MISB MOTION IMAGERY STANDARDS BOARD	MISB TRM 1802
TECHNICAL REFERENCE MATERIAL	
NATO MAJIIC 2 STANAG 4609 Motion Imagery Implementation Guide	**22 February 2018**

1 Scope

This TRM documents the Multi-Intelligence All-Source Joint Intelligence Surveillance and Reconnaissance Interoperability Coalition 2 (MAJIIC 2) implementation guidance for NATO STANAG 4609 as published by the NATO Communications and Information Agency (NCIA). The MAJIIC 2 project commenced at the end of 2015; this TRM serves as a repository for the projects' artifacts. Note that the guidance here within encompasses STANAG 4609 Edition 3 plus newer versions of specific standards cited in STANAG 4609 which are not endorsed by the MISB.

2 References

[1] NATO STANAG 4609: NATO Digital Motion Imagry Standard, Edition 3, Oct 2009.

[2] IETF RFC 2119 "Key words for use in RFCs to Indicate Requirement Levels", S. Bradner, March 1997.

[3] MAJIIC 2 Requirements Traceability Matrix, MAJIIC 2 ATWG, 2015.

[4] "MAJIIC 2 CSD-Server Specification", Ver. 1.0, MAJIIC 2 CSD FG, NCI Agency, The Hague, 2015.

[5] "MAJIIC 2 CSD Stream Server Specification", Ver. 5.0, MAJIIC 2 CSD FG, NCI Agency, The Hague, 2015.

[6] MISB EG 0104.5 Predator UAV Basic Universal Metadata Set, Dec 2006.

[7] MISB ST 0902.1 Motion Imagery Sensor Minimum Metadata Set, Jun 2011.

[8] STANAG 1059 Ed 8 Letter Codes for Geographical Entities, 19 Feb 2004.

[9] NATO AEDP-8: NATO Motion Imagery STANAG 4609 Implementation Guide, Edition 3, Dec 2009.

[10] MISB ST 0903.3 Video Moving Target Indicator and Track Metadata, Oct 2012.

[11] "MAJIIC 2 STANAG 4545 NSIF Implementation Guide", Ver. 5.0, MAJICC 2 ATWG, NCI Agency, The Hague, 2015.

[12] SMPTE ST 336:2017 Data Encoding Protocol Using Key-Length-Value.

[13] MISB ST 0102.9 Security Metadata Universal and Local Sets for Digital Motion Imagery, Sep 2010.

[14] MISB ST 0601.5 UAS Datalink Local Set, Oct 2011.

3 Acronyms

AEDP	Allied Engineering Documentation Publication
CSD	Coalition Shared Data
DVD	Digital Versatile Disc
EO	Electro-Optical
ESM	Electronic Warfare Support Measures
GMTI	Ground Moving Target Indicator
IR	Infrared
IRM & CM	Intelligence Requirements Management and Collection Management
ISR	Intelligence, Surveillance and Reconnaissance
KLV	Key-Length-Value
MAJIIC 2	Multi-Intelligence All-Source Joint Intelligence Surveillance and Reconnaissance Interoperability Coalition 2
MI	Motion Imagery
MIDSI	Motion Imagery Derived Still Imagery
MISB	Motion Imagery Standards Board
MISM	Motion Imagery Systems Matrix
MPEG	Moving Pictures Experts Group
MXF	Material eXchange Format
NATO	North Atlantic Treaty Organization
NCI Agency	NATO Communications and Information Agency
NSIF	NATO Secondary Imagery Format
OSWG	Operational Support Working Group
OUR	Operational User Requirement
OWG	Operational Working Group
PES	Packetized Elementary Stream
RTP	Real-time Transport Protocol
SAR	Synthetic Aperture Radar
SMPTE	Society of Motion Picture and Television Engineers
STANAG	Standardization Agreement
TWG	Technical Working Group
UDP	User Datagram Protocol

