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WHAT'S IN THIS DOCUMENT

This document describes how to install, setup and test the PRIME VSAR suite 2.0.0

Help and support

For contact information or our online helpdesk, please visit our support page at https://chyron.com/support/.

Disclaimer: Our products are subject to continual development and improvement. Therefore, while the information in this document was complete and accurate when it was written, additions or modifications to the products may cause changes to the technical and functional specifications. No rights can be derived from this document.



Versions

- PRIME VSAR
- Data Engine
- PRIME VSAR Tools
- <u>Sentinel Driver</u>
- License Updater
- <u>CAMIO</u>
- <u>iSQ</u>
- Endpoint
- <u>CESIUM</u>

0.77.7 or higher 2.0.0

2.0.0 or higher

- 2.0.0
 - 7.6.0
 - 2.5.0 or higher
 - 4.11.2 or higher
 - 3.7.1 or higher
 - 1.2.2 or higher
 - 5.5.0



PRIME VSAR INSTALLATION

Installation and configuration steps.

Supported platforms are **Windows 10 x64 and Windows 11 x64**.

Installation Note

Possible *Windows Defender* prompt, when trying to run installers. In some configuration, one may get a warning like the following:



In that case, click on the "More info" link and then "Run anyway"



8 Chyron.com



License

The following should be done only once, during the first installation.

For any license update, step 3) to 8) may be re-run, after features being added through Download Area (DA).

- 1) Plug the provided dongle in a USB port.
- 2) Install Sentinel System Driver.
- 3) Run *ChyronHegoLicenseUpdater*.
- 4) The updater will now show the current licenses.
- 5) Click Yes.
- 6) Make sure your license has been updated from within the DA.
 - a) VSAR(Fresh)
 - i) Option: Primitive Library
 - b) Cesium

i) Option: Parallax

- 7) The updater will now show the licenses to be updated.
- 8) Click Yes to update your license.
- 9) After this License updater will show you what licenses, options and what validity you have.
- 10) Please make sure this matches with your ordered configuration namely Hal Inputs and outputs.

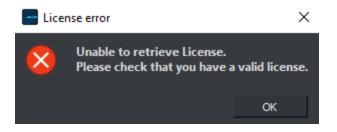
Chyron	Hego License Updater 2.	5	×	Г	Content	
0	Current license details Dongle Serial No: 0x90 License: Cesium Expiration	0 unlimited			License Cesium Expiration Parallax Version	2023-10-06 enabled 5
	Parallax License: Fresh Expiration Primitive	enabled unlimited enabled			License VSAR Expiration Primitive	2023-10-06 enabled
					Version Number of HAL outputs Number of HAL inputs	1 1 2
	Do you want to proce dongle?	ed complete update of this license			MOS gateway	enabled enabled
	lf you already have a u	pdate file (*.hlu), press "No".			Allow preview UHD capability	enabled
		Yes <u>N</u> o Cancel			HDR capability	enabled



Cesium

Cesium is the software that manages translation of any (raw or pre-processed) tracking data coming from any provider into virtual 3D space coordinates.

- 1) Install **Cesium** running its corresponding **Windows** installer (should look like Cesium_5.5.NNN_Windows_10_Pro.exe NNN being release ID).
- 2) Follow the instructions <u>above</u>, if **Windows Defender** prompts for an unrecognized application.
- After the installation is done, you may want to try and run *Cesium*.
 The following pop-up signals the software is not able to find the license.



If not already done, plug in the USB dongle with the provided license and run again. *Cesium* should open fine.



- 4) Open any of your tracking file or one provided as sample that can be found at %ProgramFiles%\Chyron\Cesium\data\cesium\samples
 For instance Simulation.cs.
- 5) For setting up customized and/or your actual tracking environment, refer to the dedicated *Cesium* manual.
- 6) To check proper connection in **PRIME VSAR**, see below, in Configuration Panel.



PRIME VSAR Tools

PRIME VSAR Tools provide a couple of utilities that help **PRIME VSAR** users to manage the environment, like connection with the **CAMIO** Universe and other remote access software.

- 1) Install **PRIME VSAR Tools**, using related **Windows** installer.
- 2) Follow instructions <u>above</u>, if *Windows Defender* prompts for an unrecognized application.

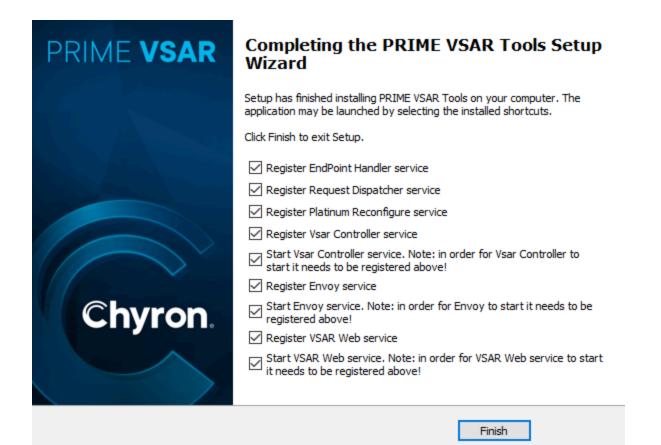
PRIME VSAR Web

Gives the ability to remotely control aspects of **PRIME VSAR** from a web browser. It's part of the **PRIME VSAR** Tools installation.

Make sure the version of **PRIME VSAR** Tools matches the **PRIME VSAR** version or install **PRIME VSAR Tools** that is included in the **PRIME VSAR** installation to ensure full compatibility.

Services used by **VSAR Web** can be registered at the end of **PRIME VSAR Tools** installation:





We highly recommend enabling and starting all the marked services after installation.

Along with the **VSAR Web service** there is also **Envoy service** and **VSAR Controller service** that needs to be registered and running in order for VSAR Web to function properly.

Services can be seen if they are registered and are running in the **Services window** (Win + R - "services.msc"):

🤹 Services						_		×
File Action View								
) 📴 🛛 📷 🛛 🕨 💷 🕪							
🔍 Services (Local)	Services (Local)							
	Chyron PRIME VSAR - Envoy	Name	Description	Status	Startup Type	Log On As		^
		Chyron PRIME VSAR - Envoy	This service Envoy(https://www.envoypro	Running	Automatic	Local Systen	n	- 10
	Stop the service Restart the service	Chyron PRIME VSAR - VSAR Controller	This service dispatches requests to a single	Running	Automatic	Local Systen	n	
	Restart the service	🧠 Chyron PRIME VSAR - VSAR Web	This service dispatches requests to a single	Running	Automatic	Local Systen	n	
		Chyron PRIME VSAR Reconfigure	HUB control of various PRIME VSAR engines		Manual	Local Systen	n	
	Description:	🖏 ChyronHego CAMIO Endpoint	ChyronHego CAMIO Endpoint	Running	Automatic	Local Systen	n	
	This service Envoy (https://www.envoyproxy.io/) is	🖳 ChyronHego Data Engine		Running	Automatic	Local Systen	n	
	used as a proxi to relay grpc to	ChyronHego Endpoint Handler	This service handles requests from the CA	Running	Disabled	Local Systen	n	
	grpc for web.	👗 🥋 ChyronHego Request Dispatcher	This service dispatches requests to a pool	Running	Disabled	Local Systen	n	~
	Extended Standard				1			

VSAR Web configuration

By default **VSAR Web** is hosted on the Local machine and can be accessed on <u>http://localhost:8080/</u> or on local network with the ip address of the machine followed by the





port (:8080). This port can be changed in the website configuration file VsarWebProd.env that is located in the **PRIME VSAR Tools** installation folder bin\config\VsarWebProd.env.

There is a separate configuration file **VSAR Web**, the static website located in **PRIME VSAR Tools** installation folder%*ProgramFiles*%/*Chyron*/*PRIME_VSAR-Tools_xxx*/*bin*/*build*/*config.js*. (where xxx is a current VSAR Tools version) this file contains:

- port to the Envoy service
- refresh time
- material settings (range, advanced) for chroma keyer

Envoy service configuration

VSAR Web expects the Envoy service to be on the same machine.

Envoy works as proxy for **VSAR Web**, it is a third party tool, more about Envoy proxy on (<u>https://www.envoyproxy.io/</u>)

Configuration for **Envoy service** is located in the **PRIME VSAR Tools** installation folder (mentioned above) **bin\envoy.yaml**. Inside the config section vsar_controller_service there is an ip address and port that should be set to the machine that has **VSAR Controller service** installed.

VSAR Controller service configuration

VSAR Controller allows VSAR Web to run commands on multiple VSAR Renderers, this allows the division of work between multiple machines.

When adding new VSAR to VSAR Controller

- 1. Make a copy of the Unreal project
- (this is needed only if project are on the same machine) Change the port in the project files Config\DefaultMithril.ini (create the file if it doesn't exist) and entry example:

[/Script/Mithril.MtGrpcHandler] Address=localhost:50051

- 3. Add new VSAR to VSAR Controller configuration located in PRIME VSAR Tools installation folder bin\config\config.ini
 - a. add name of the VSAR to VSAR_NAME_LIST example: [VSAR_NAME_LIST] VSAR_LIST=MY_VSAR,NEW_VSAR
 - b. add entry with the suffix "_URL" example: [NEW_VSAR_URL]



VSAR_IP=127.0.0.1 VSAR_PORT=50051 VSAR_POOL=1 VSAR_ENABLED=1

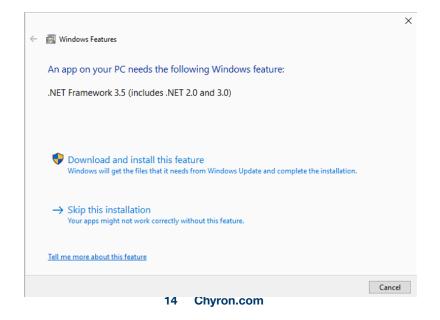
PRIME VSAR

Multiple PRIME VSAR versions can be installed on the same machine, there is no need to uninstall a previous version prior to installing a new one. **Warning**: it is recommended to uninstall any previous version prior, if expecting to work with only the last one.

- 1) If you received the PRIME VSAR installer as a .zip file (eg: PRIME_VSAR_2.0.0-Setup.zip), first start by unzipping it.
- 2) Install **PRIME VSAR**, by double clicking the .exe file (should look like PRIME_VSAR_2.0.0.xxxx-Setup.exe).

Note: *PRIME_VSAR-PDB_2.0.0.xxxx-Setup.exe* installer is with Debug functions, ignore if not to be used accordingly.

- By default, the installer proposes to install in a folder named after the release version (for instance C:\Program Files\Chyron\PRIME VSAR-2.0.0). This way different versions of PRIME VSAR may co-exist.
- 4) Follow instructions <u>above</u>, if Windows Defender prompts for an unrecognized application.
- 5) If not already installed, you may be prompted for .**NET Framework 3.5** installation.
- 6) When asked about components you wish to install, install all components shown in the installer except the Prime VSAR Tools **if installed in the previous steps**, or unless you have a specific reason not to install Prime VSAR Tools.





Setup - PRIME VSAR 2.0.0.2692	_		Х
Select Components Which components should be installed?			\bigotimes
Select the components you want to install; dear the components you do not want to inst when you are ready to continue.	all. Click I	Next	
Custom installation		`	*
✓ PRIME VSAR ✓ PRIME VSAR Tools ✓ Chyron Panels / Live Assist Panels	22,	640.0 M	3
Current selection requires at least 22.28 GB of disk space.			
Back Ne	xt	Car	ncel

7) During the installation process of the Chyron Panels (Live Assist Panels), select the **Hardware license** option

Check the components yo you don't want to install.		ncheck the	e compone	ents
Select the type of install:	Hardware license			-
Or, select the optional components you wish to install:	Software license			
Space required: 225.9 MB			6	

- 8) After the installation of LAP/Chyron Panels an automatic installation of Mercury panel will be executed.
- 9) When prompted to restart your computer, do so.



Chyron Panels (Live Assist Panels)

The **Chyron Panels (Live Assist Panels)** web server has to be started manually by clicking on the **LIVE Assist Panels Desktop shortcut**.

• Run it to start the web server. You should get the following output:

Administrator: Windows PowerShell	
Program Files\ChyronHego\LIVE Assist Panels>node inde	x.js
rting Live Assist Panels Version 2.8.1 cessManager: Creating new Process with module: liveas	sistnanals
cessManager: Creating new Process with module: liveas	
cessManager: Creating new Process with module: backup	per
cessManager: Creating new Process with module: sysmon	
cessManager: Creating new Process with module: folder cessManager: Creating new Process with module: ruleen	
cessManager: Creating new Process with module: ruleen cessManager: Creating new Process with module: databi	
cessManager: Creating new Process with module: virtua	
eassistpanels: Started webserver at port: 80	
	package.json
	package-lock.json
	README.md
	(in) start
	Ty Uninstall

• Open Chrome and type in the following URL to open the Panel web page: <u>http://localhost</u>. Login default credentials are **admin / adminLAP**

LIVE	Assist Panels
Username:	admin
Password:	••••••
	Login



VIDEO SETUP

HAL Video Setup

HAL stands for Hardware Abstraction Layer. It is a common interface to video I/Os for *Chyron* products (*PRIME*, ...).

HAL can support different manufacturer boards (called Interface). The inputs and outputs are configured through an Xml file.

Driver installation

Download and install *Matrox* drivers <u>Matrox/HAL_driver_10.3.101</u>

To register *HAL* for *Matrox*, open a CommandPrompt, or Bash in Admin Mode. Navigate to your Prime VSAR distribution, and then get into directory:

> cd..."C:\Program

Files\Chyron\PRIME_VSAR-x.x.x.\Engine\Plugins\Chyronhego\Mithril\ThirdParty \Hal\lib\x64"

Then enter the command:

> regsvr32 MvIOHAL.dll

If for some reason you need to unregister the dll, run:

> regsvr32.exe -u MvIOHAL.dll

Matrox Board Connections

This document describes the different <u>possible connections of Matrix boards</u>. for <u>LE5</u>:

HAL Interfaces Configuration

Openthebaseconfigurationfile<InstallationDirectory>Engine/Plugins/Chyronhego/Mithril/Config/BaseMithril.ini, you can thenactivate and deactivate interfaces by changing the lines:

[/Script/HalMedia.Hal]

bInterfaceMatroxEnabled=true

bInterfaceDeltacastEnabled=false

Note that interfaces are evaluated in the upper order. This means that in the Xml configuration file, the first board will be a *Matrox* board (if any), and then a *Deltacast* board (if any).



Note that the *Deltacast* interface is not designed for production.

HAL.xml: Video I/O Streams Configuration

Video Streams are configured in the xml file: %LOCALAPPDATA%/Chyronhego/Fresh/HAL.xml.

