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SERIES Q: SWITCHING AND SIGNALLING

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

BICC access network protocol

ITU-T Recommendation Q.1930

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ITU-T Recommendation Q.1930

BICC access network protocol

Summary

This Recommendation describes the protocol for access networks that support Bearer Independent Call Control (BICC). It describes the signalling for BICC access networks serving analogue loops and trunks, ISDN BRA and PRA, and B-ISDN DSS2.

Three separate signalling associations are included in the BICC access network protocol. They are call control, access network control, and remote media control.

Source

ITU-T Recommendation Q.1930 was prepared by ITU-T Study Group 11 (2001-2004) and approved under the WTSA Resolution 1 procedure on 13 April 2002.

FOREWORD

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NOTE

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ITU-T Recommendation Q.1930

BICC access network protocol

1 Scope

This Recommendation describes the protocol for access networks that support Bearer Independent Call Control (BICC). It defines the access network protocol in terms of formats, codes, and procedures.

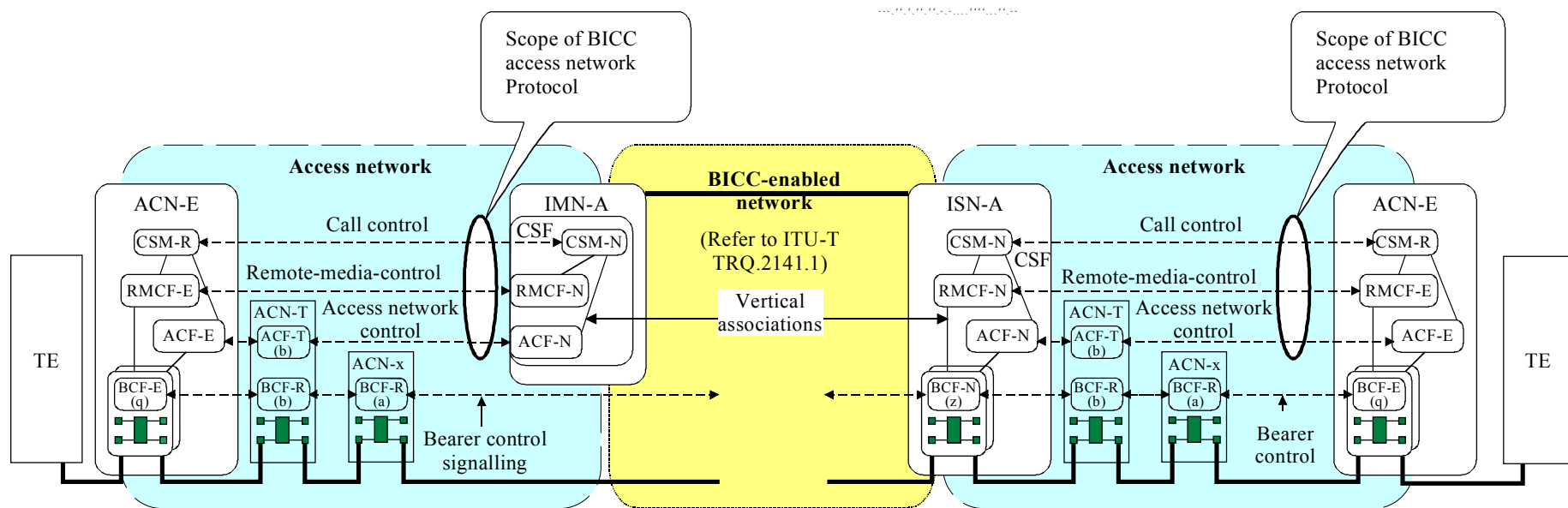
The protocol defined by this Recommendation is to be used between "Access Concentration Nodes" and "Interface Serving Nodes" or "Interface Mediation Nodes". This protocol is called the BICC Access Network protocol. It includes three signalling associations:

- Call Control;
- Access Network Control;
- Remote Media Control.

Other protocols, not specified by this Recommendation, are used between Access Concentration Nodes and Serving Nodes for the control of bearers. Other protocols, also not specified in this Recommendation, are used between bearer control functions and other access network functions across the vertical associations.

The scope of this Recommendation is illustrated by the highlighted oval in Figure 1.

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Figure 1/Q.1930 – Scope of this Recommendation – The BICC Access Network Protocol

2 References

The following ITU-T Recommendations and other references contain provision, 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.

NOTE – The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation

- [1] ITU-T Recommendation G.964 (2001), *V-Interfaces at the digital local exchange (LE) – V5.1 Interface (based on 2048 kbit/s) for the support of access network (AN)*.
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- [3] ITU-T Recommendation H.248.1 (2002), *Gateway control protocol: Version 1*.
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- [12] ITU-T Recommendation Q.921 (1997), *ISDN user-network interface – Data link layer specification*.
- [13] ITU-T Recommendation Q.931 (1998), *ISDN user-network interface layer 3 specification for basic call control*.
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- [15] ITU-T Recommendation Q.1901 (2000), *Bearer Independent Call Control protocol*.
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- [17] ITU-T Recommendation Q.1902.2 (2001), *Bearer Independent Call Control protocol (Capability Set 2) and Signalling System No. 7 ISDN user part: General functions of messages and parameters*.