4 Revision History

Revision	Date	Summary of Changes
TRM 1802	22/2/2018	• Initial release

5 MAJIIC 2 STANAG 4609 MI IMPLEMENTATION GUIDE

MAJIIC 2 STANAG 4609 MI IMPLEMENTATION GUIDE

DOCUMENT VERSION 5.0

29 October 2015

5.1 Executive Summary

The intent of this document is to address the issues arising from the decision to incorporate Motion Imagery in the Multi-Intelligence All-Source Joint ISR Interoperability Coalition (MAJIIC 2) program. MAJIIC 2 has emphasized the use of standardization agreements (STANAGs), where possible, and to that end the use of STANAG 4609 [1] has been mandated. However, without the additional information and clarifications provided by this document, technical interoperability cannot be assured.

5.2 Introduction

This document aims to define the protocols and formats for the exchange of compressed digital Motion Imagery, using STANAG 4609 and any necessary extensions, within the MAJIIC 2 program. This is the definitive document for the development of interoperable MAJIIC 2 Motion Imagery producing and consuming systems, including both real and simulated sensors.

The MAJIIC 2 project classifies participating systems into sensors, exploitation, dissemination and direction. These are applicable to Motion Imagery as follows:

- Sensor systems produce Motion Imagery clips and/or streams. Sensor systems may be simulators or may be systems producing live data.
- Exploitation systems consume Motion Imagery clips and/or streams and may produce Motion Imagery clips as a product of the exploitation process.
- Dissemination systems ensure Motion Imagery clips and/or streams are available throughout a coalition enterprise. Therefore, they both produce and consume Motion Imagery, but the data itself is generated by other participating systems.
- Direction systems do not directly produce or consume Motion Imagery.

For the purposes of this document, Motion Imagery is defined as imagery produced at greater than one frame per second. This document is concerned with defining how Motion Imagery will be formatted and transferred between systems. A generic view of these interactions, both within and between two nodes, is shown in Figure 1.

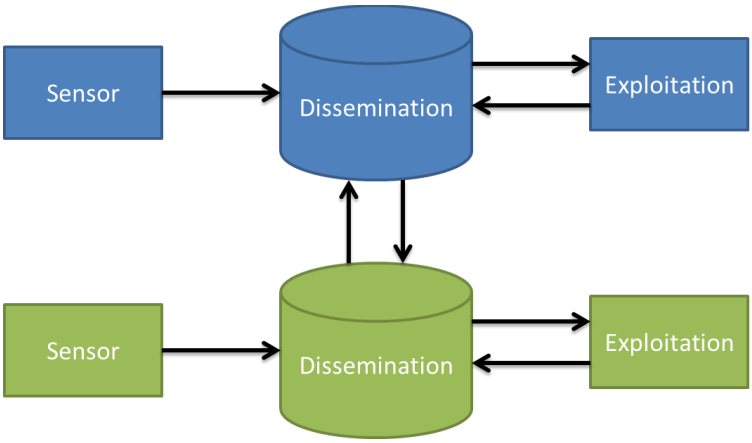

Figure 1: Generic Motion Imagery system interaction

Each of the arrows in the two halves of Figure 1 represent a separate interaction, which can be grouped as follows:

1. Creation of Motion Imagery streams and clips by sensor systems
2. Publication of Motion Imagery streams and clips by sensors to dissemination systems
3. Consumption of Motion Imagery clips by exploitation systems from dissemination systems
4. Consumption of Motion Imagery streams by exploitation systems from sensor systems, via dissemination systems
5. Publication of Motion Imagery clips by exploitation systems to dissemination systems
6. Publication of Motion Imagery streams and clips by sensors to dissemination systems

This document also defines mapping from STANAG 4609 metadata to CSD server metadata.

5.2.1 RFC 2119 COMPLIANCE

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in IETF RFC 2119 [2].

5.3 REQUIREMENTS

MAJIIC 2 efforts have been led by Operational User Requirements (OURs), which have led to architectural and technical requirements. This mapping is detailed in [MAJIIC 2 Requirements Traceability Matrix, 2015] [3].

