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INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

GENERAL STRUCTURE AND SERVICE CAPABILITIES

CALL FORWARDING UNCONDITIONAL

Recommendation I.252.4

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.252.4 was prepared 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.252.4

CALL FORWARDING UNCONDITIONAL

(revised 1992)

1 Definition

Call forwarding unconditional 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). The served user's originating service is unaffected. If this service is activated, calls are forwarded no matter what the condition of the termination. Other call forwarding services provide for call forwarding based on condition, e.g. Call Forwarding Busy and Call Forwarding No Reply.

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

Note – In normal situations, the Call Forwarding Unconditional 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 Unconditional 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, Call Forwarding Unconditional (CFU) 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 CFU 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*

CFU 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 (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 CFU 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*

If the served user has subscribed to CFU, the served user will use the activation procedure.

To activate CFU, the served user must supply:

1) the forwarded-to address;

2) information as to whether all calls or all calls of a specified basic service should be forwarded;

3) possibly the ISDN number for which CFU should apply.

As a network option, verification of the forwarded-to number should be accomplished, if possible, before accepting the call forwarding request.

When the served user so activates CFU, the service provider will return notification of acceptance or rejection of the request (see Exceptional procedures, § 3.3, for a list of possible causes for rejection).

This notification will include the number of forwarded-to users to whom the call forwarding is active. If a single number can be used by more than one terminal, activation of CFU will be possible from any terminal which uses this number.

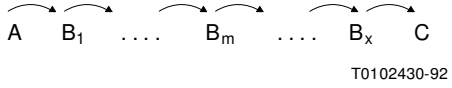
On successful activation/deactivation, the activation/deactivation response from the network will be sent to all terminals. If the activation/deactivation is unsuccessful, then the network shall inform only the terminal which requested the activation/deactivation.

As a service option, activation/deactivation may be restricted to selected terminals (users) (e.g. by use of a password).

CFU can be deactivated in either of two ways. The user can specifically deactivate the CFU activation. The user can activate CFU for the specified basic service to another number, thus causing the previous invocation of CFU to be overridden.

3.2.2 *Invocation and operation*

The following illustration clarifies the CFU 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.



3.2.2.1 *Served user B_m's perspective*

When CFU is active, all incoming calls will be forwarded without being offered to the served user B_m. When an incoming call is forwarded without being offered to the served user, 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;

5) calling party number A [if 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 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 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 invocation of other supplementary services at the forwarded-to user.

3.3 *Exceptional procedures*

3.3.1 *Activation/deactivation/registration*

3.3.1.1 *Activation*

Call Forwarding Unconditional for all basic services and Call Forwarding of particular basic services cannot be activated simultaneously.

If the system cannot accept an activation request, the served user should receive a notification that call forwarding activation was unsuccessful. Possible causes are:

i) service not subscribed;

ii) forwarded-to ISDN number invalid;

iii) use of an operator access prefix;

iv) forwarded-to ISDN number's telecommunication services violate subscribed constraints (e.g. group restrictions);

v) forwarded-to ISDN number is a free number within the same office (i.e. a number to which no call is chargeable);

vi) insufficient information;

vii) requested telecommunication service is not provided to the forwarded-to ISDN number;

viii) forwarded-to number is a special service code (e.g. police);

ix) forwarded-to number is served user's number.

However, the network is not required to validate information related to the forwarded-to user.

3.3.1.2 *Deactivation*

If the user does not specify completely which CFU request is to be deactivated (e.g. the basic service and/or the originator's number), the network will reject the deactivation request with appropriate cause.

If the network cannot accept a user's request for deactivation, the cause will be returned to the user, e.g. incorrect origination ISDN number used.

If the network deactivates CFU without the served user having requested deactivation (e.g. when an exceptional condition occurs), the served user will receive notification along with the cause.

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 on 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 CFU has been invoked, then the call would be cleared back towards the calling user. If the call has not previously undergone CFNR or CD after alerting, the call will be cleared all the way back to the calling user and the calling user will be informed that no user is responding. 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 cases 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 requirements

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 to be used for that forwarding.