- [18] 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.*
- [19] ITU-T Recommendation Q.1902.4 (2001), *Bearer Independent Call Control protocol (Capability Set 2): Basic call procedures.*
- [20] ITU-T Recommendation Q.1902.5 (2001), *Bearer Independent Call Control protocol (Capability Set 2): Exceptions to the Application transport mechanism in the context of BICC.*
- [21] ITU-T Recommendation Q.1902.6 (2001), *Bearer Independent Call Control protocol (Capability Set 2): Generic signalling procedures for the support of the ISDN user part supplementary services and for bearer redirection.*
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- [23] ITU-T Recommendation Q.1912.2 (2001), *Interworking between selected signalling systems (PSTN access, DSS1, C5, R1, R2, TUP) and the Bearer Independent Call Control protocol.*
- [24] ITU-T Recommendation Q.1912.3 (2001), *Interworking between H.323 and the Bearer Independent Call Control protocol.*
- [25] ITU-T Recommendation Q.1912.4 (2001), *Interworking between Digital Subscriber Signalling System No. 2 and the Bearer Independent Call Control protocol.*
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- [30] ITU-T Recommendation Q.2150.0 (2001), *Generic signalling transport service.*
- [31] ITU-T Recommendation Q.2150.1 (2001), *AAL type 2 signalling transport converter on MTP3 and MTP3b.*
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3 Definitions

This Recommendation defines the following terms:

3.1 Definitions of signalling associations

The following signalling associations are applied in the reference model.

3.1.1 Call Control Signalling Association (CSM to CSM): Is used to establish, modify, and release calls and services associated with those calls between the ACN-E and the ISN/IMN-A.

3.1.2 Access network control Signalling Association (ACF-E to ACF-N): Is used to insert, modify, and release bearer associations between the ACN-E and the ISN/IMN-A.

3.1.3 Remote Media Control Signalling Association (RMCF-E to RMCF-N): Is used to insert, modify, and remove tones and signals at the user port in ACN-E, and to respond to events detected at the user port in ACN-E that are associated with these tones and signals.

3.1.4 Bearer Control Signalling Association (BCF to BCF): Is used to establish, modify, and release the actual bearer transport connection between BIWFs that is controlled through the BCF in ACN-E and a BCF elsewhere in the BICC network.

3.2 Functional model definitions

Definitions of the items contained in the composite functional model are as follows:

3.2.1 Access Concentration Node (ACN): A functional entity that provides the interface between access facilities, such as analogue loop or ISDN, and the BICC Access Network. This functional entity may contain one or more call state relay models (CSM-R), at least one access control function (ACF), at least one remote media control function (RMCF), and one or more interworking functions (BIWFs) that contain Bearer Control Functions (BCFs). The CSM-R, RMCF, and BIWF interact with the access facilities and with their peers in the BICC Access Network or BICC broadband backbone network. The ACF interacts with its peers in the BICC Access Network. ACNs interact with other ACNs, within their own BICC Access Network domain, as well as with terminal equipment and with ISN/IMNs in the BICC broadband backbone network. Multiple bearer control relay functions BCF-Rs in an ACN's BIWF interact with the BCFs contained in other BIWF entities within the BICC access and BICC broadband backbone networks. The ACN-E is not bounded with respect to its physical location in this Recommendation. It may be located at the customer premises or within the access facilities operated by the network service provider.

3.2.2 Access Control Function (ACF): The ACF is a functional entity which provides a neutral binding of multiple call control protocols to multiple bearer control protocols. It binds the access concentration node to the ISN/IMN across multiple bearer switching nodes. Three types of ACFs are used in the access network functional model: ACF-E, ACF-N, and ACF-T.

- The Access Control Edge Function (ACF-E) mediates between call control and bearer control to provide the requested resources for the call. It interacts with the ACF-N in ISN/IMN-A to obtain the appropriate access network resources under the control of ISN/IMN-A.
- The Access Control Nodal Function (ACF-N) mediates between call control and bearer control to provide the requested resources for the call. It interacts with the ACF-E in ACN-E and ACF-T to assign appropriate access network resources for the call.
- The Access Control Transit Function (ACF-T) allows the ISN/IMN to manage two different types of bearers across the access network. It interacts with the ACF-N in ISN/IMN-A to obtain the appropriate access network resources under the control of ISN/IMN-A. For example, ISN/IMN-A may designate an AAL 2 bearer between ACN-E and ACN-T, while it designates an IP bearer between ACN-T and a distant BIWF.

3.2.3 Backbone Network Connection (BNC): Represents the edge-to-edge transport connection within the backbone network.

3.2.4 Bearer Control Function (BCF): Three types of BCFs are illustrated in the access network functional model: BCF-E, BCF-R and BCF-N.

- The Bearer Control Edge Function (BCF-E) provides the control of the bearer switching function and relays the bearer control signalling requests to next BCF in order to complete the edge-to-edge backbone network connection.
- The Bearer Control Relay Function (BCF-R) provides the control of the bearer switching function and relays the bearer control signalling requests to next BCF in order to complete the edge-to-edge backbone network connection

- The Bearer Control Nodal Function (BCF-N) provides the control of the bearer switching function, the communication capability with its associated call service function (CSF), and the signalling capability necessary to establish and release the backbone network connection to its peer (BCF-N).

