



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Q.1950

(12/2002)

SERIES Q: SWITCHING AND SIGNALLING

Specifications of signalling related to Bearer Independent
Call Control (BICC)

Bearer independent call bearer control protocol

ITU-T Recommendation Q.1950

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ITU-T Recommendation Q.1950

Bearer independent call bearer control protocol

Summary

This Recommendation provides the procedures, commands, parameters, messages and signalling information of the Bearer Independent Call Bearer Control (CBC) protocol for the support of narrow-band ISDN services independent of the bearer technology and signalling message transport technology used.

Source

ITU-T Recommendation Q.1950 (2002) was revised by ITU-T Study Group 11 (2001-2004) and approved under the WTSA Resolution 1 procedure on 29 December 2002.

FOREWORD

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ITU-T Recommendation Q.1950

Bearer independent call bearer control protocol

1 Scope

This Recommendation specifies the formats, codes and procedures of the Call Bearer Control Interface. Its scope is limited to the interface between the CSF and the BCF. The base of the Call Bearer Control protocol is H.248.1 that is tailored through the use of a BICC Capability Set and packages of the H.248.x subseries.

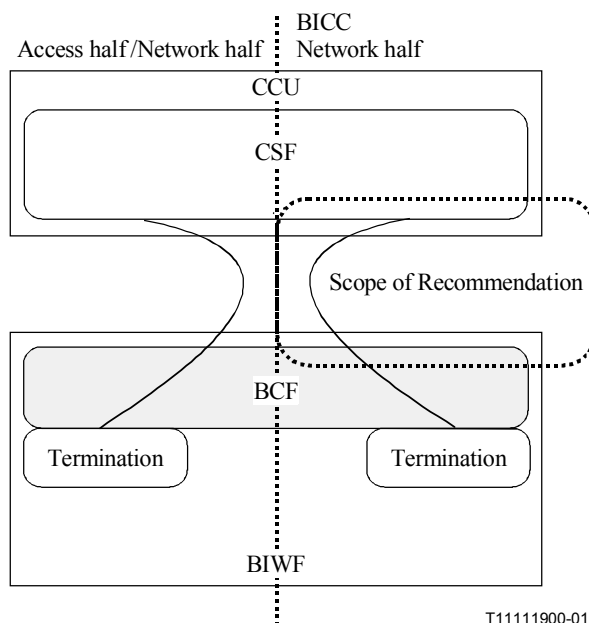


Figure 1/Q.1950 – Scope of this Recommendation

The main body of the Recommendation details the protocol for the BICC Network Half of the CBC interface. Protocols for the Access Half and Non-BICC Network Half of the interface are contained in associated annexes or separate Recommendations.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

2.1 Normative References

- [1] ITU-T Recommendation H.248.1 (2002), *Gateway control protocol: Version 2*.
- [2] ITU-T Recommendation H.248.7 (2000), *Gateway control protocol: Generic Announcement package*.
- [3] ITU-T Recommendation I.230 (1988), *Definition of bearer service categories*.

- [4] ITU-T Recommendation Q.765.5 (2000), *Signalling system No. 7 – Application transport mechanism: Bearer Independent Call Control (BICC)*.
- [5] ITU-T Recommendation Q.1902.3 (2001), *Bearer Independent Call Control protocol (Capability Set 2) and Signalling system No. 7 ISDN user part: Formats and codes*.
- [6] ITU-T Recommendation Q.2150.0 (2001), *Generic Signalling Transport Service*.
- [7] ITU-T Recommendation X.213 (2001), *Information technology – Open Systems Interconnection – Network service definition*.
- [8] IETF RFC 2327 (1998), *SDP: Session Description Protocol*.
- [9] IETF RFC 1890 (1996), *RTP Profile for Audio and Video Conferences with Minimal Control*.

2.2 Informative References

- [10] ITU-T Q-series Recommendations – Supplement 32 (2002), *Technical Report TRQ.2141.1: Signalling requirements for the support of narrow-band services via broadband transport technologies – CS-2 signalling flows*.
- [11] ITU-T Q-series Recommendations – Supplement 35 (2000), *Technical Report TRQ.2500: Signalling requirements for the support of the call bearer control interface (CS-1)*.
- [12] ITU-T Q-series Recommendations – Supplement 7 (1999), *Technical Report TRQ.2001: General aspects for the development of unified signalling requirements*.

3 Abbreviations

This Recommendation uses the following abbreviations:

AAL	ATM Adaptation Layer
AESA	ATM End System Address
ATM	Asynchronous Transfer Mode
BCF	Bearer Control Function
BIT	Bearer Information Transport
BIWF	Bearer Interworking Function
BNC	Backbone Network Connection
CBC	Call Bearer Control
CSF	Call Service Function
CSM	Call State Machine
GSN	Gateway Serving Node
IP	Internet Protocol
ISN	Interface Serving Node
MG	Media Gateway
MGC	Media Gateway Controller
MOD	Modify
MOV	Move
NOT	Notify

O-BIWF	Originating Bearer Interworking Function
PDU	Protocol Data Unit
SUB	Subtract
T-BIWF	Terminating Bearer Interworking Function
TDM	Time Division Multiplex
TMR	Transmission Medium Requirement
USI	User Service Information

4 Definitions

This Recommendation defines the following terms:

4.1 Object and call model definitions

4.1.1 Call Bearer Control (CBC): is the interface between the Call Serving Function and the Bearer Control Function.

4.1.2 connection: The connection is a logical entity representing the connection topology within a single context in the BIWF. The topology of a connection can be implied by assigning streams between terminations and/or through manipulation of the context topology.

4.1.3 context: The context is the association between one or more terminations. The BIWF creates a context and assigns a unique context identity (contextID) to it. A context cannot exist without at least one termination. When a context contains a single termination, this context may or may not contain a connection. Contexts containing a connection always will be associated with a local call instance, while a context containing no connection will not be associated with a Local Call Instance. See 6.1/H.248.1 [1].

4.1.4 end point: An end point defines the remote call or call and bearer signalling entity communicating with the CSF. This entity may be requesting actions associated with a line, trunk, or special resource function. In the object model it defines the point terminating the Call Signalling.

4.1.5 stream: A Stream specifies the parameters of a single bidirectional media stream/user data flow and is represented by a CSM assigned StreamID. See 7.1.6/H.248.1 [1].

4.1.6 stream mode: In the object model it describes the mode of the termination i.e. send, receive, send and receive. See 7.1.7/H.248.1 [1].

4.1.7 termination: A Termination is a logical entity in a BIWF that sources and/or sinks media and/or control streams. In BICC a termination sources and/or sinks a single media and/or control streams. A Termination is described by a number of characterizing Properties. Terminations have unique identities (TerminationIDs). These objects can be created "On Demand" or may be provisioned.