Individual worksheets in each of the three categories list the requirement IDs and requirement type, sub-type, name, description and category. These have been related to each other by cross-referencing in matrices providing an operational to architectural mapping, and an architectural to technical mapping. These will be maintained and continually updated, and the reader is directed to that spreadsheet to get the latest mappings.

The list below provides a simplified view, independent of IDs and indices that may change, of the Motion Imagery requirement elements as of January 2015, in terms of defining the formats for creation, exchange and processing of Motion Imagery. This section can help a MAJIIC 2 Motion Imagery system developer see the scope and make a check list for implementation of the STANAG 4609 standard for MAJIIC 2 purposes. Along this line, the subsequent sections will be devoted to detailing the why and how to meet the requirements.

5.3.1 MAJIIC 2 - OPERATIONAL-USER REQUIREMENTS

The Operational users have generated the following requirements related to Motion Imagery.

Operational:

1. The User shall be provided a capability to access and use near real time streaming data
2. The User shall be provided a capability to access and use archived streaming data

5.3.2 MAJIIC 2 - ARCHITECTURIAL-REQUIREMENTS

The architecture designers generated requirements to provide Motion Imagery exchange via the CSD server, as well as the CSD stream server.

Collection Sensor:

1. The sensor capability shall provide Motion Imagery clips
    a. In compliance with STANAG 4609 and AEDP-8 as specified in the MAJIIC 2 STANAG 4609 Motion Imagery Implementation Guide
    b. Posted to a CSD in compliance with the CSD-Server specification [DOP-MAJIIC2-103, 2015] [4]
2. The sensor capability shall provide Motion Imagery streams
    a. In compliance with STANAG 4609 and AEDP-8 as specified in the MAJIIC 2 STANAG 4609 Motion Imagery Implementation Guide
    b. Advertised in compliance with the CSD Stream Publish Interface of the CSD Stream Server [DOP-MAJIIC2-078, 2015] [5], providing periodic metadata updates

Exploitation Stations:

1. Shall discover and search for Motion Imagery streams using the CSD Stream Query Service Interface of the CSD Stream Server [DOP-MAJIIC2-078, 2015]
2. Shall receive Motion Imagery streams by requesting relays/replays via the CSD Stream Controller Service Interface of the CSD Stream Server [DOP-MAJIIC2-078, 2015]

5.3.3 MAJIIC 2 - TECHNICAL-REQUIREMENTS

The Common Data Formats (CDF) focus group made up of Subject Matter Experts (SMEs) in each ISR data type monitor the NATO STANAGs and endeavor to guide our Collection, Exploitation and IRM & CM system developers as they strive to meet the architecture requirements and that leads us to define, implement, test and improve the MAJIIC 2 data exchange capabilities and system and client interfaces. Based on this, the following technical requirement sections are derived, and the details are described in the subsequent sections of this document.

All producers/consumers must produce/consume compressed digital Motion Imagery as follows:

1. Up to MISM Level 9
2. Using either MPEG-2 or H.264 video compression
    a. Consumers MUST support both
3. Using MISB 0104.5 [6] or MISB 0902.1 [7] KLV-encoded metadata
    a. Consumers MUST support both
4. Using MISB 0102.9 KLV-encoded security metadata
    a. Use only STANAG 1059 Edition 8 [8] three-letter country codes (*)

5. For files as MPEG-2 Transport or MPEG-2 Program Streams
    a. Consumers MUST support reading both
6. For streams as MPEG-2 Transport Streams only
    a. Transported using either UDP or RTP according to the appropriate MISM level. Consumers MUST support both
7. Clipping of Motion Imagery (generating a short file from a longer file or stream) MUST comply with AEDP-8 Ed 3 [9], Section 2.1.3
8. Any VMTI metadata MUST be encoded using MISB ST 0903.3 Video Moving Target Indicator and Track Metadata [10].