3.2.5 Bearer Inter-Working Function (BIWF): A functional entity that provides bearer control and media mapping/switching functions within the scope of a Serving Node (ISN/IMN) or Access Concentration Node (ACN). A BIWF contains one Bearer Control Nodal Function (BCF-N), or one Bearer Control Edge Function (BCF-E) and one or more MCFs and MMSFs, and is functionally equivalent to a Media Gateway that incorporates bearer control. See General Requirements documents for the definitions for MCF and MMSF.

3.2.6 Call Service Function (CSF): The CSF provides the service control nodal actions associated with the access service by inter-working with access call control signalling and Bearer Independent Call Control (BICC) signalling. It signals to its peer (CSF) in the BICC network, or an ACN-E in the BICC Access Network, the characteristics of the call. It invokes, using the Call State Model (CSM), the Access Control Nodal Functions (ACF-N) and Remote Media Control Nodal Functions (RMCF-N) necessary to transport the call control signalling across the BICC broadband access network. It also invokes the Bearer Control Nodal Functions (BCF-N) necessary to transport the narrowband bearer service across the BICC broadband access network. (BCF interaction is not applicable to the IMN configuration).

3.2.7 Call State Model (CSM): Note that two types of CSMs are illustrated in the above functional model, CSM-N, CSM-R.

- The Call State Model (CSM-N) provides the service control nodal actions associated with the access service by inter-working with access call control signalling and Bearer Independent Call Control (BICC) signalling. It signals to its peer (CSM-N) the characteristics of the call, and invokes the Access Control Nodal Functions (ACF-N) and Remote Media Control Nodal Functions (RMCF-N) necessary to transport the call control signalling across the broadband backbone network. It also invokes the Bearer Control Nodal Functions (BCF-N) necessary to transport the narrowband bearer service across the broadband backbone network.
- The Call State Relay Model (CSM-R) provides the service transit actions necessary to establish and maintain a backbone network call and its associated bearer by relaying signalling between CSM-N and the terminal equipment.

3.2.8 Interface Mediation Node: (IMN): A functional entity that provides the interface with the access network. This functional entity contains one or more call service nodal functions (CSF-N), the access control nodal function (ACF-N) and the remote media control nodal function (RMCF-N). The IMN has no direct control of an own bearer inter-working function (BIWF) but controls remotely the BIWF in the access network via the RMCF-N and the ACF-N. The BIWF in the access network directly interacts with its peers within the broadband backbone network.

3.2.9 Interface Serving Node (ISN): A functional entity that provides the interface with ISDN, access, and broadband backbone networks. This functional entity contains one or more call service nodal functions (CSF-N), and one or more inter-working functions (BIWF) which interact with the ISDN network and its peers within the BICC access and BICC broadband backbone networks. The ISN also includes the access control nodal function (ACF-N) and the remote media control nodal function (RMCF-N).

3.2.10 Message Multiplex Function: The function that operates at the call control signalling layer to multiplex and demultiplex the separate information flows used for control of the access network.

3.2.11 Remote Media Control Function (RMCF): The RMCF is a functional entity that originates and terminates media gateway control commands. It provides a horizontal linkage between the ISN/IMN and ACN-E for the purpose of conveying media gateway control information

between the CSM in the ISN/IMN and the port dedicated to the terminal on ACN-E. Two types of RMCFs are illustrated in the access network functional model: RMCF-E and RMCF-N.

- The Remote Media Control Edge Function (RMCF-E) conveys media control commands to and from the port dedicated to the terminal in ACN-E. It interacts with the RMCF-N in ISN/IMN-A to convey commands to and from the CSF in ISN/IMN-A.
- The Remote Media Control Nodal Function (RMCF-N) converts call control messages received from the CSM into media control commands. It interacts with the RMCF-E in ACN-E to convey media control commands to and from the port dedicated to the terminal. It also may interact with the BIWF in ISN-A to convey media control commands to and from the access termination in the BIWF.

3.2.12 Serving Node (SN): A generic term referring to ISN or IMN in this Recommendation.

3.2.13 Terminal Equipment (TE): Represents the customer's access equipment used to request and terminate network associated connectivity services.

3.3 Definition of Signalling Information Elements and Identifiers

The following signalling objects are used in the BICC access network procedures.

3.3.1 ACA-ID: The Access Control Association Identifier is an information object that is unique between two ACF signalling entities.

3.3.2 ACN Address: A unique identifier within the domain of all ACN/ISN/IMNs that references each ACN.

3.3.3 Action ID: Specifies the Access network control action to be performed.

3.3.4 Connection-ID: An indicator of the bearer resource being associated with the user at the "uni" side. The RMCF-E maps this value to the Logical Port Termination being monitored and controlled by the ISN/IMN.

3.3.5 Connection Group Identifier: An indication sent by the ISN/IMN to the BCF that uniquely identifies a group of bearer resources within the BICC network that are dedicated to a specific purpose, e.g. permanent facilities dedicated to a customer.

3.3.6 Destination Address: The address of the ACN-E, ACN-T, or ISN/IMN that is the termination of the information flow. A unique identifier within the domain of all ISN/IMNs and all ACNs that comprise the access network.

3.3.7 ISN/IMN Address: A unique identifier for each ISN/IMN in the BICC access and BICC broadband backbone network.

3.3.8 Logical Port-ID: An indication that designates the group of bearer terminations, and signalling associations contained within a user-network interface.

