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Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 13: Call completion to busy subscriber

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Terrestrial Trunked Radio (TETRA) Technical Committee of the European Telecommunications Standards Institute (ETSI), and is now submitted for the One-step Approval Procedure phase of the ETSI standards approval procedure.

This ETS is a multi-part standard and will consist of the following parts:

Part 1: "General network design";

Part 2: "Air Interface (AI)";

Part 3: "Interworking at the Inter-System Interface (ISI)";

Part 4: "Gateways basic operation";

Part 5: "Peripheral Equipment Interface (PEI)";

Part 6: "Line connected Station (LS)";

Part 7: "Security";

Part 9: "General requirements for supplementary services";

Part 10: "Supplementary services stage 1";

Part 11: "Supplementary services stage 2";

Part 12: "Supplementary services stage 3";

Part 13: "SDL model of the Air Interface (AI)";

Part 14: "Protocol Implementation Conformance Statement (PICS) proforma specification".

Proposed transposition dates	
Date of latest announcement of this ETS (doa):	3 months after ETSI publication
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Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

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1 Scope

This ETS specifies the Call Completion on Busy Subscriber (SS-CCBS) supplementary service which is applicable to various basic services supported by TETRA Switching and Management Infrastructures (SwMIs). TETRA basic services are specified in ETS 300 392-2 [8].

SS-CCBS allows completion of a call to a subscriber that was unsuccessful because of a busy condition without making a new call attempt.

Supplementary service specifications are produced in three stages, according to the method described in ITU-T Recommendation I.210 [4]. This ETS contains the stage 1 specifications of SS-CCBS. The stage 1 descriptions specify the supplementary services as seen by users of SwMIs.

This ETS is applicable to circuit mode TETRA tele-services and bearer services only. This ETS does not address the case where the MS/LS is not reachable. SS-CCBS assumes MS/LS is reachable.

Man Machine Interfaces and charging principles are outside the scope of this ETS.

This first edition of this ETS was presented as a delta document to the first edition of ECMA-185 [2]. This version has been redrafted based on the latest published text of ECMA-185 [2] as a self-contained document so as to be more readable. Additions to ECMA-185 [2] have been made to take into account particular TETRA specifics (e.g. group call) and to include user requirements and situations not addressed in ECMA-185 [2].

NOTE: Contrary to PISN SS-CCBS and SS-CCNR which are both specified in ECMA-185 [2], TETRA SS-CCBS and TETRA SS-CCNR are specified in two separate ETSs.

2 References

This ETS incorporates by dated and undated reference, provisions from other publications. These references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] Void.

[2] Standard ECMA-185 (1997): "Specification; Functional Model and Information Flows; Call Completion Supplementary Services".

[3] ITU-T Recommendation I.112 (1993): "Vocabulary of terms for ISDNs".

[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] ITU-T Recommendation Z.100 (1993): "CCITT specification and description language (SDL)".

[7] Void.

[8] ETS 300 392-2 (1996): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)".

[9] ETS 300 392-9 (1997): "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 9: General requirements for supplementary services".

[10] ITU-T Recommandation Q.9 (1988): "Vocabulary of switching and signalling terms".

[11] TS 101 282: "Digital cellular telecommunications system (Phase 2+); Completion of Calls to Busy Subscriber (CCBS); Service description, Stage 1 (GSM 02.93 version 6.0.1 Release 1997)".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of this ETS, the following definitions apply:

Additional Network Feature: Capability, over and above that of a basic service, provided by a SwMI, but not directly to a user.

basic (…) service: Any stand alone bearer service or tele-service (derived from ITU-T Recommendation I.210 [4]).

bearer service: type of telecommunication service that provides the capability for the transmission of signals between user-network interfaces (as defined in ITU-T Recommendation I.112 [3]).

busy: Property of a user for whom either a "network determined user busy" or "user determined user busy" condition (see subclause 3.1 of ITU-T Recommendation I.221 [5]) exists.

call, basic call: Instance of the use of a basic service.

call completion: Successful presentation of a previously unsuccessful Call to a destination user (user B) which occurs when the call has entered an alerting phase or has been answered.

NOTE 1: CCBS call completion could result in a CCNR condition in which case user A would invoke SS-CCNR and not SS-CCBS anymore.

CCBS busy: Any one of the following conditions will cause user A to be considered as CCBS busy:

- maximum number of calls queued at user A;
- CCBS recall pending on user A;
- no resource available at user A.

NOTE 2: It is assumed that SS-CCNR busy is independent from SS-CCBS busy; one could consider merging the two conditions in an SS-CC busy which would combine the total numbers of CCBS and CCNR requests.

compatible MS/LS: MS/LS presenting the same basic TETRA class of service as the TETRA class of service requested by the calling user MS/LS. By analogy to ISDN "compatible terminal".

free: Property of a user who can accept any attempt by the SwMI to present a call to that user (i.e. allow the call to reach the alerting or answered state).

group busy: group is busy when group controlling SwMI determines that group is busy; group busy shall generally be equivalent to NDUB.