Hal.xml configuration file is loaded when *PRIME VSAR* starts; it allows to configure genlock, inputs and outputs of the different video boards present on the machine. So whenever you edit this file, you need to restart PRIME VSAR.

▲ When you change video format in Hal.xml from 25/50 fps to 29.97 VSAR needs to be restarted twice, in order for the change to take effect on the Matrox. This is a known issue.

Syntax

<halconfig>

<board>

```
<genlock standard="XXX" source="XXX" input="0"/>
<output standard="XXX" enabled="true" haskey="false" hphase="0" vphase="0"
fifo="3" 4k2si="false" tcpcesium="false" cesiumip="127.0.0.1"
cesiumport="22222">
<output/> ...
<input standard="XXX" enabled="true" haskey="false"/ fifo="3" timeout="50"
"useassync"="false">
<input/> ...
```

</board>

<board> ... </board>

</halconfig>

Available types

- Available *standards* for <genlock> <output> and <input> tags are:
 - S259M_NTSC,
 - S259M_PAL,
 - S274M_1080i_59,
 - S274M_1080i_60,
 - S274M_1080i_50,
 - S274M_1080p_59,



- S274M_1080p_60,
- S274M_1080p_50,
- S274M_1080p_29,
- S274M_1080p_30,
- S274M_1080p_25,
- S296M_720p_50,
- S296M_720p_59,
- S296M_720p_60,
- S4K_2160p_25,
- S4K_2160p_29,
- S4K_2160p_30,
- S4K_2160p_50,
- S4K_2160p_59,
- S4K_2160p_60,
- SFILM_720p_23,
- SFILM_720p_24,
- SFILM_1080p_23,
- SFILM_1080p_24,
- SFILM_2160p_23,
- SFILM_2160p_24
- Boolean values accept "true|1" and "false|0"
- Note: formats in red have known issues and may not work properly

<genlock>

Available genlock **source** are: *internal*|*analog*|*input*.

- In internal mode, the board is not genlocked to an external signal.
- In analog mode, the genlock is received on the dedicated Sync BNC.
- In input mode, the genlock is taken from the *inputs* SDI video input. *Input* attribute is only relevant when *source* is set to *input*.

<output>

If **enabled** is set to "false" the output will be disabled. Using this you can configure eg.: that the 1st connector is disabled and that you want to use 2. connector only.

If *haskey* is true, the output will be set in Fill+Key; if set to false, the output will be Fill only. Note that if **haskey** is enabled. As key is generated, it will be generated automatically into another output connector.

▲ when **haskey=false** there is color conversion in place that can result in worse chrominance resolution, for the highest resolution we recommend to use **haskey=true**

fifo is the number of frames buffered on the video device; there are two working modes:



- **FIFO Mode**: In fifo mode, frames computed by VSAR are pushed on the output connector; there can't be more than *fifo* buffers on the output queue. Setting a value of minimum 2 is required, 3 is recommended. In this mode, VSAR cannot guarantee that Cesium data will be properly in sync with the real camera.
- <u>Delay Mode</u>: In Delay mode, a fixed delay is guaranteed between a given input on the Matrox board, and a given output. For example, 6 frames can be guaranteed between SDI input 0 and output 2. To use this mode. You need to select an input as the 'reference delay' input (see *useassync* in <input> below).

hphase and *vphase* set the video phase of each output separately (they can be edited in the GUI, but they are currently not reported in the xml file).

If *4k2si* is true then 4K signal is transmitted in 2 sample interleave format; otherwise four quadrant split is used. *Note*: this feature may not work on some Matrox cards, use mvConnectorConfig (see below) to configure 2SI.

If *tcpcesium* is true then tcp messages will be sent to cesium to genlock the UdpGenlock Cesium drivers. This value is usually set to false in standard operation. *cesiumip* and *cesiumport* allow to set the Cesium you want to send sync messages to.

<input>

Input has the same attributes as output.

timeout is the duration (in ms) after which a video source is considered missing.

useassync is a boolean used to select an input source as the 'Delay mode' reference. If several inputs have the tag *useassync* set to true, then only the last one is considered as the sync source.

• When using *useassync*, VSAR main thread is "locked" to the input, meaning that when input is not available VSAR can get stuck.

When using **useassync** input in MediaPlayer it is possible on close of the source that output may drop up-to 2 frames, we recommend in production to keep it either opened or closed.

Notes/Troubleshooting:

- When a new "output" (resp. "input") is parsed the previously parsed output (resp. "input") is copied to the new one. This allows the user not to copy all the attributes on each line.
- This is also true for the "standard" attribute of genlock, which will be copied to the next input and output lines.
- The tcpcesium is reset to false when a new output is built.
- For Matrox, if you change the framerate (eg: 50->59, or 59->60) then you may have to restart twice PRIME VSAR before it's taken into account.



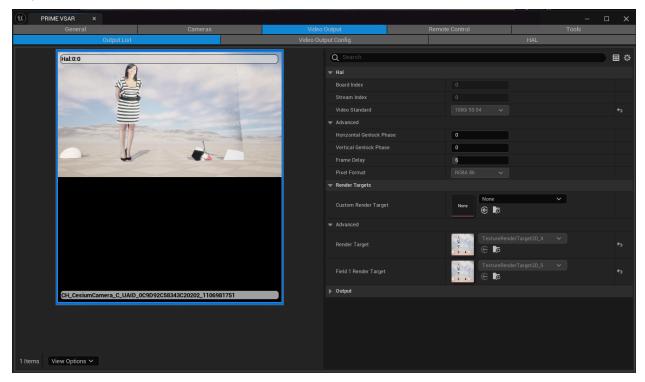
- For *Matrox*, it seems that changing haskey needs a reboot. In fact haskey="true" -> haskey="false" seems to work, but the other way seems very challenging. The same applies for 4K outputs.
- If you have more <output> or <input> declared in the xml file than the actual hardware has, they are silently ignored. Thus it's harmless to leave extra <output> or <input> lines.

Delay Mode Notes:

In Delay mode, you need to have set at least one input with "useassync"="true" (see Example4 below). This input is called 'delay reference input'.

- If an input has the "useassync" tag set, all the outputs will be considered as configured in "Delay Mode", thus their fifo attribute will silently be set to 0.
- You need to have the genlock in sync with the 'delay reference input'. If you use "source"="analog" then the analog genlock should be in sync with the 'delay reference input'. Alternatively, you can set "source"="input" "input"="XX" where XX is the index of the 'delay reference input', starting at 0 (the first input has index 0, the second index 1, and so on).

To tune the delay between the output and the 'delay reference input', get in VSAR Control Panel > Video Output > Outputs > Frame Delay. Frame delay is set independently for each output. The default is 6.





Examples

Example 1: the following file will configure 2 inputs and 2 outputs in Fill Only:

<halconfig>

<board>

<genlock standard="S274M_1080i_59"/>

<output/>

<output/>

<input/>

<input/>

</board>

</halconfig>

Example 2: the following file will configure 2 inputs and 2 outputs in Fill Only, but only the first output will send sync data to cesium.

<halconfig>

<board>

<genlock standard="S274M_1080i_59"/> <output tcpcesium="true"/> <output/> <input/> </board>

</halconfig>

Example 3: the following file will configure 2 inputs and 1 output (the second on the board, since the first one is disabled) in Fill Only.

<halconfig>

<board>

<genlock standard="S274M_1080i_59"/> <output enabled="0"/> <output/> <input/>



</board>

</halconfig>

Example 4: the following file will configure 1 input as the sync source, 2 inputs as live video inputs, 1 output in 'Delay Mode', and genlock as Analog. Note that in this configuration, Input0 and AnalogGenlock should be in sync.

<halconfig>

<board>

```
<genlock standard="S274M_1080i_59" source="analog">
<output enabled="1" fifo="0">
```

<input useassync="true"/> <input useassync="false"/> <input/>

</board>

</halconfig>

Matrox I/O reconfiguration

If you need to reconfigure the number of video inputs and outputs: open a command prompt with <u>Admin rights:</u>

> cd "C:\Program Files\Matrox DSX-TopologyUtils\drivers"

To get the list of commands (optional)

> mvConnectorConfig.exe -help

To get the Matrox Card Serial Number

> mvConnectorConfig.exe list

To display the card's current configuration

> mvConnectorConfig.exe -ShowCurrent -sn=<Matrox Card Serial Number>

To re-affect the number of video inputs and outputs (x and y values respectively)

> mvConnectorConfig.exe -<x>in<y>out -sn=<Matrox Card Serial Number>

The last command takes a while to execute, then you have to reboot the machine.



Example usage for reconfiguration of 4 spigot card from 2 in 2 out into 3 in 1 out:

```
For example:
   ./mvConnectorConfig.exe list
   ./mvConnectorConfig.exe -ShowCurrent -sn=A123456
   ./mvConnectorConfig.exe -4in4out -Silent
   ./mvConnectorConfig.exe -8inOout -sn=A123456
   ./mvConnectorConfig.exe -FlowRouting=alt -sn=A123456
   ./mvConnectorConfig.exe -FlowRouting=alt -4inOout -sn=A123456
   ./mvConnectorConfig.exe -2SI=on -sn=A123456
ChyronHego@DESKTOP-3T7TCG1 MINGW64 /c/Program Files/Matrox DSX-TopologyUtils/dri
vers
$ ./mvConnectorConfig.exe list
<< Matrox Connectors Configuration tool >> Tuesday, March 22, 2022 12:25:17
Available hardware:
  0) DSXLE4 S/N=A581423
ChyronHego@DESKTOP-3T7TCG1 MINGW64 /c/Program Files/Matrox DSX-TopologyUtils/drivers
./mvConnectorConfig.exe -ShowCurrent -sn=A581423
<< Matrox Connectors Configuration tool >> Tuesday, March 22, 2022 12:25:42
Current IO Configuration:
  SDI Inputs = 2
  SDI Outputs = 2
ChyronHego@DESKTOP-3T7TCG1 MINGW64 /c/Program Files/Matrox DSX-TopologyUtils/drivers
./mvConnectorConfig.exe -3in1out -sn=A581423
<< Matrox Connectors Configuration tool >> Tuesday, March 22, 2022 12:26:02
Updating card O-DSXLE4L/4/100F-S/N A581423
  Info: Selected IO Configuration '3in1out' will be applied to the card.
  Info: The IO configuration requested is being applied to the card...
```



PRIME VSAR OVERVIEW

PRIME VSAR is a plugin for **Unreal Engine 5** (here version 5.3.2), and is developed as such. That being said, it installs its own modified version of Unreal Editor.

PRIME VSAR brings the following elements to UE5:

- Video I/O.
- Interface with tracking (*Cesium*).
- Primitives (a set of procedural geometries, for instance to address some business graphic purposes).
- Interface with **CAMIO** Universe.
- A/B Switch (a tool to manage transitions between media, comparable to a small video mixer/switcher).
- Exposes **UE5** and **PRIME VSAR** core elements to **LUA** scripting.
- A subset of related functions/materials/components.

Most of these elements can be managed via the Configuration Panel.



Creating a PRIME VSAR Project

- 1) Start **PRIME VSAR** (Warning: this may take time to load, especially during the first start, (due to the shader compilation) see remark <u>below</u>.
- 2) Create a new or open an existing project.

Û	New Project		×
PRIME VSAR VSAR	Blank Virtual Studio A Virtual Studio B Vi	(44)	Blank A clean empty project with no code.
	Virtual Studio D		Project Defaults BLUEPRINT Target Platform Desktop Quality Preset Maximum Starter Content Raytracing
Project Location C:\Users\ChyronHego\Docum	ents\Unreal Projects	•	Project Name MyProject20

Select **PRIME VSAR** Example Projects by clicking on it to have it highlighted and enable the *Next* button.



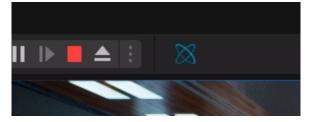
(U)	New Project	X
PRIME VSAR	Image: Constraint of the second sec	Visit Control of the second sec
Project Location C:\Users\ChyronHego\Docum	ents\Unreal Projects	Project Name MyProject20
		Create Cancel

PRIME VSAR comes with a couple of **Virtual Studio samples** originating from **Unreal** marketplace.

As for any *Unreal* projects, settings may be set up before creating it, but may be later changed. It is recommended to have **Maximum Quality** and **Desktop/Console** by default.

PRIME VSAR Configuration Panel

Open the **PRIME VSAR Config Panel** by clicking on the top **ToolBar** close to **Settings**.



PRIME VSAR related info is located here. The panel is divided into the following sections/tabs:



- <u>General</u>
- <u>Cameras</u>
- <u>Video Output</u>
- Remote control
- <u>Tools</u>



General

PRIME VSAR	×			_	×
General	Cameras	Video Output	Remote Control	Tools	
Q Search					\$
▼ General					
On Play Viewport Settings		Unlit 🗸			
On Play Screen Percentage		25			
Hide Player Pawn Mesh					
Show Mouse Cursor		✓			
Auto Play on Template Reload		✓			
		About PRIME VSAR			

Options listed in this tab can be used while running in Play mode, mainly to decrease performance needs.

• On Play Viewport Settings:

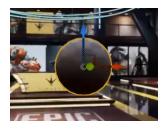
- **Nothing:** this settings leaves the quality of rendering on default presets.
- **Unlit:** play with "Unlit" lightning mode this decreases performance demands on the rendering
- Disable Viewport: this completely disables viewport, which saves the most performance for the output rendering, Warning: Screen space reflections do not update and GPU Particles don't work when the viewport is disabled. There is large memory allocation over time that will require VSAR restart.

• On Play Screen Percentage:

Reduces rendering of the viewport resolution by percentage

• Hide Player Pawn Mesh:

(Checkbox checked by default) In Unreal, a default Player Pawn is created at play time as a sphere. Irrelevant for PRIME VSAR usage



• Show Mouse Cursor:

(Checkbox checked by default) Shows (or not) the cursor in the viewport while in play mode.



The *About PRIME VSAR* link at the bottom of the window will display the about dialog, showing current **PRIME VSAR** release info. Pressing any tab will switch back to its related content.





Cameras

For managing **PRIME VSAR** cameras.

