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*European Standard (Telecommunications series)*

**Integrated Services Digital Network (ISDN);  
Remote Control (RC) supplementary service;  
Digital Subscriber Signalling System No. one (DSS1) protocol;  
Part 1: Functional protocol specification**

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**Reference**

DEN/SPAN-05117-1

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**Keywords**DSS1, ISDN, protocol, RC, supplementary  
service**ETSI**

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## Foreword

This European Standard (Telecommunication series) has been produced by ETSI Technical Committee Services and Protocols for Advanced Networks (SPAN), and is now submitted for the Public Enquiry phase of the ETSI standards Two-step Approval Procedure.

The present document is part 1 of a multi-part deliverable covering the Integrated Services Digital Network (ISDN); Remote Control (RC) supplementary service; Digital Subscriber Signalling System No one (DSS1) protocol, as identified below:

**EN 301 799-1: "Functional protocol specification";**

EN 301 799-2: "Protocol Implementation Conformance Statement (PICS) proforma specification";

TS 101 799-3: "Test Suite Structure and Test Purposes (TSS&TP) specification for the user";

TS 101 799-4: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the user";

TS 101 799-5: "Test Suite Structure and Test Purposes (TSS&TP) specification for the network";

TS 101 799-6: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the network".

<b>Proposed national transposition dates</b>	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

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# 1 Scope

The present document specifies the stage three of the Remote Control (RC) service for the pan-European Integrated Services Digital Network (ISDN) as provided by the European public telecommunications operators at the T reference point or coincident S and T reference point (as defined in ITU-T Recommendation I.411) by means of the Digital Subscriber System No. one (DSS1). Stage three identifies the protocol procedures and switching functions needed to support a telecommunications service (see CCITT Recommendation I.130).

In addition, the present document specifies the protocol requirements at the T reference point where the service is provided to the user via an intermediate private ISDN.

The present document does not specify the additional protocol requirements where the service is provided to the user via a telecommunications network that is not an ISDN.

The RC service enables a user to control a supplementary service or a number of supplementary services associated with that user from another access using the procedures provided for the supplementary service(s) to be controlled at the subscriber's access.

The RC service is applicable to all circuit-switched telecommunication services.

Further parts of the present document specify the method of testing required to identify conformance to the present document.

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# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] ETSI EN 301 691 (V1.1.1): "Integrated Services Digital Network (ISDN); Remote Control (RC) service; Service description".
- [2] ETSI EN 300 195-1: "Integrated Services Digital Network (ISDN); Supplementary service interactions; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".
- [3] ETSI EN 300 196-1: "Integrated Services Digital Network (ISDN); Generic functional protocol for the support of supplementary services; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".
- [4] ETSI EN 301 002-1 (V1.2.4): "Integrated Services Digital Network (ISDN); Security tools (SET) procedures; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".
- [5] ETSI ETS 300 345: "Integrated Services Digital Network (ISDN); Interworking between public ISDNs and private ISDNs for the provision of telecommunication services; General aspects".
- [6] ITU-T Recommendation I.112: "Vocabulary of terms for ISDNs".
- [7] ITU-T Recommendation I.210: "Principles of telecommunication services supported by an ISDN and the means to describe them".

- [8] CCITT Recommendation Z.100: "Specification and Description Language (SDL)".
- [9] ETSI EN 301 813-1: "Integrated Services Digital Network (ISDN) and Broadband Integrated Services Digital Network (B-ISDN); Generic Addressing and Transport (GAT) protocol; Part 1: Protocol specification [ITU-T Recommendation Q.860 (2000), modified]".
- [10] ITU-T Recommendation X.680: "Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation".
- [11] ITU-T Recommendation X.880: "Information technology – Remote Operations: Concepts, model and notation".

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## 3 Definitions

For the purposes of the present document, the following terms and definitions apply:

**authentication procedure:** procedure to verify the identity of the subscriber

**basic access:** see ITU-T Recommendation I.112 [6], clause 2.4, definition 425

**home location:** location at which the service provider considers the user's ISDN number and services are registered

**home user:** user when controlling the RC service at the home location

**Integrated Services Digital Network (ISDN):** see ITU-T Recommendation I.112 [6], clause 2.3, definition 308

**Network:** DSS1 protocol entity at the network side of the user-network interface

**Personal Identification Number (PIN):** PIN is the 4 to 12 position alphanumeric code or password the customer possesses for authentication. This is used to provide authentication of the user with the access device

**primary rate access:** see ITU-T Recommendation I.112 [6], clause 2.4, definition 426

**security tools (SET):** general term for the combination of characters (e.g. PIN or TAN) used to identify the subscriber when operating the RC service as defined in EN 301 002-1 [4]

**subscriber:** human user to whom the RC service is provided

**supplementary service:** see ITU-T Recommendation I.210 [7], clause 2.4

**remote location:** location other than the home location

**remote user:** user when controlling the RC service at a remote location

**Transaction Number (TAN):** alphanumeric code out of a list of TANs the customer possesses for authentication. This is used to provide authentication of the user with the access device. Each TAN is only usable for one instance of authentication

**user:** DSS1 protocol entity at the user side of the user-network interface when a coincident S and T reference point applies. General term used where no distinction is drawn between operations at either the home or remote location

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## 4 Abbreviations

For the purpose of the present document, the following abbreviations apply:

GAT	Generic Addressing & Transport protocol
ISDN	Integrated Services Digital Network
NCICS	Networked Call Independent, Connection Oriented Signalling
PIN	Personal Identification Number
PTN	Private Telecommunication Network
RC	Remote Control

TAN                      Transaction Number  
 SET                      Scurity Tools

## 5 Description

The RC service enables a subscriber to control a (supplementary) service or a number of (supplementary) services associated with that subscriber from another access using the procedures provided for the (supplementary) service(s) to be controlled at the home location.

The RC service shall be available to users connected to the network via the basic access or the primary rate access.

The RC service may be used to control the supplementary services listed in annex A of EN 301 691 [1].

The RC service enables a subscriber to perform the following actions from a remote location:

- activation of (supplementary) services,
- deactivation of (supplementary) services,
- registration of information for (supplementary) services,
- erasure of information for (supplementary) services,
- interrogation of (supplementary) services.

The home location of the subscriber shall be protected against any unauthorised operation by the use of an authentication procedure preceding any use of the RC service at a remote location. As a network option, the authentication procedure may also be required preceding any use of the RC service at the home location.

## 6 Operational Requirements

### 6.1 Provision and Withdrawal

The RC service shall be provided after prior arrangement with the network provider.

At service provision time the network provider shall provide a Security tool to be used by the subscriber in the authentication procedure. This Security tool may be in the form of a PIN only or both PIN and TAN as defined in draft EN 301 002-1 [4].

The RC service may be withdrawn at the network provider or subscriber's request.

The subscriptions options for the RC service are given in EN 301 691 [1]. Each subscription option may be provided as a service provider option. For each subscription option, only one value shall be selected. Subscription options having impact on the protocol are summarized in table 2.

The network options for the RC service are shown in table 1.

**Table 1: Network options**

Network option	Values
Activation, deactivation, interrogation, invocation, revocation for all ISDN numbers on the same access (in case of subscription on a per ISDN number basis). (Note)	-YES -NO
Authentication (security tool) procedure required for Activation/Deactivation/Interrogation operations conducted at the home location.	-YES -NO
Security tool used for RC	-PIN -PIN and TAN
NOTE: This option applies to all instances subscribed to on a per access of the served user.	



**Table 2: Subscription options**

Subscription options	Value
The subscriber can activate/deactivate the RC service	-No (Default option supported only by some networks, see EN 301 691 [1]) -Yes, only at the home location -Yes, both at the home and remote location
NOTE: If the subscription option is not supported then the RC service shall be automatically activated on provision.	

## 6.2 Requirements on the home user's network side

The requirements at the home user's network side are covered in clauses 9.1.1, 9.1.2 and 9.1.3.

## 6.3 Requirements on the remote user's network side

The requirements at the remote user's network side are covered in clauses 9.1.1, 9.1.2, 9.1.3 and 9.2.

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# 7 Coding requirements

## 7.1 Coding of the Facility information elements

EN 300 196-1 [3] shows the definitions of the operations and errors required for the RC service using ASN.1 as specified in ITU-T Recommendation X.680 [10] and ITU-T Recommendation X.880 [11].

The formal definition of the component types to encode these operations and errors is provided in clause D.1 of EN 300 196-1 [3].

The inclusion of RC service related components in Facility information elements is defined in clause 11.2.2.1 of EN 300 196-1 [3] as enhanced by the use of the GAT protocol as described in annex B. All components (invoke, return result, return error and reject) shall be included within a Facility information element. This Facility information element may be included in any RC service appropriate message as specified in clause 8.3.2 of EN 300 196-1 [3] as enhanced by the use of the GAT protocol as described in annex B, unless a more restrictive specification is given in clause 9 of the present document.

Table 3: Definitions of operations and errors

```
Remote-Control-Operations { itu-t identified-organization etsi(0) DE/SPS-05117-1 operations-and-errors(1) }
```

```
DEFINITIONS EXPLICIT TAGS::=
```

```
BEGIN
```

```
EXPORTS      activationRC,
             deactivationRC,
             invocationRC,
             revocationRC,
             interrogationRC,
             invocationTimeoutRC,
             rCInvokeFromHomeAccessNotAllowed,
             rCNotInvoked,
             rCAlreadyInOperation,
             rCDeactivationAndActivationNotSupportedAtHomeLocation,
```

```
             rCDeactivationAndActivationNotSupportedAtRemoteLocation,
             rCDeactivationAndActivationNotSubscribedAtRemoteLocation;
```

```
IMPORTS      OPERATION,
             ERROR
             FROM Remote-Operation-Information-Objects
                { joint-iso-itu-t remote-operations (4) informationObjects(5) version1(0) }

             Address,
             PartyNumber,
             PartySubaddress,
             PresentationAllowedIndicator
             FROM Revised-Addressing-Data-Elements
                { itu-t identified-organization etsi (0) 196 revised-addressing-data-elements (14) }

             notActivated,
             FROM Diversion-Operations
                { itu-t identified-organization etsi (0) 207 operations-and-errors (1) }

             notSubscribed,
             notAvailable,
             invalidServedUserNr,
             supplementaryServiceInteractionNotAllowed
             FROM Revised-General-errors
                { itu-t identified-organization etsi (0) 196 revised-general-errors (10) }

             Pin,

             invalidPin,

             UserControlBlocked,
             ChangeOfPinRequired
             FROM Pin-Set-Operations-and-Errors
                { ccitt identified-organization etsi (0) 1002 operations-and-errors (1) }

             Tan,
             invalidTan
             FROM Tan-Set-Operations-and-Errors
                { ccitt identified-organization etsi (0) 1002 operations-and-errors (1) }

activationRC

             OPERATION ::=

             {

             ARGUMENT SEQUENCE {
                 servedUserNr  ServedUserNr,
                 pin            Pin OPTIONAL,
                 tan            Tan OPTIONAL }


```

**Table 3 (continued): Definitions of operations and errors**

	<pre> RESULT ERRORS {   notAvailable    notSubscribed     rCDeactivationAndActivationNotSupportedAtHomeLocation    rCDeactivationAndActivationNotSupportedAtRemoteLocation    rCDeactivationAndActivationNotSubscribedAtRemoteLocation    invalidServedUserNr    supplementaryServiceInteractionNotAllowed    invalidPin    invalidTan    userControlBlocked     changeOfPinRequired } CODE global:{rCOID 1} } -- End of ActivationRC operation definition. </pre>
<b>deactivationRC</b>	<pre> OPERATION ::= {   ARGUMENT SEQUENCE {     servedUserNr ServedUserNr,     pin Pin OPTIONAL,     tan Tan OPTIONAL }    RESULT   ERRORS {     notActivated      notAvailable      notSubscribed      rCDeactivationAndActivationNotSupportedAtHomeLocation      rCDeactivationAndActivationNotSupportedAtRemoteLocation      rCDeactivationAndActivationNotSubscribedAtRemoteLocation      invalidServedUserNr      invalidPin      invalidTan      userControlBlocked      changeOfPinRequired }    CODE global:{rCOID 2} } -- End of DeactivationRC operation definition. </pre>
<b>invocationRC</b>	<pre> OPERATION ::= {   ARGUMENT SEQUENCE {     servedUserNr ServedUserNr,     pin Pin,     tan Tan OPTIONAL }    RESULT   ERRORS {     rCinvokeFromHomeAccessNotAllowed      notActivated      invalidServedUserNr      rCalreadyInOperation      notSubscribed      invalidPin      invalidTan      userControlBlocked      changeOfPinRequired      notAvailable}    CODE global:{rCOID 3} } -- End of InvocationRC operation definition. </pre>
<b>revocationRC</b>	<pre> OPERATION ::= </pre>

**Table 3 (concluded): Definitions of operations and errors**

	<pre> {   ARGUMENT SEQUENCE {     servedUserNr  ServedUserNr,      pin    Pin,     tan    Tan OPTIONAL}    RESULT    ERRORS {     notSubscribed      notActivated      rCnotInvoked      invalidServedUserNr      invalidPin      invalidTan      userControlBlocked      changeOfPinRequired      notAvailable}    CODE global:{rCOID 4} } -- End of RevocationRC operation definition. </pre>
<b>interrogationRC</b>	<pre> OPERATION ::=  {    ARGUMENT SEQUENCE {     servedUserNr  ServedUserNr,     pin    Pin OPTIONAL,     tan    Tan OPTIONAL}    RESULT  RCStatus </pre>
	<pre>   ERRORS {     invalidServedUserNr      notSubscribed      invalidPin      invalidTan      userControlBlocked      changeOfPinRequired      notAvailable }   CODE  global:{rCOID 5} } </pre>
	<pre> -- End of InterrogationRC operation definition. </pre>
<b>invocationTimeoutRC</b>	<pre> OPERATION ::=  {   CODE  global:{rCOID 6} } </pre>
<b>RCStatus</b>	<pre> ::= BOOLEAN --True = activated --False = deactivated </pre>
<b>ServedUserNr</b>	<pre> ::= {   individualNumber  PartyNumber} </pre>
<b>rCInvokeFromHomeAccessNotAllowed</b>	<pre> ERROR ::= {CODE global:{rCOID 10}} </pre>
<b>rCNotInvoked</b>	<pre> ERROR ::= {CODE global:{rCOID 11}} </pre>
<b>rCAlreadyInOperation</b>	<pre> ERROR ::= {CODE global:{rCOID 12}} </pre>
<b>rCDeactivationAndActivationNotSupportedAtHomeLocation</b>	<pre> ERROR ::= {CODE global:{rCOID 13}} </pre>
<b>rCDeactivationAndActivationNotSupportedAtRemoteLocation</b>	<pre> ERROR ::= {CODE global:{rCOID 14}} </pre>
<b>rCDeactivationAndActivationNotSubscribedAtRemoteLocation</b>	<pre> ERROR ::= {CODE global:{rCOID 15}} </pre>
<b>rCOID OBJECT IDENTIFIER</b>	<pre> ::= { itu-t identified organization etsi (0) xxx rc-operations-and-errors (2) } </pre>
<b>END</b>	<pre> -- of Remote Control operations and Errors </pre>

## 8 State Definitions

Table 4 defines the states for the RC service.

