

# Modbus Matrix Driver

Release Documentation

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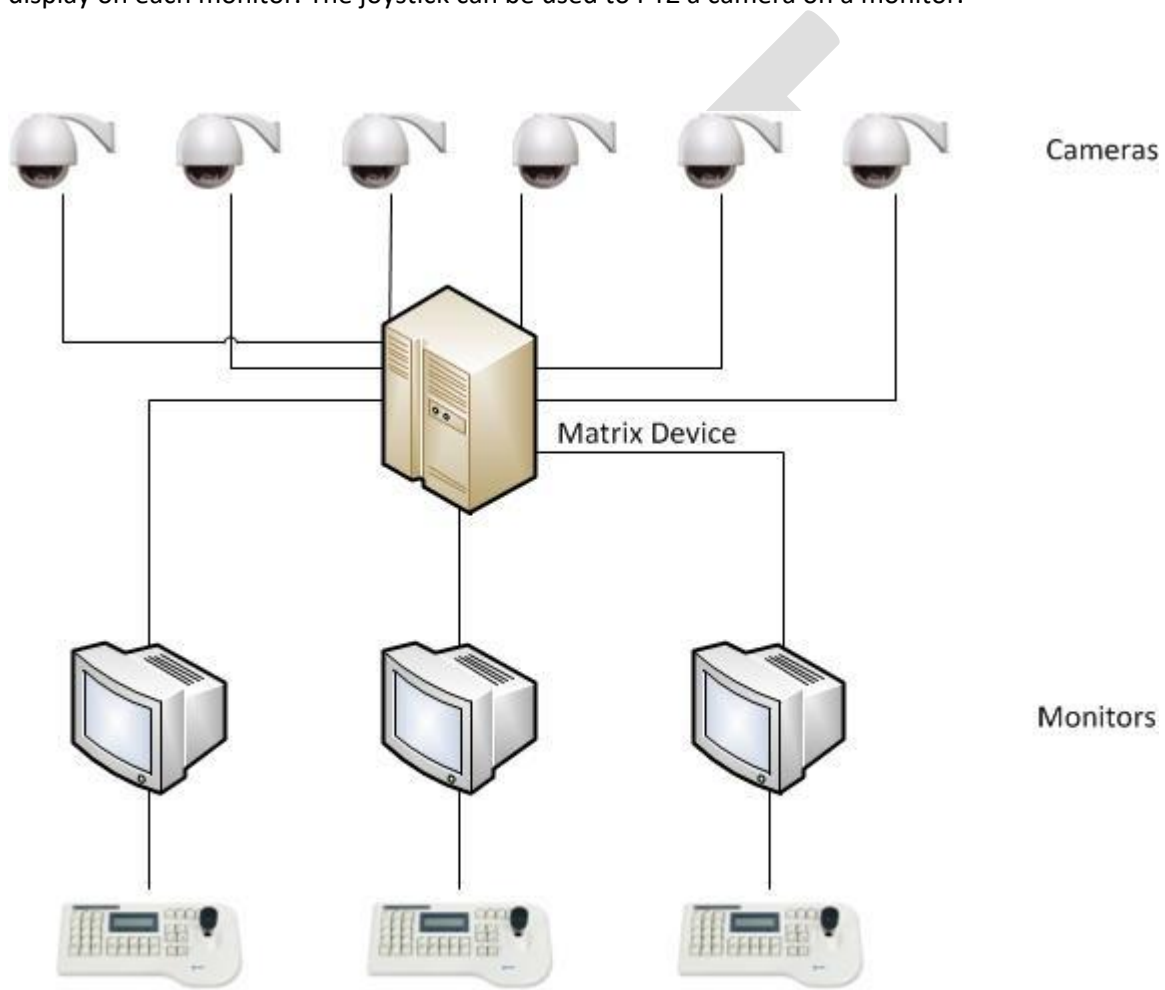
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## 1. Introduction

The following documentation outlines the instructions and prerequisites for the Modbus Matrix device driver. It contains instructions as well as technical prerequisites and system requirements.