1 PRIME VSAR ×						— C) X
General	Cameras	Video Output	Remote Co	ntrol		Tools	
CH_CesiumCamera_0		Q Search					≣⇔
	Add Came	🔻 Cesium	A (1	-0.013485 * (1 1.0 (1.	1.323568 *	64.007729 48.610596 * 1.0	ب ج
		Synchronizat Cesium Trackin Camera Index	ig 🖉	Synchronize			
Hal:0:0		Advanced Tags					-1
		Component Tag	is 07	Array element	⊕ ū		
		 Navigation Advanced 					
		 Video Output Video Output 	1	Hal:0:0 🗸			
		Show Camera F	review when Selected	2			
		🔻 Video Output -	Rendering				
		Post Process S	ettings				
		Enable Raytraci					
		Optical Center					
1 Items View Options 🗸		Advanced					

A **PRIME VSAR** camera, by default named *CH_CesiumCamera* (at first glance and for almost all applications) have 2 purposes:

- Generate an output onto **Matrox** playout ports through HAL or through **NDI** (Not supported in 2.0.0 release)
- Manage the communication with **Cesium** and thus the tracking data

In the above image, there is 1 available camera.

To create a new one, click the **Add Camera** button.

A Maximum number of Cesium Cameras is 12

To set/get (and reveal) the video parameters of the camera, just select (click on) it.

Note: after upgrading *PRIME VSAR* version, in some cases, opening an older *PRIME VSAR* .uproject with a previously created *PRIME VSAR* camera may show inconsistencies. It may be useful to delete and recreate it.

The right side of the panel shows (a subset of) the Details panel of the selected camera, also available in *Unreal*'s standard **Details** one.



Transform

 Transform 				
Location 🗸	-198.465586	-195.2384	64.007729	¢
Rotation 🗸	-0.013485 *	11.323568 °	48.610596 °	¢
Scale 🗸 🔒	1.0	1.0	1.0	

This shows the coordinates of the **PRIME VSAR** camera in space as for any **UE** Actor. If Cesium is Activated (see below) these values come straight from **Cesium** data, and thus cannot be edited.

Cesium

▼ Cesium	
Synchronization	Synchronize
Cesium Tracking	
Camera Index	0
Advanced	

Synchronization

The Synchronize button allows for forcing immediate re-synchronisation with incoming *Cesium* data. Useful if you notice some introduced delay between real and virtual.

A Unexpected delay may happen after dropping frames, and/or if you do some editing manipulations inside the *Editor*.

Cesium Activated

If unchecked this camera won't follow *Cesium* information. Should be checked for normal operation (camera tracking scenario).

Camera Index

Cesium software can handle multiple cameras. This figure selects which camera we want to use. Index starts at 0. This number relates to the Rig in **Cesium** (for example if we have two rigs in Cesium and we want to use the second one we would input 1here)

Advanced Display (rev arrow ▼)



 Advanced 			
 Receptor Props 			
🕨 🗹 Receptor Size	8.87	4.989375	
Focal Length	5.987525		
🕨 🗹 Optical Center	0.0	0.0	
Aspect Ratio	1.777778		
V Field Of View	73.055191		
Focal Multiplier	1.0		
Lens Distortion			
Focus Distance	0.22		
Min Focus Distance	0.0		
Invert Focus Mapping			

These values display the current value of the cesium Camera. This feature can be used to check that you actually receive data from *Cesium*. If you move the camera these values should change (this can be verified eg. by using simulation driver in Cesium).

Video Output

▼ Video Output			
Video Output	Hal:0:0	~	
Show Camera Preview when Selected	~		

To select which available output will be used for this camera.

The dropdown list is contextual to what outputs are available in the session.

See below regarding <u>Video Output</u> tab.

Defaults to *Hal:0:0* (for a standard workstation with one *Matrox* board installed).



Video Output - Rendering

Video Output - Rendering		
Post Process Settings		÷
Enable Raytracing		
Optical Center		
 Advanced 		
Use TAA		
Disable Alpha Capture		
Fill Render Target	TextureRenderTarget2D_9 ∨ € ₯	¢
Key Render Target	TextureRenderTarget2D_10 ∨ € ₯	¢
Final Render Target	TextureRenderTarget2D_3 ↓ ⓒ ট	¢
Distortion Render Target	TextureRenderTarget2D_11 ↓ € D	¢
Shadow Render Target	TextureRenderTarget2D_12 ↓ € □	¢
Clean Render Target	TextureRenderTarget2D_13 ↓	¢
Outputs Scene Capture Advanced Edit Mo		

Post Process Settings

A list of Unreal camera's rendering parameters.

Optical Center

When it comes to calibration/registration/targeting of the real camera, you need to check the optical center and target positions. Optical center display parameters are set here:

Optical Center Show

Displays or not the optical center. During normal operations it should be unchecked.

Optical Center Color
 Color of the center lines



• Optical Center Thickness

Thickness of the center lines

Note: this displays a cross on the whole screen, both in RGB and Alpha channels, so that it's always in front of everything when using any keyer with external matte feature.

Advanced settings (revealed when clicking on the down arrow ±).

Use TAA

Checked by default. For using Temporal Anti-Aliasing on the output. This setting smooths out jagged edges of objects in the scene.

\bigwedge For this to work TAA needs to be also selected in the project setting as the Anti-Aliasing mode.

Disable Alpha Capture

To disable management of alpha channel. Could help increase performances if no alpha is needed. (for most use-cases by very little)

Enable Distortion

To be checked when *Cesium* data is providing lens distortion info.

Then a list of *Unreal Render Targets* is used for generating the output. Each of them may be visualized in *Unreal*'s texture editor by double clicking on it.

Fill Render Target

RGB components for the rendered video output.

Key Render Target

Alpha components for the rendered video output.

Final Render Target

Combination of both above.

Distortion Render Target

The texture used for rendering distortions.

Shadow Render Target



The texture used to render shadows and reflections in Augmented Reality mode.

Outputs Scene Capture Advanced Edit Mode

Enabling this will display the Fill_SceneCaptureComponent and Key_SceneCaptureComponent allowing to edit more advanced parameters.

Video Output - Key

•	Video Output - Key								
•	Objects in Foreground	1 Array element	\odot	Û					¢
	Index [0]	Sphere2			~	\mathfrak{K}	ð	~	¢
	Objects in Matte	0 Array element	Ð	Û					
	VSAR Reflection Plane	None				~	\mathbb{R}	ð	
₽	Advanced								

Objects in Foreground

Set the list of Actors that are going to be displayed in the Fill and Key signals. Usually used to have objects in front of the talent.

Should usually be used for the *Targets* (see <u>below</u>).

Objects in Matte

Set the list of Actors that are going to be displayed in Key signal only. Usually used to hide parts of the real sets (ceilings, walls,...)

Advanced settings (revealed when clicking on the down arrow ±).

Force Alpha

Forces a full white alpha output.

Invert Alpha

Inverts the alpha.

Include Attached Actors

Applies to the actors in the Foreground/Matte lists and also all of their children.



Matte Plane

-	Matte Plane					
	Matte Plane Mesh		Plane		~	
	Matte Plane Material	1. Contraction (1. Contraction)	NewBlue	print_TextureRender1	Target_Mat ∨	¢
	Matte Plane Enabled					
	Matte Plane Distance	400.0				
•	Advanced					
	Matte Plane Advanced Component Edit M					
	Matte Plane Scale Offset	1.0				
▶	Matte Plane Location Offset	0.0		0.0	0.0	
▶	Matte Plane Rotation Offset 1	0.0		0.0	90.0	
▶	Matte Plane Rotation Offset 2	90.0		0.0	0.0	
	Compensate Optical Center					

The **Matte Plane** is a surface always facing the camera, and exactly fulfilling the **PRIME VSAR** camera field of view. If the camera moves or rotates it will follow it (it is attached to the camera). Its purpose is to immerse the Video In (talent) into the 3D world, in front or behind other compositions

Matte Plane Mesh

The actual geometry used for it. A plane by default.

Matte Plane Material

The material applied on the object. Should be using the Video Input as media source.

Matte Plane Enabled

To use it (or not).

Matte Plane Distance

Distance of the object to the camera in UE units (centimeters).

Size is aligned to the camera projection making it look like nothing changed when adjusting Plane Distance.



Matte Plane Advanced Component Edit Mode

When checked, *UE*'s Details panel shows up all the parameters of the *PRIME VSAR* camera, otherwise, only a subset is displayed.

Matte Plane Scale Offset

Adds a scale bias to the Plane. The default value is 1 and makes the plane exactly fill the camera viewport.

Matte Plane Location Offset

Adds a translation bias to the Plane. The default value is 0. and makes the plane exactly fill the camera viewport.

Matte Plane Rotation Offset 1

Adds a rotation bias to the Plane, prior to the translation. The default value is 0. and makes the plane exactly fill the camera viewport.

Matte Plane Rotation Offset 2

Adds a rotation bias to the Plane, after the translation. The default value is 0. and makes the plane exactly fill the camera viewport.

Compensate Optical Center

Apply or do not apply the Cesium optical center to the plane.



Video Output

For managing all possible Outputs:

Ű	PRIME VSAR								- □	×
	General	Came		Video Output		Remote Control		То	ols	
	Outp	put List		Video Output Config)			HAL		
	Hal:0:0			Q Se						¢۲-
	0			▼ Hal						
			and the second	Board	l Index					
			and the second	Strea	m Index					
			the state of the s	Video	Standard					
				🔻 Advar	nced					
	1		and and		ontal Genlock Phase	0				
	1		and the second second	Vertic	al Genlock Phase	0				
	-			Frame	e Delay	7				
		and the second s			Format					
				- Rende	er Targets					
					m Render Target	None	None	~		
				🔻 Advar	nced					
				Rende	er Target		TextureReno			
					1 Render Target		TextureReno			
	CH_CesiumCamera_0	C_UAID_0C9D92C58343C20202	_1106981751	▶ Outpu	rt					
	-									
1 Items	View Options 🗸									

This Tab displays the following sub-tabs:

- Outputs
- Video Output Configuration
- HAL

Outputs

This tab details the parameters related to the video outputs available for any *CH_CesiumCamera* (see <u>above</u>).

Each extra output (NDI) may be easily deleted using the "X" button on the top right corner.

(NDI is Not supported in 2.0.0 release)

The right side panel displays the different parameters related to the selected output, as Details does.



Q Search		₩ ₩
Custom Render Target	None	
Resolution Scaler	1.0	
Advanced		
▶ Ndi		
▶ Output		

Custom Render Target

when inserted render target, this render target will be used as Output instead of the hardware.

Resolution Scaler

increases or decreases the rendered resolution then it gets coveted to output resolution. For example, when we have 1080p resolution and we set this value to 2 we can use this as a custom super sampling anti aliasing, as it will render in 4k and then be scaled to 1080p.

for interlaced mode we recommend using only scale larger than 1.5 or TAA but not both at the same time.

Render Targets

Render Targets used for the selected video Output. Also called 'Render Texture' in the Game industry, it is used to make an intermediate calculation as a Texture or surface, e.g. to handle the Fill, the Key or any extra composition.

Output

🗢 Output		
Advanced		
Number Of Texture Buffers	3	

Number of Texture Buffers (from Unreal ToolTip)

Number of textures used to transfer the texture from the GPU to the system memory.

A smaller number is most likely to block the GPU (wait for the transfer to complete).

A bigger number is most likely to increase latency.



Video Output Configuration

👻 Config	
	User → Save
▼ Logs	
	Condensed V
On Screen Verbosity Color	
On Screen Verbosity Rate	1.0

Mostly used for eventually generating new NDI outputs (via the "+ NDI Out" button).

(NDI is Not supported in 2.0.0 release)

Config

Advanced: Entry for managing the video configuration file. Configuration files may be User or Project -wise. This file should not be confused with Hal.xml, which is the HAL configuration file. Default is User-mode.

The user file is %LOCALAPPDATA%/ChyronHego/Fresh/VideoOutputConfig.json\

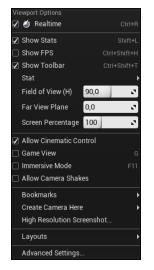
The project file is displayed, as a tooltip, when you hover the mouse on top of the drop down box.

Logs

Entry for managing **On Screen Verbosity**. Changes the level of detail of HUD messages in the editor window.

Helpful for monitoring and analyzing real-time efficiency.

When set to *Condensed* or *Verbose*, the viewer will display subsequent lines informing the state of the calculation, as long as **Viewer**'s parameters have **Show Stats** checked.



The time rate between each line is driven by the **On Screen Verbosity Rate** (in seconds).



For example in Condensed mode, you may read:

-/EL output0_0 [1069,0.0,3/3] output0	1 (1009,17.7,3/	3] input0_0 [0,3/3,0K] input0_1 [0,3/3,0K]
/EL output0_0 [1069,0.0,3/3] output0_	1 (1069,17.1,3/	3] input0_0-[0,3/3,0K] input0_1 [0,8/3,0K]
/EL output0_0 [1069,0.0,3/3] output0	1 [1069,17.4,3/3	3 input0_0 [0,3/3,0K] input0_1 [0,3/3,6K]
/-EL output0_0 [1069,0.0,3/3] output0	1 [1069,12.9,3/	input0_0 [0,3/3,0K] input0_1 [0,3/3,0K]
-/EL output0_0 [1069,0.0,3/3] output0	1 [1069,17.2,3/	input0_0 [0,3/3,0K] input0_1 [0,3/3,0K]
/EL output0_0 [1069,0.0,3/3] output0	1 [1069,16.8,3/	3] input0_0 [0,3/3,0K] input0_1 [0,3/3,0K]
/EL output0_0 [1069,0.0,3/3] output0_	1 [1069,18.3,3/	3] input0_0 [0,3/3,0K] imput0_i [0,3/3,0K]
		NEWS

Meaning:

- E : externally genlock required
- L: genlock is locked.
- output0_0: logs for the first output
 - 1069: number of drop frames since PRIME VSAR started
 - 0.0: idle time (milliseconds)
 - 3/3: output fifo fill. In normal operation this should be N/N.
- output0_1: logs for the second output
 - 1069: number of drop frames since PRIME VSAR started
 - 18.3: idle time (milliseconds). Means that there are 18.3 milliseconds left when rendering a frame. A frame usually last 40ms, or 33.6 ms. So 18.3 is a good score. Note that only the last output will contain the relevant idle time.
 - 3/3: output fifo fill. In normal operation this should be N/N.
- input0_0: logs for the first input
 - 0: number of dropped frames since PRIME VSAR started
 - 3/3: input fifo fill. In normal operation this should be 0|1/N. Having 3/3 means that the video is not currently used in the scene
 - OK: video is present on the incoming BNC.
- input0_1: logs for the second input. Same fields as upper.



HAL

A read only entry displaying how *HAL* is configured. This configuration can be changed by editing the HAL.xml file and restarting PRIME VSAR.

