# VP Installation Guide

Version 8.1

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SINCE DAY ONE.

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# HARDWARE

Chyron built hardware qualifies for running Virtual Placement. Here is the list of recommended hardware:

| | |
|---|---|
| Mainboard | Supermicro X13SWA-TF |
| CPU Supported | Intel Xeon w5-3435X |
| Memory | 64GB DDR5 4800Mhz |
| Graphics | NVIDIA RTX A5000 |
| SSD's | 3x Micron 7450 MAX U.3 3,2TB 15mm Gen4 x4 |

## Media drives

When using a file-based disk recorder (see Recorded clips), Virtual Placement requires dedicated media drives for storing video. It is not allowed to use a drive that is accessed by other applications during Virtual Placement operation.

You can choose from several approved setups. The total media drive performance requirement depends on the number of cameras and video format.

Supported configurations are

- 1 camera
- 2 cameras
- 3 cameras
- 4 cameras

### Video file size

The video file stores video and audio for clips and record train for all input cameras. Following table shows expected file size in GB ($1024^3$) to store 30 minutes of video.

| Video Format | 1 camera | 2 cameras | 3 cameras | 4 cameras | |
|---|---|---|---|---|---|
| HD 1080i 50Hz | 32 | 64 | 96 | 128 |
| HD 1080i 59Hz | 37 | 74 | 111 | 148 |
| HD 1080p 50Hz | 64 | 128 | 192 | 256 |
| HD 1080p 59Hz | 74 | 148 | 222 | 296 |
| HD 720p 50Hz | 35 | 70 | 105 | 140 |
| HD 720p 59Hz | 43 | 86 | 129 | 172 |
| 4K 2160p | 120 | 240 | 360 | n/a |

The table above assumes JPEG compression for HD/3G video, quality set to 95%. For 4K hardware codec M264 is required with "M264 XAVC 4K Intra 480 CBG 10Bit" profile.

It is recommended not to fill up all the space available. Recommended file sizes in GB for various drive setups:

## SSD drives

Always leave at least 20% of free space on a SSD drive! Do not fill up the space with either the main video dat file or with any other files. The 20% of the total space has just to be empty. SSD requires this empty space to be able to achieve high sustained write speeds.

The RAID has to be a Software RAID made in Windows. On board RAID is not supported due to missing TRIM command functionality!

# OPERATING SYSTEM

Virtual Placement is certified for following operating systems:

- Microsoft Windows 11 Enterprise version 24H2

## NVIDIA Drivers

Virtual Placement requires installed NVIDIA display drivers.

| Card Type \| Drivers Windows | |
|---|---|
| Quadro family graphics cards support according to nvidia driver release notes | 573.73 |

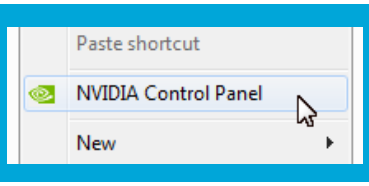
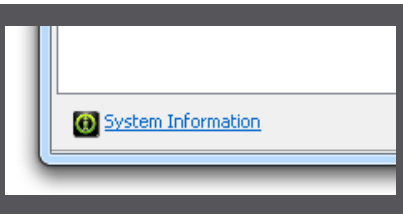
NVIDIA website: http://www.nvidia.com

### Setting

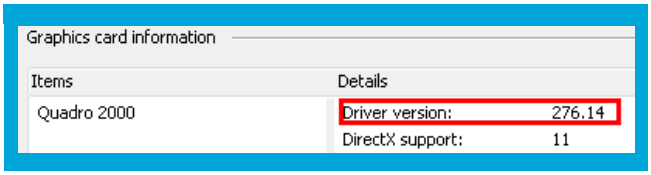
NVIDIA graphics drivers must be properly configured for running Virtual Placement. Driver setting is done automatically using NVIDIA application profile for Virtual Placement.

IMPORTANT You must reinstall Virtual Placement after upgrading or reinstalling NVIDIA driver.

#### How to find out current NVIDIA driver version

| | | |
|---|---|---|
| 1 | Do a right mouse click on an empty desktop. A popup menu appears. Select "NVIDIA Control Panel". |  |
| 2 | This is where you would put the STEP 2 directions |  |

3 This is where you would put the STEP 3 directions




## Matrox Video Card

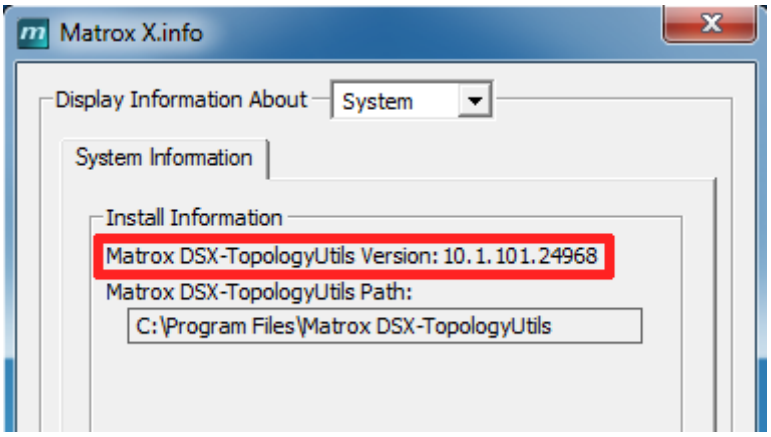
Virtual Placement supports following Matrox video cards:

- DSX LE4 LP /4
- DSK LE4 LP /8
- DSK LE4 FH /4
- DSX LE4 FH /8
- DSK LE4 FH /X2
- DSX LE5 12G (4K video)
- DSX LE5 D25
- DSX LE5 Q25

### Driver

IMPORTANT Driver **10.5.102.1873** needs to be installed. This driver is available on https://da.chyron.com/ in Virtual Placement installer section or 3rd party SW. Direct link is here. Other drivers are not supported!

If you are not sure which video card or driver version is installed then open Matrox X.info "*C:\Program Files\Matrox DSX-TopologyUtils\System64\mveXinfo.exe*". It is started automatically. Use the icon in task bar and locate the driver version in the dialog opened:




## Fast Startup

It is necessary to disable the Fast Startup Windows feature when using Matrox boards. To accomplish this, do the following;

| | |
|---|---|
| 1 | Open Start menu, start typing "Control Panel". Open the Control Panel from the menu. |
| 2 | In Control Panel, enter the Search Box and type "power options". Pick the "Change what the power button do". Power button settings page shows up. |
| 3 | Press "Change settings that are currently unavailable". Checkboxes in the bottom part of the panel get enabled. |
| 4 | Disable the "Turn on fast startup" option. |

## Bypass Relays

Video bypass relays are supported only by Matrox LE4 FH board models.

## Video IO configuration selection

The video board supports multiple input/output configurations. The current setting is visible in the X.info application. See the screenshot above. Look for “SDI in: Out: “.

| Supported Video IO Configurations | | | | | |
|---|---|---|---|---|---|
| LE4 LP /4 | LE4 LP /8 | LE4 FH /4 | LE4 FH /8 | LE4 FH /X2 | LE5 12G |
| 2in2out<br>3in1out | 4in4out | 2in2out<br>3in1out | 4in4out | 8in4out<br>4in8out | 6in6out<br>4in8out |

The configuration is programmed in the board and can be changed by supplied command line tool: *"C:\Program Files\Matrox DSX-TopologyUtils\drivers\mvConnectorConfig.exe"*

### Example: Setting 3in1out configuration on LE4 LP/4

**1** Open command prompt (start cmd.exe).
Type cd `"C:\Program Files\Matrox DSX-TopologyUtils\drivers"`

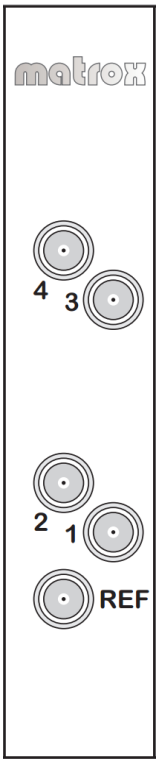
**2** Type `"mvConnectorConfig.exe -3in1out"`
If you have multiple cards you have to set them individually by adding serial number after the configuration type and separated by character =. E.g.
`"mvConnectorConfig.exe -3in1out -sn=A530986"`

**3** The configuration process takes a while. When it finishes you are asked for PC reboot to apply the changes.

Supported video formats

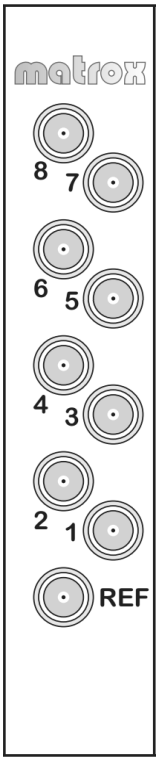
- HD 1080i 50 or 60M
- HD 720p 50, or 60M
- 3G 1080p 50 or 60M
- 4K 3840x2160 50, 60, 60M

# LE4 LP/4 Connector Layout




| Connector | 2in2out Config | 3in1out Config |
|---|---|---|
| 4 | SDI Out 1 or Key Out 0 | SDI Out |
| 3 | SDI In 1 or Key In 0 | SDI In 2 or Key In 0 |
| 2 | SDI Out 0 | SDI In 1 |
| 1 | SDI In 0 | SDI In 0 |
| REF | Reference input | Reference input |

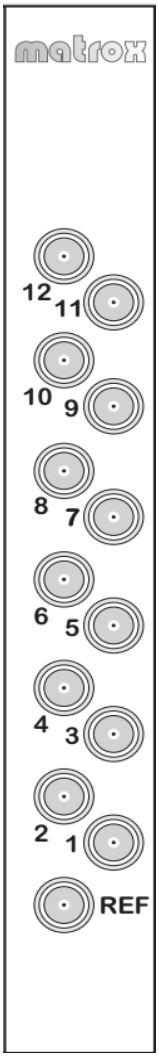
## LE4 LP/8 Connector Layout




| Connector \| 4in4out Config | |
|---|---|
| 8 | SDI Out 3 or Key Out 1 |
| 7 | SDI In 3 or Key In 1 |
| 6 | SDI Out 2 or Key Out 0 |
| 5 | SDI In 2 or Key In 0 |
| 4 | SDI Out 1 |
| 3 | SDI In 1 |
| 2 | SDI Out 0 |
| 1 | SDI In 0 |
| REF | Reference input |

One 4K video uses 4 connectors.

