

Wavesys WVMS Professional Administration Guide

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Wavesys WVMS Professional Administration Guide

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1 Software Purpose and Use Cases

Wavesys Global software products can be used for any type of surveillance system installation: they offer a wide and flexible choice of components and license types to suit anyone from home users to corporate customers. Different product editions can be selected depending on the application area and available resources.

Wavesys WVMS Professional

Wavesys WVMS Professional is a new-generation piece of VMS software from Wavesys Global, which offers a fast and scalable stand-alone multiple-server solution that truly answers your company's security needs. Proven to be high-quality and reliable and having a 64-bit version, adding an even more intuitive user interface and better functionality, as well as a long list of add-ons.

Cross-functional and modern, Wavesys WVMS Professional supports over 3500 cameras and other network devices from major producers. The software is designed for surveillance systems with 96 or fewer cameras and also allows hybrid solutions. Looking for a complete enterprise-level solution? We suggest that you refer to the Wavesys WVMS Enterprise version of the software.

Wavesys WVMS Enterprise

Wavesys WVMS Enterprise is a complete surveillance ecosystem solution for enterprises of any size, including those distributed across multiple sites. This version of the software, Wavesys WVMS Enterprise, not only offers 64-bit speed and all the necessary tools for setting up an absolute situational alertness system aimed at responding quickly to events, as well as introducing a central server governance hierarchy of all the components.

This is one of the most comprehensive enterprise-level VMS solutions on the market, featuring interactive maps linked to alarms; an advanced event and action manager; analytics tools; video wall support and other impressive components you will definitely appreciate. To ensure the safety of your data, the software also offers archive replication, advanced system health monitoring and failover clustering mechanism, all of which reduce the disruption of your video surveillance recordings to zero. All this, as well as the various possibilities for customisation and Wavesys Global flawless technical support, makes Wavesys WVMS Enterprise a video surveillance solution you can count on.

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2 Hardware Requirements

The table below details several typical **minimum** recommended **hardware sets** for Wavesys Global software. Please note that these specific processor models are given only as examples and are not compulsory: you can use a different CPU model, provided that it has the same number of threads and its performance is analogous.

Calculations are given for two major configuration examples: all streams in D1 or FullHD resolution; of course, intermediate and mixed cases may also exist. Please contact Wavesys Global representatives if you require help with choosing hardware.

HARDWARE RECOMMENDATIONS TABLE						
Installation specifications			Recommended hardware per usage scenario.			
Video Stream	Number of cameras	Motion Detector	Server only	Monitor*** only	Server + Monitor***	
D1 30fps	Up to 9	None or camera-side*	CPU: Intel G1840; RAM 4GB	CPU: Intel G4500; R a.m. 4GB	CPU: Intel i3-6300; RAM 8GB	
		Software HP**				
		Software HA**	CPU: Intel i5-6600; RAM 8GB			
	Up to 16	None or camera-side*		CPU: Intel G4500; RAM 4GB	CPU: Intel i3-6300; RAM 4GB	
		Software HP**				
		Software HA**	CPU: Intel i3-6300; RAM 8GB			
FullHD 30fps	Up to 9	None or camera-side*	CPU: Intel G1840; RAM 4GB	CPU: Intel i5-6600; RAM 8GB	CPU: Intel i7-6700; RAM 8GB	
		Software HP**	CPU: Intel G4500; RAM 4GB			
		Software HA**	CPU: Intel i5-6600; RAM 8GB			
	Up to 16	None or camera-side*	CPU: Intel G4500; RAM 4GB	CPU: Intel i7-6700; RAM 8GB	CPU: Intel i7-6700; RAM 16GB	
		Software HP**	CPU: Intel i3-6300; RAM 8GB			
		Software HA**	CPU: Intel i7-6700; RAM 8GB			
		Up to 9	None or camera-side*	CPU: Intel G1840; RAM 4GB	CPU: Intel i5-6600; RAM 8GB	CPU: Intel i7-6700; RAM 8GB
			Software HP**	CPU: Intel G4500; RAM 4GB		
			Software HA**	CPU: Intel i5-6600; RAM 8GB		
Up to 16	None or camera-side*	CPU: Intel G4500; RAM 4GB	CPU: Intel i7-6700; RAM 8GB	CPU: Intel i7-6700; RAM 16GB		
	Software HP**	CPU: Intel i3-6300; RAM 8GB				
	Software HA**	CPU: Intel i7-6700; RAM 8GB				

DDR4 RAM is strongly recommended!

- *Please refer to the list of Wavesys Global supported cameras for camera-side motion detector support
- **High Performance/High Accuracy mode
- ***System must provide:
 - DirectX 10 support
 - Graphics card with at least 256MB memory
 - Latest graphics driver version

For **WVMS Monitor workstations**, onboard video memory should be at least 256MB per display, and the recommended minimum is 512MB per display.

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For **WVMS Video Analytics (VA)**: 1x physical core 3GHz+ and 1GB RAM per video channel. CPU **must** support AVX/AVX2.


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3 Prerequisites

There are a number of requirements for the WVMS host system:

- Microsoft Windows operating system (7 SP1, 8, 8.1, 10, Server 2012 R2, Server 2016, Server 2019), real or virtual machine
- both .NET Framework 3.5 SP1 and 4.x installed (the latest version should come with OS updates)
- for Windows Server operating systems, make sure the Desktop Experience feature is installed
- all Windows updates must be installed (especially, this is critical for Windows 8 and newer editions and for pending updates)
- ports for remote connections should be enabled through the firewalls (default ports are 60554 for WVMS Monitor and Wavesys Console and 8080 for the Wavesys WVMS Streaming Server and external services)
- installation and recording directories should be added to antivirus exception list so that they are not scanned or interfered with in any other manner
- indexing and defragmentation services must be disabled for the storage locations
- for the software analytics requirements, see the corresponding section of the VCA manual (provided as a separate document)
- for WVMS Monitor application, DirectX 10+ is required along with the latest stable graphics card drivers
- for WVMS Monitor, display resolution of 1280x720 pixels or higher is recommended


 For Windows Server 2016 and 2019, specify the *Server with Desktop Experience* option as part of the installation. Prior versions of Windows Server allow you to install this feature post installation.


 If you use a server with a clean Windows installation, make sure to install **all available Windows updates before** starting the software installation. Component deficiency (framework components, redistributables etc.) may lead to unexpected issues in software operation.

 If you are using Windows 10 N or KN (special edition without media technologies), make sure to install **Windows 10 Media Feature Pack** in order to ensure WVMS operation. Without media features, WVMS will not work. You will find the media feature pack online, provided by Microsoft.

For **recording**, the following recommendations apply:

- for 48+ channels and/or >20MB/s total recorded stream, RAID 5/6/10 with high speed hardware controller is strongly advisable
- defragmentation and indexing must be disabled for all storages
- every recording location, regardless of its type, must have 10-15% of free space, not used by WVMS or any other software
- recording to the system disk is strongly not recommended
- antivirus software or any other scanners should be disabled for the storage locations
- no third-party VMS should be recording to the same location as WVMS
- for NAS, make sure to disable the *Recycle Bin* feature, so that the erased files are actually deleted and not just moved to trash folder

 Antivirus **scanning, defragmentation, indexing** and other similar processes being enabled for WVMS storages may result in dramatically decreased write speed, recording disturbances and, occasionally, database corruption. We strongly recommend that you make sure that storage locations are not affected by these processes.


 Wavesys Global is **not responsible** for software failures and/or any footage loss caused by underlying OS and/or hardware issues. It is the responsibility of the systems administrator to configure the server and provide maintenance, unless otherwise agreed (e.g., if server hardware has been shipped by Wavesys Global for bespoke configuration).


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4 Getting Started

Before starting the installation, make sure that:

- you have downloaded the correct software package
- you have acquired the corresponding valid **license** key
- the host operating system is stable (functioning correctly) and has all the **updates and drivers** installed
- server **hardware matches** the project **requirements**, taking into account all used features and planned post-deployment modifications
- host system retains all the [features and configuration](#) required for software operation


 We strongly advise that you keep the software versions (e.g., 1.x.x) and subversions (e.g., 1.2.x) across your system match exactly. Software build numbers (e.g., 1.2.0.xxxxx) may differ slightly in case you are using 64-bit and 32-bit editions.

 If you are not sure about what server hardware to choose, do not hesitate to use Wavesys Global provided hardware calculators and/or contact Wavesys Global representative for an accurate estimation.

We advise installing and activating the software on the ultimate server assembly, as extensive subsequent hardware changes are likely to cause software license activation failure. If this happens, undo these changes, if possible, or contact product support to find a solution.

WVMS is installed as a Windows service so please make sure that the Windows user you are logged in as has sufficient privileges; otherwise, software may not be installed correctly. Note that there is no option to install and run the software in application mode.

The following topics will guide you through the installation process, as well as provide details on product configuration. If you are using a Wavesys Global product for the first time, we strongly advise you to carefully read and follow the instructions in this manual and related documentation.

 Wavesys Global is **not responsible** for software failures and/or any footage loss caused by underlying OS and/or hardware issues. It is the responsibility of the systems administrator to configure the server and provide maintenance, unless otherwise agreed (e.g., if server hardware has been shipped by Wavesys Global for bespoke configuration).

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5 License Activation

In order to use the product, a **valid license** is required - whether this is a free, a trial or a purchased one. Any type of license can be activated using this wizard; note that license activation choice will differ depending on the installation package you have selected.

For standalone server edition, Wavesys WVMS Professional, the license is applied to that server. Client applications do not require a license to operate.

For Wavesys WVMS Enterprise system, the license is applied to the Wavesys WVMS Enterprise server (central management server) only; do not require a license to operate because they cannot operate independently. Client applications do not require a license to operate.

License Types

Each license includes a certain number of **video channels**, and a certain number of **advanced functionality channels**. Also, each WVMS license, including the free Wavesys WVMS Lite edition, contain 1 (**one**) video analytics channel **free of charge**.

Extra licences (on top of video channels) are required for:

- **VA** - embedded video analytics
- CrossLink - interactive channels
 - **CrossLink Basic**: interactive web applications (webpages)
 - **CrossLink Advanced**: interactive remote applications (workstations)
- advanced device integrations (Leica, CrossWalk, etc.)

For detailed information on WVMS license options, please contact our sales via sales.apac@wavesysglobal.com, sales.emea@wavesysglobal.com, sales.americas@wavesysglobal.com.

License Activation

Once you have installed the software and entered the server initialisation settings, the activation wizard will appear. If you have rebooted the server computer after completing the installation, simply run the **activation manager** in one of the following ways:

- from the Windows Start Menu, under Wavesys Global folder, or
- by typing *Activation Wizard* in the search field, or
- by right-clicking the server tray icon and selecting *About > Manage license* (server tray icon appears only after you run the WVMS Server shortcut from your Desktop or Start menu), or
- when connected to localhost via Wavesys Console, go to the main menu > *About > Manage license*.

The license manager will only pop up automatically after the initial installation. If you wish to apply license upgrades at any time, including the after-software-upgrade, run the license manager manually as described above.

It is advisable to run hardware stability tests and finalise the server hardware configuration before applying the license, as subsequent hardware changes may cause activation related issues. Approximately up to 30% of the initial hardware components can be replaced without losing the activation.

Subtopics here describe every type of license activation in details.



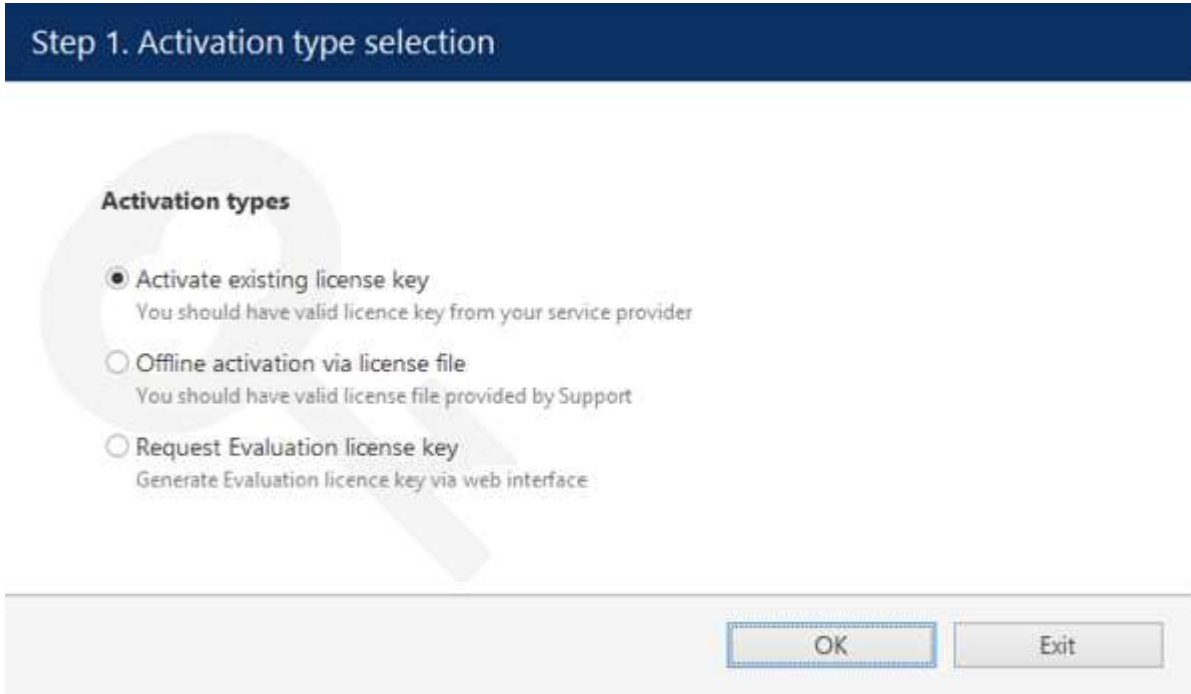
Licensing is mandatory for Wavesys WVMS Professional and Wavesys WVMS Enterprise software packages. Wavesys WVMS Enterprise Recording server does not require a license as it is not an independent component but rather operates under a Wavesys WVMS Enterprise server only.



Virtualised environment is supported starting from software version 1.13.0. If you experience any issues with the license activation, kindly contact our support engineers by emailing support@wavesysglobal.com.

6 Online Activation

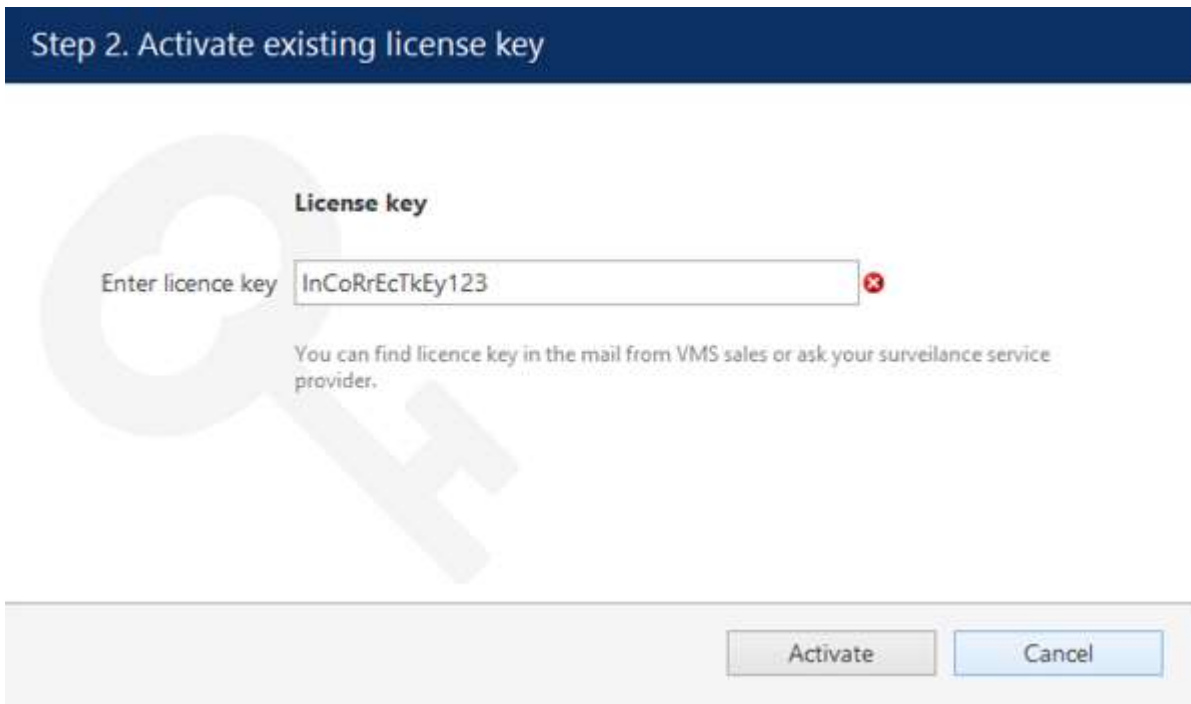
If your server has Internet connection available, you can choose online activation mode. The software will automatically connect to the activation server and register your pre-purchased license.



The screenshot shows a dialog box titled "Step 1. Activation type selection". Under the heading "Activation types", there are three radio button options: "Activate existing license key" (selected), "Offline activation via license file", and "Request Evaluation license key". Each option has a brief description below it. At the bottom right, there are "OK" and "Exit" buttons.

Activation Type Selection

Enter your product license key and hit *Activate*. If your key is incorrect, the wizard will notify you with a red X sign next to the key field: if this happens, double-check the key you have typed, looking out for mistyped characters and superfluous spaces at the start or end.



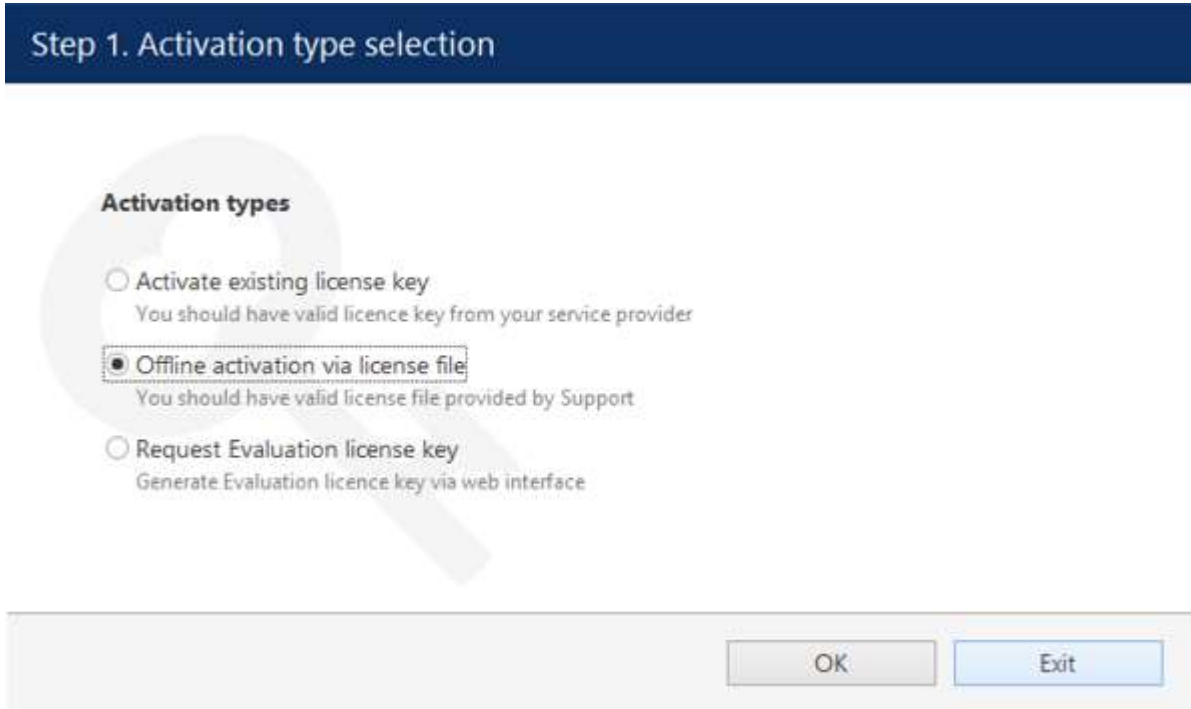
The screenshot shows a dialog box titled "Step 2. Activate existing license key". It features a text input field labeled "Enter licence key" containing the text "InCoRrEcTkEy123". A red X icon is positioned to the right of the input field, indicating an error. Below the input field, there is a note: "You can find licence key in the mail from VMS sales or ask your surveillance service provider." At the bottom right, there are "Activate" and "Cancel" buttons.

Enter License Key

When you have entered a valid license key, the wizard will activate your software. If you have decided to go with a different activation option, click *Cancel* to return to the activation type selection step.

7 Offline Activation

If there is no Internet connection for security reasons and/or server disposition particularities, choose the *Offline Activation* type.



Step 1. Activation type selection

Activation types

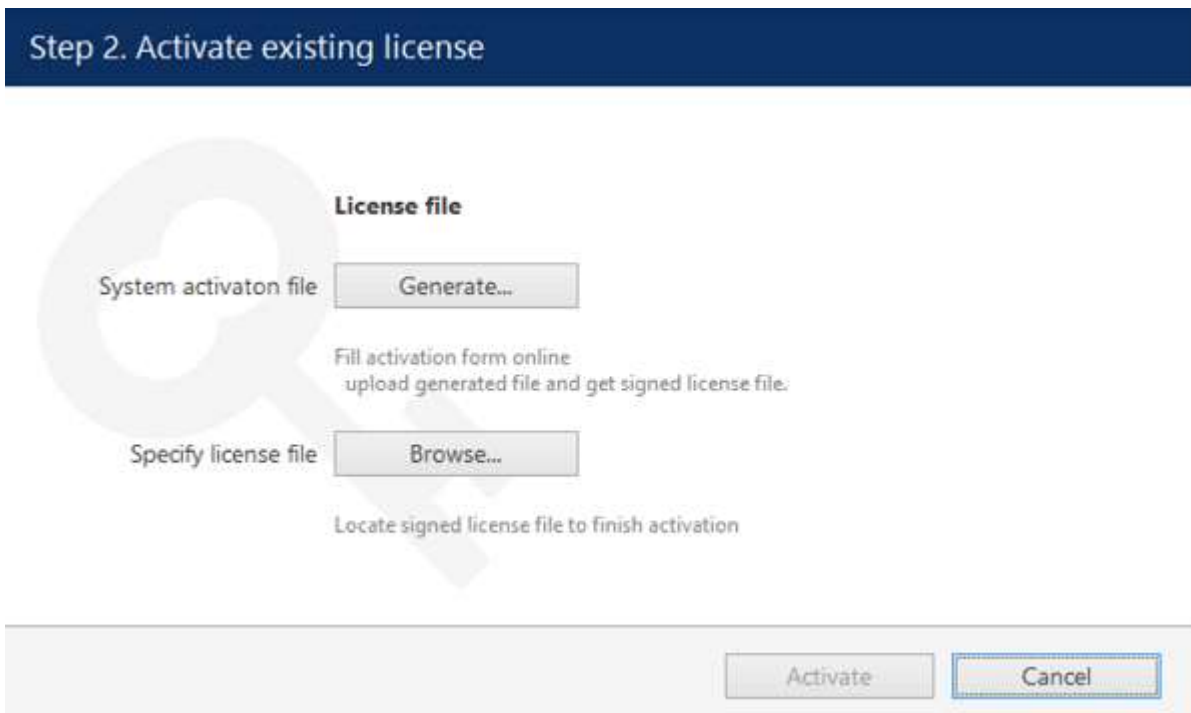
- Activate existing license key
You should have valid licence key from your service provider
- Offline activation via license file
You should have valid license file provided by Support
- Request Evaluation license key
Generate Evaluation licence key via web interface

OK Exit

Activation Type Selection

This mode consists of three steps:

- generate the activation file on the target server
- go to the online activation system at <https://www.wavesysglobal.com/purchase/software-activation> and fill in the form
- apply provided license file to your system



Step 2. Activate existing license

License file

System activation file

Fill activation form online
upload generated file and get signed license file.

Specify license file

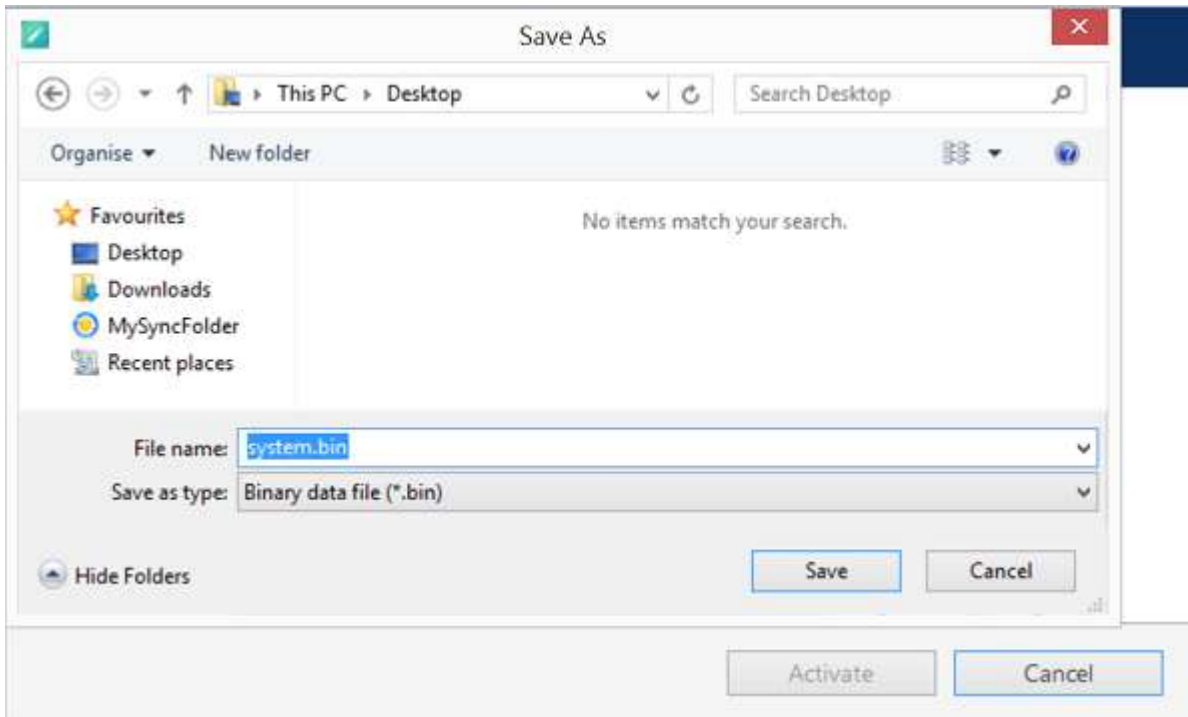
Locate signed license file to finish activation

Activate Cancel

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Offline Activation Steps

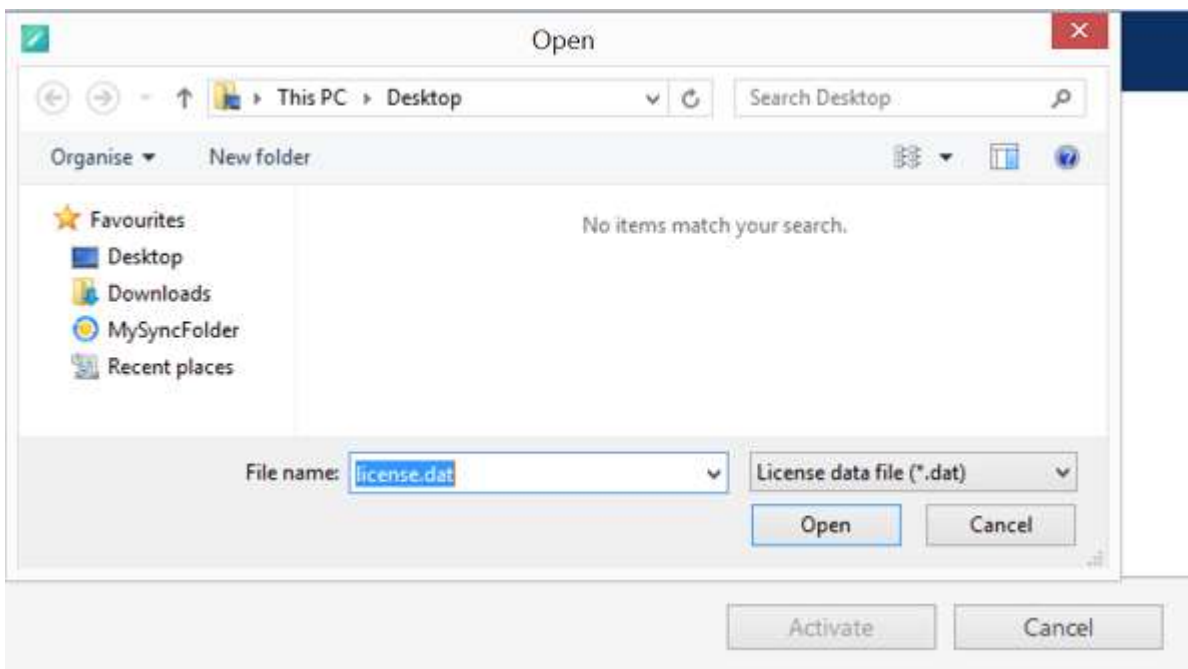
Click *Generate* to create the activation file; choose a location and save it. The default file name is *system.bin* and we do not recommend changing it.



Save Activation File

Next, copy this binary file to any other computer that has Internet access, then go to the online form available at <https://www.wavesysglobal.com/purchase/software-activation>, fill in the required fields and upload the file. The activation system will process your file and allow you to download a license file. This license file will be unique and will only be valid on the same machine from which the original *system.bin* file comes.

You can close the activation wizard after creating the activation file and reopen it later to apply the license file. Click *Browse* to locate it and open the *license.dat* file provided by the activation system.



Browse for License File

The validated *license.dat* file will be loaded, allowing you to finish the registration process.

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Step 2. Activate existing license

License file

System activaton file

Fill activation form online
upload generated file and get signed license file.

Specify license file *license.dat*

Locate signed license file to finish activation

Load the License File

Click *Activate* to apply the license file. If the license is valid, you will see an activation success confirmation with the following details:

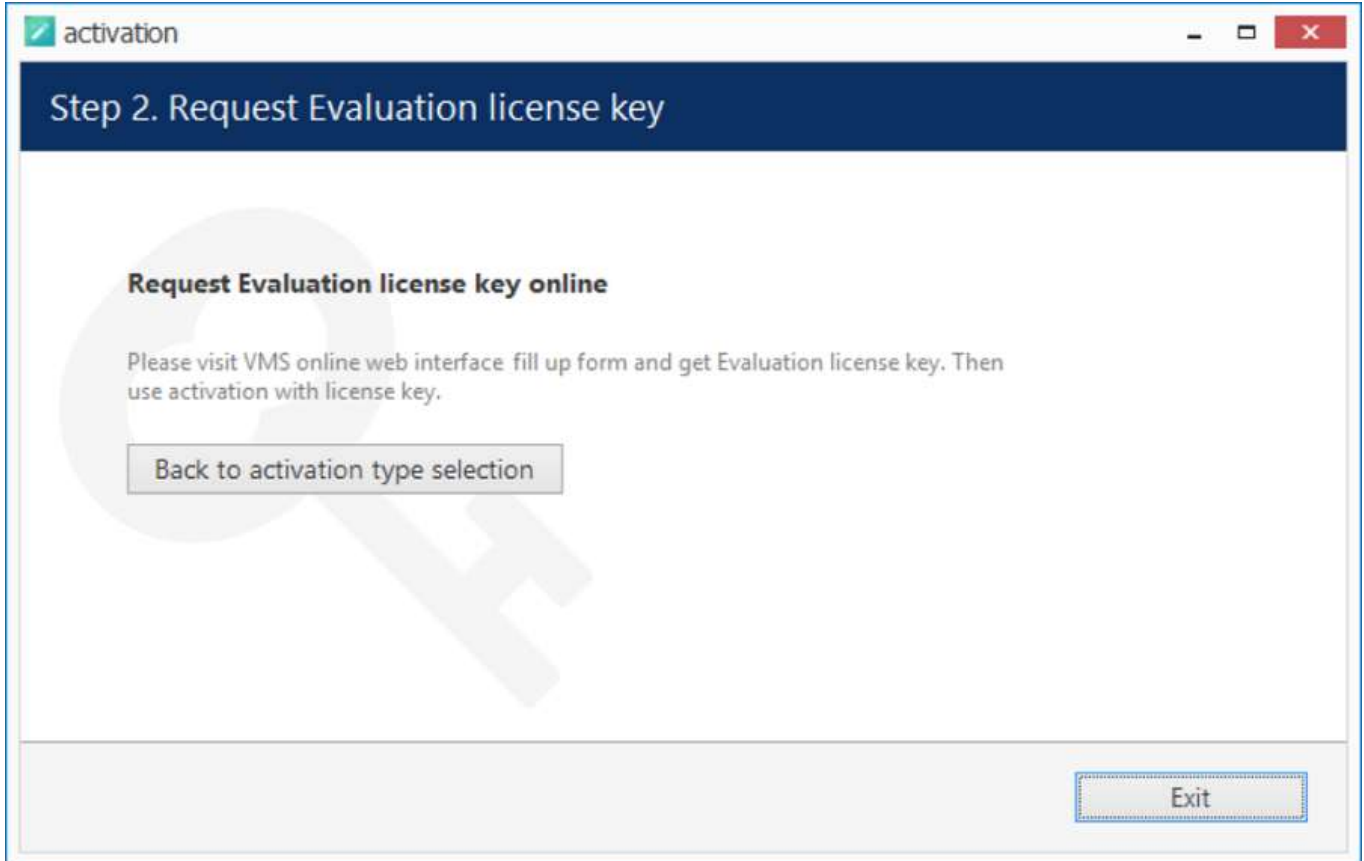
- product type
- license key
- license key expiration date, if applicable
- support subscription expiration date
- allowed channel amount

The license information will be stored on your server. However, you may wish to save a snapshot of this screen for your future reference, so that this information will be accessible in case of server OS or hardware failure.

Finally, click *Done* to exit the activation wizard or click *Start Quick Setup Wizard* to proceed with server configuration.

8 Evaluation License

If you wish to evaluate the fully featured Wavesys WVMS Professional product or need to assess server performance over a specific period of time, request an evaluation license key from Wavesys Global. After you have done so, activate your trial key using usual online or offline activation algorithm.



Get Evaluation License Key

9 Activation Management

When a server already has a license key installed, you can retrieve that information in two ways:

- right-click server icon in the system tray and select *About*. The dialog box will contain basic information about the product version and license type
- run the *Product Activation Wizard* from the Start menu

To start the wizard, go to *Start -> All Apps -> Wavesys Global -> Activation Wizard* (in Windows 7 and older versions, use *Start -> All Programs -> software installation folder -> Tools -> Activation Wizard*); alternatively, use Search to locate the Activation Wizard in the programs menu.

Step 1. Manage license

Your license: Global

License details:

Key:

Expiry date: never

Subscription valid until: 1/25/2018

Channels supported: up to 100

Upgrade current license

Upgrade product using same license key

Upgrade current license via license file

Upgrade product using activation file

Remove license

OK

Cancel

Choose an option in order to proceed

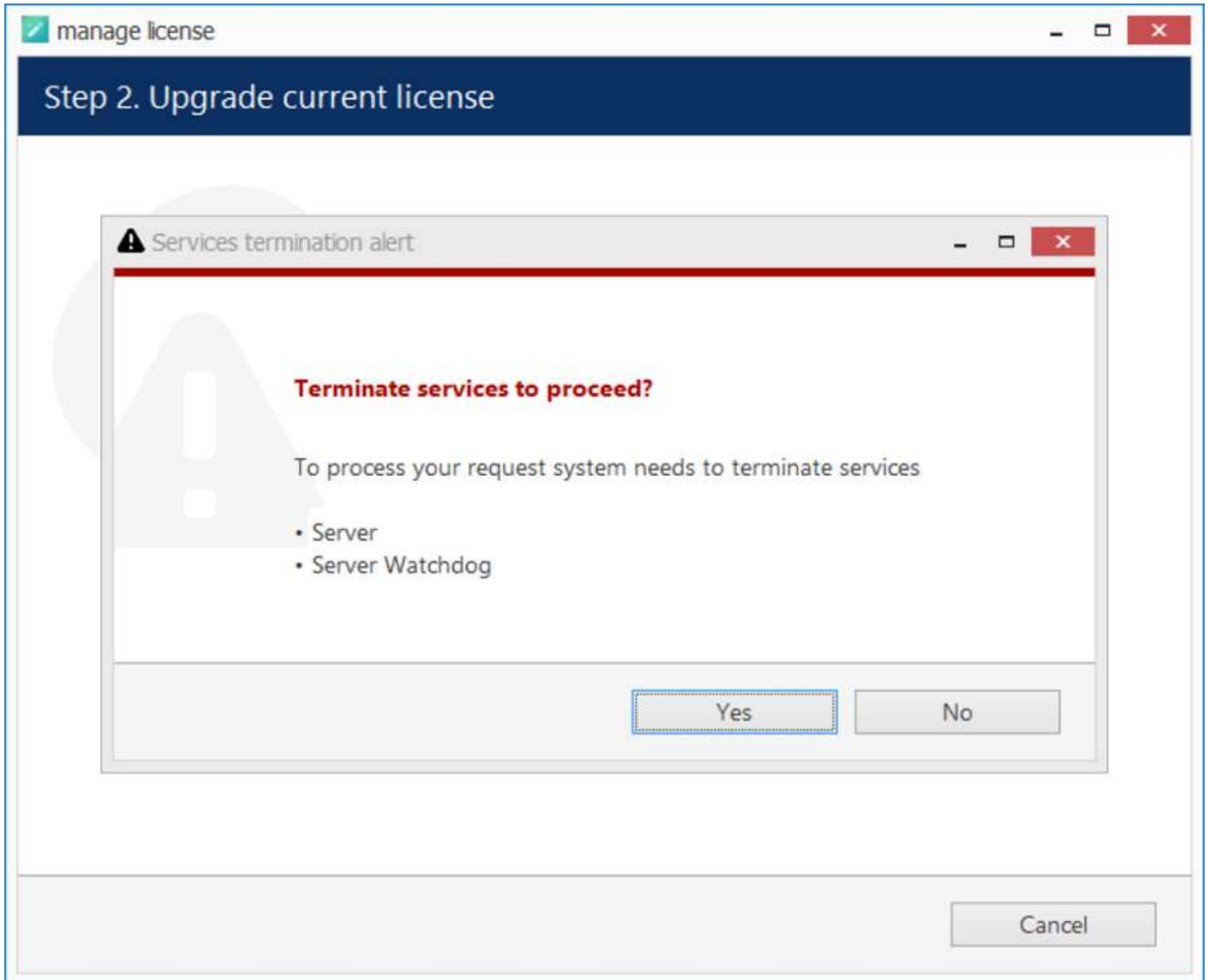
The wizard will display a summary about the currently installed license key and show the available management options.

Online license upgrade

License upgrade is available for the license keys purchased earlier. Note that all the software processes (both applications and services) must be stopped in order for the license to be applied correctly.

