

# **MVN time Code and Remote** Control

## **User Manual**

Document MV0209P, Revision H, May 2018



## Xsens Technologies B.V.

Pantheon 6a P.O. Box 559 7500 AN Enschede The Netherlands

phone +31 (0)88 973 67 00 +31 (0)88 973 67 01 e-mail info@xsens.com internet www.xsens.com

fax

#### Xsens North America, Inc.

10557 Jefferson Blvd, Suite C CA-90232 Culver City USA

fax

phone 310-481-1800 310-416-9044 e-mail info@xsens.com internet www.xsens.com



## Revisions

| Revision | Date       | Ву  | Changes  |
|----------|------------|-----|--|
| G        | May 2018   | JKO | Updated Location of Audio LTC decoder and Remote Control |
| Н        | March 2019 | DJK | Updated UDP command specifications                       |

© 2005-2019, Xsens Technologies B.V. All rights reserved. Information in this document is subject to change without notice. Xsens, MVN, MotionGrid, MTi, MTi-G, MTx, MTw, Awinda and KiC are registered trademarks or trademarks of Xsens Technologies B.V. and/or its parent, subsidiaries and/or affiliates in The Netherlands, the USA and/or other countries. All other trademarks are the property of their respective owners.



## **Table of Contents**

| 1 | IN          | TROD    | UCTION                          | . 1 |
|---|-------------|---------|---------------------------------|-----|
|   | 1.1         | Appli   | CATION                          | . 1 |
|   | 1.2         | TIMES   | ТАМР                            | . 1 |
|   | 1.3         | Remo    | TE CONTROL                      | . 1 |
| 2 | IN          | STALL   | ATION                           | . 2 |
|   | 2.1         | SOFTV   | VARE                            | . 2 |
| 3 | GI          | ETTING  | G STARTED                       | . 3 |
|   | 31          | MVN     | ANALYZE/ANIMATE CONFIGURATION   | 3   |
|   | 3.2         | TIME    | CODE                            | . 3 |
|   | 3.          | 2.1     | Time plugin configuration       | . 4 |
|   | 3.3         | REMO    | TE CONTROL                      | . 7 |
|   | 3           | 3 1     | Offset issue                    | 8   |
|   | 3.4         | UDP     | COMMANDS SPECIFICATION          | .9  |
|   | 3.          | 41      | IdentifvRea                     | . 9 |
|   | 3.          | 42      | StartMeasurinaRea               | . 9 |
|   | 3.          | 4.3     | StonMeasuringReq                | .9  |
|   | 3.          | 44      | StartRecordinaRea               | . 9 |
|   | 3.          | 4.5     | StonRecordinaRea                | 10  |
|   | 3.          | 4.6     | PlavPauseBea<br>PlavPauseBea    | 10  |
|   | 3.          | 4.7     | NaviaateToStartRea              | 10  |
|   | 3.          | 4.8     | NaviaateToEndRea                | 10  |
|   | 3.          | 4.9     | PreviousErameRea                | 10  |
|   | 3.          | 4.10    | NextFrameRea                    | 10  |
|   | 3.          | 4.11    | TogaleBepeatReg                 | 11  |
|   | 3.          | 4.12    | AddMarkerRea                    | 11  |
|   | 3.          | 4.13    | AddNetworkStreaminaTaraetRea    | 11  |
|   | 3.          | 4.14    | RemoveNetworkStreaminaTaraetRea | 11  |
|   | 3           | 4.15    | SessionStatusRea                | 12  |
|   | 3           | 4.16    | MoveCharacterToOriginReg        | 12  |
|   | 3           | 4.17    | SessionInfoReg                  | 12  |
|   | 3           | 4.18    | JumpToFrameRea                  | 12  |
|   | 3           | 4.19    | setMediaRecorderAddressReg      | 12  |
|   | 3           | 4.20    | SetSessionNameReg               | 12  |
|   | 3.          | 4.21    | ,<br>Example                    | 13  |
|   | 3.5         | LAN s   | ЕТ-UР                           | 13  |
| 4 | м           | VN AN   | ALYZE/ANIMATE AND OUTPUT        | 14  |
|   | <b>4</b> 1  | M//N    |                                 | 14  |
|   | 4.1<br>4.2  | TIMEC   |                                 | 14  |
|   | <u>⊿.</u> ∠ | TIMEC   |                                 | 15  |
|   | дл          | RECED   |                                 | 16  |
|   | 7.7         | IVELLEN |                                 | .0  |



