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SERIES J: CABLE NETWORKS AND TRANSMISSION
OF TELEVISION, SOUND PROGRAMME AND OTHER
MULTIMEDIA SIGNALS

Digital transmission of television signals

Seamless splicing for heterogeneous MPEG-2/H.264 bitstreams

CAUTION !

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ITU-T Recommendation J.286 (formerly J.h-dpi)

Seamless splicing for heterogeneous MPEG-2/H.264 bitstreams

Summary

For distribution of video content encoded in the multiple types of compression methods, bitstream domain splicing between these heterogeneous bitstreams are necessary to avoid picture quality degradation and latency caused by transcoding.

This Recommendation defines a messaging format and constraints on bitstreams to achieve seamless splicing of heterogeneous bitstreams between MPEG-2 and H.264. The messaging format is defined as an extension of ITU-T Recommendation J.181, which is intended to enable the splicing device with relevant information of the bitstreams to be spliced. If the splicing device is aware of the video coding types of the subsequent bitstream in advance of the splicing event, it would be able to take more appropriate action for splicing of the different types of bitstreams. This Recommendation thus provides a mechanism to notify the type of the bitstream to be switched over. In addition, constraints on the bitstreams are also defined based on ITU-T Recommendation J.189 to facilitate seamless playback between MPEG-2 and H.264 by the decoder that satisfies requirements for seamless splicing of heterogeneous bitstreams.

For seamless splicing, such constraints can apply at the encoder when it compresses an input video or at the splicing device by making modifications on input bitstreams. The decoder is required to be capable of seamless decoding and playback of concatenated bitstreams conforming to the constraints defined by this Recommendation. This means that a conventional dual-mode decoder requiring firmware reloading and resetting to change the mode might not be functional. How to apply the constraints at the encoder or at the splicing device, how to upgrade the existing J.181 splicing devices to J.286 ones, and how to develop the decoder for this system is design dependent, and outside the scope of this Recommendation.

1. Scope

While MPEG-2 video is adopted in a number of television systems, it is expected that the video coding method will be shifted to H.264 in order to take advantage of its improved coding efficiency. During the changeover period, there might be the situation where both MPEG-2 and H.264 exist as a compression method of video content. In addition to the migration purposes, there could be such cases that MPEG-2 video is preferably used even in the H.264-based system to avoid transcoding when content owner wishes to maintain the original bitstreams. They can also take advantage of compression noise characteristics of MPEG-2 video, which is preferable to some source materials using H.264. These situations would require distribution of video content encoded in the multiple types of compression methods and bitstream domain splicing between these heterogeneous bitstreams.

This Recommendation defines a messaging format and constraints on bitstreams to achieve seamless splicing of heterogeneous bitstreams between MPEG-2 and H.264. The messaging format is defined as an extension of ITU-T Recommendation J.181, which is intended to enable the splicing device with relevant information of the bitstreams to be spliced. If the splicing device is aware of the video coding types of the subsequent bitstream in advance of the splicing event, it would be able to take more appropriate action for splicing of the different types of bitstreams. This Recommendation thus provides a mechanism to notify the type of the bitstream to be switched over. In addition, additional constraints on the bitstreams are also defined based on ITU-T

Recommendation J.189 to facilitate seamless playback between MPEG-2 and H.264 by the decoder that satisfies requirements for seamless splicing of heterogeneous bitstreams.

“Seamless splicing”, as used in this Recommendation, means switching from one video elementary stream to a second video elementary stream in the following manner:

- Continuity of the spliced bitstream is maintained;
- Switching occurs at a Transport Stream packet boundary;
- No underflow or overflow of the decoder buffer occurs as a result of the splice;
- Correct syntax as defined in [ITU-T H.222.0] is maintained and the splice may result in discontinuities in timebase or continuity counter;
- No visible artifacts in the reconstructed baseband video are introduced.
- No audio codec change is supported by this Recommendation.

For seamless splicing, such constraints can apply at the encoder when it compresses an input video or at the splicing device by making modifications on input bitstreams. The decoder is required to be capable of seamless decoding and playback of concatenated bitstreams conforming to the constraints defined by this Recommendation. This means that a conventional dual-mode decoder that requires firmware reloading and resetting to change the mode might not be able to be used. How to apply the constraints at the encoder or at the splicing device, how to upgrade the existing J.181 splicing devices to J.286 ones, and how to develop the decoder for this system is design dependent, and outside the scope of this Recommendation.

2. References

The following ITU-T Recommendations and other references contain provisions, which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

2.1 Normative References

[ITU-T J.181] ITU-T Recommendation J.181 (06/2004), *Digital program insertion cueing message for cable television systems*

[ITU-T J.189+Cor1] ITU-T Recommendation J.189 (07/2002) + Cor.1 (04/2003), *Seamless splicing for MPEG-2 bitstreams*

[ITU-T H.222.0] ITU-T Recommendation H.222.0 (01/2007), *Information technology - Generic coding of moving pictures and associated audio information: Systems*

[ITU-T H.262] ITU-T Recommendation H.262 (02/2000), *Information technology - Generic coding of moving pictures and associated audio information: Video*

[ITU-T H.264] ITU-T Recommendation H.264 (03/2005), *Advanced video coding for generic audiovisual services*

2.2 Informative References

none