

ETSI EN 300 201 V1.2.1 (2001-05)

European Standard (Telecommunications series)

Integrated Services Digital Network (ISDN); Call Forwarding No Reply (CFNR) supplementary service; Service description



Reference

REN/SPAN-110091

Keywords

CF, ISDN, stage 1, supplementary service

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Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Services and Protocols for Advanced Networks (SPAN).

As an editorial comment received during OAP title has been aligned with the former versions of this standard.

National transposition dates	
Date of adoption of this EN:	25 May 2001
Date of latest announcement of this EN (doa):	31 August 2001
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	28 February 2002
Date of withdrawal of any conflicting National Standard (dow):	28 February 2002

1 Scope

The present document defines the stage one of the Call Forwarding No Reply (CFNR) supplementary service for the pan-European Integrated Services Digital Network (ISDN) as provided by European telecommunication operators. Stage one is an overall service description from the user's point of view (see ITU-T Recommendation I.130 [1]), but does not deal with the details of the human interface itself.

The present document defines the interworking requirements of private ISDNs with the public ISDN.

In addition, the present document specifies the base functionality where the service is provided to the user via a private ISDN.

The present document does not specify the additional requirements where the service is provided to the user via telecommunications network that is not an ISDN but does include interworking requirements of other networks with the public ISDN.

Interactions with supplementary services not listed in clause 7 are outside the scope of the present document.

Charging principles are outside the scope of the present document.

The CFNR supplementary service enables a served user to have the network redirect to another user calls which are addressed to the served user's ISDN number, and for which the connection is not established within a defined period of time. The CFNR supplementary service may operate on all calls, or just those associated with specified basic services. The served user's ability to originate calls is unaffected by the CFNR supplementary service.

The CFNR supplementary service is applicable to all circuit-switched telecommunication services.

The present document is applicable to the stage two and stage three standards for the ISDN CFNR supplementary service. The terms "stage two" and "stage three" are also defined in ITU-T Recommendation I.130 [1]. Where the text indicates the status of a requirement (i.e. as strict command or prohibition, as authorization leaving freedom, or as a capability or possibility), this shall be reflected in the text of the relevant stage two and stage three standards.

Furthermore, conformance to the present document is met by conforming to the stage three standards with the field of application appropriate to the equipment being implemented. Therefore, no method of testing is provided for the present document.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

- [1] ITU-T Recommendation I.130 (1988): "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".
- [2] ITU-T Recommendation I.112 (1993): "Vocabulary of terms for ISDNs".
- [3] ITU-T Recommendation E.164 (1997): "The international public telecommunication numbering plan".
- [4] ITU-T Recommendation I.210 (1993): "Principles of telecommunication services supported by an ISDN and the means to describe them".
- [5] ETSI ETS 300 345: "Integrated Services Digital Network (ISDN); Interworking between public ISDNs and private ISDNs for the provision of telecommunication services; General aspects".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

address: see ITU-T Recommendation E.164 [3], clause B.3.2

basic access: see ITU-T Recommendation I.112 [2], clause 2.4, definition 425

basic call procedures: procedures by which a call (as an instance of a basic telecommunication service) is established and terminated

(basic) service; Telecommunications service: see ITU-T Recommendation I.112 [2], clause 2.2, definition 201

(call) forwarding: general term applied to any functionality whereby a call is redirected automatically by the service provider to another user. The forms of forwarding are: unconditional, whereby all calls are redirected; busy, whereby calls encountering busy are redirected; and, no reply, whereby calls which are not answered within a time period are redirected

diversion: general term which includes all forms of forwarding, and includes deflection whereby calls are redirected by the user instead of being answered

diverted-to user: user to whom a call is redirected as a result of diversion

diverting user: user for whom the call is subjected to diversion

forwarded-to user: user to whom the call is redirected as a result of forwarding

Integrated Services Digital Network (ISDN): see ITU-T Recommendation I.112 [2], clause 2.3, definition 308

ISDN number: number conforming to the numbering plan and structure specified in ITU-T Recommendation E.164 [3]

primary rate access: see ITU-T Recommendation I.112 [2], clause 2.4, definition 426

served user: user to whom the CFNR supplementary service is provided

sub-address: see ITU-T Recommendation E.164 [3], clause B.3.3

supplementary service: see ITU-T Recommendation I.210 [4], clause 2.4

user A: calling user in a call which is subject to diversion

user B: served user when a call (from user A) is subject to the CFNR supplementary service

NOTE: In the context of multiple diversions, a suffix is used, e.g. 1, 2, ... n, n + 1, ... m, to denote the successive diverting users. For example, user B3 is also the diverted-to user with respect to the diversion applied at user B2.

user C: forwarded-to user in a call which is subject to the CFNR supplementary service. In the case of a call which is subject to multiple diversions, user C is the forwarded-to user with respect to the final call forwarding

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CFNR	Call Forwarding No Reply
ISDN	Integrated Services Digital Network
PSTN	Public Switched Telephone Network

4 Description

The CFNR supplementary service shall be available to users who are connected to the network via a basic access or a primary rate access.

