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CODING OF MOVING PICTURES AND ASSOCIATED AUDIO

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Title: Proposed framework for error resilience informative text in MPEG2/H.26X

Status: Proposal

An outline structure of the informative text to be included in the MPEG2/H.26X WD, and eventually the CD, is necessary to progress the development of that document and focus attention on the remaining parts of the text that are required.

The following framework is offered for consideration and refinement prior to inclusion in the WD. Bracketed text [] indicates inputs required to complete this informative part of the WD.

Error Resilience

The coded video bitstream generated by this Recommendation I International Standard may be carried by different transport systems including packet systems. The Asynchronous Transfer Mode (ATM) of B-ISDN is an example of a packet system. ATM uses relatively short, fixed length packets, called cells, consisting of a 5 byte header containing routing information, and a user payload of 48 bytes. The nature of errors on ATM is such that some cells may be lost, and the user payload of some cells may contain bit errors. At the receive terminal, the network interface forwards received cells plus indications of lost cells. Indication of cells containing bit errors may also be available, depending on AAL (ATM Adaptation Layer) functionality.

[TEXT REQUIRED TO INTRODUCE OTHER ERROR/LOSS CONDITIONS]

The following techniques of minimising the impact of lost cells and other error/loss effects are provided for reference, and indicate example methods of using the various tools available in this Recommendation I International Standard to provide good performance in the presence of those errors. Note that, while the discussion is centred around cell loss resilience, the techniques described may be equally applicable in the cases of packets of other sizes (e.g. LANs or certain storage media) or video data with uncorrected errors of different characteristics.

1. Concealment

Independent of whether any attempt has been made at the encoder to make the generated video bitstream error resilient, a decoder always has the option of providing concealment of the errors by estimating the lost data from spatio-temporally adjacent data. Techniques may range from simply not updating a frame store in the event of lost macroblock data (i.e. concealment through

estimation from the previous frame) to more sophisticated concealment methods that utilise motion compensation for the macroblock prediction.

[Reference system text required.]

2. Spatial localisation.

Spatial localisation encompasses those methods aimed at minimising the extent to which errors propagate within a picture, by providing early resynchronisation of the elements in the bitstream that are coded differentially.

[Reference text required on: Structured Packing?
Small slices?
Adaptive slice sizes?]

3. Temporal Localisation

Temporal localisation encompasses those methods aimed at minimising the extent to which errors propagate from picture to picture in the temporal sequence, by providing early resynchronisation of the elements in the bitstream that are coded differentially.

[Reference text required on: Intra pictures
Intra slices
Leaky Prediction?]

4. Layered Coding

The components produced by the coding process can be placed in a hierarchy of importance according to the effect of loss on the reconstructed image. By coding and multiplexing components of similar importance into independent bitstreams, and treating each bitstream with due importance, superior error concealment performance may be possible. The independent bitstreams may be treated differently at one or more of the following locations:

- coder - different channel coding might be used
- channel - the channel may be able to offer paths with different cell loss probabilities
- decoder - error concealment could be performed differently within each bitstream

[Reference system based on the scalability and compatibility enhancements for error concealment.]

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