General		Cameras	;	Video Output	Remote Control	Tools
Out	put List			Video Output Config		HAL
➡ Board						
Manufacturer	Matrox					
Model	DSXLE4L/8/10	0/84				
Serial Number	A524530					
🗢 Channels						
Nbr Input Channels			¢			
Nbr Output Channels			¢			
🔻 Genlock						
Genlock Source						
Genlock Connector I						
Genlock Standard						
Genlock Auto Detect						
Genlock Is Locked						



Remote Control

For managing communication with external utilities, mainly *Cesium* (tracking), *DataEngine* (*CAMIO* and remote *Lua* triggering) and *Lua* scripting.

General	Cameras	Video Output	Remote Control	Tools
Cesium Receiver		🔻 Data Engine		
Status	Connected Reconnect	Status	Connected	Reconnect 5
Socket Addr	127.0.0.1		localhost	
Socket Port	7101	Port	4300	
 Advanced 		Advanced		
Activated	 Image: A set of the set of the	🔻 Lua		
Auto Reconnect			Reload Lua	
Camera Delay	3	Lua Preload	File Path///Engine	/Plugins/Chyronh
Camera Queue Auto Sync E	 Image: A set of the set of the	Advanced		
Camera Queue Auto Sync N	50	🗢 GRPC Serve	r	
Use Legacy Protocol		Port	50051	

Cesium Receiver

Status

Connected is displayed in Green when the communication occurs with *Cesium* (this does not necessarily mean that *PRIME VSAR* is receiving proper data, see below <u>Testing</u>). A Red label is displayed if *Cesium* is not connected (running).

The **Reconnect** button helps forcing reconnection if need be (network interruption, ...) *Note*:If *Auto Reconnect* is checked (see below), then reconnection will happen automatically.

Socket Addr

The name/ip of the machine where Cesium is running

Socket Port

The port onto which Cesium delivers data.

Defaults to 7100 for Legacy protocol. (in VSAR "Use Legacy Protocol" under VSAR Config -> Remote Control -> Cesium Receiver -> Advanced, we recommend to not have this checked and use the new protocol instead)

Defaults to 7101 for the new protocol.

Extra advanced Parameters (revealed when clicking on the down arrow ±).

Default values should cover most of the usual cases:





Activated

Should be checked in normal operation. If unchecked, cesium camera data won't be read anymore. This can be useful for outputting video for non-cesium cameras.

Auto Reconnect

If checked, *Cesium* will automatically be reconnected when a disconnection happens. In normal operation, it should be checked.

Camera Delay

Queue is used to smooth out network data transmission. Incoming data from cesium is appended to the Queue(s) and then used by an individual camera on tick. If the rate of camera data is not genlocked to *PRIME VSAR* video frame rate, then at some moment a desynchronisation of the queue may happen. VSAR automatically tries to sync the Queue to be as close to the aimed Camera Delay while the camera is not moving.

- **CameraDelay** how many frames of delay should be between Cesium and VSAR. This also determines the Queue size, which is CameraDelay times two plus one, In example of delay 3 the Queue size will be 7.
- **CameraQueueAutoSyncEnabled** enables auto Synchronization functionality where the frame counter jumps in time to current Queue size CameraQueueSyncOffset, after camera synchronization has happened camera may jump in space.
- **CameraQueueAutoSyncNumPass** number of frames that are desynced before Synchronization is triggered (**CameraQueueAutoSyncEnabled** has to be enabled)

▼ Advanced	
Activated	
Auto Reconnect	
Camera Delay	3
Camera Queue Auto Sync Enabled	
Camera Queue Auto Sync Num Pass	50
Use Legacy Protocol	

Data Engine

Remote triggering is handled via *CH Data Engine*.



Data Engine remote control is mainly used by **Chyron Panels** (*LAP*) and **CAMIO** (among others).

Status

Connected is displayed in green when the connection with *DE* is alive. If it's not the case, click **Reconnect**.

Reconnect

Force the reconnection to the *DataEngine*.

IP

IP address of the machine where the DataEngine is running. 127.0.0.1 stands for localhost.

Port

Port used by the *DataEngine* (defaults is 4300)

Extra advanced Parameters (revealed when clicking on the down arrow ±):

Auto Reconnect

When checked, as soon as the **DataEngine** disconnects, it will be automatically reconnected.

Reconnect Delay

Timeout in seconds, before the *DataEngine* is declared disconnected.

Lua

Lua Preload File

When PRIME VSAR is started, a Lua initialization is loaded. The default file is: ../.././MtLuaPreload/Main.lua.

It will load several Lua libraries useful for VSAR. If you need to add your own Lua initialization scripts, most of the time, instead of changing the path of this file, it's better to edit this file and add your own file entries.

Clicking Reload Lua will execute the file content again.

Extra advanced Parameters (revealed when clicking on the down arrow ±):

Bucket



The DataEngine bucket used to communicate with PRIME VSAR (Default: ue4).

Lua in Key

Bucket's key where *PRIME VSAR* should read the Lua commands to execute (Default: *lua_in*)

gRPC Port

sets port on what the gRPC Server is run on, this connection is important for VSAR Controller service.

Tools

A tab for managing specific dedicated tools like the *Targets* and *ABSwitch* features.

1 PRIME VSAR	×			- 🗆 X
General	Cameras	Video Output	Remote Control	Tools
	Targets		AB Switch	
Add Target Displayer				
0 Items View Options ❤			No Target Displayer Sel	lected



Targets

Ċ	PRIME VSAR	×						—		×
	General		Cameras	Video	Output		Remote Control	To	ols	
		Targe	ts				AB Switch			
	CH_TargetDisplayer_C_U	u/			Q Search					≣‡
			Add Target Dis	splayer	v Transform					
	No Target File Loaded				Location	~	0.0	0.0 0.0		
					Rotation	~	0.0 *	0.0 ° 0.0	•	
					Scale	- A	1.0	1.0 1.0		
					🗢 Targets					
							Reload Targ	gets Destro	y Target	5
					File Path					
					Show Targets		 Image: A set of the set of the			
					Highlighted T	argets	0 Array element	⊕ ū		
					Target Highli	ght Colo	or 📔			
				Add Target Displayer Add Targets Add Target S Ad						
	General				Advanced					
1 It	ems View Options 🗸				➡ HLOD					

Used in Tracking mode, Targets are geometrical references ("dummies") that should reflect physical (XYZ) real positions in your studio. They're parented to a specific actor usually named *CH_TargetDisplayer*.

Their main purpose is to have in the 3D (virtual) environment references to the real world, either for calibrating/calibration checking or virtual object positioning.



If there are no Target Displayer objects created yet, click Add Target Displayer to create a new one.

Then, load the .tgt file by either entering the file path or clicking the "..." button, and press Reload Targets.



As for Cameras and Video Output tabs, the right side of the panel shows the Details of the selected element.

Transform: allows to globally translate, rotate, scale the targets. Note that in normal operation (ie to have a perfect match between *Cesium* and *PRIME VSAR*), the Transform should be set to Identity; that is: *"Location=0,0,0", "Rotation=0,0,0", "Scale="1,1,1"*.

Reload Targets: deletes and reload the targets based on the specified *File Path*.

Destroy Targets deletes all the targets contained in this target displayer object.

File Path: specifies the path to the target file (.tgt) to display. Usually, this file is the same as the one used in *Cesium*.

Show Targets: if unchecked the targets won't be displayed in the scene. In production, it should be unchecked.

Adding targets to Highlighted Targets will enhance display of the selected targets. You can control their color with Target Highlight Color, and control the color of other targets with Target Regular Color.

It is a good practice to have the targets displayed in foreground (see <u>Video Output - Key</u> above).

AB Switch

AB Switch is a tool to feature texture transitions mapped on a 3D object (for instance a virtual screen in your scenes where we expect transitions to happen).

It should behave close to standard A/B (or Program/Preview) transition effects in a mixer.

See <u>ABSwitch chapter in Prime VSAR UserGuide</u> for usage.



TESTING

Test Prime VSAR / Cesium connection

- 1) Get in Config Panel, *Cesium* and check that *Cesium* is Connected in green.
- 2) Check that Activated is checked.
- 3) Check that the corresponding *Cesium* Camera has:
 - a) Cesium Activated checked.
 - b) Correct **Cesium** Camera Index (usually 0).
- 4) Do a zoom movement and check that Field of View is moving accordingly.
- 5) Select the camera in the "World Outliner", get in **Details** panel and check that camera position and orientation are changing while you are moving the real camera.

Deeper testing can include:

- 1) IP/port configuration of **Cesium** and **PRIME VSAR**.
- 2) Check that **Cesium** camera in **Cesium** is Online and is correctly reporting data (see <u>Cesium Documentation</u>).

Cesium: Jitter and Glitches while you move the real camera

Check the following in that order:

- 1) Is *PRIME VSAR* dropping ? See <u>above</u> for **On Screen Verbosity**. Check **Output Log** for any error messages regarding dropped or late frames.
- 2) Is **PRIME VSAR** video output properly set-up? Without moving the camera, run an animation, it should be flawless. Alternatively you can create an Actor with a Rotating Component (this will save you time wrt to creating an animation). Solutions could be: bad video cables, bad overall video path configuration, field inversion, ...
- 3) Is PRIME VSAR properly genlocked to the cesium camera data? PRIME VSAR video output and Cesium camera data device should be genlocked to the same genlock source. If it's not the case, and if you are in autoReconnect mode you should have regular "Camera:resync" messages in the Console output of Unreal.



Test DataEngine/PRIME VSAR connection

- 1) Open a web browser and type *http://<ip>:4300*. For IP use the IP of the PRIME VSAR system.
- 2) Open bucket **ue4**. If it does not exist, create it. ("ue4" is used for backwards compatibility)
- 3) Open key lua_in. If it does not exist, create it.
- 4) Type *PrintLog(42)*

	Editing key: lua_in	×	
Si	Key		
51	lua_in		
14	Code Tree Tre		ł
ł	글 특히 가지 않는 것 같은 것 같	powered by ace	
	1 "PrintLog(42)"		

5) Click Save (the request is send on Save)

If everything goes well, *PRIME VSAR* should print 42 in its **Output Log** (*Window>Developer Tools>Output Log*) something like:

MtRemoteControlLog: luaHelper.cpp (line 49, Hmc::UE4Lua::PrintLog): 42

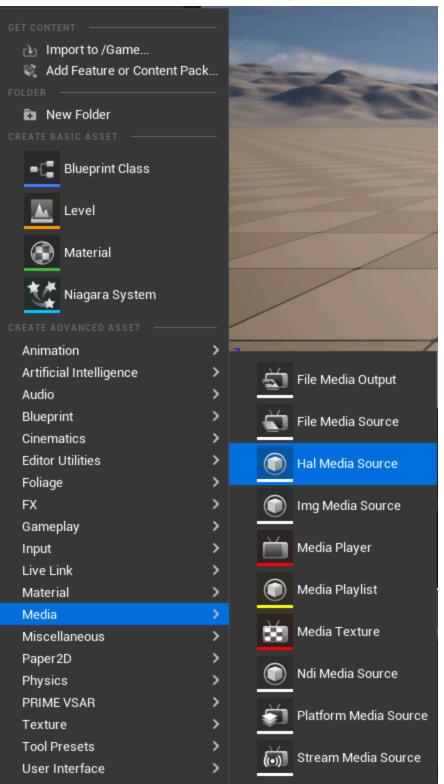
MtCesiumLog: MtCesiumReceiver.cpp (line 127, FMtCsCameraQuede..synchronize): FMtCsCameraQuede..synchronize(3179150) MtCesiumLog: MtCesiumReceiver.cpp (line 127, FMtCsCameraQueue::Synchronize): FMtCsCameraQueue::Synchronize(3179150) LogMtDataEngine: Display: MtDataEngineReplier.cpp (line 176, UMtDataEngineReplier::EventReceived): bucket(ue4) != _channel(#reqrep MtRemoteControlLog: luaHelper.cpp (line 49, Hmc::UE4Lua::PrintLog): 42 MtCesiumLog: MtCesiumReceiver.cpp (line 127, FMtCsCameraQueue::Synchronize): FMtCsCameraQueue::Synchronize(3179211) MtCesiumLog: MtCesiumReceiver.cpp (line 127, FMtCsCameraQueue::Synchronize): FMtCsCameraQueue::Synchronize(2170262)

Test Video Input

PRIME VSAR relies on HAL to manage video in a general manner.



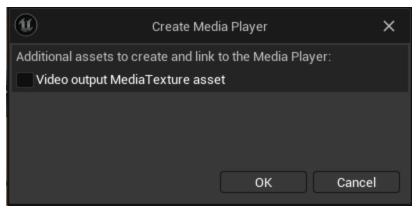
1) From *Unreal* Content browser, add a *Add/Import>Media>HAL Media Source*.



From Unreal Content browser, add a Add/Import>Media>Media Player.
 You may consider checking the checkbox that labels Video output Media Texture



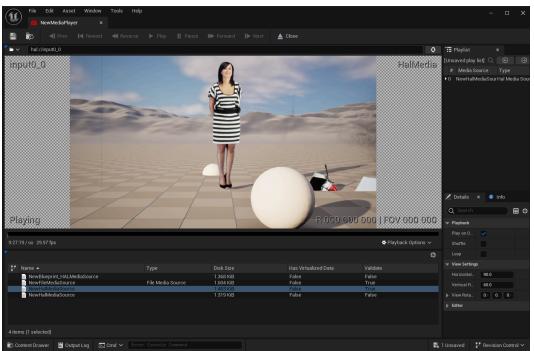
asset, since that would be needed to be used on a material as a texture.



Use the predefined **HAL Media Source** in the Media player. The URL address bar should display something like *hal://input0_0*.

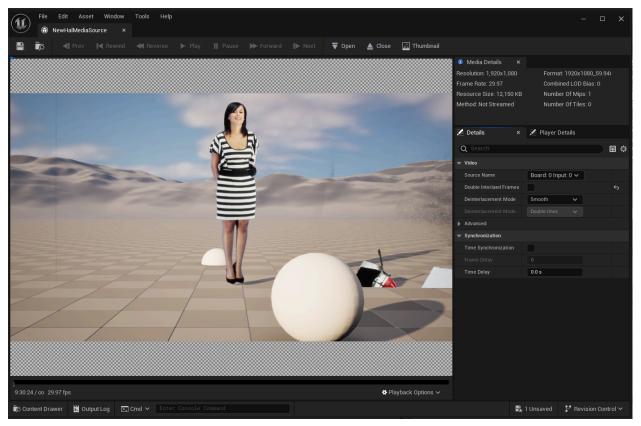
You should be able to monitor the video from there.

3) If expecting to use it on an object through a textured material you should have checked Video output Media Texture asset at the previous step, or, alternatively, from Unreal Content browser, add a new>Media>Media Texture and use the previous Media Player as Media.





HAL Media Source



Source Name

The input ID as defined in the HAL.xml configuration file, more likely hal://input0_0.

