Implementation Agreement for BICC

MSF-IA-BICC.001-FINAL

Multiservice Switching Forum
Implementation Agreement

Multiservice Switching Forum
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Abstract:
This contribution is an Implementation Agreement for a Media Gateway Controller. This IA is concerned with a BICC inter-connect between MSF compliant Media Gateway Controllers.

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1 Multiservice Switching Forum

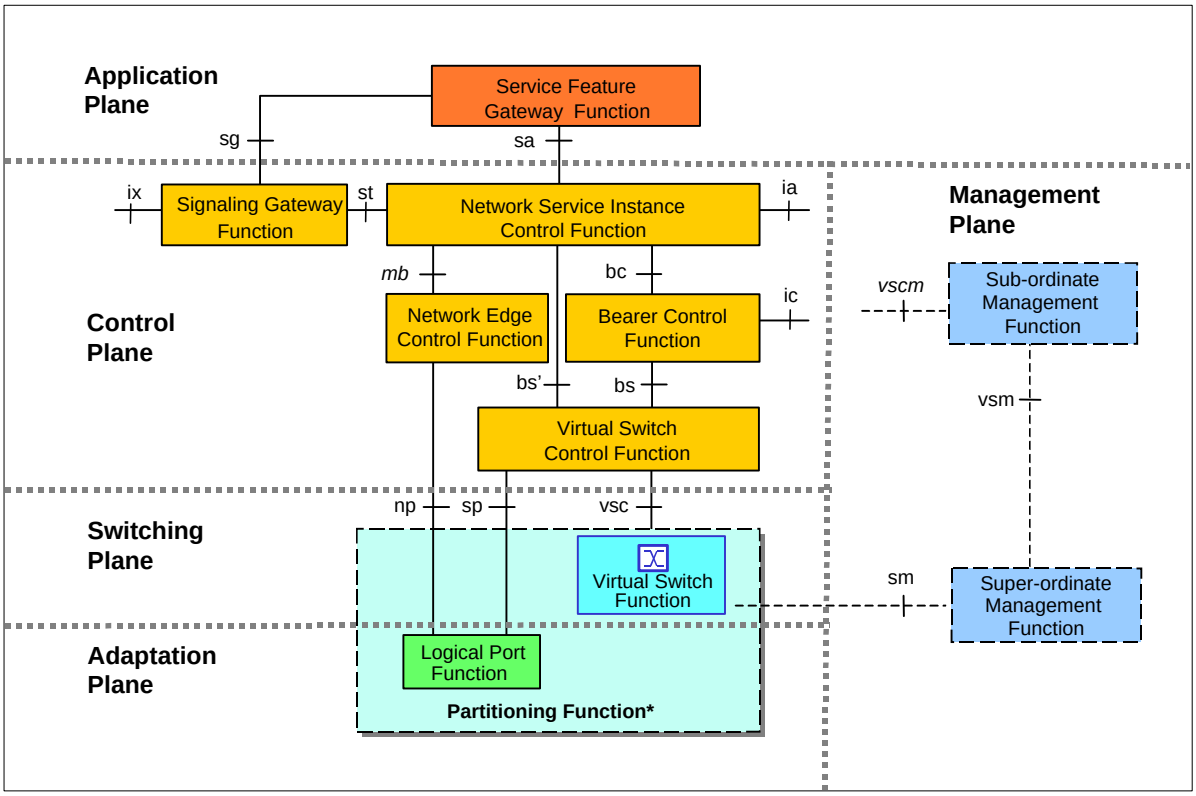
The charter of the Multiservice Switching Forum is to develop and promote implementation agreements for protocols and interfaces that enable an open architecture for multiservice switching systems supporting ATM, Frame Relay, IP, Voice and Video services. A Multiservice Switching System is a distributed switching (frame, cell or packet based) system designed to support voice, video, private line, and data such as Asynchronous Transfer Mode (ATM), Frame Relay, and Internet Protocol (IP) services. Multiservice switching systems may use a broad range of access technologies, including traditional Time Division Multiplexing (TDM), Digital Subscriber Line (xDSL), wireless data, and cable modems. MSF Implementation Agreements define the requirements of the interfaces between components of a MSS.