## 1 Introduction

## 1.1 Application

The MVN time code and remote control plug-in is designed in case synchronization of single or multiple MVN systems with other systems is required. The data of a MVN system is time stamped during recording, so it can be lined up afterwards with data of other systems i.e. camera's, audio.

## 1.2 Timestamp

This functionality enables the correlation of motion capture data from several MVN systems and the data to be used with other motion capture systems, camera footage and audio.

The time code functionality requires that MVN is synchronized to an external source that supplies a time code. The same time code used also by the other systems, which the MVN data is to be combined with.

The Timecode plugin can achieve time synchronization to within 10 ms.

## 1.3 Remote control

As part of the implemented functionality, in the set-up with multiple MVN systems it is possible to start and stop the recording via remote commands for multiple MVN systems and other systems.



## 2 Installation

## 2.1 Software

The Time code and remote control plug-in is installed with MVN Analyze/Animate. The plugin will be made available through the activation process.

To check whether the installation was successful you open folder:

- ...\Program Files\Xsens\MVN \*\MVN Studio\plugins it should contain following files:
- Time code plug-in: ltcsoundcard64.dll
- Remote control: udpremotecontrol64.dll



## 3 Getting Started

## 3.1 MVN Analyze/Animate configuration

- 1. Start MVN Analyze/Animate.
- 2. Check the installed plug-ins.

Go to Options  $\rightarrow$  and check that all the necessary plug-ins are available are there; 'Audio LTC Decoder' and 'Remote Control'

## 3.2 Time code

For correct functioning of the time code part, the hardware as seen in de picture below should be in place.



#### Time code reader hardware

The US Society of Motion Picture and Television Engineers introduced that which is called SMPTE ("simpty") time code. There are two versions:

The audio sync tone version of SMPTE is called Linear or Longitudinal Time Code (LTC, pronounced "litcee" and specified in SMPTE 12M-1999)<sup>1</sup>. The basic format is an 80-bit code that gives the time of day to the second, and the frame number within the second, so *hh:mm:ss:frame*.

Vertical Interval TimeCode (VITC, pronounced "vitsee") is a form of SMPTE time code embedded as a pair of black-and-white bars in a video signal. These lines are typically inserted into the vertical blanking interval of the video signal. VITC contains the 64 data bits of the SMPTE linear time code frame embedded in a new frame structure with extra synchronization bits and an error-detection checksum. The VITC code is always repeated on two adjacent video lines, one in each field.

<sup>&</sup>lt;sup>1</sup> See <u>www.philrees.co.uk/articles/timecode.htm</u>



To be able to read the time code, the pc running MVN Analyze/Animate should be equipped with a soundcard connected to an LTC audio signal. The timecode plug-in will decode the LTC signal to time code. The plug-in is based on 'LibLtc, Linear/Logitudinal Time Code (LTC) Library'<sup>2</sup>.

