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European Standard (Telecommunications series)

Broadband Integrated Services Digital Network (B-ISDN); Digital Subscriber Signalling System No. two (DSS2) protocol; Point-to-point multiconnection bearer control specification in a separated call and bearer environment; Part 1: Protocol specification

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Contents

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Signalling Protocols and Switching (SPS), and is now submitted for the Public Enquiry phase of the ETSI standards Two-step Approval Procedure.

The present document is part 1 of a multi-part standard covering the Digital Subscriber Signalling System No. two (DSS2) protocol; Point-to-point multiconnection bearer control specification in a separated call and bearer environment, 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".

The Protocol specification, of the present document, builds upon the basic call control procedures defined in EN 300 443-1 [7] by adding protocol elements and procedures required to enable separate call and bearer control.

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

1   Scope

The present document specifies the procedures for establishing, maintaining and clearing of bearer connections to point-to-point multiconnection calls at the B-ISDN user-network interface.

It specifies the essential features, procedures, and messages required for controlling bearer connections associated to point-to-point multiconnection calls in a functionally separated call and bearer control environment.

The procedures specified by the present document are applicable at the interface between a B-ISDN terminal equipment and a B-ISDN public network (coincident S_b and T_b reference point) as well as at the interface between a B-ISDN customer network and a B-ISDN public network (i.e. at the T_b reference point).

The separated bearer control protocol defined by the present document is applicable to control bearers associated to a multiconnection call which is controlled independently by means of a separate call control protocol.

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, subsequent revisions do apply.
- 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]   EN 302 091-1: "Broadband Integrated Services Digital Network (B-ISDN) and Broadband Private Integrated Services Network (B-PISN); Digital Subscriber Signalling System No. 2 (DSS2), Broadband Inter-Exchange Signalling (B-QSIG) and Signalling System No. 7 (SS7); Prenegotiation; Part 1: Protocol specification".

[2]   ITU-T Recommendation Q.2931 (1995): "Digital Subscriber Signalling System No. 2 (DSS 2) – User-Network Interface (UNI) layer 3 specification for basic call/connection control and Amendment 1 (1997)".

[3]   ITU-T Recommendation Q.2130 (1994): "B-ISDN signalling ATM adaptation layer – Service specific coordination function for support of signalling at the user-network interface (SSCF at UNI)".

[4]   Void.

[5]   ITU-T Recommendation Q.2962: "Digital Subscriber Signalling System No. 2 – Connection characteristics negotiation during call/connection establishment phase".

[6]   ITU-T Recommendation Q.2963: "Digital subscriber signalling system No. 2 – Connection modification".

[7]   EN 300 443-1: "Broadband Integrated Services Digital Network (B-ISDN); Digital Subscriber Signalling System No. two (DSS2) protocol; B-ISDN user-network interface layer 3 specification for basic call/bearer control; Part 1: Protocol specification [ITU-T Recommendation Q.2931 (1995), modified]".

[8]   ITU-T Recommendation I.413: "B-ISDN user-network interface".

[9]   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]".

[10]   EN 301 068-1: "Broadband Integrated Services Digital Network (B-ISDN); Digital Subscriber Signalling System No. two (DSS2) protocol; Connection characteristics; ATM transfer capability and traffic parameter indication; Part 1: Protocol specification [ITU-T Recommendations Q.2961.1 (1995), Q.2961.2 (1997), Q.2961.3 (1997), Q.2961.4 (1997), modified]".

3 Definitions

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

connection state: state for each connection (see subclause 7.2.1) which is known by the layer 3 Bearer Control entity. The different Connection states correspond to the call/connection states defined in clause 2 of ITU-T Recommendation Q.2931 [2], i.e. the states of the Q.2931 protocol entities on both sides of the UNI and relate to each call associated bearer.

bearer identifier: the identifier used to identify a bearer instance to which a particular bearer establishment request relates between two CC entities. The value of the bearer identifier is significant between two adjacent CC entities. The value is unique within a call between two adjacent CC entities.

call association: the identifier used to identify a multiconnection call instance to which a particular bearer establishment request relates between two CC entities. The value of a call identifier is significant between two adjacent call control entities. The value carried in the call association is significant between two adjacent CC entities.

preceding side: with respect to a given bearer, the side of a user-network interface from which bearer establishment across the interface originates.

succeeding side: with respect to a given bearer, the side (opposite to the preceding side) of a user-network interface which receives bearer establishment request across the interface.

