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Širokopasovno digitalno omrežje z integriranimi storitvami (B-ISDN) in širokopasovno zasebno omrežje z integriranimi storitvami (B-PISN) – Digitalna naročniška signalizacija št. 2 (DSS2), širokopasovna signalizacija med centralami (B-QSIG) in signalizacija št. 7 (SS7) – Krmiljenje klica v okolju ločenega krmiljenja klica in nosilca – 1. del: Specifikacija protokola

Broadband Integrated Services Digital Network (B-ISDN) and Broadband Private Integrated Services Network (B-PISN); Digital Subscriber Signalling System No. two (DSS2), Broadband Inter-Exchange Signalling (B-QSIG), and Signalling System No. 7 (SS7); Call control in a separated call and bearer control environment; Part 1: Protocol specification

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ETSI

Postal address

F-06921 Sophia Antipolis Cedex - FRANCE

Office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Internet

secretariat@etsi.fr
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Foreword

This European Standard (Telecommunications series) has been produced in joint activity by ETSI Technical Committee Signalling Protocols and Switching (SPS) and ECMA TC32–TG15.

The present document is part 1 of a multi-part standard covering the Digital Subscriber Signalling System No. 2 (DSS2), Broadband Inter-Exchange Signalling (B-QSIG), and Signalling System No. 7 (SS7) protocol specification for the Broadband Integrated Services Digital Network (B-ISDN) and Broadband Private Integrated Services Network (B-PISN) Call Control, 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";

Part 4: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification".

National transposition dates	
Date of adoption of this EN:	5 November 1999
Date of latest announcement of this EN (doa):	29 February 2000
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 August 2000
Date of withdrawal of any conflicting National Standard (dow):	31 August 2000

1 Scope

The present document specifies a signalling protocol for the purpose of call control at the Q_B, S_B, T_B, and co-incident S_B/T_B reference points within, between, and at the access to Broadband Private Integrated Services Networks and within, between, and at the access to European Broadband Integrated Services Digital Networks. The protocol operates between two adjacent call control entities. The protocol is applicable to a terminal or network node in a separated call and bearer (connection) control environment for the support of calls having none, a single bearer or multiple bearers. The protocol is applicable to a two-party call. The protocol also provides forward compatibility to the extent that an implementation can also operate within a multi-party call with other implementations that use additional capabilities, provided the implementation is deployed where it does not need to be aware of more than two parties.

The present document is related to other Standards in this series which will describe the architecture of a separated call and bearer control environment and scenarios in which such an architecture can be applied.

The protocol specified in the present document is independent of the supporting transport service.

The protocol specified in the present document is independent of the protocol used for bearer establishment.

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, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, 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 X.680: "Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation".

[2] ITU-T Recommendation X.681: "Information Technology - Abstract Syntax Notation One (ASN.1): Information object specification".

[3] ITU-T Recommendation X.682: "Information technology - Abstract Syntax Notation One (ASN.1): Constraint specification".

[4] ITU-T Recommendation X.683: "Information technology - Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications".

[5] ITU-T Recommendation X.690: "Information technology - ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rues (CER) and Distinguished Encoding Rules (DER)".

[6] ITU-T Recommendation X.880: "Information technology - Remote operations: concepts, model and notation".

[7] ITU-T Recommendation Z.100: "CCITT specification and description language (SDL)".

[8] ETS 300 796-1: "Broadband Integrated Services Digital Network (B-ISDN); Digital Subscriber Signalling System No. two (DSS2) protocol; Generic functional protocol; Core aspects; Part 1: Protocol specification [ITU-T Recommendation Q.2932.1 (1996), modified]".

[9] ECMA-254: "Broadband Private Integrated Services Network (B-PISN) - Inter-Exchange Signalling Protocol - Generic Functional Protocol (B-QSIG-GF)".

[10] 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".

