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Integrated Services Digital Network (ISDN); Diversion supplementary services; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification

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European Standard (Telecommunications series)

**Integrated Services Digital Network (ISDN);
Diversion supplementary services;
Digital Subscriber Signalling System No. one (DSS1) protocol;
Part 1: Protocol specification**

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Signalling Protocols and Switching (SPS).

The present document is part 1 of a multi-part standard covering the Digital Subscriber Signalling System No. one (DSS1) protocol specification for the Integrated Services Digital Network (ISDN) diversion supplementary services, as described below:

- Part 1: "Protocol specification";**
- Part 2: "Protocol Implementation Conformance Statement (PICS) proforma specification";
- Part 3: "Test Suite Structure and Test Purposes (TSS&TP) specification for the user";
- Part 4: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the user";
- Part 5: "Test Suite Structure and Test Purposes (TSS&TP) specification for the network";
- Part 6: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the network".

In accordance with CCITT Recommendation I.130 [3], the following three level structure is used to describe the supplementary telecommunication services as provided by European public telecommunications operators under the pan-European ISDN:

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

The present document details the stage three aspects (signalling system protocols and switching functions) needed to support the diversion supplementary services. The stage one aspects are detailed in ETS 300 199 (1994) [14], ETS 300 200 (1994) [15], ETS 300 201 (1994) [16], ETS 300 202 (1994) [17] and EN 301 133 [18]. The stage two aspects are detailed in ETS 300 203 (1994), ETS 300 204 (1994), ETS 300 205 (1994) and ETS 300 206 (1994).

Changes from the previous version of the present document are shown in annex B.

National transposition dates

Date of adoption of this EN:	30 October 1998
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1 Scope

This first part of EN 300 207 specifies the stage three of the diversion supplementary services for the pan-European Integrated Services Digital Network (ISDN) as provided by European public telecommunications operators at the T reference point or coincident S and T reference point (as defined in ITU-T Recommendation I.411 [6]) by means of the Digital Subscriber Signalling System No. one (DSS1). Stage three identifies the protocol procedures and switching functions needed to support a telecommunication service (see CCITT Recommendation I.130 [3]).

In addition, the present document specifies the protocol requirements at the T reference point where the service is provided to the user via an intermediate private ISDN.

The present document does not specify the additional protocol requirements where the service is provided to the user via a telecommunications network that is not an ISDN.

The diversion supplementary services comprise the following services:

- Call Forwarding Unconditional (CFU) supplementary service;
- Call Forwarding Busy (CFB) supplementary service;
- Call Forwarding No Reply (CFNR) supplementary service;
- Selective Call Forwarding Unconditional (SCFU) supplementary service
- Selective Call Forwarding Busy (SCFB) supplementary service;
- Selective Call Forwarding No Reply (SCFNR) supplementary service;
- Call Deflection (CD) supplementary service.

The CFU 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. The CFU 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 CFU supplementary service. After the CFU supplementary service has been activated, calls are forwarded independent of the status of the served user.

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 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 SCF supplementary service enables a served user to specify the forwarding of their incoming calls to a selected destination subject to certain conditions or circumstances e.g. the calling line identity of the calling user. The user is also allowed to interrogate the screening list.

The CD supplementary service enables the served user to respond to an incoming call by requesting redirection of that call to another user. The CD supplementary service can only be invoked before the connection is established by the served user, i.e. in response to the offered call, or during the period that the served user is being informed of the call. The served user's ability to originate calls is unaffected by the CD supplementary service.

The diversion supplementary services are applicable to all circuit-switched telecommunication services.

Further parts of EN 300 207 specify the method of testing required to identify conformance to the present document.

The present document is applicable to equipment supporting at least one of the diversion supplementary services, to be attached at either side of a T reference point or coincident S and T reference point when used as an access to the public ISDN.

