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PNO-ISC/SER/001

Completion of Calls to Busy Subscriber (CCBS) Supplementary Service

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PNO-ISC SERVICE DESCRIPTION
NUMBER 001

Completion of Calls to Busy Subscriber (CCBS) Supplementary Service

Combined Service Description and Functional Description

NETWORK INTEROPERABILITY CONSULTATIVE COMMITTEE
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SEE PAGE 2 FOR THE NORMATIVE INFORMATION

0.2 Normative information

All enquiries about distribution reproduction, changes and clarifications should be addressed in the first instance to the Chairman of the NICC/PNO-IG/ISC at the address on the title page.

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0.4 History

Revision	Date of Issue	Updated By	Description
Issue 1	May 2000	N Sampson, Orange	Initial Issue

0.5 Issue control

PAGE	ISSUE	DATE
All	Issue 1	May 2000

0.6 References

[1] ETSI ETS 300 357 ETSI ISDN Supplementary Service CCBS Stage 1 description.
[2] ETSI ETS 300 356-18 ISDN CCBS Stage 3 description.
[3] ETSI GSM specification 03.93 ETSI GSM CCBS Stage 2 description.
[4] PNO-ISC INFO/004 section 5 RBWF.
[5] PNO-ISC/INFO007 UK Interconnect use of SCCP.

0.7 Glossary of terms

User A: The user responsible for the original call and for placing a CCBS request on a busy subscriber.

User B: The called party in the original call from user A.

Busy: A state indicating that neither a call nor a CCBS call will be offered to the user because the user is active in another call (this state is applicable to A or B depending on the call scenario).

CCBS Busy: A state indicating that a call will not be offered to the user because another CCBS request is being processed. Note, however that a CCBS recall may be offered to a user who is CCBS busy.

CCBS Request: An instance of an activation of the CCBS supplementary service.

CCBS Recall: An indication offered to user A after user B has become not busy.

CCBS Call: The call offered to user B when user A has accepted the CCBS recall.

CCBS Suspension: A state where the CCBS request cannot be completed once user B has become not busy because user A is busy.

CCBS Resumption: An action to return a suspended CCBS request to an active CCBS request.

Destination A: The terminal of user A.

Destination B: The terminal of user B.

Originating Network: The network providing service to user A.

Terminating Network: The network providing service to user B.

Service Duration Timer: Timer governing the length of time a CCBS request remains active in a network.

B Idle Guard Timer: Timer in the terminating network governing the period after user B becomes not busy before the terminating network informs the originating network.

Recall B Timer: Timer in the terminating network governing the maximum time the terminating network shall wait for a response to a CCBS recall.

Original Number: The number provided at the point of interconnect by the originating network in the original call which led to a busy destination. This may or may not be the number dialled by user A.

Actual Number/Destination: The number of the destination resulting from number translation or number porting.

Calling Party Address: The address of a network node originating a signal.

0.8 Scope

0.8.1 Document Structure

This document is in two sections. Section 1 is a service description of CCBS for operation in the UK and has its own revision history. This is equivalent to an ETSI stage 1 description. Section 2 is a functional description of the CCBS service for interconnect signalling and has it's own revision history. Section 2 is equivalent to an ETSI stage 2 description.

The service description and functional description are in the same document for convenience. The resultant protocol/interface specifications for CCBS can be found in the relevant sections of ISC documents covering IUP and UK ISUP. The stage 2 description of RBWF is contained in INFO/004 section 5.

0.8.2 Scope of Service Description

The service description, section 1, defines the operation of the UK Completion of Calls to Busy Subscriber (CCBS) supplementary service (incorporating IUP CCBS, ISDN CCBS and RBWF. Note that these applications are different implementation options for UK CCBS). UK interconnect specifications for CCBS shall comply with these service requirements.

The scope of the service description is limited to interconnect functionality only, therefore details relating to access requirements, eg man machine interface (MMI) and guard timer values, are not included.

The service description shall apply to the following types of network:

- UK PSTN
- UK ISDN
- UK GSM/DCS1800
- UK Indirect Access

Different applications operate in the above networks to support the UK CCBS service. Private networks and DECT are considered as access issues and are not covered in this document.

