Description of video coding technology proposal by Hitachi

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Summary

- **Targeting on low delay and modest complexity model**
  - ◆ Only 3 modifications to AVC
  - ◆ EAIF, MV competition, Extended block size
- **Results (Set2)**
  - ◆ Performance: -12.55% for Beta anchor
  - ◆ Complexity: 3.15 times decoding for Beta anchor
- **Results (Set1)**
  - ◆ Proposal: IPPP was used, RDOQ disabled
  - ◆ Performance: +11.37% for Alpha anchor
  - ◆ Complexity: 4.09 times decoding for Alpha anchor
- **Remark**
  - ◆ We hope complexity aspect of encoding model will be well discussed in the process of standardization.

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Algorithm

- ■ Only 3 modifications are applied to AVC

1. Enhanced Adaptive Interpolation Filter (EAIF)

    ◆ Interpolation filter to full-pixel and sub-pixel position with filter offset

2. Motion vector competition

    ◆ PMV was calculated from spatial & temporal candidates

3. Extended block sizes

    ◆ Basically use 64x64 MBs for all classes
    ◆ Adaptively divide into 32x64, 64x32, 32x32, 16x32, 32x16blocks

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Performance of set 2 relative to Beta anchor

- **Coding conditions**
  - ◆ IPPP with no random access
  - ◆ RDOQ enabled
  - ◆ Other configurations are same as Beta anchor
- **Computing platform (B)**
  - ◆ OS: Windows Server 2003 32bit
  - ◆ CPU: Intel Xeon Quad Core 3.0GHz
  - ◆ Memory: 4GByte RAM

Test Class	BD-Value		Encoding Time (hour)
	BD-Bitrate (%)	BD-PSNR (dB)	
Class B	-20.40	0.72	104.76
Class C	-11.16	0.49	38.42
Class D	2.21	0.02	14.06
Class E	-20.98	0.92	94.91
Total	**-12.55**	**0.52**	**56.44**

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Performance of set 1 relative to Alpha anchor

- **Coding conditions**
  - ◆ IPPP with random access for every 1 seconds
  - ◆ RDOQ disabled
  - ◆ Other configurations are same as Alpha anchor
- **Computing platform (A)**
  - ◆ OS: Red Hat Linux 64bit
  - ◆ CPU: AMD Opteron Quad Core 2.8GHz
  - ◆ Memory: 2GByte RAM

Test Class	BD-Value		Encoding Time (hour)
	BD-Bitrate (%)	BD-PSNR (dB)	
Class A	3.02	-0.06	141.30
Class B	5.62	-0.05	79.48
Class C	8.12	-0.17	18.41
Class D	20.80	-0.70	5.69
Total	**11.37**	**-0.32**	**51.76**

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Complexity -decoding time-

■ **Methodology used to determine the time**

  ◆ Calculated by standard library "time()"

  ◆ YUV output enabled, reference input enabled

  ◆ Anchor was decoded by JM17.0

■ **Computing platform (B)**

  ◆ Windows Server 2003 32bit

  ◆ CPU/Memory : Intel Xeon Quad Core 3.0GHz, 4GByte RAM

Set 2

Class	Decoding time (sec)		Ratio (proposal/anchor)
	Beta anchor	Proposal	
Class B	227.57	926.20	4.07
Class C	68.50	168.21	2.46
Class D	10.58	43.09	4.07
Class E	205.49	411.35	2.00
Total	**128.03**	**387.21**	**3.15**

Set 1

Class	Decoding time (sec)		Ratio (proposal/anchor)
	Alpha anchor	Proposal	
Class A	161.35	657.71	4.08
Class B	240.19	917.54	3.82
Class C	41.48	165.11	3.98
Class D	9.13	40.89	4.48
Total	**113.04**	**445.31**	**4.09**

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Conclusion

- **Targeting on low delay and modest complexity model**
  - ◆ 3 modifications : EAIF, MV competition, Extended block size
  - ◆ Performance : (Set 2) -12.55% for Beta anchor
  - ◆ Complexity : (Set 2) 3.15 times decoding for Beta anchor
- **We hope complexity aspect of encoding model will be well discussed in the process of standardization.**

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