INTERNATIONAL TELECOMMUNICATION UNION

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THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

INTEGRATED SERVICES DIGITAL NETWORK (ISDN) GENERAL STRUCTURE AND SERVICE CAPABILITIES

CALL WAITING (CW) SUPPLEMENTARY SERVICE

Recommendation I.253.1

Geneva, 1990

FOREWORD

The CCITT (the International Telegraph and Telephone Consultative Committee) is a permanent organ of the International Telecommunication Union (ITU). CCITT 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 Plenary Assembly of CCITT which meets every four years, establishes the topics for study and approves Recommendations prepared by its Study Groups. The approval of Recommendations by the members of CCITT between Plenary Assemblies is covered by the procedure laid down in CCITT Resolution No. 2 (Melbourne, 1988).

Recommendation I.253.1 was prepared by Study Group I and was approved under the Resolution No. 2 procedure on the 2 July 1990.

CCITT NOTE

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

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CALL WAITING (CW) SUPPLEMENTARY SERVICE[1)]

1 Definition

The **Call Waiting service** is a supplementary service which permits a subscriber to be notified of an incoming call (as per basic call procedures) with an indication that no interface information channel is available. The user then has the choice of accepting, rejecting or ignoring the waiting call (as per basic call procedures).

2 Description

2.1 *General description*

The ISDN Call Waiting service allows an out-of-band notification to subscriber B of the incoming call; this is the assumed case for this definition (for optional in-band indications, see Annex A).

The maximum number of calls that can be handled (e.g. active, held, alerting, waiting) for each ISDN number on a given interface is specified at subscription time.

Note - The situation where at least one B-channel is available may be, for a given terminal, a situation similar to the one where all B-channels are busy. A terminal receiving a call request and already having an active call, may process the new incoming call in the same way as it would have processed a call if no B-channel were available, i.e. react positively to the incoming call request.

Moreover, when at least one B-channel is free, any compatible busy terminal of subscriber B can react positively to an incoming call.

2.2 *Specific terminology*

Throughout this Recommendation the following terminology will be used:

Subscriber B: the subscriber who is provided by the network with the Call Waiting service on a particular interface.

User B: the user who reacts to the call waiting at B.

User C: the user who has originated a call to B which causes the Call Waiting service to be invoked.

User A: represents a user who is engaged in a call with user B (this call can be in any state).

User Response timer T1: this timer specifies the period the network will wait for a positive response, from a terminal at B, to the offered call. It is part of the basic call and has a value of a few seconds.

No Answer timer T2: this optional timer specifies the period the network will wait for a response (answer), from user B, to the offered call from user C. The value of this timer is between 0.5 and 2 minutes.

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1) This Recommendation replaces the text of Recommendation I.253, § 1 of the CCITT *Blue Book*.

2.3 *Qualifications on the applicability to telecommunication services*

This supplementary service is considered meaningful when applied to the Telephony teleservice and the speech and 3.1 kHz audio bearer services. Furthermore, it may also be meaningful when applied to other services.

3 Procedures

3.1 *Provision/withdrawal*

Call Waiting (CW) can be provided on a subscription basis or, as a network provider option, be generally available to all users without subscription. Call Waiting can be withdrawn for administrative reasons.

As part of each applicable bearer service or teleservice, there is an option specifying the maximum number of information channels which can be used (occupied) on the interface for each ISDN number, all ISDN numbers or subsets of ISDN numbers. Call Waiting for bearer services or teleservices occurs when an attempt is made to exceed these limits.

As a network provider option, Call Waiting can be offered with several subscription options. The options apply separately to each ISDN number and service combination. For each subscription, only one value can be selected. Subscription options are summarized below:

Subscription options	*Value*
Calls that can wait	— All — Others are for further study
Calling user receives notification call is waiting	— No — Yes

In addition, the following subscription options can be specified for each ISDN number, all ISDN numbers, or subsets of ISDN numbers on each interface:

Subscription options	*Value*
Maximum number of calls which can be waiting	— One — l, where $1 \leq l \leq n$ — m

Note — The parameters m (maximum number of information channel) and n (maximum number of total calls present) are defined in the relevant basic service description (refer to Recommendation I.231 and I.241.