4.1.8 termination state: Defines the Service state of the termination e.g. In-service, Out-of-service. In the object model it describes the mode of the termination i.e. Null, Loop Back External Signal, Loop Back Internal Signal. See Termination State 7.1.5/H.248.1 [1] for the service state. For the mode of a stream i.e. loopback see 7.1.7/H.248.1 [1].

4.1.9 logical port: Defines a logical grouping of one or more media terminations and one or more signalling terminations. A Logical Port may be associated with a bearer control signalling end point.

4.1.10 Call State Machine (CSM): Defines a CSF control entity that terminates call or call and bearer peer-to-peer signalling. The prefix "O" or "T" represents the inter-relationship of CSMs

within the Local Call Instance. The "O" represents the control entity receiving an external service request, while the "T" is the control entity forwarding the request to another CSF.

4.1.11 CCU control port: Defines the signalling port associated with the CSF which is used to interact with the BIWF over the CBC Interface. This object has a unique address within the network service supplier domain.

4.1.12 BIWF control port: Defines the signalling port associated with the BIWF which is used to interact with the CCU over the CBC interface. This object has a unique address within the network service supplier domain.

4.1.13 Backbone Network Connection (BNC): Represents the edge-to-edge transport connection within the backbone network, consisting of one or more Backbone Network Connection Links (BNCL). The Backbone Network Connection represents a segment of the end-to-end Network Bearer Connection (NBC).

4.2 Call model

Refer to clause 6/H.248.1 [1].

4.3 Requests and responses

Refer to ITU-T Rec. H.248.1 [1] for descriptions of command requests and responses.

4.4 Definition of signalling flow objects

The following objects are the signalling objects to be carried by the commands in the transactions.

4.4.1 A-BNC characteristics: Are the BNC Characteristics of the BNC in the opposite half call to the current BNC.

4.4.2 announcement: Identifies that an Announcement of a certain identity be applied to a termination.

4.4.3 audit token: Specifies whether Packages and/or which type of Descriptor that are to be audited. In this Recommendation the following values are used:

- Digit Map;
- Empty (i.e. no AuditToken);
- Events;
- Media;
- MODEM;
- Mux;
- Packages;
- Signals.

4.4.4 bearer service characteristics: Identifies the user requested bearer service to be provided by the network. It is used by the BIWF to condition the bearer termination (e.g. TMR).

4.4.5 bearer information transport: Carries the tunnelled Bearer Control Information.

4.4.6 BIWF address (T-BIWF-Addr): The address on which the BNC is terminated. Passed from the terminating BIWF to the CSM and through the BICC horizontal.

4.4.7 BIWF control address: Defines the signalling address associated with the BIWF that is used to interact with the CCU over the CBC interface. This object has a unique address within the network service supplier domain.

- 4.4.8 BNC characteristic:** Identifies the type of transport to be established across the backbone network. It is carried between call control instances via BICC signalling (e.g. IP, AAL 2).
- 4.4.9 BNC cut through:** Indicates when the through connection of the BNC has occurred.
- 4.4.10 BNC-cut-through-capability:** Used by the BIWF to inform the CSM of the bearer cut-through capability (i.e. commits resources on the receipt of a Bearer SetupReq or confirm).
- 4.4.11 BNC connected:** Indicates that a termination in the BIWF has received sufficient information to determine that a bearer connection has been established.
- 4.4.12 BNC established:** Indication that a BNC has been established on a particular termination in the BIWF.
- 4.4.13 BNC-ID:** Identifies the logical connection between a local and remote termination.
- 4.4.14 BNC modified:** Indicates when the characteristics (i.e. Codec, Bearer Service Characteristics) have been modified.
- 4.4.15 BNC release:** An indication with a general reason for the disconnection or failure of a BNC (e.g. Normal Release, Interworking unspecified, etc.).
- 4.4.16 Cancel echo:** Indicates if the echo canceller should be on or off.
- 4.4.17 CCU control address:** Defines the signalling address associated with the CSF that is used to interact with the BIWF over the CBC interface. This object has a unique address in the network service supplier domain.
- 4.4.18 codec:** Contains the coding information (i.e. selected CODEC) to be used by the BIWF.
- 4.4.19 connection configuration:** Specifies the type and configuration of the connection type to be established. To specify the connection topology the connections between the terminations in a context are specified. Refer to 7.1.18/H.248.1 for more details.
- 4.4.20 context ID:** Identifies the context entity. Generated by the BIWF upon creation of the context. In this Recommendation the following values are used: ALL, when referencing all contexts in use; Context ID, when referencing a specific context in use. Null Context, which indicates a context where terminations that have resources associated with them and are not part of a Local Call Instance reside. Refer to 8.1.2/H.248.1 for more details.
- 4.4.21 cut through:** Indicates when through connection of BNC has occurred in either one or both directions.
- 4.4.22 cut through direction:** Indicates in which direction the BNC should be cut through. For example Forwards, backwards, both ways.
- 4.4.23 detect_digit(x):** Indicates that a digit stimulus is detected on a termination in a BIWF. The digit/s is indicated in "x".
- 4.4.24 digit:** Identifies that a DTMF digit/s of a certain value (i.e. 0-9, *,#,A,B,C,D) is applied to a termination.
- 4.4.25 digit map descriptor:** Holds Digit Map data such as Digit Map Name and Value. Refer to 7.1.14/H.248.1 for more details.
- 4.4.26 event:** Is an indication that there has been an occurrence of the stimulus contained in a Notification Requested request. It indicates that the stimulus has been observed on a termination in a BIWF. It may contain parameters detailing the specifics of the stimulus. Refer to 7.1.9/H.248.1 for more details.
- 4.4.27 event descriptor:** Holds Event data such as Package and Event Names and Event Parameter Names and possible Values. Refer to 7.1.9/H.248.1 for more details.

4.4.28 event ID: Provides the correlation between a request to detect an event and the notification that the event has been detected.

4.4.29 local control descriptor: Holds Local Control data such as Package and Property Names and current and possible Property Values. Refer to 7.1.7/H.248.1 for more details.

4.4.30 local descriptor: Holds Local data such as Package and Property Names and current and possible Property Values. Refer to 7.1.8/H.248.1 for more details.

4.4.31 logical port ID: Identifies the Logical Port entity. Provisioned value in BIWF (and CSF). The type of logical port is provisioned and known in the BIWF (and CSF). In the CBC protocol this Logical Port ID is represented by the Termination ID structure.

4.4.32 modem descriptor: Holds Modem data such as Package and Property Names and current and possible Property Values. Refer to 7.1.2/H.248.1 for more details.

