AVC - 799

Telecommunication Standardization
Sector
Original: English
(TSS)

Experts Group for Video Coding and Systems in ATM and Other Network Environments **May 15-18, 1995**

STUDY GROUP 15
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Title: Comments on draft H.323 and H.22Z

Date: 5/11/95 H.323 only

data T.125

1. Scope

The scope of H.323 seems very broad. To make progress and to make best use of the expertise in this group, we recommend that the scope be limited to the following items in priority order:

equal priority

1. LAN endpoint to gateway protocols to allow interconnection with H.320, H.324 and H.310/H.321 WAN terminals and indirectly to H.322 terminals.
2. H.323 LAN endpoint to H.323 LAN endpoint operation if this can be accomplished without requiring a gateway

We recommend that the "LAN mode" and specifically the following be removed from the scope of H.323:

distributed MCU

1. MCU-less multipoint operation between H.323 LAN endpoints. (Multipoint operation will be via a WAN based MCU accessed through the gateway).
2. Interconnection of WAN terminals to MCU-less LAN multipoint conferences.

2. Terminology

We recommend that the term LAN be replaced by "packet network" as the H.323 standard applies to LAN segments that are interconnected by wide-area network links. The distinguishing characteristic of the networks covered by H.323 are that they operate using packet-oriented protocols with quality of service that is not guaranteed.

3. Speech Coders

We recommend that H.323 define code points for the low complexity ("G.DSVD") coder being defined by SG15 for SG14's DSVD project. A low complexity (< 10 Mips) and low bit rate (< 12 kbps) speech coder will allow software only implementations of H.323 endpoints that are bandwidth efficient.

4. Control Channel

We recommend that all communications on the control channel be clearly classified as being in one of the following categories:

4. (H.323/H.323 on the same LAN)

1. H.323 terminal to/from gateway
2. Gateway to/from WAN equipment
3. H.323 terminal to/from WAN equipment via the gateway

5. Call Control

We recommend that call setup for calls outbound from a H.323 terminal to the WAN and inbound call alerting take place via PDUs on a reliable transport connection between the H.323 terminal and the gateway. This reliable transport connection should be established on demand and released when the call is terminated on the WAN.

gatekeeper centralized thing

We also recommend that the call control PDUs parallel the definition of the call PDUs in IEEE 802.9a ("iso-Ethernet"). These PDUs are a subset of Q.931. The use of these PDUs will ensure that the call model on a H.323 terminal matches the ISDN model and can be presented uniformly to the user with other telephony functions. It also provides a direct solution to the problem of delivering call progress and error reports.

6. Capability Negotiation

The H.323 protocols must allow a suitably capable gateway to match dissimilar capabilities between a H.323 terminal and a WAN terminal. For instance, a H.320 (BRI) terminal may need to use G.728 for audio to free up bandwidth for video and data. However, it should be able to communicate—with a suitable gateway—with a H.324 terminal that only has G.711 or G.DSVD. The gateway in this instance needs to negotiate G.728 with the H.320 terminal and G.711 or G.DSVD with the H.324 terminal and translate the audio streams as necessary. This also requires the negotiated transfer rates to be different on the two links to retain the same video stream and nominal data bandwidth assignment.

While the previous paragraph requires the H.323 protocols to allow a gateway to participate in the capability negotiation, it is also important that the H.324 endpoint and WAN endpoints be able to exchange non-standard capabilities and non-standard commands without any special arrangements in the gateway. Specifically, the WAN endpoint and H.324 terminal should be able to use non-standard speech and video coders to accommodate evolution in these technologies.

7. Audio/Video Synchronization

The timestamps in the audio and video packets should reflect the capture time of the associated audio and video content. They should not reflect the time that the packets are queued for transmission. (Such a time stamp may be necessary for evaluating communications quality of service metrics but is not appropriate for audio/video synchronization).