## 3.2.1 Time plugin configuration

1. After starting MVN Analyze/Animate it can be checked whether the plug-ins are properly initialized by going to:

Options  $\rightarrow$  Select the Audio LTC Decoder plugin

| Audio LTC Decoder Options           |                       |                         |   |         |
|-------------------------------------|-----------------------|-------------------------|---|---------|
| Audio input device Default          |                       | Input Device            | - | Rescan  |
| Enable audio LTC decoding           |                       |                         |   | Restart |
| Enable synchronization              | $\checkmark$          |                         |   |         |
| Synchronize every                   | 1                     |                         | - | seconds |
| Log received time codes             |                       |                         |   |         |
| Log received time codes every       | 1                     |                         | - | seconds |
| Status                              |                       |                         |   |         |
| LTC Decoding:                       |                       | Inactive                |   |         |
| Last processed time code:           |                       | <none></none>           |   |         |
| Last synchronized time code         | :                     | <none></none>           |   |         |
| Audio processed (ms):               | Audio processed (ms): |                         |   |         |
| Time codes decoded:                 |                       | 0 (0.0/sec)             |   |         |
| Time codes processed:               |                       | 0 (0.0/sec)             |   |         |
| Time codes synchronized:            |                       | 0 (0.0/sec)             |   |         |
| Time codes invalid/skipped:         |                       | 0 (0.00000000/sec) (0%) |   |         |
| Codec:                              |                       | <none></none>           |   |         |
| Sample Rate:                        |                       | <none></none>           |   |         |
| Channel Count:                      |                       | <none></none>           |   |         |
| Sample Info:                        |                       | <none></none>           |   |         |
| Buffer Usage: Cnt/Min/Avg/Max/Size: |                       | 0/0/0/0 bytes           |   |         |
|                                     |                       |                         |   |         |
| Save Close                          |                       |                         |   |         |

<sup>&</sup>lt;sup>2</sup> See <u>http://x42.github.io/libltc/</u>



#### Audio input device

Selects the audio input device to record and decode audio from. Click the Rescan button to scan for available audio devices. A rescan may be required after plugging in an audio source.

#### Enable audio LTC decoding

When checked, if audio is available, it will be recorded and decoded. Uncheck this to turn off LTC decoder. Click the Restart button to reinitialize and restart the LTC decoder. This will also reset all status information.

#### Enable synchronization

When checked, decoded time codes will be used to synchronize the time during a recording. Uncheck this to never synchronize the time with the decoded time codes.

#### Synchronize every x seconds

By default, time synchronization is done every second. This setting can be used to reduce the synchronization to once every *x* seconds.

#### Log received time codes

When checked, decoded time codes will be logged in the Audio LTC Decoder Log Window (See the View menu). Uncheck this to prevent the logging of decoded time codes.

#### Log received time codes every *x* seconds

By default, logging of received time codes is done every second. This setting can be used to reduce this to once every *x* seconds.

#### Status information

The status information shows, amongst others, information about the decoded time codes. Every decoded time code also has a frame number. When more than one time code is received per second, the frame number counts the time codes in that second.

A decoded time code is processed only if the frame number of the decoded time code is 0 (the first time code received per second). This means that the decoder processes a maximum of one time code per second. Decoded time codes that do not have a frame number of 0 are simply discarded. Furthermore, when a time code is considered invalid or unexpected, it is skipped as well. A time code is considered invalid or unexpected if:

- The time difference between the current time code and previous time code is too much.
- The time code differs too much from what is expected based on the actual passage of time.

When too many invalid time codes are received in sequence, it is assumed that the LTC generator changed its time. The LTC decoder will then perform a reset and reinitializes.

Note: If too many invalid time codes are received (See also the 'Time codes invalid/skipped' status information), it may be caused by an audio recording volume that is too low or too high. Adjusting the volume will solve the problem in most cases.

#### LTC Decoding

This shows whether the LTC decoder is currently recording and decoding audio. Values can be Active or Inactive.

#### Last processed time code

This shows the last time code that was decoded & processed. Note: the decoder only processes 1 time code per second.

#### Last synchronized time code



This shows the last time code that was used to synchronize. Normally this is the same as the last processed time code but this can be changed when the 'Synchronize every *x* seconds' setting is used.

