communication, e.g. a telephone or a facsimile group 4 terminal or a videotex terminal, etc.

2.3.4 **multiple capability terminal equipment**: Terminal equipment or system which is capable of handling more than one type of call/communication at the same interface, e.g. voice and facsimile group 4 and perhaps additionally also facsimile group 3.

2.3.5 **user**: The entity(ies) above the network layer using its services, i.e. the In-call Modification supplementary service within the scope of this Recommendation.

2.3.6 **served user**: The user who invokes the In-call Modification supplementary service.

2.3.7 **user channel**: The channel and associated resources as employed for the transfer of user information, e.g. the B-channel or the D-channel with a logical link identifier.

2.3.8   mixed configuration: A configuration within an established call where at one end, there exists multiple capability terminal equipment and, at the other end, at least two different single capability terminals (see Figure 2).
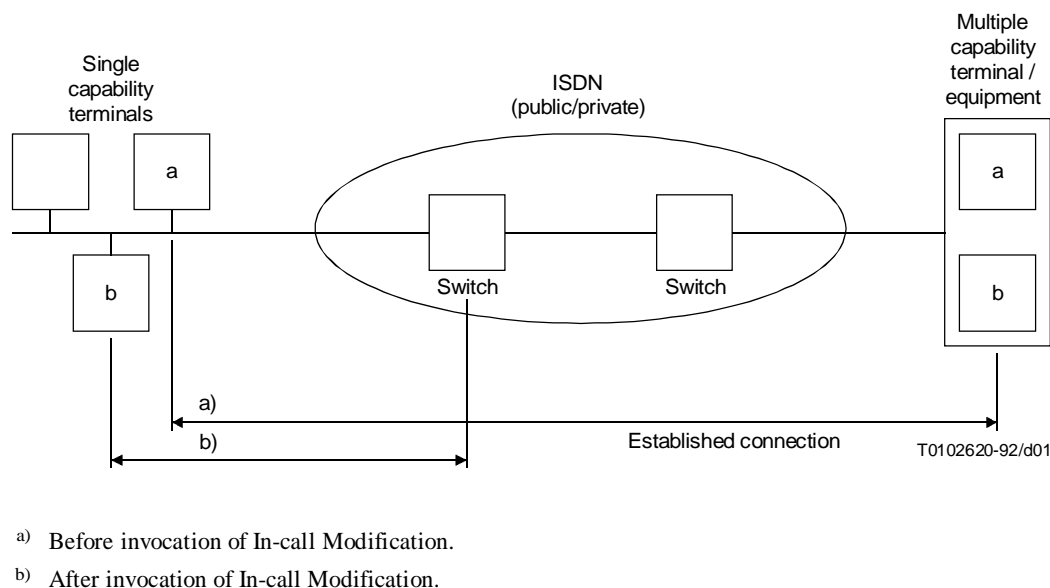

a)   Before invocation of In-call Modification.

b)   After invocation of In-call Modification.

FIGURE 2/I.258.2

Mixed configuration

2.4   Qualifications on the applicability to telecommunication services

This functionality is considered meaningful, e.g. especially for facsimile group 4 terminal equipment wishing to control the access of centralized services equipment offering value-added services such as, e.g. facsimile store-and-forward service, facsimile database services or message handling services via the ISDN.

Specifically, the low featured facsimile group 4, class 1 terminals (send and receive facsimile messages only) have no means of their own to input the necessary control information to the centralized services systems or to output suitable user guidance information back to the user. Thus, other terminals at the same network access must be used, e.g. telephones which serve this purpose already for facsimile group 3 communications or videotex terminals. Both terminal types allow for a transparent control-and-user guidance communication between the user and the centralized service system.

All the bearer services mentioned in 2.2 have to be included, as generally available single capability terminals with no special features shall be able to be used, together with in-call modification.

In-call modification is also meaningful for the same application as above, when facsimile group 3 terminals are connected within a ISDN.

In-call modification should also allow to change between 7 kHz telephony, videotelephony and other bearer services and teleservices.

3 Procedures

3.1 Provision/withdrawal

In-call modification may be provided after pre-arrangement with the service provider on a subscription basis or be generally available to all network accesses with the ability to invoke it.

3.2 Normal procedures

3.2.1 Activation/deactivation/registration

Not applicable.

3.2.2 Invocation and operation

All three configurations and cases mentioned in 2.1 shall be handled as described below.