The current MSF Reference Architecture, as defined in MSF2000.053.1, Multiservice Switching Forum System Architecture Implementation Agreement[1], provides a reference point, ia, between the Network Edge Control Function and a peer Network Edge Control Function (see Figure 1).

Figure 2 shows how the MSF functional blocks may be grouped to realize a MGC and MG. Thus, the reference point ia is an inter-MGC interface and may be realized via a number of different protocols, e.g. SIP, SIP-T, ISUP, BICC, H225. This IA is concerned with BICC.

This IA is based on the architecture realization shown in Figure 3. It is intended that the profile provides a common solution for the transporting of all packet network bearer types (i.e. ATM and IP) and be independent of the underlying packet network technology.

[1] Bjorkman, Nils, “Multiservice Switching Forum System Architecture Implementation Agreement”, MSF2000.053.1, April 3, 2000



Notes:
- Italicized reference points are not considered open reference points for release 1.
- Bearer transport reference points are not shown.
- Management functions overlaid on functional architecture
* The Partitioning Function maintains partition integrity between partitions of a partitioned entity.

Figure 1 MSF Reference Architecture Corresponding to Functional Definitions

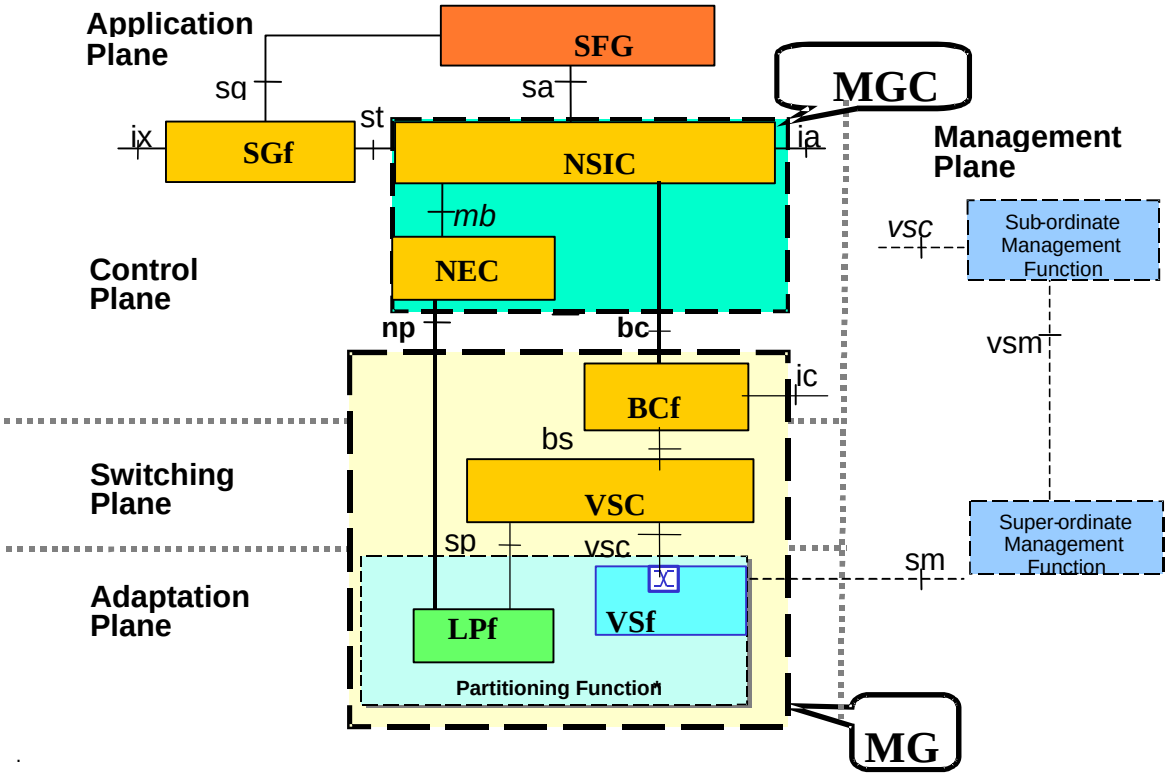


Figure 2 – MGC / MG functional groupings

2 BICC

The BICC protocol is defined by ITU-T SG11. Currently, CS-2 is being worked on and a number of recommendations are due to be considered for approval in the near future. These recommendations are :-

