



Stream and File Formats - Where Are We Now?

Presented at the 143rd SMPTE Technical
Conference by Bob Edge

Topics

- Why are file formats important?
- Broadcast formats
 - DPX
 - GXF
 - AAF
 - MXF
- Other formats
- Conclusions

Why Are File Formats Important?

- Transfer content on data networks
 - Guaranteed perfect transfers
 - Minimize Quality Control steps
 - No decompress/compress quality losses
- Data network transfers are not real-time
 - Faster than real-time on high-bandwidth networks
 - Utilize low-cost long-haul networks
- Utilize data storage technology
- Save work in process
- A file can include metadata

Applications - Acquisition and Contribution

- Capture or distribute high quality streams
- MPEG and DV streams meet the users needs
 - Real-time streams
 - Simplicity for VTRs and camcorders
- Some metadata is valuable
 - Shot time and location
 - Job or contract numbers
 - Camera information

Applications - Post-Production

- Rich feature set required
 - Edit changes with immediate preview
 - Wide selection of transitions
 - Capture source material metadata and editing history metadata
- Saving work in process for later changes
 - Customer approval of work
 - Repurposing
- All of the content is on the editing system
 - Requires compilation before playout

Applications - News, Sports, and On-Air Operations

- Some editing capabilities
 - Cuts only editing
 - Audio fade in/out
 - Voice overs
- Speed is more important than art
- Limited editing may occur at the last minute
- Play or record during file transfer may be useful

Applications - Emission

- Final playable stream
 - Uncompressed or MPEG Transport Streams
- Limited product, post-production and operations metadata
- Interactive TV data and metadata inserted
 - May be VBI data or inserted in the MPEG stream

Digital Moving Picture Exchange - DPX

- Proven SMPTE standard (SMPTE 268M)
- Standardized in 1994
- Used for transport of uncompressed images
 - Telecine machines
 - Synthetic image rendering systems
- Widely accepted for uncompressed image transport
- Some metadata is part of the format

General Exchange Format - GXF / SMPTE 360M

- Proven format
 - Introduced by GVG in 1997
 - Supported by several vendors
 - SMPTE standard adopted in April 2001
 - Uses FTP for file transfers
 - Used for news, sports, on-air operations, and archives
- Cuts edits, audio fades, and voice overs
- Can carry SMPTE KLV, and XML metadata
- Supports MPEG, DVCPRO, and JPEG video
- Supports uncompressed, AC3* and Dolby E* audio

* Documented in a revision that is underway

Advanced Authoring Format - AAF

- Designed for post-production and high-end editing
 - The AAF Association is the proponent
 - OMF was a starting point
 - AAF members have made significant contributions
 - Rich feature set; complex transitions, . . .
 - Project interchange between editing systems is key
- AAF includes
 - An API specification
 - A sample implementation
- Some products are in the marketplace
- The leading format for post-production interchange

Material Exchange Format - MXF

- A new design that is in process
- Proponents and contributors
 - Pro-MPEG, GFOR-S, EBU, IRT and other organizations
 - Several vendors
 - MXF has started the SMPTE standards balloting process
- Simple MXF files are audio/video streams with metadata
- MXF will support a variety of audio and video formats
- MXF carries SMPTE KLV metadata
- Features set needed to compliment AAF
- No products offered today

Other Formats

- Several vendors have proprietary formats
 - The details have not been publicly disclosed
- PC and Internet Formats
 - Used for Internet video
 - Interactive features
 - Some PC and Mac applications are used by broadcasters
 - These formats and applications do not always have the rich feature sets broadcasters need
 - Long term archives may be an issue
 - Examples: Microsoft WindowsMedia, QuickTime, RealNetworks, . . .

