DRAFT
pr **ETS 300 716**
February 1996

EUROPEAN TELECOMMUNICATION STANDARD

Source: ETSI TC-NA

Reference: DE/NA-010005

ICS: 33.040

Key words: ISDN, supplementary service, stage 1

Integrated Services Digital Network (ISDN); User Signalling Bearer Service (USBS); Service description

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE
Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE
X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

Tel.: +33 92 94 42 00 - Fax: +33 93 65 47 16

*

Contents

Blank page

Foreword

This European Telecommunication Standard (ETS) has been produced by the Network Aspects (NA) Technical Committee of the European Telecommunications Standards Institute (ETSI).

In accordance with CCITT Recommendation I.130 [3], 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.

This ETS details the stage 1 aspects (overall service description) for the User Signalling Bearer Service (USBS). The stage 2 and stage 3 aspects are being developed in DE/SPS-01034 and DE/SPS-05046-1, respectively.

Proposed transposition dates	
Date of latest announcement of this ETS (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

Introduction

The USBS is different from, and should not be confused with, the user-to-user signalling supplementary service. The user-to-user signalling supplementary service is used in conjunction with a circuit switched telecommunications service (a circuit-mode bearer service or a teleservice). In the USBS, only a virtual circuit is used.

Blank page

1 Scope

This European Telecommunication Standard (ETS) defines the stage one of the User Signalling Bearer Service (USBS) 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 CCITT Recommendation I.130 [3]), but does not deal with details of the human interface itself.

This ETS defines the interworking requirements of private ISDNs with public ISDNs.

In addition this ETS specifies the base functionality where the service is provided to the user via a private ISDN.

This ETS 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 this ETS.

The USBS provides the unrestricted transfer (without alteration) of user information, on the D-channel of the user access, in a packetized manner over a virtual circuit between reference points via the basic and the primary rate access. Each of the reference points can be either an S or coincident S and T reference points (see CCITT Recommendation I.411 [7]).

This ETS contains the procedures for the on demand service variant of this bearer service category. The procedures for the permanent and reserved variants are outside the scope of this ETS.

This ETS is applicable to the stage two and stage three standards for the ISDN USBS packet mode bearer service. The terms stage two and stage three are also defined in CCITT Recommendation I.130 [3]. 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 ETSs.

Furthermore, conformance to this ETS 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 this ETS.

2 Normative references

This ETS incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of, any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] CCITT Recommendation E.164 (1991): "Numbering plan for the ISDN era".

[2] CCITT Recommendation I.112 (1988): "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] CCITT Recommendation I.140 (1988): "Attribute technique for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".

[5] CCITT Recommendation I.210 (1988): "Principles of telecommunications services supported by an ISDN and the means to describe them".

[6] CCITT Recommendation I.221 (1988): "Common specific characteristics of services".

[7] CCITT Recommendation I.411 (1988): "ISDN user-network interfaces - References configurations".

3 Definitions

For the purposes of this ETS, the following definitions apply:

Integrated Services Digital Network (ISDN): See CCITT Recommendation I.112 [2], subclause 2.3 definition 308.

ISDN number: See CCITT Recommendation E.164 [1].

service, telecommunication service: See CCITT Recommendation I.112 [2], subclause 2.2, definition 201.

supplementary service: See CCITT Recommendation I.210 [5], subclause 2.4.

network determined user busy: Network determined user busy shall be considered if the maximum allowable number of USBS calls has been reached for that called user.

busy: See CCITT Recommendation I.221 [6], clause 3

user determined user busy: See CCITT Recommendation I.221 [6], clause 3

4 Abbreviations

For the purposes of this ETS, the following abbreviations apply:

ISDN	Integrated Services Digital Network
PTNX	Private Telecommunication Network Exchange
SDU	Service Data Unit
USBS	User Signalling Bearer Service

5 Description

The USBS allows the user to send and receive information on a D-channel.

NOTE 1: No circuit mode connection is involved in this bearer service.

The USBS is applicable to the basic access and to the primary rate access.

This information is passed transparently through the network. The probability of Service Data Units (SDUs) being delivered in sequence is expected to be high and the probability of mutilation or duplication is expected to be very low. However the network does not provide mechanisms that guarantee recovery in the case of loss of SDUs (see annex B).

NOTE 2: Such mechanisms can be part of end-to-end high layer protocols.

SDUs transmitted by this service are limited to 252 octets . As a network provider option, limitations can be placed on the amount of data a user is permitted to transfer in a given time period (e.g. the throughput can be limited through the use of explicit mechanisms (see annex A)).

The USBS is provided as an on demand service.

