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SERIES Q: SWITCHING AND SIGNALLING

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**Technical Report TRQ.2815: Requirements for  
interworking BICC/ISUP network with  
originating/destination networks based on  
Session Initiation Protocol and Session  
Description Protocol**

ITU-T Q-series Recommendations – Supplement 45

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## **Supplement 45 to ITU-T Q-series Recommendations**

### **Technical Report TRQ.2815: Requirements for interworking BICC/ISUP network with originating/destination networks based on Session Initiation Protocol and Session Description Protocol**

#### **Summary**

This Supplement to ITU-T Q-Series Recommendations is a technical report on the procedures, information flows and information elements needed to interwork Bearer Independent Call Control (BICC) peer-to-peer protocol (i.e., ITU-T Rec. Q.1902) and ISDN User Part (ISUP) protocol (i.e., ITU-T Recs Q.761-Q.764, Q.73y.x, Q.765.x, Q.769.x), with Session Initiation Protocol (SIP) and Session Description Protocol (SDP) at the BICC Interface Serving Node (ISN). The SIP/SDP is assumed on a "Network-to-Network Interface" (NNI) between the BICC/ISUP network and a SIP network, which is an originating or terminating/destination network.

#### **Source**

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## Supplement 45 to ITU-T Q-series Recommendations

### Technical Report TRQ.2815: Requirements for interworking BICC/ISUP network with originating/destination networks based on Session Initiation Protocol and Session Description Protocol

#### 1 Scope

This Supplement provides the requirements for specifying the interworking between Bearer Independent Call Control (BICC) peer-to-peer protocol (i.e., ITU-T Rec. Q.1902) and ISDN User Part (ISUP) protocol (i.e., ITU-T Recs Q.761-Q.764, Q.73y.x, Q.765.x, Q.769.x), with Session Initiation Protocol (SIP) as well as Session Description Protocol (SDP) at the BICC Interface Serving Node (ISN). The SIP/SDP is assumed on a "Network-to-Network Interface" (NNI) between the BICC/ISUP network and a SIP-based network, which is an originating, transit, or a terminating/destination network. The interworking should support only services or capabilities commonly applicable to both networks.

The scope of this Supplement is illustrated in Figure 1-1, with an NNI interface between the SIP/SIP-I network and the BICC/ISUP network.<sup>1</sup>

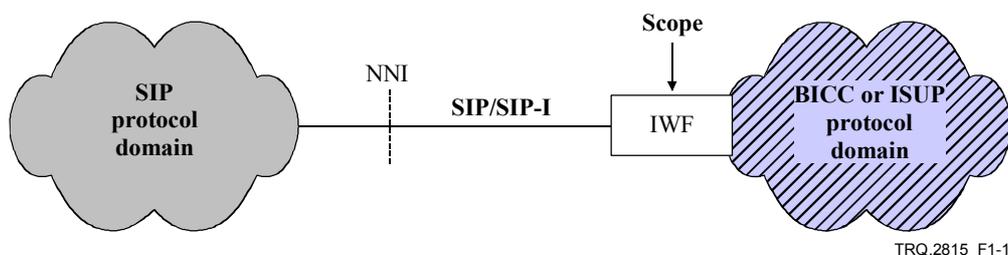


Figure 1-1 – Interface reference model

The following NNI configurations are supported, with various gateway types:

- SIP to BICC [IP or ATM];
- BICC [IP or ATM] to SIP;
- SIP to ISUP;
- ISUP to SIP;
- ISUP to SIP-I;
- SIP-I to ISUP;
- SIP-I to BICC;
- BICC to SIP-I.

The IWF is supported in the following exchanges:

- Originating Exchange;
- Intermediate National Exchange;
- Outgoing International Exchange;
- Intermediate International Exchange;

<sup>1</sup> SIP-I includes the MIME encoding of the ISUP, not BICC.

- Incoming International Exchange;
- Destination Exchange; or
- Standalone Unit.

Interworking with access protocols at the UNI is done via a concatenation with ISUP.

## 2 References

- [1] ITU-T Recommendations Q.761 to Q.764 (1999) – *Specifications of Signalling System No. 7 ISDN User Part (ISUP)*.
- [2] ITU-T Recommendations Q.1902.1 to Q.1902.4 (2001) – *Specifications of the Bearer Independent Call Control protocol (BICC)*.
- [3] IETF RFC 3261 (2002), *SIP: Session Initiation Protocol*.
- [4] IETF RFC 2327 (1998), *SDP: Session Description Protocol*.
- [5] IETF RFC 3551 (2003), *RTP Profile for Audio and Video Conferences with Minimal Control*.
- [6] IETF RFC 3312 (2002), *Integration of Resource Management and SIP for IP Telephony*.
- [7] IETF RFC 3325 (2002), *Private Extensions to the Session Initiation Protocol (SIP) for Asserted Identity within Trusted Networks*.
- [8] IETF RFC 2976 (2000), *The SIP INFO method*.
- [9] IETF RFC 3204 (2001), *MIME media types for ISUP and QSIG objects*.
- [10] IETF RFC 2046 (1996), *Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types*.
- [11] IETF RFC 3262 (2002), *Reliability of Provisional Responses in SIP*.
- [12] IETF RFC 3311 (2002), *The Session Initiation Protocol UPDATE Method*.
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- [14] IETF RFC 2833 (2000), *RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals*.
- [15] 3GPP – Technical Specification Group Core Network IP Multimedia Call Control Based on SIP and SDP, Stage 3 – Revision 5, 3GPP TS 24.229 V5.1.0 (2002-06).
- [16] ITU-T Recommendation Q.733.1 (1992), *Stage 3 description for call completion supplementary services using Signalling System No. 7: Call waiting (CW)*.
- [17] ITU-T Recommendation Q.733.2 (1993), *Stage 3 description for call completion supplementary services using Signalling System No. 7: Call hold (HOLD)*.
- [18] ITU-T Recommendation Q.733.3 (1997), *Stage 3 description for call completion supplementary services using Signalling System No. 7: Completion of calls to busy subscriber (CCBS)*.
- [19] ITU-T Recommendation Q.733.4 (1993), *Stage 3 description for call completion supplementary services using Signalling System No. 7: Terminal portability (TP)*.
- [20] ITU-T Recommendation Q.733.5 (1999), *Stage 3 description for call completion supplementary services using Signalling System No. 7: Completion of Calls on No Reply*.

- [21] ITU-T Recommendation Q.731.7 (1997), *Stage 3 description for number identification supplementary services using Signalling System No. 7: Malicious call identification (MCID)*.
- [22] ITU-T Recommendation Q.732.2-5 (1999), *Stage 3 description for call offering supplementary services using Signalling System No. 7: Call diversion services: Call forwarding busy*.
- [23] ITU-T Recommendation Q.732.3 (1993), *Stage 3 description for call offering supplementary services using Signalling System No. 7: Call forwarding no answer*.
- [24] ITU-T Recommendation Q.732.4 (1993), *Stage 3 description for call offering supplementary services using Signalling System No. 7: Call forwarding unconditional*.
- [25] ITU-T Recommendation Q.732.5 (1993), *Stage 3 description for call offering supplementary services using Signalling System No. 7: Call deflection*.
- [26] ITU-T Recommendation Q.732.7 (1996), *Stage 3 description for call offering supplementary services using Signalling System No. 7: Explicit call transfer*.
- [27] ITU-T Recommendation Q.734.1 (1993), *Stage 3 description for multiparty supplementary services using Signalling System No. 7: Conference calling*.
- [28] ITU-T Recommendation Q.734.2 (1996), *Stage 3 description for multiparty supplementary services using Signalling System No. 7: Three-party service*.
- [29] ITU-T Recommendation Q.765 (2000), *Signalling system No. 7 – Application transport mechanism*.
- [30] ITU-T Recommendation Q.765.1 (1998), *Signalling system No. 7 – Application transport mechanism: Support of VPN applications with PSSI information flows*.
- [31] ITU-T Recommendation Q.765.4 (2000), *Signalling system No. 7 – Application transport mechanism: Support of the generic addressing and transport protocol*.
- [32] ITU-T Recommendation Q.769.1 (1999), *Signalling system No. 7 – ISDN user part enhancements for the support of number portability*.
- [33] ITU-T Recommendation Q.730 (1999), *ISDN User Part supplementary services*.
- [34] 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*.
- [35] ITU-T Recommendation Q.731.1 (1996), *Stage 3 description for number identification supplementary services using Signalling System No. 7: Direct-dialling-in (DDI)*.
- [36] ITU-T Recommendation Q.731.3 (1993), *Stage 3 description for number identification supplementary services using Signalling System No. 7: Calling line identification presentation (CLIP)*.
- [37] ITU-T Recommendation Q.731.4 (1993), *Stage 3 description for number identification supplementary services using Signalling System No. 7: Calling line identification restriction (CLIR)*.
- [38] ITU-T Recommendation Q.731.5 (1993), *Stage 3 description for number identification supplementary services using Signalling System No. 7: Connected line identification presentation (COLP)*.
- [39] ITU-T Recommendation Q.731.6 (1993), *Stage 3 description for number identification supplementary services using Signalling System No. 7: Connected line identification restriction (COLR)*.

- [40] ITU-T Recommendation Q.731.8 (1992), *Stage 3 description for number identification supplementary services using Signalling System No. 7: Sub-addressing (SUB)*.
- [41] ITU-T Recommendation Q.735.1 (1993), *Stage 3 description for community of interest supplementary services using Signalling System No. 7: Closed user group (CUG)*.
- [42] ITU-T Recommendation Q.735.3 (1993), *Stage 3 description for community of interest supplementary services using Signalling System No. 7: Multi-level precedence and preemption*.
- [43] ITU-T Recommendation Q.735.6 (1996), *Stage 3 description for community of interest supplementary services using Signalling System No. 7: Global virtual network service (GVNS)*.
- [44] ITU-T Recommendation Q.736.1 (1995), *Stage 3 description for charging supplementary services using Signalling System No. 7: International Telecommunication Charge Card (ITCC)*.
- [45] ITU-T Recommendation Q.736.3 (1995), *Stage 3 description for charging supplementary services using Signalling System No. 7: Reverse charging (REV)*.
- [46] ITU-T Recommendation Q.737.1 (1997), *Stage 3 description for additional information transfer supplementary services using Signalling System No. 7: User-to-user signalling (UUS)*.
- [47] IETF RFC 3264 (2002), *An Offer/Answer Model with SDP*.
- [48] IETF RFC 3323 (2002), *A Privacy Mechanism for the Session Initiation Protocol (SIP)*.

