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AG-AF100 Worlds First Camcorder
Large Imager, HD Recording, Under $5000





Jan Crittenden Livingston

9/30/2010

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Why the AG-AF100?

- People have said it is the DSLR killer, that is not its target
- Camera is targeted at the production community
- We heard that customers like the look of the shallow depth of field obtained by the larger imagers
- We also heard the complaints coming from the DSLR crowd
  - Aliasing and Moire'
  - We know how to resolve that
- We know many customers have adopted 35mm adapters to use to get the look of the large imager
- These are the customers we are after



FOURTHIRDS

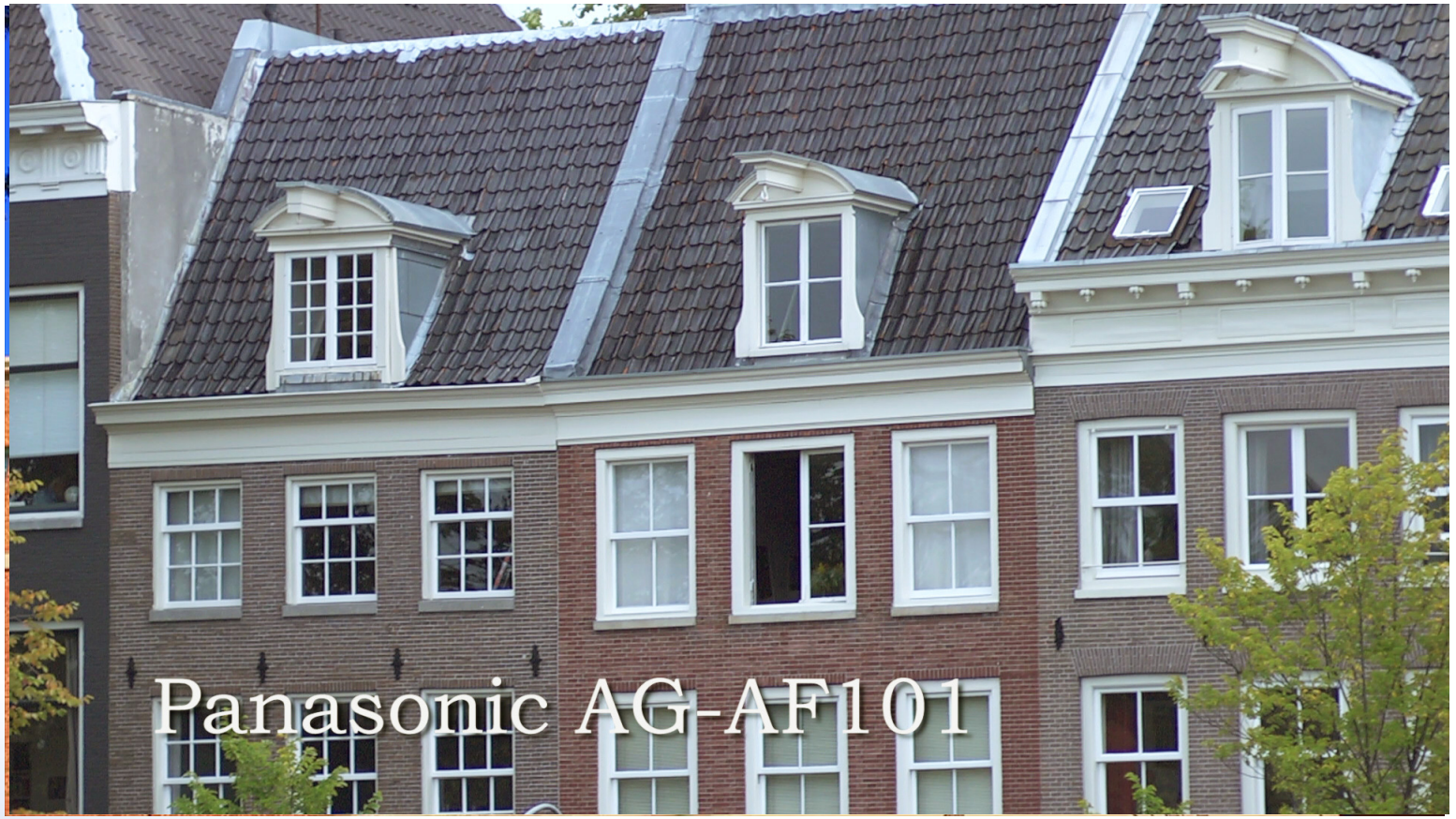


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What is meant by Aliasing and Moire?

Aliasing can cause a shot to be clearly Unusable

It is about images and not imagers, images get you paid





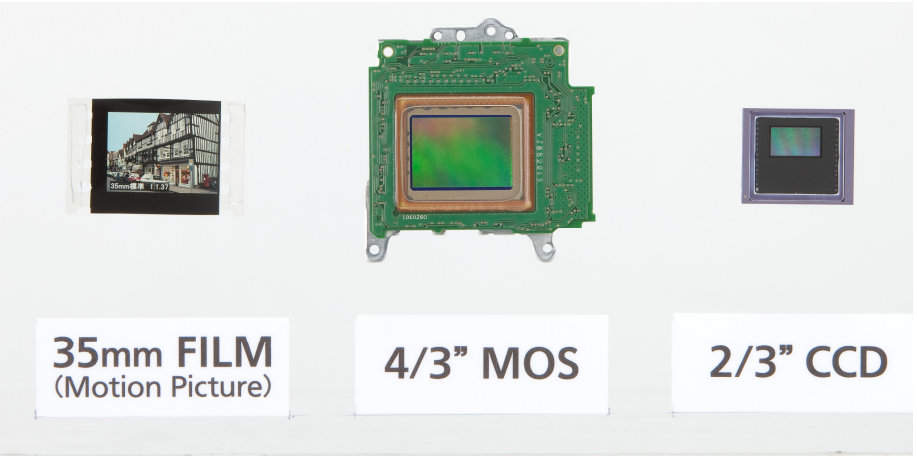
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Best in Class 4/3” Imager

- 4/3” “Best in Class” MOS imager
  - fast imager scanning
    - translates to low skew in picture quality
      - Flashband still exists as CMOS Artifact
    - optical low pass filter for elimination of aliasing and moire
- Micro 4/3”s mount = virtually any lens can be mounted