2 Normative references

References may be made to:

- a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or
- b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or
- c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or
- d) publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] ITU-T Recommendation E.164 (1997): "The international public telecommunication numbering plan".
- [2] ITU-T Recommendation I.112 (1993): "Vocabulary of terms for ISDNs".
- [3] CCITT Recommendation I.130 (1988): "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".
- [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 I.221 (1993): "Common specific characteristics of services".
- [6] ITU-T Recommendation I.411 (1993): "ISDN user-network interfaces; Reference configurations".
- [7] CCITT Recommendation X.208 (1988): "Specification of Abstract Syntax Notation One (ASN.1)".
- [8] CCITT Recommendation X.219 (1988): "Remote operations: Model, notation and service definitions".
- [9] CCITT Recommendation Z.100 (1988): "Specification and Description Language (SDL)".
- [10] ENV 41007-1 (1991): "Definition of terms in private telecommunication networks; Part 1: Definition of general terms".
- [11] EN 300 403-1: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 1: Protocol specification [ITU-T Recommendation Q.931 (1993), modified]".
- [12] EN 300 195-1: "Integrated Services Digital Network (ISDN); Supplementary service interactions; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".
- [13] EN 300 196-1: "Integrated Services Digital Network (ISDN); Generic functional protocol for the support of supplementary services; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".
- [14] ETS 300 199 (1994): "Integrated Services Digital Network (ISDN); Call Forwarding Busy (CFB) supplementary service; Service description".
- [15] ETS 300 200 (1994): "Integrated Services Digital Network (ISDN); Call Forwarding Unconditional (CFU) supplementary service; Service description".
- [16] ETS 300 201 (1994): "Integrated Services Digital Network (ISDN); Call Forwarding No Reply (CFNR) supplementary service; Service description".
- [17] ETS 300 202 (1994): "Integrated Services Digital Network (ISDN); Call Deflection (CD) supplementary service; Service description".

- [18] EN 301 133 (V1.1): "Integrated Services Digital Network (ISDN); Selective Call Forwarding (SCF) supplementary services (unconditional, busy and no reply); Service description".
- [19] EN 300 286-1: "Integrated Services Digital Network (ISDN); User-to-User Signalling (UUS) supplementary service, Digital Signalling System No.one (DSS1) protocol, Part 1: Protocol specification".

3 Definitions

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

address: An address is an ISDN number, with optionally an associated subaddress.

alerting phase: The period where the connection at the remote access is such that if it is an ISDN interface, it is in call state N7, Call Received, and if it is an analogue interface, an alerting indication is being provided.

all numbers: If for the control of the call forwarding supplementary services the parameter servedUserNr is set to "allNumbers", then all the ISDN numbers are affected that the user is subscribed to and for which the call forwarding supplementary service is subscribed to, at the point in time that the request is received in the network.

all services: If for the control of the call forwarding supplementary services the parameter basicService is set to "allServices" then all basic services are affected that the user is subscribed to, and for which the call forwarding supplementary service applies and is subscribed to, at the point in time that the request is received in the network.

basic service: A bearer service or teleservice. When used in the present document it refers only to circuit-switched basic services.

bearer service: See ITU-T Recommendation I.112 [2], definition.202.

call control message: A message as defined in EN 300 403-1 [11], subclause 3.1, which on sending or receipt causes a change of the call state at either the network or the user. Call control messages also include the INFORMATION message and the PROGRESS message.

call reference: See EN 300 196-1 [13], subclause 3.1.

call state: A state as defined in EN 300 403-1 [11], for either the user or the network as appropriate. A call state may exist for each call reference value (and for each additional responding Connection Endpoint Identifier (CEI) in the incoming call states).

calling network: The network to which the calling user is attached.

calling user: A user who initiated a call that has been diverted.

data link connection endpoint identifier; Connection Endpoint Identifier (CEI): See EN 300 196-1 [13], subclause 3.1.

deflected-to number: The ISDN number of the deflected-to user.

deflected-to user: A user to which the call is redirected as a result of deflection.

deflecting number: The ISDN number of the deflecting user.

diverted-to user: Refers either to the forwarded-to user or to the deflected-to user.

diverted-to network: The network to which the diverted-to user is attached.

diverted-to number: The ISDN number of the forwarded-to or the deflected-to user.

diverting network: The network to which the served user (diverting user) is attached.

diverting number: The ISDN number of the forwarding/deflecting user.

diversion profile: The set of data containing all the parameters pertaining to subscription and activation, involved in the decision process which leads to the diversion of an incoming call.

dummy call reference: See EN 300 196-1 [13], subclause 3.1.

explicit forwarding: Forward all calls from specified calling number(s).

forwarded-to address: The address of the forwarded-to user.

forwarded-to network: The network to which the forwarded-to user is attached.

forwarded-to number: The ISDN number of the forwarded-to user.

forwarded-to user: A user to which the call is redirected as a result of forwarding.

forwarding network: The network to which the served user (forwarding user) is attached.

forwarding number: The ISDN number of the forwarding user.

implicit forwarding: Forward all calls except from the specified calling number(s).

