



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Q.733.3

(06/97)

SERIES Q: SWITCHING AND SIGNALLING

Specifications of Signalling System No. 7 – ISDN
supplementary services

**Stage 3 description for call completion
supplementary services using Signalling
System No. 7: Completion of calls to busy
subscriber (CCBS)**

ITU-T Recommendation Q.733.3

(Previously CCITT Recommendation)

ITU-T Q-SERIES RECOMMENDATIONS
SWITCHING AND SIGNALLING

SIGNALLING IN THE INTERNATIONAL MANUAL SERVICE	Q.1–Q.3
INTERNATIONAL AUTOMATIC AND SEMI-AUTOMATIC WORKING	Q.4–Q.59
FUNCTIONS AND INFORMATION FLOWS FOR SERVICES IN THE ISDN	Q.60–Q.99
CLAUSES APPLICABLE TO ITU-T STANDARD SYSTEMS	Q.100–Q.119
SPECIFICATIONS OF SIGNALLING SYSTEMS No. 4 AND No. 5	Q.120–Q.249
SPECIFICATIONS OF SIGNALLING SYSTEM No. 6	Q.250–Q.309
SPECIFICATIONS OF SIGNALLING SYSTEM R1	Q.310–Q.399
SPECIFICATIONS OF SIGNALLING SYSTEM R2	Q.400–Q.499
DIGITAL EXCHANGES	Q.500–Q.599
INTERWORKING OF SIGNALLING SYSTEMS	Q.600–Q.699
SPECIFICATIONS OF SIGNALLING SYSTEM No. 7	Q.700–Q.849
General	Q.700
Message transfer part (MTP)	Q.701–Q.709
Signalling connection control part (SCCP)	Q.711–Q.719
Telephone user part (TUP)	Q.720–Q.729
ISDN supplementary services	Q.730–Q.739
Data user part	Q.740–Q.749
Signalling System No. 7 management	Q.750–Q.759
ISDN user part	Q.760–Q.769
Transaction capabilities application part	Q.770–Q.779
Test specification	Q.780–Q.799
Q3 interface	Q.800–Q.849
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1	Q.850–Q.999
General	Q.850–Q.919
Data link layer	Q.920–Q.929
Network layer	Q.930–Q.939
User-network management	Q.940–Q.949
Stage 3 description for supplementary services using DSS 1	Q.950–Q.999
PUBLIC LAND MOBILE NETWORK	Q.1000–Q.1099
INTERWORKING WITH SATELLITE MOBILE SYSTEMS	Q.1100–Q.1199
INTELLIGENT NETWORK	Q.1200–Q.1999
BROADBAND ISDN	Q.2000–Q.2999

For further details, please refer to ITU-T List of Recommendations.

ITU-T RECOMMENDATION Q.733.3

STAGE 3 DESCRIPTION FOR CALL COMPLETION SUPPLEMENTARY SERVICES USING SIGNALLING SYSTEM No. 7: COMPLETION OF CALLS TO BUSY SUBSCRIBER (CCBS)

Summary

Completion of Calls to Busy Subscribers (CCBS) enables a calling user A, upon encountering a busy destination B, to be notified when the busy destination B becomes free and to have the service provider reinitiate the call to the specified destination B if user A desires.

Source

ITU-T Recommendation Q.733.3 was prepared by ITU-T Study Group 11 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 5th of June 1997.

FOREWORD

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

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

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

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

NOTE

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

INTELLECTUAL PROPERTY RIGHTS

The ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. The ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, the ITU had/had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

© ITU 1998

All rights reserved. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the ITU.