Double interlaced Frames

When enabled, the interlaced format input aims to run at full fps. example: 50i running at 50 fps. and when disabled 50i is running at 25 fps

Deinterlacement Mode

Selects the preferred deinterlacing algorithm, applicable only when when Double interlaced Frames is disabled:

- Keep: keep both field as is no deinterlacement
- **Discard**: keep even or odd field and discard second depending on the odd priory
- Blend: blends between fields using average
- **Smooth**: automatically detect if deinterlacing needs to be done. Usually this setting should be preferred.

Deinterlacement Mode Doubled



Selects the preferred deinterlacing algorithm, applicable only when when Double interlaced Frames is enabled:

- Keep: keep both field as is no deinterlacement
- Half size: reduces vertical resolution by half example: 1920x1080 to 1920x540
- **Double Lines**: doubles the lines for each field, this can reduce perceived vertical resolution by half and can cause Bobbing. sometimes called "Bob"
- **Blend**: blends between fields using average
- Lerp: doubles lines by blending between them using average. can be more performance intensive

Log Drop Frame: logs dropped frames that the Media player has dropped

Max Num Video Frame Buffer: maximum number of frames in buffer before Media player shows them, interlaced format is using two buffer frames each other frame when Double interlaced Frames is enabled

Odd Priory

when using Deinterlacement Mode like Discard this value decides which frames are not discarded. example: if disabled odd fields will be discarded and when enabled even fields will be discarded.

Synchronize with Engine's Timecode

Irrelevant here.

Time Delay

delay of the playback. the value is in seconds. if we use input with 50 fps - 0.02s here will mean a single frame of delay - this value can't be larger than Max Num Video Frame Buffer in frames or it will result in black screen as all frames will be dropped before the requested delay is reached. applicable only when Synchronize with Engine's Timecode is disabled

1 Timestamp is currently not supported



KNOWN ISSUES

Loading stuck a 45%

• This happens during first start of Unreal Engine, or when you open a new project for the first time. No worry it means that the engine is compiling the Engine shaders (check in your task manager, all cpu should have full load).

Procedure to report issues

- 1) In case of a crash, open your project folder.
- 2) Go to Saved/Crashes/
- 3) Make a zip with the folder(s) inside and send it to support@chyronhego.com
- 4) Please provide steps to reproduce
- 5) Please provide specific VSAR Version, Cesium Version, VSAR Tools Version

In the case of Visual bug:

- 1) Capture screenshots
- 2) Send them to support@chyronhego.com
- 3) Please provide steps to reproduce
- 4) Please provide specific VSAR Version, Cesium Version, VSAR Tools Version

In the case of I/O Bug/Issue:

- 1) Copy Hal.xml from %LOCALAPPDATA%/Chyronhego/Fresh/HAL.xml
- 2) Send it to support@chyronhego.com
- 3) Please provide steps to reproduce
- 4) Please provide specific VSAR Version, Cesium Version, VSAR Tools Version

In All cases it is also helpful to send over a copy of the project to rule out any project specific issues, if possible.

Black Video Output

• Check that *Cesium* is running, and that a valid lens is loaded in *Cesium*.

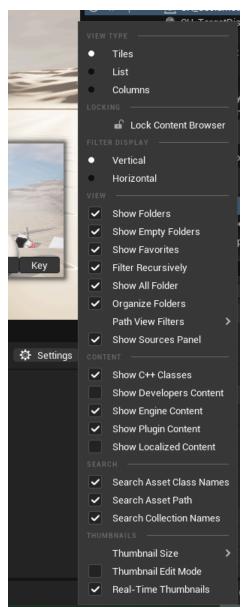


AB Switch isn't working / Texture is black

On the first installation of *PRIME VSAR* there is an issue concerning the load of the shader directory and the compilation: the material is compiled before the shader directory is loaded. The fix needs to be done one time in a new installation

How to Fix

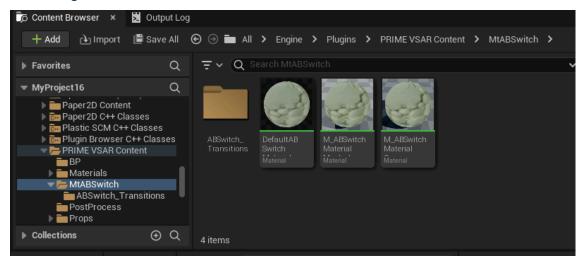
- 1) In your "Content Browser" you need to show the "Plugin Content" and "Engine Content"
- 2) To do this, click on the eye "View Options", and select "Show Engine Content" and "Show Plugin Content".



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- 3) Then open the tree on the left and scroll down to "Mithril Content" and select it.
- 4) Open the "MtAbSwitch" directory and open the "MtABSwitchMaterial" by double clicking on it.



PRIME VSAR does not execute Chyron Panels (LAP) commands

- 1) Check that **PRIME VSAR** is in PLAY
- 2) Check **PRIME VSAR/DataEngine** connection troubleshooting (see <u>above</u>)

PRIME VSAR - CAMIO INTEGRATION

Integration Overview

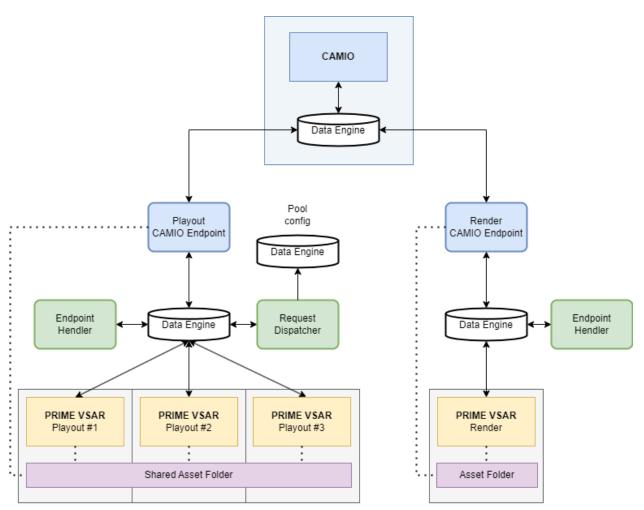
The integration of PRIME VSAR into the CAMIO universe relies on the native Data Engine's <u>Request/Reply messaging system</u> and implements the <u>Bluenet Device API</u>.

4 types of services are involved when CAMIO/iSQ commands are sent to PRIME VSAR:

- Data Engine
- Endpoint
- Endpoint Handler
- Request Dispatcher (optional in case of a single playout device)







Example of installation with a pool of 3 playout devices and 1 Render

Camio Components

Data Engine

The Data Engine is the communication layer of all CAMIO commands with PRIME VSAR. You should install at least one Data Engine for the playout device (or pool of playouts devices) and one for the preview device (cf. <u>Data Flow diagram</u>). The Data Engine on the CAMIO server should be already installed.

The Data Engine is bundled with Chyron Panels(LAP), so it should be already installed. Once installed, a Windows service is started automatically and running in the background. Download link: <u>https://da.chyronhego.com/da/download-area.php?proID=36</u>



Endpoint

The Endpoint is responsible for managing requests and template asset files from CAMIO. Therefore this service must have access to a shared folder in order to save the files, see the <u>"Cache directory (Assets folder)"</u> section for more details.

The *Endpoint* could be installed on a dedicated machine or on a playout/preview machine. There should be a single *Endpoint* running for all the playouts and a single one for the preview (cf. <u>Data Flow diagram</u>).

Once installed, a Windows service is started automatically and running in the background. Download link: <u>https://da.chyronhego.com/da/download-area.php?proID=55</u>

Endpoint Handler

This service handles requests from the Endpoint and manages the states of on-air/cued items. The requests are then forwarded to the final device or to the *Request Dispatcher* in case of multiple devices (i.e. a pool).

The Endpoint Handler executable is included in the PRIME VSAR Tools installer.

▲ If PRIME VSAR Tools has been previously installed, the services may need to be stopped manually (Win+R -> services.msc) in before proceeding to the upgrade.

Once PRIME VSAR Tools is installed, you can choose to register the service when asked

The service reads by default its configuration on the local Data Engine, make sure the bucket and key exist before starting the service (see the <u>Configuration</u> section) or it will fail to start.

Request Dispatcher

This service dispatches a request to a pool of devices, for example in case of multiple playouts devices. In the case of a single device, this service is not required.

The Request Dispatcher executable is included in the PRIME VSAR Tools installer.

If PRIME VSAR Tools has been previously installed, the services may need to be stopped before proceeding to the upgrade.

Once PRIME VSAR Tools is installed, you can choose to register the service when asked.





The service reads by default its configuration on the local Data Engine, make sure the bucket and key exist before starting the service (see the <u>Configuration</u> section) or it will fail to start.



Camio Configuration

Data Engine

Make sure the port 4300 is open on all machine were it is installed. You should be able to access <u>http://hostname:4300</u> (example <u>http://DESKTOP-MF15G8M:4300</u>) from the other machines.

For more information, please refer to the Data Engine Documentation

Endpoint

Config key or config.json

The Endpoint could be configured either by a config.json file located by default in

C:\Program Files\ChyronHego\ChyronHego CAMIO Endpoint Beta, or by a config key in the bucket bn.endpoint

The config.json file takes precedence over the config key, so delete or rename config.json if you want to use the config key method.

1 The config.json file is recreated when reinstalling the service

Example

"isqHostName":"ip" "camioExternal":"camio4"

"isqHostName": If set, Endpoint will use this to find items in running order belonging to this host name instead of its own.

1 The hostname must match the hostname visible in the rundown's JSON.

"camioExternal": It must be set to "camio4" (lower case) for backward compatibility with CAMIO 4.11.2

1 If not set, the Endpoint will fail to upload previews on CAMIO.

For more information, please refer to the Endpoint Documentation

Or in its folder installation:

e.g. C:\Program Files\ChyronHego\ChyronHego CAMIO Endpoint Beta\doc\config.md

Cache directory (Assets folder)

In order to share the assets between multiple playout devices, the Endpoint cache directory must be shared.



These steps can be done manually or can be handled by the tool platinum-reconfigure.

- 1. Create a folder and set it up as a Windows shared folder
- Create a symbolic link on each playout device pointing to the shared folder This step provides a solution to map UNC paths to "Drive Letter" paths, e.g. with cmd: mklink /d c:\sharedfolder \\COMPUTER\sharedfolder
- 3. Set the Endpoint config key or config.json accordingly e.g.: "tempPath": "c:/sharedfolder"

Endpoint Handler

The *Endpoint Handler* could be configured either by arguments on the command line or by a config key in the bucket hybrid.endpointhandler

Command line arguments

-d, --dst <ARG1> Destination device where requests should go (e.g. MyPoolId|localhost|192.168.1.42). Mandatory

-t, --type <ARG1> Destination device's type (playout|render). Mandatory

-f, --shared_folder <ARG1> Shared folder of the CAMIO device. Fallback if I disk can not be found

-h, --host <ARG1> IPv4 address|host of this service's DataEngine. DEF: localhost

-s, --src_host <ARG1> IPv4 address|host of the Endpoint's DataEngine. DEF: localhost

-c, --channel <ARG1> Device's number of channels. DEF: 1

-o, --timeout <ARG1> Requests timeout in ms. DEF: 5000

-I, --log <ARG1> Log level. DEF: info (error|warn|info|verbose|debug|silly)

-v, --version Print version number

--svc_args <ARG1> IPv4 address|host of the DataEngine with the service args (svc mode)

Config key

In order to use the config key, the argument --svc_args must be specified.



1 The config key takes precedence over the command line arguments when the argument --svc_args is specified and cannot be mixed.

The key is a JSON object with attributes similar to the command line arguments.

```
{
    "dst": "localhost",
    "type": "playout",
}
```

Schooling to c:/log/ChyronHego/endpoint-handler

Request Dispatcher

Pool of playout devices

In AR/VR, a virtual set or AR graphics could be viewed from different camera angles.

Thus the concept of a pool of playout devices has been introduced to define multiple devices working together while still being seen as a single device from the CAMIO side.

Request Dispatcher needs to run only on "master" VSAR.

Make sure the bucket hybrid.pools exists otherwise create it. See the following documentation for the JSON definition of a pool in the bucket hybrid.pools: <u>hybrid.pools</u>

Example

Key pool.Pool1 in the bucket hybrid.pools :

```
{
    "name": "Pool1",
    "master": "Pt2",
    "slaves": [
    "Pt1",
    "Pt3"
    ],
    "share": {
    "folder": "camio-endpoint",
    "type": "smb"
    }
}
```

Pt1, Pt2, Pt3 = are Hostnames but it can be also ip address

The *Request Dispatcher* could be configured either by arguments on the command line or by a config key in the bucket hybrid.requestdispatcher



Command line arguments

-p, --pool <ARG1> Pool Id where requests will be dispatched (e.g. 'MyPoolId'). Mandatory

-c, --cfg_host <ARG1> IPv4 address|host of the DataEngine with the Pool config. DEF: localhost

-s, --src_host <ARG1> IPv4 address|host of the Endpoint Handler's DataEngine. DEF: localhost

-h, --host <ARG1> IPv4 address|host of this service's DataEngine. DEF: localhost

-r, --resolve <ARG1> Request resolution policy. DEF: all (all|any|race) all: A request is resolved if all devices reply successfully any: A request is resolved if at least one device reply successfully race: The request resolution is determined by the first (fastest) device to reply successfully or not.

-x, --exclusive Exclude the master from the pool DEF: not exclusive

-o, --timeout <ARG1> Requests timeout in ms. DEF: 2000

-I, --log <ARG1> Log level. DEF: info (error|warn|info|verbose|debug|silly)

-v, --version Print version number

--svc_args <ARG1> IPv4 address|host of the DataEngine with the service args (svc mode)

Config key

In order to use the config key, the argument --svc_args must be specified.

The config key takes precedence over the command line arguments when the argument --svc_args is specified and cannot be mixed.

The key is a JSON object with attributes similar to the command line arguments.

```
{
"pool": "Pool1"
}
```

Schooling to c:/log/ChyronHego/request-dispatcher





PRIME VSAR Configuration

In the section "Remote Control" of PRIME VSAR's Config panel, make sure it is connected to the Data Engine used by the Endpoint Handler, i.e. defined by the argument --host (or by the Request Dispatcher in case of a pool of playout devices) :

								—		×
eo Output			Remote Control				Tools	6		
	-	Data Engine								
		Status			Connected	R	econn	lect		¢
		lp			localhost					
		Port			4300					
	▶	Advanced								
	•	Lua								
					Reload Lua					
		Lua Preload	File Path		//Engine/	Plug	jins/Cl	hyronh		
	▶	Advanced								
	•	GRPC Serve	r							
		Port			50051					

PRIME VSAR's Config Panel

Platinum Reconfigure

platinum-reconfigure.js listens to the dataengine to change the system configuration accordingly.