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

invoke component: See EN 300 196-1 [13], subclause 8.2.2.1. Where reference is made to an "xxxx" invoke component, an invoke component is meant with its operation value set to the value of the operation "xxxx".

ISDN number: A number conforming to the numbering plan and structure specified in ITU-T Recommendation E.164 [1].

network: The DSS1 protocol entity at the network side of the user-network interface.

Network Determined User Busy (NDUB): See ITU-T Recommendation I.221 [5].

private network: The DSS1 protocol entity at the user-side of the user-network interface when a T reference point applies.

Private Telecommunication Network eXchange (PTNX): See ENV 41007-1 [10], subclause 4.4.

point-to-point terminal configuration: A terminal configuration in which there is one user signalling entity.

reject component: See EN 300 196-1 [13], subclause 8.2.2.4.

return error component: See EN 300 196-1 [13], subclause 8.2.2.3. Where reference is made to an "xxxx" return error component, a return error component is meant which is related to an "xxxx" invoke component.

return result component: See EN 300 196-1 [13], subclause 8.2.2.2. Where reference is made to an "xxxx" return result component, a return result component is meant which is related to an "xxxx" invoke component.

screening list: A list containing conditions for forwarding or not forwarding a call.

served user: The user which activates, deactivates or interrogates the CFB, CFNR, CFU, SCF, SCFB, SCFNR or SCFU supplementary services or invokes the CD supplementary service.

service; telecommunication service: See ITU-T Recommendation I.112 [2], definition 201.

subaddress: See ITU-T Recommendation E.164 [1], subclause 12.2.

supplementary service: See ITU-T Recommendation I.210 [4], subclause 2.4.

teleservice: See ITU-T Recommendation I.112 [2], definition 203.

user: The DSS1 protocol entity at the user side of the user-network interface when a coincident S and T reference point applies.

User Determined User Busy (UDUB): Is specified for the case that the network offers the call to the user and if no compatible terminal responds "positively" but one or more compatible terminal respond "user busy".

4 Abbreviations

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

ASN.1	Abstract Syntax Notation one
CD	Call Deflection
CEI	Connection Endpoint Identifier
CFB	Call Forwarding Busy
CFNR	Call Forwarding No Reply
CFU	Call Forwarding Unconditional
CLI	Calling Line Identity
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
COLR	Connected Line Identification Restriction
DSS1	Digital Subscriber Signalling System No. one
DTN	Diverted-To Number
ISDN	Integrated Services Digital Network
LE	Local Exchange
MSN	Multiple Subscriber Number
NDUB	Network Determined User Busy
PTNX	Private Telecommunication Network eXchange
SCF	Selective Call Forwarding
SCFB	Selective Call Forwarding Busy
SCFNR	Selective Call Forwarding No Reply
SCFU	Selective Call Forwarding Unconditional
SDL	Specification and Description Language
UDUB	User Determined User Busy

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5 Description

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As a network provider option the diversion supplementary services can be provided on a per ISDN number basis or can apply to the whole access. In addition, and as a network provider option, the call forwarding supplementary services (including options) may be subscribed to for each basic service to which the user(s) of the number subscribes, or collectively for all the basic services to which the user(s) subscribes.

The CD supplementary service applies to all of the basic services subscribed to by the user.

The served user may register a different forwarded-to address for each basic service subscription parameter value and call forwarding supplementary service to which he has subscribed.

An indication that a call forwarding supplementary service is activated may, as a subscription option, be given to the forwarding user who has forwarding activated, each time an outgoing call is made.

The CFNR supplementary service only applies when a SETUP message is sent by the network and at least one user responds with an ALERTING message, possibly subsequent to other valid call control messages.