The use of T2 is a service provider option. When used, the value of T2 shall be set by the service provider as a default value subject to change only by the service provider.

3.2 *Normal procedures*

3.2.1 *Activation/deactivation*

The CW supplementary service is activated by the service provider at provision.

The CW supplementary service is deactivated by the service provider at withdrawal.

Registration does not apply

Note - The introduction, as a network option, of the possibility for a user to activate and deactivate the CW supplementary service in the network may be a long-term enhancement.

3.2.2 *Invocation*

3.2.2.1 When an incoming call from user C arrives at the access of subscriber B and encounters the channels busy condition, and a network determined user busy (NDUB) condition does not result, then the Call Waiting service will be invoked and the call shall be offered to subscriber B with an indication that the channels busy condition exists.

3.2.3 *Operation*

3.2.3.1 If a response is received from a terminal at the B access, within the normal basic call period, that the user(s) is (are) being informed about the incoming call, then user C will be given an indication that the called user(s) is (are) being informed of the incoming call. In some networks this indication may also indicate that call waiting is in operation.

3.2.3.2 If either user A or user B requests that the active call is terminated, then this call shall be terminated as for a basic call. User B shall then be able to accept the waiting call from user C using normal information channel selection procedures before the expiry of T2.

3.2.3.3 User B can also free resources by using the Call Hold supplementary service. User B shall then be able to accept the waiting call from user C using normal information channel selection procedures before the expiry of T2.

3.2.4 *Subscriber resources in use*

When an incoming call from user C arrives at the access of subscriber B and there is a B-channel available, the call shall be indicated to subscriber B. If a terminal at the access of subscriber B is busy because of another call but is able to accept the incoming call from user C, it may indicate to the network that the called user is being informed about the incoming call.

3.3 *Exceptional procedures*

3.3.1 *Activation/deactivation/registration*

Non identified.

3.3.2 *Invocation*

Non identified.

3.3.3 *Operation*

3.3.3.1 *Incoming call from user C ignored by subscriber B*

If the optional No Answer timer T2 expires without any acceptance from subscriber B of the incoming call, then the network shall inform subscriber B that the call is no longer waiting and also inform user C that his call cannot be connected. Normal release applies to the call attempt from user C (the call is cleared indicating no response) with an appropriate indication given to user C.

3.3.3.2 *Incoming call from user C rejected by user B*

A rejection of the waiting call by one of the terminals on the interface of subscriber B will not stop the optional No Answer timer T2 as another terminal may subsequently accept the waiting call within the remainder of the specified period. Such a rejection may, however, cancel any indication provided to that terminal. Where rejections of a waiting call have been received from all those terminals that responded with an alerting indication before the expiry of the optional No Answer timer T2, then the network shall inform user C that his call cannot be connected. Normal release applies to the call attempt from user C with the call being cleared indicating user rejection. Subscriber B is notified that the call is no longer waiting.

3.3.3.3 *Release by user C within the specified period*

If calling user C informs the network, before the expiry of the optional No Answer timer T2, that he wishes to release his call attempt to subscriber B, then the network shall inform subscriber B of this situation and initiate release of the call attempt from user C.

3.3.3.4 *No positive response terminals at subscriber B's interface*

If no positive response that user(s) are being informed of the waiting call is received from a terminal at subscriber B's interface during the normal call period (User Response timer T1), then the call attempt from user C shall be released by the network with user C being given the reason for the release.

3.3.3.5 *No reasons available*

If user B accepts a call and network resources do not exist to complete the call (i.e. no information channels are available), the network will indicate an error to user B with cause "no B-channels available". The network will not clear the call but will wait for another user B indication for acceptance, until user C clears the call or the optional No Answer timer T2 expires.

3.3.3.6 *Maximum number of waiting calls reached*

Subscriber B shall be considered as busy when the limit on the maximum number of calls which can be waiting has been reached. Any incoming call during this period shall be handled accordingly.

3.4 *Alternative procedures*

3.4.1 *Activation/deactivation/registration*

None identified.

3.4.2 *Invocation and operation*

None identified.

4 Network capabilities for charging

This Recommendation does not cover charging principles. Future Recommendations in the D-Series are expected to contain that information.

It shall be possible to charge the subscriber accurately for the service.

