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This contribution provides a text for Draft Recommendation H.321 “Adaptation of H.320 visual telephone terminals to B-ISDN environments” which was determined at the Study Group 15 meeting in February 1995.

Summary

This Recommendation describes technical specifications for adapting narrowband visual telephone terminals, as defined in Recommendation H.320, to broadband ISDN environments. The terminal conforming to this Recommendation interworks with the same type of terminals (i.e., other H.321 terminals) accommodated in B-ISDN as well as H.320 terminals accommodated in N-ISDN.

* Contact: Hayder Radha
AT&T Bell Laboratories
Tel.: +1 317 845 6927
Fax: +1 317 845 6900
Email: hayder@inuxs.att.com

INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

DRAFT H.321

TELECOMMUNICATION
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LINE TRANSMISSION OF NON-TELEPHONE SIGNALS

ADAPTATION OF H.320 VISUAL TELEPHONE TERMINALS TO B-ISDN ENVIRONMENTS

DRAFT ITU-T Recommendation H.321

CONTENTS

ADAPTATION OF H.320 VISUAL TELEPHONE TERMINALS TO B-ISDN ENVIRONMENTS

(Place, 199x)

1. Scope

This Recommendation describes technical specifications for adapting narrowband visual telephone terminals, as defined in Recommendation H.320, to broadband ISDN environments. The terminal conforming to this Recommendation interworks with the same type of terminals (i.e., other H.321 terminals) accommodated in B-ISDN as well as existing H.320 terminals accommodated in N-ISDN.

It is noted that some of the functionalities supported by H.321 terminals are also supported by broadband audiovisual terminals defined in Recommendation H.310. The interworking among H.310, H.321, and H.320 terminals is a mandatory requirement. Interworking between H.320 and H.321 terminals is achieved since the different H.321 terminal types, defined in this Recommendation, include the *same* functions supported by the corresponding H.320 terminal types. (See § 4.4 for more details.) Interworking between H.320/H.321 and H.310 terminals is achieved through a common set of H.320/H.321 functions (defined in Recommendation H.310). For example, in addition to supporting the ITU-T Recommendation H.262 video (MPEG-2 video), H.310 terminals shall support Recommendation H.261 which is part of both Recommendation H.320 and Recommendation H.321.

In H.321 terminals, the adaptation of H.320 functions over B-ISDN is achieved through ATM Adaptation Layer 1 (AAL 1). Both Segmentation-and-Reassembly (SAR) and Convergence Sublayer (CS) functions, as defined in Recommendation I.363, are considered in this Recommendation.

H.321 terminals have the same inband functionalities as those supported by H.320 terminals, i.e. as defined in Recommendations H.242, H.230, and H.221. Extra broadband-related signaling functions, such as negotiation for the use of the Adaptive Clock Recovery method (asynchronous mode), can be accomplished through Q.2931 Information Elements as shown in §5.7 of this Recommendation.

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; all 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.

H.221	Frame structure for a 64 to 1920 kbit/s channel in audiovisual teleservices (revised at Helsinki, 1993)
H.230	Frame-synchronous control and indication signals for audiovisual systems (revised at Helsinki, 1993)
H.242	System for establishing communication between audiovisual terminals using digital channels up to 2 Mbit/s (revised at Helsinki, 1993)
H.243	Procedures for establishing communication between three or more audiovisual terminals using digital channels up to 2 Mbit/s (Helsinki, 1993)
H.261	Video codec for audiovisual services at px64 kbit/s (revised at Helsinki, 1993)
H.320	Narrowband visual telephone systems and terminal equipment (revised at Helsinki, 1993)
H.310	Broadband audiovisual communication systems and terminals (May 1995)
H.322	Visual telephone systems and terminal equipment for local area networks which provide a guaranteed quality of service (June 1995)
I.361	B-ISDN ATM layer specification (revised at Helsinki, 1993)
I.363	B-ISDN ATM adaptation layer (AAL) specification (revised at Helsinki, 1993)
I.413	B-ISDN user-network interface (Geneva, January 1994)
I.580	General arrangements for interworking between B-ISDN and 64 kbit/s based ISDN (Geneva, November 1993)
Q.2931	B-ISDN Digital Subscriber Signaling System No. 2 (DSS 2) - User Network Interface Layer 3 Specification for Basic Call/Connection Control, ITU-T SG11/WP2 Working Document, July 1994, Edinburgh.
Q.939	Digital Subscriber Signalling System No. 2 (DSS 1) - Typical DSS 1 Service Indicator Codings for ISDN Telecommunications Services (1994)

3. Definitions and abbreviations

3.1 Definitions

Broadband: bit rate including and beyond that of narrowband.

Circuit emulation: emulation of the N-ISDN circuit switched service by B-ISDN. This is accomplished by the use of the AAL type 1 service.

Inband signalling: signalling via BAS of the H.221 frame structure.

Narrowband: bit rate ranging from 64 kbit/s to 1920 kbit/s. This channel capacity is provided as a single B/H0/H11/H12 channel or a multiple of B/H0 channels.

Outband signalling: signalling via a sub-channel not part of the B/H0/H11 channel in N-ISDN or equivalent channel in B-ISDN.

3.2 Abbreviations

AAL	ATM Adaptation Layer
ATM	Asynchronous Transfer Mode
B-ISDN	Broadband aspects of ISDN
B-NT	Broadband Network Termination
B-TA	Broadband Terminal Adaptor
B-TE	Broadband Terminal Equipment
BCH	Bose-Chaudhuri-Hocquenghem
C&I	Control & Indication
CBR	Constant Bit Rate
CRC	Cyclic Redundancy Check
CS	Convergence Sublayer
CSI	CS Indication
FEC	Forward Error Correction
IE	Information Element
ISDN	Integrated Services Digital Network
LSD	Low Speed Data
MCU	Multipoint Control Unit
OAM	Operation and Maintenance
PDU	Protocol Data Unit
PHY	PHYsical layer
SAP	Service Access Point
SAR	Segmentation And Reassembly
SDT	Structure Data Transfer
SDU	Service Data Unit

SN	Sequence Number
SNP	SN Protection
SRTS	Synchronous Residual Time Stamp
TE	Terminal Equipment
VC	Virtual Channel

4. System description

4.1 Applications

This terminal can be used for various applications such as conversational services, distributive services, retrieval services, messaging services as the existing H.320 terminal can. This Recommendation does not specify any particular service.

4.2 System configuration

The H.321 terminal is mapped onto the B-ISDN reference configuration, which is described in Recommendation I.413, as shown in Figure 1.