#### Audio processed

This shows the total amount of audio (in milliseconds) that has been processed by the decoder.

#### Time codes decoded

This shows the total number of time codes that have been decoded. This includes all received time codes, including time codes with frame numbers other than zero and time codes that will be considered invalid later. Between parentheses it shows the number per second of processed audio.

#### Time codes processed

This shows the total number of valid time codes that have been processed. This only includes time codes with frame numbers equaling zero. Between parentheses it shows the number per second of processed audio.

#### Time codes synchronized

This shows the total number of valid time codes that have been used to synchronize with. Between parentheses it shows the number per second of processed audio.

#### Time codes invalid/skipped

This shows the total number of processed but invalid time codes that have been skipped. Between the first parentheses it shows the number per second of processed audio. Between the seconds parentheses it shows the percentage of processed time codes that were invalid. If this percentage is too high, the background will be colored red.

Note: If too many invalid time codes are received, check if the recording volume is too low. A sufficiently high recording volume is required to properly decode the time codes from the audio.

#### Codec

This shows the audio codec that is being used.

#### Sample Rate

This shows the current audio sample rate in Hertz.

#### **Channel Count**

This shows the number of audio channels.

#### Sample Info

This shows information about the audio sample type. It includes the sample size, the sample type and the byte order.

#### **Buffer Usage:**

This shows the usage of the internal audio buffer. It shows:

- Cnt: This shows how many times the audio buffer has been read. This value should increase during decoding.
- Min: This shows the minimum number of samples stored in the buffer before being read.
- Avg: This shows the average number of samples store in the buffer before being read.
- Max: This shows the maximum number of samples stored in the buffer before being read.
- Size: This shows the maximum number of samples that can be stored in the buffer.



High 'Avg' or 'Max' values (more than a few KB) indicate that the decoder is not able to process the incoming audio fast enough. If values reach the maximum buffer size, the data is simply discarded.

## 3.3 Remote Control

To support the remote control UDP commands, a plug-in is implemented that attempts to parse any UDP messages it receives. When it recognizes the message, the commands will be forwarded to MVN Analyze/Animate using the plug-in system. MVN Analyze/Animate receives the commands and takes the appropriate actions: start a new recording and store the measurements in the given file or stop the ongoing recording and close the opened file.

The time to start or stop as contained in the command is expressed as a time code. Since MVN is synchronized with the time code it can properly determine the right moment to perform the action.

1. For correct functioning of the remote control code part, the hardware as seen in de picture below should be in place. The set-up has to have a system in place that generates the UDP commands, e.g. the "Central Control".

When the *Switch* in picture below is one with IGMP support<sup>3</sup>, the UDP commands can be multicasted also.

Multicast is a kind of UDP traffic similar to BROADCAST, but only hosts that have explicitly requested to receive this kind of traffic will get it. This means that a MVN System has to *join* a multicast group if you want to receive traffic that belongs to that group.

IP addresses in the range 224.0.0.0 to 239.255.255.255 (Class D addresses) belongs to multicast. No host can have this as IP address, but every machine can join a multicast address group.

The reserved IP-address 224.0.0.1, specifies "all systems on this subnet". In the set-up, all listening sockets join the multicast group "224.0.0.1". This is the "all-hosts" group. All sending sockets transmit to "224.0.0.1". This ends up going to all machines that have joined the "all-hosts" group (224.0.0.1).