A matrix is a switching device that can routes video signals from a large number of inputs to a limited number outputs. This allows a limited number of operators to view and control a large number of cameras. In legacy systems these outputs are typically connected to a monitor bank. Operators have joysticks with a numeric keyboard. Using the keyboard the operator can select which camera to display on each monitor. The joystick can be used to PTZ a camera on a monitor.



The leasing rules are summarized in the table below:

Priority of user displaying new camera	Priority of users already displaying cameras	Camera already displayed?	All outputs in use?	Outcome
Low / High	Low / High	No	No	<ul style="list-style-type: none"> <li>• Video will be routed through an unused matrix output.</li> <li>• Video will be displayed for the new camera on the IPSecurityCenter Client.</li> </ul>
Low / High	Low / High	Yes	Yes / No	<ul style="list-style-type: none"> <li>• Video will be continue to be routed through the same matrix output (i.e. the same camera will not be decoded to different outputs)</li> <li>• Video will be displayed for the new camera on the IPSecurityCenter Client.</li> </ul>
Low	Low / High	No	Yes	<ul style="list-style-type: none"> <li>• Video will not be decoded.</li> <li>• Video will not be displayed on the IPSecurityCenter client.</li> </ul>
High	Low (at least one output being held by lower priority users)	No	Yes	<ul style="list-style-type: none"> <li>• Decoding of video will be stopped for the user with the lowest priority. If there is more than one output held by lower priority users with the same priority then the oldest connection will be dropped.</li> <li>• Video for the lowest priority user will be stopped on their IPSecurityCenter client.</li> <li>• Video for the new camera will be decoded through the previously used output.</li> <li>• Video will be displayed for the new camera on the IPSecurityCenter Client.</li> </ul>

Note that the Modbus Matrix driver has been developed with the intention to work with the Scada Rockwell System, which takes camera numbers and routes internally the camera to the corresponding output for transmission via an RS100D circuit.

## 2. Setup

### 2.1 Versions

IPSecurityCenter Version: 4.8 or above  
Device Version: Devices supporting Modbus TCP/IP v1.1b  
Packages: CNL.IPSecurityCenter.Driver.Modbus.Matrix.Version.[BUILD\_VERSION].ipscdriver

The Modbus Matrix driver also works in conjunction with other devices:

For live video:

- Dedicated Micros
- CNL Training Device
- UTC UltraView

For recorded video:

- Dedicated Micros

The devices used for displaying live and recorded video are interchangeable. The driver has however only been tested with the device types listed above.

### 2.2 Driver Functionality

The driver implements the following functionality:

- Automatic routing of video from inputs (through the Modbus Matrix server) to outputs.
- Matrix output channel leasing
- Live Video
- Playback
- Video Snapshots
- Video Export

The driver does not support PTZ.

## 2.3 Prerequisites

No SDK is required for the Modbus Matrix driver; however the Modbus Matrix Service must be installed.

The following ports must be open:

