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TITLE: Call Diversion Supplementary Service in H.323
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Purpose: To add Call Diversion Supplementary Service to Annex C of H.323

Overview: At the last meeting of Q.2/15 in Boulder (12/96), it was agreed to specify ISO/IEC/ QSIG protocols. It was tentatively decided to start a new Annex C of H.323 for these specifications. Based on those agreements, this contribution proposes an initial base text for a specification of the call diversion supplementary service for H.323 terminals. According to the Boulder results, the text is tentatively structured in the style of an Annex C.3 of H.323; however it may be decided that some more protocol related parts of it (particularly the detailed coding) might be moved to a new Annex of H.225.0 rather than H.323.

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Overview

ISO QSIG (PSS1) specifies a number of supplementary services that enable an H.323 endpoint's user (application) to divert incoming calls during call establishment to another endpoint due to various reasons. In addition, service control - as well as identification information is exchanged between the endpoints involved in the service. These diversion services are called "Call Diversion" supplementary services.

It is proposed that H.323 supports the ISO QSIG Call diversion supplementary services, which particular consist of:

SS-CFU Supplementary Service Call Forwarding Unconditional

SS-CFB Supplementary Service Call Forwarding Busy

SS-CFNR Supplementary Service Call Forwarding No Reply

SS-CD Supplementary Service Call Deflection

Remark:

The rerouting function as specified already within H.225 (rerouting to MC, rerouting to Gatekeeper) can not be used instead of the proposed Call diversion supplementary services, since its scope is different. The rerouting function of H.225 is a simple rerouting function to an addressable (but not callable) H.323 entity (reroute to MC or reroute to GK) for assistance purposes in other services (Conferencing, Admission control, etc.). The H.225 rerouting function is not intended for diversion services requested by an H.323 endpoint's user (application) since it does neither contain the required service control information (number of diversions, diversion reasons, etc.) nor contain the required service identification information (notifications regarding numbers and names of involved endpoint users).

Changes to H.323V2

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2 Normative References

:

[xx]ISO/IEC 13872:Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Service description, functional capabilities and information flows - Call diversion supplementary services.

[xx]ISO/IEC 13873:Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call diversion supplementary services

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Add to Annex C

C.3 Call diversion supplementary services

C.3.1 Scope and Field of Application

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

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 endpoint destination.

This Call diversion supplementary service is based on the ISO/IEC13872 and 13873. Since the function split and some basic call related procedures of supplementary service operation is different in QSIG (PINX - PINX relation) and H.323 (endpoint - endpoint relation), text from ISO QSIG call diversion services has been incorporated within this Annex C3 with the modified terminologies and procedures applying to H.323 environment.

C.3.2 Definitions

For the purpose of this recommendation, the following definitions apply.

Activating endpoint

The Activating endpoint is the endpoint serving the activating user.

Call Deflection

The type of diversion invoked by the served endpoint's user.

Call Deflection from Alert

The type of diversion invoked by the served endpoint's user during the alerting phase of an incoming call.

Call Deflection Immediate

The type of diversion invoked by the served endpoint's user immediate after the receipt of an incoming call.

Deactivating endpoint

The Deactivating endpoint is the endpoint serving the deactivating user.

Diversion

The redirection of a call, on request of a called endpoint and prior to answer, to a number different from the number of that called endpoint.

Diversion from Alert

The type of diversion invoked from an alerting state.

Diversion Immediate

The type of diversion invoked prior to reaching the alerting state.

Diverted-to Number

The number to which a call is diverted.

Diverted-to Subaddress

The subaddress to which a call is diverted.

Diverted-to endpoint

The endpoint to which a call is diverted.

Diverting Cause

The parameter which contains the reason for the diversion, e.g. CFU, CFB, CFNR.

Diverting Number

The number of the served endpoint.

Endpoint A

The calling endpoint of a call which is subject to call diversion.

Endpoint B

The served (diverting) endpoint of a call which is subject to call diversion.

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.

Endpoint C

The diverted-to endpoint with respect to the final stage of call diversion.

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.

Interrogating endpoint

The endpoint serving the interrogating user.

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.

Original Called Number

The number of endpoint B (in case of multiple call diversion endpoint B1).

Original Called endpoint

The first served endpoint of a call which is subject to one or more stages of call diversion, i.e. endpoint B or endpoint B1.

Rerouting endpoint

The endpoint which executes call diversion.

Served endpoint

The endpoint who is requesting that calls to his number be diverted. This endpoint may also be referred to as the diverting endpoint or the called endpoint.

User

An application (e.g. served-, activating-, originating endpoint application) accessed from the hosting endpoint via application programming interface.

C.3.3 SS-CFU service description

C.3.3.1 Description

SS-CFU permits a served endpoint's user to redirect all incoming calls, or just those associated with a specified basic service, addressed to the served endpoint's number to another number. SS-CFU may operate on all calls, or just those associated with specified basic services. The served endpoint'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.

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.

C.3.3.2 Activation / Deactivation / Interrogation / Registration

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

The network may provide interrogation, which can be local, remote or both.

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

C.3.3.2.1 Local Activation / Deactivation

The served endpoint's user shall be able to activate CFU separately for each basic service for which CFU is subscribed to and thereby request a different diverted-to number for each basic service for which CFU is subscribed, and/or shall be able to activate CFU for all basic services for which CFU is subscribed to.

To activate CFU, the served endpoint's user shall supply:

1. the diverted-to number
2. information as to whether CFU is to apply to all basic services for which CFU is subscribed to or to a specific basic service out of the basic services for which CFU is subscribed to;

Verification that the diverted-to number exists and that the specific basic service is subscribed to at that number may be carried out before accepting the CFU activation request.

The service provider shall return notification of acceptance of the request. 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 network may be used.

It shall be possible to deactivate CFU by means of an explicit request for deactivation. An explicit request for deactivation shall be treated as follows:

- if deactivation of CFU for an individual basic service is requested, it shall be accepted only if CFU is already activated for that basic service and shall result in the discarding of the diverted-to number;
- if deactivation of CFU collectively for all basic services is requested, it shall result in the discarding of any diverted-to numbers for individual basic services and any diverted-to number collectively for all basic services.

It shall be possible to deactivate CFU by activating CFU to a different diverted-to number. A request for activation of CFU when CFU is already activated shall be treated as follows:

- if activation of CFU for an individual basic service is requested, it shall be accepted only if CFU is not already activated collectively for all basic services and, if CFU is already activated for that individual supplementary service, shall result in overwriting of the existing diverted-to number;
- if activation of CFU collectively for all basic services is requested, it shall result in the discarding of any existing diverted-to numbers and diverted-to subaddresses for individual basic services and the overwriting of any existing diverted-to number collectively for all basic services.

C.3.3.2.2 Remote Activation / Deactivation

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

1. A special authorized endpoint's user may activate and/or deactivate CFU at the served endpoint. Authorization shall be implementation dependent;
2. An endpoint's 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. 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. The enable and disable procedure may be performed either by the served endpoint or by an implementation specific entity;
3. The diverted-to endpoint's 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 endpoint 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 endpoint's 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 endpoint shall lose this capability as soon as CFU is reactivated in this way. The new diverted-to endpoint shall gain the capability.

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

It shall be possible, that the served endpoint activates CFU and the remote endpoint deactivates CFU and vice versa.

C.3.3.2.3 Local Interrogation

If local interrogation is provided, a network shall support interrogation on a per number basis for all basic services and/or for an endpoint specified basic service. The network response to an interrogation request shall provide the following information to the endpoint:

- 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.

C.3.3.2.4 Remote Interrogation

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

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

C.3.3.3 Invocation and Operation

All incoming calls indicating a basic service for which CFU is active shall be diverted without being presented to the served endpoint.

C.3.3.3.1 Served endpoint Notification

The served endpoint's user, as a subscription option, may receive notification of the diversion (but will not be able to answer the incoming call). This notification shall be given as soon as the network originates the call to the diverted-to endpoint

and 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. Bearer Capability information and, if available, High Layer Compatibility information and Low Layer Compatibility information;
3. endpoint B's number.

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 endpoint's number, if presentation is permitted by the original called endpoint;
7. cause for last diversion.

C.3.3.3.2 Diverted-to endpoint Notification

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

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

The notification to the diverted-to endpoint may, provided the subscription options allow, additionally include the identification of the served endpoint's name (in case of multiple diversion the name of the original called endpoint and of the last diverting endpoint).

C.3.3.3.3 Calling endpoint Notification

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

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

- if "No", no notification shall be sent to endpoint A.
- If "Yes, without diverted-to number/name", a notification without number/name shall be sent to endpoint A.
- If "Yes, with diverted-to number/name", a notification with endpoint C's number and optionally the endpoint C's name shall be sent to endpoint A if CLIR/CNIR is not invoked by endpoint C.

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

- If endpoint B1 has "No", no notification 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 altering state has been reached at the served endpoint, and
 - none of the served endpoints has the "No" option.

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

- all served endpoints have "Yes, with diverted-to number/name", and
- CLIR/CNIR is not invoked by endpoint C.

In addition, the number and optionally the name of a 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/name", and if there is no possibility of CLIR/CNIR being invoked at endpoint Bn.

C.3.4 SS-CFB Service Description

C.3.4.1 Description

SS-CFB enables a served endpoint's user to have the network redirect to another endpoint calls which are addressed to the served endpoint's number and meet busy. SS-CFB may operate on all calls, or just those associated with specified basic services. The served endpoint's ability to originate calls is unaffected by SS-CFB.

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.

C.3.4.2 Activation / Deactivation / Interrogation / Registration

Section C.3.3.2 shall apply with "CFU" replaced by "CFB".

C.3.4.3 Invocation and Operation

All incoming calls indicating a basic service for which CFB is active shall be diverted if the served endpoint is busy.

Section C.3.3.3 shall apply with "CFU" replaced by "CFB".

C.3.5 SS-CFNR Service Description

C.3.5.1 Description

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

CNFR 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.

C.3.5.2 Activation / Deactivation / Interrogation / Registration

Section C.3.3.2 shall apply with "CFU" replaced by "CFNR".

C.3.5.3 Invocation and Operation

All incoming calls indicating a basic service for which CFNR is active shall be diverted if the served endpoint's user does not answer.

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 endpoint's users, section C.3.3.3 shall apply with "CFU" replaced by "CFNR".

C.3.6 SS-CD service description

C.3.6.1 Description

Call Deflection permits a served endpoint's user (application) to respond to an incoming call offered by the network by requesting diversion of that call to another number specific in the response. This request is only allowed before the called endpoint's user has answered the call. The served endpoint's originating service 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.

C.3.6.2 Activation/deactivation/registration/interrogation

Activation, deactivation and interrogation options are not applicable.

C.3.6.3 Invocation and operation

The served endpoint's user can respond to an incoming call offered by normal H.225 basic call procedure by requesting the Call Deflection service. The request shall contain the diverted-to-number. The served endpoint's user can request CD either from an alerting state (CDA) or immediately in response to a call request from the network (CDI).

On acceptance of the CD request, the served endpoint shall perform the diversion towards the indicated diverted-to number. For clearing the call to endpoint B to cases are to be distinguished:

- 1: CDA: On acceptance of the CD request the original call at the served endpoint's user shall remain in the alerting state and the served endpoint's 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 endpoint is cleared.
- 2: CDI: The call to the served endpoint is cleared immediately on acceptance of the CD request.

C.3.7 Messages, Information elements and Operations

H.225 Facility Information element and Notification indicator Information element shall apply according to ISO/IEC13873 section 6.3.2.

