INTERNATIONAL TELECOMMUNICATION UNION

CCITT I.252.2

THE INTERNATIONAL
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CONSULTATIVE COMMITTEE

(08/92)

INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

GENERAL STRUCTURE AND SERVICE CAPABILITIES

CALL FORWARDING BUSY

Recommendation I.252.2

Geneva, 1992

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.252.2 was revised by Study Group I and was approved under the Resolution No. 2 procedure on the 4th of August 1992.

CCITT NOTES

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

2) A list of abbreviations used in this Recommendation can be found in Annex A.

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Recommendation I.252.2

CALL FORWARDING BUSY

(revised 1992)

1 Definition

Call Forwarding Busy Service permits a "served user" (see § 2.2) to have the network send to another number all incoming calls for the served user's ISDN number (or just those associated with a specified basic service) which meet busy at the served user's ISDN number. The served user's originating service is unaffected.

The forwarded-to number is registered with the network for use on all calls.

Note – In normal situations, the service is provided on a per access basis. (In these situations, there is a one-to-one relationship between ISDN number and access.) However, the network may recognize multiple numbers on a single interface; in addition, it may not understand a complete ISDN number (e.g. Direct-Dialling-In). In these cases, the Call Forwarding Busy service is offered on the basis of the part of the ISDN number which the network can recognize.

2 Description

2.1 *General description*

For a given ISDN number, the Call Forwarding Busy (CFB) service (including options) may be subscribed to for each basic service to which the user(s) of the number subscribes, or collectively for all the basic services to which the user(s) subscribes. Since subscription is on an ISDN number basis, the same call forwarding subscriptions will apply to all terminals using this number.

Note – In this service description, it is assumed that a single ISDN number is not shared across multiple interfaces. A single ISDN number may, however, be shared by multiple terminals on the same interface. Procedures permitting an ISDN number to be shared across multiple interfaces are for further study. For multiple access installations, it may be possible for the user to specify, on activation, if the service is applicable to a specific access or all accesses associated with that installation.

The served user can request a different forwarded-to number for each basic service subscription parameter value to which he has subscribed.

An indication that the CFB service is activated on a number may, as an option, be given to the user who has forwarding activated, each time an outgoing call is made. This may take the form of a special indication in the proceed response.

2.2 *Specific terminology*

Served user: User of a particular ISDN number who is requesting that calls to his number be forwarded. This user may also be referred to as the forwarding user or the called user.

Forwarded-to-user: User to whom the call shall be forwarded.

2.3 *Qualifications on the applicability to telecommunication services*

No restrictions identified.

3 Procedures

3.1 *Provision/withdrawal*

CFB service shall be provided after pre-arrangement with the service provider.

The service can be offered with four subscription options. Options apply separately to each basic service subscribed to on each ISDN number. For each subscription option, only one value can be selected. Subscription options are summarized below:

Subscription options	Value
Served user receives notification that the call has been forwarded	No Yes, with information about the call for the NDUB case (see § 3.2.2)
Calling user receives notification that the call has been forwarded (see Note)	No Yes, without the forwarded-to user number Yes, with the forwarded-to user number
Served user receives notification that CFB is currently activated	No Yes
Served user releases his/her number to forwarded-to user	No Yes

Note – Notification of diversion to the calling user A may be provided as a network provider option.

This service will be withdrawn by the service provider at the subscriber's request or for administrative reasons.

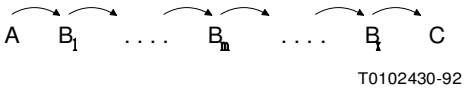
3.2 *Normal procedures*

3.2.1 *Activation/deactivation/registration*

Same as for Call Forwarding Unconditional (CFU) (see Recommendation I.252.4).

3.2.2 *Invocation and operation*

The following illustration clarifies the CFB procedures. Assume that A calls B_1, who forwards the call to B_2, ..., B_m, ..., B_x. The final receiver of the call is C.



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3.2.2.1 *Served user B_m's perspective*

If CFB is active and the served user is network determined user busy (NDUB) or user determined user busy (UDUB), then an incoming call to the served user will be forwarded. In case of NDUB, the call is not offered to the served user.