From	To	Port
IPSecurityCenter Server	Modbus Device	502 / TCP

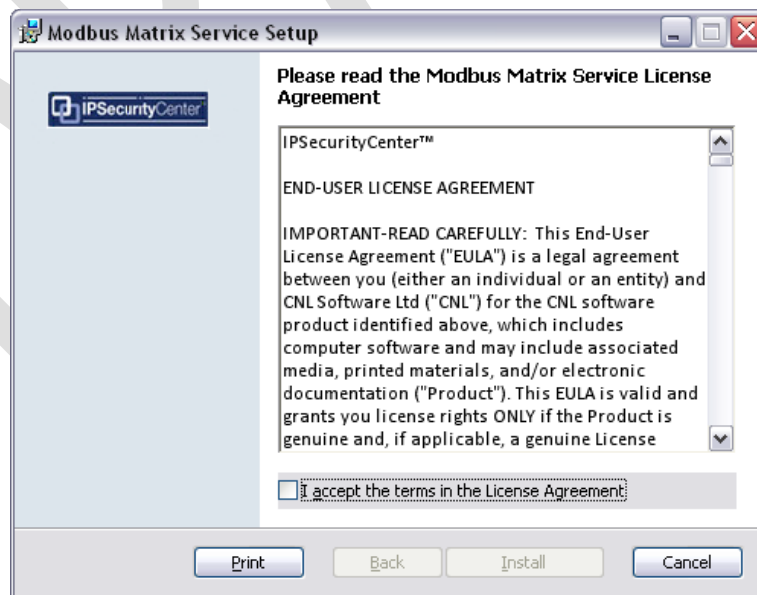
The Modbus (address) Map for the device being connected to needs to be obtained before configuring the driver.

### 2.3.1 Installation of the Modbus Matrix Service

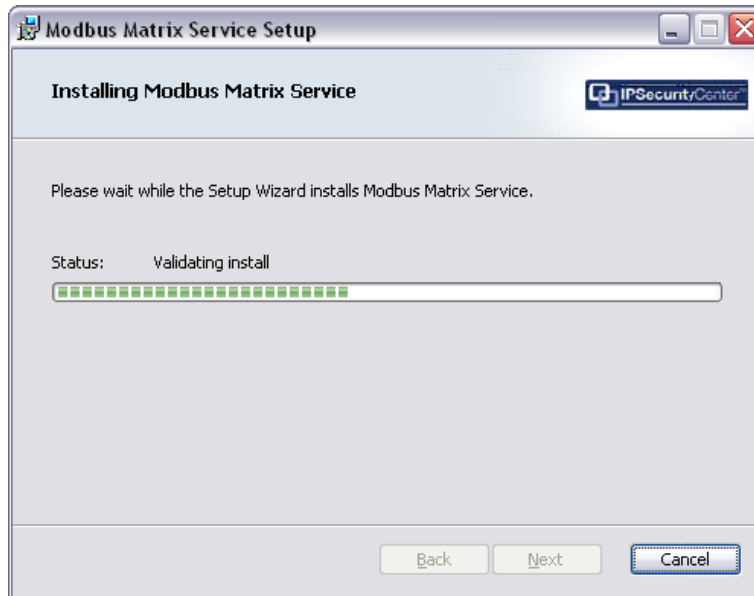
The installation is distributed with the device driver as an MSI package (ModbusMatrixService.Setup.msi)

Double click the MSI to start the install

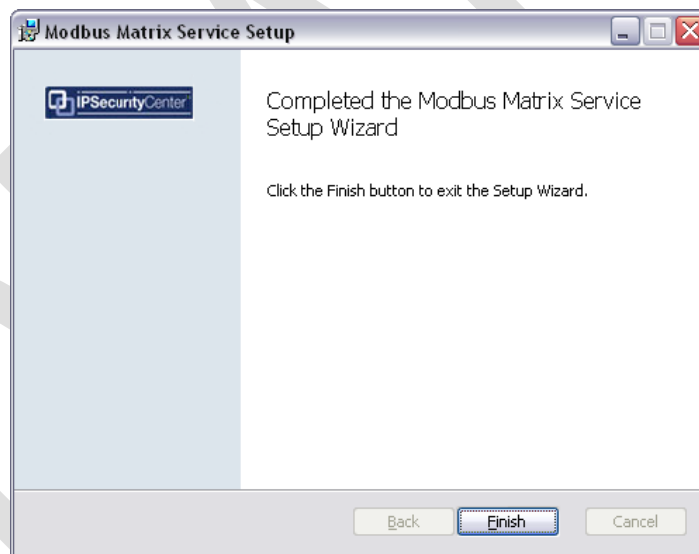
- Accept the license agreement and click install



- Wait for the installation to complete



Click 'Finish' to close the installation wizard



### 2.3.2 Configuration of the Modbus Matrix Service

Configuring the Modbus Matrix service must be done manually.

