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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS
Supplementary service for multimedia

Call diversion supplementary service for H.323

ITU-T Recommendation H.450.3

(Previously CCITT Recommendation)

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ITU-T RECOMMENDATION H.450.3

CALL DIVERSION SUPPLEMENTARY SERVICE FOR H.323

Summary

This Recommendation describes the procedures and the signalling protocol for the Call diversion supplementary service (SS-DIV) in H.323 (Packet based multimedia communications systems) networks. This Recommendation comprises the services Call Forwarding Unconditional (SS-CFU), Call Forwarding Busy (SS-CFB), Call Forwarding No Reply (SS-CFNR) and Call Deflection (SS-CD).

SS-CFU, SS-CFB, SS-CFNR and SS-CD are supplementary services which apply during call establishment providing a diversion of an incoming call to another destination endpoint.

This Recommendation makes use of the "Generic functional protocol for the support of supplementary services in H.323" as defined in Recommendation H.450.1

The procedures and the signalling protocol of this Recommendation are derived from the Call diversion supplementary service specified in ISO/IEC 13872 and ISO/IEC 13873.

Source

ITU-T Recommendation H.450.3 was prepared by ITU-T Study Group 16 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 6th February 1998.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the 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.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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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Recommendation H.450.3

CALL DIVERSION SUPPLEMENTARY SERVICES FOR H.323

(Geneva, 1998)

1 Scope

This Recommendation specifies the diversion supplementary services (SS-DIV), which comprise the services Call Forwarding Unconditional (SS-CFU), Call Forwarding Busy (SS-CFB), Call Forwarding No Reply (SS-CFNR) and Call Deflection (SS-CD), all of which are applicable to various basic services supported by H.323 endpoints.

NOTE – The concept of basic services in the context of H.323 is for further study.

SS-CFU, SS-CFB, SS-CFNR and SS-CD are supplementary services which apply during call establishment providing a diversion of an incoming call to another destination endpoint.

SS-CFU, SS-CFB, SS-CFNR and SS-CD are supplementary services which apply to point-to-point calls. An incoming call via multicasting may be subject to call diversion.

This Call diversion supplementary service is based on ISO/IEC 13872 and ISO/IEC 13873.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of the Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- ITU-T Recommendation H.225.0 (1998), *Call signalling protocols and media stream packetization for packet based multimedia communication systems.*
- ITU-T Recommendation H.245 (1998), *Control protocol for multimedia communication.*
- ITU-T Recommendation H.323 (1998), *Packet based multimedia communications systems.*
- ITU-T Recommendation H.450.1 (1998), *Generic functional protocol for the support of supplementary services in H.323.*
- ITU-T Recommendation I.112 (1993), *Vocabulary of terms for ISDNs.*
- ITU-T Recommendation I.210 (1993), *Principles of telecommunication services supported by an ISDN and the means to describe them.*
- ISO/IEC 13872:1995, *Information technology – Telecommunications and information exchange between systems – Private Integrated Services Network – Specification, functional and information flows – Call diversion supplementary services.*
- ISO/IEC 13873:1995, *Information technology – Telecommunications and information exchange between systems – Private Integrated Services Network – Inter-exchange signalling protocol – Call diversion supplementary services.*

3 Terms and definitions

This Recommendation defines the following terms:

- 3.1 **activating call:** Signalling connection between an activating user and a served endpoint.
- 3.2 **activating endpoint:** The endpoint serving the activating user.
- 3.3 **call deflection:** The type of diversion invoked by the served user.
- 3.4 **CheckRestriction call:** Signalling connection between a served endpoint and a diverted-to endpoint, for the aim of checking call diversion restrictions.
- 3.5 **deactivating call:** Signalling connection between a deactivating user and the served endpoint.
- 3.6 **deactivating endpoint:** The endpoint serving the deactivating user.
- 3.7 **diversion:** The redirection of a call, on request of a called (=served) endpoint or user and prior to answer, to a number different from the number of that called endpoint/user.
- 3.8 **diverted-to number:** The number to which a call is diverted.
- 3.9 **diverted-to subaddress:** The subaddress to which a call is diverted.
- 3.10 **diverted-to endpoint:** The endpoint to which a call is diverted.
- 3.11 **diverting cause:** The parameter which contains the reason for the diversion, e.g. CFU, CFB, CFNR.
- 3.12 **diverting number:** The number of the served endpoint/user.
- 3.13 **endpoint:** See Recommendation H.323.
- 3.14 **endpoint A:** The calling endpoint of a call which is subject to call diversion.
- 3.15 **endpoint B:** The served (diverting) endpoint of a call which is subject to call diversion.
- 3.16 **endpoint B1, endpoint B2, endpoint B3, etc.:** Served (diverting) endpoints of a call which is subject to multiple stages of diversion. B1 is the first served endpoint, B2 is the second served endpoint, B3 is the third served endpoint, etc.
- 3.17 **endpoint C:** The diverted-to endpoint with respect to the final stage of call diversion.
- 3.18 **forwarded call:** Call leg from a rerouting entity towards the diverted-to user.
- 3.19 **forwarding:** The type of diversion invoked automatically by the served endpoint in accordance with information previously registered in the served endpoint against the called number.
- 3.20 **forwarding call:** Call leg between a rerouting entity and a served endpoint/user.
- 3.21 **interrogating call:** Signalling connection between an interrogating user and the served endpoint.
- 3.22 **interrogating endpoint:** The endpoint serving the interrogating user.
- 3.23 **last diverting endpoint:** The served endpoint from the point of view of the diverted-to endpoint for a particular stage of call diversion. In the case of a call subject to a single stage of call diversion, endpoint B is the last diverting endpoint from the point of view of endpoint C. In the case of a call subject to multiple stages of call diversion, endpoint B1 is the last diverting endpoint from the point of view of endpoint B2, endpoint B2 is the last diverting endpoint from the point of view of endpoint B3, etc. The served endpoint for the final stage of call diversion is the last diverting endpoint from the point of view of endpoint C.
- 3.24 **original called number:** In case of multiple call diversion, the number of endpoint B1.

- 3.25 original called endpoint:** The first served endpoint of a call which is subject to multiple stages of call diversion, i.e. endpoint B1.
- 3.26 originating call:** Call leg between the calling user and a rerouting entity.
- 3.27 rerouting entity:** The entity (e.g. endpoint) which executes call diversion.
- 3.28 served endpoint:** The endpoint which hosts the served user and where diversion is invoked. This endpoint may also be referred to as the diverting endpoint or the called endpoint.
- 3.29 served user:** For SS-CFU, SS-CFB and SS-CFNR, the user for whom forwarding can be activated. For SS-CD, the user which can invoke deflection.
- 3.30 user:** An application which uses one or more of the services defined in this Recommendation (activation, deactivation, interrogation, invocation) via an application programming interface.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations:

| | |
|-------|--|
| ACF | Admission Confirm (see Recommendation H.225.0) |
| APDU | Application Protocol Data Unit |
| ARQ | Admission Request (see Recommendation H.225.0) |
| ASN.1 | Abstract Syntax Notation One |
| CD | Call Deflection |
| CDA | Call Diversion Activating |
| CDD | Call Diversion Deactivating |
| CDF | Call Diversion diverted (Forwarded)-to |
| CDI | Call Diversion Interrogating |
| CDO | Call Diversion Originating |
| CDR | Call Diversion Rerouting |
| CDS | Call Diversion Served |
| CFB | Call Forwarding Busy |
| CFNR | Call Forwarding No Reply |
| CFU | Call Forwarding Unconditional |
| DIV | Diversion |
| GK | Gatekeeper |
| NFE | Network Facility Extension |
| SS | Supplementary Service |

5 SS-CFU service description

5.1 Description

SS-CFU permits a served user to have incoming calls addressed to the served user's number redirected to another number. The served user's ability to originate calls is unaffected by SS-CFU. After SS-CFU has been activated, calls are forwarded independently of the status of the served endpoint.

The selective operation of SS-CFU on calls associated with a specific basic service is for further study.

CFU is provided on a per number basis.

The maximum number of diversions to a single call is an implementation option. When counting the number of diversions, all types of diversions shall be included.

5.2 Activation/Deactivation/Interrogation/Registration

CFU may be either permanently activated or activated/deactivated under user control. If activation/deactivation is under user control, activation/deactivation may be provided by the served endpoint (local activation/deactivation), by another endpoint (remote activation/deactivation), or both.

Interrogation may be provided and can be local, remote or both.

Registration of information is performed on activation of CFU. There are no separate registration procedures.

5.2.1 Local activation/deactivation

To activate CFU, the served user shall supply the diverted-to number and optionally further parameters, depending on the capabilities of the specific implementation. Verification that the diverted-to number exists may be carried out before accepting the CFU activation request.

The activating endpoint shall return notification of acceptance or rejection of the request to the served user. Notification of acceptance shall include the number of the diverted-to endpoint to whom the CFU is active.

In the absence of any of the parameters in the activation procedure (e.g. the diverted-to number), default parameters already known to the activating endpoint may be used.

It shall be possible to deactivate CFU by means of an explicit request for deactivation.

It shall be possible to deactivate CFU by activating CFU to a different diverted-to number.

5.2.2 Remote activation/deactivation

Remote activation/deactivation of CFU shall use one or more of the following procedures:

- 1) A special authorized user may activate and/or deactivate CFU at the served endpoint. Authentication procedures are out of the scope of this Recommendation.
- 2) An activating user may activate CFU at the served endpoint such that the activating endpoint becomes the diverted-to endpoint, subject to the served endpoint having remote activation enabled in advance (also known as "follow-me"). The intended diverted-to endpoint shall be able to activate CFU regardless of whether CFU is already active. The served endpoint may disable a remote activation at any time. If the disable procedure is performed whilst CFU is activated, the CFU shall not be automatically deactivated.

- 3) The diverted-to user may deactivate CFU at the served endpoint. This shall not be dependent on whether the served endpoint has enabled remote activation. The diverted-to user shall lose this capability as soon as CFU is deactivated in this way, and shall not regain the capability if CFU is activated again to a different diverted-to endpoint.
- 4) The diverted-to user, at the same time as deactivating CFU in accordance with item 3) above, may be able to activate CFU from the served endpoint to another diverted-to endpoint (i.e. change the destination of CFU). The diverted-to user shall lose this capability as soon as CFU is reactivated in this way. The new diverted-to user shall gain the capability.

When a remote activation/deactivation procedure is successfully performed, the activating/deactivating user and the served user shall be notified. This notification shall include the number of the diverted-to endpoint and the served endpoint number.

It shall be possible that the served user activates CFU and a remote user deactivates CFU and vice versa.

5.2.3 Local interrogation

If local interrogation is provided, the served endpoint shall support interrogation on a per number basis. The response to an interrogation request shall provide the following information to the interrogating user:

- activated or deactivated state of the supplementary service;
- if activated:
 - diverted-to number;
 - whether activated for all basic services or an individual basic service and the identity of the individual basic service (for further study).

5.2.4 Remote interrogation

If remote interrogation is provided, it shall be possible from one or both of the following remote users:

- 1) A special authorized user may interrogate CFU conditions on the served endpoint. Authorization shall be implementation dependent (e.g. attendants may be authorized).
- 2) The diverted-to user may interrogate CFU at the served endpoint.

The remote interrogation request and response shall include the information as specified for local interrogation and additionally the number of the served endpoint.

5.3 Invocation and operation

All incoming calls fulfilling conditions for which CFU is active shall be diverted without being presented to the served user.

NOTE 1 – The selective operation of SS-CFU on calls associated with a specific basic service is for further study.

NOTE 2 – The local conditions for selecting calls for diversion are outside the scope of this Recommendation. In the absence of specific conditions, all calls will be diverted.

5.3.1 Served user notification

The served user, as a local option, may receive notification of the diversion (but will not be able to answer the incoming call). This notification shall include the following information (on the call that has been diverted):

- 1) indication that a call has been forwarded and the reason (CFU);

- 2) if applicable Bearer Capability information (High Layer Compatibility information and Low Layer Compatibility information: for further study);
- 3) user B's number (applicable only if user B is reachable by means of more than one numbers).

If a previous diversion has occurred, the notification shall include in addition:

- 4) last diverting endpoint's number, if presentation is permitted by the last diverting endpoint;
- 5) cause for last diversion.

If more than one previous diversion has occurred, the notification shall also include:

- 6) original called number, if presentation is permitted by the original called endpoint;
- 7) cause for original diversion.

5.3.2 Diverted-to user notification

The diverted-to user shall receive an indication that the call has been diverted with the appropriate diversion cause. According to the served endpoint's local option, the diverted-to user may receive the served user's number.

If multiple diversion has occurred, the diverted-to user may receive the original called number and the last diverting endpoint's number, depending on local options at those two endpoints. When multiple diversion occurs, the diverted-to user may receive the reason for the original diversion as well as for the last diversion.

5.3.3 Calling user notification

As a subscription option of the served user, the calling user may receive a notification that the call has been diverted, and as an additional option that notification may include the diverted-to number.

For single diversion, notifications shall be sent to the calling user depending on the local option of the served endpoint as follows:

- If "No", no notification shall be sent to the calling user.
- If "Yes, without diverted-to number", a notification without diverted-to number shall be sent to the calling user.
- If "Yes, with diverted-to number", a notification with diverted-to number and optionally textual information about the diverted-to user shall be sent to the calling user if presentation is not restricted by user C.

For multiple diversions, notifications shall be sent to the calling user depending on the local options of the served endpoints as follows:

- If endpoint B1 has "No", no notification of diversion shall be sent to endpoint A.
- If endpoint B1 does not have "No", a notification shall be sent to endpoint A as a result of the diversion at endpoint B1. Diversions at successive served endpoints B2, B3, etc. each shall also result in a notification to endpoint A, but only if both:
 - the alerting state has been reached at the served endpoint; and
 - none of the served endpoints has the "No" option.

The number of endpoint C shall be sent to endpoint A, but only if both:

- all served endpoints have "Yes, with diverted-to number"; and
- presentation restriction is not invoked by endpoint C.

In addition, the number of an endpoint Bn may be sent to endpoint A, if the alerting state has been reached at endpoint Bn, if all endpoints B1 to Bn-1 have "Yes, with diverted-to number", and if there is no possibility of presentation restriction being invoked at endpoint Bn.

6 SS-CFB service description

6.1 Description

SS-CFB enables a served user to have calls which are addressed to the served user's number and meet busy, redirected to another endpoint. SS-CFB may operate on all calls, or just those fulfilling specific conditions. The served user's ability to originate calls is unaffected by SS-CFB.

NOTE – Specific conditions, if applicable, are an implementation matter.

The selective operation of SS-CFB on calls associated with a specific basic service is for further study.

CFB is provided on a per number basis.

The maximum number of diversions to a single call is an implementation option. When counting the number of diversions, all types of diversions shall be included.

6.2 Activation/Deactivation/Interrogation/Registration

Subclause 5.2 shall apply with "CFU" replaced by "CFB".

6.3 Invocation and operation

All incoming calls which fulfill the conditions for CFB shall be diverted if the served endpoint is busy.

Subclause 5.3 shall apply with "CFU" replaced by "CFB".

7 SS-CFNR service description

7.1 Description

SS-CFNR enables a served user to have calls which are addressed to the served endpoint's number and for which the connection is not established within a defined period of time, redirected to another endpoint. SS-CFNR may operate on all calls, or just those fulfilling specific conditions. The served user's ability to originate calls is unaffected by SS-CFNR.

NOTE – Specific conditions, if applicable, are an implementation matter.

The selective operation of SS-CFNR on calls associated with a specific basic service is for further study.

CFNR is provided on a per number basis.

The maximum number of diversions to a single call is an implementation option. When counting the number of diversions, all types of diversions shall be included.

7.2 Activation/Deactivation/Interrogation/Registration

Subclause 5.2 shall apply with "CFU" replaced by "CFNR".

7.3 Invocation and operation

An incoming call alerting the served user shall be diverted if the served user does not answer and if the call fulfils the conditions for CFNR.

The original call shall continue to alert the served user, who shall still be able to accept the call until the call to the diverted-to user has reached an alerting state.

For notification of the involved users, 5.3 shall apply with "CFU" replaced by "CFNR".

8 SS-CD service description

8.1 Description

Call Deflection permits a served user to respond to an incoming call offered by the served endpoint by requesting diversion of that call to another number specified in the response. This request is only allowed before the called user has answered the call. The served user's ability to originate calls is unaffected.

CD is invoked on a call-by-call basis.

The maximum number of diversions to a single call is an implementation option. When counting the number of diversions, all types of diversions shall be included.

8.2 Activation/Deactivation/Registration/Interrogation

Not applicable.

8.3 Invocation and operation

The served user can respond to an incoming call offered by normal H.225 basic call procedures by requesting the Call Deflection service. The request shall contain the diverted-to number. The served user can request CD from an alerting state.

On acceptance of the CD request, the served endpoint shall perform the diversion towards the indicated diverted-to number. The original call at the served user shall remain in the alerting state and the served user shall still be able to accept the call until the diverted-to endpoint enters an alerting state. When the diverted-to endpoint enters the alerting state, the call to the served user is cleared.

9 Messages, information elements, operations and procedures

The APDUs of the operations defined in clause 11 shall be conveyed within H.450.1 Supplementary Service APDUs included in User-user information elements, as specified in Recommendation H.450.1.

For remote activation, remote deactivation, remote interrogation, verification of the diverted-to number and served user notification, the call-independent procedures as defined in 6.2/H.450.1 shall apply.

The operations defined in Abstract Syntax Notation One (ASN.1) in clause 11 shall apply.

When conveying the invoke APDU of the operations defined in clause 11, the destinationEntity data element of the NFE shall contain the value "endpoint".

When conveying the invoke APDU of the operations divertingLegInformation1, divertingLegInformation2, divertingLegInformation3, divertingLegInformation4 or cfnrDivertedLegFailed, the interpretation APDU shall be included and shall contain the value discardAnyUnrecognizedInvokePdu. When conveying the invoke APDU of all other operations, the interpretation APDU may be omitted, or may be included with the value rejectAnyUnrecognizedInvokePdu.

9.1 Actions at the Originating endpoint

NOTE – When an Originating endpoint also provides Rerouting functionality, in support of call diversion by rerouting, the joint requirements of both – Originating endpoint (according to this subclause) and Rerouting endpoint (9.4) – will apply, with the exception that any communication between the Originating endpoint functionality and the Rerouting endpoint functionality will be an intra-endpoint matter.

On receipt of a divertingLegInformation1 invoke APDU in a FACILITY or CONNECT message while in basic call protocol control state Outgoing Call Proceeding or Call Delivered and in state CDO-Idle, the Originating endpoint shall take account of the information therein and enter state CDO-Divert. In determining whether to notify the calling user, the Originating endpoint shall take account of the value of element subscriptionOption. If the value noNotification has been received, no notification of diversion shall be given to the calling user. Otherwise, a notification of diversion shall be given to the calling user if the capability exists. The diverted-to number, diverted-to info (textual information about the diverted-to number) and subaddress shall not be presented to the calling user at this stage. When the APDU has been received in a CONNECT message, a divertingLegInformation3 invoke APDU in the same message shall be handled as specified below.

On receipt of a divertingLegInformation1 invoke APDU in a FACILITY or CONNECT message while in state CDO-Divert, the Originating endpoint shall take account of the information therein and remain in the same state. If the value of element diversionReason is cfu or cfb, no notification of this further diversion shall be given to the calling user. If the value of element diversionReason is cfnr, account shall be taken of the value of element subscriptionOption in this APDU and in all previously received divertingLegInformation1 invoke APDUs for this call. If this or any previous value is noNotification, no notification shall be given to the calling user. Otherwise, a notification of further diversion shall be given to the calling user if the capability exists. The diverted-to number, diverted-to info (textual information about the diverted-to number) and subaddress shall not be presented to the calling user at this stage. When the APDU has been received in a CONNECT message, a divertingLegInformation3 invoke APDU in the same message shall be handled as specified below.

On receipt of a divertingLegInformation3 invoke APDU in an ALERTING, CONNECT or FACILITY message while in state CDO-Divert, the Originating endpoint shall take account of the information therein, shall remain in the same state if received in an ALERTING or FACILITY message, and shall enter state CDO-Idle if received in a CONNECT message. The diverted-to number (as received in divertingLegInformation3 invoke APDU as argument redirectionNr or as received in element nominatedNr of the last received divertingLegInformation1 invoke APDU, if not contained in divertingLegInformation3) and optionally argument redirectionInfo shall be presented to the calling user, if the capability exists, only if all of the following conditions are true:

- all previously received divertingLegInformation1 invoke APDUs contained value notificationWithDivertedToNr in element subscriptionOption; and
- this and any previously received divertingLegInformation3 invoke APDUs contained value TRUE in element PresentationAllowedIndicator; and
- no previous notification of a diverted-to number has been given to the calling user unless, since then, a divertingLegInformation1 invoke APDU with value cfnr in element diversionReason has been received.

On receipt of a CONNECT message, the Originating endpoint shall enter state CDO-Idle.

9.2 Actions at a gatekeeper

As an option, in case of the gatekeeper routed model, the procedures described in the following subclauses may apply to a gatekeeper. Otherwise, the call diversion actions at the gatekeeper are limited to transparent transport of H.450.1 Supplementary Service APDUs.

9.2.1 Partial rerouting

A gatekeeper which is capable of acting as a rerouting endpoint for call diversion may decide to become the destination for a callRerouting invoke APDU received in a FACILITY message if it is capable also of being the destination of all other APDUs contained in this message. Further actions shall apply as defined for a rerouting endpoint.