**Table 4: State definitions for User States and Network States**

<b>User States</b>	
Idle	The RC service is idle.
Wait RC Activation	The user has requested activation and is waiting for a response.
Wait RC Deactivation	The user has requested deactivation and is waiting for a response.
Wait RC Invocation	The user has requested invocation and is waiting for a response.
Wait RC Revocation	The user has requested revocation and is waiting for a response.
Wait RC Interrogation	The user has requested interrogation and is waiting for a response.
<b>Network States</b>	
Idle	The RC service is idle.
Wait RC Activation	The network has received an activation request.
Wait RC Deactivation	The network has received a deactivation request.
Wait RC Invocation	The network has received an invocation request.
Wait RC Revocation	The network has received a revocation request.
Wait RC Interrogation	The network has received an interrogation request.
RC Active State	The RC service has been invoked by the network

## 9 Signalling Procedures at the coincident S and T reference point

### 9.1 Activation, deactivation and interrogation

Within the network, the RC service may be activated for the whole subscription period. However, the service provider may offer a subscription option which allows the subscriber to activate/deactivate the RC service from the home location only or from both the home location and the remote location.

#### 9.1.1 Activation

##### 9.1.1.1 Normal operation

When the subscriber has subscribed to the RC service with a subscription option which allows activation and deactivation at the home location only or at both the home and remote location, these procedures apply.

In order to activate the RC service, the user shall:

- send an ActivationRC invoke component to the network in an appropriate NCICS transport message using the procedures described in clause 8.3 of EN 300 196-1 [3] as enhanced by the use of the GAT protocol as described in annex B;
- start timer T-ACTIVATE; and
- enter the Wait RC Activation state.

The user shall indicate the instance of the RC service by use of the following parameter:

- in the servedUserNr parameter, the individual number for which the activation applies.

If the operation is conducted at a remote location or if the network option for an authentication procedure requirement at the home location applies.

- In order to meet the appropriate level of security as defined in the ETSI document, " Security tools (SET) procedures", EN 301 002-1 [4] the user shall indicate in the PIN (or PIN and TAN) parameter the appropriate data for the instance of the RC service.
- The network, on receiving such an ActivationRC invoke component shall use the appropriate parameter(s) for security to carry out an authentication procedure which is outside the scope of the present document and enter the Wait RC Activation state.

To activate an instance of the RC service, the network shall use the servedUserNr parameter and appropriate parameters for security and shall activate the instance of the RC service relating to the individual number.

If the instance is successfully activated, or was already active, the network shall:

- send an ActivationRC return result component to the user in an appropriate NCICS transport message using the procedures described in clause 8.3 of EN 300 196-1 [3] as enhanced by the use of the GAT protocol as described in annex B;
- enter the Idle state.

The user, on receiving such an ActivationRC return result component shall stop timer T-ACTIVATE and enter the Idle state.

### 9.1.1.2 Exceptional procedures

If the network is unable to activate the RC service, the network shall send an ActivationRC return error component to the user in an appropriate NCICS transport message using the procedures described in clause 8.3 of EN 300 196-1 [3] as enhanced by the use of the GAT protocol as described in annex B, indicating one of the following error values and return to the Idle state:

- "notAvailable", the RC service is not available; or
- "notSubscribed", the RC service or this subscription option is not subscribed to; or
- "invalidServedUserNr", the individual number provided to identify the subscriber is not a valid number; or
- "supplementaryServiceInteractionNotAllowed", if the provision of the RC service activation is precluded by a procedure within clause 5 of EN 300 195-1 [2].

If the operation is conducted at a home location, the following error value is valid:

- "rCdeactivationAndActivationNotSupportedAtHomeLocation", deactivation and (re)activation of the RC service at the home location is not supported by the network.

If the operation is conducted at a remote location or if the network option for an authentication procedure requirement at the home location applies, the following error values are valid:

- "rCdeactivationAndActivationNotSupportedAtRemoteLocation", if deactivation and (re)activation of the RC service at a remote location is not supported by the network; or
- "rCdeactivationAndActivationNotSupportedAtHomeLocation", deactivation and (re)activation of the RC service at the home location is not supported by the network; or
- "rCdeactivationAndActivationNotSubscribedAtRemoteLocation", if deactivation and (re)activation of the RC service at a remote location has not been subscribed by the designated subscriber; or
- "invalidPin", if the Pin parameter has not been provided or the PIN indicated in the Pin parameter doesn't match the currently registered PIN for the ISDN number identified in the servedUserNr parameter (from EN 301 002-1 [4]); or
- "invalidTan", if the requested Tan parameter has not been provided or the TAN indicated by the user is not the next one to be used from the TAN list provided to the subscriber identified in the servedUserNr parameter (from EN 301 002-1 [4]); or

- "userControlBlocked", if the activation request cannot be accepted due to the fact that the user has exceeded the number of times that an invalid PIN or TAN can be used (from EN 301 002-1 [4]); or
- "changeOfPinRequired", if the PIN indicated by the user is valid, but has expired (from EN 301 002-1 [4]).

On receiving such an ActivationRC return error component, the user shall stop timer T-ACTIVATE and return to the Idle state.

On expiration of timer T-ACTIVATE and the user not having received any response to the ActivationRC invoke component, the user shall consider that this attempt to activate the RC service has failed and enter the Idle state.

The user, on receiving a reject component, shall stop timer T-ACTIVATE, and return to the same state as before the ActivationRC invoke component was sent.

If the network receives a reject component from the user, it need not correlate it to the procedure in this clause and it shall have no impact on the RC service.

## 9.1.2 Deactivation

### 9.1.2.1 Normal operation

When the subscriber has subscribed to the RC service with a subscription option which allows activation and deactivation at the home location only or at both the home and remote location, these procedures apply.

In order to deactivate the RC service, the user shall:

- send a DeactivationRC invoke component to the network in an appropriate NCICS transport message using the procedures described in clause 8.3 of EN 300 196-1 [3] as enhanced by the use of the GAT protocol as described in annex B;
- start timer T-DEACTIVATE; and
- enter the Wait RC Deactivation state.

The user shall indicate the instance of the RC service by use of the following parameter:

- in the servedUserNr parameter, the individual number for which the deactivation applies.

If the operation is conducted at a remote location or if the network option for an authentication procedure requirement at the home location applies.

- In order to meet the appropriate level of security as defined in the ETSI document, "Security tools (SET) procedures", EN 301 002-1 [4] the user shall indicate in the PIN (or PIN and TAN) parameter the appropriate data for the instance of the RC service.
- The network, on receiving such a DeactivationRC invoke component shall use the appropriate parameter(s) for security to carry out an authentication procedure which is outside the scope of the present document and enter the Wait RC Deactivation state.

To deactivate an instance of the RC service, the network shall use the servedUserNr parameter and appropriate parameters for security and shall deactivate the instance of the RC service relating to the individual number.

If the instance is successfully deactivated, or was already deactive, the network shall:

- send a DeactivationRC return result component to the user in an appropriate NCICS transport message using the procedures described in clause 8.3 of EN 300 196-1 [3] as enhanced by the use of the GAT protocol as described in annex B;
- enter the Idle state.

The user, on receiving such a DeactivationRC return result component shall stop timer T-DEACTIVATE and enter the Idle state.

### 9.1.2.2 Exceptional procedures

If the network is unable to deactivate the RC service, the network shall send a DeactivationRC return error component to the user in an appropriate NCICS transport message using the procedures described in clause 8.3 of EN 300 196-1 [3] as enhanced by the use of the GAT protocol as described in annex B indicating one of the following error values and return to the Idle state:

- "notActivated", the RC service is not activated; or
- "notSubscribed", the RC service or this subscription option has not been subscribed to; or
- "notAvailable", if the RC service is not available; or
- "invalidServedUserNr", the individual number provided to identify the subscriber is not a valid number.

If the operation is conducted at a home location, the following error value is valid:

- "rCdeactivationAndActivationNotSupportedAtHomeLocation", deactivation and (re)activation of the RC service at the home location is not supported by the network.

If the operation is conducted at a remote location or if the network option for an authentication procedure requirement at the home location applies, the following error values are valid:

- "rCdeactivationAndActivationNotSupportedAtRemoteLocation", deactivation and (re)activation of the RC service at the remote location is not supported by the network; or
- "rCdeactivationAndActivationNotSupportedAtHomeLocation", deactivation and (re)activation of the RC service at the home location is not supported by the network; or
- "rCdeactivationAndActivationNotSubscribedAtRemoteLocation", if deactivation and (re) activation of the RC service at a remote location has not been subscribed by the designated user;
- "invalidPin", if the Pin parameter has not been provided or the PIN indicated in the old Pin parameter doesn't match the currently registered PIN for the ISDN number identified in the servedUserNr parameter (from EN 301 002-1 [4]); or
- "invalidTan", if the requested Tan parameter has not been provided or the TAN indicated by the user is not the next one to be used from the TAN list provided to the subscriber identified in the servedUserNr parameter (from EN 301 002-1 [4]); or
- "userControlBlocked", if the deactivation request cannot be accepted due to the fact that the user has exceeded the number of times that an invalid PIN or TAN can be used (from EN 301 002-1 [4]); or
- "changeOfPinRequired", if the PIN indicated by the user is valid, but has expired (from EN 301 002-1 [4]).

On receiving such an DeactivationRC return error component, the user shall stop timer T-DEACTIVATE and return to the Idle state.

On expiration of timer T-DEACTIVATE and the user not having received any response to the DeactivationRC invoke component, the user shall consider that this attempt to deactivate the RC service has failed and that the RC service may still be activated and the user shall enter the Idle state.

The user, on receiving a reject component, shall stop timer T-DEACTIVATE, and shall return to the same state as before the DeactivationRC invoke component was sent.

If the network receives a reject component from the user, it need not correlate it to the procedure in this clause and it shall have no impact on the RC service.



### 9.1.3 Interrogation of an instance of the RC service

#### 9.1.3.1 Normal operation

In order to obtain the status of the RC service relating to a designated access, the user shall:

- send an InterrogationRC invoke component to the network in an appropriate NCICS transport message using the procedures described in clause 8.3 of EN 300 196-1 [3] as enhanced by the use of the GAT protocol as described in annex B.
- start timer T-INTERROGATE; and
- enter the Wait RC Interrogation state.

The user shall indicate the instance of the RC service by use of the following parameter:

- in the servedUserNr parameter, the individual number for which the interrogation applies.

If the operation is conducted at a remote location or if the network option for an authentication procedure requirement at the home location applies.

- In order to meet the appropriate level of security as defined in the ETSI document, "Security tools (SET) procedures", EN 301 002-1 [4] the user shall indicate in the PIN (or PIN and TAN) parameter the appropriate data for the instance of the RC service.
- The network, on receiving such an InterrogationRC invoke component shall use the appropriate parameter(s) for security to carry out an authentication procedure which is outside the scope of the present document and enter the Wait RC Interrogation state.

The network shall:

- Collect the status for the instance of the RC service by use of the servedUserNr parameter.
- The collected data shall be included within the RC status parameter of the InterrogationRC return result component sent to the user in an appropriate NCICS transport message using the procedures described in clause 8.3 of EN 300 196-1 [3] as enhanced by the use of the GAT protocol as described in annex B.
- Return to the Idle state.

When the user receives a correctly encoded InterrogationRC return result component, then the user shall stop timer T-INTERROGATE and return to the Idle state.

#### 9.1.3.2 Exceptional procedures

If the network is unable to provide the information requested, the network shall send an InterrogationRC return error component to the user in an appropriate NCICS transport message using the procedures described in clause 8.3 of EN 300 196-1 [3] as enhanced by the use of the GAT protocol as described in annex B, indicating one of the following error values and return to the previous state:

- "notAvailable", if the RC service is not available; or
- "notSubscribed", if for a given individual number the RC service has not been subscribed to; or
- "invalidServedUserNr", if the individual number provided to identify the subscriber is not a valid number; or

if the operation is conducted at a remote location or if the network option for an authentication procedure requirement at the home location applies:

- "invalidPin", if the Pin parameter has not been provided or the PIN indicated in the Pin parameter doesn't match the currently registered PIN for the ISDN number identified in the servedUserNr parameter (from EN 301 002-1 [4]); or

- "invalidTan", if the requested Tan parameter has not been provided or the TAN indicated by the user is not the next one to be used from the TAN list provided to the subscriber identified in the servedUserNr parameter (from EN 301 002-1 [4]); or
- "userControlBlocked", if the interrogation request cannot be accepted due to the fact that the user has exceeded the number of times that an invalid PIN or TAN can be used (from EN 301 002-1 [4]); or
- "changeOfPinRequired", if the PIN indicated by the user is valid, but has expired (from EN 301 002-1 [4]).

On receiving such an InterrogationRC return error component, the user shall stop timer T-INTERROGATE and return to the state prior to the interrogation request.

On expiration of timer T-INTERROGATE and the user not having received any response to the InterrogationRC invoke component, the user shall consider that this attempt to interrogate the RC service has failed and enter the Idle state.

The user, on receiving a reject component, shall stop timer T-INTERROGATE and return to the state that existed before the InterrogationRC invoke component was sent.

If the network receives a reject component from the user, it need not correlate it to the procedure in this clause and it shall have no impact on the RC service.

## 9.2 Invocation and revocation

### 9.2.1 Invocation

#### 9.2.1.1 Normal operation

After the RC service has been activated, these procedures apply.

In order to invoke the RC service, the remote user shall:

- send an InvocationRC invoke component to the network, in an appropriate NCICS transport message using the procedures described in clause 8.3 of EN 300 196-1 [3] as enhanced by the use of the GAT protocol as described in annex B;
- start timer T-INVOCATION; and
- enter the Wait RC Invocation state.

The remote user shall indicate the instance of the RC service by use of the following parameters:

- in the servedUserNr parameter, the individual number for which the invocation applies.
- In order to meet the appropriate level of security as defined in the ETSI document, " Security tools (SET) procedures", EN 301 002-1 [4] the remote user shall indicate the PIN (or PIN and TAN) parameter the appropriate data for the instance of the RC service.

The network, on receiving such an InvocationRC invoke component shall use the appropriate parameter(s) for security to carry out an authentication procedure which is outside the scope of the present document and enter the Wait RC Invocation state.

