

On high-level syntax for maximum DPB size and frame latency (JCTVC-G546)

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Summary

❖ MaxDpbSize

- The JCTVC-E339 proposed to move max_dec_frame_buffering and num_reorder_frames from the optional VUI to mandatory SPS
 - $\text{MaxDpbSize} = \text{max_dec_frame_buffering}$

❖ MaxLatencyFrames

- The JCTVC-F541 proposed to add max_latency_frames_plus1 or max_latency_increase_plus1 syntax
 - $\text{MaxLatencyFrames} = \text{max_latency_frames_plus1} - 1$
 - $\text{MaxLatencyFrames} = \text{num_reorder_frames} + \text{max_latency_increase_plus1} - 1$

❖ Proposal

- Move max_dec_frame_buffering to SPS for mandatory
- Add max_latency_frames_plus1 to SPS for mandatory
- Leave num_reorder_frames to VUI as same as current WD

MaxDpbSize – Background

- ❖ MaxDpbSize specifies the required size of HRD decoded picture Buffer

If (max_dec_frame_buffering (VUI) is sent in SPS)

MaxDpbSize = max_dec_frame_buffering

else

MaxDpbSize = Min(1024* MaxDPB / (PicWidthInMbs*FrameHeightInMbs*384), 16)

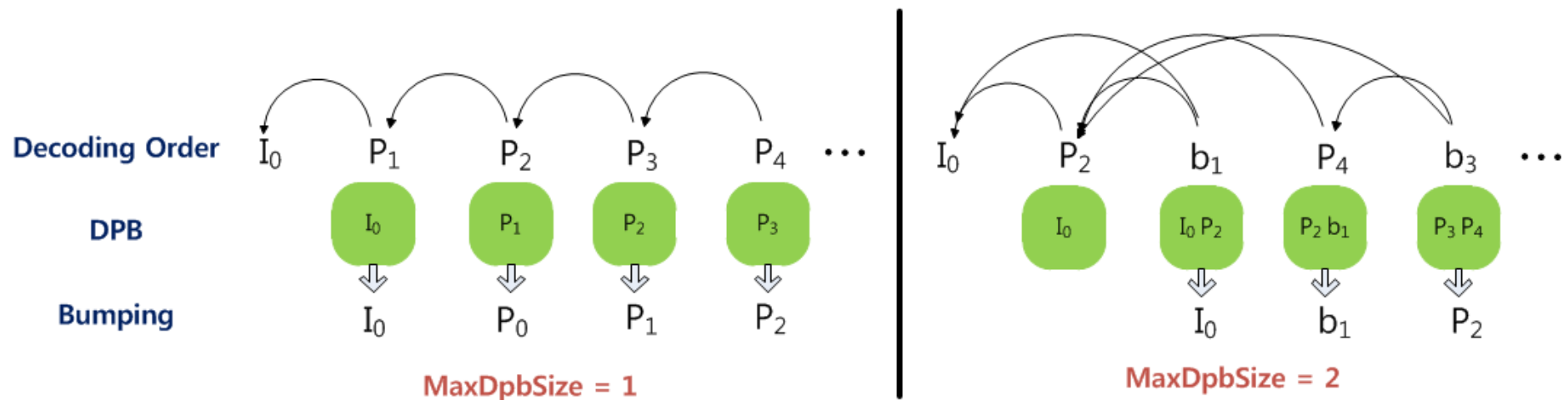
- ❖ VUI syntax is optional instead of mandatory

- If VUI is not sent, MaxDpbSize is determined by its level value
Example) MaxDpbSize w/ minimum level @ 30Hz

				(@30Hz)
Display resolution	WQVGA	WVGA	HD720p	HD1080p
	400x240	800x480	1280x720	1920x1080
Minimum Level	1.3	3.1	3.1	4
MaxDPB	891.0	6750.0	6750.0	12288.0
MaxDpbSize	13	12	5	5

