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CODING OF MOVING PICTURES AND ASSOCIATED AUDIO

ISO-IEC/JTC1/SC29/WG11
MPEG 93/620

Source: R. Aravind, AT&T
Title: Cleanup of AC-Leak Syntax and Specification
Purpose: Proposal

1. AC-Leak Extension Syntax

The syntax elements needed for AC-leak are packaged into a separate extension with its own unique identifier "1110":

ac_leak_extension() {		
extension_start_code	32	bslbf
extension_start_code_identifier	4	"1110"
leak_factor_code	3	uimsbf
dc_refresh_flag	1	uimsbf
next_start_code()		
}		

2. Semantics for the AC-Leak Extension

The conditions for transmitting the AC-leak extension are proposed as follows:

- The AC-leak extension is *not* transmitted when the picture-type (as indicated by the picture-header) is "001" (I) or "011" (B). In I-pictures and B-pictures the **dc_refresh_flag** is set to "0".
- The AC-leak extension is *always* transmitted when the picture-type is "010" (P), immediately following the picture-coding extension.
- A **leak_factor_code** of "000" is *not* allowed, while a "111" signifies perfect prediction (leak-factor LF=1). Otherwise, LF $= 1 - \frac{1}{2^n}$, where n is the **leak_factor_code**. The LF is constant inside a picture.
- A **dc_refresh_flag** of "1" indicates a DC-refresh-picture while a "0" indicates no DC-refresh. DC-refresh is also allowed with perfect prediction.

3. Syntax Modifications in the Macroblock Layer

Minor syntax modifications are proposed for the macroblock layer, mostly to deal with DC-refresh pictures where **dc_refresh_flag** = "1".

- In DC-refresh pictures, every DC-coefficient is differentially encoded as in I-pictures.
- We propose to set the (derived) flag macroblock_pattern to "0" when **dc_refresh_flag** = "1", i.e. *not* to transmit the coded block pattern in DC-refresh pictures.
- Skipped macroblocks are *not* allowed in DC-refresh pictures.

3.1 Marker Bit Syntax

To avoid the possibility of start-code emulation, the marker bit "1" that terminates a concealment motion vector of an intra MB also needs to be transmitted in DC-refresh pictures. Accordingly, the following syntax is proposed to be inserted in place of the current conditional construct for this marker_bit:

```
if (dc_refresh_flag ||
(macroblock_intra && concealment_motion_vectors))
        marker_bit                                  1          "1"
```

To keep the conditional syntax simple, we propose that the marker bit be sent for every macroblock in DC-refresh pictures (even though a motion vector may not be transmitted for some macroblocks).

4. Syntax modifications in the Block Layer

To reflect the differential encoding of DC-coefficients in DC-refresh pictures,

```
        if (macroblock_intra) {
```

is changed to

```
        if (macroblock_intra || dc_refresh_flag) {
```

5. Use of MPEG-1 VLC for nonintra DCT-coefficients

We propose that the MPEG-1 VLC be used for all nonintra-coded blocks for all leak-factors. The Intra-VLC is restricted to intra-MB, when **intra_vlc_format** is set to 1.

6. Use of the Nonintra Quantizer for Leaked AC-coefficients

We clarify that the intra-MB quantizer is *only* used in intra-MB. The nonintra-MB quantizer is used for all nonintra AC-coefficients, even in DC-refresh pictures, for all leak-factors. The intra-DC quantizer is used for all DC-coefficients in DC-refresh pictures and for the DC-coefficients in intra-MB.

7. Computation of DC-value

The DC-value of an 8x8 block is defined as the average of its pixels. We propose that this average be computed as $\sum$ // 64 where $\sum$ is the sum of the pixels. In other words, we propose to perform division with *rounding*.