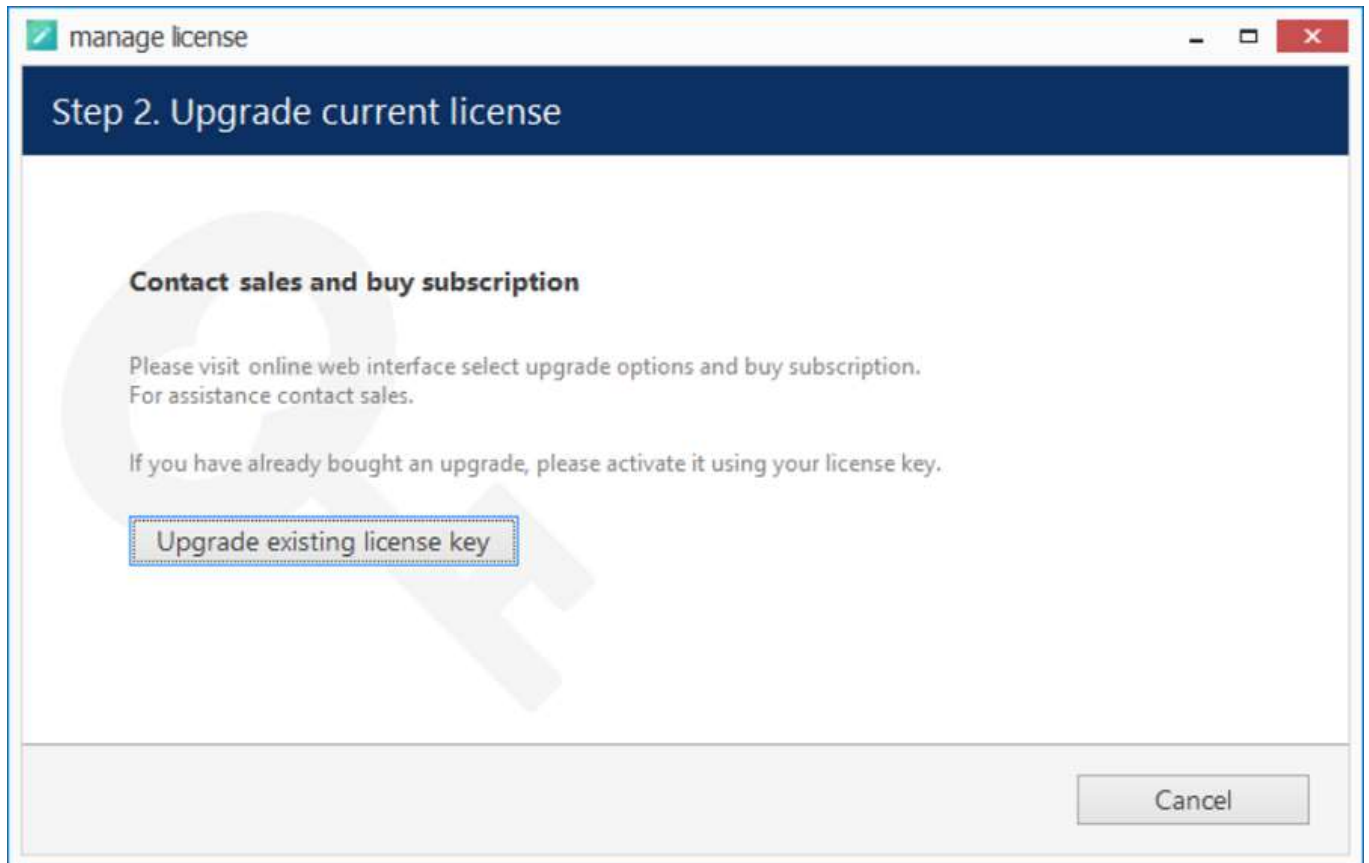
For upgrade acquisition details and assistance, please contact us via sales.apac@wavesysglobal.com, sales.emea@wavesysglobal.com, sales.americas@wavesysglobal.com.

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All software processes must be stopped in order to apply license related changes

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License upgrade option

After acquiring the upgrade from Wavesys Global, click *Upgrade Existing License Key* to enter it. Your license information will be synchronised with the activation server and you will be presented a license summary. Click *Cancel* to return to the beginning of the wizard.

Offline license upgrade

Offline license upgrade essentially the same as the offline license activation process: the same steps should be taken to retrieve the new license file.

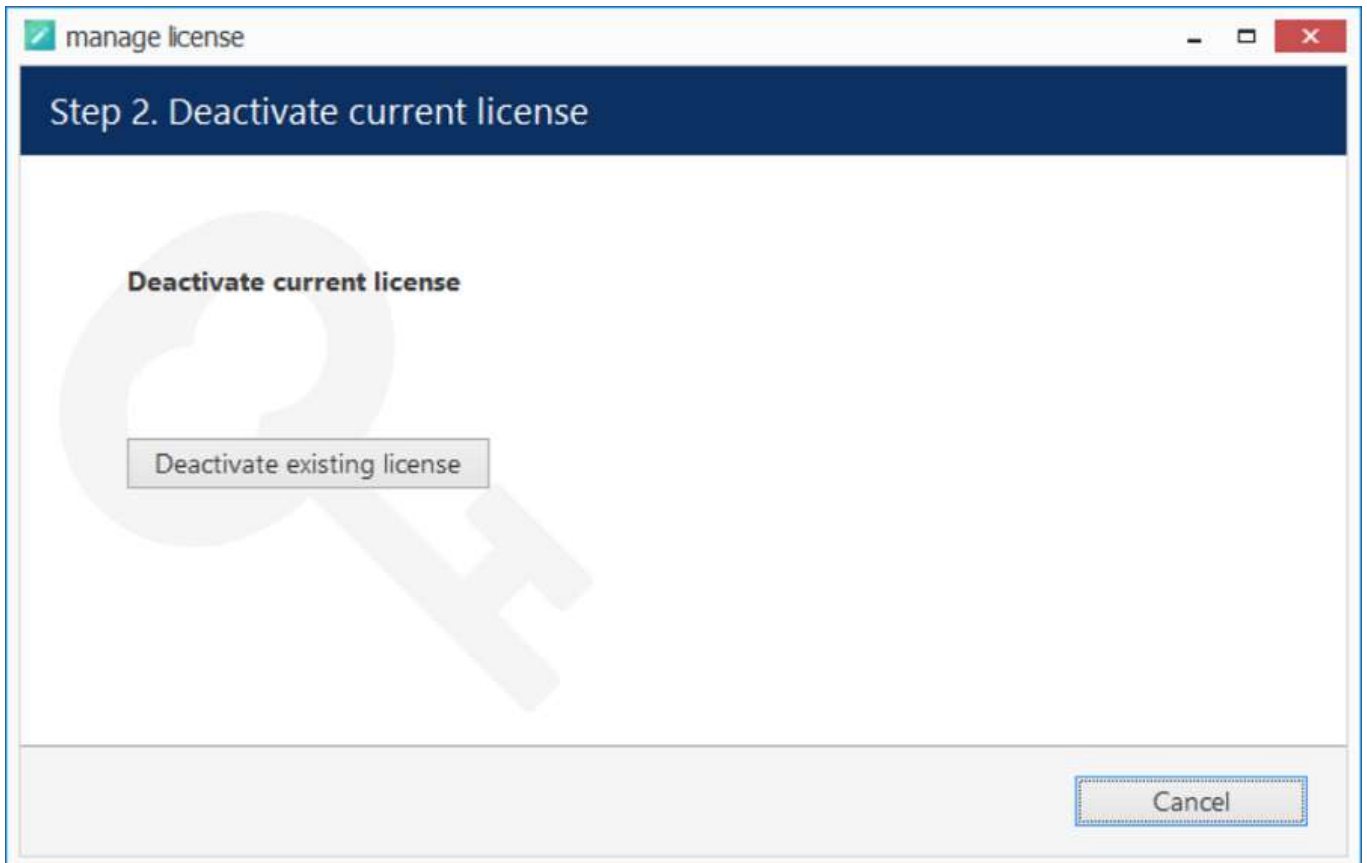
- generate activation file on the target server
- go to the online activation system at <https://www.wavesysglobal.com/purchase/software-activation> and fill in the form
- apply provided license file to your system

Click *Cancel* to return to the beginning of the wizard.

Remove license

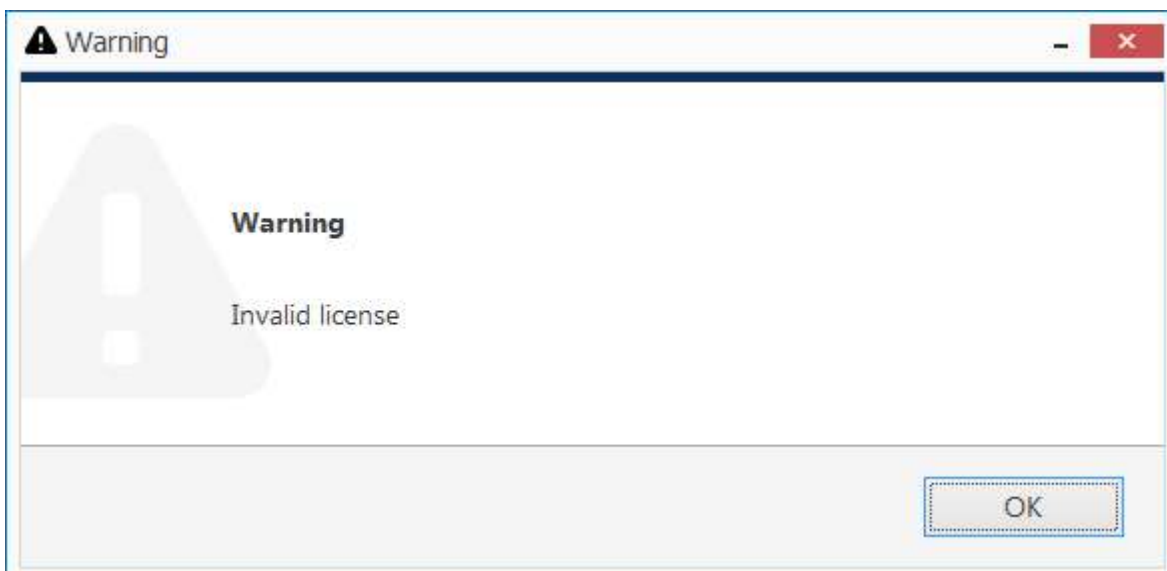
Select *Remove License* if you wish to completely delete all the license information from the server.

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Deactivate license

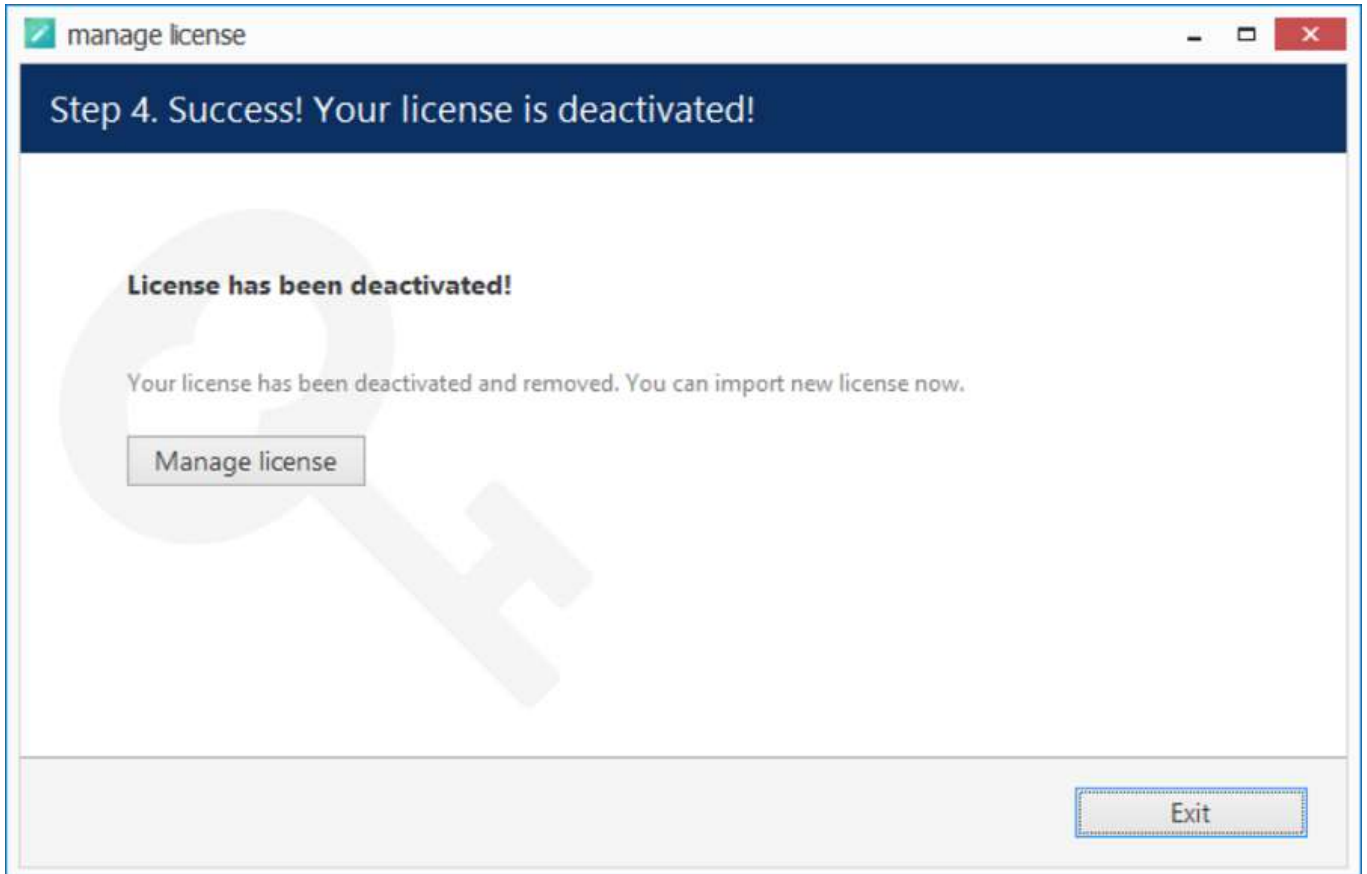
Click *Deactivate Existing License* to confirm deletion of the currently installed license. Note that you will be unable to log into Wavesys Console to access your current server configuration without a valid license of the same type; WVMS Monitor applications will also not connect to such a server. In order to use the server again, you will have to enter the license again - either the same or a new one.



An attempt to log into Wavesys Console failed because the license is missing

Alternatively, press *Cancel* to return to the wizard start page. If you are not sure about the deactivation, consult Wavesys Global technical support.

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License successfully deactivated

After license deactivation, you will be offered the chance to go back to license management in order to enter a new software license.

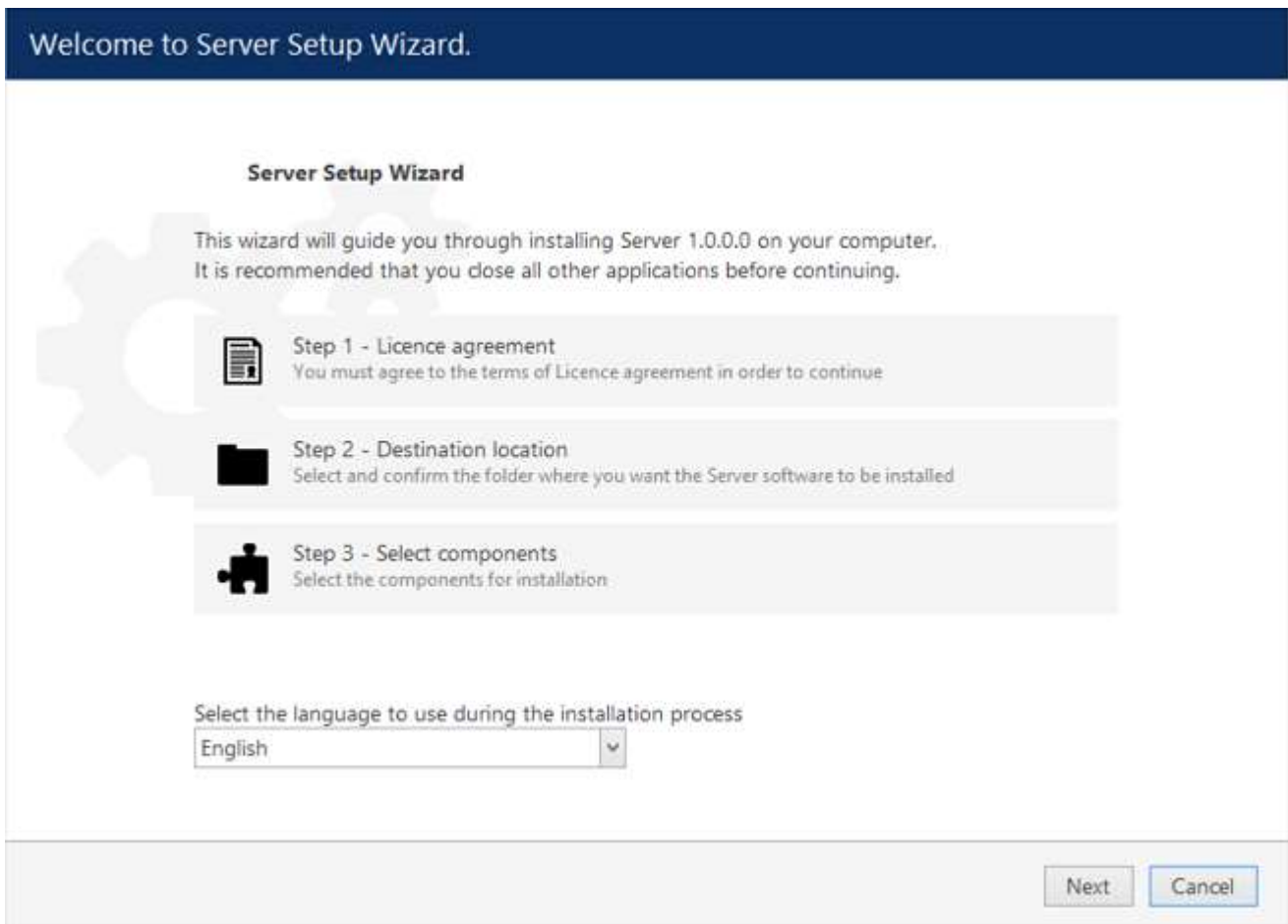
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10 Installation of Wavesys WVMS Professional

Start the installation process by double-clicking on the Wavesys WVMS Professional executable package file. The setup wizard will guide you through the installation process, providing available installation-time options depending on the chosen software package. Note that, depending on your Windows UAC configuration, you may have to confirm and/or provide administrative credentials.

We strongly advise that you stop all running third-party applications, as well as stopping antivirus scanning and Windows (and any other) updates during this phase, as these may interfere with the process and result in corrupt installation, which may cause unexpected behaviour and hard-to-track issues during further software operation.

The installation wizard displays an overview of the process; also, you are able to select the installation language here. You will be prompted to select the Wavesys WVMS Professional interface language later.



Wavesys WVMS Professional Setup Wizard

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Step 1

Carefully read the Wavesys Global license agreement: you must agree to all parts of the given document in order to proceed. If you agree, select *I agree...* in order to continue; otherwise, terminate software installation. If you have any questions regarding the contents of the present license agreement, please contact support@wavesysglobal.com.

Step 1 of 3 - Licence agreement

Server Licence Agreement

Please read the following Licence agreement. You must accept the terms of this agreement before you can continue with the installation.

misconfiguration, hardware failure, hardware conflict, software conflict, user data misconfiguration, and/or data loss.

You expressly assume the entire risk and cost associated with the Software, including risk resulting from Maintenance services (whether performed in whole, in part, or not at all), or from any virus, downloaded material, harmful component, or through any Internet use of the Software or any site or server through which the Software is available. You are solely responsible for any damage that results from or is associated with use of the Software. The Disclaiming Parties shall not be liable in any manner whatsoever for the results obtained through use of the Software. Persons using the Software are responsible for the supervision, management, and control of the Software, including determination of the

I accept the terms of the agreement

Previous

Next

Cancel

License Agreement

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Step 2

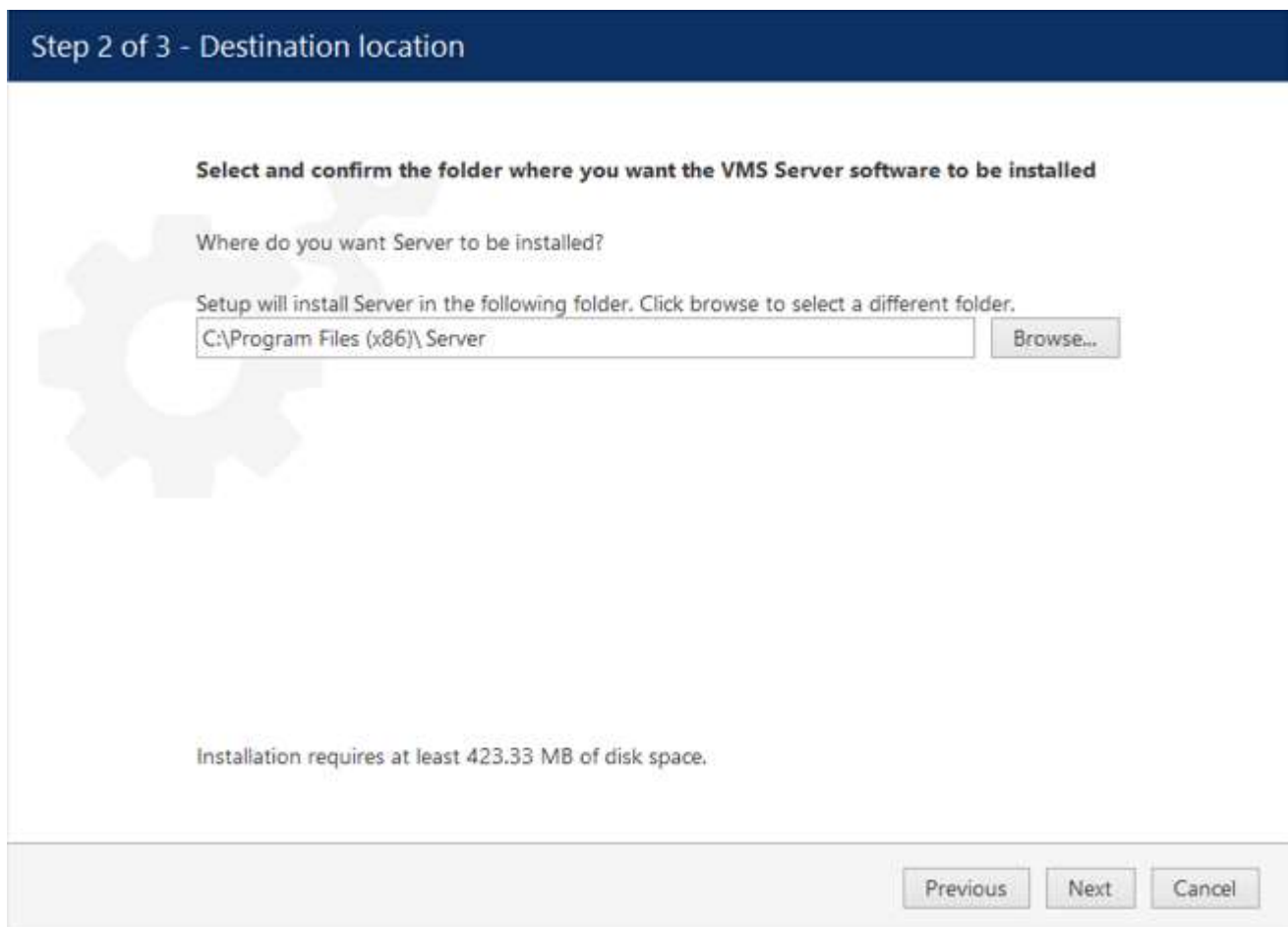
Select the destination folder you want the software to be installed in. By default, Wavesys WVMS Professional is installed in:

32-bit: *C:\Program Files (x86)\Wavesys Global\Wavesys WVMS Professional*

64-bit: *C:\Program Files\Wavesys Global\Wavesys WVMS Professional*

If you are re-installing Wavesys WVMS Professional and previously selected a non-default location, make sure to select the same destination directory, or, alternatively, completely uninstall previous Wavesys WVMS Professional version. If unsure about this, ask for Wavesys Global technical support team assistance. A full description of the software upgrade procedure is available in the corresponding section of the WVMS administration manual.

The setup wizards estimates how much disk space will be required. Make sure you have enough free space on the target disk. Note that low system disk space will dramatically decrease system performance and affect overall system stability.



Installation Directory

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Step 3

Some components are optional and so you can choose not to install them. The main Wavesys WVMS Professional parts are obligatory and cannot be deselected (by default, these options are selected and greyed out).

If not chosen at this stage, WVMS Monitor can be installed separately later.

Step 3 of 3 - Select components

Specify which components to install

Configure the components of the installation package:

- Server Server Service (390.90 MB)
- Server Management Application (3.82 MB)
- Server Client Application (1.39 MB)

Select the language to use in the user interface

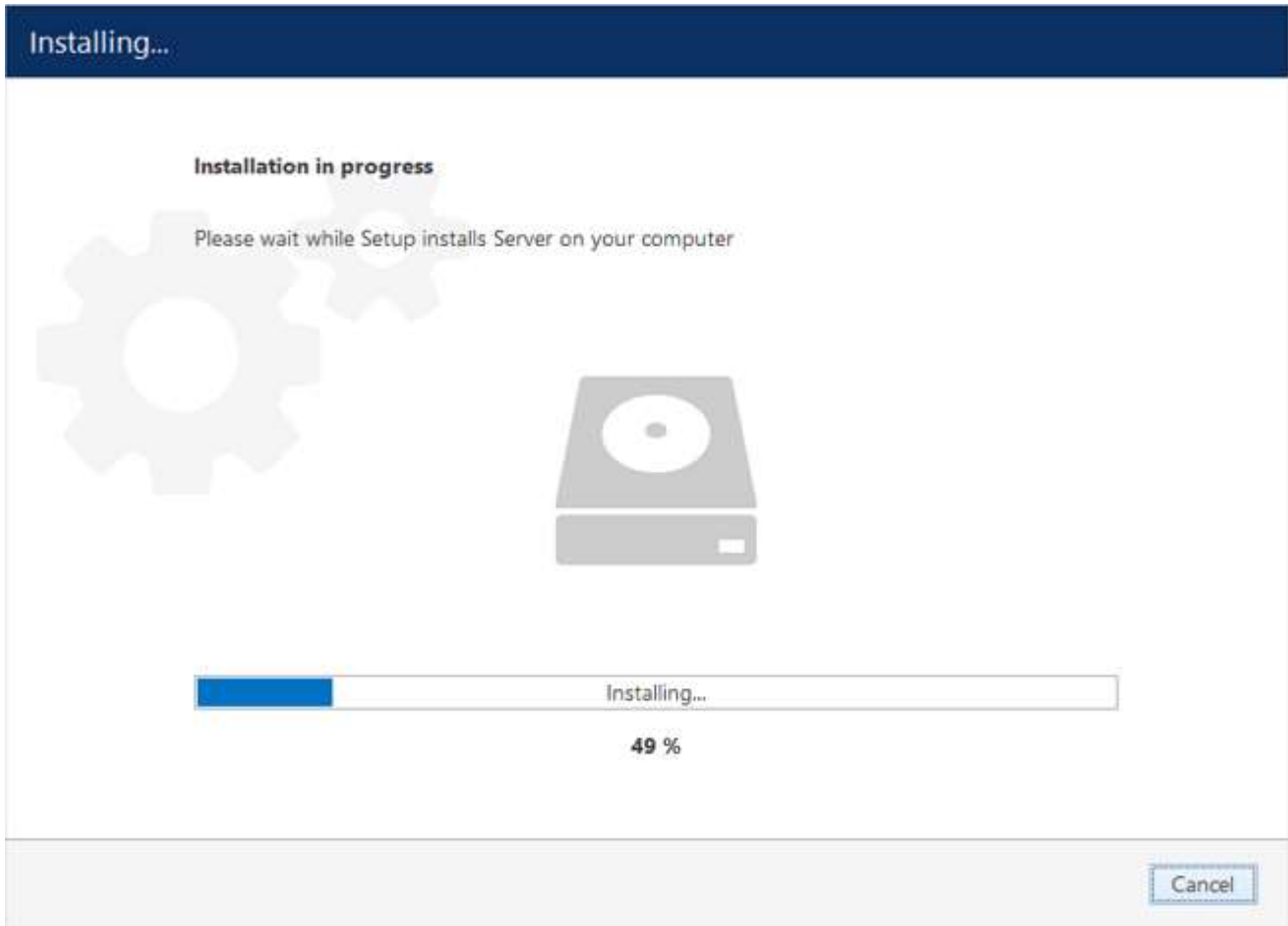
English

At least 424.72 MB of free space is required.

Select Software Components

If you are ready to proceed, click *Next* to begin the installation. Depending on selected components and host system condition, the process may take some time to complete, so please be patient.

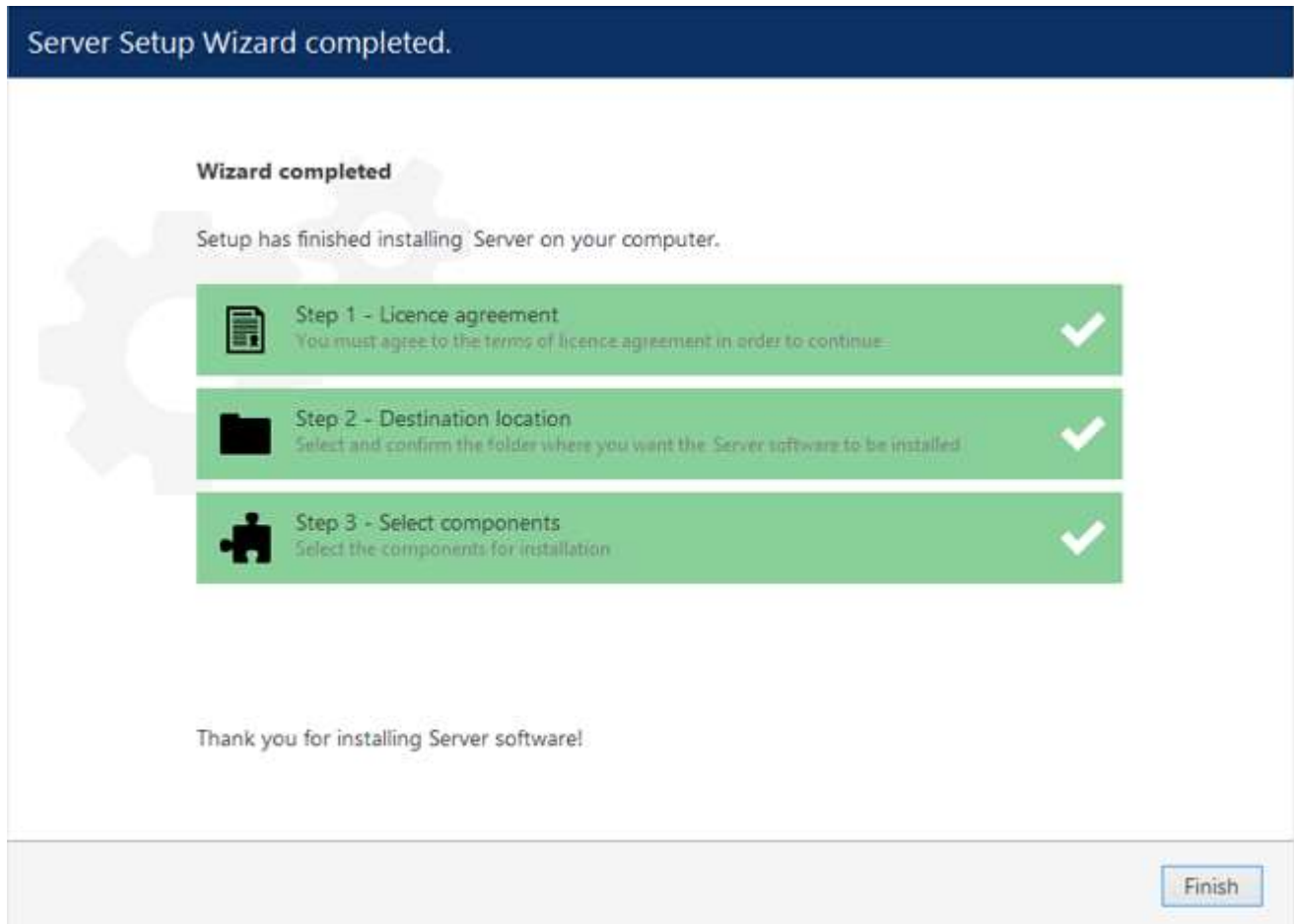
Wavesys WVMS Professional Administration Guide



Installation Progress

Upon completion, the setup wizard will show you an installation summary. If all the steps have been fulfilled successfully, simply click *Finish* to close the wizard.

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Installation Complete

After the installation has been completed, there are a few more steps necessary for you to begin using the software:


- apply server initialisation settings via *Server Setup Wizard* - it will pop up automatically after the installation in case you are doing a clean or a new installation
- activate the software - if it is not activated, the wizard will also pop up automatically
- after you run the console for the first time, you will be offered to complete the *Setup Wizard* to start the deployment, following the recommended configuration steps

All of these steps are described in details in the full version of the WVMS management manual, which is available right after the installation via your Start menu.

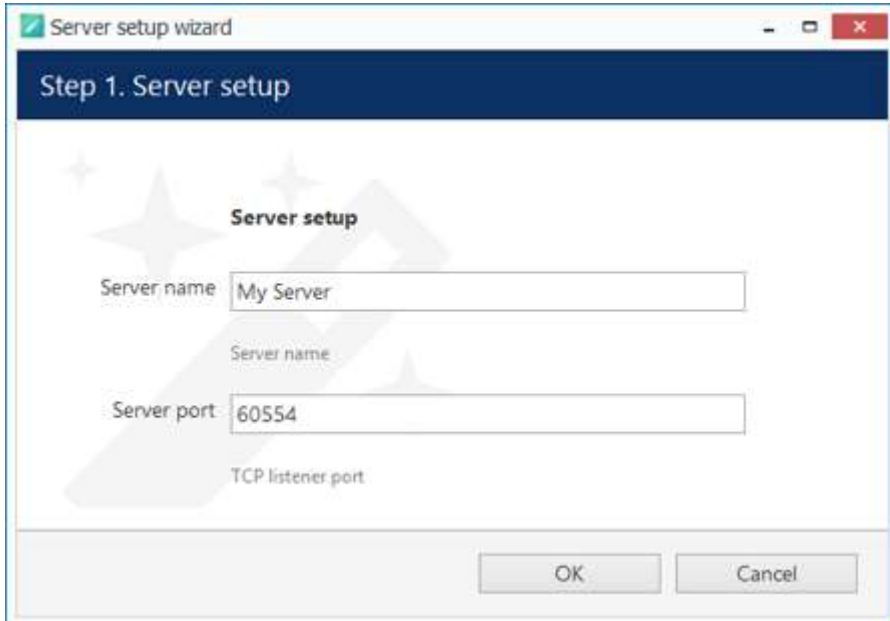
Wavesys WVMS Professional Administration Guide

11 Initialisation and Remote Upgrade

After completing the installation wizard, you will be offered to enter server setup. The settings selected during server setup can be changed later at any time via Server Setup Wizard, which will be available via your Start menu.

 You will be unable to connect to the server that has not been initialised, it will return an error (*The server is not configured*).

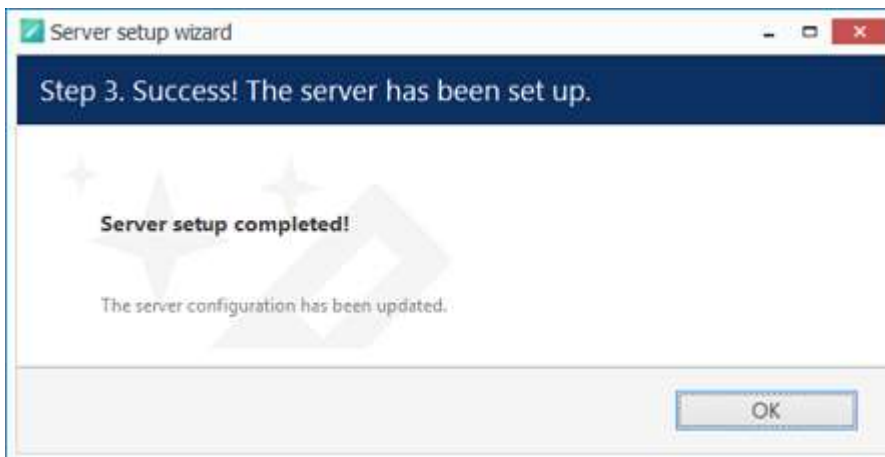
This step is **mandatory**; you will be unable to connect to your server and configure it if it has not been initialised. It is necessary to initialise the server even if you are planning to restore its configuration using the [Server Backup and Restore Wizard](#) later.



Choose Server Title and TCP port

Setting	Description	Default Value
Server name	User defined server title	<i>Server Title</i> or last used title
Server port	TCP port for the incoming remote WVMS Monitor connections	60554

Note that the port defined here will be used to retrieve the server data via local WVMS Monitor and Wavesys Console connections. You will need to define the external (Internet) port for your Wavesys WVMS Professional via Wavesys Console in order to be able to receive video streams from remote WVMS Monitor connections.



Setup Completed

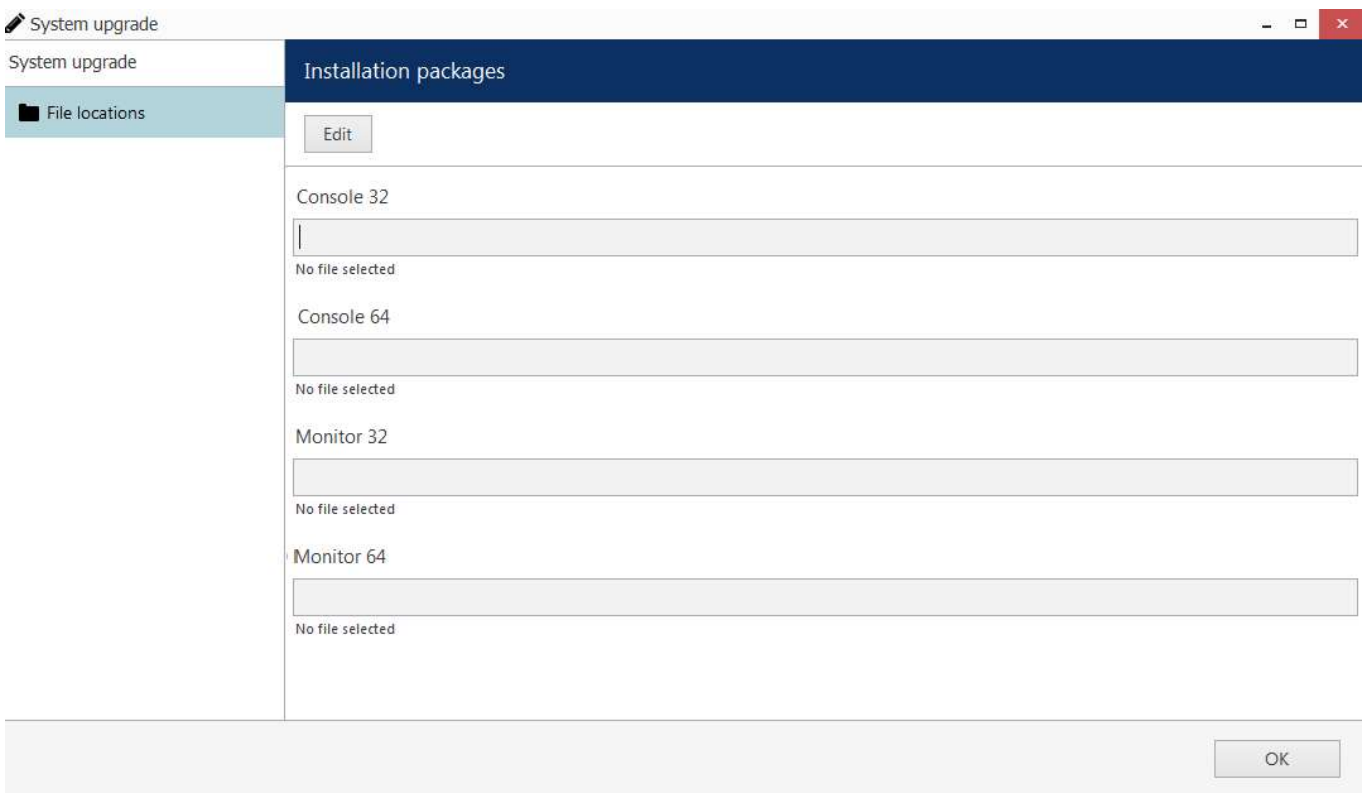
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Remote Upgrade

Starting from software version 1.10.0, it is possible to apply remote upgrade to Wavesys Console and WVMS Monitor components from the Wavesys WVMS Professional server. This feature allows you to deploy remote client machines once and then easily handle the upgrades from any place, keeping the whole system up to date with little effort.

