MISB MOTION IMAGERY STANDARDS BOARD	MISB RP 0608.2
Recommended Practice	**30 September 2010**
Motion Imagery Identification	

1. Scope

This Recommended Practice (RP) defines methods of uniquely identifying motion imagery. Currently, the scope of this RP is limited to the unique identification of a motion imagery data stream. It is anticipated that in the future, the scope of this RP will be expanded to define methods of identifying other aspects of motion imagery, such as the unique identification of a collecting sensor.

This RP defines the format of the Motion Imagery Identifier (MIID) required by segments of the National System for Geospatial-Intelligence (NSG) for motion imagery files. The RP also defines the format and encoding of the Motion Imagery Stream Identifier (MI Stream ID), an important constituent piece of the MIID. The MI Stream ID is used uniquely to identify streams of motion imagery from their source and will be included in the MIID.

2. Introduction

2.1. Background

A large number of end users have begun using and/or exploiting motion imagery. A need has arisen to be able to uniquely identify motion imagery data, be it a "clip" (file) or a motion imagery data stream. Motion imagery identification, as described in this RP, aims to meet the following requirements:

1. Provide a way accurately and conveniently to ascertain if two parties are examining the same motion imagery or related products derived from the same motion imagery.
2. Heritage information for edited or exploited motion imagery products, enabling traceability of the original source data.
3. Provide a means to build reliable query criteria for search and retrieval of motion imagery.
4. Provide a suitable identifier to incorporate into an Image Id of still image files extracted from motion imagery.

There are many different sensors, sensor configurations and downstream processing systems that can cause complex issues with trying to properly identify motion imagery. Additionally, there are identification issues when working with motion imagery streams verses motion imagery files.

The motion imagery identification problem can best be solved by having a unique identifier (UUID) embedded in the motion imagery stream, ideally by the collection system. This would require all collection systems to embed this identification into their motion imagery sensor/platforms. An interim solution is to insert automated identification information downstream from the original collection system (and original transmission). This interim solution does not fully solve the UUID identification problem, particularly for identification across multiple recipient sites, but this is an initial first step to solving the problem.

When embedding the UUID identification down stream of the collection platform/sensor/transmission issues may result. The primary problem is when two different processors assign different automated identifiers – different unique stream identifiers will be defined for the same motion imagery.

The stream identification approach outlined in this document is compatible with both ideal and interim solutions discussed above.

2.2. Overview

To help meet the needs of the NSG Segments and other community users, this document defines the Motion Imagery ID (MIID) uniquely to identify motion imagery clips. The MIID consists of information already in the metadata associated with a digital motion imagery clip, or that can be derived using a well-defined process. This RP defines the algorithm to produce the MIID from its individual components. A fixed-length, text-based presentation format for the MIID is also described.

An essential component of the MIID is the Motion Imagery Stream ID. This RP defines the Motion Imagery Stream ID, its rules for use, and its KLV encoding. The Motion Imagery Stream ID is the primary means by which streams may be uniquely identified, allowing references to a specific stream to be correlated across multiples systems, sites, or networks. Appendix A explains how to compute a Universally Unique IDentifier (UUID), which is used during creation of a Motion Imagery Stream ID.

For still NITF images the Tactical Image Identifier (TII or Tactical Image ID) contains embedded human-readable values that assist analysts when visually reviewing many returns from a database query retrieval. The MIID has been developed to contain both universally unique information and human-readable information so it may serve much the same function for motion imagery clips as the NITF TII for still imagery.

3. References

3.1. ISO 8601:2000 Data elements and interchange formats -- Information interchange -- Representation of dates and times, International Standards Organization, 2000.

3.2. SMPTE 336M-2001, Data Encoding Protocol Using Key-Length-Value

3.3. MISB EG 0607, MISB Metadata Registry and Processes, 17 December 2008.

3.4. SMPTE 330M-2005, Unique Material Identifier (UMID)

3.5. Implementation Practices of the National Imagery Transmission Format Standard (IPON), Appendix J -- Tactical Image Identifier (TII) Specification, National Geospatial-Intelligence Agency (NGA), Version 1.0, 1 August 2007.

3.6. "Discovery and Retrieval Interface Data Model" (D&R IDM), Document Control Number 7007484, NGA.

3.7. Motion Imagery Standards Profile Version 5.3 (MISP5.3), 3 September 2009.

3.8. Internet Engineering Task Force (IETF) RFC-4122 "A Universally Unique Identifier (UUID) URN Namespace," http://www.ietf.org/rfc/rfc4122.txt.

