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Integrated Services Digital Network (ISDN); Call Forwarding Busy (CFB) supplementary service; Service description



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Foreword

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

In accordance with ITU-T Recommendation I.130 [1], the following three level structure is used to describe the supplementary telecommunications services as provided by European public telecommunications operators under the pan-European Integrated Services Digital Network (ISDN):

- Stage 1: is an overall service description, from the user's standpoint;
- Stage 2: identifies the functional capabilities and information flows needed to support the service described in stage 1; and
- Stage 3: defines the signalling system protocols and switching functions needed to implement the service described in stage 1.

The present document details the stage 1 aspects (overall service description) for the Call Forwarding Busy (CFB) supplementary service. The stage 2 are detailed in ETS 300 203 (1994) and stage 3 aspects are detailed in EN 300 207-1 (V2.0.1) and EN 300 356-15 (V3.2.2).

National transposition dates	
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1 Scope

The present document defines the stage one of the Call Forwarding Busy (CFB) supplementary service for the pan-European Integrated Services Digital Network (ISDN) as provided by European public telecommunications 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 a telecommunications network that is not an ISDN but does include interworking requirements of other networks with the public ISDN.

Charging principles are outside the scope of the present document.

Interaction with supplementary services not listed in clause 7 is outside the scope of the present document.

The CFB 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 meet busy. The CFB 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 CFB supplementary service.

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

The present document is applicable to the stage two and stage three documents for the ISDN CFB 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, as a capability or possibility), this shall be reflected in the text of the relevant stage two and stage three documents.

Furthermore, conformance to the present document is met by conforming to the stage three documents 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 I.221 (1993): "Common specific characteristics of services".
- [4] ITU-T Recommendation I.210 (1993): "Principles of telecommunication services supported by an ISDN and the means to describe them".
- [5] ITU-T Recommendation E.164 (1997): "The international public telecommunication numbering plan".
- [6] ITU-T Recommendation Q.9 (1988): "Vocabulary of switching and signalling terms".

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 [5], clause 12

basic access: see ITU-T Recommendation Q.9 [6], clause 1, definition 1551

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

busy: see ITU-T Recommendation I.221 [3], clause 3.1.5

(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.

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

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

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 [5]

network determined user busy: see ITU-T Recommendation I.221 [3], clause 3.1.4

primary rate access: see ITU-T Recommendation Q.9 [6], clause 1, definition 1552

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

subaddress: see ITU-T Recommendation E.164 [5], clause 12.2

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 CFB 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 CFB 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.

user determined user busy: see ITU-T Recommendation I.221 [3], clause 3.1.4

3.2 Abbreviations

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

CFB	Call Forwarding Busy
ISDN	Integrated Services Digital Network
PSTN	Public Switched Telephone Network

4 Description

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

The CFB 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 meet busy. The CFB 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 CFB supplementary service.

As a service provider option, a subscription option can be provided to enable the served user to receive an indication that the CFB supplementary service has been activated. This indication shall be provided when the served user originates a call if the CFB 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 CFB supplementary service shall be provided after prior arrangement with the service provider.

As a service provider option, the CFB supplementary service can be provided on a per ISDN number basis, or the CFB 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 CFB 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 CFB 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 CFB 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 CFB 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, a subscription option can be offered to serve users, to enable the CFB supplementary service to be activated, deactivated and interrogated for all ISDN numbers on the same access. ISDN numbers for which the CFB supplementary service is not subscribed to shall not be affected.

The CFB 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

5.2.1.1 Registration

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

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

5.2.1.2 Erasure

Not applicable.

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 CFB supplementary service:

- the ISDN number of the forwarded-to user, which can be accompanied by a subaddress for additional identification of the forwarded-to user; and
- information as to whether the activation of the CFB supplementary service is for all basic services to which the CFB supplementary service applies, or for a specific basic service out of the basic services to which the CFB supplementary service applies.

