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SERIES Q: SWITCHING AND SIGNALLING

Supplement to ITU-T Q.1901 Recommendation – Technical Report TRQ.3010: Operation of the bearer independent call control (BICC) protocol with AAL type 2 signalling protocol (CS-1)

ITU-T Q-series Recommendations – Supplement 23

(Formerly CCITT Recommendations)

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Supplement 23 to ITU-T Q-series Recommendations

Supplement to ITU-T Q.1901 Recommendation – Technical Report TRQ.3010: Operation of the bearer independent call control (BICC) protocol with AAL type 2 signalling protocol (CS-1)

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 AAL type 2 signalling protocol, Capability Set 1 (CS-1), used to control AAL type 2 Bearer Connections.

Source

Supplement 23 to ITU-T Q-series Recommendations was prepared by ITU-T Study Group 11 (1997-2000) and approved under the WTSC Resolution 5 procedure on 3 December 1999.

FOREWORD

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The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSC Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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In this publication, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Supplement to ITU-T Q.1901 Recommendation – Technical Report TRQ.3010: Operation of the bearer independent call control (BICC) protocol with AAL type 2 signalling protocol (CS-1)

(Geneva, 1999)

1 Scope

This Supplement contains information relevant to the operation of the Bearer Independent Call Control (BICC) Protocol [6], [7], with the AAL type 2 Signalling Protocol, Capability Set 1 (CS-1) [8], making use of the AAL type 2 connection signalling model, contained in ITU-T Supplement 8, Technical Report TRQ.2400 [9]. Information which is relevant to be exchanged between the BICC signalling entity and the AAL type 2 Signalling entity is identified. The dashed box of Figure 1-1 shows the scope of this Supplement. Information passed between two peer BICC [6], [7] signalling entities is a result of the logic within the BICC [6], [7] signalling entity. Interfaces to Layer Management are outside the scope of this Supplement.

NOTE – The handling of re-use of idle bearer connections is outside the scope of the present Supplement.