In the case of UDUB, the call will have been offered to the served user. Normal call set-up information will already have been provided to the served user. When the forwarding attempt is started, the served user, as a subscription option, may receive notification that a call has been forwarded. No further notification is given.

When an incoming call is forwarded without being offered to the served user (i.e. NDUB condition), the served user, as a subscription option, may receive notification of the call forwarding (but will not be able to answer the incoming call). This notification is given as soon as the forwarding attempt is started.

This notification includes the following information (on the call that has been forwarded):

1) indication that a call has been forwarded;

2) telecommunications service information (e.g., bearer capability, higher layer compatibility);

3) user-to-user information;

4) B_m's number; and

5) calling party number A [if the calling line identification presentation (CLIP) is applicable].

If multiple forwardings have occurred and the served user is authorized to receive additional information he may also receive:

6) originally called number B_1;

7) cause for original forwarding;

8) last forwarding number $B_{(m-1)}$;

9) cause for last forwarding.

3.2.2.2 *Forwarded-to user C's perspective*

The forwarded-to user C will receive an indication that the call has been forwarded.

As an option he may also receive:

1) originally called number B_1;

2) cause for original forwarding;

3) last forwarding number B_x;

4) cause for last forwarding.

(Depending on the use of other supplementary services, the forwarded-to user C may also receive information such as the calling party A number and user-to-user signalling. See the description of interactions with other supplementary services.)

3.2.2.3 *Calling user A's perspective*

The following notification procedures for the calling user A are a network provider option. The notification procedures for calling user A shall only operate if the served user has subscribed to the option "calling user receives notification that call has been forwarded".

For the initial diversion and for any subsequent call forwarding no reply (CFNR), or call deflection (CD) after alerting has commenced, the network will take the following actions depending on the subscription option parameter of the served user.

1) If this parameter is set to "calling user does not receive notification", no notification is given to the calling user.

2) If this parameter is set to "notify calling user, without forwarded-to number", then the calling user will receive a notification that the call has been forwarded without the forwarded-to number, providing a previous diverting user has not requested that no notification is given as under item 1) above.

3) If this parameter is set to "notify calling user, with forwarded-to number", then the calling user will receive a notification that the call has been forwarded, providing a previous diverting user has not requested that no notification is given as under item 1) above. In addition, if alerting takes place (e.g. at user C), notification of the current forwarded-to number will be given when alerting commences if all served users in all previous diversions subscribe to "notify calling user, with forwarded-to number".

Transfer of the forwarded-to user's number may be subject to number notification restrictions due to the invocation of other supplementary services at the forwarded-to user.

3.3 *Exceptional procedures*

3.3.1 *Activation/deactivation/registration*

Same as CFU (see Recommendation I.252.4).

3.3.2 *Invocation and operation*

Call forwarding applies only to subscribed basic services. Calls to an ISDN number requesting a basic service which is not subscribed to, will never be forwarded.

In cases where a user may be given the address of users involved in the call [e.g. when the calling user may receive the forwarded-to user's address, or when the forwarded-to user may receive the forwarding user's address and originally forwarding address (multiple forwarding), or when the served user may receive user's addresses] as part of that user's notification and this address information is unavailable (e.g. due to address presentation restriction or interworking), the user who would have been given the address shall get an indication of the reason why no number can be given.

Within an ISDN, or tandem ISDNs, the total number of all forwardings for each call should be limited. The maximum number of such connections should be limited to a value between three and five for each call. This is to prevent infinite looping.

If the limit is reached and an attempt is made to forward the call an additional time, then the forwarded call shall be treated as follows:

If the forwarded call cannot be completed to the forwarded-to destination, then the network will clear the forwarded leg of the call. Specifically, if CFB has been invoked, and CFNR or CD after alerting has not occurred, then the call would be cleared back towards the calling user, and the calling user would be sent a cause to indicate that the call cannot be completed (i.e. because of network congestion, invalid number, facility not available, etc.). This information shall not explicitly reveal that the call has been forwarded. Refer to Recommendations I.252.3 or I.252.5 respectively, for the case where the forwarded call cannot be completed and CFNR or CD, after alerting, has occurred.