5 Interworking requirements

Calls originating from outside the ISDN can undergo call waiting at the access of subscriber B with no impact on subscriber B's service (see Annex A).

As a service provider option, a special in-band indication may be provided to the calling user instead of the normal alerting indication.

5.1 *Interworking with private ISDNs*

When user C is on a different network from subscriber B (e.g. one user on a private ISDN and the other user on a public ISDN), then indications to user C, if applicable, shall be sent to the network to which user C is attached for forwarding to user C.

6 Interaction with other supplementary services

6.1 *Call Waiting*

Not relevant.

6.2 *Call Transfer*

User B, who has subscribed to both Call Waiting and Call Transfer services, cannot transfer a waiting call from user C until he first establishes a connection to user C.

Assume that user B is on an active call with user A and has received an indication of a waiting call from user C. Users A and B have Call Waiting subscribed for their accesses and user B has subscribed to the Call Transfer service. User B intends to transfer user A to user D.

– User B may receive an indication of a waiting call from user C either before or during the transfer of user A to another party. The call waiting indication may be presented regardless of the type of transfer invoked by user B (i.e. for Normal, Single Step, or Explicit transfers). When user A has been transferred, a B-channel would normally become idle, enabling the waiting call to be answered by user B.

– If user A has a call waiting indication before or during the transfer process, then upon successful completion of the transfer of user A to user D, user A shall retain the waiting call indication. User A could use normal call waiting procedures (if desired) to accept the waiting call.

– If user D receives a call waiting indication during the transfer process, e.g. while being in a call with user B, then upon successful completion of the transfer of user A to user D, user D shall retain the waiting call indication. User D could use normal call waiting procedures (if desired) to accept the waiting call.

In general, a call waiting indication may be delivered to users A or B (and to user D during the transfer process) when the called user has subscribed to the Call Waiting service.

6.3 *Connected Line Identification Presentation (COLP)*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

When user B uses one of the call waiting procedures to accept a waiting call (within any time limits established by the service provider), user C will be informed of the connection. The confirmation that a connection has been established may provide the connected user B's number.

6.4 *Connected Line Identification Restriction (COLR)*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

6.5 *Calling Line Identification Presentation (CLIP)*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

If the user(s) at B is(are) given a call waiting indication, and has (have) subscribed to the CLIP service, then the calling user number shall be presented to the users at B at the time the call waiting indication is given.

6.6 *Calling Line Identification Restriction (CLIR)*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

Assume a user at C, who has subscribed to the CLIR service, reaches a user(s) at B, who has subscribed to the Call Waiting service. On invocation, the user at B would receive a call waiting indication but would not receive user C's number when the call waiting indication is given.

6.7 *Closed User Group*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

6.8 *Conference Calling*

A user at B who is active on any type of conference call may receive an indication of a waiting call.

Once a conference has been established:

i) Any party that has activated Call Waiting will be able to receive an indication of an incoming call, and could place his connection to the conference on hold to accept the waiting call.

ii) The Conference Controller could, if desired, add the party from the waiting call, by answering the waiting call and using the "add party from existing call" procedures.

6.9 *Direct-Dialling-In*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

6.10 *Call Diversion (Call Forwarding) services*

6.10.1 *Call Forwarding Busy*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

Note – The following text clarifies the situation. If user B is NDUB (Network Determined User Busy), call forwarding busy shall take place, and the call is not offered. If user B is not NDUB, the call shall be offered, and if the UDUB (User Determined User Busy) condition results, then call forwarding busy shall take place.

6.10.2 *Call forwarding no reply*

If subscriber B has call forwarding no reply (CFNR) activated, then a waiting call shall be offered as described in this definition. If no answer is received to this call within the duration of the CFNR timer, then the CFNR service is invoked and the call is forwarded as per that service definition.

6.10.3 *Call Forwarding Unconditional*

If subscriber B has activated Call Forwarding Unconditional, then the execution of that forwarding condition takes precedence over Call Waiting. Call Forwarding Unconditional can be activated while a call is waiting without changing the state of the waiting call.

6.11 *Line Hunting*

The Call Waiting service should not be provided to a line in a hunt group.