This description acts as a superset requirement for each application such that the service is consistent. This service description refers to more detailed documentation concerning each application, particularly [1]. Where there are any differences between this description and other CCBS application documents, this service description shall take precedence for UK Interconnect.

During the life time of the UK CCBS service, implementations will migrate between different signalling protocols. The function of the service shall comply with this service description irrespective of the interconnect protocol used. In this way the user shall perceive no difference in service.

Items in bold italics are different or additional specification to ETSI.

0.8.3 Scope of Functional Description

The functional description, section 2, specifies the functional requirements for protocol over public network operator interconnect routes to support the UK Completion of Calls to Busy Subscribers supplementary service. The content of this document complies with service requirements specified in PNO-ISC/SER 001 Section 1.

More than one method of providing the CCBS service is possible due to the requirements of protocol migration in the UK. This functional description shall be used to develop the protocol description for IUP CCBS, UK ISUP CCBS and the non-circuit related CCBS application protocol.

This specification is based on [2] ETSI ETS 300 356-18 (ISDN CCBS) and [3] ETSI GSM specification 03.93 (GSM CCBS). These specifications shall automatically apply to UK CCBS unless stated otherwise in this specification.

Section 2 is written in a different style to that of ETSI specifications. The objective of the description is to describe the information flows between UK networks for UK CCBS. UK specific services are taken into account, therefore where this description differs from ETSI, this description shall take precedence. Some information in ETSI specifications is repeated in this specification as an aid to understanding.

1. Service Description

1.1 General

The CCBS supplementary service enables user A, encountering a busy user B, to have the call completed without having to make a new call attempt when the user B becomes not busy.

1.2 Activation

When user A calls user B and user B is busy, user A may activate CCBS against user B. CCBS activation causes user B to be monitored for the not busy condition. Successful activation depends on user A, user B and the intervening networks supporting the CCBS service.

Having activated CCBS, user A can originate and receive calls in the normal way.

User A may have up to five active CCBS requests pending against different user Bs at the same time. User B may have a queue of up to five active CCBS requests against it from a number of different user As.

The life time of an active CCBS request is limited by the network.

1.3 Deactivation

User A may deactivate an active CCBS request at any time.

1.4 Invocation and Operation

When user B becomes not busy a period of time shall elapse to allow user B to make a new call. If user B is not busy after this period user A shall be informed with a CCBS recall. If user A accepts the CCBS recall user B shall be alerted and may answer the CCBS call.

1.5 Exceptional Procedures - Activation

The terminating network shall indicate to the originating network, either explicitly or implicitly, if CCBS is not possible.

If user B has become not busy when user A activates CCBS then the CCBS service is invoked and user A is offered a CCBS recall.

1.6 Exceptional Procedures - Deactivation

A CCBS request may be deactivated if user B does not become not busy within the life time of the CCBS request or if user A does not accept the CCBS recall.

1.7 Exceptional Procedures - Invocation and Operation

1.7.1 User B becomes busy during the period before user A is offered a CCBS recall

If user B becomes busy during the period before user A is offered the CCBS recall the network shall continue to monitor user B for the not busy condition and the CCBS request shall remain active.

1.7.2 User A is busy or CCBS busy when user B becomes not busy

If user A is busy or CCBS busy when the CCBS recall is received the CCBS request is generally suspended. When user A becomes neither busy nor CCBS busy, the CCBS request is resumed and user B is monitored for the not busy condition.

In the busy state user A may be given the opportunity to respond to the CCBS recall before the suspension is initiated. In this case:

- If user A ignores the CCBS recall the CCBS request is suspended
- If user A accepts the CCBS recall a CCBS call is generated
- If the service duration timer expires and user A ignores the CCBS recall the CCBS request is deactivated
- If the service duration timer expires and user A accepts the CCBS recall a CCBS call is generated.

In the busy state user A may not be given the opportunity to respond to the CCBS recall before suspension is initiated. In this case the CCBS request is suspended immediately.

1.7.3 User B is busy when the CCBS call is offered to user B

If user B is busy when the CCBS call is offered to user B, then as a network option, either:

a) the CCBS request shall be deactivated;

b) the CCBS request remains active and user B is monitored for the not busy condition.