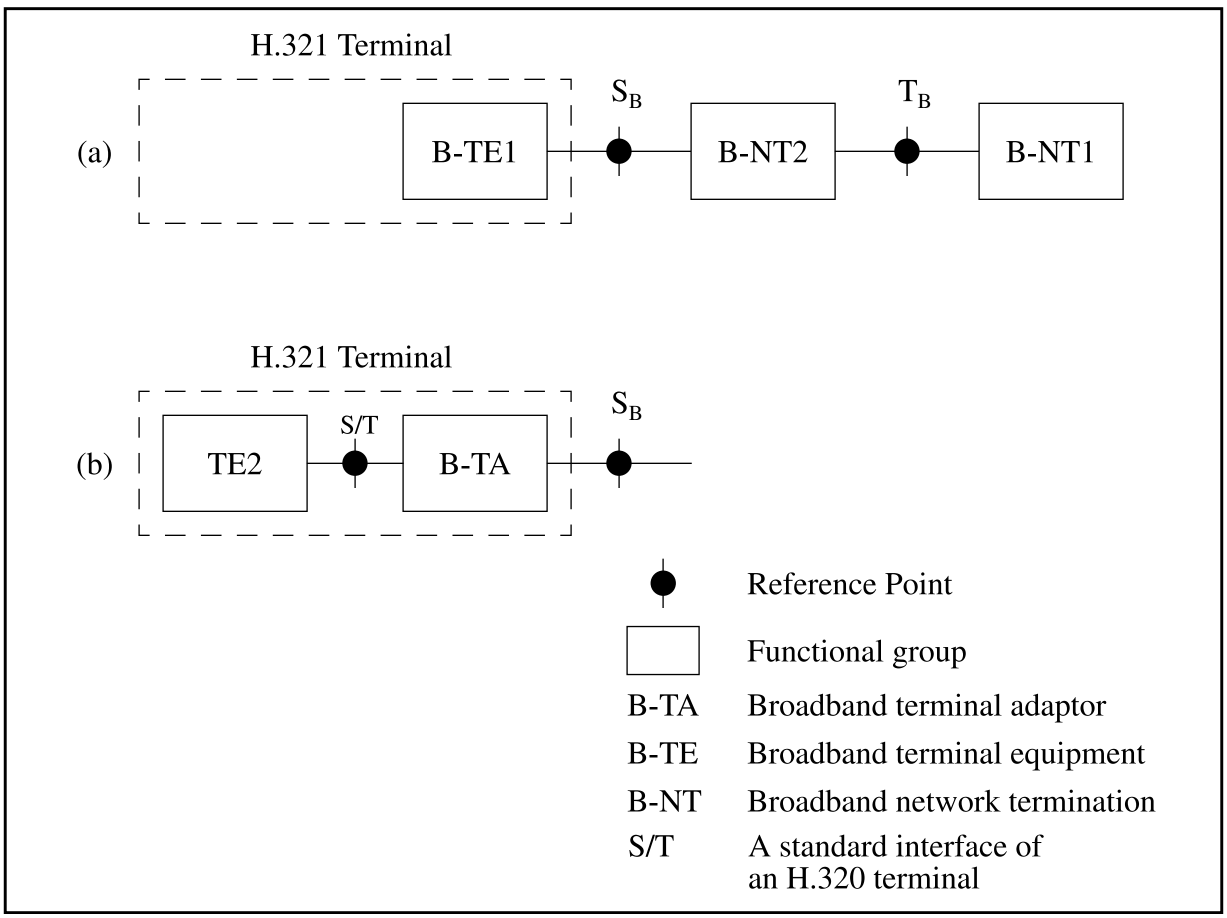

FIGURE 1/H.321: Reference Configuration

There are two possible implementations of an H.321 terminal. The first one is of an integrated design which includes H.320, ATM Adaptation Layer (AAL), and ATM functions in a single terminal unit (i.e., B-TE1 in Figure 1).

The second implementation consists of an H.320 terminal equipment (TE2) and a broadband terminal adaptor (B-TA). In this case, an H.320 signal (i.e., with an H.221 framing format) is transmitted at the interface between the H.320 terminal equipment (TE2) and the terminal adaptor (B-TA). Moreover, terminal-to-network signalling is performed in B-TA with possible interaction with TE2.

4.3 Generic terminal architecture

A generic architecture of an H.321 terminal (corresponding to the configuration of Figure 1-a) is shown in Figure 2, where constituent elements and corresponding Recommendations are indicated. The figure includes the following functional units: a video I/O equipment, an audio I/O equipment, a telematic equipment, a system control unit, video and audio codecs, an audio delay unit, and a mux/demux unit. These functional units are defined in § 3.1 of Recommendation H.320.

The AAL, ATM, and physical units provide the adaptation and interface functions required for accommodating an H.321 terminal over a broadband network.