3.3.9 Requesting Address: The address of the ACN-E, ACN-T, or ISN/IMN that is the source of the information flow. A unique identifier within the domain of all ISN/IMNs and all ACNs that comprise the access network.

3.3.10 User ID: A unique identifier within the domain of all ACNs and all ISN/IMNs of the user of the signalling association.

3.4 General Definitions

3.4.1 B-channel: A 64 kbit/s bearer channel on the ISDN basic access or primary access.

3.4.2 D-channel: A signalling channel on the ISDN basic access or primary access.

3.4.3 permanent line (PL): A permanently established connection provided between two ISDN user network interfaces routed through the transmission network bypassing network nodes of the

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switched digital network. The PL reduces the access capability at the user network interface for switched services.

3.4.4 Port Event: The event detected by the termination.

3.4.5 Port Operation: The command sent from the CSF to the RMCF-E to be executed on the termination.

3.4.6 Signalling Message: The out-band signalling message between the ISN/IMN and the CSM-R.

4 Abbreviations

This Recommendation uses the following abbreviations:

AAL	ATM Adaptation Layer
AC	Access Control
ACF	Access Control Function
ACF-E	Access Control Edge Function
ACF-N	Access Control Nodal Function
ACF-T	Access Control Transit Function
ACN-E	Access Concentration Edge Node
ACN-T	Access Concentration Transit Node
AN	Access Network
ani	Access network interface
APM	Application Transport Mechanism
ATM	Asynchronous Transfer Mode
BC	Bearer Control
BCF	Bearer Control Function
BCF-E	Bearer Control Edge Function
BCF-N	Bearer Control Nodal Function
BCF-R	Bearer Control Relay Function
BCU-ID	Bearer Control Unit Identifier
BICC	Bearer Independent Call Control
B-ISDN	Broadband Integrated Services Digital Network
BIWF	Bearer Interworking Function
BNC	Backbone Network Connection
BRA	ISDN Basic Rate Access
CBC	Call Bearer Control
CC	Call Control
CNAM	Calling Name Delivery
CND	Calling Number Delivery
CSF	Call Service Function

CSM	Call State Model
CSM-N	Call State Nodal Model
CSM-R	Call State Relay Model
DDD	Direct Distance Dial
DDI	Direct Dialling In
DSS1	Digital Subscriber System No. 1
DSS2	Digital Subscriber System No. 2
DTMF	Dual Tone Multi-Frequency
FCS	Frame Check Sequence
FE	Functional Entity
FSK	Frequency Shift Keyed
HDLC	High-level Data Link Control
IAM	Initial Address Message
ID	Identifier
IE	Information Element
IMN	Interface Mediation Node
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ISN	Interface Serving Node
ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
kbit/s	Kilobits per second
LAPD	Link Access Procedure on the D-channel
LAPV5	Link Access Procedure on the V5 Interface
LAPV5-EF	LAPV5 Enveloping Function sublayer
LSAS	Line Side Answer Supervision
LSB	Least Significant Bit
LSP	Label Switched Path
MF	Multi-Frequency
MG	Media Gateway
MPLS	Multiprotocol Label Switching
MSB	Most Significant Bit
MTP	Message Transfer Part
nmi	Network-to-network interface
PABX	Private Automatic Branch eXchange
PCM	Pulse Code modulation
PL	Permanent Line

PRA	ISDN Primary Rate Access
PSTN	Public Switched Telephone Network
PVC	Permanent Virtual Connection
RMC	Remote Media Control
RMCF	Remote Media Control Function
RMCF-E	Remote Media Control Edge Function
RMCF-N	Remote Media Control Nodal Function
ROH	Receiver Off Hook
SAPI	Service Access Point Identifier
SCTP	Stream Control Transmission Protocol
SIT	Special Information Tone
SN	Serving Node
SSCF	Service Specific Coordination Function
SSCOP	Service Specific Connection Oriented Protocol
SSCOPMCE	Service Specific Connection Oriented Protocol in a Multi-link and Connectionless Environment
STC	Signalling Transport Converter
SVC	Switched Virtual Connection
SW	Switching Node (at the bearer)
TE	Terminal Equipment
TEI	Terminal Endpoint Identifier
UNI	User to network interface
V5	Access Network (AN) Interface at The Digital Local Exchange
VMWI	Visual Message Waiting Indicator
VPCI	Virtual Path Connection Identifier

5 Conventions

- 1) The first letter of the name of each element of the following classes of terms is capitalized:
 - indicators;
 - parameters;
 - information elements;
 - messages.

Examples: Application Transport parameter, Setup message.

- 2) The definition of a parameter value is written in *italics* and is put between quotation marks.
Example: Layer 3 Address value 1100000 – "*reserved for national use*".

- 3) All message names are BICC access messages unless explicitly stated otherwise.
Example: The "Signal message" is a Signal message in the BICC access protocol, whereas a Signal message in ITU-T Rec. Q.1902.4 is referred to as an "BICC Signal message".

NOTE – Where the text has been imported from other Recommendations then the conventions of this Recommendation do not automatically apply.