### 3 Abbreviations

This Supplement uses the following abbreviations:

ANI	Access Network Interface
ATM	Asynchronous Transfer Mode
BCF	Bearer Control Function
BICC	Bearer Independent Call Control
GW	Gateway
IMS	IP Multimedia Subsystem
IP	Internet Protocol
ISUP	ISDN User Part
MIME	Multipurpose Internet Mail Extensions
NNI	Network-Network Interface
RFC	Request For Comments
RTP	Real Time Protocol
SDP	Session Description Protocol
SIP	Session Initiation Protocol
SIP-I	SIP with the MIME encoding of ISUP
SN	Serving Node
UNI	User Network Interface

## 4 Definitions

Definitions for additional terminology used in this interworking Supplement are as follows:

**4.1 incoming or outgoing:** This term is used to indicate the direction of a call (not signalling information) with respect to a reference point.

**4.2 incoming SIP or BICC/ISUP [Network]:** The network, from which the incoming calls are received, uses the SIP or BICC/ISUP protocol. Without the term "network", it simply refers to the protocol.

**4.3 Incoming Interworking Function (I-IWF):** A functional entity which terminates incoming calls using SIP and originates outgoing calls using BICC or ISUP protocols.

**4.4 Outgoing Interworking Function (O-IWF):** A functional entity which terminates incoming calls using BICC or ISUP protocols and originates outgoing calls using the SIP.

**4.5 Adjacent SIP Node (ASN):** A SIP node (SIP Proxy) that has established a direct trust relation (association) with Incoming or Outgoing IWF entities. A SIP Proxy is defined in accordance with RFC 2543.

**4.6 Outgoing SIP or BICC/ISUP [Network]:** The network, to which the outgoing calls are sent, uses the SIP or BICC/ISUP protocol. Without the term "network", it simply refers to the protocol.

**4.7 SIP Pre-condition:** Indicates the support of SIP "precondition procedure" as defined in draft-ietf-sip-manyfolks-resource.

**4.8 SIP-I:** The use of SIP with a message body that encapsulates ISUP information.

**4.9 MIME Type:** See RFC 3204 [9].

For additional definitions see: ITU-T Rec. Q.1902.2, RFC 3261 and RFC 2327.

## 5 SIP interworking architectures

### 5.1 SIP to BICC [IP or ATM]

Figure 5-1 illustrates a Type 1 Gateway for a SIP to BICC NNI, where SIP IP bearer and BICC IP or ATM bearers terminate at the Type 1 Gateway.

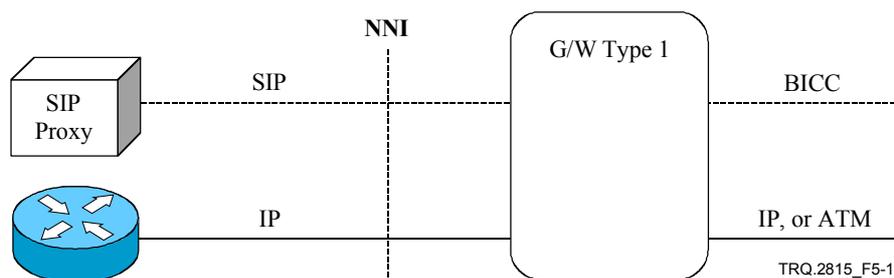
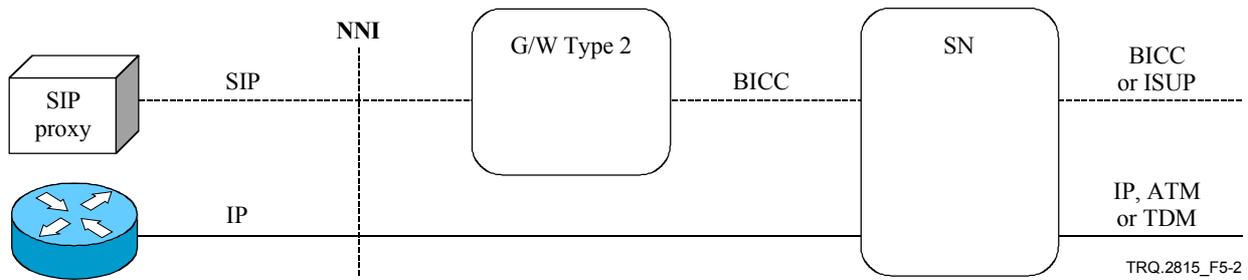


Figure 5-1 – SIP to BICC [IP or ATM] NNI, with Type 1 Gateway

Figure 5-2 illustrates a Type 2 Gateway for a SIP to BICC NNI, where the bearers do not terminate at the Type 2 gateway (e.g., CMN).



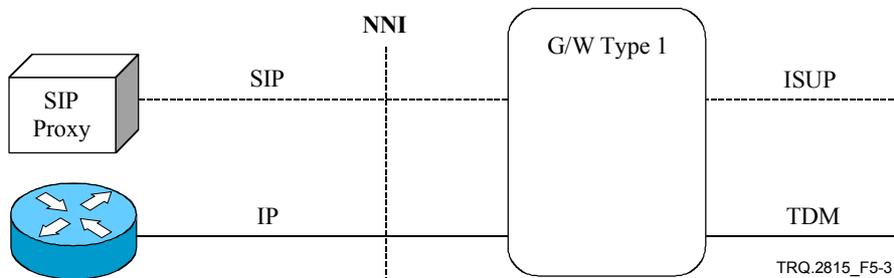
**Figure 5-2 – SIP to BICC NNI, with Type 2 Gateway**

## 5.2 BICC [IP or ATM] to SIP

Refer to 5.1

## 5.3 SIP to ISUP

Figure 5-3 illustrates a Type 1 Gateway for a SIP to ISUP NNI, where SIP IP bearer and ISUP TDM circuits terminate at the Type 1 Gateway.



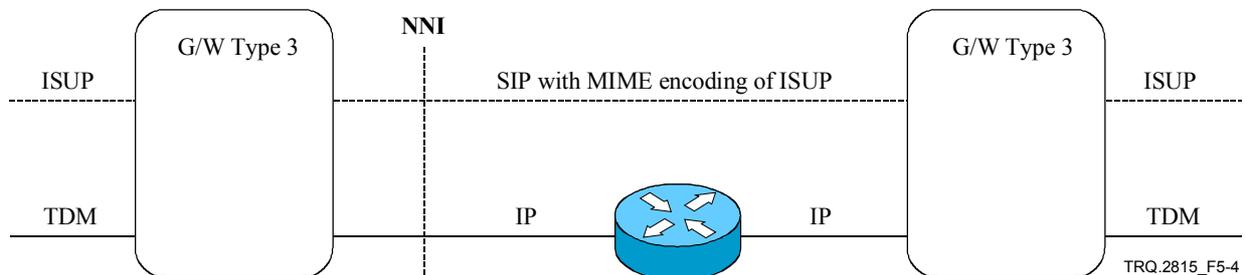
**Figure 5-3 – SIP to ISUP NNI, with Type 1 Gateway**

## 5.4 ISUP to SIP

Refer to 5.3

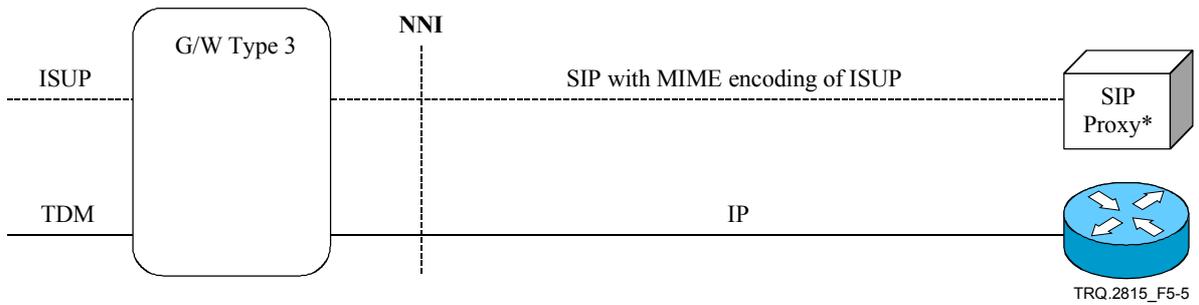
## 5.5 ISUP to SIP-I

Figure 5-4 illustrates a Type 3 Gateway for an ISUP to SIP-I NNI, where the SIP-I IP bearer and the ISUP TDM circuits terminate at the Type 3 Gateway.



**Figure 5-4 – ISUP to SIP-I NNI with Type 3 Gateways**

Figure 5-5 illustrates a Type 3 Gateway for an ISUP to SIP-I NNI, where the SIP-I IP bearer and the ISUP TDM circuits terminate at the Type 3 Gateway.



NOTE – Encapsulated ISUP can only be sent to a SIP Proxy that supports procedures for handling the ISUP MIME type. The SIP Proxy need not support ISUP message processing.

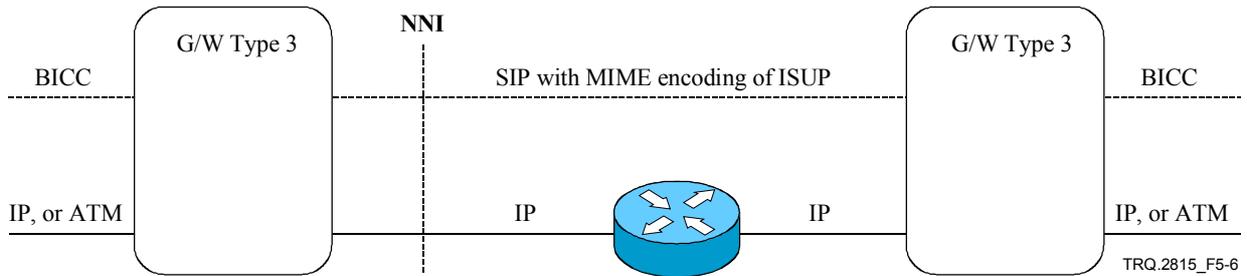
**Figure 5-5 – ISUP to SIP-I NNI with Type 3 Gateway**

**5.6 SIP-I to ISUP**

Refer to 5.5

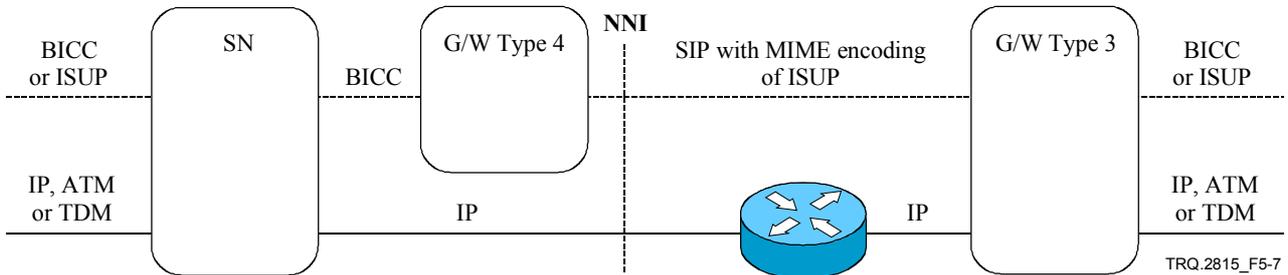
**5.7 BICC to SIP-I**

Figure 5-6 illustrates a Type 3 Gateway for a BICC to SIP-I NNI, where SIP-I IP bearer and BICC IP or ATM bearers terminate at the Type 3 Gateway.