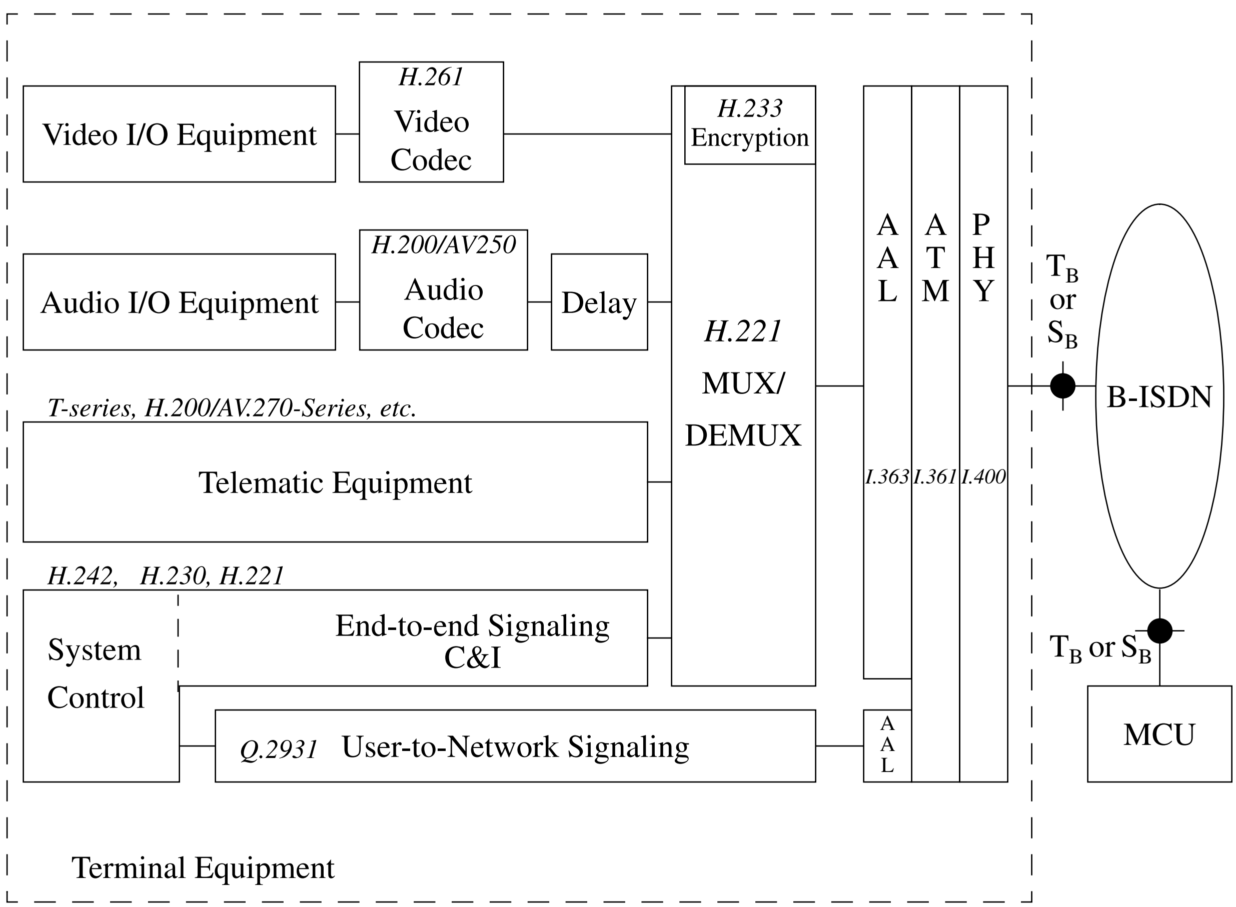

FIGURE 2/H.321: Protocol stack of the H.321 terminal

4.4 Terminal type

Several H.321 terminal types are defined according to the channel access capability (e.g., B, H0, and H11/H12), bit rate classes, and audio coding schemes. Each H.321 terminal type has a corresponding terminal defined in Recommendation H.320. Table 1/H.321 outlines the different communication and audio coding modes supported by this Recommendation. (This table corresponds to Table 1/H.320.)

A special attention should be paid to the ATM virtual channel capabilities and AAL functions supported by the different H.321 terminals. (ATM and AAL related characteristics are highlighted in Table 1/H.321.)

Table 1/H.321: Communication modes of H.321 terminals

Visual telephone mode		Channel rate (kbit/s)	N-ISDN channel (Note 1)	Number of ATM Virtual Channels (VC) (Note 2)	AAL Functions	Coding: Audio	Coding: Video
a^y	**a^y_0**	64	B	1	AAL Type 1 with both SAR and CS functions. (See § 5.6)	G.711 (Note 3)	Not applicable
	a^y_1					G.728	H.261
b^y	**b^y_1**	128	2B	2		G.711	
	b^y_2					G.722	
	b^y_3 (Note 4)					G.728	
g^y (Note 5)	**g^y_1**	nx64	nB	n		G.711	
	g^y_2					G.722	
	g^y_3					G.728	
g^y		384	H_0	1		G.722 (Note 6)	
h^y		768	$2H_0$	2			
i^y		1152	$3H_0$	3			
j^y		1536	$4H_0$	4			
k^y		1536	H_{11}	1			
l^y		1920	$5H_0$	5			
m^y		1920	H_{12}	1			

Note 1 - For multiple B/H_0 connections, all channels are synchronized at the receiving terminal using the multiframe structure mechanism as described in § 2.7 of Recommendation H.221.

Note 2 - This column represents the minimum number of ATM virtual channels that the corresponding H.321 terminal type should support. This will enable complete interworking with H.320 terminals through a N-ISDN/B-ISDN interworking unit (according to Recommendation I.580). However, when two H.321 terminals communicate with each other, a single VC can be used for the transfer of the aggregate channel rate (e.g., 128 kbit/s) as explained below.

Note 3 - If a visual telephone interworks with a wideband speech terminal, G.722 audio may be used instead of G.711 audio.

Note 4 - (Audio coding of mode b_3) In addition to G.728, higher quality audio coding such as H.200/AV.253 may be used for this mode.

Note 5 - g=c/d/e/f corresponds to n=3/4/5/6, respectively. This mode is applicable to the ISDN basic rate interface if multiple basic accesses are used.

Note 6 - Other audio modes (G.711 and G.728) can be invoked using the appropriate H.242 procedures.

The number of ATM VCs that must be supported by a given H.321 terminal is the same as the number of N-ISDN channels (i.e., B or H_0 channels) supported by that terminal type (or the corresponding H.320 terminal). For example, under the $\mathbf{b}^y$ transfer mode, two separate channels can be established between two H.321 terminals. Synchronization between the two channels is achieved through the multiframe structure described in Recommendation H.221. Similarly, an H.320 terminal using the **b** transfer mode (i.e., two B channels over a N-ISDN network) can communicate with an H.321 terminal that is capable of supporting the $\mathbf{b}^y$ mode (i.e., two B channels each of which is carried by an ATM VC over a B-ISDN network through circuit emulation). Figure 4a/H.321 illustrates the transfer mode of multiple channels over multiple VCs. *The support of this mode by H.321 terminals, which support multiple B or H_0 channels (i.e.,* $\mathbf{b}^y$, $\mathbf{g}^y{}_{1\text{-}3}$, $\mathbf{h}^y$, $\mathbf{i}^y$, $\mathbf{j}^y$, *and* $\mathbf{l}^y$*), is mandatory.*

Moreover, when two H.321 terminals communicate with each other, a single VC can be used for the transfer of the aggregate channel rate (e.g., 128 kbit/s). The use of a single VC will require the exchange of some user-to-user signaling information between the two terminals during call setup. The use of Q.2931 messages to identify terminals as being H.321 rather than H.320 is under study (jointly with SG11).

For the single VC case, and when the aggregate transfer rate is equivalent to multiple B or H_0 channels (e.g., 128 kbit/s), there are two possibilities for the transfer of the audiovisual data:

1. The data contains multiple H.221 service channels, the number being the same as the number of B or H_0 channels. This mode is illustrated in Figure 4b/H.321. *The support of this mode by H.321 terminals, which support multiple B or H_0 channels (i.e.,* $\mathbf{b}^y$, $\mathbf{g}^y{}_{1\text{-}3}$, $\mathbf{h}^y$, $\mathbf{i}^y$, $\mathbf{j}^y$, *and* $\mathbf{l}^y$*), is optional.*
2. The data contains a single H.221 service channel (i.e., FAS/BAS). This mode is illustrated in Figure 4c/H.321. *The support of this mode by H.321 terminals, which support a single B, H_0, H_{11}, or H_{12} channel (i.e.,* $\mathbf{a}^y$, $\mathbf{g}^y$, $\mathbf{k}^y$, *and* $\mathbf{m}^y$*), is mandatory.* However, *the support of this mode by H.321 terminals, which support multiple B or H_0 channels (i.e.,* $\mathbf{b}^y$, $\mathbf{g}^y{}_{1\text{-}3}$, $\mathbf{h}^y$, $\mathbf{i}^y$, $\mathbf{j}^y$, *and* $\mathbf{l}^y$*), is optional.*

See § 5.6 for more details regarding the multiple and single VC transfer modes.