- Rec. Q.1902.1- BICC Functional Description
- Rec. Q.1902.2 - BICC General Functions of Messages and Parameters
- Rec. Q.1902.3 - BICC Formats and Codes
- Rec. Q.1902.4 - BICC Basic Call Procedures
- Rec. Q.1902.5 - Exceptions to APM in the context of BICC
- Rec. Q.1902.6 - BICC Generic signaling procedures & support of the ISDN User Part Supplementary Services
- Rec. Q.1912.1 - Inter Working between SS7 ISDN User Part and BICC
- Rec. Q.1912.2 - Inter Working between various signaling types (PSTN access, DSS1, C5, R1, R2, TUP) and BICC
- Rec. Q.1912.3 - Inter Working between H.323 and BICC
- Rec. Q.1912.4 - Inter Working between DSS2 and BICC
- Rec. Q.1922.2 - Interaction between INAP CS.2 and BICC
- Rec. Q.1950 - Call Bearer Control (CBC) Protocol
- Rec. Q.1970 - IP Bearer Control Protocol (BCP)

- Rec. Q.1990 - Bearer Control Tunneling Protocol
- Rec. Q.765.5 - Application Transport Mechanism – BICC
- Rec. Q.2150.0 - Generic Signaling Transport Service
- Rec. Q.2150.1 - Signaling Transport Converter on MTP3 & MTP3b
- Rec. Q.2150.2 - Signaling Transport Converter on SSCOP & SSCOPMCE
- Rec. Q.2150.3 - Signaling Transport Converter on SCTP

BICC is based on ISUP standards (Q.761-765), which have been enhanced in order to permit the carrying of packet network bearer information. The bearer information is carried via the APM mechanism. The first phase of BICC (CS.1) was concerned with the provision of narrowband services over an ATM based bearer and concentrated on the class 4/trunk node replacement scenario. BICC CS.2 added extra capabilities to deal with an IP based bearer technology as well as more complex bearer manipulation.
It should also be noted that the SG11 work is not confined to the horizontal inter-MGC interface. SG11 have also looked at various inter-working scenarios (i.e. the Q.1912 series) as well as the vertical MGC-MG interface (Q.1950). It is stressed that the sole scope of this IA is the horizontal inter-MGC interface.

2.1 Current (CS2) Bearer Transport Capability

Currently, BICC defines two broad mechanisms for the support of transporting bearer information :-

- via a series of identifiers, each identifier carrying a specific piece of bearer related information (e.g. a codec type),
- via a generic tunneling mechanism, which enables the sum total of the bearer information to be encapsulated and carried en-bloc.

For this version of the IA, the generic tunneling mechanism must be supported. Other parameters (i.e. other than *Bearer Control Tunneling* and *Bearer Information*) may be supported. Recommendation Q.1990 defines a generic header for a block of bearer information. At the current time, only "IPBCP" is defined which represents a block of text encoded SDP that describes an IP bearer. The contents of the SDP is defined in recommendation Q.1970. Subsequent versions of this IA will support all the BICC CS.2 Data Parameters that are defined in Q.765.5.
However, the MSF wishes to support both ATM and IP based bearers. Furthermore, it is noted that IETF RFC 3108 has extended the capability of SDP to support the description of an ATM based bearer in addition to an IP based bearer. Therefore, SDP provides a generic mechanism for describing both ATM and IP bearers. It is thus recommended that a new code be allocated from Q.1990 PROTOCOL INDICATOR field to support the MSF profile requirements of text encoded SDP, the contents of the SDP being compatible either with Q.1970 (for an IP based bearer) or RFC 3108 (for an ATM based bearer).

