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Technical Report TRQ.3000: Operation of the bearer independent call control (BICC) protocol with digital subscriber signalling system No. 2 (DSS2)

ITU-T Q-series Recommendations – Supplement 22

ITU-T Q-SERIES RECOMMENDATIONS

SWITCHING AND SIGNALLING

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SUPPLEMENT 22 TO ITU-T Q-SERIES RECOMMENDATIONS

TECHNICAL REPORT TRQ.3000: OPERATION OF THE BEARER INDEPENDENT CALL CONTROL (BICC) PROTOCOL WITH DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 2 (DSS2)

Summary

This Supplement to ITU-T Recommendation Q.1901 specifies the general aspects of Bearer Independent Call Control (BICC) protocol mapping with Digital Subscriber Signalling System No. 2 (DSS2) for AAL Type 1 bearer.

FOREWORD

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Supplement 22 to Q-series Recommendations

TECHNICAL REPORT TRQ.3000: OPERATION OF THE BEARER INDEPENDENT CALL CONTROL (BICC) PROTOCOL WITH DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 2 (DSS2)

(Geneva, 1999)

1   Scope

This Supplement contains information relevant to the operation of the Bearer Independent Call Control (BICC) protocol [1], with the DSS2 [4] signalling protocol used for the control of AAL type 1 bearer connections.

Information which is relevant to be passed between the BICC [1] signalling entity and the DSS2 [4] signalling entity is identified. The dashed box of Figure 1-1 shows the scope of this Supplement. Interaction with layer management is outside the scope of this Supplement.
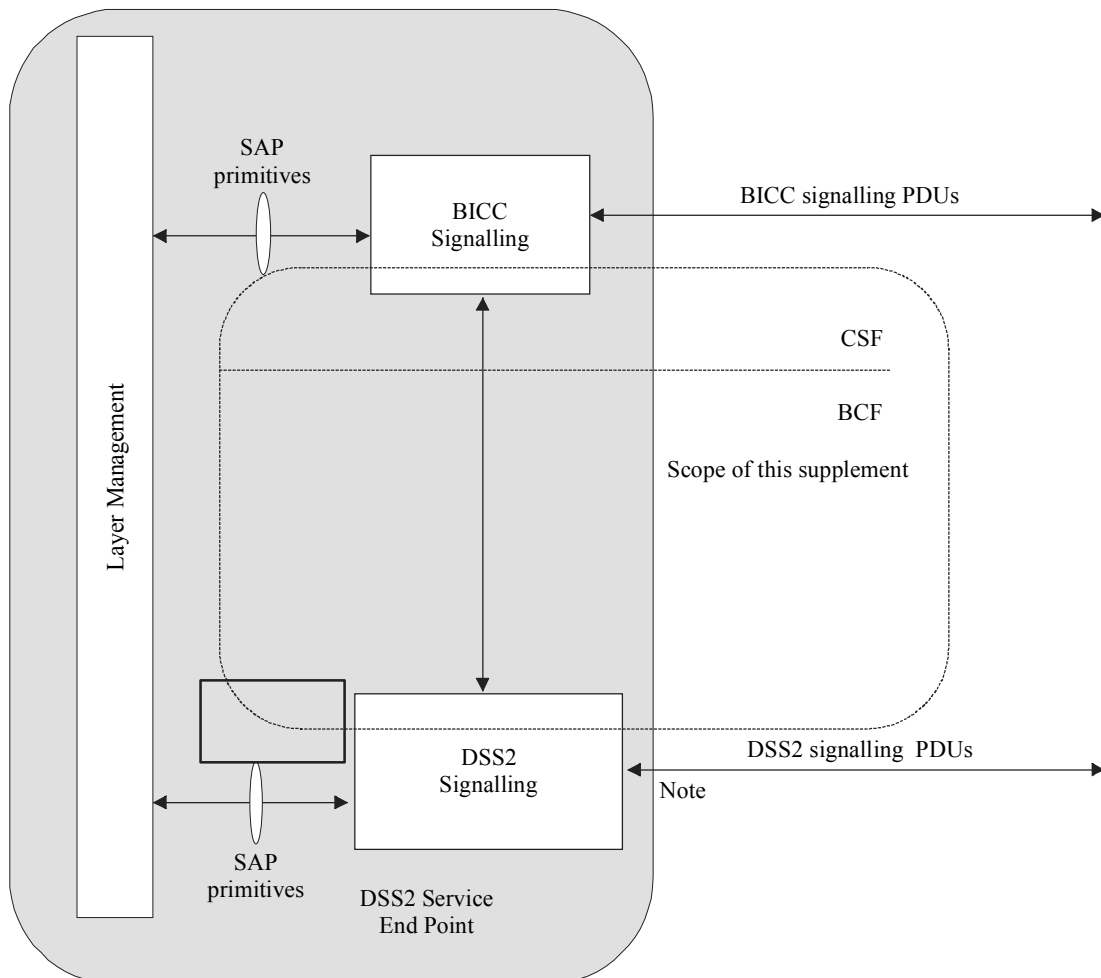
NOTE – This is the user-side of DSS2 in the case where the interface is to an ATM network. It can be the network-side on bilateral agreement.