To invoke the In-call Modification supplementary service, the served user shall indicate the necessary information for the new call type, i.e. bearer capability, low layer and/or high layer capability to the network. The served user shall also have the capability to indicate a number in order to select a specific terminal out of several terminals of the same type at the local and/or at the remote side (e.g. in the context of multiple subscriber numbers).

The network shall then request the served user's terminal function to withdraw from the currently used user channel, bar the selected second terminal against incoming calls and offer the requested call type with the new set of properties as a new call to the selected second terminal. If the same user channel can be re-used, the network shall reserve it for re-establishment of the user-to-network connection. Until this call has been accepted, the second terminal/terminal function shall stay barred against incoming new calls.

The network shall also request the remote user's terminal function to withdraw from the currently used user channel, bar the selected second terminal against incoming calls and offer the requested call type with the new set of properties as a new call to the selected second terminal at the remote side. If the same user channel can be re-used, the network shall reserve it for the re-establishment of the user-to-network connection. Until this call has been accepted, the second terminal/terminal function shall stay barred against incoming new calls.

The network shall give the served user's first terminal an indication of the successful change to the requested new call type at the remote user's side and then release it completely.

If the new bearer capability indication results in the need for replacing the original connection, the network shall undertake the actions which are necessary to replace the original intra-network path. This capability is considered an additional network feature, and its definition is outside the scope of this Recommendation.

If the served user has invoked Double IM, the network shall automatically invoke the second part of IM (i.e. return to the original call type at the original terminal) upon termination of the modified call.

3.3 Exceptional procedures

3.3.1 Activation/deactivation/registration

Not applicable.

3.3.2 Invocation and operation

The request for in-call modification shall be rejected in the following cases and the invoking user shall be notified of the cause for rejection:

    a)   if the second terminal is engaged in another call which may happen at the local or the remote side;

    b)   if the desired bearer capability was not subscribed by either party;

    c)   if the desired (second) terminal does not answer or does not exist;

d) if the network is not able to reroute the existing call, if this is necessary to obtain the desired bearer capability or suitable resources are not available;

e) if a user requests Double IM and the network does not support this option. The user may then decide whether to request only Single IM or not use the supplementary service.

NOTE – Further cases may exist.

After the notification has been sent to the invoking user's terminal/terminal function, the network shall re-establish the connection to the originally served terminal function.

3.4 Alternative procedures

3.4.1 Activation/deactivation/registration

Not applicable.

3.4.2 Invocation and operation

None identified.

4 Network capabilities for charging

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

For in-call modification between different bearer services, it shall be possible to charge the subscriber accurately.

In particular, if the calling party is paying for the call, and the called party invokes in-call modification, and this results in a different charge to the calling party, the network shall notify the calling party of the new charge and wait for explicit acceptance from the calling party before accepting the in-call modification request. Otherwise the in-call modification invocation request shall be rejected.

5 Interworking considerations

5.1 Interworking with non-ISDNs

The In-call Modification supplementary service can be invoked from the ISDN side on calls with interworking into the PSTN for those connections, where both services before and after invocation of IM are supported in the PSTN, e.g. 3.1 kHz telephony and facsimile group 3. In this case, the In-call Modification supplementary service is carried out only up to the ISDN/PSTN border.

An application is the case when a facsimile group 3 terminal and the telephone, which shall be used to control the centralized service system, are connected to an ISDN and the centralized service system is connected to a PSTN.

In this case no indication is given to the remote party in the PSTN.

5.2 Interworking with private ISDNs

Since the end-to-end connection, where IM is to be invoked, may start or end at public switches and/or ISPBXs, IM shall work across the public/private network border.

Both networks shall be prepared to receive a rejection on their IM requests.

6 Interaction with other supplementary services

6.1 Advice of Charge (AOC)

During the process of in-call modification (i.e. from invocation of the IM supplementary service to its successful switching to the required call type) charging information shall not be sent to the user who has subscribed to the AOC supplementary service.

If IM invocation gives as a result that the served user of a particular advice of charge supplementary service continues the call on a new terminal with another ISDN-number, this particular advice of charge supplementary service shall be subscribed to by the served user for that ISDN-number in order to receive charging information.

6.1.1 Charging Information at Call Set-up Time (AOC-S)

When the process of in-call modification is completed, the new charging rate shall be given to the subscriber of the AOC supplementary service.

6.1.2 Charging Information During the Call (AOC-D)

When the process of in-call modification is completed, the sending of charging information shall start again and the following information may be given:

–   updated cumulated charge; and

–   updated charging rates.

If the process of in-call modification was not successful, the sending of charging information shall be resumed.