3 Definitions

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

call: association between two or more users using a telecommunication service to communicate through one or more networks

call segment: part of a call located between two adjacent call control entities

call control: functionality and signalling in and between networks and terminals to effect the control of a call, excluding the control of individual bearers

call control entity (CC entity): entity that is located in a terminal or a network and that participates in call control

bearer control: functionality and signalling in and between networks and terminals to effect the control of a bearer, that bearer being part of a call

bearer control entity (BC entity): entity that is located in a terminal or a network and that participates in bearer control

bearer: connection for the transport of user plane information between users involved in a call

adjacent call control entities (adjacent CC entities): within the context of a single call, two CC entities that signal directly to each other with no intervening CC entity

preceding CC entity: CC entity that initiates call establishment across a given call segment

succeeding CC entity: CC entity at the opposite end of a call segment from the preceding CC entity

originating CC entity: CC entity that initiates call establishment and is located in a terminal or equipment that functions like a terminal (e.g. a server in the network)

terminating CC entity: CC entity to which call establishment is directed and that is located in a terminal or equipment that functions like a terminal

transit CC entity: CC entity through which a call passes, excluding the originating and terminating CC entity

call control signalling service provider: entity which provides the signalling services of call control

call control signalling service user: entity within the CC entity to which the signalling services of call control are provided

NOTE: The call control signalling service user performs the Call Description handling, provides the interactions with bearer control, and in a network node, co-ordinates the incoming and outgoing side of the CC entity (figure 6).

information model: representation of the service and abstract communications configuration using an object oriented technique

party: addressable signalling endpoint

calling party: party which initiates the call establishment

called party: any party in a call other than the calling party

4 Abbreviations

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

APDU	Application Protocol Data Unit
ASN.1	Abstract Syntax Notation One
B-PISN	Broadband Private Integrated Services Network
BC	Bearer Control
CC	Call Control
M	Mandatory
O	Optional

5 Basic model

5.1 Separation of Call Control (CC) and Bearer control (BC)

The protocol specified in the present document is applicable to an environment in which the control of a call is separate from the control of the bearer or bearers that exist within the context of that call.

In order for two users to communicate using a telecommunication service, an association, or call, is established between the two users. Within the context of the call, one or more bearers can be established for transporting user plane information between the users. However, bearers are not normally established until the call has been accepted by the called terminal, and therefore resources required by bearers are not occupied unnecessarily if the call cannot be established, e.g., if the called terminal is unable to accept the call because resources are not available. During the life-time of the call, bearers can be added or cleared down as required. The call is terminated by one of the two users when there is no further need for communication. Termination of the call implies that all bearers (if any) are cleared down.

Although for some telecommunication services a single bearer is sufficient, other telecommunication services benefit from the use of multiple bearers, each tailored to suit the characteristics of the user plane information to be transported. This is particularly true for multi-media applications involving audio, video and data. The call provides a context in which the various bearers can exist and a means of binding the bearers together.

5.2 Point-to-point and multi-party CC

In a point-to-point configuration the protocol specified in the present document operates between any two adjacent CC entities between the calling party and the called party.

In a multi-party configuration the protocol specified in the present document operates between any two adjacent CC entities on the point-to-point leg between a co-ordination point in the network and a called party. In this case a network node in the calling party's network takes responsibility for co-ordinating the responses from multiple point-to-point signalling associations to the called parties into one signalling association to the calling party. Enhancements to be made to the CC protocol in order to make it suitable also for this signalling association to the calling party in case of a multi-party call are outside the scope of the present document.

Figure 1 shows an example configuration for a multi-party call with two called parties involved.