3.4 *Alternative procedures*

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

With diversion invoked across more than one network, e.g. from public switched telephone network (PSTN) via ISDN to another PSTN or between ISDNs of different countries, or even different continents, a decrease in Quality of Service parameters may arise. For example, the parameters that may be influenced are:

- Call Establishment Time;
- Transmission Delay;
- Bit Error Ratio;
- Attenuation of Audio Signals.

Depending on national implementations, the network may provide some precautions, e.g. limit the number of forwarding legs, limit the number of international border crossings, limit the number of satellite hops, etc.

5.1 *Interworking with non-ISDN networks*

If the forwarded-to number is not within the ISDN, then an interworking situation is said to exist.

The number of times a call will be forwarded once it has exited the ISDN network cannot be limited by this ISDN network.

If a forwarded call meets an interworking situation, then an interworking indication should be sent to the calling party. This indication shall not explicitly reveal that the call has been forwarded.

In case of interworking, appropriate tones and/or announcements should be provided.

Note – Once a call has been forwarded to a non-ISDN network, then further forwardings and/or notifications to the calling user are outside the scope of this Recommendation.

5.2 *Interworking with private ISDN*

This assumes cooperation between the public and private networks. The forwarded-to number may be registered with the public network or the private ISDN. Further study is required to determine whether the latter should be a service provider option.

If the private network detects forwarding back to a destination in the public network, the private network could request that forwarding is performed by the public network.

The private network may also specify either a transit network or a network specific facility or both to be used for that forwarding.

Within ISDNs (public or private) the total number of forwardings for each call should be limited (see Recommendation I.252.4, § 3.3.2).

If a private ISDN employs other types of service interactions than specified under § 6, e.g. with completion of calls to busy subscribers (CCBS), the private ISDN shall supply the necessary precautions against such consequences.

Where a remote user is on a different network, notifications to the remote user, if applicable, shall be sent to the remote user's network for forwarding to the remote user.

6 Interaction with other supplementary services

The ways in which Call Forwarding Busy interacts with other supplementary services are in general identical to the ways in which Call Forwarding Unconditional interacts with other supplementary services. Thus, if the interactions are described to be "same as CFU", the CFU text should be taken verbatim, except that the expression "Call Forwarding Unconditional" should be replaced by "Call Forwarding Busy".

6.1 *Call Waiting*

Calling user: Same as CFU (see Recommendation I.252.4).

Called user: No impact. That is, if the called user is not NDUB the call will be offered, and if the called user's response is UDUB, then Call Forwarding Busy will take place. If the called user is NDUB, Call Forwarding Busy will take place and the call is not offered.

Forwarded-to user: A forwarded call can invoke Call Waiting.

6.2 *Call Transfer*

Same as CFU (see Recommendation I.252.4).

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, 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 condition results, then Call Forwarding Busy shall take place.

6.3 *Connected Line Identification Presentation*

Calling user notification of the diverted-to number is part of the diversion service and should not be considered to require an invocation of Connected Line Identification Presentation (COLP) by the calling user.

If the served (diverting) user selects the option that the calling user is not notified of call forwarding, then the calling user will receive no forwarding notification. In addition, the calling user will not receive the connected user's identity when the call is answered, unless the calling user has override capability.

If the served (diverting) user selects the option that the calling user is notified, but without the forward-to-user number, then the calling user will not receive the connected user's identify when the call is answered, unless the calling user has override capability.

6.4 *Connected Line Identification Restriction*

If a forwarded-to user subscribes to Connected Line Identification Restriction (COLR) "permanent mode", then the forwarded-to user's number shall not be provided with the notification that the call has been forwarded.

If the forwarded-to user subscribes to COLR "temporary mode", the provision of the forwarded-to-user's number to the calling user shall not be allowed during the alerting condition of the call. The forwarded-to-user's connected number may still be provided on answer based on COLR temporary mode operation.

In each of the above situations, a calling user that subscribes to COLP and having override capability shall not be able to receive the forwarded-to user number as part of the diverting notification information, but can invoke COLP in order to receive the connected line identity when the call is answered.

6.5 *Calling Line Identification Presentation*

Called user: If subscribed to, the called user can receive the calling line identification of all calls which have been forwarded.

Forwarded-to users, who have subscribed to CLIP may receive the calling user's number if the calling user has not subscribed/invoked Calling Line Identification Restriction (CLIR).