6.1.3 Charging Information at the end of the Call (AOC-E)

When the call is cleared, the charge information incurred shall be given to the user who has subscribed to the AOC supplementary service reflecting the possibly different charge rate after the invocation of the IM supplementary service.

6.2 Call Hold (HOLD)

The IM supplementary service shall not apply for a held call. However, a call shall be capable of being held after successful execution of the IM supplementary service.

6.3 Call transfer services

If the existing call was already transferred, then in-call modification is possible only to the new party.

6.4 Call Waiting (CW)

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

NOTE – During double IM, incoming calls shall be offered to the called user.

6.5 Closed User Group (CUG)

The same CUG must be assigned to all used bearer/teleservices.

6.6 Completion of calls services

6.6.1 Completion of Calls to No Reply (CCNR)

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

6.6.2 Completion of Calls to Busy Subscribers (CCBS)

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

6.7 Conference services

6.7.1 Conference Calling (CONF)

The IM supplementary service shall not apply to conference calls. However, conference calls shall be invokable after the execution of the IM supplementary service provided that conference calls are provided in the context of the new service.

6.7.2 Meet-me Conference (MMC)

The IM supplementary service shall not apply to meet-me conference calls.

6.7.3 Preset Conference Calling (PCC)

The IM supplementary service shall not apply to preset conference calls.

6.7.4 Three-Party Service (3PTY)

The IM supplementary service shall not apply to three party calls. However, three party calls shall be invokable after the execution of the IM supplementary service provided that three party calls are provided in the context of the new service.

6.8 Diversion services

For any of the call diversion supplementary services: Call Forwarding Unconditional, Call Forwarding Busy, Call Forwarding No Reply and Call Deflection, the following shall apply:

The IM supplementary service shall apply to any existing call independently of the previous use of a call diversion supplementary service.

The IM supplementary service shall also override activated call forwarding for the new service, for the served and the remote user's side.

In the Call Deflection supplementary service any attempt to deflect a request for establishing an IM call shall be rejected.

6.9 Direct-Dialling-In (DDI)

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

6.10 In-Call Modification (IM)

In the case of Single IM, no impact, i.e. neither supplementary service shall affect the operation of the other supplementary service.

Whilst the IM supplementary service is in operation due to a request for Double IM, the IM supplementary service cannot be invoked again on the call.

6.11 ISDN Freephone (IFS)

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

6.12 Line Hunting (LH)

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

6.13 Malicious Call Identification (MCID)

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

6.14 Multi-Level Precedence and Preemption (MLPP)

The precedence level of the original call shall affect the operation of the other supplementary service.

6.15 Multiple Subscriber Number (MSN)

No impact. MSN may be used in order to select a specific terminal out of several belonging to the same type.

6.16 Name identification services

6.16.1 Calling Name Identification Presentation (CNIP)

The calling user's name of the second terminal may be presented to the called user after the in-call modification has occurred.

6.16.2 Calling Name Identification Restriction (CNIR)

The calling user's name of the second terminal shall not be presented to the called user after the in-call modification has occurred.

6.17 Number identification services

6.17.1 Calling Line Identification Presentation (CLIP)

The calling user's identity of the second terminal may be presented to the called user after the in-call modification has occurred.

6.17.2 Calling Line Identification Restriction (CLIR)

The calling user's identity of the second terminal shall not be presented to the called user after the in-call modification has occurred.

6.17.3 Calling Line Identification Presentation (COLP)

The calling user's identity of the second terminal shall not be presented to the called user after the in-call modification has occurred.

6.17.4 Calling line Identification Restriction (COLR)

The calling user's identity of the second terminal shall not be presented to the called user after the in-call modification has occurred.