1.8 Interaction with other Services

UK CCBS shall comply with the supplementary service interactions defined in ETSI specifications. ***The following sections deal with exceptions or UK specific services. Where different these interactions take precedence over ETSI specifications.***

1.8.1 Display Calling Number Services

The invocation of CLI presentation/display, CLI restriction/with held and CLI unavailable on the CCBS call shall operate in the same way as on the original call.

Note: This interaction is applicable for ***UK CND****, CLIP and CLIR services.*

1.8.2 Number Portability

1.8.2.1 Geographic Number Portability

The operation of CCBS on a ported number depends on the support of CCBS in the originating network and the terminating (recipient) network. If any one of the networks does not support CCBS, CCBS shall not be possible.

1.8.2.2 Non-Geographic number Portability

Interaction to be defined.

1.8.2.3 Mobile Number Portability

Interaction to be defined.

1.8.3 Translated Number Services

The operation of CCBS on a translated number service depends of the support of CCBS in the originating network, the translating network, the number translation application and the terminating network. CCBS may be activated on a translated number service according to the applicability of CCBS to the translated number service, eg CCBS may not be possible at certain times of day for a time of day routing application. If the terminating network indicates that CCBS is possible, but CCBS is not appropriate to the translation service the translating application may prevent the CCBS possible indication from entering the originating network. Where CCBS is allowed by the translating network all phases of CCBS operation must pass through the translating network.

1.8.4 Diversion Type Services

A CCBS recall shall not be diverted.

Note: Answering Services are considered as diversion services.

1.8.5 Multiple Subscriber Number

No impact.

1.8.6 Telemetry

No impact.

1.8.7 Malicious Call Identification Services

The malicious call identification service shall be able to operate on calls established by CCBS.

1.8.8 Operator and Administration Services

CCBS shall not be activated on calls to operators or to any other administration provided services.

1.8.9 Emergency Services

CCBS shall not operate on calls to emergency services.

1.8.10 UK Barring Services

CCBS shall not be activated on subscribers who have UK specific barring services activated.

2. Functional Description

2.1 General

The CCBS supplementary service enables user A, encountering a busy user B, to have a call completed without having to make a new call attempt when destination B becomes not busy.

When user A requests the CCBS supplementary service, the terminating network will monitor for destination B becoming not busy. When destination B becomes not busy the terminating network shall wait a short time to allow user B to make an outgoing call. If user B does not make an outgoing call within this time, then the terminating network shall inform the originating network that destination B is not busy. The originating network shall then arrange for a call to be established between destination A and destination B (subject to both destinations remaining not busy).

The terminating network shall store a queue of CCBS requests against destination B. The queue length may be zero as a terminating network option.

2.2 Activation

When user A calls destination B and destination B is busy, the terminating network shall inform the originating network indicating whether the opportunity exists to activate CCBS on destination B, Figure 1. Where the indication is positive the originating network shall retain the call information for a period of time. During this time user A can activate CCBS against destination B.

If user A activates CCBS and the terminating network accepts the activation attempt, then the terminating network shall start a service duration timer, monitor destination B for the not busy condition and acknowledge the CCBS request, Figure 2. When the originating network receives the acknowledgement it shall start a service duration timer. The terminating network shall store a queue of CCBS requests against destination B.

Having activated the CCBS supplementary service, user A can originate and receive calls as normal.

2.3 Deactivation

User A may at any time deactivate an active CCBS request. The originating network informs the destination network and stored information relating to the CCBS is deleted from queues in both networks, Figure 3.

2.4 Invocation and Operation

The terminating network shall start processing (invocation) the first active CCBS request in destination B's queue when:

a) destination B becomes not busy or,

b) a CCBS request is received and destination B is not busy or,

c) a CCBS request is resumed and destination B is not busy.

The terminating network shall start the destination B idle guard timer, allowing user B time to make an outgoing call. If the destination B idle guard timer expires and user B is not busy, the terminating network shall inform the originating network of the not busy condition with a CCBS Remote User Free indication, Figure 4.

If destination A is neither busy nor CCBS busy the originating network shall alert user A. If user A accepts the CCBS recall the originating network shall initiate the CCBS call to destination B in the terminating network, Figure 4. When the terminating network indicates to the originating network that user B is being alerted then both networks shall consider the CCBS request complete.

