README

WEB3.mp4 Example File

The aim of this README file is to describe the illustrative implementation (WEB3.mp4) of the recommendations embodied in the <u>NISTIR 8161</u>, "Recommendation: Closed Circuit Television (CCTV) Digital Video Export Profile - Level 0".

Why It Was Created

This example file was created to prove NIST's approach to embedding metadata in MP4 video files as required when implementing the recommendations specified in the <u>NISTIR 8161</u>. This file was created using an existing MP4 file with an H.264 video stream and embedding related time information into the H.264-supported Supplemental Enhancement Information (SEI) messages, which reside in the video stream. The Clock Offset data was appended to the end of the file as an XMP packet with the standard defined metadata. This example demonstrates that existing structures supported in H.264 and MP4 allow for standard metadata to be included within the file and still provide standard playback capabilities.

File Content

The MP4 sample file contains a playable H.264 stream with two embedded SEI messages holding the precision timestamp and time source information associated with each frame in the video.

SEI Message: The SEI messages are classified as user unregistered messages and adhere to the standard format defined in the <u>NISTIR 8161</u>. These standard messages are embedded in every frame within the 14 second sample video file. Figure 1 provides the hex view of two sample messages contained in the file.

11	96	B4	DD	0D	EA	E3	17	98	14	DC	77	7D	37	8 A	ED	w}7
37	77	E7	EB	31	6E	1D	81	00	00	00	02	09	30	00	00	7w1n0
00	20	06	05	10	4D	49	53	50	6D	69	63	72	6F	73	65	MISPmicrose
63	74	69	6D	65	9F	00	05	FF	41	7E	FF	D9	1E	FF	90	ctimeA~
22	80	00	00	00	0F	06	05	0D	74	69	6D	65	73	6F	75	"timesou
																rce
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5D	69	CD	77	72	2C	91	D0]i.wr,
0.4	70	DC	0.0	2.2	E 4	E 7	0.0	•••	CE	00	0.0	E 4	4.0	4 7	CE	> //

Figure 1 - Hex View of Precision Timestamp and Time Source

XMP Packet: The sample file also contains an XMP packet appended to the end of theMP4 file as illustrated in Figure 2. This packet contains the necessary data elements needed to calculated the Clock Offset value when exporting a video capture from a DVR system. This allows for embedding additional

metadata as an XMP packet. The XMP packet contains the data needed for calculating the clock offset value. The data is placed in the UUID box at the end of the file.