6.18 Outgoing Call Barring (OCB)

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

6.19 Reverse Charging (REV)

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

6.20 Sub-addressing

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

6.21 Support of Private Numbering Plans (SPNP)

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

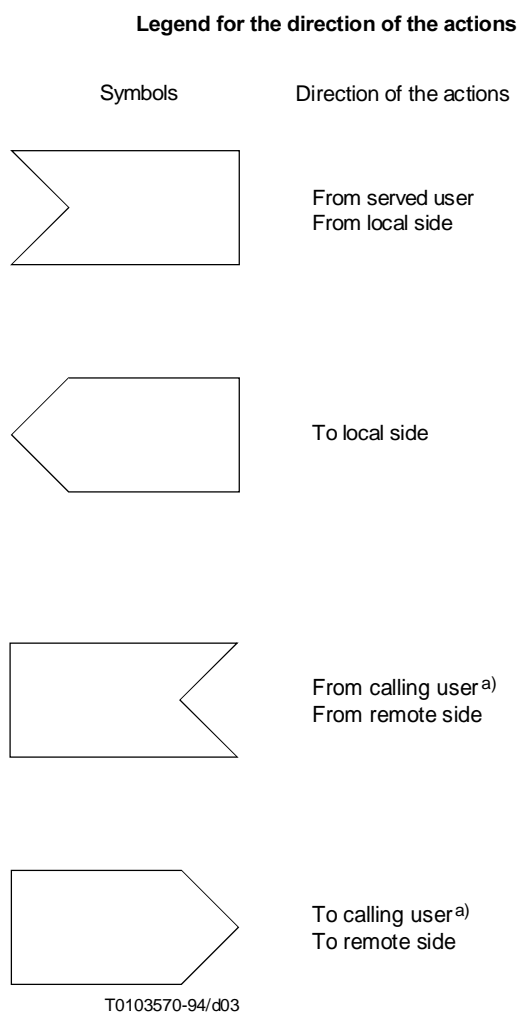## 6.22 Terminal Portability (TP)

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

6.23 User-to-User Signalling (UUS)

Only Service 3 (UUS during the active phase of the call) applies. Services 1 and 2 are not applicable as IM can occur only during an active call.

7 Dynamic description

The dynamic description of the in-call modification supplementary service is shown in Figure 3.

Legend for the direction of the actions

Symbols   Direction of the actions

From served user
From local side

To local side

From calling user [a]
From remote side

To calling user [a]
To remote side

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[a] This applies to the case when the calling user is not the served user.

FIGURE 3/I.258.2 (sheet 1 of 4)

Overall SDL diagram for in-call modification
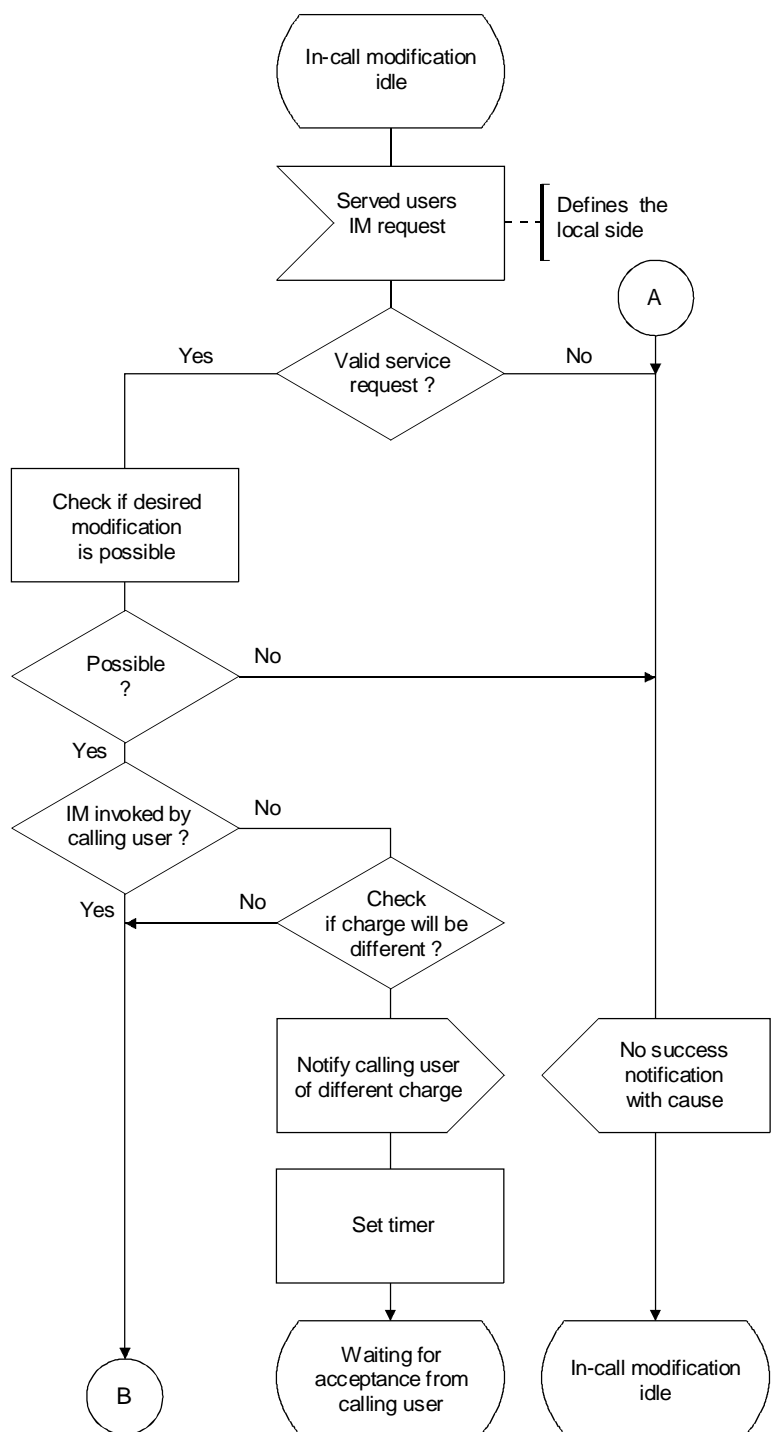
FIGURE 3/I.258.2 (sheet 2 of 4)