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Figure 1-1 – Scope of this Supplement

2   References

The following Technical Reports and other references contain provisions which, through reference in this text, constitute provisions of this Supplement. At the time of publication, the editions indicated were valid. All supplements and other references are subject to revision; all users of this Supplement are therefore encouraged to investigate the possibility of applying the most recent edition of the supplements and other references listed below. A list of the currently valid ITU-T Recommendations and supplements is regularly published.

[1]   ITU-T Recommendation Q.1901 (2000), *Bearer independent call control protocol (BICC)*.

[2]   ITU-T Recommendation I.363.1 (1996), *Broadband Integrated Services Digital Network (B-ISDN) ATM Adaptation Layer Specification: Type 1 AAL*.

[3]   ITU-T Recommendation I.610 (1999), *B-ISDN operation and maintenance principles and functions*.

[4]   ITU-T Recommendation Q.2931 (1995), *Digital Subscriber Signalling System No. 2 (DSS2) – User-Network Interface (UNI) – Layer 3 specification for basic call/connection control*.

[5]   ITU-T Recommendation Q.2941.3 (2000), *Digital subscriber signalling system No. 2 – Generic identifier transport extension for support of bearer independent call control*.

[6]   ITU-T Recommendation Q.850 (1998), *Usage of cause and location in the Digital Subscriber Signalling System No. 1 and the Signalling System No. 7 ISDN User Part*.

[7]   ITU-T Recommendation Q.765 (2000), *Signalling system No. 7 – Application transport mechanism*.

[8]   ITU-T Recommendation Q.2965.1 (1999), *Digital Subscriber Signalling System No. 2 – Support of Quality of Service classes*.

[9]   ITU-T Recommendation I.371 (2000), *Traffic control and congestion control in B-ISDN*.

[10]   ITU-T Recommendation Q.2961.2 (1997), *Support of ATM transfer capability in the broadband bearer capability information element*.

[11]   ITU-T Recommendation Q.763 (1999), *Signalling System No. 7 – ISDN User Part formats and codes*.

[12]   ITU-T Recommendation I.356 (2000), *B-ISDN ATM layer cell transfer performance*.

[13]   ITU-T Recommendation Q.2610 (1999), *Usage of cause and location in B-ISDN User Part and DSS2*.

3   Definitions

No new definitions are introduced for the purpose of this Supplement.

4   Abbreviations

This Supplement uses the following abbreviations:

AAL   ATM Adaptation Layer

ATM   Asynchronous Transfer Mode

B-BC   Broadband Bearer Capability

BCF   Bearer Control Function

BICC   Bearer Independent Call Control

CSF   Call Services Function

CS1	Capability Set 1
GIT	Generic Identifier Transport
N-ISUP	Narrowband ISDN User Part
QoS	Quality of Service
SN	Serving Node
TMR	Transmission Medium Requirement
USI	User Service Information

5 Mapping Functions between BICC Signalling Entity and DSS2 Signalling Entity

The following subclauses list the information passed between the BICC [1], [7] signalling entity and the DSS2 signalling entity:

1) Binding information;

2) Bearer service information;

3) Address information; and

4) Cause.

The mapping reflected in the tables of this subclause show the information element or parameter name followed by the (information contents in parentheses).

5.1 Binding Information

Binding information is used to associate call control signalling and bearer control signalling for the establishment of an ATM AAL Type 1 bearer. The Backbone Network Connection Identifier (BNC-ID) is carried by call control in the Application Transport Parameter [7]. The BNC-ID is carried by bearer control in the Generic Identifier Transport [5].

The mapping of Binding information between the BICC signalling entity and the DSS2 signalling entity is shown in Table 5-1.