CONTENTS

		Page
3	Completion of Calls to Busy Subscriber (CCBS)	1
3.1	Introduction	1
3.1.1	Scope	1
3.1.2	References	1
3.1.3	Terms and definitions.....	2
3.1.4	Abbreviations	3
3.2	Description	4
3.2.1	General description	4
3.2.2	Specific terminology	4
3.2.3	Qualification on the applicability to telecommunication services	4
3.3	Operational requirements	4
3.3.1	Provision/withdrawal	4
3.3.2	Requirements on the originating network.....	5
3.3.3	Requirements on the terminating network.....	5
3.3.4	Requirements on the transit network.....	5
3.4	Coding requirements	5
3.4.1	Introduction.....	5
3.4.2	Coding requirements	5
3.4.3	ASN.1 module.....	8
3.5	Signalling requirements.....	9
3.5.1	Activation/deactivation/registration.....	9
3.5.2	Erasure.....	12
3.5.3	Invocation and operation.....	13
3.5.4	Use of TC and SCCP	18
3.5.5	Dialogue	19
3.6	Interaction with other supplementary services.....	21
3.6.1	Call Waiting (CW)	21
3.6.2	Call transfer services.....	21
3.6.3	Connected Line Identification Presentation (COLP)	21
3.6.4	Connected Line Identification Restriction (COLR).....	21
3.6.5	Calling Line Identification Presentation (CLIP).....	21
3.6.6	Calling Line Identification Restriction (CLIR).....	21
3.6.7	Closed User Group (CUG).....	21
3.6.8	Conference Calling (CONF)	21
3.6.9	Direct-Dialling-In (DDI).....	22
3.6.10	Call diversion services	22
3.6.11	Line Hunting	23

	Page
3.6.12 Three-Party Service (3PTY).....	23
3.6.13 User-to-User Signalling (UUS).....	23
3.6.14 Multiple Subscriber Number (MSN)	23
3.6.15 Call Hold (HOLD)	23
3.6.16 Advice of Charge (AOC)	23
3.6.17 Sub-addressing (SUB).....	23
3.6.18 Terminal Portability (TP).....	24
3.6.19 Completion of Calls to Busy Subscriber (CCBS).....	24
3.6.20 Malicious Call Identification (MCID).....	24
3.6.21 Reverse Charging (REV)	24
3.6.22 Multi-level precedence and preemption (MLPP).....	24
3.6.23 Private Numbering Plan (PNP)	24
3.6.24 International Telecommunication Charge Card (ITCC)	24
3.6.25 Global Virtual Network Service (GVNS).....	24
3.7 Interaction with other networks.....	25
3.7.1 Interworking with an ISUP network without an ISUP that fully supports the CCBS capability.....	25
3.7.2 Interworking with a network without CCBS-ASE capability.....	26
3.7.3 Interworking with a network without SCCP/TC capability.....	26
3.7.4 Interworking with an intermediate network without 1993 version of SCCP capability	26
3.7.5 Interworking with PSTN with analogue subscribers using the CCBS service	26
3.7.6 Interworking with PSTN user	27
3.7.7 Procedures for interworking with private ISDNs.....	27
3.8 Signalling flows.....	29
3.8.1 Normal call – B busy indication sent to the calling user.....	29
3.8.2 Normal call – Successful CCBS request followed by a successful CCBS call set-up	30
3.8.3 Unsuccessful CCBS request, terminal activated.....	31
3.8.4 Unsuccessful CCBS request, network destination	31
3.8.5 Successful CCBS request followed by an unsuccessful CCBS call set-up...	32
3.8.6 B idle at CCBS request from A.....	33
3.8.7 A busy when B becomes free.....	33
3.9 Parameter values.....	34
3.9.1 Timers in the originating local exchange	34
3.9.2 Timers in the destination local exchange	34
3.9.3 Interworking timers.....	34
3.10 Dynamic description.....	34

Recommendation Q.733.3

STAGE 3 DESCRIPTION FOR CALL COMPLETION SUPPLEMENTARY SERVICES USING SIGNALLING SYSTEM No. 7: COMPLETION OF CALLS TO BUSY SUBSCRIBER (CCBS)

(Geneva, 1997)

3 Completion of Calls to Busy Subscriber (CCBS)

3.1 Introduction

3.1.1 Scope

Completion of Calls to Busy Subscribers (CCBS) enables a calling user A, upon encountering a busy destination B, to be notified when the busy destination B becomes free and to have the service provider reinitiate the call to the specified destination B if user A desires.