4.4.33 mux descriptor: Holds Mux data such as Mux Type and muxed Termination Ids. Refer to 7.1.3/H.248.1 for more details.

4.4.34 non-standard data: Specifies the BIWF Type, e.g. as Brand, Version and Issue.

4.4.35 notification requested "x": Identifies to the BIWF that it must monitor a termination for the stimulus "x" to occur. Once the stimulus "x" is detected an event is sent from the BIWF to the CSM. The request for a notification may be provisioned on a termination so that whenever the termination is instantiated, so is the request for the notification of event "x". Alternatively the request may be explicit in a H.248.1 command instantiating or modifying a termination.

4.4.36 packages descriptor: Holds data about Packages such as Package Names and Versions. Refer to 7.1.16/H.248.1 for more details.

4.4.37 remote descriptor: Holds Remote data such as Package and Property Names and current and possible Property Values. Refer to 7.1.8/H.248.1 for more details.

4.4.38 service change address: Indicates the new Control Address to be used. Refer to 7.2.8/H.248.1 for more details.

4.4.39 service change delay: Specifies the delay in seconds before the service change is activated. Refer to 7.2.8/H.248.1 for more details.

4.4.40 service change method: Specifies the type of service change. Refer to 7.2.8/H.248.1 for more details. In this Recommendation the following values are used:

- Disconnected;
- Forced;
- Graceful;
- Restart;
- Handoff.

4.4.41 service change MGCID: Indicates own CCU Control Address to be used. Refer to 7.2.8/H.248.1 for more details.

4.4.42 service change reason: Specifies the reason for the service change. Refer to 7.2.8/H.248.1 for more details. In this Recommendation the following values are used:

- Cold Boot;
- Events Capability Failure;
- Loss of lower layer connectivity;
- Media Capability Failure;
- MGC Directed Change;

- Modem Capability Failure;
- Mux Capability Failure;
- Service Restored;
- Signals Capability Failure;
- Termination Taken Out Of Service;
- Transmission Failure;
- Warm Boot.

4.4.43 service change version: Indicates supported Protocol Version. Refer to 7.2.8/H.248.1 for more details.

4.4.44 service state: Specifies the overall (not stream-specific) state of a Termination/BIWF. Refer to 7.1.5/H.248.1 for more details. In this Recommendation the following values are used:

- In Service;
- Out Of Service;
- Test.

4.4.45 signal: Indicates that the stimulus specified in it is to be applied to a termination.

4.4.46 signal completion(x): Indicates that the stimulus applied to a termination has finished. "x" identifies the stimulus.

4.4.47 signal descriptor: Holds Signal data such as Package and Signal Names and Signal Parameter Names and possible Values. Refer to 7.1.11/H.248.1 for more details.

4.4.48 signal direction: Indicates the directionality of a stimulus applied to a termination. The stimulus can be placed on a termination so that none of the other terminations in the context "hear" it (external) or so that other terminations in the context "hear" it also (internal). The direction may be set to (both way) indicating that all the terminations in the context "hear" it as well as it being sent external to the BIWF.

4.4.49 signal timing: Specifies the duration, number of cycles and stop/start of a signal to be played.

4.4.50 stream mode: Specifies the type and configuration of the termination to be established. The termination can be placed in one of several connection states: Cut-through in the forward direction, backward direction, both directions, loop back towards remote termination, or idle. Refer to 7.1.7/H.248.1 for more details.

4.4.51 termination ID: Identifies the Termination entity. In this Recommendation the following values are used:

- ALL, when referencing groups or Ephemeral Terminations not in use.
- Root, when referencing the BIWF level.
- Termination(s), when in use or in a Null Context. Refer to 7.2.2/H.248.1 for more details.

4.4.52 termination state descriptor: Holds Termination State data such as Package and Property Names and current and possible Property Values. Includes also the Service State. Refer to 7.1.5/H.248.1 for more details.

4.4.53 time stamp: Allows the passing of the local time between the BIWF and the CSF at sending of commands.

4.4.54 tone: Identifies that a tone of a certain type (i.e. Alerting tone, call waiting tone) is applied to a termination.

4.4.55 transaction (ID): Commands between the CSM and the BIWF are grouped into Transactions, each of which is identified by a TransactionID. Transactions consist of one or more



Actions. An Action consists of a series of Commands that are limited to operating within a single Context. Refer to clause 8/H.248.1 for more details.

4.4.56 tunnel indication: Identifies to the BIWF that the Bearer Information Transport mechanism can be used. The CSF may request that the BIWF provide the BIT information in a Notify.ind at the same time as the Tunnel indication request. The CSF may also indicate the BIT information may be provided in a Notify.ind at a time later than the Tunnel Indication Request.

5 BICC network CBC Capability Set

5.1 Compatibility rules

ITU-T Rec. H.248.1 version 1 (2000) and H.248.1 version 2 (05/2002) are supported by this Capability Set. The compatibility rules for packages, signals, events, properties and statistics and the H.248.1 protocol are defined in clause 12/H.248.1.

5.2 Naming conventions

5.2.1 CCU/BCU naming conventions

The MGC/MG can be named according to the naming structure of the underlying transport protocol carrying H.248.1.

5.2.2 Termination names

The Termination ID structure is provisioned in the MGC and MG and is known by the MG and the MGC at or before start up.

5.3 Topology descriptor

Topology Descriptor is to be supported by the BIWF and CSF.

5.4 Transaction timers

Any transaction timers as specified in ITU-T Rec. H.248.1 shall be supported.

5.5 Transport

The capability set shall support the transports defined in ITU-T Rec. Q.2150.0 [6].

5.6 Encoding

Binary and text encoding is supported.

5.7 Mandatory support of SDP and Annex C/H.248.1 information elements

5.7.1 Transmission Medium Requirements (TMR)

5.7.1.1 Annex C/H.248.1 Encoding

PropertyID: TMR

Property Tag: 0x9001

Description: The purpose of the Transmission Medium Requirement is to indicate the type of transmission medium required for the connection (e.g. 64 kbit/s unrestricted, speech).

Defined in: Local and Remote Descriptors

Type: Octet String

Possible Values: See 6.97/Q.1902.3 [5].

5.7.1.2 SDP Encoding

Description: This attribute is used as the means to convey the Transmission Medium Requirement to indicate the type of transmission medium required for the connection (e.g. 64 kbit/s unrestricted, speech).

Defined in: Local and Remote Descriptors

Possible Values:

The SDP encoding uses the media and bandwidth parameters of RFC 2327 [8] to encode this information. This encoding does not use direct mapping of the ISUP TMR octets into SDP. Table 1 below specifies the SDP to be used for each of the ISUP TMR values.

NOTE – "-" indicates "do not care" – i.e. the field should be set to any value valid according to SDP, but it is not used on the CBC interface.