- Locate the file:  
[Program Files]\CNL Software\IPSecurityCenter\Modbus Matrix Service\  
CNL.IPSecurityCenter.Driver.Modbus.Service.exe.config

**Note:** on a 64-bit version of Windows the service is installed in 'Program Files (x86)'

- Open the configuration file with Notepad
- Edit the existing Connection element to configure the connection details to the Modbus Matrix. The following properties are available:

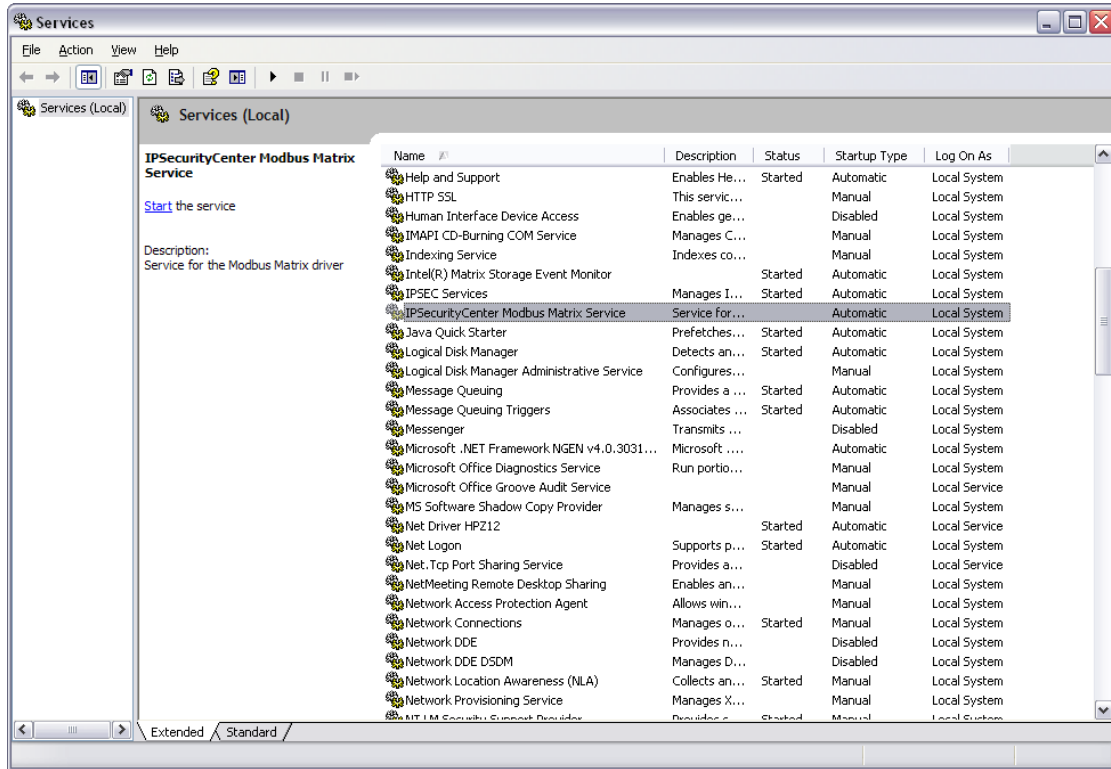
Property	Description
<b>Address</b>	This must be set to the IP address of the Modbus matrix.
<b>Port</b>	Specify 0 to use the default port of 502
<b>ConnectionTimeout</b>	Specifies the number of milliseconds to wait while attempting to connect to the Modbus Matrix before connection fails
<b>ServiceAddress</b>	<p>The WCF address the driver connects to control the Modbus Matrix (through this service).</p> <p>The ServiceAddress must always be in the following format:</p> <p><a href="http://[IP]:[Port]/ModbusMatrixService">http://[IP]:[Port]/ModbusMatrixService</a></p> <p>Each Modbus matrix connection specified must have a unique port between 49152–65535.</p>
<b>MexServiceAddress [Optional]</b>	<p>The MexServiceAddress should be in the following format:</p> <p><a href="http://[IP]:[Port]/ModbusMatrixService/Mex">http://[IP]:[Port]/ModbusMatrixService/Mex</a></p> <p>The port should match the port specified in the ServiceAddress.</p> <p>In a production environment the MexServiceAddress should be removed.</p>