NOTE 3: How the SwMi determines group busy condition is implementation dependent and is outside the scope of this draft ETS.

idle guard time: Time the network will wait after user B has become free before initiating a “CCBS recall” to user A (definition from TS 101 282 [11]).

Line Station (LS): Physical grouping that contains all the fixed equipment that is used to obtain TETRA services through a line.

Mobile Station (MS): Physical grouping that contains all of the mobile equipment that is used to obtain TETRA services. By definition, a mobile station contains at least one Mobile Radio Stack (MRS).

Network Determined User Busy: Analogy to ISDN, when all available interface resources are busy, the busy shall be network determined user busy.

path reservation: Reservation of resources just prior to SS-CCBS Recall in order that a connection path through the network is available when user A accepts the SS-CCBS Recall.

NOTE 4: Path Reservation would not guarantee that user B will be free when user A accepts the SS-CCBS Recall.

NOTE 5: Path Reservation is not the preferred mode of operation in the TERA environment due to mobility considerations.

recall timer: Timer specifies the length of time the network shall wait for a response from user A to a CC Recall.

retention timer: Timer specifies the period of time the network retains the originating call information after a valid call attempt is released.

SS-CCBS busy: See CCBS busy.

SS-CCBS call: Call generated by the network from user A to user B resulting from user A's acceptance of a SS-CCBS recall.

SS-CCBS recall: Indication informing user A that user B is no longer busy (in the case of SS-CCBS). Acceptance of this indication by user A will cause the call to be completed by the SwMI.

SS-CCBS request: Instance of an activation of SS-CCBS held in a queue pending the correct conditions for the SS-CCBS to be completed.

SS-CCBS service duration timer: Timer specifies the length of time that the service shall be active within the network.

supplementary service: Any service provided by a network in addition to its basic service or services (defined in ITU-T Recommendation Q.9 [10]). A supplementary service modifies or supplements a basic telecommunication service. Consequently, it cannot be offered to a customer as a stand alone service. It must be offered together with or in association with a basic telecommunication service (excerpt from ITU-T Recommendation I.210 [4]).

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

Switching and Management Infrastructure (SwMI): All of the TETRA equipment for a Voice plus Data (V+D) network except for subscriber terminals. The SwMI enables subscriber terminals to communicate with each other via the SwMI.

tele-service: Type of telecommunications service that provides the complete capability, including terminal equipment functions, for communication between users according to agreed protocols.

User A: Specific user that originated the call and requested the supplementary service.

User B: User that was initially addressed in the original individual call set up. In the case of a group call, Group (B) will be used in place of user B.

user B idle guard timer: See idle guard timer definition.

User Determined User Busy: Analogy to ISDN, busy shall be user determined user busy when subscriber resources (either the terminal itself or the user) do not respond positively to an incoming call request.

NOTE 6: In the case where the MS/LS has a single resource and is involved in an individual call, UDUB and NDUB will be confounded. In other words, NDUB could result of a single call occurrence.

NOTE 7: It appears, after further investigation, that UDUB will never happen in a TETRA Mobile Station; however, the definition of UDUB is left to clarify the distinction with NDUB and for the case of inter-working.

3.2 Symbols

For the purposes of this ETS, there are no special symbols besides the symbol used in SDL diagram and defined in ITU-T Recommendation Z.100 [6].

3.3 Abbreviations

For the purposes of this ETS, the following abbreviations apply:

3.3.1 General abbreviations

AI	Air Interface
ANF	Additional Network Feature
CC	Call Control (functional entity)
CC	Call Completion (generic term for both CCBS and CCNR)
CCBS	Completion of Calls to Busy Subscribers
CCNR	Completion of Calls on No Reply
GTSI	Group TETRA Subscriber Identity
ISDN	Integrated Services Digital Network
ISI	Interworking at the Inter-System Interface
LS	Line Station
MS	Mobile Station
NDUB	Network Determined User Busy
PICS	Protocol Implementation Conformance Statement
PISN	Private Integrated Services Network
SDL	Specification and Description Language
SS	Supplementary Service

NOTE: The abbreviation SS is only used when referring to a specific supplementary service.

SwMI	Switching and Management Infrastructure
TETRA	TErrestrial Trunked RAdio
TE	Terminal Equipment
UDUB	User Determined User Busy
V+D	Voice Plus Data

3.3.2 Supplementary service abbreviations

AL	Ambiance Listening
AoC	Advice of Charge
AP	Access Priority
AS	Area Selection
BIC	Barring of Incoming Calls
BOC	Barring of Outgoing Calls
CAD	Call Authorized by Dispatcher
CCBS	Call Completion to Busy Subscriber
CCNR	Call Completion on No Reply
CFB	Call Forwarding on Busy
CFNRy	Call Forwarding on No Reply
CFNRc	Call Forwarding on Not Reachable
CFU	Call Forwarding Unconditional
CLIP	Calling Line Identification Presentation
CLIR	Calling/Connected Line Identification Restriction
COLP	COnnected Line Identification Presentation
CR	Call Report
CRT	Call Retention
CW	Call Waiting
DGNA	Dynamic Group Number Assignment
DL	Discreet Listening