9.2.2 Activation/Deactivation/Interrogation/Verification of diverted-to number

A gatekeeper which is capable of acting as a served endpoint for call diversion may decide to become the destination for an activateDiversionQ invoke APDU (gatekeeper routed model).

A gatekeeper shall become the destination for a deactivateDiversionQ invoke APDU if a related diversion activation exists at the gatekeeper.

Call diversion may be activated/deactivated in the gatekeeper by the activating/deactivating endpoint sending an activateDiversionQ/deactivateDiversionQ invoke APDU to the gatekeeper's call signalling address. This may be achieved e.g. as follows. If a gatekeeper is capable of acting as the served entity for call diversion, it may respond to an ARQ message by returning an ACF message containing its own call signalling address (rather than the call signalling address of the forwarding terminal).

Alternatively, call diversion may be activated/deactivated in the gatekeeper using local or administration procedures.

A gatekeeper shall become the destination for an interrogateDiversionQ invoke APDU if a related diversion activation exists at the gatekeeper.

As a consequence of deciding to become the endpoint for an activateDiversionQ invoke APDU, the gatekeeper shall be capable of sending a checkRestriction invoke APDU for verification of the diverted-to number.

For the procedures described above, the actions as defined for a served endpoint in 9.3 apply.

9.2.3 Invocation

9.2.3.1 Invocation of call forwarding unconditional

If call forwarding unconditional is activated in the gatekeeper for an incoming call destined for user B (being the served user), the gatekeeper shall act as served endpoint and optionally also as a rerouting endpoint for invocation of call forwarding unconditional for this call.

If the option "served user notification" applies, the gatekeeper shall send a divertingLegInformation4 invoke APDU to the called terminal using the call-independent procedures as defined in 6.2/H.450.1. The gatekeeper is responsible for clearing the call-independent connection.

9.2.3.2 Invocation of call forwarding on user busy

If call forwarding busy is activated in the gatekeeper for an incoming call destined for user B (being the served user), the gatekeeper shall continue H.225 call establishment to endpoint B. The gatekeeper shall act as served endpoint and optionally also as a rerouting endpoint for invocation of call forwarding on busy for this call, if a RELEASE COMPLETE message is received from endpoint B containing Cause value "user busy".

If the option "served user notification" applies, the gatekeeper shall send a divertingLegInformation4 invoke APDU to the called terminal using the call-independent procedures as defined in 6.2/H.450.1. The gatekeeper is responsible for clearing the call-independent connection.

9.2.3.3 Invocation of call forwarding on no answer

If call forwarding on no answer is activated in the gatekeeper for an incoming call destined for user B (being the served user), the gatekeeper shall start a local "no-response" timer and shall continue H.225 call establishment to endpoint B. The gatekeeper shall act as served endpoint and optionally also as a rerouting endpoint for invocation of call forwarding on no reply for this call if the local no-response timer expires during the alerting phase of the call.

If the option "served user notification" applies, the gatekeeper shall send a divertingLegInformation4 invoke APDU to the called terminal. The divertingLegInformation4 invoke APDU may either be sent within a FACILITY message on the existing call reference or may be sent to the called terminal using the call-independent procedures as defined in 6.2/H.450.1. The gatekeeper is responsible for clearing the call-independent connection.

9.2.4 Interaction with H.323 Ad hoc conference

Calls that are established as part of an H.323 Ad hoc conference for inviting further endpoints into the conference may be subject to call diversion. If the gatekeeper acts as rerouting endpoint for call diversion, the gatekeeper may send divertingLegInformation1 invoke APDUs to other members of the conference (in addition to sending a divertingLegInformation1 invoke APDU to the calling party), unless element subscriptionOption contains the value "no notification".

9.3 Actions at the Served endpoint

9.3.1 Activation

On receipt of an activateDiversionQ invoke APDU using the call reference of a call-independent signalling connection, the Served endpoint shall verify that remote activation is supported and enabled for the served user (element servedUserNr). The address of the activating endpoint (element activatingUserNr) may also be taken into account in determining whether activation is to be allowed to proceed.

The Served endpoint may use different procedures and local techniques for verifying, as far as possible, that the diverted-to number (element divertedToAddress) is valid. If the activation request is acceptable, the Served endpoint shall activate diversion of the type indicated by the element procedure, answer the activateDiversionQ invoke APDU with a return result APDU, store the received diverted-to number and the subaddress, if provided, and optionally convey an appropriate notification to the served user.

Element basicService of the activateDiversionQ invoke APDU shall be accepted if set to allServices; other values may be ignored (i.e. treated as if allServices were received) or treated as error.

If the activation request is not accepted, an activateDiversionQ return error shall be returned.

9.3.2 Deactivation

On receipt of a deactivateDiversionQ invoke APDU using the call reference of a call-independent signalling connection, the Served endpoint shall check the validity of the request. The address of the deactivating endpoint (element deactivatingUserNr) may also be taken into account in determining whether deactivation is to be allowed to proceed.

If the deactivation request is valid, the Served endpoint shall deactivate diversion of the type indicated by the element procedure, answer the deactivateDiversionQ invoke APDU with a return result APDU and optionally convey an appropriate notification to the served user.

Element basicService of deactivateDiversionQ invoke APDU shall be accepted if set to allServices; other values may be ignored (i.e. treated as if allServices were received) or treated as error.

If the deactivation request is not accepted, a deactivateDiversionQ return error APDU shall be returned.

9.3.3 Interrogation

On receipt of an interrogateDiversionQ invoke APDU using the call reference of a call-independent signalling connection, the Served endpoint shall check the interrogation request and answer the interrogateDiversionQ invoke APDU with a return result APDU if the interrogation request is valid. The address of the interrogating endpoint (element interrogatingUserNr) may also be taken into account in determining whether interrogation is to be allowed to proceed.

If the interrogation request is not accepted, an interrogateDiversionQ return error APDU shall be returned.

9.3.4 Verification of the diverted-to endpoint's number

The Served endpoint may use the procedure below to check with the diverted-to endpoint whether the diverted-to number exists and whether there are any restrictions which might prevent call diversion.

The Served endpoint shall send a checkRestriction invoke APDU to the diverted-to endpoint using the call reference of a call-independent signalling connection. The call-independent signalling connection shall be established (or used, if an appropriate connection is already available) in accordance with the procedures specified in Recommendation H.450.1. The CDS-Act-Wait state shall be entered and timer T5 shall be started.

On receipt of a return result APDU in reply to the checkRestriction invoke APDU, the Served endpoint shall treat the diverted-to number as a valid number, enter the CDS-Act-Idle state and stop timer T5.

On receipt of a checkRestriction return error or reject APDU, the Served endpoint shall treat the diverted-to number as a valid number, enter state CDS-Act-Idle and stop timer T5.

Expiry of timer T5 before an answer is received from the diverted-to endpoint shall be equivalent to receipt of a reject APDU.

The Served endpoint is responsible for clearing the call-independent signalling connection towards the diverted-to endpoint. This may occur on receipt of a return result or return error APDU or on T5 expiry. Alternatively, the signalling connection may be retained for other applications, if appropriate.

9.3.5 Invocation

The detection of a situation leading to a call diversion invoke request is a local procedure in the Served endpoint.

When SS-DIV is invoked, a callRerouting invoke APDU shall be sent in a call-related FACILITY message to the Rerouting endpoint and the CDS-Requested state shall be entered. Sending of the FACILITY message for SS-CFU and SS-CFB shall be applicable in the basic call protocol control state Incoming Call Proceeding. Sending of the FACILITY message for SS-CFNR(SS-CD) shall be applicable in the basic call protocol control state Call Received.

The timer T1 shall be started by the Served endpoint on entering the CDS-Requested state. The timer shall be stopped on receipt of a return result, return error or reject APDU of the callRerouting operation.

The following data elements and information elements shall be included in the argument of the callRerouting invoke APDU:

- element reroutingReason containing the reason for the last diversion, indicating a value other than unknown;
- element originalReroutingReason, only in the case of multiple diversions, containing the reason for the original diversion;
- element calledAddress as stored in the Served endpoint as diverted-to number and, possibly, subaddress;
- element diversionCounter containing the number of diversions undergone by the call (value ONE if this is the first diversion);
- element h225InfoElement containing an embedded Bearer capability information element, if received in the incoming SETUP message, and any of the following information elements which were received in the incoming SETUP message: High layer compatibility, Low layer compatibility, Progress indicator and User-user;
- element lastReroutingNr containing the number of the last diverting endpoint;
- element subscriptionOption containing the served user's requirements for notifying the calling user;
- element callingPartySubaddress if a Calling party subaddress information element was received in the incoming SETUP message;
- element callingNumber as received in the incoming SETUP message in the Calling party number information element and/or in the sourceAddress field of the Setup-UIIE;
- element originalCalledNr, only in case of multiple call forwarding, containing the number of the original called endpoint;
- if available, textual information about the calling user, redirecting user and original called user may be sent in callingInfo, redirectingInfo and originalCalledInfo respectively.

On receipt of the return result APDU of the callRerouting operation, the Served endpoint shall enter the CDS-Inv-Idle state and may send an appropriate notification to the served user.

On receipt of a callRerouting return error or reject APDU or on expiry of timer T1, the action shall be implementation dependent.

9.4 Actions at the Rerouting endpoint

NOTE – When an Originating endpoint also provides Rerouting functionality, in support of call diversion by rerouting, the joint requirements of both – Originating endpoint (according to 9.1) and Rerouting endpoint (this subclause) – will apply, with the exception that any communication between the Originating endpoint functionality and the Rerouting endpoint functionality will be an intra-endpoint matter.

On receipt of a callRerouting invoke APDU in a FACILITY message during basic call protocol control state Outgoing Call Proceeding for SS-CFU/SS-CFB and Call Delivered for SS-CFNR(CD), the Rerouting endpoint shall check if the diversion request is valid. If the diversion request can be performed, the Rerouting endpoint shall answer the callRerouting invoke APDU with a return result APDU in a FACILITY message, shall initiate a new call establishment to the new destination (diverted-to endpoint) and in the case of SS-CFU or SS-CFB shall release the leg towards the Served endpoint by sending a RELEASE COMPLETE message. In the case of SS-CFU or SS-CFB, the return result APDU may instead be conveyed in the RELEASE COMPLETE message.

The SETUP message for the new call establishment shall include a divertingLegInformation2 invoke APDU.

The following specific basic call information elements shall be included:

- The information received in the element calledAddress of the callRerouting invoke APDU shall be included into the Called party number information element and/or into field destinationAddress of Setup-UUIE; if subaddress information is present, it shall be put into the Called party subaddress information element.
- The information received in the element callingNumber of the callRerouting invoke APDU shall be included into the Calling party number information element and/or into field sourceAddress of Setup-UUIE; if subaddress information is present, it shall be put into the Calling party subaddress information element.
- The Bearer capability information element if received in embedded form within the callRerouting invoke APDU, and any of the following information elements which may also have been received in embedded form in this APDU: (High layer compatibility, Low layer compatibility: for further study) and Progress indicator information elements.

The following data elements shall be included in the argument of the divertingLegInformation2 invoke APDU:

- element diversionCounter as received in the callRerouting invoke APDU;
- element diversionReason as received in the element reroutingReason of the callRerouting invoke APDU;
- element originalDiversionReason if received in the element originalReroutingReason of the callRerouting invoke APDU;
- element divertingNr as received in the element lastReroutingNr of the callRerouting invoke APDU;
- optionally redirectingInfo (textual information about the diverting user as received in callRerouting invoke APDU);
- optionally elements originalCalledNr and originalCalledInfo if received in the callRerouting invoke APDU.

The parameter reroutingReason received in the callRerouting invoke APDU shall indicate to the Rerouting endpoint whether the SS-CFU/SS-CFB or the SS-CFNR procedure is to be performed.

After the new SETUP message has been sent, the procedures of the Rerouting endpoint are split into two cases, SS-CFU/SS-CFB and SS-CFNR(CD):

- For SS-CFU/SS-CFB, the Rerouting endpoint shall send a call-related FACILITY message with a divertingLegInformation1 invoke APDU to the Originating endpoint. The two remaining legs of the call shall be joined together (Originating endpoint – Diverted-to endpoint).
- For SS-CFNR(CD), the Rerouting endpoint shall move from the CDR-Idle state into the CDR-Invoked state and wait for further events as follows:
 - On receipt of an ALERTING message from the Diverted-to endpoint, the Rerouting endpoint shall initiate call clearing towards the Served endpoint according to Recommendation H.225.0, send a divertingLegInformation1 invoke APDU in a FACILITY message to the Originating endpoint and enter the CDR-Idle state. The two remaining legs of the call shall be joined together (Originating endpoint – Diverted-to endpoint).
 - On receipt of a CONNECT message (if previously no ALERTING has been received) from the Diverted-to endpoint, the Rerouting endpoint shall initiate call clearing towards the Served endpoint according to Recommendation H.225.0, send a divertingLegInformation1 invoke APDU in the CONNECT message to the Originating

endpoint and enter the CDR-Idle state. The two remaining legs of the call shall be joined together (Originating endpoint – Diverted-to endpoint).

- On receipt of a CONNECT message from the Served endpoint, the Rerouting endpoint shall initiate call clearing towards the Diverted-to endpoint according to Recommendation H.225.0 and enter the CDR-Idle state. The CONNECT message shall be relayed to the Originating endpoint according to Recommendation H.225.0. The original call shall remain (Originating endpoint – Served endpoint).

NOTE – divertingLegInformation1 is applicable to be sent by the Rerouting endpoint, if the Rerouting endpoint is different from the calling endpoint, e.g. in case of the Rerouting endpoint being a gateway or a gatekeeper. If the Rerouting endpoint and the calling endpoint are the same, the divertingLegInformation1 is an intra-endpoint communication within the Rerouting/calling endpoint.

The argument of the divertingLegInformation1 invoke APDU shall include elements diversionReason, subscriptionOption and nominatedNr as received in the argument of the callRerouting invoke APDU in the elements reroutingReason, subscriptionOption and calledAddress, respectively. The argument of the divertingLegInformation1 invoke APDU may include elements nominatedInfo (textual information about the diverted-to user, if available), redirectingNr (as received in lastReroutingNr of callRerouting invoke APDU) and redirectingInfo (as received in redirectingInfo of callRerouting invoke APDU).

After the two legs of the call have been joined together, the Rerouting endpoint shall return to state CDR-Idle.

If the diversion request cannot be performed on receipt of a callRerouting invoke APDU, a return error APDU including the appropriate error value shall be sent back in a FACILITY message.

For events received for SS-CFNR(CD), in the CDR-Invoked state, the Rerouting endpoint shall perform the following actions:

On receipt of a RELEASE COMPLETE message from the Diverted-to endpoint, the Rerouting endpoint shall complete call clearing towards the Diverted-to endpoint, send a cfnrDivertedLegFailed invoke APDU in a FACILITY message to the Served endpoint and enter the CDR-Idle state. The original call shall remain (Originating endpoint – Served endpoint).

On receipt of a call clearing message from the Originating endpoint or Served endpoint, the Rerouting endpoint shall continue call clearing according to H.225.0, stimulate release of the remaining two legs of the call and enter the CDR-Idle state.

9.5 Actions at the Diverted-to endpoint

9.5.1 Invocation

On receipt of a SETUP message with a divertingLegInformation2 invoke APDU, the Diverted-to endpoint shall enter the CDF-Inv-Wait state. A diversion notification and the redirecting number and redirectingInfo (and the original called number and originalCalledInfo in case of multiple diversion) as received shall be conveyed together with the basic call establishment information to the called user if able and authorized to receive the notification.

When it is known whether presentation restriction applies to the diverted-to number, the Diverted-to endpoint shall enter the CDF-Inv-Idle state and send a divertingLegInformation3 invoke APDU in a FACILITY, ALERTING or CONNECT message to the Originating endpoint. This information shall indicate whether the presentation of the diverted-to number is restricted and may indicate the diverted-to number (in argument redirectionNr) and textual information about the diverted-to user (in argument redirectionInfo). The Diverted-to endpoint shall not send a FACILITY message with a divertingLegInformation3 invoke APDU unless an ALERTING message has already been sent in

case of SS-CFNR(CD). The APDU shall be sent in the CONNECT message if it has not already been sent in a FACILITY or ALERTING message.

9.5.2 Verification of the Diverted-to endpoint's number

On receipt of a checkRestriction invoke APDU using the call reference of a call-independent signalling connection (as specified in Recommendation H.450.1), the Diverted-to endpoint shall check if the address of the intended diverted-to endpoint (element divertedToNr in the argument) exists and if there are any restrictions (e.g. basic service) which could prevent call diversion from the served endpoint (element servedUserNr in the argument) to that endpoint. A checkRestriction return result APDU shall be sent back to the Served endpoint if there are no restrictions.

A checkRestriction return error APDU shall be sent back to the Served endpoint if diversion is not acceptable.

9.6 Actions at the Activating endpoint

On receipt of a remote activation request from the activating user, the Activating endpoint shall send an activateDiversionQ invoke APDU to the Served endpoint using the call reference of a call-independent signalling connection. The call-independent signalling connection shall be established (or used, if an appropriate connection is already available) in accordance with the procedures specified in Recommendation H.450.1. The Activating endpoint shall enter the CDA-Wait state and start timer T2. On receipt of the activateDiversionQ return result, return error or reject APDU, the Activating endpoint shall stop timer T2, revert to the CDA-Idle state and report the outcome back to the activating user.

Expiry of timer T2 shall be equivalent to receiving a reject APDU.

The Activating endpoint is responsible for clearing the call-independent signalling connection towards the Served endpoint. This may occur on receipt of a return result, return error or reject APDU or on T2 expiry. Alternatively, the signalling connection may be retained for other applications, if appropriate.

9.7 Actions at the Deactivating endpoint

On receipt of a remote deactivation request from the deactivating user, the Deactivating endpoint shall send a deactivateDiversionQ invoke APDU to the Served endpoint using the call reference of a call-independent signalling connection. The call-independent signalling connection shall be established (or used, if an appropriate connection is already available) in accordance with the procedures specified in Recommendation H.450.1. The Deactivating endpoint shall enter the CDD-Wait state and start timer T3. On receipt of the deactivateDiversionQ return result, return error or reject APDU, the Deactivating endpoint shall stop timer T3, revert to the CDD-Idle state and report the outcome back to the deactivating user.

Expiry of timer T3 shall be equivalent to receiving a reject APDU.

The Deactivating endpoint is responsible for clearing the call-independent signalling connection towards the Served endpoint. This may occur on receipt of a return result, return error or reject APDU or on T3 expiry. Alternatively, the signalling connection may be retained for other applications, if appropriate.

9.8 Actions at the Interrogating endpoint

On receipt of a remote interrogate request from the interrogating user, the Interrogating endpoint shall send an interrogateDiversionQ invoke APDU to the Served endpoint using the call reference of a call-independent signalling connection. The call-independent signalling connection shall be

established (or used, if an appropriate connection is already available) in accordance with the procedures specified in Recommendation H.450.1. The Interrogating endpoint shall enter the CDI-Wait state and start timer T4. On receipt of the interrogateDiversionQ return result or return error or reject APDU, the Interrogating endpoint shall stop timer T4, revert to the CDI-Idle state and convey the result or error back to the interrogating user.

Expiry of timer T4 shall be equivalent to receiving a reject APDU.

The Interrogating endpoint is responsible for clearing the call-independent signalling connection towards the Served endpoint. This may occur on receipt of a return result, return error or reject APDU. Alternatively, the signalling connection may be retained for other applications, if appropriate.

9.9 Interactions

9.9.1 Interactions with gatekeeper routed model

Refer to 9.2.

9.9.2 Interaction with other supplementary services

For further study.

10 Dynamic description of Call Diversion

The following subclauses show examples of call diversion scenarios by describing the operational model and corresponding signalling flows.