The Facility information element and the Notification indicator information element shall be conveyed in the messages as specified in ITU-T H.225.

The operations defined in Abstract Syntax Notation One (ASN.1) in ISO/IEC13873 Table 2 shall apply. The operations are also given within H.225 Annex X.

C.3.7.1 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 C.3.7.1) and Rerouting endpoint (C.3.7.4) - shall 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 CFO-Idle, the Originating endpoint shall take account of the information therein and enter state CFO-Divert. In determining whether to notify the calling endpoint's 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 endpoint's user. Otherwise a notification of diversion shall be given to the calling endpoint's user if the capability exists. The diverted-to number and subaddress shall not be presented to the calling endpoint 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 CFO-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 endpoint's 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 endpoint user. Otherwise a notification of further diversion shall be given to the calling endpoint user if the capability exists. The diverted-to number and subaddress shall not be presented to the calling endpoint 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 CFO-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 CFO-Idle if received in a CONNECT message. The diverted-to number (as received in element **nominatedNr** of the last received **diversionLegInformation1** invoke APDU) shall be presented to the calling endpoint 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 of type **PresentationAllowedIndicator**; and
- no previous notification of a diverted-to number has been given to the calling endpoint user unless, since then, a **divertingLegInformation1** invoke APDU with value **cfnr** in element **diversionReason** has been received.

The diverted-to name (as received in element **redirectionName** of the **divertingLegInformation3** invoke APDU) may be presented to the calling endpoint user, if the capability exists, only if all of the three conditions above for the presentation of the diverted-to number are true and if not marked, within the element **redirectionName**, as presentation restricted.

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

C.3.7.2 Actions at a Gatekeeper

In case of Gatekeeper routed model, the call diversion actions at the Gatekeeper are limited to transparent transport of Facility Information element and Notification Indicator Information element.

C.3.7.3 Actions at the Served endpoint

C.3.7.3.1 Activation

On receipt of an **activateDiversionQ** invoke APDU using the call reference of a call independent signalling connection, the Served endpoint endpoint shall check the received basic service (element **basicService**) for the served endpoint (element **servedendpointNr**) and verify that remote activation is supported and enabled. The address of the activating endpoint (element **activatingendpointNr**) 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 endpoint's number is valid. If the activation request is acceptable, the Served endpoint 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 endpoint user.

C.3.7.3.2 Deactivation

On receipt of a **deactivateDiversionQ** invoke APDU using the call reference of a call independent signalling connection, the Served endpoint endpoint shall check the consistency of the received basic service (element

basicService) for the served endpoint (element **servedendpointNr**). The address of the deactivating endpoint (element **deactivatingendpointNr**) 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 endpoint's user.

C.3.7.3.3 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 and Call Forwarding is activated. The address of the interrogating endpoint (element **interrogatingendpointNr**) may also be taken into account in determining whether interrogation is to be allowed to proceed.

C.3.7.3.4 Verification of the Diverted-to endpoint's Number

The Served endpoint 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 ISO/IEC11582, sec. 7.3. The CFS-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 endpoint's number as a valid number, enter CFS-Act-Idle state and stop timer T5.

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 APDU. Alternatively, the signalling connection may be retained for other applications, if appropriate.

C.3.7.3.5 Invocation

The detection of a call diversion invoke request results from different local procedures in the Served endpoint.

When SS-CF is invoked, a **callRerouting** invoke APDU shall be sent in a call related FACILITY message to the Rerouting endpoint and the CFS-Requested state shall be entered. Sending of the FACILITY message for SS-CFU(SS-CDI) 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-CDA) 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 CFS-Requested state. The timer shall be stopped on receipt of a return result 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 **pss1InfoElement** containing an embedded Bearer capability information element, as 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 and Progress indicator
 - element **lastReroutingNr** containing the number of the last diverting endpoint,
 - element **subscriptionOption** containing the served endpoint's requirements for notifying the calling endpoint,
 - 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,
 - element **callingName** if a callingName invoke APDU was received in the incoming SETUP message and recognized by the Served endpoint,
 - element **originalCalledNr**, only in case of multiple call forwarding, containing the number of the original called endpoint,
 - optionally element **redirectingName**,
 - optionally element **originalCalledName**.

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

C.3.7.4 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 C.3.7.1) and Rerouting endpoint (C.3.7.4) - shall 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(CDI)/SS-CFB and Call Delivered for SS-CFNR(CDA), 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(CDI) or SS-CFB shall release the leg towards the Served endpoint by sending a REL COM message. In the case of SS-CFU(CDI) or SS-CFB the return result APDU may instead be conveyed in the REL COM message.

The SETUP message for the new call establishment shall include a **divertingLegInformation2** invoke APDU. A **callingName** invoke APDU may be included in the SETUP message, if the element **callingName** was received in the **callRerouting** invoke APDU and if the Name Identification supplementary service is supported by the Rerouting endpoint.

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 numbers information element and, if subaddress information is present, 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, if subaddress information is present, into the Calling party subaddress information element,
- the Bearer capability information element as received in embedded form within the **callRerouting** invoke APDU, and any of the following information elements which were also received in embedded form in this APDU: High layer compatibility, Low layer compatibility 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 **originalDiversioReason** 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 element **originalCalledNr** if received in the **callRerouting** invoke APDU,
- optionally element **redirectingName** if received in the **callRerouting** invoke APDU,
- optionally element **originalCalledName** 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(CDI)/SS-CFB and SS-CFNR(CDA):

- For SS-CFU(CDI)/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(CDA), the Rerouting endpoint shall move from the CFR-Idle state into the CFR-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 endpoint according to Rec. H.225, send a **divertingLegInformation1** invoke APDU in the FACILITY message to the Originating endpoint and enter the CFR-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 ITU-T Rec. H.225, send a **divertingLegInformation1** invoke APDU in the CONNECT message to the Originating endpoint and enter the CFR-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 ITU-T Rec. H.225 and enter the CFR-Idle state. The CONNECT message shall be relayed to the Originating endpoint according to ITU-T Rec. H.225. The original call shall remain (Originating endpoint - Served endpoint endpoint).

Note: **divertingLegInformation1** is applicable to be sent by the re-routing endpoint, if the re-routing endpoint is different from the calling endpoint. This may be the case in case of the re-routing endpoint being a Gateway. If the re-routing endpoint and the calling endpoint are the same, the **divertingLegInformation1** is an intra-endpoint communication within the re-routing/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.

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

C.3.7.5 Actions at the Diverted-to endpoint

C.3.7.5.1 Invocation

On receipt of a SETUP message with a **divertingLegInformation2** invoke APDU, the Diverted-to endpoint shall enter CFF-Inv-Wait state. A diversion notification, the redirecting number (and the original called number in case of multiple diversion) as received, and optionally the redirecting name (and the original called name in case of multiple diversion) shall be conveyed in an appropriate message together with the basic call establishment information to the called endpoint 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 CFF-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 also indicate the name of the diverted-to endpoint in element **redirectionName** and whether its presentation is restricted. 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-CNFR(CDA). The APDU shall be sent in the CONNECT message if it has not already been sent in a FACILITY or ALERTING message.

C.3.7.5.2 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 section 7.3 of ISO/IEC11582), 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 **servedendpointNr** in the argument) to that endpoint. A **checkRestriction** return result APDU shall be sent back to the Served endpoint if there are no restrictions.

C.3.7.6 Actions at the Activating endpoint

On receipt of a remote activation request from the endpoint's 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 section 7.3 of ISO/IEC11582. The Activating endpoint shall enter the CFA-Wait state and start timer T2. On receipt of the **activateDiversionQ** return result APDU, the Activating endpoint shall stop timer T2, revert to the CFA-Idle state and convey the return result back to the activating endpoint.

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

C.3.7.7 Actions at the Deactivating endpoint

On receipt of a remote deactivation request from the endpoint's 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 section 7.3 of ISO/IEC11582. The Deactivating endpoint shall enter the CFD-Wait state and start timer T3. On receipt of the **deactivateDiversionQ** return result APDU, the Deactivating endpoint shall stop timer T3, revert to the CFD-Idle state and convey the return result back to the deactivating endpoint.

The Deactivating endpoint is responsible for clearing the call independent signalling connection towards the Served endpoint endpoint. This may occur on receipt of a return result APDU. Alternatively, the signalling

connection may be retained for other applications, if appropriate.

C.3.7.8 Actions at the Interrogating endpoint

On receipt of a remote interrogate request from the endpoint user, the Interrogating endpoint shall send a **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 7.3 of ISO/IEC11582. The Interrogating endpoint shall enter the CFI-Wait state and start timer T4. On receipt of the **interrogateDiversionQ** return result or return error APDU, the Interrogating endpoint shall stop timer T4, revert to the CFI-Idle state and convey the return result or return error back to the interrogating endpoint.

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 APDU. Alternatively, the signalling connection may be retained for other applications, if appropriate.

C.3.8 **Dynamic Description of Call Diversion**

C.3.8.1 **Operational model**

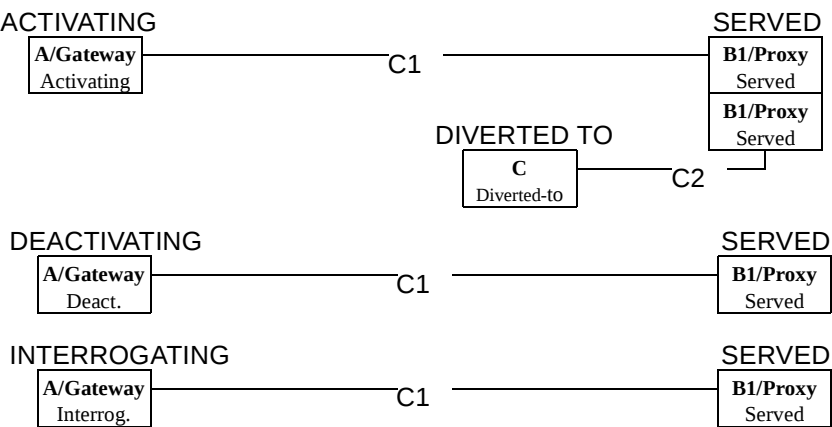


Figure C.3 -1 Operational model for remote activation/deactivation/interrogation of call forwarding

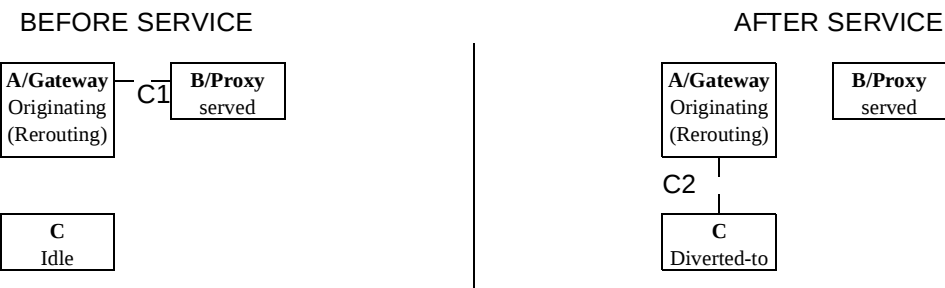


Figure C.3 -2 Operational model for call forwarding immediate (CFU, CFB, CDI) with rerouting

