ARRI Metadata
Live Link Metadata Plug-in for Unreal Engine

Date: 6. December 2021

Version: 1.02
## Version History

<table>
<thead>
<tr>
<th>Version</th>
<th>Author</th>
<th>Change Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>2021-12-06</td>
<td>Oestreich, Andreas</td>
<td>Adding new features from Changelog (V1.02)</td>
</tr>
<tr>
<td>2021-07-08</td>
<td>Oestreich Andreas</td>
<td>Formatted and structured</td>
</tr>
<tr>
<td>2021-06-23</td>
<td>Oestreich Andreas</td>
<td>Initial version</td>
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1.0 UMC-4 Configuration

1.1 Update Firmware

To update the device, proceed as follows:

1. Copy the firmware update package onto an SD card.
2. Insert the SD card in the SD card slot of the UMC-4.
3. Select Menu>System>Firmware Update and navigate to the update package on the SD card.
4. Select the package. A list of modules will be shown on the screen.
5. Press UPDATE. A new warning screen will be displayed. Proceed by simultaneously pressing the two UPDATE buttons. The screen will blackout and the status LED starts blinking red and green. The unit is being updated. This can take up to 30 seconds.
6. The UMC-4 will reboot after the update is completed. Depending on the update package content, additional modules might need to be updated after reboot; this is done automatically and is clearly indicated on the screen of the device. The second phase of the update procedure may take several minutes.

NOTE:
You may also update the Firmware via a Web browser if your device is accessible via Network. Navigate to the UMC's IP Address and follow the steps for the Firmware update in the Tab “Firmware”.

1.2 Setup UMC-4

NOTE:
Before using the UMC for Metadata streaming, make sure your UMC unit has a valid MAC address. To check this, navigate to: MENU->SYSTEM->NETWORK->SHOW PARAMETERS
In the bottom line you will see the MAC address. If this is set to: 123456789AB, your UMC device needs to be sent to ARRI Service for repair.

1. Choose whether you want to stream the data via Unicast or Multicast and set the parameter in the Network settings of the UMC device (MENU->SYSTEM->NETWORK)
2. Configure the UMCS IP Address. Navigate to: MENU->SYSTEM->NETWORK. Either use DHCP or configure a manual IP Address. (Ask your IT admin what settings to use)
3. Configure the streaming Address: Navigate to MENU->SYSTEM->NETWORK->Streaming Address
   For Multicast: Set in range 239.192.x.x
   For Unicast: Set to the IP Adress of the receiving device (e.g., 192.168.0.50)
4. For Alexa Mini, Mini LF and AMIRA cameras:
   Set the device to get its metadata from the camera: Navigate to: MENU->LENS->Set "Lens data source" to "CAM"
   For ALEXA XT, SXT, LF and 65 or Thirdparty cameras:
   Set the device to generate the metadata from the motor values: Navigate to: MENU->LENS->Set "Lens data source" to "UMC"
5. To activate the streaming navigate to:
   MENU -> METADATA -> STREAM->"ON"

The UMC will now continuously send (and record) the Lens Metadata to the designated multicast Address.
2.0 Camera Setups

2.1 Alexa Mini LF / Alexa Mini / Amira

2.1.1 LDS - CForce

Alexa Mini LF / Alexa Mini / AMIRA
LDS lens

Result:
- Metadata in file header and camera
- Metadata as Network stream

2.1.2 LDA/LDM - CForce

Alexa Mini LF with
LDM and LDA lenses

Result:
- Metadata in file header and camera
- Metadata as Network stream
2.2 ALEXA SXT / XT / 65 / LF

2.2.1 LDS - CLM

Alexa XT / SXT / Plus / LF / 65
LDS lens & CLM 3/4 Motors

notes:
Even though you have an LDS lens, you need to create an LDA table for the WCU to stream metadata correctly.

Result:
- Metadata in file header and camera
- Metadata as Network stream

2.2.2 LDA / LDM – CLM

Alexa XT / SXT / Plus / LF / 65
LDA / LDM lens & CLM 3/4 Motors

notes:
The UMC needs to control the motors to stream the metadata.
You will not have the metadata present in the header, but can record it to SD card in UMC.

Result:
- No Metadata in file header and camera
- Metadata as Network stream
2.2.3 LDS – CForce

Alexa XT / SXT / Plus / LF / 65
LDS lens & CForce Motors

notes:
Even though you have an LDS lens, you need to create an LDA table for the WCU to stream metadata correctly.

