

JPEG 2000

For Contribution Quality HD Transport

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WBU / ISOG, Zagreb, 25th October 2011

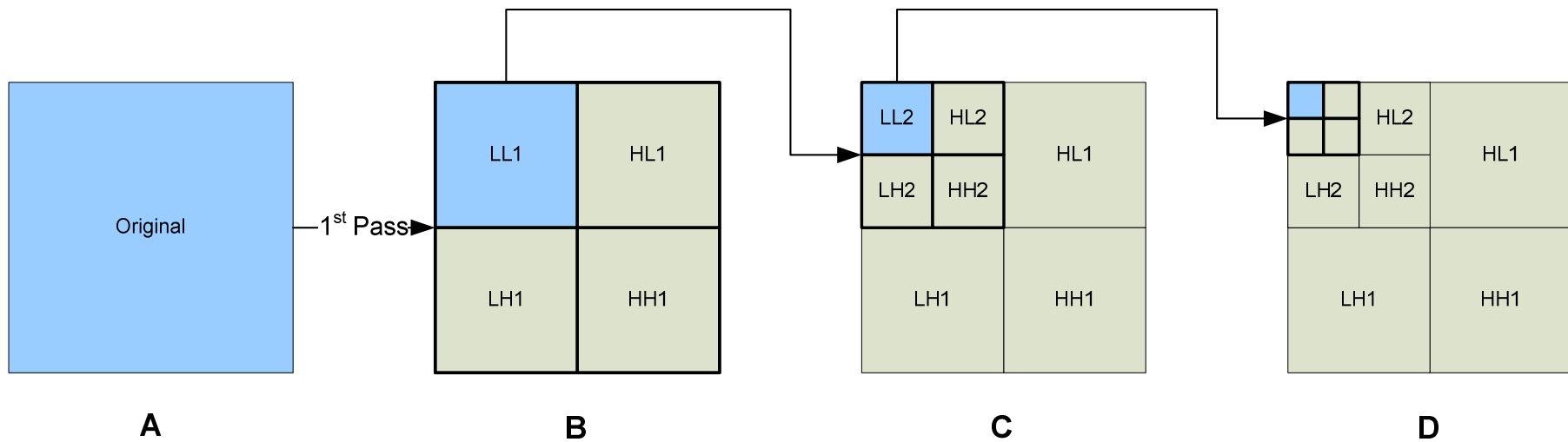


Agenda

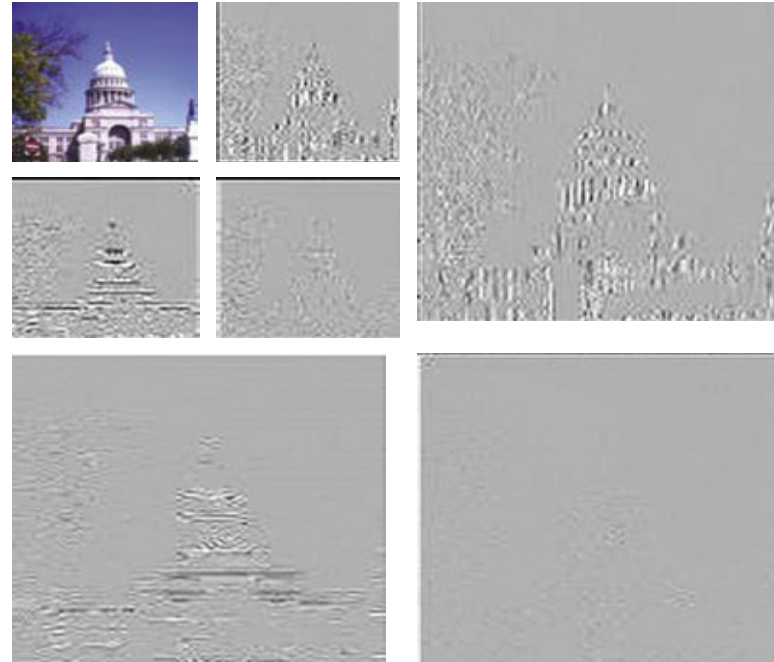
- Basic description of JPEG 2000
- Comparison between video compression standards
- Applications
- Technical infrastructure requirements
- Interoperability
- Future

JPEG 2000

State of the art compression technology based on Wavelet transform.