10.1 Operational models and signalling flows

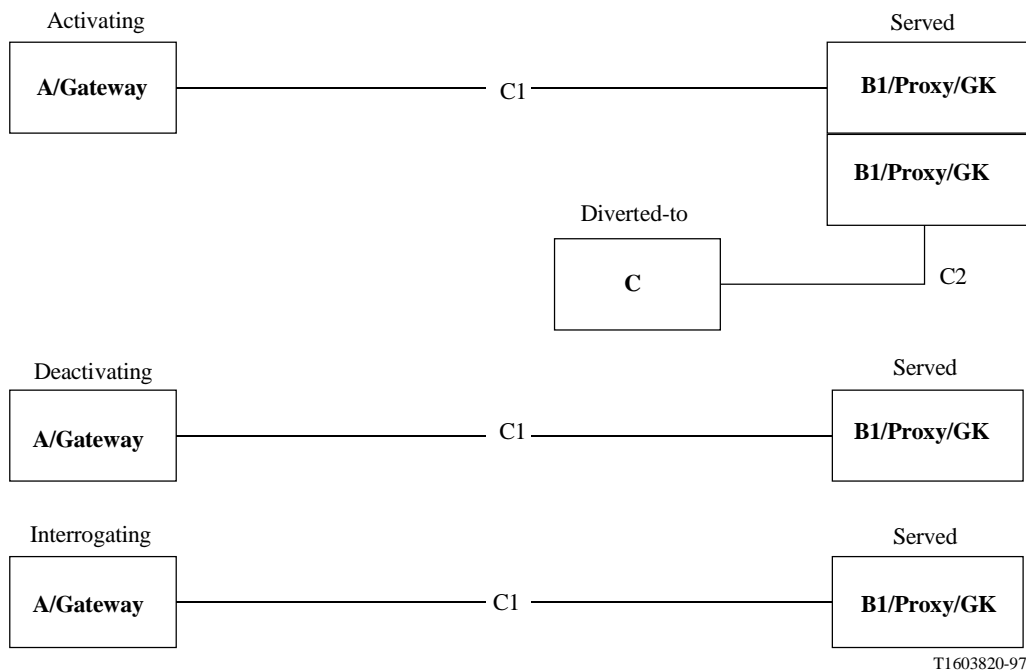


Figure 1/H.450.3 – Operational model for remote activation/ deactivation/interrogation of call forwarding

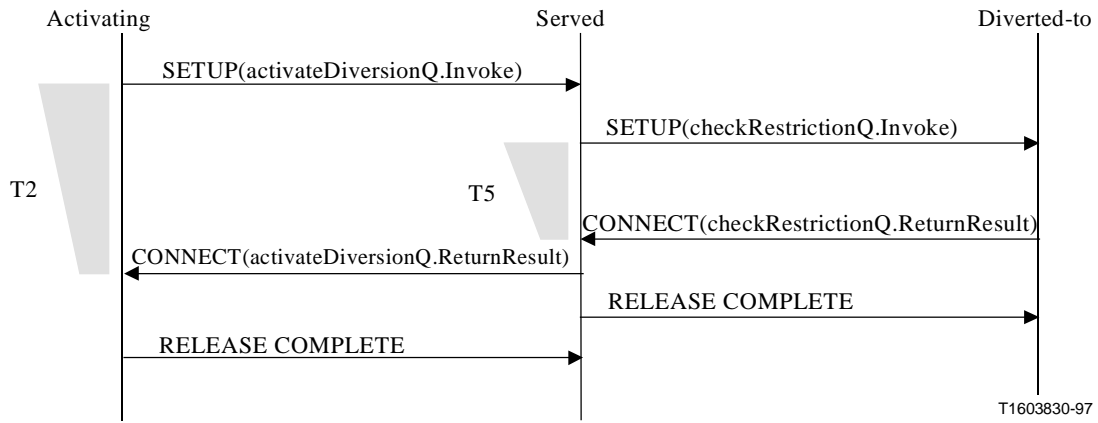


Figure 2/H.450.3 – Signalling flow for remote activation of call forwarding

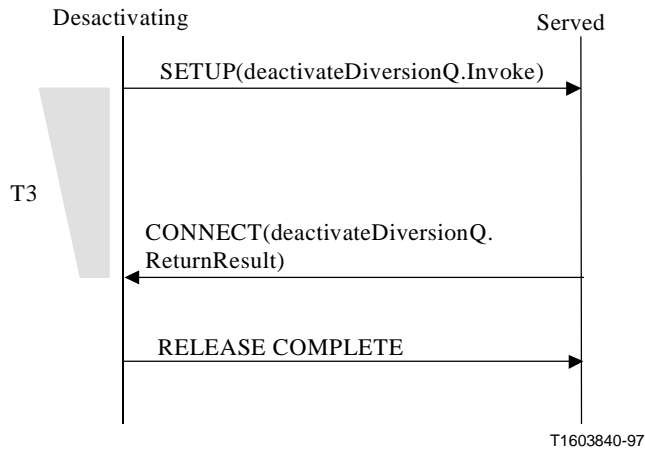


Figure 3/H.450.3 – Signalling flow for remote deactivation of call forwarding

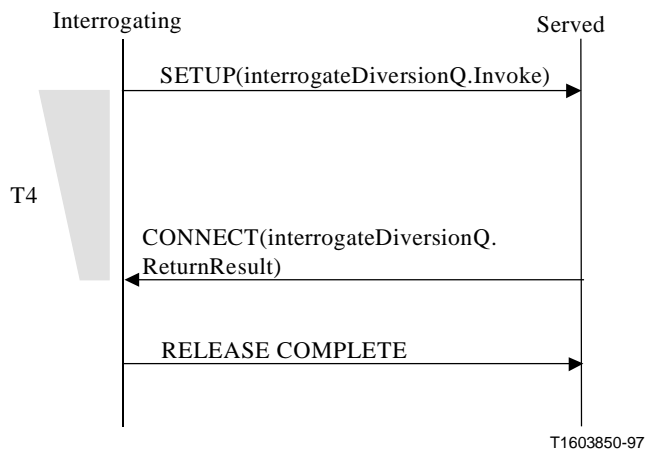


Figure 4/H.450.3 – Signalling flow for remote interrogation of call forwarding

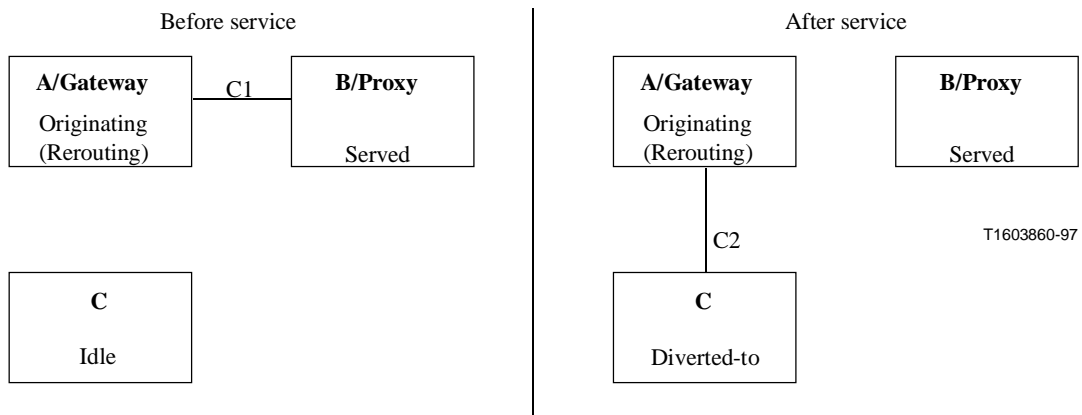


Figure 5/H.450.3 – Operational model for call forwarding immediate (CFU, CFB) with rerouting

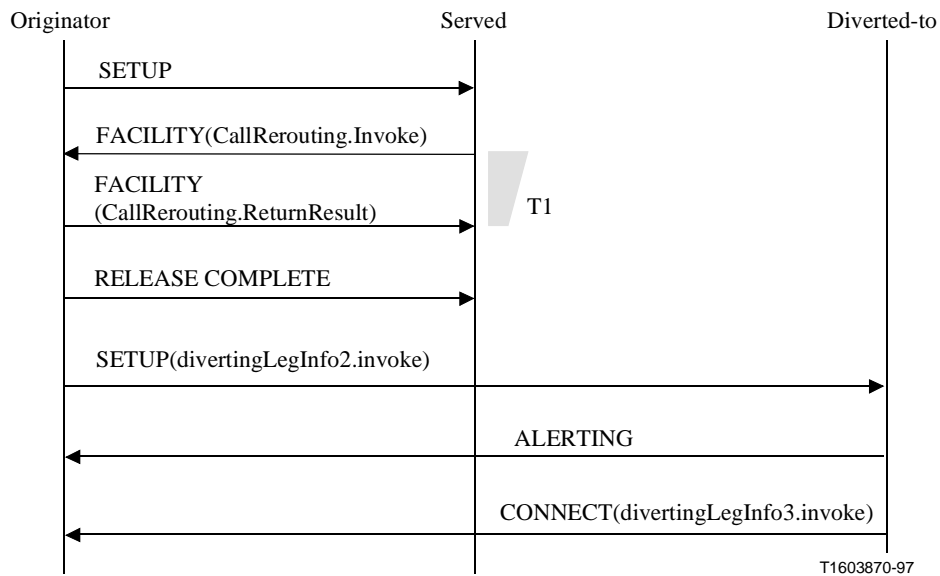


Figure 6/H.450.3 – Signalling flow for call forwarding immediate (CFU, CFB) with rerouting

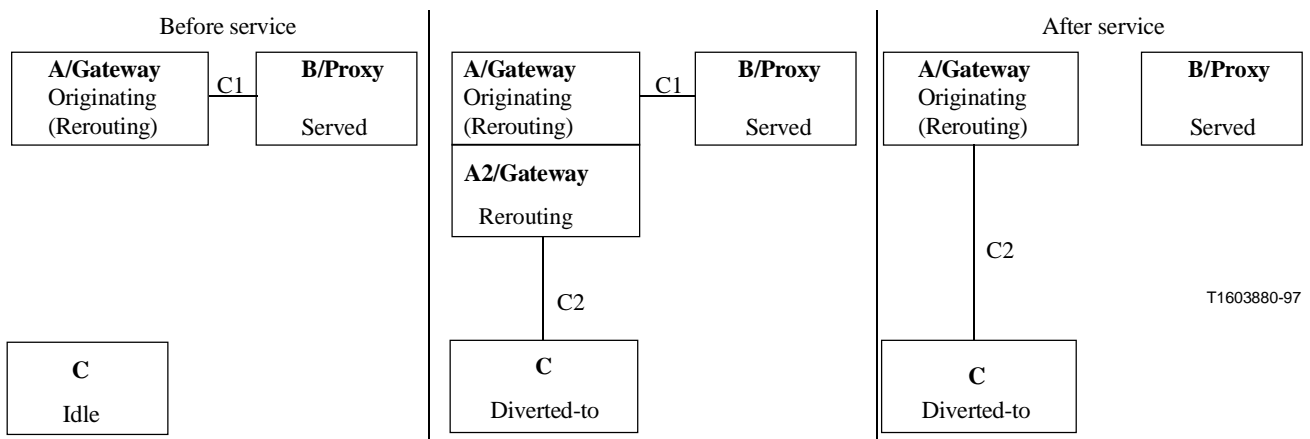


Figure 7/H.450.3 – Operational model for call forwarding delayed (CFNR, CD) with rerouting

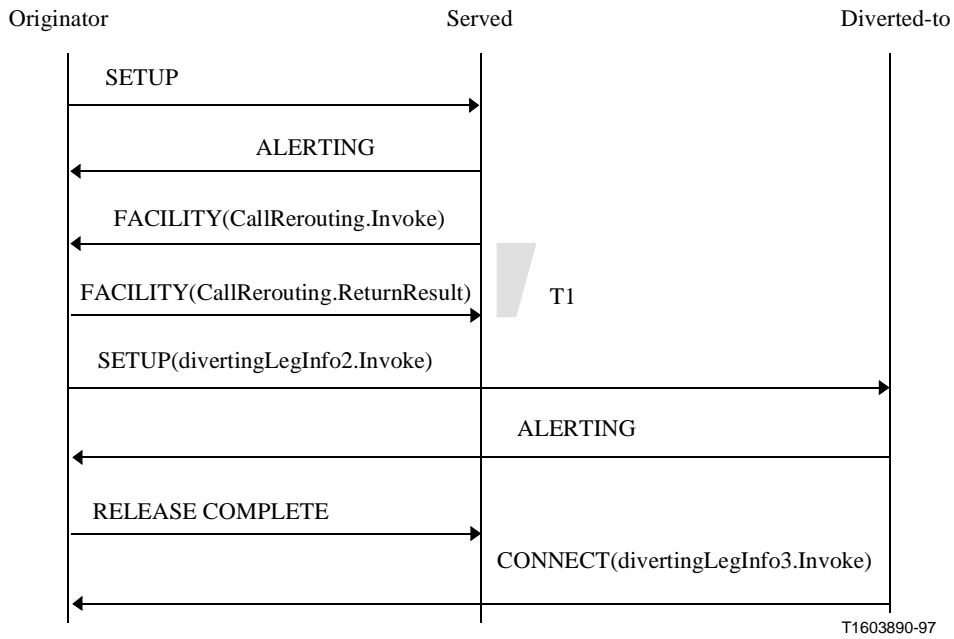
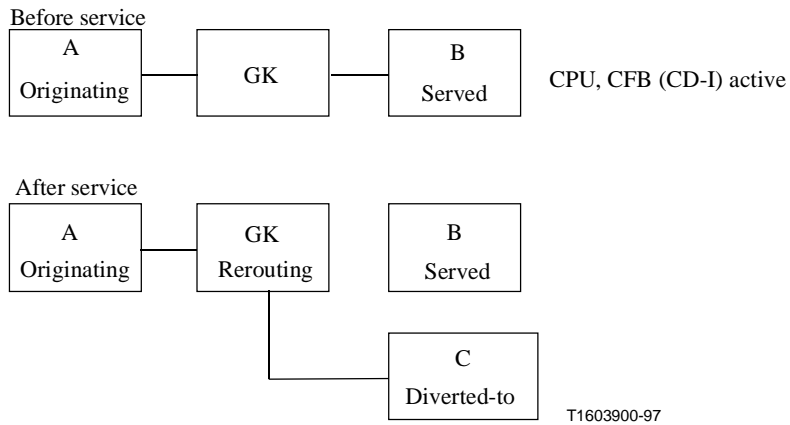


Figure 8/H.450.3 – Signalling flow for call forwarding delayed (CFNR, CD) with rerouting



NOTE – Gatekeeper routed model required for this scenario.

Figure 9/H.450.3 – Operational model for call forwarding partial rerouting in gatekeeper

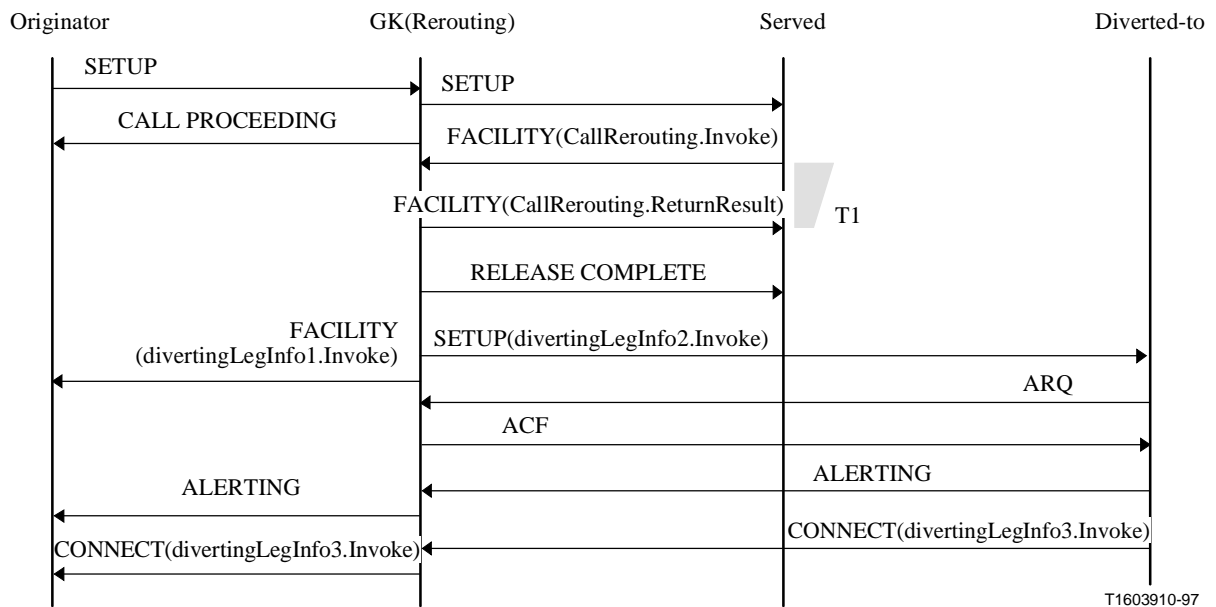
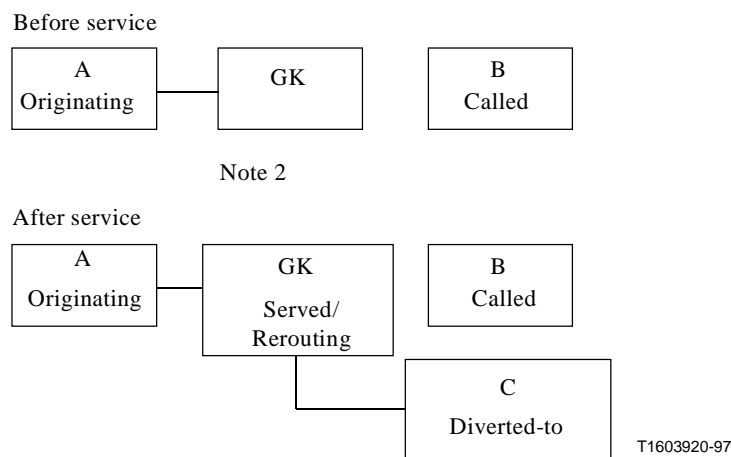


Figure 10/H.450.3 – Signalling flow for call forwarding partial rerouting in gatekeeper



NOTE 1 – Gatekeeper routed model required for this scenario.
 NOTE 2 – CFU activated in GK for all calls destined to endpoint B

Figure 11/H.450.3 – Operational model for CFU invoked by gatekeeper

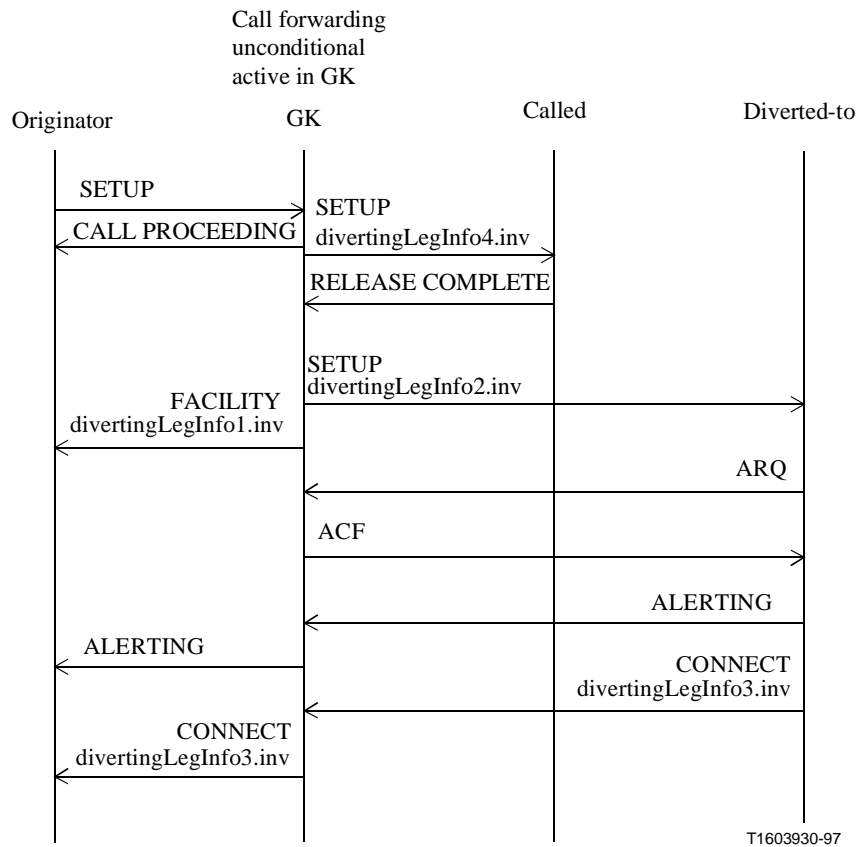
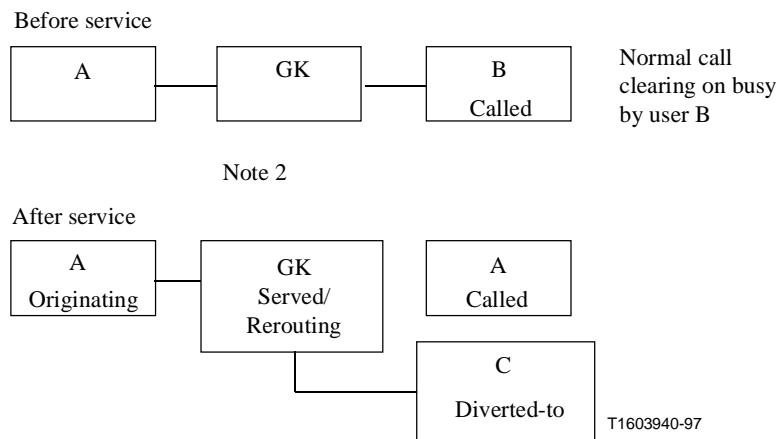


Figure 12/H.450.3 – Signalling flow for CFU invoked by gatekeeper



NOTE 1 – Gatekeeper routed model required for this scenario.
 NOTE 2 – CFB activated in GK for all calls to user B that meet busy condition at user B.

