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Technical Report TRQ.3020: Operation of the Bearer Independent Call Control (BICC) protocol with broadband integrated services digital network User Part (B-ISUP) for AAL type 1 adaptation

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Supplement 24 to ITU-T Q-series Recommendations

**Technical Report TRQ.3020: Operation of the Bearer Independent Call Control (BICC)
protocol with broadband integrated services digital network User Part (B-ISUP)
for AAL type 1 adaptation**

Summary

This Supplement to ITU-T Recommendation Q.1901 describes the general aspects of the operation
of the Bearer Independent Call Control (BICC) protocol with Broadband Integrated Services Digital
Network (B-ISDN) User Part (B-ISUP) for AAL Type 1 Adaptation.

FOREWORD

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CONTENTS

Supplement 24 to ITU-T Q-series Recommendations

**Technical Report TRQ.3020: Operation of the Bearer Independent Call Control (BICC)
protocol with broadband integrated services digital network User Part (B-ISUP)
for AAL type 1 adaptation**

1 Scope

This Supplement contains information relevant to the operation of the Bearer Independent Call Control (BICC) protocol with the B-ISUP signalling protocol used for the control of AAL Type 1 bearer connections.

Information which is relevant to be passed between the BICC signalling entity and B-ISUP signalling entity is identified. The dashed box of Figure 1-1 shows the scope of this Supplement. Interaction with the layer management is outside the scope of this Supplement.
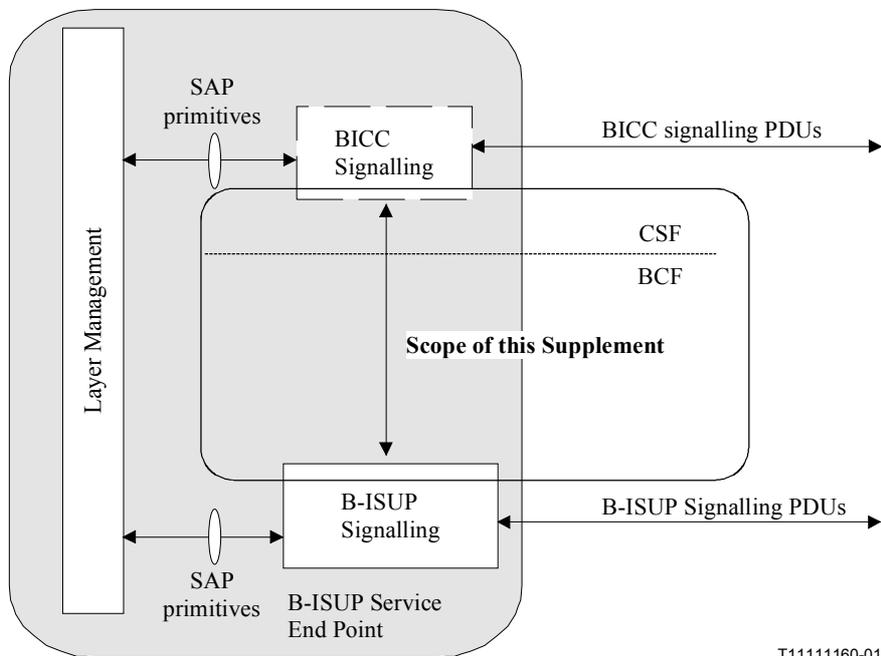
Figure 1-1 – Scope of this Supplement

2 References

The following Recommendations 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.

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

– ITU-T Recommendation I.363.1 (1996), *B-ISDN ATM Adaptation Layer specification: Type 1 AAL*.

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

- ITU-T Recommendation Q.763 (1999), *Signalling System No.7 – ISDN User Part – Formats and Codes*.

- ITU-T Recommendation Q.765 (1998), *Signalling System No.7 – Application transport mechanism*.

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

- ITU-T Recommendation Q.1901 (2000), *Bearer Independent Call Control Protocol*.