3.1.2 References

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

- [1] ITU-T Recommendation E.164 (1997), *The international public telecommunication numbering plan*.
- [2] ITU-T Recommendation I.112 (1993), *Vocabulary of terms for ISDNs*.
- [3] CCITT Recommendation I.130 (1988), *Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN*.
- [4] ITU-T Recommendation I.210 (1993), *Principles of telecommunication services supported by an ISDN and the means to describe them*.
- [5] ITU-T Recommendation I.221 (1993), *Common specific characteristics of services*.
- [6] CCITT Recommendation X.208 (1988), *Specification of Abstract Syntax Notation One (ASN.1)*.

ITU-T Recommendation X.680 (1994)/Amd.1 (1995), *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation – Amendment 1: Rules of extensibility*.
- [7] ITU-T Recommendations Q.711-Q.714 (1996), *Signalling connection control part (SCCP)*.
- [8] ITU-T Recommendations Q.771-Q.775 (1997), *Transaction capabilities application part*.
- [9] CCITT Recommendation Q.767 (1991), *Application of the ISDN user part of CCITT Signalling System No. 7 for international ISDN interconnections*.
- [10] ITU-T Recommendations Q.761-Q.764 (1993), *ISDN user part*.
- [11] ITU-T Recommendation Q.730 (1993), *ISDN supplementary services*.

- [12] ITU-T Recommendation I.253.3 (1996), *Call completion supplementary services: Completion of calls to busy subscribers.*
- [13] CCITT Recommendation Q.83.3 (1988), *Stage 2 description for call completion supplementary services: Completion of calls to busy subscriber.*
- [14] ITU-T Recommendation Q.953.3 (1997), *Stage 3 description for call completion supplementary services using DSS1: Completion of Calls to Busy Subscribers (CCBS).*
- [15] CCITT Recommendation I.230 (1988), *Definition of bearer service categories.*
- [16] CCITT Recommendation I.240 (1988), *Definition of teleservices.*
- [17] CCITT Recommendation F.721 (1992), *Videotelephony teleservice for ISDN.*
- [18] ITU-T Recommendation Q.715 (1996), *Signalling connection control part user guide.*

3.1.3 Terms and definitions

The following terms [i.e. a) through l)] are defined in Recommendation I.253.3. Abbreviated timer names are defined in the brackets.

- a) User A.
- b) Destination B.
- c) CCBS recall.
- d) CCBS call.
- e) Notification B idle.
- f) Busy.
- g) Free.
- h) CCBS busy.
- i) Retention timer (CCBS-T1).
- j) CCBS service duration timer (CCBS-T2).
- k) CCBS recall timer (CCBS-T3).
- l) Destination B idle guard timer (CCBS-T4).

Other terms:

m) retain option: The retain option, if supported in both the originating and destination network, will maintain the CCBS request in the destination B queue, if a CCBS call has failed due to destination busy condition.

n) suspended CCBS request: A request which cannot be served even if destination B is not busy, because user A is busy, or CCBS busy.

o) long-term denial: The network cannot accept user A's request to activate the CCBS supplementary service and a later attempt to activate the CCBS supplementary service for the same destination B will also be rejected.

p) short-term denial: The network temporarily cannot accept user A's request to activate the CCBS supplementary service. A later attempt to activate the CCBS supplementary service for the same destination B may succeed.

q) CCBS call indicator: Information sent in the forward direction, used in a CCBS call set-up to distinguish this call from an ordinary call at the destination local exchange.

- r) CCBS indicator:** Indicator used in the diagnostic field, sent in the cause parameter in the backward release message, at the initial call failure, to indicate the possibility to invoke a possible succeeding CCBS service request.
- s) CCBS request:** An instance of an activation of the CCBS supplementary service which is held in a queue pending the correct conditions for the CCBS supplementary service to be completed.
- t) compatible terminal:** A terminal which can support the bearer service or teleservice requested for the original call to destination B and which can accept calls to the ISDN number and subaddress identifying the called user in the original call to destination B.