Figure 13/H.450.3 – Operational model for CFB invoked by gatekeeper on user B busy

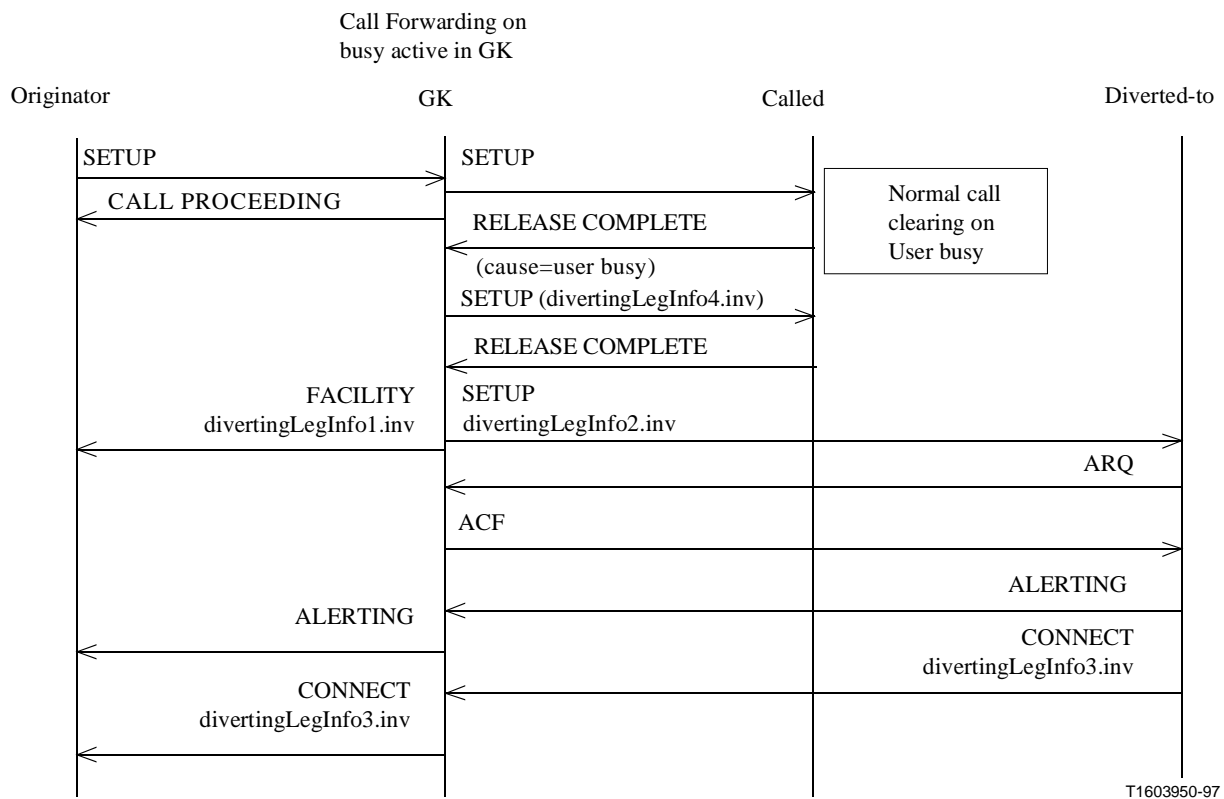
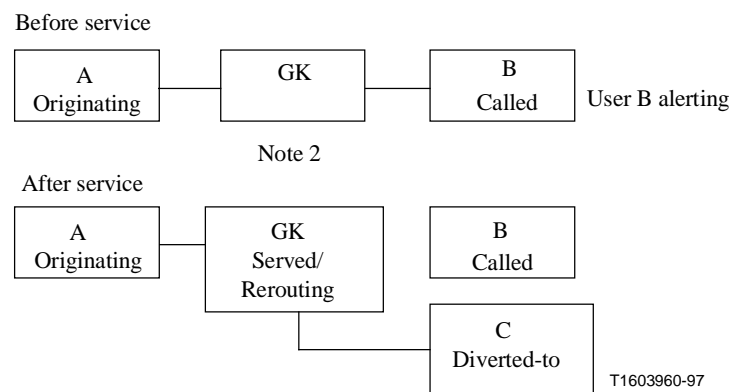


Figure 14/H.450.3 – Signalling flow for CFB invoked by gatekeeper on user B busy



NOTE 1 – Gatekeeper routed model required for this scenario.
 NOTE 2 – CFNR activated in GK for all calls to user B that do not reach active H.225 call state within a predefined time.

Figure 15/H.450.3 – Operational model for CFNR invoked by gatekeeper on user B no answer

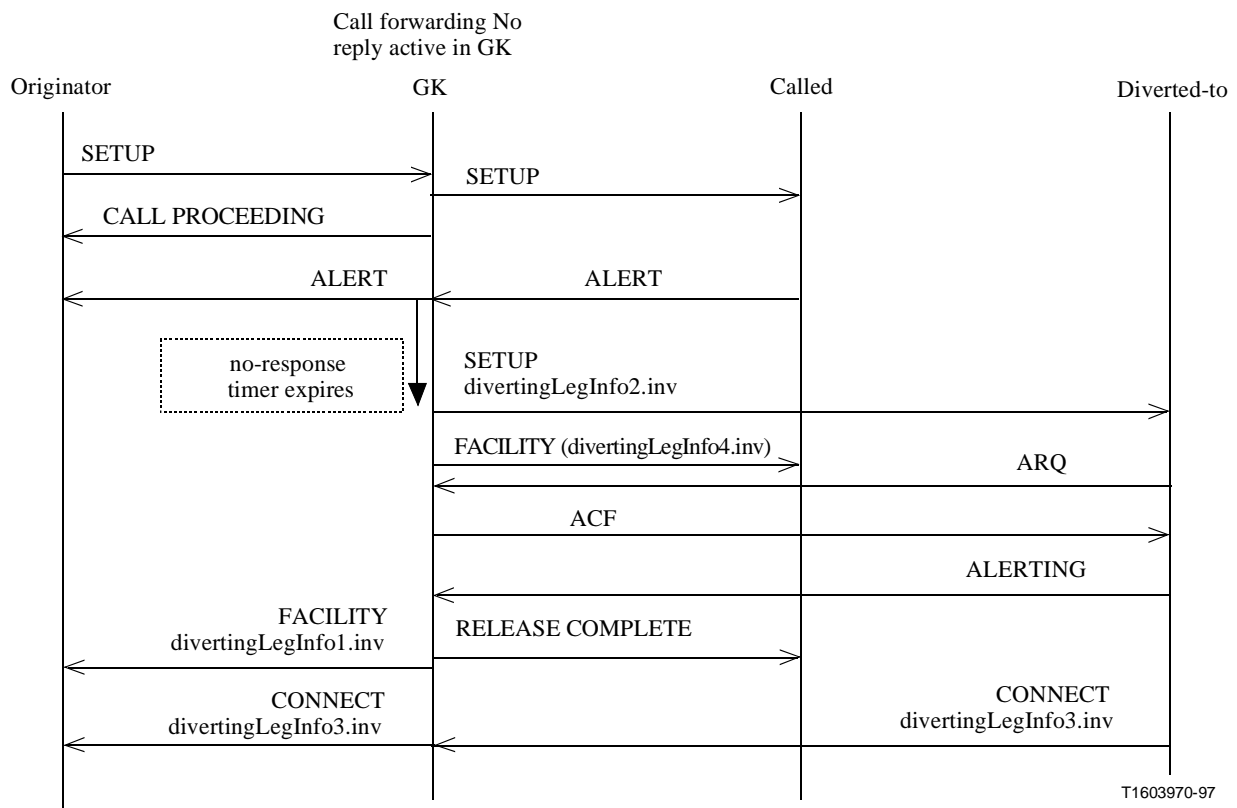


Figure 16/H.450.3 – Signalling flow for CFNR invoked by gatekeeper on user B no answer

10.2 Communication between CDO (Originating) signalling entity and CDO signalling entity user

10.2.1 Table of primitives

Table 1/H.450.3 – Table of primitives for CDO Signalling Entity

| Generic name | Type | | | |
|--------------------------|---------------------------|------------|-------------|-------------|
| | request | indication | response | confirm |
| divertingLegInformation1 | Not defined ^{a)} | PARAMETERS | Not defined | Not defined |
| divertingLegInformation3 | Not defined ^{a)} | PARAMETERS | Not defined | Not defined |
| diverting | Not defined ^{a)} | PARAMETERS | Not defined | Not defined |

^{a)} "Not defined" means that this primitive is not defined.

10.2.2 Primitive definition

The divertingLegInformation1.ind and divertingLegInformation3.ind primitives may be received from the local CDR signalling entity (if CDO and CDR signalling entity are located in the same endpoint).

The diverting.ind primitive is used to indicate diversion information to the CDO signalling entity user. Depending on the arguments subscriptionOption, diversionReason and presentationAllowedIndicator received from the peer entities or received as parameters from the

internal CDR signalling entity, the CDO signalling entity has to decide whether to present all available call diversion information to the CDO signalling entity user, to present no call diversion information or to present just portions of the available call diversion information.

10.2.3 Parameters

divertingLegInformation1.ind

- diversionReason: type of call diversion;
- subscriptionOption: call diversion presentation/presentation restriction rules at originating user;
- nominatedNumber: number of the diverted-to user;
- nominatedInfo: textual information about the diverted-to user;
- redirectingNr: number of the forwarding user;
- redirectingInfo: textual information about the forwarding user;
- extension: placeholder for manufacturer specific extensions.

divertingLegInformation3.ind

- presentationAllowedIndicator: presentation/restriction information set by diverted-to user;
- redirectionNumber: number of diverted-to user;
- redirectionInfo: textual information about the diverted-to user;
- extension: placeholder for manufacturer specific extensions.

diverting.ind

- diversionReason: type of call diversion;
- divertedToNumber: number of the diverted-to user;
- divertedToInfo: textual information about the diverted-to user;
- extension: placeholder for manufacturer specific extensions.

10.2.4 States

- CDO-Idle: No divertingLegInformation1 invoke APDU has been received;
- CDO-Divert: The divertingLegInformation1 invoke APDU has been received and the local option of the served user and the diverted-to number have been stored.

10.3 Communication between CDS (Served) signalling entity and CDS signalling entity user

10.3.1 Table of primitives

Table 2/H.450.3 – Table of primitives for CDS signalling entity

| Generic name | Type | | | |
|-----------------------|---------------------------|-------------|-------------|-------------|
| | request | indication | response | confirm |
| activateDiversionQ | Not defined ^{a)} | PARAMETERS | PARAMETERS | Not defined |
| deactivateDiversionQ | Not defined | PARAMETERS | PARAMETERS | Not defined |
| interrogateDiversionQ | Not defined | PARAMETERS | PARAMETERS | Not defined |
| checkRestriction | PARAMETERS | Not defined | Not defined | PARAMETERS |

Table 2/H.450.3 – Table of primitives for CDS signalling entity (concluded)

| Generic name | Type | | | |
|---------------------------------------|--------------------------|--------------------------|-------------|-------------|
| | request | indication | response | confirm |
| callRerouting | PARAMETERS | Not defined | Not defined | PARAMETERS |
| cfDivertingLegFailed | Not defined | – ^{b)} | Not defined | Not defined |
| divertingLegInformation ^{d)} | PARAMETERS ^{c)} | PARAMETERS ^{d)} | Not defined | Not defined |

a) "Not defined" means that this primitive is not defined.
b) "–" means no parameters.
c) Applicable only for gatekeeper, if it performs call diversion for the terminal (see 9.2.3).
d) Applicable for a terminal, if the gatekeeper performs call diversion for the terminal.

10.3.2 Primitive definition

- a) The activateDiversionQ.ind. primitive is used to indicate the forwarding-activation request.
- b) The activateDiversionQ.resp. primitive is used to respond to the forwarding-activation request.
- c) The deactivateDiversionQ.ind. primitive is used to indicate the forwarding-deactivation request.
- d) The deactivateDiversionQ.resp. primitive is used to respond to the forwarding-deactivation request.
- e) The interrogateDiversionQ.ind. primitive is used to indicate the interrogation request.
- f) The interrogateDiversionQ.resp. primitive is used to respond to the interrogation request.
- g) The checkRestriction.req. primitive is used to request the restriction-check.
- h) The checkRestriction.conf. primitive is used to confirm the result of the restriction-check.
- i) The callRerouting.req. primitive is used to request the call-rerouting.
- j) The callRerouting.conf. primitive is used to confirm the result of a rerouting request.
- k) The cfnrDivertingLegFailed.ind. primitive is used to indicate to the signalling entity user, that the diversion has failed.
- l) The divertingLegInformation4.req primitive is used by a gatekeeper performing call diversion to request sending of divertingLegInformation4 invoke APDU to the forwarding terminal.
- m) The divertingLegInformation4.ind primitive is used in the forwarding endpoint/terminal to indicate diversion information received from a gatekeeper to the forwarding user.

10.3.3 Parameters

activateDiversionQ.ind

- procedure: type of call diversion;
- basicService: defaults to "all services";
- DivertedToAddress: number of diverted-to user;
- servedUserNr: number of redirecting user;
- activatingUserNr: number of activating user;
- extension: placeholder for manufacturer-specific extensions.

activateDiversionQ.resp

- extension: placeholder for manufacturer-specific extensions;
- error: errors as defined in clause 11.

deactivateDiversionQ.ind

- procedure: type of call diversion;
- basicService: defaults to "all services";
- servedUserNr: number of redirecting user;
- deactivatingUserNr: number of deactivating user;
- extension: placeholder for manufacturer-specific extensions.

deactivateDiversionQ.resp

- extension: placeholder for manufacturer-specific extensions;
- error: see clause 11.

interrogateDiversionQ.ind

- procedure: type of call diversion;
- basicService: defaults to "all services";
- servedUserNr: number of redirecting user;
- interrogatingUserNr: number of interrogating user;
- extension: placeholder for manufacturer-specific extensions.

interrogateDiversionQ.resp

- servedUserNr: number of redirecting user;
- basicService: defaults to "all services";
- procedure: type of call diversion;
- diverted-toAddress: number of diverted-to user;
- extension: placeholder for manufacturer-specific extensions;
- error: errors see clause 11.

checkRestriction.req

- servedUserNr: number of redirecting user;
- basicService: defaults to "all services";
- divertedToNr: number of diverted-to user;
- extension: placeholder for manufacturer-specific extensions.

checkRestriction.conf

- extension: placeholder for manufacturer-specific extensions;
- error: see clause 11.

callRerouting.req

- reroutingReason: type of call diversion;
- originalReroutingReason: type of the first call diversion (in case of multiple call diversions);
- calledAddress: number of diverted-to user;
- diversionCounter: number of diversions that have occurred;

- h225InfoElement: may convey the information elements BC, LLC, HLC and Progress Indicator;
- lastReroutingNr: number of the redirecting user;
- subscriptionOption: call diversion presentation/presentation restriction rules at originating user;
- callingPartySubaddress: subaddress of the calling user;
- callingNumber: number of the calling user;
- callingInfo: textual information about the calling user;
- originalCalledNr: number of first redirecting user (in case of multiple call diversions);
- redirectingInfo: textual information about the redirecting user;
- originalCalledInfo: textual information about the first redirecting user;
- extension: placeholder for manufacturer-specific extensions.

callRerouting.conf

- extension: placeholder for manufacturer-specific extensions;
- error: see clause 11.

cfnrDivertingLegFailed.ind

- extension: placeholder for manufacturer-specific extensions.

divertingLegInformation4.req/ind

- diversionReason: type of call diversion;
- subscriptionOption: call diversion presentation/presentation restriction rules at originating user;
- callingNr: number of the calling user;
- callingInfo: textual information about the calling user;
- nominatedNr: number of the diverted-to user;
- nominatedInfo: textual information about the diverted-to user;
- extension: placeholder for manufacturer-specific extensions.

10.3.4 States

Activation states (in association with a particular request for activation):

- CDS-Act-Idle: No processing of an activateDiversionQ invoke APDU;
- CDS-Act-Wait: The Served Endpoint has received an activation request and has sent a checkRestriction invoke APDU to the Diverted-to endpoint.

Deactivation state (in association with a particular request for deactivation):

- CDS-Deact-Idle: No processing of a deactivateDiversionQ invoke APDU.

Interrogation state (in association with a particular request for interrogation):

- CDS-Inter-Idle: No processing of an interrogateDiversionQ invoke APDU.

Invocation states (in association with a particular call):

- CDS-Inv-Idle: Diversion invocation not in progress;
- CDS-Requested: The Served Endpoint has sent a callRerouting invoke APDU to the Rerouting endpoint and is waiting for receipt of a return result, return error or reject APDU.

10.4 Communication between CDF (Diverted-to) signalling entity and CDF signalling entity user

10.4.1 Table of primitives

Table 3/H.450.3 – Table of primitives for CDF signalling entity

| Generic name | Type | | | |
|--------------------------|---------------------------|-------------|-------------|-------------|
| | request | indication | response | confirm |
| checkRestriction | Not defined ^{a)} | PARAMETERS | PARAMETERS | Not defined |
| divertingLegInformation2 | Not defined | PARAMETERS | Not defined | Not defined |
| divertingLegInformation3 | PARAMETERS | Not defined | Not defined | Not defined |

^{a)} "Not defined" means that this primitive is not defined.

10.4.2 Primitive definition

- The checkRestriction.ind. primitive is used to indicate the restriction-check request.
- The checkRestriction.resp. primitive is used to respond to the restriction-check request.
- The divertingLegInformation2.ind. primitive is used to indicate information to the signalling entity user.
- The divertingLegInformation3.req. primitive is used to request an indication of information.

10.4.3 Parameters

checkRestriction.ind

- See corresponding req primitive in 10.3.3.

checkRestriction.resp

- See corresponding conf primitive in 10.3.3.

divertingLegInformation2.ind

- diversionCounter: number of call diversions for this call;
- diversionReason: type of call diversion;
- originalDiversionReason: type of first call diversion (in case of multiple call diversions);
- divertingNr: number of redirecting user;
- originalCalledNr: number of the first redirecting user (in case of multiple call diversions);
- redirectingInfo: textual information about the redirecting user;
- originalCalledInfo: textual information about the first redirecting user (for multiple call diversions);
- extension: placeholder for manufacturer specific extensions.

divertingLegInformation3.req

- presentationAllowedIndicator: presentation/presentation restriction rules for originating user set by diverted-to user;
- redirectionNr: number of the diverted-to user;
- redirectionInfo: textual information about the diverted-to user;
- extension: placeholder for manufacturer specific extensions.

10.4.4 States

Invocation states (in association with a particular call):

- CDF-Inv-Idle: No processing of a divertingLegInformation2 invoke APDU;
- CDF-Inv-Wait: A divertingLegInformation2 invoke APDU has been received and the Diverted-to endpoint is waiting for valid presentation restriction information.

Check restriction state (in association with a particular request for validating a diverted-to number):

- CDF-Res-Idle: No processing of a checkRestriction invoke APDU.

10.5 Communication between CDR (Rerouting) signalling entity and CDR signalling entity user

10.5.1 Table of primitives

Table 4/H.450.3 – Table of primitives for CDR signalling entity

| Generic name | Type | | | |
|---|---------------------------|-------------|-------------|-------------|
| | request | indication | response | confirm |
| callRerouting | Not defined ^{a)} | PARAMETERS | PARAMETERS | Not defined |
| divertingLegInformation1 | PARAMETERS | Not defined | Not defined | Not defined |
| divertingLegInformation2 | PARAMETERS | Not defined | Not defined | Not defined |
| divertingLegInformation3 | Not defined | PARAMETERS | Not defined | Not defined |
| cfnrDivertedLegFailed | _ ^{b)} | Not defined | Not defined | Not defined |
| ^{a)} "Not defined" means that this primitive is not defined. ^{b)} "-" means no parameters. | | | | |

10.5.2 Primitive definition

- The callRerouting.ind primitive is used to indicate the call-rerouting.
- The callRerouting.resp primitive is used to respond to an indicated call-rerouting.
- The divertingLegInformation1.req. primitive is used to request an indication of information.
- The divertingLegInformation2.req. primitive is used to request an indication of information.
- The divertingLegInformation3.ind. primitive is used to indicate information to the signalling entity user.
- The cfnrDivertingLegFailed.req. primitive is used to request the indication, that the diversion has failed.

10.5.3 Parameters

See 10.2.3, 10.3.3 and 10.4.3.

10.5.4 States

- CDR-Idle: Rerouting not in progress;
- CDR-Invoked: The CFNR rerouting procedure has been successfully performed and the Rerouting endpoint is waiting for completion of establishment of the call to the diverted-to user.

10.6 Communication between CDA (Activating) signalling entity and CDA signalling entity user

10.6.1 Table of primitives

Table 5/H.450.3 – Table of primitives for CDA signalling entity

| Generic name | Type | | | |
|---|--------------------------|---------------------------|-------------|------------|
| | request | indication | response | confirm |
| activateDiversionQ | PARAMETERS ^{a)} | Not defined ^{b)} | Not defined | PARAMETERS |
| ^{a)} To be added. | | | | |
| ^{b)} "Not defined" means that this primitive is not defined. | | | | |

10.6.2 Primitive definition

- a) The activateDiversionQ.req. primitive is used to request the activation of diversion.
- b) The activateDiversionQ.conf. primitive is used to indicate the result of the activation of diversion.

10.6.3 Parameters

See 10.3.3.

10.6.4 States

- CDA-Idle: Activation not in progress.
- CDA-Wait: An activateDiversionQ invoke APDU has been sent. The Activating endpoint is waiting for the response.

10.7 Communication between CDD (Deactivating) signalling entity and CDD signalling entity user

10.7.1 Table of primitives

Table 6/H.450.3 – Table of primitives for CDD signalling entity

| Generic name | Type | | | |
|---|--------------------------|---------------------------|-------------|------------|
| | request | indication | response | confirm |
| deactivateDiversionQ | PARAMETERS ^{a)} | Not defined ^{b)} | Not defined | PARAMETERS |
| ^{a)} To be added. | | | | |
| ^{b)} "Not defined" means that this primitive is not defined. | | | | |

10.7.2 Primitive definition

- a) The deactivateDiversionQ.req. primitive is used to request the deactivation of diversion.
- b) The deactivateDiversionQ.conf. primitive is used to indicate the result of the deactivation of diversion.