6.6 *Calling Line Identification Restriction*

Calling user: When CLIR is applicable and activated, the calling line identification will not be presented to the forwarded-to user unless the forwarded-to user is in the override category. The latter is a national option.

6.7 *Closed User Group*

Same as CFU (see Recommendation I.252.4).

6.8 *Conference Calling*

Same as CFU (see Recommendation I.252.4).

6.9 *Direct-Dialling-In (DDI)*

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

6.10 *Call diversion services*

6.10.1 *Call Forwarding Busy*

Not applicable.

6.10.2 *Call Forwarding No Reply*

No impact, i.e. neither supplementary service affects the operation of the other supplementary service (because these invocation criteria are mutually exclusive).

6.10.3 *Call Forwarding Unconditional*

The invocation of CFU takes precedence over CFB.

6.10.4 *Call Deflection*

In case of NDUB the incoming call is not offered to the called user and Call Forwarding Busy takes precedence over Call Deflection.

If a NDUB condition is not met, the incoming call is offered to the called user and invocation of either CFB or Call Deflection depends on the user's response. If both responses are received, the CD invocation is taken to be a "positive response" and the user busy response is ignored.

6.11 *Line Hunting*

In general, Line Hunting takes precedence over CFB. Thus, CFB only occurs if all members of the hunt group are busy.

6.12 *Three-Party Service*

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

6.13 *User-to-User Signalling*

Refer to Recommendation I.257.1, Annex B, for more details of the interaction with the User-to-User Signalling service.

See interaction with Call Forwarding Unconditional (Recommendation I.252.4). However, if a user determined user busy condition exists, any user-to-user information (UUI) and/or request for user-to-user signalling (UUS) shall also be delivered to the forwarding user when the call is offered.

6.14 *Multiple Subscriber Number*

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

6.15 *Call Hold*

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

6.16 *Advice of Charge*

Refer to Recommendation I.256.2, §§ 1.6.10, 2.6.10 and 3.6.10, Interaction with CFB.

6.17 *Multi-level Precedence and Preemption*

If the incoming call is of higher precedence than one or more calls at user B, a call of the lowest precedence will be preempted and the incoming call will be established, i.e. the Call Forwarding service will not be invoked.

If the incoming call is of equal or lower precedence than the established calls, the Call Forwarding service will be invoked.

If the called subscriber is non-preemptable, the Call Forwarding service will be invoked regardless of the precedence levels of incoming call and established calls.

The precedence level of calls is preserved during the forwarding process, and the forwarde-to user may be preempted.

If call forwarding busy is activated by the called party and the called party has specified an alternate party, the forwarding procedure will be performed prior to the alternate party diversion. If a precedence call is forwarded (including possible multiple forwardings) and is not responded to by any forwarded-to party (e.g. call unanswered or unacknowledged; called party busy with a call of equal or higher precedence; or called party busy and non-preemptable) within a specified period of time (typically 30 seconds), the call will be diverted to the alternate party of the original called subscriber. If no alternate party is specified, the call will be forwarded in the normal manner.

6.18 *Priority*

Priority service is restricted to A-B connections.

6.19 *Malicious Call Identification*

The Malicious Call Identification (MCID) supplementary service can be invoked for a forwarded call. In addition to the normal operation of the MCID supplementary service, the identity of the called user shall be registered and, as a network option, the last diverting user can be registered.

Once forwarding has taken place, the forwarding user cannot invoke the MCID supplementary service.

6.20 *Outgoing Call Barring*

When CFB has been activated prior to the activation of Outgoing Call Barring (OCB), the calls are forwarded regardless of the limitations of the version of OCB that has been activated; i.e. in this case there exists no interaction between the two services.

After OCB has been activated, calls can only be forwarded to destinations which are within the limitations of the OCB version, that has been activated.

6.21 *Reverse Charging*

If parties A, B and C are all in different countries, reverse charging (REV) for all charges to C should not be permitted.

Where charging on diverted calls occurs on a per leg basis, reverse charging should occur only on the leg on which it is requested.

A request for REV, case B made by the calling user should always be rejected on calls which have been diverted.

REV, case B requested by the called user and REV, case C can only be requested on a final leg.