Result:
- Metadata in file header and camera
- Metadata as Network stream

2.2.4 LDA / LDM – CForce

Alexa XT / SXT / Plus / LF / 65
LDA or LDM lens & CForce Motors

notes:
The UMC needs to control the motors to stream the metadata.
You will not have the metadata present in the header, but can record it to SD card in UMC.

Result:
- No Metadata in file header and camera
- Metadata as Network stream
2.0 Unreal Engine

3.1 Version compatibility

3.1.1 Unreal Engine

The Arri Unreal Engine PlugIn (1.02) is now compatible with Unreal Engine Version 4.27.0 and newer. Due to changes to the way the Live Link camera works, 4.26.x and older is no longer supported.

3.1.2 UMC-4

This PlugIn Version (1.02) is compatible with UMC Firmware:

umo4-2.2.2637
umo4-2.2.2640

3.2 Setup

Copy the Plug-in to either your project or engine folder and make sure it is activated in Unreal Engine.

Make sure you have activated the LiveLink Plug-in and, if necessary the Live Link over nDisplay Plug-in.
For UE 4.27 you also have to activate the Live Link camera Plug-in
3.2 Live Link

3.2.1 Setup

Before Setting up your Live Link make sure your UMC-4 unit is configured to your needs, either streaming as Multicast or Unicast via UDP.

- Go To Window -> Live Link and hit the “+Source” button.
- Select Arri Live Link Source and configure the settings:

<table>
<thead>
<tr>
<th>Mode</th>
<th>Multicast or Unicast (from UMC-4 configuration)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject Name</td>
<td>Name for your Live Link subject</td>
</tr>
<tr>
<td>IP Address</td>
<td>Your network card’s IP address, that is receiving the metadata from the streaming device. You can configure the IP Address with a wildcard (<em>), should you have multiple devices receiving the data. The devices must be in an identical subnet, e.g. 192.168.0.</em> This will ensure the creation of the subject on the correct IP-Address Endpoint over multiple machines from a live link preset.</td>
</tr>
<tr>
<td>UDP Port Number</td>
<td>The port number configured in the UMC (Default is 5432)</td>
</tr>
<tr>
<td>Multicast Address</td>
<td>Multicast address in local scope 239.192.x.x (Default is: 239.192.1.1)</td>
</tr>
</tbody>
</table>

**NOTE:** If your machine has multiple network cards you need to make sure you set the IP address to your preferred network card, otherwise Unreal Engine might default to the wrong network interface (0.0.0.0) and you will not be able to receive the data.

If everything is setup correctly, your Live Link subject will be automatically created.

For troubleshooting you can always view the Output Log and monitor “LogArri” to see whether your sockets are being created or whether any Warnings or Errors are thrown.
3.2.2 Workflow

3.2.2.1 Adding your subject to the cine camera

- Create a new Cine Camera Actor and place it in your scene.
- Add a Live Link Component to it. In the Live Link component select your Live Link subject.
- Once you have selected the Arri-UMC subject, the camera data is applied to the cine camera.
- Lastly make sure you untick “World transform” in Role Controllers -> Transform Role -> Live Link or set the Transform Role to “None”
3.2.2.2 Arri Live Link Camera Controller

For additional features you can enable the ArriLiveLinkCameraController from the Live Link Component Controller Menu. (LiveLinkComponentController->Role Controller->Camera Role)
3.2.2.3 Timecode

You can stream the timecode from the UMC-4 from your Live Link subject to the Unreal Engine’s Timecode Provider.

To do this, create a new Media Profile:

- Right click in Content browser->Media->New Media Profile
- Open the Media Profile and go to: Timecode Provider
- Tick the “Override Project Settings”
- As Timecode Provider select the Live Link Timecode Provider and as subject the ARRI Live Link subject.
- Hit save and open the Timecode Provider Window. Your engine timecode is now streamed from the UMC-4.

3.2.2.4 Sensor Size & Metadata manipulation

The sensor size is not streamed from the UMC4. You can choose the correct sensor size from the Arri Live Link Camera Controller:

Simply check ”set Filmback” and choose your Arri camera and its sensor setting. This will automatically apply the correct sensor width and height to your CineCameraComponent. You can also manipulate the Depth of field with a multiplier or override the Iris of the virtual camera.
3.2.2.4 Additional Metadata from Live Link

You can access additional metadata from the Live Link subject in Blueprints.