Prerequisites

- <u>VSAR Tools</u> (2.0.0+) installed on each playout. It includes the service platinum-reconfigure
- ISQ service installed on each playout. Only one service is needed at a time running on the master device but we prepare the other devices in advance in case of a pool reconfiguration



The Playout Endpoint Host is set to localhost (i.e. iSQ Service and Endpoint will be running on the master device)

骎 Data Engine Output — 🛛 🛛	x c			
Settings Playout Endpoint Host: localhost Channels: 1 Number of retries: 10 Retry Interval (ms): 100 Welcome to the iSQ Service Boot State: Health Monitor: Enabled Ingest Plugins: 1 loaded Ingest State: Online Mode (Ingest Enabled)	Save	onfigure iSQ Service	Available Plugins: iSQ Native Ingest SQ CAMIO Ingest Lyric Output Plugin Data Engine Output Plugin Refresh	ou wish to have loaded when iSQ Service starts. Plugin Information Name: Data Engine Output Plugin Version: 3.9.0.85 Description: Allows the ability to interface and communicate with playout devices through Data Engine. Configure
			Reload	Apply Close
Configuration		Shutdown	el.	: M 1/////

Reconfigure

USAGE: node `platinum-reconfigure.js` [OPTION1] [OPTION2]... The following options are supported: --de <ARG1\> IP address of the dataengine on which the script will listen. ex: node platinum-reconfigure.js --de=localhost

Pool

This tool can receive events to reconfigure the machine in a master/slaves environment pool. A pool is a group of machines with 1 master and several slaves. In this use case, all machines of the pool are expected to run the service platinum-reconfigure, working with the same dataengine.

This tool works with hostnames. So hostnames and IP correspondences are expected to be filled in the system.

On Windows:

C:\Windows\System32\drivers\etc\hosts

On the dataengine hybrid.pools bucket, each pool is described in a Key: **pool.poolname** This key needs to be created manually the first time regarding the needs.

Create in bucket hybrid.pools, the key pool.myPoolName (replace myPoolName by the pool's name, e.g. pool.Pool1) with the following content (example with FRESH3 as master and FRESH4 as slave):





```
Ex: pool.Pool1 Master on Windows (smb)
{
    "name": "Pool1",
    "master": "Pt2",
    "slaves": [
    "Pt1",
    "Pt3"
  ],
    "share": {
    "type": "smb",
    "name": "camio-endpoint",
    "drive": "S"
  }
}
```

In hybrid.pools bucket, each machine listen a Key that tell to which pool it belongs: **device.hostname**

Pt1, Pt2, Pt3 = are Hostnames but it can be also ip address

```
Ex: device.Pt2
  {
        "pool": "pool.Pool1"
    }
```

To re-arrange a pool, modify the pool description. Then overwrite the key of the new master. It will receive an event and configure itself as master. Then, when ready, it will write the keys of its slaves so they will reconfigure themselves as slaves.

For reconfiguration, external script are called:

- releaseMe.[sh-bat]
- masterMe.[sh-bat]
- slaveMe.[sh-bat]
- patchconfig.js

During the reconfiguration:

The script will read on the local dataengine to get the share folder path in bn.endpoint bucket, config key, tempPath field. That's where the shared folder is. All machines are expected to have this field on the same value. Default is C:\Users\ChyronHego\AppData\Local\Temp



For the master VSAR device, it will modify **hybrid.endpointhandler** and **hybrid.requestdispatcher** buckets, **config** keys. endpointhandler and requestdispatcher services have to be installed and those keys have to exist.

For all VSAR devices, it will modify **HOME\AppData\Local\Chyronhego\Fresh\Mithril.ini** to update [/Script/Mithril.MtDataEngineHandler] section, Ip field to the master VSAR hostname.



PRIME VSAR - CAMIO Integration Troubleshooting

Notes

iSQ web interface (experimental) is located at http://localhost:8087/isq

Bluenet (Endpoint) log web interface (experimental) is located at http://localhost:8087/log

Data Engine web interface is located at <u>http://localhost:4300</u>

Vata Engine logs are written to c:/log/ChyronHego/dataengine

Findpoint logs are written to c:/log/ChyronHego/camio-endpoint

Endpoint handler logs are written to c:/log/ChyronHego/endpoint-handler

Request dispatcher logs are written to c:/log/ChyronHego/request-dispatcher

Check list

- All the machines can ping each other
- Endpoint config file is either config.json or a config key in the bucket bn.endpoint
- Port 4300 is open on every machine hosting a Data Engine
- All services are running: Data Engine, Endpoint, Endpoint Handler, Request Dispatcher (optional, only needed for pool of playouts)
- All MOS/CAMIO server related services are running (e.g. External Render Service)
- All PRIME VSAR are connected to their respective Data Engine

Symptoms

A service is failing to read its config key on the Data Engine

(Failed to read args on the Data Engine, exiting...)

- Verify the Data Engine is running
- Verify the bucket and config key are existing and named accordingly without heading or trailing spaces
- Verify the config key's content is a valid JSON object

The rundown is selectable in iSQ web interface but is empty,

iSQ Viewer displays the rundown but commands have no effect

("item not found" or "0/0 assets" in the Endpoint logs)

- Verify Endpoint config file is either config.json or a config key in the bucket bn.endpoint
- Verify the <u>Endpoint configuration</u> key "isqHostName": If set, Endpoint will use this to find items in running order belonging to this host name instead of its own.
- Restart the Endpoint service, and republish the rundown (e.g. in ENPS toggle 'MOS Control Active')



It should display in the log "Looking for items routed to XXX", XXX being the isqHostname "X/X assets" with X not equal to 0

1 The hostname must match the hostname visible in the rundown's JSON.

The Request dispatcher is not able to see a slave machine

("Device 'xxx' is unreachable" in the logs)

- Check the Request dispatcher is pinging the slave machine
- Check the port 4300 is open on the slave machine (on the slave machine you should be able to access in a web browser the page located at <u>http://localhost:4300</u>)
 You might need to disable/reconfigure the firewall on Windows

The context is not visible in LUCI 4 / 5

• Check the Context Permission in the CAMIO Admin tool (cf. CAMIO documentation)

The playout/preview fails

- Check there is no ID clash between the PRIME VSAR instances. For example 2 previews having the same ID and running at the same time will cause issues.
- Check PRIME VSAR is running in PLAY mode



PRIME VSAR - nDisplay integration

Only available for version 2.0.1+

nDisplay integration allows the use of HDMI / DisplayPort output for VSAR with the use of Cesium Camera.

nDisplay Setup

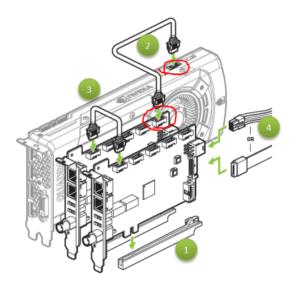
nDisplay Requirements:

- Nvidia Quadro Sync II
- Cat-5 or Cat-6 RJ45 cables. (for multiple machines)
- BNC cable for genlock
- DisplayPort to HDMI convertor (only for HDMI)

Sync setup

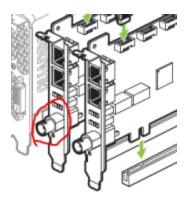
Nvidia Quadro Sync II needs to be installed in the PCIe slot on the motherboard and connected with appropriate cable to the Nvidia GPU. for more information see more at <u>Quadro-Sync-II</u> <u>user guide</u>

The cable should come with the Nvidia Quadro Sync II, Nvidia GPU has the ports for the Quadro Sync II connection at the top; they usually have plastic cover that needs to be removed to uncover the ports and connect the according the <u>Quadro-Sync-II user guide</u>





After the cable is properly connected to the GPU. We need to connect the genlock signal using BNC cable to the spigot.



after the connection is correctly connected make sure to install the the <u>Quadro sync II Driver</u> (the link is for windows 11)

For multiple machines:

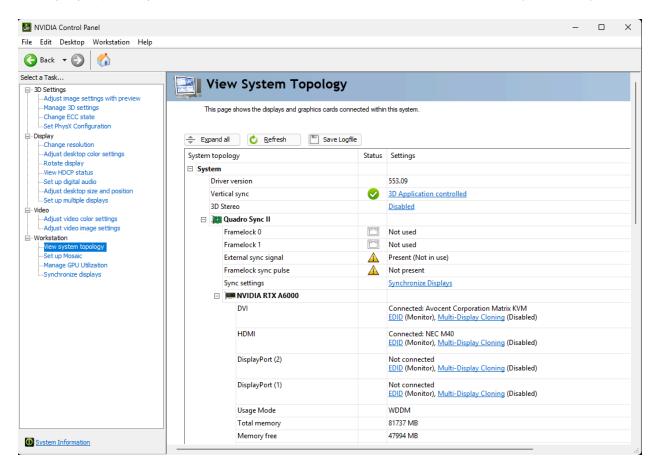
Frame Lock: connected to the Cat-5 or Cat-6 RJ45 cables according to the <u>Quadro-Sync-II</u> <u>user guide</u>, make sure to use direct connections without any TCP/IP hardware in between. Coming from the master machine going into the client machines.

Or

External Sync only: connect each Nvidia Quadro Sync II to genlock source and set them up all with external sync source.



when properly set-up on master it should say "External Sync signal: Present (Not in use)"



go to Synchronize Displays



🛃 NVIDIA Control Panel	– D X	
File Edit Desktop Workstation Help		
🕒 Back 👻 🕥		
Select a Task Select a Task 3 3D Settings -Adjust mage settings with preview -Manage 3D settings -Change ECC state -Set Physic Configuration Display -Change resolution -Adjuat desktop color settings -Rotate display -View HDCP status -Set up multiple displays Video -Adjust video color settings -Adjust video image setings	Synchronize Displays Avaiant of the system On this system On this system NEC M40 Necert Corporat	
	2. Select <u>d</u> isplays to lock to the server:	
	Active Display Refresh Rate Resolution Additional Information Avocent Corpor 60.000 Hz 1920 x 1080 NEC M40 60.000 Hz 1920 x 1080 Description:	
O System Information	Select this option if you want a display on this system to be the timing server.	

Select On this system



🛃 NVIDIA Control Panel		-		×
File Edit Desktop Workstation Help				
🕒 Back 👻 🚱				
Select a Task	Synchronize Displays			
3D Settings 4Adjust image settings with preview	Synchronize Displays			
Manage 3D settings Change ECC state Set PhysX Configuration	You can synchronize frame rendering across displays. This is useful when you want to present graphics across multiple displays or s systems to a house sync source.	ynchronize	one or ma	iny
- Display - Change resolution	1. The timing server is			
	On another system			
Rotate display View HDCP status	On this system			
	NEC M40 Image: Avocent Corporat Server Settings Image: Avocent Corporat			
	2. Select displays to lock to the server:			
	Active Display Refresh Rate Resolution Additional Information			
	Avocent Corpor 60.000 Hz 1920 x 1080			
System Information	Арріу		Cance	

Select the Main Display and click the Server Settings

if you see that the external sync frequency does not match



Server Settings	×								
Edit the properties of the frame synchronization pulses generated by the timing server.									
Server refresh rate: 60.00 Hz									
The synchronization pulses are based on:									
◯ The server refresh rate (Internal timing)									
O The server refresh rate with BNC output enabled									
• An external house sync signal									
Sync frequency: 50.00 Hz									
Sync signal detection: Composite									
The signal is interlaced									
Trigger sync pulses from the frame start signal using:									
O Leading edges									
○ Falling edges									
O Both edges (applies to TTL signals only)									
Outgoing sync interval: Sync skew:									
0.00 µs									
The server refresh rate does not match the house sync frequency									
OK Cancel Apply]								

you can fix that by going into change resolution -> refresh rate



NVIDIA Control Panel		-			×
File Edit Desktop Display Help					
🚱 Back 🔻 🛞 🐇					
Select a Task - 30 Settings - Adjust image settings with preview - Manage 30 settings - Change ECC state - Set Physic Configuration - Oisplay - Adjust desktop color settings - Adjust desktop color settings - Adjust desktop size and position - Set up multiple displays - View HOCP status - Set up multiple displays - View of the displays - View system topology - Set up Mosaic - Manage GPU Utilization - Synchronize displays - Synchronize displays - Synchronize displays - Synchronize displays - Set up Mosaic - Synchronize displays - Synchronize displays - Synchronize displays - Set up Mosaic - Set up Mosaic - Synchronize displays - Set up Mosaic - Set up Mosaic - Synchronize displays - Set up Mosaic - Set up Mo	Yes Change Resolution Succent day the amount of information appearing on the screen and reduce flickering. You can also choose the high-definition (%D) TV. Succent day you would like to change. Vecent Corporati Notest the resolution. Choose the resolution. Control Vecent Corporati Net Med Vecent Corporati Vecent Corporati Net Med Vecent Corporati Net Med Vecent Corporati Net Med Vecent Corporati Net Med Vecent Corporation Net Med Vecent Corporation Net Med Vecent Corporation Vecent Corporation Net Med Vecent Corporation Vecent Corporation Vecent Corporation		store De		
System Information				ancal	
	Apply			ancel	J.

make sure click Apply



NVIDIA Control Panel		- 🗆 X
File Edit Desktop Workstation Help		
G Back V Select a Task	Server Settings	×
- 3D Settings Adjust image settings with preview Manage 3D settings Change ECC state Set Physic Configuration	Edit the properties of the frame synchronization pulses generated by the timing server.	ent graphics across multiple displays or synchronize one or many
Display Change resolution Adjust desktop color settings Rotate display View HDCP status Set up digital audio Adjust desktop size and position Set up multiple displays Vide Adjust video color settings Adjust video color settings Adjust video image settings Adjust video image settings Adjust video image settings	 1. The synchronization pulses are based on: The server refresh rate (Internal timing) The server refresh rate with BNC output enabled An external house sync signal Sync frequency: 50.00 Hz Sync signal detection: composite The signal is interfaced Trigger sync pulses from the frame start signal using: Leading edges Both edges (applies to TTL signals only) Outgoing sync interval: Sync skew: 0 0.00 µ^S Some settings have been automatically updated to match the incoming house sync signal. 	ayne ek
3 System Information	Designition:	Apply Cancel

select the **An external house sync signal** and select the Leading/Falling edges depending on the genlock generator.