6.12 *Three-Party Service*

A user at B who is involved in a Three-Party Service operation (with minimal Three-Party Service or active in a three-way conversation) may receive an indication of a waiting call. The procedures and restrictions for handling the waiting call are defined in the Three-Party Service description.

6.13 *User-to-User Signalling*

User-to-user information (UUI) (service 1) included in the call set-up message will be delivered to subscriber B with the Call Waiting indication.

UUI (service 2) sent from the calling user to the called user during the alerting phase is allowed to be sent when a point-to-point configuration exists at the called side.

If the called user subscribes to User-to-User Signalling, he may include UUI (service 1) in a rejection of a waiting call when a point-to-point configuration exists at the called side.

There is no interaction with user-to-user service 3.

6.14 *Multiple Subscriber Number*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

6.15 *Call Hold*

When an ISDN user receives a call waiting indication the ISDN user may use the Call Hold service to hold his active call and answer the waiting call. Use of the hold service does not place a call into a waiting state.

6.16 *Advice of Charge*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

6.17 *Multi-Level Precedence and Preemption (MLPP) service*

a) The incoming call is of the lowest precedence level (precedence level 4):

1) One or more MLPP calls are of the lowest precedence level:

no interaction; Call Waiting service is invoked.

2) All MLPP calls are precedence calls:

Call Waiting service is invoked. If in-band call waiting tone is being applied as a network provider option, then the tone should not be provided in this case since it would disrupt a higher precedence call.

b) The incoming call is a precedence call:

1) One or more MLPP calls are of lower precedence than the incoming call:

An MLPP call of the lowest precedence level is preempted unless the called subscriber is non-preemptable. If the called subscriber is non-preemptable, Call Waiting service is invoked and the precedence level of the incoming call is provided to the called user along with call waiting indication.

2) One or more MLPP calls are of the same precedence and the rest of the MLPP calls are of higher precedence than the incoming call:

Call Waiting service is invoked. The precedence level of the incoming call is provided, along with call waiting indication, to the called users on MLPP calls at the same precedence level as the incoming call.

If the called user is on an MLPP call at a higher precedence level, call waiting service is invoked. If the in-band call waiting tone is being applied as a network provider option, then the tone should not be provided in this case since it would disrupt a higher precedence call.

3) All the MLPP calls are of higher precedence:

Call Waiting service is invoked. If in-band call waiting tone is being applied as a network provider option, then the tone should not be provided in this case since it would disrupt a higher precedence call.

6.18 *Priority service*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

7 Dynamic description

The dynamic description of this service is given in Figure 1/I.253.1.