- Size relationship to 35mm is very similar

FOURTHIRDS







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Lenses Compatible with 4/3” Imager

- Micro 4/3”s mount = virtually any lens can be mounted
- Size relationship to 35mm is very similar
- Autofocus during record with the H-VS014140 Lumix Lenses, with face recognition technology

FOURTHIRDS

Available Lens Mount

PL lens Adaptor

FourThird Lens Adaptor

Olympus OM lens Adaptor

LEICA M Mount Adaptor

Canon FD Mount Adaptor

Yashica CONTAX Mount Adaptor

Nikon F Mount Adaptor

PENTAX K Mount Adaptor

Panasonic Lumix GH1 Lenses



Zeiss Prime Lenses





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Lenses Compatible with 4/3” Imager

- Autofocus during record with the H-VS014140 Lumix Lens
  - Face recognition technology
  - OIS capability



PanasonicAF100 with Lumix HV014140



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Variable Frame Rates and Record Times

- Records AVCHD 1080/60i, 24P(Native), 30P and 1080/50i , 25P(Native), 720P/60 or 720P/50
- Variable frame rates in 24P, 30P and 25P, in1080 up to 60P or 50P.
- dependent on 60Hz or 50Hz mode
- Two card slots, relay recording
  - automatic clip spanning across two cards
  - 2 32GB Cards - 6 hours of PH record time
  - 2 64GB cards means 12 hours of PH Mode,
    - 48 hours in HG Mode
- SDHC and SDXC Card compatibility,