click Apply

make sure to confirm the setting



Server Settings	<							
Edit the properties of the frame synchronization pulses generated by the timing server.								
A Server refresh rate: 60.00 Hz								
The synchronization pulses are based on:								
○ The server refresh rate (Internal timing)								
○ The server refresh rate with BNC output enabled								
An external house sync signal								
Apply Changes X								
Your desktop configuration has changed. Would you like to keep these changes?								
Reverting in 17 seconds Yes No								
Trigger sync pulses from the frame start signal using:								
O Leading edges								
○ Falling edges								
O Both edges (applies to TTL signals only)								
Outgoing sync interval: Sync skew:								
0.00 µs								
Some settings have been automatically updated to match the incoming house sync signal.								
OK Cancel Apply)							

when the genlock is actively in use it should say "External Sync signal: Present (in use)" (may not necessarily mean that all configuration is correct just that it is used)



BNVIDIA Control Panel ile Edit Desktop Workstation Help					×
🕞 Back 🔻 🕑 🏠					
elect a Task	Tana	1			
- 3D Settings Adjust image settings with preview Manage 3D settings Change ECC state Set PhysX Configuration	View System Topo		1 this system.		
Display	🚖 Expand all 🕐 Refresh	Save Logfile			
Adjust desktop color settings	System topology	Status	Settings	 	
Rotate display View HDCP status	□ System				
Set up digital audio	Driver version		553.09		
-Adjust desktop size and position	Vertical sync	~	3D Application controlled		
Set up multiple displays	3D Stereo		Disabled		
Adjust video color settings	Quadro Sync II (server)				
Adjust video image settings	Framelock 0	F	Out		
- Workstation Wiew system topology	Framelock 1	T	Out		
Set up Mosaic	External sync signal	Solution	Present (In use)		
Manage GPU Utilization Synchronize displays	Framelock sync pulse	Sector 1	Present		
	Sync settings		Synchronize Displays		
	🖃 🍽 NVIDIA RTX A6000				
	DVI		Connected: Avocent Corporation Matrix KVM <u>EDID</u> (Monitor), <u>Multi-Display Cloning</u> (Disabled)		
	HDMI		Connected: NEC M40 EDID (Monitor), <u>Multi-Display Cloning</u> (Disabled)		
	DisplayPort (2)		Not connected <u>EDID</u> (Monitor), <u>Multi-Display Cloning</u> (Disabled)		
	DisplayPort (1)		Not connected <u>EDID</u> (Monitor), <u>Multi-Display Cloning</u> (Disabled)		
	Usage Mode		WDDM		
	Total memory		81737 MB		
	Memory free		47994 MB		



Enable Plugins

Open VSAR in Edit -> Plugins

File	Edit	Window	Tools	Build	Select	Actor	Help	
		් Undo (Ca	an't undo a			NewMap.u		CTRL+Z
		C ^{II} Redo (No		edo)				CTRL+Y
🗣 Place Actor:		ら Undo His	story					
Q Search Cla								
~								CTRL+X
$\odot \boxtimes \boxtimes$		🗄 Сору						CTRL+C
								CTRL+V
		Duplicate						CTRL+D
		📅 Delete						DELETE
Act		+++ Editor Pr	eferences	s				
		🖄 Project S	Settinas					
Cha	~	🔎 Plugins						

search for nDisplay and enable nDisplay and nDisplay Launch

Û	File Edit Window	Tools He	lp			– 🗆 X
+	Add 🗙 ndisplay					🔅 Settings
4	[⊨] ALL PLUGINS	538	All Plugins			
-	INSTALLED Codecs	2 1	•	×	Live Link Over nDisplay LiveLink subjects synchronization for nDisplay setup Z Edit	Version 1.0 Epic Games, Inc. 🗩
-	Other BUILT-IN 2D	1 536 1			nDisplay Support for synchronized clustered rendering using multiple PCs in mono or stereo Z Edit 🔗 Package	Version 1.0 Epic Games, Inc. 🗩
	Accessibility Advertising Al Analytics	3 1 9 5			nDisplay Launch (Bea) Launch local ndissing nodes with ease. Z Edit & Package	Version 1.0 Epic Games, Inc.
	Android Android Background Service Animation Audio			<u>/</u>	NVIDIA Rivermax Media synchronization for nDisplay (Beta) Adding NVIDIA Rivermax synchronization capabilities for nDisplay Z Edit & Package	Version 1.0 Epic Games, Inc. 🖨
	Augmented Reality BackgroundHTTP BlendSpace					
	Blueprints Build Distribution Cameras					
	Codecs Compositing Compression Computer Vision					





search for switchboard and enable it

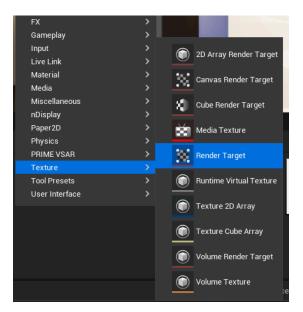
(A)	File Edit Window	Tools	Help			×
U	Plugins					
					<u>ب</u> د	
	- Add 🗙 switchboard			\square	🛟 Sett	ings
			All Plugins			
	⁼ ALL PLUGINS	538	Switchboard (Beta)	Versi	ion 0	
-	INSTALLED			Epic Game		
			Critic C Dealeana			
	Codecs					
	Other					
-	BUILT-IN	536				
	2D					
	Accessibility					
	Advertising					
	Al					
	Analytics					
	Android					
	Android Background Service					
	Animation	29				
	Audio	24				
	Augmented Reality					
	BackgroundHTTP					
	BlendSpace					
	Blueprints					
	Build Distribution					
	Cameras					
	Codecs					
	Compositing					
	Compression					
	Computer Vision					

you may need to restart VSAR



Render target

Cesium Camera is using the render target as intermediary between Cesium Camera and nDisplay. Create Render target by Right click in Content browser and select Render target.



double click on the Render target asset and set the Size X, Size Y to use custom resolution

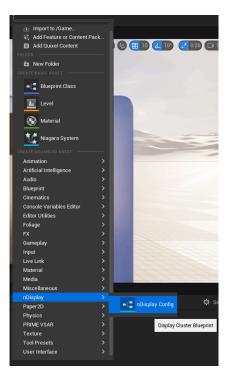
(Q Search			≣☆
	Level Of Detail			
	Mip Gen Settings	FromTextureGroup 🗸		
	LOD Bias	0		
		RenderTarget 🗸		
	Advanced			
-	Texture Render Target 2D			
		1920		
		1080		
▶	Clear Color			
	Address X	Wrap 🗸		
	Address Y	Wrap 🗸		
	Render Target Format	RTF RGBA16f V		
	Auto Generate Mips			
	Advanced			
	Texture Render Target			
	Target Gamma	0.0		
	File Path			
		No Source Path Set	×	
			1 1	

Create one for each Cesium Camera that should have HDMI / DisplayPort as output using nDisplay.

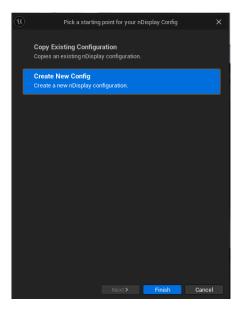


nDisplay config

Create **nDisplay config** asset in Content browser, Right click in Content browser and select nDisplay config under **nDisplay -> nDisplay config**



create new config



Add New Cluster Node



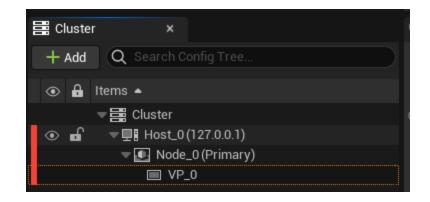
E Cluster	×		2
+ Add Q Sear			
💿 🔒 Items 🔺			
E Clust	er		
		[
	Add New Cluster Node		
			Adds a new c
			_
			0—
	Show All Cluster Items	CTRL+H	5



(1) Ad	d New Cluster	Node	×
Name		Node_0	
Parent		Cluster	~
Preset		Full HD (1,920	x 1,080) 🗸
Adjust Cluster Node Po		vent Overlap	
 Configuration 			
Host IP Address	127.0.0.1		÷
Enable Sound			
Fullscreen			
▼ Window			¢
Position	0	0	
▶ Size	1920	1080	ef 🛛
Output Remapping			
Headless Rendering			
Graphics Adapter	-1		
Enable Texture Share			
Viewports	0 Map eleme	nts	
		Add	Cancel

Set the Host IP Address if Cluster Node is not a local host (127.0.0.1). You can set your **custom resolution** in the **Window -> Size**, this is the size of all displays connected to the system.

this should created VP_0



Drag and drop VP_0 to the nDisplayScreen



• nDisplayConfig2 (Self) • Not Component (RootComponent) Edit in C++ ■ nDisplayScreen			100
 Stage Geometry Component (DisplayClusterStageGeor Sync Tick Component (DisplayClusterSyncTick) <u>Edit i</u> 			
STEP 1	CutputMapping ×	-1 m	
+ Add Q Search Config Tree ●	OutputMapping × 500 OutputMapping × 500 OutputMapping × 500 OutputMapping × S00	9	1000 1500
 Cluster I Host_0 (127.0.0.1) Node_0 (Primary) I VP_0 		E Node_0 (Primary) [1,920 x 1,080] @ 0,0	VP.0 [1,520 x 1,050] ⊕ 0, 0

When using **custom resolution** make sure to adjust the **nDisplayScreen** size in the details panel under **Screen Size -> Size**

🔻 Screen Size			
Aspect Ratio Preset	16:9	~	
▶ Size	100.0	56.25	-
_			

Select the VP_0 in details panel set **Replace -> Source Texture** to the render target created before and make sure the **Enable Viewport Texture Replacement**



	Z	Details ×				
l	(Ç Search			▤	₿
		▶ Size	1920	1080		
	Þ	Remapping				
	Þ	Overscan				
	Þ	Media				
	Þ	Advanced				
Tradition of	▼	Rendering				
WINE AND		Enable Cross-GPU Transfer	>			
		Screen Percentage	1.0			
A DISTRICT		Overlap Order	0			
111111		GPU Index	-1			
1.11.11	•	Stereo				
		Stereo GPU Index	-1			
N		Stereo Mode	Default	~		
	•	Texture Replacement				
	•	Replace			÷	
		Enable Viewport Texture	>		¢	
		Source Texture		NewTextureRenderTargel 🗸	¢	Ŷ
		Use Texture Crop				
		Texture Crop				
	•	Preview				
		Preview Frustum				

Add second viewport (per node) that the sole purpose of it is to have a valid Viewport due to deferred rendering requiring a valid Viewport (this requirement may be removed in future releases)



		-Gm	1
	Add New Viewport		
	🖺 Cut	CTRL+X	4
	📳 Сору	CTRL+C	
		CTRL+V	
Q	🖬 Duplicate	CTRL+D	
	💼 Delete	DELETE	2
	🗊 Rename	F2	/
Cluster ×	Show Selected	SHIFT+H	app
+ Add Q Search Config Tr	Hide Selected	н	-
💿 🔒 Items 🔺	Show Only Selected		In
	Show All Cluster Items	CTRL+H	
Cluster			
▼ □ I Host_0 (127.0.0			
● 🗗 🛛 ▼ 💽 Node_0 (Prim	ary)		
■ VP_0			

with the size of 1x1, we wand the viewport to be as small as possible, and uncheck the adjust Viewport position to prevent overlapping and expand cluster node to fit new viewport.

<u>(U)</u>	dd New Viewport		×
Name		VP_1	
Parent		Node_0	*
Preset	Full	HD (1,920 x 1,080)	*
djust Viewport Positi		ар	
Configuration			
Enable Viewport	>		
View Origin	None	~	
Projection Policy			
▼ Region		•	Ь
Position	0	0	
▶ Size	1	1 🖬	
Remapping			
Overscan			
Media			
Advanced			
Rendering			
	A	dd Cance	el



Make sure to also drag and drop the this Viewport on the nDisplayScreen

Select Cluster in details	panel under Sync ->	Render Sync Policy ->	Type select Nvidia (2)
----------------------------------	---------------------	-----------------------	------------------------

🔀 Details	×		
Q Search			≣☆
 Configuration 			
 PrimaryNode 			
Primary Node Pol	rts		
🔻 Sync			
🔻 Render Sync Poli	су		¢
Туре		Nvidia (2) 🗸 🗸	
Swap Group		1	
Swap Barrier		1	
 Input Sync Policy 			
Туре		ReplicatePrimary 🗸	
▶ Info			÷

for the Nvidia sync to work correctly it requires the display resolution to much the display resolution, also it does not work properly when application is out of focused or remote desktop user is connected (example: TeamViewer user is connected).

Save and Compile

drag and drop the nDisplay config asset to scene (level)



Multiple display setup

On system with multiple displays you want to set main Node for Main Display as the nDisplay window(s) appears on the Main Display, for secondary display you want to add additional Node set it up same as the first one and then use the <u>Nvidia mosaic</u> to map it to the proper display.

Interlaced display

If your specific use case requires interlaced output you can enabled that for the display in the **Change resolution -> Customize**

		-		×
File Edit Desktop Display Help				
😋 Back 🔻 🌍 🐇				
Select a Task	Change Resolution			
3D Settings		Restor	re Defau	lts
Manage 3D settings Change ECC state Set PhysX Configuration	You can adjust the amount of information appearing on the screen and reduce flickering. You can also choose the high-defin country-specific signal for your standard definition (SD) TV.	ition (HD) format if	f you are i	using
- Display	1. Select the display you would like to change.			
Change resolution Adjust desktop color settings	The second and the second se			
Rotate display				
View HDCP status Set up digital audio				
Adjust desktop size and position	Avocent Corporati NEC M40			
Set up multiple displays				
Adjust video color settings				
	2. Choose the resolution.			
-View system topology	Connector:			
Set up Mosaic	EIIII DVI - PC display			
Manage GPU Utilization Synchronize displays	Resolution: Refresh rate:			
	PC 60Hz V			
	1920 × 1200			
	1920 × 1080 (native)			
	1680 × 1050			
	1600 × 1200 1600 × 1024			
	1600 × 1024			
	1440 × 1080			
	Customize			
	3. Apply the following settings.			
System Information		_		

Click the Create Custom Resolution...