2.5 Exceptional Procedures - Activation

If the originating network does not receive a CCBS indicator with the user B busy indication, activation of CCBS shall not be permitted.

If destination B is no longer busy when the CCBS request is received by the terminating network, the terminating network shall follow the procedures of section 3.4 b).

If the terminating network is unable to accept the CCBS request temporarily, eg destination B's CCBS queue is full or a conflicting service is active, the terminating network shall reject the request indicating a temporary problem (short term denial), Figure 5.

If the terminating network is unable to accept the CCBS request at all the terminating network shall reject the request indicating a permanent problem (long term denial), eg if the CCBS application is not supported, Figure 6.

If destination B's queue length is set to zero the terminating network shall indicate that CCBS is not possible when informing the originating network that destination B is busy, see figure 7.

If the terminating network does not support the CCBS ASE (application service element) the activation attempt will fail.

2.6 Exceptional Procedures - Deactivation

2.6.1 Originating network

The originating network shall deactivate an active CCBS request if:

a) the CCBS service duration timer expires, or

b) user A is neither busy nor CCBS busy and ignores the CCBS recall.

c) user A rejects the CCBS recall

When deactivation is initiated by the originating network the originating network shall inform the terminating network about the deactivation and information relating to the CCBS request shall be deleted from queues in both networks, Figure 3.

2.6.2 Terminating network

The terminating network shall deactivate an active CCBS request if:

a) the terminating side service duration timer expires, or

b) if the recall B timer expires, or

c) destination B invokes a service that conflicts with the existing CCBS request and deactivation becomes necessary.

When deactivation is initiated by the terminating network information relating to the CCBS request shall be deleted locally. The originating network is informed, see figure 8.

2.7 Exceptional Procedures - Invocation and Operation

2.7.1 User B becomes busy during the B idle guard time

If when the B idle guard timer expires, destination B is busy, the terminating network shall return to monitoring for the not busy condition.

2.7.2 User A is busy when destination B becomes not busy

In the case where the CCBS request is suspended, the originating network shall inform the terminating network of the suspension to allow the terminating network to process other active CCBS requests, see figure 9. When destination A becomes neither busy nor CCBS busy, the originating network shall inform the terminating network

that the CCBS request is resumed. The networks shall then follow the procedures of Section 3.4. In the case where the CCBS call is generated, see figure 4. In the case where the CCBS request is deactivated, see figure 3.

2.7.3 User B is busy when the CCBS Call is established

If when the originating network establishes the CCBS call, destination B is busy, then, as a network option, either;

a) the CCBS request shall be deactivated in both networks, or

b) both networks retain the active CCBS and the terminating network returns to monitoring destination B, Figure 10. If the terminating network does not support the retention option then both networks deactivate the CCBS request.

2.7.4 User B receives unexpected CCBS call

If user B receives a CCBS call, from user A, but user B has no CCBS requests registered from user A then the terminating network shall process the call ignoring the CCBS indication.

2.8 Interaction with other Supplementary Services

UK CCBS shall comply with the supplementary service interactions defined in ETSI specifications. ***The following sections deal with exceptions or UK specific services. Where different these interactions take precedence over ETSI specifications.***

2.8.1 Display Calling Number Services

Refer to PNO-ISC/SER 001 Section 1.

2.8.2 Number Portability

2.8.2.1 Geographic Number Portability

In the scenario were the originating network and the terminating (recipient) network support UK CCBS, CCBS shall operate in the following way.

When a call is made to a number which has been ported and a busy indication is received by the donor network indicating that CCBS is possible, the donor exchange shall pass this indication back to the originating network, see Figure 11. If user A activates CCBS, the originating network shall send a CCBS request in the usual way using the original number.

The original number causes the CCBS request to be routed to the donor network. When a donor network receives a CCBS request for a number which has been ported, it shall relay the CCBS request to the recipient network by adding the number portability prefix code to the SCCP called party address (see [5] § 4.2). It is up to the donor network whether the CCBS Request is terminated in the donor network and a diloague re-established to the recipient network, or the CCBS request is simply relayed to recipient network (note : in the former case all subsequent CCBS ASE messages will route via the donor network; in the latter, subsequent CCBS ASE message will route directly between recipient and originating network). The donor network shall not modify the CCBS ASE Called Party Number parameter.