## LE4 FH Connector Layout




| Connector | 4in4out | 8in4out | 4in8out | |
|---|---|---|---|---|
| 12 | | SDI In 7 or Key In 5 | SDI Out 7 or Key Out 5 |
| 11 | | SDI In 6 or Key In 4 | SDI Out 6 or Key Out 4 |
| 10 | | SDI In 5 | SDI Out 5 |
| 9 | | SDI In 4 | SDI Out 4 |
| 8 | SDI Out 3 or Key Out 1 | SDI Out 3 or Key Out 1 | SDI Out 3 or Key Out 1 |
| 7 | SDI In 3 or Key In 1 | SDI In 3 or Key In 1 | SDI In 3 or Key In 1 |
| 6 | SDI Out 2 or Key Out 0 | SDI Out 2 or Key Out 0 | SDI Out 2 or Key Out 0 |
| 5 | SDI In 2 or Key In 0 | SDI In 2 or Key In 0 | SDI In 2 or Key In 0 |
| 4 | SDI Out 1 | SDI Out 1 | SDI Out 1 |

| | | | |
|---|---|---|---|
| 3 | SDI In 1 | SDI In 1 | SDI In 1 |
| 2 | SDI Out 0 | SDI Out 0 | SDI Out 0 |
| 1 | SDI In 0 | SDI In 0 | SDI In 0 |
| REF | Reference input | Reference input | |

One 4K video uses 4 connectors. The first 4K input connectors must be either In 0 or In 4.

## JLCooper Jog/Shuttle MCS3-USB-FTDI

You will need to install a USB driver for using the JLCooper MCS3-USB-FTDI controller. The current version is at https://da.chyron.com as a third party software in file *JLCooper_MCS3-USB-FTDI_drivers.zip.* Please unpack this archive, run install.cmd and follow the installation instructions.

## Sentinel key USB Drivers

Please install a USB driver for Sentinel dongle with Virtual Placement license. The current version is at https://da.chyron.com as a third party software in file *Sentinel System Driver Installer*

## Windows Settings

### Anti Virus

On the Virtual Placement machine, do not run any anti virus programs that performs a real-time scan of the system since this influences the system performance. If necessary, run manual scanning of the system when the system is not on-air.

### Windows services

Do not enable Windows Indexing Services.

## UAC settings

When file-based disk recorder is used (see Recorded clips), video file allocation needs elevated user privileges. The allocation is performed first time the application starts or after the video file size is changed in application config.

To meet that requirement, set the UAC level to 'Never notify' at the User Account Control Settings dialog (Control Panel → User Accounts → Change User Account Control Settings).

## Power options

Power saving features must be disabled.

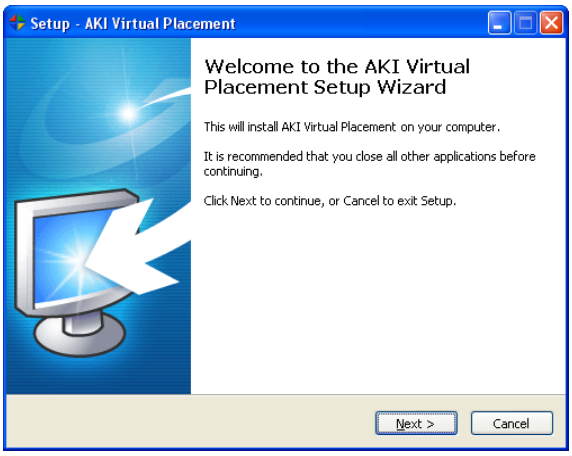
## Windows firewall

It is recommended that the Windows firewall is enabled with exception or rule for dedicated UDP port using for remote control of Virtual Placement

| | |
|---|---|
| 1 | In Windows Start menu, open *Control Panel* > *Hardware and Sound* |
| 2 | Under *Power Options*, choose *Change when the computer sleeps* |
| 3 | Change selected plan settings, set *Never* in *Put the computer to sleep* |
| 4 | Press *Save changes* button |

# INSTALLATION

Please insert a dongle in a USB plug before installation of Virtual Placement. This step is necessary for automatic installation of Sentinel Drivers.




To install Virtual Placement please run VirtualPlacementSetup<*version*>.exe

This installer will guide you through the installation process.

New icons "Virtual Placement" and "Placement Config Editor" are placed on your desktop after successful installation.

## License

The license is programmed into the Sentinel USB dongle. The dongle is required to run Virtual Placement and it has to be present during the application operation. Removing the key can shutdown Virtual Placement.

### License update

The hardware keys can be updated remotely in a simple process where some information may be exchanged between you and your software vendor. As a result, you can purchase additional services such as additional license limits remotely, without returning the key.

### The Remote Update Process

| | |
|---|---|
| 1 | Run License Updater from Start menu.<br>Alternatively, it is possible to run License Updater from Virtual Placement application by selecting Help > About > License > Update License. |
| 2 | A dialog will appear with attached dongle serial number and its current content. Press button “Yes” to start update process. |
| 3 | A dialog containing your license details is shown in case of no error occurred. Press button “Yes” to confirm dongle update. |
| 4 | Afterward, your license dongle is successfully updated .and you may access to the requested applications/features. |

For more information please visit the online document How to update license dongle.

## Software updates

Virtual Placement can be upgraded when a new version is released. All your configurations are preserved.

Each release has it's version, version number is dot-delimited and consists of *Major-number.Minor-number.Revision-number*.

Updates done in releases with changed revision version number are bug fixes or very small improvements. Change in minor or major version number indicates bigger changes.

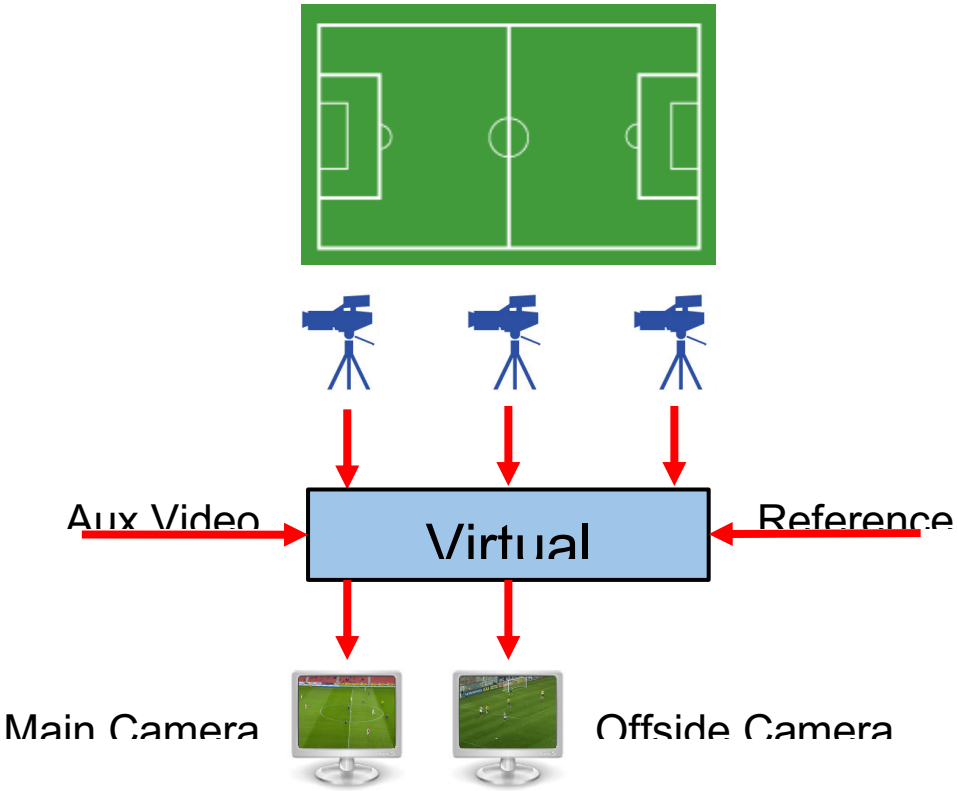
You should always read release notes before upgrading the application. If your application is running fine, do not upgrade to the new major version.

All updates are available on server https://da.chyron.com.

Please ask Chyron support to obtain login and password to access this site. You can register your email address to receive notification emails about new releases.

# VIDEO CONNECTION

## Soccer Installation



# CONFIGURATION

To edit the configuration file, use a shortcut accessible from the Windows Start menu: *Start → Programs → Virtual Placement → Config Editor.*

Main application settings can be done by choosing application preset on the System tab and here are some examples of presets.

| Application Presets | |
|---|---|
| Motion Tracking only | Keeps objects in the position in the textured scene.<br>Usage: Studio, Football |
| Anchor Tracking | Keeps objects in the position in the anchor scene.<br>Usage: Football, Hockey |
| Anchor Tracking with Main Camera Rendered to 2 Outputs | Similar to Anchor Tracking preset, allows two outputs containing the same video with different inserted graphics. |
| Pitch Tracking with Main Camera only | Automated tracking at properly calibrated pitch.<br>Usage: Football, Tennis, Badminton, Rugby |
| Pitch Tracking with 3 Recording Cameras | Automated tracking at properly calibrated pitch with all recording cameras. |
| Football with Main & Offside Cameras with Recording & Shared Output (Two 2i2o) | Football pitch automated tracking with recorded offside cameras and single video output using two video cards 2i2o |
| Football with Main & Offside Cameras with Recording & Shared Output (One 3i1o) | Football pitch automated tracking with recorded offside cameras and single video output using one video cards 3i1o |
| Football with Main & Offside Cameras with Recording & Shared Output with Clean Feed | Football pitch automated tracking with recorded offside cameras with shared video output and clean feed output using two video cards |
| Football with Main & Offside Cameras with Recording & Dedicated Offside Output | Football pitch automated tracking with recorded offside cameras and dual video output |
| Pitch Tracking with 3 Parallel cameras (2 x 2i2o) | Football pitch automated tracking with rendering to all 3 cameras. |
| Scene Tracking | Single camera configuration using Scene tracker. For details on scene tracking, see Virtual Placement User Guide. |

| | |
|---|---|
| Scene Tracking with Main Camera rendered to 2 Outputs | Single camera signal rendered into two output channels. allows two outputs containing the same video with different inserted graphics. |
| Custom settings | This option indicates the current configuration doesn't match any previous preset |
| PGM-ISO Comparison | Isolated camera used on input 1 and PGM camera used on Input 2 to compare and make a composite PGM output with tracking and graphics used in a downstream workflow (Works with both line and scene tracking) |

Besides the predefined application presets, it is possible to create user-defined preset by saving current configuration. To do that, press a cog-wheel button next to the Application Preset selector and choose Save As from the pop up menu. After specifying a name for the new preset, the preset is shown along other presets in the preset selection drop down.

## Configuration XML Reference

# Video

Video section serves to configure video properties.

### Video Format

```
<Format value="HD1080I_50"/>
```

Video format the Virtual Placement is running. Can be any of supported video formats.

### Color Depth

```
<ColorDepth value="8"/>
```

Color bit depth used across the video pipeline. Can be 8 or 10.

Default value: 8

### Level3G

```
<Level3G value="A"/>
```

Signal level of 3G video signal types. Can be A or B.

Default value: A

## Video Delay

```
<Delay value="6"> <!-- Camera and Output must be on same card. -->
      <CameraId value="0"/>
      <OutputId value="0"/>
</Delay>
```

Latency of the system, in frame periods - time between the same frame capture and playout, e.g.: value 6 on PAL (50 fps) - 6 * 1/50 s = 120 ms latency. Recommended value: 6 for PAL.

When using interlace video mode, the video delay must be an even number.