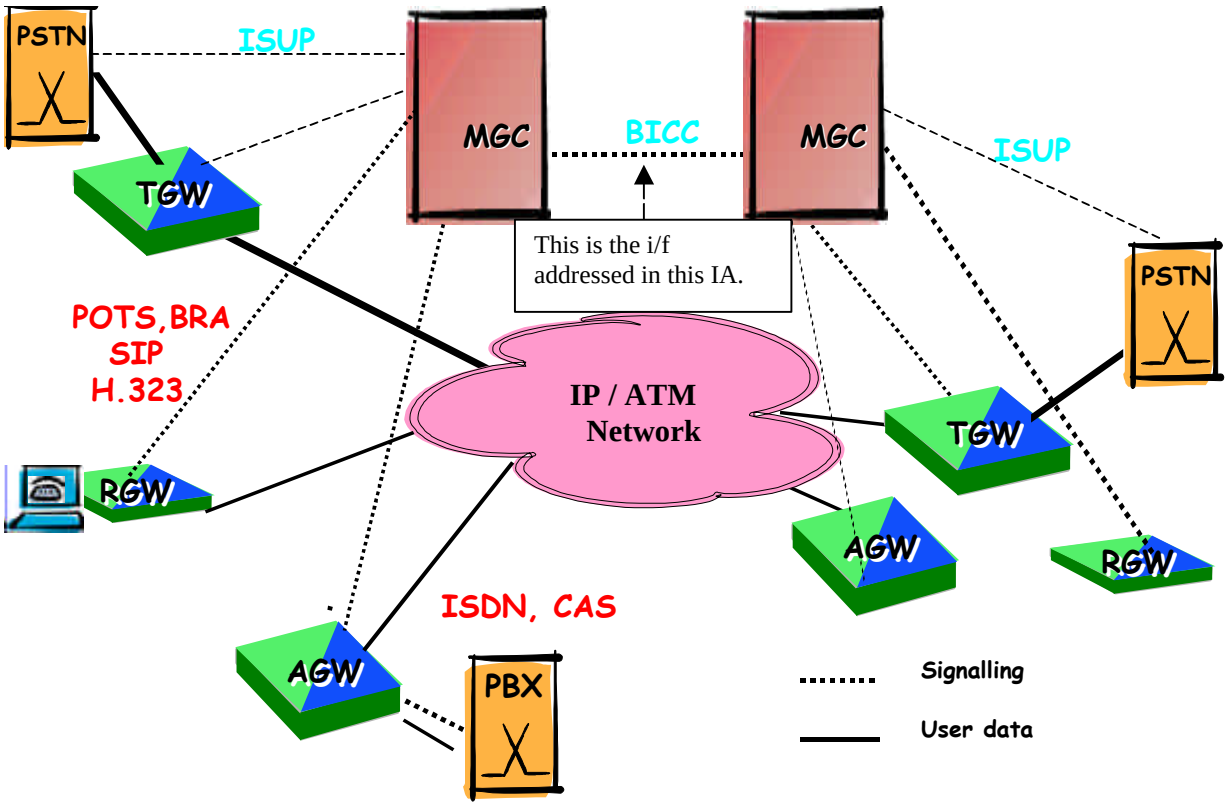
3 Assumptions

The MSF will issue several Implementation Agreements (IAs) will be used in the MSF Interoperability testing and demonstrations. This agreement does not define the test suites or scenarios for the testing, but will provide the framework for those tests. This IA defines a profile for a media gateway controller.
This release of the implementation agreement is geared specifically toward MSF interoperability testing.

4 Definition

A Media Gateway Controller, as used in this IA, is responsible for controlling a number of GWs. The underlying bearer technology may be ATM or IP. In order to realize a scaleable network, it is envisaged that there would be a number of such Media Gateway Controllers. The BICC protocol would be one candidate for the inter-connect between Media Gateway Controllers and is the subject of this IA.