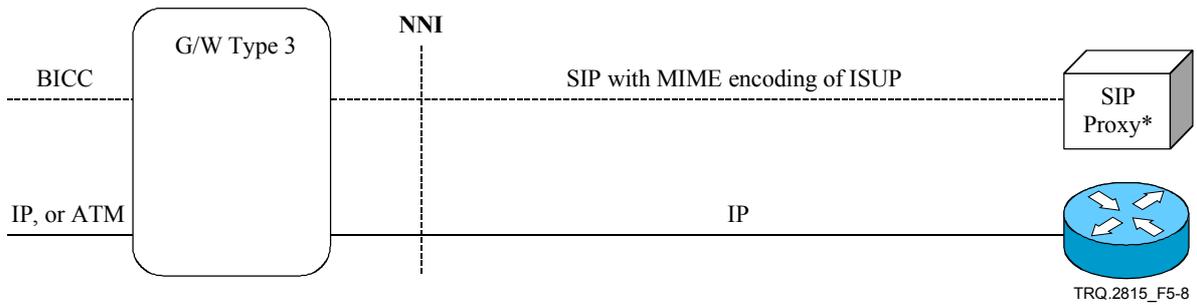
**Figure 5-6 – BICC to SIP-I NNI, with Type 3 Gateways**

Figure 5-7 illustrates using Type 4 and Type 3 Gateways for a BICC to SIP-I to BICC or ISUP NNIs, where the bearers do not terminate at the Type 4 Gateway (e.g., CMN).



**Figure 5-7 – BICC to SIP-I NNI, with Type 3 and 4 Gateways**

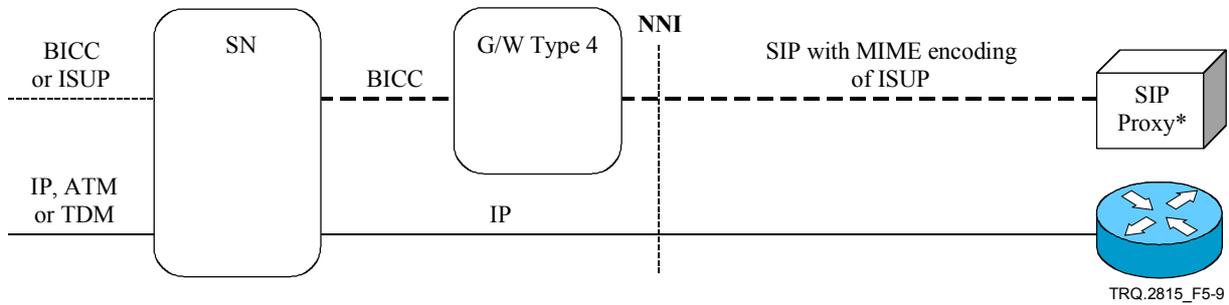
Figure 5-8 illustrates a Type 3 Gateway for a BICC to SIP-I NNI, where SIP-I IP bearer and BICC IP or ATM bearers terminate at the Type 3 Gateway.



\* Encapsulated ISUP can only be sent to a SIP Proxy that supports procedures for handling the ISUP MIME type. The SIP Proxy need not support ISUP message processing.

**Figure 5-8 – BICC to SIP-I NNI, with Type 3 Gateway**

Figure 5-9 illustrates a Type 4 Gateway for a BICC to SIP-I to BICC or ISUP NNIs, where the bearers do not terminate at the Type 4 Gateway (e.g., CMN).



\* Encapsulated ISUP can only be sent to a SIP Proxy that supports procedures for handling the ISUP MIME type. The SIP Proxy need not support ISUP message processing.

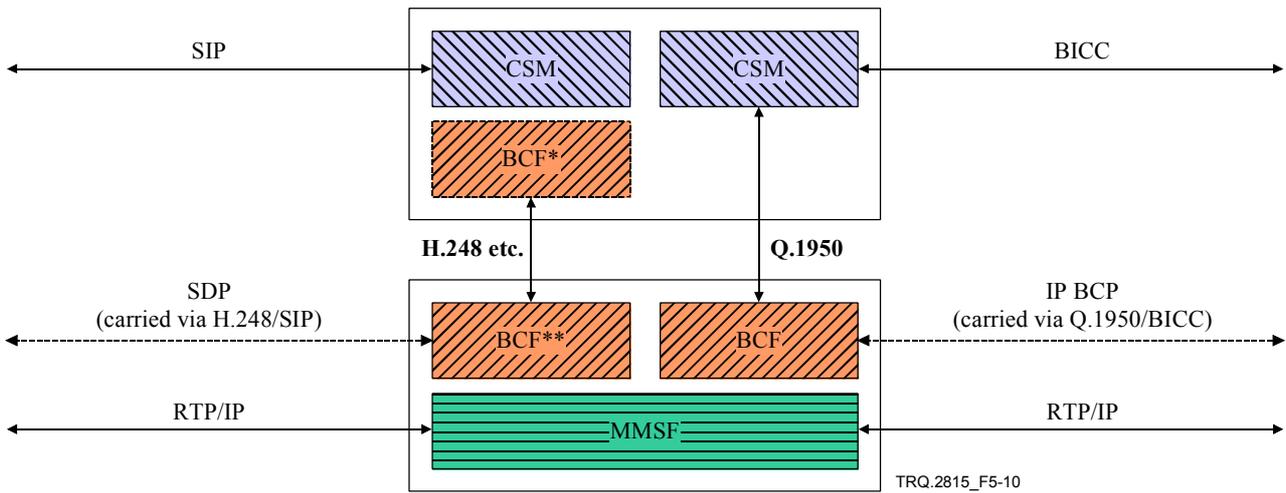
**Figure 5-9 – BICC to SIP-I NNI, with Type 4 Gateway**

## 5.8 SIP-I to BICC

Refer to 5.7

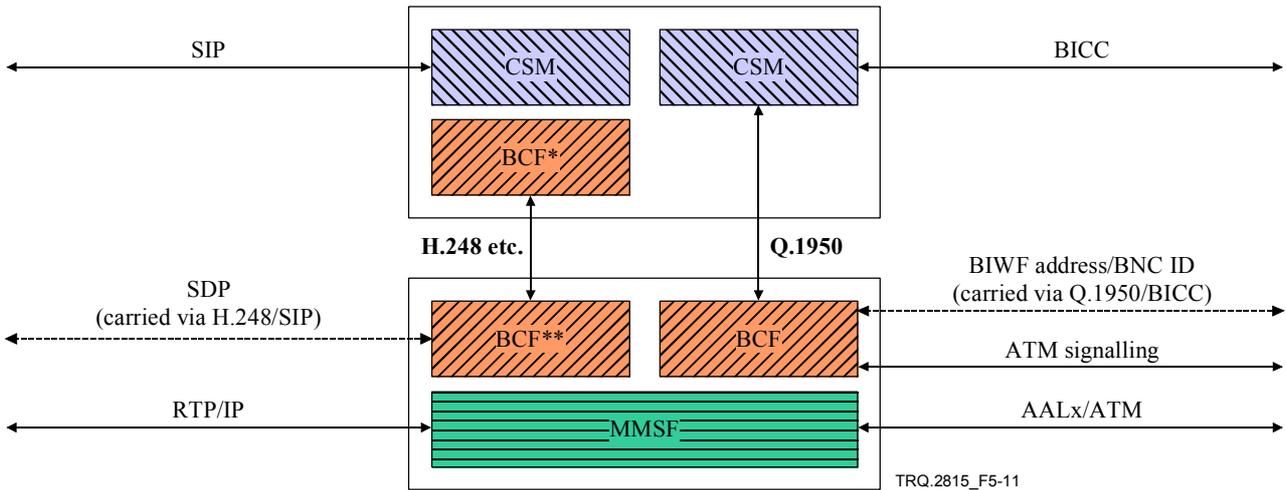
## 5.9 Architecture of the interworking function

A number of possible interworking function architectures are described in this clause.



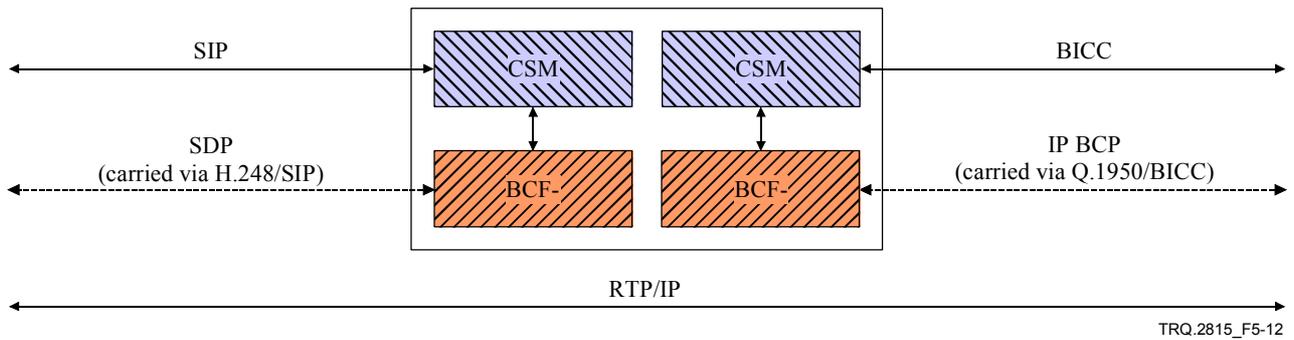
NOTE – The functionality which is labelled "BCF" on the BICC side is distributed between "BCF\*" and "BCF\*\*" on the SIP side. This functional distribution depends on the particular vertical control protocol used and is beyond the scope of this Supplement. It may or may not be the same as that defined for ITU-T Rec. Q.1950 and the exact scope of the optional functions labelled "BCF\*" (i.e., whether they are best described as Call Control or Bearer Control) is also beyond the scope of this Supplement.