Once you have upgraded the Wavesys WVMS Professional server to a newer version, you can then put the installation packages of the same version onto the Wavesys WVMS Professional server computer. The idea is that you first define the location of the executable files and then remote WVMS Monitor and Wavesys Console applications receive an update notification. The locations must be on the Wavesys WVMS Professional server machine, even if you are accessing the server from a remote Wavesys Console. The installation itself is initiated from the remote client side.

To access the remote upgrade feature, open your Wavesys Console application, click the main application menu button in the upper-right-hand corner and choose the *System upgrade* option. The *System upgrade* dialog box will appear.



Specify files for the remote upgrade

Here, you have four entries - for 32- and 64-bit editions of Wavesys Console and WVMS Monitor applications. These installation files can be downloaded from <https://www.wavesysglobal.com>. Specify the path to each file and click *OK* to save.

⚠ Do not use beta versions of the installation files on production servers.

Now, if a remote Wavesys Console or WVMS Monitor application of an older version is used to connect to this server, it will receive a notification about the available upgrade. The notifications can be disabled in the application settings.

So, if Wavesys Console or WVMS Monitor detects that an upgrade is available, it will offer you to download it straight away. If your network connection allows it, click *OK* to agree and download the upgrade package.

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Wavesys Console application offering an upgrade on startup


The upgrade package will be downloaded using your default Web browser and saved on your local computer. You can start its installation at any time, provided that your Windows user has enough privileges to run the installation. After the installation, just start the application as usual.


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12 Software Update and Uninstall

This topic provides guidelines on the installation management use cases.

We recommend that you keep the software version up to date, as new versions include new features, various improvements and optimizations, as well as the latest bug fixes.

 We strongly advise that you keep the software versions (e.g., 1.x.x) and subversions (e.g., 1.2.x) across your system match exactly. Software build numbers (e.g., 1.2.0.xxxxx) may differ slightly in case you are using 64-bit and 32-bit editions.

 Before starting the upgrade/uninstall procedure, ensure that all WVMS processes have been terminated and that WVMS files are not in use: this is necessary in order to upgrade all files to the newer versions. This includes any WVMS processes or related applications that are running, and also any third-party applications that have access to WVMS files, e.g., antivirus scanners, third-party integrations, etc. WVMS processes can be found via Task Manager: these start with *VMS*, e.g., *VMSServer.exe*.

If the processes are not stopped, or if other applications are still interfering with the process, you may be asked for a **reboot**: in that case, please restart your server machine afterwards to complete the action. This will not affect the overall process quality.

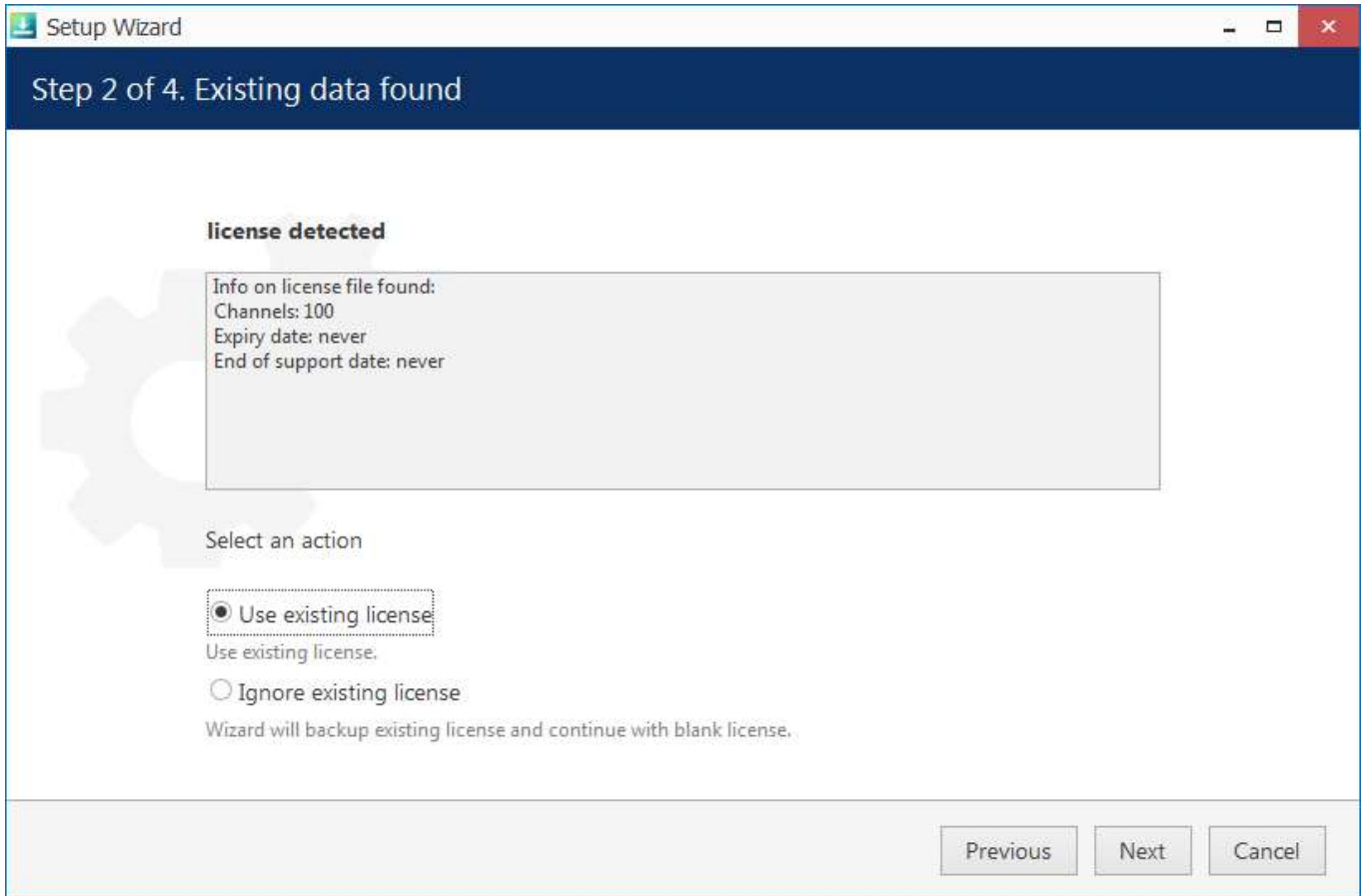
Upgrade Software

This section describes manual software update (newer version installation on top of the older one) by running the installation **locally**. For [remote upgrades](#), see the [corresponding section](#) of this document.

Before starting the software upgrade:

1. Make sure there are no other running installations and that the operating system is not in the middle of installing updates. If Windows updates are pending, apply them, then restart the computer (if required), and start the WVMS upgrade.
2. Verify that the operating system is stable and is running normally (check system logs, overall health) - these must be no "blue screens", unexpected shutdowns, slowdowns etc. (Normally, we recommend that you regularly run such system checkups, not only before upgrade).
3. Ensure stable power and connectivity (the latter is essential if you are connected via RDP).
4. See if there are any special requirements or recommendations from Wavesys Global regarding the target version. Usually, these are either mentioned on the download page, or provided alongside the download links in case the new version was recommended and sent by our engineers.
5. Check your software license subscription, and renew it, if necessary: the subscription must not run out before the target version release date. You can check the software release date by right-clicking the installation file > *Properties* > *Digital signatures* > see timestamp. The license information is available via license manager, *WVMS Activation Wizard*.

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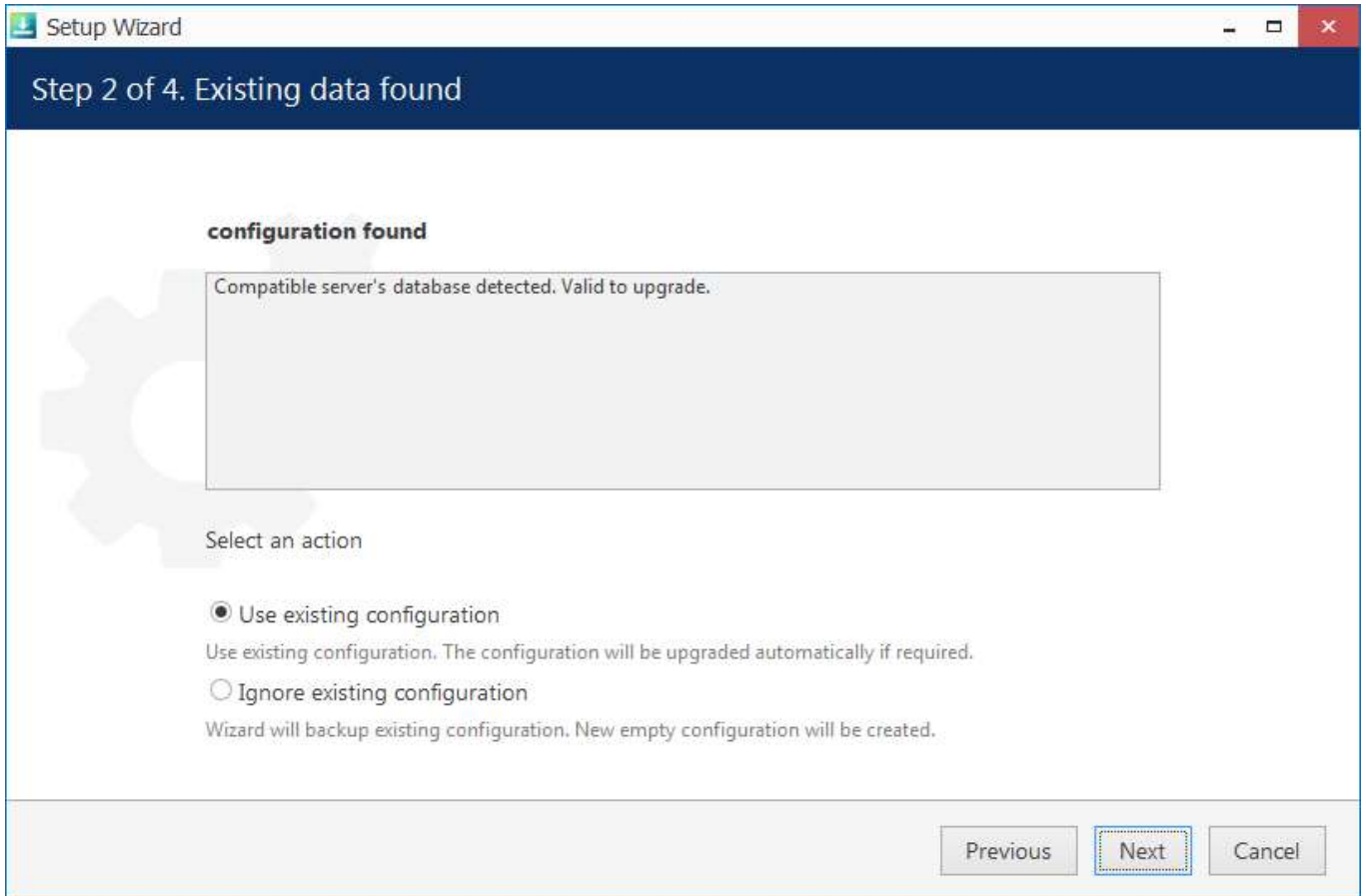


Choose license preference for the upgrade

If you launch a newer version installation package of the same kind as the already installed WVMS edition, you will be given the option to **upgrade** the product. It is not possible to install another type of package on top of the existing one, e.g., Wavesys WVMS Enterprise Recording server on top of Wavesys WVMS Professional: if you wish to change the server type, uninstall the old software package first.

Press *Next* to go through the steps and complete the wizard, which is very much alike the installation wizard. At each step, read all the information displayed and press *Next* until finished.

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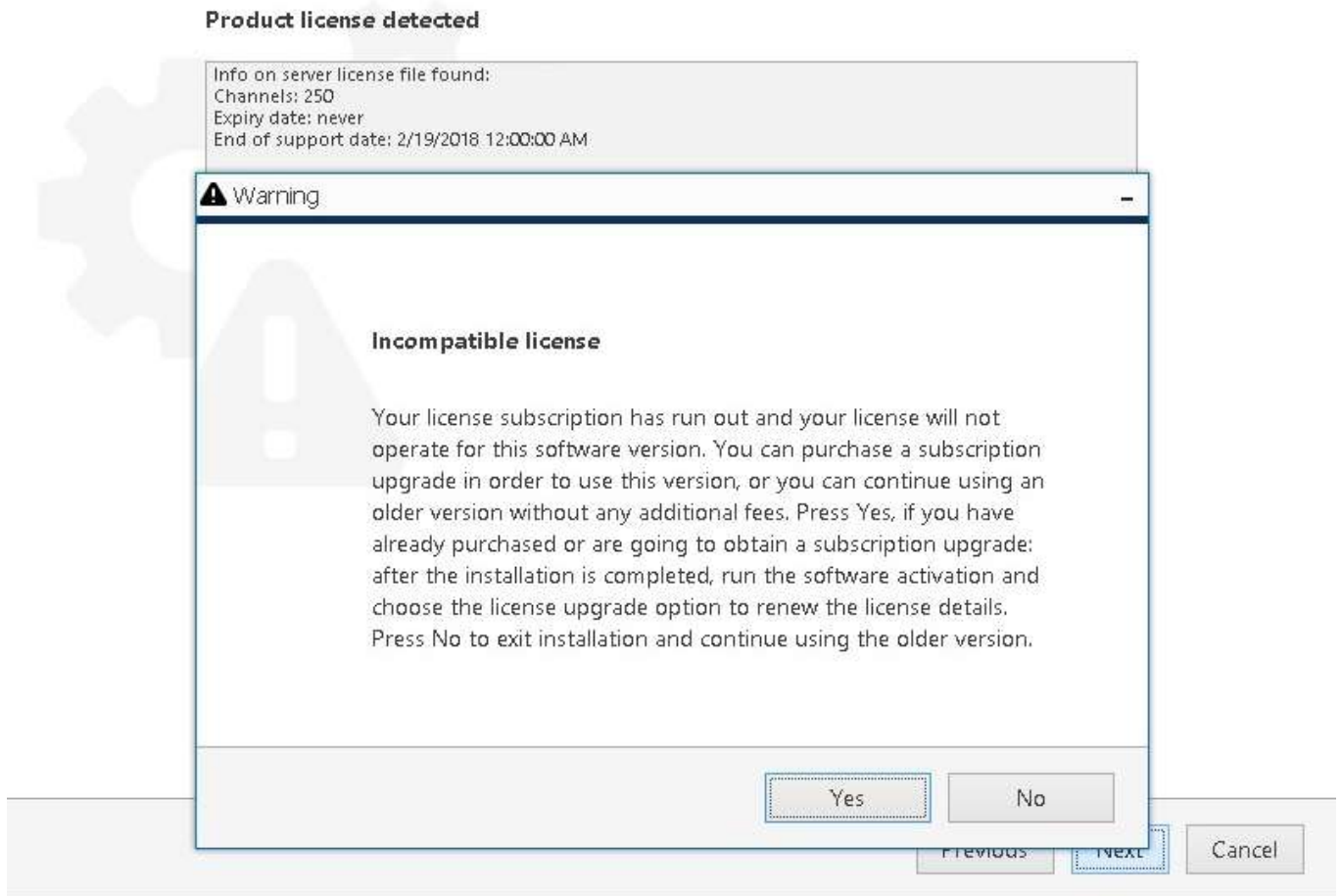
Use existing database configuration

If you want a clean installation, choose to ignore the existing **configuration**: the current database will not be used and will be replaced with an empty one, as if you were installing the software from scratch. Otherwise, leave the wizard to use the existing configuration. In either case, the old database is not actually removed but is saved as a backup, so you will be able to load it anytime later via [Backup and Restore Wizard](#).


In case the installation wizard detects your **license subscription** has run out, you will get a **warning** about license compatibility. By default, the initial subscription will allow for version upgrades during 2 years, starting from the license activation date. Hence, if the target upgrade version is newer, this warning will pop up.

- If you have already acquired a subscription upgrade, proceed with the installation, then run the [license manager](#) and upgrade your license in either online or offline mode
- Otherwise, cease the installation and choose another software version that was released before the license subscription ran out (or continue using the existing version)

You can contact our sales department via sales.apac@wavesysglobal.com, sales.emea@wavesysglobal.com, sales.americas@wavesysglobal.com or via direct manager contact to learn about the license subscription options and price offers.



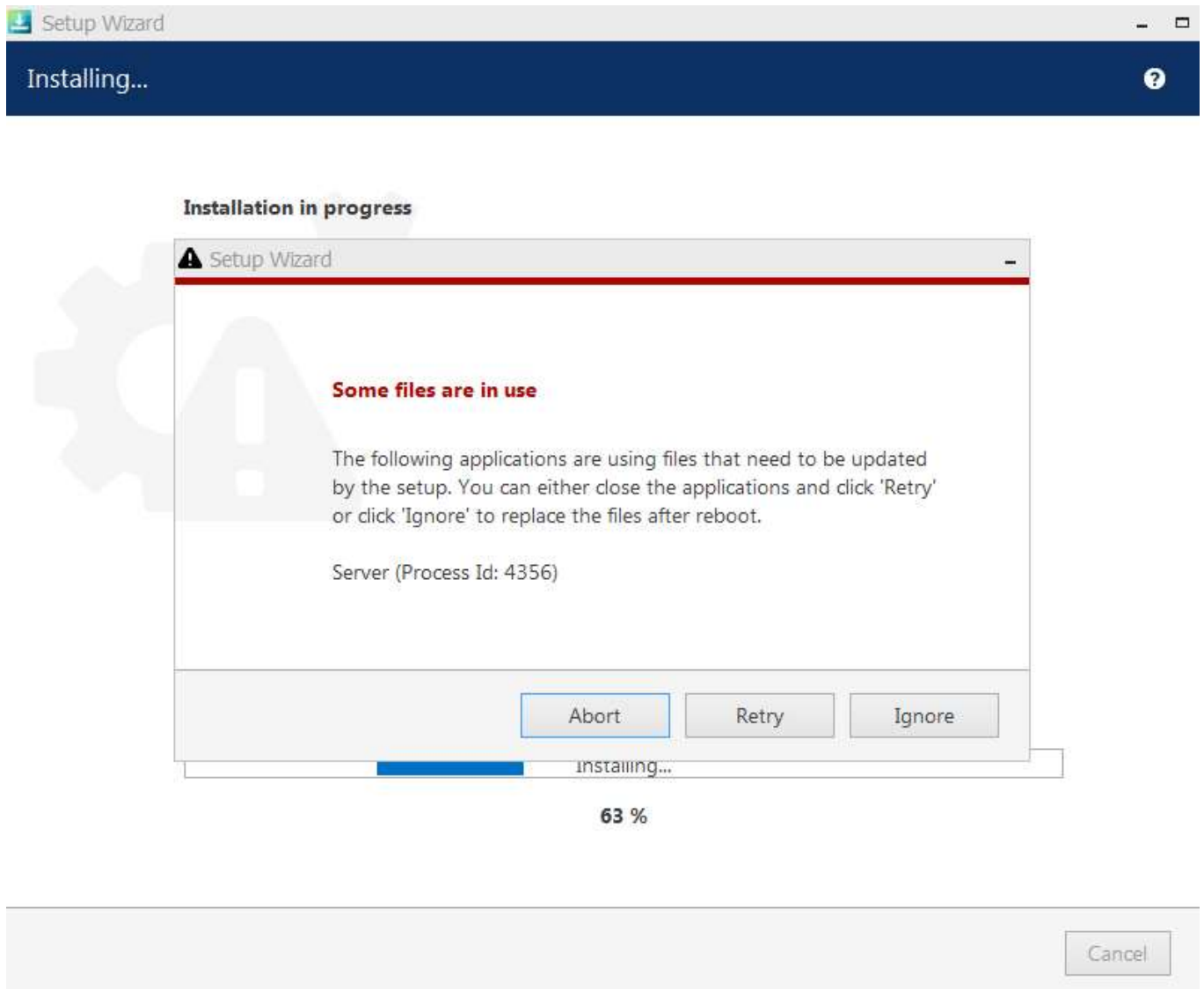
If you proceed with the upgrade but do not provide a valid license after the installation is complete, the software will not operate. Therefore, do not proceed with the upgrade until you have renewed the subscription.

 To verify the software release date against your license subscription expiration date, right-click the installation file > choose *Properties* > go to the *Digital Signatures* tab and check the timestamp.

If some of the files cannot be upgraded because they are in use, you will get a corresponding warning.

- Choose *Ignore* to proceed with the installation: reboot may be required afterwards but it is safe to select this option, esp. if the processes are from WVMS; or
- Stop the listed applications/services and click *Retry* to continue installing the software, or
- Click *Abort* to roll back the installation (the process will be cancelled and you will get a corresponding error in the wizard's dialog box).

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Click *Ignore* to proceed with installation (reboot may be required afterwards)

The upgrade process will then continue and replace your WVMS software version to the newer one.


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Uninstall/Change Software

Software can be uninstalled in two ways:

1. From the Windows Control Panel
2. By launching the same package that was used for installation

In either case, you have a choice between changing and uninstalling the product.

 Before making any changes to the installation, make sure to close and stop all software services and applications. If processes are not stopped, some of the software components may not be removed or replaced during the installation process.

In order to check this, open Windows Task Manager, select '*Show processes from all users*' and make sure there are no processes starting with 'VMS..'. If there are any, stop them manually and then proceed with the installation changes.

VMS Central Server Setup Wizard

You can change or uninstall a program from your computer if you no longer use it or if you want to free up space on your hard disk.

Change

Uninstall

Previous

Next

Cancel

Change or uninstall the product

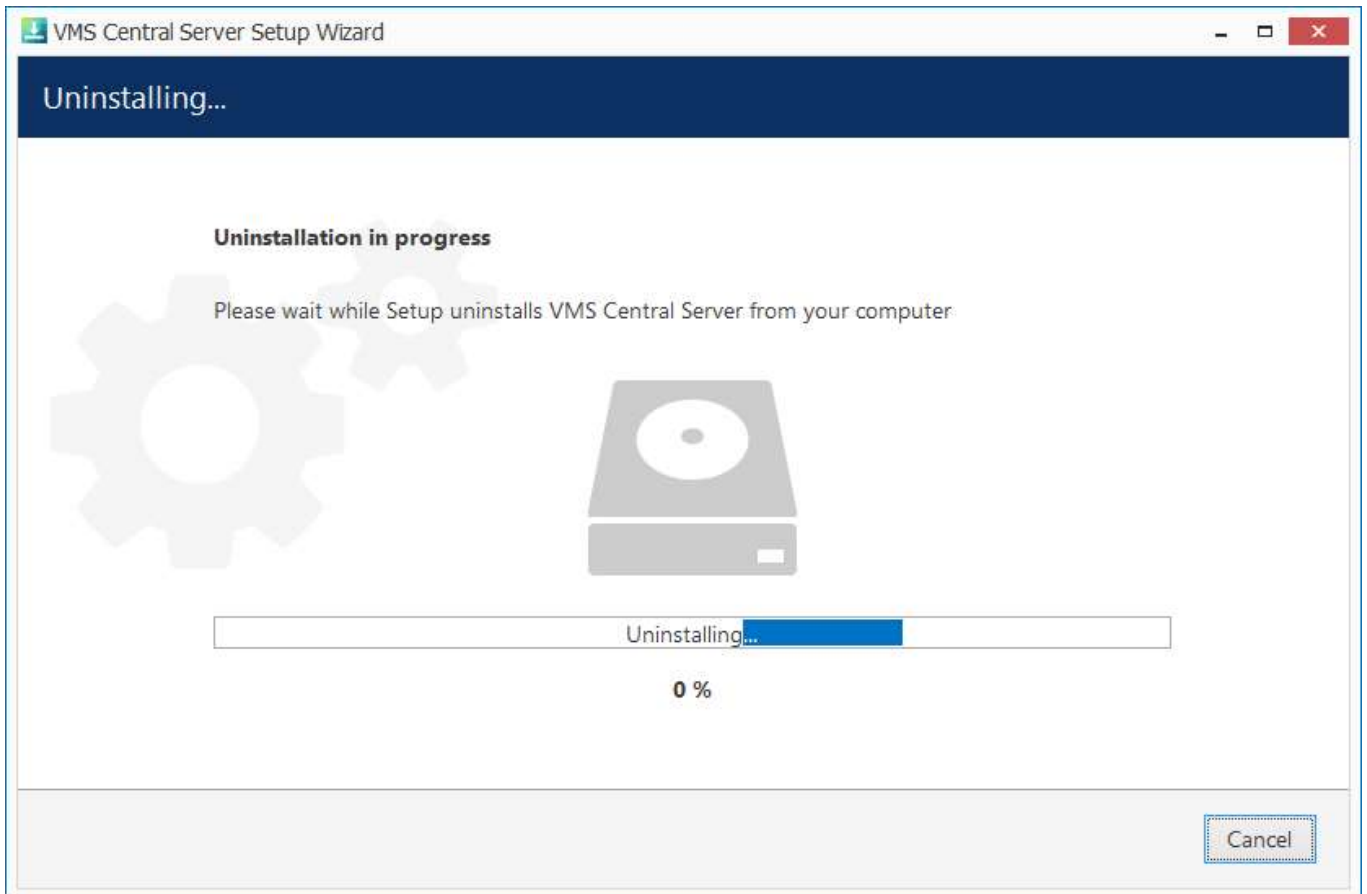
Select *Change* if you wish to re-install or add software components. The process will be similar to the initial installation.

Select *Uninstall* to remove all software components. You will be asked if you wish to keep the configuration and the current license; the following common use cases apply:

- keep the license and remove the configuration if you wish to re-configure everything from scratch after re-installation (e.g., in event of a corrupt database or having to move the server to a different system);
- keep both if you are going to clean install the software;
- remove both if you do not intend to use the software on this machine anymore.

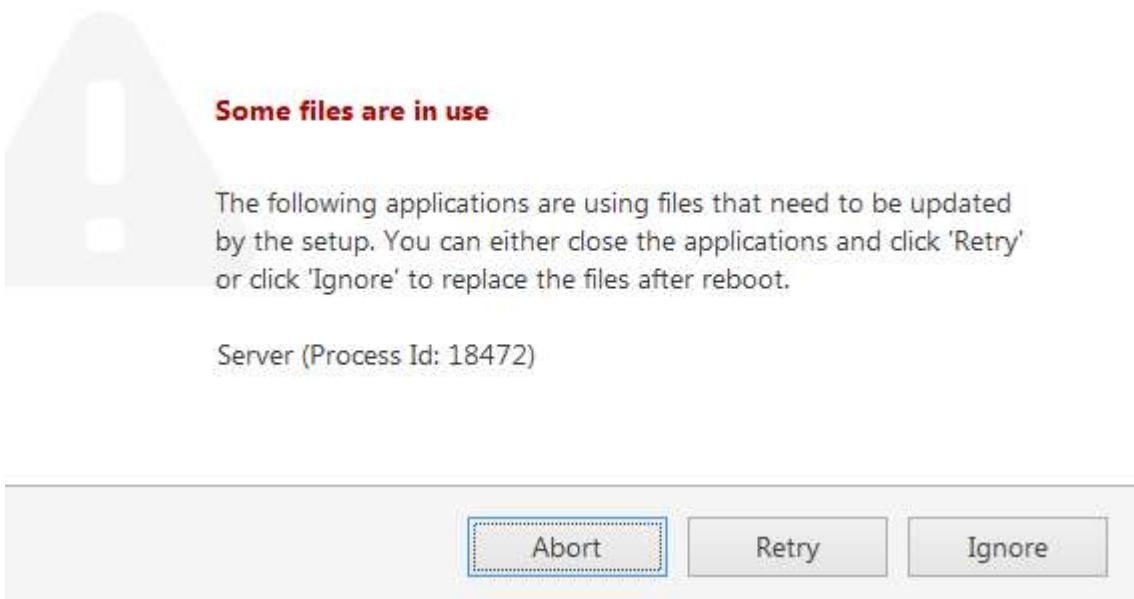
Press *Next* to proceed with the uninstallation process. Note that you may have to confirm these changes if UAC has been turned ON.

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Uninstall

If you did not stop the WVMS server before starting the uninstall process or if some third-party software (e.g., antivirus) has locked WVMS files, you will get a warning.



A warning about some files being locked by a process

In this case:

- choose **Abort** to cancel the uninstall process
- stop the processes manually yourself and then click **Retry**

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- click **Ignore** to let the wizard handle the files automatically (recommended, an reboot may be required)

Generally, if you see that the process mentioned in the warning is WVMS **own process**, simply choose the **Ignore** option and let the wizard do the job.

When the wizard finishes removing software components, hit *Finish* to exit.

Clean Install

Sometimes it is necessary to install software anew, i.e., to change software bit version, roll back version, and also in event of major [software-related troubles](#).



You can perform clean install yourself if you are already familiar with the software. If you are doing it for the first time, we recommend that the procedure is supervised by a Wavesys Global support engineer so that you learn how to do this quickly and effectively, avoiding possible mistakes.



Although software upgrade is not possible with different bit versions, you can migrate your installation to a different bit version by performing a clean install.

To perform a clean installation, it is crucial to make sure that no Wavesys Global software processes are running, whether explicitly or in the background. Follow these steps:

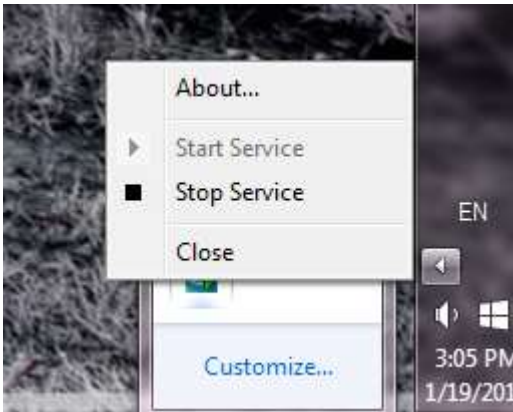
1. Stop all Wavesys Global software services and/or applications;
2. Open Windows Task Manager, click '*Show processes from all users*' and check that there are no processes starting with 'VMS.'; if there are any, stop them;
3. Uninstall software as described above, keeping your license and configuration;
4. Install [new] software version, carefully following all [steps](#) and [recommendations](#);
5. Start the software and check if the desired change has been carried out.

13 Start & Stop Server Service

After software installation (except for the Wavesys Console or WVMS Monitor only installations), two components are registered as **Windows services**: Wavesys Global Server service and the accompanying Watchdog service. Both these services are set to automatic start meaning that they will be launched straight after Windows start-up regardless of whether any user is logged in or not.

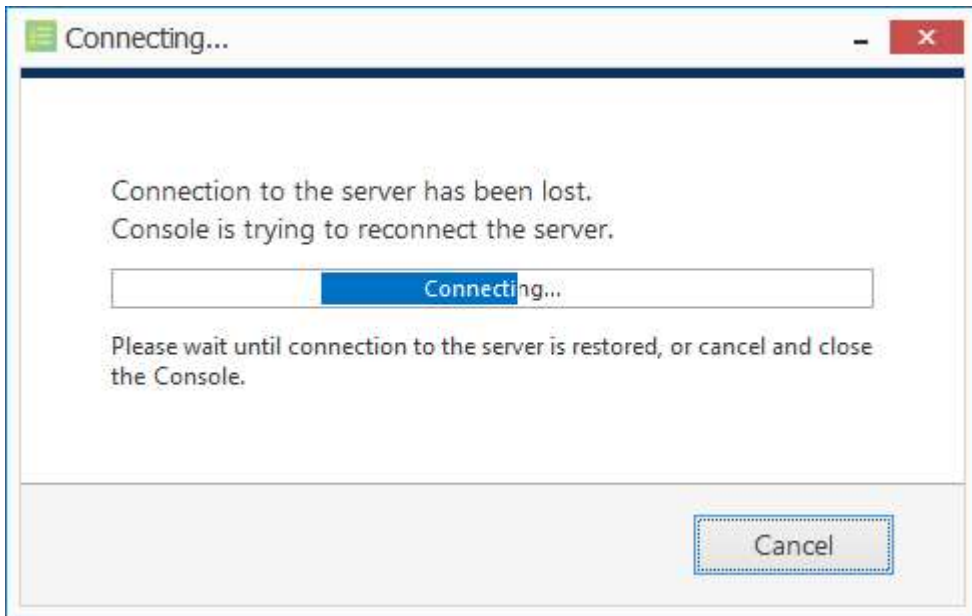
By default, the server will run in silent service mode, i.e., without any status indication other than that in the Windows Services management console; from there, both services can be stopped, started and restarted.

Double-click the server shortcut on your desktop to launch the system tray shell for the server: the server icon will appear in the system tray, allowing you to start and stop the service by right-clicking it and selecting your desired option. WVMS Watchdog service runs silently in background as an auxiliary service and has no user interface except for the settings' dialog box in Wavesys Console.



Start and stop the server service from the system tray

If the server service is stopped while Wavesys Console connections are active, the wait-for-server-connection window will appear on top of Wavesys Console, disabling any input. The same thing will happen if there are any problems with server connectivity. It will automatically disappear when the server is online again; alternatively, you can click *Close* to exit Wavesys Console at this point and open it manually later.



Connection lost

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14 Wavesys Console First Start


All server configuration is conducted through a dedicated interface - the Wavesys Console management application. The management interface has been intentionally separated from the WVMS Monitor application in order to concentrate all administrative utilities in one place and also to conceal the unnecessary menus from the WVMS Monitor operator. Applications are totally independent from each other and can be or not be installed on the same machine. Wavesys Console for a single installation management can be installed on one or more computers, depending on the system administrator's needs.

Run the Wavesys Console application by double-clicking the Wavesys Console shortcut from the desktop or Start menu.

To log in, simply enter your Wavesys WVMS Professional server's local or remote address (IP or host name), TCP port and user information. If you have logged into different servers from this Wavesys Console instance in the past, the Wavesys Console login dialog box will have a drop-down list in the *Server* field.

Note that, if you already have pre-configured user accounts, the user must have corresponding permissions in order to connect.

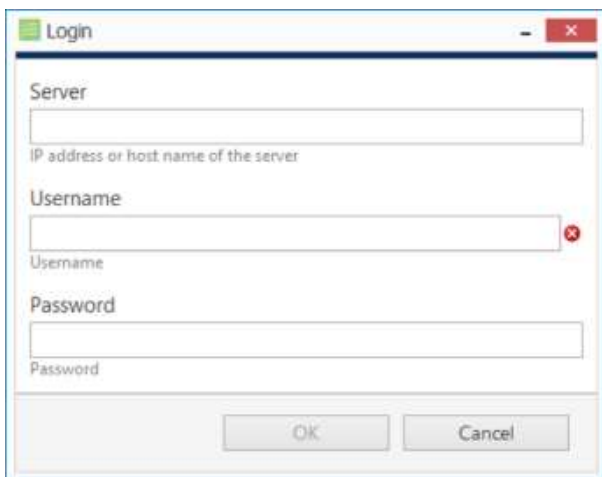
 The **default username and password** for the new installation is **admin/[empty]**.

 If your server has default TCP port configured (which is 60554), you do not need to specify it when connecting: simply type the IP or hostname of the server to connect to. However, if the server TCP port has been altered, you need to specify the port explicitly, making the connection address look as follows:

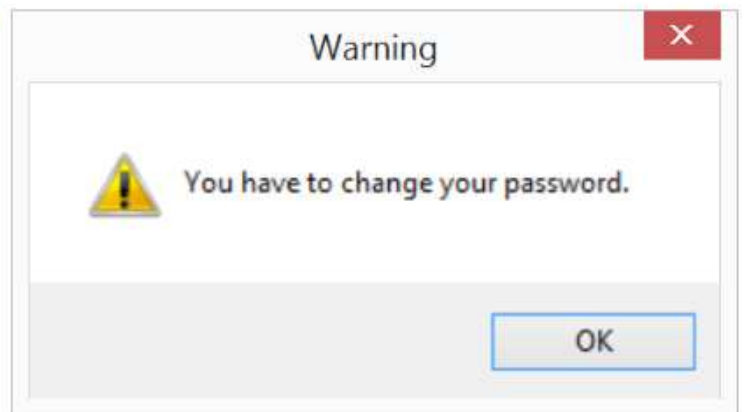
<address>:<port>, e.g., *192.168.1.77:60555* or *localhost:60887*

Server TCP port can be changed via WVMS Server Setup Wizard.

If you are refused the connection, make sure that the server is running and accessible over the network. (For more detailed information about what to do, please refer to the [Troubleshooting](#) section of this document: it is constantly updated with most common cases).

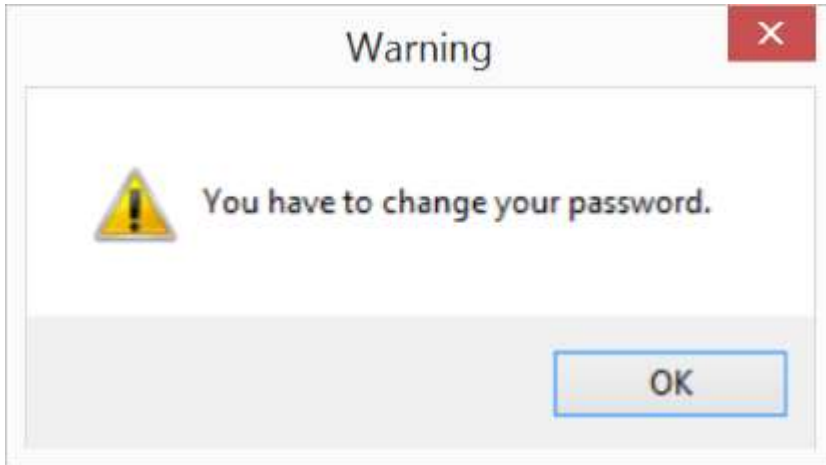


Wavesys Console login




After logging in for the first time with default username and password, you will be reminded to change your password. For security reasons, we strongly recommend that you do so at once.

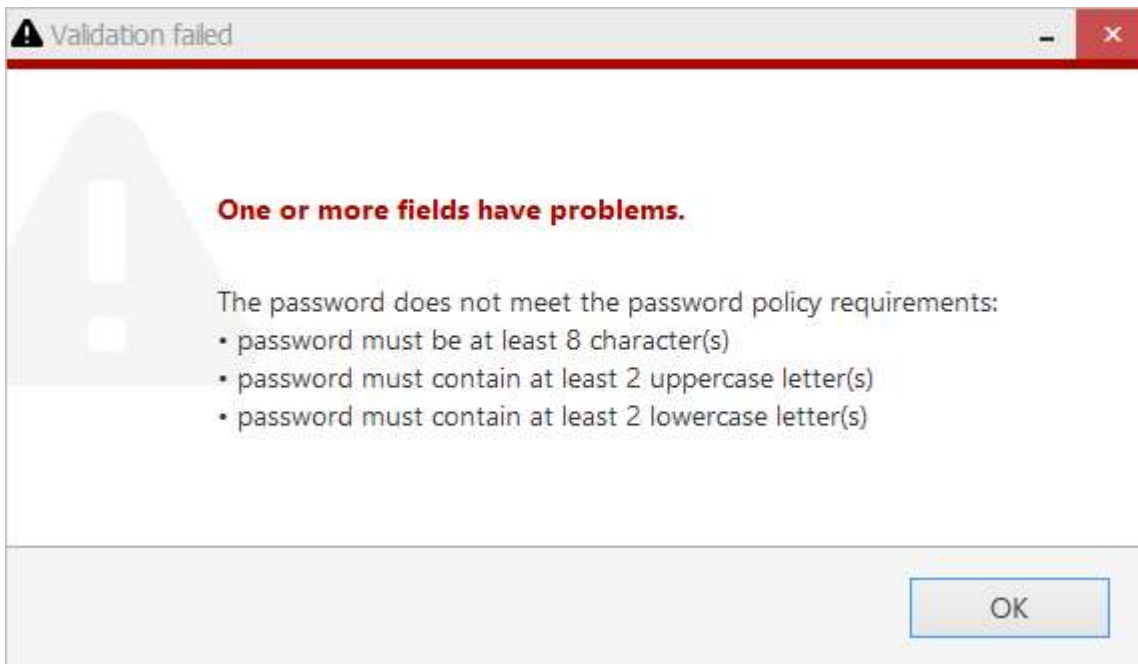
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Change Password reminder

Immediately afterwards, you will be given the option to change the password using an additional dialog box. To change the password, enter your old password (initial, default password is empty so just leave the field empty), then enter your new administrative password for the current server, enter it for the second time to confirm, then click *OK to save*.