10.7.3 Parameters

See 10.3.3.

10.7.4 States

- CDD-Idle: Deactivation not in progress.
- CDD-Wait: A deactivateDiversionQ invoke APDU has been sent. The Deactivating endpoint is waiting for the response.

10.8 Communication between CDI (Interrogating) signalling entity and CDI signalling entity user

10.8.1 Table of primitives

Table 7/H.450.3 – Table of primitives for CDI signalling entity

| Generic name | Type | | | |
|---|------------|---------------------------|-------------|------------|
| | request | indication | response | confirm |
| interrogateDiversionQ | PARAMETERS | Not defined ^{a)} | Not defined | PARAMETERS |
| ^{a)} "Not defined" means that this primitive is not defined. | | | | |

10.8.2 Primitive definition

- The interrogateDiversionQ.req. primitive is used to request the interrogation.
- The interrogateDiversionQ.conf. primitive is used to indicate the result of the interrogation.

10.8.3 Parameters

See 10.3.3.

10.8.4 States

- CDI-Idle: Interrogation not in progress.
- CDI-Wait: An interrogateDiversionQ invoke APDU has been sent. The Interrogating endpoint is waiting for the response.

10.9 Peer-to-Peer communication for call diversion

10.9.1 Messages

The following messages are used for call diversion.

- FACILITY;
- SETUP;
- CONNECT;
- ALERTING;
- RELEASE COMPLETE.

The context (states, procedure, etc.) of the messages defines the operations they may contain. See SDLs.

10.9.2 Timers

Timer T1

This timer shall be started by the Served endpoint when a callRerouting invoke APDU is sent to the Originating endpoint. The timer shall be stopped on receipt of a return result, return error or reject APDU of the callRerouting operation. The expiry of this timer shall be equivalent to the receipt of a reject APDU. Timer T1 shall have a value of not less than 10 seconds.

Timer T2

This timer shall be started by the Activating endpoint when an activateDiversionQ invoke APDU is sent to the Served endpoint. The timer shall be stopped on receipt of a return result, return error or reject APDU of the activateDiversionQ operation. The expiry of this timer shall be equivalent to the receipt of a reject APDU. Timer T2 shall have a value of not less than 30 seconds.

Timer T3

This timer shall be started by the Deactivating endpoint when a deactivateDiversionQ invoke APDU is sent to the Served endpoint. The timer shall be stopped on receipt of a return result, return error or reject APDU of the deactivateDiversionQ operation. The expiry of this timer shall be equivalent to the receipt of a reject APDU. Timer T3 shall have a value of not less than 15 seconds.

Timer T4

This timer shall be started by the Interrogating endpoint when an interrogateDiversionQ invoke APDU is sent to the Served endpoint. The timer shall be stopped on receipt of a return result, return error or reject APDU of the interrogateDiversionQ operation. The expiry of this timer shall be equivalent to the receipt of a reject APDU. Timer T4 shall have a value of not less than 15 seconds.

Timer T5

This timer shall be started by the Served endpoint when a checkRestriction invoke APDU is sent to the Diverted-to endpoint. The timer shall be stopped on receipt of a return result, return error or reject APDU of the checkRestriction operation. The expiry of this timer shall be equivalent to the receipt of a reject APDU. Timer T5 shall have a value of not less than 15 seconds.

10.9.3 Counters

Diversion counter: The CDS entity at each served endpoint uses this counter to keep track of the number of diversions for this particular call. The counter is incremented at each served endpoint. Actions when the counter exceeds its limit are implementation dependent.

10.9.4 Message flows: Remote activation of call diversion

See Table 8.

10.9.5 Message flow: Call Forwarding "immediate" with rerouting

For conditions: CFU, CFB.

NOTE – In the following scenarios only the H.225 signalling is considered. The subsequential establishment of the H.245 connection and the opening of media channels is not described.

Description from user point of view

User B (served party): not present or busy.

User A (originating/rerouting party): calling B; receives request for forwarding; communicating with C.

User C (diverted to party): idle; receives notification of incoming call (forwarded); accepts call; confirms media; communicating with A.

See Table 9.

10.9.6 Message flow: Call Forwarding "delayed" with rerouting

For conditions: CFNR, CD.

Description from user point of view

User B (served party): receives notification of incoming call; alerting; does not reply or initiates deflection.

User A (originating/rerouting party): calling B; alerting; waiting for reply; receives request for forwarding; communicating with C.

User C (diverted to party): idle; receives notification of incoming call (forwarded); accepts call; confirms media; communicating with A.

See Table 10.

Table 8/H.450.3 – Remote activation of Call Forwarding

| Row No. | User/Application action | a) Primitive b) State c) Timer | Note | H.225, H.323, H.245, H.450 | Note | a) Primitive b) State c) Timer | User/Application action |
|----------|---------------------------------|--|------|---|------|--|---|
| 1 | MM Terminal A/Gateway | | | Network | | MM Terminal B/Proxy B | |
| 2 | Invoke activation of CF in TE B | a) -<activate DiversionQ.req.> b) U1 CDA-Wait c) start timer T2 | 1 | H.225 <SETUP> → H4501SupplementaryService apdu: invoke activateDiversionQ procedure=CFU(1) [as an example] forwardedToAddress=address C servedUserNr | | a) -<activate DiversionQind.> b) U6 CDS-Act-Idle | Receive request for activation of C |
| 3 | MM Terminal B/Proxy B | | | Network | | MM Terminal C | |
| 4 | Check restriction on TE C | a) -<check Restriction req.> b) U1 CDS-ACT-Wait c) start timer T5 | | H.225 <SETUP> → H4501SupplementaryService apdu: invoke checkRestriction | | a) -<check Restriction ind.> b) U6 CDF-Res-Idle | Receive restriction check and check restrictions |
| 5 | Active CF | a) -<check Restriction.conf.> b) U1 CDS-ACT-Wait c) stop timer T5 | | H.225 <CONNECT> ← H4501SupplementaryService apdu: returnResult checkRestriction | | a) -<check Restriction.resp.> b) U10 CDF-Res-Idle | Send result of restriction check |
| 6 | | a) <Release.req> b) U0 | | H.225 <RELEASE COMPLETE> → | | a) <Release.ind> b) U0 | Receive H.225 release indication |
| 7 | MM Terminal A/Gateway | | | Network | | MM Terminal B/Proxy B | |
| 8 | Activation indication to user | a) -<activate DiversionQ.conf.> b) U1 CDA-Idle c) stop timer T2 | | H.225 <CONNECT> ← H4501SupplementaryService apdu: returnResult activateDiversion | | a) -<activate DiversionQ.resp.> b) U6 CDS-Act-Idle | Accept activation of CF activation indication to user |
| 9 | | a) <Release.req> b) U0 | | H.225 <RELEASE COMPLETE> → | | a) <Release.ind> b) U0 | Receive H.225 release indication |

Table 9/H.450.3 – Call Forwarding "immediate" with rerouting (unconditional or on busy)

| Row No. | User/Application action | a) Primitive b) State c) Timer | Note | H.225, H.323, H.245, H.450 | Note | a) Primitive b) State c) Timer | User/Application action |
|----------|---|---|------|--|------|--|---|
| 1 | MM Terminal A/Gateway | | | Network | | MM Terminal B/Proxy | |
| 2 | Request for call establishment to user B. Select Media user B address | a) -<Setup.req.> b) U1 CDR-Idle CDO-Idle | | H.225 <SETUP> → | | a) -<Setup.ind.> b) U6 CDS-Inv-Idle | Receive H.225 setup_indication condition: – unconditional – busy |
| 3 | Receive forwarding request | a) -<call Rerouting.ind.> b) U1/U3/U4 CDR-Idle CDO-Idle | | H.225 <FACILITY> ← H4501SupplementaryService apdu: invoke callRerouting reroutingReason=cfu(1); cfb(2) calledAddress=address C | | a) -<call Rerouting.req.> b) U6/U7/U9 CDS-Requested c) start timer T1 | Request terminal A to call terminal C |
| 4 | Acceptance of forwarding | a) -<call Rerouting.resp.> b) U1/U3/U4 CDR-Idle CDO-Idle | | H.225 <FACILITY> → H4501SupplementaryService apdu: returnResult callRerouting | | a) -<call Rerouting.conf.> b) U6/U7/U9 CDS-Inv-Idle c) stop timer T1 | |
| 5 | | a) -<Release.req.> b) U0 CDR-Idle CDO-Idle | | H.225 <RELEASE COMPLETE> → | | a) -<Release.ind.> b) U0 CDS-Inv-Idle | Receive H.225 release_indication |
| 6 | MM Terminal A/Gateway | | | Network | | MM Terminal B/Proxy | |
| 7 | Request for call establishment to user C. Select Media user C address | a) -<diverting LegInformation2.req.> b) U1 CDR-Idle CDO-Divert | | H.225 <SETUP> → H4501SupplementaryService apdu: invoke divertingLegInformation2 | | a) -<diverting LegInformation2.ind.> b) U1 CDF-Inv-Idle | Call accept by user C or by Application C |
| 8 | Indication to Appl/User A of MM Terminal C general availability Indication of diverted-to-number | a) -<diverting LegInformation3.ind.> b) U10 CDR-Idle CDO-Idle | | H.225 <CONNECT> ← H4501SupplementaryService apdu: invoke divertingLegInformation3 | | a) -<diverting LegInformation3.req.> b) U1 CDF-Inv-Idle | Call accept by user C or by Application C |

Table 10/H.450.3 – Call Forwarding "delayed" with rerouting

| Row No. | User/Application action | a) Primitive b) State c) Timer | Note | H.225, H.323, H.245, H.450 | Note | a) Primitive b) State c) Timer | User/Application action |
|-----------|--|--|------|---|------|---|--|
| 1 | MM Terminal A/Gateway | | | Network | | MM Terminal B/Proxy | |
| 2 | Request for call establishment to user B. Select Media user B address | a) -<Setup.req.> b) U1 CDR-Idle CDO-Idle | | H.225 <SETUP> → | | a) -<Setup.ind.> b) U6 CDS-Inv-Idle | Receive H.225 setup_indication |
| 3 | | a) -<Alerting.ind.> b) U4 CDR-Idle CDO-Idle | | H.225 <ALERTING> ← | | a) -<Alerting.req.> b) U7 CDS-Inv-Idle | Start user alerting |
| 4 | | | | | | | Condition: – timer (no reply) expire – user deflection |
| 5 | Receive forwarding request | a) -<call Re-routing.ind.> b) U4 CDR-Idle CDO-Idle | | H.225 <FACILITY> ← H4501SupplementaryService apdu: invoke callRerouting reroutingReason=cfnr(3) calledAddress=address C | | a) <callRerouting.req.> b) U7 CDS-Requested c) start timer T1 | |
| 6 | Acceptance of forwarding | a) -<call Re-routing.resp.> b) U4 CDR-Idle CDO-Idle | | H.225 <FACILITY> → H4501SupplementaryService apdu: returnResult callRerouting | | a) -<call Rerouting.conf.> b) U7 CDS-Inv-Idle c) stop timer T1 | |
| 7 | MM Terminal A/Gateway | | | Network | | MM Terminal C | |
| 8 | Request for call establishment to user C. Select Media user C address | a) -<diverting LegInformation2.req.> b) U1 CDR-Invoked CDO-Idle | | H.225 <SETUP> → H4501SupplementaryService apdu: invoke divertingLegInformation2 | | a) -<diverting LegInformation2.ind.> b) U6 CDF-Inv-Wait | Receive H.225 setup_indication diversion indication |
| 9 | Case 1: Successful forwarding (user B did not answer during forwarding) | | | | | | |
| 10 | | a) -<Alerting.ind.> b) U4 CDR-Invoked CDO-Divert | 1 | H.225 <ALERTING> ← | | a) -<Alerting.req.> b) U7 CDF-Inv-Wait | Start user alerting |

Table 10/H.450.3 – Call Forwarding "delayed" with rerouting (concluded)

| Row No. | User/Application action | a) Primitive b) State c) Timer | Note | H.225, H.323, H.245, H.450 | Note | a) Primitive b) State c) Timer | User/Application action |
|-----------|---|--|------|--|------|--|--|
| 11 | MM Terminal A/Gateway | | | Network | | MM Terminal B/Proxy | |
| 12 | | a) -<Release.req.> b) U0 CDR-Idle CDO-Divert | | H.225 <RELEASE COMPLETE> → | | a) -<Release.ind.> b) U0 CDS-Inv-Idle | Receive H.225 release_indication |
| 13 | MM Terminal A/Gateway | | | Network | | MM Terminal C | |
| 14 | Indication to Appl/User A of MM Terminal C general availability Indication of diverted-to-number | a) -<diverting LegInformation3.ind.> b) U10 CDR-Idle CDO-Idle | | H.225 <CONNECT> ← H4501SupplementaryService apdu: invoke divertingLegInformation3 | | a) -<diverting LegInformation3.req.> b) U10 CDF-Inv-Idle | Call accept by user C or by Application C |
| 15 | Case 2: User B answers before alerting of user C | | | | | | |
| 16 | MM Terminal A/Gateway | | | Network | | MM Terminal B/Proxy | |
| 17 | Indication to Appl/User A of MM Terminal B general availability | a) -<Setup.conf.> b) U10 CDR-Invoked CDO-Divert | | H.225 <CONNECT> ← | | a) <Setup.resp.> b) U10 c) CDS-Inv-Idle | Call accept by user B or by Application B |
| 18 | MM Terminal A/Gateway | | | Network | | MM Terminal C | |
| 19 | | a) -<Release.req.> b) U0, CDR-Idle, CDO-Idle | | H.225 <RELEASE COMPLETE> → | | a) -<Release.ind.> b) U0, CDF-Inv-Idle | Receive H.225 release_indication |
| 20 | Case 3: Call establishment to terminal C fails | | | | | | |
| 21 | MM Terminal A/Gateway | | | Network | | MM Terminal C | |
| 22 | Receive H.225 release_indication | a) -<Release ind.> b) U0, CDR-Invoked, CDO-Idle | | H.225 <RELEASE COMPLETE> ← | | a) -<Release.req.> b) U0, CDF-Inv-Idle | Receive H.225 release_indication |
| 23 | MM Terminal A/Gateway | | | Network | | MM Terminal B/Proxy | |
| 24 | | a) -<cfnrDivertedLeg Failed.req.> b) U4, CDR-Idle, CDO-Idle | | H.225 <FACILITY> → H4501SupplementaryService apdu: invoke cfnrDivertedLegFailed | | a) -<cfnrDivertedLeg Failed.ind.> b) U7 CDS-Inv-Idle | Receive H.225 release_indication |

11 Operations in support of Call diversion supplementary service

The following operations defined in Abstract Syntax Notation One shall apply:

Call-Diversion-Operations

{itu-t recommendation h 450 3 version1(0) call-diversion-operations(0)}

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS **OPERATION, ERROR FROM Remote-Operations-Information-Objects**
 {joint-iso-itu-t remote-operations(4)
 informationObjects(5) version1(0)}
EXTENSION, Extension{} **FROM**
 Manufacturer-specific-service-extension-definition
 { itu-t recommendation h 450 1 version1(0) msi-definition(18) }
H225InformationElement **FROM Generic-parameters-definition**
 { itu-t recommendation h 450 1 version1(0)
 h225-generic-parameters(6) }
NonStandardParameter **FROM H323-MESSAGES** -- see H.225.0
EndpointAddress, PartySubaddress, PresentationAllowedIndicator
FROM Addressing-Data-Elements { itu-t recommendation h 450
 1 version1(0) addressing-data-elements (9) }
userNotSubscribed, notAvailable, invalidServedUserNumber,
basicServiceNotProvided, resourceUnavailable,
supplementaryServiceInteractionNotAllowed **FROM H4501-General-Error-List**
 { itu-t recommendation h 450 1 version1(0)
 general-error-list (1) };

H323CallDiversionOperations **OPERATION** ::=
 { **activateDiversionQ** | **deactivateDiversionQ** | **interrogateDiversionQ** |
 checkRestriction | **callRerouting** | **divertingLegInformation1** |
 divertingLegInformation2 | **divertingLegInformation3** |
 divertingLegInformation4 | **cfnrDivertedLegFailed** }

activateDiversionQ **OPERATION::=**
 {-- sent from the activating h.323-endpoint to the served h.323-endpoint
 ARGUMENT **SEQUENCE**
 {procedure Procedure,
 basicService BasicService,
 divertedToAddress EndpointAddress,
 servedUserNr EndpointAddress,
 activatingUserNr EndpointAddress,
 extension CHOICE
 {extensionSeq ExtensionSeq,
 nonStandardData NonStandardParameter } **OPTIONAL,**
 ...
 }

 RESULT **CHOICE**
 {extensionSeq ExtensionSeq,
 nonStandardData NonStandardParameter } **OPTIONAL TRUE**

ERRORS {userNotSubscribed | notAvailable | invalidServedUserNumber |
 basicServiceNotProvided | resourceUnavailable | invalidDivertedNumber |
 specialServiceNumber | diversionToServedUserNumber |
 temporarilyUnavailable | notAuthorized | unspecified }

```

CODE      local:15
}
deactivateDiversionQ  OPERATION ::=
  {-- sent from the deactivating h.323-endpoint to the served h.323-endpoint
  ARGUMENT  SEQUENCE
    {procedure      Procedure,
     basicService   BasicService,
     servedUserNr   EndpointAddress,
     deactivatingUserNr EndpointAddress,
     extension      CHOICE
                   {extensionSeq ExtensionSeq,
                    nonStandardData NonStandardParameter } OPTIONAL,
    ...
  }
  RESULT    CHOICE
            {extensionSeq ExtensionSeq,
             nonStandardData NonStandardParameter } OPTIONAL TRUE

ERRORS     {userNotSubscribed | notAvailable | invalidServedUserNumber |
            temporarilyUnavailable | notAuthorized | unspecified }

CODE      local:16
}
interrogateDiversionQ OPERATION ::=
  {-- sent from the interrogating h.323-endpoint to the served h.323-endpoint
  ARGUMENT  SEQUENCE
    {procedure      Procedure,
     basicService   BasicService DEFAULT allServices,
     servedUserNr   EndpointAddress,
     interrogatingUserNr EndpointAddress,
     extension      CHOICE
                   {extensionSeq ExtensionSeq,
                    nonStandardData NonStandardParameter } OPTIONAL,
    ...
  }
  RESULT    IntResultList

ERRORS     {userNotSubscribed | notAvailable | invalidServedUserNumber |
            temporarilyUnavailable | notAuthorized | unspecified }

CODE      local:17
}
checkRestriction  OPERATION ::=
  {-- sent from the served h.323-endpoint to the diverted-to h.323-endpoint
  ARGUMENT  SEQUENCE
    {servedUserNr   EndpointAddress,
     basicService   BasicService,
     divertedToNr   EndpointAddress,
     extension      CHOICE
                   {extensionSeq ExtensionSeq,
                    nonStandardData NonStandardParameter } OPTIONAL,
    ...
  }
  RESULT    CHOICE
            {extensionSeq ExtensionSeq,
             nonStandardData NonStandardParameter } OPTIONAL TRUE
  ERRORS    {notAvailable | invalidServedUserNumber |
            invalidDivertedNumber | specialServiceNumber | unspecified }

```



```

CODE      local:18
}
callRerouting OPERATION ::=
  {-- sent from the served h.323-endpoint to the rerouting h.323-endpoint
  ARGUMENT SEQUENCE
    {
      reroutingReason          DiversionReason,
      originalReroutingReason  DiversionReason OPTIONAL,
      calledAddress            EndpointAddress,
      diversionCounter          INTEGER (1..15),
      h225InfoElement          H225InformationElement,
      -- The H.225 information elements Bearer capability,
      -- High layer compatibility, Low layer compatibility and
      -- Progress Indicator information element may be embedded
      -- in the h225InfoElement in accordance with H.450.1.
      lastReroutingNr          EndpointAddress,
      subscriptionOption        SubscriptionOption,
      callingPartySubaddress    PartySubaddress OPTIONAL,
      callingNumber             EndpointAddress,
      callingInfo               BMPString (SIZE(1..128)) OPTIONAL,
      originalCalledNr          EndpointAddress OPTIONAL,
      redirectingInfo           BMPString (SIZE(1..128)) OPTIONAL,
      originalCalledInfo        BMPString (SIZE(1..128)) OPTIONAL,
      extension                 CHOICE
        {extensionSeq          ExtensionSeq,
         nonStandardData       NonStandardParameter } OPTIONAL,
      ...
    }
  RESULT CHOICE
    {extensionSeq          ExtensionSeq,
     nonStandardData       NonStandardParameter } OPTIONAL TRUE

  ERRORS {userNotSubscribed | notAvailable | resourceUnavailable |
  invalidDivertedNumber | specialServiceNumber |
  diversionToServedUserNumber | numberOfDiversionsExceeded |
  supplementaryServiceInteractionNotAllowed | unspecified }

CODE      local:19
}

divertingLegInformation1 OPERATION ::=
  {-- sent from the re-routing h.323-endpoint to the originating h.323-endpoint
  -- if the re-routing endpoint equals the originating endpoint, this operation
  -- is not applicable; may also be sent from the rerouting endpoint to other
  -- members of a conference, if subscription option allows.
  ARGUMENT SEQUENCE
    {
      diversionReason          DiversionReason,
      subscriptionOption        SubscriptionOption,
      nominatedNr              EndpointAddress,
      nominatedInfo            BMPString (SIZE(1..128)) OPTIONAL,
      redirectingNr            EndpointAddress OPTIONAL,
      redirectingInfo           BMPString (SIZE(1..128)) OPTIONAL,
      extension                 CHOICE
        {extensionSeq          ExtensionSeq,
         nonStandardData       NonStandardParameter } OPTIONAL,
      ...
    }
  RETURN RESULT FALSE
  ALWAYS RESPONDS FALSE
CODE      local:20
}

```

```

divertingLegInformation2 OPERATION ::=
  --sent from the re-routing h.323-endpoint to the diverted-to h.323-endpoint
  ARGUMENT SEQUENCE
    {
      diversionCounter INTEGER (1..15),
      diversionReason DiversionReason,
      originalDiversionReason DiversionReason OPTIONAL,
      divertingNr EndpointAddress OPTIONAL,
      originalCalledNr EndpointAddress OPTIONAL,
      redirectingInfo BMPString (SIZE(1..128)) OPTIONAL,
      originalCalledInfo BMPString (SIZE(1..128)) OPTIONAL,
      extension CHOICE
        {extensionSeq ExtensionSeq,
         nonStandardData NonStandardParameter } OPTIONAL,
      ...
    }
  -- The divertingNr element is mandatory except in the case of interworking
  RETURN RESULT FALSE
  ALWAYS RESPONDS FALSE

  CODE local:21
}

divertingLegInformation3 OPERATION ::=
  --sent from the diverted-to h.323-endpoint to the originating h.323-endpoint
  ARGUMENT SEQUENCE
    {presentationAllowedIndicator PresentationAllowedIndicator,
     redirectionNr EndpointAddress OPTIONAL,
     redirectionInfo BMPString (SIZE(1..128)) OPTIONAL,
     extension CHOICE
       {extensionSeq ExtensionSeq,
        nonStandardData NonStandardParameter } OPTIONAL,
     ...
    }
  RETURN RESULT FALSE
  ALWAYS RESPONDS FALSE

  CODE local:22
}

divertingLegInformation4 OPERATION ::=
  -- If call diversion is not performed by the forwarding terminal but by a
  -- gatekeeper, the gatekeeper may send divertingLegInformation4 and u to the
  -- forwarding terminal.
  ARGUMENT SEQUENCE
    {
      diversionReason DiversionReason,
      subscriptionOption SubscriptionOption,
      callingNr EndpointAddress,
      callingInfo BMPString (SIZE(1..128)) OPTIONAL,
      nominatedNr EndpointAddress,
      nominatedInfo BMPString (SIZE(1..128)) OPTIONAL,
      extension CHOICE
        {extensionSeq ExtensionSeq,
         nonStandardData NonStandardParameter } OPTIONAL,
      ...
    }
  RETURN RESULT FALSE
  ALWAYS RESPONDS FALSE
  CODE local:100
}

```

```

cfnrDivertedLegFailed  OPERATION ::=
  {-- sent from the rerouting h.323-terminal to the served h.323-endpoint
  ARGUMENT  CHOICE
    {extensionSeq      ExtensionSeq,
     nonStandardData  NonStandardParameter } OPTIONAL TRUE

```

```

RETURN RESULT FALSE
ALWAYS RESPONDS FALSE

```

```

CODE    local:23
}

```

-- This indicates that the diverted-to leg has been cleared during SS-CFNR execution.