When the actual destination has become not busy and the CCBS recall is accepted by user A, the CCBS call shall be routed via the donor network in the same way as the original call.

2.8.2.2 Non-Geographic number Portability

Refer to PNO-ISC/SER 001 Section 1.

2.8.2.3 Mobile Number Portability

Refer to PNO-ISC/SER 001 Section 1.

2.8.3 Translated Number Services

In the scenario were the originating network, the translating network, the translation application and the terminating network support UK CCBS, CCBS shall operate in the following way.

When a call is made to a translated number service and a busy, CCBS possible indication is returned by the terminating network, the number translation application in the translating network determines according to it's service logic whether to pass the CCBS possible indication on to the originating network. In the case where CCBS possible is not passed back, no further action is taken, see Figure 12.

In the case where CCBS is allowed and user A activates CCBS, the originating network shall send a CCBS request in the usual way using the original number, see Figure 13. The original number causes the CCBS request to be routed to the translating network. When the translating network receives a CCBS request it shall perform the same translation on the SCCP called party address and the CCBS ASE called party number parameter as it did on the original call. The modified CCBS request shall then be routed (at a lower level) to the destination network using the translated number. The translating network shall retain the calling party address provided with the original CCBS request.

The terminating network shall return an acknowledgement to the translating network using the SCCP calling party address in the modified CCBS request. The translating network shall return the acknowledgement to the originating network using the SCCP calling party address provided with the original CCBS request.

When the actual destination has become free, the CCBS Remote User Free shall be routed to the originating network via the translating network. If the CCBS recall is accepted the originating network shall send the CCBS call to the translating network using the original number. The translating network shall then re-route the CCBS call to the terminating network.

2.8.4 Diversion Type Services

Refer to PNO-ISC/SER 001 Section 1.

2.8.5 Multiple Subscriber Number

Refer to PNO-ISC/SER 001 Section 1.

2.8.6 Telemetry

Refer to PNO-ISC/SER 001 Section 1.

2.8.7 Malicious Call Identification Services

No interaction, ie once a CCBS call has been connected it is considered a normal call and MCI may be applied.

2.8.8 Operator and Administration Services

An operator or administration service system shall not signal CCBS possible or accept a CCBS activation.

2.8.9 Emergency Services

An emergency services system shall not signal CCBS possible or accept a CCBS activation.

2.8.10 UK Barring Services

Generally where destination B is barred from receiving incoming calls a call to destination B is not considered busy. Therefore CCBS cannot be activated.

In scenarios where destination B is barred from receiving incoming calls but busy is signalled by the terminating network, the CCBS possible indication shall not be signalled.