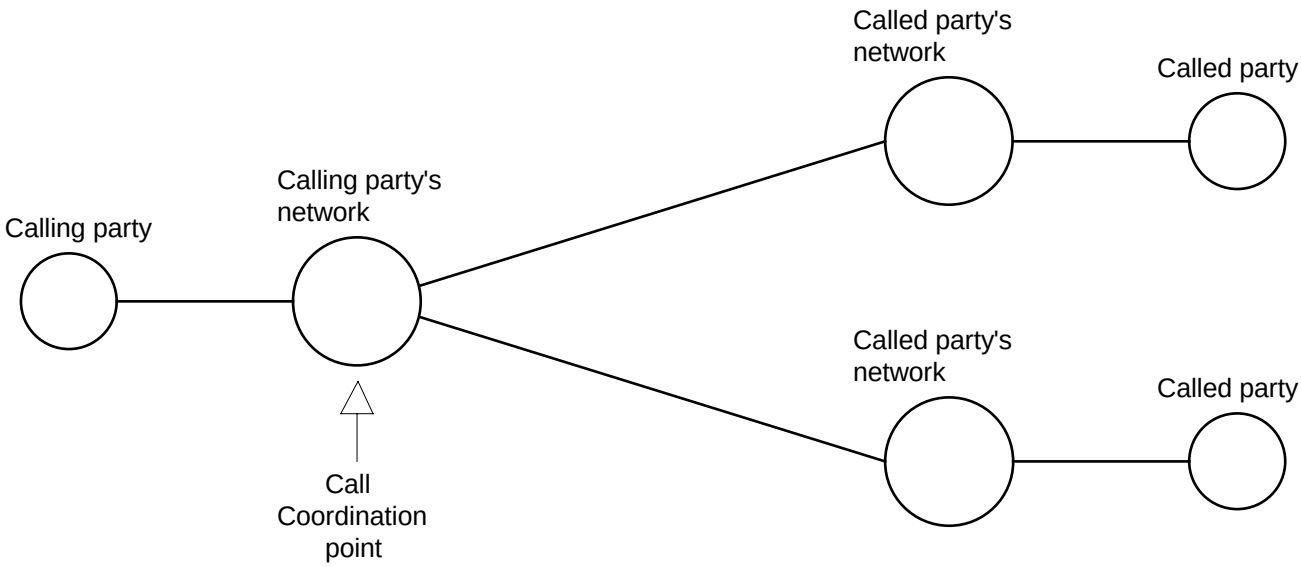

Figure 1: Multi-party call with two called parties

5.3 CC architecture

CC provides the means of establishing, maintaining and clearing down a call, including the operation of any supplementary services that relate to the call rather than to individual bearers. Control of a call is effected by means of a number of call control entities (CC entities) located in the users' terminals and in various network nodes. Whereas BC involves a bearer control entity (BC entity) at each network node through which a bearer passes, CC requires a CC entity only at those network nodes that provide call-related functionality, e.g., the nodes serving the terminals concerned or nodes that, in the context of the call, provide interworking between networks. In particular, CC entities are not required at nodes that would only provide transit functionality. The precise criteria for determining whether a network node needs to provide CC functionality for a given call are outside the scope of the present document.

The various CC entities involved in a given call are linked in series by signalling associations. These CC entities and signalling associations are created during call establishment and cleared down when the call is cleared down. The protocol specified in the present document provides such an association between adjacent CC entities and conveys call-related signalling information between those CC entities. That part of a call between two CC entities that communicate directly via a single signalling association is known as a call segment. This is illustrated in figure 2 for a call that involves four CC entities (e.g., one at each terminal and one at each node serving those terminals) and consequently three call segments.

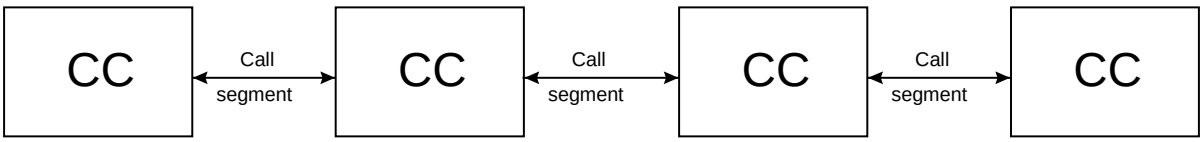

Figure 2: CC involving four CC entities (three call segments)

5.4 Relationship to BC architecture

BC requires functionality, and hence a BC entity, at each terminal and at every network node through which the bearer is routed. This is in contrast to CC, which involves a CC entity only at the terminals and selected network nodes. Each bearer can be routed independently of other bearers and independently of the routeing of CC signalling associations. However, each bearer is required to be routed through each network node at which there is a CC entity, and hence have a BC entity at each of these nodes, so that the CC entity can manage the bearer if required. This is illustrated in figure 3 for the same call as in figure 2 and a single bearer that has a BC entity collocated with each CC entity and an additional BC entity (e.g. at a transit node) located between the second and third CC entities.

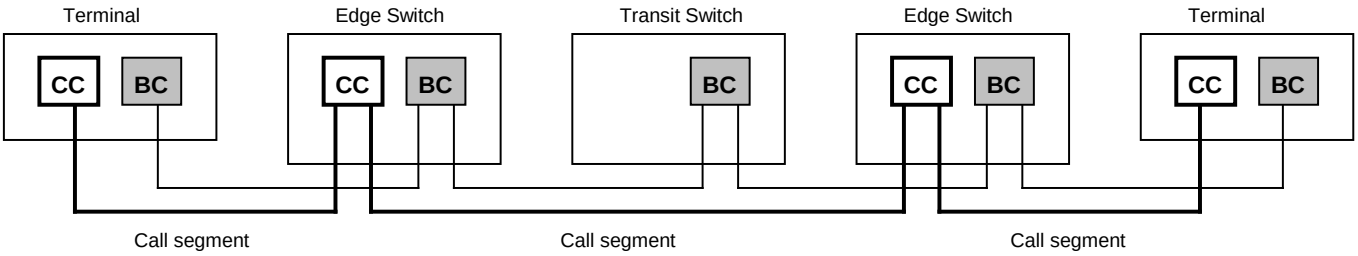

Figure 3: Relationship of CC and BC architecture

NOTE: Signalling between BC entities is outside the scope of the present document.