Mode	16GB	32GB	64GB
PH	90	180	6 Hours
HA	120	240	8 Hours
HE	360	720	24 Hours



Framerate	Effect of 24p standard	Effect of 30p standard
12p	200% (Quick)	250% (Quick)
15p	160% (Quick)	200% (Quick)
18p	133% (Quick)	167% (Quick)
20p	120% (Quick)	150% (Quick)
21p	114% (Quick)	143% (Quick)
22p	109% (Quick)	136% (Quick)
24p	100% (Standard)	125% (Quick)
25p	96% (Slow)	120% (Quick)
26p	92% (Slow)	115% (Quick)
27p	89% (Slow)	111% (Quick)
28p	86% (Slow)	107% (Quick)
30p	80% (Slow)	100% (Standard)
32p	75% (Slow)	94% (Slow)
34p	71% (Slow)	88% (Slow)
36p	67% (Slow)	83% (Slow)
40p	60% (Slow)	75% (Slow)
44p	55% (Slow)	68% (Slow)
48p	50% (Slow)	63% (Slow)
54p	44% (Slow)	56% (Slow)
60p	40% (Slow)	50% (Slow)

Exchangeable Scene Files

- Six Built-in Scene files, which of course the customer can customize, selectable from a menu rather than a scene file dial,
  - Currently unnamed but using idea from HMC150/HPX170, they will be similar
- Built-in gamma curves like HD Norm, SD Norm, HD Low and High, Cine-like D, Cine-like V, B.Stretch
- 4 selectable color matrices like Norm 1 and Norm 2, Fluorescent and Cinelike
- Color Phase and Saturation, Pedestal and Detail image control
- Exchangeable scene files, for instant/easy matching between multiple cameras

F1: —	Standard settings
F2: FLUO.	Indoor shooting under fluorescent lights
F3: SPARK	Highlighting subjects at receptions, dinners etc.
F4: B-STR	Enhanced gradations of luminance in low light scenes
F5: CINE V	Cine-Like setting shifted to prioritize contrast
F6: CINE D	Cine-Like setting shifted to prioritize dynamic range



Ins and Outs of the AF100

- HD Video monitoring during record and playback
- Uncompressed 4:2:2, 8 Bit HD-SDI output
  - Simultaneous HDMI output
  - Turn off VF
- Down converted output on video out



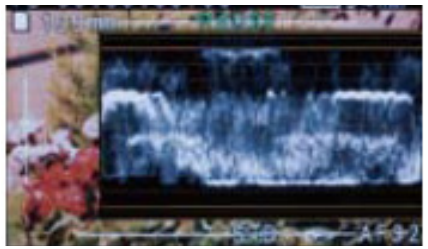
Side crop *Letterbox* *Squeeze*

- Uncompressed 48KHz 16 Bit audio recording capability in PH mode. Dolby Digital in lesser modes
  - Two professional XLR audio inputs,
  - line/mic selectable with phantom power
  - full manual audio level control
  - ability to disable all Audio Gain
  - high-quality audio pre-amps at the input
- Audio outputs, both line level and headphones



Focus Assist and Production Toolset

- High resolution LCD and Viewfinder
- Focus assist that can be used while recording,
  - color on peaking
  - focus bar
- Two sets of zebras that can be set for your style of shooting
- Spotmeter "marker" for instant feedback on key subject exposure value, assignable to Function key
- Waveform monitor and vectorscope, for more accurate monitoring of Broadcast Safe Levels







