ITU Telecommunication Standardization Sector
Study Group 15
Experts Group for Video Coding and Systems
in ATM and Other Network Environments

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Title: H.32X Communication Modes, Terminal Types and Interworking Scenarios between H.32X terminals
Purpose: Discussion/Proposal

1. Introduction

In the narrow-band ISDN environment, the communication mode of an H.320 terminal can be uniquely identified by the combination of channel rate, audio codec and video codec capabilities[1]. Because of the relatively limited number of choices in these capabilities, the number of allowable communication modes is reasonably small and manageable. Basically the channel rate decides the mode with only a few variations allowed for several G.-series voice coding standards. The video codec capability (i.e., H.261) and multiplex format (i.e., H.221) follow without ambiguity after the specification of the network adaptation capability, which is nothing but the channel rate in the circuit-based narrow-band ISDN. Terminal types are then defined according to the communication modes that a terminal is capable of. Interworking between terminals of different types can be easily achieved by using the default (minimum) communication mode.

With all the flexibility in the broadband environment, the definition of communication modes, terminal types, and interworking scenarios have become much more complicated. The network capabilities extend far beyond just the channel rate specification. They include the indication of CBR/VBR, different AALs, different service types and bit rates for CBR, different traffic descriptors for VBR, and different multiplexing possibilities. Even with an unambiguous specification of network capabilities, there still exist different possibilities of video coding and audio coding.

Contributions AVC-608[2], AVC-610[3], and AVC-612[4] submitted in March/94 meeting considered three terminal types and implicitly discussed several possible communication modes. This contribution attempts to present a framework for the work on the H.32X to move forward along this direction. This contribution also provides a strawman proposal for H.32X communication modes, terminal types, and the interworking scenarios among these terminal types.

2. Communication Modes

Similar to H.320, three attributes are used in the definition of a communication mode. These attributes are Video Codec Capabilities (VCC), Audio Codec Capabilities (ACC), and Network Adaptation Capabilities (NAC). Since a communication session may be asymmetric for many applications in the broadband environment, these attributes are specified separately for the transmit end (TE) and the receive end (RE). An alternative to separate TE and RE attributes is to add a fourth attribute for symmetry with the possible values of "receive only," and "bi-directional." However, this approach will take away the flexibility of having bi-directional but asymmetric capabilities.

2.1 Video Codec Capabilities (VCC)

Possible values of this attribute at the transmit end:

- H.261 (more granularity?)
- H.262 MP@ML
- H.262 MP@HL

Possible values of this attribute at the receive end:

- H.261 (more granularity?)
- H.262 MP@ML
- H.262 MP@HL

2.2 Audio Codec Capabilities (ACC)

Possible values of this attribute at the transmit end:

- G.-series Audio
- MPEG-2 Audio
- MPEG-2 Audio Extension

Possible values of this attribute at the receive end:

- G.-series Audio
- MPEG-2 Audio
- MPEG-2 Audio Extension

2.3 Network Adaptation Capabilities (NAC)

This attribute can be further divided into the following sub-attributes:

1. Multiplexing and synchronization
2. AAL
3. Bit rate

Some possible values of this attribute at both the transmit end and receive end are shown in the following list.

- H.221 in a single VC, AAL1 with Circuit Emulation, appropriate bit rates

- H.222.0 Transport Stream in a single VC, AAL1, CBR with appropriate bit rates
- H.222.0 Transport Stream in a single VC, AAL5, CBR with appropriate bit rates
- H.222.0 Transport Stream in a single VC, AAL2, VBR with appropriate traffic descriptors
- H.222.0 Transport Stream in a single VC, AAL5, VBR with appropriate traffic descriptors
- H.222.1[1] in multiple VCs, AAL1, CBR with appropriate bit rates
- H.222.1 in multiple VCs, AAL5, CBR with appropriate bit rates
- H.222.1 in multiple VCs, AAL2, VBR with appropriate traffic descriptors
- H.222.1 in multiple VCs, AAL5, VBR with appropriate traffic descriptors

3. Terminal Types

3.1 Type A

Type A terminals have the minimum capabilities to allow easy interworking with H.320 terminals. Their capabilities are symmetric.