Table 1/Q.1950 – SDP/ISUP TMR equivalence

ISUP TMR field (1 octet) (Ref. 6.97/Q.1902.3)	Description	SDP encoding
00000000	"speech"	m=audio - - - (Note that in this case the attributes in the media level description would be set to take account of "speech", e.g. echo cancellation settings etc.)
00000001	"spare"	No SDP coding required
00000010	"64 kbit/s unrestricted"	m=data - - - b=AS:64
00000011	"3.1 kHz audio"	m=audio - - - (Note that in this case, additional parameters in the media level description will give details of the codecs used (and implicit in these codecs, the bandwidth used))
00000100	Reserved for "alternate speech (service 2)/64 kbit/s unrestricted (service 1)"	See "64 kbit/s unrestricted".
00000101	Reserved for "alternate 64 kbit/s unrestricted (service 1)/speech (service 2)"	See "64 kbit/s unrestricted".
00000110	"64 kbit/s preferred"	m=data - - - b=AS:64
00000111	"2 × 64 kbit/s unrestricted"	m=data - - - b=AS:128
00001000	"384 kbit/s unrestricted"	m=data - - - b=AS:384
00001001	"1536 kbit/s unrestricted"	m=data - - - b=AS:1536
00001010	"1920 kbit/s unrestricted"	m=data - - - b=AS:1920
00010000	"3 × 64 kbit/s unrestricted"	m=data - - - b=AS:192

Table 1/Q.1950 – SDP/ISUP TMR equivalence

ISUP TMR field (1 octet) (Ref. 6.97/Q.1902.3)	Description	SDP encoding
00010001	"4 × 64 kbit/s unrestricted"	m=data - - - b=AS:256
00010010	"5 × 64 kbit/s unrestricted"	m=data - - - b=AS:320
00010011	"spare"	No SDP required
00010100	"7 × 64 kbit/s unrestricted"	m=data - - - b=AS:448
00010101	"8 × 64 kbit/s unrestricted"	m=data - - - b=AS:512
00010110	"9 × 64 kbit/s unrestricted"	m=data - - - b=AS:576
00010111	"10 × 64 kbit/s unrestricted"	m=data - - - b=AS:640
00011000	"11 × 64 kbit/s unrestricted"	m=data - - - b=AS:704
00011001	"12 × 64 kbit/s unrestricted"	m=data - - - b=AS:768
00011010	"13 × 64 kbit/s unrestricted"	m=data - - - b=AS:832
00011011	"14 × 64 kbit/s unrestricted"	m=data - - - b=AS:896
00011100	"15 × 64 kbit/s unrestricted"	m=data - - - b=AS:960
00011101	"16 × 64 kbit/s unrestricted"	m=data - - - b=AS:1024
00011110	"17 × 64 kbit/s unrestricted"	m=data - - - b=AS:1088
00011111	"18 × 64 kbit/s unrestricted"	m=data - - - b=AS:1152
00100000	"19 × 64 kbit/s unrestricted"	m=data - - - b=AS:1216
00100001	"20 × 64 kbit/s unrestricted"	m=data - - - b=AS:1280
00100010	"21 × 64 kbit/s unrestricted"	m=data - - - b=AS:1344
00100011	"22 × 64 kbit/s unrestricted"	m=data - - - b=AS:1408
00100100	"23 × 64 kbit/s unrestricted"	m=data - - - b=AS:1472
00100101	"spare"	No SDP required
00100110	"25 × 64 kbit/s unrestricted"	m=data - - - b=AS:1600
00100111	"26 × 64 kbit/s unrestricted"	m=data - - - b=AS:1664
00101000	"27 × 64 kbit/s unrestricted"	m=data - - - b=AS:1728

Table 1/Q.1950 – SDP/ISUP TMR equivalence

ISUP TMR field (1 octet) (Ref. 6.97/Q.1902.3)	Description	SDP encoding
00101001	"28 × 64 kbit/s unrestricted"	m=data - - - b=AS:1792
00101010	"29 × 64 kbit/s unrestricted"	m=data - - - b=AS:1856
00101011 through 11111111	"Spare"	No SDP required.

5.7.2 User Service Information (USI)

5.7.2.1 Annex C/H.248.1 Encoding

Property Name: USI

PropertyID: 0x9023

Description: The purpose of the User Service Information is to indicate a requested I.230 [3] bearer service to be provided by the network.

Defined in: Local and Remote Descriptors

Type: Octet String

Possible Values: The contents of the User Service Information is coded as shown in 6.102/Q.1902.3 [5].

5.7.2.2 SDP Encoding

Description: This attribute is used as the means to convey the User Service Information to the BIWF to identify the appropriate rate adaptation/compression algorithms to be used.

Defined in: Local and Remote Descriptors

Possible Values:

The encoding used is as follows:

a = isup_usi: <value of USI in hex digits as specified in 6.102/Q.1902 [5]>

The left most hex digit pair (e.g. EF in the following sequence EF 23 12 13) represents the first binary octet that would be transmitted as per 5.10/Q.1902.3.

5.7.3 Codec

5.7.3.1 Annex C/H.248.1 Encoding

Property ID: ACodec

Property Tag: 0x1006

Description: The purpose of the Codec Information is to indicate the type of voice encoding algorithm that is required for the connection.

Defined in: Local and Remote Descriptors

Type: Octet String

Possible Values: See 11.1.7/Q.765.5 for the format and the encoding of this string.

5.7.3.2 SDP Encoding

Description: The purpose of the Codec Information is to indicate the type of voice encoding algorithm that is required for the connection. The encoding of the audio Codec property uses the "vsel" and "codecconfig" attribute line parameters. This attribute is technology independent and can be used for SDP based codec negotiation irrespective of network type.

Defined in: Local and Remote Descriptors

Possible Values:

The general format of the "vsel" attribute line is shown below.

```
a = vsel:<encodingName #1> <packetLength #1><packetTime #1>
```

where:

<encodingName> represents the name of a codec e.g. G.711 (encoding names are based on IANA formats – see RFC 1890).

<packetLength> is a decimal integer representing the length of the packet in octets.

<packetTime> is a decimal integer representing the packetization interval in milliseconds.

In BICC networks the value of <packetLength> and <packetTime> shall be set to "-". Values others than "-" shall not be sent if received and shall be ignored.

The codec is listed within the vsel command.

The "codeconfig" attribute line parameter is used with codecs that require further specification of the characteristics of the codec as specified in ITU-T Rec. Q.765.5. This line is therefore optional.

The format of the attribute line is as follows.

```
a = codeconfig <value of codec configuration as per ITU-T Q.765.5>
```

The symbols to be used for the codecs are maintained by IANA (along with the RTP Payload Types for those with statically mapped Payload Types).