The CFNR supplementary service enables a served user to have the network redirect to another user calls which are addressed to the served user's ISDN number, and for which the connection is not established within a defined period of time. The CFNR supplementary service may operate on all calls, or just those associated with specified basic services. The served user's ability to originate calls is unaffected by the CFNR supplementary service.

The CFNR supplementary service can only be invoked by the network after the call has been offered to the served user and an indication that the called user is being informed of the call has been received.

As a service provider option, a subscription option can be provided to enable the served user to receive an indication that the CFNR supplementary service has been activated. This indication shall be provided when the served user originates a call if the CFNR supplementary service has been activated for the served user's ISDN number and for the basic service requested for the call.

The maximum number of diversions permitted for each call is a service provider option with an upper limit of five diversions. When counting the number of diversions, all types of diversion are included.

5 Procedures

5.1 Provision and withdrawal

The CFNR supplementary service shall be provided after prior arrangement with the service provider.

As a service provider option, the CFNR supplementary service can be provided on a per ISDN number basis, or the CFNR supplementary service can apply to the whole access. If a service provider offers both of these options, then it shall be a subscription option to choose which of these options applies.

In addition, the CFNR supplementary service (including options) can be subscribed to for all basic services subscribed to by the user, or as a service provider option, the user can identify particular basic service(s) for which the CFNR supplementary service shall apply.

As a service provider option, the service can be offered with one or more of four subscription options, which can apply separately to each basic service subscribed to. If the CFNR supplementary service is provided on a per ISDN number basis, then these options can apply separately to each ISDN number. For each subscription option, only one value can be selected. Subscription options are summarized in table 1.

Table 1

Subscription options	Value
Served user receives notification that the call has been forwarded	- no - yes
Calling user receives notification that the call has been forwarded	- no - yes, without the ISDN number of the forwarded-to user - yes, with the ISDN number of the forwarded-to user
Served user receives notification that the CFNR supplementary service is currently activated	- no - yes
The served users ISDN number can be presented to the forwarded-to user	- no - yes

As a service provider option, the value of the no reply timer shall be able to be changed by the served user by means of a subscriber procedure.

As a service provider option, a subscription option can be offered to served users, to enable the CFNR supplementary service to be activated, deactivated and interrogated for all ISDN numbers on the same access. ISDN numbers for which the CFNR supplementary service is not subscribed to shall not be affected.

The CFNR supplementary service shall be withdrawn by the service provider upon request of the subscriber or for service provider reasons.

5.2 Normal procedures

5.2.1 Registration and erasure

Registration of information is performed on activation of the CFNR supplementary service.

There are no separate registration procedures for the CFNR supplementary service.

5.2.2 Activation and deactivation

5.2.2.1 Activation

The served user shall supply the following information when requesting the activation of the CFNR supplementary service:

- the ISDN number of the forwarded-to user, which can be accompanied by a **sub-address** for additional identification of the forwarded-to user; and
- information as to whether the activation of the CFNR supplementary service is for all basic services to which the CFNR supplementary service applies, or for a specific basic service out of the basic services to which the CFNR supplementary service applies; and
- the value in seconds of the no reply timer, if different from the present value. (Maximum value 180 seconds.).

When subscription applies on a per ISDN number basis and more than one ISDN number is allocated to the access, then:

- the served user shall also supply the ISDN number for which the activation of the CFNR supplementary service shall apply; or
- as a service provider option, the served user can, if subscribed to, indicate that the activation of the CFNR supplementary service shall apply for all ISDN numbers for which the CFNR supplementary service is subscribed to. In this case, this activation shall replace any previous activation of the CFNR supplementary service which may be in force on individual ISDN numbers on the access, for the basic services indicated at activation.

When subscription applies for the whole access, or only one ISDN number is allocated to the access, the served user need not provide an ISDN number to identify the served user. If the served user includes an ISDN number allocated to that access, or indicates that the activation of the CFNR supplementary service shall apply to all ISDN numbers (if this functionality is offered by the service provider and subscribed to by the served user) then the ISDN number, or the indication of all ISDN numbers, shall be ignored. Activation of the CFNR supplementary service shall proceed as normal.

The served user can separately activate the CFNR supplementary service for each basic service to which the CFNR supplementary service applies and thereby request a different ISDN number and/or **sub-address** to identify the forwarded-to user for each basic service to which the CFNR supplementary service applies.

When the CFNR supplementary service is activated for all basic services, this activation shall replace any previous activation of the CFNR supplementary service which may be in force on individual basic services.

Verification of the ISDN number of the forwarded-to user can be carried out before accepting the request to activate the CFNR supplementary service. This verification can be limited, e.g. a simple check of the ISDN number of the forwarded-to user to see if the ISDN number is within the allowed number range.