Figure 3 - Functional Gateway/Controller Architecture



TGW = Trunking Gateway

AGW = Access Gateway

RGW = Residential Gateway

PSTN = Public Switched Telephone Network

PBX = Private Branch Exchange

5 BICC Profile

This profile shall be entitled “MSF BICC Controller Profile”. The version number shall be 1.0.

5.1 Functional Description.

As Q.1902.1.

5.2 General Functions of Messages & Parameters

As Q.1902.2.

5.3 BICC Formats & Codes

As Q.1902.3.

5.4 Basic Call Procedures

As Q.1902.4. However, this IA does require an additional flow that is currently absent from Q.1902.4. This flow represents an ATM set-up using tunneling and is shown in Appendix 1 of this IA.
The generic tunneling mechanism must be supported for both IP and ATM based bearers.
For this version of the IA, a backward bearer set-up is assumed for ATM based bearers. ATM bearers may be AAL1 or AAL2 (compatible Gateways are assumed - i.e. no need to consider AAL1-AAL2 inter working).
ATM bearers may or may not be dynamically set-up. In the AAL2 case, multiple calls can be supported via a single bearer set-up.

5.5 Exceptions to the APM Mechanism for BICC

As Q.1902.5.

5.6 Generic Signaling Procedures & Support of ISDN Supplementary Services

As Q.1902.6.

5.7 Tunneling Of Bearer Information

Bearer information shall be tunneled using the mechanism of Q.1990. However, it is required to allocate a new code in the PROTOCOL INDICATOR field in Q.1990 in order to support the tunneling of text encoded SDP (which may describe IP or ATM based bearers) for this profile. The extension is defined as follows:-

- Value :- 110111
- Meaning - MSFBCP (Text encoded SDP).

The specific value chosen is the highest allocated from the set reserved for text encoding. By adopting this value, the chances of clashing with subsequent ITU allocated values are minimized.
For this version of the IA, all bearer information must be tunneled via the newly proposed MSFBCP. Furthermore, in order to support mid-call bearer manipulation, MSFBCP shall permit multiple exchanges of bearer information within a single call. This differs from IPBCP which currently permits only the codec to be modified subsequent to the exchange of bearer information. However, it is recognized that the initial priority of this IA is for basic call and thus an implementation MAY not support mid-call bearer modification for this IA (there are mechanisms in the protocol to reject such requests - see 5.9).

5.8 Signaling Transport

The BICC signaling transport shall be IP based. For this version of the IA, UDP transport must be supported. SCTP may also be supported. Recommendation Q.2150.3 describes the transport of BICC over SCTP/IP and port 3097 has already been registered with IANA for this purpose.
In addition, SS7 and ATM may be used for signaling transport in accordance with Q.2150.1 and Q.2150.2 respectively.

5.9 SDP Contents

IP based bearers shall conform to Q.1970 with the replacement of the IPBCP session attribute (from Q.1970) with that shown below.
ATM based bearers shall conform to IETF RFC 3108, with the addition of the session attribute shown below.
Session Attribute
The session attribute "msfbcp" will be used to identify the SDP as conforming to the MSF Bearer Control Protocol. It provides the Version Number as well as distinguishing between Request, Accepted, Confused and Rejected messges. It takes the following syntax (based on existing Q.1970) :-
a=msfbcp <version> <type>
<version> = 1 for this IA.
<type> = ("Request"/"Accepted"/"Confused"/"Rejected")

5.10 Security

This version of the IA assumes that BICC is used on an inter-MGC interface in a closed/secure network. Therefore, there are no security implications for this version of the IA. This may change for future versions.