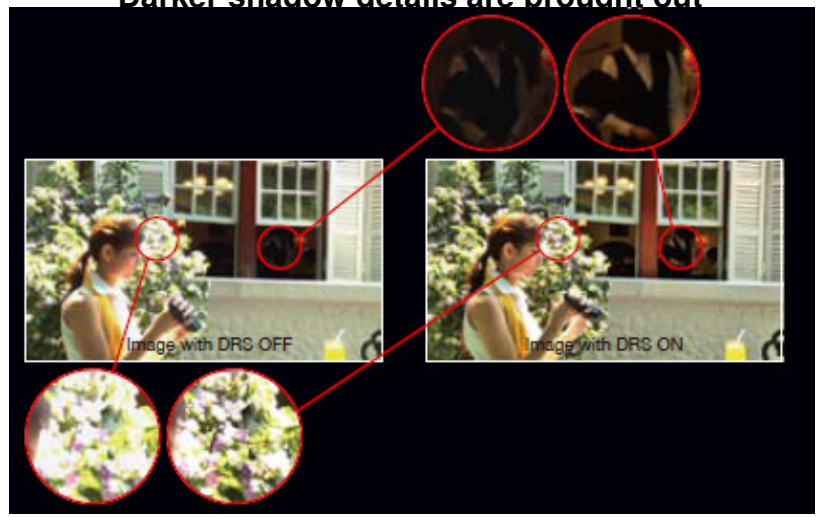
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Time Code and Dynamic Range Stretch

- Timecode and timecode synchronizing for simple multiple-camera shoots via video out connection
- Built-in optical neutral density filters
  - 2 stops, 4 stops and 6 stops
  - 1/4, 1/16, 1/64
- Two manual black and white balance choices and preset White Balance at 3200 or 5600K
- Dynamic Range Stretch in all modes, and frame rates



Darker shadow details are brought out



Highlights are surpressed from blowing out



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Helpful Toolsets

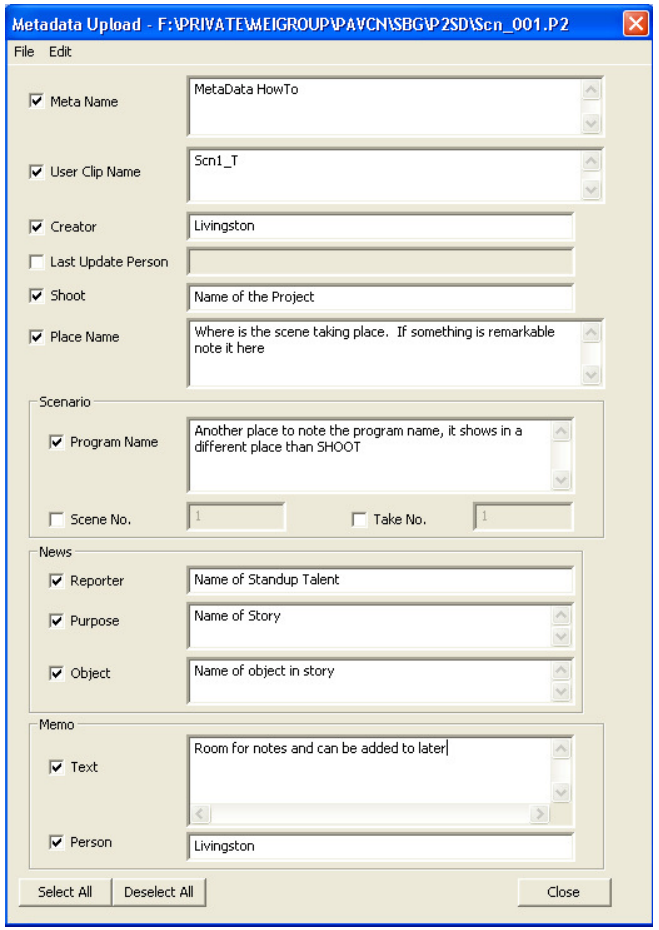
- Different aspect ratio markings in the viewfinder/LCD
  - 90% "safety zone" against the 16:9
    - for making sure your framing will be visible on all TVs
  - 2.35
  - 1.85
  - 14:9
  - 4:3 for safe down converted output framing
  - Grid
- Professional Color bars and 1000Hz tone for communicating levels to the edit suite



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MetaData and its Viability

- Metadata - assign user clip names to the clips that get shot
- Marker ability to mark clips "good" or "no good"