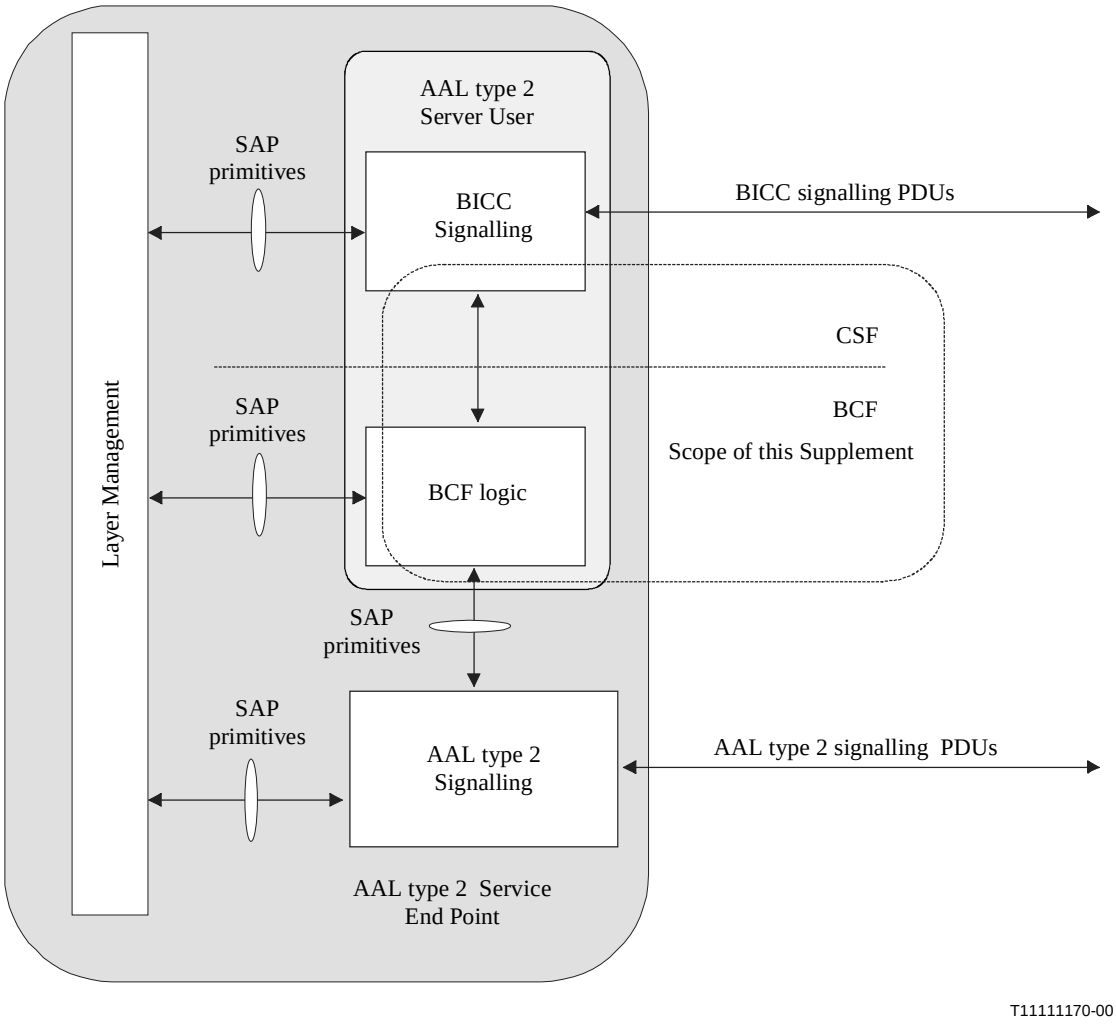

Figure 1-1 – Scope of this Supplement

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 I.363.2 (1997), *B-ISDN ATM Adaptation layer specification: Type 2 AAL.*

[2] ITU-T Recommendation I.366.1 (1998), *Segmentation and reassembly service specific convergence sublayer for the AAL Type 2.*

[3] ITU-T Recommendation I.366.2 (1999), *AAL type 2 service specific convergence sublayer for trunking.*

[4] ITU-T Recommendation X.200 (1994), *Information technology – Open System Interconnection – Basic Reference Model.*

[5] ITU-T Recommendation X.210 (1993), *Information technology – Open System Interconnection – Basic Reference Model: Conventions for the Definition of OSI Services.*

[6] ITU-T Recommendation Q.765.5 (2000), *Signalling System No. 7 – Application transport mechanism: Bearer Independent Call Control (BICC).*

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

[8] ITU-T Recommendation Q.2630.1 (1999), *AAL type 2 Signalling Protocol (Capability Set 1).*

[9] ITU-T Q-series Recommendations – Supplement 8 (1999), *Technical Report TRQ.2400*: *Transport control signalling requirements – Signalling requirements for AAL Type 2 link control capability set 1*.

[10] ITU-T Recommendation G.711 (1988), *Pulse Code Modulation (PCM) of voice frequencies.*

[11] ITU-T Recommendation G.722 (1988), *7 kHz audio-coding within 64 kbit/s.*

[12] ITU-T Recommendation G.723.1 (1996), *Dual rate speech coder for multimedia communications transmitting at 5.3 and 6.3 kbit/s.*

[13] ITU-T Recommendation G.726 (1990), *40, 32, 24, 16 kbit/s Adaptive Differential Pulse Code Modulation (ADPCM).*

[14] ITU-T Recommendation G.727 (1990), *5-, 4-, 3- and 2-bits sample embedded Adaptive Differential Pulse Code Modulation (ADPCM).*

[15] ITU-T Recommendation G.728 (1992), *Coding of speech at 16 kbit/s using low-delay code excited linear prediction.*

[16] ITU-T Recommendation G.729 (1996), *Coding of speech at 8 kbit/s using conjugate-structure algebraic-code-excited linear-prediction.*

[17] ITU-T Recommendation H.221 (1999), *Frame structure for a 64 to 1920 kbit/s channel in audiovisual teleservices.*

[18] ITU-T Recommendation Q.763 (1997), *Signalling System No.7 – ISDN user part format and codes.*

[19] 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.*

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

[21] ITU-T Recommendation I.366.3, *AAL type 2 Service Specific Convergence Sublayer for Mobile.*

3 Definitions

No definitions are introduced for the purpose of this Supplement.