6 Architecture

6.1 Service Architecture

The BICC Access Network supports services provided over the following access types. It is however not intended by this Recommendation to restrict any implementation of ACNs, ISNs or IMNs supporting the full set or a subset of the services listed in this Recommendation.

6.1.1 Analogue Loop and Analogue Trunk

- a) *Single customer*
 - with DTMF or line state signalling;
 - with or without supplementary services.
- b) *PABXs*
 - with or without DDI;
 - with DTMF or line state signalling;
 - with or without supplementary services.

The protocol elements specified in this Recommendation can be combined in a flexible manner to support dedicated PSTN applications. Applications of data over voice are not described, however, they are not precluded in conjunction with the services described.

6.1.2 ISDN Basic Access

There is no restriction for teleservices or bearer services using B-channels as well as supplementary services for the ISDN access. Packet mode services through D-channel and Packet-data in B-channel are also supported.

Bit rates lower than 64 kbit/s are not supported directly. They are seen as user applications within a 64 kbit/s B-channel.

One or both B-channels may be used for the optional Permanent Line (PL) capability or semi-permanent leased line service. This service must be established with management procedures.

6.1.3 ISDN Primary Access

The full capability of primary access is supported.

6.1.4 B-ISDN DSS2 Access

The intention of this Recommendation is support of 64 kbit/s Circuit Mode Services in DSS2, however, there is no restriction on other capabilities in DSS2.

6.2 Architecture Discussion

This clause discusses architectural aspects of the functional entities in the BICC access network.

6.2.1 ACN-E Architecture

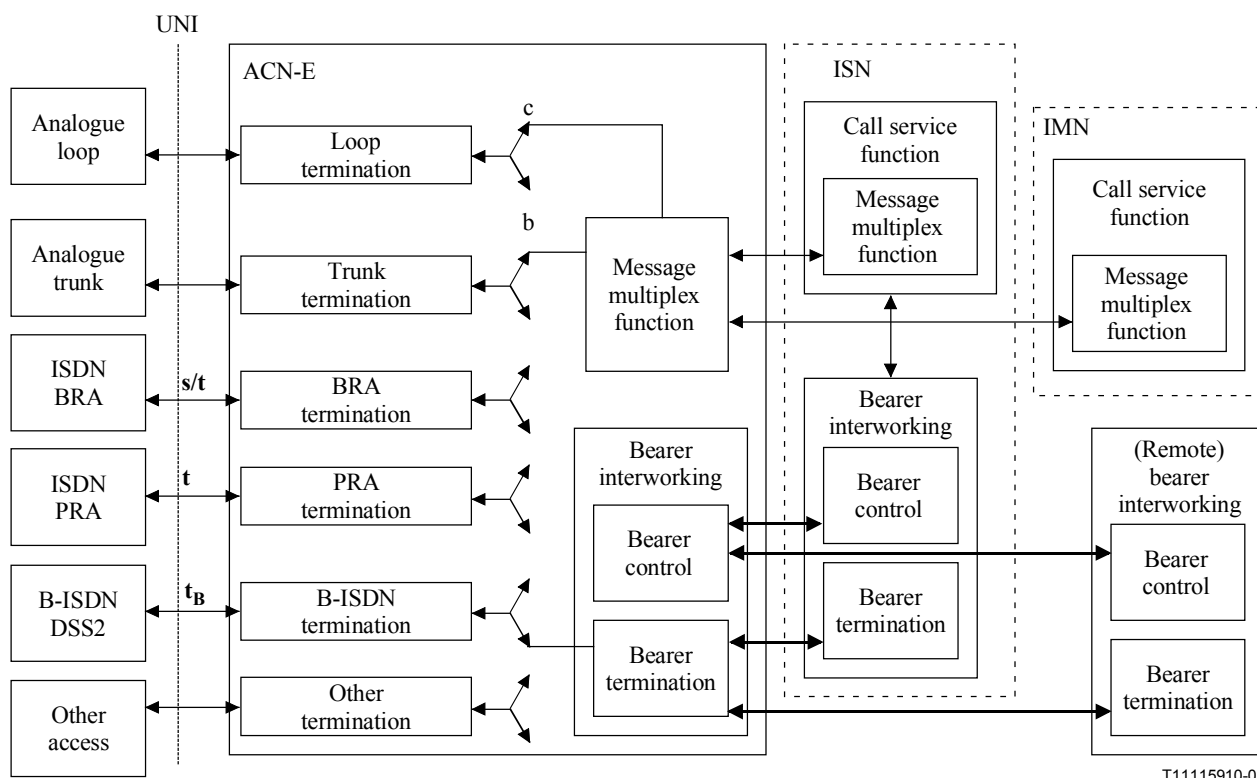
The services listed are present at the respective service terminations on the Access Concentration Edge Node (ACN-E) as illustrated in Figure 2. Control information received on the service termination is multiplexed when passed to the Message Multiplex Function for transport to either an ISN or an IMN. Bearer information received on the service termination is passed to the bearer termination on the ACN-E.

Control information received from the CSF at the Message Multiplex Function in ACN-E is passed to the appropriate service termination. Bearer information received at the bearer termination is distributed to the appropriate service termination.

The ACN-E relays call control information between the terminal and the ISN/IMN and may have no knowledge of the call state.

6.2.2 ISN/IMN Architecture

The Call Service Function in the ISN/IMN has responsibility for call control.