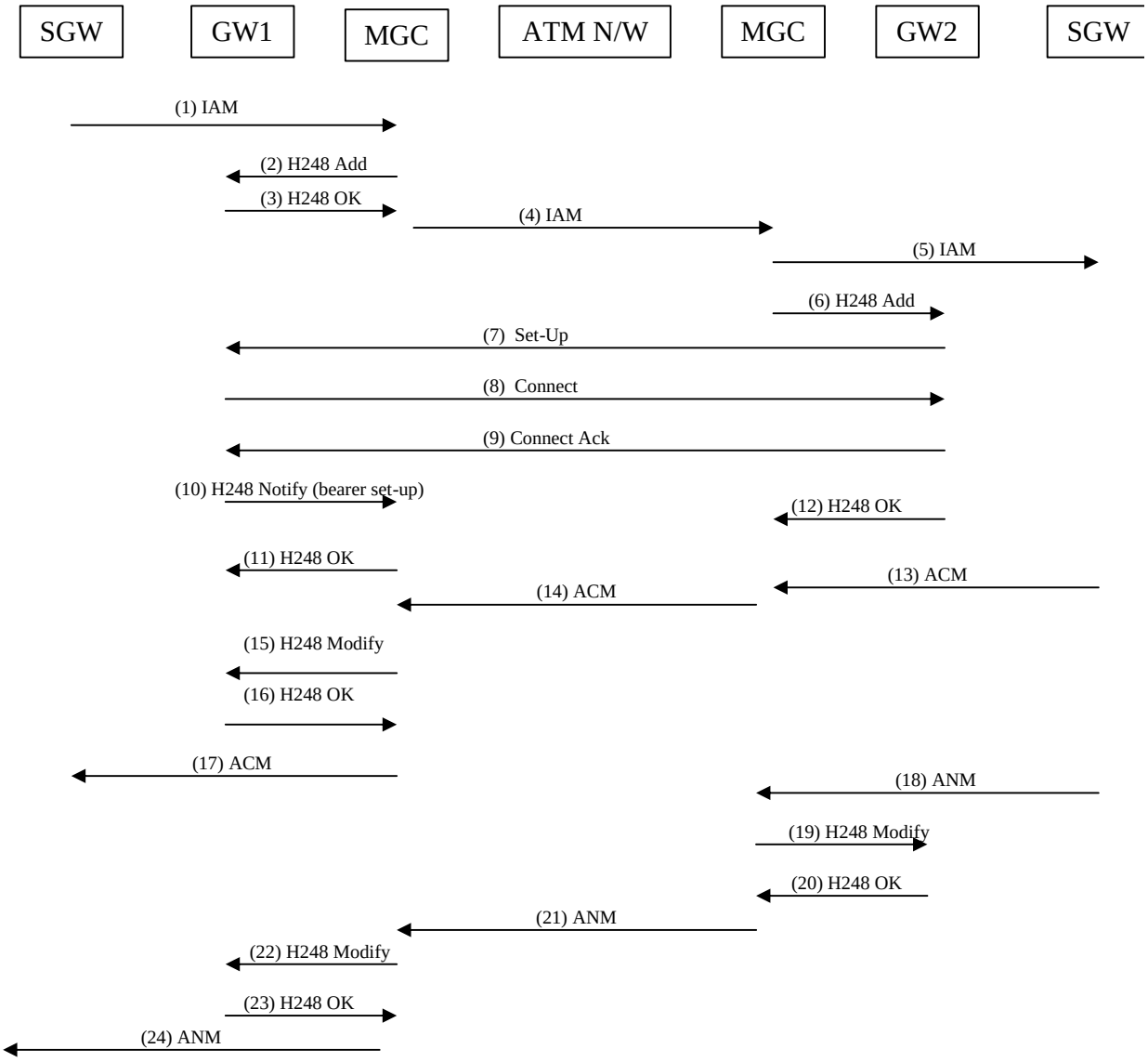
APPENDIX 1

BICC Call Flow

This shows an example BICC call flow which is using "tunneling" for an ATM based bearer. The sequence shows a backward ATM AAL2 bearer path being set up. However, the sequence is sufficiently generic to represent an AAL1 based bearer as well (i.e. in the AAL2 case, subsequent calls need not require a new bearer set-up since they may use the AAL2 sub-channels of the existing bearer). The flow shows a "class 4" replacement scenario and the call both originates and terminates in the PSTN. ISUP signalling is used into the PSTN. For simplicity and to reduce messages, en-bloc working is assumed. BICC is used between the two MGCs.