- Ensure there are as many Connection elements as there are Modbus devices.

### 2.3.3 Starting the Modbus Matrix Service

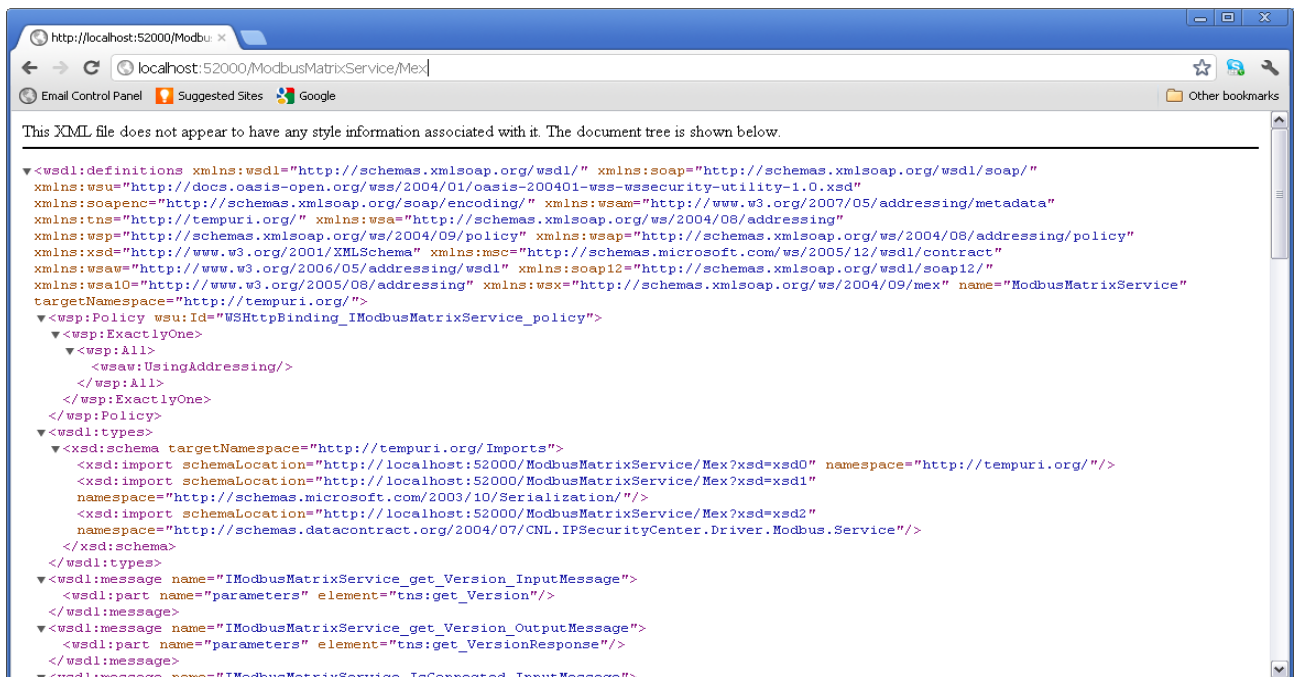
- Open the Services MMC snap-in from the Control Panel and locate the 'IPSecurityCenter Modbus Matrix Service' service.