Table 5-1 – Mapping of binding information

BICC Signalling Entity Parameter (Call Control)	DSS2 Signalling Entity Information Element (Bearer Control)
Application Transport Parameter (BNC-ID) [7]	Generic Identifier Transport (BNC-ID) [5]

5.2 Bearer service information

This subclause defines the mapping of the bearer service information contained in the BICC TMR parameter to the required DSS2 information elements for the support of AAL TYPE 1 bearer connections.

NOTE – BICC Codec information is not used by this Supplement.

The DSS2 information elements required for the mapping of the bearer service information are shown in Table 5-2.

**Table 5-2 – DSS2 Information Elements required for
the mapping of Bearer service information**

	Information elements used to describe network relevant bearer attributes	Information elements used to describe lower layer attributes
DSS2 related information elements (see 4.5/Q.2931 [4])	– Broadband Bearer Capability (B-BC) – ATM traffic descriptor – QoS parameter	ATM adaptation layer Parameters (AAL parameters)

Table 5-3 shows the mapping between the BICC TMR parameter and the DSS2 broadband bearer capability information element and QoS parameter information elements. This mapping is independent of the TMR parameter codes.

**Table 5-3 – Mapping of the BICC TMR parameter and the DSS2
Broadband bearer capability and QoS parameter information elements**

	BICC TMR parameter = Speech, 64kbit/s unrestricted, 3.1 kHz audio, N*64 kbit/s		
DSS2 Broadband bearer capability information element contents [10]			
Bearer class	X	X	X
BTC	7 (Note 1)	7 (Note 1)	5
Susceptibility to clipping	Not susceptible to clipping		
User plane configuration	Point-to-point		
DSS2 QoS parameter information element contents [8]			
QoS class forward	1 (Note 2)	0 (Note 3)	0 (Note 3)
QoS class backward	1 (Note 2)	0 (Note 3)	0 (Note 3)
NOTE 1 – The requested I.371 [9] ATM transfer capability is DBR (see Recommendation Q.2961.2 [10]).			
NOTE 2 – The requested I.356 [12] QoS Class is Class 1 (stringent QoS class) (see Recommendation Q.2965.1 [8]).			
NOTE 3 – No specific I.356 QoS class is explicitly requested (see Recommendation Q.2965.1 [8]).			

Table 5-4 shows the mapping between the BICC TMR parameter and the DSS2 AAL parameters information element. The mapping is independent of the TMR parameter codes except for the DSS2 CBR rate and Multiplier subfields.

**Table 5-4 – Mapping of the BICC TMR parameter and
the DSS2 AAL parameters information elements**

	TMR parameter codes				
	Speech, 64 kbit/s unrestricted or 3.1 kHz audio	384 kbit/s unrestricted	1536 kbit/s unrestricted	1920 kbit/s unrestricted	N*64kbit/s
DSS2 AAL parameters information element contents [10]					
AAL type	1 (AAL type 1)				
Subtype	2 (Circuit transport)				
CBR rate	1 (64 kbit/s)	64 (N) × 64 kbit/s	64 (N) × 64 kbit/s	64 (N) × 64 kbit/s	64 N*64 kbit/s
Multiplier	Not applicable	6	24	30	N
Source clock frequency recovery method	0 (Null)				
Error correction method	0 (Null)				
SDT block size (Note)	1	N			
Partially filled cells	47 (Full fill)				
NOTE – For single channel adaptation using AAL type 1, the SDT block size is set to 1. For 384 kbit/s, 1536 kbit/s, 1920 kbit/s and N*64, where N > 1, the SDT block size is set to N.					

Table 5-5 shows the mapping between the BICC TMR parameter and the ATM peak cell rates (CLP = 0 + 1) signalled in the ATM traffic descriptor information element. For each TMR parameter code, a value for the peak cell rate is selected such that the bit rate of the corresponding N-ISDN service (e.g. 64 kbit/s, N × 64 kbit/s) can be transported as the cell payload of the ATM cells, i.e. excluding the overhead of the ATM cell and AAL type 1 header.