4.5 Point to point communication

An H.321 terminal may have a variety of capabilities. In point to point communications, a common set of them is determined on a call by call basis through the communication procedures defined in H.242.

4.6 Multipoint communication

An H.321 terminal can participate with other H.321 or H.320 terminals in multipoint communications through MCUs which are accommodated in B-ISDN or N-ISDN. An example of a multipoint configuration is shown in Figure 3/H.321. The necessary communication procedures are found in Recommendation H.243.

5. Infrastructure

5.1 Audio coding

As per G.711, G.722, G.728 or other standardized coding methods which may be added in the future.

5.2 Video coding

As per H.261.

5.3 Multimedia multiplexing and synchronization

As per H.221.

5.4 End-to-end control

Mandatory Control & Indication signals are defined in Table 4/H.320. Other C&I signals are defined in H.230.

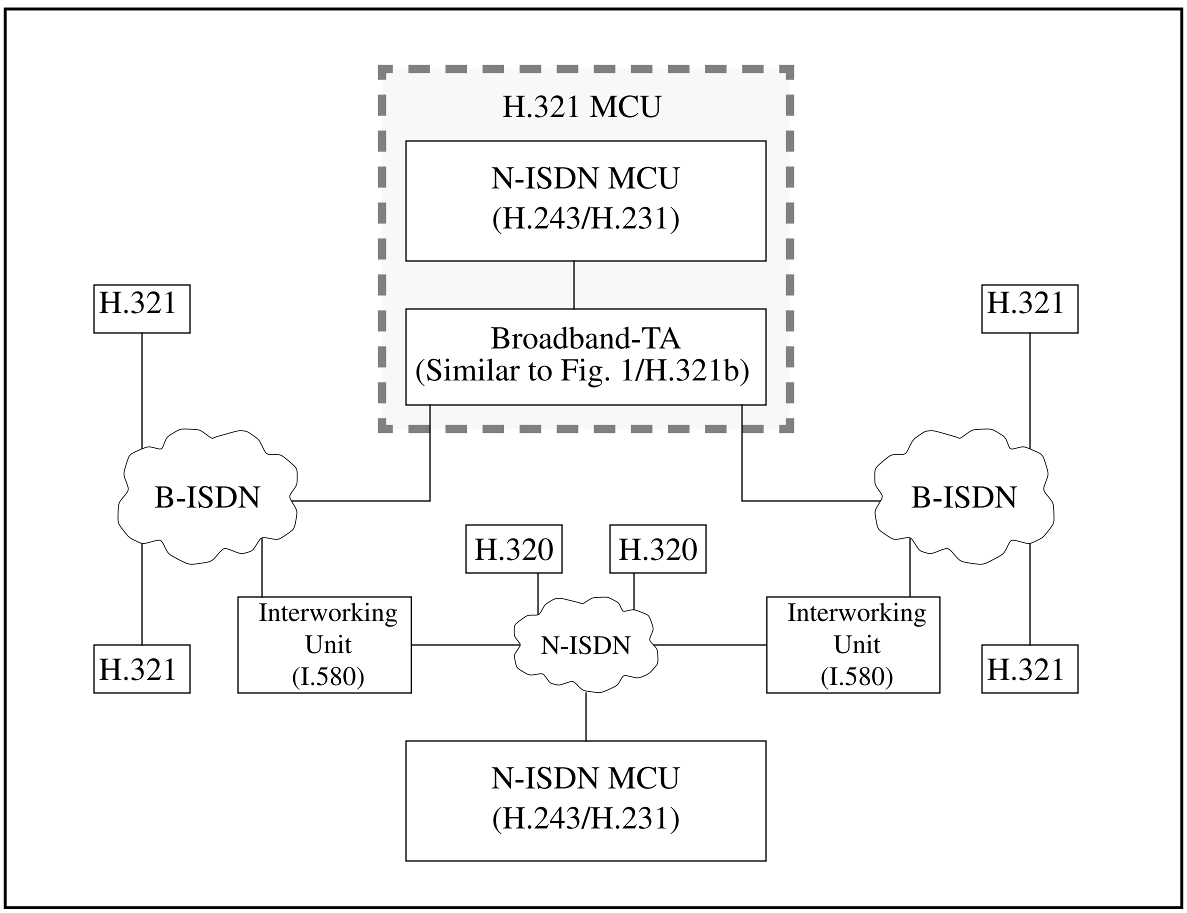

FIGURE 3/H.321: An example of a multipoint configuration for H.321/H.320 terminals

5.5 Communication procedures

As per H.242 and H.243.

5.6 AAL functions

Segmentation-and-Reassembly (SAR) and Convergence Sublayer (CS) functions of AAL Type 1 (AAL-1) shall be supported by H.321 terminals. Figure 4/H.321 shows a functional architecture for the SAR and CS functions and their interfaces within an H.321 terminal.