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Creature Features

- Programmable User Buttons with options like Delete Last Clip, Focus Assist, Rec Check, Capture, ATW Lock and Shot Mark
- Black and White Recording Mode





Intervalometer and Batteries

- Pre-record, 3 seconds in HD
- Intervalometer function for up to 24 hours
- Smart Battery interface, record times up to 4 hours with 5400mA battery
  - Same battery as the other AVCCAM Batteries



Removable Handles

- Removing the handles allows for a more compact size
- Further customization of the product





Remote Control

- Wireless infrared remote controller
- Remote iris/stop/start control interfaces, standard communication protocol as with all Panasonic Professional camcorders
- Accessories will be key in fleshing out zoom and focus options



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AVCCAM PH Mode, Full Production Codec

- High quality AVCCAM PH mode, full production codec, I frames, B frames and P frames, also has HA Mode and HE Mode
  - note these last two are 1080i only
- Many have opinions on AVCHD as they have had experience with other manufacturer's implementation of AVCHD
  - There is no standard for encoding only decoding
  - Some of those implementations are only I frames and P frames
  - Some only have a couple of B frames

Mode	bps	Sampling	Audio
PH	Approx. 24Mbps	1920 x 1080 1280 x 720	Dolby Digital 2 Ch
HA	Approx. 17Mbps	1920 x1080	
HE	Approx. 6Mbps	1440 x1080	



AVCCAM at its Best

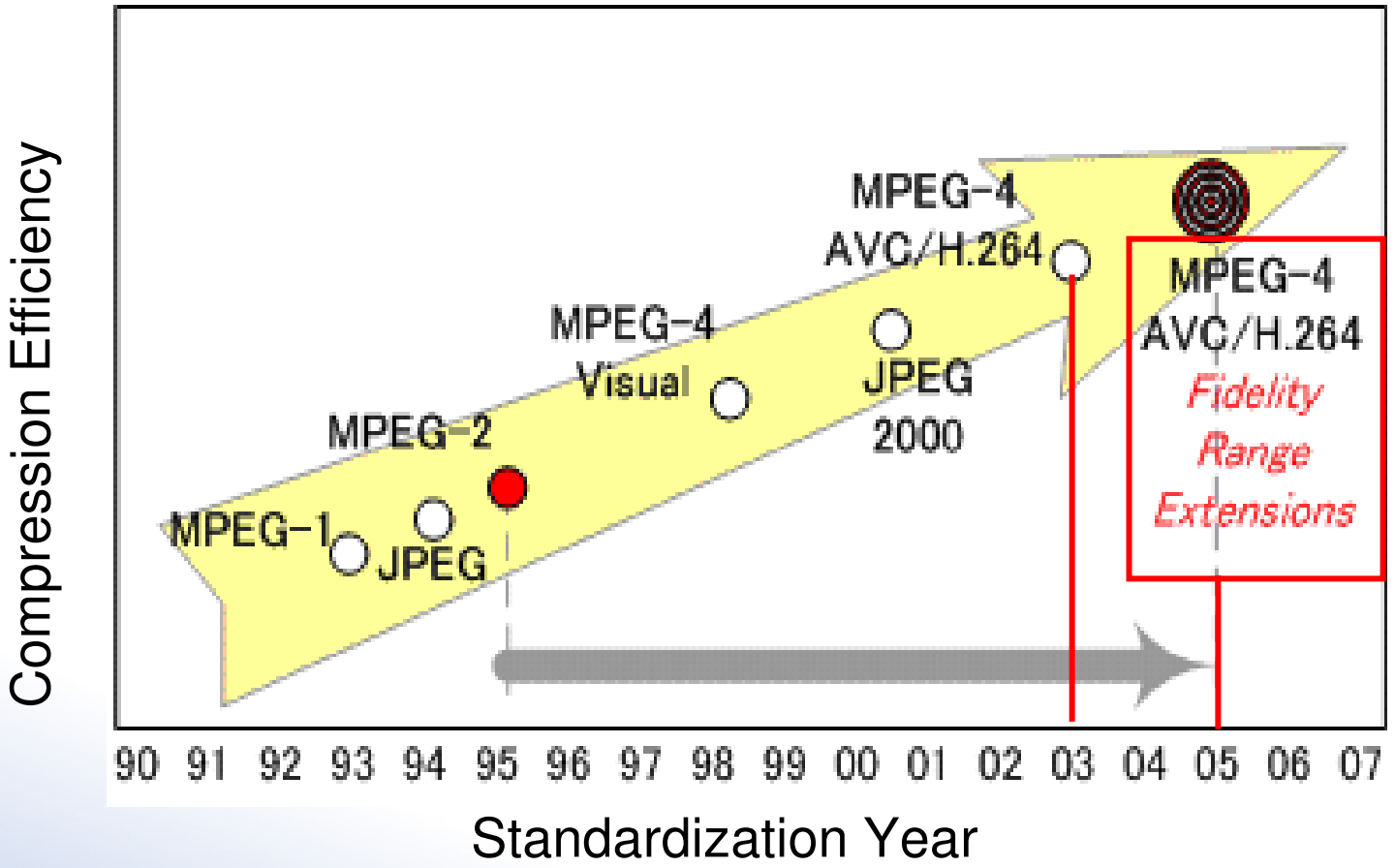
- People have asked why AVCCAM, why not AVC-Intra
  - Would have made the camera too expensive for the target market
  - Don't discount it without trying it, you may be pleasantly surprised
- Two record slots for continuous recording capability
  - Hot swappable
- If higher bit rate is desired add an external recorder and take the signal from the SDI output
  - 4:2:2, Uncompressed, 8 Bit