3.1.1 VCC

H.261 for both TE and RE.

3.1.2 ACC

G.-series audio for both TE and RE.

3.1.3 NAC

H.221 in a single VC, AAL1 with Circuit Emulation, appropriate bit rates.

3.2 Type B

Type B terminals are further divided into two sub-types. Type B1 terminals can only receive and function as viewing stations. Type B2 terminals' capabilities are symmetrical.

3.2.1 Type B1

3.2.1.1 VCC

- H.261 at RE
- MPEG-2 MP@ML at RE

3.2.1.2 ACC

- G.-series Audio at RE
- MPEG-2 Audio at RE

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[1] H.222.1 is not yet specified.

3.2.1.3 NAC

- H.221 in a single VC, AAL1 with Circuit Emulation, appropriate bit rates at RE
- Other appropriate network adaptation capabilities at RE

3.2.2 Type B2

3.2.2.1 VCC

- H.261 at RE and TE
- MPEG-2 MP@ML at RE and TE

3.2.2.2 ACC

- G.-series Audio at RE and TE
- MPEG-2 Audio at RE and TE

3.2.2.3 NAC

- H.221 in a single VC, AAL1 with Circuit Emulation, appropriate bit rates at RE and TE
- Other appropriate network adaptation capabilities at RE and TE

3.3 Type C

Type C terminals are further divided into two sub-types. Type C1 terminals can only receive and function as viewing stations. Type C2 terminals' capabilities are symmetrical.

3.3.1 Type C1

3.3.1.1 VCC

- H.261 at RE
- MPEG-2 MP@ML at RE
- MPEG-2 MP@HL at RE

3.3.1.2 ACC

- G.-series Audio at RE
- MPEG-2 Audio at RE

3.3.1.3 NAC

- H.221 in a single VC, AAL1 with Circuit Emulation, appropriate bit rates at RE
- Other appropriate network adaptation capabilities at RE

3.3.2 Type C2

3.3.2.1 VCC

- H.261 at RE and TE
- MPEG-2 MP@ML at RE and TE
- MPEG-2 MP@HL at RE and TE

3.3.2.2 ACC

- G.-series Audio at RE and TE
- MPEG-2 Audio at RE and TE

3.3.2.3 NAC

- H.221 in a single VC, AAL1 with Circuit Emulation, appropriate bit rates at RE and TE
- Other appropriate network adaptation capabilities at RE and TE

4. Interworking Scenarios

4.1 Point-to-point

The entries in the following table identify the terminal type that would dictate the communication mode of a communication session between two terminals in a point-to-point connection.

		SINK				
		Type A	Type B1	Type B2	Type C1	Type C2
SOURCE	Type A	A	A	A	A	A
	Type B2	A	B	B	B	B
	Type C2	A	B	B	C	C

4.2 Point-to-multipoint

The entries in the following table identify the terminal type that would dictate the communication mode of a communication session between terminals in a point-to-multipoint connection.

		SINK						
		Type A	Type B	Type C	Type A Type B	Type A Type C	Type B Type C	Type A Type B Type C
SOURCE	Type A	A	A	A	A	A	A	A
	Type B2	A	B	B	•	•	B	•
	Type C2	A	B	C	•	•	C	•

• Simulcast or minimum mode

5. Concluding Remarks

A framework for defining H.32X communication modes and terminal types is presented with a strawman proposal of the communication modes and terminal types. It is proposed that the Experts Group adopt such a framework and work on refining/modifying the strawman proposal for a pratical set of communication modes and terminal types.

References

[1] ITU-T Recommendation H.320, "Narrow-band Visual Telephone Systems and Terminal Equipment," March, 1993.

[2] ITU-T SG15 AVC-608, "Terminal Specifications for High Quality Videoconferencing," March 2, 1994.

[3] ITU-T SG15 AVC-610, "Terminal Specifications for Audiovisual Communication Using WS," March 2, 1994.

[4] ITU-T SG15 AVC-612, "Terminal Specifications for Broadcasting Including CATV," March 2, 1994.