Open your Blueprint class or your level blueprint and create the following Nodes.

You can access all the camera metadata from the Live Link camera, including the timecode.

Additionally embedded in the Meta Data field of the Live Link Frame data, you will find the following properties. These can only be stored as Strings. If you want to use them, you need to take care of the conversion from String to designated datatype in Blueprints.

<table>
<thead>
<tr>
<th>Key</th>
<th>Data type in String</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CameraState</strong></td>
<td><strong>Datatype ENUM as String</strong></td>
</tr>
<tr>
<td>CameraSystem Unknown state</td>
<td></td>
</tr>
<tr>
<td>CameraSystem Ready</td>
<td></td>
</tr>
<tr>
<td>CameraSystem Recording</td>
<td></td>
</tr>
<tr>
<td>CameraSystem Recording start</td>
<td></td>
</tr>
<tr>
<td>CameraSystem Recording stop</td>
<td></td>
</tr>
<tr>
<td>CameraSystem Warning</td>
<td></td>
</tr>
<tr>
<td>CameraSystem Error</td>
<td></td>
</tr>
<tr>
<td>CameraSystem Not Ready</td>
<td></td>
</tr>
<tr>
<td>CameraSystem Booting</td>
<td></td>
</tr>
<tr>
<td>CameraSystem Updating</td>
<td></td>
</tr>
<tr>
<td>CameraSystem Update Finished</td>
<td></td>
</tr>
<tr>
<td>CameraSystem Prerecording</td>
<td></td>
</tr>
<tr>
<td>CameraSystem Starting Prerecording</td>
<td></td>
</tr>
<tr>
<td>CameraSystem Playback</td>
<td></td>
</tr>
<tr>
<td>CameraSystem Formatting Medium</td>
<td></td>
</tr>
<tr>
<td>ExposureIndex</td>
<td>integer</td>
</tr>
<tr>
<td>ExposureTime</td>
<td>float</td>
</tr>
<tr>
<td>ShutterAngle</td>
<td>float</td>
</tr>
<tr>
<td>CCT</td>
<td>integer</td>
</tr>
<tr>
<td>tint</td>
<td>float</td>
</tr>
</tbody>
</table>
3.3 Blueprint

You can access all the metadata without using Live Link.

**NOTE:** If you do this, make sure you are not using Live Link at the same time. You must use one or the other, or you will have a conflict in the created socket, resulting in undefined behaviour.

**Exception:**
Should you be streaming the data via Multicast to two different network cards, you can setup a Live Link and Blueprint workflow simultaneously, since you can create a socket per network card. Just make sure you are using the correct IP address.

- Begin by creating an ArriDevice Variable:
- +Variable -> Variable Type -> Object Types -> ArriDevice -> Object Reference
- On Event Begin Play initialize the ArriDevice with your desired settings.
- Drag the ArriDevice Variable in the blueprint and set it from the Init Device output.
- Drag the Arri Device into your Blueprint again and use “get”. Drag out from its output and use the function “get Metadata”. Connect it to the Event Tick.
- The return value can now be broken (break ArriMetadata) and you will have access to all the metadata streamed from the UMC.
- Lastly close the device on Event End Play with the function “close device”.

You can now build your own logic with all the provided metadata.
### 3.3.1 Metadata types and availability based on camera system