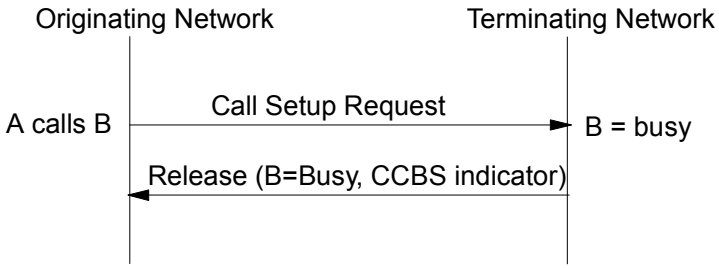

Figure 1. A encounters B busy

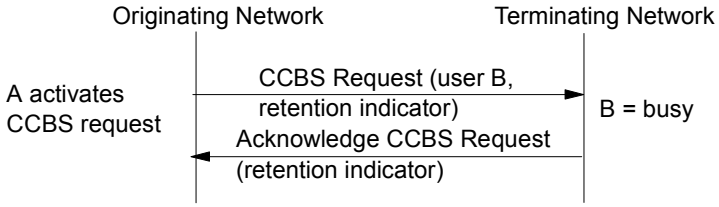

Figure 2. A activates CCBS

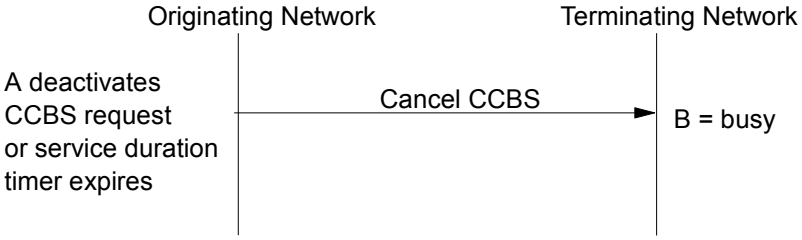

Figure 3. CCBS Deactivation

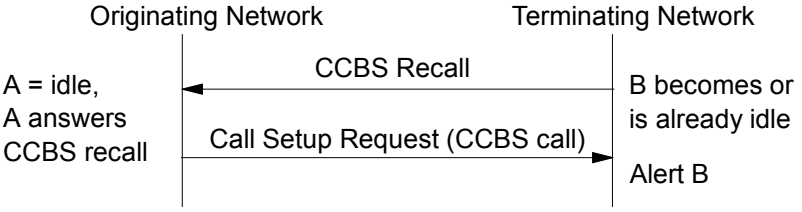

Figure 4. CCBS Invocation

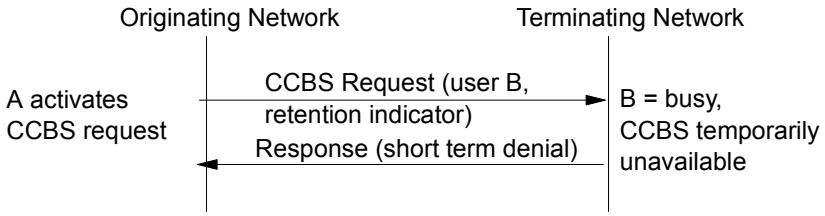

Figure 5. Short term denial of activation

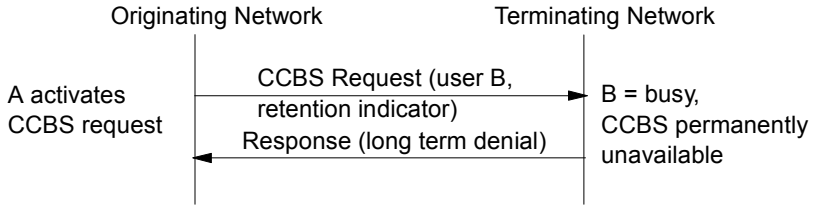

Figure 6. Long term denial of activation

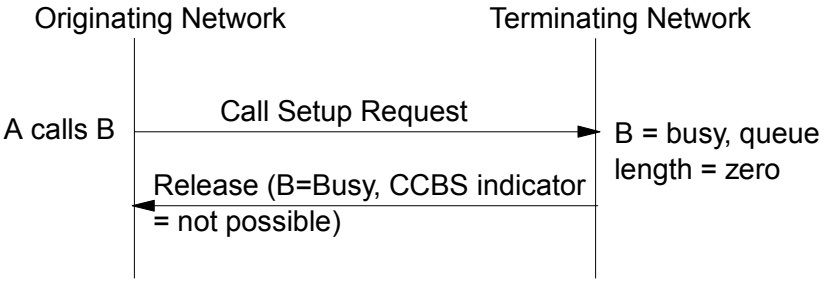

Figure 7. Not possible

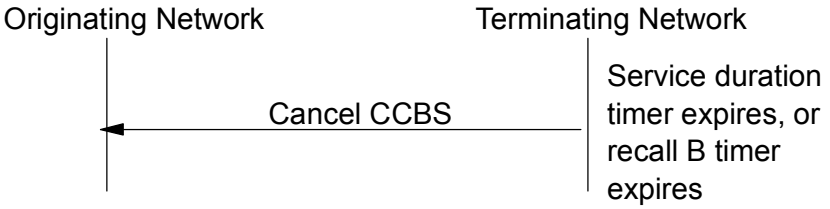

Figure 8. Terminating Network Deactivation