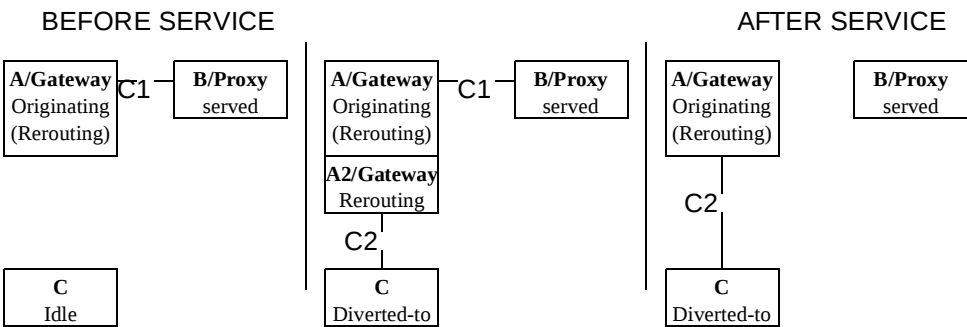


Figure C.3 -3 Operational model for call forwarding delayed (CFNR, CDA) with rerouting

C.3.8.2 Communication between CDO (Originating) signalling entity and CDO signalling entity user

C.3.8.2.1 Table of primitives

generic name	type			
	request	indication	response	confirm
divertingLegInformation1	not defined ¹	PARAMETERS ²	not defined	not defined

1 “not defined” means that this primitive is not defined
2to be added

C.3.8.2.2 Primitive Definition

The divertingLegInformation1.ind. primitive is used to indicate information to the signalling entity user

C.3.8.2.3 Parameter Definition

To be defined

C.3.8.2.4 States

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

C.3.8.2.5 State Transition diagram

To be defined

C.3.8.3 Communication between CDS (Served) signalling entity and CDS signalling entity user

C.3.8.3.1 Table of primitives

generic name	type			
	request	indication	response	confirm
activateDiversionQ	not defined ¹	PARAMETERS ²	PARAMETERS	not defined
deactivateDiversionQ	not defined	PARAMETERS	PARAMETERS	not defined
interrogateDiversionQ	not defined	PARAMETERS	PARAMETERS	not defined
checkRestriction	PARAMETERS	not defined	not defined	PARAMETERS
callRerouting	PARAMETERS	not defined	not defined	PARAMETERS
cfDivertingLegFailed	not defined	_ ³	not defined	not defined

1 “not defined” means that this primitive is not defined
2to be added
3“-” means no parameters

C.3.8.3.2 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
 - k) The `callRerouting.conf.` primitive is used to confirm the result of a rerouting request
 - l) The `cfDivertingLegFailed.ind.` primitive is used to indicate to the signalling entity user, that the diversion has failed.

C.3.8.3.3 Parameter Definition

To be added

C.3.8.3.4 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.

C.3.8.3.5 State Transition diagram

To be added.

C.3.8.4 Communication between CDF (Diverted-to) signalling entity and CDF signalling entity user

C.3.8.4.1 Table of primitives

generic name	type			
	request	indication	response	confirm
checkRestriction	not defined ¹	PARAMETERS ²	PARAMETERS	not defined
divertingLegInformation2	not defined	PARAMETERS	not defined	not defined
divertingLegInformation3	PARAMETERS	not defined	not defined	not defined

1 “not defined” means that this primitive is not defined

2to be added

C.3.8.4.2 Primitive Definition

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

C.3.8.4.3 Parameter Definition

To be defined

C.3.8.4.4 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.

C.3.8.4.5 State Transition diagram

To be defined

C.3.8.5 Communication between CDR (Rerouting) signalling entity and CDR signalling entity user

C.3.8.5.1 Table of primitives

generic name	type			
	request	indication	response	confirm
callRerouting	not defined ¹	PARAMETERS ²	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
cfDivertingLegFailed	- ³	not defined	not defined	not defined

1 “not defined” means that this primitive is not defined

2 to be added

3 “-” means no parameters

C.3.8.5.2 Primitive Definition

- a) The divertingLegInformation1.req. primitive is used to request an indication of information
- b) The divertingLegInformation2.req. primitive is used to request an indication of information
- c) The divertingLegInformation3.ind. primitive is used to indicate information to the signalling entity user.
- d) The cfDivertingLegFailed.req. primitive is used to request the indication, that the diversion has failed.

C.3.8.5.3 Parameter Definition

To be defined

C.3.8.5.4 States

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

C.3.8.5.5 State Transition diagram

To be defined

C.3.8.6 Communication between CDA (Activating) signalling entity and CDA signalling entity user

C.3.8.6.1 Table of primitives

generic name	type			
	request	indication	response	confirm
activateDiversionQ	PARAMETERS ¹	not defined ²	not defined	PARAMETERS

1 to be added

2 “not defined” means that this primitive is not defined

C.3.8.6.2 Primitive Definition

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

C.3.8.6.3 Parameter Definition

To be defined

C.3.8.6.4 States

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

C.3.8.6.5 State Transition diagram

To be defined

C.3.8.7 Communication between CDD (Deactivating) signalling entity and CDD signalling entity user

C.3.8.7.1 Table of primitives

generic name	type			
	request	indication	response	confirm
deactivateDiversionQ	PARAMETERS ¹	not defined ²	not defined	PARAMETERS

1 to be added

2 “not defined” means that this primitive is not defined

C.3.8.7.2 Primitive Definition

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

C.3.8.7.3 Parameter Definition

To be defined

C.3.8.7.4 States

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

C.3.8.7.5 State Transition diagram

To be defined

C.3.8.8 Communication between CDI (Interrogating) signalling entity and CDI signalling entity user

C.3.8.8.1 Table of primitives

generic name	type			
	request	indication	response	confirm
interrogateDiversionQ	PARAMETERS ¹	not defined ²	not defined	PARAMETERS

¹to be added

² “not defined” means that this primitive is not defined

C.3.8.8.2 Primitive Definition

- a) The interrogateDiversionQ.req. primitive is used to request the interrogation
- b) The interrogateDiversionQ.conf. primitive is used to confirm the result of the interrogation

C.3.8.8.3 Parameter Definition

To be defined

C.3.8.8.4 States

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

C.3.8.8.5 State Transition diagram

To be defined

C.3.8.9 Peer-to-Peer Communication for Call diversion

C.3.8.9.1 Messages

To be added

C.3.8.9.2 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.

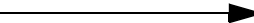
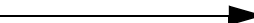
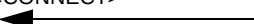
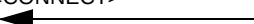
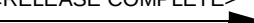
Timer T5 shall have a value of not less than 15 seconds.

C.3.8.9.3 Counters

To be added.

C.3.8.9.4 Message flow model: Remote Activation of call diversion

Table C.3 - 1 Remote activation of call forwarding

Row no.	User / Application action	a) Primitive b) State c) Timer	N o t e	IP, H.225, QSIG, CSTA, H.245	N o t e	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) API -<activate DiversionQ.req.> b) U1 CDA-Wait c) start timer T2	1	H.225 <SETUP>  Facility IE: invoke QSIG: activateDiversionQ procedure=CFU(1) [as an example] forwardedToAddress=address C servedUserNr		↓ a) API -<activate DiversionQ.ind.> b) U6 CDS-Act-Idle	Receive request for activation of CT
3	MM Terminal B / Proxy B			Network		MM Terminal C	
4	check restriction on Te C	↓ a) API -<check Restriction.req.> b) U1 CDS-ACT-Wait c) start timer T5		H.225 <SETUP>  Facility IE: invoke QSIG: checkRestriction activationStatus notificationDiv		↓ a) API -<check Restriction.ind.> b) U6 CDF-Res-Idle	Receive restriction check restrictions
5	activate CF	↓ a) API -<check Restriction.conf.> b) U10 CDS-ACT-Wait c) stop timer T5		H.225 <CONNECT>  Facility IE: returnResult QSIG: checkRestriction		↓ a) API -<check Restriction.resp.> b) U10 CDF-Res-Idle	send result of restriction check
6	MM Terminal A / Gateway			Network		MM Terminal B / Proxy B	
7	activation indication to user	↓ a) API -<activate DiversionQ.conf.> b) U1 CDA-Idle c) stop timer T2		H.225 <CONNECT>  Facility IE: returnResult QSIG: activateDiversionQ procedure=CFU(1) forwardedToAddress=address C servedUserNr		↓ a) API -<activate DiversionQ.resp.> b) U6 DSD-Act-Idle	accept activation of CF activation indication to user
8	MM Terminal B / Proxy B			Network		MM Terminal C	
9		↓ a) API -<Release.req.> b) U0		H.225 <RELEASE COMPLETE> 		↓ a) API -<Release.ind.> b) U0	Receive H.225 release_in dication
10	MM Terminal B / Proxy B			Network		MM Terminal A / Gateway	
11		↓ a) API -<Release.req.> b) U0		H.225 <RELEASE COMPLETE> 		↓ a) API -<Release.ind.> b) U0	Receive H.225 release_in dication

1In contradiction to H.225 the Facility IE must be supported in the SETUP and CONNECT message.

C.3.8.9.5 Message flow model: Immediate Call Forwarding with Rerouting

For conditions: unconditional, on busy, deflection-early release

In addition to Te B, Te A also has to be a H.323-SpIS-terminal, or gateway of A is able to forward calls.

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.

Note: In contradiction to H.225 the Facility IE must be supported in the SETUP and CONNECT message.

C.3.8.9.5.1 Description from user point of view:

User B (served party): not present, busy or initiating deflection

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

Table C.3 - 2 Immediate Call forwarding with rerouting (unconditional, on busy, deflection-immediate)

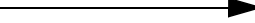
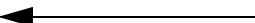
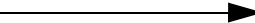
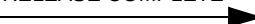
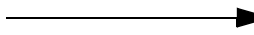
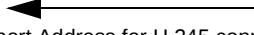
Row no.	User / Application action	a) Primitive b) State c) Timer	Network	IP, H.225, QSIG, CSTA, H.245	Network	a) Primitive b) State c) Timer	User / Application action
12	MM Terminal A / Gateway			Network		MM Terminal B / Proxy	
13	Request for call establishment to User B. Select Media User B address	↓ a) API -<Setup.req.> b) U1 CDR-Idle CDO-Idle		H.225 <SETUP> 		↓ a) API -<Setup.ind.> b) U6 CDS-Inv-Idle	Receive H.225 setup_indication
14							condition: -unconditional -busy -user deflection
15	Receive forwarding request	↓ a) API -<call Rerouting.ind.> b) U1/U3/U4 CDR-Idle CDO-Idle		H.225 <FACILITY>  Facility IE: invoke QSIG: callRerouting reroutingReason=cfu(1); cfb(2) calledAddress=address C		↓ a) API -<call Rerouting.req.> b) U6/U7/U9 CDS-Inv-Requested c) start timer T1	Request terminal A to call terminal C
16	Acceptance of forwarding	↓ a) API -<call Rerouting.resp.> b) U1/U3/U4 CDR-Idle CDO-Idle		H.225 <FACILITY>  Facility IE: returnResult QSIG: callRerouting reroutingReason=cfu(1); cfb(2) calledAddress=address C		↓ a) API -<call Rerouting.conf.> b) U6/U7/U9 CDS-Inv-Idle c) stop timer T1	
17		↓ a) API -<Release.req.> b) U0 CDR-Idle CDO-Idle		H.225 <RELEASE COMPLETE> 		↓ a) API -<Release.ind.> b) U0 CDS-Inv-Idle	Receive H.225 release_indication
18	MM Terminal A / Gateway			Network		MM Terminal C	

Table C.3 - 2 Immediate Call forwarding with rerouting (unconditional, on busy, deflection-immediate)