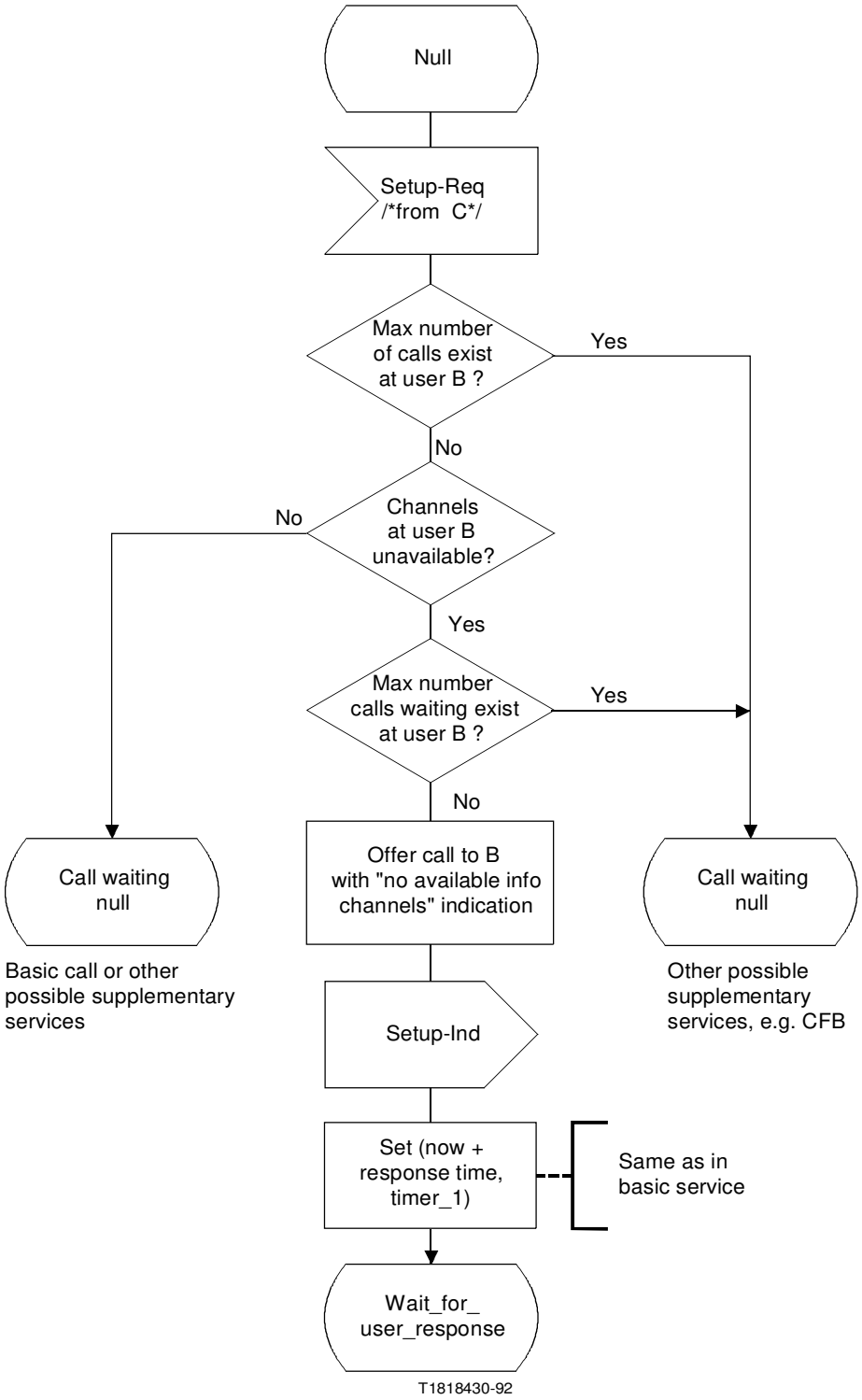

FIGURE 1/I.253.1 (sheet 1 of 5)