4 Abbreviations

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

AAL	ATM Adaptation Layer
ATM	Asynchronous Transfer Mode
B-ISDN	Broadband Integrated Services Digital Network
DSS2	Digital Subscriber Signalling System No 2
SAAL	Signalling ATM Adaptation Layer
SDL	Specification and Description Language
UNI	User-Network Interface

5 Description

5.1 Application to interface structure

The bearer control procedures apply to the interface structures defined in ITU-T Recommendation I.413 [8]. They use the functions and services provided by layer 2 (i.e. the SAAL). The layer 3 procedures request the services of layer 2 and receive information from layer 2 using the primitives defined in ITU-T Recommendation Q.2130 [3]. These primitives are used to illustrate the communication between the protocol layers and are not intended to specify or constrain implementations.

5.2 Capabilities supported by the present document

The present document builds upon the basic point-to-point combined call/bearer control protocol defined in EN 300 403-1 [9] (see subclause 1.5 of ITU-T Recommendation Q.2931 [2]) to enable the separate control of bearers being associated to a multiconnection call.

5.3   General overview

The present document provides the procedures, messages and information elements needed for establishing, maintaining and clearing of bearer connections being associated with a point-to-point multiconnection call.

After a multiconnection call has been initiated or has progressed to the active state, bearer connections can be added to the call by individual bearer connection set-up requests from the calling party or the called party, using the separated bearer control protocol specified in the present document, which is based on the procedures in EN 300 403-1 [9]. Each new connection establishment request shall use a new call reference (see clause 4 of ITU-T Recommendation Q.2931 [2]). Bearers may be established or released from the multiconnection call at any time while not modifying the call state. New connections can be established by the calling party or the called party by sending a SETUP message as defined in ITU-T Recommendation Q.2931[2], which in addition contains the call association information element in order to associate that bearer with the multiconnection call. Connections may be released from the call by the calling party or the called party by sending a RELEASE message as defined in ITU-T Recommendation Q.2931 [2].

The individual bearers are controlled independently. In particular, multiple bearer connection establishment requests may be initiated in parallel (i.e. the requesting party does not need to wait for a response related to one bearer connection set-up request before issuing another one). Similarly, multiple bearer connection release requests may be pending at the same time (i.e. the requesting party does not need to wait for a response related to one release connection request before issuing the next one).

Any ATM transfer capability available at the interface may be requested independently for each of the bearers associated with a multiconnection call, using appropriate connection characteristics parameters indication as specified in EN 301 068-1 [5]. Furthermore, the ATM traffic parameter negotiation features defined in ITU-T Recommendation Q.2962 [5] apply independently to each bearer at establishment time, as does ATM traffic parameter negotiation during the active state of the connection, using the ITU-T Recommendation Q.2963 [6] defined features.

6   Operational requirements

6.1   Provision and withdrawal

A bilateral agreement between the user and the network provider concerning the availability of the multiconnection call capabilities is assumed to exist. This may be the subject of a subscription option or may be made generally available.

6.2   Requirements on the originating network side

None beyond the support of the multiconnection call capability related control protocols.

6.3   Requirements on the destination network side

None beyond the support of the multiconnection call capability related control protocols.

7   Primitive definitions and state definitions

7.1   Primitive definitions

Clause 8 of ITU-T Recommendation Q.2931 [2] shall apply. No additional primitives between DSS2 layer 3 and the Signalling ATM adaptation Layer are defined for the purpose of the present document.