**Figure 5-10 – SIP/BICC interworking node for IP/IP case**



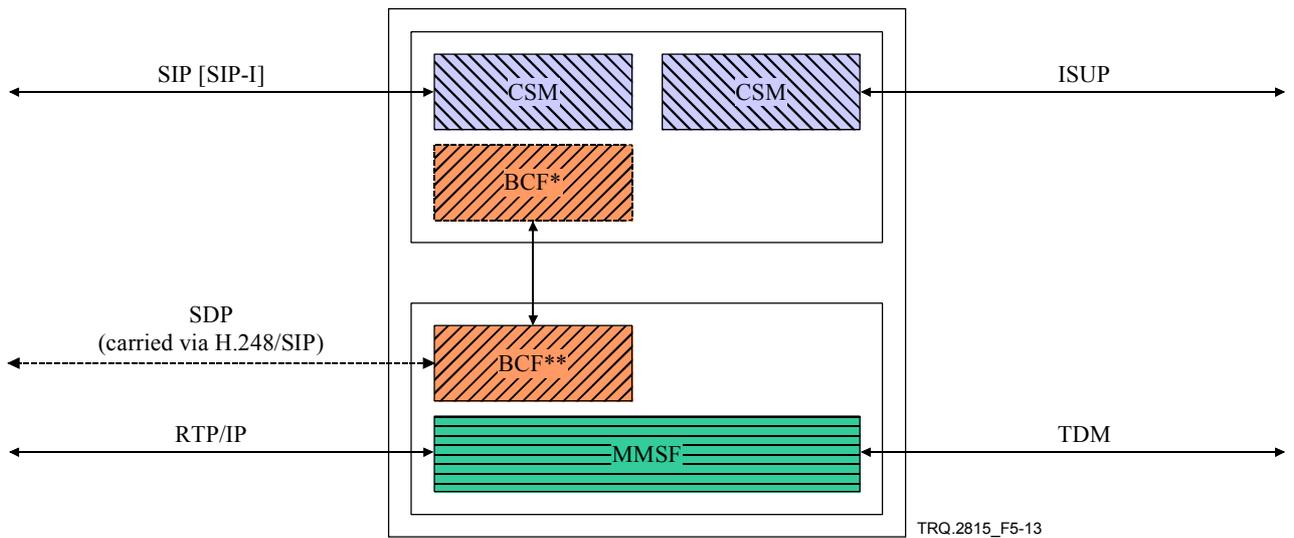
NOTE – The functionality which is labelled "BCF" on the BICC side is distributed between "BCF\*" and "BCF\*\*" on the SIP side. This functional distribution depends on the particular vertical control protocol used and is beyond the scope of this Supplement. It may or may not be the same as that defined for ITU-T Rec. Q.1950 and the exact scope of the optional functions labelled "BCF\*" (i.e., whether they are best described as Call Control or Bearer Control) is also beyond the scope of this Supplement.

**Figure 5-11 – SIP/BICC interworking node for IP/ATM case**



NOTE – The functionality "BCF-" is concerned with the processing and mapping of the Bearer Control information carried in the SDP and IP BCP. It does not comprise the same functionality as the BCF, since it is not controlling a Media Gateway.

**Figure 5-12 – SIP/BICC interworking node for IP/IP case with no media layer device**



NOTE – The interworking node is monolithic for SIP/SIP-I interworking with ISUP.

**Figure 5-13 – SIP (SIP-I)/ISUP interworking node for IP/TDM case**

## 6 Capabilities supported at interworking serving node

The capabilities supported by the interworking of two protocols are represented by the intersection of two sets of capabilities. This clause indicates the set of common capabilities supported by the interworking configuration assumed in this Supplement.

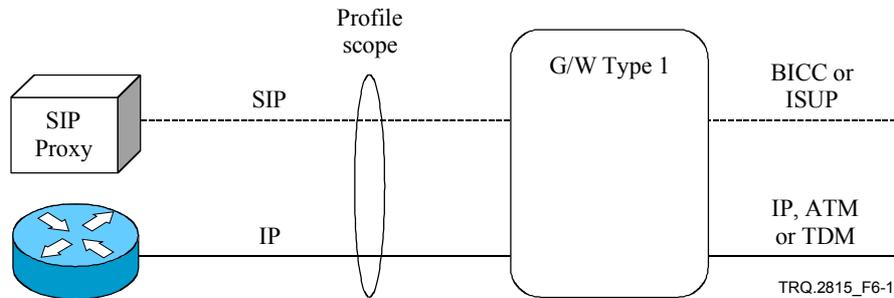
### 6.1 SIP profiles for interworking between SIP and BICC/ISUP

The interworking capability tables for each profile contained in this clause identify the level of the functionality required at a BICC/SIP interworking point. Three basic types of functionality are identified:

- 1) Originating;
- 2) Terminating; and
- 3) Operating through an interworking point (supported in both BICC and SIP signalling).

All entries in the column "Terminate/Oriinate at interworking point" are indicated as "Yes" until an appropriate IETF RFC (for Profiles B and C), or 3GPP Technical Specification (for Profile A) can be identified which specifies the equivalent functionality in the SIP/SDP network domain compared to that specified in the Q-series Recommendations listed. Only after these specifications are identified and verified in providing the required functionality, is the entry in the column "Terminate/Oriinate at interworking point" changed to "No" and protocol interworking Recommendations show support through the interworking point.

### 6.1.1 Profile A<sup>2</sup>



**Figure 6-1 – Profile scope for SIP interworking with BICC/ISUP with a Type 1 Gateway**

The SIP profile for 3GPP (profile A) can be found in:

- 3GPP TS 24.229 V5.1.0 (2002) [15].

**Table 6-1 – Interworking capabilities between BICC and SIP profile A**

BICC/ISUP function/service	Terminate/ originate at interworking point	BICC/ISUP Recommendation	3GPP Technical Specification
<b>Basic call signalling procedures</b>			
Speech/3.1 kHz audio	No	Q.1902.4 [2] Q.764 [1]	3GPP TS 24.229 V5.1.0 (2002) [15]
64 kbit/s unrestricted	Yes	Q.1902.4 [2]/Q.764 [1]	
Multirate connection types	Yes	Q.1902.4 [2]/Q.764 [1]	
N × 64 kbit/s connection types	Yes	Q.1902.4 [2]/Q.764 [1]	
<i>En bloc</i> address signalling	No	Q.1902.4 [2]/Q.764 [1]	
Overlap address signalling	Yes	Q.1902.4 [2]/Q.764 [1]	
Transit network selection	Yes	Q.1902.4 [2]/Q.764 [1]	
Continuity indication	Yes	Q.1902.4 [2]/Q.764 [1]	
Forward transfer	Yes	Q.1902.4 [2]/Q.764 [1]	
Simple segmentation	Yes	Q.1902.4 [2]/Q.764 [1]	
Tones and announcements	Yes	Q.1902.4 [2]/Q.764 [1]	

<sup>2</sup> While profile A was designed for use by 3GPP IMS networks, it is not intended that its use for other applications is precluded.

**Table 6-1 – Interworking capabilities between BICC and SIP profile A**

<b>BICC/ISUP function/service</b>	<b>Terminate/ originate at interworking point</b>	<b>BICC/ISUP Recommendation</b>	<b>3GPP Technical Specification</b>
Access delivery information	Yes	Q.1902.4 [2]/Q.764 [1]	
Transportation of User teleservice information	Yes	Q.1902.4 [2]/Q.764 [1]	
Suspend and resume	Yes	Q.1902.4 [2]/Q.764 [1]	
Signalling procedures for connection type allowing fallback capability	Yes	Q.1902.4 [2]/Q.764 [1]	
Propagation delay determination procedure	Yes	Q.1902.4 [2]/Q.764 [1]	
Simplified echo control signalling procedures	Yes	Q.1902.4 [2]/Q.764 [1]	
Enhanced echo control signalling procedure	Yes	Q.1902.4 [2]/Q.764 [1]	
Automatic repeat attempt	Yes	Q.1902.4 [2]/Q.764 [1]	
Blocking and unblocking	Yes	Q.1902.4 [2]/Q.764 [1]	
CIC group query	Yes	Q.1902.4 [2]/Q.764 [1]	
Dual seizure	Yes	Q.1902.4 [2]/Q.764 [1]	
Reset	Yes	Q.1902.4 [2]/Q.764 [1]	
Receipt of unreasonable signalling information	Yes	Q.1902.4 [2]/Q.764 [1]	
Compatibility procedure	Yes	Q.1902.4 [2]/Q.764 [1]	
ISDN User Part signalling congestion control	Yes	Q.1902.4 [2]/Q.764 [1]	
Automatic congestion control	Yes	Q.1902.4 [2]/Q.764 [1]	
Interaction with INAP	Yes	Q.1902.4 [2]/Q.764 [1]	
Unequipped CIC	Yes	Q.1902.4 [2]/Q.764 [1]	
ISDN User Part availability control	Yes	Q.1902.4 [2]/Q.764 [1]	
MTP pause and resume	Yes	Q.1902.4 [2]/Q.764 [1]	
Overlength messages	Yes	Q.1902.4 [2]/Q.764 [1]	
Temporary Alternative Routing (TAR)	Yes	Q.1902.4 [2]/Q.764 [1]	
Hop counter procedure	Yes	Q.1902.4 [2]/Q.764 [1]	
Collect call request procedure	Yes	Q.1902.4 [2]/Q.764 [1]	
Hard-to-Reach	Yes	Q.1902.4 [2]/Q.764 [1]	
Calling geodetic location procedure	Yes	Q.1902.4 [2]/Q.764 [1]	
Inter-nodal traffic group identification (BICC only)	Yes	Q.1902.4 [2]	
Carrier selection indication	Yes	Q.1902.4 [2]/Q.764 [1]	
Codec negotiation and modification procedures (BICC only)	Yes	Q.1902.4 [2]	
Joint BIWF support (BICC only)	Yes	Q.1902.4 [2]	