**Table 5-5 – Mapping of BICC TMR codes and ATM
Peak Cell Rates in the ATM traffic descriptor**

BICC Signalling Enity (Call Control)		DSS2 Signalling Entity (Bearer Control)
TMR		ATM Traffic Descriptor [9], [10] Forward/Backward peak cell rate (CLP = 0 + 1) (no OAM cells) (Note)
TMR Codes	**TMR DEFINITION**	**PCR**
0 0 0 0 0 0 0 0	Speech	171 cells/s
0 0 0 0 0 0 1 0	64 kbit/s unrestricted	171 cells/s
0 0 0 0 0 0 1 1	3.1 kHz audio	171 cells/s
0 0 0 0 1 0 0 0	384 kbit/s unrestricted	1022 cells/s
0 0 0 0 1 0 0 1	1536 kbit/s unrestricted	4086 cells/s
0 0 0 0 1 0 1 0	1920 kbit/s unrestricted	5107 cells/s

**Table 5-5 – Mapping of BICC TMR codes and ATM
Peak Cell Rates in the ATM traffic descriptor** *(concluded)*

BICC Signalling Enity (Call Control)		DSS2 Signalling Entity (Bearer Control)
TMR		**ATM Traffic Descriptor [9], [10]** Forward/Backward peak cell rate (CLP = 0 + 1) (no OAM cells) (Note)
TMR Codes	**TMR DEFINITION**	**PCR**
0 0 0 0 0 1 1 0	64 kbit/s preferred	171 cells/s
0 0 0 0 0 1 1 1	2 × 64 kbit/s unrestricted	341 cells/s
0 0 0 1 0 0 0 0	3 × 64 kbit/s unrestricted	511 cells/s
0 0 0 1 0 0 0 1	4 × 64 kbit/s unrestricted	681 cells/s
0 0 0 1 0 0 1 0	5 × 64 kbit/s unrestricted	852 cells/s
0 0 0 1 0 0 1 1	6 × 64 kbit/s unrestricted	1022 cells/s
0 0 0 1 0 1 0 0	7 × 64 kbit/s unrestricted	1192 cells/s
0 0 0 1 0 1 0 1	8 × 64 kbit/s unrestricted	1362 cells/s
0 0 0 1 0 1 1 0	9 × 64 kbit/s unrestricted	1532 cells/s
0 0 0 1 0 1 1 1	10 × 64 kbit/s unrestricted	1703 cells/s
0 0 0 1 1 0 0 0	11 × 64 kbit/s unrestricted	1873 cells/s
0 0 0 1 1 0 0 1	12 × 64 kbit/s unrestricted	2043 cells/s
0 0 0 1 1 0 1 0	13 × 64 kbit/s unrestricted	2213 cells/s
0 0 0 1 1 0 1 1	14 × 64 kbit/s unrestricted	2383 cells/s
0 0 0 1 1 1 0 0	15 × 64 kbit/s unrestricted	2554 cells/s
0 0 0 1 1 1 0 1	16 × 64 kbit/s unrestricted	2724 cells/s
0 0 0 1 1 1 1 0	17 × 64 kbit/s unrestricted	2894 cells/s
0 0 0 1 1 1 1 1	18 × 64 kbit/s unrestricted	3064 cells/s
0 0 1 0 0 0 0 0	19 × 64 kbit/s unrestricted	3235 cells/s
0 0 1 0 0 0 0 1	20 × 64 kbit/s unrestricted	3405 cells/s
0 0 1 0 0 0 1 0	21 × 64 kbit/s unrestricted	3575 cells/s
0 0 1 0 0 0 1 1	22 × 64 kbit/s unrestricted	3745 cells/s
0 0 1 0 0 1 0 0	23 × 64 kbit/s unrestricted	3915 cells/s
0 0 1 0 0 1 0 1	24 × 64 kbit/s unrestricted	4086 cells/s
0 0 1 0 0 1 1 0	25 × 64 kbit/s unrestricted	4256 cells/s
0 0 1 0 0 1 1 1	26 × 64 kbit/s unrestricted	4426 cells/s
0 0 1 0 1 0 0 1	27 × 64 kbit/s unrestricted	4596 cells/s
0 0 1 0 1 0 1 0	28 × 64 kbit/s unrestricted	4766 cells/s
0 0 1 0 1 0 0 0	29 × 64 kbit/s unrestricted	4937 cells/s
NOTE – No OAM cells are included in the PCR calculations.		

5.3   Address Information

This subclause describes the address information mapping between the BICC signalling entity and the DSS2 signalling entity. Address mapping between the BICC signalling entity and DSS2 signalling entity is shown in Table 5-6.

Table 5-6 – Mapping of Address information

BICC Signalling Entity (Parameter)	DSS2 Signalling Enity (Information Element)
Application Transport Parameter [7] (T-BIWF-address)	Called Party Number [4] (T-BIWF-address)

5.4   Cause

This subclause describes the mapping of cause values [4], [6] between BICC call control signalling and DSS2 bearer signalling at the reference point between the BCF and CSF. Cause values related to specific bearer operations in DSS2 are mapped to suitable bearer control related cause values in BICC. The cause value mappings apply to the case where the BCF can no longer establish or maintain the bearer. Mapping of DSS2 Release message Cause Values to BICC are only performed at the ISN that set up the connection. The scope of the cause value mapping is from the bearer protocol to the generic BCF-CSF primitive interface and not directly to the BICC protocol.