Wavelet

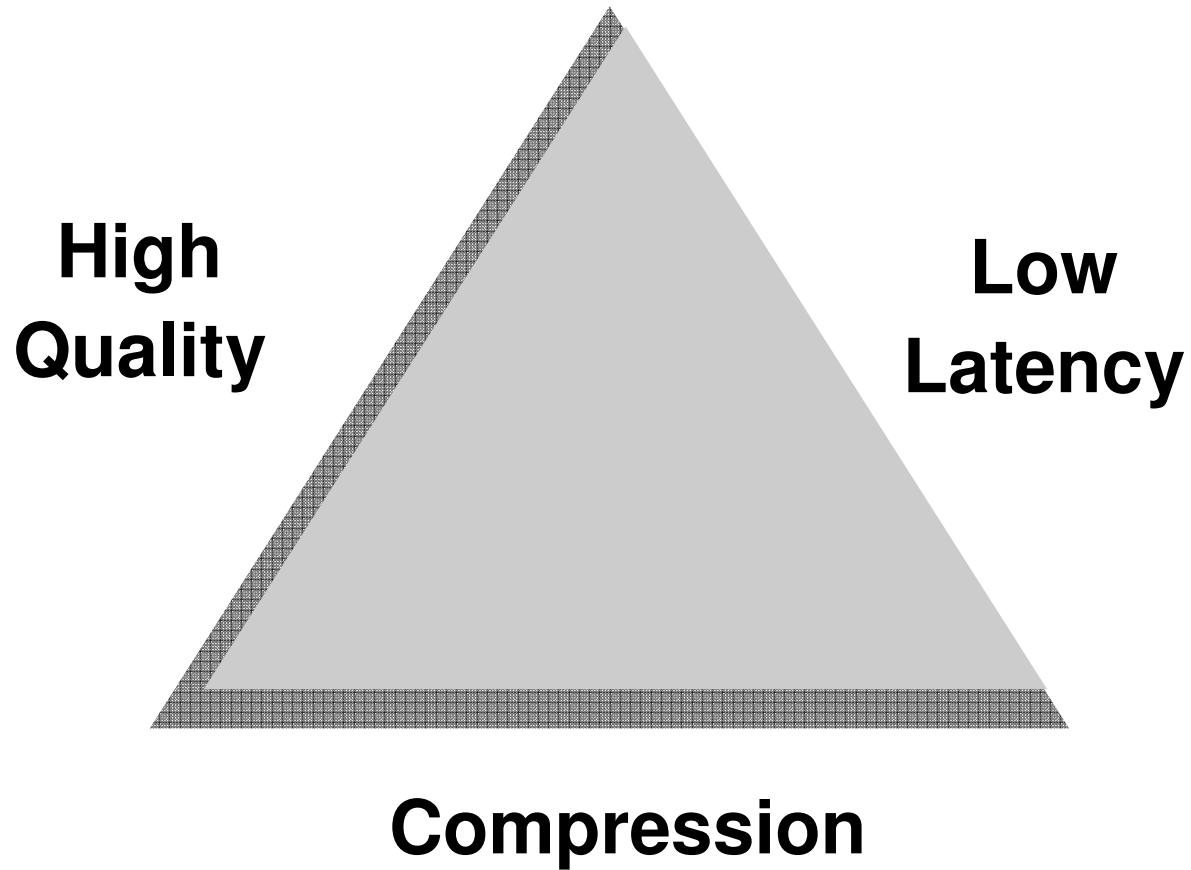


* Analog Dialogue 38-09, September (2004)

Benefits

- Compression quality
- Scalability
 - Quality progression
 - Resolution progression
 - Position progression
 - Component progression
- Latency
- Constant quality through multiple generation