<

Accept the Legal Disclaimer (make sure you know what you doing)

NVIDIA Le	gal Disclaimer	×
1	Terms and Conditions:	
	Warning: The software utility you are about to enable ("utility") may potentially cause damage to your display monitor and void warranties, if any, in connection with your display monitor.	
	This utility may run your display monitor out of the manufacturer's design specifications, including, but not limited to: higher system voltages, above normal temperatures, higher frequencies, disruptions to sync, and changes to bios that may corrupt the bios.	
	Depending on the manufacturer of your display monitor, the display monitor warranties provided by such manufacturer may be voided, and you may not receive any further manufacturer support.	
	NVIDIA does not provide customer service support for this utility. It is for these reasons that absolutely no warranty or guarantee is either express or implied by NVIDIA.	
	Before enabling and using, you should determine the suitability of the utility for your intended use, and you shall assume all responsibility in connection therewith.	
	Disclaimer of warranties: All materials, information, and software products, included in or made available through this utility are provided "as is" and "as available" for your use.	
	The utility is provided without warranties of any kind, either express or implied, including, but not limited to, implied warranties of merchantability, fitness for a particular purpose, or noninfringement.	
	NVIDIA and its subsidiaries do not warrant that the utility is reliable or correct; that any defects or errors will be corrected; or that the utility is free of viruses or other harmful components. Your use of the utility is solely at your risk.	
	Accept Decline	



Select the correct display

In the Scan type you can select Interlaced

Create Custom Resolution	on			×		
Create a resolution that is not currently available in Windows. Your display may flicker a						
1. Select displays:				Identify displays		
Display		ID	Current resolution			
Avocent Corpor NEC M40	ation Matrix KVM	1 2	1920 x 1080 at 60H 1920 x 1080 at 50H			
2. Resolution settings: Display mode (as repor	ted by Windows)			Import settings		
Horizontal pixels:	1920 🜲		Vertical lines:	1080 🗘		
Refresh rate (Hz):	60		Color depth (bpp):	32 ~		
Scan type:	Progressive	~				
Timing	Interlaced					
Standard:	CVT reduced blank	~				
	Horizontal		Vertical			
Active pixels:	1920 🚖		1080 🚖			
Front porch (pixels):	48 🔶		3			
Sync width (pixels):	32		5			
Total pixels:	2080 🚖		1111 🚖			
Polarity:	Positive (+)	\sim	Negative (-)	Rudalada		
Refresh rate:	66.66 KHz		60.000 + Hz (59.000 to 61.000)	Pixel clock: 138.6528 MHz		
			Test	Cancel		



Cesium Camera Output

in PRIME VSAR config add Render Target Output

🗭 Content Browser	🍎 Me	ssage Log	🖞 Output Log	🕅 PRIME VSAR			
General		Camera	3	Video Output		Remote Control	Tools
(Dutput List			Video Output Config			HAL
🔻 Config							
				Project 🗸 🛛 Save			
🔻 Logs							
On Screen Verbosity				Condensed 🗸			
On Screen Verbosity Co							
On Screen Verbosity Ra				1.0			
Add Output				+ Render Target Out + Ndi	i Out		

Set the Render Target input to the before created Render target

🝺 Content Browser	🎽 Message Log	🔀 Output Log	🕅 PRIME VS	SAR ×					
General		Cameras	Video (Output	Remo	ote Control	T	ools	
	Output List		Video Outį	put Config			HAL		
Hal:0:0	RenderTarget	Dutput_2		Q Search Render Targets Frame Rate		Unlimited	~		÷
<mark>. ۴۱</mark>				Render Target Inj	put	THE ALLOW	lewTextureRenderTarget2D	~	٩
Not Assigned	CH_CesiumCa	mera_C_UAI		Custom Render T	Target	Nene	lone Do		
2 Items View Option	is 🗸								

In the corresponding Cesium Camera in details panel select in the Video Output -> RenderTargetOutput



🔀 Details 🛛 🗙 🌍 World Settings		
CH_CesiumCamera_0	+ Add •1 -	6
CH_CesiumCamera_0 (Self)		
💌 🚣 Mt Cesium Camera Component (CesiumCameraComponent)	Edit in C	:++
Q Search		★ ☆
General LOD Misc Streaming All		
Advanced		
▼ Video Output		
Video Output	RenderTargetOutput_2 🗸	
Show Camera Preview when Selected	None	
▼ Video Output - Rendering		•
Post Process Settings	 RenderTargetOutput_2 -> (This Camera) 	
Enable Raytracing	HAL	
Optical Center		
	RenderTargetOutput_2	

Make sure that the deferred capture is enabled under Video Output - Rendering -> Advanced -> Use Deferred Capture

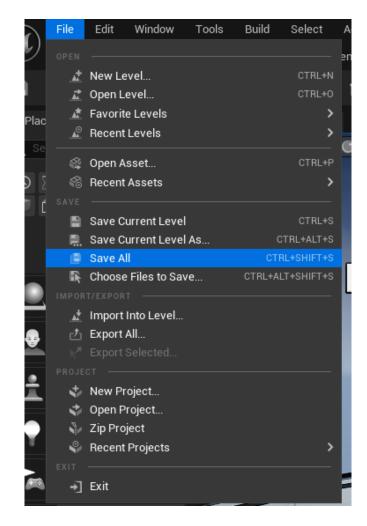
🔀 Details 🛛 🗙 🌍 World Settings					
🧕 CH_CesiumCamera_0			+ Add	••••	6
🧕 CH_CesiumCamera_0 (Self)					
💌 🚣 付 Mt Cesium Camera Component (CesiumCameraComponent)				Edit i	ו C++
▲ Output Component (OutputComponent)				Edit i	ו C++
Q Search					★ ☆
General LOD Misc Streaming All					
▼ Video Output - Rendering					
Post Process Settings					
Enable Raytracing					
▶ Optical Center					
▼ Advanced					
Use TAA	~				
Disable Alpha Capture					
Use Deferred Capture					
Fill Render Target	The second se	TextureRenderTarget2D_9			÷
		TextureRenderTarget2D_10			



Make sure to save the output configuration

🝺 Content Browser	Output Log	🎽 Message Log	🕅 PRIME VSAR	×				
General		Cameras	Video Outp	ut	I	Remote Control		Tools
0	Output List		Video Output 0	onfig			HAL	
🗢 Config								
			User 🗸 🛛 Save					
🔻 Logs								
On Screen Verbosity			Condensed 🗸					
On Screen Verbosity Color								
On Screen Verbosity Rate			1.0					
Add Output			+ Render Target Out	+ Ndi Out				

Make sure to Save all



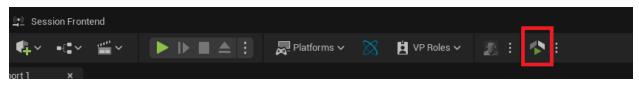


Launching nDisplay

While launching nDisplay it launches a standalone application that may take some time to boot up and will appear black while it is loading.

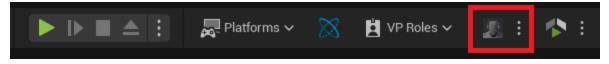
There are two main ways to launch nDisplay configuration:

using Launch nDisplay



It requires nDisplay config to be in the scene. When using **Launch nDisplay** the **Editor** can consume SDI inputs/outputs due to the Editor and standalone application having the same settings.

using Switchboard



First launch of the switchboard requires installation.

Select .uproject file for project if not populated automatically

🔊 Add new	v Switchboard Configuration	×
Config Path	NDisplayTest	Browse
uProject	C:\Users\CHYRONHEGO\Documents\Unreal Projects\NDisplayTest\NDisplayTest.uproject	Browse
Engine Dir	I:\dev\vsar\Git\UE5\Engine	Browse
Perforc	e	
P4 Projec		
P4 Engine		
Workspac		
	OK Detect	Cancel

select correct level



Switchboard - NDisplayTest				
Configs Settings Tools				
sequence Default		Slate	Scene	9
🏠 Add Device 🔻	Level: NewMap		• 0	nDisplay Monitor
Engine CL 🕌 None 🖃 🖓 🖓 Project CL 5435842 🔍 🖓		† ‡ †	0 «	Console: Node Host Conne

Add Device **nDisplay** one for each

ं	Add	Device 🔻	Level:	New
		KiPro		
		LiveLinkFace		h
		Motive		
		MultiplayerServe	r	
	1	nDisplay		
	扙	Shogun		
		SoundDevices		
	Ľ	Unreal		

Select nDisplay Config file



🔳 Add nDi	splay Device	×	<
Config File		▼ Browse Populate	
		OK Cancel	

Launch the switchboard listener on all VSAR machines you want the nDisplay config to run on

\boxtimes	🛓 VP Roles 🗸	<u>,</u>	:	station (* 1990)	1
			LI	STENER	
Q	3 🕀 🗞 🔳 1	0 🗹	Ī	Launch Switchboard Listener on Login	earcl em L
			C	Create Config	
				Loupob	Cuvito

Close **VSAR** on all VSAR machines you want the nDisplay config to run on

Click the connect button to try to connect to all the nodes

nDisplay Devices	Address	Changelist	80.
○ 🚺 ★ Node_1			•
○ 📶 ★ Node_0			0 4

you can start all nodes using the start button (up arrow)



nDisplay Devices	Address	Changelist	설 🚺 🚸
• 🚺 🛪 Node_1	127.0.0.1	.8	0
• 🚺 🛪 Node_0	127.0.0.1	.8	0 🗣

you can rebuild the node to update it to the project changes, unfortunately this requires <u>development environment</u>

Setting up development environment

Development environment for Unreal Engine 5.3.2 requires:

- Visual Studio 2022 v17.4 or newer
- Windows SDK 10.0.18362 or newer
- LLVM clang 14.0.1
- .NET 4.6.2 Targeting Pack
- .NET 6.0

is may change depending on the base Unreal Engine Version

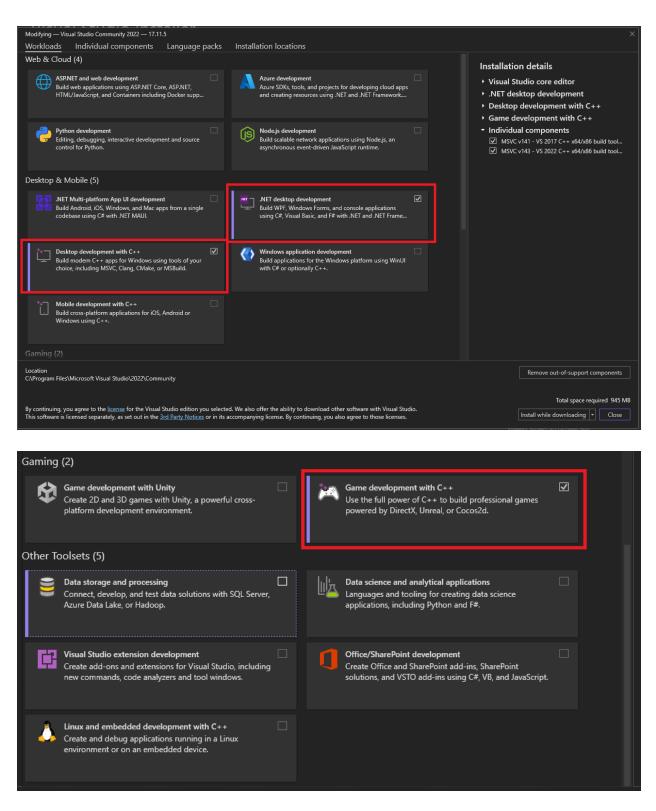
Visual Studio

download Visual studio community 2022

and install it

while installing select .NET desktop development, Desktop development with c++ and Game development with c++





then select individual components search for MSVC and select **MSVC v143 - VS 2022 c++** x64/x86 build tools (v14.34-17.4)



Worklo	pads Individual components Language packs Installation locations
msvc	
	MSVC v143 - VS 2022 C++ ARM64/ARM64EC Spectre-mitigated libs (v14.36-17.6)
	MSVC v143 - VS 2022 C++ ARM64/ARM64EC Spectre-mitigated libs (v14.37-17.7)(Out of support)
	MSVC v143 - VS 2022 C++ ARM64/ARM64EC Spectre-mitigated libs (v14.38-17.8)
	MSVC v143 - VS 2022 C++ ARM64/ARM64EC Spectre-mitigated libs (v14.39-17.9)
	MSVC v143 - VS 2022 C++ ARM64/ARM64EC Spectre-mitigated libs (v14.40-17.10)
	MSVC v143 - VS 2022 C++ ARM64/ARM64EC Spectre-mitigated libs (v14.41-17.11)
\checkmark	MSVC v143 - VS 2022 C++ x64/x86 build tools (Latest)
	MSVC v143 - VS 2022 C++ x64/x86 build tools (v14.30-17.0) (Out of support)
	MSVC v143 - VS 2022 C++ x64/x86 build tools (v14.31-17.1) (Out of support)
	MSVC v143 - VS 2022 C++ x64/x86 build tools (v14.32-17.2) (Out of support)
	MSVC v143 - VS 2022 C++ x64/x86 build tools (v14.33-17.3) (Out of support)
☑	MSVC v143 - VS 2022 C++ x64/x86 build tools (v14.34-17.4)
	MSVC v143 - VS 2022 C++ x64/x86 build tools (v14.35-17.5) (Out of support)
	MSVC v143 - VS 2022 C++ x64/x86 build tools (v14.36-17.6)
	MSVC v143 - VS 2022 C++ x64/x86 build tools (v14.37-17.7)(Out of support)
	MSVC v143 - VS 2022 C++ x64/x86 build tools (v14.38-17.8)
	MSVC v143 - VS 2022 C++ x64/x86 build tools (v14.39-17.9)
	MSVC v143 - VS 2022 C++ x64/x86 build tools (v14.40-17.10)
	MSVC v143 - VS 2022 C++ x64/x86 build tools (v14.41-17.11)
	MSVC v143 - VS 2022 C++ x64/x86 Spectre-mitigated libs (Latest)
	MSVC v143 - VS 2022 C++ x64/x86 Spectre-mitigated libs (v14.30-17.0) (Out of support)
	MSVC v143 - VS 2022 C++ x64/x86 Spectre-mitigated libs (v14.31-17.1) (Out of support)
	MSVC v143 - VS 2022 C++ x64/x86 Spectre-mitigated libs (v14.32-17.2) (Out of support)
	MSVC v143 - VS 2022 C++ x64/x86 Spectre-mitigated libs (v14.33-17.3) (Out of support)
	MSVC v143 - VS 2022 C++ x64/x86 Spectre-mitigated libs (v14.34-17.4)

then search for windows sdk and select **Windows 11 SDK (10.0.22621.0)** and make sure that no other sdk is check



windows sdk X	
.NET	
.NET MAUI SDK for Windows	
Compilers, build tools, and runtimes	
C++ Windows XP Support for VS 2017 (v141) tools [Deprecated]	
Windows Universal CRT SDK	
SDKs, libraries, and frameworks	
Windows 10 SDK (10.0.18362.0)	
Windows 10 SDK (10.0.19041.0)	
Windows 10 SDK (10.0.20348.0)	
Windows 11 SDK (10.0.22000.0)	
✓ Windows 11 SDK (10.0.22621.0)	
Windows 11 SDK (10.0.26100.0)	
Windows Driver Kit	
✓ Windows Performance Toolkit	
✓ Windows Universal C Runtime	

and press install

restart the machine after the installation