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SERIES Q: SWITCHING AND SIGNALLING

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

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**Interworking between H.323 and the Bearer  
Independent Call Control protocol**

ITU-T Recommendation Q.1912.3

(Formerly CCITT Recommendation)

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## **ITU-T Recommendation Q.1912.3**

### **Interworking between H.323 and the Bearer Independent Call Control protocol**

#### **Summary**

This Recommendation defines the signalling interworking between the Bearer Independent Call Control (BICC) protocol and H.323. It defines in particular the signalling interworking between the BICC protocol and the H.225.0 Multimedia Call Control protocol based on the interworking between H.225.0 and the ISDN User Part (ISUP) protocol of Signalling System No. 7.

#### **Source**

ITU-T Recommendation Q.1912.3 was prepared by ITU-T Study Group 11 (2001-2004) and approved under the WTSA Resolution 1 procedure on 2 July 2001.

## FOREWORD

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

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

## NOTE

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

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## **ITU-T Recommendation Q.1912.3**

### **Interworking between H.323 and the Bearer Independent Call Control protocol**

#### **1 Scope**

This Recommendation defines the signalling interworking between the Bearer Independent Call Control (BICC) protocol and H.323.

It defines in particular the signalling interworking between the BICC protocol and the H.225.0 Multimedia Call Control protocol in an H.323 network based on the interworking between H.225.0 and the ISDN User Part (ISUP) protocol of Signalling System No. 7.

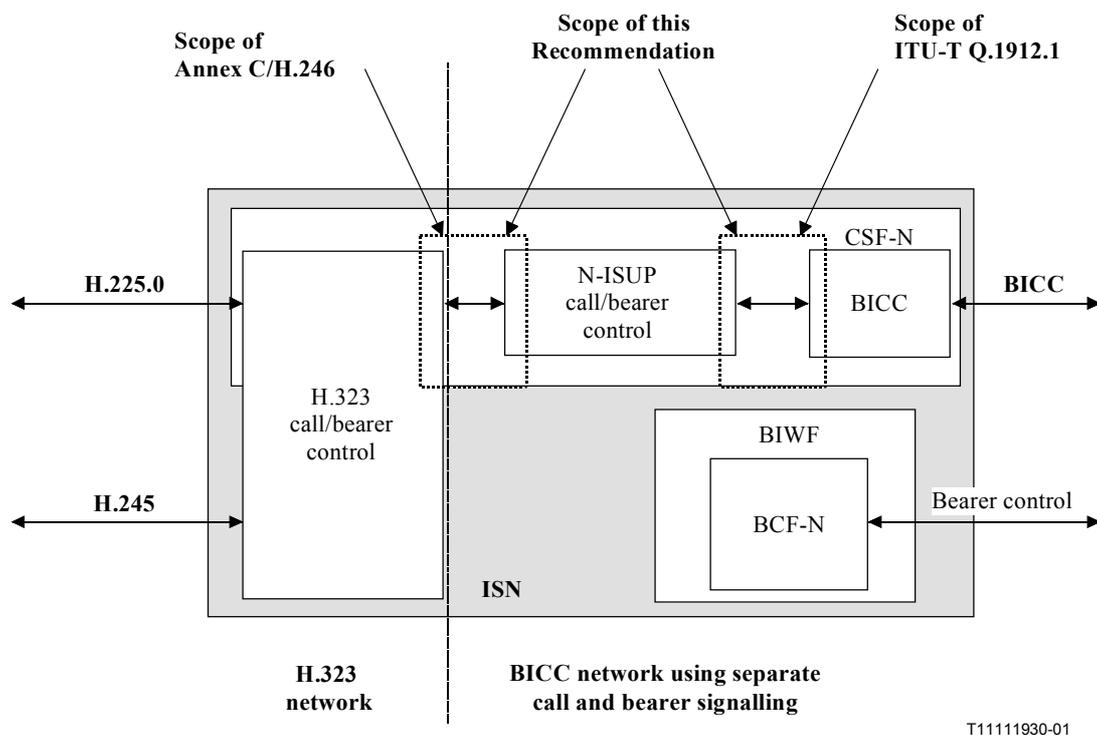
The interworking between H.245 and BICC is for further study (some aspects are addressed in 6.3 and Appendix I).

BICC is the protocol defined in ITU-T Recommendations Q.1902.1 to Q.1902.4 [5]. The Multimedia Call Control protocol is defined in ITU-T H.225.0 [1] for a network in accordance with ITU-T H.323 [3]. ISUP is the protocol defined in ITU-T Recommendations Q.761 to Q.764 [4].