To invoke an instance of the RC service, the network shall use the servedUserNr parameter and appropriate parameters for security and shall invoke the instance of the RC service relating to the access.

If the Invocation instance is successfully invoked, the network shall:

- send an InvocationRC return result component to the remote user in an appropriate NCICS transport message using the procedures described in clause 8.3 of EN 300 196-1 [3] as enhanced by the use of the GAT protocol as described in annex B; and
- start timer T-IDLEGUARD and
- enter the RC active state.

The remote user, on receiving such an InvocationRC return result component shall stop timer T-INVOCATION and enter the Idle state.

Once the RC service has been invoked, the remote user may control supplementary services using the procedures defined in clauses 9 and 10 of the DSS1 protocol specification of the supplementary service to be controlled. Note: Where subscribed to, the user can remotely control supplementary services for all numbers on the home access.

### 9.2.1.2 Exceptional procedures

If the network is unable to invoke the RC service, the network shall:

- send an InvocationRC return error component to the remote user in an appropriate NCICS transport message using the procedures described in clause 8.3 of EN 300 196-1 [3] as enhanced by the use of the GAT protocol as described in annex B, indicating one of the following error values and return to the Idle state:
- "rCinvokeFromHomeAccessNotAllowed", the RC service cannot be invoked from the home access; or
- "notActivated", the RC service is not activated; or
- "invalidServedUserNr", the individual number provided to identify the subscriber is not a valid number; or
- "rCalreadyInOperation", the RC service is already in operation at that home location; or
- "notSubscribed", if (for a given individual number or for the whole access) the requested RC service has not been subscribed to; or
- "invalidPin", if the Pin parameter has not been provided or the PIN indicated in the Pin parameter doesn't match the currently registered PIN for the ISDN number identified in the servedUserNr parameter (from EN 301 002-1 [4]); or
- "invalidTan", if the requested Tan parameter has not been provided or the TAN indicated by the remote user is not the next one to be used from the TAN list provided to the subscriber identified in the servedUserNr parameter (from EN 301 002-1 [4]); or
- "userControlBlocked", if the invocation request cannot be accepted due to the fact that the remote user has exceeded the number of times that an invalid PIN or TAN can be used (from EN 301 002-1 [4]); or
- "changeOfPinRequired", if the PIN indicated by the remote user is valid, but has expired (from EN 301 002-1 [4]); or
- "notAvailable", if the RC service is not available due to network failures;

On receiving such an InvocationRC return error component, the remote user shall stop timer T-INVOCATION and return to the Idle state.

On expiration of timer T-INVOCATION and the remote user not having received any response to the InvocationRC invoke component, the remote user shall consider that this attempt to invoke the RC service has failed and enter the Idle state.

The remote user, on receiving a reject component, shall stop timer T-INVOCATION, and return to the same state as before the InvocationRC invoke component was sent.

If the network receives a reject component from the remote user, it need not correlate it to the procedure in this clause and it shall have no impact on the RC service.

## 9.2.2 Revocation

### 9.2.2.1 Normal operation

After the remote user has invoked the RC service, these procedures apply.

In order to revoke the RC service, the remote user shall:

- send an RevocationRC invoke component to the network, in an appropriate NCICS transport message using the procedures described in clause 8.3 of EN 300 196-1 [3] as enhanced by the use of the GAT protocol as described in annex B;
- start timer T-REVOCAION; and
- enter the Wait RC Revocation state.

The remote user shall indicate the instance of the RC service by use of the following parameters:

- In the servedUserNr parameter, the individual number for which the revocation applies.
- In order to meet the appropriate level of security as defined in the ETSI document, "Security tools (SET) procedures", EN 301 002-1 [4] the remote user shall indicate the PIN (or PIN and TAN) parameter the appropriate data for the instance of the RC service.
- The network, on receiving such a RevocationRC invoke component shall use the appropriate parameter(s) for security to carry out an authentication procedure which is outside the scope of the present document and enter the Wait RC Revocation state.

To revoke an instance of the RC service, the network shall use the servedUserNr parameter and appropriate parameters for security and shall revoke the instance of the RC service relating to the access.

If the revocation instance is successfully revoked, the network shall:

- send a RevocationRC return result component to the remote user in an appropriate NCICS transport message using the procedures described in clause 8.3 of EN 300 196-1 [3] as enhanced by the use of the GAT protocol as described in annex B; and
- stop timer T-IDLEGUARD; and
- enter the Idle state.

The remote user, on receiving such a RevocationRC return result component shall stop timer T-REVOCAION and enter the Idle state.

### 9.2.2.2 Exceptional procedures

If the network is unable to revoke the RC service, the network shall:

- stop timer T-IDLEGUARD; and
- send a RevocationRC return error component to the remote user in an appropriate NCICS transport message using the procedures described in clause 8.3 of EN 300 196-1 [3] as enhanced by the use of the GAT protocol as described in annex B, indicating one of the following error values and in these cases return to the Idle state:
  - "notSubscribed", the RC service is not subscribed to; or
  - "notActivated", the RC service is not activated; or
  - "rCnotInvoked", the RC service has not been invoked; or
- if one of the following error values is indicated, the network shall return to the RC Active state:
  - "invalidServedUserNr", the individual number provided to identify the remote user is not a valid number; or

- "invalidPin", if the Pin parameter has not been provided or the PIN indicated in the old Pin parameter doesn't match the currently registered PIN for the ISDN number identified in the servedUserNr parameter (from EN 301 002-1 [4]); or
- "invalidTan", if the requested Tan parameter has not been provided or the TAN indicated by the remote user is not the next one to be used from the TAN list provided to the subscriber identified in the servedUserNr parameter (from EN 301 002-1 [4]); or
- "userControlBlocked", if the revocation request cannot be accepted due to the fact that the remote user has exceeded the number of times that an invalid PIN or TAN can be used (from EN 301 002-1 [4]); or
- "changeOfPinRequired", if the PIN indicated by the remote user is valid, but has expired (from EN 301 002-1 [4]); or
- "notAvailable", if the RC service is not available due to network failures.

On receiving such a RevocationRC return error component, the remote user shall stop timer T-REVOCATION and return to the Idle state.

On expiration of timer T-REVOCATION and the remote user not having received any response to the RevocationRC invoke component, the remote user shall consider that this attempt to revoke the RC service has failed and enter the Idle state.

The remote user, on receiving a reject component, shall stop timer T-REVOCATION, and return to the same state as before the RevocationRC invoke component was sent.

If the network receives a reject component from the remote user, it need not correlate it to the procedure in this clause and it shall have no impact on the RC service.

If the remote user fails to revoke an instance of the RC service within the expiration time of the idle guard timer, T-IDLEGUARD, the network shall:

- revoke the instance of the RC service relating to the access; and
- send an InvocationTimeoutRC invoke component to the remote user in a Facility Information Element in an appropriate NCICS transport message using the procedures described in clause 8.3 of EN 300 196-1 [3] as enhanced by the use of the GAT protocol as described in annex B, and return to the Idle state.

---

## 10 Procedures for interworking with private ISDNs

A subscriber who has subscribed to (supplementary) services on the public ISDN can invoke the RC service from an access attached to a private ISDN if the intercommunication between the public ISDN and the private ISDN applies.

Where the RC service described in the present document is available in the private ISDN a user who has subscribed to supplementary services or services within that private ISDN can invoke the RC service of that private ISDN from an access attached to a public ISDN if the intercommunication between the public ISDN and the private ISDN applies, in order to distinguish between remote control of private services and public services related to the interface between public and private networks the ISDN number of the home location shall be evaluated.

Interworking with private ISDNs shall be according to the procedures of clause 9, symmetrically for each direction and shall include the requirements given in ETS 300 345 [5].

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## 11 Interactions with other networks

If the RC service is available in a non-ISDN part of the network and communication is available between the ISDN and non-ISDN, invocation of the RC service may be possible with non-ISDN procedures. Access to the ISDN remote control service may also be available from the PSTN network. Examples of interworking with the PSTN network are given in annex C. These procedures for interworking with networks other than ISDN are outside the scope of the present document.

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## 12 Interactions with supplementary services

There are no interactions with supplementary services.

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## 13 Parameter Values (timers)

The following values of timers shall be used by this application when using the procedures described in clause 8.3 of EN 300 196-1 [3] as enhanced by the use of the GAT protocol as described in annex B.

**Table 5: Parameter Timers**

Timer value	Time out value	Cause for start	Normal stop	At expiry
T-ACTIVATE	10 sec.	ActivationRC invoke sent	ActivationRC return result received	Return to Idle
T-DEACTIVATE	10 sec.	DeactivationRC invoke sent	DeactivationRC return result received	Remain in Activated state
T-INTERROGATE	10 sec.	InterrogationRC invoke sent	InterrogationRC return result received	Remain in the state prior to the invoke
T-INVOCATION	10 sec.	InvocationRC invoke sent	InvocationRC return result received	
T-REVOCAION	10 sec.	RevocationRC invoke sent	RevocationRC return result received	
T-IDLEGUARD	5 min.	InvocationRC return result sent	RevocationRC return result sent or RevocationRC return error sent	The network shall revoke the instance of the RC service as described in clause 9.2.2.2.

## 14 Dynamic description (SDL diagrams)

The following SDL diagrams are specified according to CCITT Recommendation Z.100 [8].

NOTE 1: Reject components are not shown in the SDL diagrams.

NOTE 2: Figures 1 and 2 provide the SDLs applicable at the coincident S/T reference point for the user side and network side respectively. The SDLs in Figure 2 also apply to both the user side and network side at the T reference point.

NOTE 3: Only the Idleguard Timer operations are shown, other timer operations are not shown.

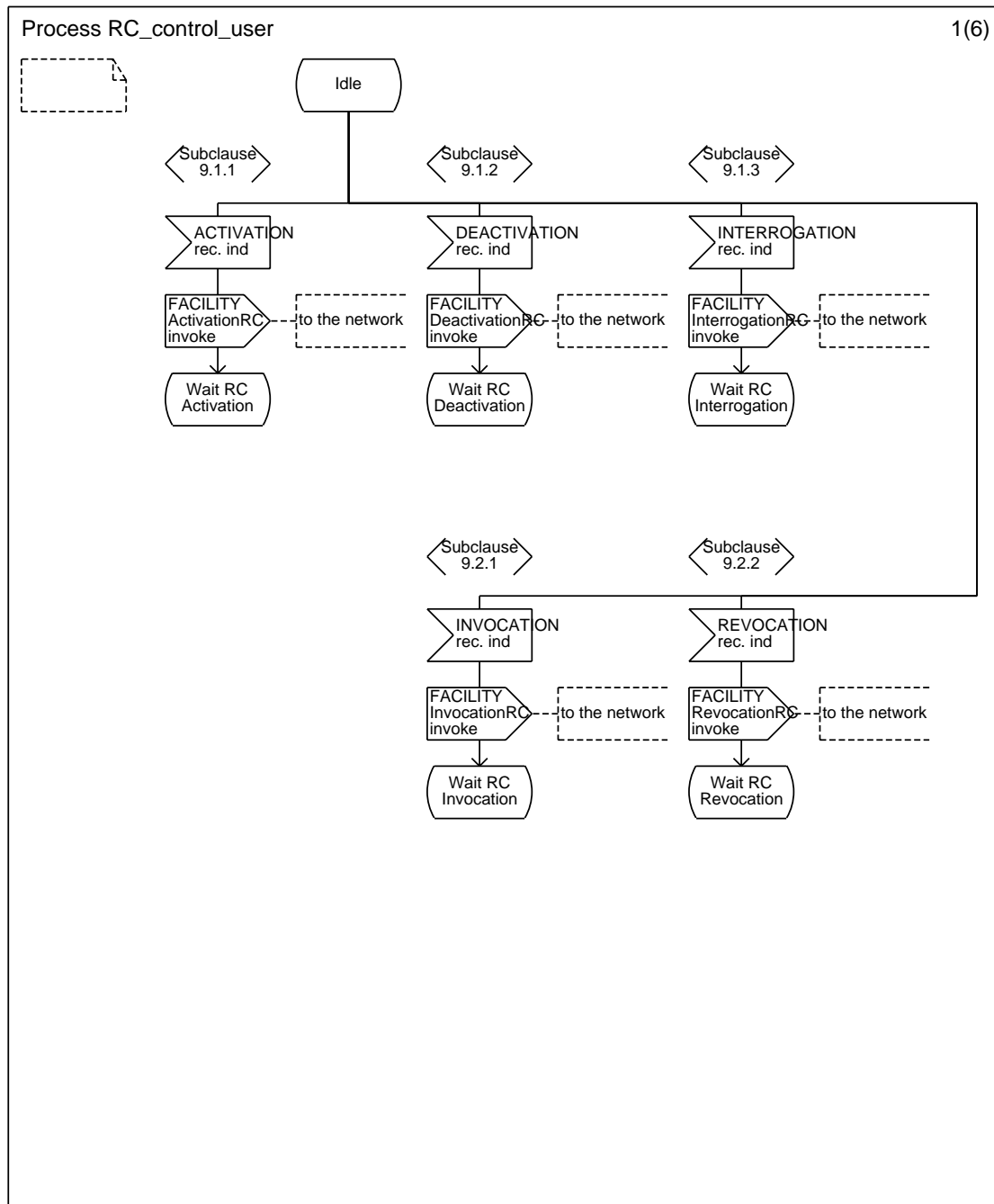


Figure 1 (sheet 1 of 6)