**Table 6-1 – Interworking capabilities between BICC and SIP profile A**

<b>BICC/ISUP function/service</b>	<b>Terminate/ originate at interworking point</b>	<b>BICC/ISUP Recommendation</b>	<b>3GPP Technical Specification</b>
Global Call Reference procedure (BICC only)	Yes	Q.1902.4 [2]	
Out of band transport of DTMF tones and information (BICC only)	No	Q.1902.4 [2]	3GPP TS 24.229 V5.1.0 [15]
<b>Generic signalling procedures</b>			
Generic number transfer	Yes	Q.730 [33]	
Generic digit transfer	Yes	Q.730 [33]	
Generic notification procedure	Yes	Q.730 [33]	
Service activation	Yes	Q.730 [33]	
Remote Operations Service Element (ROSE) capability	Yes	Q.730 [33]	
Network specific facilities	Yes	Q.730 [33]	
Pre-release information transport	Yes	Q.730 [33]	
Application Transport Mechanism (APM)	Yes	Q.765 [29]	
Redirection	Yes	Q.730 [33]	
Pivot routing	Yes	Q.730 [33]	
Bearer redirection (BICC Only)	Yes	Q.1902.6 [34]	
<b>Supplementary services</b>			
Direct-Dialling-In (DDI)	No	Q.731.1 [35]	3GPP TS 24.229 V5.1.0 (2002) [15]
Multiple Subscriber Number (MSN)	No	Q.1902.4 [2]/Q.764 [1]	3GPP TS 24.229 V5.1.0 (2002) [15]
Calling Line Identification Presentation (CLIP)	No	Q.731.3 [36]	3GPP TS 24.229 V5.1.0 [15]
Calling Line Identification Restriction (CLIR)	No	Q.731.4 [37]	3GPP TS 24.229 V5.1.0 [15]
Connected Line Identification Presentation (COLP)	Yes	Q.731.5 [38]	
Connected Line Identification Restriction (COLR)	Yes	Q.731.6 [39]	
Malicious Call Identification (MCID)	Yes	Q.731.7 [21]	
Sub-addressing (SUB)	Yes	Q.731.8 [40]	
Call Forwarding Busy (CFB)	Yes	Q.732.2 [22]	
Call Forwarding No Reply (CFNR)	Yes	Q.732.3 [23]	
Call Forwarding Unconditional (CFU)	Yes	Q.732.4 [24]	
Call Deflection (CD)	Yes	Q.732.5 [25]	
Explicit Call Transfer (ECT)	Yes	Q.732.7 [26]	
Call Waiting (CW)	Yes	Q.733.1 [16]	
Call HOLD (HOLD)	Yes	Q.733.2 [17]	

**Table 6-1 – Interworking capabilities between BICC and SIP profile A**

<b>BICC/ISUP function/service</b>	<b>Terminate/ originate at interworking point</b>	<b>BICC/ISUP Recommendation</b>	<b>3GPP Technical Specification</b>
Completion of Calls to Busy Subscriber (CCBS)	Yes	Q.733.3 [18]	
Completion of Calls on No Reply (CCNR)	Yes	Q.733.5 [20]	
Terminal Portability (TP)	Yes	Q.733.4 [19]	
Conference calling (CONF)	Yes	Q.734.1 [27]	
Three-Party Service (3PTY)	Yes	Q.734.2 [28]	
Closed User Group (CUG)	Yes	Q.735.1 [41]	
Multi-Level Precedence and Preemption (MLPP)	Yes	Q.735.3 [42]	
Global Virtual Network Service (GVNS)	Yes	Q.735.6 [43]	
International telecommunication charge card (ITCC)	Yes	Q.736.1 [44]	
Reverse charging (REV)	Yes	Q.736.3 [45]	
User-to-User Signalling (UUS)	Yes	Q.737.1 [46]	
<b>Additional functions/services</b>			
Support of VPN applications with PSS1 Information Flows	Yes	Q.765.1 [30]	
Support of GAT protocol	Yes	Q.765.4 [31]	
Support of Number Portability (NP)	Yes	Q.769.1 [32]	

**Table 6-2 – Interworking capabilities between SIP profile A and BICC/ISUP**

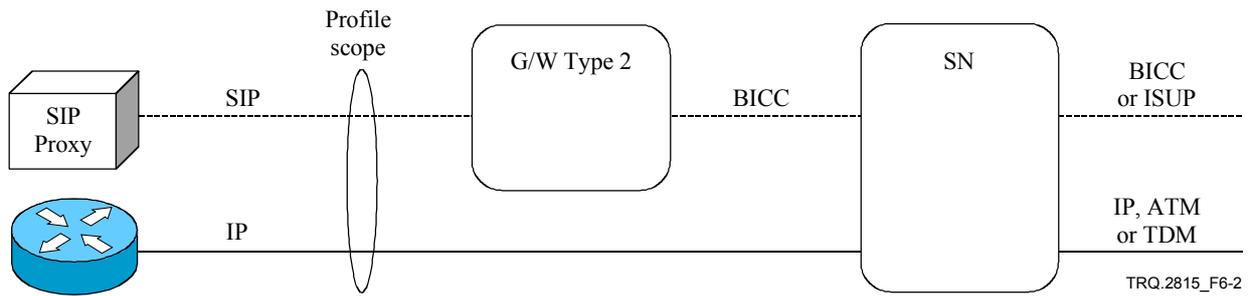
<b>SIP function/service</b>	<b>Terminate/ originate at interworking point</b>	<b>3GPP Technical Specification</b>	<b>BICC/ISUP Recommendation</b>
Bidirectional Audio Session	No	3GPP TS 24.229 V5.1.0 (2002) [15]	Q.1902.4 [2]/Q.764 [1]
All other features ...	Yes	3GPP TS 24.229 V5.1.0 (2002) [15]	

#### 6.1.1.1 Mapping of bearer control protocols

Interworking of AAL type 2 (ITU-T Rec. Q.2630.2), ISUP (ITU-T Recs Q.761-Q.764), B-ISUP for AAL type 1 (ITU-T Recs Q.2761-Q.2764), DSS2 for AAL type 1 (ITU-T Rec. Q.2931) and IPBCP (ITU-T Rec. Q.1970) to SDP/SIP is applicable to Type 1 Gateway.

## 6.1.2 Profile B

Figure 6-1 and Figure 6-2 apply for Profile B.



**Figure 6-2 – Profile scope for SIP interworking with BICC/ISUP with a Type 2 Gateway**

- RFC 3261: *SIP: Session Initiation Protocol* [3].
- RFC 3264: *An Offer/Answer Model with SDP* [47].
- RFC 2327: *SDP: Session Description Protocol* [4].
- RFC 3262: *Reliability of Provisional Responses in SIP* [11].
- RFC 3323: *A Privacy Mechanism for the Session Initiation Protocol (SIP)* [48].
- RFC 3325: *Private Extensions to the Session Initiation Protocol (SIP) for Asserted Identity within Trusted Networks* [7].
- RFC 3578: *Mapping of ISUP Overlap Signalling to the Session Initiation Protocol* [13].
- RFC 2833: *RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals* [14].

This profile shall be supported with and without preconditions:

- RFC 3312: *Integration of Resource Management and SIP* [6].
- RFC 3311: *The Session Initiation Protocol UPDATE Method* [12].

**Table 6-3 – Interworking capabilities between SIP profile B and BICC/ISUP**

BICC/ISUP function/service	Terminate/originate at interworking point	BICC/ISUP Recommendation	SIP/SDP and extensions RFC
<b>Basic call signalling procedures</b>			
Speech/3.1 kHz audio	No	Q.1902.4 [2]/Q.764 [1]	RFC 3261 [3], RFC 2327 [4], RFC 3264 [47], RFC 3262 [11], RFC 3311 [12]
64 kbit/s unrestricted	Yes	Q.1902.4 [2]/Q.764 [1]	
Multirate connection types	Yes	Q.1902.4 [2]/Q.764 [1]	
N × 64 kbit/s connection types	Yes	Q.1902.4 [2]/Q.764 [1]	
<i>En bloc</i> address signalling	No	Q.1902.4 [2]/Q.764 [1]	RFC 3261 [3]
Overlap address signalling	No	Q.1902.4 [2]/Q.764 [1]	RFC 3578 [13]
Transit network selection	Yes	Q.1902.4 [2]/Q.764 [1]	

**Table 6-3 – Interworking capabilities between SIP profile B and BICC/ISUP**

<b>BICC/ISUP function/service</b>	<b>Terminate/ originate at interworking point</b>	<b>BICC/ISUP Recommendation</b>	<b>SIP/SDP and extensions RFC</b>
Continuity indication	Yes	Q.1902.4 [2]/Q.764 [1]	RFC 3261 [3]
Forward transfer	Yes	Q.1902.4 [2]/Q.764 [1]	
Simple segmentation	Yes	Q.1902.4 [2]/Q.764 [1]	
Tones and announcements	Yes	Q.1902.4 [2]/Q.764 [1]	
Access delivery information	Yes	Q.1902.4 [2]/Q.764 [1]	
Transportation of User teleservice information	Yes	Q.1902.4 [2]/Q.764 [1]	
Suspend and resume	Yes	Q.1902.4 [2]/Q.764 [1]	
Signalling procedures for connection type allowing fallback capability	Yes	Q.1902.4 [2]/Q.764 [1]	
Propagation delay determination procedure	Yes	Q.1902.4 [2]/Q.764 [1]	
Simplified echo control signalling procedures	Yes	Q.1902.4 [2]/Q.764 [1]	
Enhanced echo control signalling procedure	Yes	Q.1902.4 [2]/Q.764 [1]	
Automatic repeat attempt	Yes	Q.1902.4 [2]/Q.764 [1]	
Blocking and unblocking	Yes	Q.1902.4 [2]/Q.764 [1]	
CIC group query	Yes	Q.1902.4 [2]/Q.764 [1]	
Dual seizure	Yes	Q.1902.4 [2]/Q.764 [1]	
Reset	Yes	Q.1902.4 [2]/Q.764 [1]	
Receipt of unreasonable signalling information	Yes	Q.1902.4 [2]/Q.764 [1]	
Compatibility procedure	Yes	Q.1902.4 [2]/Q.764 [1]	
ISDN User Part signalling congestion control	Yes	Q.1902.4 [2]/Q.764 [1]	
Automatic congestion control	Yes	Q.1902.4 [2]/Q.764 [1]	
Interaction with INAP	Yes	Q.1902.4 [2]/Q.764 [1]	
Unequipped CIC	Yes	Q.1902.4 [2]/Q.764 [1]	
ISDN User Part availability control	Yes	Q.1902.4 [2]/Q.764 [1]	
MTP pause and resume	Yes	Q.1902.4 [2]/Q.764 [1]	
Overlength messages	Yes	Q.1902.4 [2]/Q.764 [1]	
Temporary Alternative Routing (TAR)	Yes	Q.1902.4 [2]/Q.764 [1]	
Hop counter procedure	No	Q.1902.4 [2]/Q.764 [1]	
Collect call request procedure	Yes	Q.1902.4 [2]/Q.764 [1]	
Hard-to-Reach	Yes	Q.1902.4 [2]/Q.764 [1]	
Calling geodetic location procedure	Yes	Q.1902.4 [2]/Q.764 [1]	
Inter-nodal traffic group identification (BICC only)	Yes	Q.1902.4 [2]	