When the served user's request to activate the CFNR supplementary service is accepted, the service provider shall inform the served user. The information shall include the address of the forwarded-to user to whom the served user has activated the CFNR supplementary service. All affected users shall be informed.

5.2.2.2 Deactivation

The CFNR supplementary service can be deactivated in any of the following ways:

- the served user can request the deactivation of the CFNR supplementary service for individual basic services. The service provider shall inform the served user that the previous activation of the CFNR supplementary service has been deactivated. All affected users shall be informed;
- the served user can request the deactivation of the CFNR supplementary service for all basic services. The service provider shall inform the served user that the previous activation of the CFNR supplementary service has been deactivated. All affected users shall be informed;
- the served user can request the activation of the CFNR supplementary service indicating a basic service for which the CFNR supplementary service has already been activated. This shall replace the previous information registered for that basic service. In this case, users shall not be specifically informed of the deactivation. The procedures of clause 5.2.2.1 for informing the served user apply;
- the served user can request the activation of the CFNR supplementary service for all basic services. This shall replace the information registered for all of the basic services for which the CFNR supplementary service has already been activated. In this case, users shall not be specifically informed of the deactivation. The procedures of clause 5.2.2.1 for informing the served user apply.

When subscription applies on a per ISDN number basis and more than one ISDN number is allocated to the access, then:

- the served user shall also supply the ISDN number for which the deactivation of the CFNR supplementary service shall apply; or
- as a service provider option, the served user can, if subscribed to, indicate that the deactivation of the CFNR supplementary service shall apply for all ISDN numbers for which the CFNR supplementary service is subscribed to.

When subscription applies for the whole access, or only one ISDN number is allocated to the access, the served user need not provide an ISDN number to identify the served user. If the served user includes an ISDN number allocated to that access, or indicates that the deactivation of the CFNR supplementary service shall apply to all ISDN numbers (if this functionality is offered by the service provider and subscribed to by the served user) then the ISDN number, or the indication of all ISDN numbers, shall be ignored. Deactivation of the CFNR supplementary service shall proceed as normal.

5.2.3 Invocation and operation

The maximum number of diversions for each call shall be limited. The maximum number of diversions is a service provider option with an upper limit of five diversions for each call. When counting the number of diversions, all types of diversions shall be included.

5.2.3.1 Served user's view

If the CFNR supplementary service has been activated, then if the connection is not established within a specified time interval after the served user has been informed of the call, then the service provider shall attempt to forward the call.

The call shall be offered to the served user by means of basic call procedures.

According to the value of a subscription option, the served user shall be informed that the CFNR supplementary service has been invoked on the call. This information shall be given when the network originates the call to the forwarded-to user.

When the CFNR supplementary service is invoked, the network shall set up a call to the forwarded-to user. According to a network option, one of the following shall occur:

- a) the call to the served user shall be retained until the network receives an indication that the forwarded-to user is being informed of the call, or that the connection is established at the forwarded-to user, whereupon the call shall be removed from the served user. If, on a multipoint access, another terminal requests the establishment of the connection prior to the removal of the call, then the connection shall be established and the forwarding ceased; or
- b) the call shall be removed from the served user when the CFNR supplementary service is invoked.

5.2.3.2 Forwarded-to user's view

The forwarded-to user shall receive an indication that the CFNR supplementary service has been invoked on the call. Depending on the value of one of the served user's subscription options the forwarded-to user can also receive the ISDN number of the served user.

If multiple diversions have occurred, then the forwarded-to user can also be given the originally called user's ISDN number provided that the presentation has been permitted by the diversion service invoked for the originally called user. When multiple diversions occur the reason for forwarding given to the forwarded-to user shall indicate the last type of forwarding (i.e. the invocation of the CFNR supplementary service).

5.2.3.3 Calling user's view

Depending on the value of the served user's subscription option "calling user receives notification that the call has been forwarded", user A can be given an indication that the call is being forwarded. In that case, this information shall be given when the network originates the call to the forwarded-to user. Depending on the value of this subscription option, user A can also be given the ISDN number of the forwarded-to user.

When calls are forwarded once, i.e. due to a single invocation of the CFNR supplementary service, the following information shall be given to user A based on the value of the served user's subscription option "calling user receives notification that the call has been forwarded":

- if the value of the subscription option is "no", then no information shall be sent to user A;
- if the value of the subscription option is "yes, without the ISDN number of the forwarded-to user", then an indication that the call is being forwarded shall be sent to user A. The ISDN number of the forwarded-to user shall not be sent; and
- if the value of the subscription option is "yes, with the ISDN number of the forwarded-to user", then an indication that the call is being forwarded shall be sent to user A. In addition, the ISDN number of the forwarded-to user shall be given to user A:
 - after alerting at the forwarded-to user, if there is no possibility of the presentation of the ISDN number being restricted by the forwarded-to user (i.e. the forwarded-to user does not subscribe to the connected line identification restriction supplementary service); or
 - when the connection has been established if the forwarded-to user confirms that the presentation of the ISDN number is not restricted (see clause 7.5.4).