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

- ITU-T Recommendation Q.2726.4 (2000), *Extensions to the B-ISDN User Part – Application generated identifiers*.

- ITU-T Recommendation Q.2763 (1999), *Signalling System No. 7 B-ISDN User Part (B-ISUP) – Formats and codes*.

- ITU-T Recommendation Q.2764 (1999), *Signalling System No. 7 B-ISDN User Part (B-ISUP) – Basic Call Procedures*.

- ITU-T Recommendation Q.2961.2 (1997), *Digital subcriber signalling system No. 2 – Additional traffic parameters: Support of ATM transfer capability in the broadband bearer capability information element*.

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

- ITU-T Recommendation X.200 (1994) | ISO/IEC 7498-1:1994, *Information technology – Open System Interconnection – Basic Reference Model: The Basic Model*.

- ITU-T Recommendation X.210 (1993) | ISO/IEC 10731:1994, *Information technology – Open System Interconnection – Basic Reference Model: Conventions for the definition of OSI Services*.

3 Definitions

No new definitions are needed.

4 Abbreviations

This Supplement uses the following abbreviations:

AAL   ATM Adaptation Layer

ATM   Asynchronous Transfer Mode

BCF   Bearer Control Function

BICC   Bearer Independent Call Control

B-ISDN   Broadband Integrated Services Digital Network

B-ISUP   Broadband ISDN User Part

BIWF   Bearer Interworking Function

BNC-ID   Backbone Network Connection Identifier

BTC   Broadband Transfer Capability

CBR   Constant Bit Rate

CS-1   Capability Set 1

CSF   Call Service Function

DBR   Deterministic Bit Rate

IAM   Initial Address Message

ISN   Interface Serving Node

N-ISDN   Narrowband Integrated Services Digital Network

PCR   Peak Cell Rate

QoS   Quality of Service

T-BIWF   Terminating Bearer Interworking Function

TMR   Transmission Medium Requirement

5   Mapping Functions between BICC Signalling Entity and B-ISUP Signalling Entity

The following subclauses list the information passed between the BICC signalling entity and B-ISUP signalling entity:

1)   binding information;

2)   bearer service information;

3)   address information; and

4)   cause.

The mapping reflected in the tables of this clause show the parameter names followed by the information contents in parentheses.

The originating BIWF is always viewed as an originating exchange in the context of the B-ISUP Recommendations. Similarly, the terminating BIWF is always viewed as a destination exchange.

5.1   Binding information

Binding information is used to associate the call control signalling and bearer control signalling for the establishment of an AAL Type 1 bearer connection. The Backbone Network Connection Identifier (BNC-ID) is carried by the call control in the Application transport parameter. The BNC-ID is carried by bearer control in the Application generated identifiers parameter.

The mapping of the binding information between BICC signalling entitiy and B-ISUP signalling entitiy is shown in Table 5-1.

Table 5-1 − Mapping of binding information

BICC Signalling Entity (Parameter)	B-ISUP Signalling Entity (Parameter)
Application transport parameter (BNC-ID)	Application generated identifiers (BNC-ID)

5.2 Bearer Service Information

This subclause defines the mapping of the bearer service information contained in the BICC TMR parameter to the required B-ISUP parameters for the support of AAL Type 1 bearer connections.

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

The B-ISUP parameters required for the mapping of the bearer service information are shown in Table 5-2.

Table 5-2 – B-ISUP Parameters required for the Mapping of Bearer Service Information

	Parameters used to describe network relevant bearer attributes	Parameters used to describe lower layer attributes
B-ISUP related parameters (see Q.2763)	− Broadband Bearer Capability − ATM cell rate − QoS parameter	ATM adaptation layer parameters (AAL parameters)

Table 5-3 shows the mapping between the BICC TMR parameter and the B-ISUP Broadband bearer capability parameter and QoS parameter. This mapping is independent of the TMR parameter codes.