The description of the signalling interworking between the H.225.0 Multimedia Call Control protocol and the BICC protocol in this Recommendation builds upon:

- The signalling interworking between the H.225.0 Multimedia Call Control protocol and the ISDN User Part (ISUP) protocol of Signalling System No. 7 as defined in Annex C/H.246 [2].
- The signalling interworking between the Bearer Independent Call Control (BICC) protocol and the ISDN User Part (ISUP) protocol of Signalling System No. 7 as defined in ITU-T Q.1912.1 [6].

The scope of this Recommendation with regard to the signalling interworking between the H.225.0 Multimedia Call Control protocol and the BICC protocol is as shown in Figure 1.



**Figure 1/Q.1912.3 – Scope of this Recommendation for BICC/H.225.0 interworking**

## 2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- [1] ITU-T H.225.0 (2000), *Call signalling protocols and media stream packetization for packet-based multimedia communication systems*.
- [2] ITU-T H.246 Annex C (2000), *ISDN user part function – H.225.0 Interworking*.
- [3] ITU-T H.323 (2000), *Packet-based multimedia communications systems*.
- [4] ITU-T Q.761 to Q.764 (1999), *Specifications of Signalling System No. 7 – ISDN user part (ISUP)*.
- [5] ITU-T Q.1902.1 to Q.1902.4 (2001), *Specifications of the Bearer Independent Call Control protocol (BICC)*.
- [6] ITU-T Q.1912.1 (2001), *Interworking between Signalling System No. 7 ISDN user part (ISUP) and the Bearer Independent Call Control protocol*.
- [7] ITU-T H.450.x-family (1998 onwards), *Procedures and the signalling protocols between H.323 entities for the control of supplementary services*.
- [8] ITU-T Implementors Guide (2001) for H.323, H.225.0, H.245, H.246, H.283, H.235, H.450-series and H.341 Recommendations.
- [9] ITU-T H.245 (2001), *Control protocol for multimedia communication*.

### 3 Definitions

For BICC specific terminology, the reader is referred to ITU-T Q.1902.1 [5].

### 4 Abbreviations

This Recommendation uses the following abbreviations:

APM	Application Transport Message
BCF-N	Bearer Control Nodal Function
BICC	Bearer Independent Call Control
BIWF	Bearer InterWorking Function
CSF-N	Call Service Nodal Function
DTMF	Dual Tone Multi Frequency
ISDN	Integrated Services Digital Network
ISN	Interface Serving Node
ISUP	ISDN User Part
SCN	Switched Circuit Network

### 5 General considerations

This clause describes the interworking principle between H.225.0 and BICC based on the interworking between H.225.0 and ISUP concatenated with the interworking between ISUP and BICC. This refers to the necessary mapping of signalling information to achieve connectivity and functionality between an H.323 network and a BICC network. Figure 2 provides the functional grouping of the interworking functions involved following the half call model description technique for BICC.

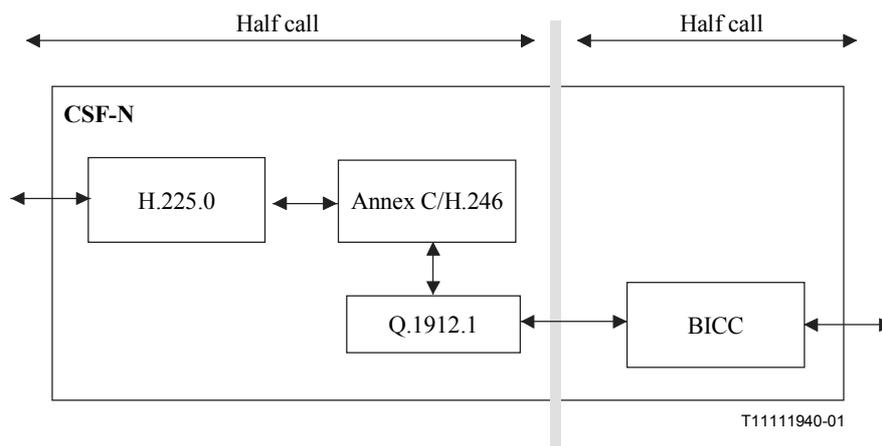


Figure 2/Q.1912.3 – Functional description of the interworking configuration

## **6 Interworking considerations**

### **6.1 General**

The interworking between H.225.0 and BICC shall act according to the interworking between H.225.0 and ISUP in Annex C/H.246 [3], and the additional interworking statements in the Implementors Guide for H.323, H.225.0, H.245, H.246, H.283, H.235, H.450-series and H.341 Recommendations in ITU-T Implementors Guide [8], concatenated with the interworking between ISUP and BICC in ITU-T Q.1912.1 [6].

### **6.2 Prevention of speech clipping**

For an incoming H.323 call for which the incoming bearer is not established yet in the H.323 network, the Continuity Indicator in the Nature of Connection Indicators parameter in the IAM in BICC shall be set to indicate "COT to be expected" if the ISN is aware that the call establishment procedures in ITU-T H.245 [9] can take place in the H.323 network without waiting until an ACM message is received in BICC (Note).