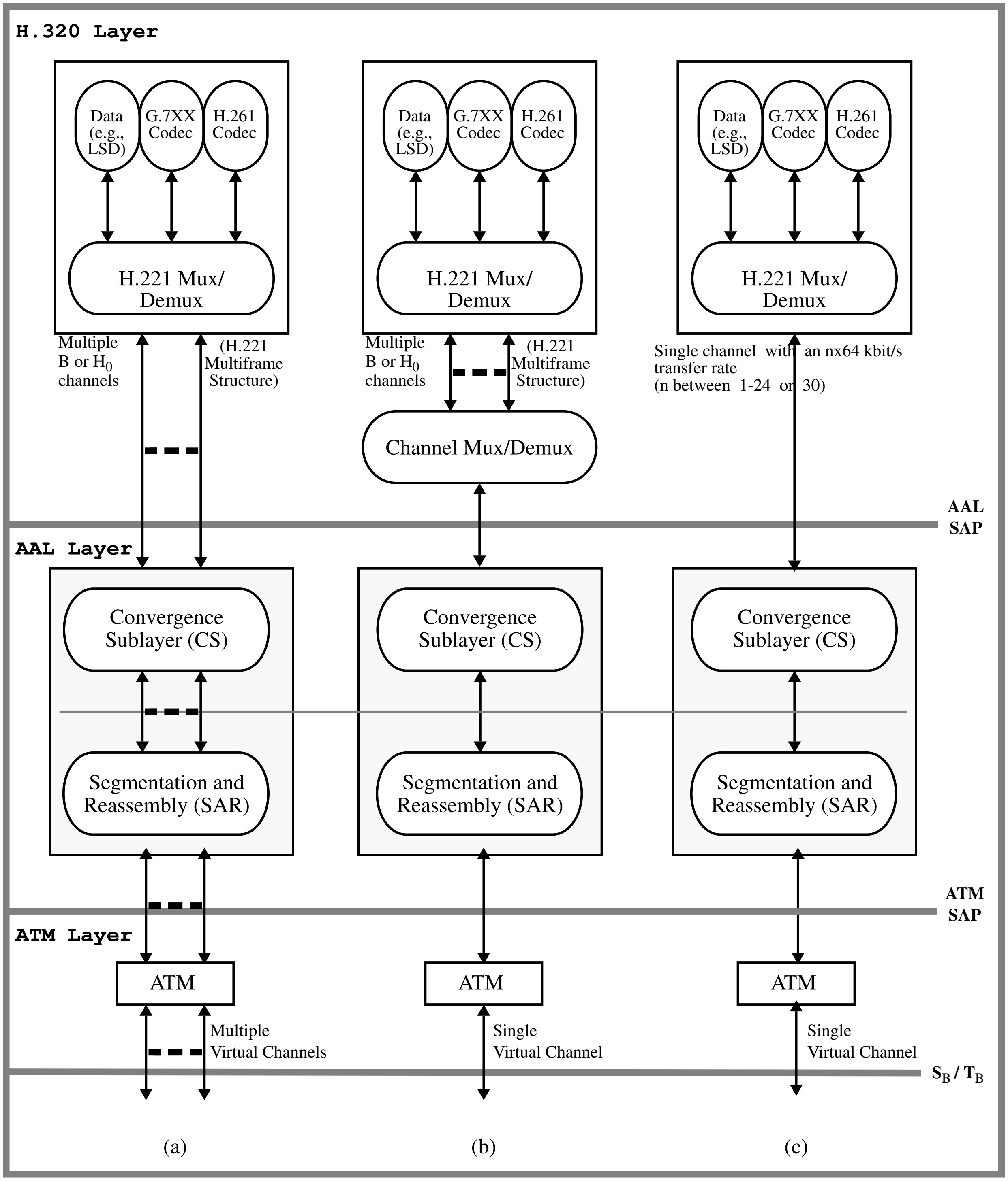

FIGURE 4/H.321: AAL layer interfaces for H.321 terminals with single and multiple virtual channels.

Three transfer modes are shown in the Figure: multiple channels over multiple VCs, multiple channels over a single VC, and a single channel over a single VC. H.321 terminals that support the transfer of multiple channels must support the mode illustrated in Figure 4a/H.321. H.321 terminals that only support the transfer of a single channel (e.g., single B or H_0) must support the mode illustrated in Figure 4c/H.321. The support of the transfer mode illustrated in Figure 4b/H.321 is optional. (See § 4.4 for more details.)

For the multiple-channels over a single-VC case (i.e., the mode shown in Figure 4b/H.321), the multiplexing should be done using octet interleaving among the different channels. An example of this is shown in Figure 5/H.321.

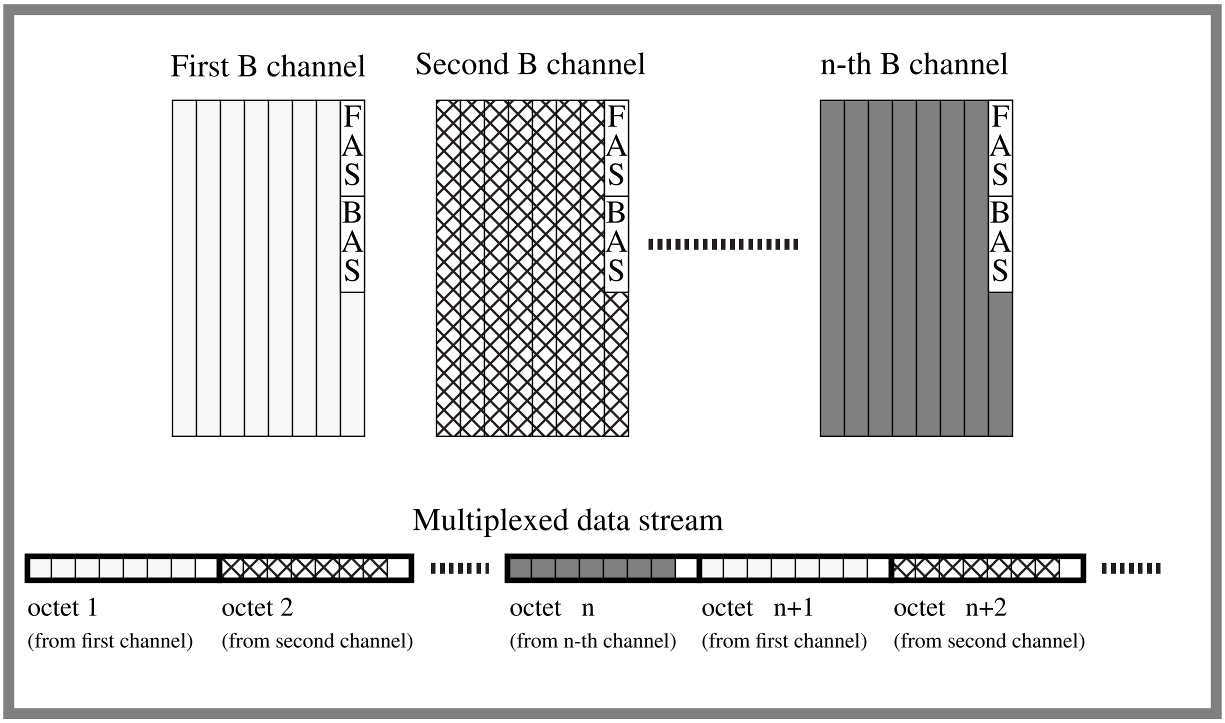

FIGURE 5/H.321: Octet interleaving of multiplexed channels for the transfer mode shown in Figure 4b.