NOTE: In the remaining part of this clause, the terms "forwarded" and "forwarded-to" should be taken to include all types of diversion, i.e. it includes call deflection.

When calls are forwarded due to multiple diversions, the following information shall be given to user A based on the value of the subscription option "calling user receives notification that the call has been forwarded" for each of the served users:

- if the value of user B1's subscription option is "no", then no information shall be sent to user A;
- if the value of user B1's subscription option is "yes, without the ISDN number of the forwarded-to user", then an indication that the call is being forwarded shall be sent to user A.

If diversion subsequently occurs at user B_n after alerting has commenced (e.g. invocation of the CFNR supplementary service), then user A shall be informed only if neither user B_n, nor any preceding user, has "no" as the value of the subscription option.

In either case, the ISDN number of the forwarded-to user shall not be sent:

- if the value of user B1's subscription option is "yes, with the ISDN number of the forwarded-to user", then an indication that the call is being forwarded shall be sent to user A.

In addition, if the value of the subscription option for all users (user B1 to user B_n) is "yes, with ISDN number of the forwarded-to user", the ISDN number of the forwarded-to user shall be given to user A:

- after alerting at the forwarded-to user, if there is no possibility of the presentation of the ISDN number being restricted by the forwarded-to user (i.e. the forwarded-to user does not subscribe to the connected line identification restriction supplementary service); or
- when the connection has been established if the forwarded-to user confirms that the presentation of the ISDN number is not restricted (see clause 7.5.4).

If diversion subsequently occurs at user B_n after alerting has commenced (e.g. invocation of the CFNR supplementary service), then user A shall be informed only if neither user B_n, nor any preceding user, has "no" as the value of the subscription option.

Again, if the value of the subscription option for all users (user B1 to user B_n and user B_n + 1 to user B_m) is "yes, with ISDN number of the forwarded-to user", the ISDN number of the forwarded-to user shall be given to user A:

- after alerting at the forwarded-to user, if there is no possibility of the presentation of the ISDN number being restricted by the forwarded-to user (i.e. the forwarded-to user does not subscribe to the connected line identification restriction supplementary service); or
- when the connection has been established if the forwarded-to user confirms that the presentation of the ISDN number is not restricted (see clause 7.5.4).

5.2.4 Interrogation

The served user can interrogate the network in order to determine the status of the CFNR supplementary service. Interrogation can be for the whole access (in the case of forwarding for the whole access), or on a per ISDN number basis.

The served user can request that the information is provided for all basic services, or a single basic service specified by the user.

When subscription applies on a per ISDN number basis and more than one ISDN number is allocated to the access, the served user shall also supply the ISDN number for which interrogation of the CFNR supplementary service shall apply.

When subscription applies for the whole access or only one ISDN number is allocated to the access, the served user need not provide an ISDN number to identify the served user. If the served user includes an ISDN number allocated to that access, then the number shall be ignored.

The following information shall be provided in response to a request:

- the CFNR supplementary service is not currently activated; or
- the CFNR supplementary service has been activated.

If the CFNR supplementary service has been activated, the following additional information shall be provided:

- the address of the forwarded-to user; and
- the basic service(s) for which the CFNR supplementary service has been activated. (This information is not applicable if the served user requested interrogation for a particular basic service.)

If the served user has requested that information is given for all basic services, and the served user has activated the CFNR supplementary service to different forwarded-to users for different sets of basic services, then these items shall be repeated, as necessary, in order to provide the address of the forwarded-to users for each of the basic services.

In the case of subscription on a per ISDN number basis, if the functionality to activate, deactivate and interrogate the CFNR supplementary service for all ISDN numbers on the access, is offered by the service provider and subscribed to by the served user, then the served user can interrogate the network in order to determine for which of the ISDN numbers on the served user's access the CFNR supplementary service has been activated. As a response to the request, the network shall provide a list of the ISDN numbers on the served user's access for which the CFNR supplementary service has been activated (for any basic service).

5.3 Exceptional procedures

5.3.1 Registration and erasure

Not applicable.

5.3.2 Activation and deactivation

5.3.2.1 Activation

If the request to activate the CFNR supplementary service includes an ISDN number to identify the served user, and that number is not allocated to that access, then the request for the activation of the CFNR supplementary service shall be rejected.

If the served user indicates that the activation of the CFNR supplementary service shall apply for all ISDN numbers on the access, and this functionality is not offered by the service provider, or it is not subscribed to by the served user, then the request for the activation of the CFNR supplementary service shall be rejected.

If subscription applies on a per ISDN number basis and more than one ISDN number is allocated to the access, then, if neither an ISDN number to identify the served user, nor an indication that the activation of the CFNR supplementary service shall apply for all ISDN numbers, is provided, then the request for the activation of the CFNR supplementary service shall be rejected.