2. After starting MVN Analyze/Animate it can be checked whether the plug-ins are properly initialized by going to:

Options → Select the Remote Control plugin

<sup>&</sup>lt;sup>3</sup> <u>http://en.wikipedia.org/wiki/Internet Group Management Protocol</u>



The port used by the *remote control plug-in* and the multicast IP-address to join can be configured. The default value for the port is 6004. The plug-in will join any IP-address other than 0.0.0.0. In the field 'Name' the (optional) 'System ID' can be specified which will be appended to the given filename.

| 😕 Remote Control Options                       |           |  |  |
|--|-----------|--|--|
| Enable UDP remote contro<br>Listen on UDP port | 6004      |  |  |
| Name   | Xsens MVN |  |  |
|  |           |  |  |
| Save Close                                     |           |  |  |

3. Check the reception of the UDP commands.

A *CaptureStart* and *CaptureStop* can be sent right after each other in the format as specified in section 3.4. Open the 'Remote Control Log Window from the 'View' menu. If no action are logged and executed in MVN Analyze/Animate, check the LAN set-up (see section 3.5).

#### 3.3.1 Offset issue

The command must specify a time in the future (expressed in a time code) when to start the recording. When the times in the MVN systems are synchronized to an external time code, the recordings can then start at the same time. However, there will be some offset as is discussed in the next paragraph. After having received the start time (expressed as a time code) in the remote command, the first key-frame in the recording is the one for which the timestamp is larger than the received start time, assuming a synchronized MVN system of course. The *MVN start time* that is stored in the MVN file will be the time stamp of that frame. So, worst case the MVN start time is 1 sample (e.g. 8.33 ms for 120 Hz sample rate) larger than the specified start time.

Also this means that for two MVN systems the worst case offset between key-frames with the same index is 1 frame at the start of the recording. Of course this is a known offset since it follows from the values stored in the MVN file.

The above is illustrated in picture below.



Possible offset between two MVN systems.

For longer takes, two MVN systems only stay synchronized when the synchronization algorithm is working properly. This is because the clocks of the MVN Xbus Masters for both MVN systems are not running at exactly the same pace: the clocks are specified to have an accuracy of 10ppm at 25°C,

Document MV0209P.H



15pmm whole temp range. The result will be, that for longer takes (few minutes), the clocks will drift apart and so will the offset between two frames with the same index.

## 3.4 UDP commands specification

The UDP commands use case sensitive XML-like text-string containing 'key-value'pairs. The commands are typically broadcast (e.g. destination IP-address <netmask>.255) over the network so all recording devices are triggered simultaneously, or be sent to a specific IP-address.

Note:

All fields are placed between double quotes. The *Boolean* format takes the values "TRUE" and "FALSE". The *Path* format uses forward slashes.

### 3.4.1 IdentifyReq

Description: Request to MVN Analyze/Animate to identify itself. Attributes: none Response: IdentifyAck Response Attributes:

- IpAddress, ddd.ddd.ddd.ddd: The IP address of the UDP Remote Control Plugin
- InstanceName, String: The instance name as entered in the MVN Analyze/Animate preferences
- <Address>, Tag with VALUE: The address of the UDP Remote control plugin host machine. Usually more than one address is returned, the caller should determine which address is relevant.

### 3.4.2 StartMeasuringReq

Description: Request to start measuring, wake up from low-power mode. Attributes: none Response: StartMeasuringAck Response Attributes:

• Result, Boolean: TRUE if the request was successful

### 3.4.3 StopMeasuringReq

Description: Request to stop measuring, switch to low-power mode.

Attributes: none

Response: StopMeasuringAck

Response Attributes:

• Result, Boolean: TRUE if the request was successful

### 3.4.4 StartRecordingReq

Description: Request to start recording to an MVN file. Attributes:

- SessionName, Path: Either the full path + filename of the desired MVN file or just the filename. Relative paths are not supported and may result in unpredictable behaviour.
- StartTime, hh mm ss: The StartTime is expressed as a timecode (hours minutes seconds). If the attribute is not supplied, an immediate start is triggered. Any extra values after the ss field are ignored. Note that a time that is more than 4 hours in the past is considered to be in the future.

• Description, String: The description of the recording. This will be recorded in the file. Response: StartRecordingAck

Response Attributes:



- Result, Boolean: TRUE is the request was successful
- Reason, String: Reason for failure. Only set if Result is "FALSE".