7.2   State definitions

The bearer connection states that may exist on the user or network side of the user-network interface coincide with the call/connection states defined in clause 2 of ITU-T Recommendation Q.2931 [2]. The bearer control entity maintains the current state of each individual bearer independently.

The bearer connection states defined in subclause 2.2 of ITU-T Recommendation Q.2931 [2] (corresponding to the additional call/connection states) relating to interworking requirements are not applicable although they may be available if the point-to-point combined call/bearer control capability (using the Q.2931 basic call control protocol) interworking with existing services or networks (i.e. operating exclusively the combined call/bearer control protocol) is supported. However such interworking requirements are beyond the scope of the present document.

8   Coding requirements

8.1   Messages

Messages are defined in accordance with the principles given by the introductory paragraph in clause 3 of ITU-T Recommendation Q.2931 [2]. Only changes to messages defined in clause 3 of ITU-T Recommendation Q.2931 [2] are specified in subclause 8.1.1 f.f.

8.1.1   Modification to messages defined in ITU-T Recommendation Q.2931

The following modifications apply to the messages defined in subclause 3.1 of ITU-T Recommendation Q.2931 [2]. However they do not apply, unless otherwise explicitly stated, to the messages relating to the support of 64 kb/s based ISDN circuit-mode services (subclause 3.2 of ITU-T Recommendation Q.2931 [2]) even if the interworking of Multiconnexion calls with these services (or interworking with networks providing these services) is supported.

Table 8-1 lists the existing clause 3 of ITU-T Recommendation Q.2931 [2] messages that have their contents modified to support the establishment/release of bearer connections in a point-to-point multiconnection call control environment by means of separated call and bearer control protocols.

Table 8-1: Modified ITU-T Recommendation Q.2931 [2] messages

Message	Reference
SETUP	8.1.1.1

8.1.1.1   SETUP

This message is sent by the user to the network and by the network to the user to initiate an individual bearer connection establishment.

See Table 8-2 for additions to the structure of this message shown in Table 3-8 of ITU-T Recommendation Q.2931 [2].

Table 8-2: SETUP message additional contents

Message type: SETUP

Significance: global

Direction: both

Information Element	Reference	Direction	Type	Length
Call association	8.2.1/Q.298x-bc	both	O (note)	8-9
Bearer identifier	8.2.2/Q.298x-bc	both	O (note)	7
NOTE: Mandatory when the message is used to add a bearer to a multiconnection call.				

8.1.1.2   Other messages

If interworking between multiconnection call supported services and 64 kb/s based ISDN circuit mode services is supported, the messages defined in subclause 3.2 of ITU-T Recommendation Q.2931 [2] apply. In addition the SETUP ACKNOWLEDGE (subclause 3.2.8 of ITU-T Recommendation Q.2931 [2]) message and the INFORMATION message (subclause 3.2.4 of ITU-T Recommendation Q.2931 [2]) is not applicable although they may be used to support ITU-T Recommendation Q.2931 [2] combined call/connection control capability at the same interface.

8.2   Information elements

The information elements and coding rules of subclauses 4.1, 4.2, 4.3, 4.4 and 4.5 of ITU-T Recommendation Q.2931 [2] shall apply with the additions or modifications identified in the following subclauses.

8.2.1   Call association

The purpose of the call association information element is to identify the call to which the bearer in the process of being established relates. The call identifier value carried in the call association information element has significance between the two peer call control entities between which the bearer is being established.

NOTE: The assignment of the call association value is initiated by the originating side of the first message referring to the establishment of the multiconnection call.

The call association information element is coded as shown in Figure 8-1 and Table 8-3.