 The new password must **comply with server policies**, by default these are: minimum 8 characters total length, including at least 2 lowercase and 2 uppercase letters.



Password must meet the server policy requirements

After you are done with the password update, you will be given the opportunity to fill in the initial server settings using the quick [Setup Wizard](#). We recommend that for optimum configuration progression you follow the steps in the wizard.

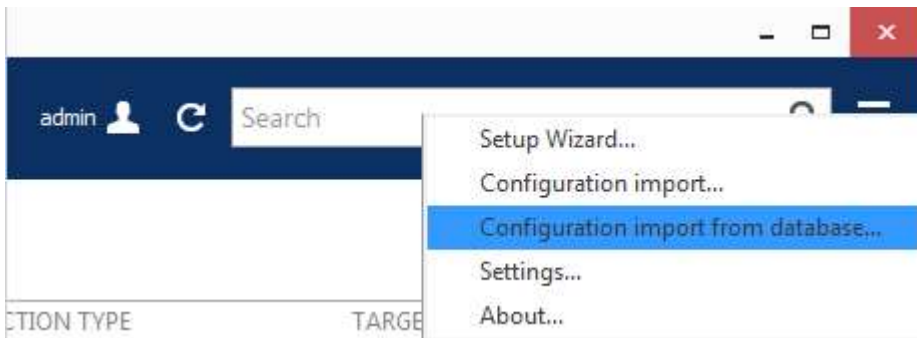
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15 Database Import

It is possible to use a WVMS database - either coming from a different server and/or a different software edition - to import resources into your WVMS installation. This feature allows you to add such resources as devices, channels, users and [Event&Action Configurator](#) content. It is possible to import the data from **single server** databases.

Possible scenarios for this feature may be as follows:

- combine many Wavesys WVMS Professional servers into a single Wavesys WVMS Enterprise installation
- transfer configuration from one Wavesys WVMS Professional server to another



Choose the database import option from the application menu

To start data import, press the application menu button in the upper-right-hand corner of the Wavesys Console window and choose the *Configuration import from a database* option.

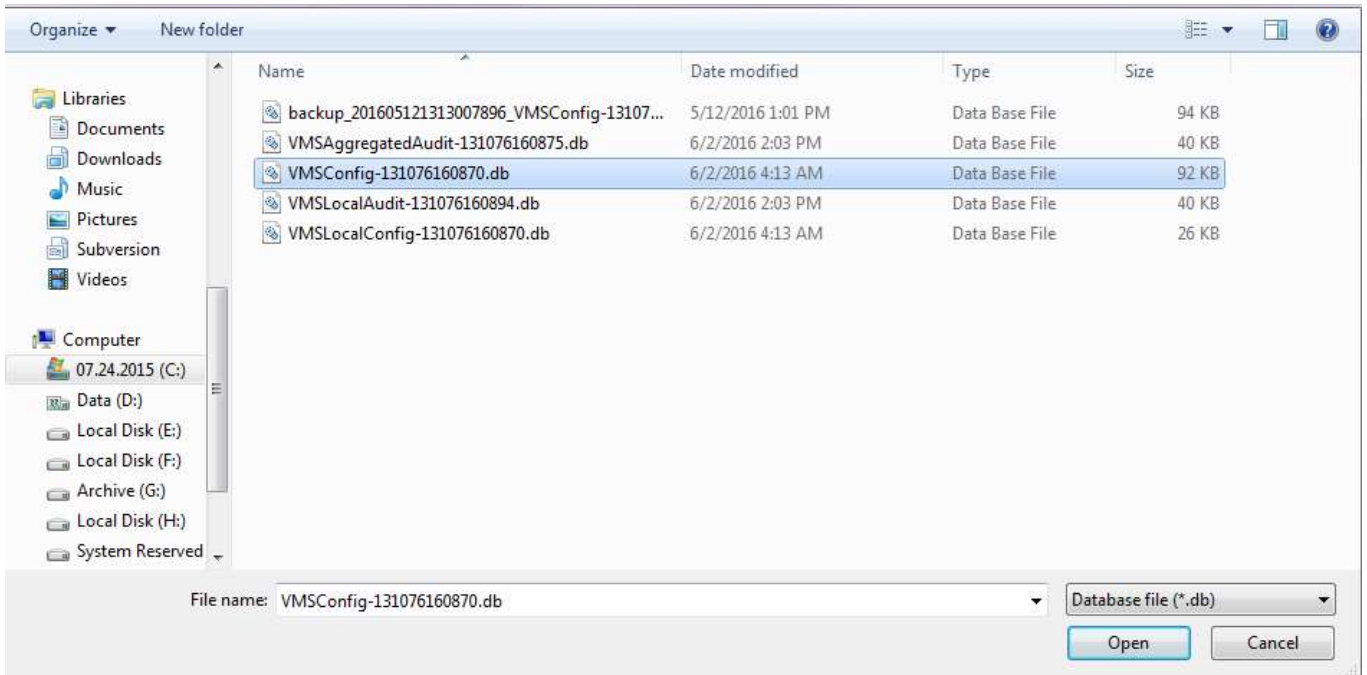


You can also bring a database from another server. By default, all WVMS databases are located in the following directories:

- C:\ProgramData\Wavesys Global\Wavesys WVMS Professional - for the Wavesys WVMS Professional product edition
- C:\ProgramData\Wavesys Global\Wavesys WVMS Enterprise - for the Wavesys WVMS Enterprise product edition
- C:\ProgramData\Wavesys Global\Wavesys WVMS Enterprise Recording server - for the Wavesys WVMS Enterprise Recording server component of a Wavesys WVMS Enterprise installation

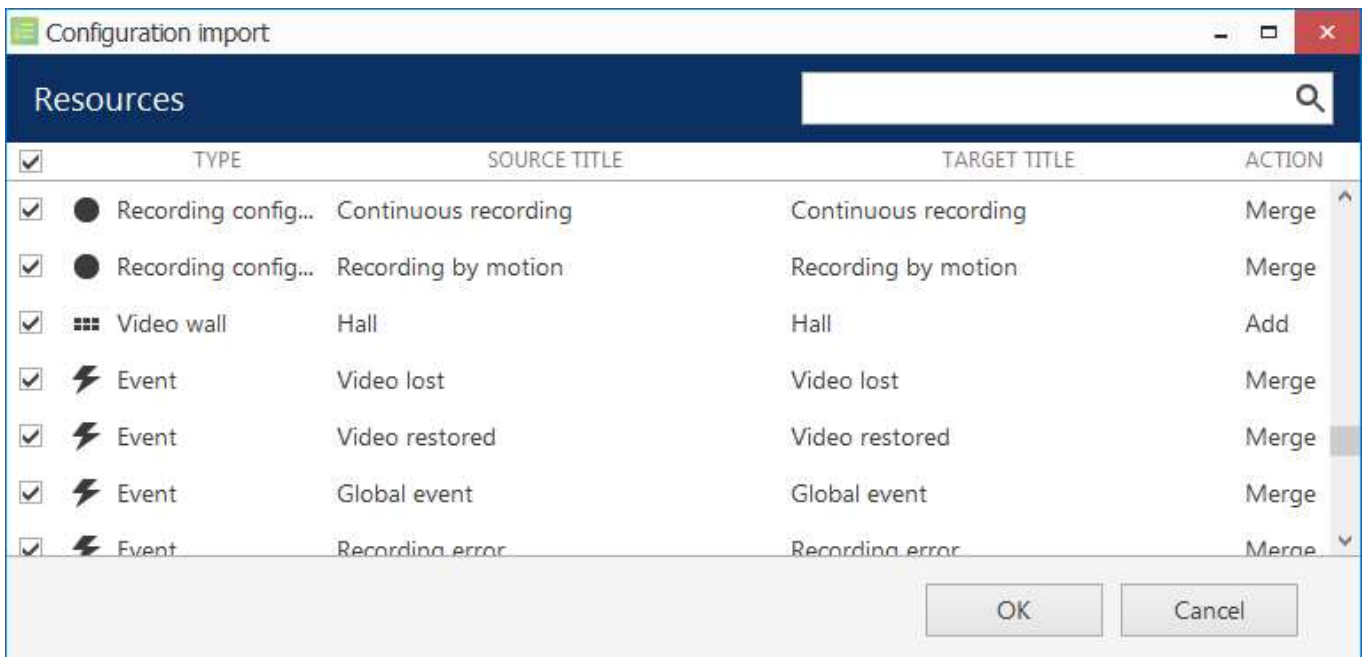
From the standard Windows Explorer *Open File* dialog box, locate the target *VMConfig-xxxxxxxxxxx.db* file and open it.

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Locate the database file

The resource selection dialog box will appear. Choose the items to be imported using checkmarks in the left column; use the search field in the upper right corner to filter the items by type or by any other text field. In case the imported entities already exist on the host server (e.g., built-in recording profiles), their import action will be *Merge*; otherwise, the action will be marked as *Add*. When resources are merged, their permissions are merged as well. All types of resources can be imported.



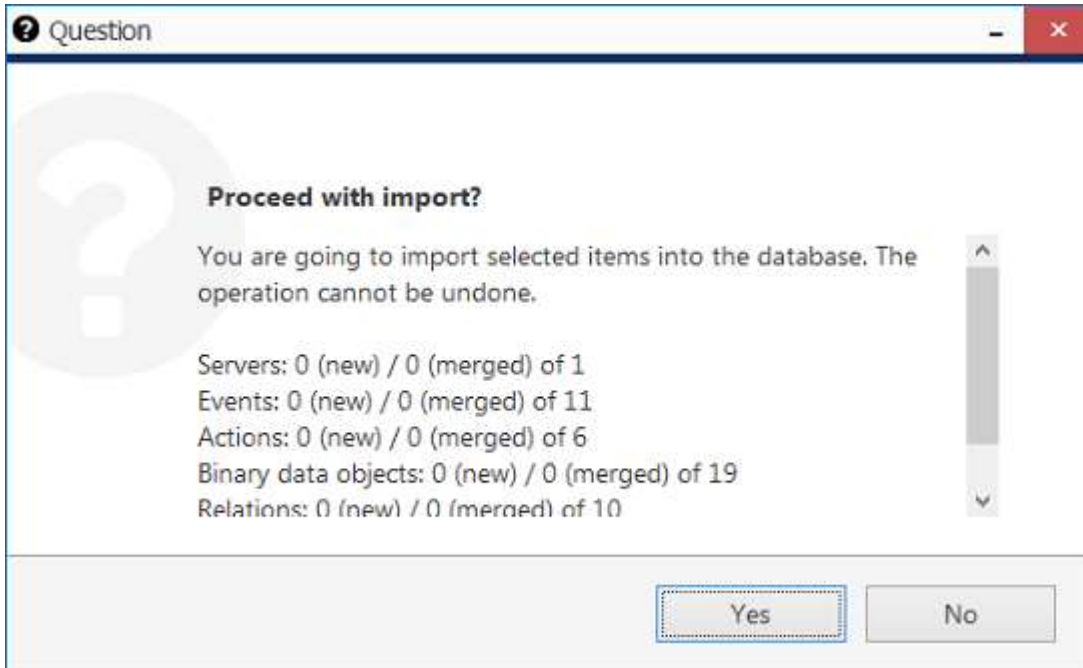
Choose resources to be imported

When you have finished with resource selection, click *OK* to proceed.

Important: this action cannot be undone. Before confirming, make sure to review all the changes you wish to apply.

Before applying all the changes, review your import summary and click *OK* to confirm and finish the import.

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Review the summary and confirm configuration import

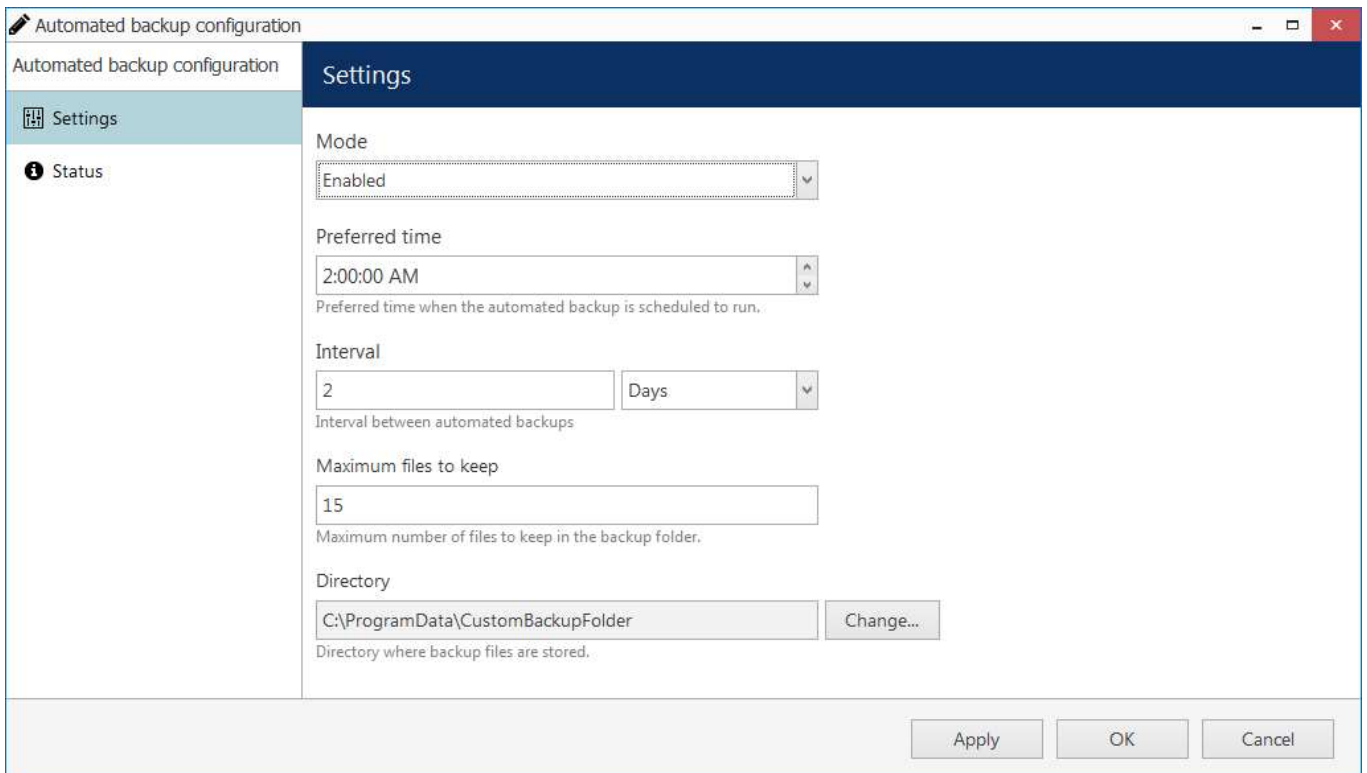
All selected items will be added to the server configuration immediately and you will be able to work with them normally.

16 Configuration Backup

Server configuration is a time-consuming process and it is wise to save a copy of your WVMS database after certain changes so that you have something to start the server with in case the main database becomes corrupt because of a hard disk failure or some other reason. WVMS provides several options for database backup and we strongly recommend that you create configuration restore points to save the trouble of re-configuring the server from scratch.

Automatic Backup

Automated configuration backup allows you to save your WVMS database based on a schedule. To access the settings via Wavesys Console, click the application menu button in the upper-right-hand corner and choose *Automated backup configuration*.



The screenshot shows a window titled "Automated backup configuration" with a "Settings" tab selected. The window has a sidebar on the left with "Settings" and "Status" options. The main area contains the following settings:

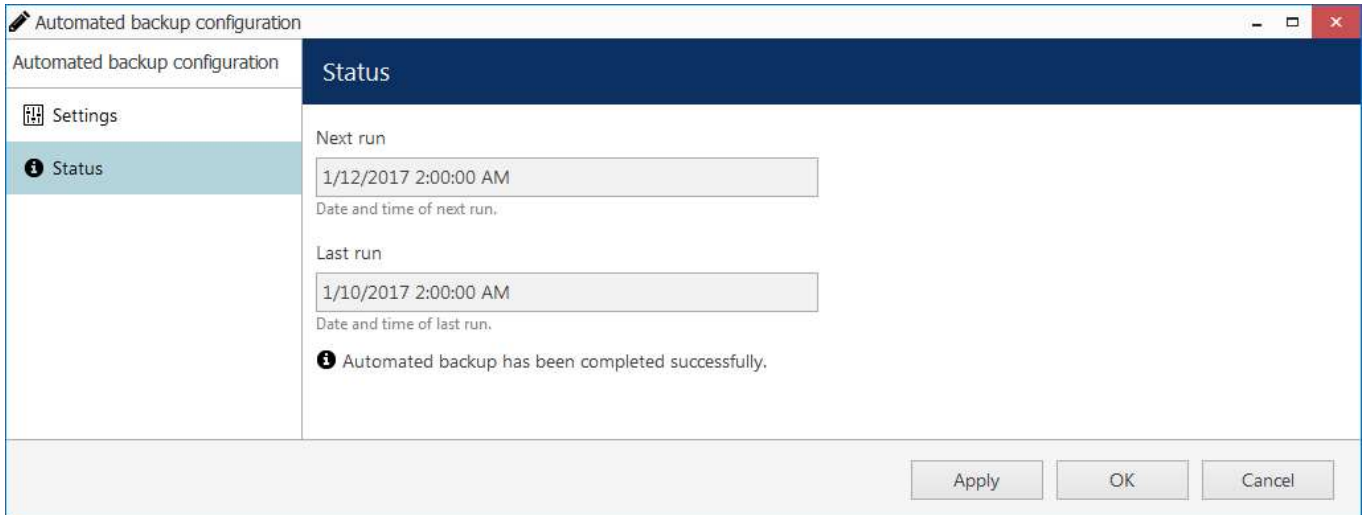
- Mode:** A dropdown menu set to "Enabled".
- Preferred time:** A time picker set to "2:00:00 AM". Below it is the text: "Preferred time when the automated backup is scheduled to run."
- Interval:** A text input set to "2" and a dropdown menu set to "Days". Below it is the text: "Interval between automated backups".
- Maximum files to keep:** A text input set to "15". Below it is the text: "Maximum number of files to keep in the backup folder."
- Directory:** A text input set to "C:\ProgramData\CustomBackupFolder" and a "Change..." button. Below it is the text: "Directory where backup files are stored."

At the bottom right of the window are three buttons: "Apply", "OK", and "Cancel".

Set automatic database backup preferences

Automated backup is enabled by default with the following settings: a restore point is created every two days at 2AM, with a maximum of 15 files to be kept. You can either leave the default settings, including the default location, or define your own backup time and frequency in the *Settings* tab.

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Backup status

In the *Status* tab, you can see the date of the last backup attempt and the next scheduled backup time.

Backup and Restore Wizard

Additionally to the automated backup, it is possible to create a configuration restore point manually at any time. The same wizards provides an opportunity to start the WVMS with an earlier database version.

Run the *Backup and restore wizard* from your Windows Start menu: *Start -> All Apps -> Wavesys Global -> Wavesys Global Server Backup and Restore Wizard*. In Windows 7 and older versions, use *Start -> All Programs -> software installation folder -> Tools -> Wavesys Global Server Backup and Restore Wizard*; alternatively, use Cortana/Search to locate the wizard in the programs menu.



Choose whether you want to back up or restore the database

Backup

Choose the first option to back up the database contents to serve as a restore point and click *Next*.

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Backup and restore wizard

Step 1 of 1. Backup options

Choose items to back up:

- Configuration
Include configuration.
- Audit
Include audit.
- Events
Include events.

Description

Backup description.

Filename

C:\ProgramData\CustomBackupFolder\Backup20170110163240242.lxb

Browse...

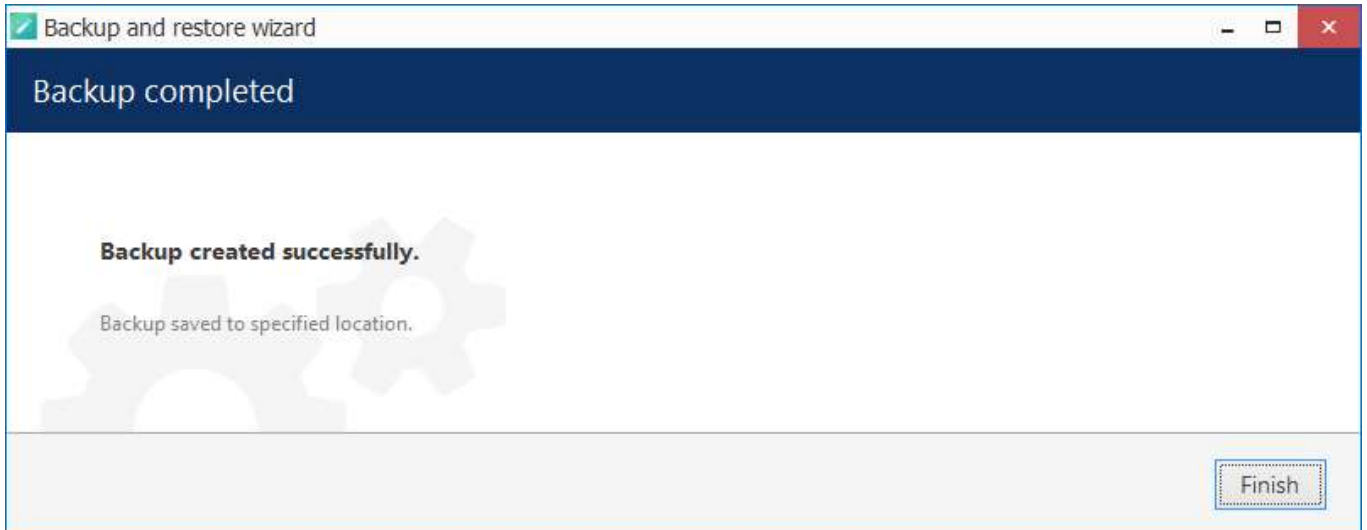
Backup will be saved to the file specified.

Previous Next Cancel

Choose items to back up

Here, you can choose the information to be saved and also add a custom description for your future reference. You can either use the default destination folder or choose a custom one, even located on a different disk or a network drive.

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Restore point successfully created

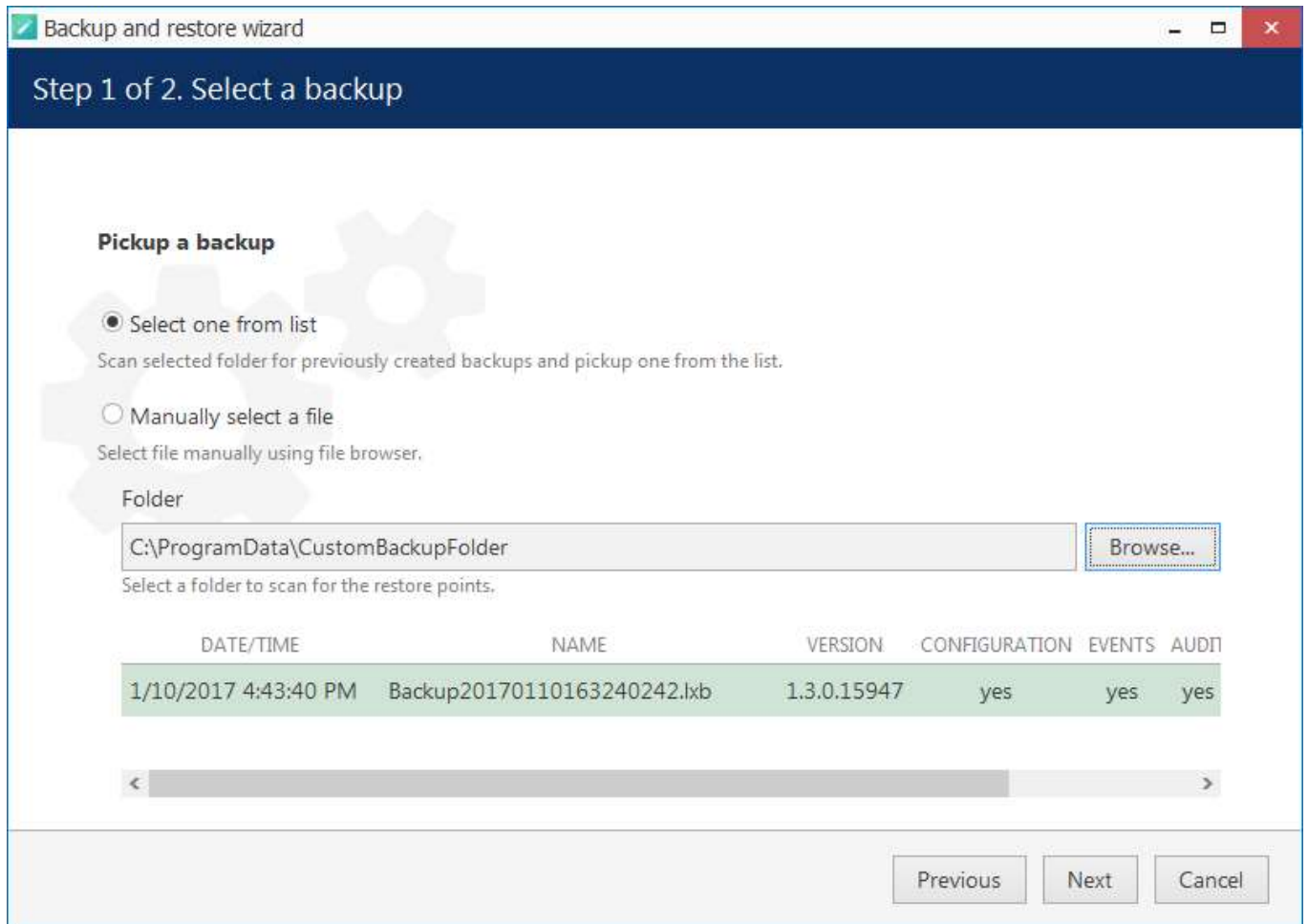
The wizard will create the backup and display a success message. Click *Finish* to exit.

Restore

Choose this option if you wish to start the WVMS server with a database from an earlier time instead of the current configuration.

 If you have a clean WVMS installation and wish to restore its configuration from an earlier point, make sure to initialise the server using the Server Setup Wizard, which usually pops up automatically after the installation is completed and is available via Start menu. (There is no need to do this if you upgraded the software to a newer version so that it already has been initialised earlier).

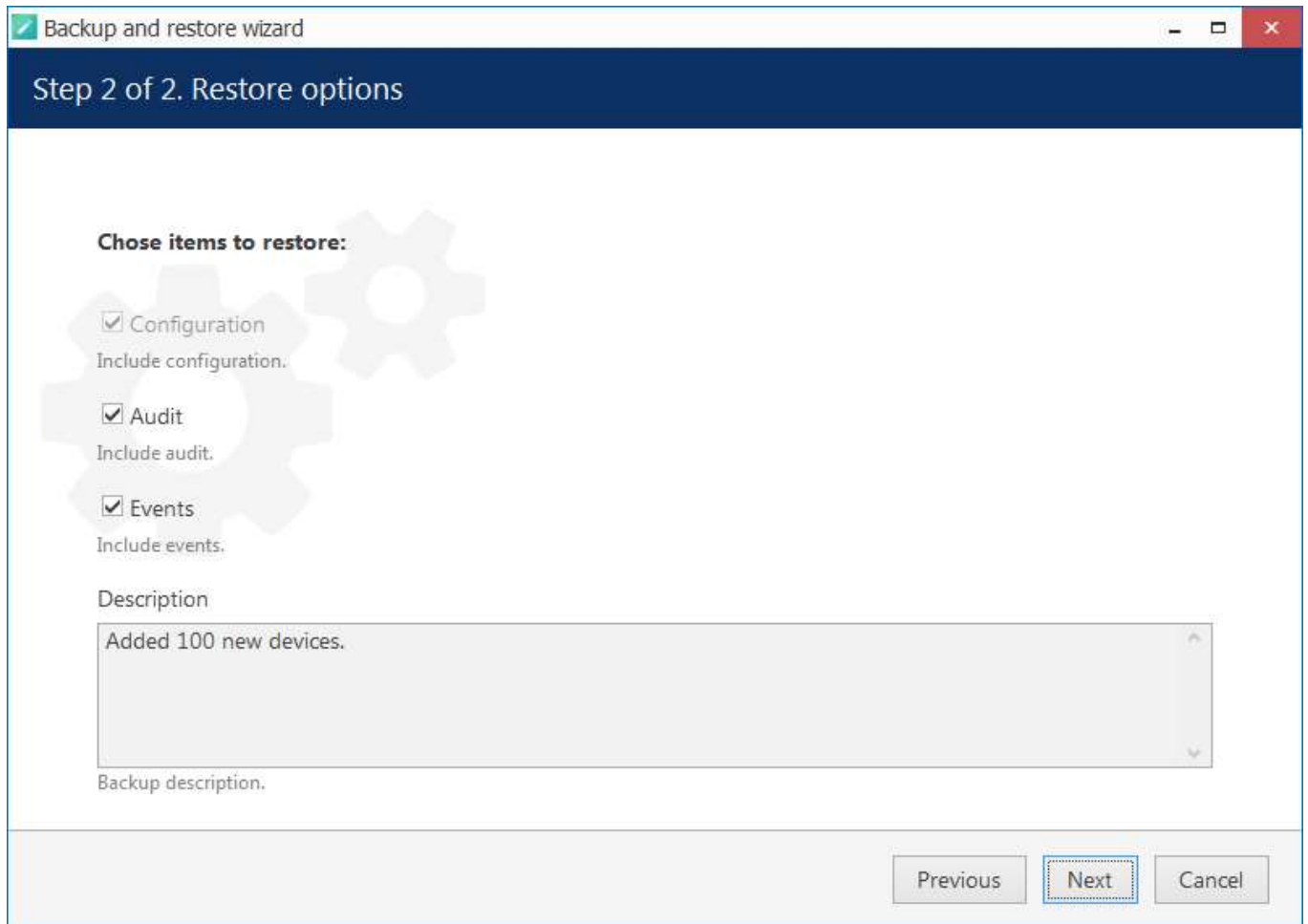
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Choose a restore point


Here, you have two options: select a backup file from the list or manually locate the necessary *.lxb file. In either case, make sure you have chosen the right backup to be used and then click *Next*.

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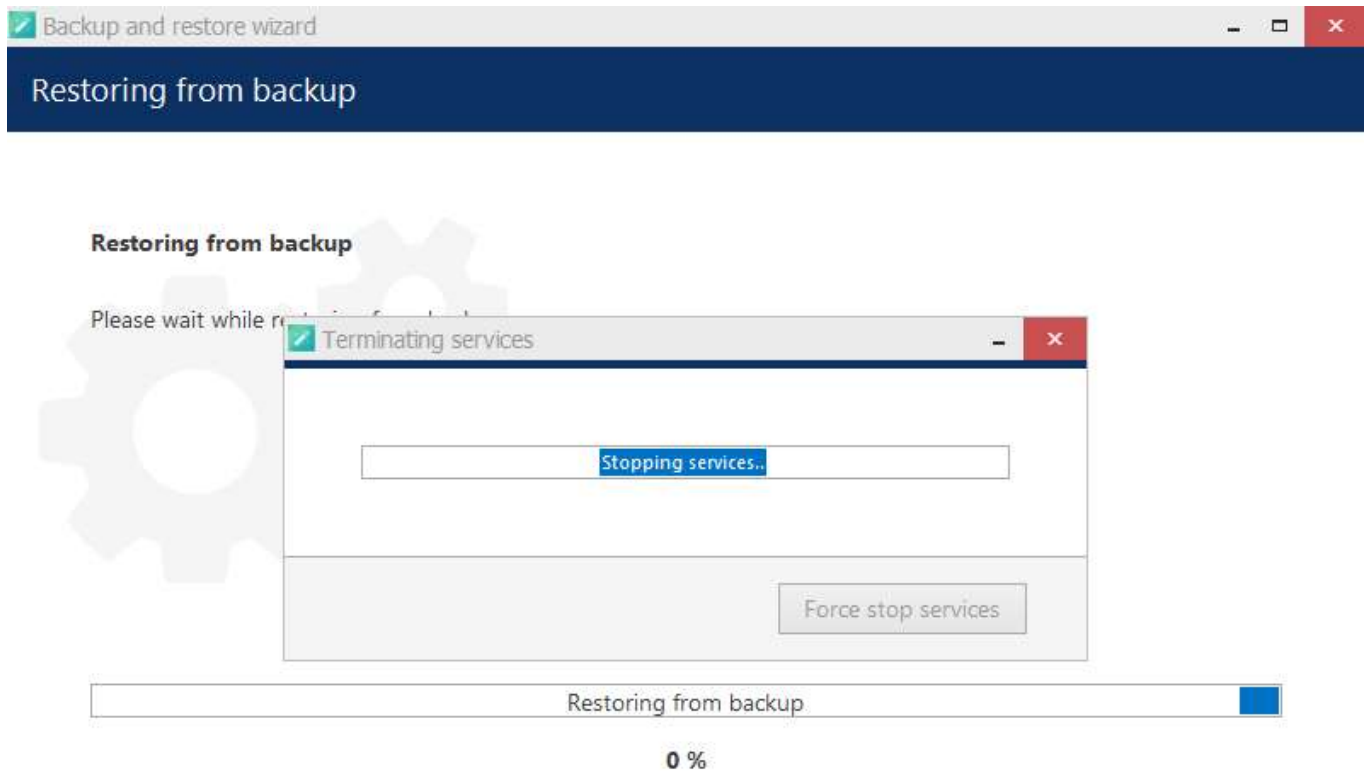


Choose items to restore

Make sure you have chosen a suitable database to be restored by reviewing the items and using your earlier comments as a reference. Click *Next* when ready.

 A database from a newer software version cannot be used for this. Older database versions can be used without issues; however, we recommend that you use the latest available backup from a stable software version (not beta).

Wavesys WVMS Professional Administration Guide



Next

Restore in progress

The wizard will ask you to stop the WVMS services and start restoring the database after your confirmation.

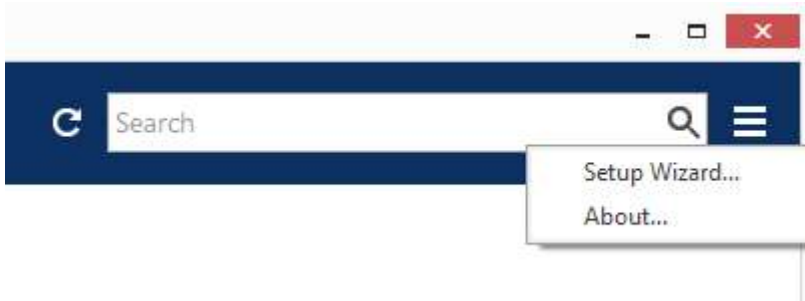
⚠ Caution! This is an irreversible operation. Do not abort the process or shut down the server machine during the process.

If nothing interferes with the restore process and the backup file is intact, you will receive a success message after the wizard finishes restoring your WVMS server configuration. Server service will be automatically started with the restored database.

Wavesys WVMS Professional Administration Guide

17 Setup Wizard

The Wavesys Console Setup Wizard is automatically started after product installation and activation is complete. You can skip the wizard at this point and launch it later anytime from the Wavesys Console upper-right-hand corner menu:



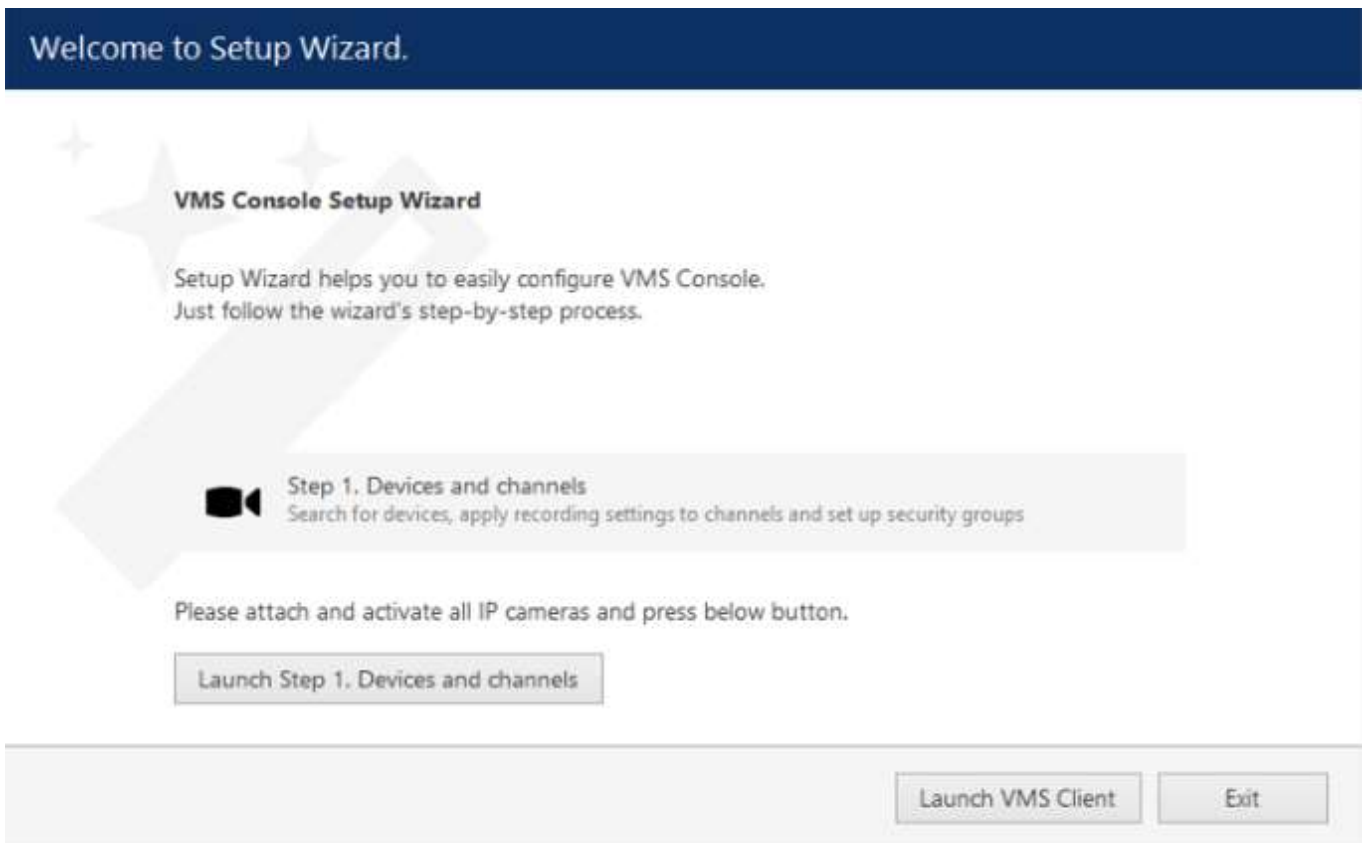
Run Setup Wizard from Wavesys Console

Setup Wizard will show you the process summary and guide you through the steps to configure the installation. To proceed with each next step, simply click the button below the step list; to exit the wizard prematurely, press either *Exit* or *Launch WVMS Monitor* button in the bottom-left-hand corner.

Setup wizard for Wavesys WVMS Lite consists of just one step that covers devices and channels; setup wizard for Wavesys WVMS Professional includes three steps, which are devices& channels, users and basic events&actions. Make sure you connect all devices (IP cameras and/or other video sources) before launching the wizard: it will automatically scan the network for available video sources.

Step 1: Devices and Channels

This step will allow you to automatically search and add cameras and other video source devices into your server configuration. Press the *Launch Step 1* button to begin.