Motion imagery clips MUST be ingested by a client into a CSD server as follows:

1. Providing metadata whose mapping complies with AEDP-8 Annex B Engineering Guideline 0803 [NATO AEDP-8 Ed3, 2009]
2. Providing the NSIL_COVERAGE.spatialGeographicReferenceBox attribute
3. Providing the THUMBNAIL_FIRST_FRAME and THUMBNAIL_LAST_FRAME related files
4. Optionally, providing the VIDEO_PREVIEW, VIDEO_INTRO and/or VIDEO_DESCRIPTOR related files

Motion imagery exploitation systems:

1. MUST visualize the geospatial metadata embedded within the Motion Imagery
2. If Motion Imagery derived still imagery is supported, MUST comply with the MAJIIC 2 STANAG 4545 NSIF Implementation Guide [DOP-MAJIIC2-006, 2015] [11]

5.4 STANAG 4609 OVERVIEW

5.4.1 GENERAL

This section provides an overview of STANAG 4609. While STANAG 4609 also covers analogue and uncompressed digital Motion Imagery, Motion Imagery within MAJIIC 2 is limited to compressed, digital Motion Imagery. Section 5.4 details the specific requirements or STANAG 4609 applicable to MAJIIC 2.

The NATO Motion Imagery (MI) standard (STANAG 4609) is aimed at promoting interoperability of current and future Motion Imagery systems within and among NATO nations. The MI Allied Engineering Documentation Publication (AEDP-8) provides implementation guidance for users of NATO STANAG 4609. The AEDP defines a “Motion Imagery Systems (spatial and temporal) Matrix” (MISM) which enables simple identification of the technical capabilities of NATO Motion Imagery systems. Refer to AEDP-8 [NATO AEDP-8 Ed3, 2009] for more information.

STANAG 4609 heavily leverages standards, practices, and technologies from the motion picture industry. Standards developed by the Society of Motion Picture and Television Engineers (SMPTE) comprise many of the reference documents listed in STANAG 4609.

STANAG 4609 Edition 3 is the current ratified version and shall be used as the reference version. Unless otherwise specified, "STANAG 4609" in this document refers to Edition 3.

5.4.2 COMPONENTS OF COMPRESSED DIGITAL MOTION IMAGERY

In general, compressed digital MI is composed of two major components - the data stream and the format. The data stream may be a set of "elementary" streams, such as video, audio, metadata, and subtitles. Each stream type is processed by a specific encoder/decoder (CODEC).

Moving Picture Experts Group (MPEG-2) and H.264 are specific video CODECs. There are many other CODECs for audio, metadata, and subtitle streams.

STANAG 4609 mandates the metadata streams to be presented as a private stream as per ISO/IEC 13818-1:2007. It also mandates that the metadata complies with the Key-Length-Value (KLV) encoding in accordance with multiple SMPTE documents and specifically SMPTE ST 336 [12]. This KLV protocol is in effect the CODEC for STANAG 4609 metadata streams.

The format is the protocol for transporting Motion Imagery over a network or via files. In STANAG 4609, the transport formats available for MPEG-2 compressed digital Motion Imagery are elementary stream (ES), program stream (PS), and transport stream (TS). PS and TS formats can carry multiple synchronized streams. STANAG 4609 also allows the use of the Material Exchange Format (MXF) to contain compressed digital Motion Imagery.

Common internet video formats such as AVI and MOV do not have the ability to carry multiple streams in an interoperable manner and, for this and other reasons are not generally useful for exploitation. See AEDP-8 Annex B RECOMMENDED PRACTICE 0220 - Motion Imagery System Matrix regarding MISM-L1 [NATO AEDP-8 Ed3, 2009].