3.9. MISB Standard 0301.4: MISB Profile for Aerial Surveillance and Photogrammetry Applications (ASPA), 18 September 2008.

4. Motion Imagery ID

4.1. Internal Components Within the MIID

The MIID consists of the elements detailed in the following sections:

4.1.1. **Acquisition Start Date and Time** – This element is the date and time (Z) of the first frame of the motion imagery clip or file. The value is obtained from the metadata associated with the motion imagery clip being identified.

4.1.2. **Acquisition End Date and Time** – This element is the date and time (Z) of the final frame of the motion imagery clip or file. The value is obtained from the metadata associated with the motion imagery clip being identified.

4.1.3. **Motion Imagery Stream ID** – This element is a 32 byte, Universal Unique Identifier (UUID) that identifies the source video stream. UUIDs are defined in IETF RFC 4122. Rules for creation, insertion, and use, as well as KLV encoding, of the Motion Imagery Stream ID can be found in Section 5. The motion imagery stream ID has been assigned a KLV metadata key of 06.0E.2B.34.01.01.01.01.0E.01.02.03.05.00.00.00 in the MISB Metadata Registry.

4.1.4. **Platform Type** – This element is the general type of platform hosting the source motion imagery. The value is in a free-text format and is obtained from metadata in the motion imagery stream, if present. NOTE: JITC will maintain a list of valid query values for platform. The values will be included in the D&R IDM. New platform names should be submitted to JITC for approval. A default value of twelve underscores shall be used if the platform type is unknown or undefined. The motion imagery platform designation ID has been assigned a KLV metadata key of 06.0E.2B.34.01.01.01.03.01.01.21.01.00.00.00.00 in the MISB Metadata Registry.

4.1.5. **Production Date and Time** – This element identifies the date and time (Z) the clip being identified was produced (created or edited)

The required components, considered together and fully populated, are sufficient to provide a unique identifier to any captured subset of a motion imagery stream.

4.2. MIID in Compilation Clips

Compilation chips, that is, clips comprised of multiple original sources will have a newly created UUID if all the original sources are not the same (that is, if a clip contains multiple source motion imagery streams each having distinct MI Stream IDs). The Acquisition Start and End Date and Time will be from the earliest and latest frame respectively. The platform value will be 'Multiple' if more than one platform is identified in the multiple clips. The Production Date and Time will be the creation time of the compilation.

NOTE: The creation of a new UUID is limited to generation of the MIID. The original source MI Stream IDs in a compilation's source motion imagery are not removed or modified. That is, the original MI Stream ID KLV items remain unchanged and a compilation will carry multiple different MI Stream IDs. This preserves original source identification.

4.3. MIID in "Clips of a Clip"

A clip of a clip – that is a clip that has been shortened in length will have the same UUID value. The Acquisition Start and End Date and Time will be from the earliest and latest frame respectively. The platform value will remain the same. The Production Date and Time will be the creation time of the new clip.

4.4. MIID Encoding

This RP specifies an ASCII textual encoding for the MIID. This encoding should be used for user presentation and/or interaction.

Other encodings are possible but are not discussed by this RP. Care should be taken when using other encodings without proper community standardization, as it may lead to interoperability issues and/or user confusion. Non-standard encodings are most appropriate for internal system use. Encodings of the MIID other than that described in the following section shall not use the term "Motion Imagery ID" or "MIID" in any end user-visible presentation.

4.4.1. MIID Text Encoding

The text encoded format for the MIID is designed for a human-readable, fixed width format. ASCII has been chosen as the character set for the textual encoding due to its simplicity, fixed character width, and universal understanding within the community. The encoding rules detailed below limit the domain of characters to the printable set of ASCII characters.

The textual representation of an MIID is produced by converting each individual MIID component, to an ASCII representation. The ASCII representations of the constituent components are then concatenated together, in order, to form the text encoding of the MIID as a whole. Because users identify with the MIID as a whole, the text encoding of the MIID is to be considered a single entity and should not be split into its individual components in user interfaces.

The sequencing of the MIID components, as well as the ASCII conversion process, is specified in Table 1 below.