Setup Wizard

Wavesys WVMS Professional Administration Guide

Scan Parameters

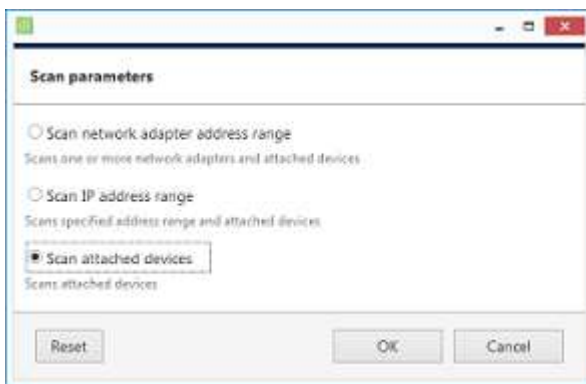
First, select scan mode; the following options are available:

- scan IP address range: specify a continuous LAN segment to be scanned
- scan network adapter address range: select one or more network interfaces to be fully scanned
- scan attached devices: the local hardware system will be scanned for capture boards and Direct Show video sources

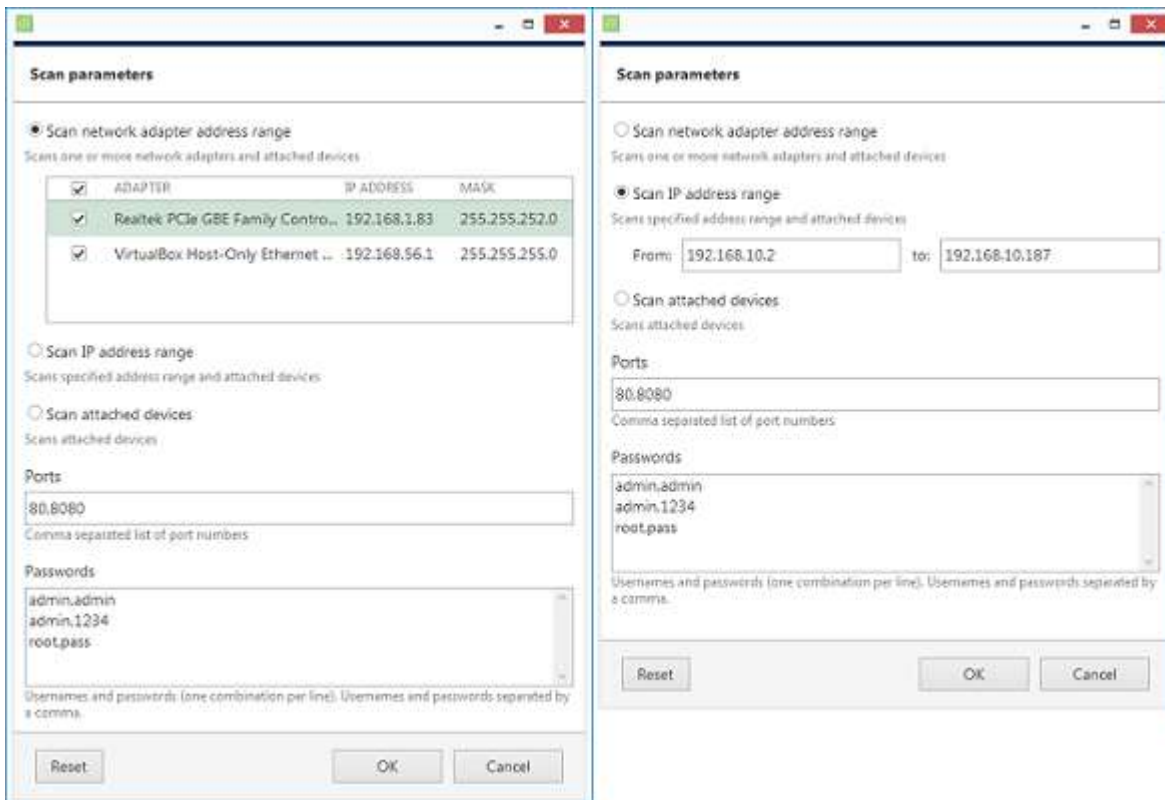
If you have chosen to search for IP video sources, you should review additional connection settings and change or update them, if required:

- ports: HTTP ports, comma separated
- user credentials: pairs of comma-separated user names and passwords, one pair per line

Use the *Reset* button below to discard all changes and start entering scan parameters again. When you are ready, press *OK* button below to begin scanning.



Scan attached devices



Scan address range

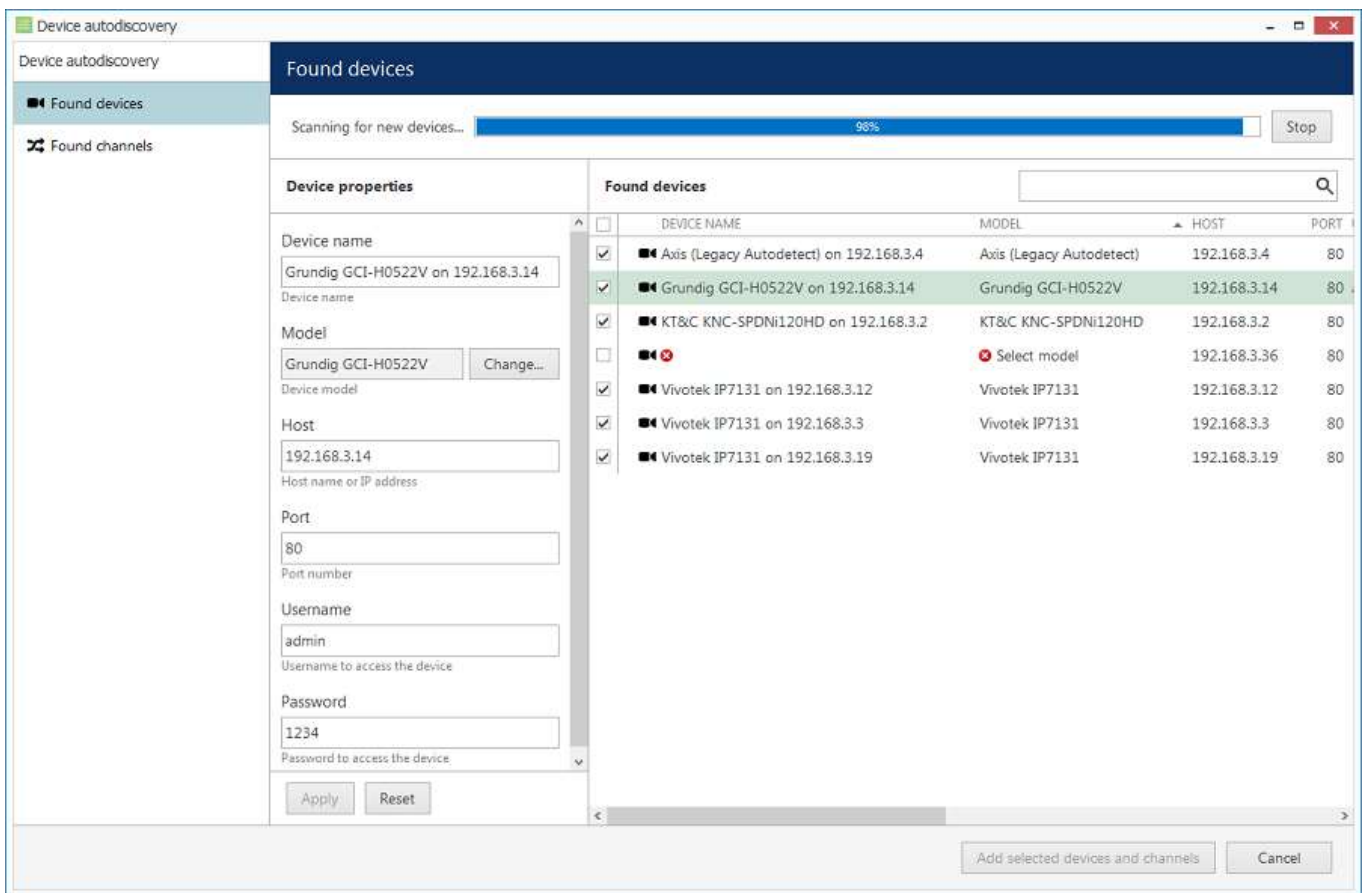
Wavesys WVMS Professional Administration Guide

Device Autodiscovery

After scanning has been completed, you will be taken to the Device Autodiscovery dialog box, which will allow you to review the found [devices and their channels](#), and enter/modify related settings. Use the *Search* field in the upper-right-hand corner to find a specific device by name, model, IP, port or hardware ID (for IP devices, ID includes MAC address).

There are two types of selection in the item list: checkboxes and colour highlight. **Checkboxes** are used to choose the items to be added to server configuration after you close the dialog box; **highlighted** items are subject to immediate properties changes. Use *CTRL+click* or *Shift+click* to select all or several items at once to change their settings.

Click a device in the item list to load its settings into the *Device Properties* window. Note that some settings may be missing for some of the automatically found devices; this depends mostly on device and whether user data was correctly provided. In such cases, simply fill in the missing data manually and click the *Apply* button below to save the configuration changes.



Set up discovered devices

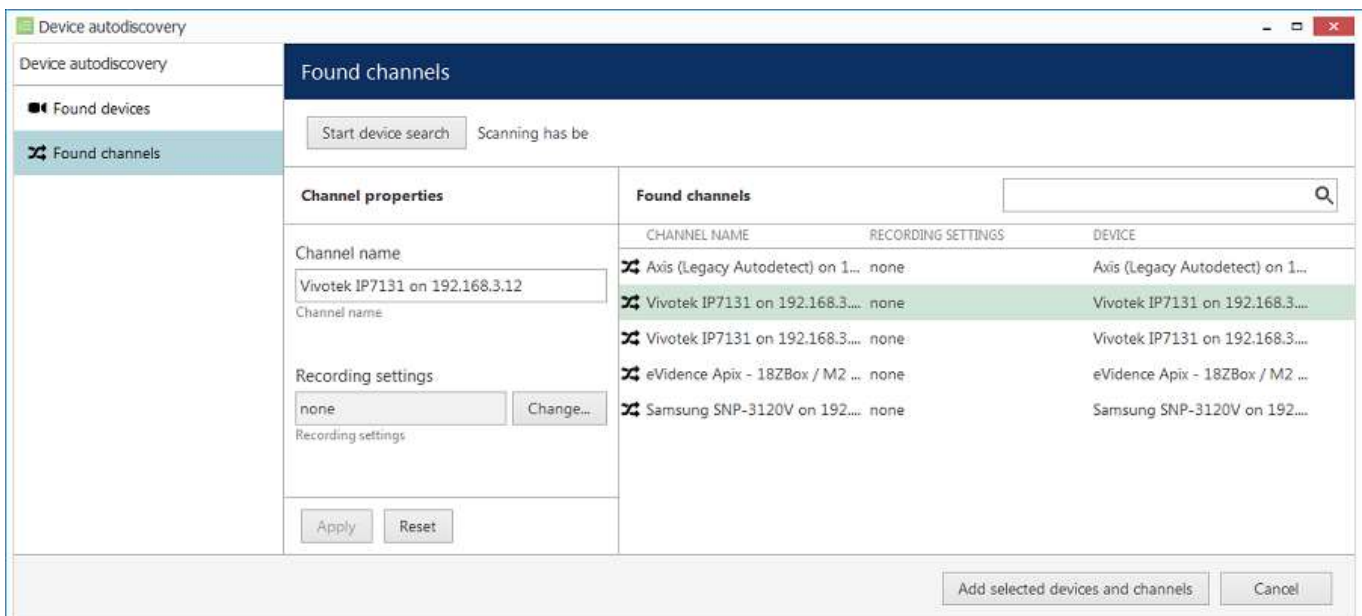
Wavesys WVMS Professional Administration Guide

If device is not integrated with the software (native support), it may be detected as generic type (e.g., ONVIF). If you think some devices have not been discovered, check if they have different HTTP ports; also, try adding them [manually](#).

Setting	Description	Default value
Device name	User-defined video source name	Autodetected model + IP, empty if not detected
Model	Device manufacturer and model, or generic type	Autodetected vendor and model, empty if not detected
Host	Device IP address	Autodetected
Port	Device HTTP port	Autodetected
Username	Device user credentials; note that you have to provide administrative profile credentials in order to be able to change device settings via software interface	Appropriate username from provided list or autodetected
Password	Device user password	Appropriate password from provided list or autodetected


Make sure you select all the devices you wish to add by putting a checkmark next to them. Devices with missing configuration (model and/or IP) are unchecked by default and will not be added to active server configuration.


Switch to *Channels* tab to review the detected video channels of the discovered devices: this is particularly important if you are using multichannel devices, e.g., capture boards and encoders. Use the *Search* field in the upper-right-hand corner to find specific channels by name or device name.



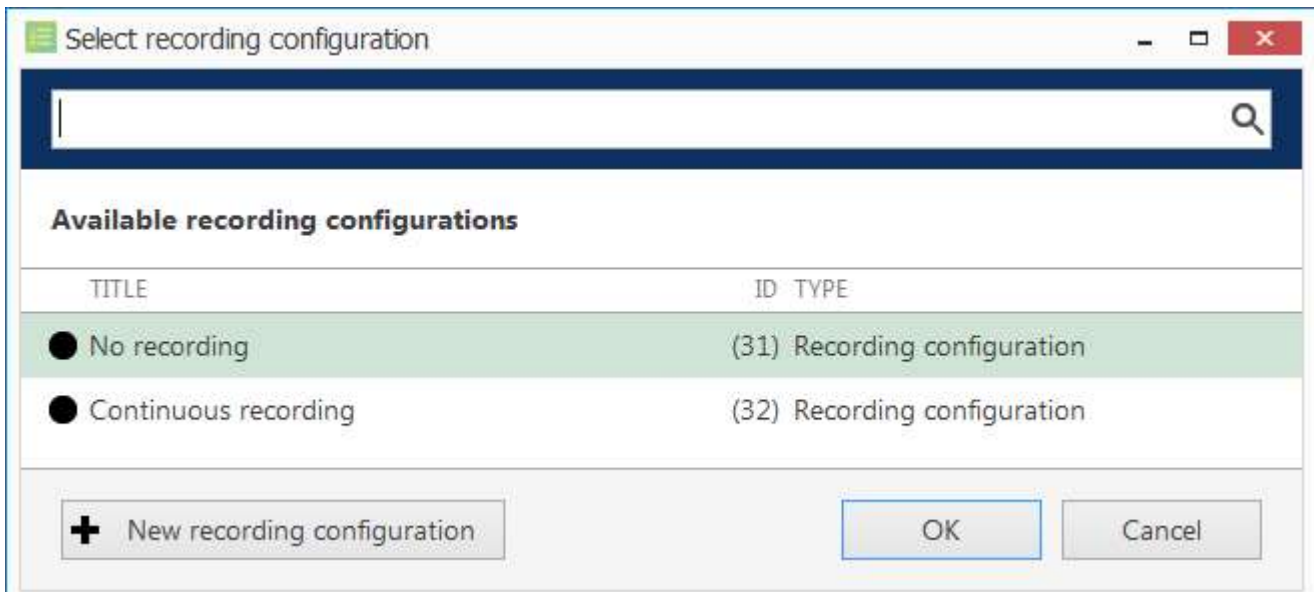
Set up discovered channels

Here you can edit the channel name and assign recording configuration. By default, recording is enabled for all channels: click the *Change* button near *Recording settings* to [manage recording profiles](#) and [assign them](#) to your channels. To add a new recording profile, click the + *New recording configuration* button below; you can find more details about recording profiles in the [corresponding section](#). Click *OK* to save and return back to devices and channels; click *Apply* to save configuration changes.

 After changing the channel recording configuration, do not forget to click *Apply*, otherwise the changes will not take effect.

 Recording configuration here is assigned to the **main streams** of the target channels. In order to set up substream recording, please go to [channel configuration](#).

Wavesys WVMS Professional Administration Guide

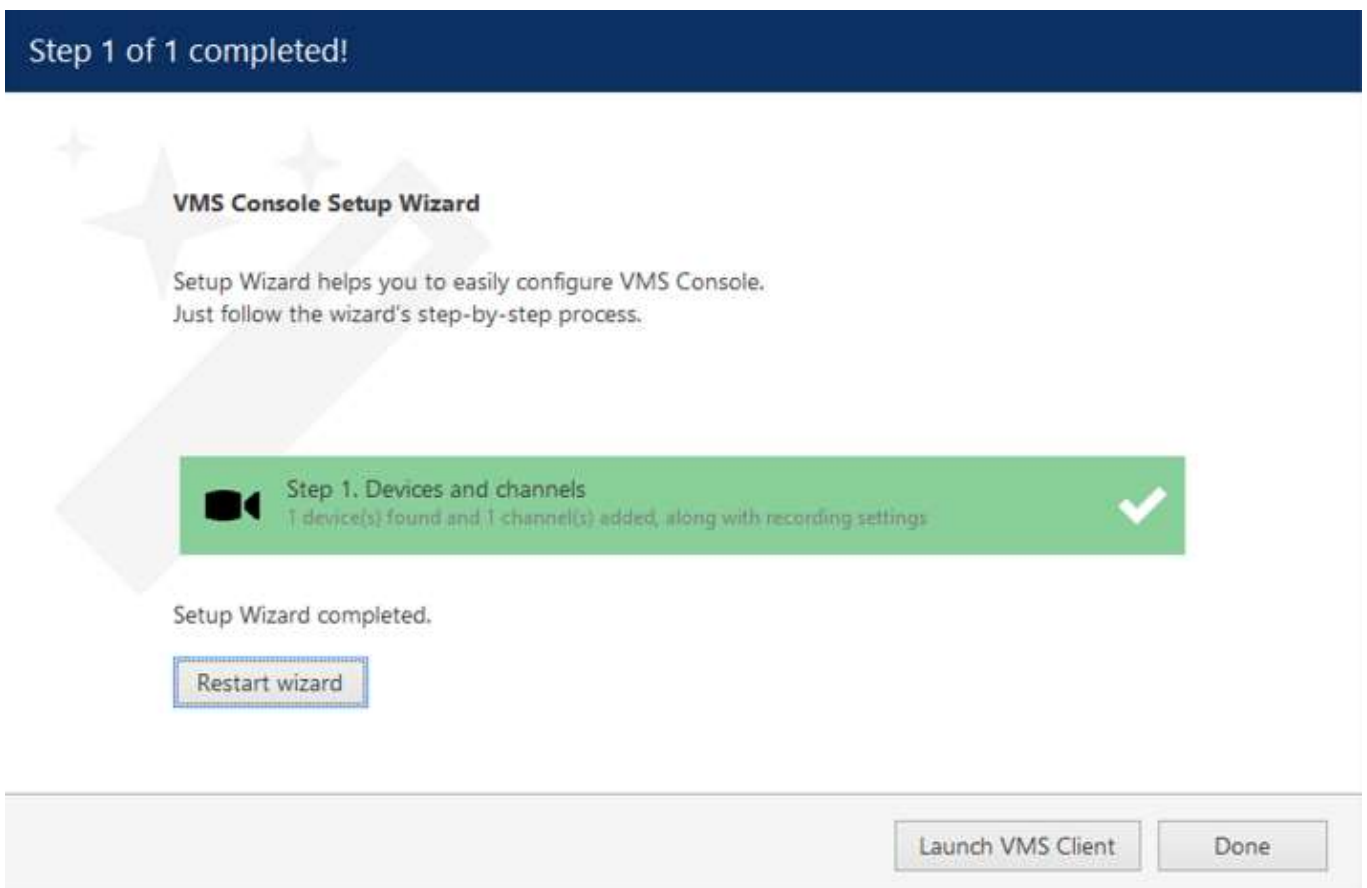


Select the recording configuration or create a new recording profile

Click the *Start device search* button above at any time to restart device discovery.

⚠ All previously discovered devices and all configuration changes will be discarded if you restart camera autodiscovery.

When you have finished with configuration, click *Add selected devices and channels* to go back to the wizard.




Wizard completed successfully

Wavesys WVMS Professional Administration Guide

If you are using the Wavesys WVMS Lite version of the software, you can now either restart the wizard to cover the rest of your devices, or close it. Press the Launch WVMS Monitor button to switch to the monitoring mode at once.

Step 2: Users and User Groups

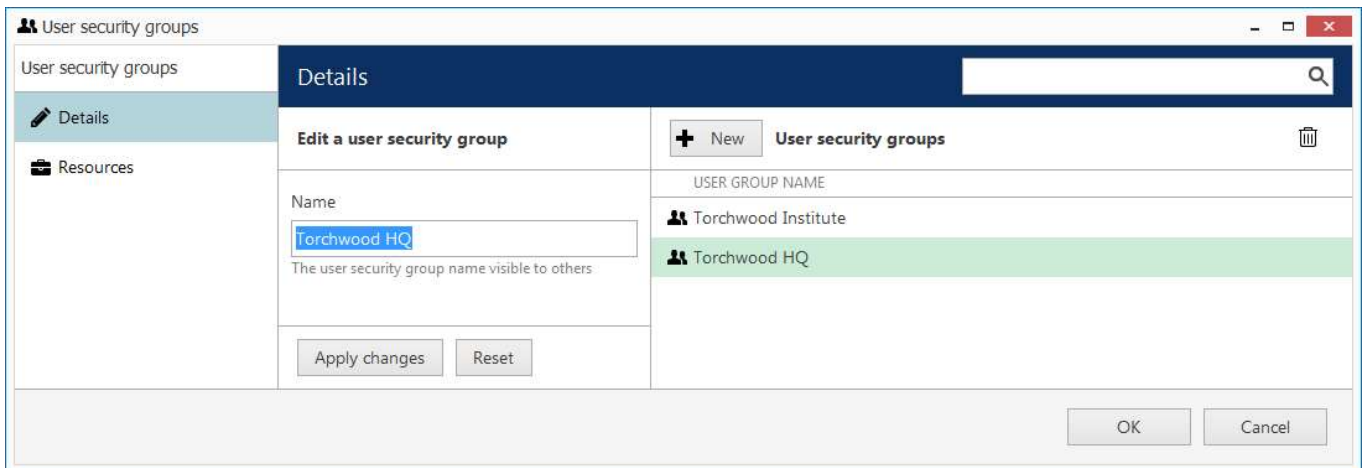
Wavesys WVMS Professional users can press the *Launch Step 2* button to proceed with *Users*. This step will allow you to add users and user groups and give them permissions for the devices and channels added earlier.

 The built-in Administrator user account and built-in Administrators group are root users with access to absolutely all the available resources. As a result, resources choice is unavailable for the Administrators group, and it is also impossible to add Administrator user to any other group.

Any users added as members to the built-in Administrators group will have the same full authority as root users.


User Groups

First, decide whether you want to create user groups or work with a non-systemised array of user accounts. For large systems with complex user structure, groups are strongly recommended for reasons of improved manageability. Choose *No* to proceed with plain user management at once; otherwise, you will be offered the chance to create user groups and distribute existing resources between them. Note that the Setup Wizard interface offers simplified settings for user groups at this point; later, you will be able to create nested groups via the [corresponding](#) Wavesys Console section.



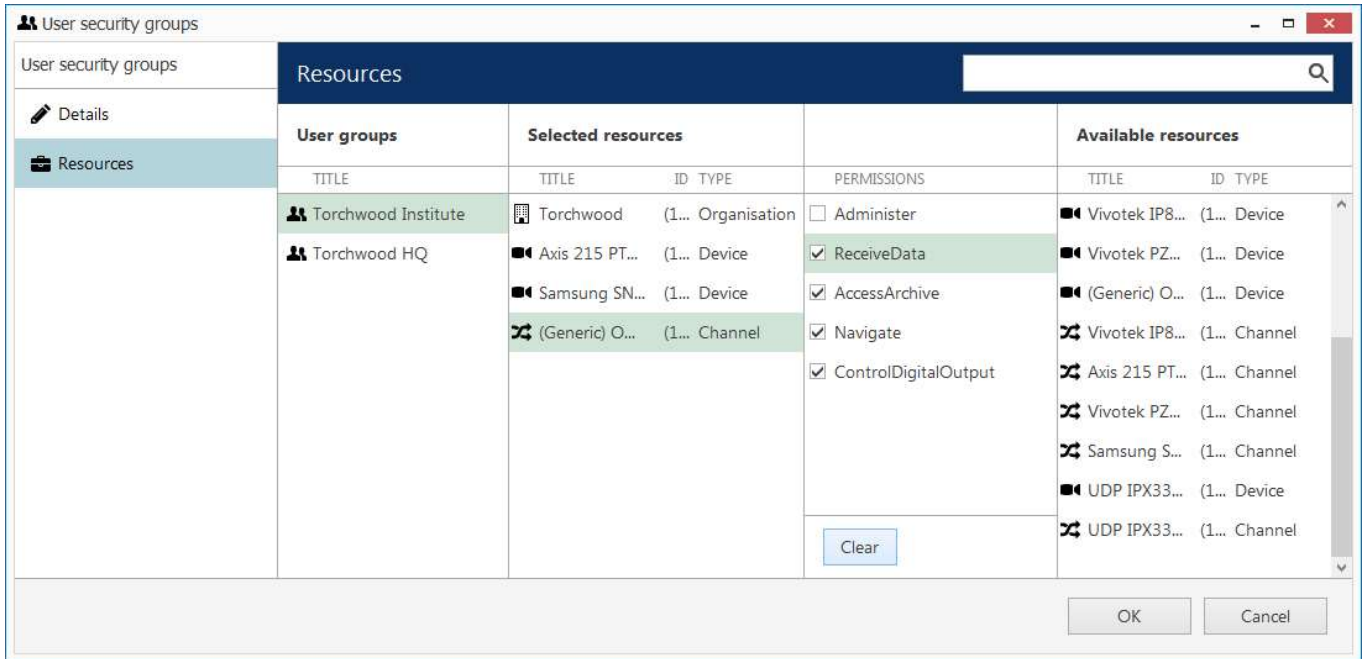
Add one or multiple user groups

Enter a name for the first user group and then click the *Create* button below: newly created group will appear in the item list on the right. By default, the last modified group stays opened for changes. Correct group name, if necessary and then click *Apply changes*, or click *Reset* to discard the latest changes and revert to the most recently saved state (the same thing will happen if you select a different item for editing).

To create more groups, click the *+ New* button on the upper panel and proceed in the same way as on the first iteration. Use the  recycle bin icon to delete selected group(s) (hold CTRL or Shift to select multiple items).

Switch to the *Resources* tab to assign the permissions for this user group. Available resources at this point include servers, devices and channels.

Wavesys WVMS Professional Administration Guide



Add resources for created group(s)

Choose the group name in the first column to manage its resources. To add a resource, pick at least one permission for it and it will be automatically moved to the *Selected resources* list. To remove a resource, uncheck all its permissions - either manually or using the *Clear* button below. Note that double-clicking resources does not work here as one or multiple different permissions must be specified.

When you have finished, click *OK* to proceed with user accounts.

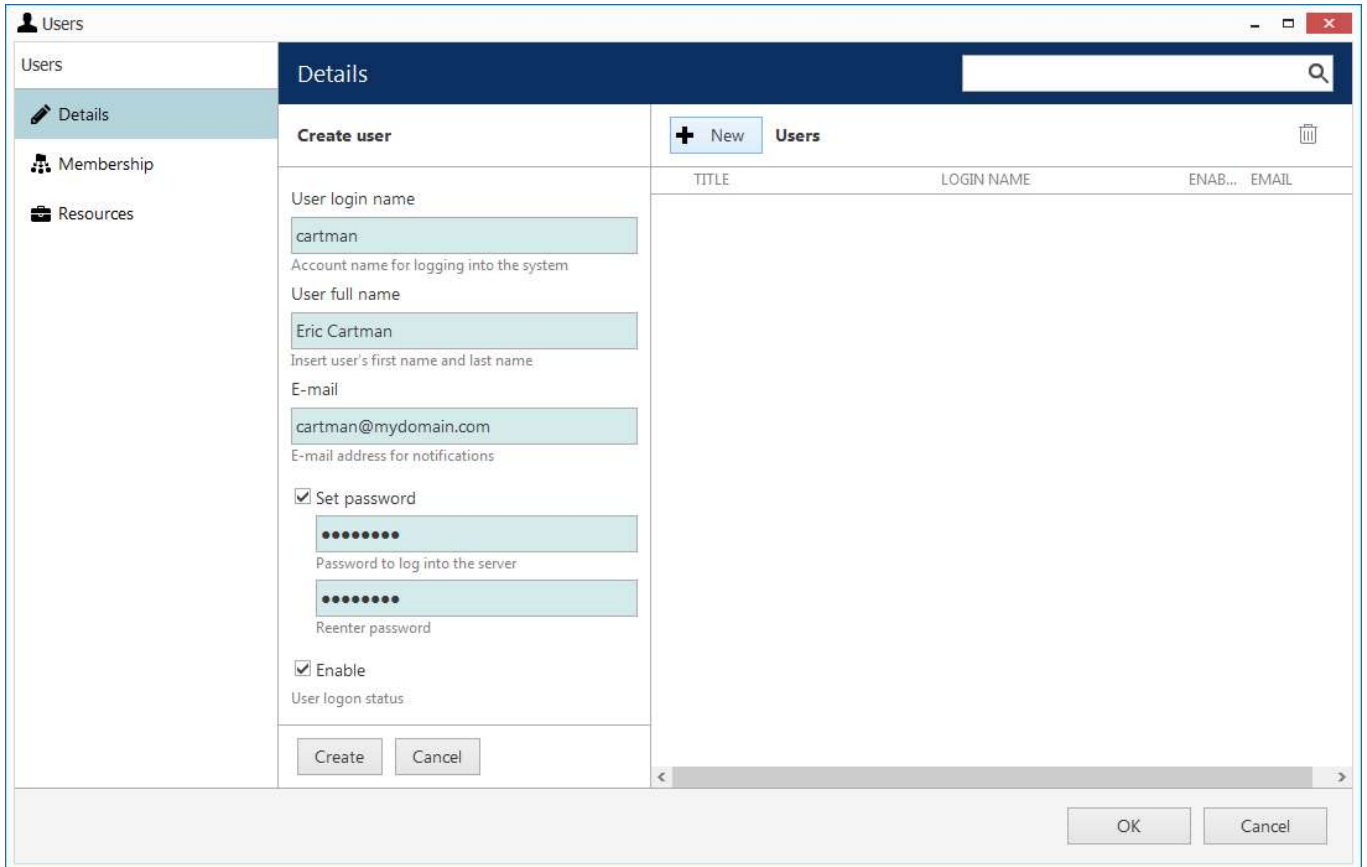
Users

To create the first user, simply fill in their details and then click *Create* below. By default, the most recently modified user will stay open for changes; correct user details, if necessary and then click *Apply changes*, or click *Reset* to discard the most recent changes and revert to the latest saved state (the same thing will happen if you select a different item for editing). Note that you do not have to re-enter the password when editing - only activate *Set password* if you wish to re-define it.

To add more users, press the + *New* button on the upper panel and proceed in the same way as described previously.

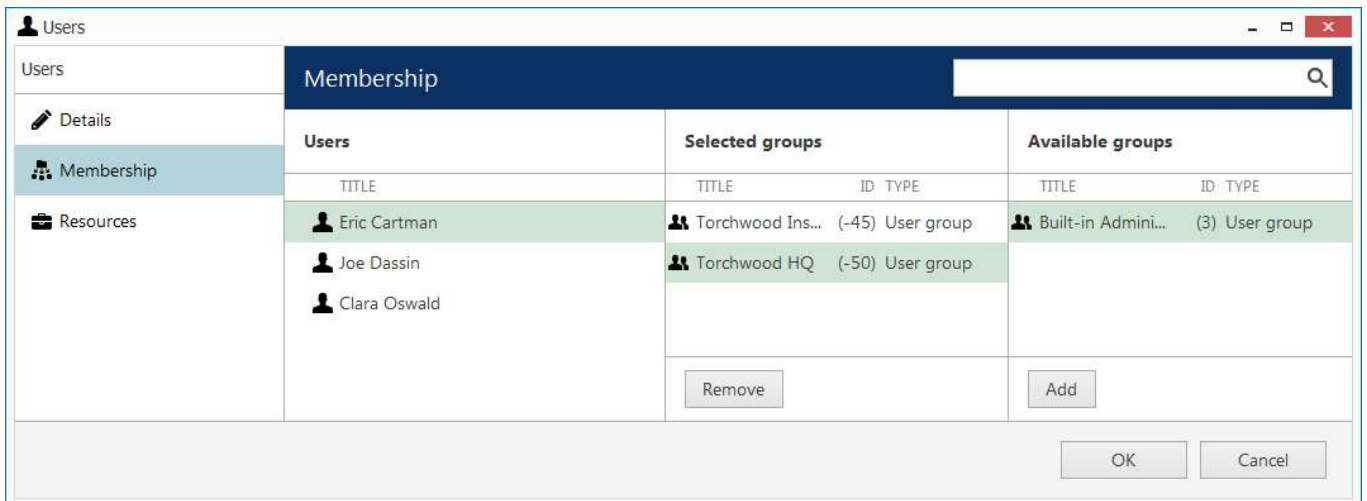
Use the  recycle bin icon to delete selected user(s) (hold CTRL or Shift to select multiple items).

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Enter user details

On the *Details* tab, the following user properties are available (all fields are required): login, full user name, email address, password and status. Passwords must be entered twice - this is a security precaution to avoid typos. Every user is enabled by default meaning that the target account is active and can be used for server logon; disable user accounts you wish to suspend while keeping all user-related information and resource permissions.



Choose groups for the newly created users

On the *Membership* tab, select groups for the specified users to become members of: move groups by double-clicking them or by using the *Add/Remove* buttons below.

Switch to the *Resources* tab to add individual resource permissions. This can be used both for group members and for users not belonging to any of the groups; individual permissions will not be removed if the user is excluded from the group.

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To add a resource, pick at least one permission for it and it will then automatically be moved to the *Selected resources* list. To remove a resource, uncheck all its permissions - either manually or using the *Clear* button below. Note that double-clicking resources does not work here as one or multiple different permissions must be specified.

When you have finished, click *OK* to save and go back to the main wizard window.

Step 3: Events and Actions

On the last step, basic alarm and action management is introduced. Press the *Launch Step 3* button to open the dialog box.

Note that all the settings here apply solely to the channels discovered on the previous step; if you have configured other devices prior to launching this wizard, they will **not** receive the current event & action settings - launch the *Event & Action Configurator* to set up rules for other devices. You can also use *E&A Configurator* if you wish to add other (advanced) types of alarms and/or actions.

When you are finished with all steps, you have the following options:

- **Restart wizard:** start the wizard again to set up more resources
- **Launch WVMS Monitor:** open WVMS Monitor application (will close the wizard)
- **Done:** close the wizard and proceed to Wavesys Console

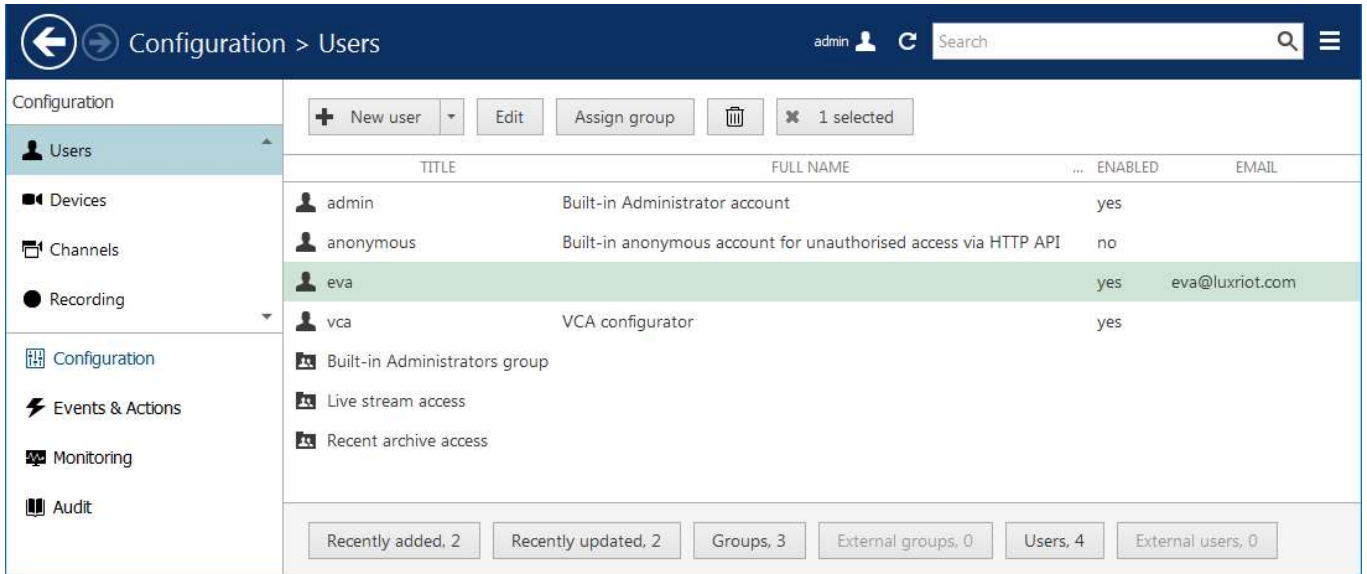
You can run this Setup Wizard again at any time via your Wavesys Console application menu in the upper right corner.

Wavesys WVMS Professional Administration Guide

18 Interface Overview: Management Application

Wavesys Console is a straightforward graphics user interface tool with access to all possible server settings. To ensure comfortable and easy navigation, it is important that you become acquainted with its structure before starting to use it.

Note that Wavesys Console appearance slightly depends on your software package and license limitations. Nevertheless, its logic always remains the same. Those sections, which are unavailable due to license restrictions, will be greyed out but still listed to get you acquainted with all available features. You can hide those features via Wavesys Console settings or upgrade your WVMS server to a superior version.



Wavesys Console management application interface

Navigation Panel



Wavesys Console Navigation Panel

The blue panel on top serves as navigation bar and its usage is similar to that of Windows Explorer. Here are its main components (from left to right):

- *Left* and *Right* arrows enable navigation through your browsing history and allow you to switch between previous and next locations; you can also use Backspace on your keyboard to go back
- Your current location is displayed right next to these arrows
- If you are in the *Organisations* view, an *Exit* button will appear
- Currently logged in *User account* button with options to view user profile or to log out
- *Refresh* button - reloads current item list
- *Search* field - only items matching the search criteria will be displayed in the list (this filter is maintained as you switch between the sections)

Wavesys WVMS Professional Administration Guide

Application Menu

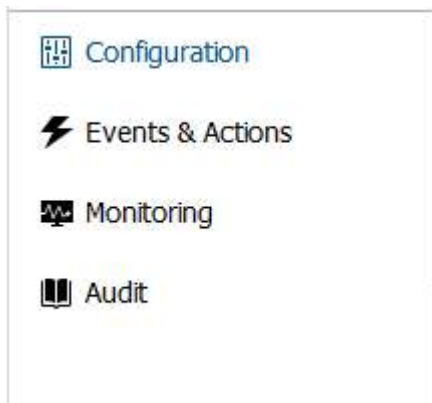


Application Menu, position: top right

Application menu button in the upper-right-hand corner gives you the following launches the options:

- launch the [Setup Wizard](#)
- import the [configuration from an XML file](#)
- import the [configuration from another WVMS server database](#)
- change Wavesys Console settings
- set up [automatic configuration backup](#)
- [remotely upgrade](#) system components
- open the software documentation
- open the [About](#) section

Sections



Sections panel, position: bottom left

The bottom left panel allows you to switch between the four main Wavesys Console sections: Configuration, Events & Actions, Monitoring and Audit. The contents of the components panel on the left will change depending on the selected section. If the Wavesys Console windows is resized, the sections will be reduced to icons.

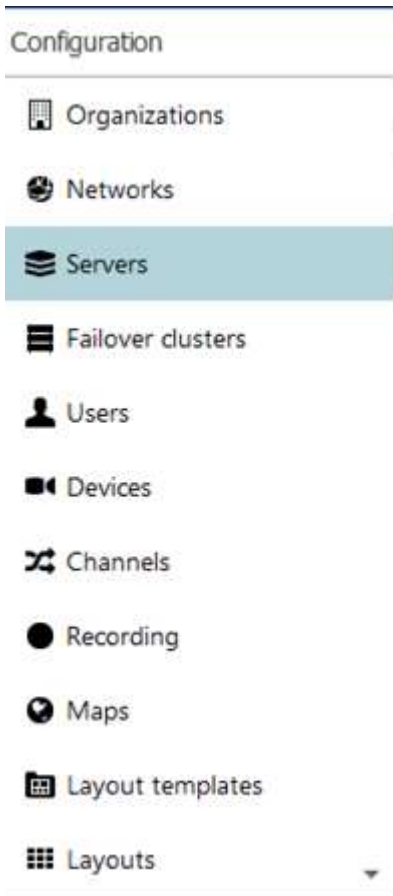
Components

The panel on the left will display the list of all available configuration components based on the selected section. As a result of license limitations, some of the items may be greyed out or unavailable. The list below shows maximum available items by category:

- **Configuration:** setup for the server components
 - Organisations, Networks, Servers, External services, Failover clusters, Users, Devices, Channels, Recording, Maps, Layout templates, Layouts, Video walls, User buttons, Visual groups, Live podcasts, Data sources, Mail servers, Reports, Access control
- **Events & Actions:** configuration of automated scenarios
 - Rules, Events, Actions, Global events, Conditions, Schedules, Counters, OPC, Indicators
- **Monitoring:** live component status
 - Servers, Devices, Channels, Streams, Archive statistics, Storages, User sessions, Video walls, External services, Reports, Access control, OPC, Indicators
- **Audit:** log of server events and user actions
 - Servers, Users

This document further describes the purpose and usage of each category in details.