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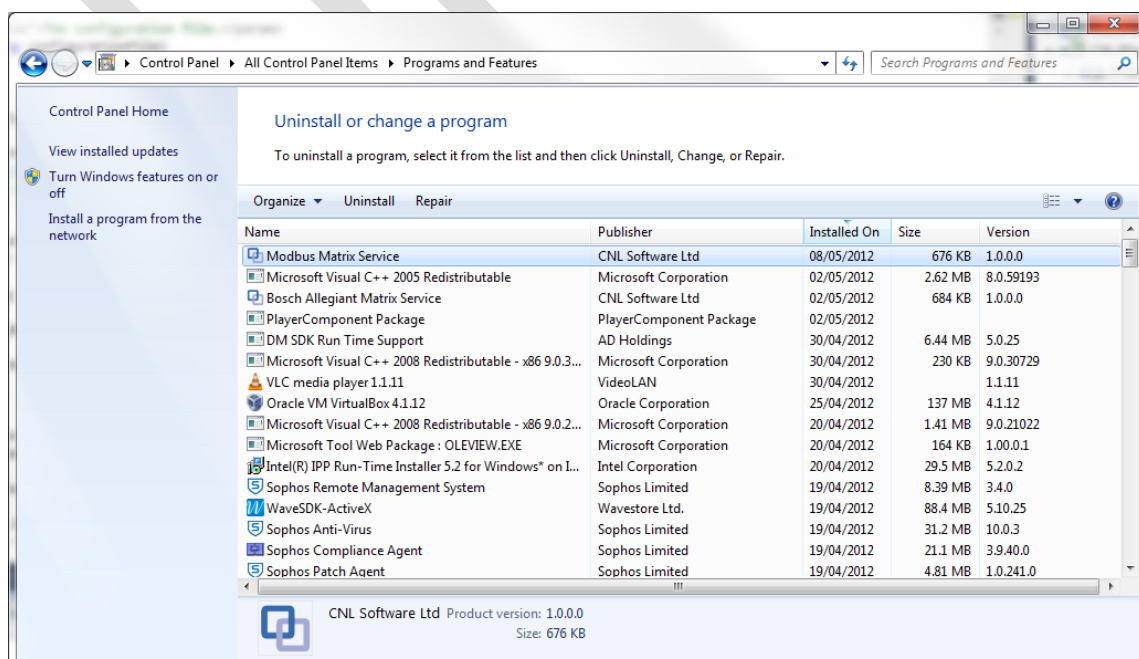
- Start the service. You can verify the WCF service has been started for each service by entering the 'MexServiceAddress' for each one into a web browser (if these have been specified in the config):



## 2.3.4 Uninstalling the Modbus Matrix Service

The service can be uninstalled from 'Add / Remove Programs' (Windows XP) or 'Programs and Features' (Windows 7) from the Windows Control Panel.

It is listed as 'IPSecurityCenter Modbus Matrix Service':



## 2.4 Operating System Requirements

The functionality of the device has been tested on the following operating systems:

- Windows 7 64-Bit

The driver may be compatible on other operating systems, however functionality cannot be guaranteed.

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## 3. Driver Functionality

### 3.1 Properties

#### IP

Gets / Sets the IP of the Modbus matrix service.

#### Port (Default: 0)

Get / Sets the port for the Modbus matrix service. The standard port is 52000. 0 can be specified to use the default port.

#### Username

Gets / Sets the username for the device. Not used by the device

#### Password

Gets / Sets the password for the device. Not used by the device

#### Outputs

Configures the outputs for the matrix device.

### 3.2 Events

This device exposed the following events.

#### Online State Event

The online state event will be raised when the device changes state. This is checked by querying the time on the device.