-- Definitions of general used data types:

```

DiversionReason ::= ENUMERATED { unknown (0), cfu (1), cfb (2), cfnr (3), ... }

```

-- The value unknown is only used if received from another network when interworking.

```

IntResultList::= SET SIZE (0..29) OF IntResult

```

```

IntResult ::= SEQUENCE

```

```

  {
    servedUserNr      EndpointAddress,
    basicService     BasicService,
    procedure        Procedure,
    divertedToAddress EndpointAddress,
    remoteEnabled    BOOLEAN DEFAULT FALSE,
    extension        CHOICE
      {extensionSeq  ExtensionSeq,
       nonStandardData  NonStandardParameter } OPTIONAL,
    ...
  }

```

```

Procedure ::= ENUMERATED { cfu (0), cfb (1), cfnr (2), ... }

```

```

SubscriptionOption::= ENUMERATED {
  noNotification (0),
  notificationWithoutDivertedToNr (1),
  notificationWithDivertedToNr (2), ... }

```

```

invalidDivertedNumber      ERROR ::= {CODE    local:12}
specialServiceNumber      ERROR ::= {CODE    local:14}
diversionToServedUserNumber ERROR ::= {CODE    local:15}
numberOfDiversionsExceeded ERROR ::= {CODE    local:24}
temporarilyUnavailable     ERROR ::= {CODE    local:1000}
notAuthorized              ERROR ::= {CODE    local:1007}
unspecified                ERROR ::=
  {
    PARAMETER  CHOICE
      {
        extension  Extension{{ExtensionSet}},
        nonStandard  NonStandardParameter
      }
    CODE      local:1008
  }

```

```

BasicService ::= ENUMERATED {
  allServices(0),
  -- speech (1),
  -- unrestrictedDigitalInformation (2),
  -- audio3.1KHz (3),
  -- telephony (32),
  -- teletex (33),
  -- telexGroup4Class1 (34),
  -- videotexSyntaxBased (35),
  -- videotelephony (36),
  ... }

```

-- For multimedia calls the value "allServices" shall be used only.
 -- The usage of the other codepoints for multimedia calls is for further study.

ExtensionSeq ::= SEQUENCE OF Extension{{ExtensionSet}}

ExtensionSet EXTENSION ::= {...}
 -- Actual values defined by individual manufacturers

END -- of Call-Diversion-Operations

12 Specification and Description Language (SDL) diagrams

The procedures for call diversion signalling entities are described in SDL form in Figures 19 to 25.

In case the CDO and CDR are in the same physical location at the originating user, the originating user deals with the forwarding call and the forwarded call only. In case the CDR is located in the gatekeeper, the originating user deals with the originating call and the gatekeeper deals with the originating call, forwarded call, and forwarding call.

NOTE 1 – In case of conflict between the text and the SDLs, the text shall take precedence.

NOTE 2 – The SDLs only show call diversion messages transported on H.225.0 reliable connection. H.245 procedures (e.g. terminal capability exchange, master/slave determination, opening and closing of logical channels, etc.) are not shown).

NOTE 3 – Specific gatekeeper SDLs for call diversion are not provided.

12.1 Call Diversion block diagram

Figure 17 shows the block of the supplementary service Call Diversion and its interfaces to other blocks. The substructure of this block is given in Figures 18 (sheets 1 to 3).

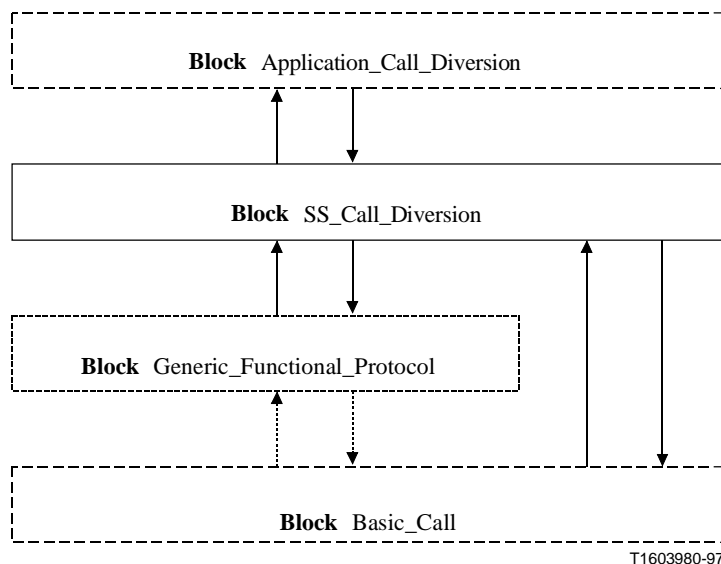


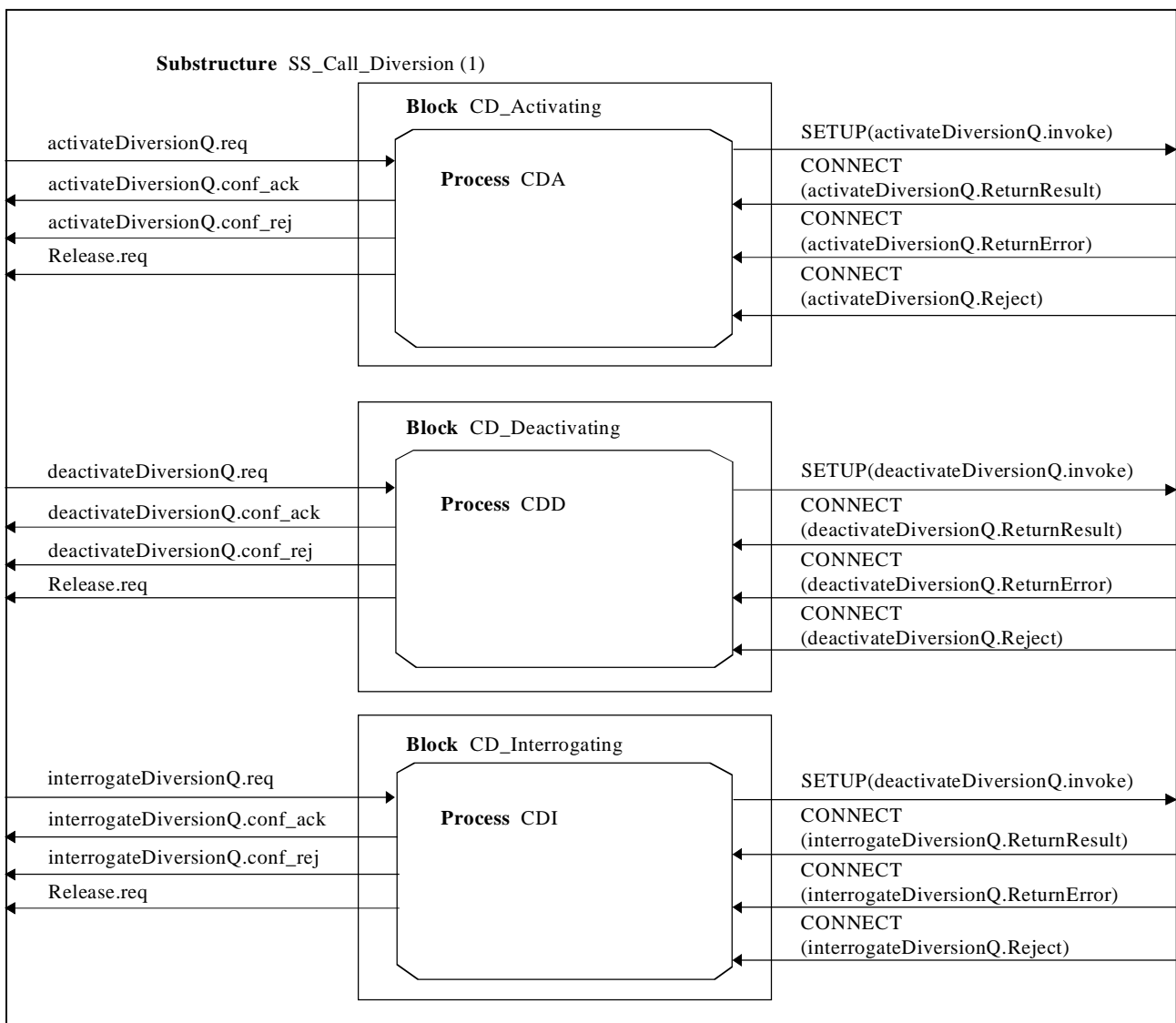
Figure 17/H.450.3 – Call Diversion block diagram

12.2 Call Diversion substructure diagram

The substructure SS_Call_diversion consists of the processes CDA, CDD, CDI, CDO, CDR, CDS and CDF, which are applicable at the following endpoints:

- Activating endpoint (CDA);
- Deactivating endpoint (CDD);
- Interrogating endpoint (CDI);
- Originating endpoint (CDO);
- Rerouting endpoint (CDR);
- Served endpoint (CDS);
- Diverted-to endpoint (CDF).

These processes are described by SDL diagrams in the next subclauses.

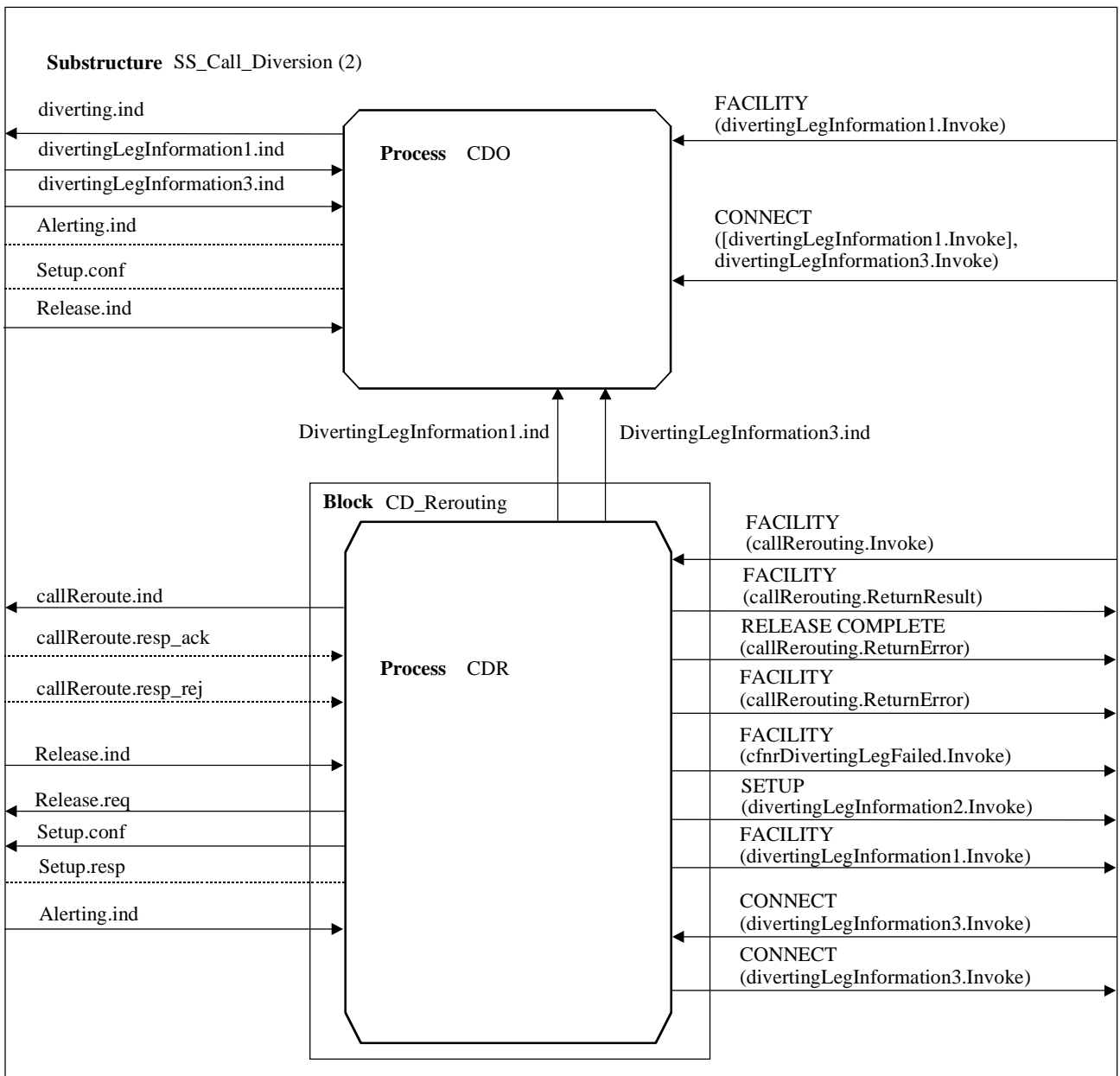


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NOTE 1 – activateDiversionQ, deactivateDiversionQ and interrogateDiversionQ invoke APDUs may also be sent in a FACILITY message on the call reference of an existing call-independent signalling connection.

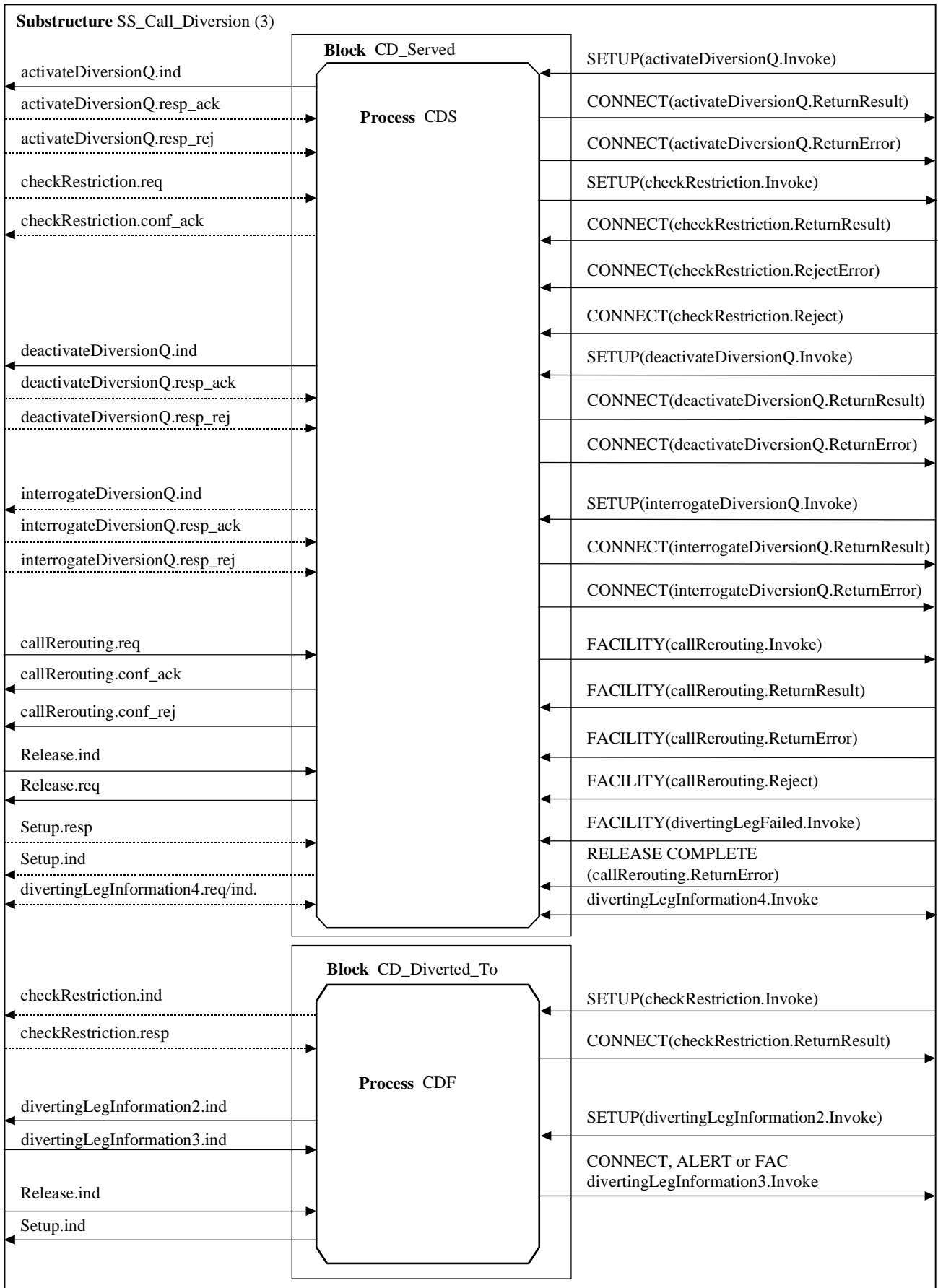
NOTE 2 – Return result, return error and reject APDUs for activateDiversionQ, deactivateDiversionQ and interrogateDiversionQ may also be sent within RELEASE COMPLETE or FACILITY messages.