**Table 6-3 – Interworking capabilities between SIP profile B and BICC/ISUP**

<b>BICC/ISUP function/service</b>	<b>Terminate/ originate at interworking point</b>	<b>BICC/ISUP Recommendation</b>	<b>SIP/SDP and extensions RFC</b>
Carrier selection indication	Yes	Q.1902.4 [2]/Q.764 [1]	RFC 3261 [3]
Codec negotiation and modification procedures (BICC only)	No	Q.1902.4 [2]	
Joint BIWF support (BICC only)	Yes	Q.1902.4 [2]	
Global Call Reference procedure (BICC only)	Yes	Q.1902.4 [2]	
Out of band transport of DTMF tones and information (BICC only)	Yes	Q.1902.4 [2]	
<b>Generic signalling procedures</b>			
Generic number transfer	Yes	Q.730 [33]	
Generic digit transfer	Yes	Q.730 [33]	
Generic notification procedure	Yes	Q.730 [33]	
Service activation	Yes	Q.730 [33]	
Remote Operations Service Element (ROSE) capability	Yes	Q.730 [33]	
Network specific facilities	Yes	Q.730 [33]	
Pre-release information transport	Yes	Q.730 [33]	
Application Transport Mechanism (APM)	Yes	Q.765 [29]	
Redirection	Yes	Q.730 [33]	
Pivot routing	Yes	Q.730 [33]	
Bearer redirection (BICC Only)	Yes	Q.1902.6 [34]	
<b>Supplementary services</b>			
Direct-Dialling-In (DDI)	No	Q.731.1 [35]	RFC 3261 [3]
Multiple Subscriber Number (MSN)	No	Q.1902.4 [2]/Q.764 [1]	RFC 3261 [3]
Calling Line Identification Presentation (CLIP)	No	Q.731.3 [36]	RFC 3323 [48], RFC 3325 [7]
Calling Line Identification Restriction (CLIR)	No	Q.731.4 [37]	RFC 3323 [48], RFC 3325 [7]
Connected Line Identification Presentation (COLP)	Yes	Q.731.5 [38]	
Connected Line Identification Restriction (COLR)	Yes	Q.731.6 [39]	
Malicious Call Identification (MCID)	Yes	Q.731.7 [21]	
Sub-addressing (SUB)	Yes	Q.731.8 [40]	
Call Forwarding Busy (CFB)	Yes	Q.732.2 [22]	
Call Forwarding No Reply (CFNR)	Yes	Q.732.3 [23]	
Call Forwarding Unconditional (CFU)	Yes	Q.732.4 [24]	
Call Deflection (CD)	Yes	Q.732.5 [25]	

**Table 6-3 – Interworking capabilities between SIP profile B and BICC/ISUP**

<b>BICC/ISUP function/service</b>	<b>Terminate/ originate at interworking point</b>	<b>BICC/ISUP Recommendation</b>	<b>SIP/SDP and extensions RFC</b>
Explicit Call Transfer (ECT)	Yes	Q.732.7 [26]	RFC 3204 [9] RFC 3261 [3] RFC 3264 [47]
Call Waiting (CW)	Yes	Q.733.1 [16]	
Call HOLD (HOLD)	No	Q.733.2 [17]	
Completion of Calls to Busy Subscriber (CCBS)	Yes	Q.733.3 [18]	
Completion of Calls on No Reply (CCNR)	Yes	Q.733.5 [20]	
Terminal Portability (TP)	No	Q.733.4 [19]	
Conference calling (CONF)	Yes	Q.734.1 [27]	
Three-Party Service (3PTY)	Yes	Q.734.2 [28]	
Closed User Group (CUG)	Yes	Q.735.1 [41]	
Multi-Level Precedence and Preemption (MLPP)	Yes	Q.735.3 [42]	
Global Virtual Network Service (GVNS)	Yes	Q.735.6 [43]	RFC 3204 [9] RFC 3261 [3] RFC 3264[47]
International telecommunication charge card (ITCC)	Yes	Q.736.1 [44]	
Reverse charging (REV)	Yes	Q.736.3 [45]	
User-to-User Signalling (UUS)	Yes	Q.737.1 [46]	
<b>Additional functions/services</b>			
Support of VPN applications with PSS1 Information Flows	Yes	Q.765.1 [30]	
Support of GAT protocol	Yes	Q.765.4 [31]	
Support of Number Portability (NP)	Yes	Q.769.1 [32]	

**Table 6-4 – Interworking capabilities between SIP profile B and BICC/ISUP**

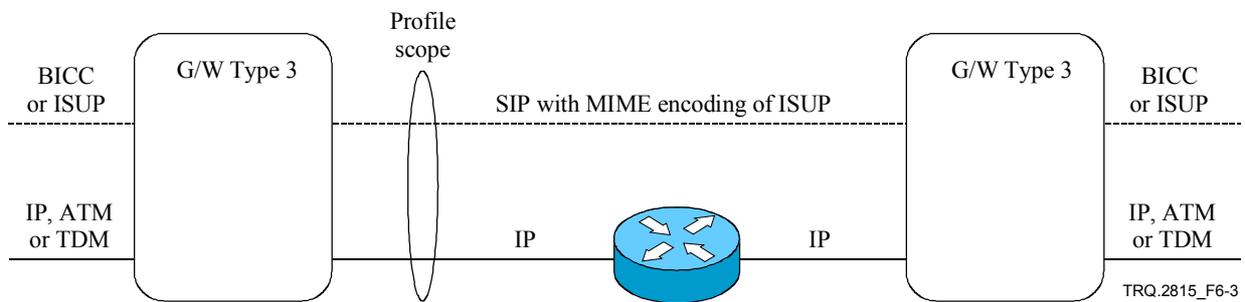
SIP function/service	Terminate/originate at interworking point	SIP/SDP and extensions RFC	BICC/ISUP Recommendation
Bidirectional Audio Session	No	RFC 3261 [3], RFC 3264 [47], RFC 2327 [4], RFC 3262 [11], RFC 3311 [12].	Q.1902.4 [2]/Q.764 [1]
All other features ...	Yes	RFC 3261 [3], RFC 3264 [47], RFC 2327 [4], RFC 3262 [11], RFC 3311 [12].	

**6.1.2.1 Mapping of bearer control protocols**

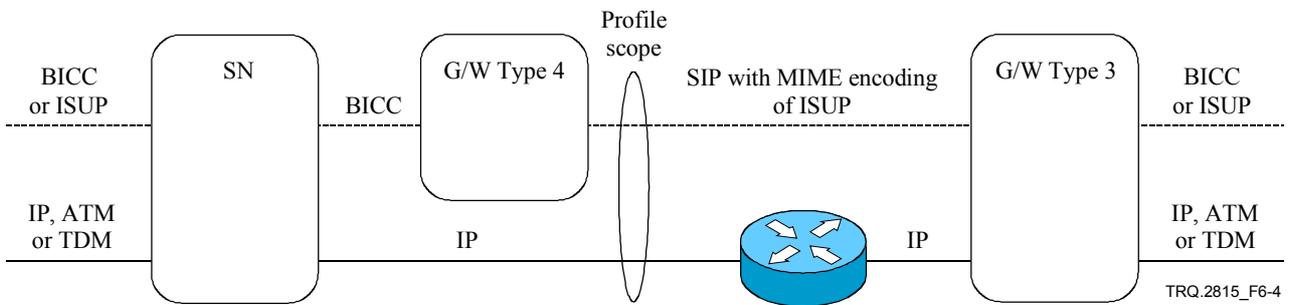
Interworking of AAL type 2 (ITU-T Rec. Q.2630.2), ISUP (ITU-T Recs Q.761-Q.764), B-ISUP for AAL type 1 (ITU-T Recs Q.2761-Q.2764), DSS2 for AAL type 1 (ITU-T Rec. Q.2931) and IPBCP (ITU-T Rec. Q.1970) to SDP/SIP is applicable to Type 1 Gateway.

Interworking of IPBCP (ITU-T Rec. Q.1970) to SDP/SIP is applicable to Type 2 Gateway.

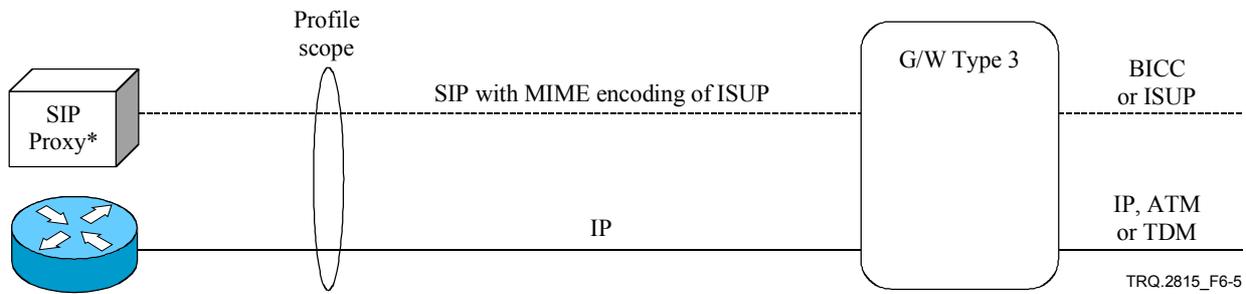
**6.1.3 SIP profile C for interworking between SIP with MIME encoding of ISUP and BICC/ISUP**