Default value: 6

You can specify the delay for one video stream that is connected to the same card. This one stream is guaranteed to have specified delay. All other video streams try to achieve desired delay value, but are not guaranteed to succeed. There can be only one Video Delay Element.

The values of CameraID and OutputID are ID used in one of Camera and Output elements. Both of them contain CardID and ConnectorID which must be equal. Generally, such video feeds must be on the same card and corresponding video inputs/outputs (both 0 or both 1).

When the system crashes, such stream is redirected to go through the card unmodified and correct. Even during PC boot sequence or when the computer is off the signal goes through uncorrupted.

You can increase the system latency if needed. It is useful to set higher system latency for downstream keying to allow virtual insertion in the 1st frame after camera edit. Increasing latency affects multiple configuration parameters like a Mixer Delay or frame allocation. It is therefore strongly recommended to use Config Editor (Video page > Video Latency value) to change Virtual Placement video latency.

## Video Genlock Source

```
<Video>
      <Genlock>
            <GenlockSource value="value"/>
            <GenlockH value="0"/>
```

```
            <GenlockV value="0"/>
      </Genlock>
</Video>
```

GenlockSource can have following values:

ANALOG
SDI

Default value:  ANALOG

You can also specify vertical and horizontal genlock delay. Copy the values from Bluefish444 Feature App - Timing Adjust Horizontal/Vertical. The genlock timing values are applied when application starts.

## Video Output

```
<Output id="0">
      <Enabled value=”1”>
      <CardId value="0"/>
            <ConnectorId value="0"/>
            <EnableVANC value="0"/>
</Output>
<Output id="1">
      <Enabled value=”1”>
      <CardId value="0"/>
      <ConnectorId value="1"/>
      <EnableVANC value="0"/>
      <TrackingUdpPort value="0"/>
</Output>
```

Defines symbolic id for given card ID and camera ID. The output ID is used below in the camera element definition.

If the value of Enabled element is set to 1, the output is used.

Recommended: Main camera to be on the same card, input 0 and output 0.

`EnableVANC`: allows previously got VANC data to be written into the output video stream.

`TrackingUdpPort`: allows to send camera tracking data to UDP. For detailed info, see Streaming Camera Tracking Data chapter.

## Video Texture

```
<Video>
      <VideoTexture>
            <Enabled value="1"/>
            <CardId value="1"/>
            <ConnectorId value="0"/>
            <WithAlpha value="0"/>
            <Format value="HD720P_50"/>
            <AudioEnabled value="0"/>
      </VideoTexture>
</Video>
```

### Enabled

Enables/disables capturing a video texture. Used as a source for a Video Input Product.

Value for Enabled element: 0/1

Default value: 0

If the video texture is enabled, you have to specify where the texture is connected to the computer. Set correct CardID and ConnectorID values.

### Format

Video texture can define its own video format, different from the format used by Virtual Placement application. Any valid video format can be specified.
With 4K signal, four connectors starting from the connector specified by VideoTexture/ConnectorId are used to supply the input signal.

### WithAlpha

Enables or disables alpha channel for video texture. When enabled, two input signals, Fill and Key, need to be connected to Virtual Placement. The connection scheme is Fill signal first (at a connector specified by VideoTexture/ConnectorId), followed by Key signal on the next input connector.

With 4K signal, Fill signal occupies four input connectors and Key signal occupies the following 4 connectors.

Value: 0/1

Default value: 0

### AudioEnabled

Enables or disables audio from video texture input. When enabled, audio will be mixed into the output when VideoInput product is in production.

## InterlaceInterpolation

```
<Video>
     <InterlaceInterpolation value="value"/>
</Video>
```

Possible values are:
NONE
2LINE
4LINE

The playing back of smooth slow motion pictures carries specific issues since some fields must be repeated at regular interval to provide the video at the playback speed required by the operator, parity violation appears regularly on the output video signal. This issue is specific to interlaced formats (525i, 625i and 1080i) and does not concern progressive formats (720p).

Disabled interpolation (NONE) produces vertical jitter but perfectly sharp image.

The 2-line interpolation actually generates a new field, when the original field is in parity violation. Each line of this new field is calculated by a weighted average of the 2 neighboring lines. This process solves the problem of parity violation and vertical jitter, but the drawback is a reduction of the vertical resolution on the interpolated fields that appear unfocused. Another by-side effect is the alternation of original fields (perfectly focused) and interpolated fields (unfocused), resulting in a "pumping" video signal.

The 4-line interpolation uses a more sophisticated calculation based on the 4 neighboring lines. The final result is a permanently, slightly unfocused picture. The advantage is a stable output signal with no jitter and no "pumping", but the vertical bandwidth is even more reduced.

The interpolation is always disabled at 100% playback speed, because there is no parity violation.

## Cameras

Cameras section is subsection of the Video section.

```
<Video>
      <Camera id="0">
            <Enabled value="1"/>
            <Name value="Main"/>
            <CardId value="0"/>
            <ConnectorId value="0"/>
            <TrackerId value="main"/>
            <OutputId value="0"/>
            <EnableVANC value="0"/>
            <Keyer value=”Gauss”/>
      </Camera>
</Video>
```

### Camera id

Unique integer identifying the camera within the system.

Default value: 0

### Camera Enabled

Values: 0/1

Enables / disables given camera. Simple way to disable a camera when you don't need it.

Default value: 1

### Camera Name

User-defined name that will be displayed in the application. User configurable.

Default value: Main

## Card ID (CardId)

Define Matrox Card ID, where the output of a given camera is connected to.

## Connector ID (ConnectorId)

Define connector ID on the previously defined card, where the camera is connected to.

## Enable VANC

Allow reading of VANC data from the SDI signal.

## Tracker ID (TrackerId)

Defines tracker name associated to the camera. One of the { main, offside_left, offside_right, hi_behind } values.

The Tracker ID can be declared multiple times for one Camera. That way, multiple trackers are running on the camera stream. Data from the tracker with best tracking quality are used for tracked graphics. This can be effectively used for downstream tracking, when incoming stream contains mix of different camera shots.

## Output ID (OutputId)

Define output, on which this camera should play out (Video outputs are described above, in the Video Output section). Value of <OutputId value="0"/> should correspond to one of output id (<Output id="0">) defined above.

One output can be referred by more cameras (they have defined the same Output ID). In this case, output signal will switch signal from one of sharing cameras, according to which one is selected in preview.

The OutputId element can be specified multiple times for one Camera. That way, the camera is streamed to multiple outputs. In combination with Multi channel mixing, video coming from one camera can be split to multiple outputs, containing different graphics on different outputs.

## Keyer

Selects a chroma keyer type used by the camera.

| Keyer values | |
|---|---|
| Gauss | Default value. Chroma keyer set manually by picking keyed colors in video image. |
| Adaptive | Automatic keyer. Keyed color is computed adaptively from image color histogram. |

# Audio

Audio section configures sound subsystem properties.

## Enabled

Enables or disables audio processing.

Allowed values: 0, 1

Default value: 1

## SampleRate

Sampling rate of the audio, in samples per second.

Only 48000 samples per second rate is currently supported.

## BitsPerSample

Audio bit depth, number of bits per each sample.

Allowed values: 16, 32

Default value: 16

## ChannelCount

Number of audio channels.

Allowed values: 2, 4, 6, 8, 16

Default value: 4

## AudioMix

Type of  audio processing. Decides how the audio embedded in the incoming SDI input is mixed with the audio supplied by gfx content (usually from .gtc clip).

| AudioMix values | |
|---|---|
| MIX | Default value. Application internally mixes input/clip audio with content audio. |
| OUT | Application outputs content audio only. |
| PASS | Application outputs input audio only |
| MIX_OVER_LIVE | Application internally mixes live input audio with content audio. |

## AudioChannelConfig

Allows to customize mapping of gfx content audio channels to the IO audio channels. Contains a list of AudioChannel elements, each one defining mapping of single content channel.

For example:

```
<AudioChannelConfig>
      <AudioChannel source=”0” io=”2”/>
      <AudioChannel source=”1” io=”3”/>
</AudioChannelConfig>
```

The example above makes channel 0 of the gfx content to be mapped into io channel 2. Content channel 1 is mapped into io channel 3.

## OutputTone

Allows to generate a constant sinus output tone of given frequency to specific audio channel.

```
<OutputTone>
      <Enabled value="1"/>
      <Frequency value="1000"/>
      <AudioChannel value="2"/>
</OutputTone>
```

With the configuration above, VP generates audio signal of 1kHz into channel 2.

## Dolby E audio support

Dolby E audio is currently supported in PASS mode only. Use following settings to get audio passing through correctly:

| | |
|---|---|
| BitsPerSample | 32 |
| AudioMix | PASS |
| ChannelCount | 2 (or more) |

# Tracking parameters

It is strongly recommended to keep the default values and do not modify the Motion Estimation section.

```
<MotionEstimation>
      <TrackerType value="MOTION"/>
      <Projection value="PERSPECTIVE"/>
      <FeatureSelector value="REGULAR"/>
      <FlowStride value="FRAME"/>
      <FlowInterlace value="ESTIMATE"/>
      <DropRecover value="0"/>
      <MotionThreads value="1”/>
</MotionEstimation>
```

### TrackerType

Decides type of the tracking used by Virtual Placement.

| MotionEstimation TrackerType values | |
|---|---|
| MOTION | Simple motion tracking. Allows to keep object on same position in scene when camera moves. Tracking is stable only for a limited amount of time. After then, objects start to suffer from drift and distortion. |
| ANCHOR | Places object relatively to predefined anchor frames. Tracked objects are visible when the anchor frame is recognized in incoming video. |
| PITCH | Line tracking, designed for sports with distinct lines drawn on pitch. Requires proper calibration. Allows to place tracked objects on virtual pitch plane. |
| SCENE | Recognizes a scene using a wide panorama captured during calibration. Allows to place objects in virtual scene space. |
| PITCH_OFFLINE | Pitch tracker using tracking data coming as a part of the signal from an upstream |

| | |
|---|---|
| | machine as a VANC or audio data. See TrackingSource setting for details. |
| SCENE_OFFLINE | Scene tracker using tracking data coming as a part of the signal from an upstream machine as a VANC or audio data. See TrackingSource setting for details. |

## Projection

Type of allowed transformations describing image movement for Motion Tracking. This setting is OBSOLETE! Please always keep value PERSPECTIVE.

| MotionEstimation Projection values | |
|---|---|
| SCALE_UNIFORM_AND_TRANSLATE | Experimental. |
| SCALE_AND_TRANSLATE | Experimental. |
| AFFINE | Experimental. |
| PERSPECTIVE | Default. Recommended. |
| PERSPECTIVE_NO_ROLL | Experimental. |

## FeatureSelector

Algorithm of image feature selection for Motion Tracking.

| MotionEstimation FeatureSelector values | |
|---|---|
| REGULAR | Default value. Tracking area homogeneously covered with grid of tracking points, recommended for outdoor scenes. |
| CORNER | Distinct features are found in the image and used as tracking points, recommended for in-studio usage or in situations when there are indifferent solid color areas in an image. |

## FeatureCount

Number of points used for Motion Tracking.