Figure 18/H.450.3 (sheet 1 of 3) – Call Diversion substructure diagram



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Figure 18/H.450.3 (sheet 2 of 3) – Call Diversion substructure diagram



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Figure 18/H.450.3 (sheet 3 of 3) – Call Diversion substructure diagram

12.3 Call Diversion Activating Endpoint (CDA) SDLs

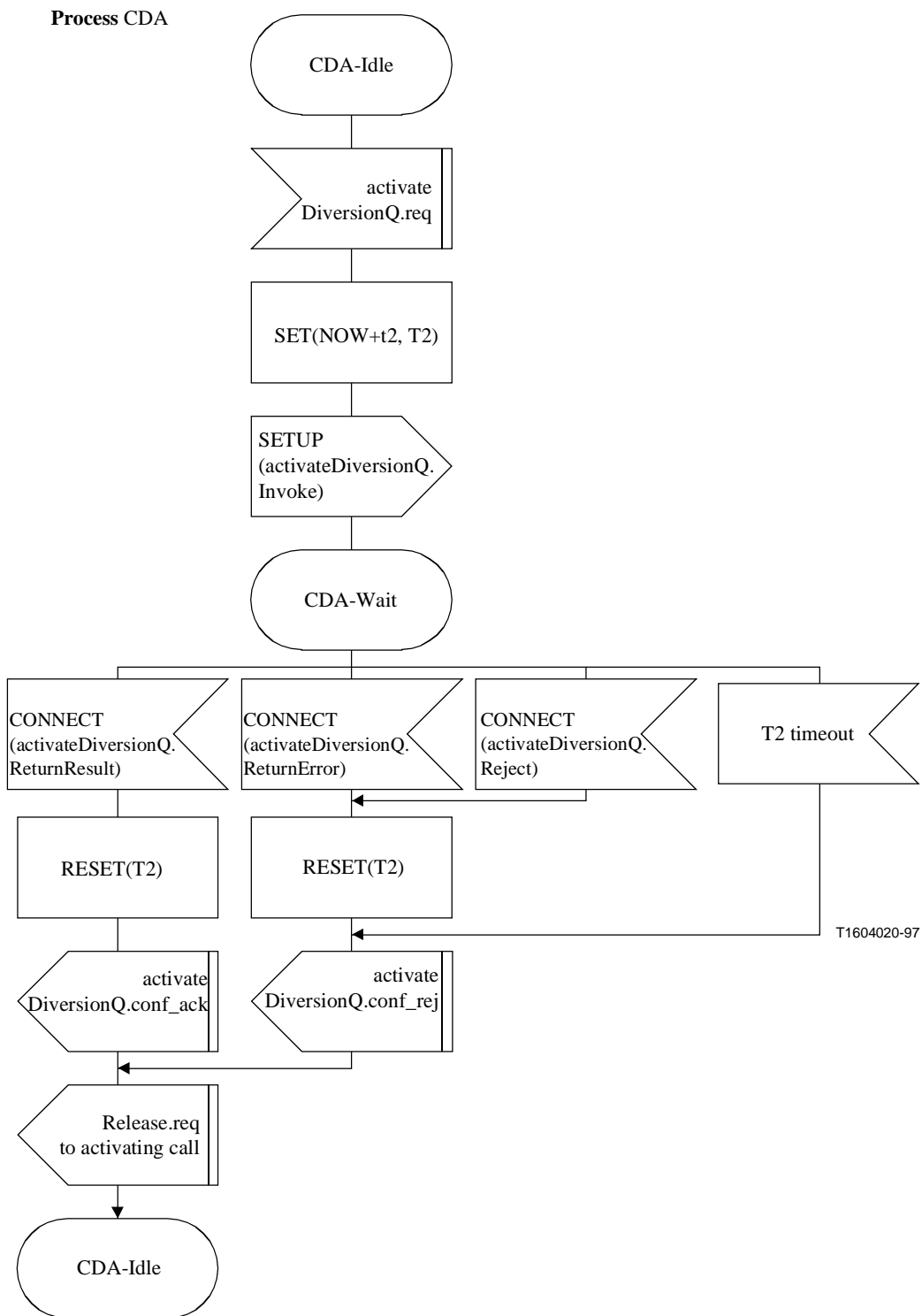


Figure 19/H.450.3 – CDA SDLs

12.4 Call Diversion Deactivating Endpoint (CDD) SDLs

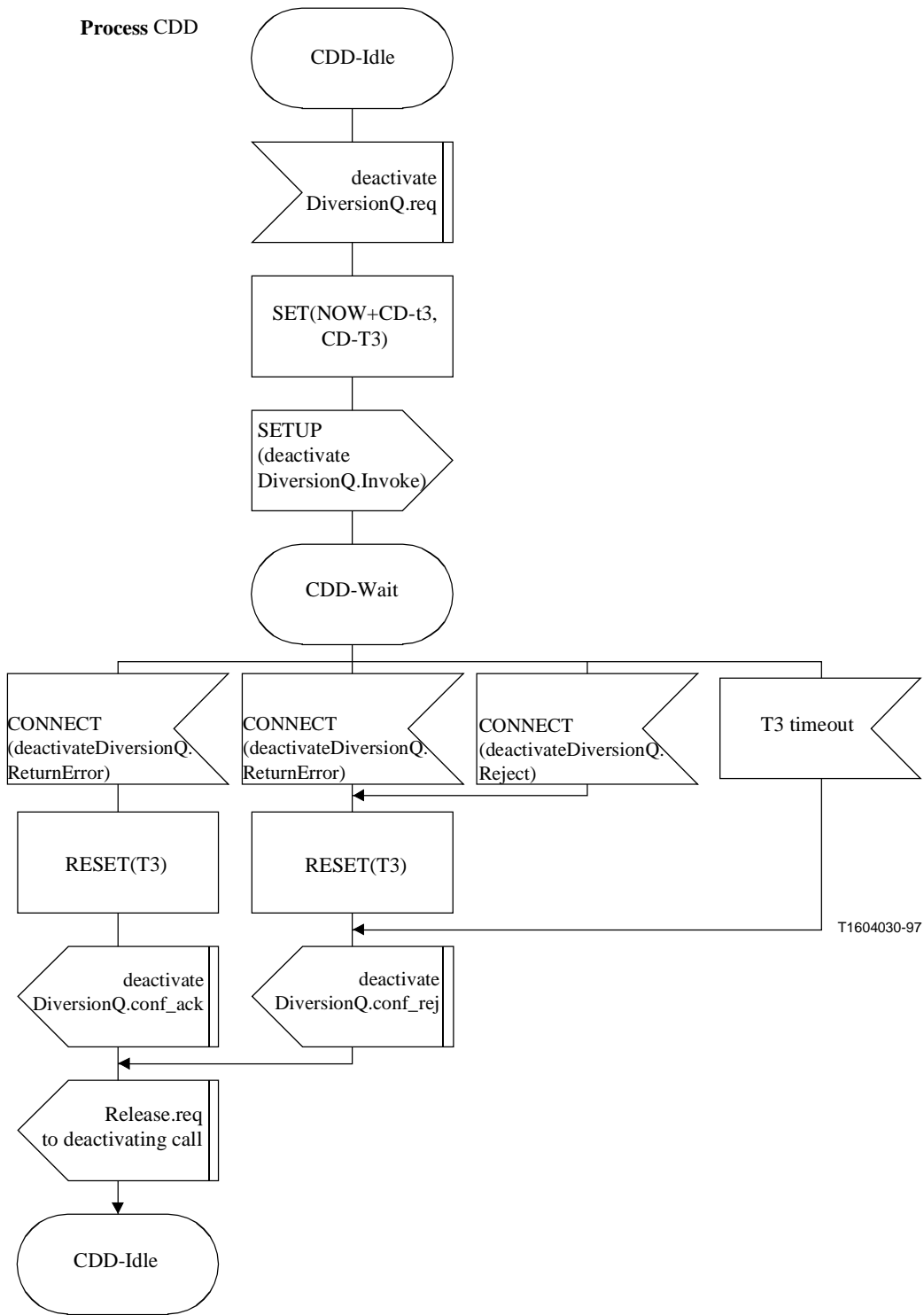


Figure 20/H.450.3 – CDD SDLs

12.5 Call Diversion Interrogating (CDI) SDLs

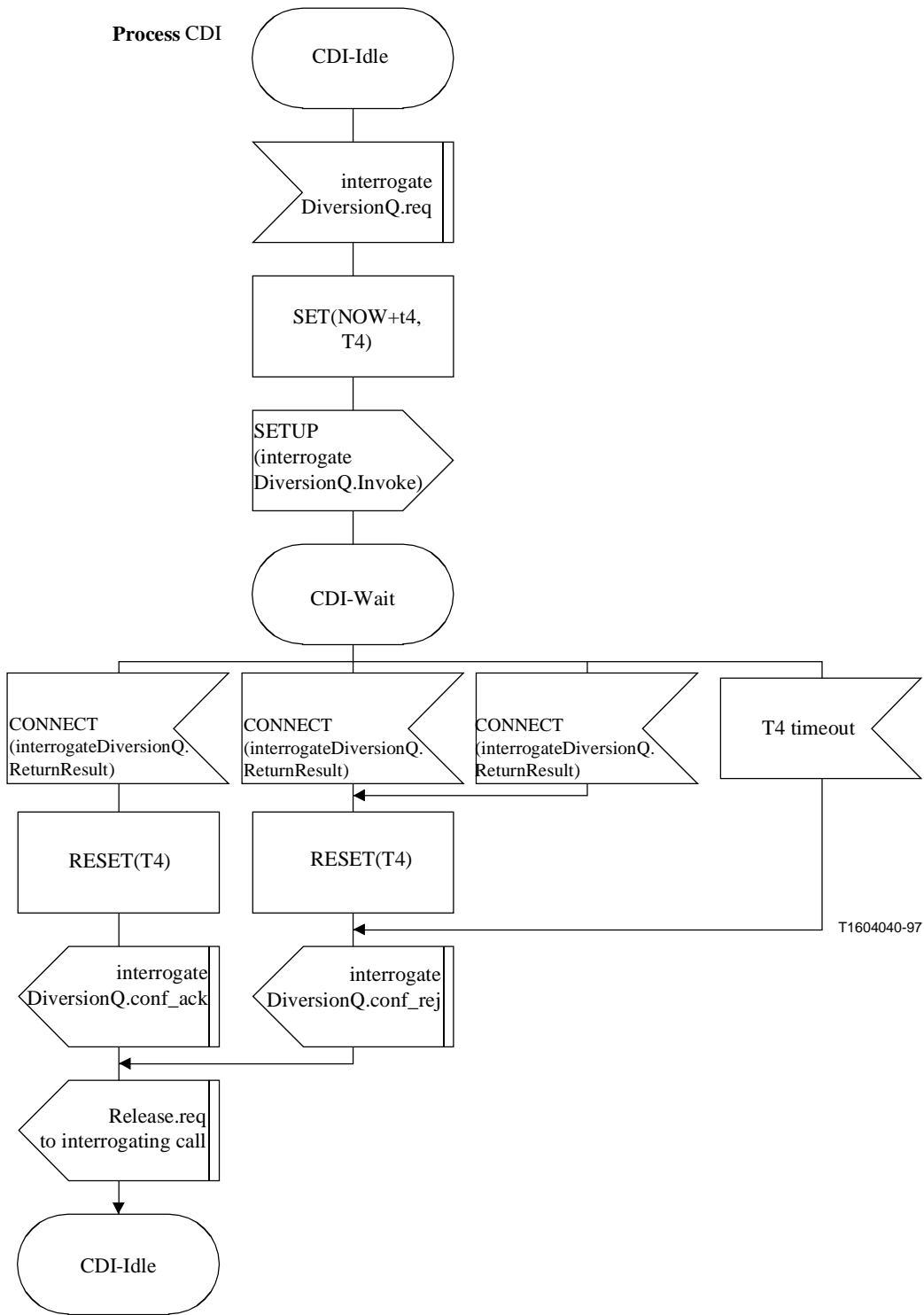


Figure 21/H.450.3 – CDI SDLs

12.6 Call Diversion Originating Endpoint (CDO) SDLs

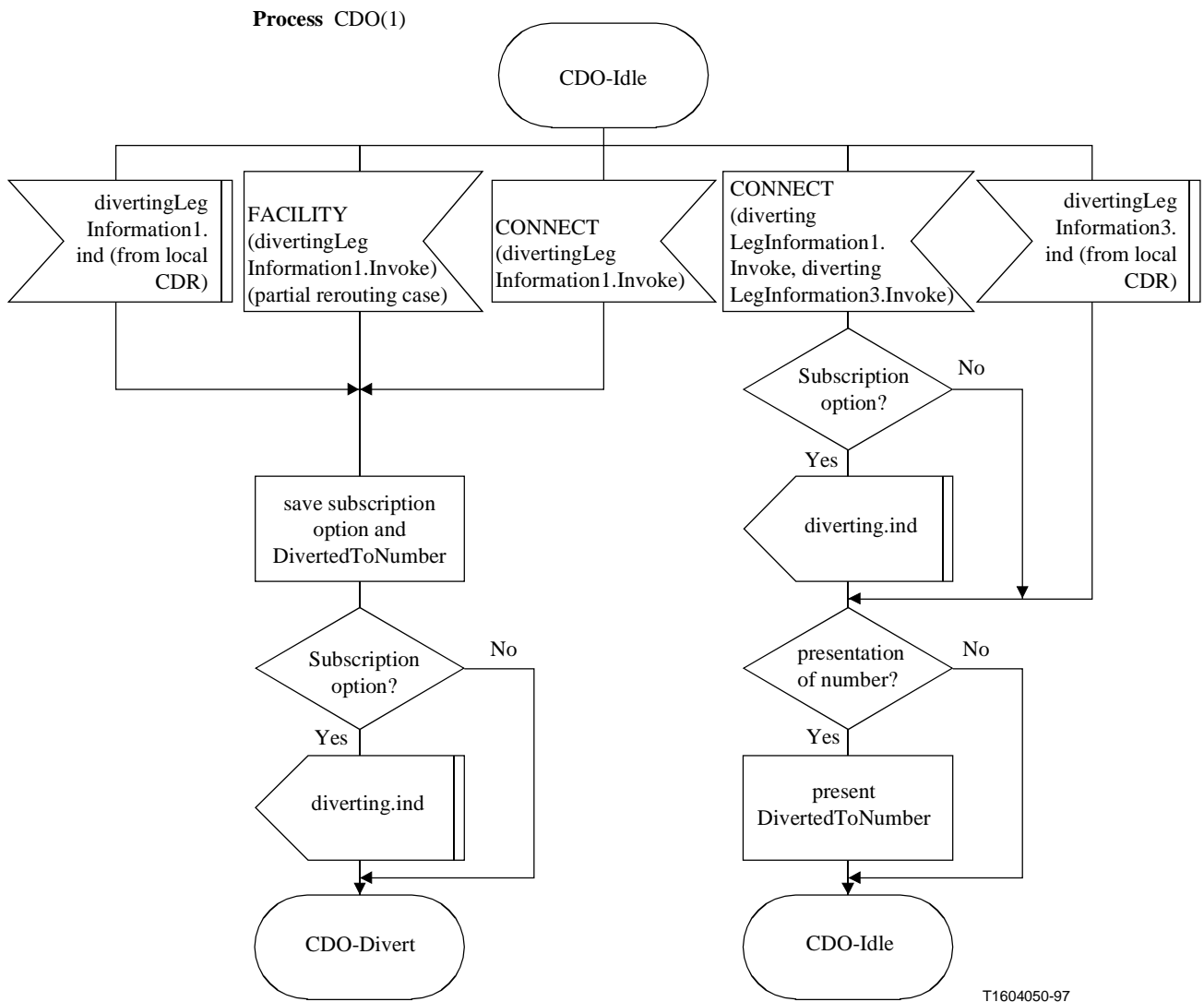


Figure 22/H.450.3 (sheet 1 of 2) – CDO SDL

Process CDO(2)