Row no.	User / Application action	a) Primitive b) State c) Timer	Not to be used	IP, H.225, QSIG, CSTA, H.245	Not to be used	a) Primitive b) State c) Timer	User / Application action
19	Request for call establishment to User C Select Media User C address	↓ a) API -<divertingLegInformation2.req.> b) U1 CDR-Idle CDO-Divert		H.225 <SETUP>  Facility IE: invoke QSIG: divertingLegInformation2		↓ a) API -<divertingLegInformation2.ind.> b) U6 CDF-Inv-Wait	Receive H.225 setup_indication diversion indication
20	Indication to Appl/ User A of MM Terminal C general availability Indication of diverted-to-number	↓ a) API -<divertingLegInformation3.ind.> b) U10 CDR-Idle CDO-Idle		H.225 <CONNECT>  [Transport Address for H.245 connection] Facility IE: invoke QSIG: divertingLegInformation3		↓ a) API -<divertingLegInformation3.req.> b) U10 CDF-Inv-Idle	Call accept by User C or by Application C

C.3.8.9.6 Message flow model: Delayed Call Forwarding with Rerouting

For condition: no reply; deflection-late release

C.3.8.9.6.1 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

Table C.3 - 3 Delayed Call forwarding with rerouting (no reply; deflection-alerting)

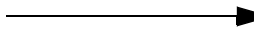
Row no.	User / Application action	a) Primitive b) State c) Timer	Not to be used	IP, H.225, QSIG, CSTA, H.245	Not to be used	a) Primitive b) State c) Timer	User / Application action
21	MM Terminal A / Gateway			Network			MM Terminal B / Proxy
22	Request for call establishment to User B. Select Media User B address	↓ a) API -<Setup.req.> b) U1 CDR-Idle CDO-Idle		H.225 <SETUP> 		↓ a) API -<Setup.ind.> b) U6 CDS-Inv-Idle	Receive H.225 setup_indication

Table C.3 - 3 Delayed Call forwarding with rerouting (no reply; deflection-alerting)

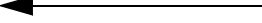
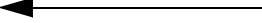
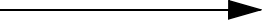
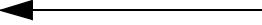
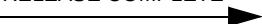
Row no.	User / Application action	a) Primitive b) State c) Timer	Note	IP, H.225, QSIG, CSTA, H.245	Note	a) Primitive b) State c) Timer	User / Application action
23		↓ a) API -<Alerting.ind.> b) U4 CDR-Idle CDO-Idle		H.225 <ALERTING>  [Transport Address for H.245 connection]		↓ a) API -<Alerting.req.> b) U7 CDS-Inv-Idle	Start user alerting
24							condition: -timer (no reply) expires -user deflection
25	Receive forwarding request	↓ a) API -<call Rerouting.ind.> b) U1/U3/U4 CDR-Idle CDO-Idle		H.225 <FACILITY>  Facility IE: invoke QSIG: callRerouting reroutingReason=cfnr(3) calledAddress=address C		↓ a) API -<call Rerouting.req.> b) U6/U7/U9 CDS-Inv-Requested c) start timer T1	Request terminal A to call terminal C
26	Acceptance of forwarding	↓ a) API -<call Rerouting.resp.> b) U1/U3/U4 CDR-Idle CDO-Idle		H.225: <FACILITY>  Facility IE: returnResult QSIG: callRerouting reroutingReason=cfnr(3)		↓ a) API -<call Rerouting.conf.> b) U6/U7/U9 CDS-Inv-Idle c) stop timer T1	
27	MM Terminal A / Gateway			Network		MM Terminal C	
28	Request for call establishment to User C Select Media User C address	↓ a) API -<divertingLegInformation2.req.> b) U1 CDR-Invoked CDO-Idle		H.225 <SETUP>  Facility IE: invoke QSIG: divertingLegInformation2		↓ a) API -<divertingLegInformation2.ind.> b) U6 CDF-Inv-Wait	Receive H.225 setup_indication diversion indication
29	Case 1: Successful forwarding (user B did not reply during forwarding)						
30		↓ a) API -<Alerting.ind.> b) U4 CDR-Invoked CDO-Divert	1	H.225 <ALERTING>  [Transport Address for H.245 connection]		↓ a) API -<Alerting.req.> b) U7 CDF-Inv-Wait	Start user alerting
31	MM Terminal A / Gateway			Network		MM Terminal B / Proxy	
32		↓ a) API -<Release.req.> b) U0 CDR-Idle CDO-Divert		H.225 <RELEASE COMPLETE> 		↓ a) API -<Release.ind.> b) U0 CDS-Inv-Idle	Receive H.225 release_indication
33	MM Terminal A / Gateway			Network		MM Terminal C	

Table C.3 - 3 Delayed Call forwarding with rerouting (no reply; deflection-alerting)

Row no.	User / Application action	a) Primitive b) State c) Timer	Note	IP, H.225, QSIG, CSTA, H.245	Note	a) Primitive b) State c) Timer	User / Application action
34	Indication to Appl/ User A of MM Terminal C general availability Indication of diverted-to-number	↓ a) API -<divertingLegInformation3.ind.> b) U10 CDR-Idle CDO-Idle		H.225 <CONNECT> ← Facility IE: invoke QSIG: divertingLegInformation3	2	↓ a) API -<divertingLegInformation3.req.> b) U10 CDF-Inv-Idle	Call accept by User C or by Application C
35	Case 2: User B replies before alerting of user C						
36	MM Terminal A / Gateway			Network		MM Terminal B / Proxy	
37	Indication to Appl/ User A of MM Terminal C general availability	↓ a) API -<Setup.conf.> b) U10 CDR-Invoked CDO-Divert		H.225 <CONNECT> ←		↓ a) API -<Setup.resp.> b) U10 CDS-Inv-Idle	Call accept by User C or by Application C
38	MM Terminal A / Gateway			Network		MM Terminal C	
39		↓ a) API -<Release.req.> b) U0 CDR-Idle CDO-Idle		H.225 <RELEASE COMPLETE> →		↓ a) API -<Release.ind.> b) U0 CDF-Inv-Idle	Receive H.225 release_indication
40	Case 3: Call establishment to terminal C fails						
41	MM Terminal A / Gateway			Network		MM Terminal C	
42	Receive H.225 release_indication	↓ a) API -<Release.ind.> b) U0 CDR-Invoked CDO-Idle		H.225 <RELEASE COMPLETE> ←		↓ a) API -<Release.req.> b) U0 CDF-Inv-Idle	
43	MM Terminal A / Gateway			Network		MM Terminal B / Proxy	
44	alerting timer expiry or release request by user or application	↓ a) API -<cfDivertingLegFailed.req.> b) U4 CDR-Idle CDO-Idle		H.225 <FACILITY> → Facility IE: invoke QSIG: cfDivertingLegFailed		↓ a) API -<cfDivertingLegFailed.ind.> b) U7 CDS-Inv-Idle	Receive H.225 release_indication

1Connect could also be sent

2If not already sent

C.3.8.10 SDLs

C.3.8.10.1 Model Call diversion supplementary service

In the following, SDL representation for SS Call diversion is given from the following endpoints view:

- Originating endpoint ¹
- Rerouting endpoint
- Served endpoint
- Activating endpoint
- Deactivating endpoint
- Interrogating endpoint

C.3.8.10.2 Primitive Parameter default Values

To be added.

C.3.8.10.3 Message Field default Values

To be added.

1. When an Originating endpoint also provides Rerouting functionality, in support of call diversion by rerouting, the joint requirements of both - Originating endpoint and Rerouting endpoint - shall apply, with the exception that any communication between the Originating endpoint functionality and the Rerouting endpoint functionality will be an intra-endpoint matter.

C.3.8.10.4 Call Diversion Originating endpoint (CDO) SDLs

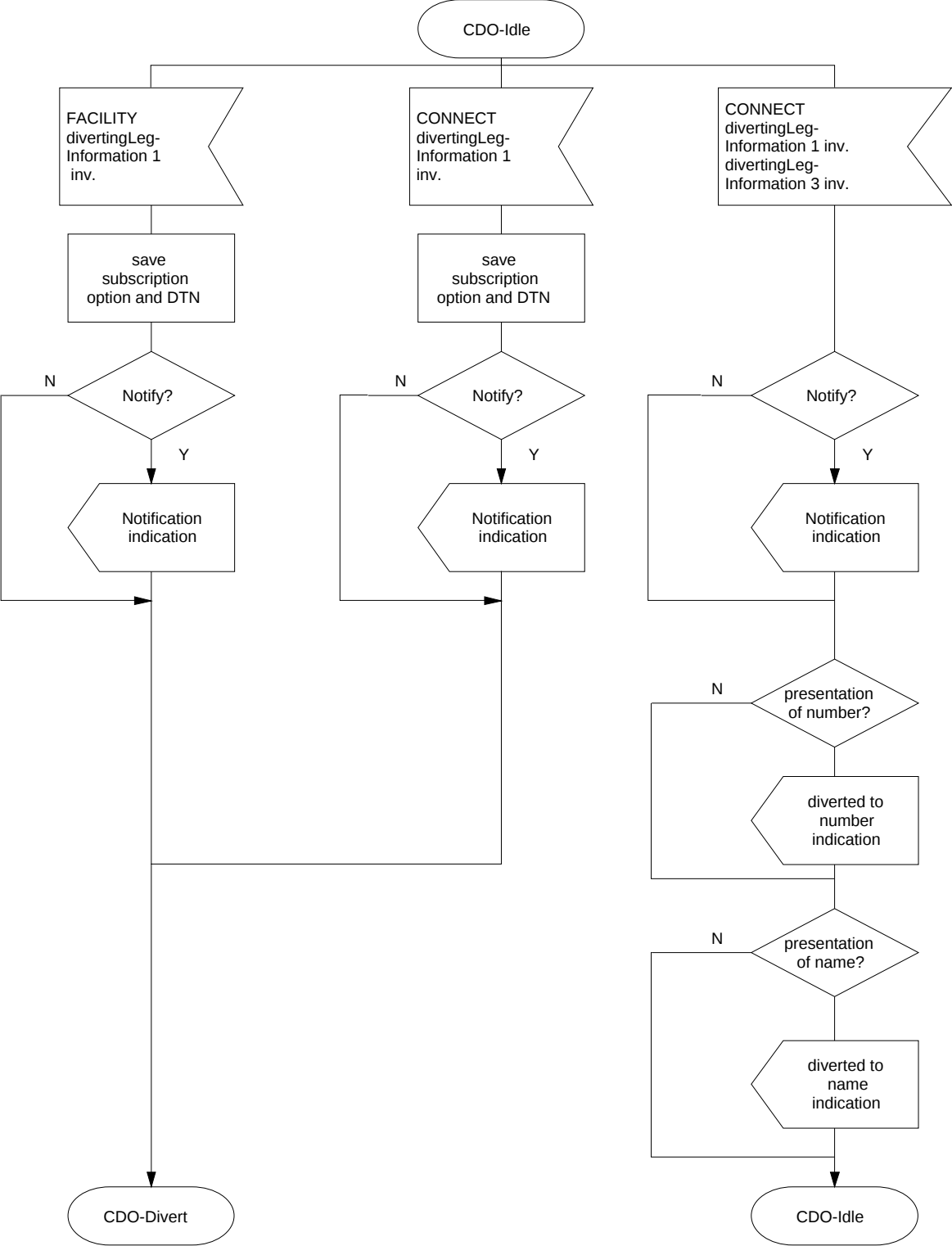


Figure C3 - 4 Originating endpoint SDL (sheet 1 of 2)