The Continuity message, with the Continuity Indicators parameter set to "Continuity" shall be sent in BICC upon successful completion of the incoming H.323 bearer set-up procedures.

NOTE – In some H.323 implementations, the H.245 call establishment procedures cannot be initiated before an ACM is received from the BICC network (because the H.245 procedures are not handled until a CONNECT is received or because a CALL PROCEEDING message is not generated before an ACM is received). In such cases, speech clipping cannot be prevented. H.323 networks using such implementations should not be interconnected to BICC networks. The H.245 call establishment procedures shall be initiated as soon as possible on the H.323 side.

If the Fast Connect procedure is used on the H.323 side, the ISN shall first check that the bearer establishment can be successfully completed according to the proposals received in the fastStart element of the SETUP message received from the H.323 side, before sending the IAM in BICC.

### **6.3 Codec negotiation and out-of-band transport of DTMF and tone information**

Interworking procedures related to codec negotiation (including mid-call codec modification and mid-call codec negotiation procedures) and out-of-band transport of DTMF and tone information have also to be considered in case of interworking between an H.323 network and a BICC network. These procedures require the definition of interactions between the BICC protocol and some parts of the H.245 protocol. The accurate definition of these procedures is for further study. Appendix I provides guidelines for the implementation of the end-to-end codec negotiation procedures through a BICC and H.323 network.

### **6.4 Interworking of ISDN supplementary services**

Please note that the interworking of ISDN supplementary services (ITU-T H.450.x-series [7]) is for further study.

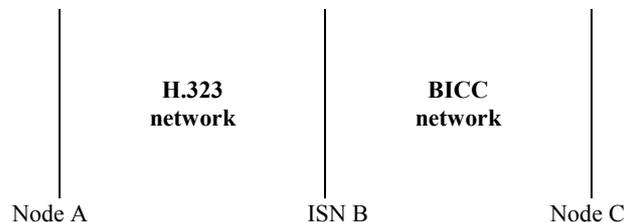
## Guidelines BICC/H.323 interworking for end-to-end codec negotiation

### I.1 Introduction

The H.245 capability exchange procedures are more complex than the BICC codec negotiation procedures since H.323 nodes have the possibility to separately indicate receive and transmit capabilities, as well as various combination of modes in which the node can operate simultaneously. A different codec can be selected for each unidirectional media channel in H.323.

As the same codec is used for transmission and reception in a BICC network, only the codecs which are proposed by the H.323 network for reception and transmission will be included in the initial BICC Supported Codecs list used to perform the BICC codec negotiation. This principle is generally applied in the procedures defined below although it is not explicitly mentioned.

### I.2 H.323 to BICC interworking



#### I.2.1 If the H.245 procedures are used (with a separate H.245 control channel or using the H.245 encapsulation method)

- 1) If the capabilities supported by the preceding H.323 node (node A) are received by the ISN (in an H.245 TerminalCapabilitySet message) before the IAM is sent on the outgoing side, the Supported Codec List sent in the IAM is derived from the capability structures contained in the received TerminalCapabilitySet message by deleting the codecs that cannot be used for the call (not offered by the ISN) and adding (with a lower priority) the codecs that can be used for the call (proposed by the ISN) but were not indicated in the received capabilities from the preceding H.323 node (node A).

The ISN shall wait until an APM with the selected codec is received before indicating its capabilities to the preceding H.323 node (node A).

- If the Selected Codec received in the APM was contained in the received TerminalCapabilitySet message from the preceding H.323 node (node A), the H.245 TerminalCapabilitySet message sent by the ISN shall only contain the selected codec received in the BICC APM. The end-to-end codec negotiation procedures are successfully completed. The codec selected by the ISN on the H.323 side (sent in the OpenLogicalChannel message) is the codec resulting from the BICC negotiation procedure.
  - If the Selected Codec received in the APM does not belong to the capabilities indicating by the preceding H.323 node (node A), a transcoder shall be used.
- 2) If the capabilities supported by the preceding H.323 node (node A) are not received by the ISN (in an H.245 TerminalCapabilitySet message) before the IAM is sent on the outgoing side, the Supported Codec List is constructed in the ISN as described in ITU-T Q.1902.4 (SN initiating codec negotiation). The ISN waits until the codec negotiation procedure is completed on the BICC side before indicating its capabilities to the preceding node (node A).