All messages are numbered. The subsequent table provides additional details of these messages.

Call Flow Sequence



Message Number	Message Name	Comments / Salient Parameters
1	ISUP IAM	ISUP CIC, Destination E164 Address, OPC, DPC
2	H248 ADD	Circuit termination (derived from CIC), Context = $, ATM AAL2 Ephemeral Termination = $. The Local Descriptor of the ephemeral requestes the GW to provide its NSAP address, eecid, VCCI and AAL2 CID. The Circuit Termination is set to "recv only" in its Local Control Descriptor.
3	H248 OK	Ephemeral ID, Local Descriptor contains an SDP block that contains the NSAP address of GW1 within the ATM network and the eecid. However, the VCCI and CID are still unknown at this point.
4	BICC IAM	BICC CIC, Destination E164 Address, APM parameter that denotes a Context Identity of BAT and consists of a Bearer Control Tunnelling Parameter plus a Bearer Control Information Parameter. The former says that tunnelling is to be used and the latter consists of the SDP block returned from GW1 in its Local Descriptor (with the addition of the IA extension to identify the block as an "MSFBCP Request").
5	ISUP IAM	ISUP CIC, Destination E164 Address, OPC, DPC. In this flow, the IAM is shown being sent prior to bearer set-up. Some networks may prefer to delay this IAM until the bearer is confirmed.
6	H248 ADD	Circuit termination (derived from CIC), Context = $, ATM AAL2 Ephemeral Termination = $. The Local Descriptor of the ephemeral requests the GW to provide its NSAP address, EECID, VCCI and AAL2 CID. The Remote Descriptor of the ephemeral consists of the SDP block obtained from the BICC Bearer Control Information (with the BICC extension removed). The Circuit Termination is set to "send only" in its Local Control Descriptor.
7	ATM Set-Up	The bearer request across the ATM network. Contains the NSAP address of GW1, the EECID (of GW1) plus the VCCI (allocated by GW2).
8	ATM Connect	Confirmation of bearer set-up
9	ATM Connect Ack	Terminates the protocol
10	H248 NOTIFY	Contains the EECID. It is debatable whether this is really needed since it would not occur in the event of a bearer connection already being present. It

		may be used to notify the billing layer.
11	H248 OK	Acknowledges the notification.
12	H248 OK	Ephemeral ID, Local Descriptor contains an SDP block that contains the NSAP address of GW2 within the ATM network, the VCCI and CID (both allocated by GW2).
13	ISUP ACM	ISUP CIC, OPC, DPC.
14	BICC ACM	BICC CIC, APM parameter that denotes a Context Identity of BAT and consists of a Bearer Control Tunnelling Parameter plus a Bearer Control Information Parameter. The former says that tunnelling is to be used and the latter consists of the SDP block returned from GW2 in its Local Descriptor (with the addition of the IA extension to identify the block as an "MSFBCP Accepted").
15	H248 MODIFY	Context Id, Ephemeral Id. The Remote Descriptor of the ephemeral contains the SDP block received over BICC (with the extension removed).
16	H248 OK	The acknowledgement.
17	ISUP ACM	ISUP CIC, OPC, DPC
18	ISUP ANM	ISUP CIC, OPC, DPC
19	H248 MODIFY	Context Id, Circuit Termination is set to duplex in its Local Control Descriptor.
20	H248 OK	The acknowledgement.
21	BICC ANM	BICC CIC
22	H248 MODIFY	Context Id, Circuit Termination is set to duplex in its Local Control Descriptor.
23	H248 OK	The acknowledgement.
24	ISUP ANM	ISUP CIC, OPC, DPC

Abbreviations

BAT - Bearer Association Transport
CIC - Call Instance Code (BICC)
CIC - Circuit Identification Code (ISUP)

End of paper