Table 5-4 shows the mapping between the BICC TMR parameter and B-ISUP AAL parameters parameter. The mapping is independent of the TMR parameter codes, except for the B-ISUP Constant Bit Rate (CBR) and Multiplier subfields.

Table 5-5 shows the mapping between the BICC TMR parameter and the ATM peak cell rates (CLP = 0 + 1) signalled in the ATM cell rate parameter. 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 5-3 – Mapping of the BICC TMR Parameter and B-ISUP Broadband Bearer Capability and QoS Parameters

	BICC TMR parameter = Speech, 64 kbit/s unrestricted, 3.1 kHz audio, N*64 kbit/s		
B-ISUP Broadband bearer capability parameter contents			
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		
B-ISUP QoS parameter contents			
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 ATM transfer capability is DBR (see Q.2961.2).			
NOTE 2 – The requested I.356 QoS Class is Class 1 (stringent QoS class) (see Q.2965.1).			
NOTE 3 – No specific I.356 QoS class is explicitly requested (see Q.2965.1).			

Table 5-4 – Mapping of the BICC TMR Parameter and B-ISUP AAL Parameters Parameter

	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*64 kbit/s
B-ISUP AAL parameters parameter contents					
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)				
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 – Mapping of BICC TMR Codes and ATM Peak Cell Rates in the ATM Cell Rate Parameter

BICC Signalling Entity		B-ISUP Signalling Entity
TMR		**ATM cell rate** 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
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

Table 5-5 – Mapping of BICC TMR Codes and ATM Peak Cell Rates in the ATM Cell Rate Parameter *(concluded)*

BICC Signalling Entity		B-ISUP Signalling Entity
TMR		ATM cell rate Forward/Backward peak cell rate (CLP = 0 + 1) (no OAM cells) (Note)
TMR Codes	TMR DEFINITION	PCR
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 address information mapping between BICC signalling entity and B-ISUP signalling entity. Address mapping between BICC signalling entity and B-ISUP signalling entity is shown in Table 5-6.

Table 5-6 – Address Mapping

BICC Signalling Entity (Parameter)	B-ISUP Signalling Entity (Parameter)
Application transport parameter (T-BIWF-address)	Called party number and/or AESA for called party (T-BIWF-address)

5.4   Cause

This subclause describes the mapping of cause values between BICC call control signalling and B-ISUP bearer control signalling at the interface between the BCF and CSF. Cause values related to specific bearer operations in B-ISUP 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 B-ISUP 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 B-ISUP signalling, which is passed from the B-ISUP signalling entity to the BICC signalling entity to provide Cause indicators parameter fields giving details on the circumstances of a call being cleared due to a B-ISUP bearer establishment failure.

Table 5-7 – Mapping of Cause – B-ISUP Signalling Entity to BICC Signalling Entity

B-ISUP Signalling Entity – Cause Indicators	BICC signalling Entity – Cause Indicators
Coding standard	Coding Standard
Cause value (see Table 5-8)	Cause value (see Table 5-8)

Table 5-8, identifies the mapping of the cause value received in the B-ISUP signalling entity and passed by the B-ISUP signalling entity to the BICC signalling entity. Applicable B-ISUP 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 – B-ISUP Signalling Entity to BICC Signalling Entity

No.	B-ISUP 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
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
36	VPCI/VCI Assignment Failure	127	Interworking, unspecified

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

No.	B-ISUP Signalling Entity (Note)	No.	BICC Signalling Entity
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 B-ISUP, 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 B-ISUP signalling entity to derive the B-ISUP Cause indicators parameter field values to be used by the B-ISUP clearing procedure as result of a call being cleared.

Table 5-9 – Mapping of Cause – BICC Signalling Entity to B-ISUP Signalling Entity

BICC Signalling Entity – Cause Indicators	B-ISUP Signalling Entity – Cause Indicators
Coding standard	Coding standard
Cause value set to any value	Cause value #16 "normal clearing"

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