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 CFB supplementary service shall apply, or;
- as a service provider option, the served user can, if subscribed to, indicate that the activation of the CFB supplementary service shall apply for all ISDN numbers for which the CFB supplementary service is subscribed to. In this case, this activation shall replace any previous activation of the CFB 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 CFB 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 CFB supplementary service shall proceed as normal.

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

When the CFB supplementary service is activated for all basic services, this activation shall replace any previous activation of the CFB 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 CFB 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 CFB 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 CFB supplementary service. All affected users shall be informed.

5.2.2.2 Deactivation

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

- the served user can request the deactivation of the CFB supplementary service for individual basic services. The service provider shall inform the served user that the previous activation of the CFB supplementary service has been deactivated. All affected users shall be informed;
- the served user can request the deactivation of the CFB supplementary service for all basic services. The service provider shall inform the served user that the previous activation of the CFB supplementary service has been deactivated. All affected users shall be informed;
- the served user can request the activation of the CFB supplementary service indicating a basic service for which the CFB 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 CFB supplementary service for all basic services. This shall replace the information registered for all of the basic services for which the CFB 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 CFB supplementary service shall apply, or;
- as a service provider option, the served user can, if subscribed to, indicate that the deactivation of the CFB supplementary service shall apply for all ISDN numbers for which the CFB 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 CFB 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 CFB supplementary service shall proceed as normal.

5.2.3 Invocation and operation

When the CFB supplementary service has been activated and the served user is network determined user busy or user determined user busy, then an incoming call to the served user, indicating a basic service for which the CFB supplementary service has been activated, shall be forwarded.

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 is user determined user busy

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

If the served user responds to the offered call by indicating that the user is busy (user determined user busy), then the network shall attempt to forward the call. According to the value of a subscription option, the served user shall be informed that the CFB supplementary service has been invoked on the call.

NOTE: The call offering information associated with the subscription option to inform the served user that a call is being forwarded will have already been given by the network as part of offering the call. This information includes the following information about the call that has been forwarded:

- the telecommunications service information;
- user-to-user information (if any);
- the address of the served user;
- the address of user A (provided that the served user has subscribed to the calling line identification presentation supplementary service, and the calling line identification restriction supplementary service is not applied).

If multiple diversions have occurred, the information also includes:

- the ISDN number of the originally called user;
- the ISDN number of the last diverting user;
- reason for last diversion (e.g. invocation of the CFB supplementary service).

5.2.3.2 Served user is network determined user busy

In the case of network determined user busy, the call is forwarded without being offered to the served user.

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

This information shall include:

- an indication that the CFB supplementary service has been invoked on a call;
- the telecommunications service information;
- user-to-user information (if any);
- the address of the served user;
- the address of user A (provided that the served user has subscribed to the calling line identification presentation supplementary service, and the calling line identification restriction supplementary service is not applied).

If multiple diversions have occurred, the information shall also include:

- the ISDN number of the originally called user;
- the ISDN number of the last diverting user;
- reason for last diversion (e.g. invocation of the CFB supplementary service).

5.2.3.3 Forwarded-to user' s view

The forwarded-to user shall receive an indication that the CFB 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 CFB supplementary service).

5.2.3.4 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 CFB 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 Bn after alerting has commenced (e.g. invocation of the call forwarding no reply supplementary service), then user A shall be informed only if neither user Bn, 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 Bn) is "yes, with the 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 Bn after alerting has commenced (e.g. invocation of the call forwarding no reply supplementary service), then user A shall be informed only if neither user Bn, 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 Bn and user Bn + 1 to user Bm) 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 CFB 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 CFB 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 CFB supplementary service is not currently activated; or
- the CFB supplementary service has been activated.

If the CFB 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 CFB 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 CFB 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 CFB 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 CFB 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 CFB 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 CFB 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 CFB supplementary service shall be rejected.

