

**JCTVC-J0063**  
**AHG9: SYNTAX FOR NAL PACKET**  
**PRIORITY**

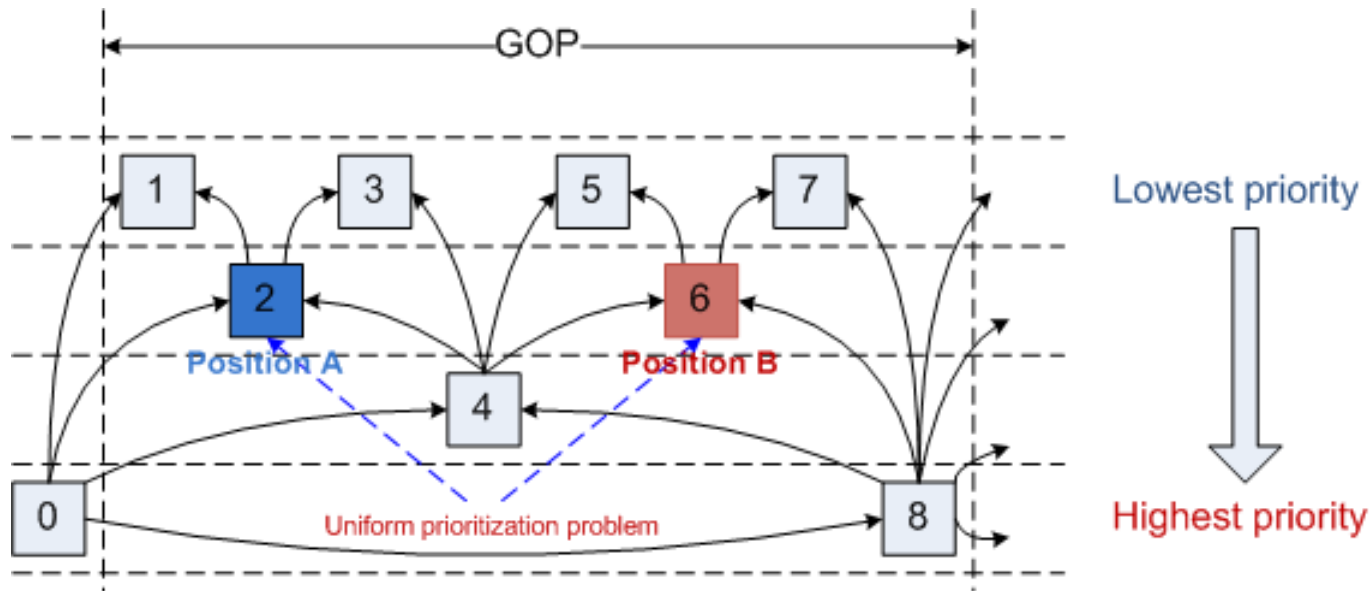
Eun-Seok Ryu, Yan Ye, Yuwen He, Yong He  
InterDigital Communications, LLC  
10<sup>th</sup> JCT-VC meeting, July 10-20, 2012

# Problem statement

- NAL unit priority information is essential for QoS handling for video applications such as streaming
  - Unequal Error Protection
  - Packet dropping for bandwidth adaptation
  - Differentiated service by smart router, etc
- Currently in WD7, NAL header has some priority indication
  - 3-bit temporal\_id
- Observation: pictures in the same temporal level can still have different priorities
- **Need for further priority differentiation**

<b>nal_unit( NumBytesInNALunit ) {</b>	<b>Descriptor</b>
<b>forbidden_zero_bit</b>	f(1)
<b>nal_ref_flag</b>	u(1)
<b>nal_unit_type</b>	u(6)
<b>temporal_id</b>	u(3)
<b>reserved_one_5bits</b>	u(5)
...	
}	