Feasible range is 100 - 500.

Default value is 200.

## FlowStride

Amount of frames tracked in a single batch in Motion Tracking.

| MotionEstimation FlowStride values | |
|---|---|
| LONG | Several number of frames in a batch. This can help to reduce noise in tracking when scenes are almost static. |
| FRAME | Default value. Each frame is tracked independently, just relative to its predecessor, recommended value. |

### MaxLongStrideAge

Maximum length of the long flow stride. Applied only when the FlowStride is set to LONG. Lowering the value can improve tracker behavior with long dissolves.

Default value: 150

### FlowInterlace

Treating of upper/lower field tracking method.

| MotionEstimation FlowInterlace values | |
|---|---|
| ESTIMATE | Default value. Both fields are tracked, recommended. |
| INTERPOLATE | Every even field is tracked, odd fields motion is interpolated. |

### DropRecover

This setting could be used to avoid losing Motion tracking when video contains drops or flashes (for example in indoor sports). Set to 0 to disable or set to number of retries (frames or fields) to try to recover from the last frame of good tracking before the drop. The recover phase tries to skip defined number of frames during tracking. During this time the tracking is reported as no movement. After the recover the movement follows up from the last frame before drop. If recover cannot be computed in selected number of retries, then new scene is created. When your video contains both flashes and scene cuts then see parameter FlashThreshold.

Default value: 0

### FlashThreshold

Parameter for detecting still camera flashes in video. When your video contains both flashes and scene cuts then the flash detector can better distinguish between the two. This number

specifies brightness threshold of a frame with a flash in percents, where 100% is full white. Reasonable value range is 91-99. When the flash is not detected then the tracking drop is considered as a scene cut.  Value 0 disables the detector and all tracking drops are always tried to recover.

Range is 80 to 100.
Default value: 95

## MotionThreads

Sets number of CPU threads for Motion tracking. The number of threads must corresponds to CPU performance and number of available processors.
For low speed CPUs 2 up to 4 threads can be used, depending on video resolution.
For high speed CPUs one thread is enough for all video modes.
Having too many threads on good CPU just makes all the threads busy and can hurt performance of other processing threads.

Default value: 1

## MaxMotionError

Defines sensitivity of scene detection. Value 0.0 disables scene detection, this can increase robustness when using clean feed directly from camera and the camera movement is fast.

Lower values increase sensitivity. Higher values decrease sensitivity.

Typical value for sensitive scene detection is 5. The value depends on conditions and video footage quality.

Default value: 20

## TrackingMaskThreshold

Defines threshold for considering if the pixel in the mask is  included or excluded from tracking. The mask itself is an image that can have 256 gray levels. The tracking mask is a binary mask - tracked or not. If the pixel in the mask is greater or equal than this threshold then tracking is allowed at this position. Beware the image mask is inverted  after loaded from file - before the comparison is made! Value 0 becomes 255, value 1 becomes 254 and so on.

For example you can set threshold to 255. and create an image with value 1. Then image value 0 enables both tracking & insertion, value 1 disables tracking but still enables insertion (well, almost, it will be 0.39% transparent, such low transparency is not noticeable), values up to 255 gradually disable insertion.

Range is 0 to 255.
Default value: 128

## AnchorThreads

The number of threads for processing Anchor tracking.

Default value: 3

## AnchorPoints

The number points used for Anchor tracking.

Default value: 500

## AnchorPointMinQuality

Sensitivity of point selection for Anchor tracking. Point to track are automatically detected.. Each point has assign quality based of contrast level at the area. Lowering this threshold will find more points in the image. It is not guaranteed that having more points will end up in better tracking. Low quality point could be unstable and can hurt the overall tracking quality.

Feasible range is 0.001 to 0.02.
Default value: 0.01

## AnchorPointMinDistance

This number influences number of points used for Anchor tracking. The number means minimal distance between points in pixels. When points are too close to each other then it does not add any value for tracking. For example some large very contrast area could detect many points. These points are at one place. Because number of points is limited then no other points from other part of the image is used. As a result the tracking could be unstable.

Feasible range is 5 to 30.
Default value: 15

## AnchorRefSimilarity

This is a threshold for each point in anchor reference frame. When value is non zero then all points are matches against each other. It might happen that reference image contains many very similar points (for example labels around the pitch that are replicated many times). These duplicated points do not add any value to tracking because the matching will mostly fail as the points are too similar. Value zero disables this test (equal to Virtual Placement 6.0 and lower). Low value discards very similar points. Higher value discards points that are only little similar.

Feasible range is 0-100
Default value: 40

## AnchorMaxError

This is a threshold for matching error between reference frame and live video frame. If the error is larger then this value then the match is rejected. Increasing the threshold increases the chance that an incorrect match will be accepted. Making the threshold lower allows to pass only really good matches. Having the value too low could result in effectively disabling the anchor tracking as the matching is never perfect.

Feasible range is 1.0 - 3.0.
Default value: 1.8

## AnchorMode

Controls anchor transmission over SDI VANC. When set to MASTER then anchor tracking is embedded into SDI VANC block. When set to SLAVE then the anchor tracking is not computed locally but rather the tracking parameters are extracted from SDI VANC. Slave do not have anchor tracking calibration dialog. The project file created on master PC should be delivered to slave for optimal workflow. VANC must be enabled to use this feature. See parameter Output / EnableVANC. See also parameter AnchorVancLine.

Possible values: MASTER, SLAVE, empty string.
Default value: empty string

## AnchorVancLine

Configures VANC line for anchor tracking transmission inside SDI VANC block. Value 10 is recommended. Value 0 disables the transmission/extraction.

Default value: 0

## DissolveWindow

Configures dissolve detection. Set to 0 to disable dissolve detector. Otherwise the value specifies expected duration of the dissolve. Too narrow window would generate more false positives. Too wide window could miss short dissolves.  The value is unit less.

Feasible range is 5 – 15. Value 0 disables dissolve detection.
Default value: 0 to disable, 7 is default to enable dissolve detection.

## DissolveThreshold

Configures sensitivity of dissolve detection. Lower value makes it more sensitive but could also increase rate of false positives. Higher value minimizes false positives but could miss some dissolves. The value is unit less.

Feasible range is 5 – 30.
Default value: 10

## DissolvePreCut

The dissolve is normally detected at somewhere in the middle of the transition. The system must process several consecutive frames to decide if this was dissolve or not. It happens that during the dissolve the motion tracking is not reliable. The gfx jumps or skews. To minimize this problem the motion cut could be applied much earlier then the dissolve is actually detected. This value specifies number of fields in interlace or frames in progressive how much earlier the motion cut should be made. For example value 5 would report motion cut 5 frames/fields before the dissolve is detected. Beware that to be able to use this feature you must configure longer total latency of the system. For example if you normally use latency 6 and have this value set to 10, then the total latency would need to be at least 16.

Feasible range is 0 – 20.
Default value: 0

## LateFadeDuration

When anchor tracking recognizes the scene too late then graphics could appear immediately in the middle of the screen. This is often disturbing. This parameter allows to set a duration of gradual fade in when the graphics in about to be displayed. The fade in is

not applied after the scene cut and also when the graphics is projected outside the screen area at the time of recognition. Value zero disabled this functionality. This parameter is only implemented in Anchor tracking.

Feasible range is 0-10.
Default value: 0 (disabled)

### PanScan

When enabled, VP gets video from Evertz DreamCatcher that contains embedded camera pan-scan data in VANC area. Must be used together with scene tracking with static camera.

Possible values: 1 (enabled), 0 (disabled)
Default value: 0

### CameraSelector

Useful for downstream tracking applications. Algorithm used to decide which camera is in incoming video.

| MotionEstimation CameraSelector values | |
|---|---|
| (empty) | Default value. Camera is decided by evaluating tracking quality of individual trackers associated with video input. |
| TONE | Camera is decided from audio signal taken from given audio channel of the incoming SDI signal. See parameters below for details. |

### CameraSelectorTones

When TONE CameraSelector value is used, allows to assign tone frequency to individual camera(s). Syntax is 'frequency=trackerName<space>'. For example, '1000=main' specifies that when audio tone has frequency 1000 Hz, input signal contains main camera.

### CameraSelectorLatency

Specifies delay between video and audio signal, in frames/fields. 2 is minimum. Positive value means that audio tone changes come with some delay after the camera signal actually changes on the video input.

### CameraSelectorAudioChannel

Specifies id of the audio channel bringing camera selector tone.

Feasible range is 0 – 16.

Default value: 2

### TrackingSource

Specifies external source for tracking data. Used for downstream configurations where the upstream machine performs tracking and sends tracking data to the downstream machine. Tracking data can be sent over VANC or over audio channel.

TrackingSource value is supported by PITCH_OFFLINE and SCENE_OFFLINE tracker types.

You need a Downstream license to use the external data feature.

| TrackingSource values | |
|---|---|
| (empty) | Default value. No external tracking data are received. |
| VANC | Tracking data are embedded into the SDI signal as a VANC data. Requires upstream machine to enable Output/EnableVANC |
| Audio/n | Tracking data are embedded into n-th audio channel. Requires upstream machine to have OutputTrackingAudio/Enabled. The channel setting must be the same on both machines. |

## OutputTrackingAudio

Sends tracking data modulated onto specific audio channel. Allows to connect other VP machine to receive the tracking data (see TrackingSource setting). Note that audio must be enabled and configured to use a sufficient number of channels.

```
<OutputTrackingAudio>
      <Enabled value="1"/>
      <AudioChannel value="3"/>
</OutputTrackingAudio>
```

The example above sends modulates tracking data to the channel 3 of the output audio.

## Mixer

```
<Mixer>
   <Delay value="2"/>
   <BypassControl value="0"/>
   <MultiChannel value="0"/>
   <FontEngine value="OLD"/>
</Mixer>
```

### Delay

Time utilized mostly by computation of tracking. Must be less than Video/Delay value. See Video/Delay for more details.

Default value: 2

### BypassControl

When set to 1, GUI shows a VIDEO BYPASS button. When pressed, the button temporarily suspends sending of mixed frames to output. Clean video is sent instead.

Default value: 0

### MultiChannel

Enables or disables multi channel mixing.

| Mixing Modes | |
|---|---|
| 0 | Single Channel mixing. Default. Single mixer running in application. Graphics is mixed only to the camera currently shown in preview. |
| 1 | Multi Channel mixing. There is a mixer channel running for each application output. Each output can therefore contain different rendered graphics at same time. Products are assigned to particular rendering channel. |

### FontEngine

Font rendering engine used for rendering texts.

| Font Rendering Engine types | |
|---|---|
| OLD | Default. Legacy rendering engine. Suitable in most situations. |

| | |
|---|---|
| DWRITE | Enhanced engine supporting rendering of special alphabet characters (e.g.Arabic or Japanese). |

## Still Images

Still images allows you to put a still image to the video output instead of video feed. This is useful for e.g. let the director know, an offside is being prepared by putting image with some (language localized) text to the output. Also allows you to prepare an image with logo of your company etc. If image file for given event not given, black screen is used.