<table>
<thead>
<tr>
<th>Metadata</th>
<th>ALEXA Mini LF AMIRA ALEXA Mini</th>
<th>ALEXA XT SXT 65 LF</th>
<th>LiveLink</th>
<th>Blueprint</th>
<th>Comment</th>
<th>Datatype</th>
</tr>
</thead>
<tbody>
<tr>
<td>camera state</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>The state the camera currently is in. Useful for recording automation.</td>
<td></td>
</tr>
<tr>
<td>camera model</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>For UMC-4 workflow this metadata will be set to “UMC-4”</td>
<td>String</td>
</tr>
<tr>
<td>umc4 serial</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>The serial number of the UMC-4 device</td>
<td>String</td>
</tr>
<tr>
<td>umc4 software version</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>The UMC-4's software version</td>
<td>String</td>
</tr>
<tr>
<td>camera serial number</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>The camera’s serial number</td>
<td>String</td>
</tr>
<tr>
<td>camera software version</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>The camera’s software version</td>
<td>String</td>
</tr>
<tr>
<td>nd filter density</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>ND filter density (e.g. 0.6 or 1.2)</td>
<td>float</td>
</tr>
<tr>
<td>nd filter type</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>set to &quot;none&quot; or &quot;active&quot;</td>
<td>ENUM</td>
</tr>
<tr>
<td>lens name</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>name of the lens in use</td>
<td>String</td>
</tr>
<tr>
<td>lens serial number</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>serial number of the lens</td>
<td>String</td>
</tr>
<tr>
<td>motor encoder limits</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>The encoder limits of the attached lens motors:</td>
<td>integer</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>motorRawEncoderLimitsFocusMin</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>motorRawEncoderLimitsFocusMax</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>motorRawEncoderLimitsIrisMin</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>motorRawEncoderLimitsIrisMax</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>motorRawEncoderLimitsFLMin</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>motorRawEncoderLimitsFLMax</td>
<td></td>
</tr>
<tr>
<td>focus unit</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>metric or imperial</td>
<td></td>
</tr>
<tr>
<td>focus distance</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Is always converted to metric in cm</td>
<td>float</td>
</tr>
<tr>
<td>iris / aperture</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>presented as aperture in Unreal Engine</td>
<td>float</td>
</tr>
<tr>
<td>focal length</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Focal length</td>
<td>float</td>
</tr>
<tr>
<td>lens raw encoder values</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td>Lens encoder values for lenses with LDS (lens data system)</td>
<td>Integer</td>
</tr>
<tr>
<td>motor raw encoder values</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>Motor encoder values of the external lens motors</td>
<td>Integer</td>
</tr>
<tr>
<td>Parameter</td>
<td>Value</td>
<td>Description</td>
<td>Type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------</td>
<td>-----------------------------------------------------------------------------</td>
<td>--------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>shutter angle</td>
<td>x</td>
<td>the shutter angle set in the camera in degrees</td>
<td>float</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>exposure time</td>
<td>x</td>
<td>the sensor's exposure time in milliseconds</td>
<td>integer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>exposure index</td>
<td>x</td>
<td>the exposure index (ASA)</td>
<td>integer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>recording media capacity</td>
<td>x</td>
<td>leftover capacity of the recording media in seconds</td>
<td>integer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>framerate</td>
<td>x</td>
<td>the framerate of the timecode</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dropframe</td>
<td>x</td>
<td>dropframe flag for timecode</td>
<td>boolean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>framenumber</td>
<td>x</td>
<td>the framenumber, describing timecode in combination with framerate and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>dropframe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>clip number</td>
<td>x</td>
<td>number of recorded clips on the recording media -&gt; check known issues</td>
<td>integer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>camera index</td>
<td>x</td>
<td>camera index, e.g. “AA” or “B”</td>
<td>String</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>color temperature</td>
<td>x</td>
<td>the color temperature setting of the camera, e.g. 5600</td>
<td>integer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tint</td>
<td>x</td>
<td>the green or magenta tint in range -16 to 16 -&gt; check known issues</td>
<td>float</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tilt</td>
<td>x</td>
<td>tilt value of UMC’s IMU</td>
<td>float</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>roll</td>
<td>x</td>
<td>roll value of UMC’s IMU</td>
<td>float</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.0 Troubleshooting

Contact

If you are having issues with the UMC-4 or the Unreal Plug-In, please contact:

mrplugins@arri.de

For convenience, please include the Output Logs from Unreal Engine.

Debugging

If you would like to monitor the metadata, you can access the verbose Logs by typing the following command in the Output Log’s command line:

Log LogArri Verbose

You can now easily monitor all metadata streamed from the UMC, without needing to access it via Blueprints.

Make sure to set this back to normal by typing:

Log LogArri Log

This sets the log back to its default state.

5.0 Known issues

5.1 UMC Firmware update

1. When updating the UMC’s Firmware, make sure you activate the Streaming after the update is complete and restart the UMC. Otherwise, it can happen, that you won’t have an active ethernet stream. A reboot will solve this, when the UMC comes up with streaming enabled.

5.2 Metadata

1. There is an issue with the “clip number” metadata. This is currently always set to 1. Please refrain from using it for take automation until this issue is fixed.
2. The tint value is currently not conversed correctly between camera and UMC unit, making its resolution narrower. It will only contain full numbers, without the decimal point.