At the AAL Service Access Point (AAL-SAP) the CS sublayer receives AAL Service Data Units (AAL-SDUs) from the H.320 layer. The AAL-SDU is an octet of a constant bitrate (CBR) H.320 signal.The SAR sublayer receives a 47-byte CS Protocol Data Unit (PDU) from the convergence sublayer, and adds a one byte of SAR header to generate the 48-byte SAR-PDU. The SAR-PDU is passed to the ATM layer across the ATM-SAP. The ATM layer adds the five-byte ATM header and forms the 53-byte ATM cell.

5.6.1 Convergence sublayer functions

The only CS function supported by H.321 terminals is the Structure Data Transfer (SDT) mode. It is important to note that all H.321 terminals are required to support this function at all time[1]. The SDT mode includes the transfer of the SDT pointer for all nx64 transfer rates except for the single B (i.e., 64 kbit/s) case as specified in Recommendation I.363. The SDT mode should be used both when H.321 terminals are communicating with H.320 terminals, and when H.321 terminals are

1. The use of the SDT pointer for the transfer mode illustrated in Figures 4b/H.321 and 5/H.321 (i.e., multiple channels over a single VC) is under study.

communicating among themselves over a B-ISDN network. It is also important to note that when multiple-B channels are established over multiple VCs, then the SDT pointer is **not** used in the individual channels[1] (although the aggregate transfer rate is a multiple of 64 kbit/s). However, if multiple-B channels are carried over a single VC, then the SDT pointer should be employed as per Recommendation I.363.

5.6.2 SAR sublayer functions

In addition to mapping between the CS-PDU and SAR-PDU, in H.321 terminals the SAR sublayer provides the following functions:

a. Sequence numbering:

   At the transmitting end, the SAR sublayer receives a sequence number from the CS sublayer for each CS-PDU. This number occupies three bits of the four-bit sequence number (SN) field of the SAR-PDU byte header. At the receiving end, the sequence number value is passed to the CS.

b. CS indication:

   The SAR sublayer indicates the existence of the CS sublayer. In H.321 terminals, and as explained above, when the convergence sublayer SDT pointer is present, coding of the CS Indication (CSI) bit and the SDT pointer byte should be done according to Recommendation I.363. The Synchronous Residual Time Stamp (SRTS) function is **not** used in H.321 terminals.

c. Error protection:

   The SAR sublayer protects the SN field (i.e., the 3-bit sequence number value and the CSI bit) using a 4-bit SN Protection (SNP) field. The SNP is divided into a 3-bit CRC code to protect the SN field, and an even parity to protect the resulting seven-bit code (4-bit SN plus 3-bit CRC).

5.7 Call control

Since an H.321 terminal is, in principle, a B-ISDN terminal emulating a N-ISDN service, then a call is established through the procedures defined in § 6 of Recommendation Q.2931[2].

The out-of-band signalling functional unit of an H.321 terminal should use, during the call-connection procedure, the Q.2931 Information Elements (IEs) shown in Table 2. These IEs are part of the SETUP message[3] (Table 3-19/Q.2931) used when initiating a 64 kbit/s based circuit-mode ISDN service call over a broadband ISDN network.

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1. This includes the commonly used 2x64 kbit/s (2B) connection mode over two virtual channels.

2. That section of Recommendation Q.2931 outlines the requirements for supporting (a) 64 kbit/s based circuit-mode ISDN services in B-ISDN and (b) access signalling interworking between N-ISDN and B-ISDN.

3. Other Q.2931 messages may also use these IEs.

Table 2/H.321: Q.2931 Information Elements for H.321 terminals

Q.2931 Information Element	Information Element Field(s)	IE Parameter(s) for H.321 terminals
Narrowband bearer capability (N-BC)	**Information transfer capability**	• Unrestricted Digital Information (UDI) • Restricted Digital Information (RDI) • 3.1kHz audio • UDI with tone/announcement (UDI-TA)
	Transfer mode	• circuit
	Information transfer rate	• 64 kbit/s • 2x64 kbit/s • 384 kbit/s • 1536 kbit/s • 1920 kbit/s • multirate (64 kbit/s base rate)
	Rate multiplier	• 2 to the maximum number of B channels.
	User information layer 1 protocol	• Recommendation G.711 μ-law • Recommendation G.711 A-law • Recommendations H.221 and H.242
Broadband bearer capability (B-BC)	**Bearer class**	• BCOB-A
	Susceptibility to clipping	• Susceptible to clipping
	Call configuration	• point-to-point
Broadband low layer information (B-LLI)	(The support of this information element by H.321 terminals is under study)	

Table 2/H.321: Q.2931 Information Elements for H.321 terminals

Q.2931 Information Element	Information Element Field(s)	IE Parameter(s) for H.321 terminals
ATM traffic descriptor	**Forward peak cell rate** (for CLP 0)	(Variable: depends on the transfer rate)
	Backward peak cell rate (for CLP 0)	
	Forward peak cell rate (for CLP 0+1)	
	Backward peak cell rate (for CLP 0+1)	
AAL parameters	**AAL type**	• AAL 1
	Subtype identifier	• Circuit Transport
	CBR rate	• 64 kbit/s • nx64 kbit/s
	Multiplier	• 2 to the maximum value of n (in nx64 kbit/s) supported by the corresponding H.321 terminal. (Note 1)
	Source clock frequency recovery method	• Null (synchronous) • Adaptive Clock Method (Note 2)
	Error correction method	• Null (No error correction is provided) (Note 3)
	Structure data transfer block size	(Note 4)
	Partially filled cells method	• 47
End-to-End transit delay	**Cumulative transit delay value**	(Under Study)
	Maximum end-to-end transit delay value	
Quality of service (QOS)	(Under Study)	

Table 2/H.321: Q.2931 Information Elements for H.321 terminals

Q.2931 Information Element	Information Element Field(s)	IE Parameter(s) for H.321 terminals
Narrowband low layer compatibility (N-LLC) (Note 5)	**Information transfer capability**	• Unrestricted Digital Information (UDI) • Restricted Digital Information (RDI) • 3.1kHz audio • UDI with tone/announcement (UDI-TA)
	Negotiation indicator	• out-band negotiation not possible • out-band negotiation possible
	Transfer mode	• circuit
	Information transfer rate	• 64 kbit/s • 2x64 kbit/s • 384 kbit/s • 1536 kbit/s • 1920 kbit/s • multirate (64 kbit/s base rate)
	Rate multiplier	• 2 to the maximum number of B channels.
	User information layer 1 protocol	• Recommendation G.711 μ-law • Recommendation G.711 A-law • Recommendations H.221 and H.242
Narrowband high layer compatibility (N-HLC)	(Note 6)	
OAM traffic descriptor	(Under Study)	

Note 1 - It is important to note that, when H.321 terminals are communicating with H.320 terminals then the multipliers 6, 24, and 30 should be used for the H_0, H_{11}, and H_{12} transfer rates, respectively. On the other hand, when H.321 terminals are communicating among themselves over a B-ISDN network, then all integer values between 2 and 30 can be used. The capability of transferring nx64 kbit/s data (for an arbitrary n between 1-24 or 30) over a single VC is under study as explained in § 4.4 of this Recommendation.