The USBS allows an originating user on a per call basis to establish a virtual packet switched connection to a destination user identified by an ISDN number. When the connection is established, the users can exchange SDUs.

As a network provider option the USBS can be provided as a preregistered on demand mode. In this case the destination number of the USBS call is registered in the network.

The user signalling bearer service shall not be used for direct information exchange between user application and network application processes.

This bearer service shall provide unrestricted information transfer therefore it can be used to support various user applications. Examples include:

EXAMPLE 1: Teleaction applications.

EXAMPLE 2: Point of sales applications.

EXAMPLE 3: Public pay phones/faxes (card-phone/fax-boxes).

EXAMPLE 4: signalling between PTNXs.

6 Procedures

6.1 Provision and withdrawal

The service shall be provided after prior arrangement with the service provider, or, be generally available. If the service is provided after prior arrangement, then, as a service provider option, the USBS can be provided on an ISDN number basis, or the USBS can apply on the whole access. If the service provider offers both options, then it shall be a subscription option to choose which one of these options applies.

If subscription to the service is required, both users shall subscribe to the service.

As a network provider option, there can be a maximum allowable number of simultaneous USBS calls per D-channel.

The service can be withdrawn at the request of the customer or for administrative reasons.

As a network option, USBS calls shall only be allowed to destination numbers contained on a preregistered list. The destination number(s) of the USBS call shall be registered at provision. The size of the list is a network option.

NOTE: This allows service providers to dimension the signalling network in a better way.

6.2 Normal procedures

All user-network signalling shall be done on the D-channel.

6.2.1 Activation, deactivation and registration

Activation and deactivation are not applicable.

In the case of the network option with preregistered destination numbers, registration of destination numbers shall be done by the service provider at provision. No procedures are defined at the user network interface for registration of destination numbers.

6.2.2 Invocation and operation

6.2.2.1 Originating the service (call establishment)

A call is originated by a served user requesting from the network the required bearer service category. This request shall include an ISDN number identifying the called user. Other information, as required, for use by the network in connection with supplementary services provided to the called used (e.g. the calling line identification presentation supplementary service) can also be included.

In case of the network option with the preregistered destination numbers, the call request shall contain only a preregistered destination number. The network shall screen the called party number sent by the user against the numbers in the list. If a match is found, the call shall be allowed.

The identity of the called user can be given to the network either en-bloc, containing all the required information, or not en-bloc.

6.2.2.2 Indications during call establishment

After initiating a call, the calling user shall receive an acknowledgement that the network can process the call. The called user shall receive an indication of the arrival of the incoming call of this bearer service category.

When an indication is received by the network that the called user is being informed of the call, the calling user shall also be given an indication that the incoming call is being offered to the called user.

When the connection is established, an indication of this shall be sent to the calling user. The called user can also provide other information for use by the network in connection with supplementary services provided to other users (e.g. the connected line identification presentation supplementary service).

6.2.2.3 Information transfer phase

Once the connection is established, the D-channel is available for the transmission of SDUs. No restriction is placed by the network on the content of the SDUs. The network shall attempt to deliver the SDUs in the sequence received without duplication, mutilation or misdelivery.

An SDU can have a maximum length of 252 octets.

The network shall limit the flow of SDUs received from the users within a given time period for each connection. This flow control mechanism, as described in annex A, gives a maximum throughput of approximately 1,6 kbit/s.

The user and the network shall employ the congestion control mechanism described in annex B. Congestion control shall override the flow control.

Neither the flow control nor the congestion control includes mechanisms that guarantee recovery in the case of loss of SDUs.

NOTE: Such mechanisms should be part of end-to-end high layer protocols.

6.2.2.4 Terminating the call

The call can be terminated by either of the users by indicating this to the network. If one user terminates the call, and the other user has not yet terminated the call, an appropriate indication shall be sent to the other user.

6.3 Exceptional procedures

6.3.1 Situations at the calling user side

When the network receives an invalid service request from a user, the network shall give that user an appropriate indication and the call establishment shall be ceased.

A user inputting an invalid ISDN number shall be given the appropriate failure indication by the network and the call establishment shall be ceased.

In the case of the network option with the preregistered destination numbers, if a user inputs a non-preregistered number, the user shall receive an appropriate failure indication from the network and the call establishment shall be ceased.

When the network receives a service request from a user and the maximum allowable number of USBS call has been reached for that D-channel (network provider option), the network shall give that user an appropriate indication and the call establishment shall be ceased.

Users can input network address information subsequent to the service request (i.e. overlap sending). In this case, if the user fails to enter address information or subsequent parts the address within network determined time intervals, the network shall give that user the appropriate indication and the call establishment shall be ceased.

