

## **Recommendation H.320**

Recommendation H.320

### NARROW-BAND VISUAL TELEPHONE SYSTEMS AND TERMINAL EQUIPMENT

## **1 Scope**

This Recommendation covers the technical requirements for narrow-band visual telephone services defined in H.200/AV.120-Serie Recommendations, where channel rates do not exceed 1920 kbit/s.

*Note* — It is anticipated that this Recommendation will be extended to a number of Recommendations each of which would cover a single videoconferencing or videophone service (narrow-band, broadband, etc.). However, large parts of these Recommendations would have identical wording, while in the points of divergence the actual choices between alternatives have not yet been made; for the time being, therefore, it is convenient to treat all the text in a single Recommendation.

The service requirements for visual telephone services are presented in Recommendation H.200/AV.120-Serie; video and audio coding systems and other technical set aspects common to audiovisual services are covered in other Recommendations in the H.200/AV.200-Serie.

## **2 Definitions**

### **bit-rate allocation signal (BAS)**

Bit position within the frame structure of H.221 to transmit, e.g. commands, control and indication signals, capabilities.

### **control and indication (C&I)**

End-to-end signalling between terminals consisting of control which causes a state change in the receiver and indication which provides for information as to the functioning of the system, see also Recommendation H.230.

### **data port**

Input/output gate for the user data transmitted within service channel or sub-channels according to Recommendation H.221.

### **lip synchronization**

Operation to provide feeling that speaking motion of the displayed person is synchronized with the voice the person makes.

### **in-band signalling**

Signalling via BAS of the H.221 frame structure.

**multipoint control unit (MCU)**

A piece of equipment located in a node of the network or in a terminal which receives several channels from access ports and, according to certain criterions, processes audiovisual signals and distributes them to the connected channels.

### **man-machine interface (MMI)**

Man-machine interface between user and terminal/system which consists of a physical section (electro-acoustic, electro-optic transducer, keys, etc.) and a logical section dealing with functional operation states.

### **narrow-band**

Bit rates ranging from 64 kbit/s to 1920 kbit/s. This channel capacity may be provided as a single B/H0/H11/H12-channel or multiple B/H0-channels in ISDN.

### **out-band signalling**

Signalling via a channel not being part of the B/H0/H11/H12-channel (due to I.400-Serie Recommendations).

### **visual telephone services**

A group of audiovisual services including videophone defined in Recommendation F.721 and videoconferencing to be defined in H.200/AV.112-Serie Recommendations.

FIGURE 1/H.230 = 11,5 cm

## 3 System description

### 3.1 Block diagram and identification of elements

A generic visual telephone system is shown in Figure 1/H.320. It consists of terminal equipment, network, multipoint control unit (MCU) and other system operation entities.

A configuration of the terminal equipment consisting of several functional units is also shown in Figure 1/H.320. Video I/O equipment includes cameras, monitors and video processing units to provide functions such as split-screen scheme. Audio I/O equipment includes microphones, loud-speakers and audio processing units to provide such functions as acoustic echo cancellation. Telematic equipment are visual aids such as electronic blackboard, still picture transceiver to enhance basic visual telephone communication. System control unit carries out such functions as network access through end-to-network signalling and end-to-end control to establish common mode of operation and signalling for proper operation of the terminal through end-to-end signalling. Video codec carries out redundancy reduction coding and decoding for video signals, while audio codec does the same thing for audio signals. Delay in the audio path compensates video codec delay to maintain lip synchronization. Mux/dmux unit multiplexes transmitting video, audio, data and control signals into a single bit stream and demultiplexes a received bit stream into consisting multimedia signals. Network interface makes necessary adaptation between the network and the terminal according to the user-network interface requirements defined in the I.400-Serie Recommendations.