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NOTE – The remote Bearer Interworking is outside of the BICC access network. The operation of bearer interworking and bearer control is outside the scope of this Recommendation.

c indicates the transfer of call control, media gateway control, and access network control to/from the Message Multiplex Function.

b indicates the transfer of bearer information to/from the bearer termination.

Figure 2/Q.1930 – BICC Access Network Service Architecture

6.3 Protocol Reference Model

The BICC Access Network protocol includes three signalling associations:

- Call Control;
- Access Network Control;
- Remote Media Control.

The information for call, media, and access is conveyed between the ACN-E and the Call State Entity in the Call Service Function. Generally, the ACN-E is not required to have knowledge of call state, because the call information is passed between the Call State Entity in the CSF and the terminal equipment. The ACN-E also does not initiate bearer establishment, which is invoked by the Call State Entity based on stimuli from call control signalling, or from media control signalling. The ACN-E applies signals and detects events related to media control based on requests from the Call State entity in the CSF.

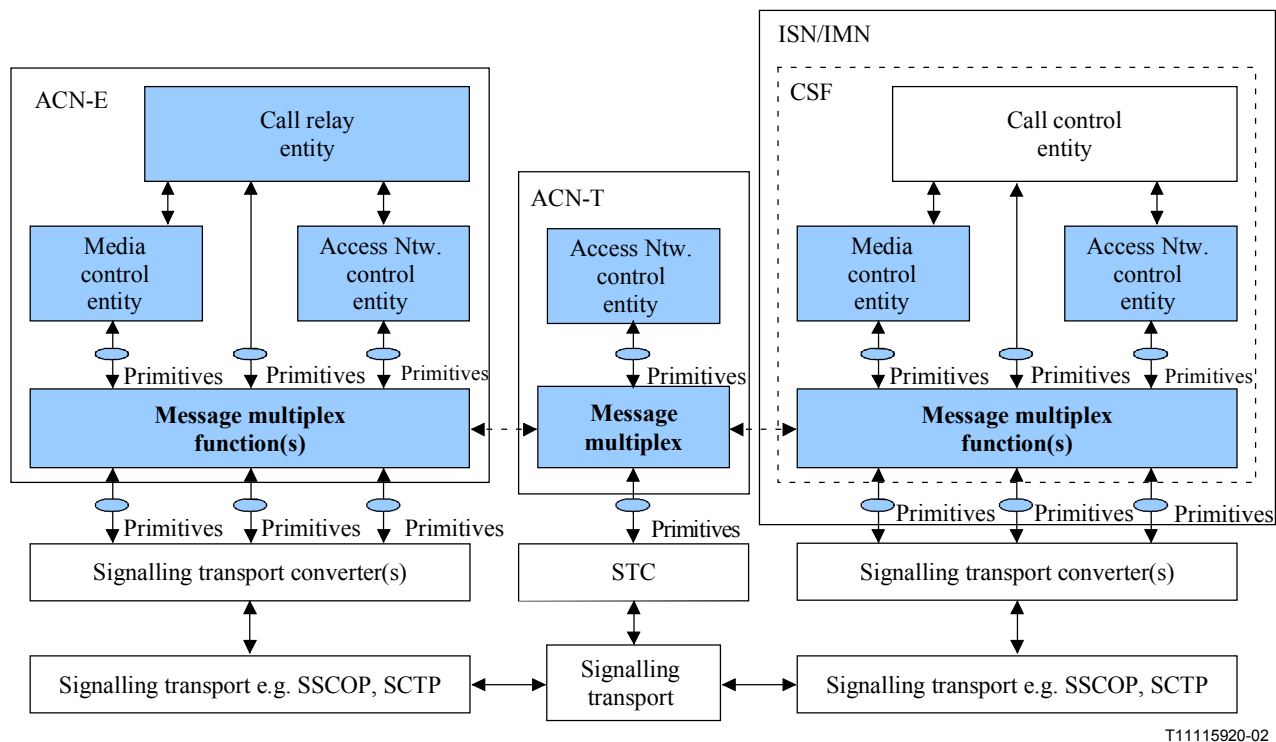


Figure 3/Q.1930 – BICC Access Network Protocol Reference Model

As shown in Figure 3, the Call Control Entity, the RMCF entity, and the ACF entity add the Protocol Type identifier (e.g. call control, remote media control, access network control, and other information) before sending the application data to the Message Multiplex Function. The protocol identifier, described later, signifies the functional entity to which the protocol-specific packet is addressed in the ACN-E, ACN-T, or in the CSF: Call Control Relay, Access network control, Remote Media Control, or Management (which is outside the scope of this Recommendation).

The Access Network Message Multiplex Function in the BICC access network performs multiplexing and message distribution. A given protocol-specific packet may be addressed to any ACN and any ISN/IMNs in the access network.

As shown in Figure 3, the Access Network Message Multiplex Function performs the following functions:

- It adds the Destination and Requesting Address to permit routing of the access network message from multiple ACN-Es to multiple ISN/IMNs, and vice versa. It may also use ACN-T addresses.
- It adds the pointer, which locates the start of the next common header in the stream of messages.