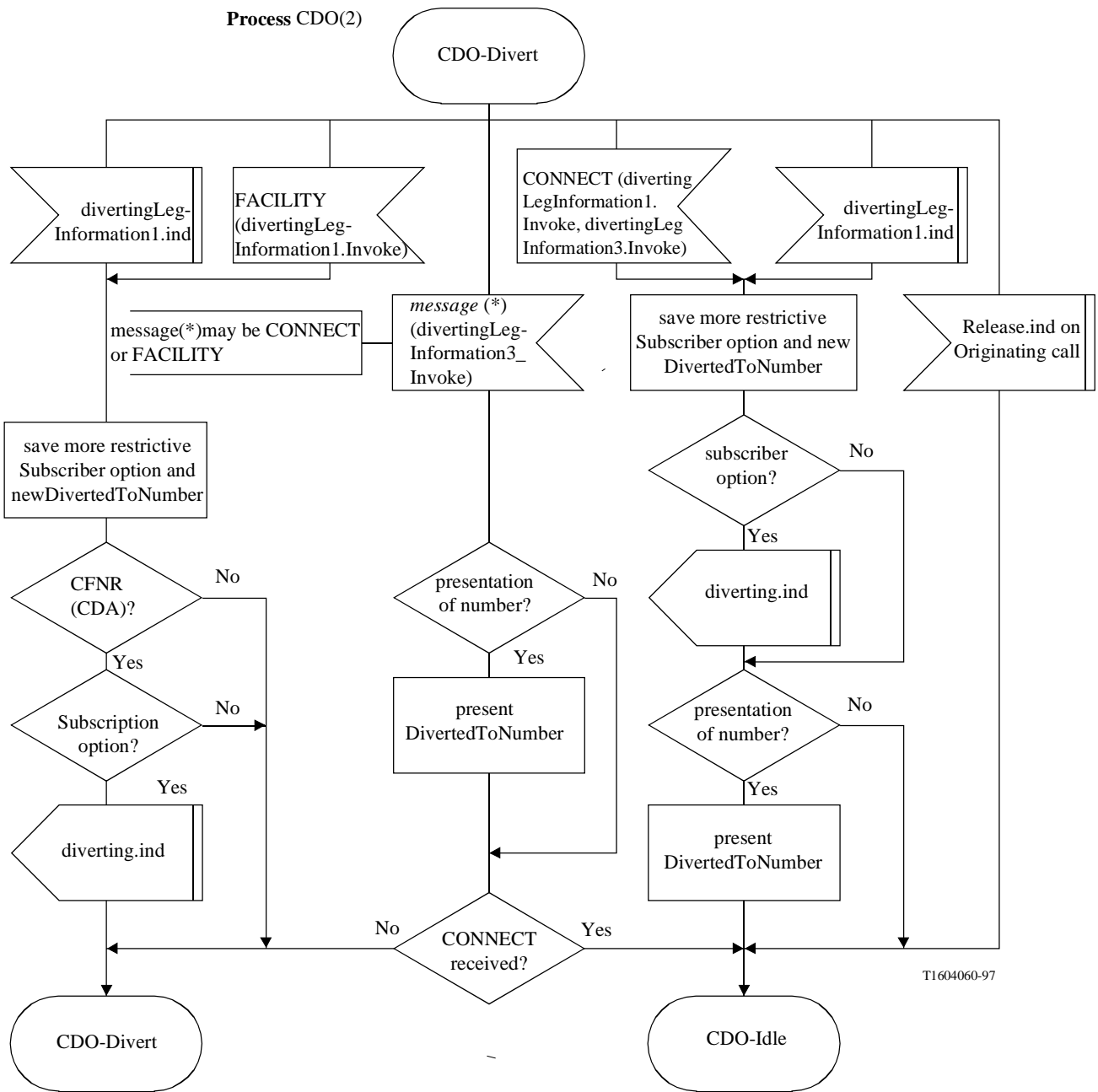


Figure 22/H.450.3 (sheet 2 of 2) – CDO SDLs

12.7 Call Diversion Rerouting Endpoint (CDR) SDLs

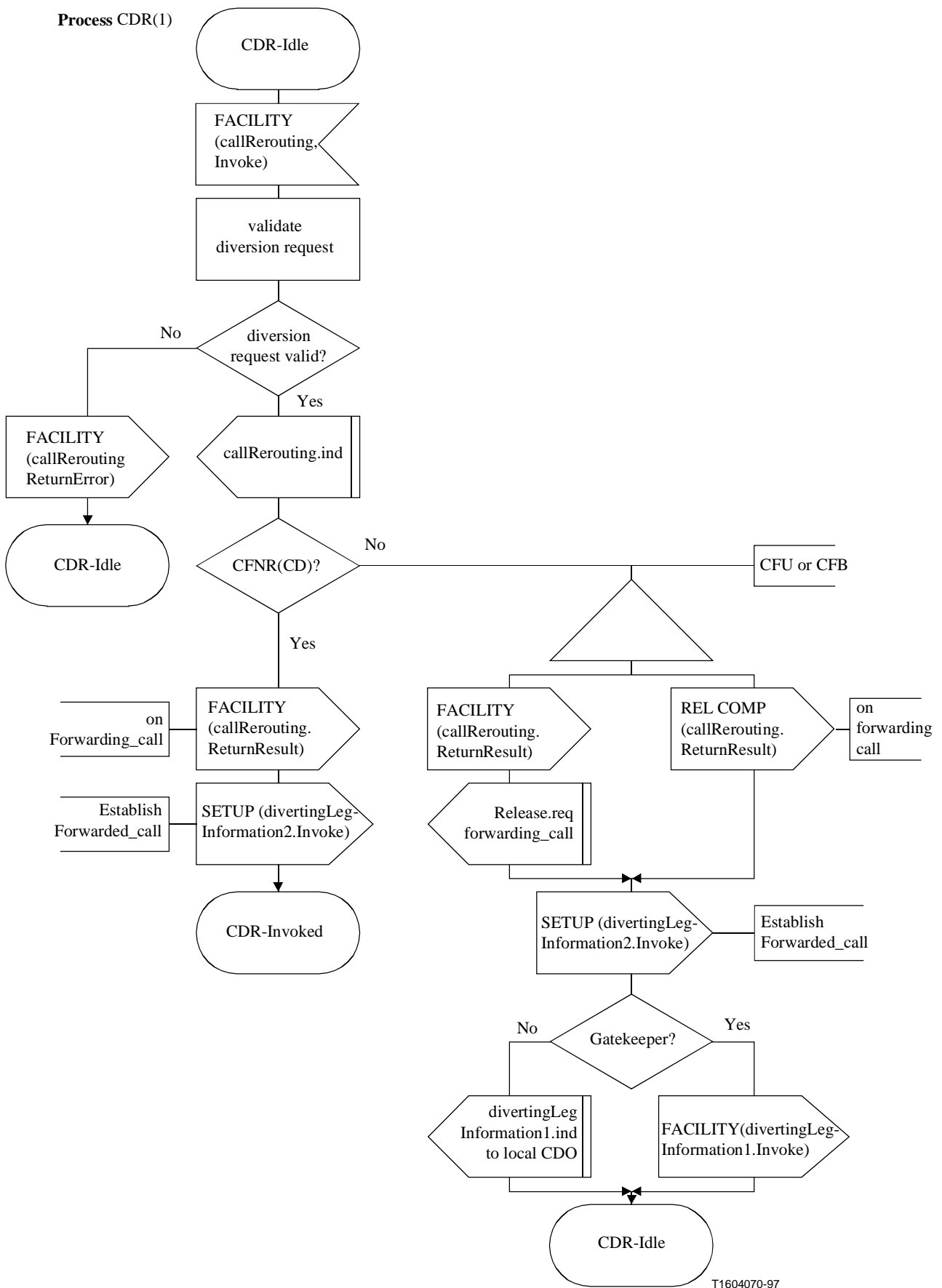
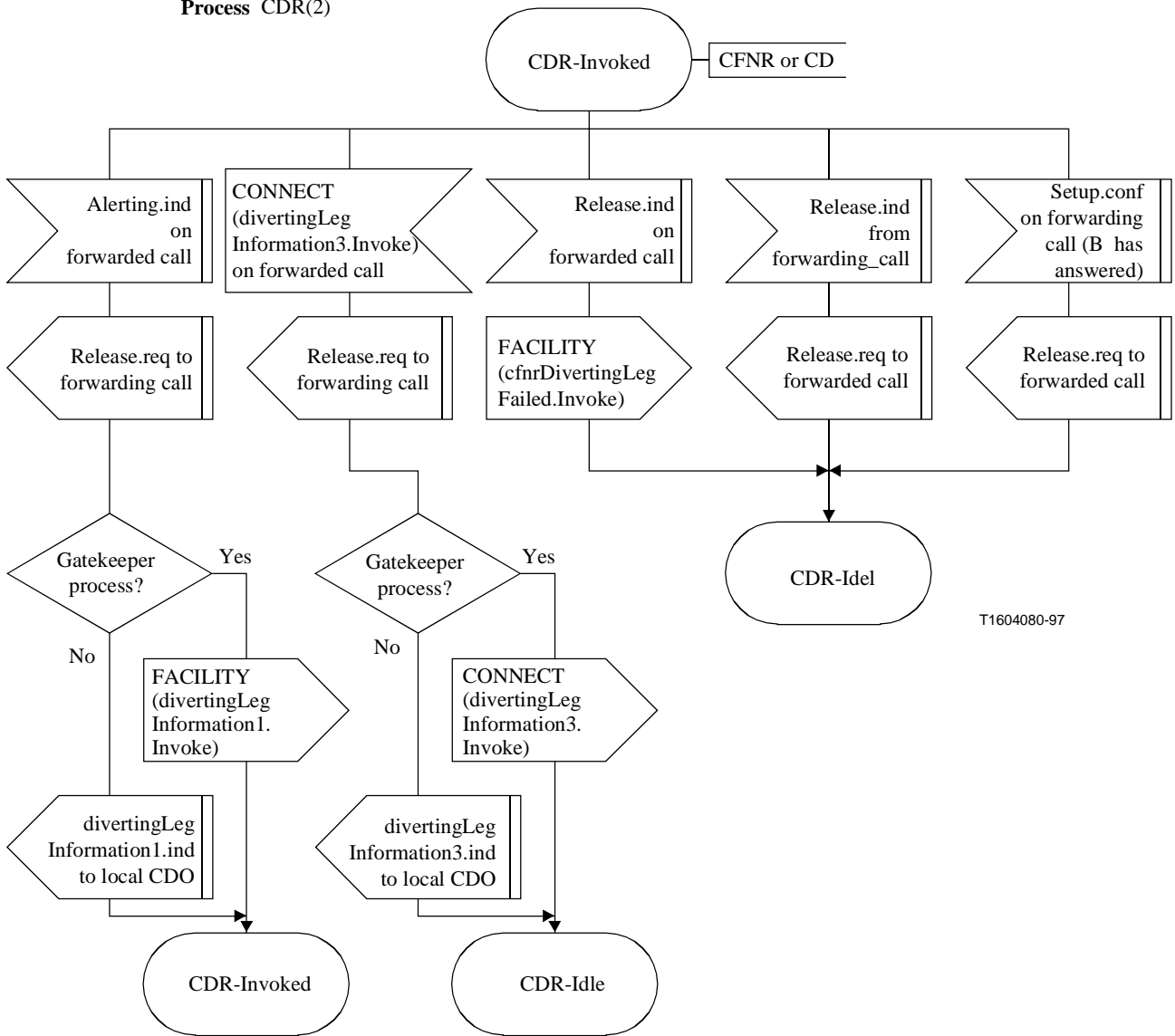


Figure 23/H.450.3 (sheet 1 of 2) – CDR SDLs

Process CDR(2)



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Figure 23/H.450.3 (sheet 2 of 2) – CDR SDLs

12.8 Call Diversion Served Endpoint (CDS) SDLs

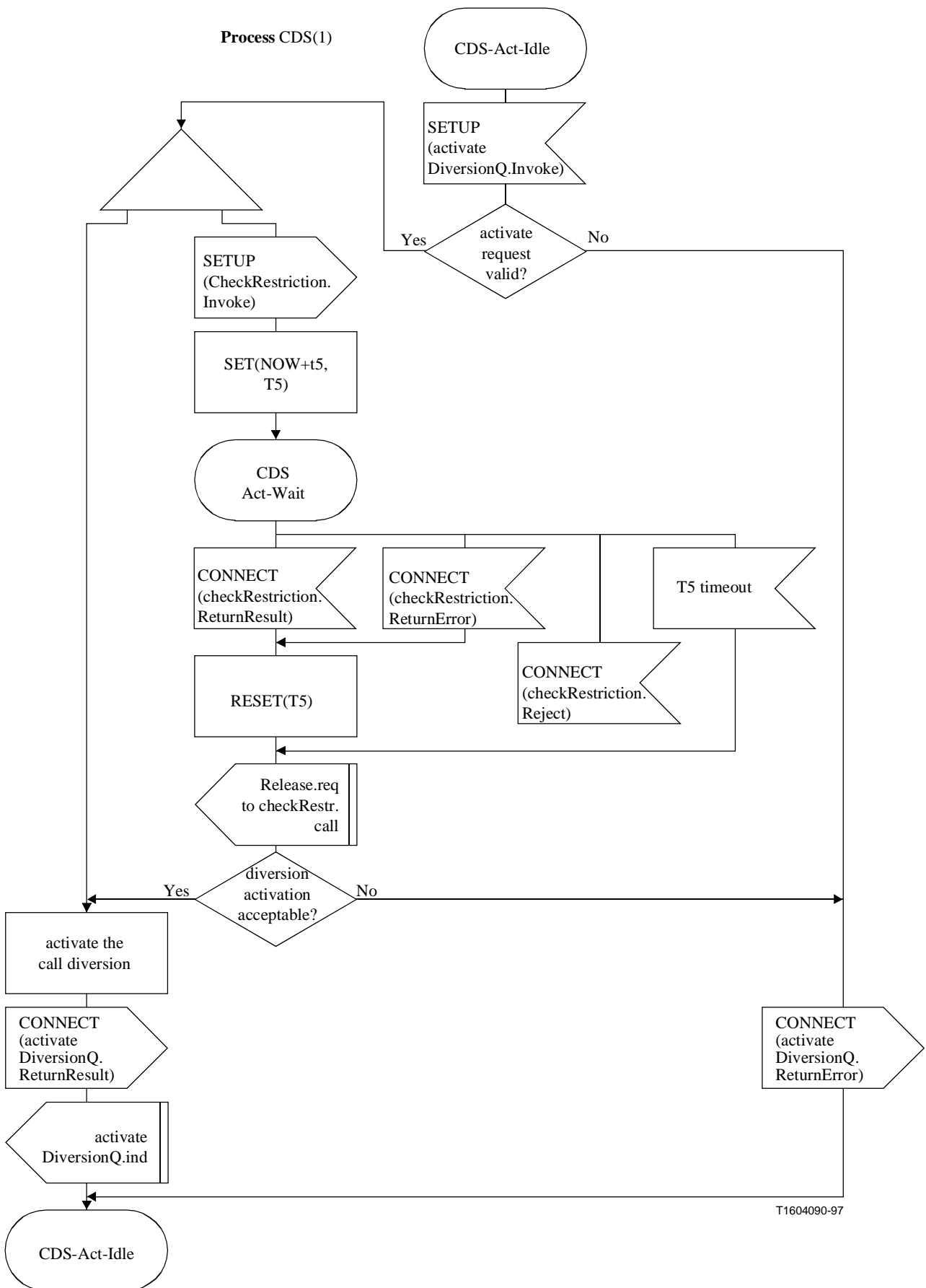


Figure 24/H.450.3 (sheet 1 of 4) – CDS SDLs

Process CDS(2)

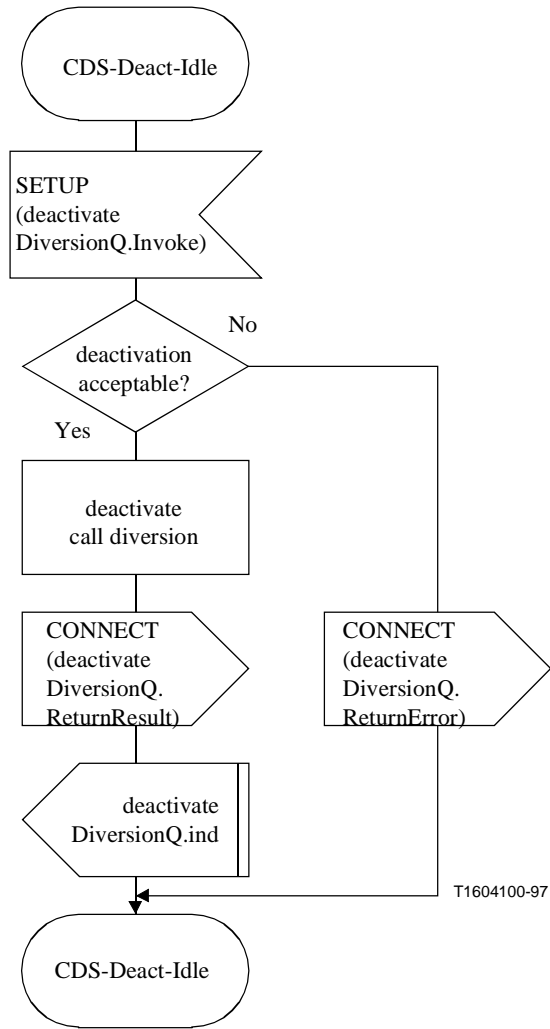


Figure 24/H.450.3 (sheet 2 of 4) – CDS SDLs

Process CDS(3)

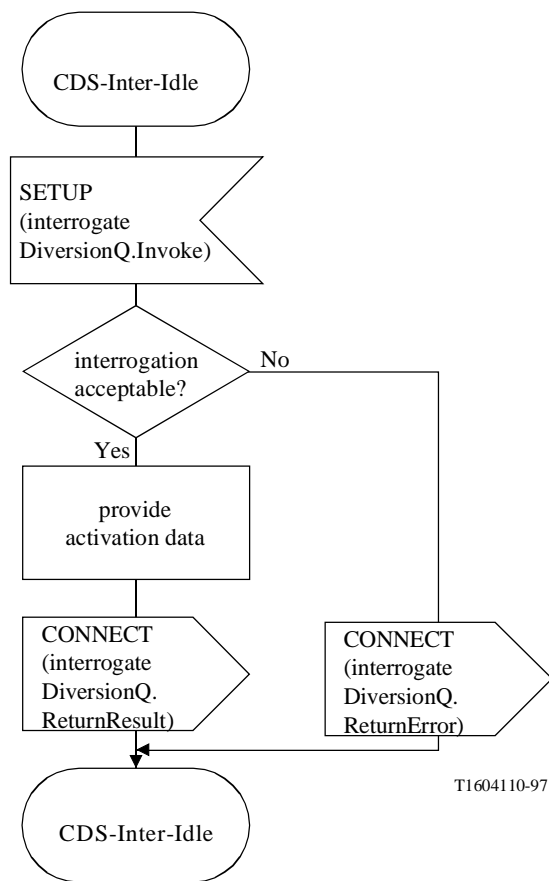
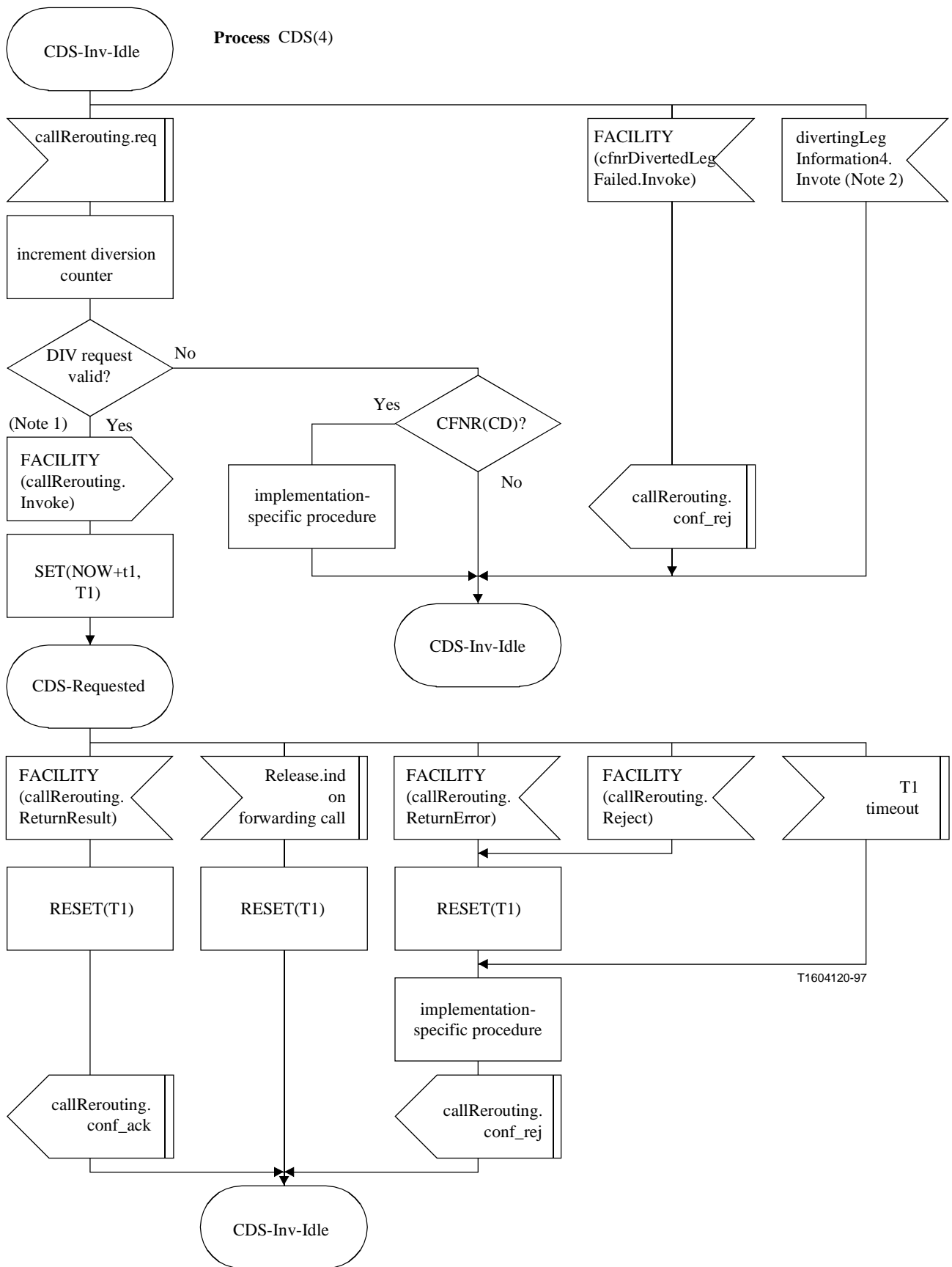


Figure 24/H.450.3 (sheet 3 of 4) – CDS SDLs



NOTE 1 – If gatekeeper performs calldiversion, a divertingLegInformation4invoke APDU is sent to the served terminal.
 NOTE 2 – May be restricted by a served terminal from a GK (if GK performed call diversion).

Figure 24/H.450.3 (sheet 4 of 4) – CDS SDLs

12.9 Call Diversion Diverted-to endpoint (CDF) SDLs

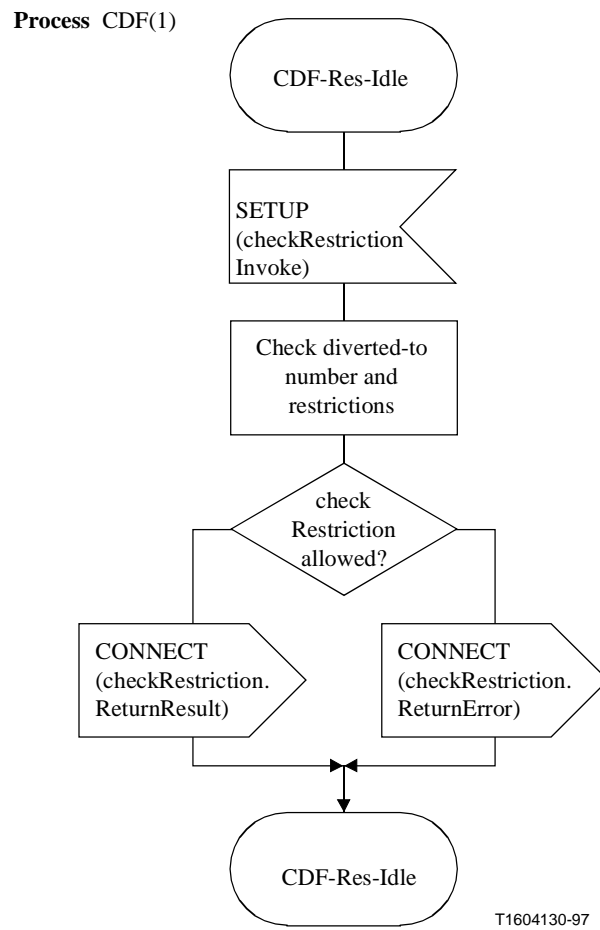
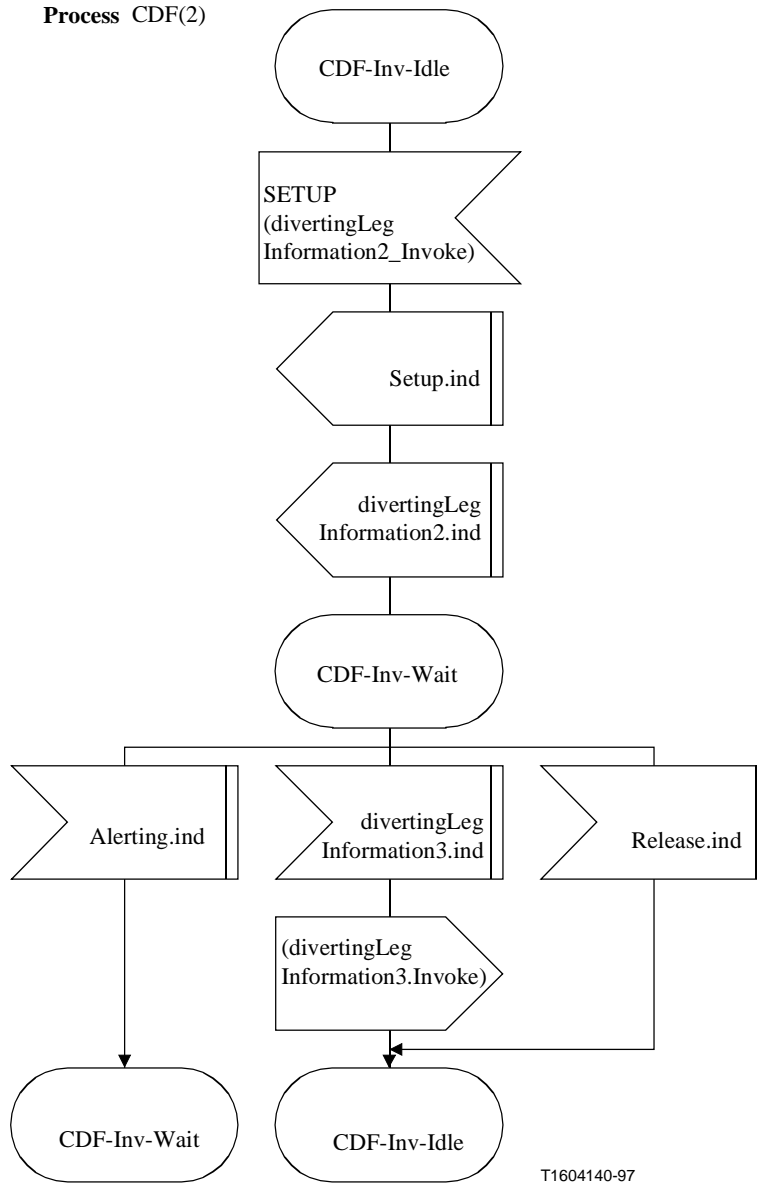


Figure 25/H.450.3 (sheet 1 of 2) – CDF SDLs

Process CDF(2)



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Figure 25/H.450.3 (sheet 2 of 2) – CDF SDLs

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- Series D General tariff principles
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