### 3.3 Methods

#### Add Cameras

The Add Cameras method allows cameras to be added via a CSV file. The Add Cameras method requires the full path to the CSV File. The CSV File contains details of the Modbus cameras, with the following fields; physical port, logical port, matrix camera label, playback camera GUI. Below is an example CSV import file:-

```
physical_port,logical_port,matrix_camera_label,playback_camera_guid
1,1,Camera 1,8A94DE52-BF92-4F68-AFF3-08B777985C33
```

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## 4. Configuration

### 4.1 Configuring Supporting Devices

Add all the video encoders and NVR devices required to provide live and recorded video streams for the Modbus matrix driver. An encoder input is required for each output being used on the Modbus matrix.

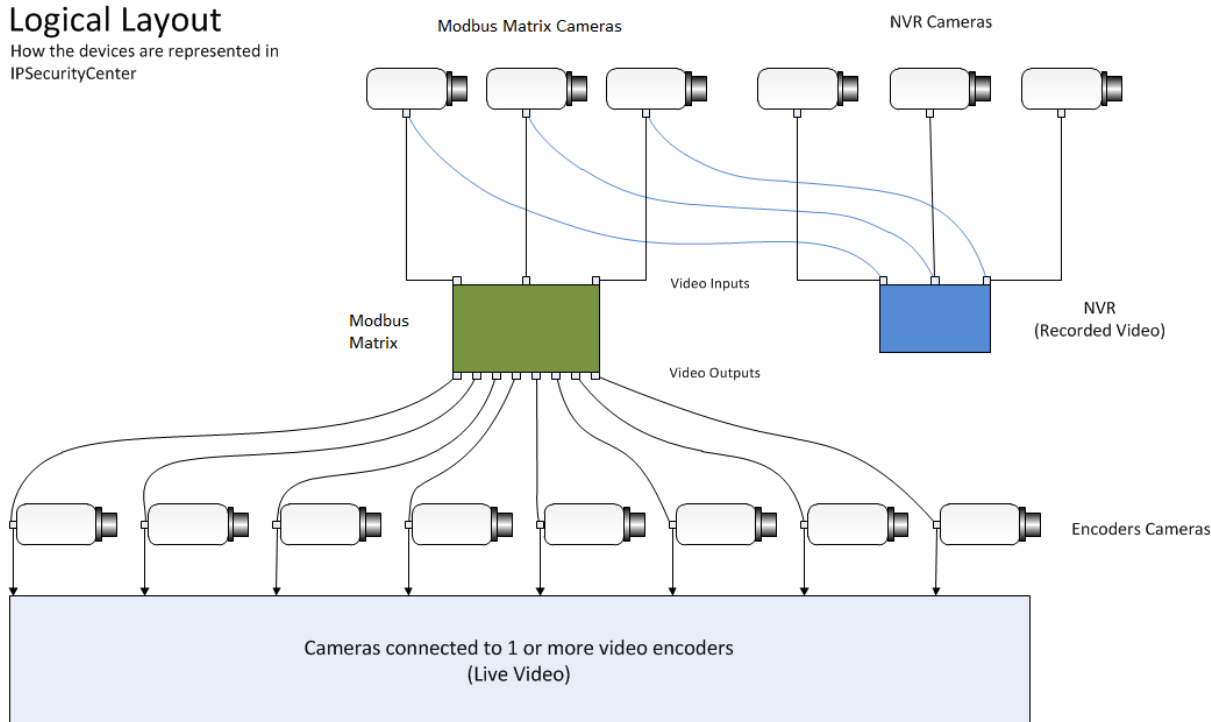
Enable the devices to populate their cameras.

### 4.2 Create the Configuration CSV File

The configuration CSV file specifies the cameras that are connected to the Modbus Matrix and how they are connected to NVRs.