5.4.2.1 Video Compression and Decompression

STANAG 4609 mandates the use of MPEG-2 or H.264 encoding for video compression if MI compression is required. STANAG 4609 enables the concept of "Xon2" which supports the "seamless" implementations of advanced video compression technologies without disrupting current and future operations and systems. "X" defines existing or future video compression technologies adopted by NATO and "on2" refers to the use of MPEG-2 TS streams and files. "2on2" payloads have been successfully deployed using standards compliant MPEG-2 compressed video elementary streams, audio elementary streams, and SMPTE KLV encoded metadata as private data streams, over an MPEG-2 TS format. Similarly, it is possible for H.264 ("264on2") to be carried over an MPEG-2 transport stream.

5.4.2.2 Transport Formats

5.4.2.2.1 Streaming

For streaming applications, STANAG 4609 mandates that MPEG-2 transport streams be used. The primary rationale for this requirement is transport streams are the most robust for use in a

network environment. As of Edition 3, STANAG 4609 enables RTP in some specific profiles as a transport protocol, otherwise UDP is used.

5.4.2.2.2 Files

For simple file applications STANAG 4609 allows either MPEG-2 Transport or MPEG-2 Program Streams to be used for NATO applications. Program streams, like transport streams, can handle multiple streams of data in the format protocol. Unlike transport streams, program streams assume a reliable underlying transport (for example, a DVD drive), so are only suitable for file storage and not streaming.

5.4.2.2.3 Compliance

According to STANAG 4609, all NATO systems must be able to receive and decode both Transport and Program Stream files.

According to AEDP-8, Section 1.4.3, page 9, first paragraph [NATO AEDP-8 Ed3, 2009], all nations shall be able to handle video Motion Imagery System Matrix (MISM) up to and including level 9:

> "It is assumed that a host system designed to a profile of a given level will accept all profiles of the levels below. It is agreed that nations implementing STANAG 4609 [NATO STANAG 4609 Ed3, 2009] shall be able to accept and decode Motion Imagery up to and including Level 9 (High Definition format).

5.4.2.3 Metadata

Metadata elements to be used are defined in several documents including MISB engineering guidelines, standards and SMPTE standards.

It should be noted that some reference documents, including the current version of the AEDP 8 [NATO AEDP-8 Ed3, 2009], contain typos when referring to KLV keys. To avoid typos, it is highly recommended to never re-type KLV keys; instead keys should always be copied-and-pasted whenever possible. Further, the definition of the data types to be used for a specific key varies from completely undefined to more accurate specifications with type (e.g. integer), type and length (e.g. integer, 4 byte) and type, length and value range (e.g. float, 4-byte, range -180.0 to +180.0) and combinations of those. As a rule of thumb, data producers should, as accurately as possible, produce metadata which complies with the definitions. On the other hand, consumers should accept values more gracefully if the data type and content does make sense. For example, float or integer values should be accepted even if the provided length does not match exactly the expected length (it might be unspecified), as the length information is already part of the received KLV information. A limitation inherent in the KLV specification is the lack of type information within the KLV itself. Consumers should ensure that the provided data matches the expected type and do sanity checks on the input data (e.g. non-printable characters in strings, invalid float values).

The following metadata sets are used within MAJIIC 2. Note that some editions are newer than those specified in STANAG 4609.

- Predator UAV Basic Universal Metadata Set, MISB EG 0104.5

- Security Metadata Universal and Local Sets for Digital Motion Imagery, MISB ST 0102.9 [13]
- Motion Imagery Sensor Minimum Metadata Set, MISB ST 0902.1

The Local Set as defined in UAS Datalink Local Metadata Set, MISB ST 0601.5 [14] provides metadata in the form of a single KLV key, which contains one-byte tags mapping existing known metadata keys to the tags. This has been introduced with Edition 3 of STANAG 4609 and provides a more efficient and flexible encoding.

5.5 STANAG 4609 APPLIED TO MAJIIC 2

MAJIIC 2 Motion Imagery producing and consuming systems MUST comply with the compressed digital Motion Imagery requirements of STANAG 4609 Edition 3. This includes but is not limited to the following list. If any requirement contradicts STANAG 4609 Edition 3, the requirement in this document takes precedence. Those known to contradict or substantially refine the STANAG 4609 requirement are marked with a (*).