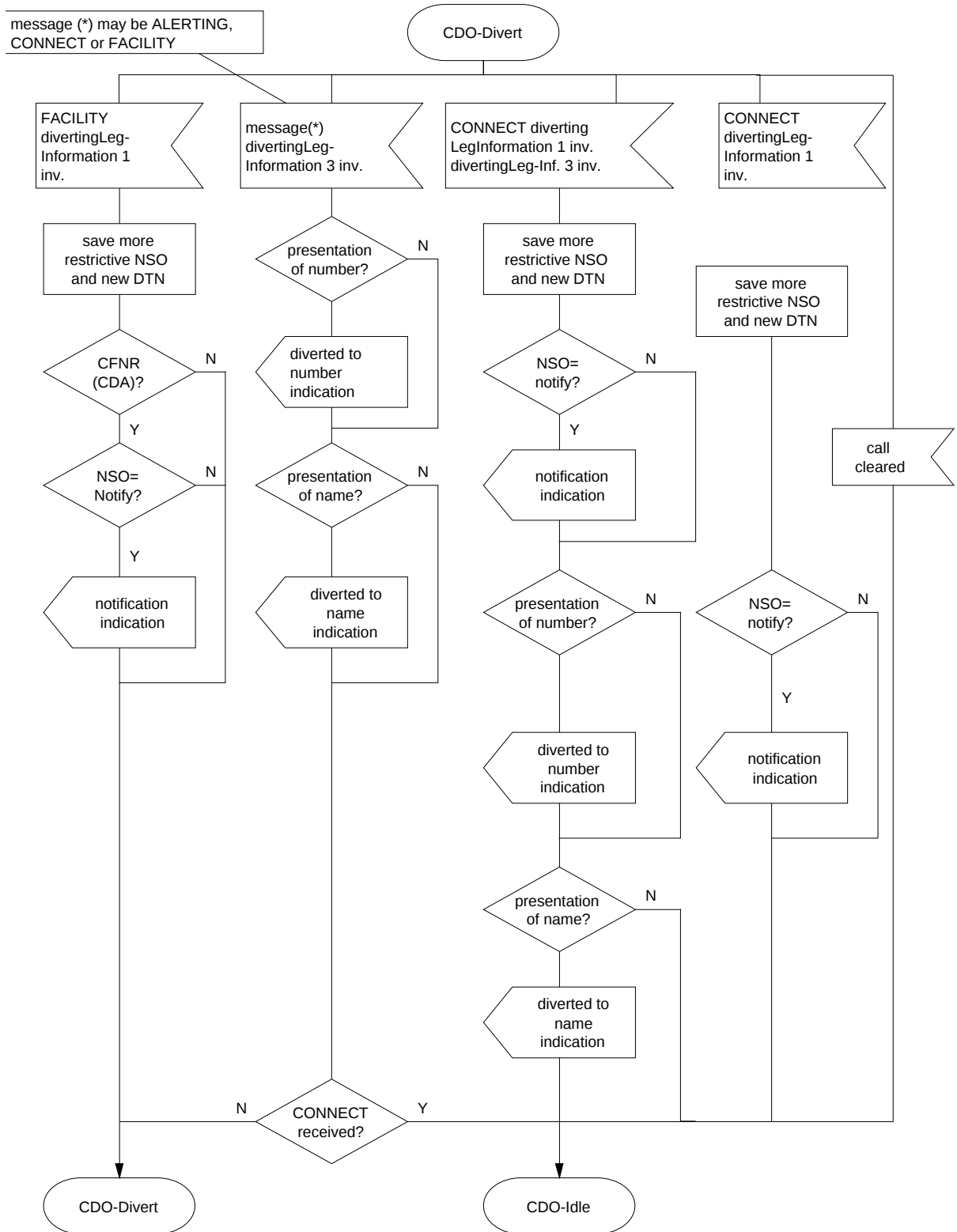
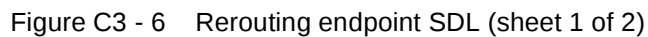
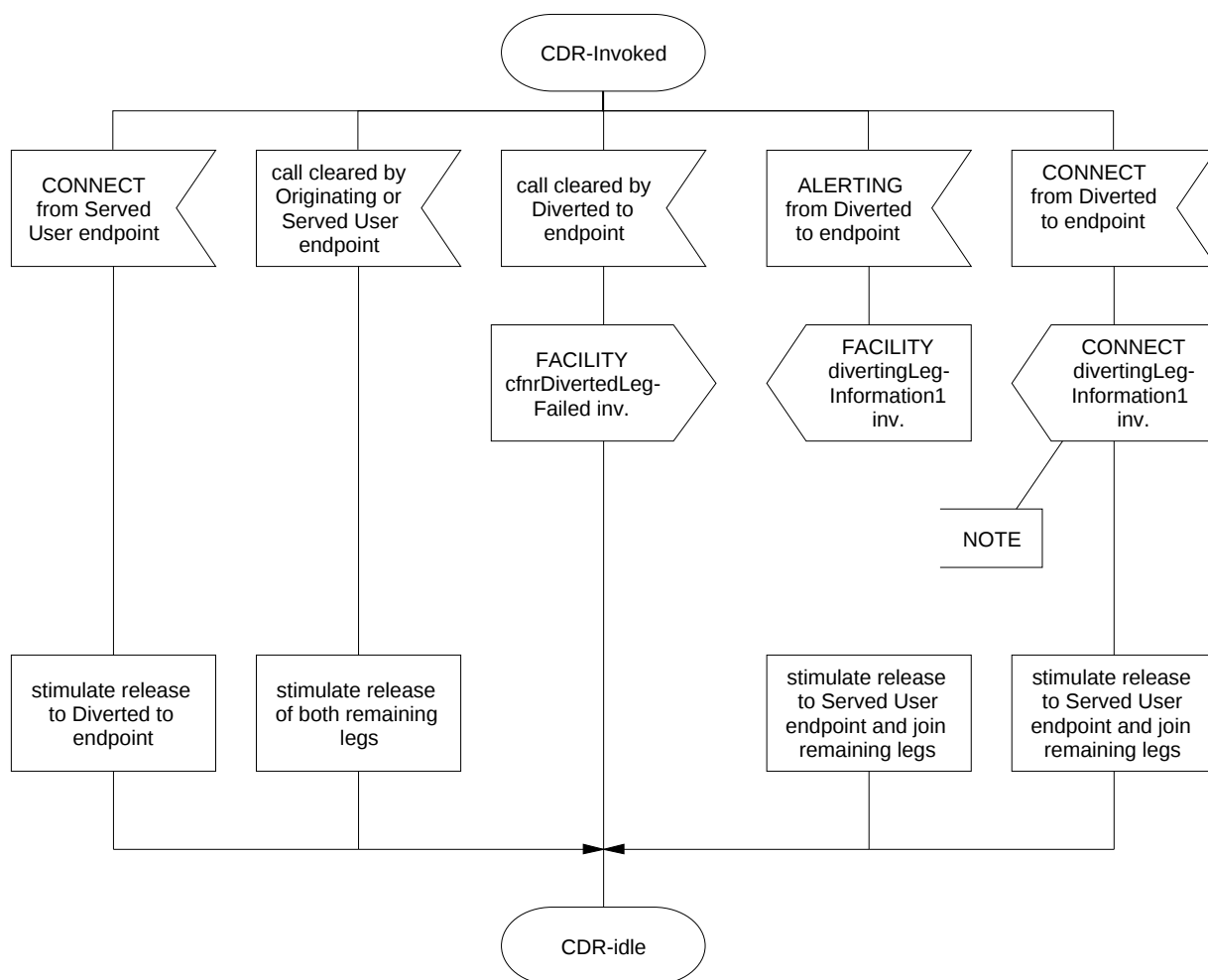


Figure C3 - 5 Originating endpoint SDL (sheet 2 of 2)

Call Diversion Rerouting endpoint (CDR) SDLs





NOTE - If a divertingLegInformation 3 invoke APDU is included in the incoming CONNECT message from the Diverted to endpoint, this APDU is inserted in addition to the divertingLegInformation1 invoke APDU in the outgoing CONNECT message.

Figure C3 - 7 Rerouting endpoint SDL (sheet 2 of 2)

C.3.8.10.6 Call Diversion Served endpoint (CDS) SDLs

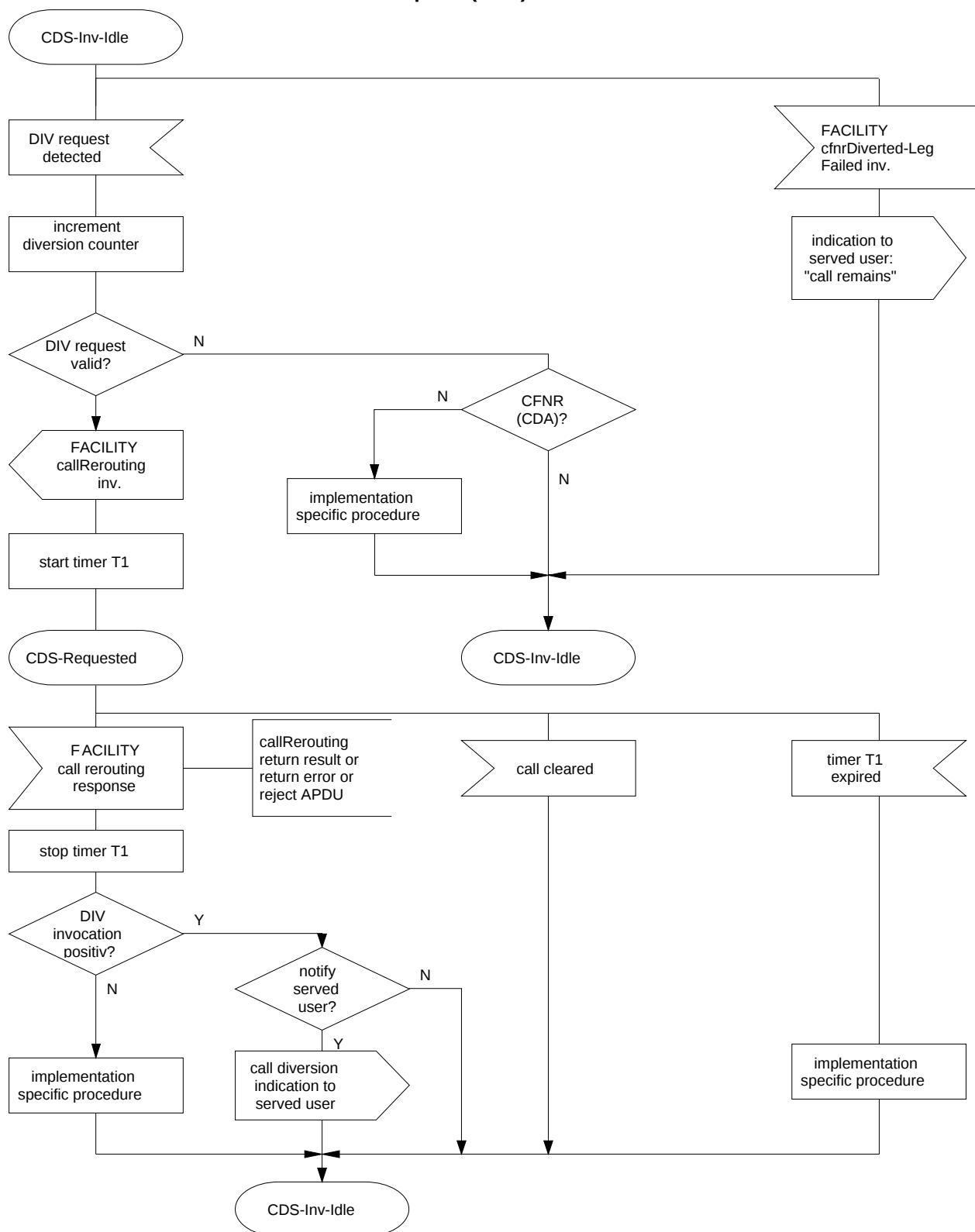


Figure C3 - 8 Served endpoint SDL (sheet 1 of 3)