# Hierarchical B prediction

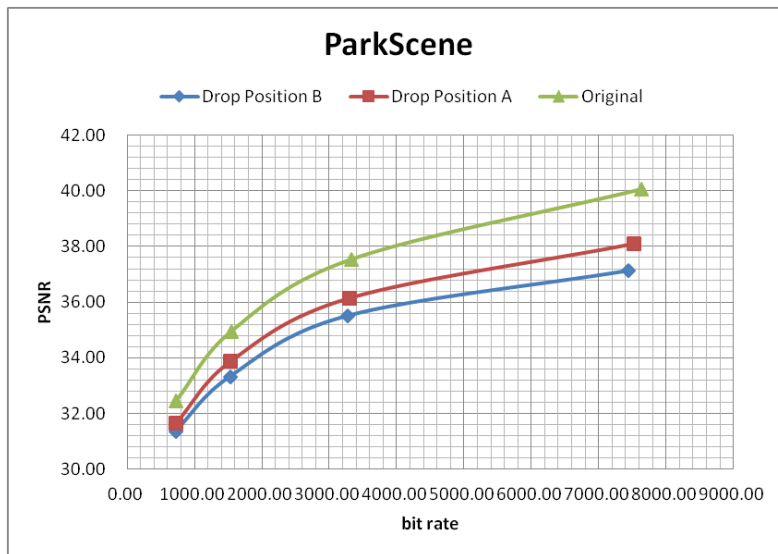
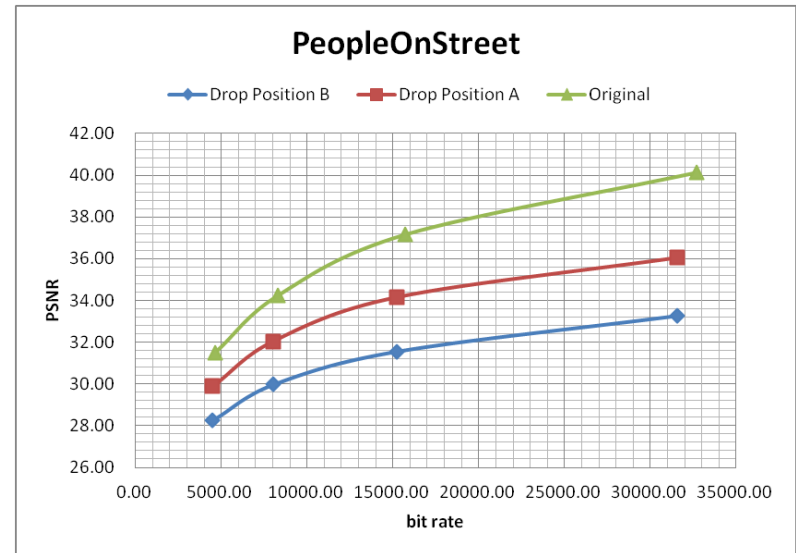
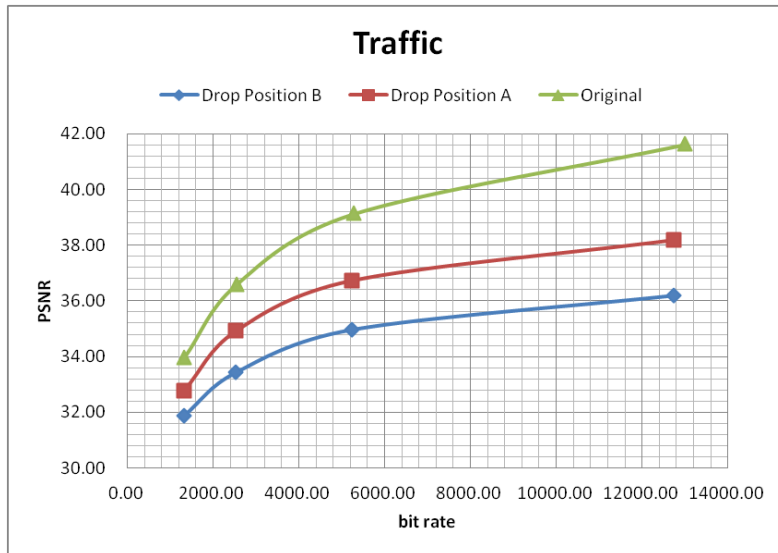


In one intra period of 32 pictures, **Position A** pictures are referenced **12** times, while **Position B** pictures are referenced **16** times



Packet loss at Position A and at Position B has different implication on error propagation

# Simulation Results



## Test settings

- RA in common test condition
- Drop 1 picture per intra period
- HM6.1

## Observation

- Clear difference in performance between packet loss at Position A and at Position B
- As much as 3dB

# Proposed method 1

- Replace nal\_ref\_flag with nal\_priority\_flag
  - nal\_ref\_flag not useful in the presence of temporal\_id

nal_unit( NumBytesInNALunit ) {	Descriptor
<b>forbidden_zero_bit</b>	f(1)
<del>nal_ref_flag</del>	<del>u(1)</del>
<b>nal_priority_flag</b>	<b>u(1)</b>
<b>nal_unit_type</b>	u(6)
<b>temporal_id</b>	u(3)
<b>reserved_one_5bits</b>	u(5)
.....	
}	

**nal\_priority\_flag** equal to 1 specifies that the NAL unit has a higher priority than the other NAL units in the same temporal level. **nal\_priority\_flag** equal to 0 specifies that the NAL unit has a normal priority in the same temporal level.

## Proposed method 2

- Add `priority_id` to AU delimiter

<code>access_unit_delimiter_rbsp( ) {</code>	<b>Descriptor</b>
<b><code>pic_type</code></b>	<code>u(3)</code>
<code>priority_id</code>	<code>u(4)</code>
<code>rbp_trailing_bits( )</code>	
<code>}</code>	

**priority\_id** specifies a priority identifier for the following NAL unit(s) until the next access unit delimiter is present. The priority identifier indicates the priority of NAL unit(s) in the same temporal level.

# Conclusions

- Observation: there is need to differentiate packet priorities within the same temporal layer
- Proposed two methods to provide enhanced packet priority indication
  - Method 1: replace nal\_ref\_flag
  - Method 2: add priority\_id in AU delimiter
- Recommend to adopt