HOLD	Call Hold
IC	Include Call
LE	Late Entry
LSC	List Search Call
MRS	Mobile Radio Stack
PC	Priority Call
PEI	Peripheral Equipment Interface
PPC	Pre-emptive Priority Call
SNA	Short Number Addressing
TC	Transfer of Control
TPI	Talking Party Identification

4 SS-CCBS Stage 1 Specification

4.1 Description

4.1.1 General description

SS-CCBS is offered to a calling user (user A). On encountering a busy condition at the called user (user B), SS-CCBS may be offered to the calling user (user A). If user A invokes SS-CCBS, the SwMI B shall monitor user B. If user B becomes not busy and stays free during the 'idle guard time' (user B does not place an outgoing call and does not receive an incoming call with higher priority than the pending CCBS call), user A is notified that user B is not busy. On positive response by user A to that notification, the SwMI shall attempt to complete the call to user B.

4.1.2 Qualifications on applicability to telecommunication services

This supplementary service is applicable to all basic circuit mode TETRA V+D services.

4.2 Procedures

4.2.1 Provision/Withdrawal

SS-CCBS may be provided after pre-arrangement with the service provider (to selected users), or may be generally available to all users. SS-CCBS may be withdrawn on request of the user or for administrative reasons.

No subscription options shall be offered by the SwMI.

NOTE 1: Contrary to ECMA-185 which offers two subscription options for recall mode, SS-CCBS Recall shall be offered only to the terminal which has invoked SS-CCBS.

NOTE 2: As a guidance to stage 3 ETS, the following main options in relation to ECMA 185 are selected for TETRA SS-CCBS:

- Path reservation is not provided;

NOTE 3: In the TETRA network environment, path reservation is deemed not to be necessary due to mobility considerations; a path reserved between two SwMIs could become not available when one of the user migrates.

- Signaling connection is retained for the duration of the SS-CCBS request;

- Retention of the SS-CCBS service until expiration of the service duration timer (if user A and/or user B is found busy after the recall).

4.2.2 Normal procedures

4.2.2.1 Activation/deactivation/registration/Interrogation

SS-CCBS shall be permanently activated upon provision and permanently deactivated upon withdrawal.

User B needs not to have subscribed to SS-CCBS for calling user A invocation of SS-CCBS to operate properly.

Restriction of SS-CCBS for called user B is outside the scope of this ETS.

NOTE: A mechanism provided to user B which causes rejects of CCBS requests is outside the scope of this ETS.

Interrogation will not be used to interrogate activation/deactivation status; a process similar to interrogation may be implemented; see invocation clause below.

4.2.2.2 Invocation and operation

When a call from user A fails because the destination user, user B, is busy, the network shall retain the call information provided by user A, for a period governed by the SS-CCBS Retention Timer. User A shall be able to request SS-CCBS during that period. On receipt of a request for SS-CCBS during that period, the network shall check whether it is possible to initiate the service, and if so shall send a positive acknowledgment to user A, start monitoring user B and start the SS-CCBS service duration timer. The acknowledgment means that user A can expect to receive a SS-CCBS Recall if user B becomes not busy within the period of the SS-CCBS service duration timer.

NOTE 1: The fact that user B is already being monitored, as a result of a call completion request from another user, needs not cause rejection of the request from user A. The handling of multiple requests against the same user B is an implementation matter, typically involving some sort of queue arranged in chronological and/or priority order.

NOTE 2: The fact that user A has already invoked call completion against another user needs not cause rejection of any further requests for call completion from user A. The handling of multiple requests by the same user A is an implementation matter.

NOTE 3: Only users for which SS-CCBS has been activated by subscription are allowed to invoke SS-CCBS for a particular busy subscriber; users for which SS-CCBS has not been activated and invoking SS-CCBS will receive a negative response to their request.

After the SS-CCBS request has been acknowledged, user A shall be able to receive and initiate other calls.

A network may provide user A with the ability to request a list of outstanding SS-CCBS-requests that user A has invoked. Only details of requests made by the user from that terminal should be provided. The list will be empty if there are no outstanding SS-CCBS requests.

When the monitoring of user B indicates that user B has become free, and if user A is also free, the network shall provide user B with an optional time guard during which user B can place outgoing call but can only receive incoming calls which have a higher priority level than the original CCBS call priority level. If user B is still free after the idle guard time, the network shall then provide an SS-CCBS Recall to user A, and start the SS-CCBS Recall timer. The priority of the recall signaling process shall be equal to the priority of the original call.

If user A accepts the SS-CCBS Recall, the network shall attempt to complete the call between user A and user B. User A shall not be able to modify the call parameters in the CCBS Call; this holds true for the basic call setup (such as basic service, priority and area selection) as well as for the supplementary services invoked for the initial call. If the call is successfully presented to user B and enters an alerting phase or is answered, SS-CCBS shall be regarded as complete.

In the case where several invocations of SS-CCBS are in the queue, the calls shall be handled in the order they occurred unless their priority levels are different in which case the higher priority call shall be handled first.

To properly operate, SS-CCBS shall be supported by the originating SwMI as well as the terminating SwMI.

