

Study Group 15

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

Source: AT&T (Amy R. Reibman and Barry Haskell)

Title: Proposed Addition to H.245 for Jitter Control (in ATM Networks)

Purpose: Discussion and Proposal

Introduction

In document AVC-735, we presented a discussion and proposal to transmit information about received jitter from the receiver to the transmitter. This information will include:

- (a) decoder buffer size available for jitter removal,
- (b) an estimate of the received jitter at the decoder, and
- (c) indication of frame skipping by the decoder.

The video encoder would then have the option of using this information to restrict the video decoder buffer fluctuations to help prevent decoder buffer underflow or overflow, given the occurring jitter. If the encoder takes this option, it will enable correct operation for existing designs of video decoder buffers, regardless of the amplitude of received jitter, as well as allow correct operation with minimum delay.

In the following, we describe a possible location for this information within the standards. Since this information transfer could be useful regardless of the video coding standard used, the correct location appears to be in H.245. It might also be useful for wireless transport of H.263 video if ARQ (Automatic Repeat reQuest) introduces jitter into the received video data. The feedback of jitter information can also be a valuable tool in transport of video over LANs.

The following is a suggestion for modifications to the joint draft of H.245, dated May 11, 1995, distributed by Mike Nilsson by email. -----

IN: Section 4.1 Multimedia system control messages ADD:

jitterControl[APPLICATION 12]IMPLICIT JitterControl

ADD NEW SECTION (syntax)

Section 4.13 Jitter control

JitterControl	::=SEQUENCE
{	
logicalChannelNumber	INTEGER (0,8191), -- for 13 bit PID --
estimatedReceivedJitter	5-bit STRING
skippedFrameFlag	BOOLEAN
skippedFrameIndicator	OPTIONAL INTEGER (0,15)
availableBufferFlag	BOOLEAN
availableTransportBuffer	OPTIONAL INTEGER (0,31)
availableDecoderBuffer	OPTIONAL INTEGER (0,2¹⁸-1)
}	

ADD NEW SECTION (semantics)

Section 5.13 Jitter control

This message is used to specify the amount of jitter estimated by the receiver of a logical channel. It may be useful for buffer control in video channels, or to determine the rate of PCR transmission in PCR channels, etc.

When the **logicalChannelNumber** is zero, the information pertains to the whole multiplex. Each transmission of this command can affect a specific logical channel or the entire multiplex. More than one such command may be in effect at the same time, up to the number of open logical channels plus one, for the overall multiplex limitation.

estimatedReceivedJitter provides an estimate of the jitter that has been received by the unit sending the message. The meaning of the 5-bit **STRING** is defined as follows. The possible range is from 1 usec to 7.5 sec. The first 2 bits indicate the magnitude of the received jitter as described by the table below:

bits	meaning
00	1
01	2.5
10	5
11	7.5

The next 3 bits indicate the exponent of the received jitter:

bits	meaning
000	larger than 7.5 sec
001	* 1 usec
010	* 10 usec
011	* 100 usec
100	* 1 msec
101	* 10 msec
110	* 100 msec
111	* 1 sec

[Example: 5-bit **STRING** = 01011 means 250 usec.] If the last 3 bits are 000, the **estimatedReceivedJitter** is greater than 7.5 seconds, which is the maximum that the syntax can specify.

skippedFrameFlag is "1" if **skippedFrameIndicator** is present. It is "0" otherwise.

skippedFrameIndicator indicates how many frames have been skipped by the decoder since the last **JitterControl** message. [Since frames are skipped when the decoder buffer underflows, additional jitter may cause the decoder buffer to underflow more or less often than the encoder expects frame skips to happen.] Since the maximum value here is 15, this information must be transmitted (if the decoder implements this option) before more than 16 frames have been skipped.

availableBufferFlag is "1" if **availableTransportBuffer** and **availableDecoderBuffer** are present. (These are only necessary to be transmitted once, since they don't change during the call.) It is "0" otherwise.

availableTransportBuffer indicates the physical size of the receiver transport buffer. This uses 5 bits, where the physical size of the receiver transport buffer is $\text{availableTransportBuffer} \times 512$ bytes.

availableDecoderBuffer indicates the physical size of the video decoder buffer. This uses 18 bits, and is defined the same way as `vbv_buffer_size` in section 6.3.3 of ITU-T H.262.