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So What is AVCHD/H.264, MPEG4?

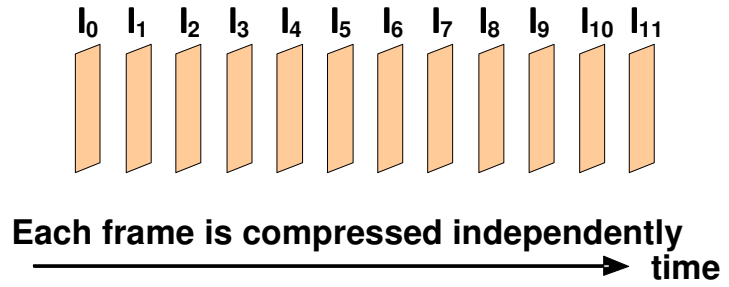
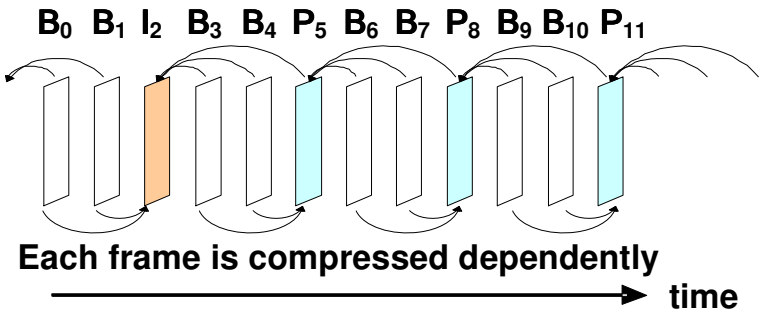




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Compression Comparison - Intra vs. Long GOP

Intra compression : Suitable for editing
Long GOP: Suitable for lowering bit rate application with acceptance of degradation

	Intra compression	Long GOP
Compression Scheme	**Individual frame**  	**Multiple frames (GOP)** 
Bit rate saving	**Use special correlation**	**Use special and temporal correlations**
Picture quality	**Stable picture**	**Depends on objects**
Editing capability	**Cut editing: Data copy only**	**Cut editing : Need re-encode**
Multi-generation Deterioration	**Smaller (VTR:Intra comp. base)**	**Larger (Long GOP structure)**
Error propagation	**Smaller (Max. 1 frame)**	**Larger (Max. 1GOP)**
Parallel processing	**Easier**	**More difficult**