MaxDpbSize – Problem 1

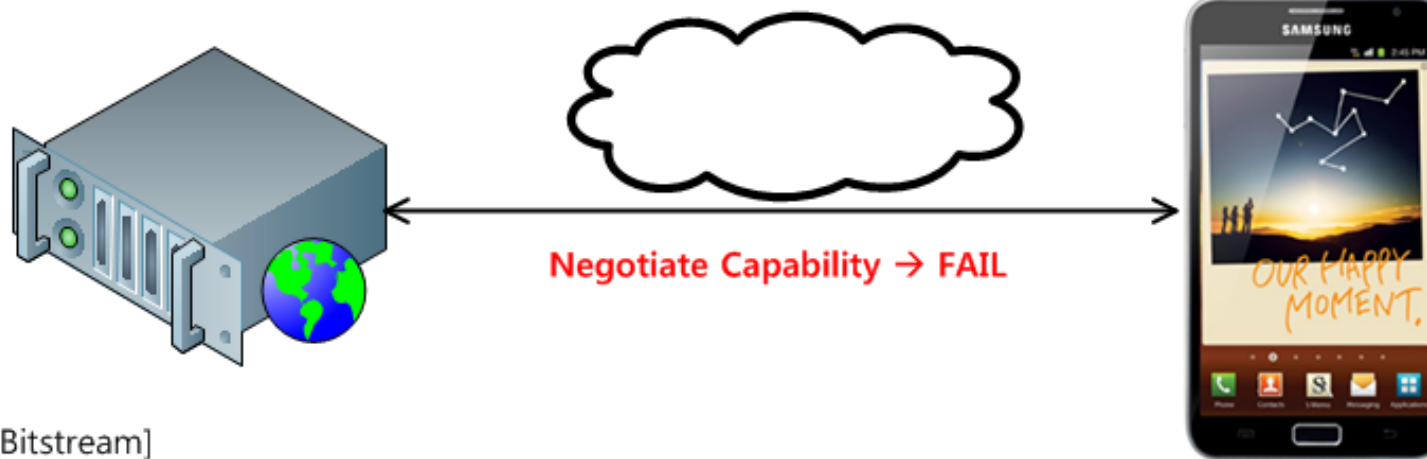
- ❖ Inefficient memory usage when MaxDpbSize is determined by level
 - Some stupid encoders do not set max_dec_frame_buffering in VUI
 - Example 1
 - 400x240@30Hz and Level 1.3 (minimum)
 - The decoder SHOULD allocate 13 frame memory for DPB
 - Example 2
 - 800x480@30Hz and Level 4 (minimum is equal to 3.1)
 - The decoder SHOULD allocate 16 frame memory for DPB
- ❖ Below popular use case only use 1 or 2 MaxDpbSize



MaxDpbSize – Problem 2

❖ Decoder capability negotiation

- When decoder negotiates with server for communication, SPS is delivered to decoder for checking its decoding capability
- If terminal (mobile device) has not enough memory to cover MaxDpbSize, the negotiation will be failed even though decoder can decode the bitstream



[Bitstream]

- MaxDpbSize is determined by level as 13
- Actually only needs 4 frame memory

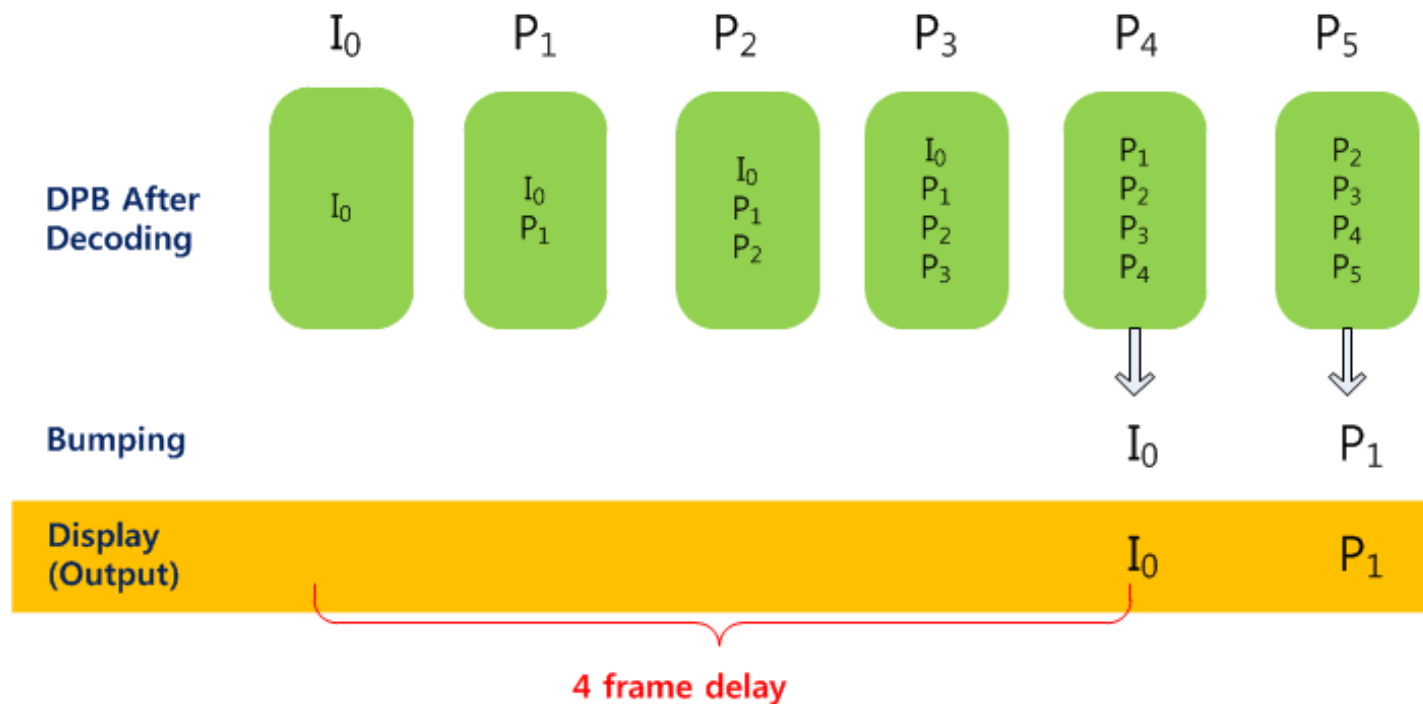
[Mobile device]