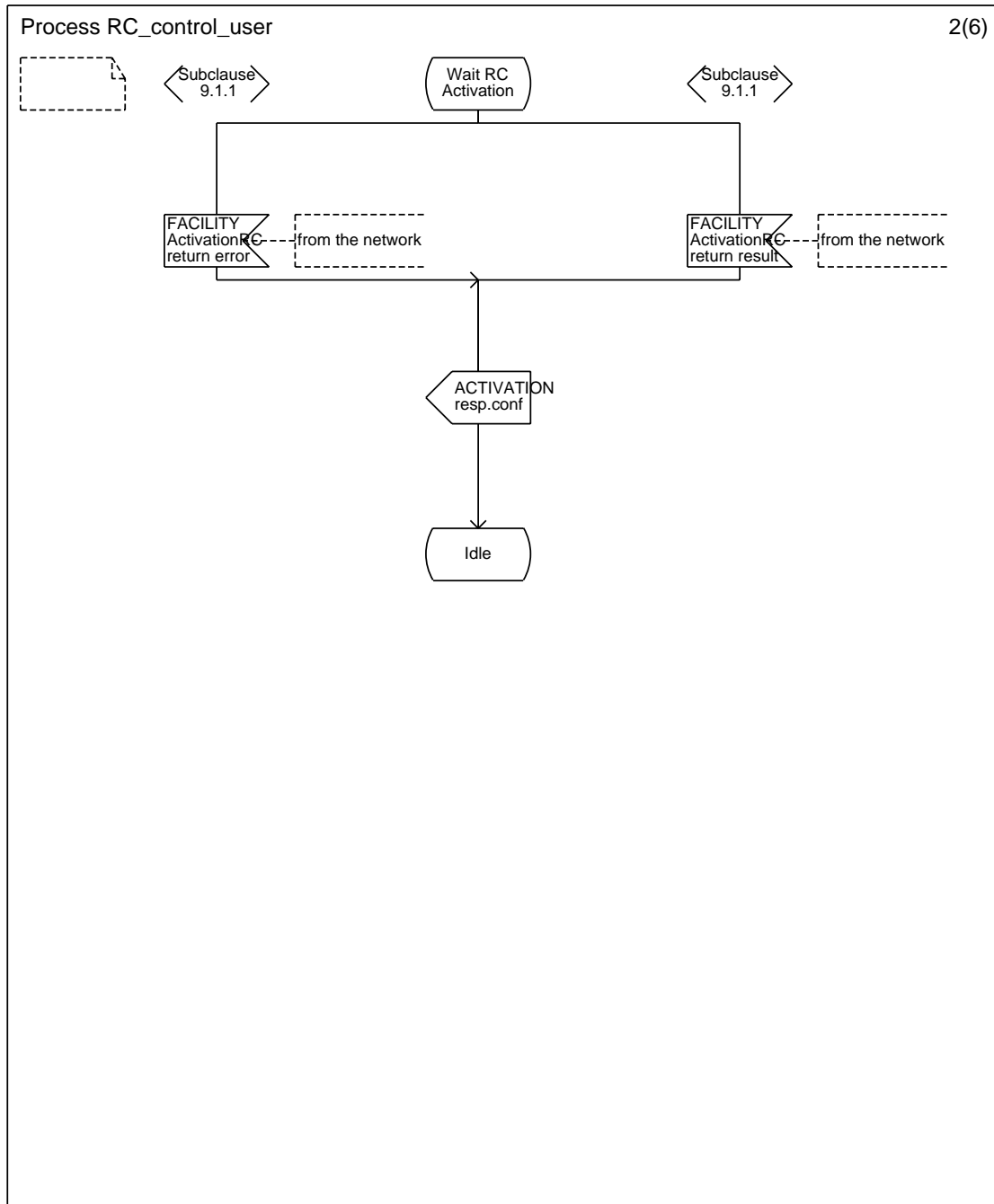


Figure 1 (sheet 2 of 6)



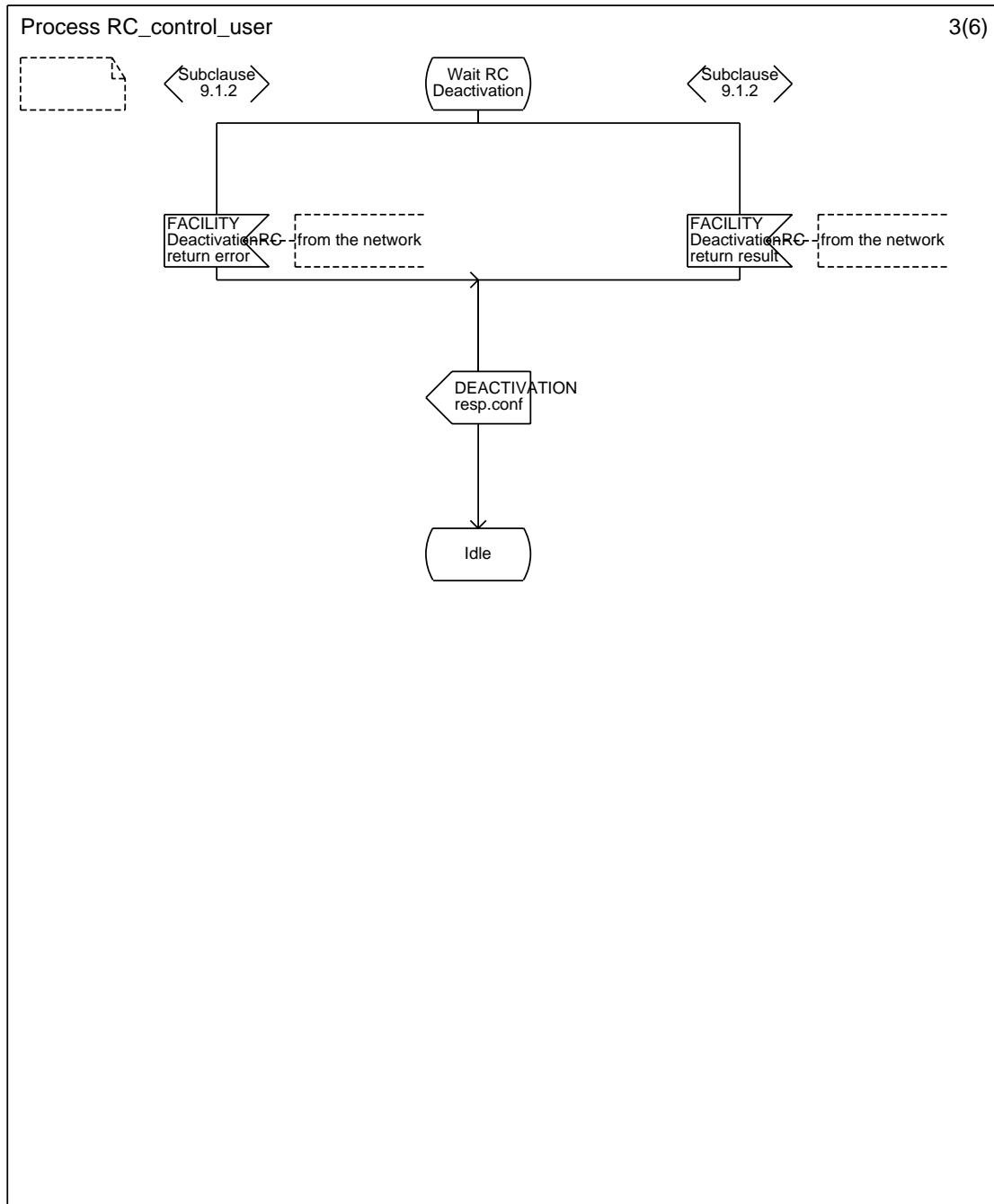


Figure 1 (sheet 3 of 6)

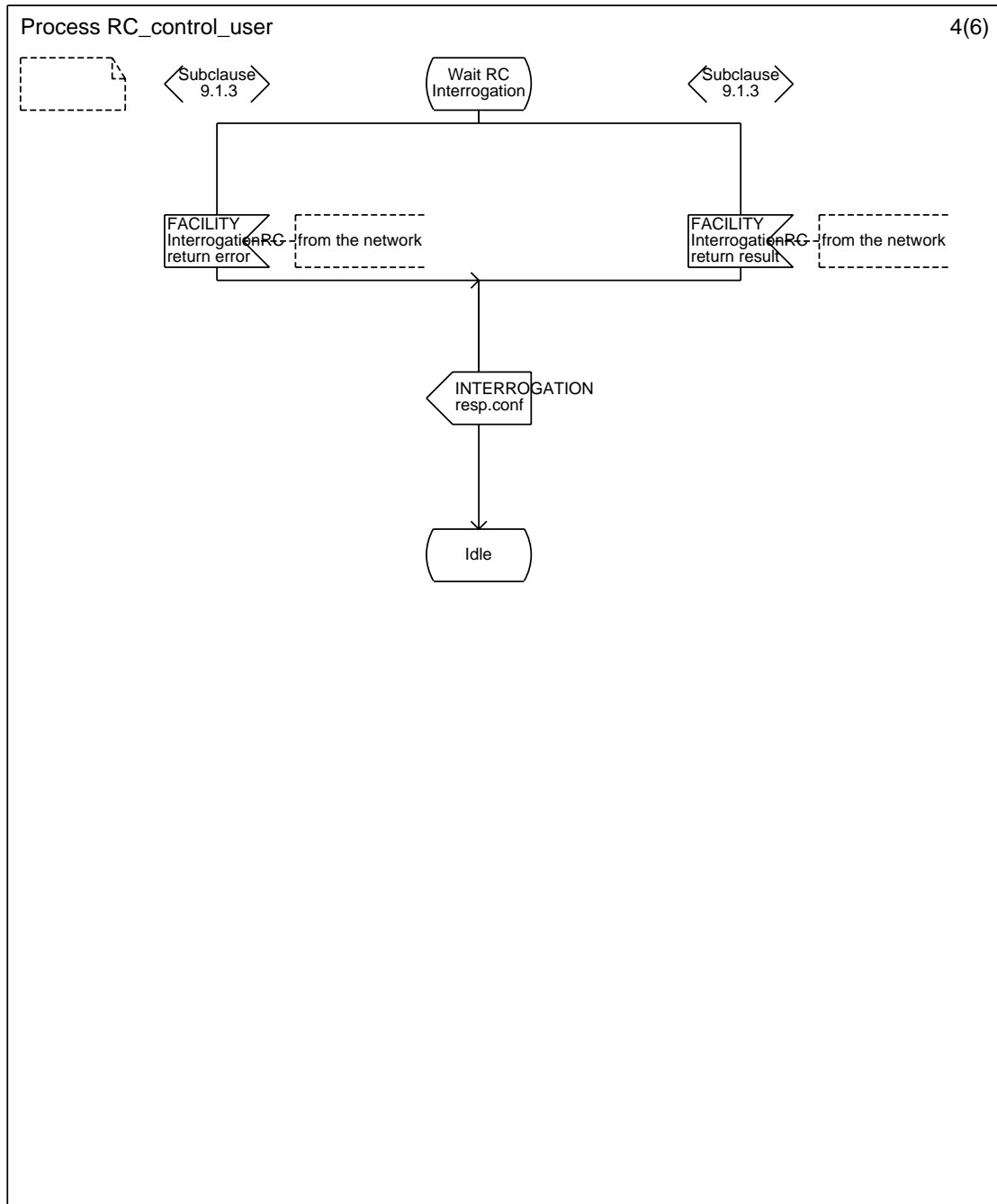


Figure 1 (sheet 4 of 6)

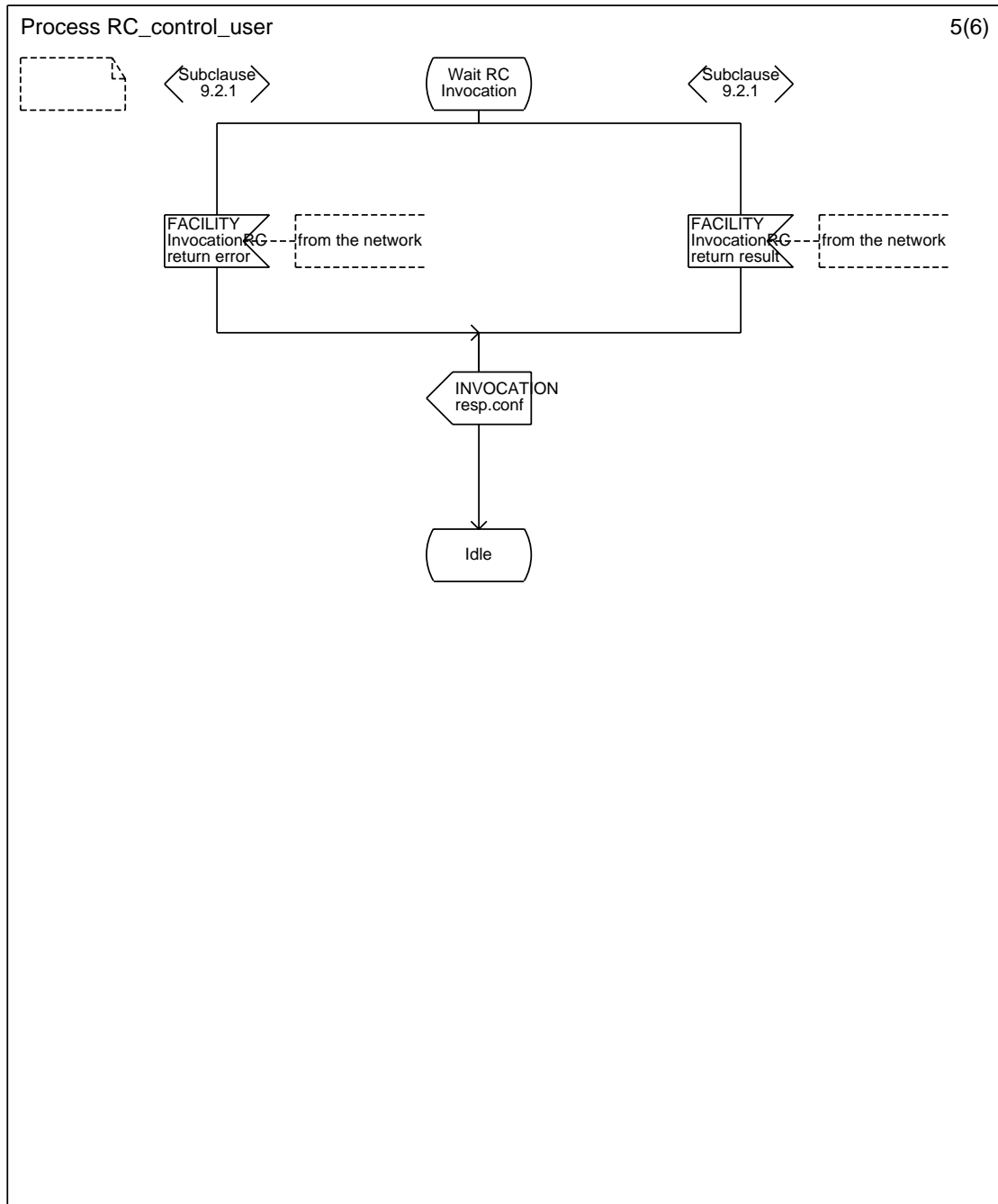


Figure 1 (sheet 5 of 6)