Overall SDL diagram of Call Waiting

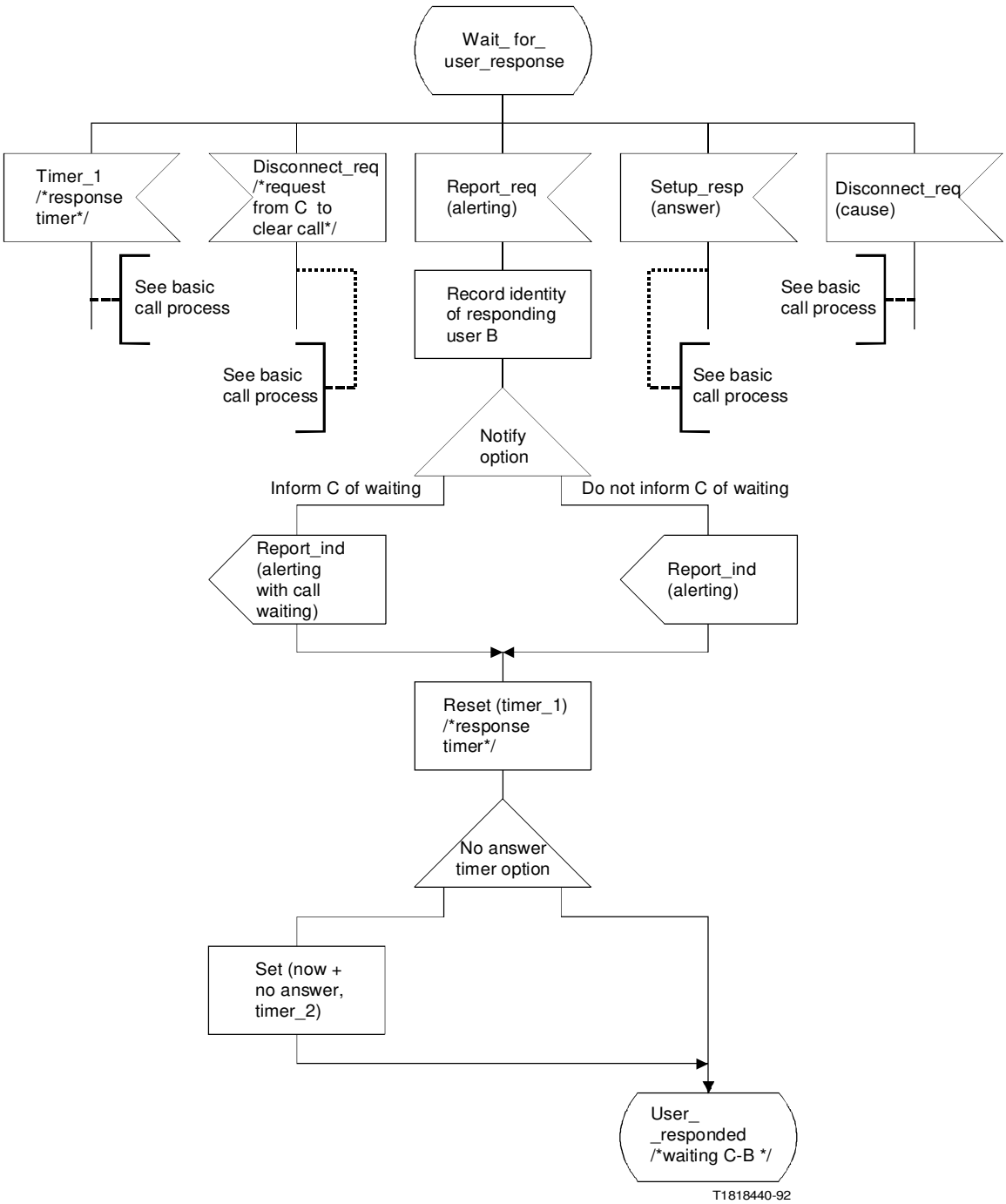

FIGURE 1/I.253.1 (sheet 2 of 5)

Overall SDL diagram of Call Waiting

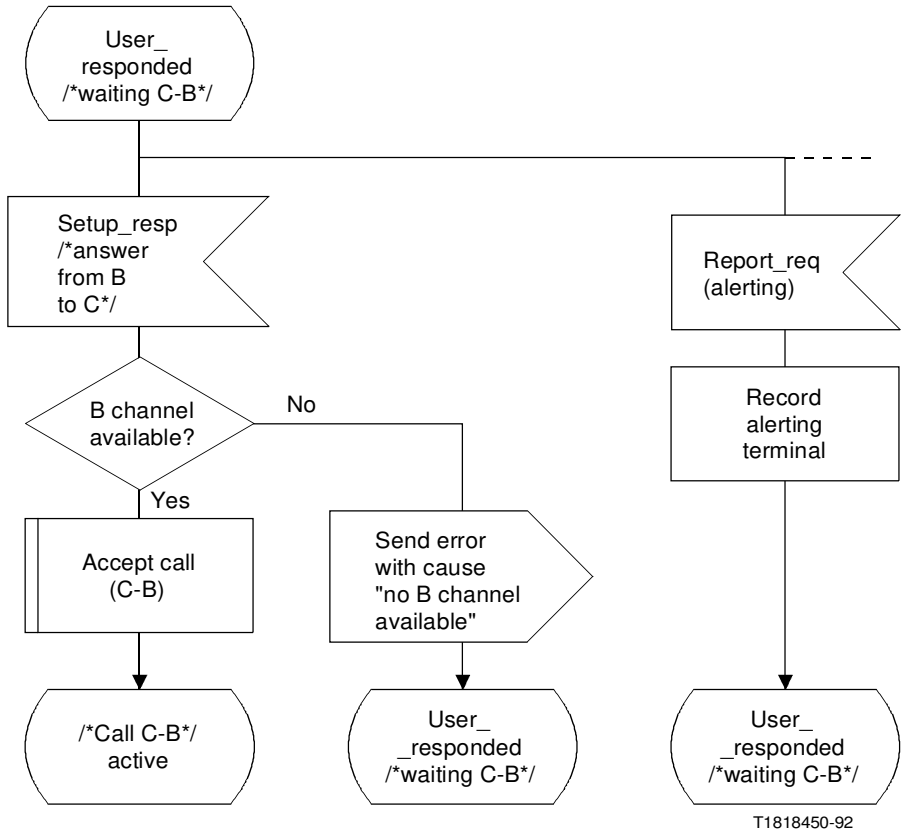

FIGURE 1/I.253.1 (sheet 3 of 5)