5.5 Screening function

The model for call and BC functional entities (figure 3) shows all CC entities existing at the same location as BC entities. While BC can exist independently of CC, the opposite does not apply. Each CC entity includes bearer co-ordination capabilities.

Although at network boundaries, CC entities will normally be present, network boundaries can also be crossed without provision of a CC entity and the connections associated with those calls can be routed differently from each other and from the call, thereby crossing network boundaries at different locations or even being routed through different networks.

Where a call crosses a network boundary, a number of functions will need to be performed within CC that do not require the presence of a connection. These include:

a) service control. Control of the provision of basic and supplementary services, and subscription arrangements. Identification of correct service profile;

b) translation of numbering plans where the two networks use different numbering plans (e.g. public to private). Even where the same numbering plan is used, the addition of the country code may be necessary;

c) provision of some supplementary services that provide security control on a network basis, e.g. closed user group;

d) support of supplementary services related to numbering (e.g., DDI, MSN) and restriction of numbers (CLIR, COLR).

The functions listed above are outside the scope of the present document.

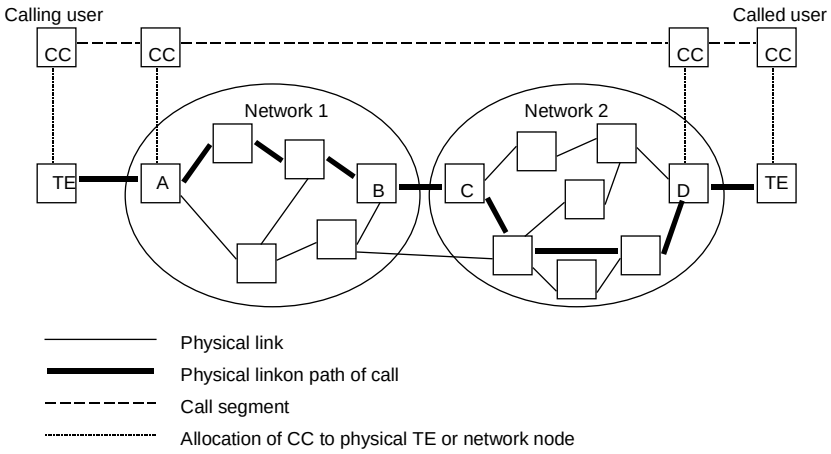

Figure 4: Call originating and terminating in different networks

Figure 4 shows an example of a call originating and terminating in different networks. If calling line identification restriction (CLIR) applies to the call, this information will be known at the CC at node A, which can add a presentation restricted indicator to the calling party number forwarded on across the next call segment. Normally, on exit from one network to another, a calling party number with an associated presentation restricted indicator is not forwarded, but instead just the presentation restricted indicator is forwarded. The absence of a CC at node B (point of egress to network 2) means that there will be no opportunity to filter out the calling party number until the CC at node D is reached. This is clearly insecure.

Possible alternatives are:

1) Ensure that there is a CC at node B (and similarly at node C to handle this type of situation in the reverse direction). However, CCs are points of bearer coordination, and the presence of CCs at nodes B and C would force all bearers to go via nodes B and C. This would deny the possibility of using other routes between the two networks. For some bearers, the route via nodes B and C might not be the cheapest, or may be congested, or may not provide the desired quality of service. It is desirable to minimize the number of CCs in order to provide maximum flexibility for routeing bearers.

2) Ensure that the CC at node A performs the filtering. However, this requires node A to have knowledge that the call segment leads to another network. This knowledge may not always be available.

To solve the problem without introducing the disadvantages of alternatives 1 and 2, filtering (screening) functionality may be provided at node B (and node C). A functional entity (screening function) may optionally appear between CC entities, and is located as necessary at incoming and outgoing gateways between networks. Figure 5 shows an example.

The screening functional entity has no impact on the information flows, except that this functional entity may impose itself as a transit point on an existing flow.

