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**COMPLETION OF CALLS TO BUSY SUBSCRIBER
(CCBS – RING BACK)**

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0. Document history

Every update of this document results in a complete new version with new version number and release date.

Version	Date	Main or important changes since previous version
1.0	05 JAN 2000	<ul style="list-style-type: none">• First version
1.1	13 FEB 2001	<ul style="list-style-type: none">• 'R 5' procedure• Announcement after busy tone
1.2	26 JUL 2001	<ul style="list-style-type: none">• § 1.2 : "If user A is busy ..."• § 1.3. : timers• § 1.4.1.1., 1.4.1.2.• § 1.5. and end of § 1.6.1.
1.3	10 FEB 2003	<ul style="list-style-type: none">• Document has been updated due to new software release versions for EWSD-V16B and S12-P8 switching systems.• Paragraph 4.2 : change of retention option value• Paragraph 4.3 : change of timer values

1. Scope

This document specifies the stage three (the protocol procedures and switching functions implemented to support a telecommunications service) of the Completion of Calls to Busy Subscriber (CCBS) supplementary service for the Integrated Services Digital Network (ISDN) as provided by Belgacom.

This document is applicable to the Siemens 'EWSD V16B' - and 'Alcatel S12 Pack 8' - switching systems.

The service is applicable for both ISDN and ANALOG line interfaces.

Some parts of the technical implementation may be different between the two switching systems. In this case, specific switch-dependent comments are added or tables are used explaining the technical implementation for both systems.

2. References

ETS 300 102-1	ETSI-specification: Integrated Services Digital Network (ISDN); User-network interface layer 3 Specifications for basic call control
EN 300 403-1	ETSI-specification: Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 1: Protocol specification
ITU-T I.411	ITU-recommendation: ISDN user-network interfaces - Reference configurations
ETS 300 357 (October 1995)	ETSI-specification: Integrated Services Digital Network (ISDN); Completion of Calls to Busy Subscriber (CCBS) supplementary Service; Service description
ETS 300 358 (September 1995)	ETSI-specification: Integrated Services Digital Network (ISDN); Completion of Calls to Busy Subscriber (CCBS) supplementary Service; Functional capabilities and information flows
ETS 300 359-1 (November 1995)	ETSI-specification: Integrated Services Digital Network (ISDN); Completion of Calls to Busy Subscriber (CCBS) supplementary Service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification
EN 300 195-1 (February 2001)	ETSI-specification: Integrated Services Digital Network (ISDN); SS-interactions; DSS1; Part 1: Protocol Specification
EN 300 196-1 (April 1998)	ETSI-specification: Generic functional protocol for the support of supplementary services.
ETS 300 134 (December 1992)	CCITT Signalling System No.7 Transaction Capabilities Application Part (TCAP)
ETS 300 356-18 (February 1995)	ISDN User Part (ISUP) version 2 for international interface – Completion of Calls to Busy Subscriber (CCBS)

3. Symbols, definitions and abbreviations

For the purpose of the present document, the following symbols, abbreviations and definitions applies:

3.1. Abbreviations

3PTY	Three-part Conference
ACR	Anonymous Call Rejection
AMA	Automatic Message Accounting
AOC	Advice Of Charge
AOC-S	Advice Of Charge at call Set-up time
AOC-D	Advice Of Charge During the call
AOC-E	Advice Of Charge at the End of the call
AR	Automatic Recall (Call Return)
ASE	Application Service Element (i.e. TCAP user e.g. CCBS)
BA	Basic Access
CBX	Coinbox
CCBS	Completion of Calls to Busy Subscriber
CD	Call Deflection
CFB	Call Forwarding on Busy
CF_BLK	Call Forwarding on Blocking
CFNR	Call Forwarding on No Reply
CFU	Call Forwarding Unconditional
CH	Call Hold
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
CNA	Changed Number Announcement
CNIP	Calling Name Identification Presentation
COLP	Connected Line Identification Presentation
COLR	Connected Line Identification Restriction
CPS	Carrier Pre Selection
CSC	Carrier Selection Code
CUG	Closed User Group
CW	Call Waiting
DDI	Direct Dialling In
DN	Directory Number
DSS1	Digital Signaling System Number 1
ECT	Explicit Call Transfer
EWSD	Elektronisches Wähl System Digital (Digital Switch of Siemens)
FDC	Fixed Destination Call
FDC-I	Fixed Destination Call - Immediate
FDC-T	Fixed Destination Call - Timed
GD	General Deactivation
GDN	General Directory Number
HM	Home Meter
ICB	Incoming Call Barring
IDN	Individual Directory Number
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
LE	Local Exchange

