

No.	<b>VC-26-N053</b>
Resource:	Future Video Coding Study Group
Title:	Challenge of Video Compression Technology
Date/Place:	June 15, 2019, Chengdu, China

## 1. 测试数据

主办方在考虑场景多样性和运动复杂程度的基础上，准备 10 个测试序列，具体序列信息如下表所示。在这些测试序列上对比了 DLVC 1.0，HM 16.20 和 VTM 5.0，结果表明，这些测试序列编码结果差异较大。

	Sequence	Resolution (width x height)	Frame rate	Frames to be coded	Format (YUV)	Bit-depth
Class 1080p	1	1920x1080	25	32	420	8
	2	1920x1080	30	32	420	8
	3	1920x1080	30	32	420	8
	4	1920x1080	60	64	420	8
	5	1920x1080	60	64	420	8
	6	1920x1080	60	64	420	8
	7	1920x1080	60	64	420	8
Class 4K	8	3840x2160	30	32	420	8
	9	3840x2160	30	32	420	8
	10	3840x2160	30	32	420	8

## 2. 测试条件

主办方提供三个 baseline: X264、HM、DLVC，使用相同的测试条件。测试条件包含 Low Delay B 和 Random Access，具体配置如下：

LD Configuration		RA Configuration	
Test Platform	CPU & GPU	Test Platform	CPU & GPU
QP	22、27、32、37	QP	22、27、32、37
InternalBitDepth	10	InternalBitDepth	10
Gop Size	4	Gop Size	16
Intra period	-1	Intra period	32
FramesToBeEncoded	32 or 64	FramesToBeEncoded	32 or 64

Low Delay B

Random Access

### 3. 编码结果

基于以上测试数据和测试条件，主办方对比了测试数据在不同编码平台的编码性能。

➤ **[CPU] Anchor: HM16.20 Test: DLVC1.0**

Random Access Main10					Low delay B Main10				
	Sequence	BD-rate			Sequence	BD-rate			
		Y	U	V		Y	U	V	
Class 1 1080p	1	-20.9%	-23.5%	-41.0%	1	-19.3%	-28.5%	-36.8%	Class 1 1080p
	2	-42.7%	-46.4%	-48.7%	2	-33.6%	-41.2%	-46.1%	
	3	-21.0%	-19.3%	-10.8%	3	-18.3%	-18.2%	-15.9%	
	4	-35.9%	-45.2%	-38.5%	4	-29.7%	-40.5%	-35.8%	
	5	-43.8%	-50.8%	-49.3%	5	-32.9%	-45.9%	-45.4%	
	6	-30.4%	-26.6%	-14.2%	6	-23.9%	-26.0%	-18.7%	
	7	-23.2%	-31.2%	-17.3%	7	-17.8%	-25.5%	-15.8%	
Class 2 4K	8	-33.5%	-43.8%	-40.8%	8	-31.2%	-47.4%	-45.8%	Class 2 4K
	9	-34.1%	-31.5%	-34.8%	9	-26.7%	-29.5%	-33.3%	
	10	-33.7%	-25.2%	-26.6%	10	-24.6%	-26.8%	-27.0%	
Class 1		-31.1%	-34.7%	-31.4%	Class 1		-25.1%	-32.3%	-30.6%
Class 2		-33.8%	-33.5%	-34.0%	Class 2		-27.5%	-34.6%	-35.4%
All		<b>-31.9%</b>	<b>-34.3%</b>	<b>-32.2%</b>	All		<b>-25.8%</b>	<b>-33.0%</b>	<b>-32.1%</b>
Enc Time[%]		3895%			Enc Time[%]		3599%		
Dec Time[%]		508259%			Dec Time[%]		445601%		

