

MXF Low Latency Streaming Demonstrator

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10h-10h20

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Who I am

- Media Engineer at 4AM SA
- Graduated with a Master of Science HES-SO in Engineering, Major in Information and Communication Technologies.
Projects : Quality of IPTV reception, MXF Demonstrator
- Bachelor in Telecommunications
Projects : IPv6 Infrastructure and Migration, IS-IS routing protocol

Master Project Objectives

- Study MXF Standards
- Realisation of a Software Demonstrator for analysing and validating MXF Stream.
- Conformity Check, tests and measures on the Demonstrator
- Software Demonstrator does not replace, but complements professional tools and helps promoting MXF Low Latency Streaming.

Presentation Objectives

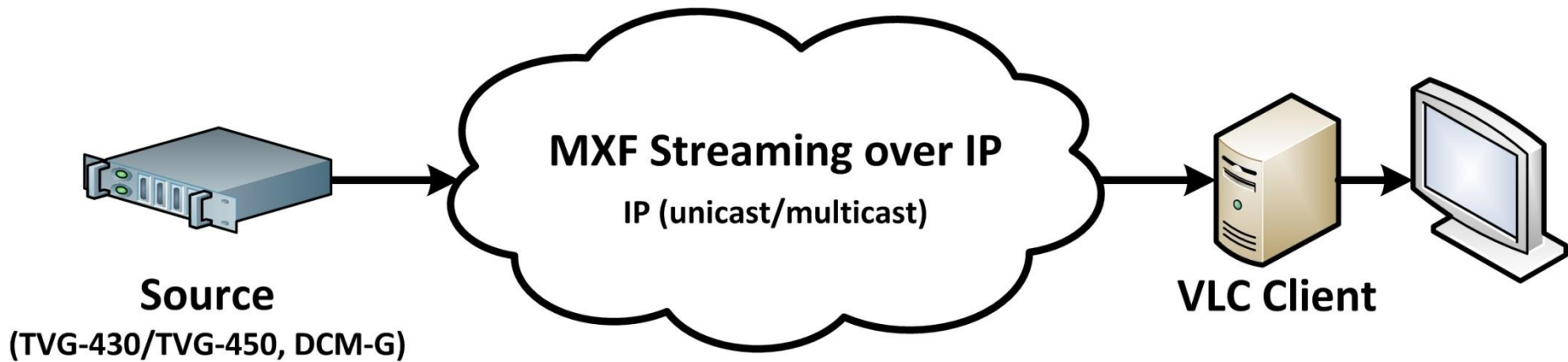
Sharing my work :