Compression Dilemma



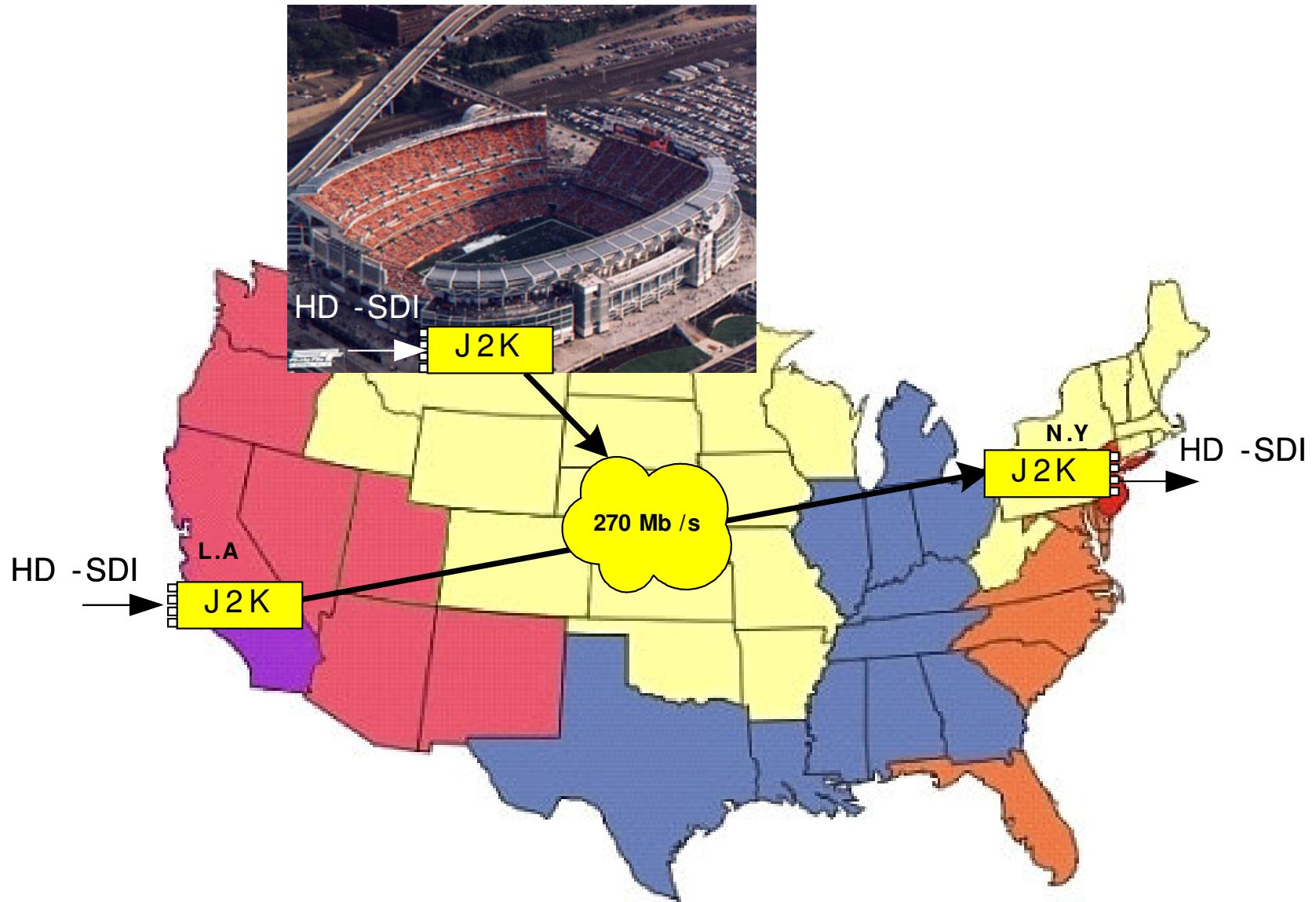
Compression Standards

	MPEG-2	H.264 AVC	AVC-I	JPEG 2000
Inter frame coding	Yes	Yes	No	No
Transform Base	DCT	DCT	DCT	Wavelet
Bit depth	8	8 to 14	10	10
Visual impairments at low bitrates	Blocking	Blocking	Blocking	Blur
Encoder / decoder design complexity	Asymmetrical	Asymmetrical	Asymmetrical	Symmetrical
Low bit rate thumbnail	No	No	No	Yes
HD contribution bit rate [Mbps]	45 - 100	20 - 80	80 - 600	80 - 600
End-to-end latency	> 1 sec	+ 500 msec	< 100 msec	< 100 msec