Table 1: 80-Byte Motion Imagery ID (MIID) ASCII Encoding

Field Size	MIID Field Name	MIID Field Description	Format
14	Acquisition Start Date and Time	Date and time, in UTC (Z), of the first frame of the motion imagery clip or file. Rounded down to one second precision.	REQUIRED YYYYMMDDhhmmss Zulu time zone ISO 8601 format without 'T' separator or 'Z' suffix..
14	Acquisition End Date and Time	Date and time, in UTC (Z), of the last frame of the motion imagery clip or file. Rounded up to one second precision.	REQUIRED YYYYMMDDhhmmss Zulu time zone ISO 8601 format without 'T' separator or 'Z' suffix.
32	Motion Imagery Stream ID	Universal Unique Identifier (UUID) that uniquely identifies the source video stream or uniquely identifies multiple files that haves different UUIDs.	REQUIRED String representation of the UUID as specified in IETF RFC 4122, omitting the urn:uuid: prefix and the hyphen delimiters. Hexadecimal components are limited to uppercase letters.
12	Platform Type	General type of the platform hosting the source motion imagery.	Platform Type Text, literal ASCII '-' padded. Non-printable or non-ASCII characters should be represented as literal ASCII '0'. If value is unknown, the entire field shall be filled with literal ASCII underscore ('_').
8	Production Date and Time	Creation time stamp for the clip, in UTC (Z), converted to microseconds since 1970 as per RP0603 Annex A. Resulting value is rounded to the nearest whole second.	REQUIRED Number of seconds is taken to be a 4-byte unsigned integral value. The 4-byte value is converted to an 8-character hexadecimal ASCII string. Most significant bits of the most significant byte first, progressing left to right, down to least significant bits of least significant byte (big endian). Hexidecimal components are limited to uppercase letters. ASCII zeroes ('0') are padded on the left to fill the 8-character field as needed.

NOTE: Reference paragraphs 4.2 and 4.3 for updates to the MIID when the clip is changed such as performing clip compilation or clip of a clip operation.

Example of MIID Text Encoding

Consider the following example MIID data components:

Motion Imagery Stream ID	0x98765432101234567890987654321012
Acquisition Start Date and Time	1 May 2007, 13:05:34.75 UTC
Acquisition End Date and Time	2 May 2007, 17:43:21.09 UTC
Platform Type	Predator
Production Date and Time	1 June 2007, 08:23:45.55 UTC

The ASCII encoding of the above example MIID data components would be:

20070501130534200705021743229876543210123456789098765432101 2Predator____465FD792

5. Motion Imagery Stream ID

The Motion Imagery Stream ID is the mechanism for providing a Universally unique identifier for digital motion imagery streams, and is a vital part of creating a meaningful MIID for clips or files extracted from such a stream. The subsequent sections define methods for creating, encoding, and rules for managing the Motion Imagery Stream ID.

5.1. Creation, Insertion, and Processing Rules

The MI Stream ID is a Universal Unique Identifier (UUID) and shall be computed and inserted as into all digital motion imagery streams as close to the origination as possible. Ideally, the value should be inserted by the sensor prior to any other metadata encoding or insertion.

Systems which use more than one sensor sequentially (that is, they never transmit motion imagery from more than one sensor at a time) **shall** produce only one Motion Imagery Stream ID and assign unique values to the essence from each sensor in the MPEG-2 Transport Stream PID. Note that a platform replacing its essence with coming from an alternate platform (*e. g.*: a fired missile w/ a nose-mounted video camera) falls under this case.

Systems which transmit essence from more than one sensor simultaneously (or transmit essence from a single sensor in more than one format (*e. g.*: H.D. and S.D.) simultaneously) **shall** assign unique Motion Imagery Stream IDs to each essence whether the essences reside in the same Transport Steam. Note that a platform augmenting its essence with essence coming from an alternate platform (*e. g.*: a fired missile w/ a nose-mounted video camera) falls under this case.

Systems producing more than one Transport Stream for any reason **shall** assign a unique Motion Imagery Stream ID to each Transport Stream. See MISP v5.3 and later for guidance on the use of multiple Transport Streams.

These rules may and shall be used in conjunction with one another.

Ground-based processing, relaying, editing, or archival systems that manage motion imagery streams must check incoming streams for the presence of a digital MI Stream ID metadata item. When the system receives a digital motion imagery stream that does not contain an MI_STREAM_ID, the system **shall** compute and insert a MI Stream ID value prior to forwarding, rebroadcasting, or clipping the stream.

Systems that receive digital motion imagery streams or files with embedded values for MI Stream ID UUID **shall** maintain the MI Stream ID metadata item when editing, rebroadcasting, creating clips, or otherwise modifying a motion imagery data stream. The MI Stream ID is the universally unique identifier of the original data stream; it allows for tracing clips back to an original stream or file and must not be modified by any processing system.