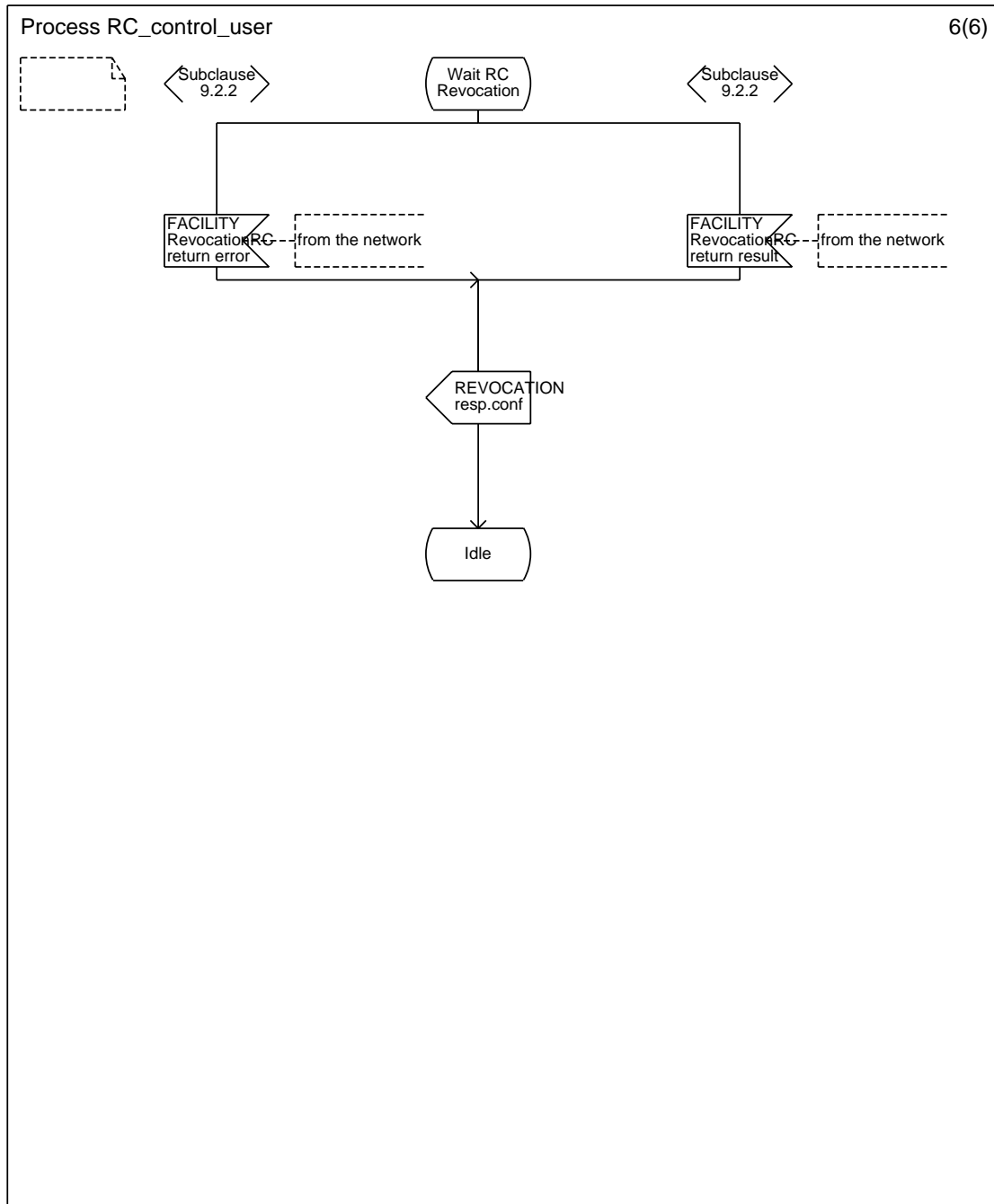


Figure 1 (sheet 6 of 6)

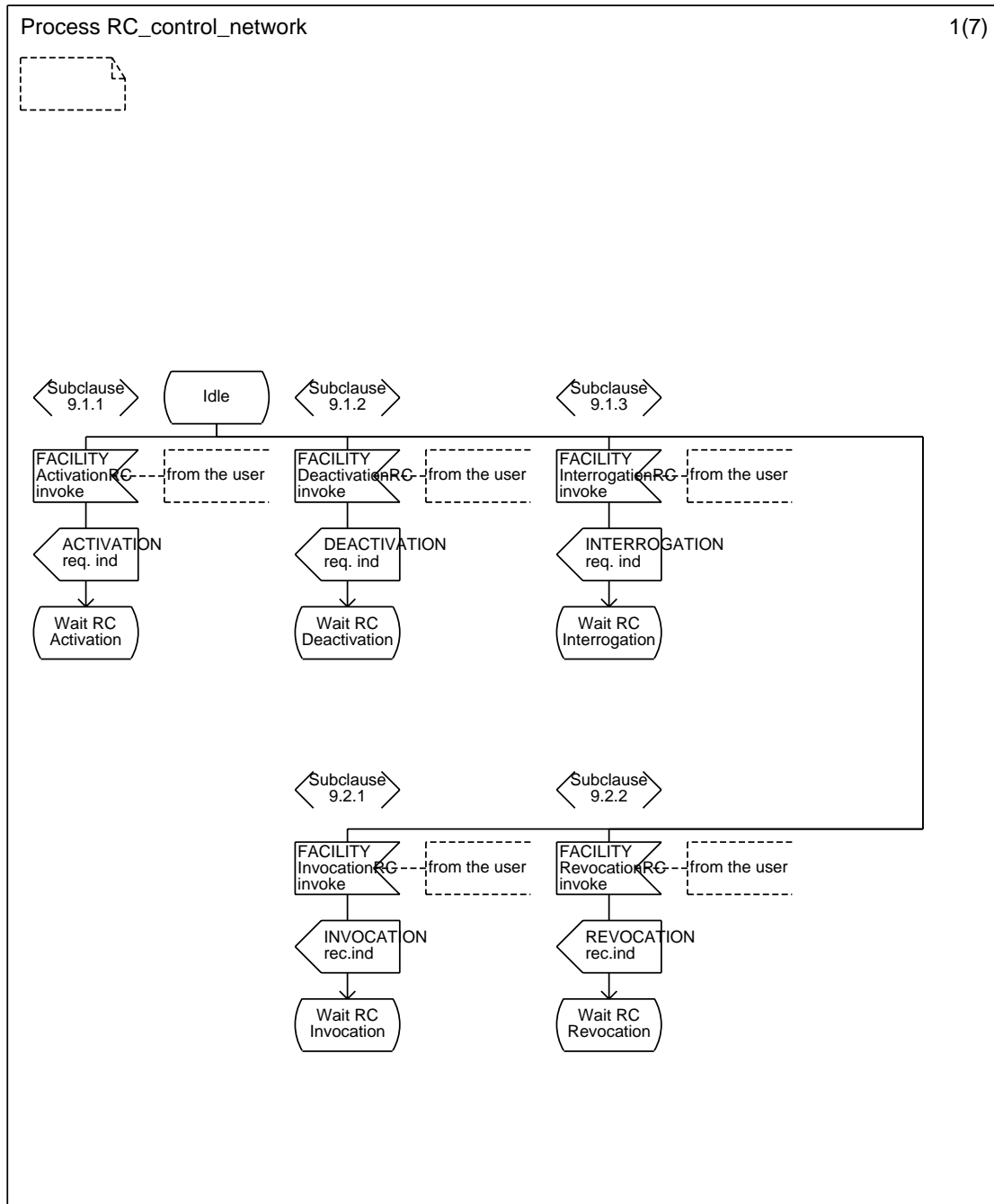


Figure 2 (sheet 1 of 7)

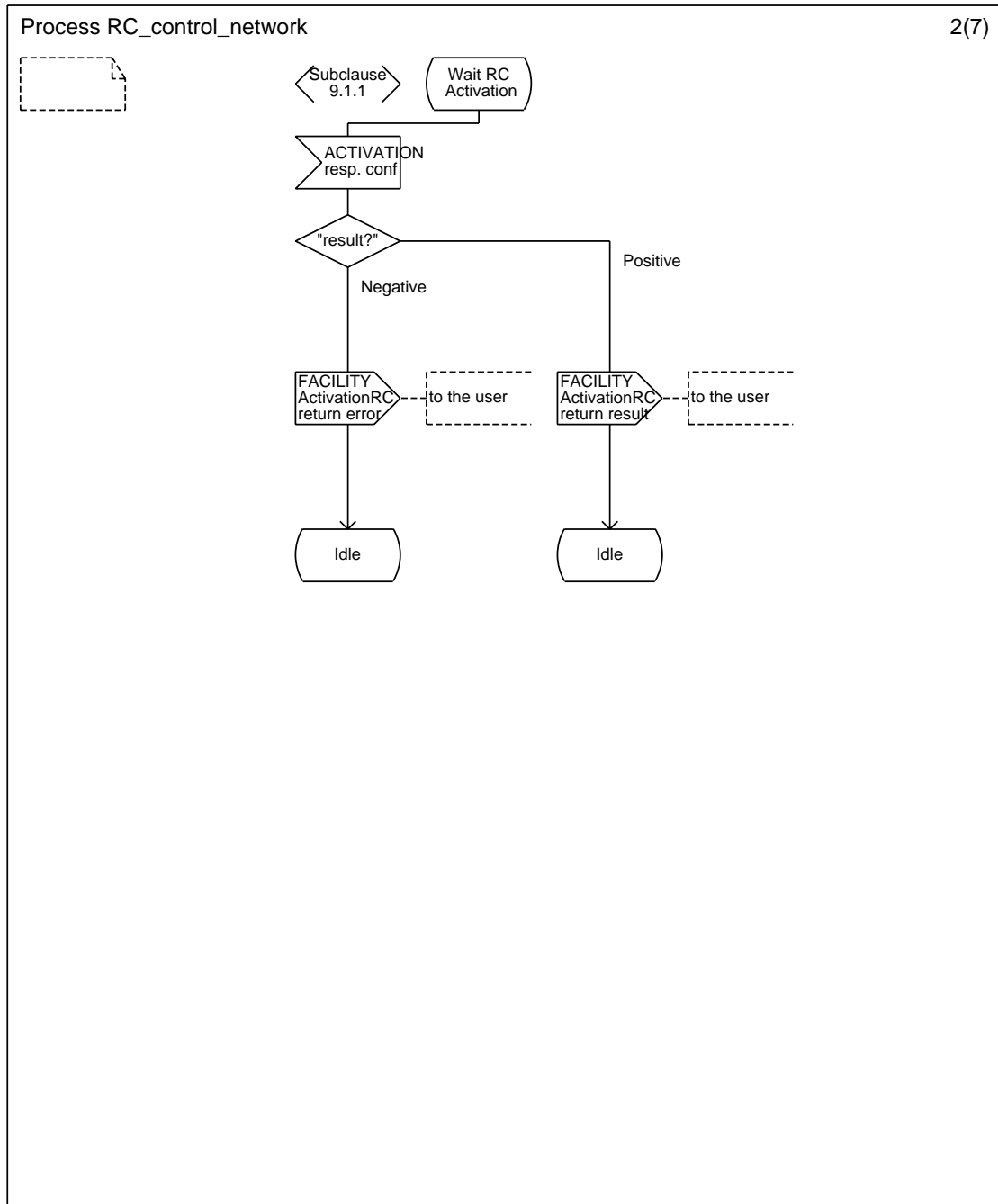


Figure 2 (sheet 2 of 7)

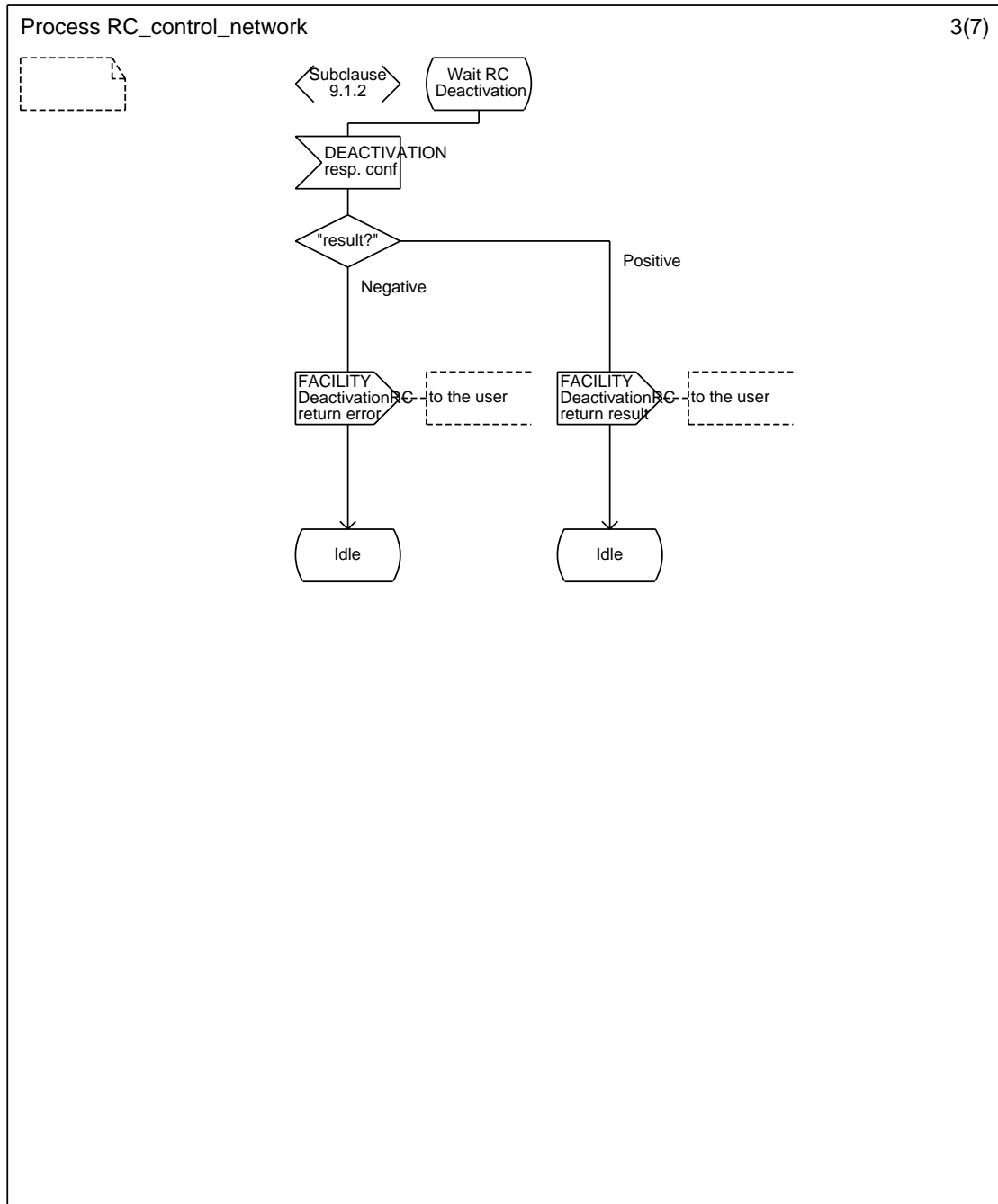


Figure 2 (sheet 3 of 7)