4.2.2.3 Cancellation

The network shall provide user A with the ability to request cancellation of at least one of the following:

- all outstanding SS-CCBS requests for which a SS-CCBS Recall is still expected;
- the most recent SS-CCBS request for which a SS-CCBS Recall is still expected; and
- a specific SS-CCBS request for which a SS-CCBS Recall is still expected.

User A shall be able to cancel its own requests and shall not be able to cancel requests from other users.

User A shall be informed of successful cancellation.

4.2.2.4 Group call considerations

A group is busy when the Group Controlling SwMI declares the group (GTSI) to be busy. SS-CCBS shall be applicable against the group GTSI and not against any member of the group. SS-CCBS does not affect the group call set-up at the air interface.

NOTE 1: The actual algorithm that leads to the declaration of a group as busy is outside of the CCBS ETSs. The group GTSI may be declared busy even though no member of the group is actually involved in the group.

NOTE 2: During a group call, a member of the group call will never encounter a busy situation when calling the group (as the SwMI would merge him into the group call). SS-CCBS will therefore never be invoked by a member of a group call calling the group he belongs to.

NOTE 3: A member of a busy group not involved in that group call may accept any other call; this may depend on the MS/LS implementation.

4.2.2.5 Timers

This paragraph regroups all values of timers as seen by the user so as to provide a range of values for timers in further stages of this CCBS.

- Idle guard timer: The value of this optional timer is a network option and shall be in the range from 0 to 15 seconds. The value 0 corresponds to no guard at all.

- Retention timer: shall be at least 15 seconds.

- List request timer: shall be between 20 and 60 seconds.

- SS-CCBS service duration timer should be from 15 to 45 minutes.

- Recall timer shall have a minimum value of 10 seconds and a maximum value of 30 seconds.

- Request/cancel timer shall have a value in the range "10 to 30" seconds.

4.2.3 Exceptional Procedures

4.2.3.1 Activation/deactivation/registration/interrogation

Not applicable.

4.2.3.2 Invocation and Operation

In the case where the originating SwMI does not support SS-CCBS, the CCBS call request shall be rejected as in any SS-reject described in ETS 300 392-2 [8] and ETS 300-392-9 [9].

4.2.3.2.1 Rejection of SS-CCBS Service request

If user A is not permitted to request SS-CCBS, the network shall reject the SS-CCBS request with an indication of whether denial is short or long term.

Short term denial shall be used for temporary conditions where a later request for SS-CCBS might be successful. Examples of conditions that may result in a short term denial are:

- limit of requests by user A already reached;
- no call information retained;
- limit of requests against user B already reached.

NOTE 1: Contrary to ECMA 185, duplicate requests following a new call attempt is not a cause for rejection; see subclause 4.2.3.2.6.

Long term denial shall be used when later requests will also be rejected. Examples of conditions that may result in a long term denial are:

- SS-CCBS not provided to user A;
- inter-working with a network which does not support SS-CCBS;
- SS-CCBS not allowed against user B.

NOTE 2: SS-CCBS not allowed against user B is an implementation option which is outside the scope of this ETS.

4.2.3.2.2 User A is busy on SS-CCBS recall

4.2.3.2.2.1 Case of user A busy

If user A is found to be busy when user B becomes free, the network shall wait for both users to become free before providing SS-CCBS Recall and starting the SS-CCBS Recall timer. As an option, the network may notify user A that the network is attempting to complete a call. On receipt of such a notification, user A may either:

- ignore the notification, thereby causing the SS-CCBS Recall to be delayed;
- cancel the SS-CCBS request; or
- free resources by disposing of an existing call, thereby allowing the SS-CCBS Recall to proceed.

4.2.3.2.2.2 Case of SS-CCBS busy

If user A is found to be SS-CCBS busy, the network shall wait for user A to become SS-CCBS non busy before providing SS-CCBS Recall and starting the SS-CCBS Recall timer.

4.2.3.2.3 Network congestion

Since the TETRA network does not use path reservation, or inter-works with a network which does not allow path reservation, the call completion attempt can fail after user A has accepted the SS-CCBS Recall because of network congestion. In this case, user A shall be informed of the failure, the SS-CCBS request shall be maintained by the network and a further SS-CCBS Recall can be expected.

In case of network congestion, the SS-CCBS calls shall be queued as in the case of a normal call set-up.

4.2.3.2.4 User B becomes busy after SS-CCBS recall

If user B is busy for the CCBS Call resulting from an accepted SS-CCBS Recall by user A, the network shall resume monitoring of user B, indicating the reason for the failure to user A and that the SS-CCBS request has been maintained. In such a case, user A may, as a user option, either request cancellation of the SS-CCBS request, if call completion to user B is no longer required or re-invoke SS-CCBS. When the CCBS invocation is maintained, the service duration timer is not reset to zero.

As a network option, if user B makes an outgoing call after SS-CCBS Recall has been started, but before user A has accepted the SS-CCBS Recall, then user B may be notified that the network is attempting to

complete a call. This gives user B the opportunity to abandon call initiation in order to allow the SS-CCBS call to complete.