Figure 1 shows a possible signaling time-line for the encoder and decoder.

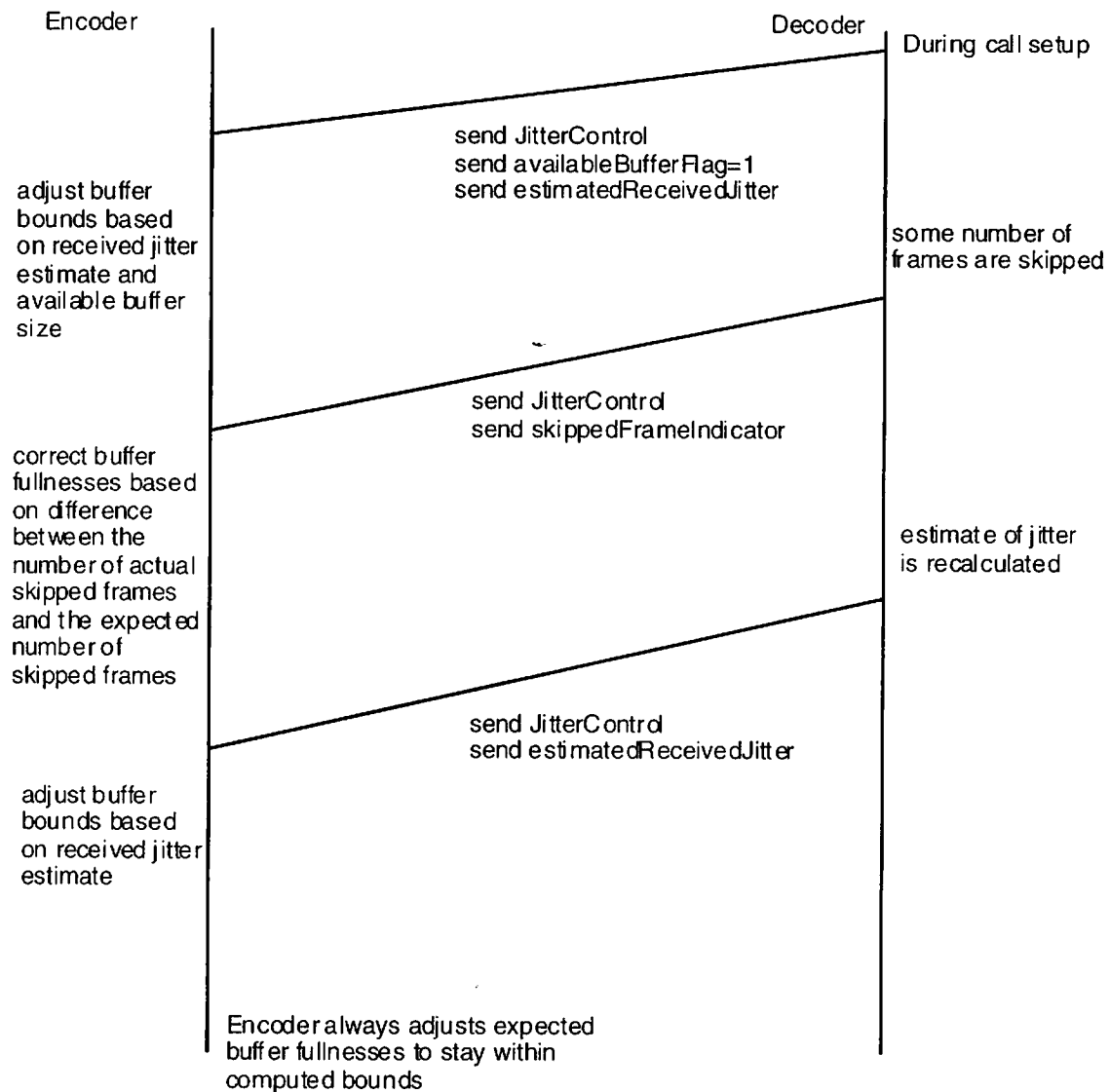


Figure 1. Possible scenario for jitter control signalling.