#### Logical Layout

How the devices are represented in IPSecurityCenter



The header for the CSV is as follows:

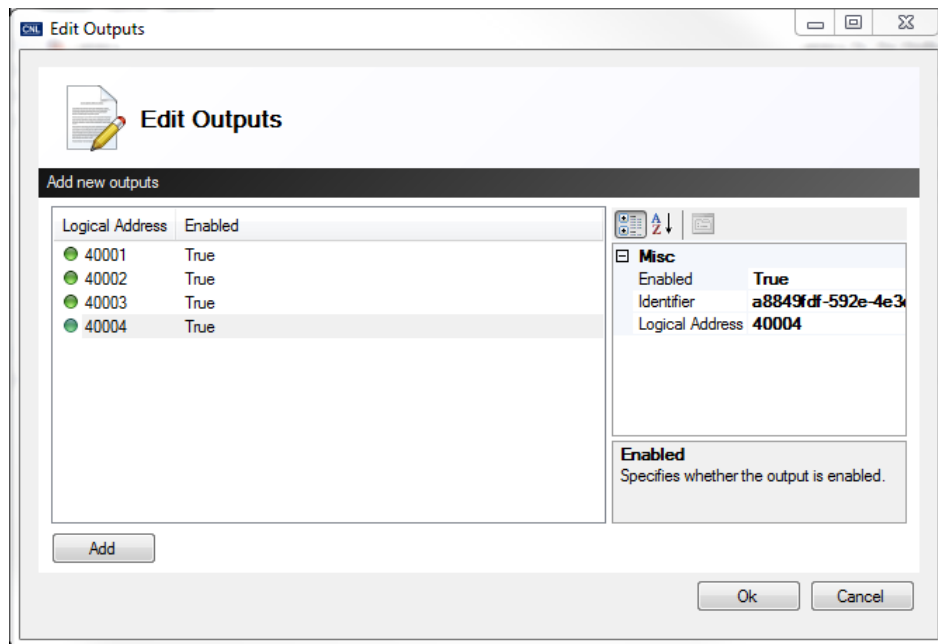
`physical_port,logical_port,matrix_camera_label,playback_camera_guid`

Field	Description
<b>physical_port</b>	The physical address of the port the camera is connected to on the Modbus Matrix.
<b>logical_port</b>	The logical address of the port the camera is connected to on the Modbus Matrix.
<b>matrix_camera_label</b>	The label for the camera
<b>playback_camera_guid</b>	The GUID for the camera that provides the recorded video stream for the Modbus Matrix camera.

Create the CSV for all the matrix cameras, and place this somewhere accessible to the IPSecurityCenter server.

### 4.3 Configuring the Modbus Matrix Device

- Add a Modbus Matrix device using the 'Add Device Wizard' in the IPSecurityCenter system configuration. The IP address should be set to the IP specified in the Connection element for the device in the service configuration file. If this IP is set to 'localhost' then the IP address of the machine hosting the service should be used.
- Select the Modbus Matrix device in the 'System Configuration' and edit the 'Outputs' property in the property grid. A configuration dialog will be displayed:



- Add each output to be used by the driver. Each output has its own (logical) address. These are usually numbered from 40001 which is the offset address for Modbus registers. Click 'Ok' to save the changes. Take care when doing this as outputs cannot be removed (although they can be edited) once they have been added.
- Enable the device to bring it online. This will populate the video outputs on the device.
- Connect the cameras from the video encoders to the video outputs on the Modbus matrix.



- Run the 'Add Cameras' method from the property grid, specifying the path to the CSV file created in 4.2.
- Enable the cameras.
- Disable and re-enable the 'Modbus Matrix Server'

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## 5. Known Limitations

### 5.1

When using Dedicated Micros for Live or playback, if there are too many cameras displayed on a client (say 20), there is an unhandled exception coming from SDK which causes VCM to crash.

### 5.2 PTZ

PTZ is not supported by the driver.

### 5.2 Serial Modbus Devices

This driver does not support serial Modbus devices, even when it is TCP/IP enabled with a serial to TCP/IP converter.

## 6. Troubleshooting

If the connection to the device is lost, the Modbus matrix service has to be re-started after re-establishing the connection.

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