LC	Language Choice
LH	Line Hunting
LH	Left Handset
MALSAN	Maximum Authorized Length of Subaddress Accepted by Network
MDS	Message Delivery Service
MSN	Multiple Subscriber Number
MML	Man Machine Language
MWI	Message Waiting Indication
NDUB	Network Determined User Busy
NP	Number Portability
OCB	Outgoing Call Barring
P-T-P	Point-to-point
P-T-MP	Point-to-multipoint
PABX	Private Automatic Branch Exchange
PMBS-D	Packet Mode Bearer Service – D channel
PRA	Primary Rate Access
PSTN	Public Switched Telephone Network
PW	Password
S12	System 12 (Digital Switch of Alcatel)
SSF	Service Switching Function
SSP	Service Switching Point
SUB	Subaddressing
TCAP	Transaction Capabilities Application Part
TP	Terminal Portability
UDUB	User Determined User Busy
UNI	User network Interface
VDP	Voice Data Protection
UUS	User-to-User Service

3.2. Definitions

User A	The user originated the call and to whom the CCBS supplementary service is provided.
Busy	<p>See CCITT Recommendation I.221, paragraph 3</p> <p><i>Clarification:</i></p> <p><i>The definition of busy is according to CCITT recommendation I.221 and is summarised as follows. Busy is the situation when terminating resources needed to successfully complete the call are not available.</i></p> <p><i>Resources can be:</i></p> <p><i>Interface resources: B-channels and maximum number of calls supported</i> <i>Subscriber resources: terminals</i></p> <p><i>The following busy conditions are defined:</i></p> <ul style="list-style-type: none"> - <i>Channels busy: no information channel (B-channel) available for the network to use for the call.</i> - <i>Maximum number of total calls reached: this condition occurs when the maximum number of total calls supported at a given subscriber's interface(s) has been reached.</i> - <i>Subscriber busy: this condition is indicated by the subscriber's terminal equipment either in response to a status request or when a call is offered.</i> <p><i>Based on the above resource busy conditions, two definitions apply:</i></p> <p><i>Network Determined User Busy (NDUB):</i> <i>Channels busy and maximum number of additional calls supported reached. (the latter can be e.g. call waiting calls); or</i> <i>Maximum number of total calls that are supported at the interface is reached.</i></p> <p><i>User Determined User Busy (UDUB): - subscriber (terminal) busy</i> <i>A destination is considered busy if it is either 'network determined user busy' or 'user determined user busy'. i.e. BUSY = NDUB or UDUB.</i></p> <p><i>NDUB and UDUB correspond to the cause values #34 and #17 respectively, sent to the served user.</i></p>
Destination B	The entity addresses in the original call set up.
Retention timer	<p>This timer specifies the amount of time that the network retains all of the information supplied by the calling user when the call encounters busy. This timer is part of the basic call procedures. Although this timer is optional for the basic call procedures, it is needed for the operation of the CCBS supplementary service.</p> <p><i>Clarification for S12: System 12 shall only retain call information when the originating user has a subscription to particular supplementary services, e.g. CCBS.</i></p>
CCBS service duration timer	The maximum time the CCBS supplementary service will remain activated for user A within the network.

CCBS recall timer	The maximum time the network will wait for user A to respond to a CCBS recall.
Destination B idle guard timer	The time the network will wait after destination B has become not busy before informing user A.
CCBS busy	Any one of the following conditions will cause user A to be considered as CCBS busy: maximum number of calls reached at user A; no B-channels available at user A; CCBS recall pending on user A.
CCBS call	A call generated by the network from user A to destination B resulting from user A's acceptance of a CCBS recall.
CCBS recall	An indication informing user A that the network is ready to initiate a CCBS call to destination B and that the network is awaiting a response to this indication.
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.
<i>Suspended CCBS request</i>	<i>A CCBS request which cannot be served even if destination B is not busy, because user A is busy or CCBS busy.</i>
<i>Compatible terminal</i>	<i>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.</i>
<i>CCBS request retention</i>	<i>If an attempt to establish a CCBS call fails because the destination is busy again, then the network option "CCBS request retention" defines whether the CCBS supplementary service shall continue or not, i.e. if the "CCBS request retention" is supported, the original CCBS request shall retain its position in the destination B queue, and the monitoring of user B shall continue. Otherwise the CCBS request shall be deactivated.</i>
Status Request (Check)	<i>This is a procedure that allows the network to check whether compatible and incompatible terminals are connected to an interface and whether these terminals are free or busy. The procedure is part of the Generic Functional Protocol. (ETS 300 196-1).</i>

4. Technical requirements

4.1. Service denomination

The CCBS service is commercialised by Belgacom under the name Ring Back. Reference to the service will be made via the denomination 'CCBS' in this document.

4.2. Service description

The CCBS supplementary service enables a user A, encountering a busy destination B, to have the call completed without having to make a new call attempt when the destination B becomes not busy. When user A requests the CCBS supplementary service, the network will monitor for destination B becoming not busy.

When destination B becomes not busy, the network starts the destination B idle guard timer and when this timer expires, user A is informed. If user A is neither busy nor CCBS busy, user A is recalled :

- normal ringing cadence for "A" analog subscriber
- for ISDN, the "A" subscriber is informed with a functional command. It is up to the CPE (e.g. the ISDN telephone set) to treat the functional command in an appropriate way (e.g. display the appropriate information on the ISDN set at the moment the CCBS recall is received). The network will not send DISPLAY information elements as such to the ISDN set. This is in compliance with ETS 300 359-1.