MI producers/consumers MUST produce/consume Motion Imagery:

1. Up to MISM Level 9
2. Using either MPEG-2 or H.264 video compression. Consumers MUST support both
3. Use MISB EG 0104.5 or MISB ST 0902.1 KLV-encoded metadata. Consumers MUST support both
4. Using MISB ST 0102.9 KLV-encoded security metadata (*)
    a. Using only STANAG 1059 Edition 8 three-letter country codes (*)
    b. Interpreting the length limitation of the releasability field as non-binding (*)

    Note: STANAG 4609 Edition 3 and MISB ST 0102.9 are ambiguous regarding whether 40 characters is a recommended (for bandwidth efficiency) or a maximum length. In MAJIIC 2, the former interpretation is taken, thus the length of this field is theoretically unbounded to accommodate large coalitions.

    e.g. “CAN DEU ESP FRA GBR ITA NLD NOR USA NATO” = 40
5. For files as MPEG-2 Transport or MPEG-2 Program stream
    a. Consumers MUST support reading both
6. For streams as MPEG-2 Transport Stream only
    a. Transported using either UDP or RTP according to the appropriate MISM level. Consumers MUST support both
7. The use of MXF is PROHIBITED in MAJIIC 2 (*)
8. MAJIIC 2 systems are NOT REQUIRED to comply with the analogue or uncompressed digital video requirements – indeed, their usage is prohibited within MAJIIC 2 (*)
9. Clipping of Motion Imagery (generating a short file from a longer file or stream) MUST comply with AEDP-8 Ed 3 [NATO AEDP-8 Ed3, 2009], Section 2.1.3

Note: this ensures the clip is properly formed and contains all the necessary metadata to pass through network guard and similar devices.

10. Any VMTI metadata MUST be encoded using MISB ST 0903.3 Video Moving Target Indicator and Track Metadata

    Note: Neither STANAG 4609 Edition 3 nor AEDP-8 Edition 3 mandate how VMTI metadata should be encoded. It is expected that this will be addressed by the next edition of STANAG 4609.

11. Insertion of Motion Imagery products into a CSD server or CSD Stream Server MUST comply with Section 5.6
12. Motion imagery exploitation system capabilities MUST comply with Section 5.7

5.6 COALITION SHARED DATA SERVER

5.6.1 Overview

The Coalition Shared Data (CSD) Server is a server implementation of STANAG 4559, the NATO Standard ISR Library Interface (NSILI) [DOP-MAJIIC2-103, 2015]. The STANAG 4559 API enables access to a shared repository of ground moving target indicator (GMTI), synthetic aperture radar (SAR) data, electro-optical (EO) imagery, infrared (IR) imagery, Motion Imagery (MI), potentially ESM information as well as exploitation products and other relevant data that is generated and used by MAJIIC 2 collection assets and exploitation systems. The CSD Stream Server is a similar server but specialized for the efficient storage and retrieval of streaming data, including Motion Imagery, GMTI and Link 16 data [DOP-MAJIIC2-078, 2015].

In the MAJIIC 2 architecture, the CSD server contains the output of Motion Imagery exploitation (still images, reports and clips – the latter of which is detailed here), whereas the CSD Stream Server contains “raw” Motion Imagery from the sensor.

5.6.2 INGESTION OF MOTION IMAGERY CLIPS TO A CSD SERVER

Motion imagery clips MUST be ingested into a CSD server in accordance with the CSD server specification [DOP-MAJIIC2-103, 2015]. The precise mechanism of ingest (e.g. NSILI vs CSD publish interface) is not detailed here, but the client MUST provide metadata for the clip.

5.6.2.1 Metadata Mapping

Mapping of metadata from STANAG 4609 to the CSD server data model (known here as CSD metadata) MUST comply with AEDP-8 Annex B Engineering Guideline 0803 - Engineering guideline to facilitate integration of Motion Imagery products into the STANAG 4559 data model [NATO AEDP-8 Ed3, 2009]. Note: there is another EG 0803 “Delivery of low bandwidth Motion Imagery” with the same number published by the MISB, which is not meant here; it is not part of AEDP-8.