As shown in Figure 3, the Access Network Message Multiplex Function performs the following distribution function:

- It distributes information received from the signalling transport converter to the protocol entities including call control, access network control, and remote media control. These protocol entities are described elsewhere in the BICC Access Network Protocol except for the call control in the ISN/IMN which is described in other Recommendations or protocols, e.g. ITU-T Recs Q.931 and Q.2931, and national PSTN protocols.

6.4 Recommendation structure

This Recommendation describes procedures that are generally relevant to the BICC access network protocol, independent of the bearer technology employed. It first describes the signalling protocol stacks and the format of the multiplex structure for the signalling messages. It then describes the formats, codes, and procedures used for the three BICC access network signalling associations. The operation of each signalling association is described in a separate clause. Interaction between the BICC access network signalling associations is noted in the text. Additionally, interaction with the BICC protocol described in ITU-T Rec. Q.1902-series is also noted in the text.

7 Signalling Identifiers used in the BICC Access Network

Table 1 lists the identifiers that are used for BICC Access Network signalling. Note that many parameters used for the action identifier are derived from ITU-T Rec. Q.765.5 and conveyed across the BICC Access Network. Specific parameters added for the operation of the BICC access network protocol are described in more detail later in this Recommendation.

Table 1/Q.1930 – Identifiers used in the BICC Access Network

Identifiers Used by Protocol-Specific Entities
User Identifier
Logical Port identifier
Access Control Association ID
Connection Identifier
Action Identifier (multiple parameters)
Identifiers used by Message Multiplex
Requesting Address
Destination Address

7.1 Description of Signalling Identifiers

User ID: A unique identifier, within the domain of all ACNs and all ISN/IMNs attached to the access network, of the user of the signalling association.

Connection-ID: An indication of the connection being associated with the user of the user-network interface of the ACN-E. The RMCF-E maps this value to the Logical Port Termination being monitored and controlled by the ISN/IMN.

Logical Port-ID: An indication that designates the group of bearer terminations, and signalling associations associated with a user-network interface.

Requesting Address: The address of the ACN-E, ACN-T, or ISN/IMN that is the source of the information flow. A unique identifier within the domain of all ISN/IMNs and all ACNs that comprise the access network.

Destination Address: The address of the ACN-E, ACN-T, or ISN/IMN that is the termination of the information flow. A unique identifier within the domain of all ISN/IMNs and all ACNs that comprise the access network.

Action ID: Specifies the Access network control action to be performed.

Access Control Association ID: The Access Control Association Identifier is an information object that is unique between two ACF signalling entities.

7.2 Assignment of User-ID between the ACN-E and CSF

The User-ID is unique within the domain of all ACN-Es that subtend from ISN/IMNs attached to the access network. The recommended assignment of the User ID for selected access protocols is as follows:

Analogue Loop and Analogue Trunk

Each analogue loop or analogue trunk is assigned one User-ID between the ACN-E and the ISN/IMNs.

ISDN Basic Access

Each out-band signalling association represented by an active TEI on the D-channel is assigned one User-ID between the ACN-E and the ISN/IMNs.

ISDN Primary Access

Each out-band signalling association represented by a D-channel is assigned one User-ID between the ACN-E and the ISN/IMNs.

B-ISDN DSS2

Each signalling channel on the B-ISDN has one signalling association represented by a User-ID between the ACN-E and the ISN.

8 Signalling Transport Protocol Stacks

Based on the BICC Access Network protocol reference model, Table 2 provides the BICC Access Network signalling protocol stack for signalling transport networks. The protocol model and an example of the packet format that is transported between the ACN-E, the ACN-T, and the ISN/IMN are shown in Figure 4. The access network Message Multiplex Function relies on the Generic Signalling Transport Service (ITU-T Rec. Q.2150.0) to interface with the Signalling Transport Converter (STC). The access network Message Multiplex Function uses the (STC) to interface to specific signalling transport technologies.

NOTE – Currently, Signalling Transport Converters are defined for the following Signalling Transport Technologies:

- MTP3 and MTP3b (ITU-T Rec. Q.2150.1);
- SSCOP and SSCOPMCE (ITU-T Rec. Q.2150.2); and
- SCTP over IP.

Table 2/Q.1930 – BICC Access Network Signalling Protocol Stack

BICC access signalling protocol	Remote media control	Access network control	Call control
Protocol-specific function	Encapsulated media control messages	Encapsulated access control messages	Encapsulated call control messages
Message multiplex function	Add common header	Add common header	Add common header
Signalling transport	Generic signalling transport		

The BICC Access Network signalling transport model is based on the following criteria:

