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Video Coding Experts Group (Question 15)

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Title: New Data Partitioning Method using Data Reordering Algorithm (DRA)

Purpose: Proposal and Information

1. Abstract

In this proposal, we investigate the efficient data-ordering for the data partitioning. This proposal basically targets for the channel with low bit error rate.

2. Proposed Structures

We propose a simple and reliable data partitioning based scheme in which bitstream is packetized in GOB.
Since each packet containes a GOB, it does not require any other information for packetization such as MBA and resynchronization maker. This concept is easily expanded into slice-structure mode, Annex J. When this proposal is used with the Annex J, the packetization can be done in a slice. Two types of packet structures are used according to picture types.

2.1 Packet structure for intra-coded picture

The packet-structure for intra-coded picture is depicted in the Figure 1.

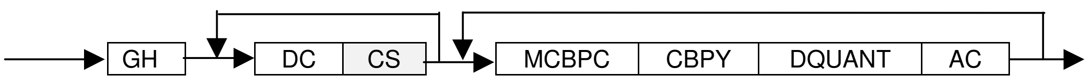

Figure 1: Packet structure of proposed data partitioning syntax for intra-coded picture (I-picture);
GH and CS denote the GOB Header and Check Sum (CS) for error detection, respectively. This syntax is repeated for each GOB and this forms a packet in the MUX and total bits for each GOB is byte-aligned.

Background for the proposed data-reordered partitioning

Since the first picture which is coded by using intra-coding method has no reference frame in H.263, there is no signal to retrieve lost MBs for error-concealment. For this reason, DC values are grouped together. Since the DC is coded in FLC, there is no error-detection ability unlike VLC-coded data. So the checksum bits with two bits size are added for each. Also, the remaining data such as MCBPC, CBPY, DQUANT, and AC are grouped together. Because all the data are very closely related, there is no gain by partitioning each one into one data group. Notice that there is no resynchronization marker between the two data group shown in Figure 1, since DC and CS are coded in FLC. So, there is no error propagation for this data and the overhead information is not required in the proposed data partitioning method. Also, note that the Annex I, advanced intra coding mode, is not used to use this merit.

Note that MCBPC, CBPY and DQUANT are only related with AC coefficients and have no relationship with DC coefficients when not using Annex I.

2.2 Packet structure for inter-coded picture

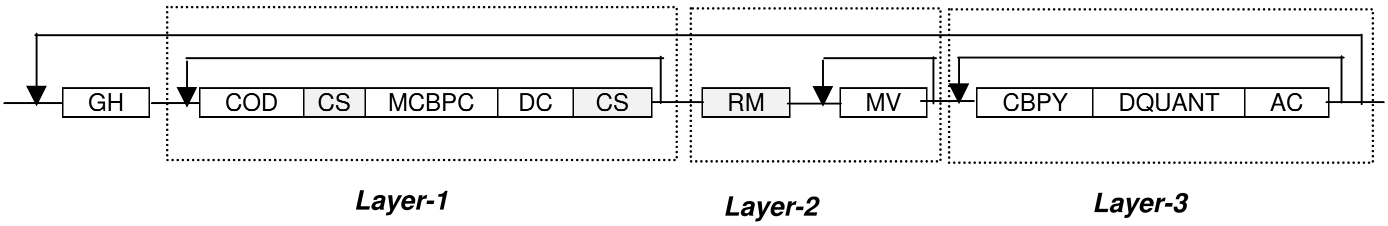

Figure 2: Packet structure of proposed data partitioning syntax for inter-coded picture (P-picture)

The packet-structure for intra-coded picture is depicted in the Figure 1.

Background for the proposed data-reordering partitioning

The main idea of this data-reorder lies in the UEP (unequal error protection). The importance of data is based on the following:

- COD and DC have highest priority. Since if COD is lost, all the data are lost. And then, DC has most of information for intra-coded MB. Note that the DC is more important than the MV. Since most of information of inter-coded MB lies in the previous picture and the MV has high spatial correlation, the lost inter-coded MB can be concealed by using the MVs from MBs of previous GOB. But intra-coded MB can not be concealed from previous picture, since basically, the MB selected as intra-coded MB can not be predicted with good prediction gain from the previous image. For this reason, the DC is more stressed than MV. Note that the bits denoted as CS are checksum bits with size of two bits.
- Data with next priority is MV. If comparing the MV and DCT AC coefficient, the loss of AC coefficients does not cause significant quality degradation.
- The AC coefficients has the lowest priority. So, the data related with AC coefficients are grouped together.

Note that though the data, CBPY, is control or administration information, the data are only related to the AC coefficients. So, its importance is very low, compared COD, DC, and MV. Also the data, DQUANT, is classified into low important data from the same reason on the CBPY.

3. Simulation results

The subjective quality test will be demonstrated.