The H.324 should specify an accuracy requirement for the audio/video synchronization timestamps in the transmitting H324 terminal. For a certain event—such as a clapper board click—the video packet carrying the coded video of the event and the audio packet carrying the coded audio of the event should not have timestamps that vary by no more than some bound.

Similarly there must be a numerical specification for how much error in audio/video synchronization a receiving endpoint must tolerate before it starts an error recovery procedure such as requesting a restart of the video stream. The exact error recovery procedure must also be specified.

Since the video can be delivered ahead of audio, the audio/video synchronization rules must account for this and cannot merely state that it is not allowed.

8. Audio Quality Assurance

The audio codecs on the H.324 terminals are not locked to a network provided time base and so must have an accuracy requirement for their sample rate. This will allow sample rate repair algorithms to be designed to work reliably. A accuracy requirement of 10 ppm has proven to be adequate. The need for sample rate repair is another reason for maintaining the current requirement that audio delay be only be inserted on the playback side.

The H.324 terminal must also provide some minimum amount of echo return loss (e.g., 40 dB) so that a poorly isolated terminal does not reduce audio quality at the other end.

The H.324 specification must also provide some guidance on the nominal audio levels to be transmitted. This will allow audio levels to be uniform from call to call.

9. Network Management

H.324 terminals and gateways will be deployed in large enterprise networks and must therefore provide support for network management. The H.324 specification must therefore provide definitions for management data structures such as MIBs.

10. Inbound Call Routing

We recommend that two forms of inbound call routing be supported:

1. When the gateway receives an inbound call from a WAN end-point, it utilizes either the called or calling number to map to a network address. This has the benefit of requiring no change to the WAN endpoint. The primary disadvantage is the requirement for an enterprise network administrator to assign an ISDN phone number for each H.324 end-point.
2. A more flexible approach requires the WAN endpoint to place a call to the gateway and then respond to a query from the gateway for a string that can be mapped to a network address. For H.320 endpoints, the query and response can be implement using new TCS commands in H.242. Is it possible to add this to H.320 (1996)?

11. Authentication

Since H.324 connects WAN endpoints to enterprise networks, stronger authentication than the H.242 password mechanism is required. Many enterprise networks do not authorize the use of any remote access mechanism in which cleartext passwords are transmitted over public facilities. H.324 must therefore consider enhancing H.242 with a challenge/response mechanism. Is it possible to add this to H.320 (1996)?

12. Support for T.120 Data

The specification needs to define a model for T.120 operation. Is the model for data connectivity a simple T.123 level relay? In this case, the LAN endpoints continue to support T.123 as currently specified and there is no need for H.22Z to deal with data

streams. The connection model must be specified clearly so that data streams can be associated unambiguously with their audio/video counterparts.

T.120 operation between a LAN endpoint and a WAN MCU or terminal must be fully supported. This includes the ability for GCC_Invite()s and other primitives to be issued to cause a WAN MCU to call out to a LAN terminal.

13. Multiplexing Audio and Video

To allow the use of the (evolving) quality of service functions in network routers deployed in enterprise networks, it is very important that audio and video streams are transmitted in separate packets and are either sent or received from separate network port ids.

14. Packetizing Video

We recommend that the protocol allows the video coder to transmit a stream of pictures (frames). These picture packets can be much larger than the underlying datagram service can support and so we need a protocol mechanism for fragmenting and reassembling picture packets. It is very undesirable to tie the overall protocol to H.261 as there are other video coders (H.262, H.263) already within the scope of the standard.

15. Echo on PSTN voice calls

It is necessary to bridge a H.324 terminal to a POTS telephone on an analog loop to support the bridging to a H.324 or DSVD terminal. It may be adequate to specify a minimum near end (and far end) hybrid echo suppression level for the gateway to guarantee that echo is eliminated.

16. Specification using Real World Transport Protocols

We recommend that the H.323 and H.22Z specifications contain profiles for real world transports such as TCP/IP and SPX/IPX including assigned port addresses. The revision to the T.123 specification is apparently setting a precedent here.