### 3.2 Signals

Visual telephone signals are classified into video, audio, data and control as follows:

- Audio signals are continuous traffic and require real-time transmission.  
*Note* — In order to reduce the average bit rate of audio signals, voice activation can be introduced (in which case the audio signals are no longer continuous).
- Video signals are also continuous traffic, the bit rate allocated to video signals should be as high as possible, in order to maximize the quality within the available channel capacity.
- Data signals include still pictures, facsimile and documents, or other facilities, this signal may occur only occasionally as required and may temporarily displace all or part of the audiovisual signal content. It should be noted that data signals are associated only with optional enhancements to the basic visual telephone system, therefore, the opening of a path to carry such signals is preceded by negotiation between the terminals.
- Control signals are some system control signals by definition. The path for the terminal-to-network control signals is provided in the D-channel, while the path for the terminal-to-terminal control signals is provided in BAS or service channel only when necessary by the mechanism defined in Recommendation H.221.

### 3.3 *Bit rate options and infrastructure*

#### 3.3.1 *Communication modes of visual telephone*

Communication modes of visual telephone are defined in Table 1/H.320 according to their channel configuration and coding.

μTABLE 1/H.320

#### **Communication modes of visual telephone**

Visual  
telephone mode

Channel  
rate  
(kbit/s)

ISDN  
channel  
(Note 2)

ISDN interface

Coding

Basic

Primary  
rate

Audio

Video

a

a0

64

B

Rec. G.711

Not  
applicable

a1

Rec. H.200/  
AV.254

b

b1

128

2B

Rec. G.711

b2

Rec. G.722

b3

Rec.H.200/  
AV.254, AV.253  
(Note 1)

c

198

3B

d

256

4B

e

320

5B

Rec. H.261

f

384

6B

g

384

H0

Applicable

Rec. G.722

h

768

2H0

i

1152

3H0

Not  
applicable

j

1536

4H0

k

1536

H11

l

1920

5H0

m

1920

H12

*Note 1* — (Audio coding of mode b3) In addition to H.200/AV.254, higher quality audio coding such as H.200/AV.253 may be used for this mode.

*Note 2* — For multiple channels of B/H0, all channels are synchronized at the terminal according to § 2.7 of Recommendation H.221.

## §

### 3.3.2 *Terminal types of visual telephone*

Table 2/H.320 lists terminal types of visual telephone. The terminal type is categorized according to the communication modes and the type of communication channels with which the terminal can communicate; mxB (type X with parameter a-f), nxH0 (type Y with parameter 1-5; see Note), H11/H12 (type Z with parameter a-β) or their combinations.

*Note* — Type Y terminals must have the H0-6B compatibility mode defined in

Recommendation H.221 for interworking of evolving networks.

### 3.3.2.1 *Examples:*

- a) type Xb3 is a terminal capable of operating at modes a0, a1, b1, b2 and b3 through B or 2xB-channel;
- b) type Xb3Y1 is a terminal capable of operating at modes a0, a1, b1, b2, b3 and g through B, 2xB- or H0-channel.
- c) type XfY4Za is a terminal capable of operating at modes a0-k through (1-6)xB, (1-4)xH0- or H11-channel.

For MxB and NxH0 categories, the terminal should be able to operate at all the values of m and n not higher than M and N in principle (see Note). The type of remote terminal is identified through the transfer rate capability exchange defined in Recommendation H.242.

*Note* — Until Recommendation H.200/AV.254 is recommended, exceptions may arise.

### 3.3.3 *Video codec*

As per Recommendation H.261.

### 3.3.4 *Audio codec*

As per Recommendations G.711, G.722, H.200/AV.254, AV.253 (see Table 1/H.320).

### 3.3.5 *Frame structure*

As per Recommendation H.221.

### 3.3.6 *Control and indication (C&I)*

Identified subset of H.230 is used (see § 4.4).

### 3.3.7 *Communication procedure*

As per Recommendation H.242.

## 3.4 *Call control arrangements*

To establish intercommunication between various audiovisual terminals, it is necessary to carry out in-band and out-band procedures according to Recommendation H.242 and other relevant Recommendations.

The different stages of the call are referred according to a point-to-point configuration where terminal X is the calling terminal and Y the called terminal.