To change the image, just enter path to the image file to the filename attribute of corresponding event element.

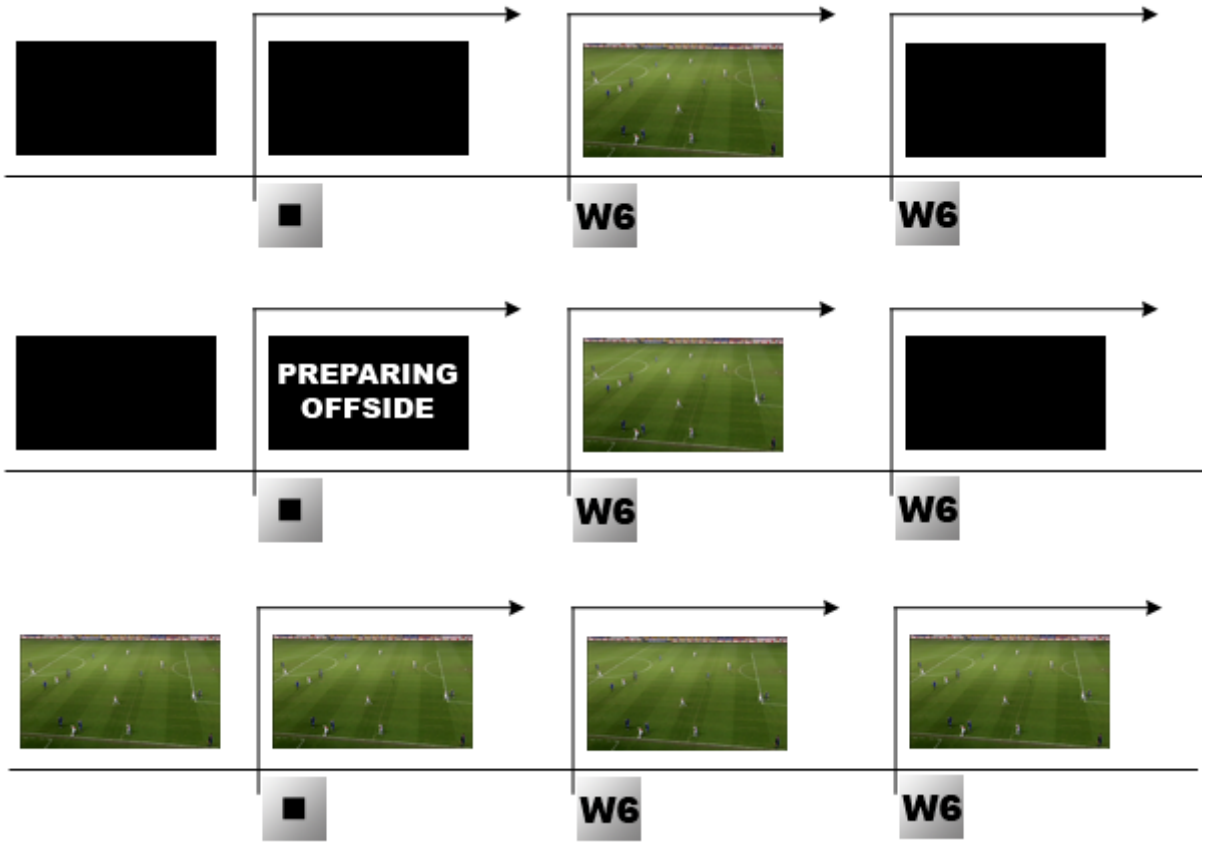
OutputID's value attribute must contain reference to valid offside output.

The filename contains either absolute path or relative path to the application install directory.

```
<StillVideoImages>
       <Image type="OFFSIDEOFFAIR" filename="offs_offair.png” outputid=”1” enabled=”1”/>
       <Image type="OFFSIDEPREPARING" filename="offs_preparing.png"outputid=”1” enabled=”1”/>
       <Image type="OFFSIDEONAIR" filename="" outputid=”1” enabled=”1”/>
</StillVideoImages>
```

| StillVideoImages types | |
|---|---|
| OFFSIDEOFFAIR | Image used on output during the game, between the offside events. Default image „offside_offair.png“ is a black image. |
| OFFSIDEPREPARING | Time between switching to recorded footage and signal that offside is ready. Default image is black image with „Offside Preparing“ label. |
| OFFSIDEONAIR | Time when the offside is on-air. Must stay empty, otherwise there wouldn't be video signal! |

How the offside output differs according to Still Images setting:




1. Black image (can be any other image) is on the output, only during production the recorded signal appears.
2. During offside preparation you can put a “Preparing offside” label on the output. This can be useful in communication with the director.
3. Offside signal contains the same signal, that is actually in the preview all the time.

Setting for StillImages Section to achieve the discussed output content:

1

```
<Image type="OFFSIDEOFFAIR" filename="offside_offair.png"
   enabled ="1" outputid=”1”/>
<Image type="OFFSIDEPREPARING"
filename="offside_preparing.png"
   enabled ="0" outputid=”1”/>
<Image type="OFFSIDEOFFAIR" filename=""
   enabled ="1" outputid=”1”/>
```

| | |
|---|---|
| 2 | <Image type="OFFSIDEOFFAIR" filename="offside_offair.png"<br>enabled ="0" outputid=”1”><br><Image type="OFFSIDEPREPARING"<br>filename="offside_preparing.png"<br>enabled ="1" outputid=”1”><br><Image type="OFFSIDEOFFAIR" filename=""<br>enabled ="1" outputid=”1”> |
| 3 | <Image type="OFFSIDEOFFAIR" filename="offside_offair.png"<br>enabled ="1" outputid=”1”><br><Image type="OFFSIDEPREPARING"<br>filename="offside_preparing.png"<br>enabled ="1" outputid=”1”><br><Image type="OFFSIDEOFFAIR" filename=""<br>enabled ="1" outputid=”1”> |

## Disk Recorder

This section serves to set parameters of the disk recorder. Values of some elements may seem to be very strange numbers. They are adjusted to follow size of HDD blocks and they become more meaningful in hexadecimal representation. Do not change them randomly, the throughput of the system may suffer.

```
<DiskRecorder>
      <Enabled value="1"/>
      <FileName value="RAM"/>
      <FileSize value="12"/>
      <BlockBytes value="402653184"/>    <!-- 0x18000000 →
      <BlockInfoBytes value="1572864"/>  <!-- 0x180000 →
      <FramesPerGroup value="1"/>
      <MinRecordHoleToSkip value="15"/>|
      <PreallocateBy value="16777216"/>  <!-- 0x1000000 →
      <DynamicLockRadius value="1000"/>
      <PlaylistLength value="2"/>
</DiskRecorder>
```

## Enabled

Values: 0/1

Enables using disk recorder. At this point, no camera is recorded. Enable recording on desired cameras (see Cameras sections).

Default value: 1

## File Name (FileName)

Specify path to the video file. Use absolute path.

Default value:  RAM

## File Size (FileSize)

Specify size of the video file in GB. Make sure there's sufficient disk space for the whole file. The file is allocated at the start of the application so it has the specified size all the time. Mind, change will take some time to reallocate the file at the next start.

Default value: 12

## Block bytes (BlockBytes)

Bytes per one logical block.

Default value: 402653184

## Block Info Bytes (BlockInfoBytes)

Number of bytes of metadata per block.

Default value:  1572864

## Frames Per Group (FramesPerGroup)

Default value: 1

## Minimal recording hole (MinRecordHoleToSkip)

Footage holes, having hole of more than given number of frames, will be considered as invalid and skipped. Holes shorter than that, will be played (last valid frame). Value of 15 means, if there's hole of 14 frames, the last valid frame will be played instead of the 14

missing ones. If there's hole of 16 frames, they will be skipped and the played footage will be 16 frames shorter.

Recommended value: 15

### Prelocation (PrelocatedBy)

Controls size of disk blocks used during video disk initialization.

Default value: 16777216

### Dynamic Lock (DynamicLockRadius)

Number of last frames that are automatically locked and thus not rewritten. Usually, the disk recorder reuses unlocked disk blocks = footage not contained in any clip. Having this value set to 1000 guarantees, the last 1000 frames ( ~ 20 seconds @50 fps) are not rewritten and can be transformed to clip up to 20 seconds later. This is the worst case that can occur when disk is almost full or very small.

Default value: 1000

### Playlist length (PlaylistLength)

Number of frames of a clip computed in advance before loading.

Default value: 2

## Cache

Cache is used to accelerate clip loading and playback.

```
<Cache>
     <ClipPreload value="-1"/>
</Cache>
```

### Preload Size (ClipPreload)

Number of MB of video data loaded ahead for a clip after selection. Greater value decreases disk overhead during clip playback, however, it can cause the application to wait for a while after the clip is selected.

Default value: -1 (uses as much as possible)

## Snapshots

```
<Snapshots>
      <CameraId value="200" />
      <OutputId value="0" />
      <Directory value="" />
</Snapshots>
```

### CameraId

Identifier, used to identify snapshots. Must be unique among all CameraId values in the config. Recommended value: 200.

### OutputId

Reference to output where the snapshots appear. Recommended value: 0.

### Directory

Directory to store the snapshots into. In case, the value is empty string, path to application directory is used:

C:\Users\<user>\AppData\Roaming\Chyron\VirtualPlacement8\Snapshots

Recommended value: empty.

## Stored clips

When Disk Recorder is set to record to RAM, you can store the clips on the hard drive for future playback.

```
<ImportedClips>
      <CameraId value="300" />
      <OutputId value="1" />
      <Directory value="" />
      <Enabled value="1" />
</ImportedClips>
```

### CameraId

Identifier, used to identify clips. Must be unique among all CameraId values in the config. Recommended value: 300.

### OutputId

Reference to output where the stored clips appear. Recommended value: 1.

### Directory

Directory to store the clips into. In case, the value is empty string, path to application directory is used:

C:\Users\<user>\AppData\Roaming\Chyron\VirtualPlacement8\ExportedClips

Recommended value: empty.

### Enabled

Enables storing/importing clips.

## Recorded clips

Enable clip controls when the Disk recorder is set to record to Video file.

```
<RecordedClips>
      <Enabled value="1" />
      <AutomaticClipLength value="30" />
      <LockClipsInAllCameras value="false" />
      <EnterRecordingCameraOnJog value=”false”/>
</RecordedClips>
```

### Enabled

Enable management for recorded clips in the video file. Disk recorder must be enabled and set to Video file.

### AutomaticClipLength

Length of the clip (in seconds) created automatically, when only In/Out point is specified.

Default Value: 30

### LockClipsInAllCameras

Define clips in one camera or in all cameras. If the value is true, each clip is created in all recorded cameras and camera can be changed during playback.

Default Value: false

### EnterRecordingCameraOnJog

When enabled, application automatically switches to recorder camera whenever user moves the jog wheel while in live camera.