Panasonic ideas for life Advanced Entropy Encoding using CAVLC/CABAC

- CAVLC (Context Adaptive VLC)
- CABAC (Context Adaptive Binary Arithmetic Coding)

	MPEG-2 VLC	MPEG-4 AVC/H.264	
		CAVLC	CABAC
Encoding Method	Variable length coding	Adaptive Variable length coding	Arithmetic Coding
Context adjustment process	No	DCT Coefficient coding adaptation	1 bit unit
Encoding efficiency	Moderate	High	Excellent
Major Application	DTV/DVD/HDV	Cell phone video	Blu-ray, HD-DVD, AVCHD



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MPEG2 Compared to AVC MEPEG4 H.264

	MPEG-2 High Profile	MPEG-4 AVC/H.264 High Profile	Remarks
Products	HDV, XDCAM	AVCHD, AVC-Intra	
Interlace compatibility	OK	OK	No change
DCT Block size	Fixed 8×8 for both Y/C	Y: 8×8 / 4×4 variable C: 4×4	Better optimization of block size to content
Intra-frame prediction	DPCM of DC coefficient only	Y: 16×16/8×8/4×4 C: 8×8	Prediction efficiency improves
Transform	DCT	Integer DCT	Calculation accuracy improves
Motion Prediction: Block matching options	Fixed 16×16 unit	16×16, 16×8, 8×16, 8×8, 8×4, 4×8, 4×4	Forecast efficiency improves
New entropy encoding CAVLC / CABAC	VLC, 2 dimensional Hoffman	CABAC / CAVLC	Large efficiency increase.
Compression efficiency	1.0	2.0	×2 in TTL



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Efficiency Improved by Compression of Residual Image

Original image

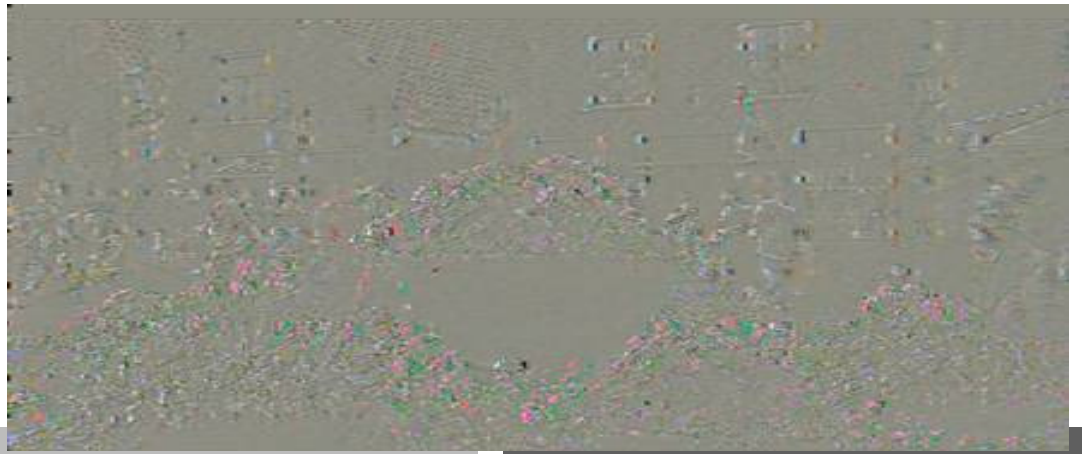


Intra predicted image











Residual image
=(original image)–(Intra predicted image)

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Original Input and Intra Prediction