Wavesys WVMS Professional Administration Guide



Components panel, position: left

Item List

The main part of the Wavesys Console window displays items in the selected category depending on the search and/or item filters. You can select one or more items at once using the *Shift* or *CTRL* button.

TITLE	ID	LOGIN NAME	EMAIL
 Built-in Administrator account	(1)	admin	
 John Doe	(124)	johndoe	johndoe@email.com
 Admins	(126)		
 Built-in Administrators group	(3)		
 Local admins	(127)		
 Operators	(125)		

Item list, position: centre

Click any column title to use as a **sorting** basis for the whole item list; the little arrow near the column title indicates that it is currently being used for arrangement - either ▲ ascending or ▼ descending. Right-click item list header for sorting options and column fit settings. The *Best fit* option will assign automatic size to all columns based on their name width. You can change column **width** simply by dragging their boundaries in the header row: these adjustments will be remembered and restored after you go to other sections, or close and re-open the Wavesys Console application.

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TITLE	LOGIN NAME	ORGANISATION	ENABLED
Built-in Administrator account	admin		
James Bond	jamesbond		
Jimmy Neutron	jimmyneutron		
Johnny English	johnnyenglish		
Built-in Administrators group			
Supervisors			

- Sort Ascending
- Sort Descending
- Best Fit
- Best Fit (all columns)**

Right-click header for additional options

For each category, it is possible to **define the set of columns** to be displayed, and **freeze** one or several leftmost columns for convenient horizontal scrolling. To do this, click the grid icon in the upper right corner just below the application menu (the rightmost button in the upper panel). An additional window will pop up, allowing you to define the column layout.

Table settings - Channels

Columns

Selected columns		Available columns	
TITLE	FREEZE	TITLE	
ICON	yes	SERVER	
TITLE	yes	IP	
ENABLED		PORT	
MOTION DETECTION MODE		SUBSTREAM RECORDING CONFIGURATION	
MAIN STREAM RECORDING CONFIGURATION		EDGE RECORDING CONFIGURATION	

Remove

Add

Reset
OK
Cancel

Choose item details to be displayed

On the left, you will see the currently displayed details. On the right, there will be all available columns.

- Use the *Add* and *Remove* buttons, or simply **double-click** items to move them from left to right and vice versa to select and deselect them.
- Use the *Up* and *Down* arrows to sort your selected columns on the left side.
- The grid button next to these arrows allows you to **freeze/unfreeze** the leftmost columns (i.e., those on top of the list). These will stick to the left window side as you scroll the table horizontally. You can freeze as many columns as you like, but only the ones on the far left side. For the columns in the middle of the list, this button will be greyed out (inactive).
- To discard all changes and **restore** the default (application original) list of columns, click the *Reset* button.

When done adjusting the table layout, click *OK*. Your new column configuration will appear: adjust the width of the newly appeared details, as desired.

Item Actions

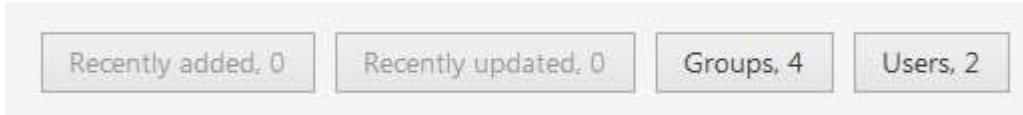
New user
Edit
Assign group
 1 selected

Wavesys WVMS Professional Administration Guide

Item actions panel, position: top right, under Navigation panel

The panel above the item list displays the available actions, if applicable. Usually, the buttons here will allow you to create a new item, edit or delete existing ones, create or edit contiguous items, etc.

Item Filters

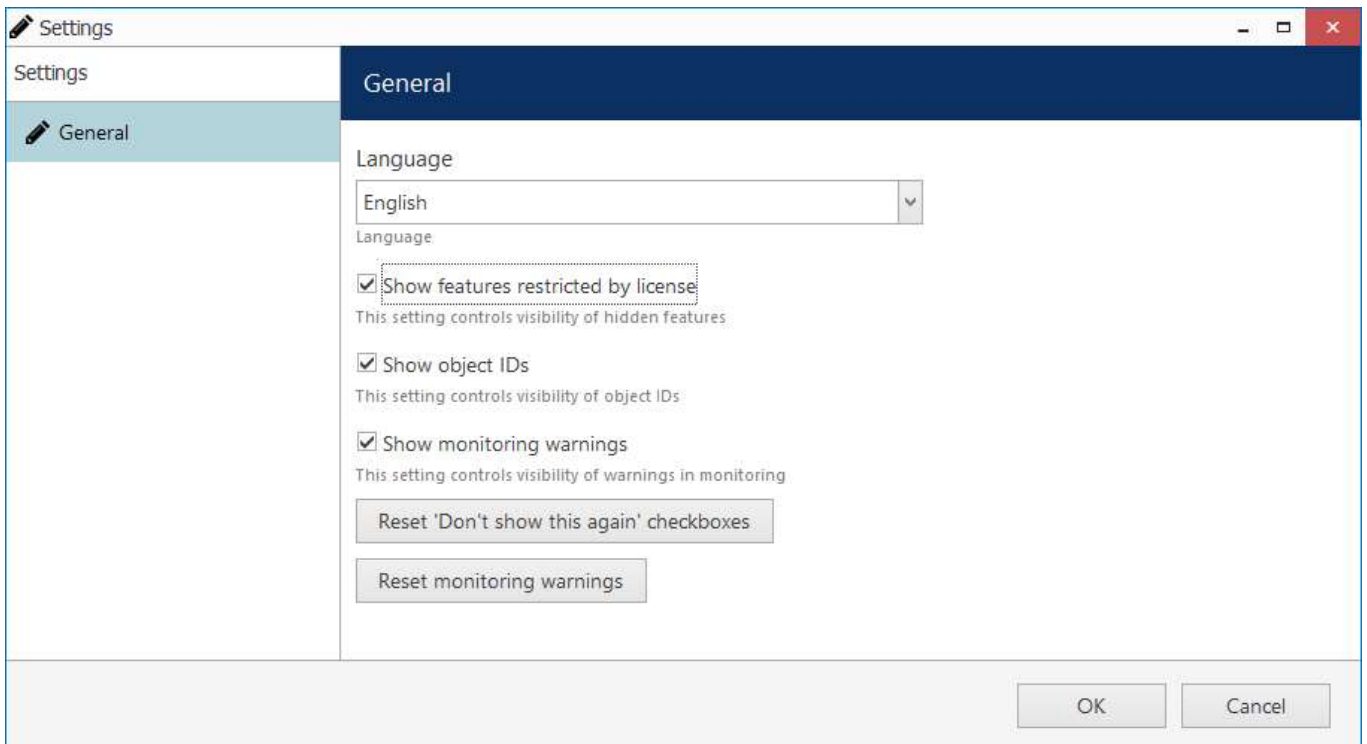


Item filters panel, position: bottom right

The bottom panel contains miscellaneous item filters, such as: recently added and updated, corresponding groups etc. Click any of the filters to apply them; use the X button to reset and display the full item list.

Application Settings

To change Wavesys Console application settings, go to the main application menu in the upper-right-hand corner and choose *Settings*. The preferences here only affect the current Wavesys Console instance, no matter to which server it connects.



Wavesys Console application settings

Here, it is possible to:

- change application **language** (by default, the language chosen during installation is used)
- show or hide software features restricted by license
- show or hide object identifiers (internal object IDs mostly necessary for addressing WVMS entities via HTTP API)
- show or hide monitoring warnings (critical errors will always be showed, only warning level info can be turned off)
- reset all *Don't show this again* checkboxes, which have been set so far
- reset [monitoring section warnings](#), if they had been reset manually

Wavesys WVMS Professional Administration Guide

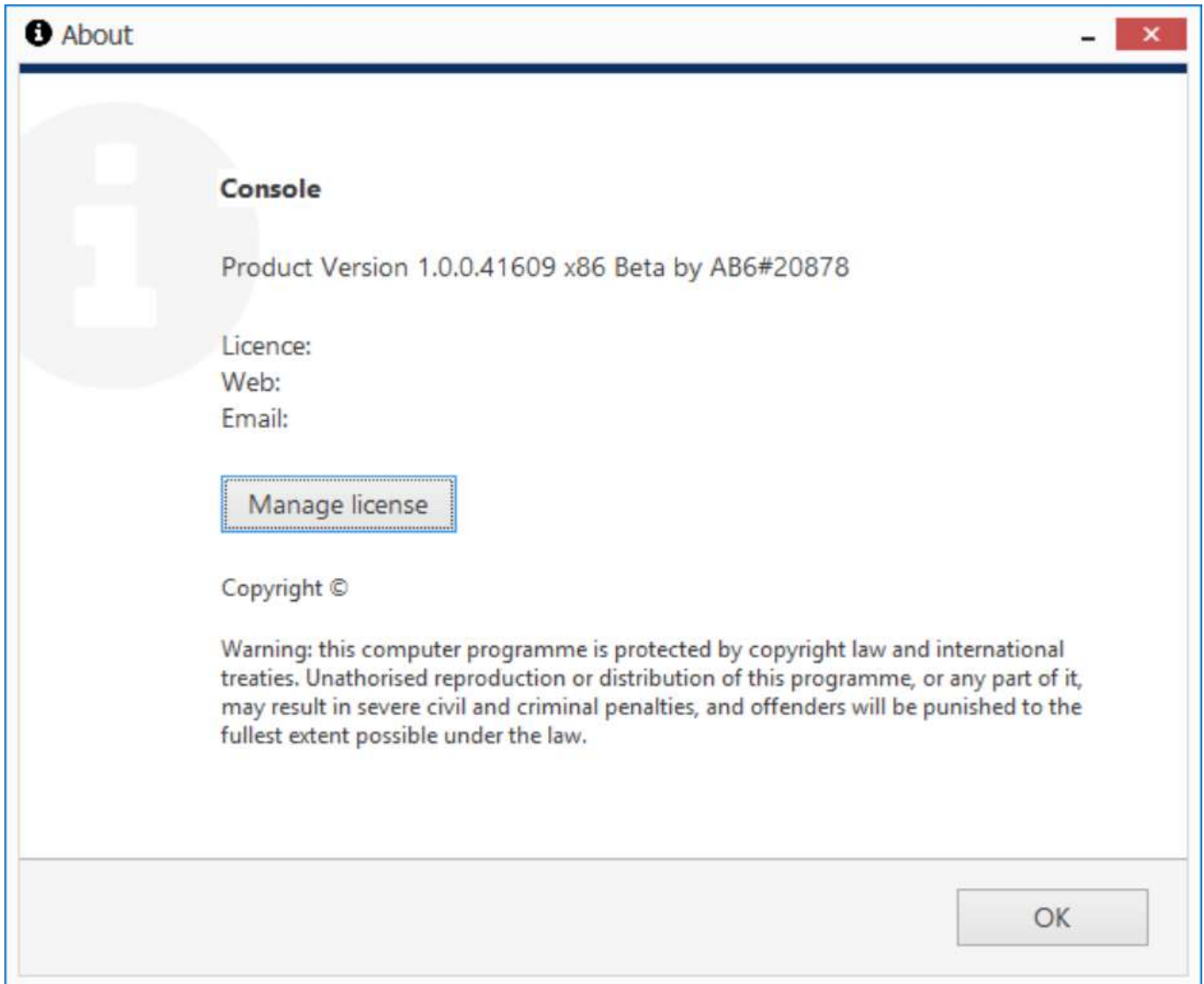


Ignore channel warnings in the monitoring section

19 About Product

Information about currently running software can be viewed from the local computer in the following ways:

- **WVMS info:** right-click the system tray icon and select *About* (if there is no tray icon, launch server shortcut to run the tray shell);
- **WVMS Monitor info:** from WVMS Monitor, go to the main menu, click *Help* and select *About*;
- **Wavesys Console info:** from Wavesys Console, go to the main menu, click *Help* and select *About*.



About Server

If you are connected to your WVMS server locally (via *localhost*), the *About* window will allow you to open the activation manager from here (except for WVMS Monitor). For remote connections, this option will be grayed out.

20 Conventions and Keyboard Shortcuts

Mouse Gestures

Double-click an item containing more entities (e.g., any group): opens item contents in the same window

Double-click a **non-expandable** item (e.g., server, user): opens entity configuration dialog box

CTRL+click or **Shift+click**: select multiple items in a list

Right-click on a text field: standard text edit menu

Right-click on a text field when creating an action: standard text edit plus text macros

Keyboard Shortcuts



Backspace: browse one step back in Wavesys Console

Alt+F4: close Wavesys Console

CTRL+A: select all items


Visual Elements


General

 New item (click  drop-down arrow to see available options)

 Remove item(s)

 Deselect item(s)


 Unacceptable filed value, hover mouse cursor for more information

 More information about the item, click to view the details


 Refresh item list

 Search

Wavesys Console sections

 Configuration

 Events & Actions

 Health monitoring

 Audit log


Management

  Network (server connection), connection settings

 Server
































 Server group

 External service

 External service group

 Failover cluster


Wavesys WVMS Professional Administration Guide

-  Software Watchdog
-  Storage
-  Resources (all or any type)
-  User account/session
-  User group
-  General details
-  Members of the current item
-  Current item membership in other groups
-  User and user group permissions for target item
-  Device
-  Device group
-  Channel
-  Channel group
-  Recording profile (core recording settings)
-  Recording schedule (recording itinerary based on core recording settings)
-  Recording configuration (recording interface assignable to channels)
-  Motion detector
-  Layout Template
-  Layout
-  Layout group
-  Map
-  Video wall
-  User button
-  Visual group
-  Shared channel
-  Audit Journal (software log)
-  Set (period etc.)
- Events & Actions**
-  Rules
-  Events
-  Actions
-  Global events

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 Conditions

 Event & Action schedules

 Mail servers

 Action delay timers


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21 Encryption

All WVMS editions have enhanced security aimed at data protection, which includes not only advanced permission management but also encryption wherever possible. Data protection for WVMS encompasses database encryption, server-to-server and server-to-clients connection encryption, as well as password protection for the proprietary archive.

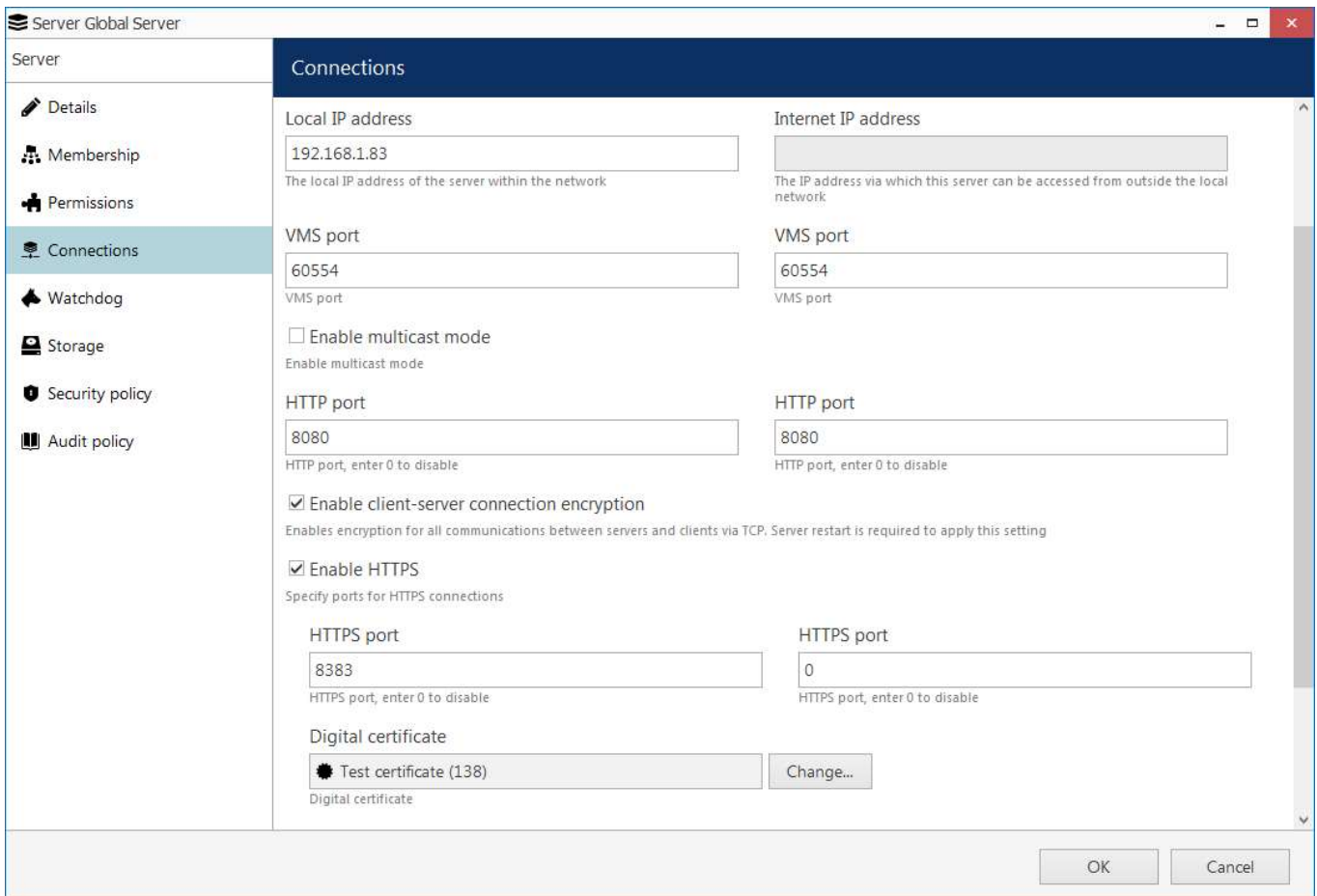
Database Encryption

WVMS server uses several databases for storing the server configuration, audit logs and other software data, and all of them are encrypted by default. Once you install the software version that supports database encryption, all the databases are automatically converted to the encrypted format. There is no need to adjust any settings to enable this feature.

 Database encryption was introduced starting from the WVMS version 1.8.0 and is supported in all succeeding versions.

Connection Encryption

Traffic encryption is not enabled by default, it can be turned ON in the [server settings](#), in the *Connections* tab. There are separate settings for TCP connection encryption and HTTPS.



The screenshot displays the 'Connections' tab in the 'Server Global Server' configuration window. The interface is organized into two columns. The left column contains fields for 'Local IP address' (192.168.1.83), 'VMS port' (60554), 'HTTP port' (8080), and 'HTTPS port' (8383). The right column contains fields for 'Internet IP address', 'VMS port' (60554), 'HTTP port' (8080), and 'HTTPS port' (0). Below these fields are several checkboxes: 'Enable multicast mode' (unchecked), 'Enable client-server connection encryption' (checked), and 'Enable HTTPS' (checked). A 'Digital certificate' section shows 'Test certificate (138)' with a 'Change...' button. At the bottom right, there are 'OK' and 'Cancel' buttons.

Wavesys WVMS Enterprise server connection settings with encryption options

Client-Server Connections

This setting affects all TCP traffic between servers and clients, including server-to-server communications in Wavesys WVMS Enterprise.

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⚠ When [configuring a Wavesys WVMS Enterprise system](#) that has remote servers and clients of version 1.7 or earlier, make sure to upgrade all remote components to the same version as Wavesys WVMS Enterprise so that they support encrypted connections. As soon as it is done, you can safely enable encryption for TCP connections.

HTTPS

Connections from remote Web browser clients and mobile applications, as well as API connections, can also use a secure channel instead of plain HTTP.

To enable secure communications, enable HTTPS in the server settings, then specify desired HTTPS ports (different from HTTP ports) for local and internet connections, and then add the digital certificate you wish to use; you can either use your own certificate or generate a self-signed one right on this step.

⚠ If you are setting up a Wavesys WVMS Enterprise system:

In addition to the setup in the central management server settings, HTTPS should be enabled for each Wavesys WVMS Enterprise Recording server **separately**, in the settings of the target server. The certificate, though, should be only added **once**, and then you just need to choose it from the list, when setting up HTTPS on the Wavesys WVMS Enterprise Recording server machines.

💡 It is recommended that you use a valid digital certificate signed by a trusted authority instead of self-signed ones. If you use a certificate generated by WVMS, your browser will show you a warning.

Archive Encryption

Each archive storage (local or network), as well as archive backups made through the [Archive Backup Wizard](#), can be encrypted. You can provide a different password for every storage unit, and there is also an option to change the password at any time.

Regular Server Archive

To access the archive encryption settings in Wavesys Console, open the *Configuration* section, choose *Servers* on the left, then double-click the desired server to edit its settings. In the *Storage* tab, click the *Open storage properties* button.

The screenshot shows the 'Storage properties' window in Wavesys Console. The 'Directories' tab is active, displaying a table of storage units. A 'Set password' dialog box is overlaid on the table, prompting for a new password and a password hint.

	PATH	STORAGE	QUOTA	FREE SPACE	TOTAL SIZE
1	I:\Archive Files	S1	200.00 GB	821.30 GB	931.51 GB

Set password dialog:


- Field: New password (masked with dots)
- Field: Repeat password (masked with dots)
- Field: Password hint (text: My favorite book, p.31, 45th row)
- Buttons: OK, Cancel

Password-protected storage setup

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Click the target storage in the list on the right or add a new local or network storage unit by using the *+New* button above the storage list: its properties will appear on the left. Mark the *Enable encryption* option and specify the password you want.


To **save the changes**, hit the *Apply* button beneath the storage settings, then hit *OK* to close the storage configuration dialog box, and then click *OK* to finally save the storage settings together with the server configuration. Pressing *Cancel* on the last step will revoke the changes in the storage configuration.

 When assigning a new password for the storage, make sure to remember it or store in a secure place: you will require it, should you need to access the storage contents in the following scenarios:

- when accessing the archive with the Portable Player tool
- when adding the same disk as a storage unit for another server
- when adding a disk with archive backup as a storage unit
- if you delete the encrypted disk from the storage configuration and then add it anew

There is a field that allows you to enter a password hint, which will be displayed in these situations.

You will not be prompted for the password when accessing the archive from the WVMS Monitor application connected to a server with encrypted archive: WVMS server will decrypt it automatically.


 There is no option to recover the password if you have forgotten it.

Starting from the moment you set the password, all footage recorded to the target storage becomes encrypted; retroactive encryption for the previously recorded archive is not supported. If you wish to have the already recorded data to be encrypted, you can use the [replication feature](#) in Wavesys WVMS Enterprise, targeting the replicas to an encrypted storage.

When the storage password is changed, the new password is used for encryption from then on. If storage encryption is disabled for some time and then enabled back, that part of the archive will remain unencrypted.

Adding an Encrypted Disk

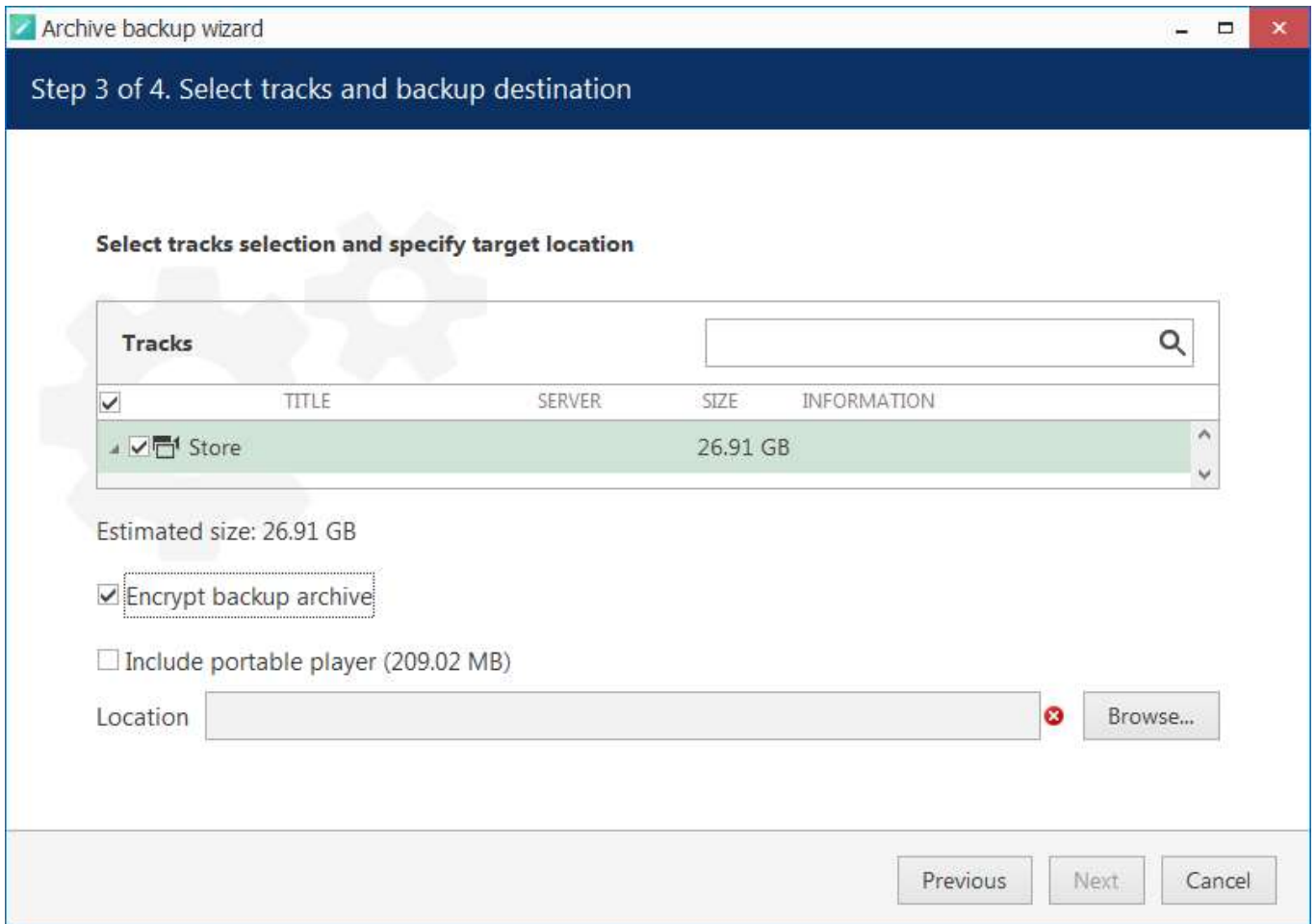
If you wish to use a storage, which contains encrypted archive, as a new storage unit and add it to the server configuration, you will be prompted for the password. You need to provide the **password** that was used to encrypt that disk. If you have provided a password hint earlier, it will appear as a **tooltip** when hovering your mouse over the password field.

 Do not modify the contents of encrypted disks manually, this may result in the corruption of the whole archive.

Archive Backups

The [archive backup tool](#) also provides an option to specify a password to encrypt the backup.

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Password protection for the archive backup

There is no difference if the backup is made from an encrypted or an unencrypted storage; the password provided at this step will be used in future for archive access, whether you read the disk contents using the Portable Player tool or add the disk as a new storage to some WVMS server.

Encrypted Archive Access

When accessing an encrypted storage via WVMS Monitor and Wavesys WVMS Mobile, the archive is decrypted automatically and provided for browsing according to the user permissions.

Should you want to access a directory that contains proprietary WVMS archive or its part (backup) using WVMS Portable Player tool, you will be prompted for the password.




Encrypted archive access in the Portable Player tool.

If you have specified a hint at the point of setting the password, it will be displayed as text or as a hint when hovering your mouse over the password field.

22 Server Settings

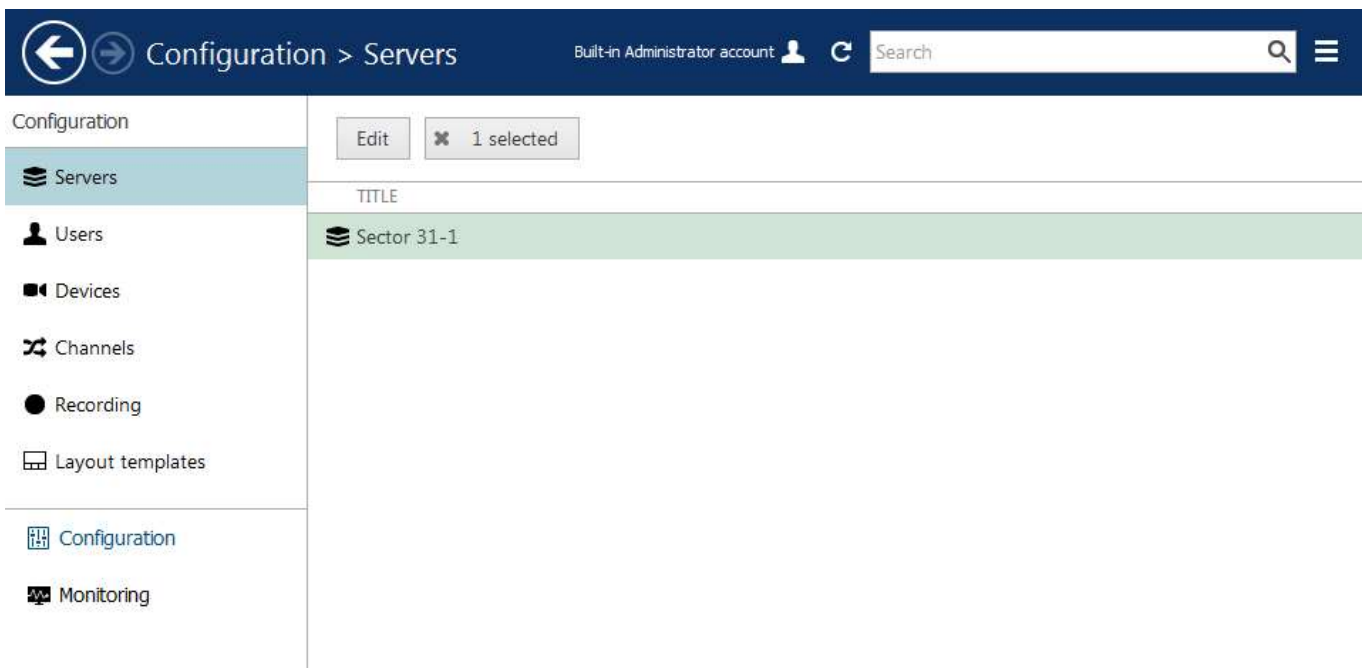
All the changes in the server configuration are done via Wavesys Console application. The settings are immediately saved and stored in an **encrypted internal database**, which guarantees that your server configuration cannot be accessed without entering a valid username and password.

 Server database encryption is automatic, meaning that you do not need to enable it explicitly, and is available starting from the software version 1.8.0.

This topic describes available server settings.

General

In order to access Wavesys WVMS Professional server settings via Wavesys Console, select *Configuration* section and then choose *Servers* components from the menu on the left.



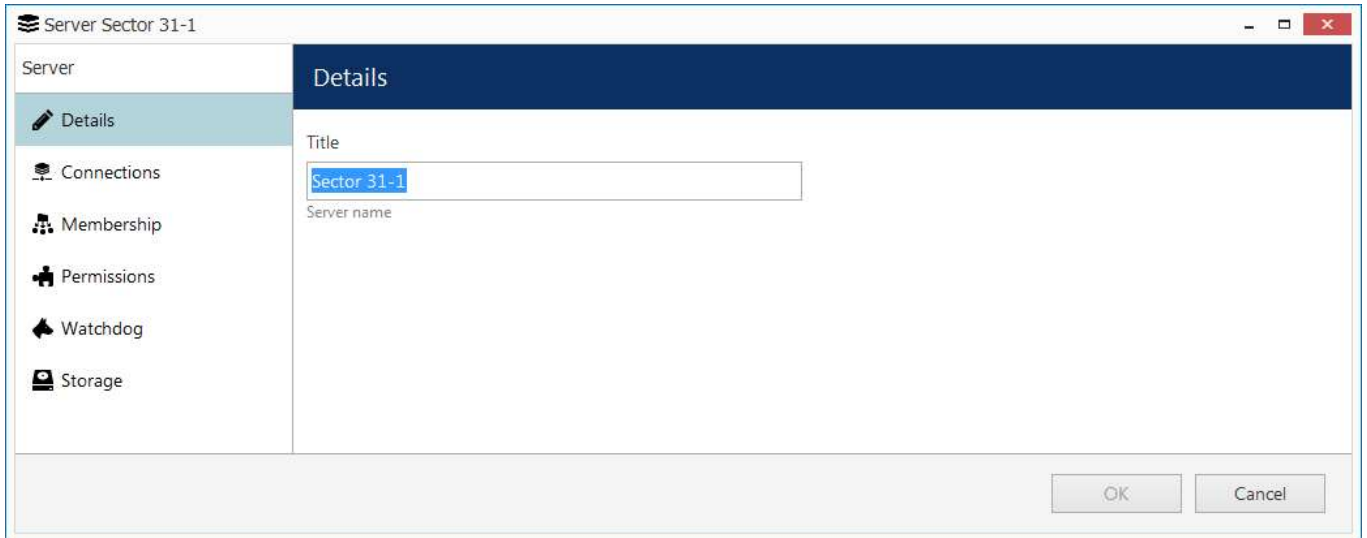
Configuration -> Servers

Double-click server or click the *Edit* button on the upper panel to access server configuration dialog box.

Details

On the *Details* tab, you can change the server **name**: it will appear everywhere in Wavesys Console and in the connected WVMS Monitor applications, including Web client.

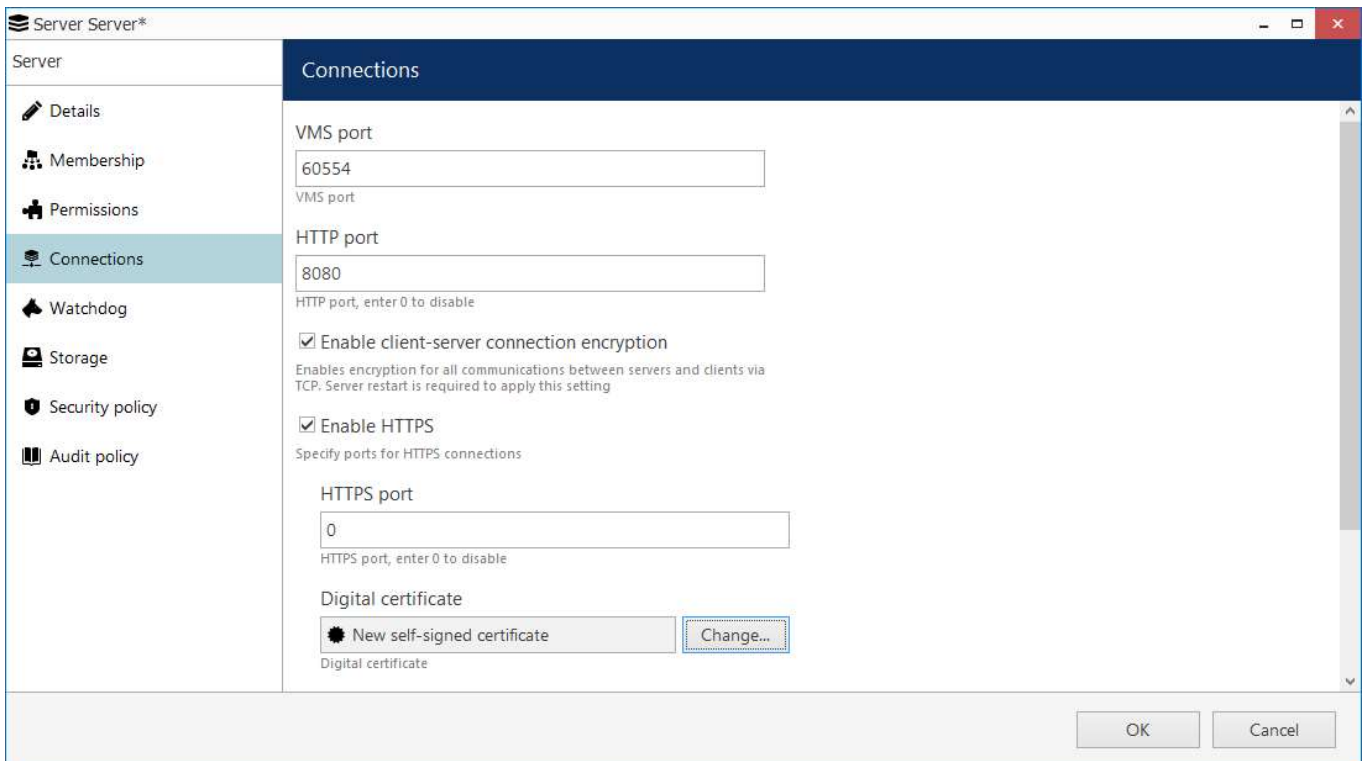
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Server details

Connections

The *Connections* tab allows you to define **ports** for WVMS Monitor and Wavesys WVMS Streaming Server connection; the default ports are **60554** for WVMS Monitor and **8080** for Wavesys WVMS Streaming Server (HTTP). Note that, in case you plan to access your Wavesys WVMS Professional server from the Internet, the ports must be properly forwarded on your router according to your desired topology and allowed through the firewall. Details on the port forwarding setup can be found in your router operation guide.



Connection settings


Here, you can **enable encryption** for client-server connections and also for HTTP connections (by default, it is disabled).

Server-client encryption setting affects all TCP traffic, i.e.:

- Wavesys Console connections to the Wavesys WVMS Professional server
- WVMS Monitor connections to the server

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When you change the server-client encryption setting, all currently connected clients - both Wavesys Console and WVMS Monitor applications - will be disconnected so that the encryption settings can be applied correctly. They will re-connect back shortly provided that they support encryption, too - make sure to upgrade them so that their version matches server version.

 Connection encryption is supported starting from software version **1.8.0**. If your system has remote Wavesys Console and/or WVMS Monitor applications of **older versions**, these will be **unable to connect** to a server that has encryption enabled; therefore, first make sure to **upgrade all the clients** and only then enable encryption on the server side.

To enable **HTTPS** (HTTP over TLS), mark the corresponding setting and then:

- specify HTTPS port (different from HTTP)
- add a digital certificate

You can either use your own valid **digital certificate** or generate one right in the software. In the latter case, the certificate will be self-signed and you will need to add it as trusted when connecting from the mobile app and from your Web browser(s).

 If you are using your own CA certificates, create a *.pem* file with your certificate chain as described here: <https://www.digicert.com/ssl-support/pem-ssl-creation.htm>

This is necessary for the certificate to be recognized correctly by all HTTP clients - Web browsers and WVMS mobile applications. If you simply apply your CA certificate in Wavesys Console, there is a chance it is not recognized because some applications require the entire certificate chain.

Then, apply the *.pem* file as the certificate together with your key when the importing certificate into Wavesys Console.

Also, if you are going to use SNMP traps in your [Event & Action](#) scenarios, here you can define server's **SNMP community** name and **SNMP port** for incoming and outgoing messages. Community will be used by the SNMP manager to send requests; SNMP port will serve for both incoming and outgoing messages (supported incoming messages are third-party SNMP manager requests, **not** external SNMP traps!). Leave both values **zeroed to disable** this functionality.

The next topics describe the remaining aspects of server settings in details.

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23 Watchdog

General

Server *Watchdog* is an important part of the WVMS software. It runs as a separate Windows service and protects the software from certain types of failures by automatically attempting to restart the server.

Watchdog operates based on the software and system overall health monitoring; default trigger values have been selected on the grounds of our analysis of extensive tests, which we conducted on many systems with different configuration and stability level.