Default Value: false

## Chroma Keyer

```
<ChromaKeyer>
      <PickMinThreshold value="20" />
      <PickMaxThreshold value="80" />
</ChromaKeyer>
```

### PickMinThreshold

Default min threshold when picked chroma key value. When current pixel has lower distance to key color than this threshold then the key is considered as fully active (white).

### PickMaxThreshold

Default max threshold when picked chroma key value. When current pixel has  higher distance to key color than this threshold then the key is considered as fully inactive (black).

Color distance (in color key model) between min and max produces key values proportionally between white and black.

## Keyboard Configuration

There are several shortcuts in the application. You can define your own shortcuts to the available actions or modify the default assignment.

The keyboard configuration takes place in the Keyboard xml element.

### Keyboard Shortcut Assignment

```
<Keyboard>
      <Button action="SelectProduct1" name="F1"/>
      <Button action="SelectProduct2" name="F2"/>
      …
      <Button action="DeleteProduct" name="ctrl D"/>
      …
      <Button action="Go" name="numpad ENTER"/>
      …
      <Button action="ProductToMouse" name="typed B"/>
      …
</Keyboard>
```

## Button function assignment (Button)

- Attribute *action*: Symbolic name of the action that should be performed on the button press.
- Attribute *name*: Symbolic button name. You can use both printable and function keys.
- Printable keys ('A-Z', '0-9', '.', ';', 'enter' etc) can be combined with modifier keys ('ctrl', 'alt', 'shift'). Please use only uppercase (e.g. 'A', not 'a').

| Printable keys assignment examples | |
|---|---|
| “typed A” | Key of 'A' without any modifier keys pressed. |
| “ctrl A” | Key of 'A' with ctrl key pressed. |
| “ctrl shift alt 0” | Key of '0' with ctrl and shift and alt pressed. |

- Function keys – keys that don't cause printing a character ('F1-F12', 'home', 'end', 'delete' etc). For these keys, you can specify, if the action is called on press or release. When 'pressed/released' not specified, 'pressed' is used as default. The key name must be in capitals.

| Function keys assignment examples | |
|---|---|
| “ESCAPE” | 'Escape' key is pressed. |
| “pressed F1” | 'F1' key is pressed. |
| “released PAGE_UP” | 'Page Up' key is released |
| “shift LEFT” | 'Left' key is pressed during 'Shift' key is down. |
| “ctrl UP” | 'Up' key is pressed during shift key is down. |

List of string representation of the function keys:

| | | |
|---|---|---|
| ESCAPE | INSERT | BACK_SPACE |
| F1..F12 | DELETE | TAB |
| PAGE_DOWN | LEFT | SPACE |
| PAGE_UP | RIGHT | CONTEXT_MENU |
| HOME | UP | |
| END | DOWN | |

- Special keys List of special key combinations that can be assigned to a function. Do not modify the string that represents them.

| Special keys assignment examples | |
|---|---|
| “numpad enter” | The enter in the numeric part of the keyboard. The main enter will be ignored (doesn't call the assigned function). |
| “numpad typed *” | Asterisk/Multiplication mark in the numeric part of the keyboard. |
| “numpad typed -” | Dash/Subtraction mark in the numeric part of the keyboard. |

## Project Directories

```
<Projects>
      <Directory
value="C:\Users\<user>\Documents\VirtualPlacementProjects"/>
</Projects>
```

Specifies path to project directory. This directory will be used as default. Here you'll be offered to save/load products and projects.

Default value:

```
C:\Users\<user>\Documents\VirtualPlacementProjects
```

## Products

```
<Products>
	<Product enabled="1" type="Image"/>
	<Product enabled="1" type="Clip"/>
	<Product enabled="1" type="Text"/>
	<Product enabled="1" type="Freekick"/>
	<Product enabled="1" type="Offside"/>
	<Product enabled="1" type="ZoomSpot"/>
	<Product enabled="1" type="Freehand"/>
	<Product enabled="1" type="VideoInput"/>
	<Product enabled="1" type="Group"/>
	<Product enabled="1" type="HeightMeasurement"/>
	<Product enabled="1" type="Script"/>
	<Product enabled="1" type="TracabScript"/>
	<Product enabled="1" type="DownAndDistance"/>
</Products>
```

Enables/Disables using of certain products. You can disable some products, e.g. for faster orientation among the available products in GUI during production.

Possible values for the enabled attribute: 0/1

### Offside automatic clip export (OffsideClipAutoSave)

```
<Products>
	<Product enabled="1" type="Offside">
		<OffsideClipAutoSave value="1"/>
	</Product>
</Products>
```

Enable automatic clip saving after the offside line is placed. The exports starts when switched out of the offside camera.

Default value: 0

### Offside configurable clip margins (OffsideClipMargins)

```
<Products>
      <Product enabled="1" type="Offside">
            <OffsideClipMargins before="10" after="20"/>
      </Product>
</Products>
```

Determines offside clip length by definition of  margin around offside timecode. Units are in seconds.

Default value before: 10
Default value after: 20

### Offside automatic selection

```
<Products>
      <Product enabled="1" type="Offside">
            <AutoSelection enabled="true"/>
      </Product>
</Products>
```

Automatically selects first offside product and deselects all others on transition from Live camera to Recorder camera (when Stop button is pressed).
Default value: true

## Application Window

```
<Window>
      <FullScreen value="1"/>
</Window>
```

Defines application appearance.

## Fullscreen mode (FullScreen)

If the value attribute is set to 1, the application is run in full screen mode without decorating and space occupying title bars. If set to 0, application is run in normal window mode with window size of 1024x768.

Possible values: 0/1

Default value: 1

# Tracab integration

Virtual Placement supports tight integration with Tracab system.

## Integrating Virtual Placement with Tracab

| | |
|---|---|
| 1 | Add Tracab element to config.xml. See below for details. |
| 2 | Enable product for player tracking visualization. Add this into `<Products>` section:<br>`<Product enabled="1" type="TracabPlayers"/>` |
| 3 | When you start the application with Tracab integration enabled for the first time then dialog about Windows firewall appears. Please press "Allow access". |
| 4 | It is required to run Tracab's TDCGraphics version 4.5.9.2 or newer. Only UDP Protocol version 4 is supported |

Tracab configuration:

```
<Tracab>
      <Server value="localhost"/>
      <UDPPort value="9006"/>
      <SignalPort value="49001"/>
      <LogFile value=""/>
      <Delay value="0"/>
      <FlipSides value="false"/>
      <Queue value="2"/>
      <Repeat value="0"/>
      <SendUdpPort value="0"/>
      <SendOutputId value="0"/>
      <FrameDoubler value="true"/>
      <OverlayData value="1"/>
</Tracab>
```

| Tracab Configuration Values | |
|---|---|
| Server | Host name or IP address of Tracab streaming application (TDCGraphics). If server name is empty then Tracab data reader is disabled. |
| UDPPort | If present it is an UDP data port where the data are received. If not present then default port 9006 is used. |
| SignalPort | If present it is a TCP signalization port that is made to TDCGraphics. If not present then default port 49001 is used. |
| LogFile | Optional. Full file path where info about received packets are logged. Example: `"C:\Users\<user>\Documents\VirtualPlacementProjects\tracab.log"`. |
| Delay | Optional. Controls data delay relative to incoming video. Tune this parameter when tracking lags or is too ahead of video. Value in video fields/frames. This should never be higher then Video/Mixer value. |
| FlipSides | Set to `true` when Tracab cameras and TV cameras are on the opposite sides of the pitch. |
| Queue | Optional. Set to value 4 or 5 when the Tracab live data are coming in very irregular intervals. Default value is 2. This number specifies an average queue length for synchronizing Tracab data with input video. Longer queue length also delays the data. So the Delay parameter should be adjusted as well. |
| Repeat | Optional. Allows to repeat a frame one a while to match Tracab frequency with video frequency. The value 0 disables this feature. Value N means that after N frames that frame is repeated. Set to 0 if frequencies match. Set to 5 when Tracab runs in 25Hz and video is in 60Hz. |
| SendUdpPort | Optional. Set to UDP port number where to send Tracab frame counter. The counter is sent to specified video output when video frame goes to SDI output. The value is sent as a 32bit binary integer in little endian format. |
| SendOutputId | Optional. Defines video output ID with which to synchronize the packet transmitting. Default is 0. |
| FrameDoubler | Controls duplication of data frames coming from Tracab. Normally Tracab sends data in half frame rate then video rate (25 vs. 50). Set to `true` to enable the doubler. Set to `false` to disable it. |
| OverlayData | Allows to enable or disable retrieval of refined tracking data from Tracab server during replays. Makes it possible to show speeds and distances during replays as they are not supplied with refined tracking data. |

## User Time

The application allows to bind custom time information to individual frames being passed through the system. User time functionality is controlled by UserTime element:

```
<UserTime>
      <Enabled value="1"/>
      <Source value="Internal"/>
      <Hego name="CLOCK" port="3213"/>
      <PresetTime>00:00</PresetTime>
      <PresetTime>45:00</PresetTime>
      <PresetTime>daytime</PresetTime>
</UserTime>
```

The `Source` value decides which type of the UserTime source is used.

| UserTime Source values | |
|---|---|
| Internal | Default source type. User-controlled time, accessible from UI. |
| Hego | Time value being transmitted via UDP connection using Hego time protocol. Optional Hego element specifies additional parameters:<br>name - Time value name<br>port - Server port used to transmit data |
| DownAndDistance | Down & Distance play clock received from the scoreboard protocol. See section Down & Distance online data for connection setting. |

`PresetTime` elements define preset values for the Internal time source. Presets are listed and can be applied in user time UI. Use either *hh:mm:ss* or *mm:ss* notation. To make the preset apply current day time, use special daytime preset value.

## Remote control using Sony 9-pin protocol

The application can be remotely controlled via Sony 9-Pin protocol with Odetics extension using limited set of supported commands. Connection could be over TCP/IP or using serial port.{setting 38400 Bit/s, 8 data bits, 1 stop bit, parity odd).

Sony 9-pin is used to control the application from 3rd party devices.

### Command block format

The bytes in each command block are assigned as follows:

| CMD-1/DATA COUNT | CMD-2 | DATA-1 | ... | DATA-N | CS |
|---|---|---|---|---|---|

| Command Block Detailed Description | |
|---|---|
| CMD-1 | Indicates the function and direction of the command |
| DATA COUNT | Indicates the number of bytes inserted between CMD-2 and CHECKSUM.<br>CMD-1 is the upper 4 bits, DATA COUNT is the lower 4. |
| CMD-2 | Designates the command. |
| DATA-1 to DATA-N | Data which correspond to those indicated by the command.<br>N is the value in data count. |
| CS | Checksum, lower eight bits of the sum of the bytes in the command block (CMD-1/DATA COUNT to DATA-N) |

| Communication Protocol Command Format<br>RemoteControl/Button@name | | |
|---|---|---|
| Stop | 20 00 CS | |
| Play | 20 01 CS | |
| FastForward | 20 10 CS | |
| Rewind | 20 20 CS | |
| Pause | 21 12 00 CS | |
| CueUpWithDataOdeticsID | 28 31 ii ii ii ii ii ii ii CS | Odetics clip ID is fixed length 8-digit alphanumeric |

| | | |
|---|---|---|
| | | code for clips. This ID is passed to action. |
| CueUpWithData | 24 31 ff ss mm hh CS | Only seconds “ss” from timecode “ff ss mm hh” are passed to action |
| CurrentTimeSenseLTC | 61 0c 01 CS | Watchdog test, always returns timecode “00:00:01.00” |
| Up | 21 13 4a CS | |
| Right | 21 13 40 CS | |
| Down | 21 23 4a CS | |
| Left | 21 23 40 CS | |

All numbers are in hex format.