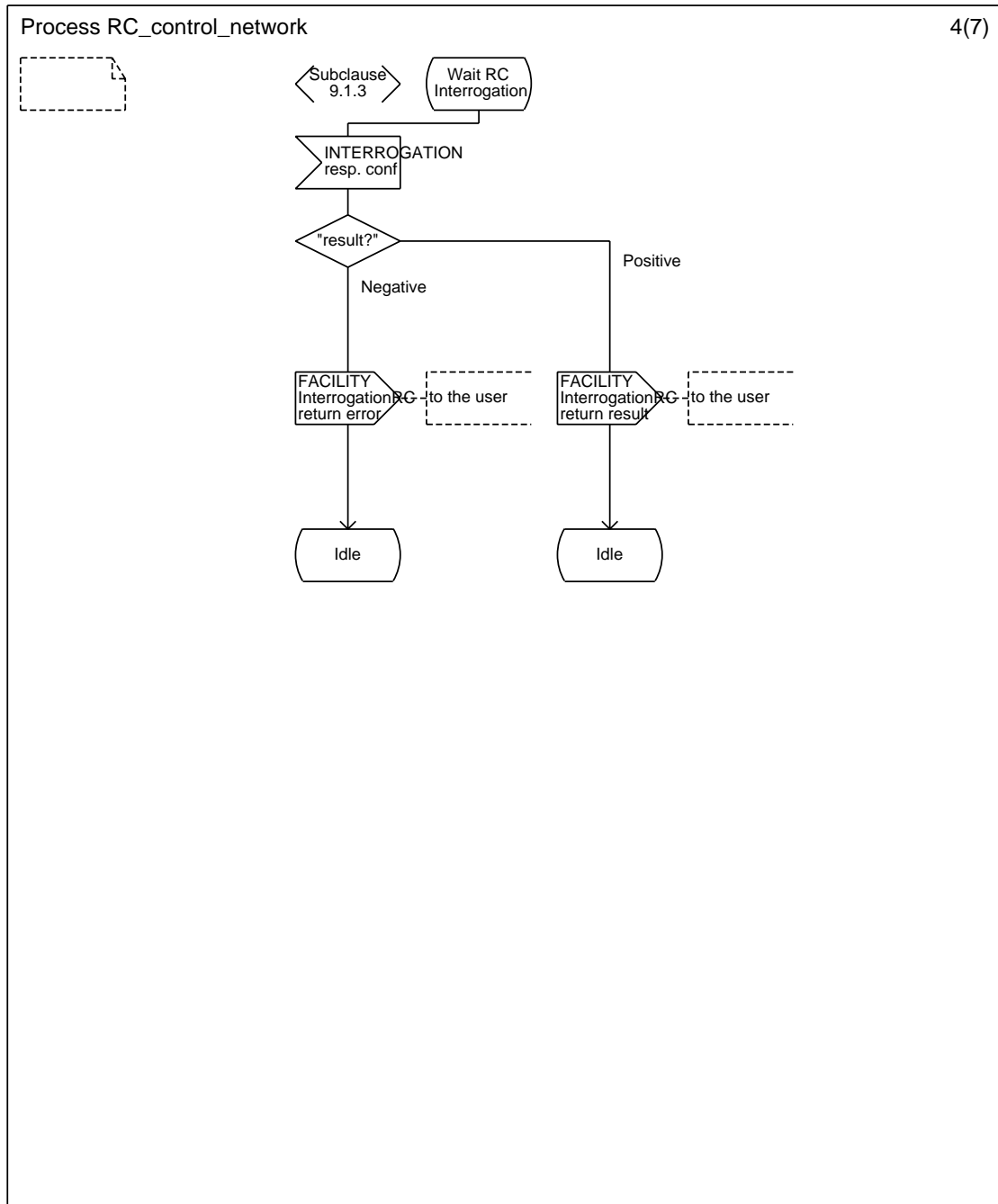


Figure 2 (sheet 4 of 7)



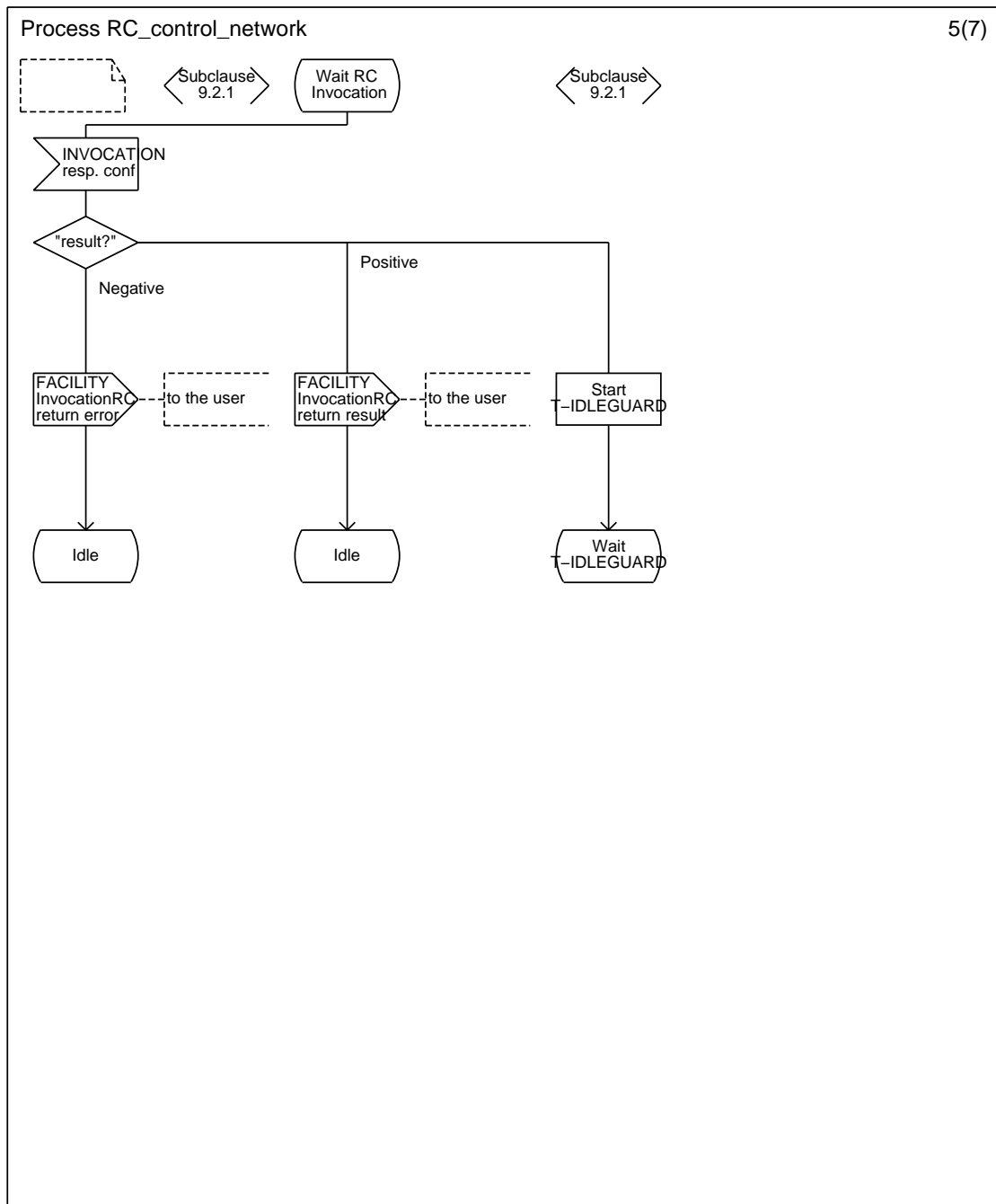


Figure 2 (sheet 5 of 7)

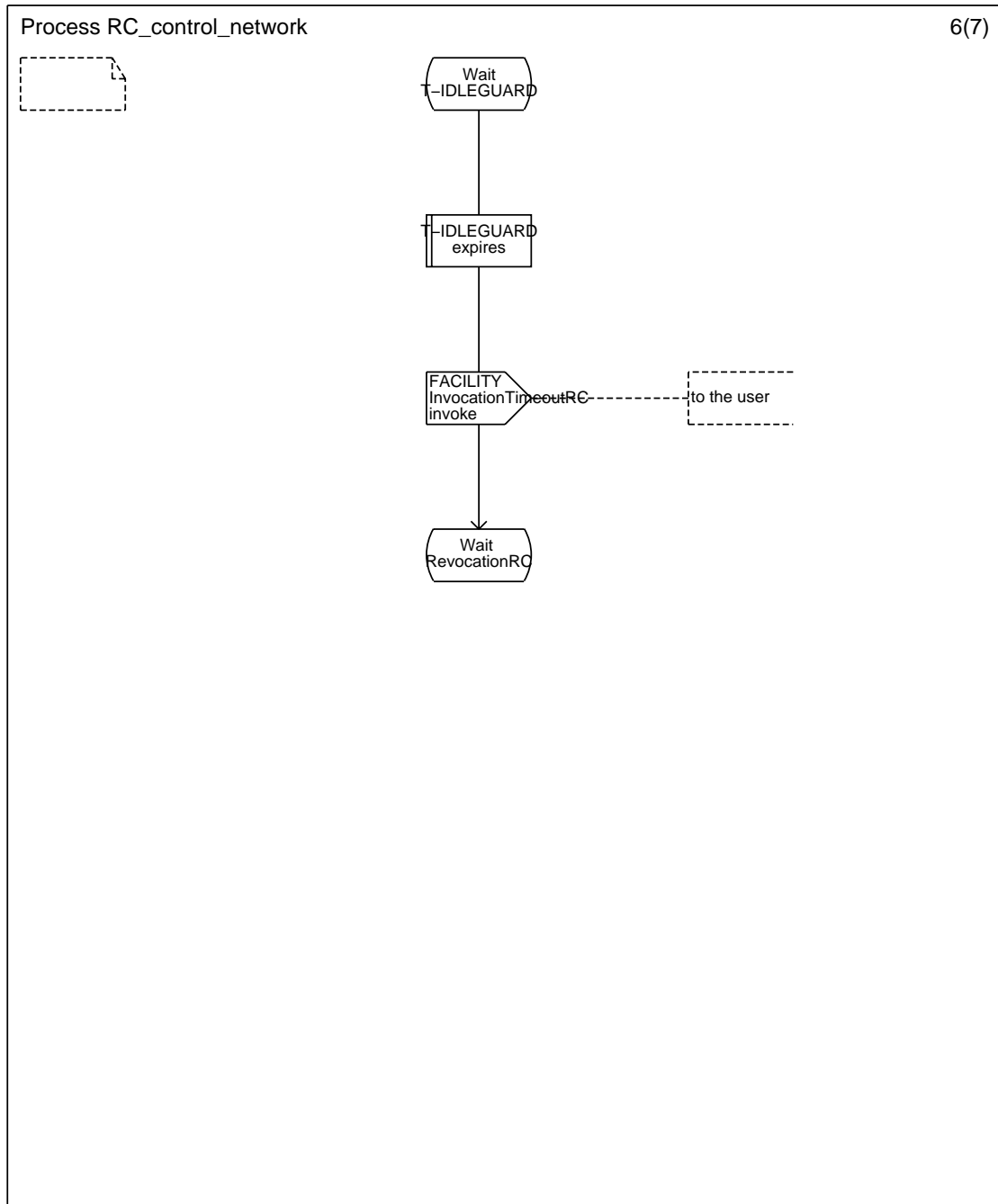


Figure 2 (sheet 6 of 7)

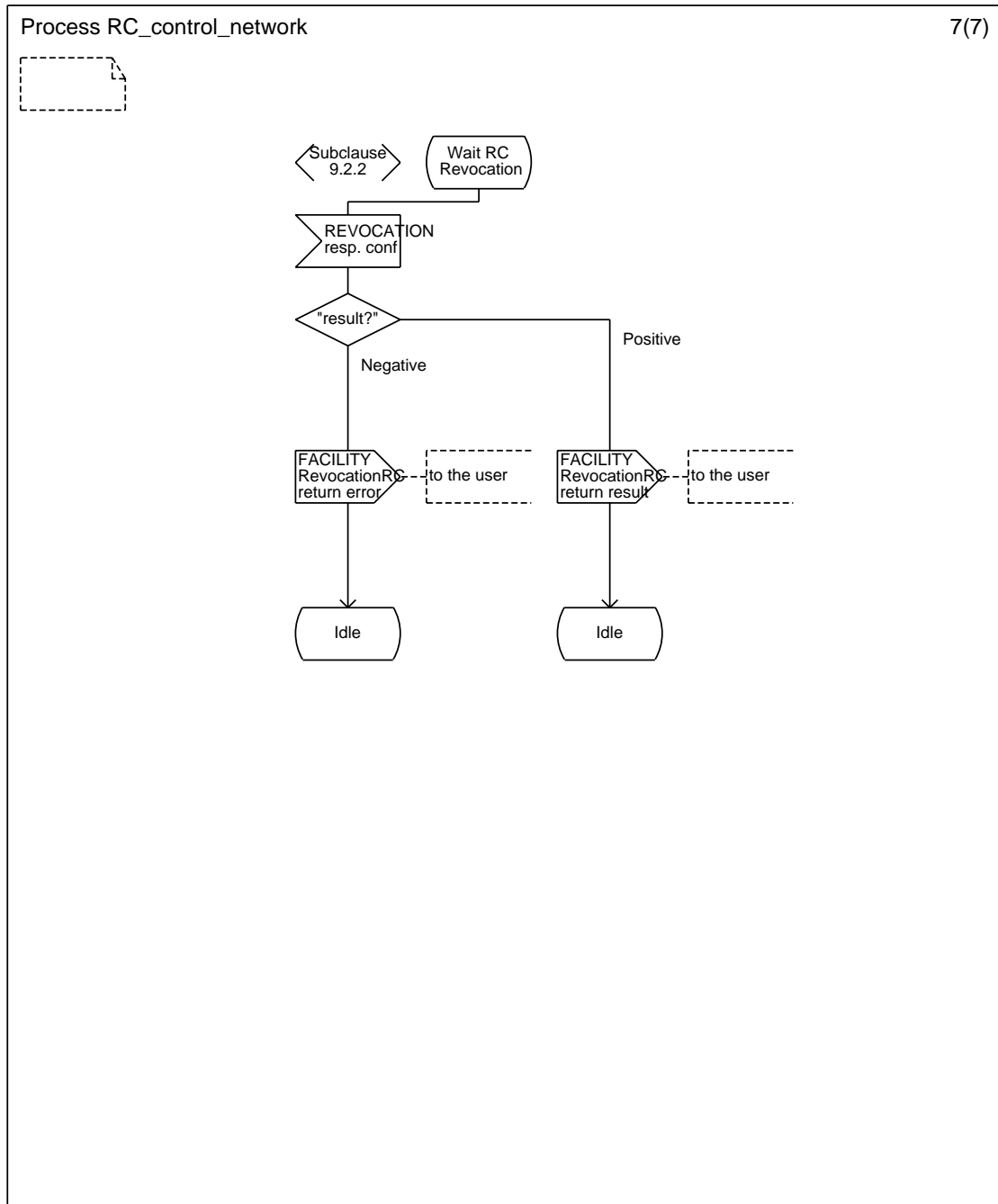
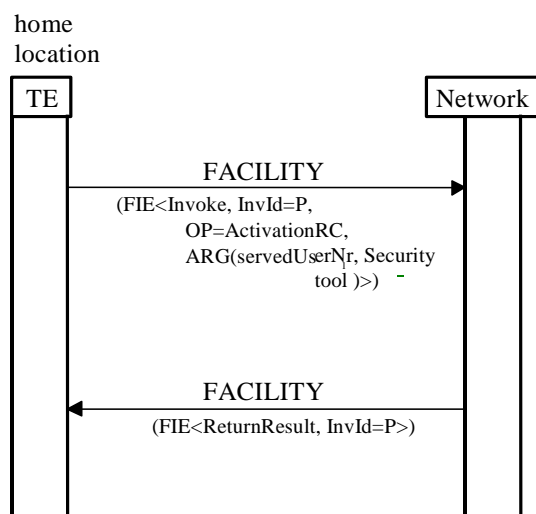
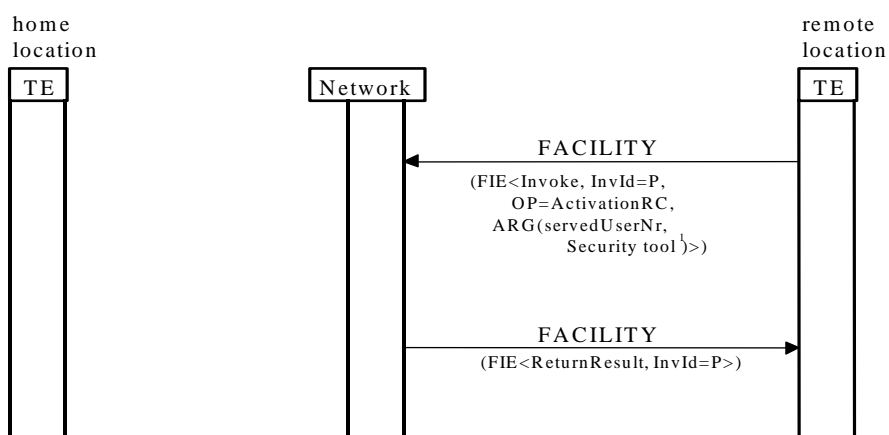


