# JCTVC-J0063
AHG9: SYNTAX FOR NAL PACKET PRIORITY

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10th 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, *temporal_id* in NAL header can serve as priority indication
- Observation: pictures in the same temporal level can still have different priorities
- Need for further priority differentiation

| nal_unit(NumBytesInNALunit) {	Descriptor
forbidden_zero_bit	f(1)
nal_ref_flag	u(1)
nal_unit_type	u(6)
temporal_id	u(3)
reserved_one_5bits	u(5)
…	
}	

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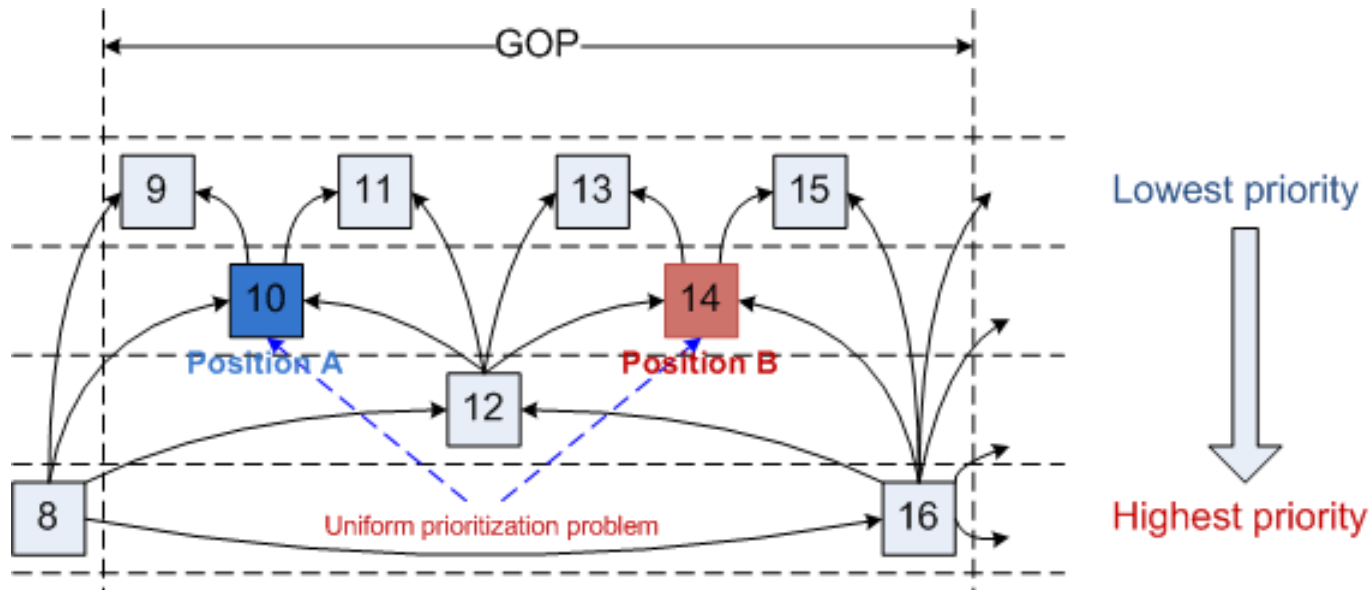
In one intra period of 32 pictures, Position A pictures are referenced 12 times, while Position B pictures are referenced 16 times