The functions of the CD supplementary service are implemented in the network and they are invoked by the terminal on a call by call basis.

The SCF supplementary service is an incoming call management feature to the defined Call Forwarding supplementary services that allows the served user to define one or more screening lists. Incoming calls that satisfy the conditions identified by the screening list are forwarded to the forward-to ISDN address, which is registered on activation of the SCF supplementary service. The served user's ability to originate calls is unaffected by the SCF supplementary service.

The Calling Line Identity (CLI) is the only forwarding condition defined in the present document for use in the screening lists. As a service provider option, the served user may specify the forwarding of their incoming calls to destinations according to additional forwarding conditions e.g.:

- time of day, day of week etc.;
- area of call origination.

NOTE: The specification of these conditions is outside the scope of the present document.

The served user can have multiple instances of the activation of the SCF supplementary service i.e. more than one screening list may be in use. This enables calls to be forwarded to different destinations, according to different criteria in the screening lists.

At activation time, for each screening list, the served user specifies whether forwarding is to be done unconditionally or on busy and/or on no reply.

At registration, the status of each screening list, i.e. explicit or implicit is stated.

NOTE: If applicable, the priority of the screening lists may be indicated at registration.

The format of the CLIs in the screening lists (e.g. complete E.164 numbers or part E.164 numbers) will be as specified in stage one. All parameters specified by the served user in a screening list are independent from those specified in the other screening lists belonging to the served user.

The SCF service does not apply to the Call Deflection (CD) supplementary service.

6 Operational requirements

6.1 Provision and withdrawal

The CFU, CFB, CFNR, SCFU, SCFB, SCFNR and/or CD supplementary services shall be provided after prior arrangement with the network provider.

Each diversion supplementary service may be withdrawn separately by the network provider at the subscriber's request or for administrative reasons.

The diversion supplementary services may be offered separately with subscription options.

The subscription options for the CFU supplementary service are given in ETS 300 200 [15], subclause 6.1.

The subscription options for the CFB supplementary service are given in ETS 300 199 [14], subclause 6.1.

The subscription options for the CFNR supplementary service are given in ETS 300 201 [16], subclause 6.1.

The subscription options for the SCF supplementary service are given in EN 301 133 [18], subclause 6.1.

The subscription options for the CD supplementary service are given in ETS 300 202 [17], subclause 6.1.

The actual items in the SCF served user's screening list shall be agreed between the served user and at the discretion of the network provider at subscription time.

Each subscription option may be provided as a network provider option. For each subscription option, only one value shall be selected. Subscription options having impact on the protocol are summarized in table 1.

Table 1: Subscription options for the diversion supplementary services

Subscription option	Value	Applicability
Served user receives notification that a call has been forwarded (note 1)	No	CFU CFB CFNR
	Yes, with call offering information	SCFU SCFB SCFNR
Calling user is notified of diversion (forwarded or deflected) (note 1)	No	CFU CFB CFNR
	Yes, with diverted-to number	CD SCFU
	Yes, without diverted-to number	SCFB SCFNR
Served user receives reminder notification on outgoing calls that forwarding is currently activated (note 1)	No	CFU CFB CFNR
	Yes	SCFU SCFB SCFNR
Diverting number is released to the diverted-to user (note 1)	No	CFU CFB CFNR CD
	Yes	SCFU SCFB SCFNR
Activation, deactivation and interrogation for all ISDN-numbers on the same access (in case of subscription on a per ISDN number basis) (note 2)	No	CFU CFB CFNR
	Yes	SCFU SCFB SCFNR
NOTE 1: These options apply separately to each instance of the supplementary service that the user has subscribed to.		
NOTE 2: This option applies to all the instances subscribed to on the access of the served user for the related supplementary service.		

The following network provider options are available for the diversion supplementary services.

The network provider options for the CFU supplementary service are given in ETS 300 200 [15].

The network provider options for the CFB supplementary service are given in ETS 300 199 [14].

The network provider options for the CFNR supplementary service are given in ETS 300 201 [16].

The network provider options for the SCF supplementary service are given in EN 301 133 [18].

The network provider options for the CD supplementary service are given in ETS 300 202 [17].

These network provider options are summarized in table 2.