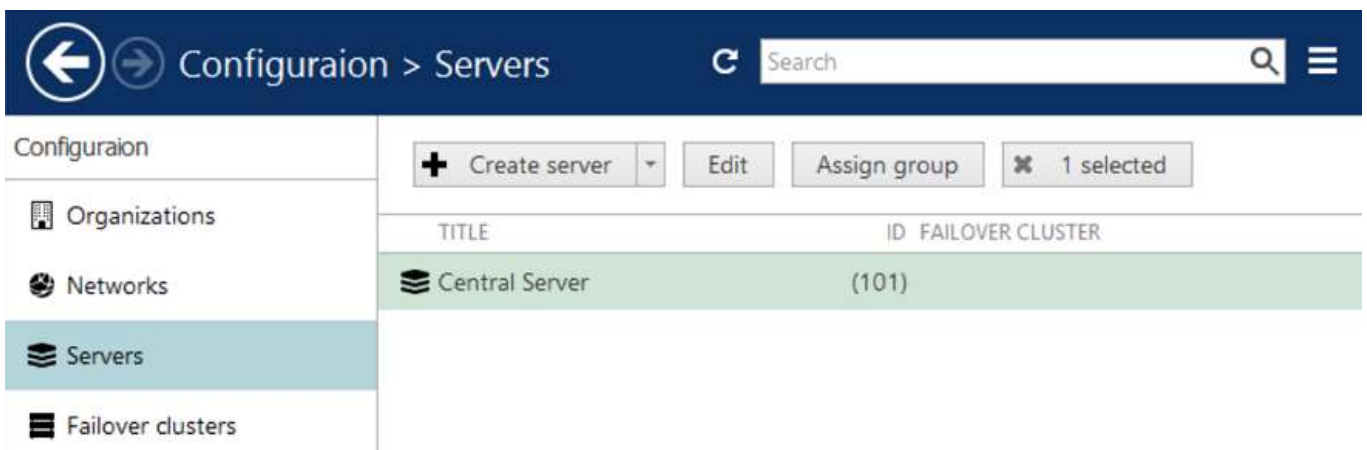
Although it is possible to disable the *Server Watchdog* service, we strongly advise against doing so, as the principal role of the watchdog is to keep the software operation as stable as possible in the given circumstances.

Watchdog operation can be tracked by messages in the Windows Application log and in the software [Audit log](#). If you do experience frequent disturbances such as software restarts or server rebooting, this might be an indication of some serious issue related to the software, operating system and/or underlying hardware. In such a situation, the best course of action is to:

- carefully read the messages in the Windows Application Log, as these may already contain some indication of why Watchdog was triggered;
- refer to the [relevant topic in the Troubleshooting section](#) of this manual to read about typical causes of such cases;
- send a [Problem Report](#) from the faulty server, providing as much information as possible about the issue;
- consult the Wavesys Global technical support team directly via support@wavesysglobal.com.

Configuration

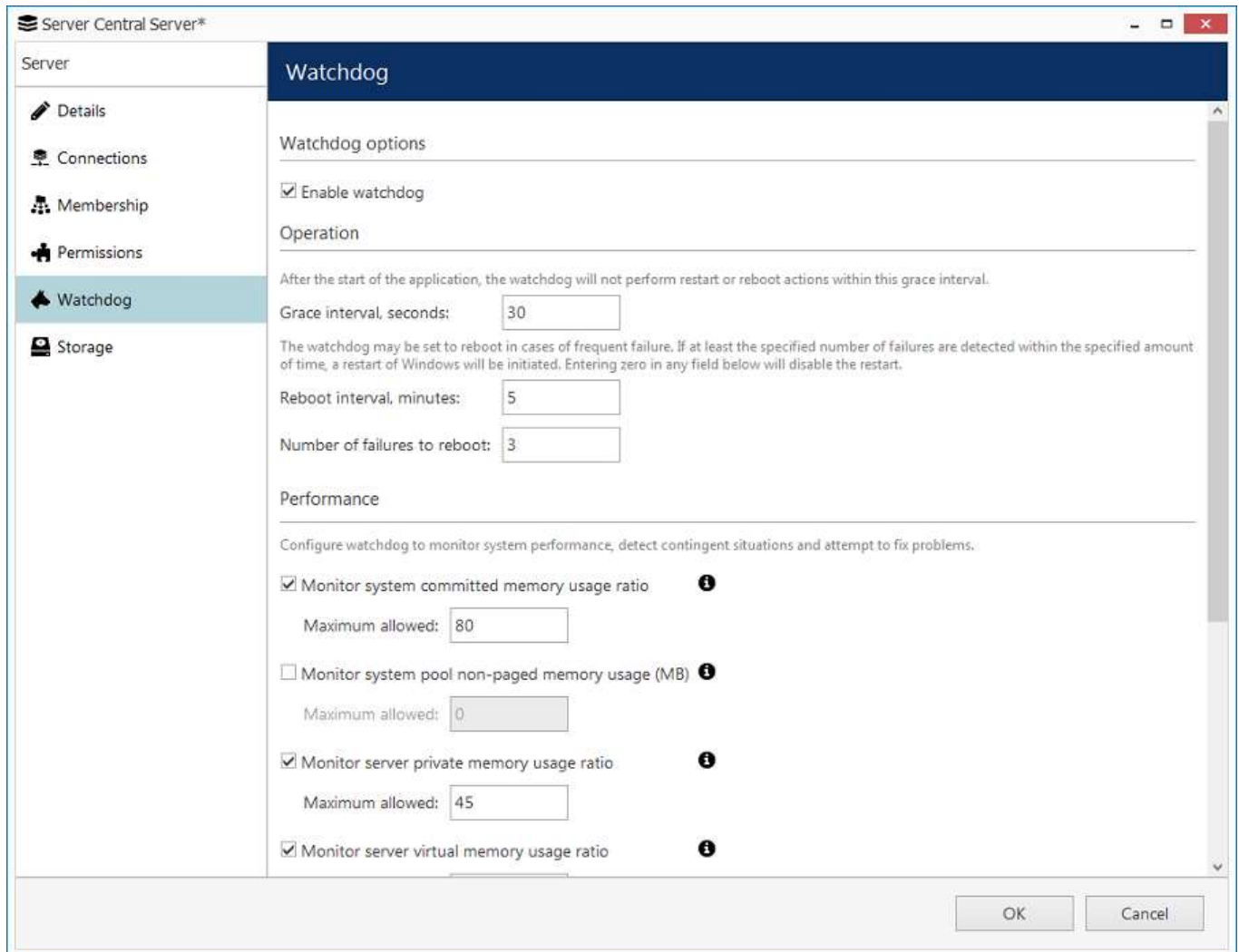
Watchdog operation can be configured for each server independently. To access the watchdog settings in Wavesys Console, select *Configuration* in the bottom left menu and select *Servers* from the list on the left, then double-click the desired server or simply click *Edit* button on the top panel for the pre-selected server.



Locate server for Watchdog configuration

In the *Server* dialog box, select Watchdog from the left menu.

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Watchdog configuration

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The table below contains a detailed explanation of the watchdog settings. Please note that, for most cases, **default and near-default settings are recommended**; it is advisable that you consult with Wavesys Global support if, for some reason, you plan to make extensive changes to these settings. Click the information icon next to each setting to read more about them.

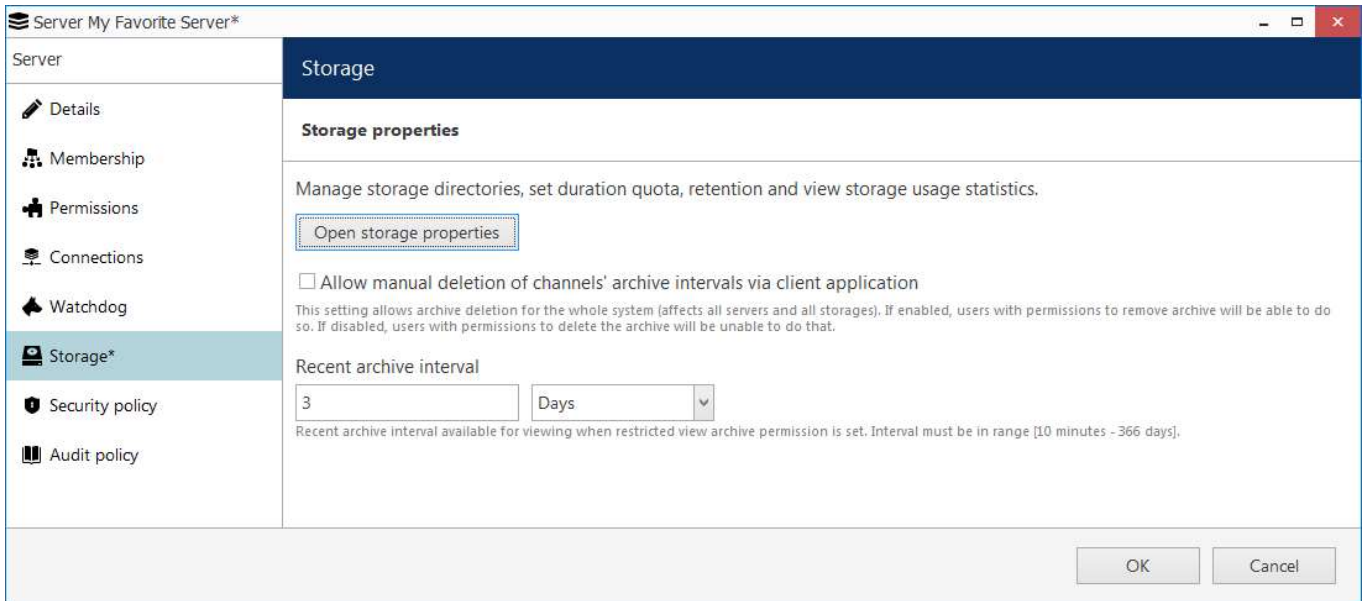
Setting	Description	Default Value
Enable Watchdog	Enables Watchdog operation for the target server	Enabled
Grace Interval, seconds	Time interval in seconds, counting from server start, during which Watchdog will not attempt to restart the software	30
Reboot Interval, minutes	Watchdog will reboot Windows if there have been a certain number (N) of software restarts (N is specified below) in the given time interval; the default for rebooting is 3 restarts in 5 minutes; setting the specified number to 0 will disable rebooting	5
Number of Failures to Reboot	Watchdog will reboot Windows in case there have been N software restarts in the time interval specified above; the default for rebooting is 3 restarts in 5 minutes; setting the specified number to 0 will disable rebooting	3
System Committed Memory Usage Ratio, %	Watchdog will restart the software if the ratio of total system committed memory exceeds the specified percentage; this value is shown under <i>Memory</i> section of <i>Performance</i> tab in the Windows Task Manager	Enabled, 70%
System Pool Nonpaged Memory Usage, MB	Watchdog will restart software if the amount of system nonpaged pool memory exceeds the specified amount	Disabled
Private Memory Usage Ratio, %	Watchdog will restart software if the amount of private memory used by server process exceeds the specified value	Enabled, 45%
Virtual Memory Usage Ratio	Watchdog will restart software if the amount of virtual memory used by server process exceeds the specified ratio; ratio shows the amount of virtual memory used by server process versus maximum per-process virtual memory allowed by OS	Enabled, 90%
Enable Periodic Restart	Enables automatic software restart every N days or hours; use hours for troubleshooting purposes	Enabled, 7 days
Enable Periodic Restart Hours	Limit periodic restart to specific hours, e.g. only restart at night; we recommend to leave at least a 1h interval for the restarts	Disabled

24 Storage

Server storage configuration includes storage directories, size and duration quotas, optional encryption, cleanup time settings and storage differentiation by name for further flexible allocation of the recorded streams.

To access the storage settings for the server via Wavesys Console, choose the *Configuration* section, then select *Servers* from the menu on the left, double-click your server and then click the *Storage* tab. Click the *Open storage properties* button to open the configuration dialog box.

There are also several settings in server settings dialog box itself. These are explained in the end of this chapter.



Access storage settings for selected server


To **save the changes** after you have finished with storage configuration, hit the *Apply* button beneath the storage settings, then hit *OK* to close the storage configuration dialog box, and then click *OK* to finally save the storage settings together with the server configuration. Pressing *Cancel* on the last step will revoke the changes in the storage configuration.

Directories

All available **local disks** will be automatically listed after the first installation (with empty configuration) and enabled for recording with default archive directories using the *Default* storage label. By default, system disk (C:) is not listed if other disks are available, as we strongly do not recommend recording to the system disk.

If you are upgrading, re-installing the software, [restoring](#) an earlier database configuration, or inserting new local disks into the server after the software has been installed, the local disks will not be listed automatically so you need to **add** them as **new storages**. You can also add network paths to remote storage locations.

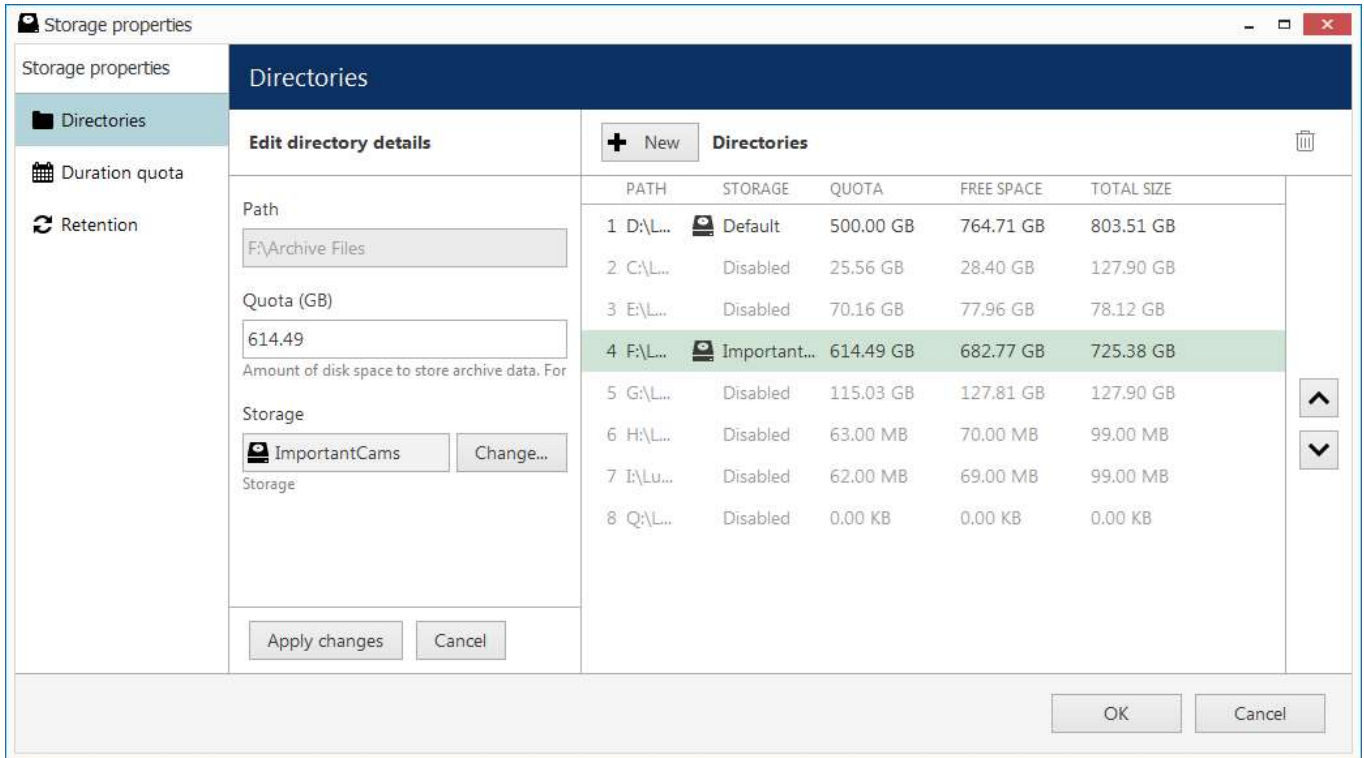
Use UP and DOWN arrows on the right to change the disk order (priority); use the recycle bin button in the top panel to **remove** any local or network directory from the storage configuration.

 Mapped network shares that appear as drives in Windows Explorer will **not** be listed automatically because WVMS operates as Windows Service and therefore is unable to access these (due to Windows API peculiarities). You are welcome to add these as network directories in storage settings.

For each storage location, the following information will be displayed:


- storage priority: determined by the item position in the list
- storage label (see description below)
- current quota size
- free space on disk (except network storages)
- total disk size (except network storages)


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Configure storage directories


Each directly attached storage location will be automatically assigned a quota of 90%; each storage will have 20GB quota by default. We strongly advise that you review all the settings and make sure that all the storage locations have sufficient free space, and, if necessary, free up some space. It is recommended that every recording location has 10-15% of free space: this helps avoid fragmentation effect and also allows highly loaded software to effectively enforce recording quotas.

 **Minimum quota** per each storage location for any storage type is 20GB.

 We advise against recording to the **system drive** because it is often used by other processes like defragmentation and system backup, not to mention the operating system itself, and thus doing so may affect recording efficiency and stability. As a result, disk C: is not selected for recording by default.

 Total size and free space on the **network storages** is not displayed here. You can check these in the *Monitoring* section of Wavesys Console, under *Storages*.

To change the disk quota, simply highlight the desired location for storage from the item list, then enter the quota size in GB and click *Apply changes*.

 If you plan to **protect** some footage from being erased (this functionality is available via WVMS Monitor application), keep in mind that **protected archive** areas will be **ignored when forcing quotas**. Make sure there is enough free space on the disk(s) and set lower quotas, if necessary.

To review and/or **un-protect** such areas, go to the *Monitoring* section of Wavesys Console, choose *Archive statistics* on the left, highlight one or more target channels, and press the [Protected intervals](#) button on the top panel.

Storages

You can either use the *Default* storage category for all locations, or create multiple different **storage** profiles (types, names, labels). These can be used for manually distributed streaming between storage directories:

- storage directories are marked with corresponding storage tags
- each channel is [assigned](#) to a recording location

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To choose a storage profile different from the *Default*, select the storage location from the *Directories* list and click the *Change* button.

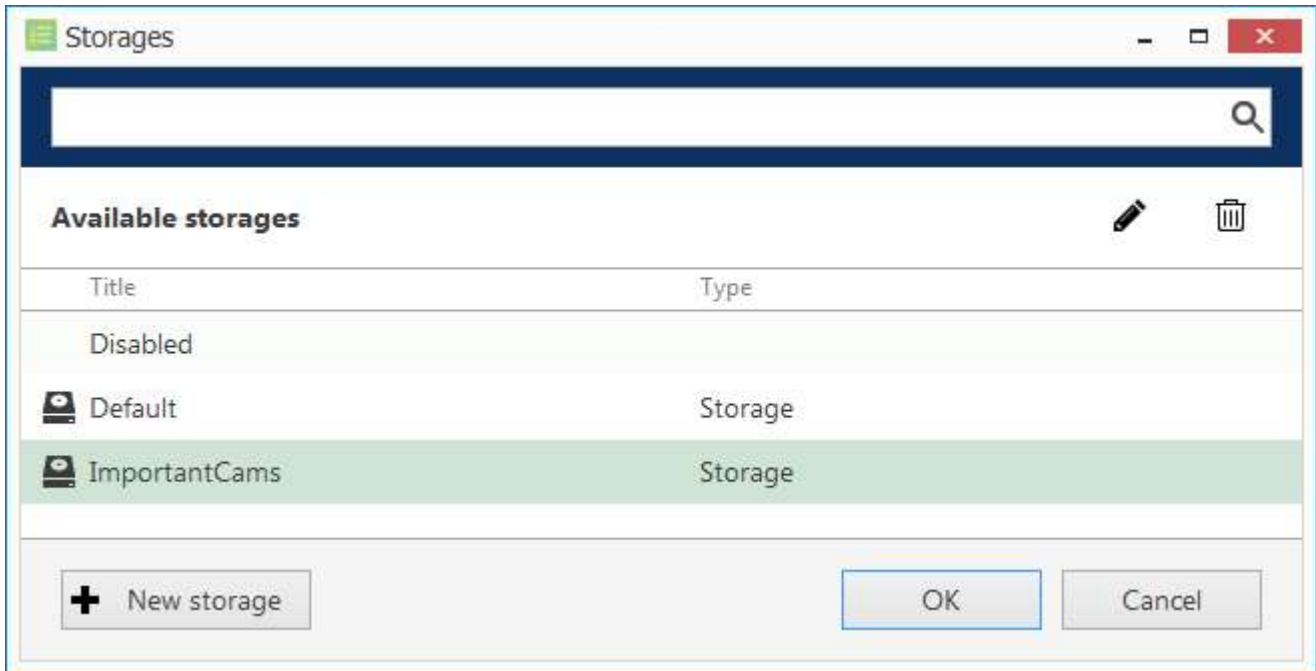
Storage



Storage

Change storage

Select one of the built-in storage profiles or create and edit a new one.



Choose storage profile

The built-in storage types are:

- **Disabled:** storage location will not be used
- **Default:** default storage tag
- **Fallback:** storage destination to be used if all the storage units with specified tags have failed
- **Readonly:** existing data will be available for reading and will not be erased; no new recordings will be appended to this location

These profiles cannot be edited or removed. Fallback storage settings are available in the corresponding tab of the *Storage properties*.

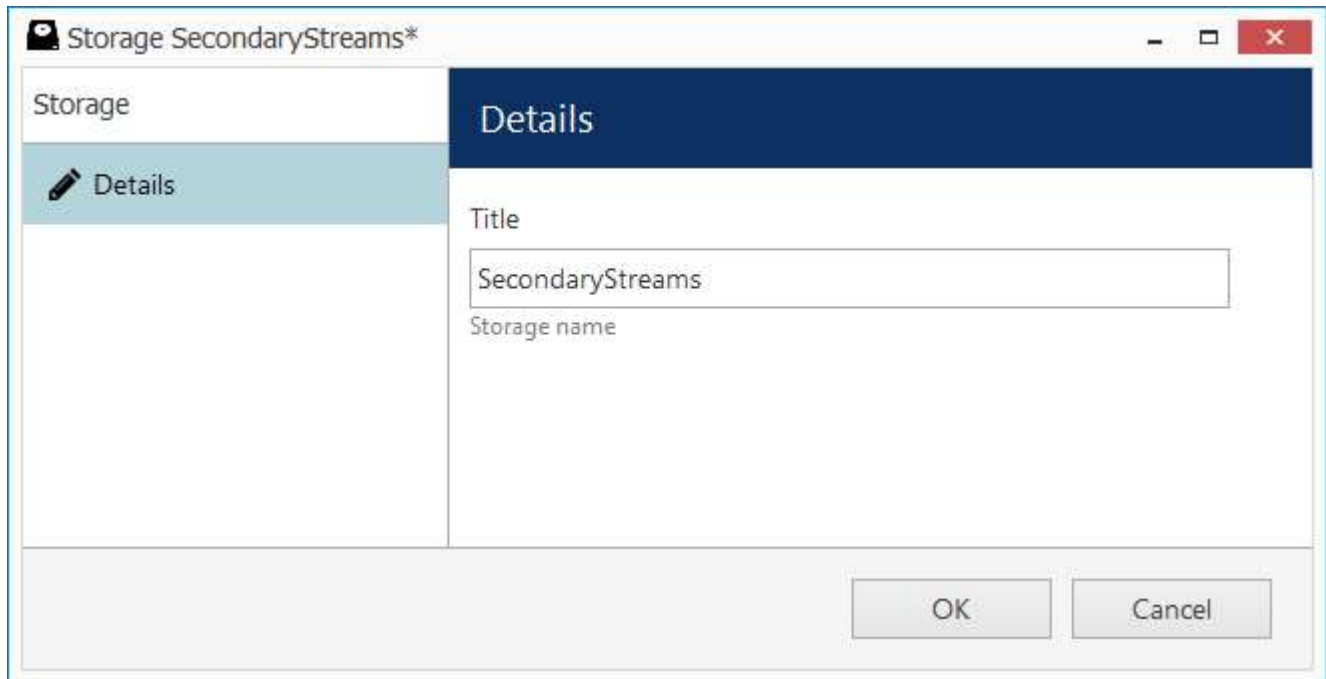


Readonly storage type can be used, for example, in the following cases:

- it is necessary to view the old data from a different WVMS server when you need to insert the disks originating from another computer and you do not wish that these data are erased
- some storage unit contains important footage that has been requested to be kept for a longer time so that the recordings are not erased over time while still allowing access to the footage

Click + *New storage* button to create a new storage profile, or select an existing one and click the *Edit* button in the upper-right-hand corner to change its name.

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New storage profile


Enter the storage profile title and click *OK* to save and exit.

The storage tag you have selected or just created will appear as selected. Click the *Apply* button below to **confirm** storage configuration settings before proceeding.

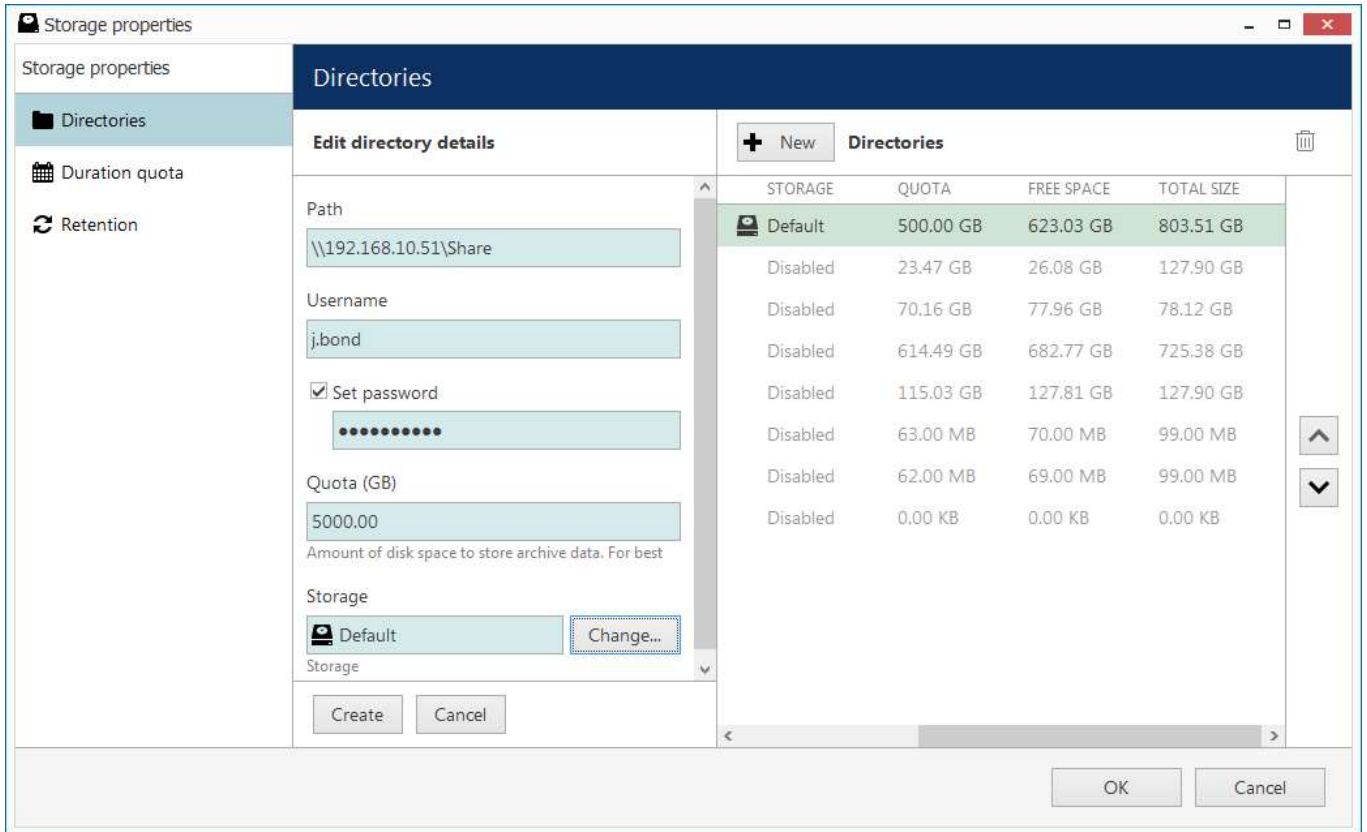
Add Storage

In order to add a new **local disk** or a **network storage** (NAS, SAN, network share), click + *New* button on the upper panel, select *New local directory* or *New shared directory*, and then enter the setup details.

 If you are using a NAS, make sure to **disable** the *Recycle Bin* feature (for some NAS models, it is called *trashbox* or similar). This will ensure that the erased files (e.g., when reaching quota) are actually **deleted** permanently.

 If you are adding a previously encrypted storage (e.g., it has been used on another server), make sure to provide the same password. You can track the storage status in the *Monitoring* section of Wavesys Console, under *Storages*.

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Add a new storage directory

The table below details the available settings for a **shared directory**. Enter the settings for the target storage and click *Create* below: the storage will be validated immediately.

Setting	Description	Default Value
Path	Full network path to the storage directory	\\Server\Share\Wavesys Global\Archive Files
Username	User name to connect to the storage	[empty]
Password	Define storage access password, if applicable	[empty]
Quota	Maximum amount of storage in gigabytes to be used for recording; 85-90% is recommended	20GB
Storage	Storage label to be assigned to the target storage directory	Disabled

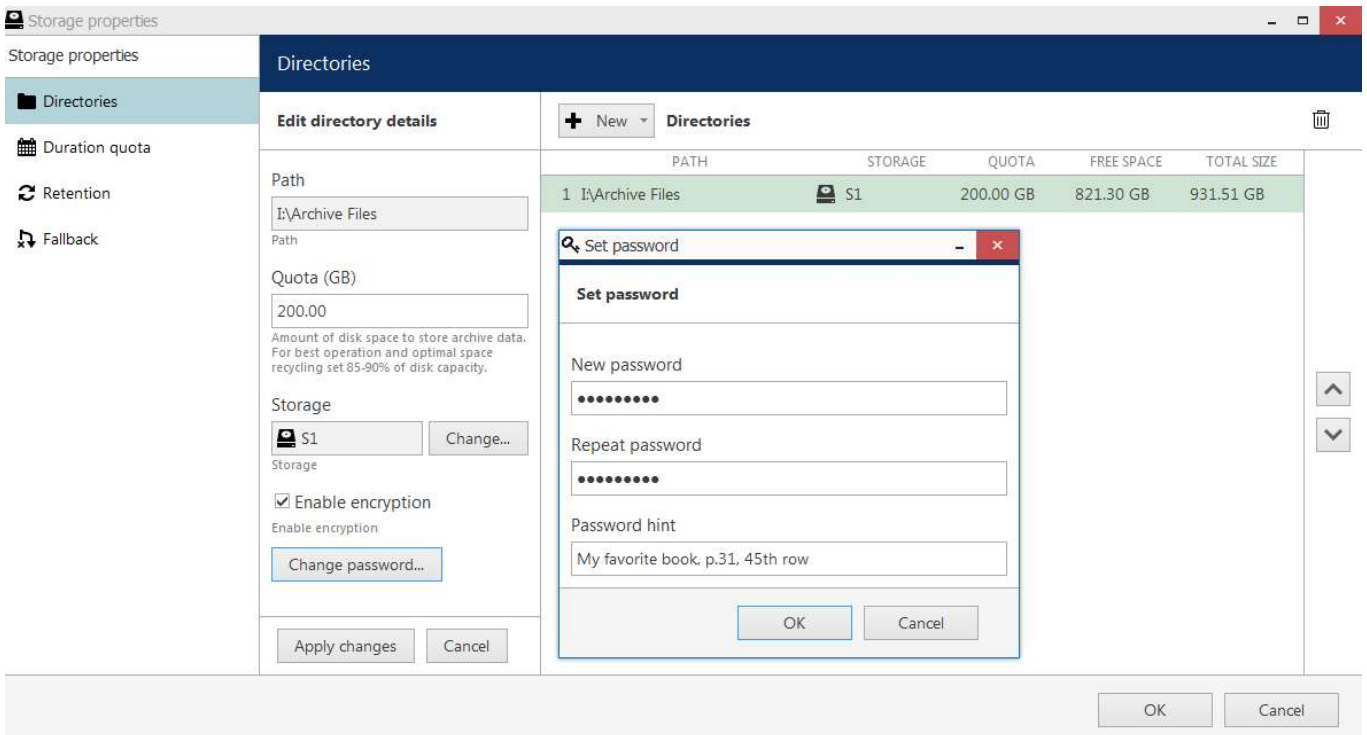
When adding a **local directory**, you are first offered to choose the disk from the list of detected ones. If there is just one disk left available, it will be chosen automatically.

Setting	Description	Default Value
Path	Full path to the archive directory	X:\Wavesys Global\Archive Files
Quota	Maximum amount of storage in gigabytes to be used for recording; 85-90% is recommended	20GB
Storage	Storage label to be assigned to the target storage directory	Disabled

Storage Encryption

Once you have added all the necessary storages, you can enable encryption and set a password for each storage separately.

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Storage encryption settings

Mark the *Enable encryption* option and specify the password you want. You can change the password at any point, and there is also an additional field that lets you add a hint that may help remembering the password in future: it will appear either as regular text or a tooltip when hovering your mouse cursor over the password prompt field.



When assigning a new password for the storage, make sure to remember it or store in a secure place: you will require it, should you need to access the storage contents in the following scenarios:

- when accessing the archive with the Portable Player tool
- when adding the same disk as a storage unit for another server
- when adding a disk containing archive backup as a storage unit
- if you delete the encrypted disk from the storage configuration and then add it anew

There is a field that allows you to enter a password hint, which will be displayed in these situations.

You will not be prompted for the password when accessing the archive from the WVMS Monitor application connected to a server with encrypted archive: WVMS server will decrypt it automatically.



There is **no option to recover** the password if you have forgotten it.

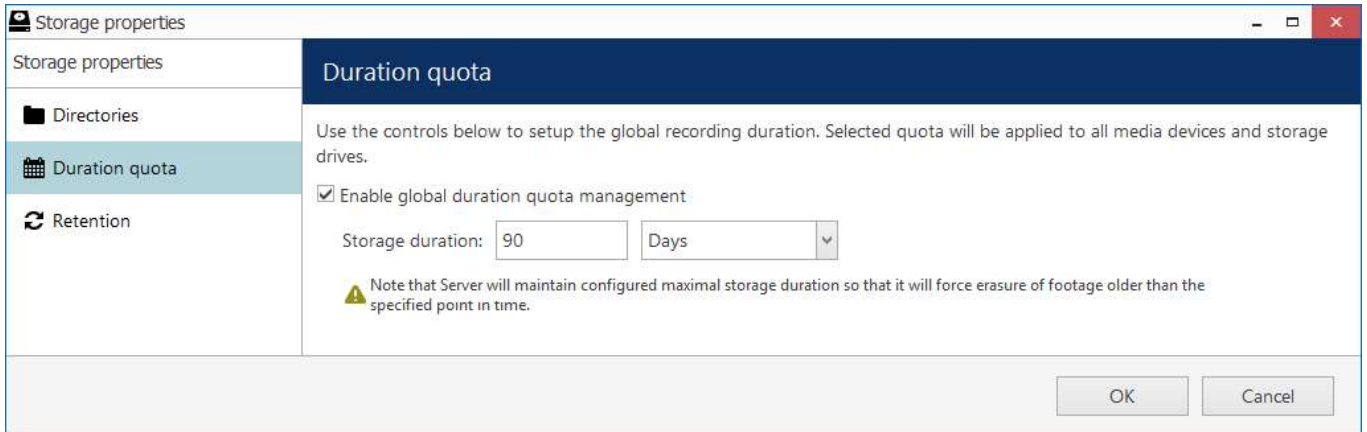
Starting from the moment you set the password, all footage recorded to the target storage becomes encrypted; retroactive encryption for the previously recorded archive is not supported.

When the storage password is changed, the new password is used for encryption from then on. If storage encryption is disabled for some time and then enabled back, that part of the archive will remain unencrypted.

Duration Quota

Set the global recording duration limit for your server here: enable quota management and then enter desired number of days. All recordings older than the number of days specified will be erased.

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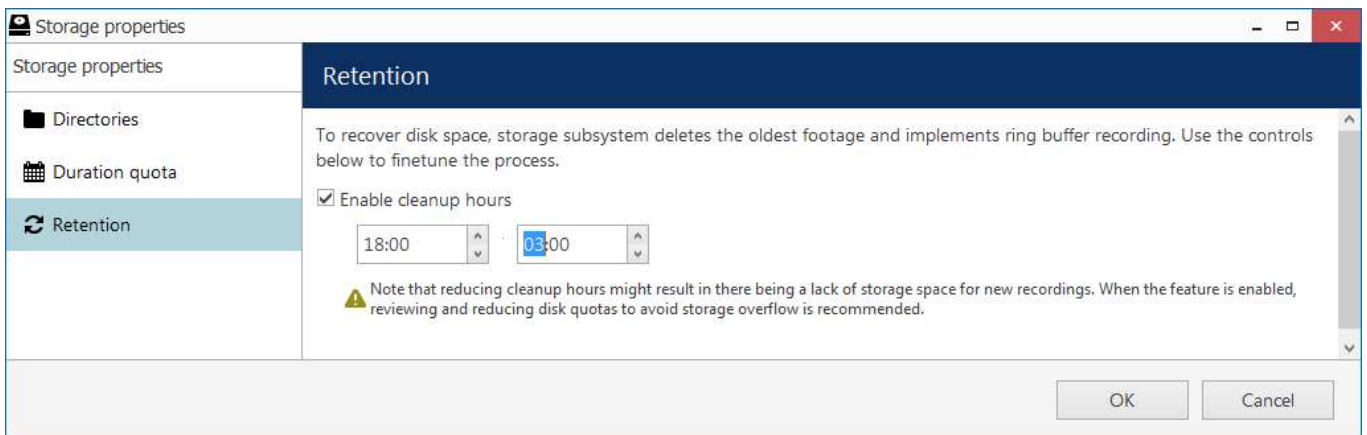


Global duration quota

Note that the global duration quota has priority over the individual (per-channel) duration quota that is set in the recording configurations.


Retention

You can set the software erasing mechanism so that it cleans up old recordings only during specific periods of time, e.g., when the recorder is less overloaded or when the quality of recordings are less important.



Set cleanup hours

To do this, enable the cleanup hours setting and specify the time period during which erasing is allowed.

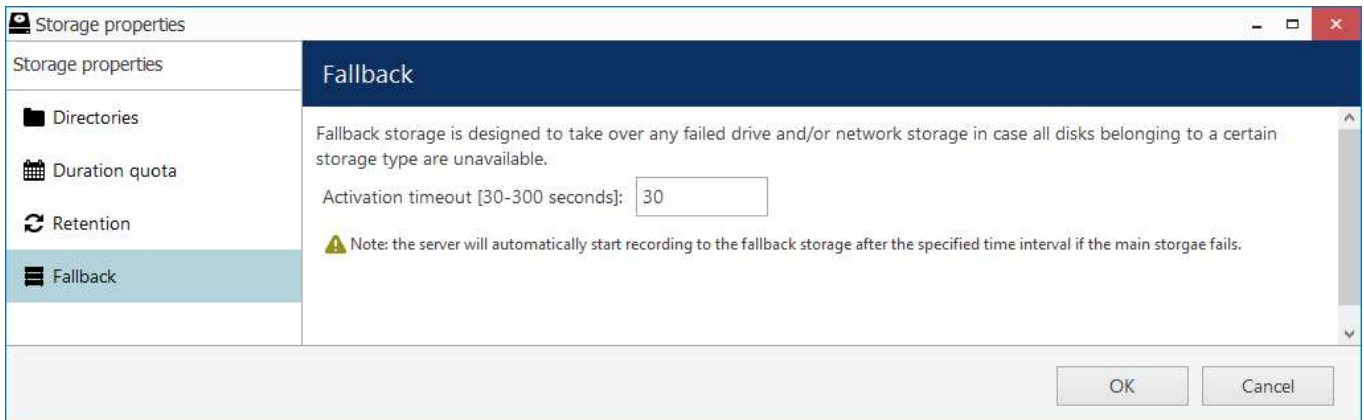
 This control has priority over the storage quota. Setting insufficient cleanup time may lead to storage overflow and result in recordings being lost. We strongly recommend that you do not enable any cleanup hours' restrictions unless you absolutely know what you are doing.

Fallback

You can dedicate a specific recording location to serve as a failover storage, called **fallback storage**. Such storage location will be used for recording only if all specified target storages of the certain type have failed.