It is RECOMMENDED that whenever possible, CSD metadata is automatically derived from the STANAG 4609 Motion Imagery metadata. CSD metadata not available from STANAG 4609

Motion Imagery metadata may be available from other sources and/or settable as constants for each clip.

The NSIL_COVERAGE.spatialGeographicReferenceBox attribute is MANDATORY for Motion Imagery stored within a CSD server or CSD Stream Server within MAJIIC 2.

5.6.2.2 Related Files

The following related files MUST be provided by the client:

- THUMBNAIL_FIRST_FRAME - a thumbnail of the first image in the clip
- THUMBNAIL_LAST_FRAME - a thumbnail of the last image in the clip

The following related files MAY be provided by the client:

- VIDEO_PREVIEW - a STANAG 4609 compliant file, of reduced size as compared to the original file, which would enable an operator to preview the content of the original product before deciding to download the original, larger, file. Parameters that can influence the reduced file size are, for example: image size, number of frames per second, compression level, video codec, etc. The duration of the VIDEO_PREVIEW must match the duration of the original file.
- VIDEO_INTRO - a STANAG 4609 compliant file, of reduced size as compared to the original file, which would enable an operator to view the first X seconds (e.g. 10 seconds) of a video, before deciding to download the original, larger, file. The VIDEO_INTRO is of the same quality (resolution, compression parameters etc.) as the original file, but of shorter duration.
- VIDEO_DESCRIPTOR - an MPEG-2 Transport Stream (TS) (STANAG 4609) compliant file obtained by de-multiplexing the KLV content from the original file. The resulting file is still formatted as an MPEG-2 TS, except that the file has a single Packetized Elementary Stream (PES) which contains the KLV metadata. The objective is to enable an operator to perform a search on the full content of the KLV before deciding to download the original, larger, file.

5.6.2.3 Hand-Held Motion Imagery Sensors

This special case is to cover the instance where a sensor provides the sensor geo-location, but not the coverage area (i.e. sensor footprint geo-location). This is often the case, but is not limited to, the use of Motion Imagery from hand-held video cameras. In such cases, the NSIL_COVERAGE.spatialGeographicReferenceBox attribute SHOULD be populated with a box centered on the sensor position. The box SHOULD be of a size reflecting approximately the sensor range, for example 500 m square box could be used for a hand-held camera.

5.7 MOTON IMAGERY EXPLOITATION SYSTEMS

Motion imagery exploitation systems MUST comply with the Motion Imagery consumer requirements listed in Section 5.5. In addition, if they produce Motion Imagery (e.g. Motion Imagery clips), they MUST also comply with the Motion Imagery producer requirements.

Furthermore, Motion Imagery exploitation systems MUST visualize the geospatial metadata embedded within the Motion Imagery. For example:

- The media player displaying the Motion Imagery MAY include a set of dynamically updated labels showing the geographic position and other metadata associated with the video frame currently being displayed; or
- The geolocation of the video frames MAY be drawn (e.g. as a quadrilateral) on a separate GIS display where this "frame-indication" is synchronized with the video and dynamically updated.

5.7.1 CREATION OF MOTION IMAGERY DERIVIED STILL IMAGERY (MIDSI)

Motion Imagery Derived Still Imagery (MIDSI) files are a common intelligence product of Motion Imagery exploitation. Such files MUST comply with the MAJIIC 2 STANAG 4545 NSIF Implementation Guide [DOP-MAJIIC2-006, 2015], which includes a description of the metadata mapping between STANAG 4609 and STANAG 4545. Motion imagery exploitation systems MAY also provide the ability to annotate MIDSI, again, in compliance with the MAJIIC 2 STANAG 4545 NSIF Implementation Guide.