Figure 2 (sheet 7 of 7)

## Annex A (informative): Examples of Signalling flows



**Figure A.1: Activation of RC from home location**



<sup>1</sup> Security tool may be PIN & TAN or PIN only

**Figure A.2: Activation of RC from remote location.**

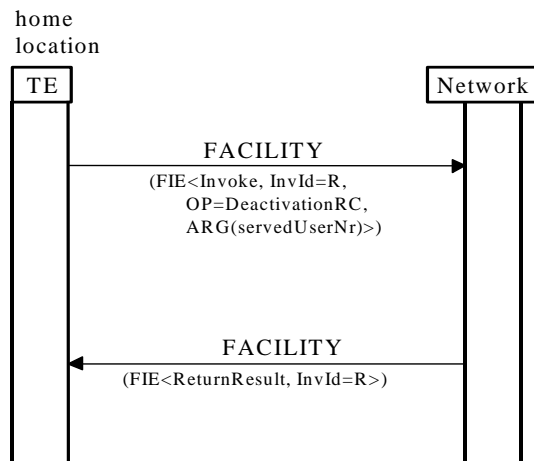
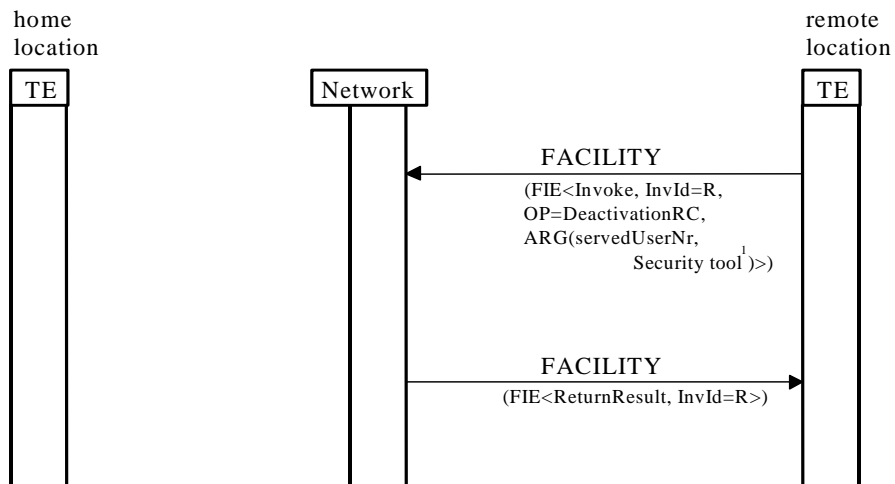
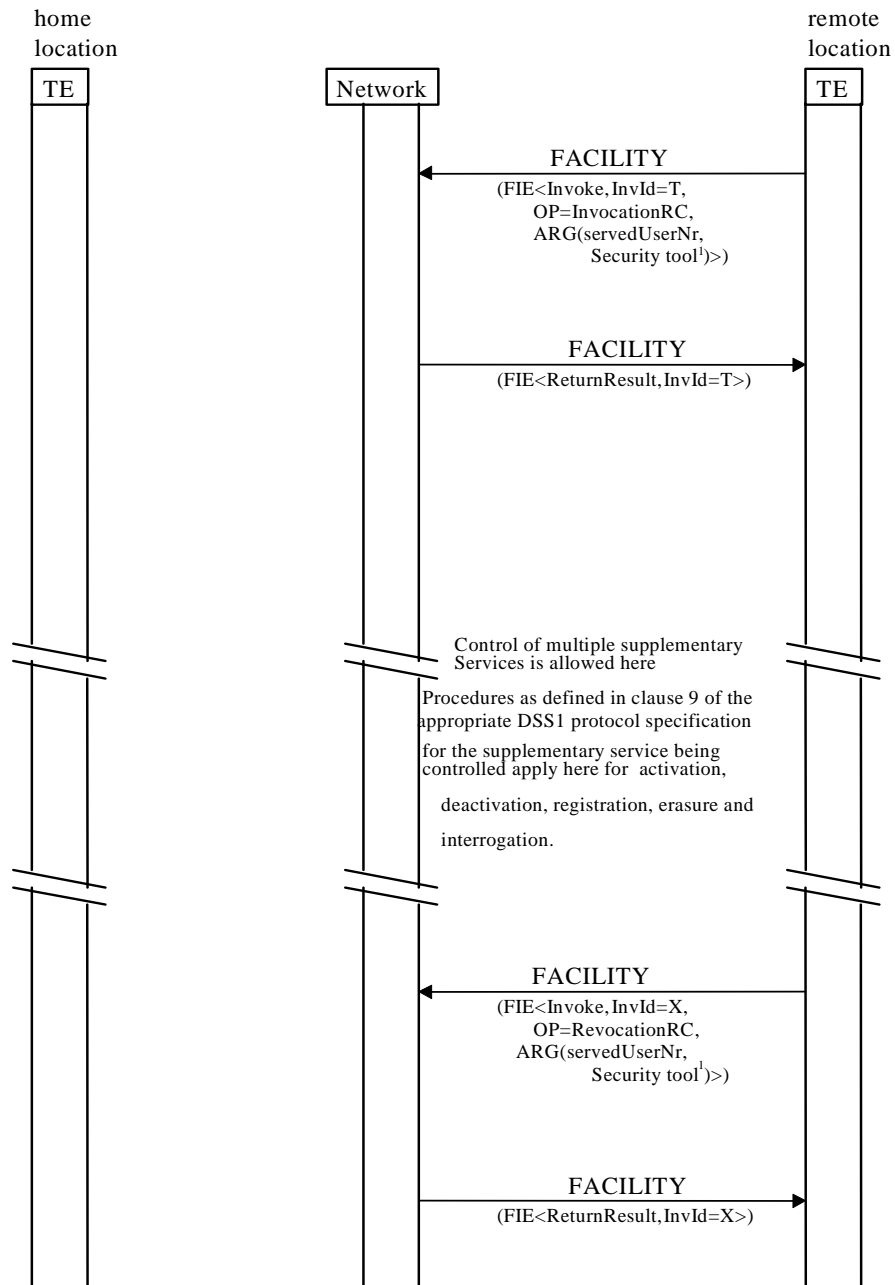


Figure A.3: Deactivation of RC from home location



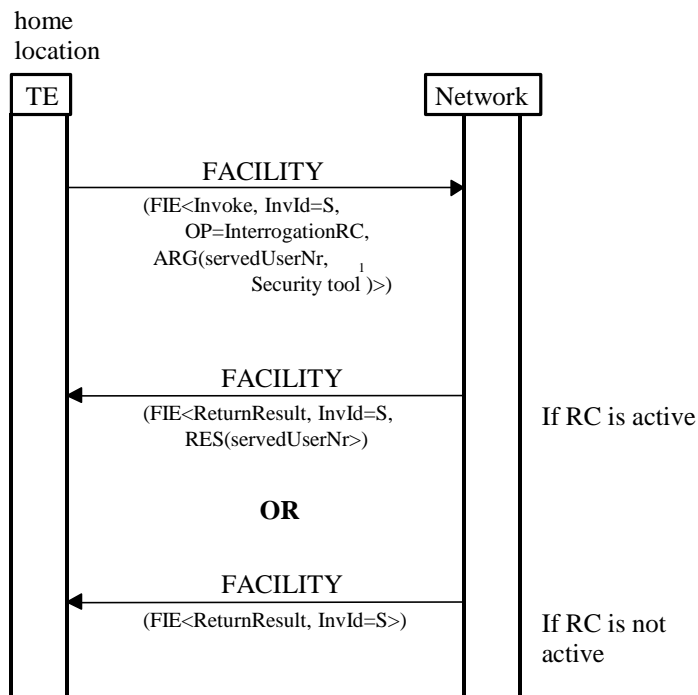
<sup>1</sup> Security tool may be PIN & TAN or PIN only

Figure A.4: Deactivation of RC from a remote location



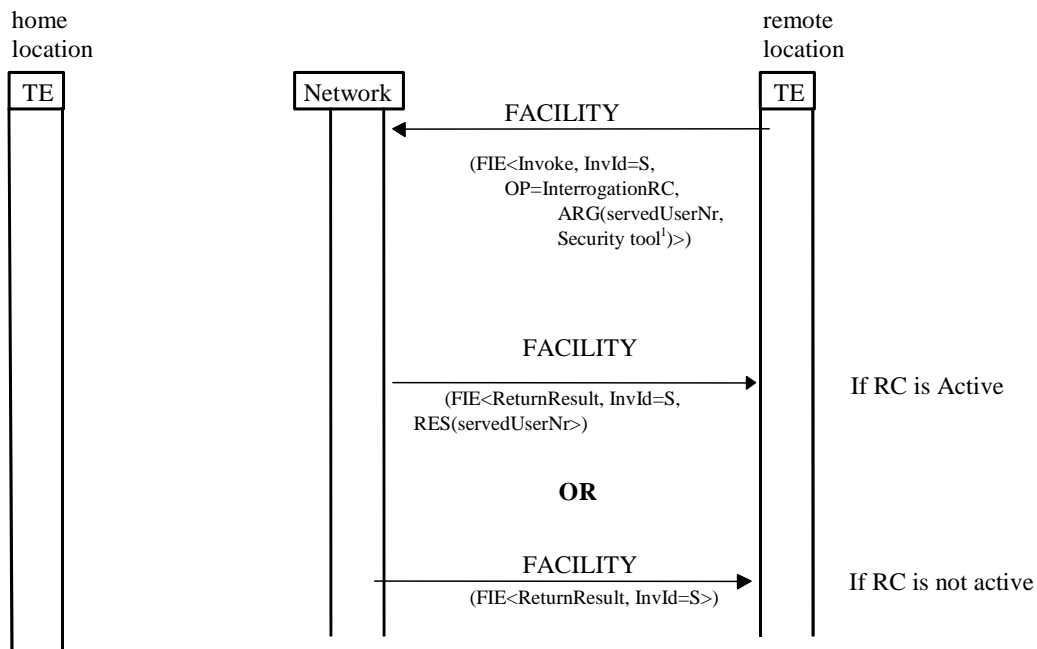
<sup>1</sup> Security tool may be PIN & TAN or PIN only.

**Figure A.5: Invocation/revocation of RC from a remote location**



¹ Security tool may be PIN & TAN or PIN only

Figure A.6: Interrogation of RC from home location



¹ Security tool may be PIN & TAN or PIN only.

Figure A.7: Interrogation of RC from a remote location

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## Annex B (informative): Additions to the Generic Functional Protocol for the ISDN Remote Control service

This annex is designed to provide Remote Control specific information over and above EN 300 196-1 [3] for the transport of PDUs within the present document for signalling application for the ISDN Remote Control service; DSS1 Protocol specification.

---

### B.1 Informative references

- ITU-T Recommendation E.164 (1997): "The International public telecommunications Numbering plan".
  - CCITT Recommendation X.219: "Remote operations: model, notation and service definition".
  - CCITT Recommendation X.229: "Remote operations: Protocol specification".
- 

### B.2 Definitions

**Home node:** The node (exchange) in the home network to which the user's terminal (i.e. the terminal from which the service would normally be directly invoked) is attached.

**Visited terminal:** The terminal from which the remote control service is invoked.

Definitions for the terms listed below are provided in EN 301 813-1 [9].