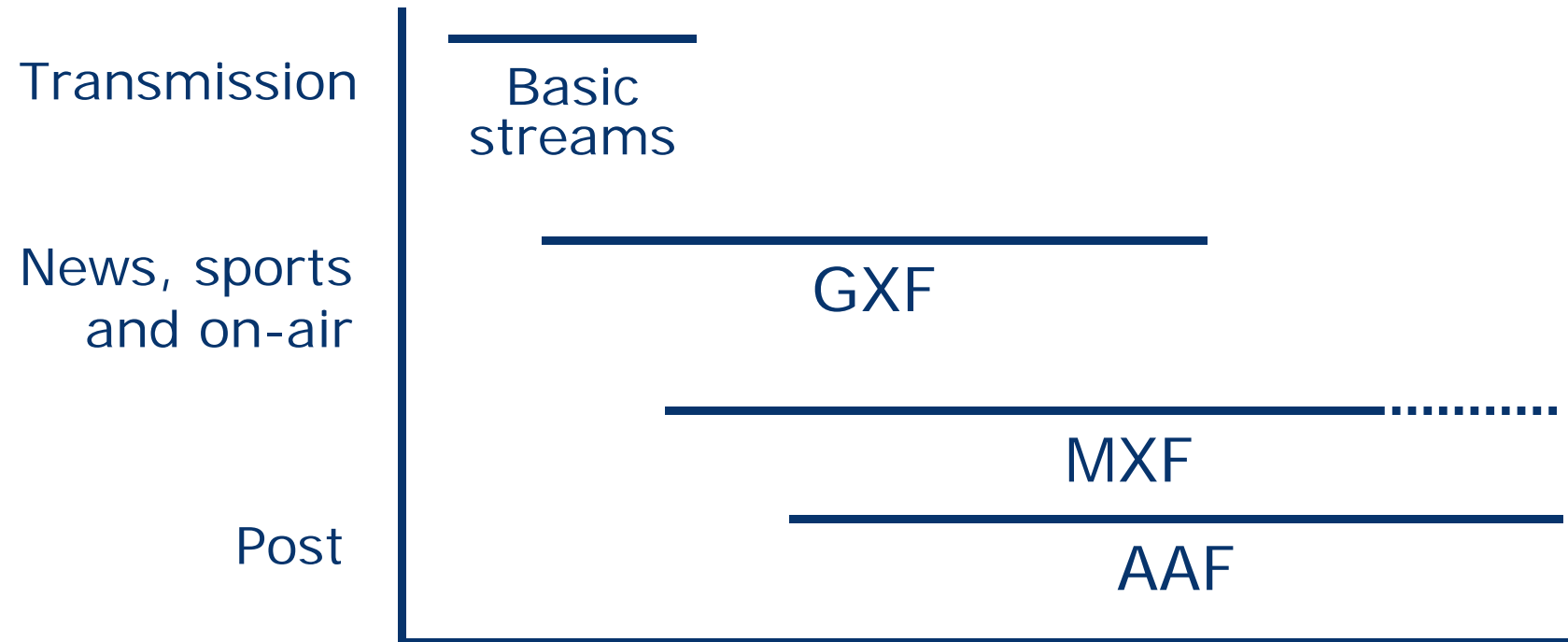
Metadata

- How to encode metadata?
 - SMPTE KLV for SDI, SDTI and related technologies
 - XML for systems derived from IT technologies
- Where is the metadata?
 - In a stream
 - Camera position and parameters
 - Good shot
 - UMIDs
 - In a material management system database
 - Film or video tape
 - Material that is in an archive

Applications of File Formats

	Video	DPX	GXF	AAF	MXF
Acquisition	Yes				Planned
Post-production	Yes	Yes		Yes	
Contribution	Yes		Yes		Planned
Live events	Yes				
News production	Yes		Yes	Yes	Planned
Sports production	Yes		Yes		Planned
On-air operations	Yes		Yes		Planned
Distribution	Yes				
Archives	Yes	Yes	Yes	Yes	Planned

Application of File Formats



Features (Metadata, multiple formats, complexity. . .)

Where Are We Now?

- DV and MPEG family compression systems
 - Established stream formats
- DPX (SMPTE 268M)
 - Established uncompressed image transfer format
- GXF (SMPTE 360M)
 - Established interchange format
- AAF
 - Emerging post-production format and tool set
- MXF
 - Interchange format that is under development

Conclusions

- Several stream and file formats are in use today
- Additional formats are being proposed
- No format meets every application's needs

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