Bits

8	7	6	5	4	3	2	1	Octets
Call association								1
1	0	0	1	0	0	1	1	
Information element identifier								
1 ext	Coding standard		Flag	Res.	IE Action Ind			2
Length of call association contents								3
Length of call association contents (continued)								4
Identifier for call identifier value								5
0	0	0	0	0	0	0	1	
Call identifier value								5.1 to 5.3
or								
Identifier for call segment identifier value								6
0	0	0	0	0	0	1	0	
Call segment identifier value								6.1 to 6.4

Figure 8-1: Call association information element

Table 8-3: Call association information element coding

-	Octets 1 through 4 are coded according to the coding rules specified in clause 4 of ITU-T Recommendation Q.2931 [2]. Either a call identifier (octet group 5) or a call segment identifier (octet group 6) shall be included but not both. This depends on the method of call identification employed in the related call control protocol.
-	The call identifier value field (octets 5.1 to 5.3), if present, contains the call identifier value if provided by the associated CC entity.
-	The call segment identifier value field (octets 6.1 to 6.4), if present, contains the call segment identifier value if provided by the associated CC entity.

8.2.2   Bearer identifier

The purpose of the bearer identifier information element is to relate a bearer in the process of being established to a bearer object known to peer call control entities within the context of a multiconnection call. The bearer identifier value has significance only between the two peer call control entities between which the bearer is being established.

The bearer identifier information element is coded as shown in Figure 8-2 and in Table 8-4.

Bits

8	7	6	5	4	3	2	1	Octets
Bearer identifier								
1	0	0	1	0	0	0	1	1
Information element identifier								
1 ext	Coding standard	Flag	Res.	IE instruction field IE Action Ind				2
Length of bearer identifier contents								3
Length of bearer reference contents (continued)								4
0/1 Bearer identifier flag	Bearer identifier value							5
Bearer identifier value (continued)								6
Bearer identifier value (continued)								7

Figure 8-2: Bearer identifier information element

Table 8-4: Bearer identifier information element coding

- Octets 1 through 4 are coded according to the coding rules specified in section 4 of ITU-T Recommendation Q.2931 [2]. - Bearer identifier flag (Octet 5) Bit 8 0 The message is sent from the side that originated the bearer reference. 1 The message is sent to the side that originated the bearer reference. - Bearer identifier value (Octets 5, 6 and 7) The bearer identifier is a 23-bit integer (coded in binary) to uniquely identify a bearer within a multiconnection call.

8.2.3   Other information elements

The Broadband sending complete information element (subclause 4.5.21 of ITU-T Recommendation Q.2931 [2]) is not applicable. However its use is optional and its presence or absence in the SETUP message shall not incur an error situation.

The information elements defined for the support of 64 kb/s based ISDN circuit mode services (subclause 4.6 of ITU-T Recommendation Q.2931 [2]) apply only when their interworking with multiconnection call supported services is provided.

9   Signalling procedures at the coincident S_b and T_b reference point

9.1   Introduction

Before the procedures described in this subclause are invoked, an assured mode SAAL connection shall be established as specified in subclause 5.1 and clause 8 of ITU-T Recommendation Q.2931 [2].

The procedures specified in this subclause cover the following capabilities:

a) addition of bearers to multiconnection call being established or having progressed to the active state;

b) release of bearers from an existing call, while maintaining the call active, including when no more bearers exist.

NOTE: Any of the users may initiate bearer establishment or clearing.

The procedures for basic (and simultaneous) call/connection control as defined in clause 5 of ITU-T Recommendation Q.2931 [2] shall apply as the basis for the separated bearer control. Only additional procedures required to handle the separated bearer control functions of a multiconnection call are described in the following subclauses.

9.2   Establishment of a bearer

As soon as the multiconnection call has been initiated and the initiating call control entity has received an indication that call establishment is proceeding, one or more bearer-additions to the call may be initiated.

9.2.1   Additional procedures at a preceding side

When sending a SETUP message, a preceding side that is a point of call/bearer coordination shall place in the Called party number information element the called party number supplied by the call control signalling service user.

The bearer control entity requesting the addition of a bearer to a multiconnection call shall send a SETUP message with a new call reference and containing a call association information element specifying the call to which the bearer establishment request relates.

The SETUP message shall contain the called party number and called party sub-address information elements containing addresses provided by the call control entity.