5.7.4 Backbone Network Connection Identifier (BNC-ID)

5.7.4.1 Annex C/H.248.1 Encoding

Property ID: BIR

PropertyTag: 3002

Description: This property specifies the BNC-ID

Defined in: Local and Remote Descriptors

Type: Octet String (Maximum length 4 octets)

Possible Values: See 11.1.4/Q.765.5, "Backbone Network Connection Identifier", for the possible values and for the encoding of this string.

5.7.4.2 SDP Encoding

Description: This property specifies the BNC-ID, or End to End Call Identifier (EECID).

Defined in: Local and Remote descriptors.

Possible Values:

The value is encoded in the following SDP parameter format.

```
a = eecid:<eecid>
```

where <eecid> consists of up to 8 hex digits (equivalent to 4 octets).

The left most hex digit pair (e.g. EF in the following sequence EF 23 12 13) represents the most significant binary octet in the textual encoding.

5.7.5 BIWF Address

5.7.5.1 Annex C/H.248.1 Encoding

Property Tag: NSAP

PropertyID: 3003

Description: The address of the peer Bearer Interworking Function.

Defined in: Local and Remote Descriptors

Type: Octet String (Maximum length 20 octets)

Possible Values: NSAP. See 11.1.5/Q.765.5, "Interworking Function Address", for the possible values and for the encoding of this string.

5.7.5.2 SDP Encoding

Description: The address of the peer bearer interworking function.

Defined in: Local and Remote descriptors.

Possible Values:

The text encoding of the BIWF address is based upon the SDP connection line parameter as defined in RFC 2327. The format of the encoding is as follows.

c= <NetworkType> <AddressType> <Address>

Independent of the <NetworkType>, the format of <Address> is dependent on the <AddressType> as follows:

<AddressType>	Format of <Address>
NSAP	NSAP format in hexadecimal digits, optionally with "." between each 4 digits

Note that while SDP allows for the various address types as shown, the BIWF address for use in BICC messaging is the NSAP format.

5.8 Required standard packages

The following packages are to be used by this BICC Capability Set:

Basic BICC functionality (Mandatory):

- E.1/H.248.1 Generic v1
- E.2/H.248.1 Base Root Package v1

Optional BICC functionality (depending upon the network services deployed in the network):

- E.3/H.248.1 Tone Generator Package v1
- E.4/H.248.1 Tone Detection Package v1
- E.5/H.248.1 Basic DTMF Generator Package v1
- E.6/H.248.1 DTMF Detection Package v1
- E.7/H.248.1 Call Progress Tones Generator Package v1
- H.248.7 Generic Announcement Package v1
- E.13/H.248.1 TDM Circuit Package v1

The properties, signal, events and statistics correspond to the signalling objects as shown in 4.4.

5.9 BICC Packages

The following is a list of new packages that this capability set of BICC introduces:

Basic BICC Functionality (Mandatory):

- Bearer Characteristics Package, A.3
- Bearer Network Connection Cut Through Package, A.4
- Generic Bearer Connection Package, A.6

Optional BICC functionality (depending upon the network services deployed in the network):

- Reuse Idle Package, A.5
- Bearer Control Tunnelling Package, A.7
- Basic Call Progress Tones Generator with Directionality, A.8
- Expanded Call Progress tones Generator Package, A.9
- Basic Services Tones Generation Package, A.10
- Expanded Services Tones Generation Package, A.11

Document Sharing Hub

- Intrusion Tones Generation Package, A.12
- Business Tones Generation Package, A.13

In defining BICC packages the following rules have been applied to determine whether a new information element is a property or a signal parameter and to which descriptor it resides:

- A new information element is defined in the Local/Remote descriptors if it relates directly to the media and its encoding. For example: a codec relates directly to the media stream.
- A new information element is defined in the Local Control descriptor if it relates to the relationship between the CSM and the BIWF.
- A new information element is defined as a Signal parameter if:
 - The information element does not relate to the encoding of the media stream. For example: the codec is not contained in the EstablishRequest signal as it is contained in the Local/Remote Descriptor.
 - The information element is transient. For example: Bearer Control signalling occurs and the MG returns to its previous state. An announcement plays and the MG returns to its previous state.
- A new Event and its parameter is defined if no other existing event is suitable for use.

6 CBC Procedures

6.1 Nomenclature

The CSM uses $X = ?$ to indicate that the CSM requests the BIWF to provide an appropriate value for signalling object (X).

The $X = Y$ is used to indicate that the BIWF/CSM should set the signalling object (X) to value (Y).

Notification Requested "zzz" is used to request the BIWF to notify the CSM when event "zzz" has been detected. The Notification Requests are shown in the relevant transactions however the request for notification may be provisioned and when the termination is instantiated the request for indication will become active.

Signal Requested "www" is used to request the BIWF to send a signal "www" on the specified termination.

Event = "vvv" is used by the BIWF to indicate that a particular event "vvv" has been detected on a termination.

(..., Transaction) is used to indicate that this transaction can be sent in conjunction with another transaction.

$X = Y/Z$, is used to indicate a choice for X: Y or (exclusive) Z.

$X = Y + Z$, is used to indicate a choice for X: Y and/or (inclusive) Z.

$X = Y \& Z$, is used to indicate: Y and Z.

..., is used to indicate an optional continuing list.

Brackets () are used to indicate boolean priority e.g. $X = (Y/Z) + (M/N)$

Some signalling objects are optional to carry in a transaction, this "optionality" is indicated by an underlined text statement before the object in the tables in 7.1 and 7.2.

Termination Ids in commands may be wild carded so that the one command will be applied to several terminations.

6.2 CBC procedures and encoding

The procedures in clauses 7 and 8 indicate which H.248.1 commands are used to perform an action and how they relate to transactions. The transaction name, e.g. *"Change_Topology"* is not encoded. The command and the information elements described in the tables in the procedures section are encoded as per clause 10. Transactions shall be validated according to the rules of H.248.1.

ITU-T Rec. H.248.1 provides general mechanisms to optimize the number of messages sent. The procedures and associated transactions listed in clauses 7 and 8 provide the necessary information flows to achieve an action. These information flows may be further optimized as indicated below.

6.2.1 Multiple transactions in a message

ITU-T Rec. H.248.1 has the capability of carrying several transactions in one H.248.1 message. The CSF and BIWF may choose to optimize the number of messages sent by placing more than one transaction in a message. For example: the CSF sends a Command request in Message 1 (transaction 1). The BIWF sends a Notify.ind in Message 2 (transaction 2). The BIWF then sends a Command response in Message 3 (transaction 1). The CSF sends a Notify.resp in Message 4 (transaction 2). This procedure could be optimized by sending a single message containing the Notify.ind (transaction 2) and the Command.resp (transaction 1).