With respect to REV, cases A and D, the following restrictions apply:

a) on leg A-B_1, REV will come into operation only if user B_1 subscribes to REV, case D. User A may or may not have requested REV, case A in addition;

b) on leg B_m-B_{m+1}, REV will come into operation only if user B_{m+1} subscribes to REV, case D. User B_m may or may not have requested REV, case A together with a deflection request.

Note – In other cases of diversion, user B_m cannot make a request for REV on the outgoing leg.

c) on leg B_n-C, the following applies:

– if user C subscribes to REV, case D, REV will always come into operation. User B_n may or may not have requested REV, case A, together with a deflection request.

Note – In other cases of diversion, user B_n cannot make a request for REV on the outgoing leg.

– if user C does not subscribe to REV, case D, then REV will come into operation only if user B_n has requested REV, case A, together with a deflection request and user C accepts the REV request when connecting the call.

6.22 *Sub-addressing*

The sub-address associated with the original called party number shall not be forwarded if the call is forwarded.

7 Dynamic description

The dynamic description given in Figure 1/I.252.2 contains the descriptions of the four call diversion services (CFU, CFB, CFNR and CD).

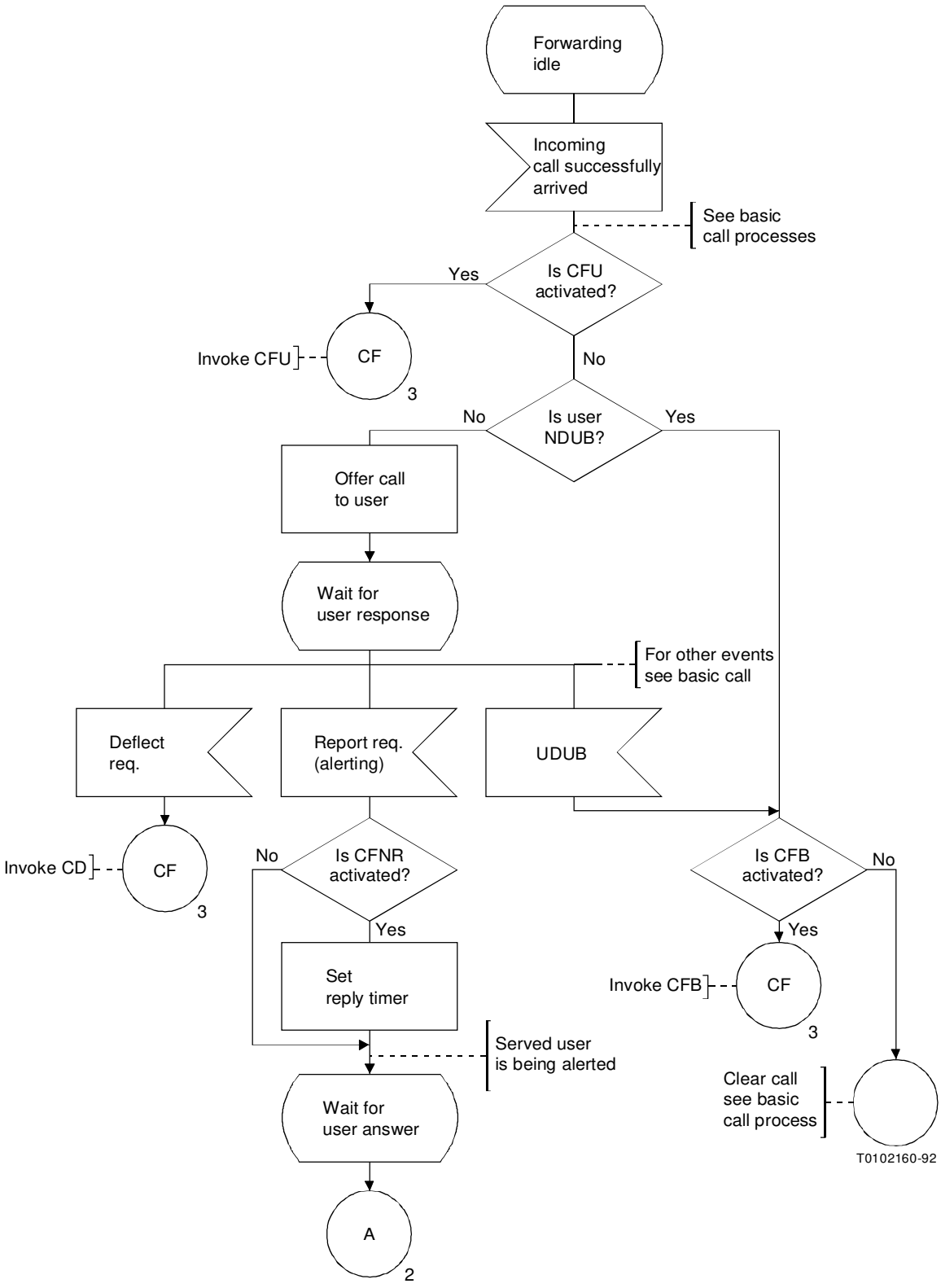


FIGURE 1/I.252.2 (sheet 1 of 5)

Call Forwarding Busy

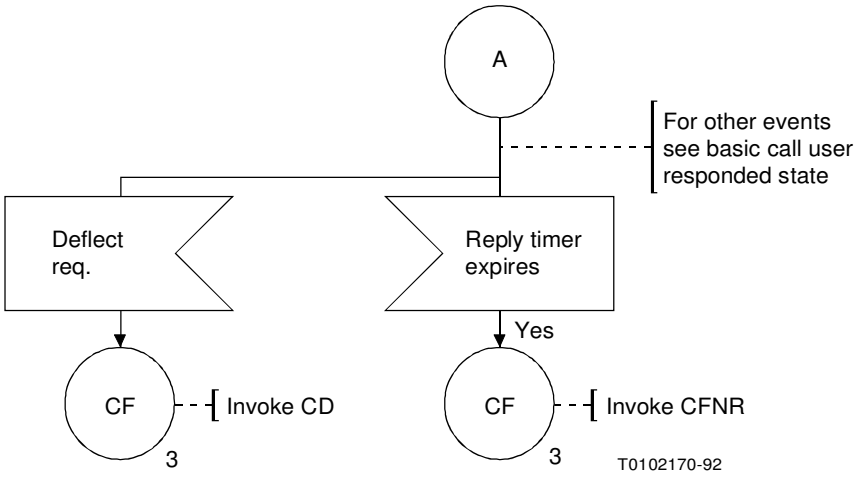


FIGURE 1/I.252.2 (sheet 2 of 5)