You have to assign appropriate action when a command is received.

## Configuration file

There is section `<RemoteControl>` in configuration file, where user can defines settings and assignment of a protocol command to an application action.

| Sony 9-pin Protocol RemoteControl configuration | | |
|---|---|---|
| Enabled | 0(default)<br>1 | Enables or disables remote controller. |
| Port | COM<n> (default COM1)<br>BF<n><br>TCP<n><br>UDP<n> | Serial port used for application control.<br>COM<n> identifies internal serial port<br>BF<n> represents serial port available on Bluefish card (1 means 1st Bluefish card).<br>TCP<n> represents serial port over TCP port <n><br>UDP<n> represents serial port over UDP port <n> |
| Protocol | SONY9PIN | Sony 9-pin protocol with Odetics extension. |
| Debug | 0 (default)<br>1 | Enables or disable log of received commands to status bar. |
| Button name | | Command (see Supported commands in communication protocol).<br>Name Assignment of a protocol command (attribute name) to an application action (attribute action).<br>e.g. <Button name="Play" action="Go"/><br>defines command Play to invoke action Go. |
| Button action | | Symbolic name of the action. Available actions are described in Start menu → Virtual Placement → Actions. |

Example of configuration with TCP/IP port 5000

```
<RemoteControl>
	<Enabled value="1"/>
	<Port value="TCP5000"/>
	<Protocol value="SONY9PIN"/>
	<Debug value="1"/>
	<Button name="Play" action="StartProduction"/>
	<Button name="Stop" action="DeselectProducts"/>
	<Button name="CueUpWithDataOdeticsID" action="SelectProductByName"/>
</RemoteControl>
```

## Remote control using JLCooper Jog/Shuttle

JLCooper MCS3 and JLCooper SloMo Elite Jog/Shuttle devices are supported.


Both device types have variants that are connected to computer using an USB cable. A virtual serial port is added to OS that allows application to connect to the device. Additionally, MCS3 device has a variant that allows connection via serial line into Bluefish card or COM port. Chapter JLCooper MCS3 Jog/Shuttle controller connection contains information about physical connection of the device to the computer.

| JLCooper Jog/Shuttle RemoteControl configuration | | |
|---|---|---|
| Enabled | 0(default)<br>1 | Enables or disables remote controller. |
| Port | COM<n> (default)<br>BF<n> | Serial port used for application control.<br>COM<n> identifies internal serial port<br>BF<n> represents serial port available on Bluefish card (1 means 1st Bluefish card). |
| Protocol | MCS3SP<br>SLOMOELITE | Type of the JLCooper device. |
| Button name MCS3 | | Symbolic button/command name, one of:<br>F1, F2, F3, F4, F5, F6, W1, W2, W3, W4, W5, W6, W7, UP, DOWN, LEFT, RIGHT, REWIND, FASTFORWARD, STOP, PLAY, RECORD. |

| | | |
|---|---|---|
| Button name<br>SLOMOELITE | | Symbolic button/command name, one of:<br>NUMBER1..10, F1, F2, F3, F4, C1, C2, C3, C4, C5, C6, C7, C8, VERTICAL1..5, HORIZONTAL1..5. |
| Button action | | Symbolic name of the action. Available actions are described in Start menu → Virtual Placement → Actions. |
| Button value | | Parameter of the action. When the action doesn't take parameters, this attribute is ignored. |

## Remote Control using Contour Design Shuttle

Virtual Placement supports Contour Design Shuttle Express, Shuttle Pro and Shuttle Pro 2 controllers. Devices are connected using an USB cable.

| Contour Design Shuttle Remote Control configuration | | |
|---|---|---|
| Enabled | 0(default)<br>1 | Enables or disables remote controller. |
| Port | USB | |
| Protocol | SHUTTLEXPRESS<br>SHUTTLEPRO<br>SHUTTLEPRO2 | Type of the Shuttle device. |
| Button name | BUTTON1..x | Button names. Number of supported buttons is different for each device type:<br>Shuttle Express: 5 buttons<br>Shuttle Pro: 13 buttons<br>Shuttle Pro 2: 15 buttons |
| Button action | | Symbolic name of the action. Available actions are described in Start menu → Virtual Placement → Actions. |
| Button value | | Parameter of the action. When the action doesn't take parameters, this attribute is ignored. |

## Remote Control using Action based protocol

The application can be remotely controlled via XML-based protocol with set of supported actions. Connection should be established using UDP protocol.

Action based protocol allows other software to control Virtual Placement application.

### Message format

Format of the data sent over the UDP channel is plain text XML.

Example:

```
<DeselectAllProducts/>
```

Example of action with parameter:

```
<SelectProductByName value="MyClip"/>
```

Example of configuration:

```
<RemoteControl>
      <Enabled value="1"/>
      <Port value="UDP5000"/> <!-- UDP at port 5000 →
      <Protocol value="ACTION"/>
</RemoteControl>
```

Available actions are described in the file doc/Actions.html (or Start menu → Virtual Placement → Actions).

## Remote Control using REST Protocol

Clients can communicate with Virtual Placement using a REST protocol. The protocol allows to trigger user actions or query VP runtime values.

### Configuration

Allows to specify port used for REST commands.

```
<RemoteControl>
      <Enabled value="1"/>
      <Port value="8000"/>
      <Protocol value="REST"/>
</RemoteControl>
```

### REST action invocation

To trigger a user action, send a http POST request to an url in form:

```
http://<vp.host.name>:<REST.port>/action
```

Request body must contain xml with action data formatted the same way as with Action-based protocol.

Example:

```
POST http://localhost:8000/action
```

req data `<DeselectAllProducts/>`

## REST value queries

To query runtime value, send a http GET request to an url in form:

```
http://<vp.host.name>:<REST.port>/query/<valueName>[?param1[&param2]]
```

The query can contain additional parameters in form: `<param.name>=<param.value>`

Example:

```
GET http://localhost:8000/query/TracabTime?frameCount=123&camera=100
```

Virtual Placement sends a reply containing a xml data formatted as:

```
<QueryResult query="<valueName>">valueData</QueryResult>
```

Value data can be either a string representation of primitive value or a xml structure in case of non-trivial values.

In case the query can not be resolved, a 404 error is returned.

| Values supported by REST query<br>Value Name \| Value Description \| Reply Description | | |
|---|---|---|
| PreviewCamera | Camera ID currently selected in preview. | Integer value |
| PreviewTimecode | Timecode of frame currently shown in preview. | Long value |
| TracabTime | Retrieve a recorder timecode for given Tracab frame counter value.<br>Parameters:<br>• frameCount - Tracab frame count<br>• camera - Camera to resolve timecode for<br>• fromTime - Start of searched range, in recorder timecode<br>• toTime - End of searched range, in recorder timecode | Time and frame count of matched frame. The result frame does not necessarily match the request frameCount exactly. Search algorithm can locate the closest frame available.<br>Values are formatted to XML in following way:<br><br>`<QueryResult query="TracabTime">`<br>`  <FrameCount value="123"/>`<br>`  <Time value="456"/>`<br>`</QueryResult>` |

| | | |
|---|---|---|

## Master/Slave Control

Master control allows one instance of Virtual Placement 7 to control other instances. Master machine sends commands using Action based protocol via UDP or SDI VANC.

Example of master configurations:

```
<MasterControl>
      <Enabled value="1"/>
      <Port value="UDP5000"/>
      <Protocol value="ACTION"/>
</MasterControl>

<MasterControl>
      <Enabled value="1"/>
      <Port value="SDI0"/>
      <VancLine value="9"/>
      <Protocol value="ACTION"/>
</MasterControl>
```

`EnableVANC` setting must be enabled on appropriate output (see Cameras section).

Slave machine must have a `RemoteControl` section in the config file with the same parameters. UDP implementation uses UDP broadcast datagrams so both Master and Slave must be in the same local network.

### Action configuration

#### Master machine

If you want an action to be performed on the Slave machine, define a *SendMessage* action in the Keyboard section of the Master, and specify the desired action as value of the *SendMessage* action.

The action is sent to the Slave using Action based protocol.

Value of the SendMessage action can have following format:

- Simple action name when the action doesn't take any parameters.
- Action name and action parameters separated by a space.

Example of configuration:

```
<Keyboard>
      <Shortcut action="SendMessage" name="ctrl 0" value="DeselectAllProducts"/>
      <Shortcut action="SendMessage" name="ctrl 1" value="SelectProduct 1"/>
      <Shortcut action="SendMessage" name="ctrl 2" value="SelectProduct 2"/>
</Keyboard>
```

The SendMessage actions sends the message without executing it on the Master machine. When using UDP connection, you can setup the Master to be a Slave at the same time, so the command is executed and broadcast at the same time.

Available actions are described in the file doc/Actions.html (or Start menu → Virtual Placement → Actions).

## Slave machine

Slave machine executes received message.

Examples of configuration:

```
<RemoteControl>
      <Enabled value="1"/>
      <Port value="UDP5000"/>
      <Protocol value="ACTION"/>
</RemoteControl>
```

```
<RemoteControl>
      <Enabled value="1"/>
      <Port value="SDI0"/>
      <VancLine value="9"/>
      <Protocol value="ACTION"/>
</RemoteControl>
```

`EnableVANC` setting must be enabled on appropriate camera (see Cameras section).

## Down & Distance online data

Source data for Down & Distance product can be read from an online source. GSIS, OES and Daktronics protocols are supported. Configuration:

```
<DownAndDistance>
      <Enabled value="1"/>
      <Protocol value="GSIS"/> <!-- GSIS or OES or Daktronics →
      <LogFileName value=""/>
     <Delay value="5000"/>
      <GSIS>
            <Server value="172.19.1.103"/> <!-- or 204.141.106.136 →
            <RegistrationPort value="50001"/>
            <DataPort value="50000"/>
            <ClientId value=""/>
            <HomeClubCode value=""/>
            <VisitClubCode value=""/>
      </GSIS>
      <OES>
            <Port value="COM1"/>
      </OES>
      <Daktronics>
            <Port value="COM1"/>
      </Daktronics>
</DownAndDistance>
```

`LogFileName` – all incoming messages are logged into specified file. The file can be later used for analysis in case of any problems. Keep the value attribute empty to disable logging.

