ITU Telecommunication Standardization Study Group 15

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Experts Group for Video Coding and Systems in ATM and Other Network Environments

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PURPOSE: Proposal

TITLE : Providing Quality of Service on NGQoS LANs/H.323

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1. Introduction

This Submission is part of a group of submissions generated by RADVision relevant to the H.323 standards. We have chosen to break out our recommendations into several discrete Submissions, where each Submission is focused on a specific topic, but with an eye to the whole. The list of Submissions includes:

AVC-810 Numbering and Addressing System for H.323 Terminals and Gateways.
AVC-811 Defining Session ID for H.323
AVC-812 H.22Z Frame and LAN packet
AVC-813 Requirements for H.Signalling Recommendation within the scope of H.323
AVC-814 Providing Quality of Service on NGQoS LANs/H.323
AVC-815 RTP/RTCP use for H.22Z
AVC-816 Video Payload for the H.22Z

2. Purpose

The major problem facing the designer of an H.323 based LAN/WAN Videoconferencing solution is how to provide the best QoS on LANs which were not designed for Real Time video. The H.323 standard should be formulated so that the implementations utilize to the maximum whatever means are available to improve the QoS.

The purpose of this submission is to provide means to monitor, manage and improve the Quality of Service (QoS) of H.323 Session on non-guaranteed QoS LANs. The proposal is based on our work during the development of OnLAN, a LAN/WAN Gateway based solution for H.320 terminals.

3. Overview

Experience has shown, that Quality of Service improvements can be achieved in packet based non-guaranteed QoS LANs by providing feedback from the Receiver to the Transmitter. A prime example is TCP, which provides guaranteed delivery on packet LANs. TCP's major drawback of TCP is that the protocol does not lend itself to real time traffic.

We are proposing that a real time feedback mechanism will be provided in H.22Z, to allow improvements in QoS.

Examples on how QoS improvements for Audio and Video for videoconferencing sessions can be achieved:

3.1. *Improved QoS Audio*

Since audio Codecs encode the audio in a few milliseconds and video Codecs encoding is in excess of 100msec, audio can be transmitted ahead of the video, and if feedback is provided from the Receiver (that the Audio was lost), there is ample time to retransmit the Audio, and still achieve lip sync.

3.2. *Improved QoS Video*

If a Video is lost, the Receiver can inform the Transmitter to resend the specific GOB or MB, and the relevant GOB/MB can be resent, and the image updated accordingly.

3.3. *Handling Overload and Starvation*

A Session that involves a Gateway connects a fixed rate H.320 terminal to a variable rate, LAN connected terminal. Flow control is required in order that the LAN side station will know to reduce or increase the data rates, so as to make sure that the WAN connection is always full.

Using feedback, a flow control mechanism may be provided so as to reduce or increase the bit rate, the effective bandwidth permitted for the Session.

4. Feasibility

The underlying assumption behind this proposal is that there is always a full duplex connection between the active terminals. As a reminder, H.323 is defined for two way communications (see 1.1.1 there). In H.323 Videoconferencing Sessions, every active terminal has at least one full duplex connection to every other active terminal, made up of at least two logical Channels. This connection is the Audio connection.

Sessions are divided into Point to Point or Multiway Sessions. Multiway session may be implemented either via a central MCU or be a distributed Multiway Session where each Active Terminal serves as a Switch or Mixer.

To summarize, a full duplex connection is always available. (By the way, even if RTP is adopted as part of H.22Z, the use of RTP does not prevent us from defining variable field length, H.323 proprietary headers).

Note on Multicast (one way):

The nature of Multicast (if we decide to include Multicast as part of H.323) is such that QoS considerations are very different. We may liken Multicast to CATV transmissions. There is no feedback from a Cable TV receiver back to the Head End Transmitter.

5. Fields

We propose that the H.22Z Frame Header will include the necessary fields needed to provide the feedback. We have decided not to propose specific field formats since it is not clear whether H.22Z will use RTP or not. RTP provides a mechanism to use variable length headers in addition to the fixed length header.

H.22Z Header fields should include, but not be limited to, the following information:

Version:

Frame index: The number of H22Z frames from the beginning of a session

Session Id: 4 Bytes for IP address of the originator and 4 Bytes for sequence number.

Acknowledge Status (Optional)

Number of Frames	Frame 1	Frame 2	Frame 3	Frame 4	Frame 5

The Acknowledge Status has the following fields:

Number of Frames - The number of Frames in the acknowledge status

Frame 1 - Frame n - The Frame index of the received Frames at the other side