6.2.2 Notification requests, events and the BIWF

The CSF may order the BIWF to detect events at any time, according to the rules of ITU-T Rec. H.248.1. However, rather than sending multiple Notification requests in multiple MOD.req's over the life of the termination in a particular context the CSF may elect to put all Notification Requests in the initial ADD.req for the termination when adding it to a context. This will have the effect of keeping those Notification Requests active for the life of the termination in a context. The Notification Requests may also be provisioned on a termination. The CSF may remove a Notification Request at any time according to the rules of event handling in ITU-T Rec. H.248.1.

7 CBC procedures – Call related

This clause contains the Call Related procedures for the CBC protocol.

7.1 CSM transactions

The following transactions are used to indicate that a procedure is to be initiated by the CSM. These transactions lead to commands being sent across the CBC interface.

Table 2/Q.1950 – Call related CSM originated transactions on the CBC interface

Transaction	Description
Change_Topology	This transaction is used to change the connection topology within the BIWF. It describes the flow of user data internally to the BIWF. It may be used in cases where monitoring is required.
Confirm_Char	This is used to indicate to the BIWF that it should now use the indicated bearer service characteristics and that the BIWF can release resources associated with bearer service characteristics no longer used.
Cut_BNC	This is used to indicate to the BIWF that it should initiate a bearer release.
Cut_Through	This is used to indicate to the BIWF that cut-through of the bearer should occur.
Detect_Digit(s)	This transaction is used to indicate to the BIWF that it should prepare the necessary resources to detect a DTMF digit and report the occurrence of the digit to the CSM.

Table 2/Q.1950 – Call related CSM originated transactions on the CBC interface

Transaction	Description
Echo Canceller	This primitive is used to indicate the BIWF that it should associate echo canceller resources with the BNC.
Establish_BNC_notify	This is used to indicate to the BIWF that it should initiate a bearer setup.
Insert_Announcement	This is used to insert an announcement on a particular termination/s in the BIWF.
Insert_Digit(s)	This is used to insert DTMF digit/s on a particular termination/s in the BIWF.
Insert_Tone	This is used to insert a tone on a particular termination/s in the BIWF.
Isolate	This transaction is used to isolate one termination from other terminations effectively stopping media flow between the isolated termination and existing terminations. This is used when services like Call Hold are supported.
Join	This transaction is used to join one or more terminations establishing media flow between the terminations. This is used when services like Conferencing or 3 party are supported.
Modify_Char	This is used to indicate to the BIWF that it should initiate a change in the bearer service characteristics. I.e. Change of codec, Bearer Service.
Prepare_BNC_notify	This is used to indicate to the BIWF that it must be prepared to receive a bearer setup request.
Reserve_Char	This is used to indicate to the BIWF that it should allocate the necessary bearer resources for a particular codec or bearer service characteristic.
Reuse_Idle	This is used to indicate that reuse of an idle bearer should be attempted.
Tunnel	The tunnel transaction allows the: CSM to indicate to the BIWF that Bearer Control Tunnelling is available. BIWF to indicate to the CSM direction that Bearer Control Tunnelling shall be used for a particular termination. Passing from BIWF to CSM a Bearer Control Protocol data unit relating to a particular termination for transport to the peer termination.

7.1.1 Prepare_BNC_notify

When the transaction "*Prepare_BNC_notify*" is required the following procedure is initiated.

An ADD.req, MOD.req or MOV.req command is sent with the following information.

1	ADD.req/MOD.req/MOV.req (Prepare_BNC_notify)	CSM to BIWF
	<u>Address information</u>	<u>Bearer information</u>
	<u>If required:</u>	<u>If CSF chosen:</u>
	T-BIWF-Address = "?"	BNC characteristics = chosen characteristics
	<u>If termination requested:</u>	<u>If BIWF chosen:</u>
	Termination ID = ?	BNC characteristics = ?
	<u>If termination provided:</u>	
	Termination ID = bearer1	
	<u>Logical Port ID = y</u>	A-BNC Characteristics
	<u>Notification_Requested (Event ID = x, "All BNC events")</u>	If NOT (Forward Establishment & Tunnelling = option 1): BNC-id = ?
	<u>If Context Requested:</u>	<u>If No Codec Negotiation</u>
	Context ID = ?	Bearer Service Characteristics
	<u>If Context Provided:</u>	
	Context ID = c1	<u>If Codec Negotiation</u>
	<u>If Forward Establishment:</u>	Codec
	BNC-cut-through-capability = ?	Optionally if Forward Establishment & Tunnelling = option 1: BIWF-Addr = x BNC-ID = x1

Upon reception of the command, the BIWF shall:

- Assign a context ID if requested.
- Assign a termination ID based upon logical port ID, the preferred BNC characteristics and optionally a Bearer Service Characteristics or Codec.
- If requested assign a BNC-id.
- In the case of forward establishment and tunnelling option 1 the BIWF will use the provided BIWF-Addr and BNC-ID.
- If the case of forward establishment and tunnelling option 1 is not used, be prepared to accept a Bearer Establishment request.
- Be prepared to notify the CSM that a bearer is connected.
- In the case that this is the second termination in the context, the BIWF performs an analysis of the two terminations and determines whether a transcoder is required between the termination. If a transcoder is required, it is reserved for this purpose.
- The BIWF will determine whether or not the cut through for the requested bearer technology shall occur early or late.

Upon completion of processing command (1) an ADD.resp, MOD.resp or MOV.resp command (2) is sent.

2 ADD.resp/MOD.resp/MOV.resp

BIWF to CSM

Address information

If requested:

T-BIWF-Address = X

Control information

Transaction ID = z

Termination ID = bearer1

Context ID = c1

If requested:

BNC-cut-through-capability =
early/late

Bearer information

If NOT (Forward Establishment
& Tunnelling = option 1):

BNC-ID= x1

If BIWF Chosen:

BNC Characteristics = chosen
characteristics

7.1.2 Establish_BNC_notify

When the transaction "*Establish_BNC_notify*" is required the following procedure is initiated.

An ADD.req, MOD.req or MOV.req command is sent with the following information.

1 ADD.req/MOD.req/MOV.req (Establish_BNC_notify)

CSM to BIWF

Address information

T-BIWF-Address = X

Control information

Transaction ID = z

NotificationRequested (Event ID
= x, "All BNC Events")

Signal = BNC Establish

If the context is provided:

Context ID = c1

If the context is NOT provided:

Context ID = ?

If Termination Requested:

Termination ID = ?