Overall SDL diagram of Call Waiting

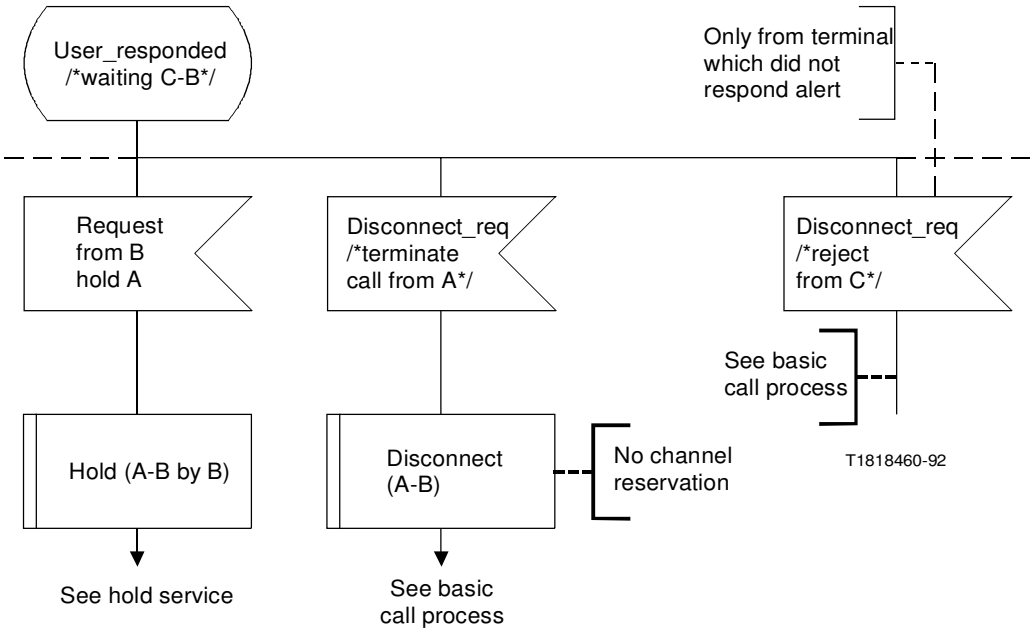

FIGURE 1/I.253.1 (sheet 4 of 5)