**Figure 6-3 – Profile scope for SIP with MIME encoding of ISUP, interworking with BICC/ISUP with Type 3 Gateways**

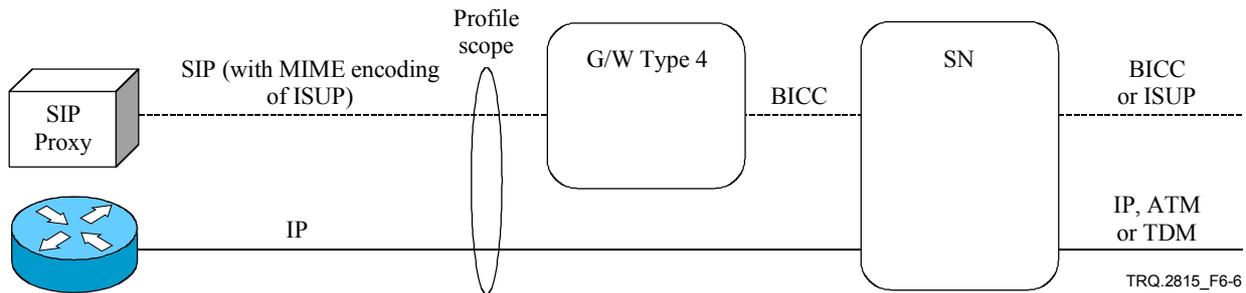


**Figure 6-4 – Profile scope for SIP, with MIME encoding of ISUP, interworking with BICC/ISUP with Type 3 and 4 Gateways**

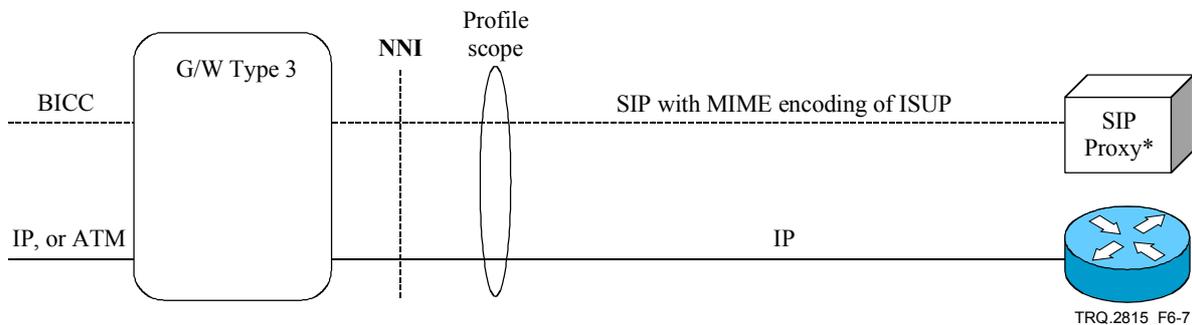


NOTE – Encapsulated ISUP can only be sent to a SIP Proxy that supports procedures for handling the ISUP MIME type. The SIP Proxy need not support ISUP message processing.

**Figure 6-5 – Profile scope for SIP with MIME encoding of ISUP, interworking with BICC/ISUP with Type 3 Gateway**



**Figure 6-6 – Profile scope for SIP, with MIME encoding of ISUP, interworking with BICC/ISUP with Type 4 Gateway**



NOTE – Encapsulated ISUP can only be sent to a SIP Proxy that supports procedures for handling the ISUP MIME type. The SIP Proxy need not support ISUP message processing.

**Figure 6-7 – Profile for SIP, with MIME encoding of ISUP, interworking with BICC/ISUP with Type 3 Gateway**

- RFC 3261: *SIP: Session Initiation Protocol* [3].
- RFC 3264: *An Offer/Answer Model with SDP* [47].
- RFC 3262: *Reliability of Provisional Responses in SIP* [11].
- RFC 3323: *A Privacy Mechanism for the Session Initiation Protocol (SIP)* [48].
- RFC 3325: *Private Extensions to the Session Initiation Protocol (SIP) for Asserted Identity within Trusted Networks* [7].
- RFC 3204 [9]: *MIME media types for ISUP and QSIG objects* [9].
- RFC 2976: *SIP INFO method* [8].
- RFC 3578: *Mapping of ISUP Overlap Signalling to the Session Initiation Protocol* [13].

- RFC 2833: *RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals* [14].

This profile shall be supported with and without preconditions:

- RFC 2976: *Integration of Resource Management and SIP* [6].
- RFC 3311: *The Session Initiation Protocol UPDATE Method* [12].

There may be a misalignment between the MIME'd ISUP and the information in the SIP/SDP headers/fields received at an I-IWF. The I-IWF shall reconcile these inconsistencies.

It is assumed that entities in the SIP domain that modify the ISUP will also modify the SIP/SDP headers/fields to be consistent, in a similar manner as an O-IWF.

To preserve the network integrity and prevent different network fraud possibilities, the following principles of the mapping between SIP status codes and ISUP release cause values should be adopted:

- *SIP originating/terminating scenario*
  - In case of SIP to ISUP mapping: The mapping should only use the cause values described in ITU-T Rec. Q.850 which application is defined as for both ISUP/DSS 1 protocols. The location subfield shall contain the network beyond interworking point (BI) value. Encoding per ITU-T Rec. Q.767 for international exchanges.
  - In case of ISUP to SIP mapping: No additional considerations.
- *SIP transit scenario*
  - The mapping will follow the originating/terminating scenario for the consistency. The actual release cause value will be taken from encapsulated ISUP message.

**Table 6-5 – Interworking capabilities between BICC/ISUP and SIP profile C**

ISUP function/service	Terminate/ originate at interworking point	ISUP Recommendation	SIP/SDP and extensions RFC
<b>Basic call signalling procedures</b>			
Speech/3.1 kHz audio	No	Q.1902.4 [2]/Q.764 [1]	RFC 3261 [3], RFC 2327 [4], RFC 3264 [47], RFC 3262 [11], RFC 3312 [6], RFC 3311 [12].
64 kbit/s unrestricted	Yes	Q.1902.4 [2]/Q.764 [1]	
Multirate connection types	Yes	Q.1902.4 [2]/Q.764 [1]	
N × 64 kbit/s connection types	Yes	Q.1902.4 [2]/Q.764 [1]	
<i>En bloc</i> address signalling	No	Q.1902.4 [2]/Q.764 [1]	RFC 3261 [3]
Overlap address signalling	No	Q.1902.4 [2]/Q.764 [1]	RFC 3204 [9], RFC 578 [13]
Transit network selection	No	Q.1902.4 [2]/Q.764 [1]	RFC 3204 [9]
Continuity indication	Yes	Q.1902.4 [2]/Q.764 [1]	
Forward transfer	No	Q.1902.4 [2]/Q.764 [1]	RFC 3204 [9] RFC 2976 [8]
Simple segmentation	Yes	Q.1902.4 [2]/Q.764 [1]	

**Table 6-5 – Interworking capabilities between BICC/ISUP and SIP profile C**

<b>ISUP function/service</b>	<b>Terminate/ originate at interworking point</b>	<b>ISUP Recommendation</b>	<b>SIP/SDP and extensions RFC</b>
Tones and announcements	Yes	Q.1902.4 [2]/Q.764 [1]	
Access delivery information	No	Q.1902.4 [2]/Q.764 [1]	RFC 3204 [9]
Transportation of User teleservice information	No	Q.1902.4 [2]/Q.764 [1]	RFC 3204 [9]
Suspend and resume	No	Q.1902.4 [2]/Q.764 [1]	RFC 3204 [9]
Signalling procedures for connection type allowing fallback capability	No	Q.1902.4 [2]/Q.764 [1]	RFC 3204 [9]
Propagation delay determination procedure	No	Q.1902.4 [2]/Q.764 [1]	RFC 3204 [9]
Simplified echo control signalling procedures	No	Q.1902.4 [2]/Q.764 [1]	RFC 3204 [9]
Enhanced echo control signalling procedure	No	Q.1902.4 [2]/Q.764 [1]	RFC 3204 [9]
Automatic repeat attempt	Yes	Q.1902.4 [2]/Q.764 [1]	
Blocking and unblocking	Yes	Q.1902.4 [2]/Q.764 [1]	
CIC group query	Yes	Q.1902.4 [2]/Q.764 [1]	
Dual seizure	Yes	Q.1902.4 [2]/Q.764 [1]	
Reset	Yes	Q.1902.4 [2]/Q.764 [1]	
Receipt of unreasonable signalling information	Yes	Q.1902.4 [2]/Q.764 [1]	
Compatibility procedure	No	Q.1902.4 [2]/Q.764 [1]	RFC 3204 [9]
ISDN User Part signalling congestion control	Yes	Q.1902.4 [2]/Q.764 [1]	
Automatic congestion control	Yes	Q.1902.4 [2]/Q.764 [1]	
Interaction with INAP	No	Q.1902.4 [2]/Q.764 [1]	RFC 3204 [9]
Unequipped CIC	Yes	Q.1902.4 [2]/Q.764 [1]	
ISDN User Part availability control	Yes	Q.1902.4 [2]/Q.764 [1]	
MTP pause and resume	Yes	Q.1902.4 [2]/Q.764 [1]	
Overlength messages	Yes	Q.1902.4 [2]/Q.764 [1]	
Temporary Alternative Routing (TAR)	Yes	Q.1902.4 [2]/Q.764 [1]	
Hop counter procedure	No	Q.1902.4 [2]/Q.764 [1]	RFC 3204 [9]
Collect call request procedure	No	Q.1902.4 [2]/Q.764 [1]	RFC 3204 [9]
Hard-to-Reach	Yes	Q.1902.4 [2]/Q.764 [1]	
Calling geodetic location procedure	No	Q.1902.4 [2]/Q.764 [1]	RFC 3204 [9]
Inter-nodal traffic group identification (BICC only)	Yes	Q.1902.4 [2]	
Carrier selection indication	No	Q.1902.4 [2]/Q.764 [1]	RFC 3204 [9]
Codec negotiation and modification procedures (BICC only)	No	Q.1902.4 [2]	RFC 3261 [3]