Table 5-7 identifies the Cause related information, derived from DSS2 signalling, which is passed from the DSS2 Signalling entity to the BICC Signalling entity to provide Cause parameter fields giving details on the circumstances of a call being cleared due to a DSS2 bearer establishment failure.

Table 5-7 – Mapping of Cause (DSS2 Signalling Entity to BICC Signalling Entity)

DSS2 Signalling Entity – Cause	BICC Signalling Entity – Cause Indicators
Coding Standard [4]	Coding Standard [6], [11]
Cause value [4] (see Table 5-8)	Cause value [6] (see Table 5-8)

Table 5-8, identifies the mapping of the Cause value received in the DSS2 Signalling entity and passed by the DSS2 signalling entity to the BICC entity. Applicable DSS2 cause values are mapped to one of six categories: "1 = unallocated number", "16 = normal call clearing", "31 = normal, unspecified", "47 = resource unavailable unspecified", "79 = service/option not implemented, unspecified", and "127 = interworking, unspecified".

Table 5-8 – Mapping of Cause Values (DSS2 Signalling Entity to BICC Signalling Entity)

No.	DSS2 Signalling Entity (Note)	No.	BICC Signalling Entity
1	Unallocated (unassigned) number	1	Unallocated (unassigned) number
2	No route to specified transit network	1	Unallocated (unassigned) number
3	No route to destination	1	Unallocated (unassigned) number
16	Normal call clearing	16	Normal call clearing
22	Number changed	1	Unallocated (unassigned) number
25	Exchange routing error	1	Unallocated (unassigned) number

Table 5-8 – Mapping of Cause Values(DSS2 Signalling Entity to BICC Signalling Entity)
(concluded)

No.	DSS2 Signalling Entity (Note)	No.	BICC Signalling Entity
27	Destination out of order	47	Resource unavailable, unspecified
28	Invalid number format (address incomplete)	1	Unallocated (unassigned) number
31	Normal, unspecified	31	Normal, unspecified
34	No circuit/channel available	47	Resource unavailable, unspecified
35	Requested VPCI/VCI not available	127	Interworking, unspecified
36	VPCI/VCI Assignment Failure	127	Interworking, unspecified
37	User Cell Rate not available	47	Resource unavailable, unspecified
38	Network out of order	47	Resource unavailable, unspecified
41	Temporary failure	47	Resource unavailable, unspecified
42	Switching equipment congestion	47	Resource unavailable, unspecified
44	Requested circuit/channel not available	47	Resource unavailable, unspecified
45	No VPI/VCI available	47	Resource unavailable, unspecified
46	Precedence call blocked	47	Resource unavailable, unspecified
47	Resource unavailable, unspecified	47	Resource unavailable, unspecified
49	Quality of service not available	47	Resource unavailable, unspecified
57	Bearer capability not authorized	79	Service or option not implemented, unspecified
58	Bearer capability not presently available	47	Resource unavailable, unspecified
63	Service or option not available, unspecified	79	Service or option not implemented, unspecified
65	Bearer capability not implemented	79	Service or option not implemented, unspecified
66	Channel type not implemented	79	Service or option not implemented, unspecified
69	Requested facility not implemented	79	Service or option not implemented, unspecified
70	Only restricted digital information bearer capability is available	79	Service or option not implemented, unspecified
73	Unsupported Combination of Traffic Parameters	79	Service or option not implemented, unspecified
79	Service or option not implemented, unspecified	79	Service or option not implemented, unspecified
91	Invalid transit network selection	1	Unallocated (unassigned) number
NOTE – All other cause values, which are not related to bearer specific operations in DSS2, are translated to cause value 127 and sent to the BICC signalling entity.			

Table 5-9 identifies the Cause related information passed from the BICC signalling entity to the DSS2 Signalling entity to derive the DSS2 Signalling Cause parameter field values to be used by the DSS2 clearing procedure as result of a call being cleared.

Table 5-9 – Mapping of Cause (BICC Signalling Entity to DSS2 Signalling Entity)

BICC Signalling Entity – Cause Indicators	DSS2 Signalling Entity – Cause
Coding Standard [13]	Coding Standard [6], [11]
Cause Value [13] set to any value	Cause value #16 "Normal clearing"

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