If the user attempts to activate the CFNR supplementary service and the service provider cannot comply with the request, the service provider shall reject the request and give the reason for rejection.

Possible reasons for rejection are:

- the CFNR supplementary service is not subscribed to;
- insufficient information provided by the user;
- forwarded-to number is a special service number (see note);
- the ISDN number of the forwarded-to user is the served user's ISDN number;
- forwarded-to number is an invalid ISDN number;
- the CFNR supplementary service does not apply to the basic service for which activation is requested;
- invalid value of the no reply timer.

NOTE: Service providers may prevent a served user from activating the CFNR supplementary service when the ISDN number specified for the forwarded-to user has special significance, e.g. emergency services, operator services. The identification of such numbers is outside the scope of the present document.

If the request to activate the CFNR supplementary service is rejected, then the network shall inform only the terminal from which the user requested activation of the CFNR supplementary service.

5.3.2.2 Deactivation

If the request to deactivate the CFNR supplementary service includes an ISDN number to identify the served user, and that number is not allocated to that access, then the request for the deactivation of the CFNR supplementary service shall be rejected.

If the served user indicates that the deactivation of the CFNR supplementary service shall apply for all ISDN numbers on the access, and this functionality is not offered by the service provider, or it is not subscribed to by the served user, then the request for the deactivation of the CFNR supplementary service shall be rejected.

If subscription applies on a per ISDN number basis and more than one ISDN number is allocated to the access, then, if neither an ISDN number to identify the served user, nor an indication that the deactivation of the CFNR supplementary service shall apply for all ISDN numbers, is provided, then the request for the deactivation of the CFNR supplementary service shall be rejected.

If the user attempts to deactivate the CFNR supplementary service and the service provider cannot comply with the request, the service provider shall reject the request and give a reason for rejection.

Possible reasons for rejection are:

- the CFNR supplementary service has not been activated;
- the CFNR supplementary service is not subscribed to;
- the CFNR supplementary service does not apply to the basic service for which the activation is requested;
- insufficient information provided by the user.

If the request to deactivate the CFNR supplementary service is rejected, then the network shall inform only the terminal from which the user requested deactivation of the CFNR supplementary service.

5.3.3 Invocation and operation

Calls to an ISDN number which use a basic service which is not subscribed to by the served user, or for which the CFNR supplementary service has not been activated, shall not be forwarded by the CFNR supplementary service.

In cases where a user would normally receive a user's ISDN number as part of notification (e.g. the ISDN number of the forwarded-to user, or the ISDN number of the last diverting user), and the ISDN number cannot be given to the user (e.g. due to number presentation restriction, or number not available), the user who would have been given the ISDN number shall receive an indication of the reason why no ISDN number is given.

If the limit on the number of diversions has been reached, then a subsequent attempt to invoke the CFNR supplementary service shall not be made.

If the call to the forwarded-to user cannot be completed, then the forwarded part of the call shall be terminated (if this has not already occurred).

In either case, one of the following shall occur:

- on networks which support option a) in clause 5.2.3, the call shall continue at the served user; or
- on networks which support option b) in clause 5.2.3, then if neither the call deflection supplementary service nor the CFNR supplementary service had been invoked previously on the call, then the call shall be terminated using basic call procedures.

If either of the call deflection supplementary service or the CFNR supplementary service had previously been invoked, then the call shall be terminated back to that diverting user. The procedures of the call deflection supplementary service or the CFNR supplementary service, at that user, shall then apply, as appropriate.

5.3.4 Interrogation

If the request to interrogate the CFNR supplementary service includes an ISDN number to identify the served user, and that number is not allocated to that access, the request for the interrogation of the CFNR supplementary service shall be rejected.

If the served user indicates that the interrogation of the CFNR supplementary service shall apply for all ISDN numbers on the access, and this functionality is not offered by the service provider, or it is not subscribed to by the served user, then the request for the interrogation of the CFNR supplementary service shall be rejected.

If subscription applies on a per ISDN number basis and more than one ISDN number is allocated to the access, then, if neither an ISDN number to identify the served user, nor an indication that the interrogation of the CFNR supplementary service shall apply for all ISDN numbers, is provided, then the request for the interrogation of the CFNR supplementary service shall be rejected.

6 Interworking requirements

If there is a requirement from an ISDN user not to send a call waiting notification to a calling user, this requirement may not always be met, e.g. voice notification, if the calling user is outside the called user's ISDN.

NOTE 1: In the case of diversion within an ISDN, or across more than one ISDN, e.g. ISDNs in different countries or continents, or when interworking between an ISDN and a PSTN occurs, a decrease in quality of service parameters may arise. A network may provide some precautions to prevent this situation occurring, e.g. restrict the propagation delay, or limit the number of satellite hops.

NOTE 2: In interworking situations when information is passed to other networks which do not support the requirements of the present document, information could be discarded.

6.1 Interworking with non-ISDNs

User A and/or the forwarded-to user can belong to a non-ISDN.