3.1.4 Abbreviations

This Recommendation uses the following abbreviations.

ACM	Address Complete Message
ANM	Answer Message
ASE	Application Service Element
ASN.1	Abstract Syntax Notation one
ATP	Access Transport Parameter
CCBS	Completion of Calls to Busy Subscriber (CCBS) supplementary service
CCSS	Call Completion Service Set-up
CFB	Call Forwarding Busy
CFNR	Call Forwarding No Reply
CFU	Call Forwarding Unconditional
CLI	Calling Line Identification
DLE	Destination Local Exchange
DSS 1	Digital Subscriber Signalling System No. 1
GT	Global Title
HLC	High Layer Compatibility
IAM	Initial Address Message
IPI	ISDN user part Preference Indicator
ISDN	Integrated Services Digital Network
ISPBX	Integrated Services Private Branch Exchange
ISUP	Integrated Services Digital Network User Part
LLC	Low Layer Compatibility
OLE	Originating Local Exchange
OU	Originating User
REL	Release Message
RLC	Release Complete Message
SCCP	Signalling Connection Control Part
SDL	Specification and Description Language

SPC	Signalling Point Code
SSN	SubSystem Number
SUB	Sub-address
TC	Transaction Capabilities
TE	Transit Exchange
TU	Terminating User
USI	User Service Information

3.2 Description

3.2.1 General description

After receiving a busy indication (e.g. tones or messages), user A may request the CCBS supplementary service. The network will then monitor the wanted destination B for becoming free. When the wanted destination B becomes free, then the network will wait a short time in order to allow the resources to be re-used for originating a call. If the resources are not re-used by destination B within this time, then the network will automatically recall user A.

When user A accepts the CCBS recall, then the network will automatically generate a CCBS call to destination B.

3.2.2 Specific terminology

See 3.1.3, terms and definitions.

3.2.3 Qualification on the applicability to telecommunication services

The CCBS supplementary service shall be applicable to all circuit mode bearer services defined in Recommendation I.230 [15], and all teleservices defined in Recommendation I.240 [16] with the following exceptions:

- a) call 2 of the videotelephony service (see Recommendation F.721 [17]);
- b) all other circuit-switched telecommunications services requiring the use of more than one B-channel.

3.3 Operational requirements

3.3.1 Provision/withdrawal

The CCBS supplementary service may be provided to user A after prior arrangement with the service provider or may be generally available. The CCBS supplementary service shall be withdrawn by the service provider upon request of the subscriber or for service provider reasons.

As an option of the monitoring network, CCBS activation may be allowed against either network determined user busy or busy. Free is then defined as "neither network determined user busy nor channels busy" or "neither busy nor channels busy", respectively.

As a network option, the presence of compatible terminals at the destination may be verified.

As a network option, CCBS busy is defined as either "network determined user busy or CCBS recall pending for user A" or "busy or CCBS recall pending for user A".

3.3.2 Requirements on the originating network

In order to operate the CCBS supplementary service, the originating local exchange shall have TC capabilities [8]. The originating network shall have SCCP capability [7] for routing the TC operations.

3.3.3 Requirements on the terminating network

In order to operate the CCBS supplementary service, the destination local exchange shall have TC capabilities. The terminating network shall have SCCP capability for routing the TC operations.

3.3.4 Requirements on the transit network

The transit network shall have SCCP capability for routing the TC operations.

3.4 Coding requirements

3.4.1 Introduction

This subclause describes the coding of information needed to support the CCBS supplementary service. The coding is specified for the following two protocols:

- a) ISUP [10].
- b) ASE for CCBS.

3.4.2 Coding requirements

3.4.2.1 ISUP protocol

3.4.2.1.1 Signalling aspects impacting the routing

For the CCBS call the IPI in the forward call indicators parameter in the IAM message shall be set to "ISDN User Part required all the way".