#### 3.4.5 StopRecordingReq

Description: Request to stop recording and save (and close, depending on settings) the MVN file. Attributes:

• StopTime: hh mm ss: The StopTime is expressed as a timecode (hours minutes seconds frame). If the attribute is not supplied, an immediate stop is triggered. Any extra values after the ss field are ignored. Note that a time that is more than 4 hours in the past is considered to be in the future.

Response: StopRecordingAck

Response Attributes:

• Result, Boolean: TRUE if the request was successful

#### 3.4.6 PlayPauseReq

Description: Toggle play / pause for the active session. This has no effect on a live session, only on a file session.

Attributes: none Response: PlayPauseAck Response Attributes: none

#### 3.4.7 NavigateToStartReq

Description: Navigate to start of file for the active session. This has no effect on a live session, only on a file session. Attributes: none Response: NavigateToStartAck Response Attributes: none

#### 3.4.8 NavigateToEndReq

Description: Navigate to end of file for the active session. This has no effect on a live session, only on a file session. Attributes: none Response: NavigateToEndAck Response Attributes: none

#### 3.4.9 PreviousFrameReq

Description: Navigate one frame backwards for the active session. This has no effect on a live session, only on a file session. Attributes: none Response: PreviousFrameAck Response Attributes: none

#### 3.4.10 NextFrameReq

Description: Navigate one frame forwards for the active session. This has no effect on a live session, only on a file session. Attributes: none Response: NextFrameAck Response Attributes: none



#### 3.4.11 ToggleRepeatReq

Description: Toggle repeat for the active session. This has no effect on a live session, only on a file session.

Attributes: none Response: ToggleRepeatAck Response Attributes: none

#### 3.4.12 AddMarkerReq

Description: Insert a marker into the active recording at the current frame. This is intended for a live session only. Its behavior is undefined if used on a file session.

Attributes:

Text, String: The text of the marker. If not supplied or empty, a default marker text will be inserted.

Response: AddMarkerAck Response Attributes: none

#### 3.4.13 AddNetworkStreamingTargetReq

Description: Add a network streaming target. Attributes:

- IpAddress, ddd.ddd.ddd.ddd: The IP address of the target to add
- PortNumber, Integer: The port number to stream to. If unspecified, the default port 9763 will be used
- Protocol, String: The desired protocol to enable. This is an optional field. The choices are:
  - o DgramPoseEuler
  - DgramPoseQuat
  - DgramUnity3D
  - o DgramMetaData
  - o DgramOptical
  - o DgramScaling
  - DgramTrackerKinematics
  - DgramLinearSegmentKinematics
  - DgramAngularSegmentKinematics
  - DgramCenterOfMass
  - DgramJointAngles
  - DgramTimeCode
  - DgramSiemens

Response: AddNetworkStreamingTargetAck

Response Attributes:

• Result, Boolean: TRUE if the request was successful

### 3.4.14 RemoveNetworkStreamingTargetReq

Description: Remove a network streaming target. Attributes:

- IpAddress, ddd.ddd.ddd: The IP address of the target to remove
- PortNumber, Integer: The port number of the target. If unspecified, the default port 9763 will

be used. Please note that there must be an exact IP+port match in order to remove a target.

Response: RemoveNetworkStreamingTargetAck Response Attributes:

• Result, Boolean: TRUE if the request was successful



#### 3.4.15 SessionStatusReq

Description: Request session status information. Attributes: none

Response: SessionStatusAck

Response Attributes: a relevant subset of the following

- isRecording, Boolean: The live session is currently recording
- isPlaying, Boolean: The file session is currently playing
- isRepeating, Boolean: The file session's repeat option is enabled
- isPaused, Boolean: The file session is currently paused (not playing)
- playSpeedRatio, Fraction: The speed at which the file session is played. This is expressed as a fraction or an integer, ie: "1" or "4" or "1/8"

#### 3.4.16 MoveCharacterToOriginReq

Description: Move the character to the origin. This has no effect on a file session, only on a live session.