NOTE 1: The number of times a call will be diverted once it has exited the ISDN cannot be limited by the ISDN.

NOTE 2: Once a call has been forwarded to a non-ISDN, then any further diversion and/or indications to the calling user are outside the scope of the present document.

NOTE 3: Indications to the calling user attached to a non-ISDN are outside the scope of the present document.

6.2 Interworking with private networks

The CFNR supplementary service can be provided to private ISDNs.

NOTE 1: In some networks, this may be restricted to the provision of the CFNR supplementary service for the whole access.

When a remote user (i.e. a calling user or a forwarded-to user) is on a network different from that of the served user (e.g. one user is on a private ISDN and the other user on a public ISDN), indications to the remote user shall be sent to the remote user's network for forwarding to the remote user. Numbers included in this notification shall be provided in the form of national or international ISDN numbers.

If the private ISDN detects forwarding back to a destination in the public ISDN, the private ISDN can request that forwarding is performed by the public ISDN assuming that the public ISDN offers this functionality. When the private ISDN requests the public ISDN to perform the forwarding, the private ISDN shall be informed of any invocation failure.

NOTE 2: In the case of invocation failure, subsequent actions performed by the private ISDN are outside the scope of the present document.

In all cases, the limit on the total number of diversions (see clause 5.2.3) shall continue to apply when calls are forwarded from a private ISDN to a public ISDN, or forwarded from a public ISDN to a private ISDN.

Interworking with private ISDNs shall include the requirements given in ETS 300 345 [5].

7 Interaction with ISDN supplementary services

7.1 Advice of charge

7.1.1 Advice of charge at call set-up

Original calling user:

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

Forwarding user:

Not applicable.

7.1.2 Advice of charge during the call

Original calling user:

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

Forwarding user:

Not applicable.

7.1.3 Advice of charge at the end of the call

Original calling user:

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

Forwarding user:

When a call is forwarded and the forwarding user is charged for the forwarded part of the call, then as a network option, the charging information can be transferred to the forwarding user when the call is terminated provided that the served user has subscribed to the Advice of charge: charging information at the end of the call supplementary service with the value of the subscription option set to "for all calls automatically".

7.2 Call waiting

If user B has activated the CFNR supplementary service, then a waiting call shall still be offered. If the CFNR timer expires before an answer is received then the CFNR supplementary service shall be invoked and the call shall be forwarded and call waiting ceased.

If the forwarding user subscribes to the value "No" for the subscription option "Calling user receives notification that the call has been forwarded", no notification of call waiting shall be sent to the calling user from the forwarded-to user.

In case of multiple diversions, a notification of call waiting shall only be sent to the calling user if all diverting users allow notification that the call has been forwarded.

A forwarded call can invoke the call waiting supplementary service.

7.3 Call hold

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

7.4 Explicit call transfer

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

NOTE: Where a service provider supports the option to transfer a call for which the connection has been established to a user to which the connection has not yet been established, the transferred call can be forwarded if this second user activated the CFNR supplementary service.

7.5 Number identification services

7.5.1 Calling line identification presentation

When a call has been forwarded and the forwarded-to user has been provided with the calling line identification presentation supplementary service, the forwarded-to user shall receive the number of the original calling user, if this calling user has not subscribed to or invoked the calling line identification restriction supplementary service.

7.5.2 Calling line identification restriction

When the calling line identification restriction supplementary service has been invoked, the calling user's ISDN number shall not be presented to the forwarded-to user unless the forwarded-to user has an override capability.

7.5.3 Connected line identification presentation

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

If the served (forwarding) user selects the option that the calling user is notified, but without the forwarded-to number, then the calling user shall not receive the connected user's identity when the call is answered, unless the calling user has an override capability.

7.5.4 Connected line identification restriction

If a forwarded-to user subscribes to the connected line identification restriction supplementary service "permanent mode", then the forwarded-to user's number shall not be provided with the notification that the call has been forwarded.

If a forwarded-to user subscribes to the connected line identification restriction supplementary service "temporary mode", then the forwarded-to user's number shall not be provided until negotiation with the user has taken place and a positive indication from the user has been received (i.e. the default value shall not be used).

NOTE: The forwarded-to user's number can still be released on answer, after confirmation, or using the default.

In each of the above situations, a calling user that subscribes to the connected line identification presentation supplementary service and who has override capability will not receive the forwarded-to user's number as part of the diverting notification information, but can use the override capability in order to receive the connected line identity when the call is answered.

7.6 Closed user group

NOTE: Closed user group restrictions were checked and met for the call between the calling user and the forwarding user when call was offered to the forwarding user.

The parameters of the closed user group applied by the network on the original call shall be used for the forwarded part of the call and by this means closed user group restrictions shall be checked and met for the call between the calling user and the forwarded-to user.

The outgoing call barring attribute of the forwarding user's closed user group supplementary service shall not be used to determine if the call can be forwarded.