The bearer control entity receiving a SETUP message specifying a call association value which is not recognized as relating to an existing multiconnection call, shall reject the bearer establishment request by sending a RELEASE COMPLETE message with cause #101, *'message not compatible with call state'*.

Upon receipt of an indication that the bearer establishment request has been accepted and proceeds, the network shall associate the bearer (identified by the call reference in the received message) to the multiconnection call (identified by the value carried in the call association information element).

9.2.1.1   Additional procedures at a preceding side that is a point of call/bearer coordination

When sending a SETUP message, a preceding side that is a point of call/bearer coordination shall place in the called party number information element the called party number supplied by the local call control signalling service user.

It shall also include in the SETUP message a call association information element containing a call identifier value or a call segment identifier value supplied by the local call control signalling service user.

In addition, it shall include in the SETUP message a bearer identifier information element containing a bearer identifier value supplied by the local call control signalling service user.

9.2.1.2   Additional procedures at a preceding side that is not a point of call/bearer coordination

When sending a SETUP message , a preceding side that is not a point of call/bearer coordination shall place in the called party number information element the called party number received in the bearer establishment request from the previous point of call/bearer coordination.

It shall also include in the SETUP message a call association information element containing a call identifier value or a call segment identifier value that has been received in the SETUP bearer establishment request message from the previous point of call/bearer coordination.

In addition, it shall include in the SETUP message a bearer identifier information element contained in the bearer establishment request message received from the previous point of call/bearer coordination.

9.2.2 Additional procedures at a succeeding side

Upon receipt of a SETUP message containing a call association information element, the succeeding side shall determine whether it is the point of call/bearer coordination addressed by the called party number information element. If so, the procedures of subclause 9.2.2.2 shall apply, otherwise the procedures of subclause 9.2.2.1 shall apply.

9.2.2.1 Additional procedures at a succeeding side that is not a point of call/bearer coordination

A succeeding side that is not a point of call/bearer coordination shall forward the bearer establishment request based on information in the received SETUP message towards the next point of call/bearer coordination, as addressed by the number in the received called party number information element.

It shall also pass forward in the SETUP bearer establishment request message towards the next point of call/bearer coordination the call identifier value or the call segment identifier value received in the call association information element present in the received SETUP message.

In addition, it shall pass forward in the SETUP bearer establishment request message towards the next point of call/bearer coordination the bearer identifier value received in the bearer identifier information element.

9.2.2.2 Additional procedures at a succeeding side that a point of call/bearer coordination

A succeeding side that is a point of call/bearer coordination shall forward the bearer establishment request based on information in the received SETUP message to the local call control signalling service user.

It shall also pass to the local call control signalling service user the call identifier value or the call segment identifier value received in the call association information element present in the received SETUP message.

> NOTE 1: The call control service user can use this value to relate the bearer to an existing multiconnection call. Failure to relate the bearer to an existing multiconnection call can result in a rejection by the call control signalling service user of the bearer being requested to be established.

In addition, it shall pass to the local call control signalling service user the bearer identifier value in the bearer identifier information element.

> NOTE 2: The call control service user can use this value to correlate the bearer against the call's object model. Failure to correlate can result in the call control signalling service user to reject the bearer being requested to be established.

9.3 Clearing of a connection

Clearing procedures as specified in subclause 5.4 of ITU-T Recommendation Q.2931 [2] shall apply. Clearing of a bearer connection does not affect the call state.

> NOTE: The bearer clearing messages does not contain the call association information element.

10 Signalling procedures at the T_b reference point

Clause 9 applies.

11 Interworking with other networks

Interworking with user or network entities not supporting the multiconnection call capability is an implementation option. The interworking specifications are beyond the scope of the present document.

If supported, the interworking function shall map each connection of a multiconnection call to a call/connection in networks not supporting the multiconnection call capability.

12 Interactions with supplementary services

Beyond the scope of the present document.

13 Parameter values

No additional parameter required beyond those defined in ITU-T Recommendation Q.2931 [2].