4.2.3.2.5 Duplicate SS-CCBS requests

If user A has already requested SS-CCBS on user B for a particular basic service, and is awaiting recall, any subsequent request from user A to invoke SS-CCBS on user B, for the same basic service, shall cause the network to accept the request as valid. In this case, user A shall receive only one SS-CCBS Recall. The network shall reset the SS-CCBS duration timer and retain only one CCBSI reference.

In the case where user A makes a second call (after requesting SS-CCBS for a first call), and finds user B free, SS-CCBS will continue to operate as if no second call had been made (since no invocation of SS-CCBS for that second call took place).

4.2.3.2.6 Other situations

A user can be both a “user A” and a “user B” simultaneously: that user can have activated the CCBS supplementary service and have SS-CCBS requests outstanding whilst at the same time that user can be the destination of CCBS recalls from other users.

If a user receives a SS-CCBS recall while that user’s B queue is being processed, then the CCBS recall shall take priority over the handling of the user B SS-CCBS queue. The handling of SS-CCBS requests activated by this user shall have priority over the handling of SS-CCBS requests activated by other users on this user.

4.2.3.2.7 Other failure situations

A particular request for the service shall be automatically canceled by the network, and user A shall be notified if:

- user B and/or user A is still busy after the SS-CCBS Service Duration Timer expires;
- user B invokes or activates a service that conflicts with the existing SS-CCBS invocation, e.g. SS-BIC;
- for any reason, the network is unable to continue with the CCBS invocation.

A particular request for the service shall be automatically canceled by the network, and user A shall not be notified if user A does not accept the SS-CCBS Recall before the SS-CCBS Recall timer expires.

4.2.3.3 Cancellation

A cancellation request shall be rejected if there are no SS-CCBS requests for user A or if the request is to cancel a specific SS-CCBS request which does not exist.

4.3 Interactions with other supplementary services and ANFs

Interactions with other supplementary services and ANFs for which SwMI standards were available at the time of publication of this ETS are specified below.

4.3.1 Calling Line Identification Presentation (SS-CLIP)

No possible interaction.

4.3.2 Connected Line Identification Presentation (SS-COLP)

No possible interaction.

4.3.3 Calling/Connected Line Identification Restriction (SS-CLIR)

If user A requests presentation restriction for a call (does not use the default value for a call), and the call encounters a busy user B, the request to restrict presentation of the calling line identification shall be retained by the network and shall apply to a call resulting from the use of SS-CCBS.

4.3.4 Completion of Calls on No Reply (SS-CCNR)

If user A has SS-CCNR activated on user B, and user A requests SS-CCBS on user B for a new call to user B, this request shall be treated as a duplicate SS-CCBS request.

NOTE: When user B is busy (the pre-requisite for invocation of SS-CCBS by user A) before SS-CCNR Recall has been started relating to a previous SS-CCNR request, the pending SS-CCNR request has effectively become an SS-CCBS request, as it is awaiting a free user B in order to recall user A. If an SS-CCBS request is then received from user A, relating to user B, this is therefore actually a duplicate SS-CCBS request and is treated as such by the network.

4.3.5 Call Forwarding Unconditional (SS-CFU)

4.3.5.1 SS-CFU activated by user B before user A requests SS-CCBS

If the call to user B is diverted to user C by SS-CFU and user C is busy, then a SS-CCBS request from user A shall be applied to the diverted-to user C.

4.3.5.2 SS-CFU activated by user B after user A requests SS-CCBS

If user B activates SS-CFU after user A has requested SS-CCBS and whilst the SS-CCBS Recall has not yet been accepted by user A, the SS-CCBS request shall either continue to be applied to user B or be cancelled.

4.3.5.3 SS-CFU activation by user A

If user A invokes SS-CCBS whilst SS-CFU is activated, or user A invokes SS-CCBS and subsequently activates SS-CFU, SS-CCBS Recall shall still be given to user A.

4.3.6 Call Forwarding Busy (SS-CFB)

4.3.6.1 SS-CFB activated by user B before user A requests SS-CCBS

If the call from user A to user B is diverted to user C by SS-CFB and user C is busy, then a SS-CCBS request made by user A shall be applied either to the diverted-to user C or to the originally called user B.

4.3.6.2 SS-CFB activated by user B after user A requests SS-CCBS

If user B activates SS-CFB after user A has requested SS-CCBS and whilst the SS-CCBS Recall has not yet been accepted by user A, the SS-CCBS request shall continue to be applied to user B.

4.3.6.3 SS-CFB activation by user A

If user A invokes SS-CCBS whilst SS-CFB is activated, or user A invokes SS-CCBS and subsequently activates SS-CFB, this shall not affect the provision of the SS-CCBS Recall to user A.

4.3.7 Call Forwarding on No Reply (SS-CFNR)

Call completion to busy subscriber shall not have any interaction with Call Forwarding on No Reply (SS-CFNR).

NOTE 1: The activation of SS-CFNR by user B during activation of SS-CCBS by user A on user B and while user A has not yet accepted the SS-CCBS Recall will result in the continuation of SS-CCBS request being applied to user B.

NOTE 2: In such a case, the call resulting from successful completion of SS-CCBS can be subject to SS-CFNR if not answered.