7.7 Call completion services

7.7.1 Completion of calls to busy subscriber

Assume that user A calls user B and that user B activates the CFNR supplementary service or has activated the CFNR supplementary service to user C.

NOTE 1: A recall resulting from the completion of calls to busy subscriber supplementary service will not be forwarded.

NOTE 2: If user B has activated the CFNR supplementary service and user B is busy, user A may activate the completion of calls to busy subscriber supplementary service on user B.

The CFNR supplementary service was activated by user B before user A requests the completion of calls to busy subscriber supplementary service on user B.

If user A calls user B and the call is forwarded on no reply to user C and user C is then busy and the call is not retained at user B, then any request by user A for the completion of calls to busy subscriber supplementary service shall be rejected with user A being given a short term denial as reason.

NOTE 3: If the call is retained at user B then the completion of calls to busy subscriber supplementary service does not apply.

The CFNR supplementary service is activated by user B after user A has activated the completion of calls to busy subscriber supplementary service on user B.

If user B activates the CFNR supplementary service after user A has activated the completion of calls to busy subscriber supplementary service on user B, then the call resulting from the completion of calls to busy subscriber supplementary service shall be given to user B. After the no reply timer has expired at user B, the call shall be forwarded as a normal call.

7.7.2 Completion of calls on no reply

Assume that user A calls user B and that user B activates the CFNR supplementary service or has activated the CFNR supplementary service to user C.

The CFNR supplementary service was activated by user B before user A requests the completion of calls on no reply supplementary service on user B.

If user A calls user B and the call is forwarded on no reply to user C and user C does not answer the call (No Reply), then a request by user A to activate the completion of calls on no reply supplementary service shall apply to the originally called destination B.

The CFNR supplementary service is activated by user B after user A has activated the completion of calls on no reply supplementary service on user B.

If user B activates the CFNR supplementary service after user A has activated the completion of calls on no reply supplementary service on user B, then the call resulting from the completion of calls on no reply supplementary service shall be given to user B. After the no reply timer has expired at user B, the call shall be forwarded as a normal call.

Arrival of the call resulting from the completion of calls on no reply supplementary service after the CFNR supplementary service has been activated.

If user B has activated the CFNR supplementary service and does not answer the call (No Reply) resulting from the completion of calls on no reply supplementary service, then according to a network option, the call shall be treated as follows:

- the procedures of the completion of calls on no reply supplementary service shall apply; or
- the call shall be forwarded as a normal call.

7.8 Conference services

7.8.1 Conference call, add-on

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

7.8.2 Meet me-conference

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

7.9 Direct dialling in

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

7.10 Diversion services

7.10.1 Call forwarding unconditional

Invocation of the call forwarding unconditional supplementary service shall take precedence over the CFNR supplementary service.

7.10.2 Call forwarding busy

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

7.10.3 Call forwarding no reply

Not applicable.

7.10.4 Call deflection

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

NOTE: If the network indicates the arrival of an incoming call to the user, then the call deflection supplementary service, or the CFNR supplementary service can be invoked, depending on the response, or lack of response, from the served user.

7.10.5 Selective call forwarding

Invocation of the selective call forwarding supplementary service operating on no reply or invocation of the selective call forwarding supplementary service operating unconditionally shall take precedence over invocation of the CFNR supplementary service.

7.11 Freephone

Forwarding to a freephone number:

The number of diversions of the call should not be lost after having been subjected to the freephone supplementary service.

Forwarding of a freephone call:

According to a service provider option, calls which are subject to the freephone supplementary service, i.e. "freephone calls", shall be forwarded in one of the following ways:

- freephone calls which are allocated to a user shall override the CFNR supplementary service, if activated. Such calls shall be subject to other mechanisms for allocating the call to another user. The procedures for this are outside the scope of the present document; or
- freephone calls which are allocated to a user shall be subject to the CFNR supplementary service if it has been activated by that user. If a freephone call is forwarded, the calling user shall not receive the ISDN number of the forwarded-to user.

7.12 Malicious call identification

The malicious call identification supplementary service can be invoked for a forwarded call. In addition to the normal operation of the malicious call identification supplementary service, the identity of the first diverting 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 malicious call identification supplementary service.

The malicious call identification supplementary service shall not be automatically invoked when a call is terminated due to the invocation of the CFNR supplementary service.

7.13 Multiple subscriber number

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

When the CFNR supplementary service applies on a per number basis, if the served user also subscribes to the multiple subscriber number supplementary service, then in an activation, deactivation or interrogation request, the ISDN number to which the CFNR supplementary service relates shall be included (see clause 5.2).

7.14 Sub-addressing

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

7.15 Terminal portability

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

7.16 Three party

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

7.17 User-to-user signalling

Annex A gives an overview of the interaction between the user-to-user signalling supplementary service and the CFNR supplementary service.