If the served user indicates that the activation of the CFB 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 CFB 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 CFB supplementary service shall apply for all ISDN numbers, is provided, then the request for the activation of the CFB supplementary service shall be rejected.

If the user attempts to activate the CFB 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 CFB 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 CFB supplementary service does not apply to the basic service for which activation is requested.

NOTE: Service providers may prevent a served user from activating the CFB 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 CFB supplementary service is rejected, then the network shall inform only the terminal from which the user requested activation of the CFB supplementary service.

5.3.2.2 Deactivation

If the request to deactivate the CFB 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 CFB supplementary service shall be rejected.

If the served user indicates that the deactivation of the CFB 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 CFB 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 CFB supplementary service shall apply for all ISDN numbers, is provided, then the request for the deactivation of the CFB supplementary service shall be rejected.

If the user attempts to deactivate the CFB 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 CFB supplementary service has not been activated;
- the CFB supplementary service is not subscribed to;
- the CFB 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 CFB supplementary service is rejected, then the network shall inform only the terminal from which the user requested deactivation of the CFB 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 CFB supplementary service has not been activated, shall not be forwarded by the CFB 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 CFB 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, the following shall occur:

- if neither the call deflection supplementary service nor the call forwarding no reply supplementary service had been invoked previously on the call, then the call shall be terminated using basic call procedures; or
- if either of the call deflection supplementary service or the call forwarding no reply 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 call forwarding no reply supplementary service, at that user, shall then apply, as appropriate.

5.3.4 Interrogation

If the request to interrogate the CFB 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 CFB supplementary service shall be rejected.

If the served user indicates that the interrogation of the CFB 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 CFB 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 CFB supplementary service shall apply for all ISDN numbers, is provided, then the request for the interrogation of the CFB supplementary service shall be rejected.

6 Intercommunication considerations

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 ISDNs

The CFB supplementary service can be provided to private ISDNs.

NOTE 1: In some networks, this may be restricted to the provision of the CFB 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.

7 Interaction with other supplementary services

7.1 Advice of charge services

7.1.1 Charging information at call set-up time

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 Charging information 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 Charging information 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

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

NOTE: The following text clarifies this situation. If user B is network determined user busy, the CFB supplementary service shall take place, and the call is not offered. If user B is not network determined user busy, the call shall be offered, and if the user determined user busy condition results, then the CFB supplementary service shall take place.

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.

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 user 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

Closed user group restrictions shall be checked and met for the call between the calling user and the forwarding user. The parameters of a 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 Completion of calls to busy subscriber

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

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

The CFB 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 B has activated the CFB supplementary service and is busy, and the forwarded-to user C is also busy, then a request by user A to activate the completion of calls to busy subscriber supplementary service shall be applied to user B;

The CFB 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 CFB supplementary service after user A has activated the completion of calls to busy subscriber supplementary service on user B, the call resulting from the completion of calls to busy subscriber supplementary service shall be treated as described in the paragraph below;

Arrival of the completion of calls to busy subscriber call after the CFB supplementary service has been activated:

If user B has activated the CFB supplementary service and is busy upon the arrival of a call resulting from the completion of calls to busy subscriber supplementary service, then according to a network option, the call shall be treated as follows:

- user B shall be considered as being busy and the procedures of the completion of calls to busy subscriber 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 CFB supplementary service.

7.10.2 Call forwarding busy

Not applicable.

7.10.3 Call forwarding no reply

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

7.10.4 Call deflection

If the user is not network determined user busy, then the call deflection supplementary service or the CFB supplementary service can be invoked, depending on the response from the served user.

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 CFB 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 CFB 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.

7.13 Multiple subscriber number

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

When the CFB 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 CFB supplementary service relates shall be included (see clause 5.2.2).

7.14 Subaddressing

The subaddress associated with the original called party number 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

Any user-to-user information or request for the user-to-user signalling supplementary service shall be forwarded with the call.

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

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

Annex A (informative): Bibliography

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