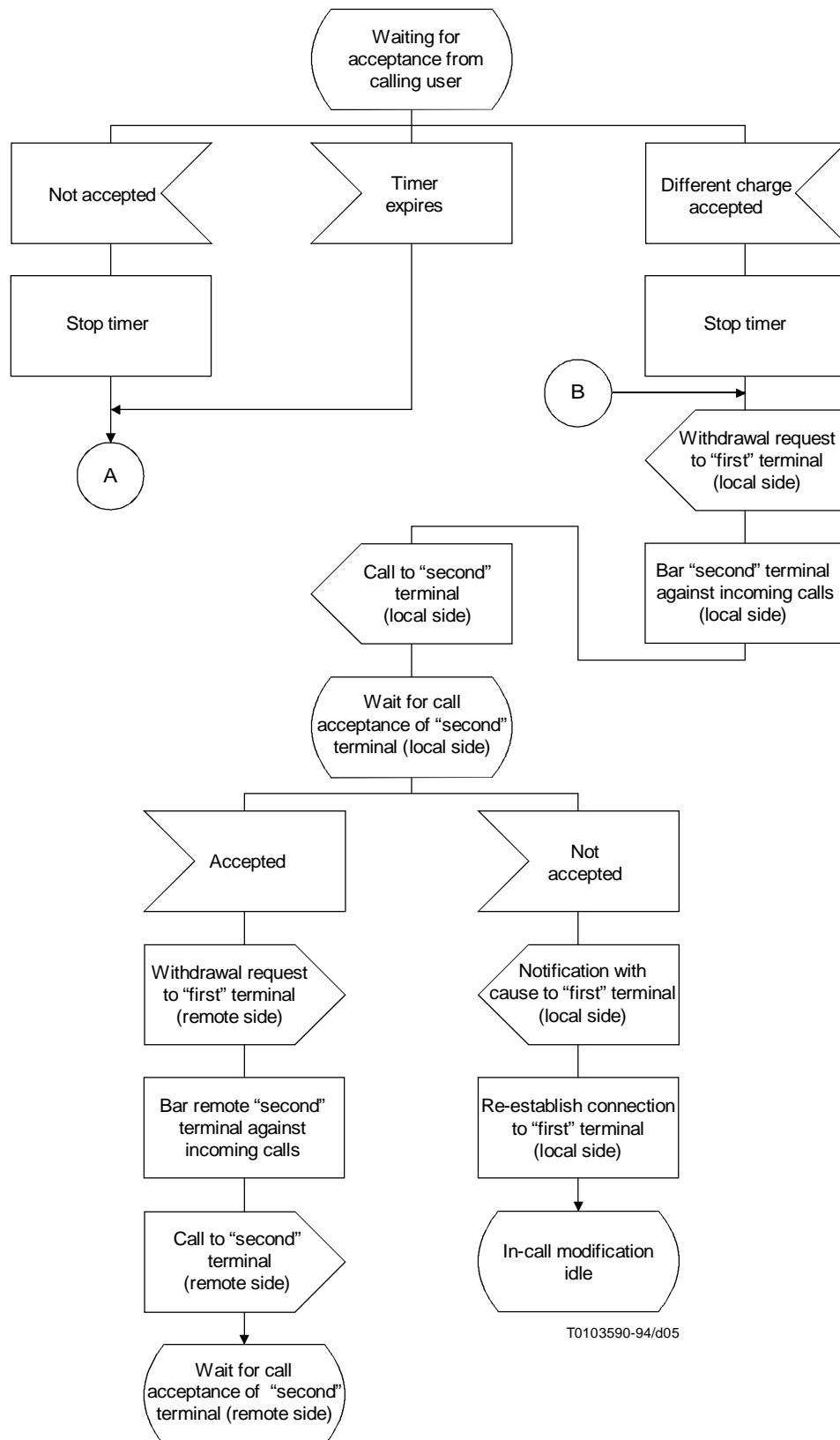**Overall SDL diagram for in-call modification**