Within ISDNs (public or private) the total number of forwardings for each call should be limited (see § 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

6.1 *Call Waiting*

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

Called user: If a called user has activated CFU, then execution of that forwarding condition takes precedence over Call Waiting. CFU can be activated while a call is waiting without changing the state of the waiting call.

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

6.2 *Call Transfer*

6.2.1 *Transfer of a forwarded call*

Calling user: A call which has been forwarded can be transferred by the calling user.

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

Forwarded-to user: A call that has been transferred will be forwarded if the transferred-to user has CFU active and the appropriate forwarding conditions are met. A call which has been forwarded can be transferred by the forwarded-to user.

6.2.2 *Forwarding of a call during transfer*

A call which is being transferred can be forwarded by the party to whom the call is being transferred.

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 forwarded-to user number, then the calling user will not receive the connected user's identity when the call is answered, unless the calling user has override capability.

6.4 *Connected Line Identification Restriction*

If a forwarded-to user subscriber 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*

Closed User Group (CUG) restrictions between the calling user and the forwarding user must be met. In the case of multiple forwarding, CUG restrictions between the calling user and the forwarding user have to be met at each intermediate forwarding point. In addition, CUG restrictions between the calling user and forwarded-to user must be met end-to-end.

Called user/forwarded-to user: When a call is forwarded, a new check of the CUG restrictions between the calling user and forwarded-to user is made at the "forwarded-to" destination. The CUG information sent to the "forwarded-to" destination is the same calling user CUG information that was sent from the originating network.

6.8 *Conference Calling*

Calling user: If a conference controller attempts to establish a conference call and calls a user with call forwarding active, the forwarded-to user will be alerted and can be added to the conference.

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

Forwarded-to user: A forwarded-to user can establish a conference using an existing forwarded call as one of the conference connections.

A call, which has been forwarded, can be added to an existing conference by the forwarded-to user.

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*

The invocation of CFU takes precedence over CFB.

6.10.2 *Call Forwarding No Reply*

The invocation of CFU takes precedence over CFNR.

6.10.3 *Call Forwarding Unconditional*

Not applicable.

6.10.4 *Call Deflection*

The invocation of CFU takes precedence over CD.

6.11 *Line Hunting*

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

Called user: Call Forwarding may be assignable to all or part of the hunting group. When forwarding is only required on part of the hunting group, the forwarding customer must specify, at activation, which access the service is to be invoked from. Procedures for the operations of this service in association with part of a hunt group, need to be completed. In general, CFU takes precedence over Line Hunting.

Forwarded-to user: Forwarded calls will be treated as normal calls when completing to a multiline group user.

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 (UUS) service.

Calls originated by a user with call forwarding unconditional activated.

Since call forwarding unconditional does not affect the forwarding user's ability to make outgoing calls, a user with call forwarding unconditional activated can send and receive user-to-user information (UUI) in association with an ongoing call or at the set-up of a new call.

Calls incoming to a user with call forwarding unconditional activated.

Any UUI or request for UUS that accompanies the set-up request, shall be forwarded with the call.

Note – As a network provider option, the forwarding of UUI and/or UUS requests can be restricted to forwarding users who subscribe to the relevant UUS supplementary service.

After forwarding:

UUS service 3 may be requested during the active phase of the call.

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 CFU.

6.17 *Multi-level Precedence and Preemption*

The Call Forwarding Unconditional service takes precedence over the MLPP service.

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

If Call Forwarding Unconditional 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 CFU 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 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 Reverse Charging (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

Refer to the call forwarding busy (CFB) dynamic description (which covers CFB, CFNR, CFU and CD) in Recommendation I.252.2, § 2.

ANNEX A

(to Recommendation I.252.4)

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
CUG	Closed user group
DDI	Direct-dialling-in
ISDN	Integrated services digital network
MCID	Malicious call identification
OCB	Outgoing call barring
PSTN	Public switched telephone network
REV	Reverse charging
UUI	User-to-user information
UUS	User-to-user signalling