μTABLE 2/H.320

**Visual telephone terminal type**

Mode

Type X (Note 2)

Type Y (Note 3)

Type Z

a

b1

b2

b3

b4

b5

c

d

e

f

1

2

3

4

5

a

b

a0 B (audio only)

X

X

X

X

X

X

X  
X  
X  
X

a1 B (H.200/AV.254 audio)

X  
X  
X  
X

X  
X  
X  
X

b1 2B (G.711 audio)

X

X

X

X

X

X

X

X

X

b2 2B (G.722 audio)

X

X

X

X

X

X

X

b3 2B (H.200/AV.254 audio)

X

X

X

X

X

c 3B

X

X

X

X

d 4B

X

X

X

e 5B

X

X

f 6B

X

g H0

X

X

X

X

X

h 2H0

X

X

X

X

i 3H0

X  
X  
X

j 4H0

X

X

k H11

X

1 5H0

X

m H12

X

*Note 1* — “X” means the mode is equipped with the terminal of the type.

*Note 2* — Types Xb4 and Xb5 are defined to take into account that H.200/AV.254 has not yet been recommended.

*Note 3* — Terminal of this type must have the H0-6B compatible mode defined in Recommendation H.221.

§

### 3.4.1 *Establishment of a visual telephone call — Normal procedure*

The provision of the communication is made in the main following steps:

- phase A: call set-up, out-band signalling;
- phase B1: mode initialization on initial channel;
- phase CA: call set-up of additional channel(s), if relevant;
- phase CB1: initialization on additional channel(s);
- phase B2 (or CB2): establishment of common parameters;
- phase C: visual telephone communication;
- phase D: termination phase;
- phase E: call release.

#### 3.4.1.1 *Phase A — Call set-up*

After user initialization, the terminal X performs a call set-up procedure. As soon as the terminal receives an indication from the network that the connection is established, a bidirectional channel is opened from end to end, and it overlays H.221 framing on the channel.

Following the connection establishment, all the terminals will start to work in the following modes defined in Recommendation H.221:

- type X: mode OF (A-law or  $\mu$ -law),
- type Y and type Z: mode OF (A-law or  $\mu$ -law) audio only.

In-band procedure is activated.

#### 3.4.1.2 *Phase B1 — Mode initialization*

#### 3.4.1.3 *Phase B1-1*

Using the procedures provided in Recommendation H.242, framed PCM audio is transmitted in both directions, after frame and multiframe alignment terminal capabilities are exchanged.

#### 3.4.1.4 *Phase B1-2 (terminal procedure)*

Determination of the appropriate mode to be transmitted. This will normally be the highest common mode (see Table 3/H.320 for the case using a B or 2xB-channel), but a lower compatible mode could be chosen instead.

In the case that both terminals have announced the capability to work on additional channel(s), terminal X initiates the request for supplementary call set-up. Alternatively, this action may be suspended until the user at X has given the go-ahead, the Y user may also control the additional channel requests. It is for further study.

*Note* — If the user at either terminal does not wish the call to proceed to two or more

channels, even though his terminal has this capability, he must set the terminal such that only single-channel capability is declared in phase B1-1. In that case, we should distinguish the active capability, wished by the users, from the virtual capability of the terminal.

#### 3.4.1.5 *Phase B1-3 (mode switching)*

Both terminals switch to the mode they have identified in phase B1-2, using the procedure of Recommendation H.242.

*Note* — If the terminals have not both adopted the common mode, an asymmetric communication may result.

**C&I signals for visual telephone**

*Note* — The

	C&I signal
	C/I
	Source
	Sink
	Sync. with picture
	Transmission channel
	Codeword definition
Picture format	I
	Decoder
Coder	No
	BAS
	H.221
Picture format	C
	Coder
Decoder	Yes
	Embedded in video
	H.261

communication modes indicated in the table above include the possibility to use the CIF format as well as the QCIF format. The CIF format is used in both directions of transmission, if both terminals indicate this capability. In all other cases the QCIF format is used.

Each terminal may use a minimum decodable picture interval in its sending direction which makes best use of the capability indicated by the other terminal.

This table does not include interworking situations between visual telephones and telephone terminals. If visual telephone terminals are connected to telephones, mode a0 is used for the communication.