When the APM with the selected codec is received by the ISN:

- The ISN sends a TerminalCapabilitySet message containing the codecs that can be used for the call (codecs supported by the ISN), allocating the highest priority to the BICC selected codec and the other codecs of the Available codec List.
- If the codec selected by the preceding H.323 node (node A) (received in the H.245 OpenLogicalChannel message) is the BICC Selected codec, end-to-end negotiation procedures are successfully completed. The codec selected by the ISN on the H.323 side (sent in the OpenLogicalChannel message) is the same as the codec selected by the preceding H.323 node.
- If the codec selected by the preceding H.323 node (node A) (received in the H.245 OpenLogicalChannel message) is not the BICC Selected codec but belongs to the BICC Available codec List, the BICC Modification procedure shall be applied on the BICC side: the newly selected codec is the codec selected by node A and the new Available codec List is the old one from which the codecs not supported by node A are deleted. The codec selected by the ISN on the H.323 side (sent in the OpenLogicalChannel message) is the same as the codec selected by the preceding H.323 node.
- If the codec selected by the preceding H.323 node (node A) does not belong to the BICC Available codec List, a transcoder shall be used.

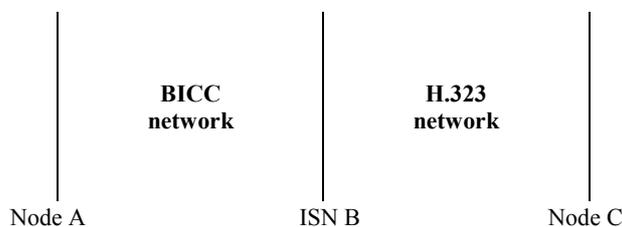
### **I.2.2 If Fast Connect procedure is used**

The Supported Codec List sent in the IAM is derived from the OpenLogicalChannel proposals received in the fastStart element of the Setup message by deleting the codecs which are not supported for the call (the codecs are listed in the same priority order as received in the fastStart element) and adding (with a lower priority) the codecs that can be used for the call but were not proposed in the received fastStart element.

The backward APM with the Selected codec is awaited before the fastStart element is sent back by the ISN.

- If the Selected Codec received in the APM was proposed in the received fastStart element, the ISN sends a fastStart element selecting amongst the OpenLogicalChannel proposals containing the Selected codec received in the APM. The end-to-end codec negotiation is successfully completed.
- If the Selected Codec received in the APM was not proposed in the received fastStart element, a transcoder shall be used.

### **I.3 BICC to H.323 interworking**



### **I.3.1 If H.245 procedures are used (with a separate H.245 control channel or using the H.245 encapsulation method)**

It may not be possible to wait until the capabilities of node C are received before selecting the codec on the BICC side: H.245 procedures may only begin in the H.323 network when a H.225.0 CONNECT message is sent (when an answer is received from the called party) whereas the BICC codec negotiation procedures must be completed before the ACM is sent. It is therefore preferable to complete the BICC codec negotiation procedures independently of the H.323 procedures on the outgoing side.

- The ISN waits until a TerminalCapabilitySet message is received from the succeeding H.323 node.
- If the BICC Selected codec is supported by the succeeding H.323 node (node C), end-to-end negotiation procedures are successfully completed. The ISN sends a TerminalCapabilitySet containing the BICC selected codec only. The OpenLogicalChannel message which will be sent by the ISN shall contain this same BICC selected codec. The end-to-end codec negotiation procedures are successfully completed.
- If the BICC selected codec does not belong to the list of codecs supported by the succeeding H.323 node, the ISN selects the codec with the highest priority in the BICC Available Codecs List which is also supported by the succeeding H.323 node. The ISN sends a TerminalCapabilitySet containing the BICC selected codec only. The OpenLogicalChannel message which will be sent by the ISN shall contain this same BICC selected codec. The BICC modification procedure is applied on the BICC side: the newly selected codec is the codec selected by the ISN and the new Available codec List is the old one from which the codecs not supported by the succeeding H.323 (node C) are deleted.
- If no codec of the BICC Available Codecs List is supported by the succeeding H.323 node, a transcoder shall be used.

### **I.3.2 If Fast Connect procedure is used**

The OpenLogicalChannel proposals sent in the fastStart element of the SETUP message contains the codecs that can be used for the call (supported by the ISN). The BICC Selected codec and the codecs of the BICC Available codecs List resulting from the BICC negotiation procedure are proposed with the highest priority.

- If the codec selected by the succeeding H.323 node (node C) (received in the selected OpenLogicalChannel indicated in the fastStart element) is the BICC Selected codec, end-to-end negotiation procedures are successfully completed.
- If the codec selected by the succeeding H.323 node (node C) (received in the OpenLogicalChannel contained in the fastStart element) is not the BICC Selected codec but belongs to the BICC Available codec List, the BICC Modification procedure shall be applied on the BICC side: the newly selected codec is the codec selected by the succeeding H.323 node (node C) and the new Available codec List is the old one from which the codecs which were proposed with a higher priority than the H.323 Selected codec (codecs not supported by the succeeding H.323 node (node C)) are deleted.
- If the codec selected by the succeeding H.323 node (node C) does not belong to the BICC Available Codecs List, a transcoder shall be used.





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