If requested:

Logical Port ID = y

If Termination Provided:

Termination ID = bearer1

If Tunnelling can be used:

NotificationRequested (Event ID
= x, "Tunnel Indication = x")

Bearer information

BNC-id = x1

If Termination Requested:

BNC Characteristics

A-BNC Characteristics

If No Codec Negotiation:

Bearer Service Characteristics

If Codec Negotiation:

Codec

Upon reception of the command, the BIWF shall:

- Assign a context ID if requested.
- Assign a termination based upon the preferred BNC characteristics and optionally the Bearer Service Characteristics or Codec if requested.
- Generate a Bearer Setup Request to the destination specified by the BIWF-Address using the provided BNC-id.
- If tunnelling is applicable, use the CBC interface to tunnel Bearer Control Messages.
- In the case that this is the second termination in the context, the BIWF performs an analysis of the two terminations and determines whether a transcoder is required between the termination. If a transcoder is required, it is reserved for this purpose.

Upon completion of processing command (1) an ADD.resp, MOD.resp or MOV.resp command (2) is sent.

2 ADD.resp, MOD.resp, MOV.resp		BIWF to CSM
<u>Address information</u>	<u>Control information</u>	<u>Bearer information</u>
	Transaction ID = z Context ID = c1	
	<u>Termination Requested:</u> Termination ID = bearer1	

7.1.3 Cut_Through

The cut through transaction is used to through connect or break media on the terminations. The Cut_Through primitive can be used for this purpose in two ways. The implicit cut through is used when the termination is instantiated to allow the BIWF to control when the cut through of the media occurs. The explicit cut through is used when the CSM wants to control when the cut through of the media on the terminations occurs. To break the user plane the explicit cut through is used. The cut through transactions should be applied to the terminations that need to be cut through.

7.1.3.1 BIWF Controlled (Implicit)

When the transaction "*Cut_Through*" is required the following procedure is initiated.

1 ADD.req/MOD.req/MOV.req (... , Cut_Through)		CSM to BIWF
<u>Address information</u>	<u>Control information</u>	<u>Bearer information</u>
	As per flow (1) 7.1.1 Prepare_BNC_notify or 7.1.2 Establish_BNC_notify	
	With the following addition: Cut Through Direction = direction	
	If Notification of Cut through is required: NotificationRequested = (Event ID = x, "Cut Through")	

Upon reception of the command, the BIWF shall:

- When the BIWF receives the request for the termination "bearer1" with the cut through direction set to indicate through connection (forward, backward, both, inactive), the BIWF will wait until a Bearer SetupRequest or Bearer Setup Connect is sent or received. It will through connect the logical port represented by termination "bearer1".
- It will indicate the acceptance of the task to the CSM with information flow (2). The BIWF will send the indication of cut-through as per 7.2.3.1.

Upon completion of processing command (1) an ADD.resp/MOD.resp or MOV.resp is sent.

2 ADD.resp/MOD.resp/MOV.resp		BIWF to CSM
<u>Address information</u>	<u>Control information</u>	<u>Bearer information</u>
	As per flow (2) 7.1.1 Prepare_BNC_notify or 7.1.2 Establish_BNC_notify	

7.1.3.2 CSM Controlled (Explicit)

When the transaction "*Cut_Through*" is required the following procedure is initiated.

1	MOD.req/MOV.req (<i>Cut_Through</i>)	CSM to BIWF
	<u>Address information</u>	<u>Bearer information</u>
	<u>Control information</u> Termination ID = bearer1 Context ID = c1 Cut Through Direction = forward, backward, both, inactive Transaction ID = z	

Upon reception of the command, the BIWF shall:

- When the BIWF receives the request for the terminations "bearer1" with the cut through direction set to forward, backward, both, inactive, the BIWF will through connect the logical port represented by termination "bearer1". More than one termination may be included in the same transaction to through connect several terminations simultaneously.
- It will indicate the acceptance of the request to the CSM with information flow (2).

Upon completion of processing command (1) a MOD.resp/MOV.resp is sent.

2	MOD.resp/MOV.resp	BIWF to CSM
	<u>Address information</u>	<u>Bearer information</u>
	<u>Control information</u> Transaction ID = z Context ID = c1 Termination ID = bearer1	

7.1.4 Modification of Bearer Characteristics

7.1.4.1 Reserve_Char

This transaction is used on the termination that originates the bearer level modification. When the transaction "*Reserve_Char*" is required the following procedure is initiated.

1	MOD.req (<i>Reserve_Char</i>)	CSM to BIWF
	<u>Address information</u>	<u>Bearer information</u>
	<u>Control information</u> Transaction ID = z Termination ID = bearer1 Context ID = c1 NotificationRequested (Event ID = x, "BNC modified/BNC Mod Failed") Signal = BNC Modify Reserve_Value	<u>If Non Codec Negotiation</u> Bearer Service Characteristics <u>If Codec Negotiation</u> Codec/s – New and Old

Upon reception of the command, the BIWF shall:

- When the BIWF receives the request to modify the Bearer Characteristics for the termination it shall reserve resources for the characteristics of the bearer associated with the termination. The BIWF shall analyse whether new transcoding equipment is required between the termination "bearer1" and any other terminations in a context. If transcoding is required the BIWF shall insert transcoding equipment. The BIWF will analyse the bandwidth needs of the new codec or bearer service characteristic and initiate a Bearer Modify Request information flow to modify the bandwidth if the value to be reserved requires a greater bandwidth.
- Modify the codec profile being used on the connection to the new codec by sending a Bearer Modify Request information flow.

- As the Reserve_Value indication is sent, allocates the resources required for the support of multiple values of bearer information. For example if 2 codecs are sent then the resources to support both are reserved.

Upon completion of processing command (1) a MOD.resp is sent.

2	MOD.resp	BIWF to CSM
	<u>Address information</u>	<u>Bearer information</u>
	<u>Control information</u>	
	Transaction ID = z	
	Termination ID = bearer1	
	Context ID = c1	

7.1.4.2 Confirm_Char

This transaction is used on the termination that originates the bearer level modification. When the transaction "Confirm_Char" is required the following procedure is initiated.

1	MOD.req (Confirm_Char)	CSM to BIWF
	<u>Address information</u>	<u>Bearer information</u>
	<u>Control information</u>	<u>If Non Codec Negotiation</u>
	Transaction ID = z	Bearer Service Characteristics
	Termination ID = bearer1	
	Context ID = c1	
	Signal = BNC Modify	<u>If Codec Negotiation</u>
		Codec
	<u>If reverting to the original codec:</u>	
	NotificationRequested (Event ID	
	= x, "BNC modified/BNC Mod	
	Failed")	

Upon reception of the command, the BIWF shall:

- When the BIWF receives the request to confirm the modification of the Bearer Characteristics for the termination it shall modify the characteristics of the bearer associated with the termination according to the provided Codec or Bearer Service Characteristic. When the u-plane no longer needs the bandwidth the BIWF may initiate the Bearer Modify Request information flow to reduce the bandwidth if the previously reserved bandwidth is greater than what is needed.