- What I have done
- What you can re-use and improve

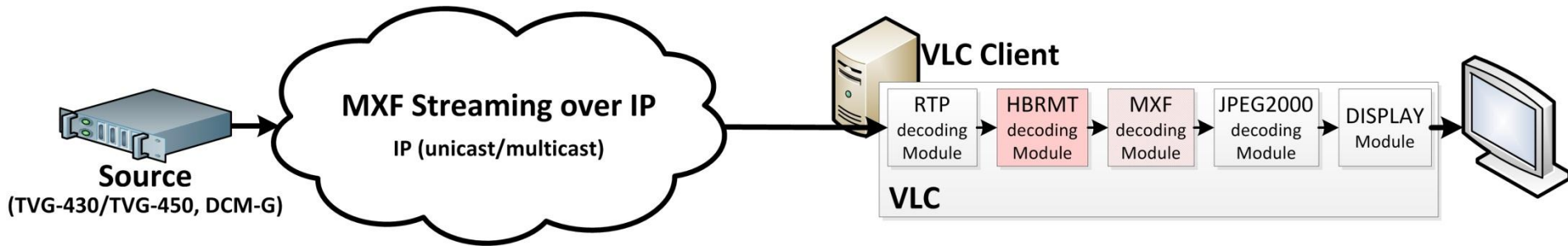
Developed Software under GNU GPL

<https://sourceforge.net/projects/mxfdemonstrator/>

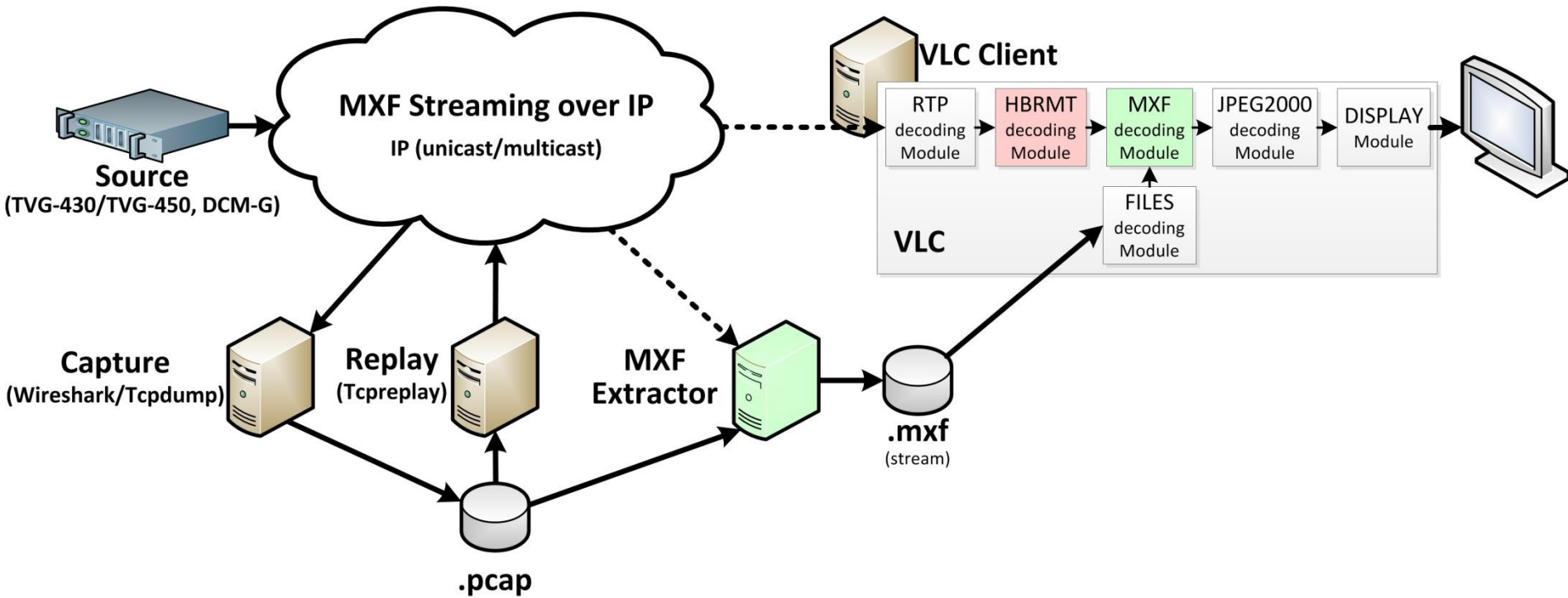
Final Objectives Schema



Before Project Schema



Actual Schema



MXF Low Latency Streaming

Abstraction Layer	Protocol	
Application	MXF	FEC
	HBRMT	
	RTP	
Transport	UDP	
Network	IP	
		IEEE 802.1Q
Link	Ethernet	

MXF Low Latency Streaming

- Sequence repeated indefinitely :
 - Structural Metadata JPEG2000 Descriptor
 - Structural Metadata AES3 Descriptor
 - N x Essence Container
- My Stream capture examples :
 - Motion JPEG2000 with AES3 audio
 - Stream of 50-100 Mbps
 - 720x576i or 1920x1080p/i
 - Options : FEC Stream, IEEE 802.1Q, RTP Padding

VLC's MXF Module

- Coded in C
- New module : total control on demultiplexing
- Based on last project experience
- Code not yet submitted to VLC Community

- Show information in Console and display video in VLC panel

VLC's MXF Module

- Analyze and Decode :
 - Partition Pack
 - Primer Pack
 - Structural Metadata (included JPEG2000 Descriptor)
 - JPEG2000 Essence
- Use of a StateMachine

Example Partition Pack

Analyse Partition Pack

Partition status is incomplete, respecting SMPTE 2049-200X

MXF OP1a streamable: 0X10109

ECB Check 3 elements :

ECB Adding Entry : 0X060E2B34040101070D010301020C0100

MXF-GC JPEG-2000 Picture Mappings

MXF-GC Frame-wrapped JPEG-2000 Pictures

ECB Adding Entry : 0X060E2B34040101010D01030102060100

MXF-GC AES-BWF Audio

ECB Adding Entry : 0X060E2B34040101030D010301027F0100

MXF-GC Generic Essence Mappings

Partition Pack alright

Example JPEG2000 Descriptor

Structural Metadata KLV : JPEG2000 Picture Sub-Descriptor

InstanceUID : 0X0000264B12341056789A000000000000

SampleRate : 2500/100

FrameLayout : 1

StoredWidth : 1920

StoredHeight : 540

AspectRatio : 0/0

ECB Adding Entry : 0X060E2B34040101000D010301020C0100

MXF-GC JPEG-2000 Picture Mappings

MXF-GC Frame-wrapped JPEG-2000 Pictures

JPEG2000Descriptor : DataBase New Version

Image Size set to : 1920x540

Frame rate set to : 2500/100

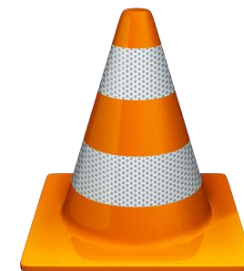
MXF Extractor Software

- Extract MXF content from HBRMT payload (proprietary or Standard compliant)
- Coded in C, use pcap library
- Consider IEEE 802.1Q and RTP padding
- Concise analysis of MXF Stream
- Synchronization on RTP M flag
- Management of fragmented KLV
- Management of proprietary HBRMT case

Improvements

- VLC's MXF Module :
 - Code in ffmpeg library
 - Add Video/Audio Descriptors
 - Add Descriptive Metadata
- MXF Extractor Software :
 - Live stream source
 - Delete corrupted KLV (actually padding with "0")
 - Wrapping between proprietary HBRMT

Questions - Answers



Acknowledgment - Contact

Thanks for your attention !

Do not hesitate to contact me for additional informations :

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