Call Forwarding Busy

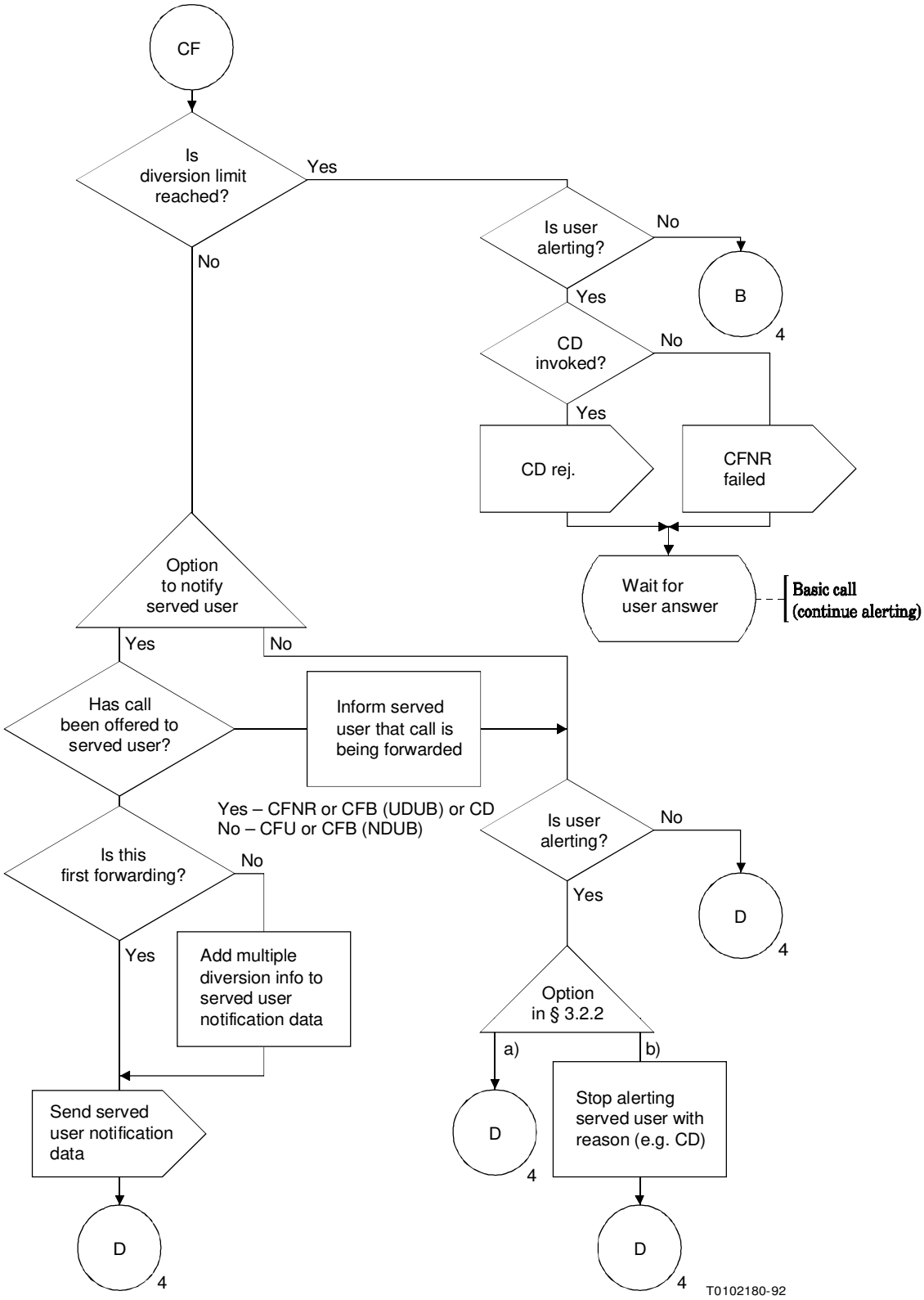