Upon completion of processing command (1) a MOD.resp is sent.

2	MOD.resp	BIWF to CSM
	<u>Address information</u>	<u>Bearer information</u>
	<u>Control information</u>	
	Transaction ID = z	
	Termination ID = bearer1	
	Context ID = c1	

7.1.4.3 Modify_Char

This transaction is used on the termination that terminates the bearer level modification. When the transaction "Modify_Char" is required the following procedure is initiated.

1	MOD.req (Modify_Char)	CSM to BIWF
	<u>Address information</u>	<u>Bearer information</u>
	<u>Control information</u>	<u>Non Codec Negotiation</u>
	Transaction ID = z	Bearer Service Characteristics
	Termination ID = bearer1	
	Context ID = c1	
	<u>If multiple values of Bearer Information are required:</u>	<u>If Codec Negotiation</u>
	Reserve_Value	Codec/s

Upon reception of the command, the BIWF shall:

- When the BIWF receives the request to modify the Bearer related Characteristics for the termination it shall modify the characteristics of the bearer associated with the termination. The BIWF shall analyse whether new transcoding equipment is required between the termination "bearer1" and any other terminations in the context and includes any required transcoding equipment. The BIWF will inform the CSM that the task is completed with information flow (2).
- If the Reserve_Value indication is sent, reserve the resources required to support multiple values of bearer information. For example if 2 codecs are sent then the resources to support both are reserved.
- The BIWF should take relevant actions to ensure smooth transition to the new encoding.

Upon completion of processing command (1) a MOD.resp is sent.

2	MOD.resp	BIWF to CSM
	<u>Address information</u>	<u>Bearer information</u>
	<u>Control information</u>	
	Transaction ID = z	
	Termination ID = bearer1	
	Context ID = c1	

7.1.5 Tunnel

This transaction is used to carry the "Bearer Information Transport information" from the CSF to the BIWF. It is also used to indicate to the MG that a Bearer Information Transport tunnel can be used. The "Bearer Information Transport" information can be carried in a stand alone transaction or can be carried as part of a transaction used for another purpose, for example "Establish_BNC_notify". The Tunnel transaction may be associated with another transaction. E.g. Establish_BNC_notify. Likewise the response to a transaction may be associated with another transaction. E.g. It is possible for an ADD.resp (Establish_BNC_notify) and a NOTIFY.ind(x) to share the same message.

When the transaction "*Tunnel*" is required the following procedure is initiated.

1	ADD.req/MOD.req/MOV.req (... , Tunnel)	CSM to BIWF
	<u>Address information</u>	<u>Bearer information</u>
	<u>Control information</u> As per the transaction that this is combined with (i.e. "Establish_BNC_notify" and "Prepare_BNC_notify"), with the following addition: Tunnel Option = ?/no/1/2 NotificationRequested (Event ID = x, "Tunnel Indication")	
	OR: Transaction ID = z Context ID = c1 Termination ID = bearer1 Signal = Bearer Information Transport NotificationRequested (Event ID = x, "Tunnel Indication")	

Upon reception of the command, the BIWF shall:

- When Bearer Information Transport is received, act according to the information contained in the object. I.e. Process a Bearer SetupRequest.
- If a Tunnel indication is received, the BIWF shall depending on the option received to use a tunnel, choose to use a tunnel or choose NOT to use a tunnel. If the BIWF uses a tunnel it shall return the Bearer Information Transport in a NOTIFY.ind according to what type of response was requested.

Upon completion of processing command (1) an ADD.resp, MOD.resp, MOV.resp is sent.

2	ADD.resp, MOD.resp, MOV.resp	BIWF to CSM
	<u>Address information</u>	<u>Bearer information</u>
	<u>Control information</u> As per ("Establish_BNC_notify" and "Prepare_BNC_notify")	
	OR: Transaction ID = z Context ID = c1 Termination ID = bearer1 <u>If requested:</u> Tunnel Option = no/1/2	

7.1.6 Reuse Idle

7.1.6.1 Establish_BNC_notify

When the transaction "*Establish_BNC_notify*" is required the BIWF may return in the response that an Idle Bearer is to be used. The following procedure is initiated.

1	ADD.req/MOD.req (Establish_BNC_notify)	CSM to BIWF
	<u>Address information</u> As per 7.1.2	<u>Bearer information</u> As per 7.1.2
	<u>Control information</u> As per 7.1.2	

Upon reception of the command, the BIWF shall:

- As per 7.1.2 information flow (1) with the following additions.
- If the BIWF determines that an idle bearer is to be used it will send an indication "reuse_Idle" and the BNC-ID of the idle bearer. If the CSM had requested the BIWF to choose a termination ID, the BIWF shall return the termination ID of the termination that relates to the idle bearer.

Upon completion of processing command (1) an ADD.resp, MOD.resp is sent.

2	ADD.resp, MOD.resp	BIWF to CSM
	<u>Address information</u>	<u>Bearer information</u>
	<u>Control information</u>	BNC-id = BNC-ID of the idle bearer to be reused.
	As per 7.1.2 with the following additions:	
	Reuse-Idle_indication	
	<u>If Termination Requested:</u>	
	Termination ID = idle_bearer	

7.1.6.2 Reuse_Idle

When the transaction "Reuse-Idle" is required the following procedure is initiated.

1	MOD.req (... , Reuse_Idle)	CSM to BIWF
	<u>Address information</u>	<u>Bearer information</u>
	<u>Control information</u>	BNC-id = BNC-ID of the idle bearer to be reused.
	Transaction ID = z	
	Context ID = c1	
	Termination ID = bearer1	

Upon reception of the command, the BIWF shall:

- Associate the Bearer represented by the BNC-id = "Reuse_Idle" with the termination indicated. This termination will now relate to the idle bearer.

Upon completion of processing command (1) an ADD.resp is sent:

2	MOD.resp	BIWF to CSM
	<u>Address information</u>	<u>Bearer information</u>
	<u>Control information</u>	
	Transaction ID = z	
	Context ID = c1	
	Termination ID = bearer1	

7.1.7 Release

The transaction below shows Release where the BIWF combines multiple actions (i.e. bearer release signalling, breaks the connection and removes the termination) in one transaction. These actions may be achieved individually in their own transaction for:

- Bearer Release Signalling by sending a MOD.req and MOD.reply with a signal "BNC Release".
- Breaking the Connection by sending a MOD.req and MOD.reply indicating that the cut through direction is send/receive/inactive.
- Removing the termination by sending a SUB.req and SUB.resp.