4 Abbreviations

This Supplement uses the following abbreviations:

A2EA	AAL type 2 Service Endpoint Address
AAL	ATM Adaptation Layer
ALC	Link Characteristics
ATM	Asynchronous Transfer Mode
BCF	Bearer Control Function
BICC	Bearer Independent Call Control
CID	Channel Identifier
CPS	Common Part Sublayer
CS-1	Capability Set 1
CSF	Call Server Function
DCME	Digital Circuit Multiplication Equipment
PDU	Protocol Data Unit
SAP	Service Access Point
SSIA	Service Specific Information (Audio)
SSIM	Service Specific Information (Multirate)
SUGR	Served User Generated Reference

5 Information exchanged between BICC and AAL type 2 Signalling Entities

It is assumed that the format of information passed between the BICC [6], [7] entity and the AAL type 2 Served User Converter is the same as the format of information passed between two peer BICC [6], [7] entities. No primitives are defined for this interface. The primitives passed between the AAL type 2 Signalling [8] entity and the AAL type 2 Served User [8] are defined in Recommendation Q.2630.1 [8].

The following subclauses list the information passed between the BICC [6], [7] and AAL type 2 [8] Signalling Entities. The relevant information relates to:

1) Channel Attributes;
2) Addressing;
3) Binding Information; and
4) Cause.

In the following tables, the relationship and appropriate conversion of information between the BICC [6], [7] and AAL type 2 [8] Signalling Entities is performed by the AAL type 2 Served User [8] Converter.

5.1 Channel Attributes

Table 5-1 identifies the Channel Attributes related information passed from the BICC entity to the AAL type 2 Signalling entity, which are applicable to derive the AAL type 2 signalling parameters needed to control the establishment of the AAL type 2 link.

Table 5-1 – Mapping of Channel Attributes

BICC Signalling Entity [6] and [7]	AAL type 2 Signalling Entity [8]
Codec Information (Note), or Transmission Medium Requirements (Note)	Link Characteristics (ALC), and/or Service Specific Information (SSIA, SSIM)
NOTE – Codec Information is used if present, otherwise the Transmission Medium Requirements are used.	

5.1.1 Codec Information

Table 5-2 identifies the Codec type information passed from the BICC entity to the AAL type 2 Signalling entity which are applicable to derive the AAL type 2 link characteristics needed to control the establishment of the AAL type 2 bearer.

Table 5-2 – Mapping of Codec Type to Link Characteristics

BICC Signalling Entity [6] and [7] Codec Type	AAL type 2 Signalling Entity [8] Link Characteristics			
	Maximum CPS-SDU Bit Rate (kbit/s)	Average CPS-SDU Bit Rate (kbit/s)	Maximum CPS-SDU Size (octets)	Average CPS-SDU Size (octets)
G.711 64 kbit/s A-law	64	64	8, 16, 24, 32, 40 (Note 2)	As maximum
G.711 64 kbit/s μ-law	64	64	8, 16, 24, 32, 40 (Note 2)	As maximum
G.711/H.221 56 kbit/s A-law	56	56	7, 14, 21, 28, 35 (Note 2)	As maximum
G.711/H.221 56 kbit/s μ-law	56	56	7, 14, 21, 28, 35 (Note 2)	As maximum
G.711/H.221 48 kbit/s A-law	48	48	6, 12, 18, 24, 30 (Note 2)	As maximum
G.711/H.221 48 kbit/s μ-law	48	48	6, 12, 18, 24, 30 (Note 2)	As maximum
G.722 (Note 3)	64	64	8, 16, 24, 32, 40 (Note 2)	As maximum
G.723.1 (Note 4)	6.3	5.3-6.3	24	20-24
G.723.1 Annex A (Silence suppression) (Notes 4 and 5)	6.3	2.8-3.2	24	20-24

Table 5-2 – Mapping of Codec Type to Link Characteristics *(concluded)*

BICC Signalling Entity [6] and [7] Codec Type	AAL type 2 Signalling Entity [8] Link Characteristics			
	Maximum CPS-SDU Bit Rate (kbit/s)	**Average CPS-SDU Bit Rate (kbit/s)**	**Maximum CPS-SDU Size (octets)**	**Average CPS-SDU Size (octets)**
G.726 (Note 6)	40	32	4, 8, 12, 16, 20 (Note 2)	As maximum
		40	5, 19, 15, 29, 25 (Note 2)	
G.727 (Note 6)	40	32	4, 8, 12, 16, 20 (Note 2),	As maximum
		40	5, 10, 15, 20, 25 (Note 2)	
G.728 (Note 7)	16	16	5, 10, 15, 20 (Note 2)	As maximum
G.729 (Note 8)	11.8	8	10, 20 (Note 2)	As maximum
		11.8	15, 30 (Note 2)	
G.729 Annex B (Silence suppression) (Notes 5 and 8)	11.8	4	10, 20 (Note 2)	As maximum
		5.9	15, 30 (Note 2)	

NOTE 1 – The values indicated do not include framing protocol overheads.