Overall SDL diagram of Call Waiting

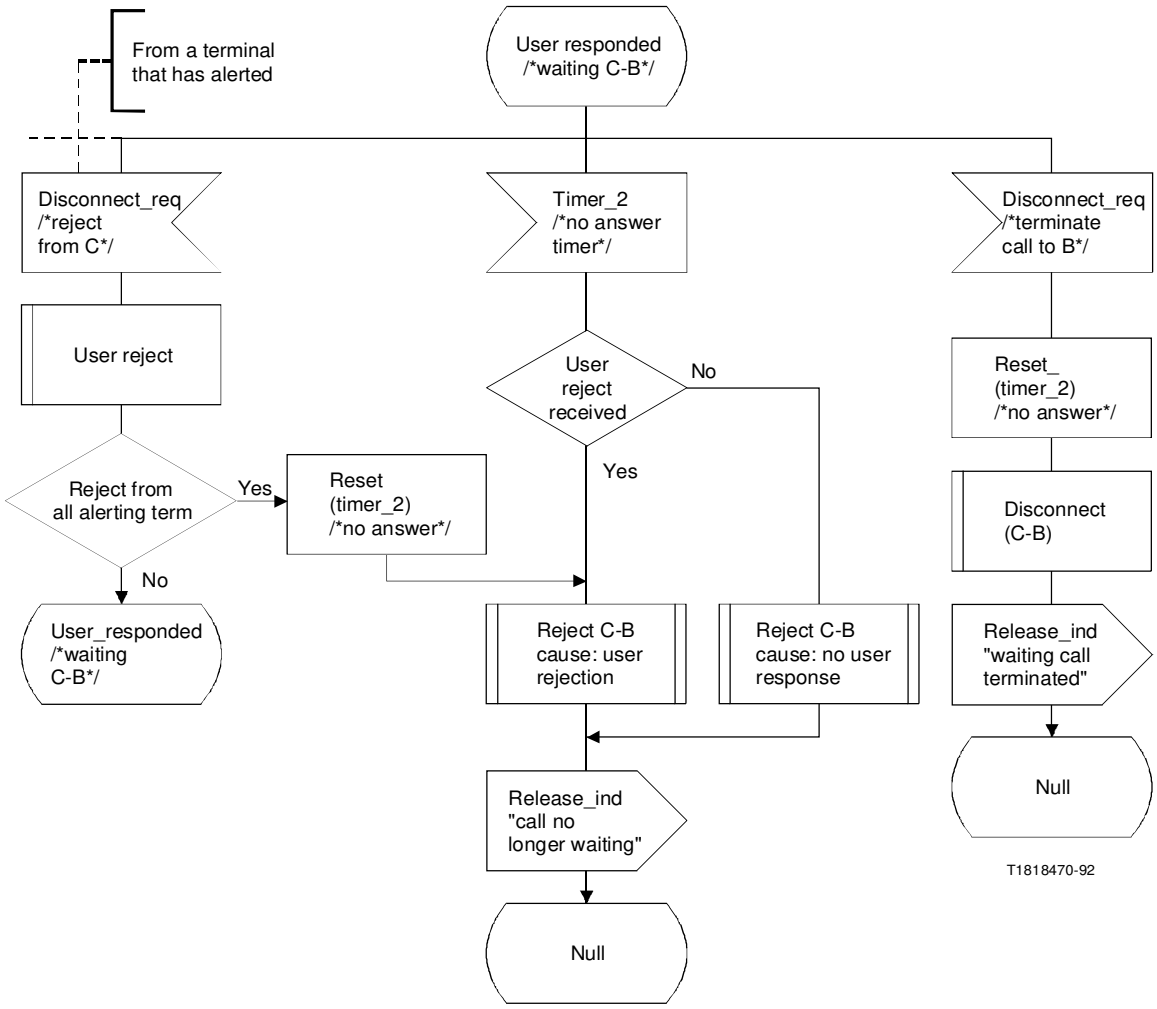

FIGURE 1/I.253.1 (sheet 5 of 5)

Overall SDL diagram of Call Waiting

ANNEX A

(to Recommendation I.253.1)

Optional in-band indications

A.1 *In-band call waiting indication*

In addition, as a service provider option, audible in-band indications may be provided to the channels occupied with the speech bearer service and the telephony teleservice. Where applied, tones should be in accordance with Recommendation E.180.

A.2 *Activation/deactivation*

In addition, under the in-band call waiting indication option, subscriber B may activate and deactivate call waiting in-band indications with an appropriate request. Whether, and if so, to what degree, activation/deactivation is supported by the network may be network dependent. If supported, then the network shall inform subscriber B (all terminals on the access) of the success, or other outcome, of this action.

A.3 *Interworking requirements*

If an ISDN subscriber B receives a call from a non-ISDN calling user, the network will send the call waiting indication to subscriber B in the normal way.

In addition, under the in-band call waiting indication option, an in-band indication will be applied to channels occupied with the 3.1 kHz audio bearer service (where the call originated from the PSTN as identified by a progress indicator), only if it is destined to a number designated for in-band notification by the call waiting subscriber.

ANNEX B

(to Recommendation I.253.1)

Additional "Busy" information

B.1 The following subscription option and definition text (ref. CCITT Report COM XVIII-R15) is included in this definition pending publication in Recommendation I.221.

The following subscription option is applicable to the interface as a whole regardless of service:

Subscription options	*Value*
Maximum number of information channels on the interface	c

B.2 *Resource busy conditions*

a) *Channels busy* — This condition occurs when there is no appropriate information channel (physical or logical) available for the network to use for the call. It may be due to exceeding the information channel limit associated with the service or with the interface.

b) *Maximum number of total calls reached* — This condition occurs when the maximum number of total calls supported either at the given subscriber's interface(s) or for a given service has been reached.