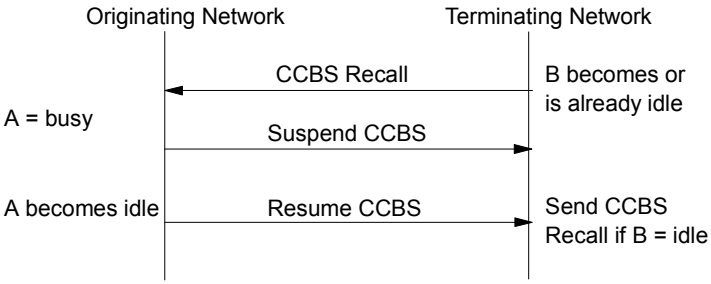

Figure 9. CCBS Suspend/Resume

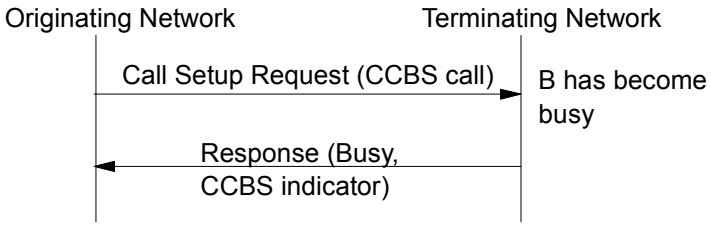

Figure 10. Network retention option

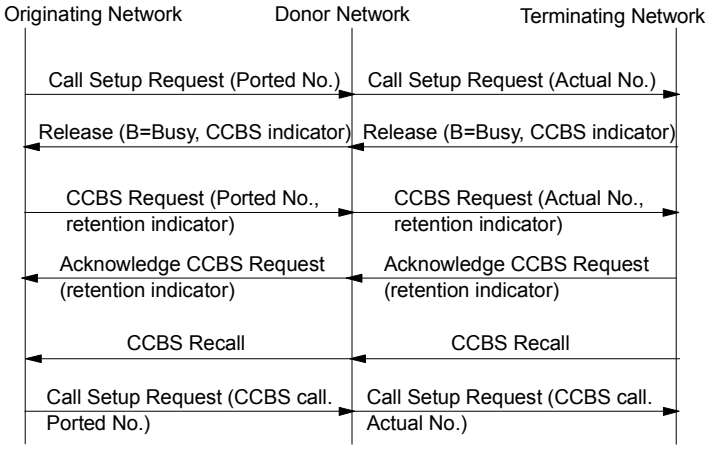

Figure 11. Interaction of CCBS with a ported number.
Note : the Acknowledge CCBS Request and CCBS Recall may or may not route through the donor network.

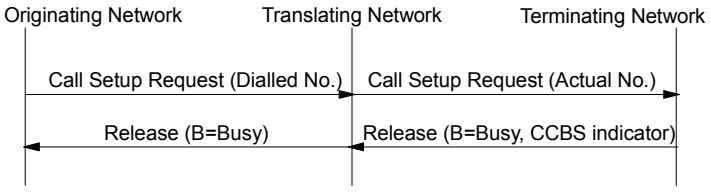

Figure 12. CCBS possible but not appropriate to translated number service.

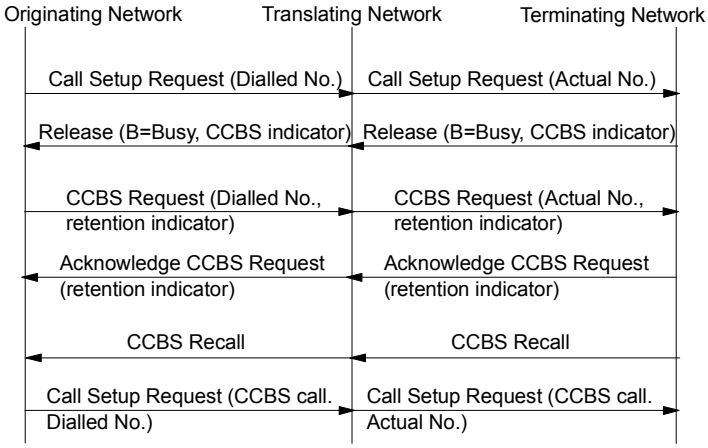

Figure 13. Interaction of CCBS with a translated number service.

End of PNO-ISC/SER/001