➤ **[GPU] Anchor: HM16.20 Test: DLVC1.0**

Random Access Main10					Low delay B Main10				
	Sequence	BD-rate			Sequence	BD-rate			
		Y	U	V		Y	U	V	
Class 1 1080p	1	-20.9%	-21.9%	-35.1%	1	-19.3%	-27.6%	-29.7%	Class 1 1080p
	2	-42.5%	-46.3%	-49.1%	2	-33.6%	-40.9%	-46.6%	
	3	-21.0%	-19.1%	-10.9%	3	-18.3%	-18.3%	-16.2%	
	4	-35.8%	-45.2%	-38.5%	4	-29.7%	-40.5%	-36.0%	
	5	-44.2%	-51.9%	-49.8%	5	-32.9%	-46.3%	-46.0%	
	6	-30.3%	-26.5%	-13.8%	6	-23.8%	-26.4%	-18.6%	
	7	-23.3%	-31.3%	-17.3%	7	-17.7%	-25.4%	-15.4%	
Class 2 4K	8	-33.5%	-43.6%	-40.8%	8	-31.3%	-47.5%	-45.9%	Class 2 4K
	9	-34.1%	-31.4%	-34.6%	9	-26.7%	-29.7%	-33.3%	
	10	-33.6%	-25.0%	-26.4%	10	-24.6%	-26.8%	-27.0%	
Class 1		-31.2%	-34.6%	-30.6%	Class 1		-25.0%	-32.2%	-29.8%
Class 2		-33.7%	-33.4%	-34.0%	Class 2		-27.5%	-34.7%	-35.4%
All		<b>-31.9%</b>	<b>-34.2%</b>	<b>-31.6%</b>	All		<b>-25.8%</b>	<b>-33.0%</b>	<b>-31.5%</b>
Enc Time[%]		2406%			Enc Time[%]		2364%		
Dec Time[%]		6352%			Dec Time[%]		5688%		

➤ **[CPU] Anchor: VTM5.0 Test: DLVC1.0**

Random Access Main10					Low delay B Main10				
Sequence		BD-rate			Sequence		BD-rate		
		Y	U	V			Y	U	V
Class 1 1080p	1	-1.1%	-12.6%	4.0%	Class 1 1080p	1	-1.5%	-11.5%	10.5%
	2	-8.4%	-8.9%	-6.1%		2	-6.0%	-17.7%	-18.4%
	3	-1.7%	6.5%	9.7%		3	-0.9%	-2.6%	-0.9%
	4	-6.0%	-8.9%	-5.1%		4	-4.1%	-14.9%	-10.8%
	5	-18.8%	-25.4%	-28.4%		5	-6.1%	-23.1%	-25.3%
	6	-0.7%	-4.9%	-6.0%		6	-1.2%	-17.9%	-21.7%
	7	1.1%	-9.8%	-6.8%		7	1.6%	-22.0%	-24.5%
Class 2 4K	8	-6.5%	-12.4%	-11.7%	Class 2 4K	8	-3.0%	-18.9%	-19.0%
	9	-7.3%	-5.8%	-6.4%		9	-3.8%	-16.5%	-16.9%
	10	-4.7%	8.2%	8.8%		10	-2.2%	-16.3%	-14.1%
Class 1		-5.1%	-9.2%	-5.5%	Class 1		-2.6%	-15.7%	-13.0%
Class 2		-6.2%	-3.3%	-3.1%	Class 2		-3.0%	-17.2%	-16.6%
All		-5.4%	-7.4%	-4.8%	All		-2.7%	-16.1%	-14.1%
Enc Time[%]		382%			Enc Time[%]		454%		
Dec Time[%]		316053%			Dec Time[%]		308931%		

➤ [GPU] Anchor: VTM5.0      Test: DLVC1.0

Random Access Main10					Low delay B Main10				
Sequence		BD-rate			Sequence		BD-rate		
		Y	U	V			Y	U	V
Class 1 1080p	1	-1.1%	-10.7%	15.1%	Class 1 1080p	1	-1.5%	-10.3%	22.1%
	2	-8.2%	-8.7%	-6.6%		2	-6.0%	-17.2%	-19.0%
	3	-1.7%	6.7%	9.4%		3	-0.9%	-2.7%	-1.6%
	4	-5.9%	-9.0%	-5.2%		4	-4.1%	-15.0%	-11.1%
	5	-19.4%	-27.0%	-29.0%		5	-6.1%	-23.7%	-26.0%
	6	-0.6%	-4.7%	-5.4%		6	-1.2%	-18.4%	-21.7%
	7	1.0%	-10.0%	-6.9%		7	1.7%	-22.0%	-24.2%
Class 2 4K	8	-6.5%	-12.2%	-11.8%	Class 2 4K	8	-3.1%	-19.0%	-19.1%
	9	-7.3%	-5.8%	-6.2%		9	-3.8%	-16.7%	-16.9%
	10	-4.6%	8.4%	9.1%		10	-2.3%	-16.3%	-14.1%
Class 1		-5.1%	-9.1%	-4.1%	Class 1		-2.6%	-15.6%	-11.6%
Class 2		-6.1%	-3.2%	-3.0%	Class 2		-3.0%	-17.3%	-16.7%
All		-5.4%	-7.3%	-3.7%	All		-2.7%	-16.1%	-13.2%
Enc Time[%]		236%			Enc Time[%]		299%		
Dec Time[%]		3950%			Dec Time[%]		3944%		

## 4. 参考软件 DLVC

会后三周内发布 DLVC 1.1。 Website: <http://dlvc.bitahub.com/>