NOTE 3: If user A invokes SS-CCBS whilst SS-CFNR is activated, or user A invokes SS-CCBS and subsequently activates SS-CFNR, this shall not affect the provision of the SS-CCBS Recall to user A. Recall of user A is not a call but a notification.

4.3.8 Call Report (SS-CR)

Call completion to busy subscriber shall not have any interaction with call report.

4.3.9 Talking Party Identification (SS-TPI)

Call completion to busy subscriber shall not have any interaction with talking party identification.

4.3.10 Call Forwarding on Not Reachable (SS-CFNR$_C$)

If the call from user A to user B is diverted to user C by SS-CFNR$_C$ and user C is busy, then a SS-CCBS request made by user A shall be applied to the diverted-to user C.

If user A invokes SS-CCBS whilst SS-CFNR$_C$ is activated against user A, or user A invokes SS-CCBS and subsequently activates SS-CFNR$_C$, and then becomes not reachable, the network shall wait until user A has become reachable before the provision of the SS-CCBS Recall to user A.

4.3.11 List Search Call (SS-LSC)

User A shall not be able to invoke SS-CCBS if the original call has failed due to all attendants in the list search call being busy.

4.3.12 Call Authorized by Dispatcher (SS-CAD)

If the original call placed by user A was given authorization by a dispatcher for completion, then subsequent invocation of SS-CCBS by user A to the authorized destination, shall not require further authorization by a dispatcher. In the CCBS Call set-up, an indication that the call set-up belongs to a CCBS Call shall be needed; this indication will insure that dispatcher is by-passed in the subsequent CCBS call.

4.3.13 Short Number Addressing (SS-SNA)

Call completion to busy subscriber shall not have any interaction with short number addressing.

4.3.14 Area Selection (SS-AS)

If user B is originally outside the area selected and busy, it shall not be possible for user A to invoke SS-CCBS.

If user A has invoked SS-CCBS against user B who was busy and within the selected area, when user B becomes free, the area in which user B happens to be at the time user B becomes free will be checked and compared to the area requested in the initial call; if user B is free but is outside the selected area, RECALL is not sent to user A; call failure shall be notified to user A as in a normal Area Selection call failure; SS-CCBS request shall be canceled and user A shall be notified accordingly; if user B is free and is within the selected area, user B free notification shall be sent to user A SwMI and recall will be presented to user A. Monitoring of when user B is back in the selected area is outside the scope of this ETS.

The same Area Selection shall be used for the initial call setup and the CCBS Call.

4.3.15 Access Priority (SS-AP)

Call completion to busy subscriber shall not have any interaction with access priority.

4.3.16 Priority Call (SS-PC)

Call completion to busy subscriber shall not have any interaction with priority call.

If the priority call leads to invocation of SS-CCBS, (finding user B busy), the CCBS Call shall use the same priority as the original call.

NOTE: The recall is not a call in itself and does not have any priority assigned to it.

4.3.17 Call Waiting (SS-CW)

Call completion to busy subscriber shall not have any interaction with call waiting. Call waiting shall have priority over CCBS Call.

NOTE: SS-CW is not defined for TETRA at the time this ETS is prepared.

4.3.18 Call Hold (SS-HOLD)

Call completion to busy subscriber shall not have any interaction with call hold.

4.3.19 Late Entry (SS-LE)

Call completion to busy subscriber shall not have any interaction with late entry.

4.3.20 Transfer of Control (SS-TC)

Call completion to busy subscriber shall not have any interaction with transfer of control.

4.3.21 Pre-emptive Priority Call (SS-PPC)

Call completion to busy subscriber shall not have any interaction with pre-emptive priority call. SS-PPC calls shall overrule the user B optional idle guard time if implemented and shall have priority over CCBS Call not subject to SS-PPC.

4.3.22 Include Call (SS-IC)

Call completion to busy subscriber shall not have any interaction with include call.

4.3.23 Advice of Charge (SS-AoC)

Call completion to busy subscriber shall not have any interaction with advice of charge.

4.3.24 Barring of Outgoing Calls (SS-BOC)

Not applicable. (If user A is unable to make outgoing calls because SS-BOC has been activated against user A, then it should be unlikely that user A shall be able to invoke SS-CCBS). If SS-BOC is invoked after SS-CCBS, the CCBS Call may be barred (implementation dependent).

4.3.25 Barring of Incoming Calls (SS-BIC)

Call completion to busy subscriber shall not have any interaction with barring of incoming calls. If the served user also has SS-BIC activated it shall not prevent the receipt of the SS-CCBS Recall from the infrastructure in order to start the call completion process. If SS-BIC is invoked after SS-CCBS, the CCBS Call may be barred (implementation dependent).

4.3.26 Discreet Listening (SS-DL)

Call completion to busy subscriber shall not have any interaction with discreet listening.

4.3.27 Ambiance Listening (SS-AL)

Call completion to busy subscriber shall not have any interaction with ambiance listening.

4.3.28 Dynamic Group Number Assignment (SS-DGNA)

Call completion to busy subscriber shall not have any interaction with dynamic group number assignment.

