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Telecommunication Standardization Sector
Study Group 15
Experts Group for ATM Video Coding
(Rapporteur's Group on Part of Q.2/15)

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Source : JAPAN
Title : VIDEO SOURCE CLOCK RECOVERY USING NETWORK CLOCK
Purpose : Proposal
Relevant sub-group: System

1. Introduction

Based on the agreement that we need a mechanism to synchronize the video source clock and the video decoder clock (13.5 MHz in case of Rec.601 signals) for high quality applications, the Experts Group considered the following two alternatives at the Ipswich meeting in October 1992;

- Use of buffer fill information and time stamps provided in MPEG-1 (AVC-377),
- Use of video clock frequency information measured with the network clock common to the transmitter and receiver and contained in the picture header (AVC-371).

It was suggested there that since the common usage of the high quality network clock at both ends provides good jitter performance, there would be a possibility to combine the two approaches for B-ISDN applications (see §7.2/AVC-398R).

This contribution proposes an addition of indication to the MPEG-1 method for the use of common network clock.

2. Environments

We assume the following environments:

- A high quality network clock (such as 155.52 MHz with accuracy higher than +/- 10^{-11}) may or may not be commonly available at both ends.
- ISO/IEC 11172-1 (MPEG-1 Systems) is applied above the video layer.

Hence our strategy should be that the video clock be recoverable without relying on the network clock, but the decoder may utilize it if available.

3. Encoder operation

Encoder has an internal 90 kHz oscillator for STC (System Time-Clock), but this can be switched to an external 90 kHz source which is derived from the network clock (e.g. 155.52 MHz / 1728). When an external source is used, it is indicated in the bitstream so that the decoder may use the common external source.

PTS (Presentation Time Stamp) and DTS (Decoding Time Stamp) are generated based on STC.

4. Clock recovery at the decoder

Decoder locks its 90 kHz STC with that of encoder by comparing extracted SCR (System Clock Reference) value contained in the pack header with the output of local STC. If the

encoder STC is derived from the network clock and the same network clock is available at the decoder, the decoder may use it for STC instead of the slaved local source.

Video clock is locked with the encoder source clock by comparing the received PTS value with the local one which is generated based on the decoder STC.

An overall configuration is illustrated in Figure 1.

4. Proposal

One bit flag is added to the pack header (or system header, or AAL?) to indicate whether internal or external STC source is used

SCR_source 1 bslbf

'0' external source which may commonly be available to the decoder
'1' internal source

It sould be noted that if the decoder receives SCR_source =1, the only choice is to use the internal STC, while if SCR_source =0 is received, either of internal or external STC is possible.

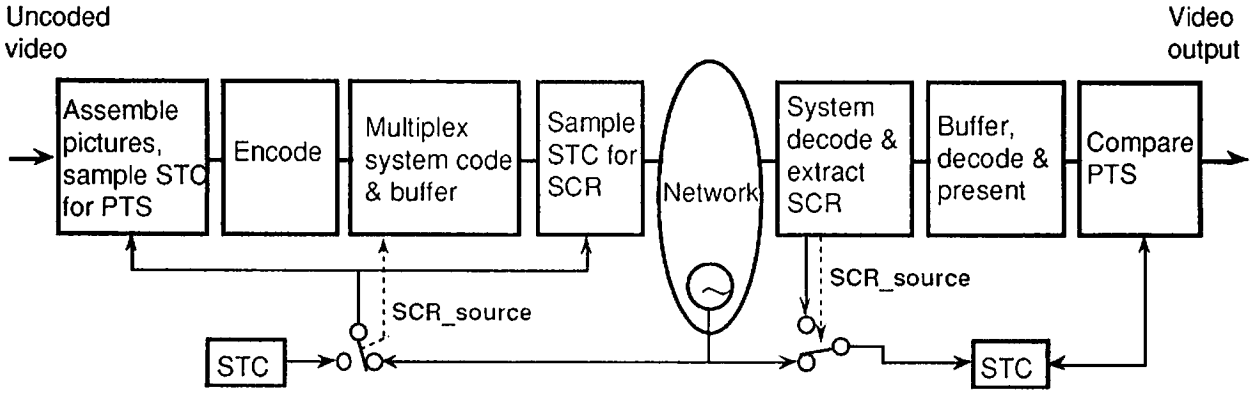

Figure 1 Video clock recovery by use of the network clock

5. Conclusion

Use of high quality network clock for SCR has been discussed and one bit flag addition has been proposed to indicate which of the internal or external sources is used by the encoder.

END

References

AVC-371	VIDEO SOURCE CLOCK RECOVERY (JAPAN)	October 1992
AVC-378	VIDEO CLOCK RECOVERY (B,F, I,N,NL,UK)	October 1992
AVC-398R	REPORT OF THE NINTH MEETING IN IPSWICH AND LONDON (27 October - 6 November 1992) - PART I	November 1992
ISO/IEC 11172-1	Coding of moving pictures and associated audio for digital storage media up to about 1,5 Mbit/s, Part 1: Systems	1993