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Source: VideoServer (USA)
Title: Procedures for Centralized Multipoint Employing Unicast and Multicast Media Streams
Purpose: Discussion

Motivation

In [1], models are described for Centralized and Decentralized Multipoint Conferences. Decentralized Multipoint relies on terminals for media selection and mixing. This technique, can provide effective small conferences, but conference size may be limited by terminal processing bandwidth. Centralized Multipoint (MC+MP) allows potentially larger conference sizes, but depending on the topology of the conference, effectively could double the required network bandwidth used for multimedia transmission. Section 6.8.1 specifically states that the MC+MP entity may utilize IP Multicast addressing to distribute video to terminals which are multicast capable, but leaves open the use of IP Multicast for distribution of audio. It is a VideoServer position that the MC+MP entity may distribute both audio and video to terminals in a manner appropriate with their announced capabilities. Therefore, we wish to augment the Centralized Multipoint model in a manner that is asymmetric in use of IP unicast/multicast addressing mechanisms for transmit and receive.

References

[1] ITU-T Recommendation H.323: VISUAL TELEPHONE SYSTEMS AND EQUIPMENT FOR LOCAL AREA NETWORKS WHICH PROVIDE A NON-GUARANTEED QUALITY OF SERVICE, May 1996.

Centralized Model Employing Unicast/Multicast Media Stream Distribution

- H.323 Terminals transmits Unicast media streams to MC+MP.
- MC+MP transmits media on Multicast address to most endpoints (those which are multicast capable)
- MC+MP transmits media directly to selected endpoints using terminal IP address (those which are not multicast capable or which are presently in a broadcast mix.
- MC+MP signals selected endpoints whether or not to discard media streams sent to Multicast address

Capabilities

- H.245 mode: **centralizedControl**, **centralizedAudio**, **centralizedVideo**, and **centralizedData**.
- H.245 conference control options - director control, video switching, continuous presence, etc.
- MC+MP Opens dual logical channels for media stream; one for Unicast and the other for Multicast with each Multicast capable endpoint.
- MC+MP provides stream synchronization to allow terminal playout of media streams
- MC+MP may turn on/off multicast logical channels in favor of Unicast logical channels for selected endpoints. Alternatively, endpoint could switch between Unicast or Multicast logical channels by observing CSRC in RTP broadcast mix and dropping Multicast in favor of Unicast during period which CSRC indicates inclusion in mix.

Procedure

- Conference is created on MC+MP enitity

- MC+MP selected during Master/Slave Procedure
- Conference Multicast Logical Channels opened by parties which are multicast capable.
- Conference Unidirectional, Unicast Logical channels opened between MC+MP and all parties.
- The MC+MP entitiy receives media streams directed to the Unicast address supplied when the logical channels were opened for the endpoints in its conference.
- The MC+MP processes media streams. For example to obtain an audio mix and adjust timestamps for media synchronization.
- The resulting media streams are sent to participant endpoints on the conference Multicast logical channel. In addition, some endpoints may be directed to discard the media streams sent to the Multicast address in favor of streams sent to their unicast address. These streams will be prepared specifically for the endpoint for reasons such as selected endpoints to view in a video mix or an audio mix in which the endpoints own audio has been removed. The MC entity signals these endpoints when to begin discarding the conference Multicast logical channels and when to resume processing of the Multicast logical channels.
- The mechanism proposed for control of the Multicast logical channel is the flowControlCommand. When received with a Null bandwidth value on a unidirectional channel, it shall assert that the endpoint should discard the contents on the channel in favor of the corresponding Unicast logical channel. The MC entity will signal the resumption of processing by sending a flowControlCommand with the negotiated stream bandwidth.