14 Dynamic description SDLs

None required beyond those in Annex A of ITU-T Recommendation Q.2931 [2].

Annex A (informative):
Guidelines for the use of the instruction indicator

This annex provides guidelines for the setting of the instruction indicator field in the call association and bearer identifier information elements. An implementation may choose to set the instruction indicator differently, depending on possible specific requirements beyond those covered explicitly within the present document.

Recommended setting of the instruction indicator in the call association information element:

Flag: "Ignore explicit instructions".

Action indicator: "Not significant".

Recommended setting of the instruction indicator in the bearer identifier information element:

Flag: "Ignore explicit instructions".

Action indicator: "Not significant".

Annex B (informative):
Significance and use of the bearer identifier and call association at the user-network interface

This annex provides further information on the use of the bearer identifier value included in the bearer identifier information element to enable the association of a bearer to a multiconnection call through the use of the call identifier or call segment identifier value contained in the call association information element.

Figure B.1 shows the peer-to-peer call and bearer control elements at the user-network interface and their relationships.
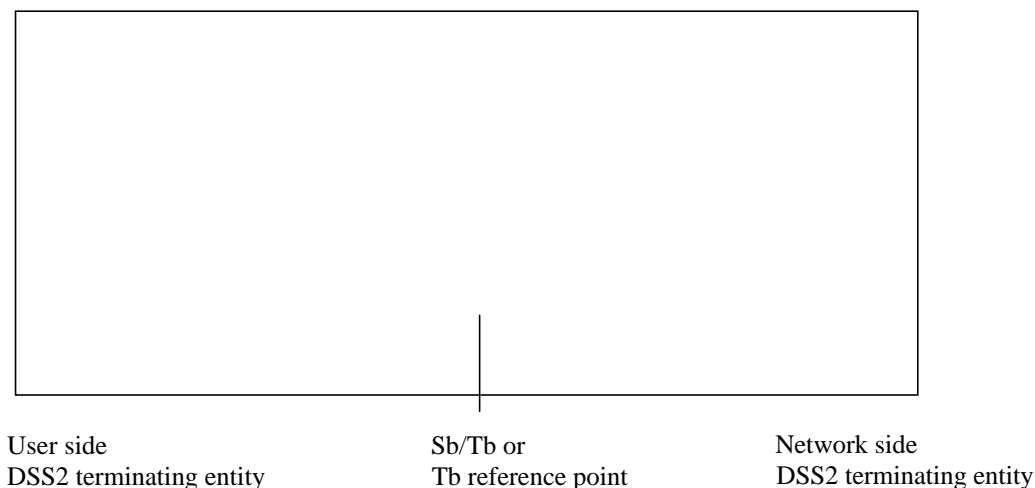

| User side | Sb/Tb or | Network side |
| DSS2 terminating entity | Tb reference point | DSS2 terminating entity |

Figure B.1: Call and bearer control elements relationships at UNI

The call identifier or the call segment identifier value provides the means to establish the required association between corresponding peer call object instances and the bearer identifier value is used to explicitly associate corresponding peer bearer object instances at each side of the user-network interface.

The call state machine is maintained by the CC entity. Each call state machine instance is identified by the call identifier or the call segment identifier, depending on the separated call control protocol used to operate the multiconnection call.

The bearer state machine is maintained by the BC entity. Each bearer state machine instance is identified by the bearer identifier.

The call/bearer coordination function uses the call identifier or the call segment identifier value contained in the call association information element in the received bearer establishment SETUP message to relate (i.e. establish an association) of the bearer, identified by the bearer identifier value, to an existing multiconnection call.

Bibliography

The following material, though not specifically referenced in the body of the present document (or not publicly available), gives supporting information.

- ITU-T Recommendation Q.2961: "Digital subscriber signalling system No. 2 – Additional traffic parameters".

History

Document history				
V1.1.2	December 1998	Public Enquiry	PE 9917:	1998-12-25 to 1999-04-23