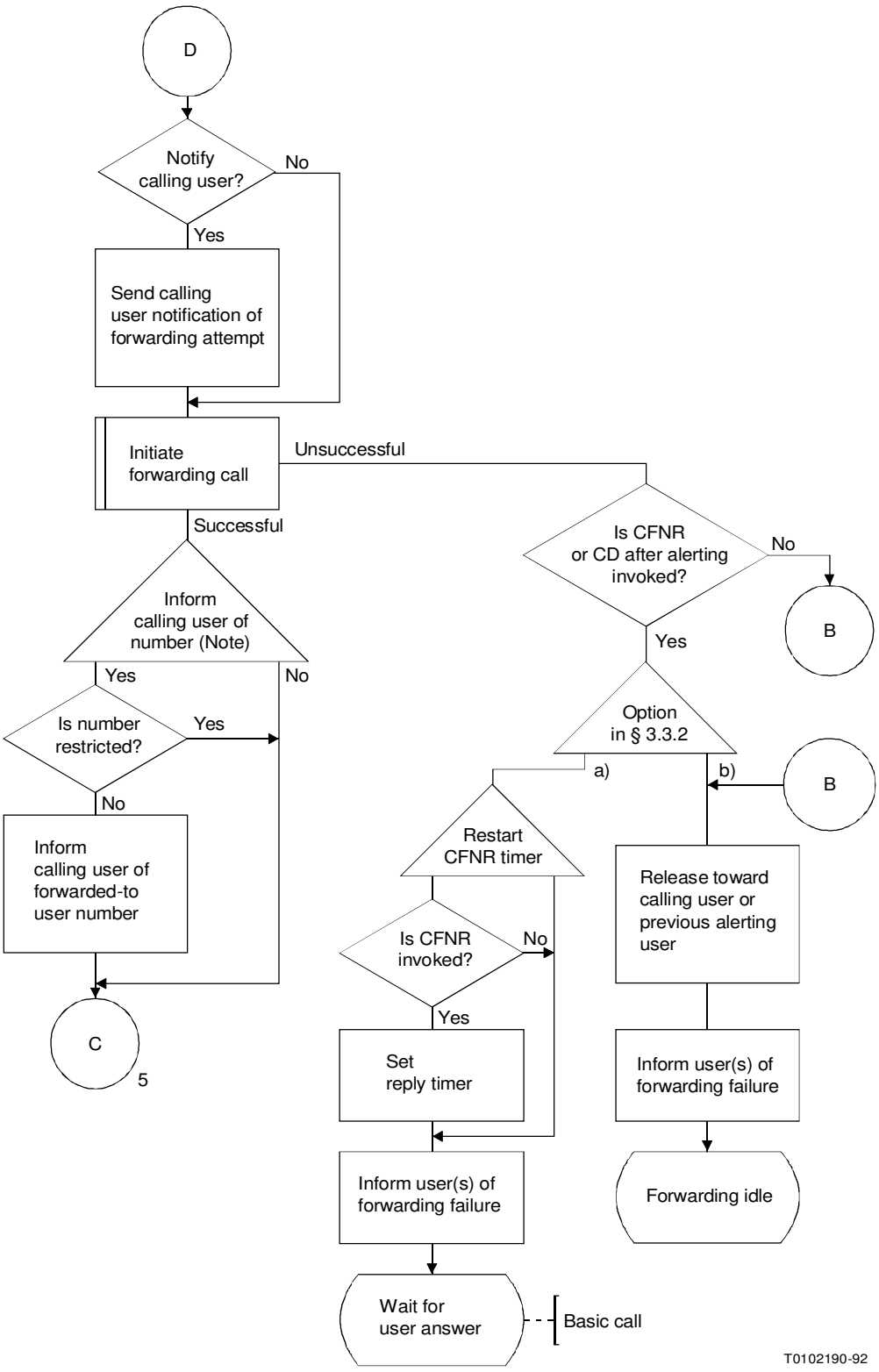