NOTE 2 – The value used for CPS-SDU packet sizes are network dependent. It is worth noting that a greater CPS-SDU packet size results in a lower overheads but greater delay, while a lower CPS-SDU packet size results in less delay but greater overheads.

NOTE 3 – Codec can change rate after every sample.

NOTE 4 – Codec can change rate from 5.3 to 6.3 kbit/s, every 30 ms frame.

NOTE 5 – 50% silence assumed.

NOTE 6 – Codec may change rates between 16, 24, 32 and 40 kbit/s. 16 and 24 kbit/s are only used when in overload. 32 kbit/s is the normal rate for voice, 40 kbit/s is used for data.

NOTE 7 – Codec may change rates between 9.6, 12.8 and 16 kbit/s. 9.6 and 12.8 kbit/s are only used when in overload.16 kbit/s is the normal rate for use.

NOTE 8 – Codec may change rates between 6.4, 8 and 11.8 kbit/s. 8 kbit/s is used for normal quality, 11.8 kbit/s for higher quality and 6.4 kbit/s is used for DCME overload.

Table 5-3 identifies the Codec type information passed from the BICC entity to the AAL type 2 Signalling entity which are applicable to derive the AAL type 2 Signalling Service Specific Information which may be used to control the establishment of the AAL type 2 bearer.

Table 5-3 – Mapping of Codec Type to Service Specific Information

BICC Signalling Entity [6] and [7] Codec Type	AAL type 2 Signalling Entity [8] Service Specific Information [8]	Value
Refer to I.366.3 [22]	ITU-T profile	1 .. 255
NOTE – The BCF logic entity by examining the Codec Type determines the ITU-T Profile to be used for the AAL type 2 Bearer connection.		

5.1.2 Transmission Medium Requirements

Table 5-4 identifies the Transmission Requirements information passed from the BICC entity to the AAL type 2 Signalling entity which are applicable to derive the AAL type 2 Link characteristics which are needed to control the establishment of the AAL type 2 bearer. This mapping applies only if Codec type information is not available.

Table 5-4 – Mapping of Transmission Medium Requirements to Link Characteristics

BICC Signalling Entity [6] and [7] Transmission Medium Requirements [19]	AAL type 2 Signalling Entity [8] Link Characteristics (Note 1)			
	Maximum CPS-SDU Bit Rate (kbit/s)	Average CPS-SDU Bit Rate (kbit/s)	Maximum CPS-SDU Size (octets)	Average CPS-SDU Size (octets)
64 kbit/s unrestricted	64	64	8, 16, 24, 32, 40 (Note 2)	As maximum
3.1 kHz audio	64	64	8, 16, 24, 32, 40 (Note 2)	As maximum
2 × 64	128	128	40	40
384	384	384	40	40
1536	1536	1536	40	40
1920	1920	1920	40	40
Multirate (64 kbit/s base rate) 1 < n < 31	64*n	64*n	40	40
NOTE 1 – The values indicated do not include framing protocol overheads. NOTE 2 – The value used for CPS-SDU packet sizes are network dependent. It is worth noting that a greater CPS-SDU packet size results in a lower delay, while a lower CPS-SDU packet size results in greater overheads.				

Table 5-5 identifies the Transmission Requirements information passed from the BICC entity to the AAL type 2 Signalling entity which are applicable to derive the AAL type 2 Service Specific Information which may be used to control the establishment of the AAL type 2 bearer. This mapping applies only if Codec type information is not available.

Table 5-5 – Mapping of Transmission Medium Requirements to Service Specific Information

BICC Signalling Entity [6] and [7] Transmission Medium Requirements [19]	AAL type 2 Signalling Entity [8] Service Specific Information [8]	Value
64 kbit/s unrestricted	SSIA(CMD) SSIA(FRM) SSIM	Enabled Disabled (Note 1) Multiplier n, n = 1
3.1 kHz audio	SSIA(FRM) SSIA (CMD) ITU-T Profile (Note 2) A/μ-law	Disabled Disabled 1 … 255 0 or 1
2 × 64	SSIA (CMD) SSIM (FRM) SSIM	Enabled Disabled (Note 1) Multiplier n, n = 2
384	SSIA (CMD) SSIM (FRM) SSIM	Enabled Disabled (Note 1) Multiplier n, n = 6
1536	SSIA (CMD) SSIM (FRM) SSIM	Enabled Disabled (Note 1) Multiplier n, n = 24
1920	SSIA (CMD) SSIM (FRM) SSIM	Enabled Disabled (Note 1) Multiplier n, n = 30
Multirate (64 kbit/s base rate) 1 < n < 31	SSIA (CMD) SSIM (FRM) SSIM	Enabled Disabled (Note 1) Multiplier n, 1 < n < 31
NOTE 1 – Frame Mode (FRM) is not supported in the service set of ISUP 2000. NOTE 2 – The BCF logic entity by examining the Transmission Medium Requirements determines the ITU-T Profile and other parameters to be used for the AAL type 2 Bearer connection.		