6.3.2 Situations at the called user side

A calling user attempting to establish a call to a user who is identified by the network to be busy (either network determined user busy or user determined user busy) shall be given the appropriate indication by the network.

A user attempting to establish a call to a user whose terminal equipment fails to respond shall be given an appropriate indication by the network and the call establishment shall be ceased.

On a call to a user whose terminal equipment has responded that the called user is being informed of the call, but has failed to establish a connection within a defined period of time, the calling user attempting to establish the call shall be given an appropriate indication by the network and the call establishment shall be ceased.

6.3.3 Situations due to network conditions

A user attempting to establish a call but meeting problems due to network conditions (e.g. congestion) shall be given the appropriate indication by the network.

In extreme circumstances of network congestion or failure, SDUs can be discarded. Users wishing to ensure reliable transport can employ end-to-end protocols.

7 Interworking

7.1 Interworking between public networks

Network interworking between two public networks shall be provided.

7.2 Interworking between private and public ISDNs

The USBS may be provided by a Private ISDN therefore the service shall be supported across the interface between the public network and the private network.

8 Applicability of supplementary services

The applicability of supplementary services to the USBS is described in annex D.

9 Attributes and values of attributes (including the provision of user signalling bearer services)

The attributes are defined in CCITT Recommendation I.140 [4], subclause A.1.1

The values of the attributes are defined in CCITT Recommendation I.140 [4], clause A.2.

9.1 Low layer attributes

9.1.1 Information transfer attributes

The information transfer attributes of this bearer service are specified in table 1.

Table 1: Values of information transfer attributes

Attribute	Possible values
Information transfer mode	packet
Information transfer rate	see annex A
Information transfer capability	unrestricted digital information
Structure	service data unit integrity
Establishment of communication	demand
Symmetry	bidirectional symmetric
Communication configuration	point-to-point

9.1.2 Access attributes

The access attributes of this bearer service are given in table 2.

Table 2: Values of access attributes

Attribute	Value
Access channel and rate	D(16), D(64)
Signalling access protocol layer 1	ETS 300 012 or ETS 300 011
Signalling access protocol layer 2	ETS 300 125
Signalling access protocol layer 3	DE/SPS 5046
Information access protocol layer 1	ETS 300 012 or ETS 300 011
Information access protocol layer 2	ETS 300 125
Information access protocol layer 3	DE/SPS 5046

9.2 High layer attributes

Not applicable.

9.3 General attributes

This ETS does not provide values for general attributes. Annex C contains information on quality of service.

Annex A (normative): Flow control mechanism for USBS

The flow control procedure applies to user information sent from the user to the network. It does not apply to the user information sent by the network to the user.

After answer, in each direction, a burst capability of sending N messages shall be immediately available where N initially equals the value of the burst parameter X. The value of N shall be decremented by one for every message sent by the user and incremented by Y at regular intervals of T (T = 10 seconds). The value of N shall be limited to a maximum of X.

The value of the burst parameter X shall be 16.

The value of the replenishment parameter Y shall be 8.

According to this mechanism, the maximum throughput is 1,6 kbit/s.

If messages are received at a rate which exceeds the flow control limit set by the network, the network shall discard the user information messages that cannot be handled and respond to the first discarded message with a control indication.

When the flow control restrictions are removed, and, if a user information message has been discarded due to that restriction, an indication shall be given to the user that further user information messages can be accepted. Otherwise no indication shall be given.

NOTE: The above mechanism is functionally equivalent to a "leaky bucket" algorithm employed by the network, with the threshold X, increment value Y and increment time T. It assumes that a user layer 3 entity submits, in the information transfer phase of a USBS call, less than or equal to Y messages during consecutive, non-overlapping, periods of T seconds. The burst parameter X provides elasticity in terms of delay jitter and phase difference between the network and (possible) user timers.

Annex B (normative): Congestion control for USBS

This annex specifies real-time mechanisms to prevent and recover from congestion during periods of coincidental peak traffic demands or network overload (e.g. resource failures).

Congestion control shall override the normal flow control mechanism described in annex A.

If an entity (user or network) recognizes congestion, the entity shall send an indication of this condition to the other entity. The entity receiving such an indication shall suspend the submission of SDUs. When a congestion indication is received from a user, it shall be delivered to the remote user.

If an entity recovers from congestion, it shall send an indication that congestion no longer exists, to the other entity. The other entity can resume the sending of SDUs if desired.