**Table 6-5 – Interworking capabilities between BICC/ISUP and SIP profile C**

<b>ISUP function/service</b>	<b>Terminate/ originate at interworking point</b>	<b>ISUP Recommendation</b>	<b>SIP/SDP and extensions RFC</b>
Joint BIWF support (BICC only)	Yes	Q.1902.4 [2]	
Global Call Reference procedure (BICC only)	Yes	Q.1902.4 [2]	
Out of band transport of DTMF tones and information (BICC only)	Yes	Q.1902.4 [2]	
<b>Generic signalling procedures</b>			
Generic number transfer	No	Q.730 [33]	RFC 3204 [9]
Generic digit transfer	No	Q.730 [33]	RFC 3204 [9]
Generic notification procedure	No	Q.730 [33]	RFC 3204 [9]
Service activation	No	Q.730 [33]	RFC 3204 [9]
Remote Operations Service Element (ROSE) capability	No	Q.730 [33]	RFC 3204 [9]
Network specific facilities	No	Q.730 [33]	RFC 3204 [9]
Pre-release information transport	No	Q.730 [33]	RFC 3204 [9] RFC 2976 [8]
Application Transport Mechanism (APM)	No	Q.765 [29]	RFC 3204 [9] RFC 2976 [8]
Redirection	No	Q.730 [33]	RFC 3204 [9]
Pivot routing	No	Q.730 [33]	RFC 3204 [9]
Bearer redirection (BICC Only)	No	Q.1902.6 [34]	RFC 3261 [3]
<b>Supplementary services</b>			
Direct-Dialling-In (DDI)	No	Q.731.1 [35]	RFC 3261 [3]
Multiple Subscriber Number (MSN)	No	Q.1902.4 [2]/Q.764 [1]	RFC 3261 [3]
Calling Line Identification Presentation (CLIP)	No	Q.731.3 [36]	RFC 3323 [48], RFC 3325 [7]
Calling Line Identification Restriction (CLIR)	No	Q.731.4 [37]	RFC 3323 [48], RFC 3325 [7]
Connected Line Identification Presentation (COLP)	No	Q.731.5 [38]	RFC 3325 [7]
Connected Line Identification Restriction (COLR)	No	Q.731.6 [39]	RFC 3325 [7]
Malicious Call Identification (MCID)	No	Q.731.7 [21]	RFC 3204 [9]
Sub-addressing (SUB)	No	Q.731.8 [40]	RFC 3204 [9]
Call Forwarding Busy (CFB)	No	Q.732.2 [22]	RFC 3204 [9] RFC 3261 [3]
Call Forwarding No Reply (CFNR)	No	Q.732.3 [23]	RFC 3204 [9] RFC 3261 [3]
Call Forwarding Unconditional (CFU)	No	Q.732.4 [24]	RFC 3204 [9] RFC 3261 [3]

**Table 6-5 – Interworking capabilities between BICC/ISUP and SIP profile C**

<b>ISUP function/service</b>	<b>Terminate/ originate at interworking point</b>	<b>ISUP Recommendation</b>	<b>SIP/SDP and extensions RFC</b>
Call Deflection (CD)	No	Q.732.5 [25]	RFC 3204 [9] RFC 3261 [3]
Explicit Call Transfer (ECT)	No	Q.732.7 [26]	RFC 3204 [9] RFC 3261 [3]
Call Waiting (CW)	No	Q.733.1 [16]	RFC 3204 [9] RFC 3261 [3]
Call HOLD (HOLD)	No	Q.733.2 [17]	RFC 3204 [9] RFC 3261 [3] RFC 3264 [47]
Completion of Calls to Busy Subscriber (CCBS)	Yes	Q.733.3 [18]	
Completion of Calls on No Reply (CCNR)	Yes	Q.733.5 [20]	
Terminal Portability (TP)	No	Q.733.4 [19]	RFC 3204 [9] RFC 3261 [3] RFC 3264 [47]
Conference calling (CONF)	No	Q.734.1 [27]	RFC 3204 [9]
Three-Party Service (3PTY)	No	Q.734.2 [28]	RFC 3204 [9]
Closed User Group (CUG)	No	Q.735.1 [41]	RFC 3204 [9]
Multi-Level Precedence and Preemption (MLPP)	No	Q.735.3 [42]	RFC 3204 [9]
Global Virtual Network Service (GVNS)	No	Q.735.6 [43]	RFC 3204 [9]
International telecommunication charge card (ITCC)	No	Q.736.1 [44]	RFC 3204 [9]
Reverse charging (REV)	No	Q.736.3 [45]	RFC 3204 [9]
User-to-User Signalling (UUS)	No	Q.737.1 [46]	RFC 3204 [9] RFC 2976 [8]
<b>Additional functions/services</b>			
Support of VPN applications with PSS1 Information Flows	No	Q.765.1 [30]	RFC 3204 [9] RFC 2976 [8]
Support of GAT protocol	No	Q.765.4 [31]	RFC 3204 [9] RFC 2976 [8]
Support of Number Portability (NP)	No	Q.769.1 [32]	RFC 3204 [9]

**Table 6-6 – Interworking capabilities between SIP profile C and BICC/ISUP**

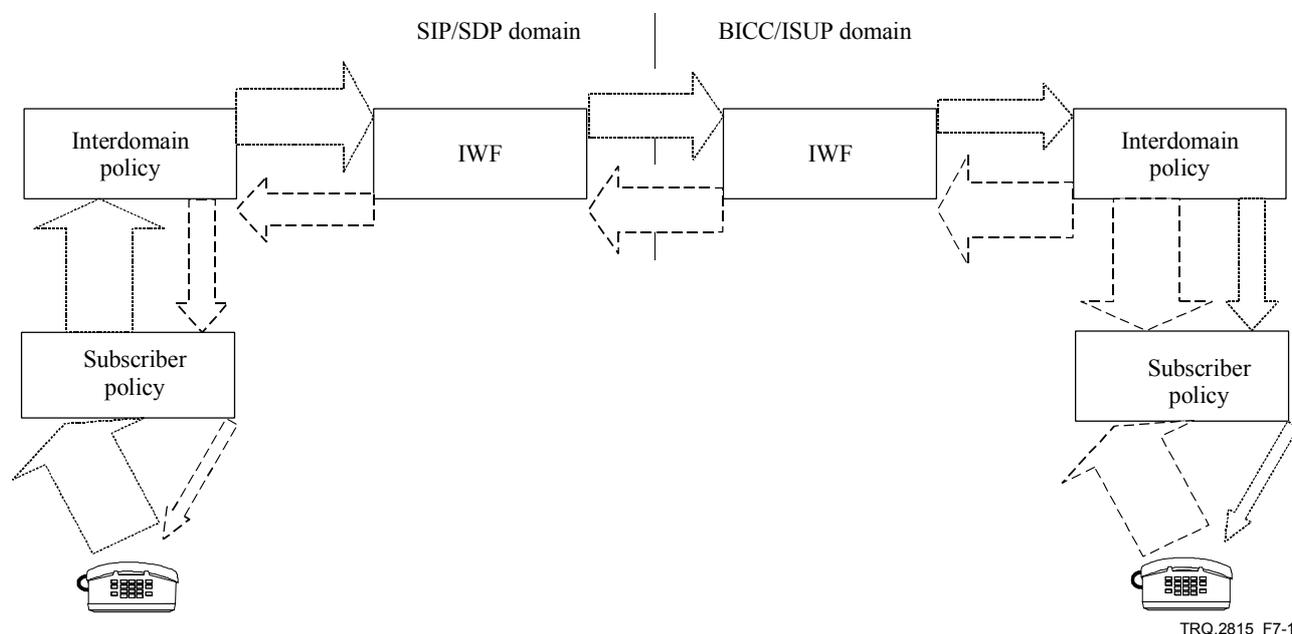
SIP function/service	Terminate/originate at interworking point	SIP/SDP and extensions RFC	BICC/ISUP Recommendation
Bidirectional Audio Session	No	RFC 3261 [3], RFC 3264 [47], RFC 2327 [4], RFC 3262 [11], RFC 3312 [6], RFC 3311 [12].	Q.1902.4 [2]/Q.764 [1]
All other features ...	Yes	RFC 3261 [3], RFC 3264 [47], RFC 2327 [4], RFC 3262 [11], RFC 3312 [6], RFC 3311 [12].	

### 6.1.3.1 Mapping of bearer control protocols

Interworking of AAL type 2 (ITU-T Rec. Q.2630.2), ISUP (ITU-T Recs Q.761-Q.764), B-ISUP for AAL type 1 (ITU-T Recs Q.2761-Q.2764), DSS2 for AAL type 1 (ITU-T Rec. Q.2931) and IPBCP (ITU-T Rec. Q.1970) to SDP/SIP is applicable to Gateway Type 3.

Interworking of IPBCP (ITU-T Rec. Q.1970) to SDP/SIP is applicable to Gateway Type 4.

## 7 Trust model



**Figure 7-1 – Relationship of interworking and policy functions**

In Figure 7-1 the width of the arrows indicate the reduction in features available end-to-end between the subscribers. It should be noted that this also illustrates local services that have no end-

to-end significance. The actions shown above apply, independent of traffic direction, however, particular "policing"<sup>3</sup> may be traffic-direction dependent.

Each domain must implement all three functions to meet the interworking requirements.

- The subscriber policy function "polices" the features available to the end subscriber from the operator he/she is associated with.
- The interdomain policy function "polices" the features available between network operators independent of which subscriber is requesting/responding to a feature request.
- The IWF "polices" features between operators based on the technical capability of the interface used between operator domains.

Independent of the physical realization of a network, the above three functions must be present to allow a SIP network to connect to the PSTN/ISDN.

Encapsulated ISUP is only to be sent to nodes in a trusted domain that supports ISUP. An indication should be associated with the encapsulated ISUP indicating that support is required.

## **8 Tones, announcements and switch through**

As subscribers of the PSTN/ISDN networks shall not experience a difference in behaviour from that provided by the network they are connected to, the following requirements exist:

- a) For calls originating in the PSTN/ISDN which would normally receive ring tone, ring tone must be available. This must be inserted by the interworking function if no indication of tone insertion is available from the SIP domain. If a GW Type 2 or GW Type 4 is included in the path, the tones and announcements have to be included by the adjacent BICC SN.
- b) For calls originating in the PSTN/ISDN, the interworking function shall ensure that the switch through procedure of a terminating local exchange (see ITU-T Rec. Q.764 [1]) shall be applied, preferably in the SIP domain otherwise, in the interworking function. If a GW Type 2 or GW Type 4 is included in the path, the through connection procedures have to be performed by the adjacent BICC SN.
- c) For calls originating in the SIP domain, the interworking function shall ensure that the switch through procedure of an originating local exchange (see ITU-T Rec. Q.764 [1]) shall be applied, preferably in the SIP domain otherwise, in the interworking function. If a GW Type 2 or GW Type 4 is included in the path, the through connection procedures have to be performed by the adjacent BICC SN.
- d) For SIP-I, the interworking function shall ensure that the switch through procedure of a transit exchange (see ITU-T Rec. Q.764 [1]) at the I-IWF shall be applied. At the O-IWF, the switch through shall be applied when the SIP bearer set-up is completed. If a GW Type 2 or GW Type 4 is included in the path, the through connection procedures have to be performed by the adjacent BICC SN.

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<sup>3</sup> It should be noted that this "policing" action is based on international, regional and national regulatory requirements and also the business arrangements between operators and other operators or subscribers associated with their network.



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