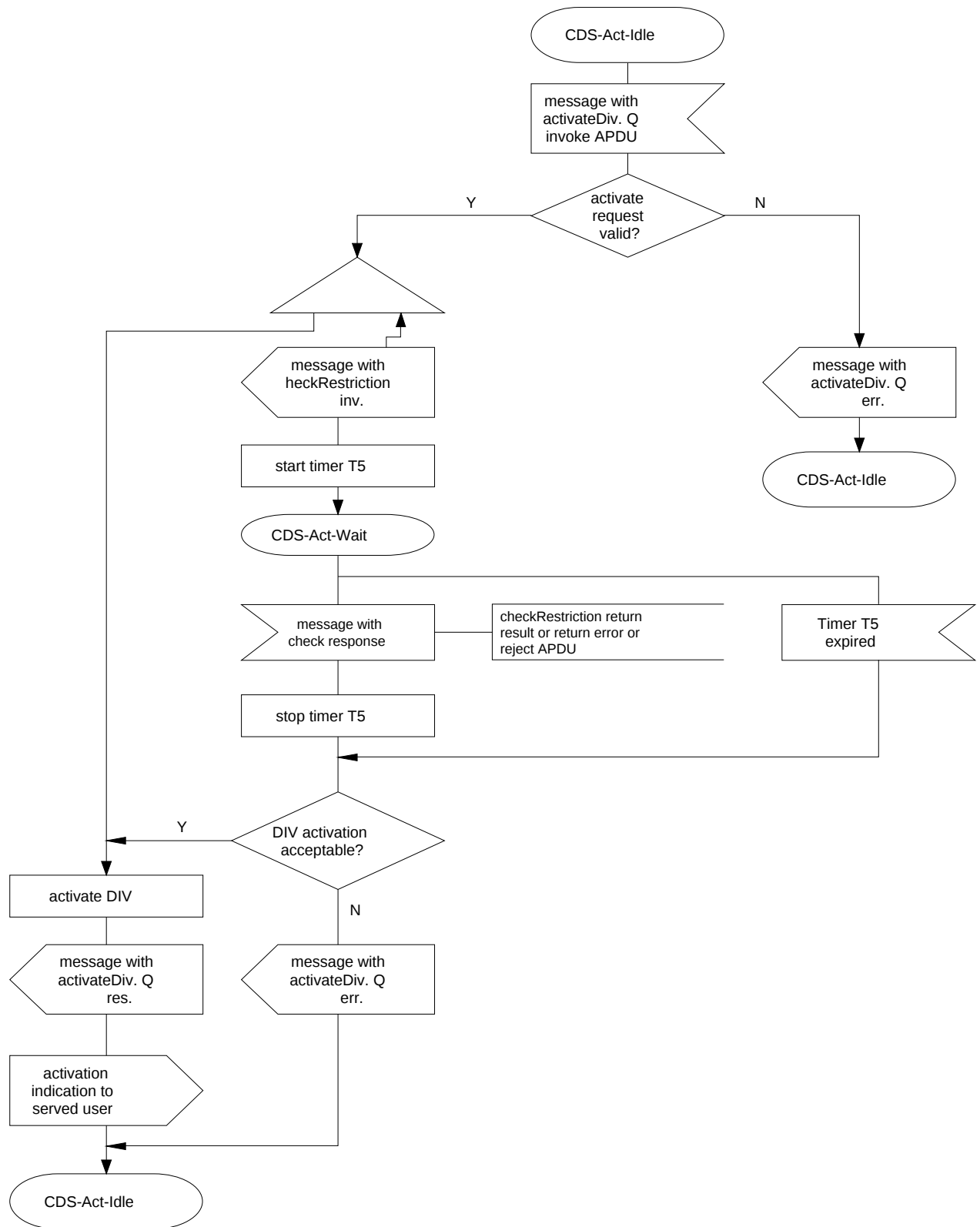
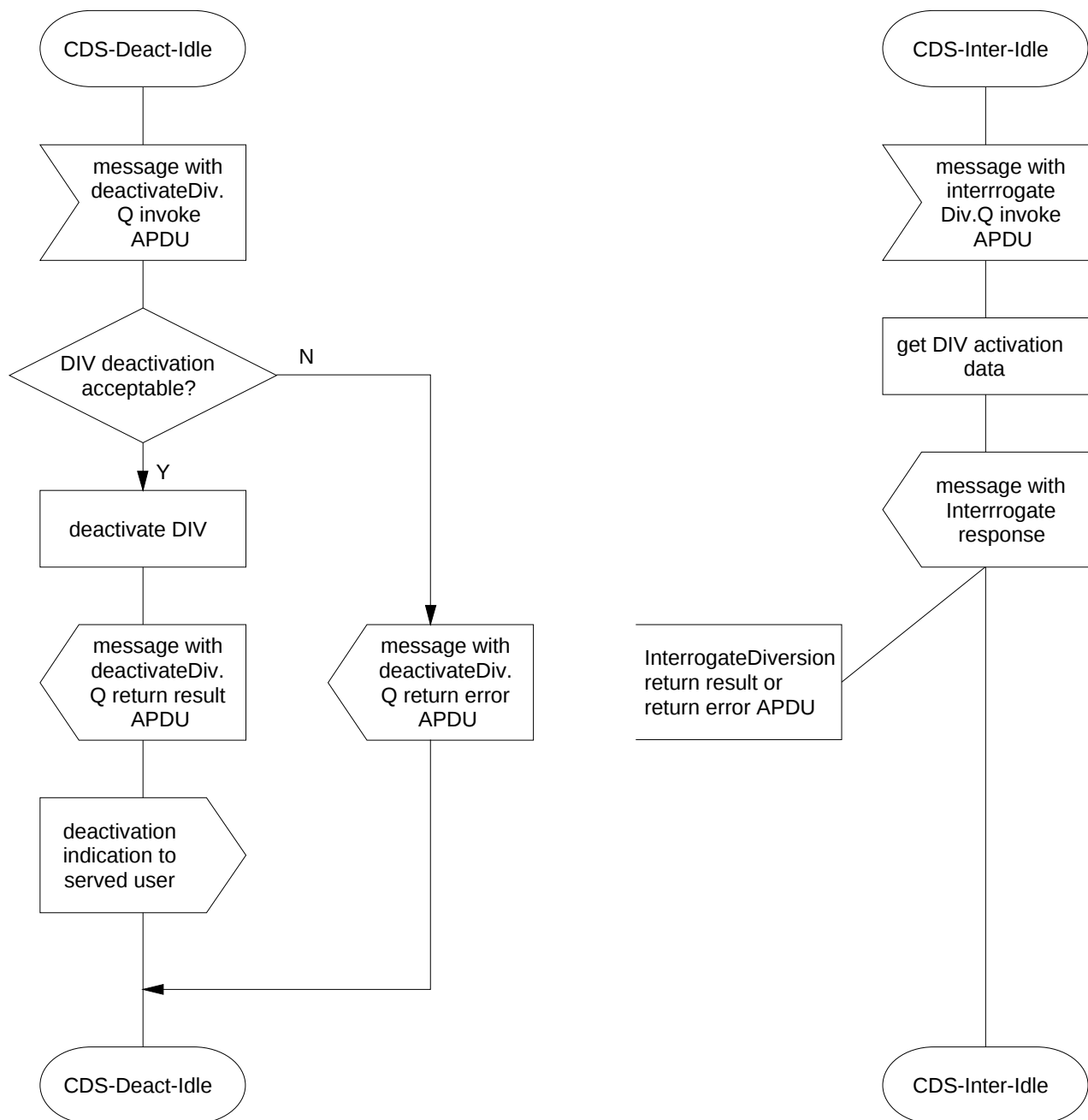


Figure C3 - 9 Served endpoint SDL (sheet 2 of 3)



NOTE - ActivateDiversio nQ, deactivateDiversio nQ and interrogateDiversio nQ operations are not visible at the Q reference point in case of local activation, deactivation and interrogation

Figure C3 - 10 Served endpoint SDL (sheet 3 of 3)