Attributes:

• CharacterId, integer: The index of the character to move. Supply -1 or omit to move all characters.

Response: MoveCharacterToOriginAck Response Attributes: none

#### 3.4.17 SessionInfoReq

Description: Request session information.

Attributes: none

Response: SessionInfoAck

Response Attributes: a relevant subset of the following

- sessionName, String: The current session name
- recordingTrial, Integer: The current recording trial
- isLive, Boolean: The session is in live mode
- fileDurationFrame, Integer: The current file duration expressed in number of frames
- fileDurationMs, Integer: The current file duration expressed in milliseconds

#### 3.4.18 JumpToFrameReq

Description: Jump to the specified frame. Attributes:

• frame, Integer: The frame to jump to

Response: JumpToFrameAck

Response Attributes: none

#### 3.4.19 SetMediaRecorderAddressReq

Description: Identifies a media recorder to transfer media from (i.e. reference video). Attributes:

- IpAddress, String: The media recorder's ip address.
- PortNumber, Integer: Port number with which communication will occur Response: SetMediaRecorderAddressAck

Response Attributes: none

#### 3.4.20 SetSessionNameReq

Description: Request a session name change Attributes:

• sessionName, String: The new session name

Document MV0209P.H



Response: SetSessionNameAck

**Response Attributes:** 

• Success, Boolean: The session name has been set successfully

### 3.4.21 Example

The following gives an example of the command that starts a recording:

</IdentifyAck>

## 3.5 LAN set-up

To secure that the UDP commands is only sent to the MVN workstations, it is preferable to configure the IP addresses of the MVN workstations:

- IP address with only the LSB, e.g. 192.168.2.<index>
- Subnetmask: 255.255.255.0

| Internet Protocol (TCP/IP) Properties   |               |  |  |
|---|---------------|--|--|
| General   |               |  |  |
| You can get IP settings assigned automatically if your network supports<br>this capability. Otherwise, you need to ask your network administrator for<br>the appropriate IP settings. |               |  |  |
| <ul> <li>O Dbtain an IP address automatically</li> </ul>  | y             |  |  |
| Use the following IP address:   |               |  |  |
| IP address:   | 192.168.2.101 |  |  |
| Subnet mask:  | 255.255.255.0 |  |  |
| Default gateway:  | · · ·         |  |  |

Configure the IP address of the MVN workstation.

When the UDP command is sent to IP address 192.168.2.255, only the MVN workstations will receive it.



## 4 MVN Analyze/Animate and output

## 4.1 MVN Analyze/Animate time coded timestamp

To be able to show the time codes in MVN Analyze/Animate, an option "Show time code for frames" will be added in the "User Interface" tab of the "Preferences" dialog.

| 送 Preferences         |   |              | ×          |
|-----------------------|---|--------------|------------|
| Recordings<br>3D View | Re-enable notification dialogs that were disabled using a "Don't show again" checkbox.                                    |              | Re-enable  |
| User Interface        | Allow MVN to gather and send anonymous usage<br>statistics to improve your product  | $\checkmark$ |            |
|                       | Restore the preferences to the default configuration<br>Visual elements of currently open windows may<br>not be affected. | ,            | Restore    |
|                       | Frame time format   |              | TimeCode 🔹 |
|                       | Use imperial units (inches)   |              |            |
|                       | Enable simple calibration routines  |              |            |
|                       | Show popup dialog for file comments after recording   | $\checkmark$ |            |
|                       | Show popup when using external triggers   |              |            |
|                       | Maximum number of frames displayed at once  | $\checkmark$ | 40000      |
|                       | Maximum number of frames kept in memory (per file)  | $\checkmark$ | 160000     |
|                       |   |              |            |
|                       |   |              |            |
|                       |   |              |            |
|                       |   |              |            |
|                       |   |              |            |
|                       |   |              |            |
|                       |   |              |            |
|                       |   |              |            |
|                       |   |              |            |
|                       |   |              |            |
|                       |   |              |            |
|                       |   |              | Save Close |

Selecting the "TimeCode" option will show the time code for the key-frame instead of the standard timestamp. Note that this can only be done during prerecording and play-back. During recording MVN Analyze/Animate displays the duration of the recording.