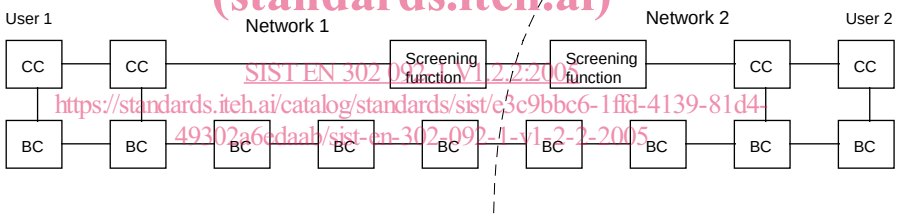

Figure 5: Screening functional entities at network boundaries

6 Operational requirements

6.1 Provision and withdrawal

The provision of this capability within a network is a network provider option.

The provision of this capability between networks or between a network and a user is by bilateral agreement.

6.2 Transport mechanism

The choice of the underlying transport mechanism within a network is a network provider option.

The choice of the transport mechanism between networks or between a network and a user is by bilateral agreement.

7 Primitive definitions and state definitions

7.1 Service primitives

7.1.1 Service primitive architecture

The following services for call establishment and release are defined:

ESTABLISH-CALL	confirmed
RELEASE-CALL	confirmed
COMPLETE-CALL	unconfirmed
STATUS-CALL	unconfirmed
PROCEED-CALL	unconfirmed
ERROR	indication

Figure 6 shows the architecture which is assumed for two concatenated call segments.

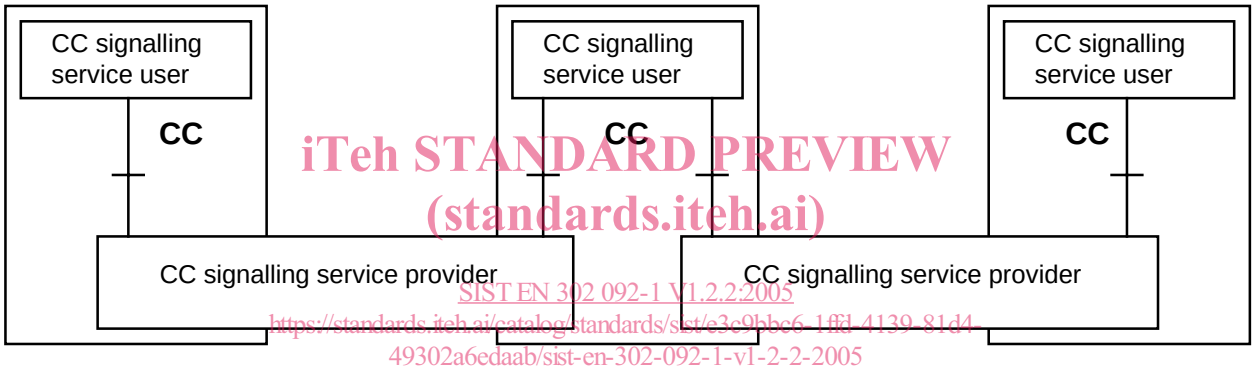

Figure 6: Architecture

7.1.2 ESTABLISH-CALL

This service is used by the CC signalling service user to establish a call and its information model. It is a confirmed service. Table 1 shows the parameters of the ESTABLISH-CALL primitive.

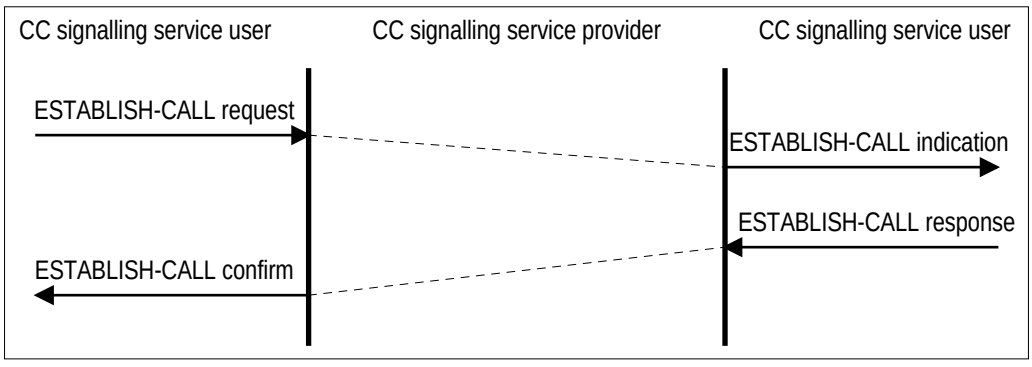

Figure 7: ESTABLISH-CALL service