Editing systems producing a compilation clip from multiple different sources (which contain different MI Stream IDs) **shall** retain the MI Stream ID of each source clip in the corresponding section of the compilation.

Metadata co-created at the time the MIID is assigned **shall** have no impact on the MIID. If metadata are added later, however, the Production Date and Time **shall** be updated, thus changing the MIID.

5.2. Creation

The MI Stream ID is a UUID, as specified by IETF RFC 4122. RFC 4122 specifies creation algorithms for UUIDs. An overview of these algorithms and further references are given in Appendix A.

5.3. KLV Encoding

The MI Stream ID is encoded into the metadata of a motion imagery stream using KLV encoding. The MI Stream ID metadata element has been assigned a KLV metadata key of 06.0E.2B.34.01.01.01.01.0E.01.02.03.05.00.00.00 in the MISB Metadata Registry. The UUID comprising the MI_STREAM_ID is placed into the value field of the KLV item in binary form, with octets laid out and ordered as specified in section 4.1.2 of RFC 4122.

5.4. Other Considerations

1. The Motion Imagery ID cannot be created for a live stream since a component of the MIID is the Acquisition End Date and Time, which lies in the future for a live stream. Other components of the MIID can and should be created, and any product created from a live stream must, perforce, have a cutoff day and time for the data incorporated in that product. Such a product should then have a MIID

2. It is the opinion of the MISB that the issue of discovering a live stream is beyond the scope of the MISB, but that the guidance on when and how to assign Motion Imagery Stream ID's should address one of the major issues faced by parties attempting to make live streams discoverable.

3. To restate: It is a requirement of systems producing Motion Imagery to create the Motion Imagery Stream ID. Such systems, however, are not required to create the MIID.

Appendix A Algorithms for UUID Calculation (Informative)

The Universal Unique Identifier (UUID) calculation is based on the Internet Engineering Task Force (IETF) RFC-4122 “A Universally Unique Identifier (UUID) URN Namespace” algorithm posted by the IETF web site (http://www.ietf.org/rfc/rfc4122.txt). This document on the RFC4122 algorithm includes a platform-independent source code implementation and other information resource references.

Most development systems can generate UUID using various Software Development Kit (SDK) function calls and utilities for various platforms. Thus, software developers usually will not have to write their own implementation. Check your SDK documentation for exact syntax. As an example, for the Windows platform, COM function CoCreateGuid() implements the RFC-4122 algorithm to generate Class IDs (CLSIDs) and interface identifiers. Microsoft Visual Studio and Platform SDK include the utilities:

- UUIDgen.exe: Command line utility relies on Win32 functions.
- GUIDgen.exe: Console utility generates Implement_OLECreate(..), Define_GUID(..), static construct GUID, and registry format values.

An alternate example is Sun’s Java development kits (JDK) also include UUID generation classes and methods.

Appendix B Population of the NITF Tactical Image Identifier (TII) From the MIID (Informative)

MIID Subfield Name	MIID Subfield Characters	MIID Format Conversion Required	TII Default Value (Ref 3.5)	TII Subfield Name (Ref 3.5)	TII Subfield Characters (Ref 3.5)
Acquisition Start Date and Time	16	Convert from numerical ISO 8601 format to alphanumerical DDMMMYY format: DD is the numerical day of the month, MMM is a three letter abbreviation of the month, e.g. JAN, FEB,…DEC (all uppercase), YY is the least significant 2 digits of the year	→	ACQUSITION_DATE	7
		Note 1	9Z	PROGRAM CODE	2
		Note 1	00	SORTIE NO	2
		Note 1– default 00000	→	SCNUM	5
		Note 1	ZX	PRODUCER_CODE	2
		Note 1– default 000000	→	PRODUCT_NO	6
		Note 1	ZZ	PROJECT_CODE	2
		Note 1	000	REPLAY	3
		Note 1	000	PRODUCER_SN	3
		Note 2	Eight -character (hex) frame extraction date/time (GMT represented in hexadecimal as elapsed time in seconds since midnight January 1, 1970.)	PRODUCTION_DATIM	8 (hex)

Note 1 – This value is not part of the MIID but if it is present in metadata in the motion imagery stream or clip this information should be inserted into the TII.

Note 2 – The NITF TII PRODUCTION_DATIM is the date and time that the still frame was extracted from the motion imagery clip.