



WBU-ISOG MPEG-4 interoperability program

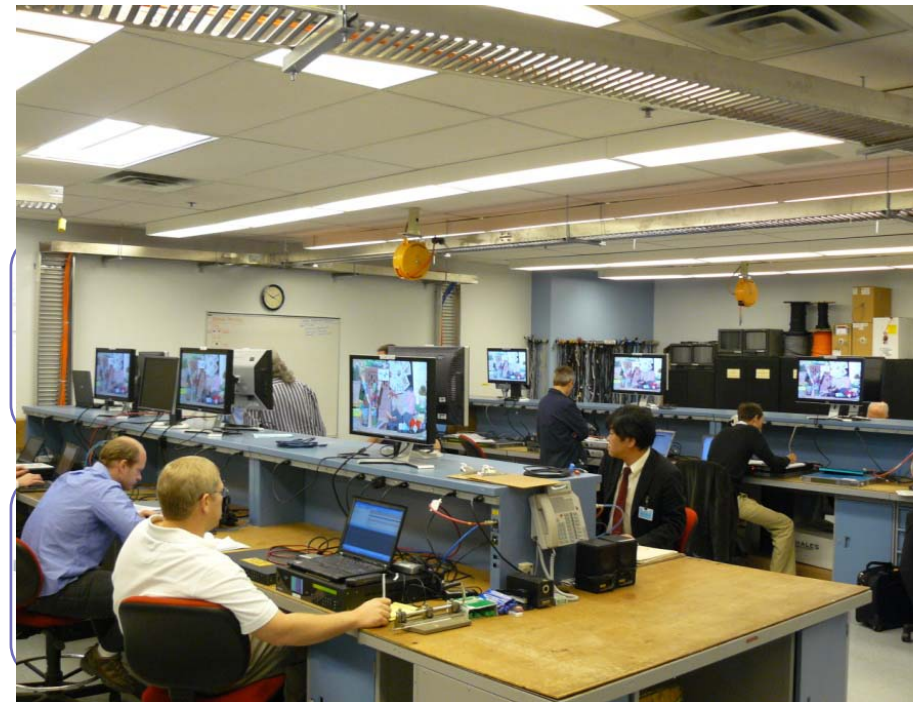
ATEME Update

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Good news for our industry !

- **Multi vendor interoperability means OPEX reduction**
- **MPEG-4 (H.264) is an open standard all the way to 10-bit Chroma sampling and increase quality of service over legacy codec**
- **Bandwidth saving is such that capacity is doubled within same infrastructure**
- **Test confirmed products are available and ready for deployments**

Company involved to provide you with products are committed to make interoperability a reality and WBU- ISOG coordination is key

Tested Equipments

	Encoder	Decoder
	MEDIAHUB -HD422	
	CM4101	DR8100
	AVC4000	HMR5440
	9780ENC-H264HD	7880DEC-H264HD
	IP9500e	IP9500
	UE9310	
		4104 PRO VIDEO
	HVE9100	HDV 9100
	D9054	D9854
		MRD 3187
	EN8090	RX 1290
	EM3000	RD3000

All Vendors provide their best Encoders and/or Decoders solution for this campaign

Testing Materials

- **WBU-ISOG and TELESAT provided HDCAM SR, D5, Uncompressed materials with the courtesy of CBC Radio Canada, FOX and EBU**
- **All vendors had to playback , compress and capture streams**
- **28 Tests streams with specific requirements were provided :**
 - **4:2:2 8-bit streams at 10, 20, 38 Mbps**
 - **4:2:0 8-bit streams at 10, 20, 38 Mbps**
 - **Streams with specific GOP size (15 or 16) or pattern (IBBP or IBBBP)**
 - **Streams with special Audio like, AAC, PCM or DOLBY E pass thru**
 - **1920 x1080i 50 fps, 1920x1080i50 fps, 720p50, 720p60**



An impressive test pattern !

ISOG MPEG4 Interoperability Transport Streams

as of June 22 2009

	Encoder	Decoder Details	Vendor	Vendor TS File	TS1	TS2	TS3	TS4	TS5
Digital	yes	n/a	yes	no	422	420		422/420	422/420
E	yes	yes	yes	yes	422	420	422	422	422
chTV	yes	yes	yes	yes					
Microsystems Inc.	yes	yes	yes	yes					
Computer Products of America	yes	yes	yes	yes	420	420	420	420	420
ic (Encoder only)	yes	n/a	yes	yes					
ional Datacasting (Decoder Only)	n/a	yes	yes	n/a					
electronics Corporation	yes	yes	yes	yes	422	420	422	422	422
ic Atlanta, A Cisco Company	yes	yes	yes	yes	422	420		422	
e (Decoder Only)	n/a	partial	yes	n/a					
rg Television	yes	partial	yes	yes					
on Grass Valley	yes	yes	yes	yes		420	420	420	420
38 Mbps Standard Latency IBBP									
RESOLUTION	1080i	1080i	1080i	720p	720p				
FREQUENCY	59,94	59,94	50	59,94	50				
IBBP/GOP	15	15	15	15	15				
AUDIO	MPEG2	MPEG2	MPEG2	MPEG2	MPEG2				
PARAMETERS	Hi422@L4	HiP@L4	Hi422@L4	Hi422@L4	Hi422@L4				

	No file
	Files uploaded prior to the May 22 WBU deadline
	Files uploaded after the May 22 WBU deadline
	Files uploaded after the May 22 WBU, pre May 22 TS file exists.
	deemed not acceptable
	due to fill rate or non-standard 422 implementation
	file was named 422 but was 420 - was uploaded prior May 22
	file tested was recorded on site