CE 74 C1 00	00 00 00 00	00 00 01 00	CA CC 72 00	AD 00 00 00 00 00 00	ata Ibalia a
65 74 61 00	00 00 00 00	00 00 21 68	64 6C 72 00		etam
64 69 72 61	70 70 6C 00	00 00 00 00	00 00 00 00		dirappl+ilst
00 00 00 23	A9 74 6F 6F	00 00 00 1B	64 61 74 61	00 00 00 01 00 00 00 00	#.toodata
4C 61 76 66	35 34 2E 32	30 2E 34 00	00 05 27 75		Lavf54.20.4'uuid.z
A9 42 E8 9C	71 99 94 91	E3 AF AC 3C	3F 78 70 61	63 6B 65 74 20 62 65 67	.Bq xpacket beg</td
69 6E 3D 27	EF BB BF 27	20 69 64 3D	27 57 35 4D		in='' id='W5M0MpCehiH
7A 72 65 53	7A 4E 54 63	7A 6B 63 39	64 27 3F 3E	0A 3C 78 3A 78 6D 70 6D	<pre>zreSzNTczkc9d'?>.<x:xmpm< pre=""></x:xmpm<></pre>
65 74 61 20	78 6D 6C 6E	73 3A 78 3D	27 61 64 6F	62 65 3A 6E 73 3A 6D 65	eta xmlns:x='adobe:ns:me
74 61 2F 27	20 78 3A 78	6D 70 74 6B	3D 27 49 6D	61 67 65 3A 3A 45 78 69	ta/' x:xmptk='Image::Exi
66 54 6F 6F	6C 20 31 30	2E 32 36 27	3E 0A 3C 72	64 66 3A 52 44 46 20 78	fTool 10.26'>. <rdf:rdf td="" x<=""></rdf:rdf>
6D 6C 6E 73	3A 72 64 66	3D 27 68 74	74 70 3A 2F	2F 77 77 77 2E 77 33 2E	<pre>mlns:rdf='http://www.w3.</pre>
6F 72 67 2F	31 39 39 39	2F 30 32 2F	32 32 2D 72	64 66 2D 73 79 6E 74 61	org/1999/02/22-rdf-synta
78 2D 6E 73	23 27 3E 0A	3C 72 64 66	3A 44 65 73	63 72 69 70 74 69 6F 6E	x-ns#'>. <rdf:description< td=""></rdf:description<>
20 72 64 66	3A 61 62 6F	75 74 3D 22	22 0A 78 6D	6C 6E 73 3A 64 63 3D 22	<pre>rdf:about="".xmlns:dc="</pre>
68 74 74 70	3A 2F 2F 70	75 72 6C 2E	6F 72 67 2F	64 63 2F 65 6C 65 6D 65	http://purl.org/dc/eleme
6E 74 73 2F	31 2E 31 2F	22 3E 0A 3C	64 63 3A 74	69 74 6C 65 3E 43 6C 6F	<pre>nts/1.1/">.<dc:title>Clo</dc:title></pre>
63 6B 4F 66	66 73 65 74	3C 2F 64 63	3A 74 69 74	6C 65 3E 0A 3C 2F 72 64	ckOffset.
66 3A 44 65	73 63 72 69	70 74 69 6F	6E 3E 0A 3C	72 64 66 3A 44 65 73 63	f:Description>. <rdf:desc< td=""></rdf:desc<>
72 69 70 74	69 6F 6E 20	72 64 66 3A	61 62 6F 75	74 3D 22 22 0A 78 6D 6C	ription rdf:about="".xml
6E 73 3A 63	6C 6F 73 65	74 3D 22 68	74 74 70 3A		<pre>ns:closet="http://www.ni</pre>
73 74 2E 67	6F 76 2F 32	30 31 36 2F	43 6C 6F 63		st.gov/2016/ClockOffset"
0A 78 6D 6C	6E 73 3A 74	69 6D 65 76	61 6C 3D 22	68 74 74 70 3A 2F 2F 77	.xmlns:timeval="http://w
77 77 2E 6E	69 73 74 2E	67 6F 76 2F	32 30 31 36		ww.nist.gov/2016/TimeVal
75 65 73 65	74 22 3E 0A	3C 63 6C 6F	73 65 74 3A		ueset">. <closet:exportsy< td=""></closet:exportsy<>
73 74 65 6D	54 69 6D 65	3E 0A 3C 74	69 6D 65 73		stemTime>. <timesetval:ex< td=""></timesetval:ex<>
70 6F 72 74	53 79 73 74	65 6D 54 69	6D 65 4D 6F		portSystemTimeModeSource
43 6F 64 65	3E 30 36 3C	2F 74 69 6D	65 76 61 6C		Code>06
79 73 74 65	6D 54 69 6D	65 4D 6F 64	65 53 6F 75		vstemTimeModeSourceCode>
13 13 14 03	00 54 05 00	05 40 01 04	03 33 01 73	72 03 03 43 01 04 03 3L	ys cemi fileriouesour cecoue>

Figure 2 - Hex View of XMP Packet Containing Clock Offset Data Elements

Playability

The sample file was included in the Video Player Software Study described in <u>NISTIR 8172</u>. This proof of concept demonstrated that a standard metadata approach would not impact the playability of the MP4 file. The metadata defined in the profile adds refined evidentiary information to videos recorded by video surveillance systems.