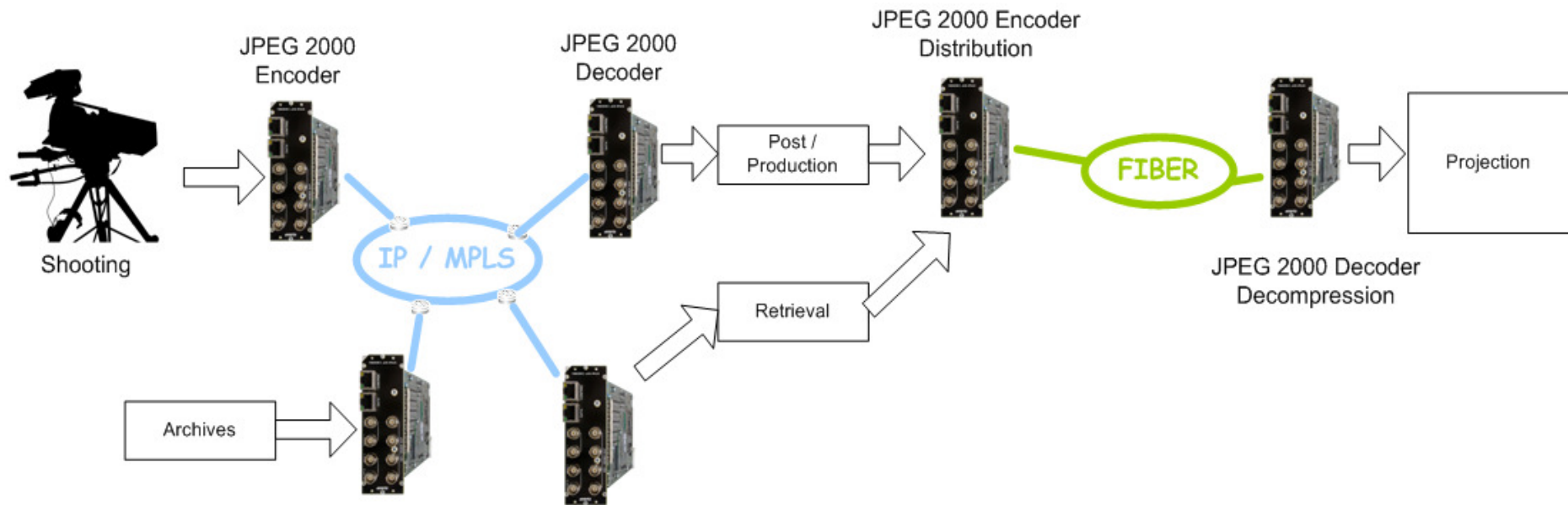
Applications

- MPEG-2
 - Legacy broadcast infrastructure
- H.264
 - Low bit rate distribution
 - Contribution over satellite or IP
 - SNG
- AVC-Intra
 - Live broadcast streaming (AVC-I cameras) < 100 Mbps
 - New telco-based communication links
- JPEG 2000
 - Live broadcast streaming < 100 Mbps
 - New telco-based communication links
 - Digital Cinema Distribution < 250 Mbps
 - High quality broadcast contribution up to 1 Gbps (Post Production)
 - Audiovisual archiving > 1 Gbps

Contribution Network for News



Digital Cinema Workflow



Infrastructure

- High bandwidth for HD contribution
 - Bitrates above 120Mb/s for visually lossless quality
 - Bitrates above 300-500 Mb/s for near lossless quality
- Transport media
 - Dark fiber
 - SONET or SDH networks
 - IP over MPLS
- Transport interface
 - SDI, SDTI, ASI, IP
- Encapsulation
 - MXF for studio transport
 - MPEG-2 TS for video transport – standard in progress

The Future of JPEG 2000 is bright

- Application trends
 - Continue HD deployment worldwide
 - 3G (1080P 50-60Hz) contribution
 - 3D contribution (over 3G or 2x 1.5Gb/s links)
 - Archiving of content into servers
- Technology trends
 - Standardization of the Transport layer
 - 4Kx4K or 8Kx8K resolution

Conclusion

- JPEG 2000 does not replace MPEG-2 or H.264
- JPEG 2000 is a very good solution for high quality / high bitrate contribution applications
- JPEG 2000 will grow further when interoperability is achieved.