Note 2 - There are two possible solutions for recovering the source clock in H.321 terminals: (1) If a common clock is available at both ends, then this clock is used to recover timing and synchronize both ends as usually done in a synchronous circuit transport; (2) When a common clock is not available, then the Adaptive Clock Recovery method is used. Therefore, in H.321 terminals, the Synchronous Residual Time Stamp (SRTS) approach is not needed, and consequently is not supported by this Recommendation.

Note 3 - H.321 terminals do not employ the short or long interleaver (FEC and cell-loss recovery mechanism) options available within the convergence sublayer of AAL type 1.

Note 4 - As noted in § 5.6 of this Recommendation, the SDT mode must be supported by all H.321 terminals, and should be used at all time. See § 5.6 for more details.

Note 5 - The (optional) N-LLC information element is used for compatibility checking between the two communicating ends. The attributes in here should not be in conflict with the attributes specified in the N-BC information element.

Note 6 - The (optional) N-HLC information element is used for compatibility checking between the two communicating ends.

6. Terminal equipment

6.1 Environments

6.2 Audio source and arrangement

(See Recommendation H.320)

6.3 Video source and arrangement

(See Recommendation H.320)

6.4 Data and other auxiliary equipment

(See Recommendation H.320)

6.5 Optional enhancements

(Under Study)

6.6 Error resilience

In B-ISDN environments, a communication channel may suffer from occasional bit errors and cell losses. Audio and video source coding/decoding have inherent or built-in error correction or resilience mechanisms such as the BCH FEC code in H.261 which provides an appropriate protection against random bit-error events. Furthermore, because the mean time between cell loss events is expected to be acceptably long for the applications supported by H.321 terminals, the short or long FEC interleaver options of the AAL type 1 convergence sublayer are not provided.

7. Intercommunications

7.1 Intercommunication among H.321 terminals

A common mode of (H.320) operation among H.321 terminals should be determined as described in Recommendation H.320. Moreover, when an H.321 terminal is communicating with another H.321 terminal, several possibilities exist regarding the number of virtual channels needed between the two terminals. Both single and multiple VCs scenarios are shown in Figure 6/H.321.

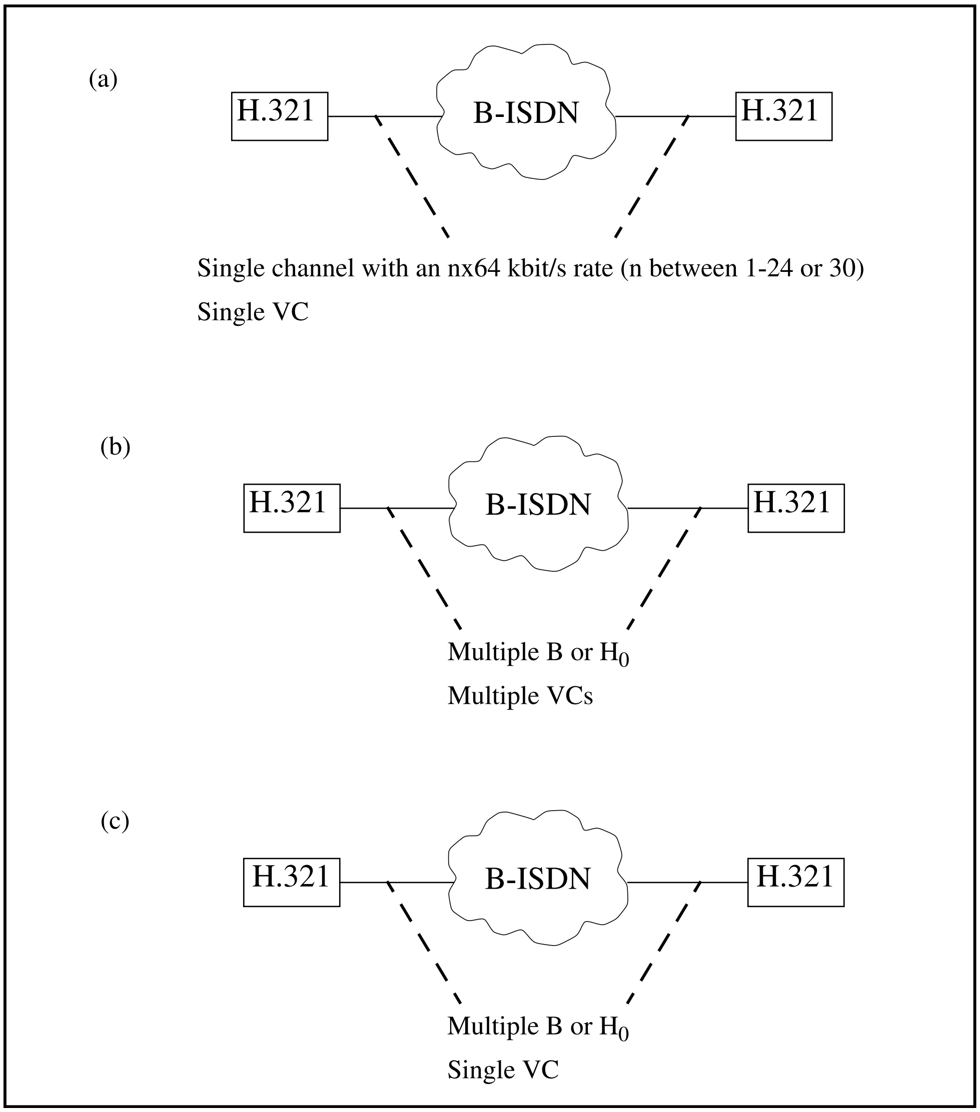

FIGURE 6/H.321: Interworking scenarios between H.321 terminals

7.2 Intercommunication with N-ISDN terminals

H.321 terminals have the capability of interworking with H.320 terminals through the network support of interconnection between B-ISDN and N-ISDN as specified in I.580.

A common mode of (H.320) operation among H.320 and H.321 terminals should be determined as described in Recommendation H.320. Moreover, several modes of communications are possible between H.320 and H.321 terminals, depending on, for example, the number of channels used. Examples of these communication modes are shown in Figure 7/H.321.