FIGURE 1/I.252.2 (sheet 3 of 5)

Call Forwarding Busy



Note – All users in a diversion.

FIGURE 1/I.252.2 (sheet 4 of 5)

Call Forwarding Busy

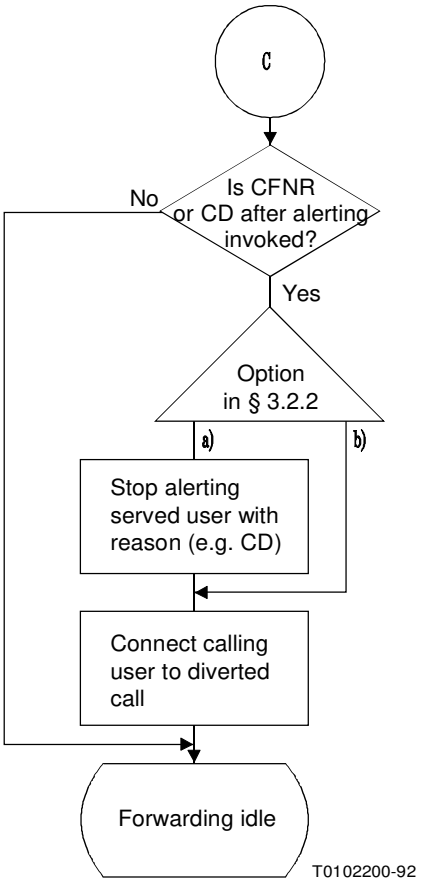


FIGURE 1/I.252.2 (sheet 5 of 5)

Call Forwarding Busy

ANNEX A

(to Recommendation I.252.2)

Alphabetical list of abbreviations used in this Recommendation

CCBS	Completion of calls to busy subscribers
CD	Call deflection
CFB	Call forwarding busy
CFNR	Call forwarding no reply
CFU	Call forwarding unconditional
CLIP	Calling line identification presentation
CLIR	Calling line identification restriction
COLP	Connected line identification presentation
COLR	Connected line identification restriction
ISDN	Integrated services digital network
MCID	Malicious call identification
NDUB	Network determined user busy
OCB	Outgoing call bearing
PSTN	Public switched telephone network
REV	Reverse charging
UDUB	User determined user busy
UUI	User-to-user information
UUS	User-to-user signalling