The MVN Analyze/Animate time code is calculated from the timestamps. This means that it can occasionally happen that there are more or less than 120 frames in a 'time code second' and / or that there are double frame numbers. Also, after long takes (e.g. >1 hour) it can occur that the total number of captured key-frames differs between the MVN Systems as not all clocks of the MVN Body Packs are exactly the same (accuracy is around  $\pm 30$  ppm).

## 4.2 Timecode in MVNX file format

The MVNX (MVN Open XML format) file stores the start of the recording in the *recData* field of the *mvnxInfo* tag. With respect to the timestamp the following fields are stored: <<u>F> tag</u>



The current <F> tag has an attribute t="..." which indicates the timestamp for the frame, the formatting depends on a new *timeFormat* field in the <mvnxInfo> tag as described in the following. <a href="https://www.info>tag">www.info>tag</a> a described in the following.

The <mvnxlnfo> tag will get a new "*timeFormat*" attribute, which specifies the format of the time field in *F* tags as follows:

- timeFormat="ms" makes the time "YYYY-MM-DD HH:MM:SS.mmm", where mmm is in ms
- timeFormat="timecode" makes the time "HH MM SS Frame". *Frame* is the number of MVN frames since the second, starting at 0.

To specify the *timeFormat*, in MVN Analyze/Animate an option "Time code" is available on to the "MVNX" tab in the "Preferences" dialog. When checked, MVN Analyze/Animate writes the time code in MVNX file. By default the option is checked. More information on the MVNX file format can be found in the MVN Analyze/Animate User Manual under MVNX file description.

## 4.3 Timecode in FBX file format

To store the proper time code in an FBX file, the FBX exporter plug-in must be set to "Dynamic time increments. Start at real start time" (see picture).

| 送 Export File                            |                      |                      | ×      |  |  |  |
|--|----------------------|----------------------|--------|--|--|--|
| Please configure your export:            |                      |                      |        |  |  |  |
| · · · · · · · · · · · · · · · · · · ·    |                      |                      |        |  |  |  |
| Output path                              | File path            |                      |        |  |  |  |
| Output name                              | File name            | File name            |        |  |  |  |
| Exporter                                 | FBX Exporter (*.fbx) | FBX Exporter (*.fbx) |        |  |  |  |
| Append suit name                         |                      |                      |        |  |  |  |
| Output file name                         | File name.fbx        |                      |        |  |  |  |
|  |                      |                      |        |  |  |  |
|  |                      | Export               | Cancel |  |  |  |
| Hide entions                             |                      |                      |        |  |  |  |
| nide options                             |                      |                      |        |  |  |  |
| Exporter frame skip (for downsampling) 0 |                      |                      |        |  |  |  |
| Overwrite first frame with a T-pose      |                      |                      |        |  |  |  |
| Output preset                            |                      | Default 🔹            |        |  |  |  |
| Output unit                              |                      | centimeters <        |        |  |  |  |
| Time increment                           | mode                 | Dynamic 🔹            |        |  |  |  |
| Start at                                 |                      | 0                    | -      |  |  |  |
| Walk on the spo                          | t                    |                      |        |  |  |  |
|  |                      |                      |        |  |  |  |



## 4.4 References

- [1] [2] [3] http://www.philrees.co.uk/articles/timecode.htm
- http://x42.github.io/libltc/
- http://en.wikipedia.org/wiki/Internet\_Group\_Management\_Protocol