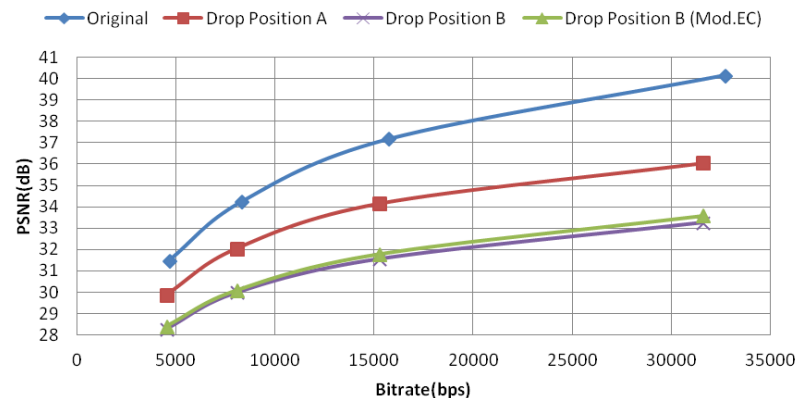Packet loss at Position A and at Position B has different implication on error propagation

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Simulation Results
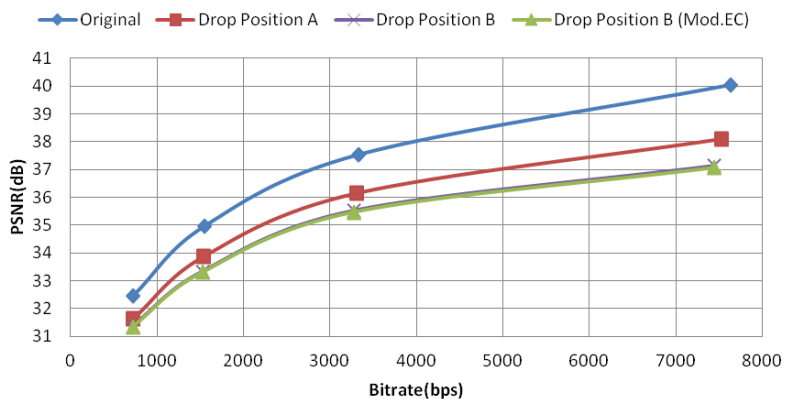

Traffic RA
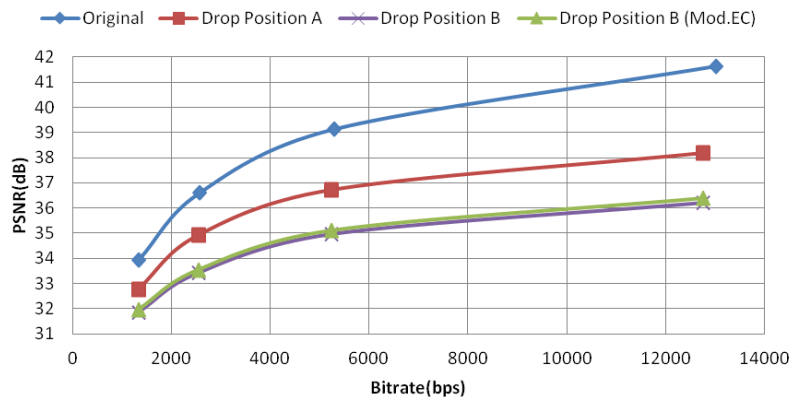
PeopleOnStreet RA

ParkScene RA

Test settings
- RA in common test condition
- Drop 1 picture per intra period from 2nd GOP
- HM6.1 decoder (w/ and w/o modified EC)
  - For Position B loss, copy from higher quality picture instead of the previous picture

Observation
- Clear difference in performance between packet loss at Position A and at Position B
- As much as 2.8dB difference
- Modified EC method results in very limited difference on error propagation

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Proposed method 1

- Replace nal_ref_flag with nal_priority_flag
  - nal_ref_flag has limited use in WD7

nal_unit(NumBytesInNALunit) {	Descriptor
forbidden_zero_bit	f(1)
~~nal_ref_flag~~	~~u(1)~~
nal_priority_flag	u(1)
nal_unit_type	u(6)
temporal_id	u(3)
reserved_one_5bits	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.

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Proposed method 2

- Add priority_id to AU delimiter

access_unit_delimiter_rbsp( ) {	Descriptor
pic_type	u(3)
priority_id	u(4)
rbsp_trailing_bits( )	
}	

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.

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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

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