NOTE 1: As a service provider option, the forwarding of user-to-user information, or requests for the user-to-user signalling supplementary service may be restricted to forwarding users who subscribe to the relevant parts of the user-to-user signalling supplementary service.

User-to-user signalling service 1:

If the calling user requests implicitly service 1, then the CFNR supplementary service can be invoked. The request for service 1 shall be forwarded with the call.

If the calling user requests service 1 and indicates that it is required for the call to proceed, then the CFNR supplementary service shall be rejected and the call shall not be forwarded.

If the calling user requests service 1 and indicates that it is not required on the call, then:

- if the called user has explicitly accepted the request, then as a service provider option:
 - the request for the CFNR supplementary service will be rejected and the call shall not be forwarded; or
 - the request for the CFNR supplementary service can be accepted. In this case the call shall be forwarded and the request for service 1, together with any user-to-user information, shall be forwarded with the call.

NOTE 2: In this case, the indication that the forwarded-to user is being informed of the call will not be sent to the calling user and any user-to-user information included in this indication will be discarded.

NOTE 3: Also in this case, if the forwarded-to user rejects the request for service 1 when the connection is established, then this rejection may be given to the calling user.

- if the called user has rejected, or has ignored, the request, the CFNR supplementary service can be invoked. The call shall be forwarded without the request for service 1.

User-to-user signalling service 2:

If the calling user requests service 2 and indicates that it is required for the call to proceed, then the CFNR supplementary service shall be overridden and the call shall not be forwarded.

If the calling user requests service 2 and indicates that it is not required on the call, then:

- if the called user accepts the request for service 2, the invocation of the CFNR supplementary service shall be overridden and the call shall not be forwarded;
- if the called user rejects or ignores the request for service 2, the CFNR supplementary service shall be invoked and the call shall be forwarded without the request for service 2.

NOTE 4: In this case, if the calling user sends user-to-user information after the call has been forwarded, then this information will be discarded.

User-to-user signalling service 3:

If the calling user requests service 3 when originating the call, then the CFNR supplementary service can be invoked. The request for service 3 shall be forwarded with the call.

After forwarding, the user-to-user signalling service can be requested after the communication has been established.

7.18 Call barring services

7.18.1 Outgoing call barring-fixed

If the outgoing call barring-fixed supplementary service has already been activated, a request to activate the CFNR supplementary service shall be rejected if the served user's call to the forwarded-to user would be barred by the outgoing call barring-fixed supplementary service at the time of the activation attempt of the call forwarding service.

If the CFNR supplementary service was activated before the activation of the outgoing call barring-fixed supplementary service, the CFNR supplementary service shall not be affected.

7.18.2 Outgoing call barring-user controlled

If the outgoing call barring-user controlled supplementary service has already been activated, a request to activate the CFNR supplementary service shall be rejected if the served user's call to the forwarded-to user would be barred by the outgoing call barring-user controlled supplementary service.

If the CFNR supplementary service was activated before the activation of the outgoing call barring-user controlled supplementary service, the CFNR supplementary service shall not be affected.

7.19 Message waiting indication

The message waiting indication shall never be diverted. The indication shall be given to the receiving user at the receiving user's original location.

Annex A (informative): Interaction between user-to-user signalling and the CFNR supplementary service

Table A.1: Interaction between user-to-user signalling and the CFNR supplementary service

Calling user		Forwarding user		
UUS service	Type of request	User-to-user signalling request and/or user-to-user information given to forwarding user	Call is forwarded	User-to-user signalling request and/or user-to-user information forwarded
1-A	Implicit	Yes	Yes	Yes
1-C	Explicit, required	Yes (acceptance) Yes (no response) Yes (rejection)	No No Not applicable (rejection)	Not applicable Not applicable Not applicable
1-B	Explicit, not required	Yes (acceptance) Yes (no response) Yes (rejection)	(note) Yes Yes	(note) No No
2-B	Explicit, required	Yes (acceptance) Yes (rejection)	No (maintain) Not applicable (rejection)	No Not applicable
2-A	Explicit, not required	Yes (acceptance) Yes (no response) Yes (rejection)	No Yes Yes	Not applicable No No
3-B	Explicit, required requested in call set-up	Yes	Yes	Yes
3-A	Explicit, not required requested in call set-up	Yes	Yes	Yes
3-C	Explicit, not required requested while the call is established	No impact	No impact	No impact
<p>NOTE: As a service provider option:</p> <ul style="list-style-type: none"> - the request for the CFNR supplementary service will be rejected and the call will not be forwarded; or - the request for the CFNR supplementary service can be accepted. In this case, the call will be forwarded and the request for service 1, together with any user-to-user information, will be forwarded with the call. 				

History

Document history		
Edition 1	December 1994	Publication as ETS 300 201
Amendment 1	September 1996	Amendment 1 to first Edition of ETS 300 201
V1.2.1	January 2001	One-step Approval Procedure OAP 20010525: 2001-01-24 to 2001-05-25
V1.2.1	May 2001	Publication