5.2 Addressing

Table 5-6 identifies the Addressing related information passed from the BICC entity to the AAL type 2 Signalling entity which are applicable to derive the AAL type 2 Service Endpoint Address which is required to control the establishment of the AAL type 2 bearer.

Table 5-6 – Mapping of Addressing

BICC Signalling entity [6]	AAL type 2 Signalling Entity [8]
Interworking Function Address (IWFA)	AAL type 2 Service Endpoint Address (A2EA) [8]

5.3 Binding Information

Table 5-7 identifies the bearer Binding related information passed from the BICC entity to the AAL type 2 Signalling entity which is used to derive the AAL type 2 signalling Served User Generated Reference which is required to be passed to the peer AAL type 2 Served User at the time of the establishment of the AAL type 2 bearer.

Table 5-7 – Mapping of Binding Information

BICC Signalling Entity [6]	AAL type 2 Signalling Entity [8]
Backbone Network Connection Identifier (BNC-Id)	Served User Generated Reference (SUGR) [8]

5.4 Cause

Table 5-8 identifies the Cause related information, derived from the AAL type 2 signalling, which is passed from the the AAL type 2 Signalling entity to the BICC entity to provide the Cause parameter fields giving details on the circumstances of a call being cleared due to an AAL type 2 Bearer establishment failure.

Table 5-8 – Mapping of Cause – AAL type 2 Signalling Entity to BICC Signalling Entity

AAL type 2 Signalling Entity [8] – Cause	BICC Signalling Entity [7] – Cause Indicators
NOTE – Location does not exist in AAL type 2 signalling	Location [19] = network beyond interworking point (BI)
Coding Standard [8]	Coding Standard [19]
Cause value [8] (refer to Table 5-9 below)	Cause value [19] (refer to Table 5-9)

Table 5-9 identifies the mapping of the Cause value received in the AAL type 2 Signalling and passed by the AAL type 2 signalling entity to the BICC signalling entity.

Table 5-9 – Mapping of Cause values (AAL type 2 Signalling to BICC)

AAL type 2 Signalling Entity [8] – Cause value [8]		BICC Signalling Entity [7] – Cause value [20]	
1	Unallocated (unassigned) number	1	Unallocated (unassigned) number
3	No route to destination		
31	Normal, unspecified	31	Normal, unspecified
34	No circuit/channel available	47	Resource unavailable, unspecified
38	Network out of order		
41	Temporary failure		
42	Switching equipment congestion		
44	Requested circuit/channel not available		
47	Resource unavailable, unspecified		

Table 5-9 – Mapping of Cause values (AAL type 2 Signalling to BICC) *(concluded)*

AAL type 2 Signalling Entity [8] – Cause value [8]		BICC Signalling Entity [7] – Cause value [20]	
93	AAL parameters cannot be supported	127	Interworking, unspecified
95	Invalid message, unspecified		
96	Invalid message, unspecified		
97	Message type non-existent or not implemented		
99	Information element /parameter non-existent or not implemented		
100	Invalid information element contents		
102	Recovery on timer expiry		
110	Parameter non-existent or not implemented, passed on		

Table 5-10 identifies the Cause related information passed from the BICC entity to the AAL type 2 Signalling entity to derive the AAL type 2 Signalling Cause parameter fields values to be used by AAL type 2 clearing procedure as a result of the call being cleared.

Table 5-10 – Mapping of Cause – BICC to AAL type 2 Signalling

BICC Signalling Entity [7] – Cause Indicators	AAL type 2 Signalling Entity [8] – Cause
Location [20] set to any value	NOTE – Location does not exist in AAL type 2 signalling
Coding Standard [20]	Coding Standard [8]
Cause value [20] set to any value	Cause value [8] = Normal, unspecified (31)

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