FIGURE 3/I.258.2 (sheet 3 of 4)
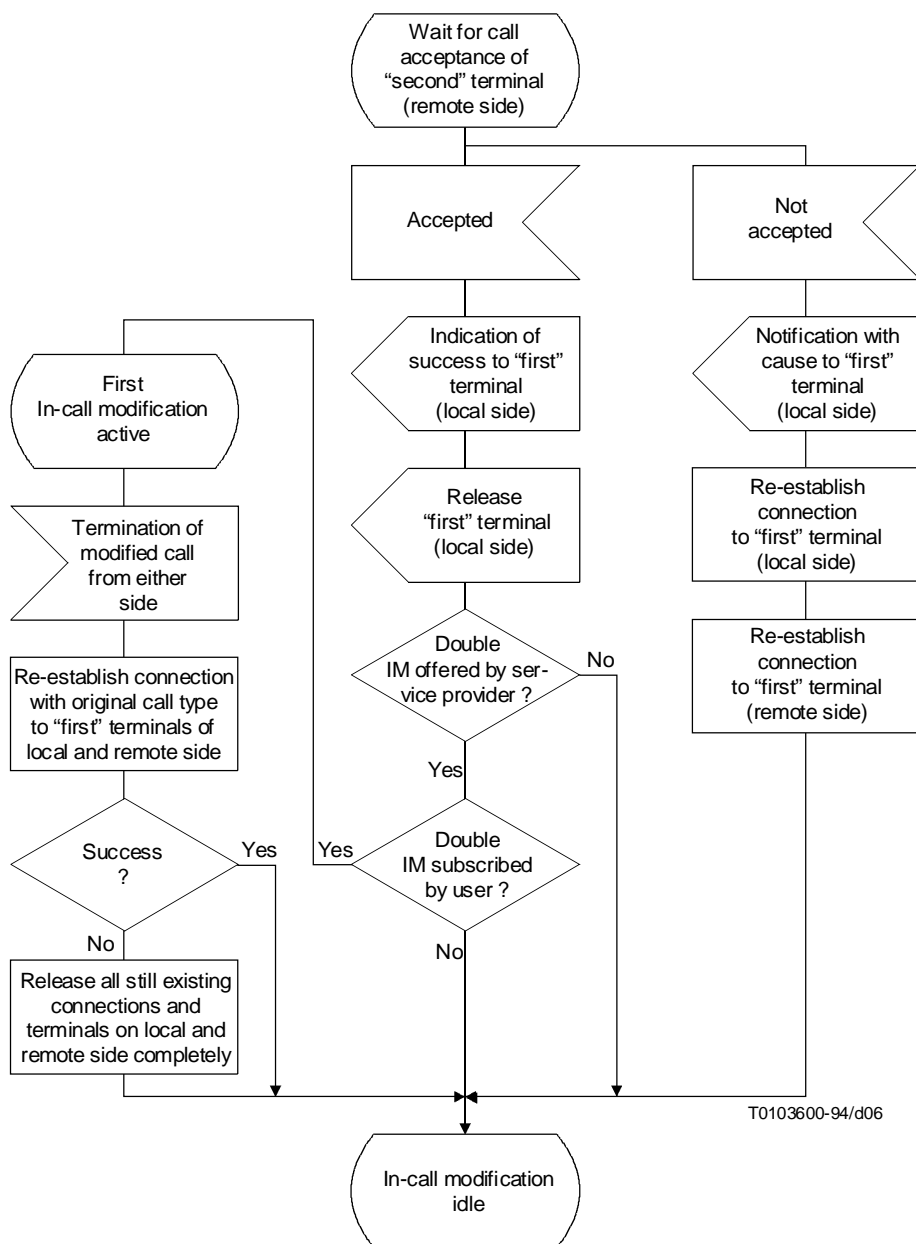
Overall SDL diagram for in-call modification

FIGURE 3/I.258.2 (sheet 4 of 4)

Overall SDL diagram for in-call modification