The DGNA number needs to be valid during the duration of the CCSB duration timer. If the DGNA number is no longer valid and/or the DGNA timer has expired, the CCBS Request shall be canceled.

4.3.29 Call Retention (SS-CRT)

Call completion to busy subscriber shall not have any interaction with call retention.

4.3.30 Interaction with ANFs

4.3.30.1 Mobility

Migration related descriptions can be split into several cases.

4.3.30.1.1 Migration of user B while SS-CCBS is active for a given call

Mobility management shall insure that SS-CCBS invocation of user B is kept during the migration by insuring that the call parameters and timers are passed to the user B visited SwMI.

4.3.30.1.2 Migration of user A while SS-CCBS is active

Mobility management shall insure that SS-CCBS invocation from user A is kept during the migration by insuring that the call parameters and timers are passed to the visited SwMI.

4.3.30.1.3 Migration of either user A or user B to a SwMI not supporting SS-CCBS

In either case the whole SS-CCBS shall be canceled and user A shall be notified (long term denial).

4.3.31 Inter-working considerations

If users A and B are on different networks, the availability of SS-CCBS to user A will be limited by the capabilities of the other network and the inter-working functions between the SwMI and the other network.

If user B is connected to a public ISDN and the public ISDN version of the SS-CCBS service is available at the network inter-working point, user A may be able to request SS-CCBS on public ISDN user B. In addition, a user A served by the Public ISDN shall be able to request SS-CCBS on a user B served by a TETRA SwMI.

NOTE: This assumes peer co-operation between the public ISDN and the TETRA network in provision of the SS-CCBS service.

4.4 SS-CCBS overall SDL

Figure 1 contains the dynamic description of SS-CCBS using the Specification and Description Language (SDL) defined in ITU-T Recommendation Z.100 [6]. The SDL process represents the behavior of the network in providing SS-CCBS. The relationship of this process to the basic call process is indicated in the annotations.

Input signals from the left and output signals to the left represent primitives from and to user A. Input signals from the right represent internal stimuli.

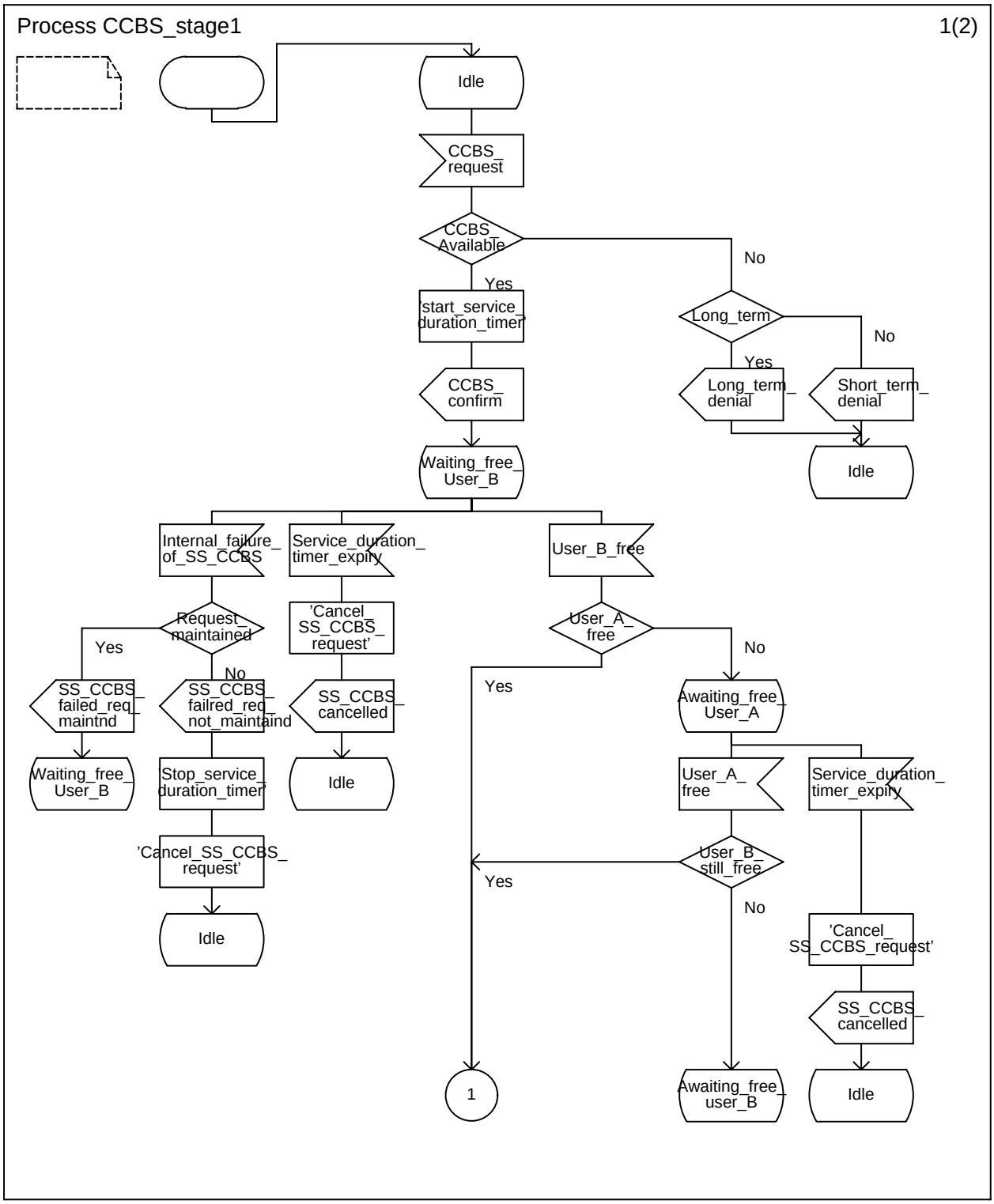

Figure 1: SS-CCBS, Overall SDL (sheet 1 of 2)