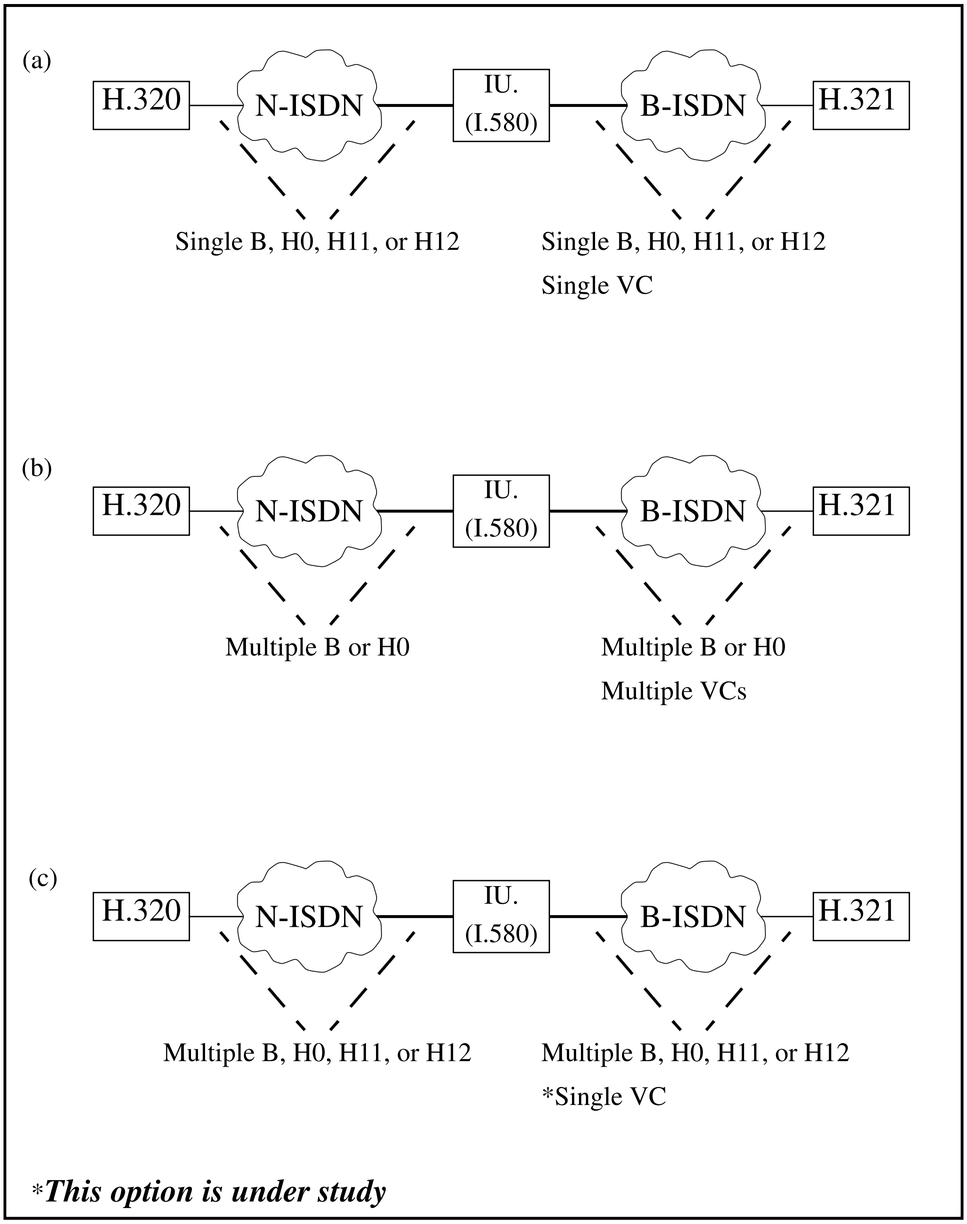

FIGURE 7/H.321: Interworking scenarios among H.320 and H.321 terminals

7.3 Intercommunication with telephony

H.321 terminals shall be able to interwork with telephones accommodated in N-ISDN and PSTN using G.711 audio.

7.4 Intercommunication with audiovisual terminals connected to other networks

A common mode of (H.320) operation among H.322/H.323 and H.321 terminals should be determined as described in Recommendation H.320. H.321 terminals will interwork with both H.322 (H.320 over guaranteed bandwidth LANs) and H.323 (H.320 over non-guaranteed bandwidth LANs) terminals as shown in Figure 8/H.321.

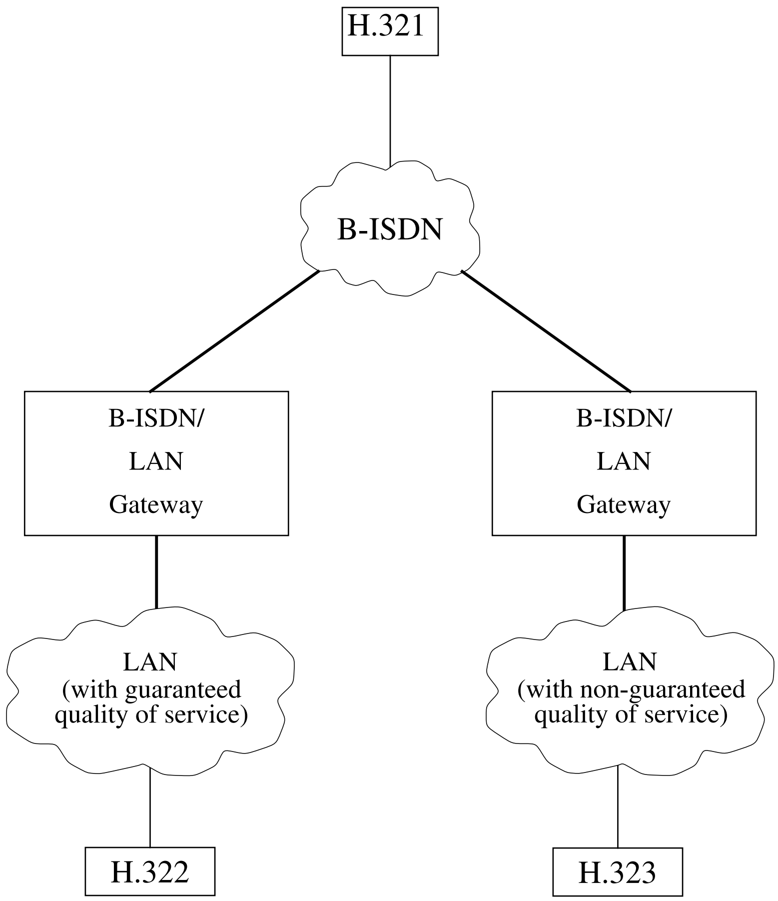

FIGURE 8/H.321: Interworking between H.322/H.323 and H.321 terminals

END