**AnyNode**

**EndNode**

**EndTerminal**

**Terminal address**

**Terminal**

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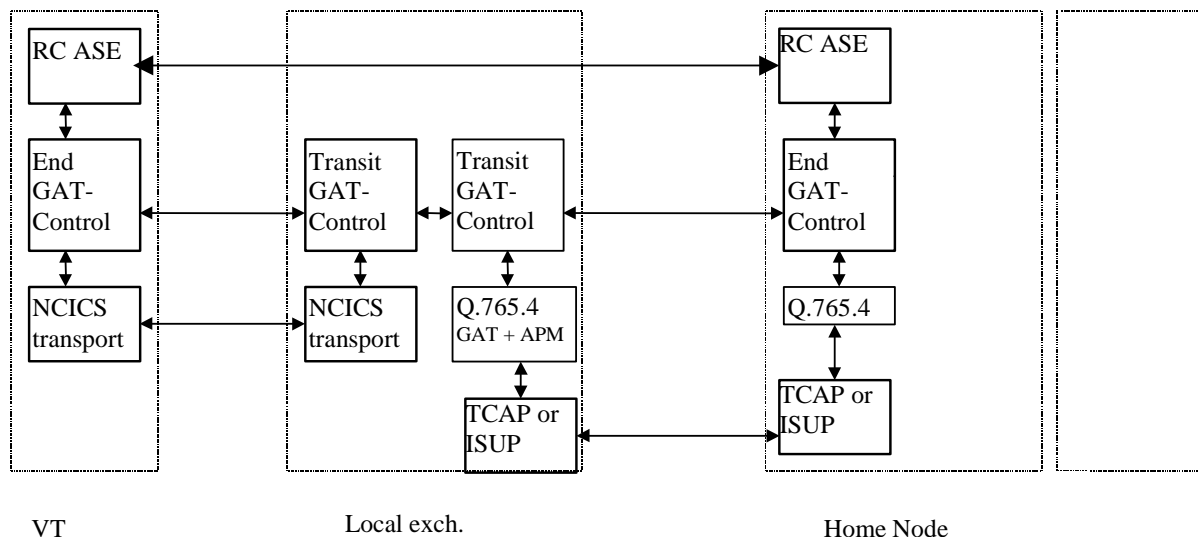
### B.3 Symbols and abbreviations

APDU	Application Protocol Data Unit
APM	Application Transport Message
ASE	Application Service Element
ASN.1	Abstract Syntax Notation No. 1
DSS1	Digital Signalling System No. 1
GAT-Control	Generic Addressing & Transport - Control
HN	Home Node
ISUP	ISDN User Part
NFE	Network Facility Extension
PDU	Protocol Data Unit
ROSE	Remote Operations Service Element
TCAP	Transaction Capability Application Part
VT	Visited Terminal



## B.4 Description

Figure B.1 shows the protocol ASEs used for the transport of information relating to the RC ASE in a bearer-independent transport environment.



**Figure B.1: Bearer-independent transport of RC information**

Within this diagram, the following descriptions apply:

- 1) Transport mechanism. For DSS1, this is the Networked Call Independent Connection-Oriented Signalling (NCICS) transport mechanism as defined in EN 300 196-1 [3].

The mechanism is link by link, i.e. a separate state machine exists at each node that is passed through that controls the establishment, use and release of this mechanism. The transport mechanism is routed by the Called party number information element, and in the absence of information is routed based on information from GAT protocol. The transport mechanisms for SS#7 is ISUP or TCAP. As the mechanism is link by link, any protocol that is defined as a local acknowledgement, rather than of end significance, should not be delayed by remote activities (e.g. in an SCF).

- 2) GAT-control. This provides an entity that analyses whether service functionality should be provided locally, or should be provided at some entity further along a transport mechanism (either existing or yet to be created, possibly further created based on information from GAT protocol).
- 3) ROSE. This is as defined by Recommendation X.219/X.229 (see clause B.1) and is equivalent to the functionality used within TCAP and ITU-T Recommendation X.880 [11]. Other APDUs that are not related to the Remote Control service in the same message may be handled differently.
- 4) Remote Control ASE. This provides the Remote Control specific protocol.

The local exchange and the RC application entity may be co-located within the same exchange. Between the VT and the local exchange, a private network may be inserted, which provides functionality at the GAT-control.

This annex provides the additional requirements to support the above for interfaces using the DSS1 protocol.

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## B.5 Network facility extension APDU

### B.5.1 Transport mechanism

The bearer-independent transport mechanism is NCICS as defined in clause 8.3.3 of EN 300 196-1 [3].

### B.5.2 GAT-control

The Facility information element is extended as shown in clause 11.2.2.1 of EN 300 196-1 [3] to include the NFE APDU. Inclusion of the network facility extension APDU shall be permitted based on the coding of the protocol profile field as defined in clause 11.2.2.1 of EN 300 196-1 [3].

The definition of the NFE APDU required for the RC service using ASN.1 as specified in ITU Recommendation X.680 [10] is given in table B.1.

This APDU shall be included within a Facility information element. This Facility information element may be included in any appropriate message as specified in EN 300 196-1 [3], clause 8.3.1.1, unless a more restrictive specification is given in clause 9.

The inclusion of the components in facility information elements is defined in EN 300 196-1 [3], clause 11.2.2.1.

**Table B.1: Network facility extension**

Proposed generic addressing and transport APDU coding using Recommendation X.680 [10]

```

GAT-PDU
    {itu-t recommendation q 850 gat-pdu(1)}

DEFINITIONS ::=
EXPORTS  GATPDU;
IMPORTS  PartyNumber FROM Addressing-Data-Elements
        { CCITT-recommendation q932 addressing-data-elements(7) },
        Interpretation-APDU FROM Interpretation-APDU
        { iso standard pss1-generic-procedures(11582) interpretation-apdu(3) },
        Component FROM Facility-Information-Element-Component
        { ccitt recommendation q 932 facility-information-element-component (3) };

BEGIN

GATPDU ::= SEQUENCE
    { gatNetworkFacilityExtension  GATNetworkFacilityExtension OPTIONAL,
      serviceIndicator             ServiceIndicator,
      localValueDiscriminator      LocalValueDiscriminator DEFAULT Itu-tLocalValue,
      interpretation-APDU          Interpretation-APDU OPTIONAL
      apduPortion                  A pduPortion

GATNetworkFacilityExtension ::= [10] IMPLICIT SEQUENCE
    { sourceEntity      [0] IMPLICIT EntityType,
      sourceEntityAddress  [1] IMPLICIT AddressInformation OPTIONAL,
      destinationEntity   [2] IMPLICIT EntityType,
      destinationEntityAddress  [3] IMPLICIT AddressInformation OPTIONAL
    }

EntityType ::= INTEGER
    { endNode( 2),
      anyNode( 3),
      endTerminal( 4)
    }

AddressInformation ::= PartyNumber

ServiceIndicator ::= OBJECT IDENTIFIER

LocalValueDiscriminator ::= INTEGER
    { itu-tLocalValue(0),
      iso-iecLocalValue(1)
    }

A pduPortion ::= SEQUENCE (SIZE (1..max)) OF
    ROSComponent

END -- of GAT-PDU

```

## B.6 Signalling procedures at the coincident S and T reference point

### B.6.1 GFT-control

#### B.6.1.1 Requirements for sending Remote Control service APDUs

All usages of the transport mechanism are bearer independent.

The table B.2 identifies the set of parameters that will be used.

**Table B.2: Information to be included in the GAT APDUs**

APDU/parameter	VT -> HN initiation	HN -> VT response
Source Entity	End terminal	Node
Source Entity address	Optionally, E.164 number (see clause B.1) identifying the terminal	E.164 number (see clause B.1) identifying the node
Destination Entity	End Node	End terminal
Destination entity Address	---	Optionally, E.164 number (see clause B.1) identifying the terminal
Service Function	---	---

Initiation in the reverse direction is not required.

#### B.6.1.2 Requirements for receiving RC APDUs

Refer to the requirements as specified in EN 301 813-1 [9].

NOTE: the following RC specific assumptions have been made:

- RC ASE (User side) is always provided in the user side of an S reference point or the user side of a coincident S and T reference point. A private network does not provide RC functionality that crosses the T reference point.
- RC ASE (Network side) is always provided in the public network supporting the T reference point or in the coincident S and T reference point.

## B.7 Procedures for interworking with private ISDNs

Refer to the requirements as specified in EN 301 813-1 [9].

NOTE: In the requirements for sending RC APDUs the RC ASE cannot exist within the user side of the T reference point, but only within an VT beyond the private network. The private network therefore relays information within the network facility extension APDU unchanged unless the private network itself is addressed, and does not itself send RC APDUs.

## Annex C (informative): Example configurations of RC service interactions with the PSTN network

The configuration shown in Figure C.1 provides the simplest network signalling procedures. A PSTN bearer is set-up from the remote network by dialling a service number. This service number is terminated by an interworking function in the Local exchange serving the terminal access to be remotely controlled.

This solution avoids any ISUP interactions, because the interworking function is located in the LE of the subscriber. However, interworking functions will be required in all LEs offering the RC service.

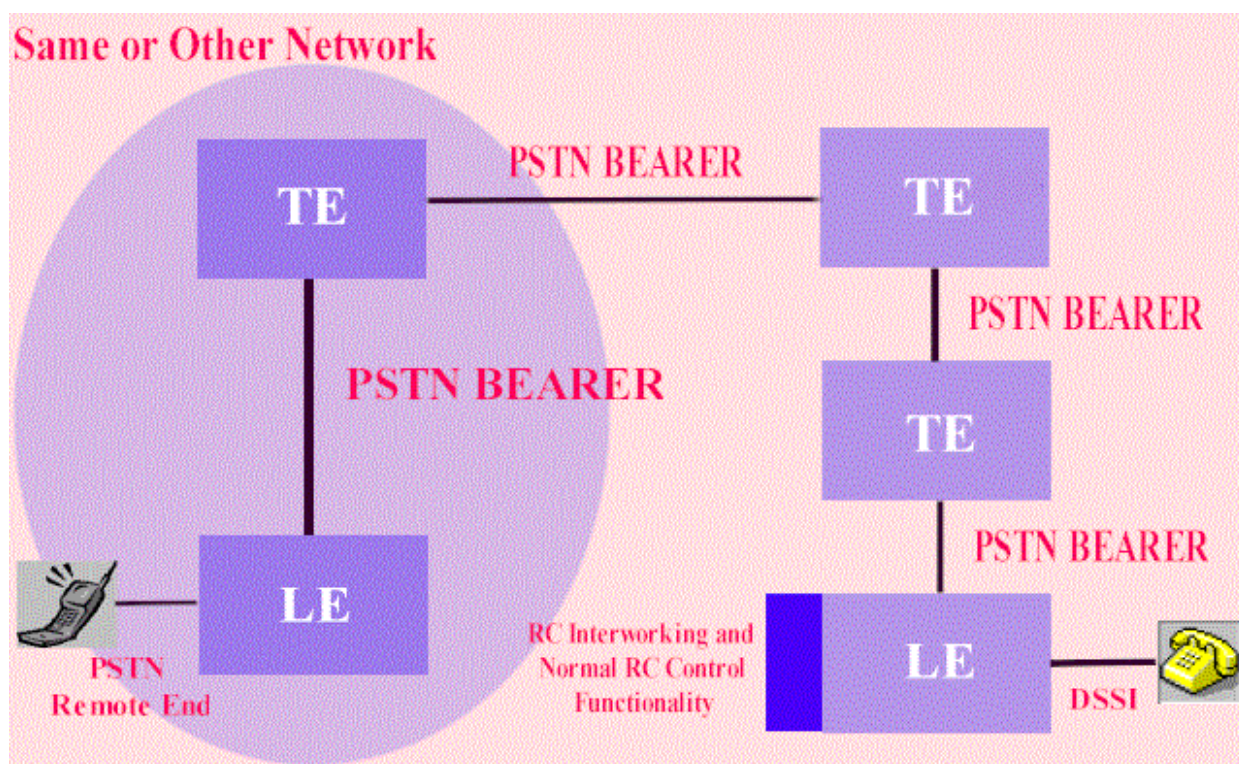


Figure C.1

The configuration shown in figure C.2 removes the need for an RC interworking function in each LE where the RC service is offered. Instead there is one centralised interworking function.

However, unlike the configuration of figure C.1, ISUP interworking is now required, to carry RC commands from the TE containing the RC interworking function to the LE serving the user.

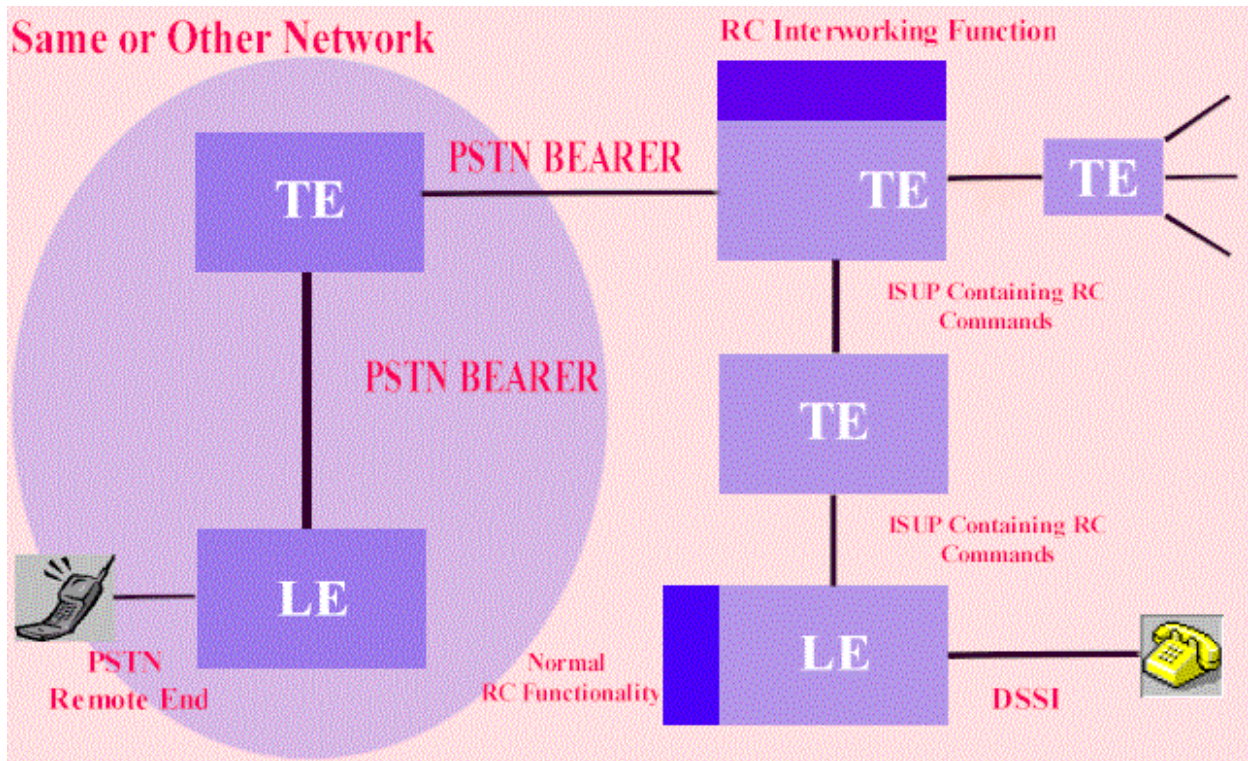


Figure C.2

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## History

<b>Document history</b>		
V1.1.1	August 2000	Public Enquiry PE 20001201: 2000-08-02 to 2000-12-01