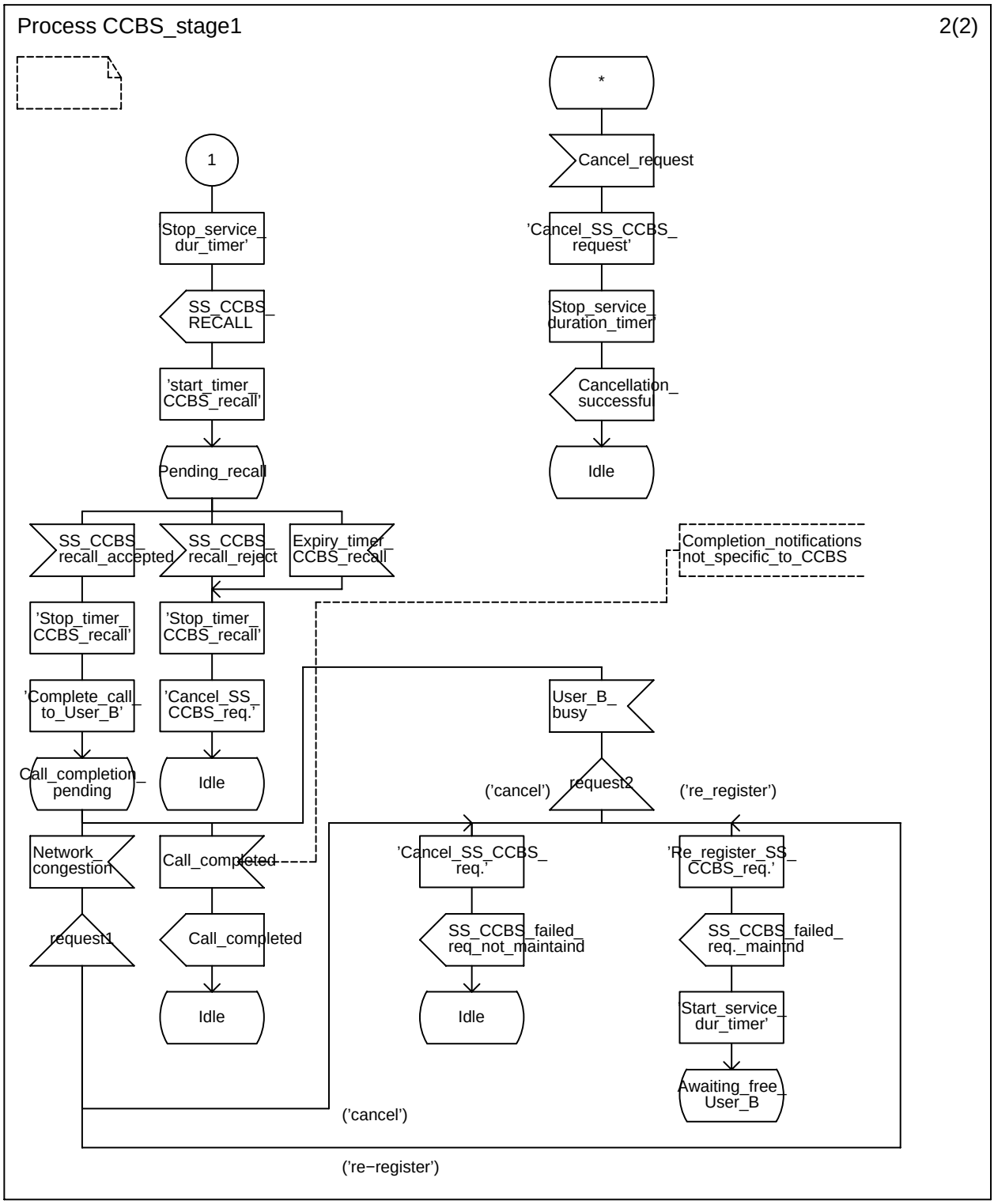

Figure 1: SS-CCBS, Overall SDL (sheet 2 of 2)

Annex A (informative): Bibliography

The following material, though not specifically referenced in the body of the present document (or not publicly available), gives supporting information.

- ITU-T Recommendation I.130: "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".

- ETS 300 171 (1992): "Private Telecommunication Network (PTN); Specification, functional models and information flows; Control aspects of circuit mode basic services; ECMA-BCSD".

History

Document history	
April 1996	First Edition
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