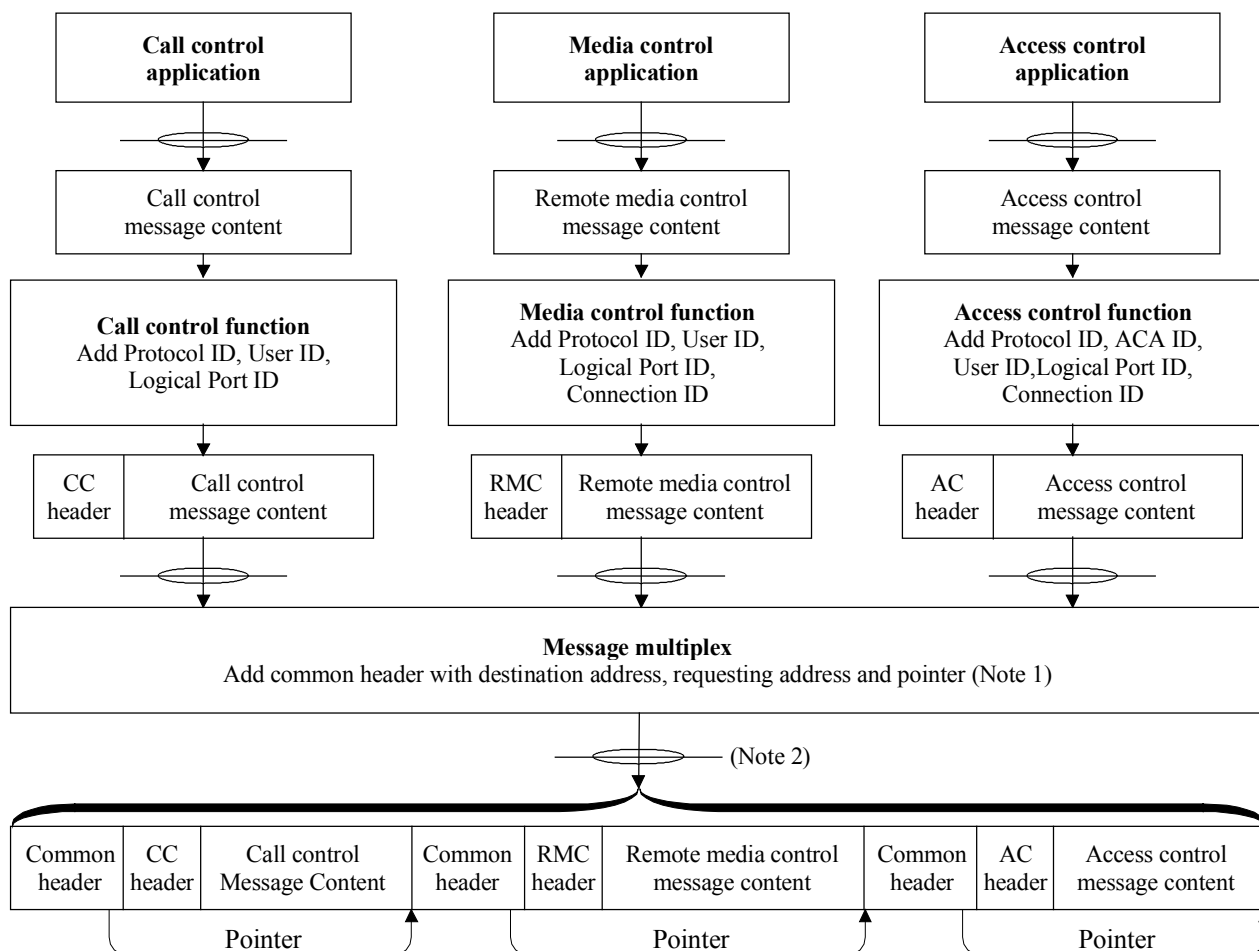
- The access network message multiplex function is defined to be transport independent and, therefore, multiple transport options are possible (e.g., IP or ATM).
- The BICC access network can make use of a common transport network to transport the call control, access network control, and remote media control signalling.
- If a new transport is defined in the future, it is easily adopted for the transport of the BICC access protocol(s).

The protocol model allows multiplexing at a higher layer (i.e., at the access network message multiplex) as opposed to at the lower layers (i.e., at the transport network). Therefore, the need for multiple virtual links or connections between adjacent nodes (i.e., ACN-E and ISN/IMN) is not needed.

8.1 Operation of BICC Access Network Signalling Encapsulation

The procedures for the operation of the BICC access network signalling encapsulation are invariant with respect to the functional entity within the access network in which they are implemented. They apply equally to the Call Service Function (CSF), Access Concentration Transit Node (ACN-T), and Access Concentration Edge Node (ACN-E). The content that is encapsulated within the common header varies with respect to the functional entity that is constructing the protocol-specific header before passing it to the signalling transport function.

The BICC access network operates three applications that are used to establish calls and connections between the ISN/IMN and the Terminal Equipment. These applications, which are defined elsewhere in this Recommendation, are Call Control, Remote Media Control, and Access network control.



NOTE 1 – A message multiplex function may exist for each signal transport type.

NOTE 2 – The destination address is mapped into the appropriate transport association.

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Figure 4/Q.1930 – Format of the protocol-specific and message multiplex packet

8.1.1 Actions of the Application-Specific Functions

The content received from the BICC access network applications is passed through an application-specific function that adds the protocol-specific information and protocol-specific header to the encapsulated application information. This protocol-specific information is required for the operation of the BICC access network protocol and includes the following:

For the Call Control application, the protocol-specific information is

- Protocol ID = Call Control;
- User ID = the unique identifier within the BICC Access Network for the signalling association with the terminal equipment;
- Logical Port ID = the unique identifier within the ACN-E for the port that serves the bearer connected to the terminal equipment.

NOTE 1 – The application data that is encapsulated under the call control header is an information element that contains an individual signalling message from another protocol, e.g. DSS1 Q.931 SETUP, DSS1 Q.931 SETUP ACKNOWLEDGE, DSS2 Q.2931 CONNECT, V5 Q.964 ESTABLISH.