`Delay` – incoming messages are delayed by given number of milliseconds.

| GSIS Protocol Configuration Values | |
|---|---|
| Server | IP address of the server running the GSIS Partner clock program. |
| RegistrationPort | Registration port |
| DataPort | Data port with online data |
| ClientId | ID assigned by the NFL |
| HomeClubCode | Standard NFL club code of home team (NYC, KC...) |
| VisitClubCode | Standard NFL club code of visiting team |

| OES and Daktronics Protocol Configuration Values | |
|---|---|
| Port | Serial port connected to data stream (COM1, COM2, ...) |

| Daktronics D-SUB 9 connector pinout | |
|---|---|
| 2 | RX+ |
| 3 | TX+ |
| 5 | GND |

### Play Clock

GSIS and Daktronics protocols support play clock which could be visible as user time. See section User Time for play clock details.

## UDP Events

Some modules inside application are able to send events over UDP. Events have xml structure and typically contain named values. Example of the event:

```
<Event app="VP" source="freekick">
      <GoalDistance value="49.656548"/>
</Event>
```

UDP events are configured by `UdpEvents` element in config.xml:

```
<UdpEvents>
      <Enabled value="1"/>
      <Host value="192.168.1.155"/>
      <Port value="4445"/>
</UdpEvents>
```

| UdpEvents configuration | |
|---|---|
| Enabled | Enables or disables sending data to UDP. |
| Host | IP address of the server listening for UDP data. It is allowed to use broadcast address (255.255.255.255). Multiple host elements can be defined. |
| Port | UDP Port receiving the data |

## Streaming Camera Tracking Data

VP can stream real time camera parameters over UDP port. This can be enabled for every configured video output.

Add/Edit element `<TrackingUdpPort value="<udp.port>"/>` to appropriate `Video/Output` element. The value is receiving UDP port where to send the tracking. Value 0 disables the functionality.

The UDP packet is broadcast to the whole network.
Packet data layout is following:

```
struct SerializedModelRecord {
      uint32_t magic = 'CmR4';
      float pos[3];
      float rot[9];
      float focal;
      float aspect;
      float kappa;
      float lensCenterX;
      float lensCenterY;
      float quality;
      uint32_t unused[5];
};
```

| Model Record reference | |
|---|---|
| pos | Position of camera, in meters. Coordinate system used is positioned in pitch center, having x axis along the pitch to the right, y axis across the pitch, positive away from camera and z axis vertically, positive up. |
| rot | Coefficients of the orthogonal rotation 3x3 matrix. |

| | |
|---|---|
| focal | Focal length for Y axis in meters. fovX = fovY / aspect. Use the following formula to calculate FOV (in radians): fov = 2.0 * atan(1.0/ focal) |
| aspect | Video aspect (e.g. 16.f/9.f). |
| kappa | Lens Distortion in normalized coords ([0, 0]=screen center, x+ right, y+ up). |
| lensCenterX, lensCenterY | Lens Center in normalized coords ([0, 0]=screen center, x+ right, y+ up). |
| quality | Tracking quality, value between 0.f (tracking failed) and 1.f (tracking fully locked) |

Using the data, clients can reconstruct projection 4x3 matrix as a product of matrices:

```
K * R * T.
```

Intrinsic matrix K is:

```
focal/aspect   0       -lensCenterX

0              focal   -lensCenterY

0              0       -1
```

Rotation matrix R is stored in row major order in field rot.

Translation matrix T is constructed from translation vector - pos.

The final transformation produces homogeneous coordinates in range `-1 .. +1` in both X and Y.

To apply lens distortion get 2D screen space point P and calculate:

```
P = P - [lensCenterX, lensCenterY]
P2 = P * [aspect,1]
a = 1 + |P2|^2 * kappa
P = P2*a + [lensCenterX, lensCenterY]
```

The packet does not contain pitch crowning parameters.

## Insertion Mask

Insertion masks allow to exclude part of video area from virtual graphic insertion and tracking. Multiple masks can be created in order to use different mask in different situation. From user perspective, there are two mask modes:

| Insertion Mask Modes | |
|---|---|
| MANUAL | Default mode. Insertion mask is applied manually by user. |
| AUTO | Masks are associated with template images. Whenever the system matches input video with one of template images, the corresponding mask is applied automatically. |

Insertion mask mode is controlled by `InsertionMask/Mode` value:

```
<InsertionMask>
      <Mode value="AUTO"/>
</InsertionMask>
```

# VIRTUAL PLACEMENT Prime

## Integration with Prime rendering engine

Virtual Placement can use Prime Engine as a rendering engine. Prime Engine is controlled normally via Tk5. The gfx graphics are rendered as a separate layer on top of all the other graphics in VP. It is visible in both preview and output. Prime Engine must be installed on the same PC as Virtual Placement.

### Prime Engine Configuration

| | |
|---|---|
| 1 | Open Prime Engine config editor |
| 2 | Go to the<br>System tab. Set Number of Channels to 1 |
| 3 | Go to Channel 0 tab/Render. Set "Lens distortion" to checked |
| 4 | Go to Channel 0 tab/Audio. Uncheck "Enable" checkbox |
| 5 | Go to tab Channel 0 tab/Video<br>• Select Device "Embedded Engine (Txtr)"<br>• Select Mode Downstream Key<br>• Uncheck Output YCrCb 4:2:2<br>• Uncheck Chroma Keyer<br>• Uncheck Premultiplied Output |
| 6 | Go to Virtual tab<br>• Set studio to "vp"<br>• Set Number Of Heads to 1 |
| 7 | Close config editor |

| | |
|---|---|
| 8 | Open file C:\ProgramData\Chyron\Prime Engine\PrimeEngine.config in text editor |
| 9 | Go to section [Video] and add these two lines or make sure the values are set to:<br>• CameraTracking=true<br>• SceneInterlaceFieldSync=false |
| 10 | Save the config file and close the text editor |
| 11 | Configure camera data driver<br>• Create folder C:\ProgramData\Chyron\Prime Engine\studios\vp\cameras<br>• C:\Program Files\Chyron\Prime Engine\studios\templates\sdi.cfg to C:\ProgramData\Chyron\Prime Engine\studios\vp\cameras\1.cfg |

### Virtual Placement Configuration

| | |
|---|---|
| 1 | Open Virtual Placement config editor |
| 2 | Select Render tab |
| 3 | Enable "Prime Engine". Enabling it eventually increases total system latency to at least 8. Confirm this change. |

## Operation

Start Virtual Placement. The Prime Engine will start automatically. Do not start Prime Engine manually!. Now you can connect to Prime Engine from other apps (like Prime Designer). You will see the gfx in both preview and SDI output. The Prime Engine graphics are

controlled through Prime. There is no way to control it from the Virtual Placement user interface.

You need a license for both Virtual Placement and Prime Engine (could be on the same dongle).

Prime Engine needs the license feature "Virtual Sport".

# JLCOOPER MCS3 CONNECTION

JLCooper MCS3 Jog/Shuttle controller connection

JLCooper MCS3 SP allows you to control the replays. For details how the connection is configured and enabled in software see Remote control using JLCooper Jog/Shuttle.


## Connection cable

There are several options how to connect this Jog/Shuttle controller:

### Tedia RS422 card (PCI or PCIe or RS422 serial module) and using custom made cable.

| D-SUB 9M Pinout for connection using Tedia RS422 Card (opt.A)<br>Signal Type \| MCS3-SP Side \| Tedia Card Side | | |
|---|---|---|
| Jog -> PC | 3 (TX+) | 6 (RX+) |
| Jog -> PC | 8 (TX−) | 7 (RX−) |
| PC -> Jog | 7 (RX+) | 8 (TX+) |
| PC -> Jog | 2 (RX−) | 9 (TX−) |

### Serial port available on Bluefish card and using Sony RS422 crossover cable.

| D-SUB 9M Pinout for connection using Bluefish Card (opt.B)<br>Signal Type \| MCS3-SP Side \| Tedia Card Side | | |
|---|---|---|
| Jog -> PC | 3 (TX+) | 6 (RX+) |
| Jog -> PC | 8 (TX−) | 7 (RX−) |
| PC -> Jog | 7 (RX+) | 8 (TX+) |

| | | |
|---|---|---|
| PC -> Jog | 2 (RX−) | 9 (TX−) |

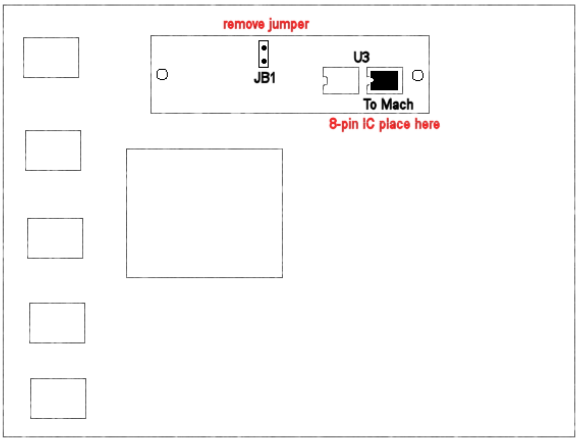
In both connections above, the connection cable has D-SUB 9 female on both ends. Some RS422 documentation might use polarity notation A for minus and B for plus.

### Serial port available on Bluefish card and directly attached MCS3 to the connector on PCI shield.

See Using RS422 serial port on Bluefish444 card below how to connect serial port to bluefish video card.

## Controller Setting

JLCooper Jog/Shuttle MCS3-SP controller should be internally configured in a Host/Slave mode to work with Virtual Placement. This operation mode is selected by removing JB1 jumper and by placing the small 8-pin IC to the position “To Mach”.



# VIRTUAL PLACEMENT TROUBLESHOOTING

Although we make maximum effort to eliminate any errors in the application, sometimes problems can occur. In that case, Virtual Placement offers multiple ways to help with locating the source of troubles.

## Application Log File

Application is logging any important events, errors and other information into application log file located at *C:\log\Chyron\VirtualPlacement.txt*. Level of log detail can be controlled by `LogFilter` value in application config:

```
<Debugging>
      <LogFilter value=""/>
</Debugging>
```

`LogFilter` allows extensive syntax for controlling log levels for different areas of application. However, to enable as much logging as possible, set value to `"=DEBUG"`.

## Diagnostic Tool

When a problem with Virtual Placement is encountered, it is generally a good practice to run Diagnostic Tool and submit its report to the support center. The diagnostics report contains snapshot of a system and application configuration together with log files and other important information.

To run the Diagnostic Tool, open Start menu - Virtual Placement - Diagnostic Tool and follow the instructions. The output compressed zip file can be directly uploaded to our support center or sent via email.

# ABOUT US

Chyron is ushering in the next generation of storytelling in the digital age. Founded in 1966, the company pioneered broadcast titling and graphics systems. With a strong foundation built on over 50 years of innovation and efficiency, the name Chyron is synonymous with broadcast graphics. Chyron continues that legacy as a global leader focused on customer-centric broadcast solutions. Today, the company offers production professionals the industry's most comprehensive software portfolio for designing, sharing, and playing live graphics to air with ease. Chyron products are increasingly deployed to empower OTA & OTT workflows and deliver richer, more immersive experiences for audiences and sports fans in the arena, at home, or on the go.

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