	Encoder	Decoder Details	Vendor	Vendor TS File	TS6	TS7	TS8	TS9	TS10	TS11	TS12	TS13	TS14	TS15	TS16	TS17
Digital	yes	n/a	yes	no		422/420	422/420	422/420		420				422/420		422/420
E	yes	yes	yes	yes	422	422	422	422	420	420	422	422	422	422	422	422
chTV	yes	yes	yes	yes	420	420	420									
Microsystems Inc.	yes	yes	yes	yes			420			420	420	420	420	420	420	420
Computer Products of America	yes	yes	yes	yes		420	420	420	420	420	420	420	420	420	420	420
ic (Encoder only)	yes	n/a	yes	yes	420	420		420	420		420	420	420	420	420	420
ional Datacasting (Decoder Only)	n/a	yes	yes	n/a												
electronics Corporation	yes	yes	yes	yes		422	422	422	422	420		422		422		422
ic Atlanta, A Cisco Company	yes	yes	yes	yes	420	420	420	420	420	420			420	420		
e (Decoder Only)	n/a	partial	yes	n/a												
rg Television	yes	partial	yes	yes	420	420	420		420		420	420	420	420	420	420
on Grass Valley	yes	yes	yes	yes	420	420	420	420	420	420	420	420	420	420	420	420
20 Mbps Standard Latency IBBP																
RESOLUTION	1080i	1080i	1080i	1080i	1080i	1080i	1080i	1080i	1080i	1080i	720p	720p	720p	720p	720p	720p
FREQUENCY	59,94	59,94	59,94	59,94	59,94	59,94	50	50	59,94	59,94	59,94	59,94	50	50	50	50
IBBP/GOP	16	15	15	15	15	15	16	15	16	15	16	15	16	15	16	15
AUDIO	MPEG2	MPEG2	Dolby	PCM	AAC	MPEG2	MPEG2	MPEG2	MPEG2	MPEG2	MPEG2	MPEG2	MPEG2	MPEG2	MPEG2	MPEG2
PARAMETERS	Hi422@L4	Hi422@L4	Hi422@L4	Hi422@L4	Hi422@L4	HiP@L4	Hi422@L4	Hi422@L4	Hi422@L4	Hi422@L4	Hi422@L4	Hi422@L4	Hi422@L4	Hi422@L4	Hi422@L4	Hi422@L4

28 Tests files for 12 Vendors = 336 Video interoperability results per vendor

A bank of 4032 video case has been created for WBU-ISOG

Vendor information spreadsheet

	Encoder	Decoder	Encoder	Decoder	Encoder	Decoder	Encoder	Decoder	Encoder	Decoder	Encoder	Decoder	Encoder	Decoder	Encoder	Decoder
Vendor Name	Adtec	AEME	AEME	Cisco	Cisco	ComtechTV	ComtechTV	Evertz	Evertz	Fujitsu	Fujitsu	Harmonic	IDC	Tandberg	Tandberg	Tandberg
Codec Model	mediaHUB-HD422	DR8100	CM4101	D9854	D9054	HMR5440	AVC4000	7880DEC-H264HD	9780ENC-H264HD	IP-9500e / IP-9500De v4.0	IP-9500e v4.0	UE9310	4104 Pro Video	RX1290	RX1290	RX1290
Codec Serial No.	na	fw 7.1.1	fw 3.1.0.2	30313224	D-00000051	1160001550	930001005	1930030006	119708365	00015, 00070	00018, 00318	266048	F.W. 1.15	105256	105256	105256
1080i/59.94 (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1080i/50 (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
720p/59.94 (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
720p/50 (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
38 Mbps (Y/N)	Y	Y	Y	Y	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y (max 25Mbps video)
20 Mbps (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
10.3 Mbps (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4:2:2 (Hi422@LA) 10 bit (Y/N)	N	DR8400	Y	N	N	N	N	N	N	N	N	N	N	N	N	N
4:2:2 (Hi422@LA) 8 bit (Y/N)	Y	Y (NTT)	Y	N	N	N	N	N	N	N	N	N	N	N	N	N
4:2:0 (HiP@L4) 8 bit (Y/N)	Y	Y	Y	Y	Y	Y	N (MP@L4)	Y	Y	Y	Y	Y	Y	Y	Y	Y
IBBP / GOP 15 (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
IBBBP / GOP 16 (Y/N)	N	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y
4 Ch Audio MPEG-2 (MPEG, Layer 2) (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Dolby E 20 bit mode 8 channels (SMPTE 302M 2002) (Y/N)	pass through	pass through	pass through	N	Y	pass through	N	pass through	pass through	Y	Y	pass through	N	Y	Y	Y
CM (SMPTE 302M 2002) (Y/N)	pass through	Y	Y	Y	Y	pass through	N	Y	N	Y	Y	Y	N	Y	Y	Y
AAC 4 ch (Y/N)	N	Y	Y	Y	Y	N	N	Y	N	Y	Y	Y	Y	Y	Y	Y (4ch down mix to 2ch or 2 ch #pid)

All data as provided by Vendor - not verified
 Vendor has not supplied information

All Vendors provide detailed specifications for their Encoders and/or Decoders

Conclusion and Next Steps ...

- **An Intensive week of tests and measurements wisely prepared thanks to the “prior – testing” streams submission**
- **TELESAT performed objective and accurate testing**
- **Successful results for most vendors + This program lead every vendor to improvements**

- **No video quality/performance comparison tests were performed**
- **As more 4:2:2 solution becoming real for sports, WBU-ISOG might extend this interoperability campaign**