- Can decode the bitstream up to 10 frame memory

MaxLatencyFrames

- ❖ MaxLatencyFrames is also needed for in time display
- ❖ Example
 - MaxDpbSize is equal to 4 / MaxLatencyFrames is not defined
 - Decoder can display(output) at bumping process

MaxDpbSize = 4



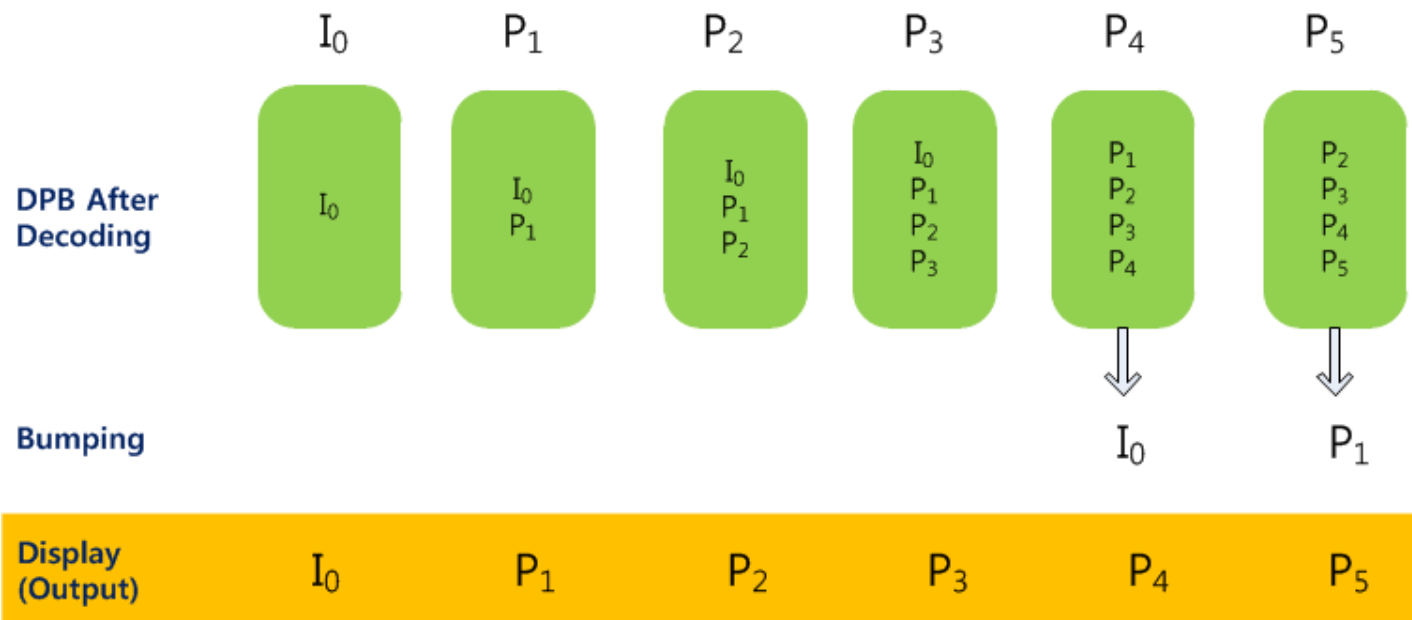
MaxLatencyFrames

❖ Example

- MaxDpbSize is equal to 4 / MaxLatencyFrames is equal to 0
- Decoder can know the display(output) time before bumping

MaxDpbSize = 4

MaxFrameLatency = 0



No delay

Syntax

<code>seq_parameter_set_rbsp() {</code>	Descriptor
profile_idc	u(8)
reserved_zero_8bits /* equal to 0 */	u(8)
level_idc	u(8)
seq_parameter_set_id	ue(v)
<snip>	
inter_4x4_enabled_flag	u(1)
max_dec_frame_buffering	ue(v)
max_latency_frames_plus1	ue(v)
rbp_trailing_bits()	
}	