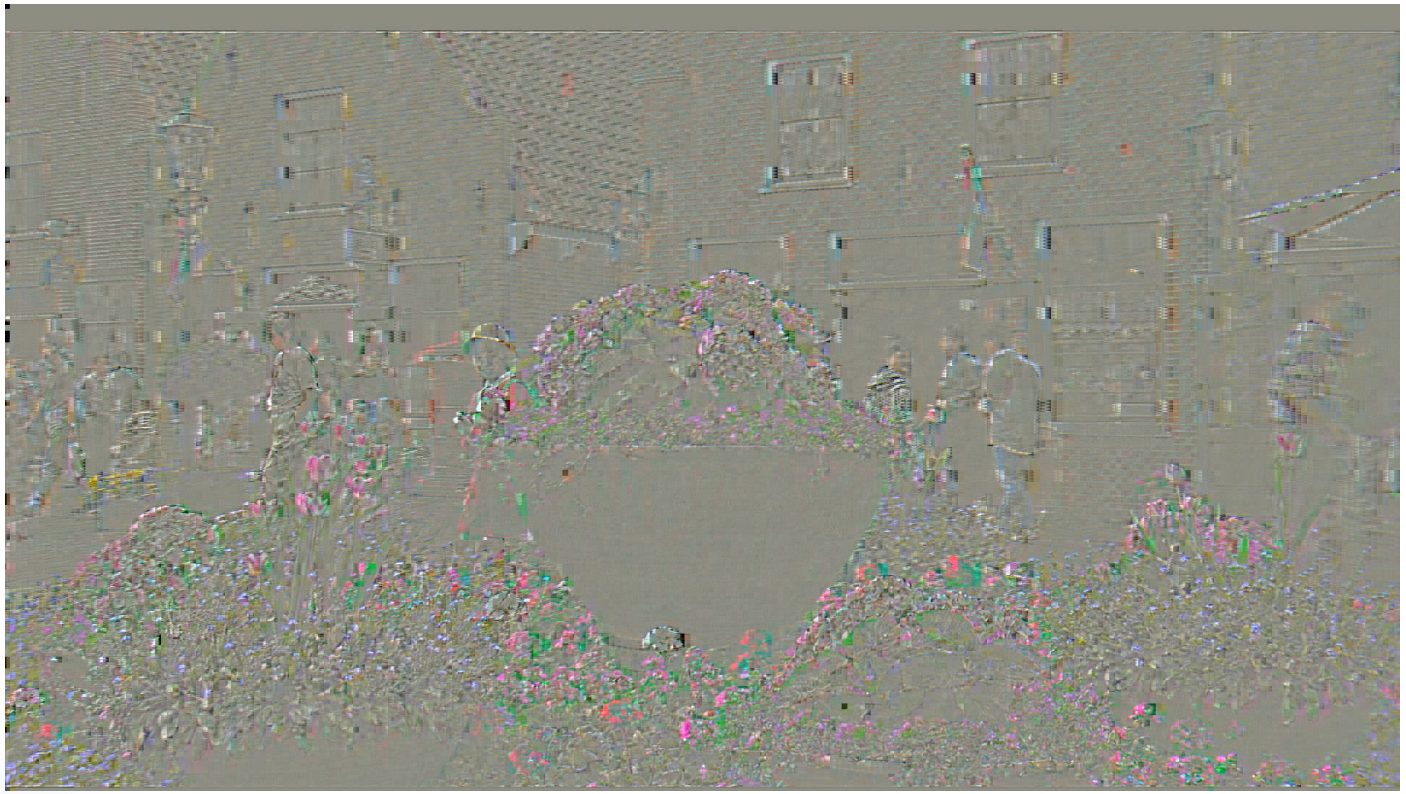






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Compressed Residual Image and Prediction Mode





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HDV vs. AVCHD; MPEG2 vs. MPEG4





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Professional Looks, Professional Support

- Professional Body Color and Styling, similar to other Panasonic Professional cameras
- Similar placement of controls to other Panasonic Handheld cameras
- 3-year AVCCAM warranty upon registration in PASS network