When user A accepts the CCBS recall, then the network will automatically generate a CCBS call to destination B. When the network receives an indication that the destination B is being informed of the CCBS call, the corresponding CCBS request is considered as completed.

If user A is busy at the moment of the recall, the CCBS request will be suspended and the network will start monitoring user A. When A becomes free, then no destination B idle guard timer is started, the CCBS-request is resumed, and user A is recalled and normal operation continues.

At the moment that A is alerted, the CCBS recall timer is started. If user A accepts the recall before the CCBS recall timer expires, then the network initiates the CCBS call to destination B.

In case that A does not react upon the recall within the recall timer period, then the CCBS request shall be cancelled at both the A and B network side.

When A has accepted the recall but B has become busy again, then the network shall monitor B until he becomes free. Note that a second booking against busy called B is not possible.

Additional information: (Ref. ETS 300 359-1, 9.5.5.2, Exceptional procedures):

If user A establishes the CCBS call, and user B is determined to be busy again, then network B shall inform network A, and, depending on the "CCBS request retention" option being used, shall either maintain the CCBS request, or deactivate the CCBS request.

For S12-P8 & EWSD-V16B, the retention option is "YES".

4.3. CCBS service timers

The CCBS service uses a set of timers to control the service flow. Below the used timers are listed with their default values as to be implemented.

All timer values apply for analog and ISDN involved parties.

The timers comply with the definition as stated in ETS 300 359-1.

Timer Name Acc. ETS 300 359-1		Limits	EWSD V16B		S12 P8	
			Analog	ISDN	Analog	ISDN
T-RETENTION	Retention timer	> 15 s	Announcement play-time (>15 s)	20 s	30 s	30 s
T-CCBS1	Status check timer A-side	4 s	-	4 s	4 s	4 s
T-STATUS	Status check timer B-side	4 s	-	4 s	4 s	4 s
T-CCBS2	CCBS service duration timer	15 - 45 min	30 min	45 min	45 min	45 min
T-CCBS3	Recall timer	10 - 20 s	15 s	20 s	20 s	20 s
T-CCBS4	Destination B idle guard timer	0 - 15 s	10 s	10 s	10 s	10 s

* The default values indicate the current situation in the network.

4.4. Procedure

4.4.1. Analog procedure

4.4.1.1. Activation

On reception of an appropriate announcement, indicating that destination B is busy (CCBS allowance for that call), the analog user A activates a CCBS-booking by the following procedure :

R DT 5 RSP RH

R	Register Recall
DT	Dial Tone
RSP	Response (SCT or SIT)
SCT	Special Confirmation Tone
SIT	Special Information Tone
RH	Replace Handset
LH	Lift Handset

*Note : CCBS activation is also possible via the code **R * 37 # (additional to R 5)**.*

4.4.1.2. Deactivation

A CCBS shall be deactivated by the network or by user A if :

- user A sends a deactivation request.
- the CCBS service duration timer expires.
- user A does not accept the CCBS recall before the recall timer expires.
- destination B invokes a service that conflicts with the existing CCBS request and deactivation becomes necessary.

User A can send two possible deactivation requests :

⇒ deactivate a *specific* request :

LH DT # 37 * DN # RSP RH

(This code is only applicable on Alcatel S12 exchanges.)

⇒ deactivate *all* requests :

LH DT # 37 # RSP RH

Note : If the CCBS service is not installed on the subscriber's line, then no announcement but normal busy tone shall be generated for a call to a busy destination.

Also an activation or deactivation of the CCBS service shall be rejected and shall result in a SIT.

4.4.1.3. Interrogation

This feature is not applicable for analog served users.

4.4.2. ISDN procedure

For ISDN users a functional procedure is defined to activate, deactivate (specific or all) and interrogate CCBS bookings (the procedure is conform to spec. ETS 300-357 / ETS 300-359-1).

A special procedure exists for **Private ISDN equipment's** (PABX) which is stated in ETS 300-359-1, §10.

4.5. Tones and announcements

Analog subscribers: as an invitation to the A subscriber to use the "RING BACK" service, the calling user will receive an appropriate announcement. A busy tone may be incorporated in the announcement.

ISDN subscribers: as an invitation to the A subscriber to use the "RING BACK" service, the ISDN subscribers get busy tone and (depending on the implementation in the CPE of the functional protocol) an indication that the RING BACK service can be booked. No announcement is given.

As a result of a CCBS booking the activating party receives the Special Confirmation Tone (to confirm a successful booking) or the Special Information Tone (to reject the booking - long or short time denial).

4.6. Signalling

4.6.1. Public network

All signalling on the public network shall be according to ETSI ISUP (ref. ISUP v2 for the international interface CCBS ETS 300-356-18).

ISUP is not obligatory for the original call but is mandatory for the CCBS call. TCAP shall be used for all inter-network bearer-unrelated dialogues used to support the CCBS supplementary service.

4.6.2. Public network - private ISDN

The procedures described in ETS 300-359-1 (Interworking with Private ISDN) shall apply.