For some interaction cases, the service is possible without ISUP-X signalling capability. See 3.7.

3.4.2.1.2 CCBS indicator in cause indicators parameter in REL message

An indication about the possibility of invocation of the completion of calls to busy subscriber (CCBS) supplementary service in the destination local exchange is given in the diagnostic field of the cause indicators parameter in the REL message along with cause #17 or #34. As the first call is a basic call and as other signalling systems than "ISUP supporting CCBS" may be used, the diagnostic field is not always conveyed.

NOTE – Cause value #34 applies to interworking with private networks.

The CCBS indicator in the diagnostic field is coded as follows:

Bits 8-1	00000000	Spare
	00000001	CCBS possible
	00000010	CCBS not possible
	00000011	
	to	Spare
	01111111	
	10000000	
	to	Spare for national use
	11111110	
	11111111	Reserved for extension

3.4.2.1.3 CCSS call indicator

The CCSS call indicator is carried in the CCSS parameter.

CCSS parameter

The format of the CCSS parameter is shown in Figure 3-1.

8	7	6	5	4	3	2	1
H	G	F	E	D	C	B	A

Figure 3-1/Q.733.3 – CCSS parameter

The following codes are used in the CCSS parameter field:

bit	A:	CCSS call indicator
	0	no indication
	1	CCSS call

bits H-B: Spare

The code of the CCSS parameter is 0100 1011.

3.4.2.2 ASE for CCBS

3.4.2.2.1 General

3.4.2.2.1.1 Subsystem number

The subSystem Number (SSN) value 0000 1011 has been allocated to the ISDN supplementary services ASEs.

3.4.2.2.1.2 List of operations

From originating local exchange to destination local exchange:

- | | | |
|----|-----------------------|---------|
| a) | CCBS REQUEST (invoke) | class 1 |
| b) | CCBS SUSPEND | class 4 |
| c) | CCBS RESUME | class 4 |
| d) | CCBS CANCEL | class 4 |

From destination local exchange to originating local exchange:

- a) CCBS REQUEST (return result, error) class 1
- b) REMOTE USER FREE class 4
- c) CCBS CANCEL class 4

3.4.2.2.1.3 List of parameter types

Addressing and identification parameters:

- a) Calling party number;
- b) Called party number.

NOTE 1 – If presentation of the calling party number is allowed, the country code shall be included in the calling party number in the originating local exchange, in case of an international outgoing call.

Service management parameters:

- a) Retain supported.
- b) Cancel cause.

Subscriber management parameters:

- a) User service information.
- b) User service information prime (see Note 2).
- c) Access transport.

NOTE 2 – The user service information prime parameter is used in the case of signalling procedures for connection type with fallback capability.

3.4.2.2.1.4 List of application errors

- a) Short-term denial.
- b) Long-term denial.

3.4.2.3 Abstract syntax, general

Subclause 3.4.3 specifies the abstract syntax for the CCBS-ASE protocol using the Abstract Syntax Notation One (ASN.1) [6].

The set of values each of which is a value of the ASN.1 type TCAPMessages.MessageType are defined in Recommendations Q.771-Q.775 with the ANY DEFINED BY definitions resolved by the operations and errors definitions included in 3.4.3 form the abstract syntax for the CCBS ASE protocol.

The set of encoding rules which are applicable to this abstract syntax are defined in Recommendations Q.771-Q.775. The mapping of the OPERATION and ERROR MACROs to TC components is also described in Recommendations Q.771-Q.775.

The ASN.1 data type which follows the keywords "PARAMETER" or "RESULT" (for OPERATION and ERROR) is always optional from a syntactic point of view. However, except specific mention, it has to be considered as mandatory from a semantic point of view.

When a mandatory element is missing in any component or inner data structure, a reject component is returned (if the dialogue still exists). The problem cause to be used is "Mistyped parameter".