An entity can attempt to resume submission of SDUs after a period T (where T is 15 minutes) has elapsed since the indication of congestion has been received. The entity receiving an SDU after time T shall respond with an appropriate congestion control indication (i.e. congestion not present)

NOTE: The value of period T should be seen as the maximum value; The above situation is to guard against the exceptional case, where an indication that congestion has ceased is not received.

When an entity that has previously indicated congestion, receives an SDU, it shall respond to the first SDU with the appropriate congestion indication. No further congestion indication shall be given within the time T on the reception of further SDUs. To avoid loss of SDUs due to collision, the network shall retain the first SDU received after having sent out a congestion indication. Further SDUs shall be discarded as long as congestion persists.

Annex C (normative): Quality of service

The quality of service shall be in line with that experienced for circuit-related ISDN signalling, including the user-to-user signalling supplementary service.

In particular:

a) call set-up time.

The call set-up time shall be of the same order as that for a circuit switched ISDN call;

b) transit delay.

The transit delay shall be of the same order as that for circuit related messages, and similarly dependent on distance traversed.

Average values of the order of one second are therefore typical.

Values for times between transmission of a message and reception of an acknowledging message shall therefore be set to at least 14 seconds (the sum of the CCITT Recommendation I.451 timers T303 and T310). In many cases, a value of 44 seconds (the sum of the new values of timers T303 and T310) may be more appropriate;

c) throughput.

Annex A limits the maximum average throughput to Y/T messages per second in each direction, while peak rate for a burst of up to Y messages in a period of T is limited only by signalling channel and processing bandwidth.

The maximum average throughput is only attainable if Y messages are submitted in every period T. In this case, and assuming that every message contains the maximum of 252 octets, the maximum average throughput for an international call is 1,6 kbit/s;

d) message loss, duplication and mis-sequencing.

Probabilities of the same order as for signalling messages.

Between exchanges, ITU-T Recommendation Q.706 guarantees that, due to failure in the message transfer part:

- not more than 1 in 107 messages will be lost;

- not more than 1 in 1 010 messages will be duplicated or delivered out-of-sequence.

Annex D (informative): Applicability of supplementary services to the USBS

Supplementary services applicable to USBS are those ISDN supplementary services which are not specifically circuit-related.

Table B.1: Applicability of supplementary services to the USBS

Supplementary service	Applicability
Advice of charge services:	
Charging information at call set-up time	Applicable
Charging information during the call	Applicable
Charging information at the end of the call	Applicable
Call waiting	Not applicable (note 1)
Call hold	Not applicable (note 1)
Explicit call transfer	Not applicable (note 1)
Number identification services:	
Calling line identification presentation	Applicable
Calling line identification restriction	Applicable
Connected line identification presentation	Applicable
Connected line identification restriction	Applicable
Closed user group	Applicable
Completion of call to busy subscriber	Applicable (note 2)
Conference services:	
Conference call, add-on	Not applicable (note 1)
Meet-me conference	Not applicable (note 1)
Direct Dialling In	Applicable
Diversion services:	
Call forwarding unconditional	Applicable
Call forwarding on busy	Applicable (note 2)
Call forwarding on no reply	Applicable
Call deflection	Applicable
Freephone	Applicable
Malicious call identification	Applicable
Multiple subscriber number	Applicable
Subaddressing	Applicable
Terminal portability	Applicable
Three party service	Not applicable (note 1)
User-to-user signalling	Not applicable (note 1)

NOTE 1: "Not applicable" means that the supplementary service is not considered meaningful in conjunction with this bearer service.

NOTE 2: Only applicable in the case of network determined user busy.

Annex E (informative): Bibliography

- ETS 300 011: "Integrated Services Digital Network (ISDN); Primary rate user-network interface; Layer 1 specification and test principles".

- ETS 300 012: "Integrated Services Digital Network (ISDN); Basic user-network interface; Layer 1 specification and test principles".

- ETS 300 125: "Integrated Services Digital Network (ISDN); User-network interface data link layer specification; Application of CCITT Recommendations Q.920/I.440 and Q.921/I.441".

- DE/SPS-01034: "Integrated Services Digital Network (ISDN); Signalling System No.7; User Signalling Bearer Service (USBS)".

- DE/SPS-05046: "Integrated Services Digital Network (ISDN); User Signalling Bearer Service (USBS); Digital Subscriber Signalling System No. one (DSS1) protocol".

- CCITT Recommendation I.451: "ISDN user-network interface layer 3 specification for basic call control".

- ITU-T Recommendation Q.706: "Signalling System No. 7 - Message transfer part signalling performance".

History

Document history			
February 1996	Public Enquiry	PE 101:	1996-02-05 to 1996-05-31