C.3.8.10.7 Call Diversion Diverted-to endpoint (CDF) SDLs

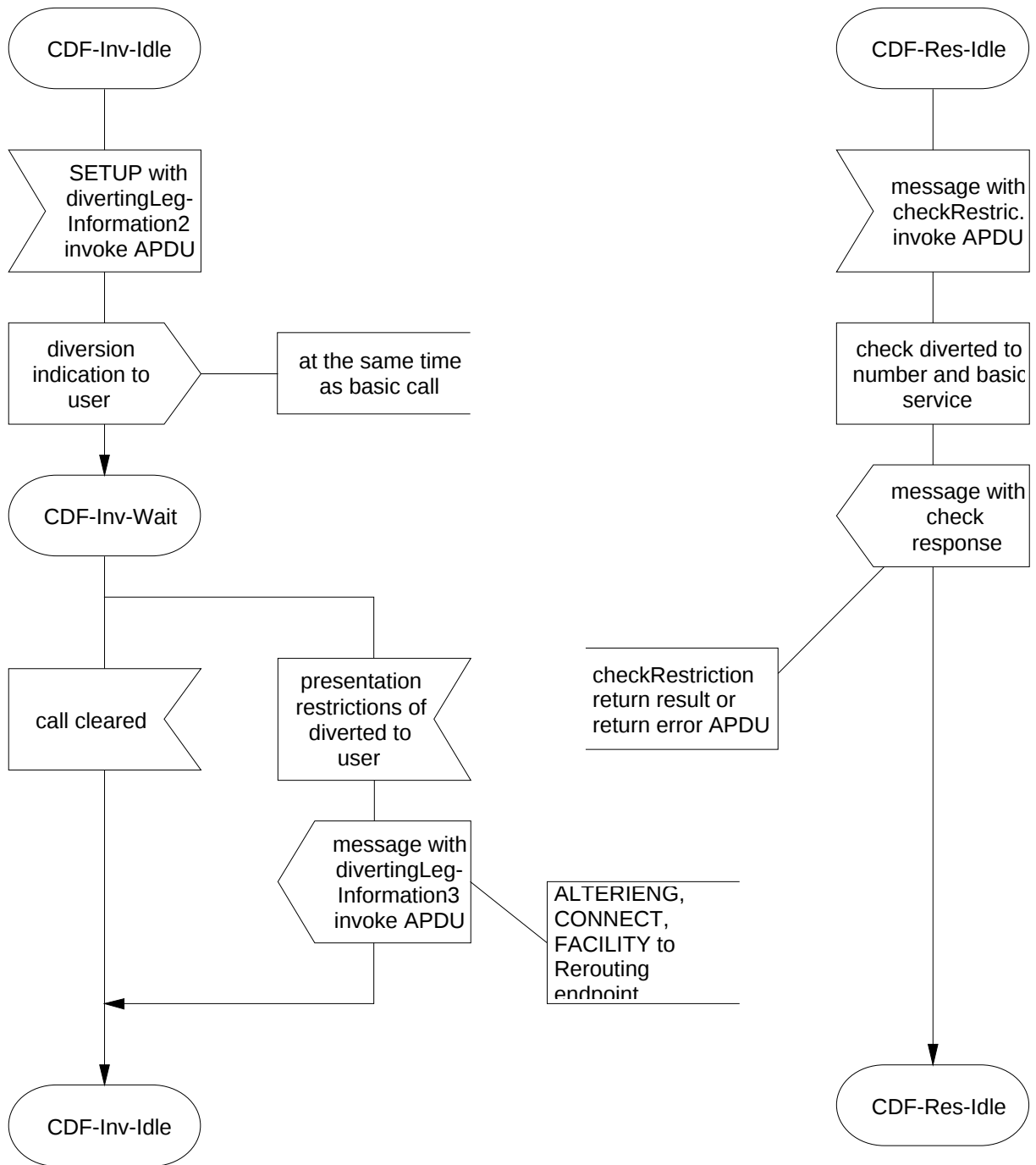
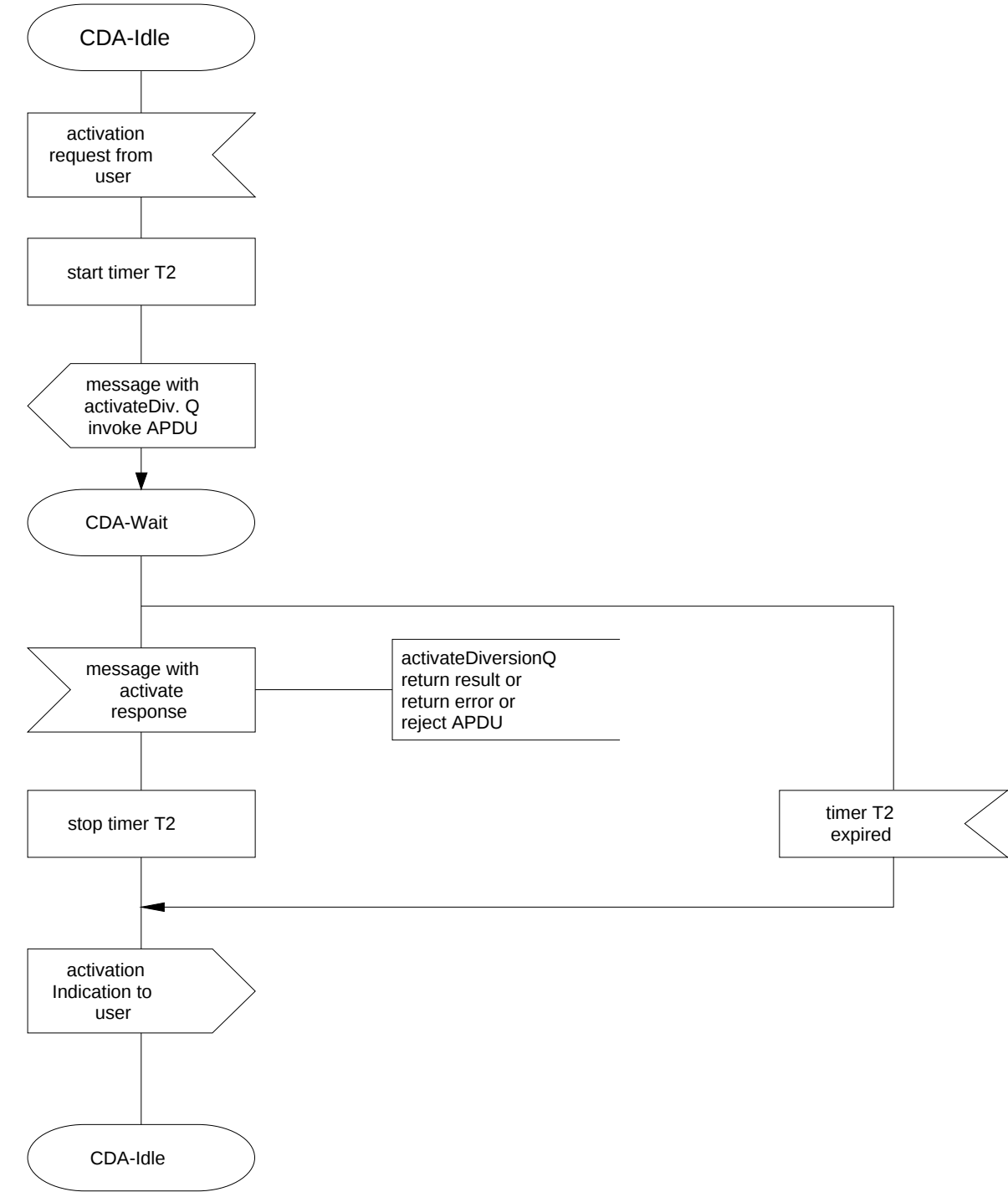


Figure C3 - 11 Diverted-to endpoint SDL

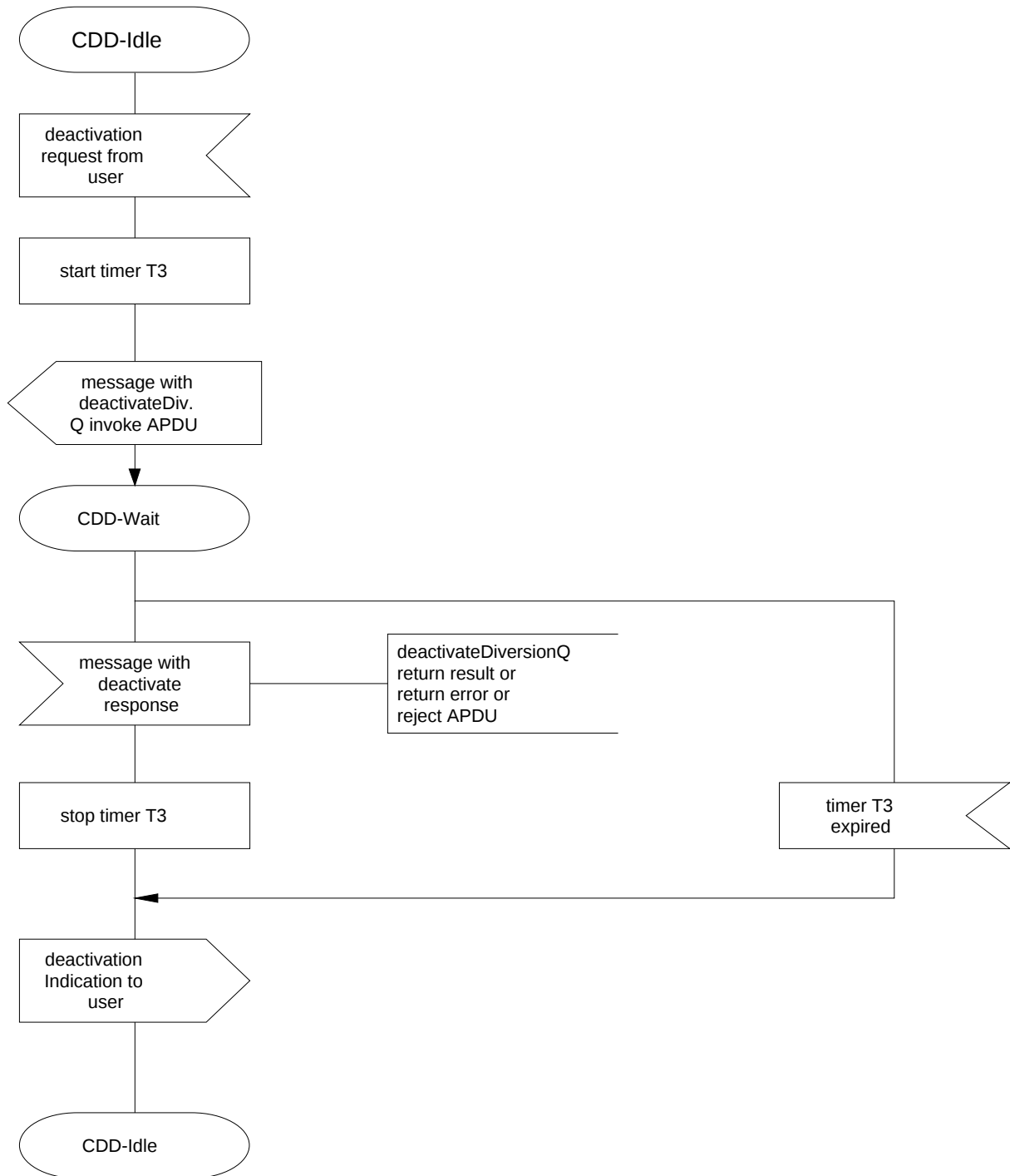
C.3.8.10.8 Call Diversion Activating endpoint (CDA) SDLs



NOTE - ActivateDiversionsQ operations are not visible at the Q reference point in case of local activation

Figure C3 - 12 Activating endpoint SDL

C.3.8.10.9 Call Diversion Deactivating endpoint (CDD) SDLs



NOTE - DeactivateDiversionQ operations are not visible at the Q reference point in case of local deactivation

Figure C3 - 13 Deactivating endpoint SDL

C.3.8.10.10 Call Diversion Interrogating endpoint (CDI) SDLs

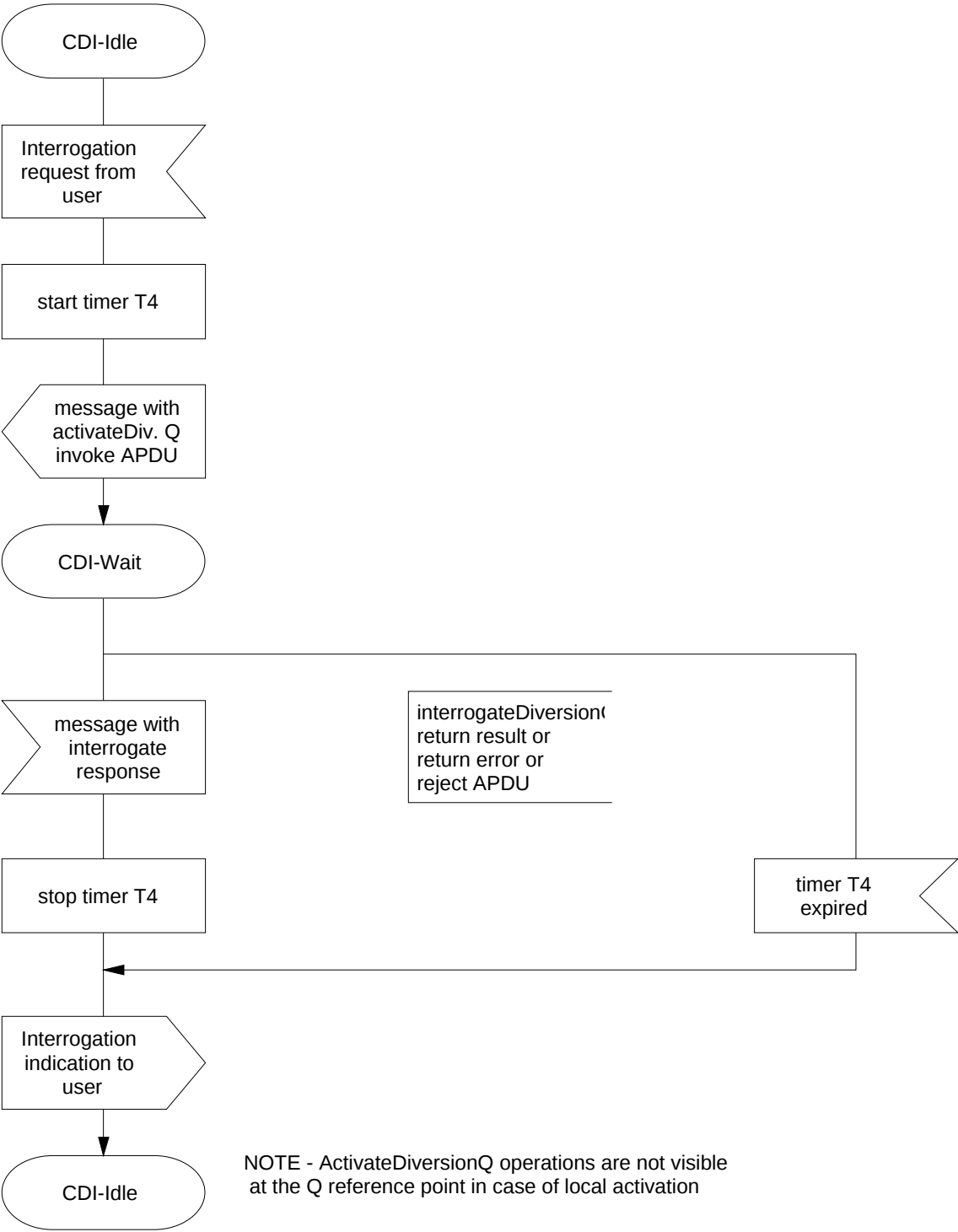


Figure C3 - 14 Interrogating endpoint SDL

Changes to H.225V2

:

2 Normative References

:

[xx]ISO/IEC 13872:*Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Service description, functional capabilities and information flows - Call diversion supplementary services.*

[xx]ISO/IEC 13873:*Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call diversion supplementary services*

:

:

Add to Annex X

Xn Operations in support of Call diversion supplementary service (Informative)

The following tables reflect the ASN.1 coding for the Call diversion supplementary service.

This coding is incorporated from the ISO/IEC 13873, Sec. 6.3. In case of conflicts between the coding in the following tables and the coding in the ISO/IEC 13873, Sec. 6.3, the coding as given in the ISO standard takes precedence.

```

Call-Diversion-Operations
{ iso (1) standard (0) pss1-call-diversion (13873)call-diversion-operations (0) }

DEFINITIONS EXPLICIT TAGS::=

BEGIN

IMPORTS      OPERATION, ERROR FROM Remote-Operation-Notation
             { joint-iso-ccitt (2) remote-operations (4) notation (0)}
Extension FROM Manufacturer-specific-service-extension-definition
             { iso standard pss1-generic-procedures (11582) msi-definition (0)}
PSS1InformationElement FROM Generic-parameters-definition
             { iso standard pss1-generic-procedures (11582) PSS1-generic-
               parameters (6) }

             Address, PartyNumber, PartySubaddress,
             PresentedNumberScreened,PresentedNumberUnscreened,
             PresentationAllowedIndicator,
             FROM Addressing-Data-Elements
             { iso standard pss1-generic procedures (11582) addressing-data-
               elements (9) }

             Name FROM Name-Operations
             { iso standard pss1-name (13868) name-operations (0) }

             userNotSubscribed, notAvailable, invalidServedUserNr,
             basicServiceNotProvided, resourceUnavailable,
             supplementaryServiceInteractionNotAllowed FROM General-Error-List
             { ccitt recommendation q 950 general-error-list (1) };

ActivatedDiversionQ      OPERATION
- - Sent from the Activating H.323-endpoint to the served H.323-endpoint
ARGUMENT SEQUENCE
{
    procedure          Procedure,
    basicService        BasicService,
    divertedToAddress   Address,
    servedUserNr        PartyNumber,
    activatingUserNr     PartyNumber,
    extension           CHOICE {
        [1] IMPLICIT Extension,
        [2] IMPLICIT SEQUENCE OF Extension } OPTIONAL }

RESULT CHOICE {
    NULL,
    [1] IMPLICIT Extension
    [2] IMPLICIT SEQUENCE OF Extension }

ERRORS {notSubscribed, notAvailable, invalidServedUserNr,
        basicServiceNotProvided, resourceUnavailable, invalidDivertedToNr,
        specialServiceNr, diversionToServedUserNr, temporarilyUnavailable,
        notAuthorized, unspecified }

DeactivatedDiversionQ    OPERATION
- - Sent from the Deactivating H.323-endpoint to the served H.323-endpoint
ARGUMENT SEQUENCE
{
    procedure          Procedure,
    basicService        BasicService,
    servedUserNr        PartyNumber,
    deactivatingUserNr  PartyNumber,
    extension           CHOICE {
        [1] IMPLICIT Extension,
        [2] IMPLICIT SEQUENCE OF Extension } OPTIONAL }

```

RESULT	CHOICE { NULL, [1] IMPLICIT Extension, [2] IMPLICIT SEQUENCE OF Extension }
ERRORS	{notSubscribed, notAvailable, invalidServedUserNr, temporarilyUnavailable, notAuthorized, unspecified }
InterrogateDiversionQ OPERATION	
- - Sent from the Interrogating H.323-endpoint to the served H.323-endpoint	
ARGUMENT	SEQUENCE { procedure Procedure, basicService BasicService DEFAULT allServices, servedUserNr PartyNumber, interrogatingUserNr PartyNumber, extension CHOICE { [1] IMPLICIT Extension, [2] IMPLICIT SEQUENCE OF Extension } OPTIONAL }
RESULT	IntResultList
ERRORS	{ notSubscribed, notAvailable, invalidServedUserNr, temporarilyUnavailable, notAuthorized, unspecified }
CheckRestriction OPERATION	
- - Sent from the served H.323-endpoint to the Diverted-to H.323-endpoint	
ARGUMENT	SEQUENCE { servedUserNr PartyNumber, basicService BasicService, divertedToNr PartyNumber, extension CHOICE { [1] IMPLICIT Extension, [2] IMPLICIT SEQUENCE OF Extension } OPTIONAL }
RESULT	CHOICE { NULL, [1] IMPLICIT Extension [2] IMPLICIT SEQUENCE OF Extension }
ERRORS	{notAvailable, invalidServedUserNr, invalidDivertedToNr, specialServiceNr, unspecified }
CallRerouting OPERATION	
- - Sent from the served H.323-endpoint to the Originating H.323-endpoint	
ARGUMENT	SEQUENCE { reroutingReason DiversionReason, originalReroutingReason[0] IMPLICIT DiversionReason OPTIONAL, calledAddress Address, diversionCounter INTEGER (1..15), pSS1InfoElement PSS1InformationElement
- - The basic call information elements Bearer capability, - - High layer compatibility, - - Low layer compatibility, Progress indicator - - can be embedded in the pSS1InfoElement in accordance with clause 10.5.3.1.5.	
	lastReroutingNr [1] PresentedNumberUnscreened, subscriptionOption [2] IMPLICIT SubscriptionOption, callingPartySubaddress [3] PartySubaddress OPTIONAL, callingNumber [4] PresentedNumberScreened, callingName [5] Name OPTIONAL, originalCalledNr [6] PresentedNumberUnscreened OPTIONAL, redirectingName [7] Name OPTIONAL, originalCalledName [8] Name OPTIONAL, extension CHOICE { [9] IMPLICIT Extension, [10] IMPLICIT SEQUENCE OF Extension } OPTIONAL }

```

        RESULT CHOICE {
            NULL,
            [1] IMPLICIT Extension
            [2] IMPLICIT SEQUENCE OF Extension }
    ERRORS {
        notSubscribed, notAvailable,
        resourceUnavailable, invalidDivertedToNr, specialServiceNr,
        diversionToServedUserNr, numberOfDiversionsExceeded,
        supplementaryServiceInteractionNotAllowed,
        unspecified }
    - - The error value numberOfDiversionsExceeded applies only in case of
    - - partial rerouting.

```

DivertingLegInformation1 OPERATION

```

    ARGUMENT SEQUENCE
    {
        diversionReason      diversionReason,
        subscriptionOption    subscriptionOption,
        nominatedNr           PartyNumber,
        extension             CHOICE {
            [9] IMPLICIT Extension,
            [10] IMPLICIT SEQUENCE OF Extension }
    }

```

DivertingLegInformation2 OPERATION

--Sent from the Originating H.323-endpoint to the Diverted-to H.323-endpoint

```

    ARGUMENT SEQUENCE
    {
        diversionCounter      INTEGER (1..15),
        diversionReason        diversionReason,
        originalDiversionReason[0] IMPLICIT DiversionReason OPTIONAL,
        divertingNr           [1] PresentedNumberUnscreened OPTIONAL,
        originalCalledNr       [2] PresentedNumberUnscreened OPTIONAL,
        redirectingName        [3] Name OPTIONAL,
        originalCalledName     [4] Name OPTIONAL,
        extension             CHOICE {
            [5] IMPLICIT Extension,
            [6] IMPLICIT SEQUENCE OF Extension } OPTIONAL }

```

--The divertingNr element is mandatory except in the case of interworking

DivertingLegInformation3 OPERATION

--Sent from the Diverted-to H.323-endpoint to the Originating H.323-endpoint

```

    ARGUMENT SEQUENCE
    {
        presentationAllowedIndicatorpresentationAllowedIndicator,
        redirectionName      [0] Name OPTIONAL,
        extension            CHOICE {
            [1] IMPLICIT Extension,
            [2] IMPLICIT SEQUENCE OF Extension } OPTIONAL }

```

CfnrDivertedLegFailed OPERATION

- - Sent from the Originating H.323-terminal to the Diverted-to H.323-terminal

```

    ARGUMENT CHOICE
    {
        NULL,
        [1] IMPLICIT Extension,
        [2] IMPLICIT SEQUENCE OF Extension }

```

- - 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          PartyNumber,
    basicService           BasicService,
    procedure              Procedure,
    divertedToAddress      Address,
    remoteEnabled          BOOLEAN DEFAULT FALSE,
    extension              CHOICE {
        [1] IMPLICIT Extension,
        [2] IMPLICIT SEQUENCE OF Extension } OPTIONAL }

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

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

invalidDivertedToNrERROR ::= 12
specialServiceNrERROR ::= 14
diversionToServedUserNrERROR ::= 15
numberOfDiversionExceededERROR ::= 24
temporarilyUnavailableERROR ::= 1000
notAuthorizedERROR ::= 1007
unspecifiedUnspecified ::= 1008

UnspecifiedERROR      PARAMETER Extension

BasicService ::= ENUMERATED {
    allServices(0)
    speech (1)
    unrestrictedDigitalInformation (2)
    audio3.1KHz (3)
    telephony (32)
    teletex (33)
    telefaxGroup4Class1 (34)
    videotexSyntaxBased (35)
    videotelephony (36) }

activateDiversionQ      ActivateDiversionQ      ::= 15
deactivateDiversionQ    DeactivateDiversionQ    ::= 16
interrogateDiversionQ   InterrogateDiversionQ   ::= 17
checkRestriction        CheckRestriction        ::= 18
callRerouting           CallRerouting           ::= 19
divertingLegInformation1 DivertingLegInformation1 ::= 20
divertingLegInformation2 DivertingLegInformation2 ::= 21
divertingLegInformation3 DivertingLegInformation3 ::= 22
cfmrDivertedLegFailed   CfmrDivertedLegFailed   ::= 23

END - - of Call-Diversion-Operations

```