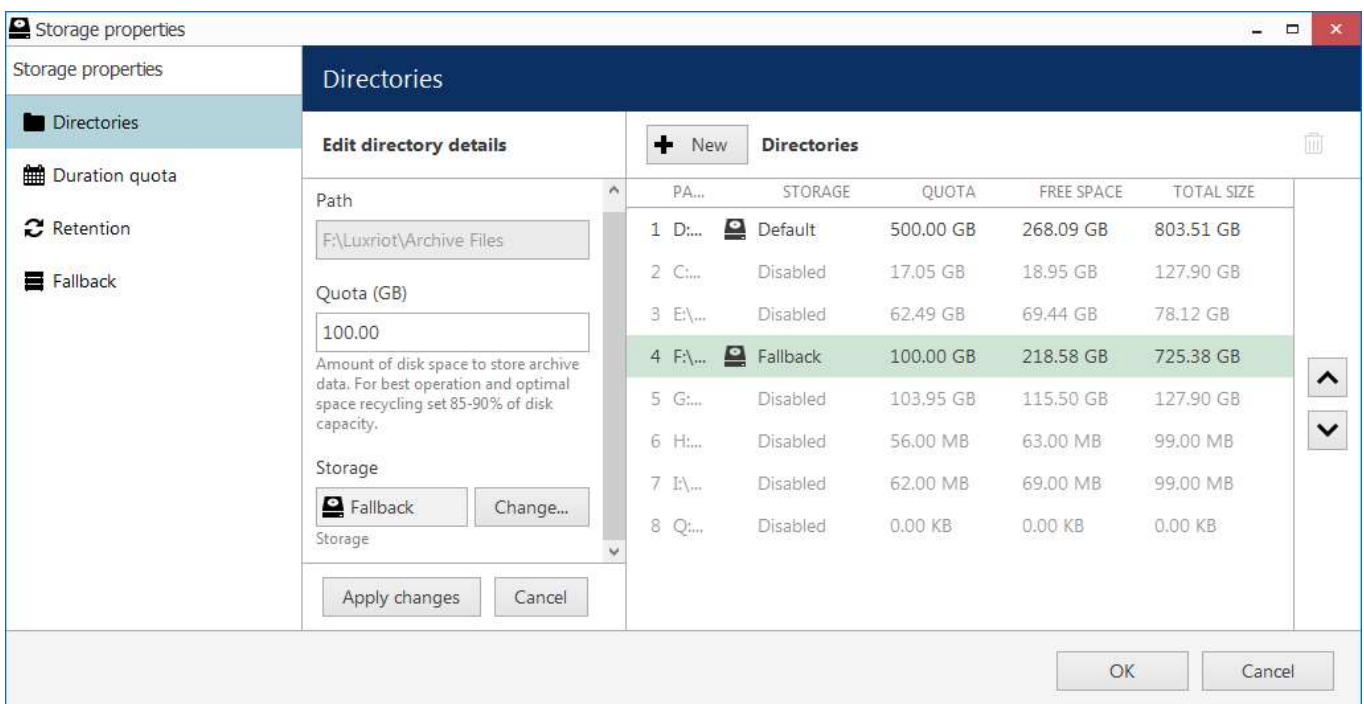
WVMS server automatically detects when a channel or channels cannot be written onto their normal destination storage and switches to the fallback storage after the specified timeout has been reached. Minimum and also default timeout is thirty seconds, and maximum is five minutes. A default [system event](#) is raised when fallback is activated.

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Fallback storage settings

After setting the desired timeout, switch to the *Directories* tab and specify, which storage will serve as fallback.



Set fallback storage units

Usage example:

Consider a system where all main streams are recorded to the storage with the tag *Main* and all secondary streams are, in their turn, recorded to the *Substreams* storage. If either or both of these storages fail, recording will automatically proceed to the *Fallback* storage.

⚠ The fallback storage must be able to handle the load and have enough free space to keep the recordings until the main storage gets back online.

Server checks if the main storage is available if one of the conditions has been fulfilled:

- server has finished and closed a data file (4GB)
- the data file has not reached 4GB in size but six hours have passed
- server was restarted

In other words, the recording mechanism checks if the main storage is available every 6h OR every 4GB of recorded data OR after a restart (upon startup). If the main storage is OK, WVMS server continues to record onto it; the recordings made onto the fallback storage stay there and are not transferred anywhere.

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To **save the changes**, hit the *Apply* button beneath the storage settings, then hit *OK* to close the storage configuration dialog box, and then click *OK* to finally save the storage settings together with the server configuration. Pressing *Cancel* on the last step will revoke the changes in the storage configuration.

Archive Protection and Deletion


Outdated archive is erased automatically once any of the quotas is reached (storage or duration, server wide or individual). Oldest recordings are removed to free up some space for the newer recordings. However, there are some exceptional cases when the footage is not or may not be erased:

- storage marked as *Readonly* will not be used for writing and no data will be erased from such storages based on quotas (however, footage from such storages can be removed using selective erasing from the WVMS Monitor application)
- no erasing will be conducted outside cleanup hours (by default, erasing is allowed 24/7 and this setting is recommended)
- protected archive intervals will be also ignored by the erasing mechanism until you un-protect them

Archive protection is an additional feature available in the WVMS Monitor application, in playback mode. You can mark certain footage to protect it from being erased if it is important to keep it for longer, overriding the quotas (e.g., important evidence). To unlock the protected intervals, go to *Archive statistics* in the [Monitoring](#) section of Wavesys Console.

 If there are too many protected recordings on a disk, the storage may be filled up to 100%: this may negatively affect the overall recording operation. Pay attention to the amount of free space on every storage unit in case you are using archive protection:


- set lower recording quotas so that there are always 10-15% of free space on each storage,
- [un-protect the archive](#) that no longer needs to be protected from erasing.

 When you **protect a short period** of the archive (e.g., several minutes), in fact, the **whole file** containing this period is protected from erasing. Therefore, intervals adjacent to protected period will also be locked. You can verify the exact protected interval by opening Wavesys Console >> *Monitoring* section >> *Archive statistics* >> *Protected intervals*.

Keep this in mind when protecting too many short intervals: as all files containing them are locked, they will not be erased when forcing quotas, so you may come to a point when there is **not enough free space** on the disk. If you know you will use the archive protection feature a lot, it may be wise to set a **lower disk quota** - for example, 80% instead of 90%.

WVMS Monitor application allows users with corresponding privileges to delete certain parts of the archive. This mechanism can delete recordings from storages marked as *Readonly* but cannot erase protected archive from any storage unit.

If the footage is not protected, it will be removed as outdated when the server eraser reaches one of the quotas. Also, the **unprotected** footage can be removed manually by someone who has a permission to **delete archive**. However, as such a feature may be regarded as a potential threat for the archive integrity, it is **disabled by default**. You can enable it in the server storage settings by marking the *Allow manual deletion* option.

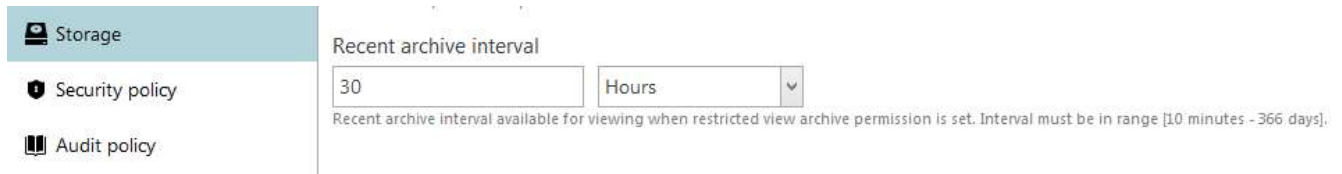
 Enabling manual archive deletion will automatically enable the **admin** user to do so, as admin is a root user who has all possible privileges. The same is true for all users belonging to the *Administrators group*. If you are enabling this feature, make sure that no unauthorized personnel have access to the administrative accounts.

Time Restricted Access to Archive

There is a possibility to grant **archive access** permissions for a **limited time**: for example, for the last N days or M hours. The access permissions are a part of the [channel permission](#) set.

Here, in the server settings dialog box > *Storage* tab, you can define the allowed archive access period, starting from the present moment.

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The screenshot shows a sidebar on the left with three menu items: 'Storage' (highlighted in light blue), 'Security policy', and 'Audit policy'. The main content area is titled 'Recent archive interval' and contains a text input field with the value '30' and a dropdown menu currently set to 'Hours'. Below the input field, there is a small text note: 'Recent archive interval available for viewing when restricted view archive permission is set. Interval must be in range [10 minutes - 366 days]'.

Depending on your needs, the duration can be expressed in **minutes**, **hours**, or **days**. The minimum period is 10 minutes and the maximum value is 366 days (1 year).

Example: if the recent archive interval is set to 30 minutes, all users having a *Restricted video playback* permission will be able to browse the last half an hour of the target channel archive in all archive playback modes of the WVMS Monitor application.

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25 Server Policies

WVMS policies are configurable sets of rules that are followed by WVMS servers when handling access requests. At this point, these include security settings and audit log configuration.

Security Policy

Security settings related to password management, connections etc. can be defined for each system. To access the server security policy settings via Wavesys Console, choose the *Configuration* section, select *Servers* from the menu on the left, double-click your target server and then click the *Security policy* tab.

It is recommended that, in order to enhance your system security, you do not leave the default policy settings but rather define your own, system-specific preferences.

The screenshot shows a web-based configuration window titled "Server Torchwood*" with a "Security policy" tab selected. On the left is a navigation menu with options: Details, Connections, Membership, Permissions, Watchdog, Storage, and Security policy (highlighted). The main area contains three input fields: "Minimum password length" (value: 12), "Minimum number of special symbols in password" (value: 2), and "Minimum number of digits in password" (value: 1). Each field has a label and a description below it. At the bottom right are "OK" and "Cancel" buttons.

Server security settings

The table below details the available settings.

Setting	Description	Default Value
Minimum password length	Minimal mandatory length of a user password	8
Minimum number of special symbols	Define how many (at least) special characters (#\$%&...) must be present in a user password	2
Minimum number of digits	Define how many (at least) digits must be present in a user password	2
Minimum number of uppercase letters	Define how many (at least) UPPERCASE letters must be present in a user password	2
Minimum number of lowercase letters	Define how many (at least) lowercase letters must be present in a user password	2
Number of previous passwords to remember	Password history to be kept by the server to prevent the user from using the same password again when changing it	1
Maximum number of days between password change	Define how frequently WVMS will ask users to change their password; this setting can be overridden in the user settings to make the password never expire for a specific user	0 (unlimited)
Maximum number of simultaneous connections with the same login name	Allowed number of simultaneous incoming connections from the same user account via any port (TCP/HTTP) or client app, this setting can be overridden for the specific user in the user settings; 0=unlimited	0 (unlimited)
Maximum unsuccessful login attempts*	After this number of unsuccessful login attempts the user account will be blocked (can be unlocked via user properties). Set 0 to allow	0

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unlimited attempts.

Password related policies are solely meant for WVMS internal users and they do not affect any other user account settings (e.g., Windows users etc.). All policies are in effect for **all user accounts**, including the built-in root *admin* user account.

*To **unlock the user** account, go to the *Users* section > open the user details for editing > enable the *Active* option > save. To override the policy for a specific user, enable the *Never lock account on bad password* option in the user account details.

💡 The **maximum number of simultaneous connections** from the same user account can be re-defined for any specific user via user settings dialog box. User-specific setting has priority over global connection quota and it may be either larger or smaller than the global quota.

Example 1: global policy is set to 0, which means no imposed limitations. However, user account *admin* has his max number of connections set to 3, which means that three incoming connections with this user account are allowed at a time so that the administrator can connect via Wavesys Console, WVMS Monitor and Wavesys WVMS Mobile at once for troubleshooting purposes.

Example 2: global policy is set to 1, which means only one connection from each user is allowed at a time. However, user *demo* has an allowance of 30 simultaneous connections so that this account can be used for demonstration purposes.

Audit Policy

Whenever a [permission](#) is used, a corresponding entry appears in the internal WVMS [audit log](#); internal server events are logged as well. The audit policy lets you define, which user actions and server events are recorded, as well as set the maximum size and duration of the audit log.

The screenshot shows the 'Audit policy' configuration window for 'Server Global Server*'. The window has a sidebar on the left with navigation options: Details, Membership, Permissions, Connections, Watchdog, Storage, Security policy, and Audit policy (which is selected). The main area is titled 'Audit policy' and contains the following settings:

- Maximum number of records:** A text input field containing '1000000'. Below it, the text reads 'Maximum number of records to keep in the database'.
- Maximum number of days:** A text input field containing '30'. Below it, the text reads 'Maximum number of days to keep in the database (0 - unlimited)'.
- Events:** A tree view under the heading 'EVENTS'. It is expanded to show:
 - Server events
 - Internal server events
 - Resource access
 - Archive
 - Bookmark added
 - User events
 - E&A
 - Rule modifiers
 - Event condition added

At the bottom right of the dialog, there are 'OK' and 'Cancel' buttons.

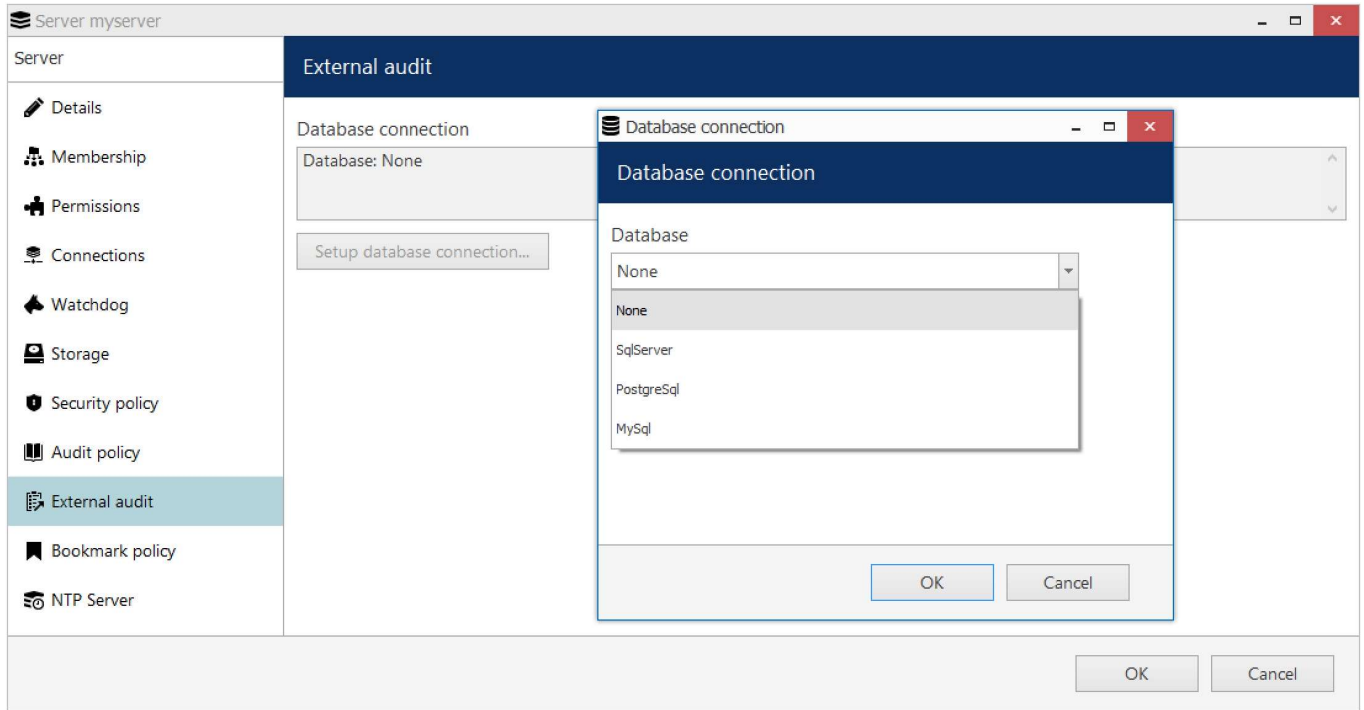
WVMS audit policy

The default limit for the number of audit entries is one million and they are kept for one month; set zero days to disable the duration limitation (the quota for the number of records will still have effect). By default, all the events are audited.

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External Audit

For Wavesys WVMS Enterprise software edition, it is possible to set up set up log event storing in an **external audit database**. The main (internal) audit log is kept always, and the external audit is a copy (addition). You cannot turn OFF the internal audit if you do not need it, but you can limit it to one or two days, and keep the external log for a longer period.



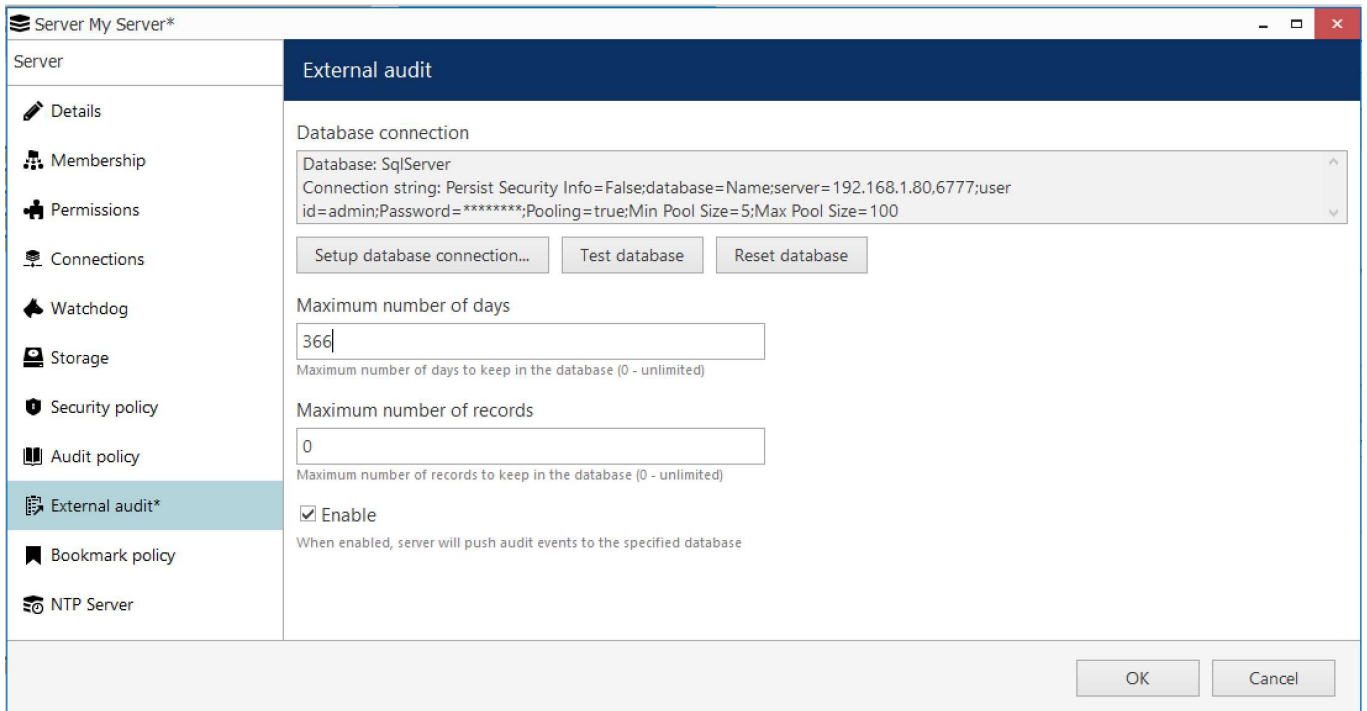
Connecting an external database for the audit log

At this point, three database formats are supported:

- SQL database
- PostgreSQL
- MySQL


First, set up your external database, and then fill in the corresponding settings in Wavesys Console: server **host**, **port**, **user account**, and target **database name**.

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Once you have entered the database connection details, you can test it and enable it

After adding the database connection, you can **test** it to verify that the entered configuration is correct. The database **must exist** for the WVMS server to connect successfully, and you cannot create a new external database from Wavesys Console. The connection test runs **automatically** once you have entered a new DB connection or modified the connection settings.

 The connection **test may take some time**. You can tell by the disabled (grayed out) buttons below. If you close the server settings dialog box, the test will still run in background so you will have the result pop up after some time.

If your target database contains something else and you want to clean it, press *Reset*: all contents of the target database will be then **removed** and replaced with the tables necessary for the audit log.

Similarly to internal audit, here you can **limit** for how long and how many records should be kept in the external audit database. Set zeroes for **unlimited** options (the number of records will be then only limited by database type).

You can prepare the database connection and leave it disabled (default mode) until you decide to **enable** the external logging. To do this, put the check mark in the corresponding checkbox.

When done, click *OK* to save the settings and close the dialog box.

Troubleshooting: if, during operation, the WVMS server is **unable to write** events to the external database, you will have a **warning** (highlighted orange) in the *Monitoring* section of Wavesys Console, under the [Servers category](#). Click the target Wavesys WVMS Enterprise server, then click *Details* on the upper panel to see the **database connection errors**.

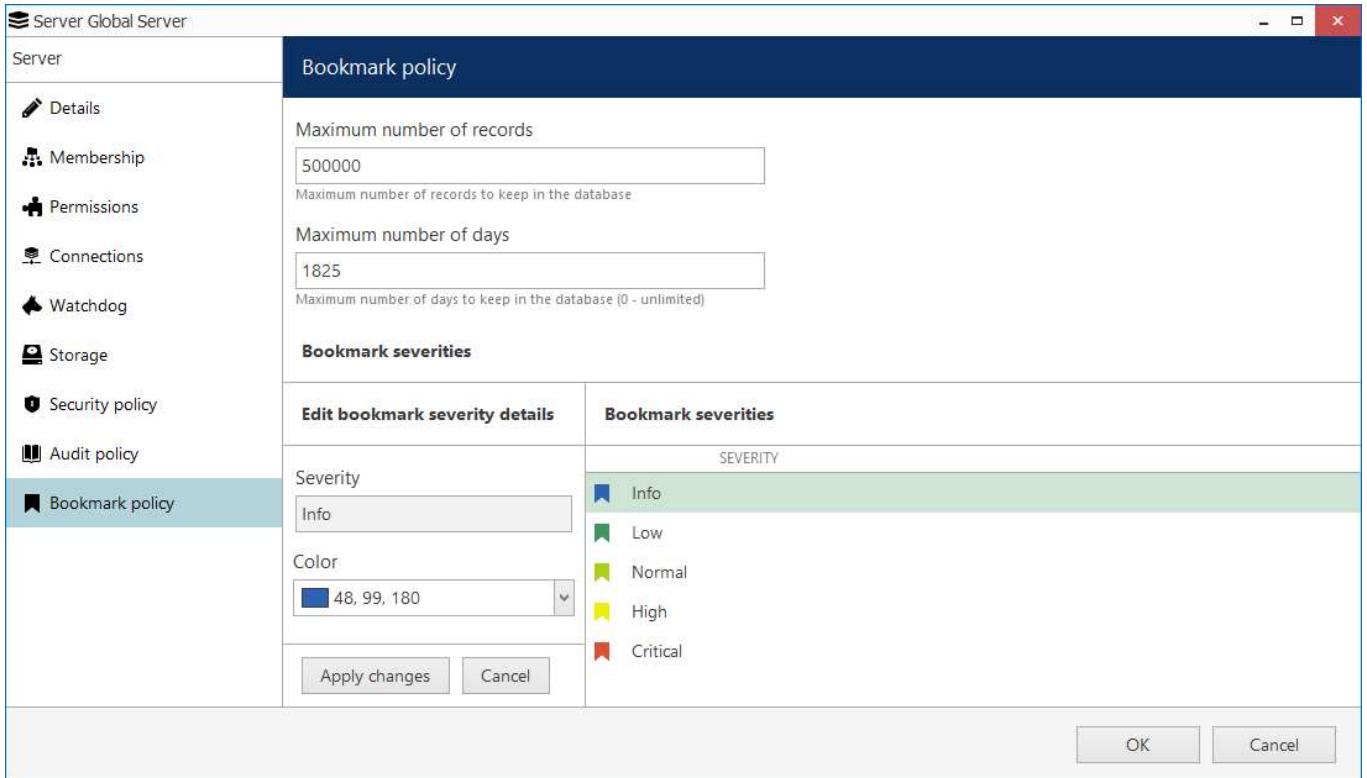
Bookmark Policy

Here, you can set limits for the bookmark database by defining its desired duration and size, and also change bookmark colours for different severity levels. The settings here affect the whole system - all servers, all channels.

The default (and also the maximum) **number of records** (items in the database) is 500000, and they are kept for 5 (five) years. Set 0 days to set unlimited **duration quota** (the items' quota will still have effect).

These limitations were introduced in the software version 1.14.1. Therefore, when you upgrade from an older version, database will be reduced in size by removing the oldest bookmarks so that their number matches the default quota (500000). If the old database contains more than 1 million items, it is truncated and compacted during the upgrade.

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Limitations for the bookmark database and default colours

Bookmark **severity levels** were introduced in the software version 1.16.0. Prior to this version, all bookmarks were red and had no ranking; to preserve compatibility with older archive, all bookmarks from the older archive will stay red and have the highest severity, *Critical*. Here, in the policy tab, you can change the colours used for different bookmark labels. To do this, select an item in the ranking list, then choose a colour using the built-in picker.

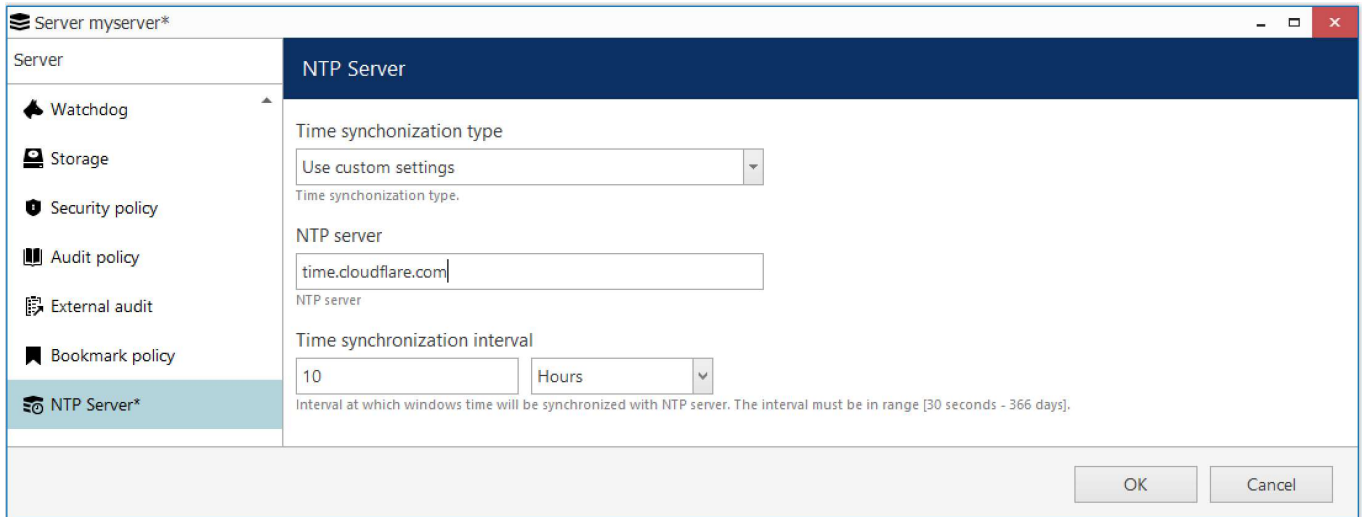
After you change the colour related to a certain severity level, all bookmarks with that severity level will start using the new colour. If the bookmarks are already opened somewhere (e.g., on the timeline of a WVMS Monitor), simply refresh the timeline to see the new colour: remove the channel from the view and add it anew. In instant playback mode, switching to live and back will do the trick.

NTP Server

WVMS servers use the local machine time. Wavesys Console provides you with an opportunity to force **sync time** with the specified NTP server.

Essentially, this is the same as configuring the target server OS use the specified NTP server: the time server you set via Wavesys Console is applied to the underlying OS settings. The only difference is that you can do this remotely via Wavesys Console interface, without connecting via RDP or other remote control software.

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NTP server connection settings

The available settings here are:

- **NTP server:** the target IP or hostname of the time server, local or public
- **Time synchronization interval:** how often to sync the time, choose any desired interval from 30 seconds up to 1 year.

26 Overview of Devices and Channels

The traditional idea of cameras as surveillance software entities has been developed, resulting in the concept of **devices and channels**. Essentially, it represents the separation of physical and data layers for reasons of security and easier management.

"Device" refers to any piece of physical equipment that serves as a data provider; a hardware piece delivering video, audio and event streams to the server. IP cameras, video encoders, capture boards, USB web cameras - these are all examples of devices that can be added to Wavesys Global software. Devices do not include any data streams.

"Channel" refers to any actual video stream (with corresponding audio/event stream, if applicable) delivered to the server from any of the configured devices. Software [licensing mechanism](#) counts channels and not devices.

In Wavesys Console, devices hold camera TCP/IP and user settings, as well as actual hardware model. By contrast, channels do not possess these properties: this allows them to be handled as virtual entities, detaching and re-attaching them from/to devices. Channels feature video stream configuration settings - resolution, frame rate, bit rate and others - as well as all supplementary data streams, such as audio, motion and digital input/output events, PTZ control and camera-side analytics information. Thus, the underlying device may be removed or replaced without losing its channel's configuration, which also includes user permissions.

As there are also some multichannel devices, e.g., capture boards and video encoders, each device can have one or more channels attached to it - these can either be assigned or detected automatically; maximum number of channels for each specific device is stipulated by the device model.

Devices only appear within Wavesys Console, allowing the administrator to apply all necessary configurations. WVMS Monitor only displays the channels and does not provide any access to the devices' properties to the end users.

Both devices and channels can be grouped independently. For internal Wavesys Console management, device groups and channel groups are available; for WVMS Monitor channel grouping, [visual groups](#) are to be used.

27 Add Devices Using Autodiscovery

Use automatic device discovery feature to find all available devices. This method is of great help when dealing with large amounts of cameras, and also when exact addresses of devices are not available.

To access the configuration dialog box from Wavesys Console, open *Configuration* section and select *Devices* in the menu on the left; in the upper panel, click down arrow near *New device* button and then select *Find devices*.

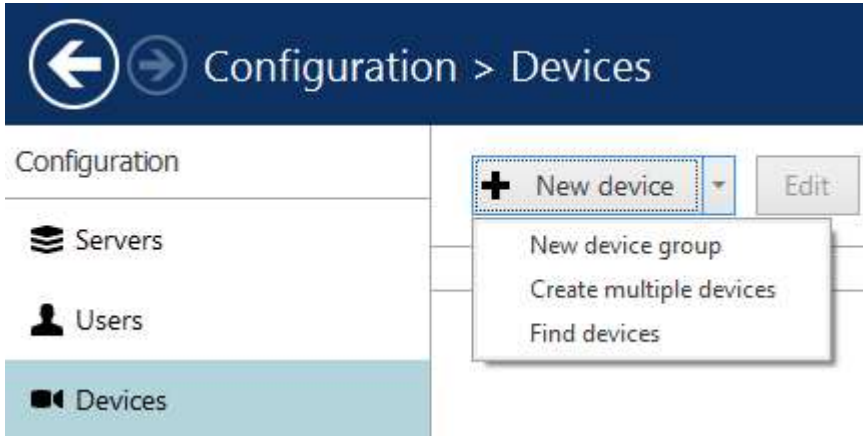


Image Title

Scan Parameters

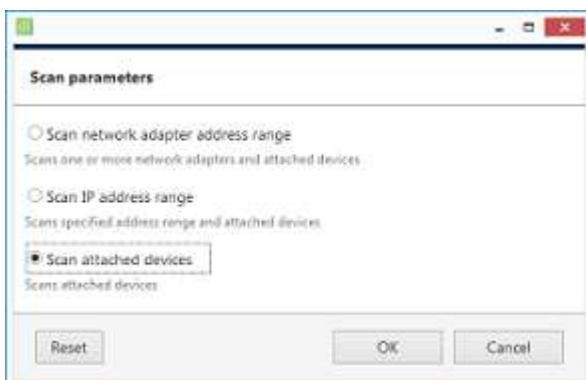
First, select scan mode; the following options are available:

- scan IP address range: specify a continuous LAN segment to be scanned
- scan network adapter address range: select one or more network interfaces to be fully scanned
- scan attached devices: the local hardware system will be scanned for capture boards and Direct Show video sources

If you have chosen to search for IP video sources, you should review additional connection settings and change or update them, if required:

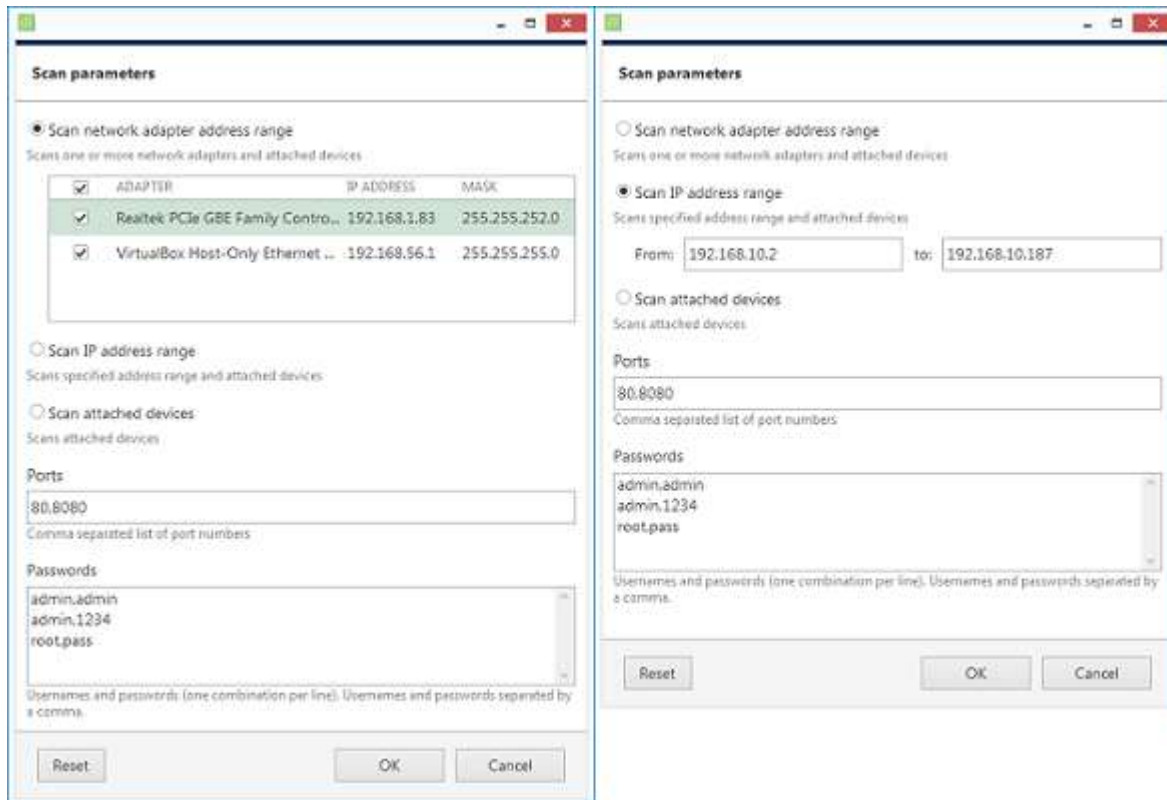
- ports: HTTP ports, comma separated
- user credentials: pairs of comma-separated user names and passwords, one pair per line

Use the *Reset* button below to discard all changes and start entering scan parameters again. When you are ready, press *OK* button below to begin scanning.



Scan attached devices

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Scan address range

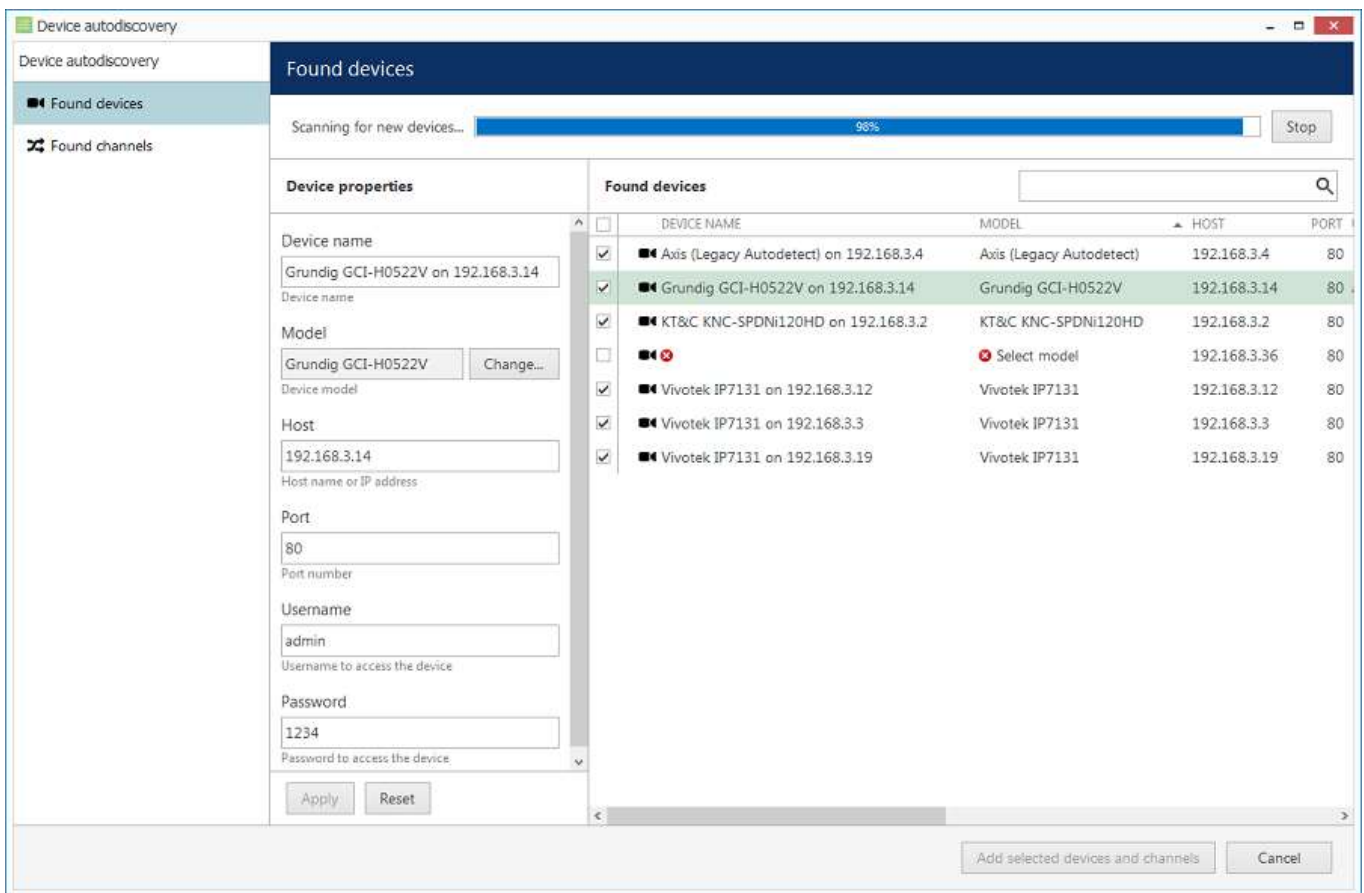
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Device Autodiscovery

After scanning has been completed, you will be taken to the Device Autodiscovery dialog box, which will allow you to review the found [devices and their channels](#), and enter/modify related settings. Use the *Search* field in the upper-right-hand corner to find a specific device by name, model, IP, port or hardware ID (for IP devices, ID includes MAC address).

There are two types of selection in the item list: checkboxes and colour highlight. **Checkboxes** are used to choose the items to be added to server configuration after you close the dialog box; **highlighted** items are subject to immediate properties changes. Use *CTRL+click* or *Shift+click* to select all or several items at once to change their settings.

Click a device in the item list to load its settings into the *Device Properties* window. Note that some settings may be missing for some of the automatically found devices; this depends mostly on device and whether user data was correctly provided. In such cases, simply fill in the missing data manually and click the *Apply* button below to save the configuration changes.



Set up discovered devices

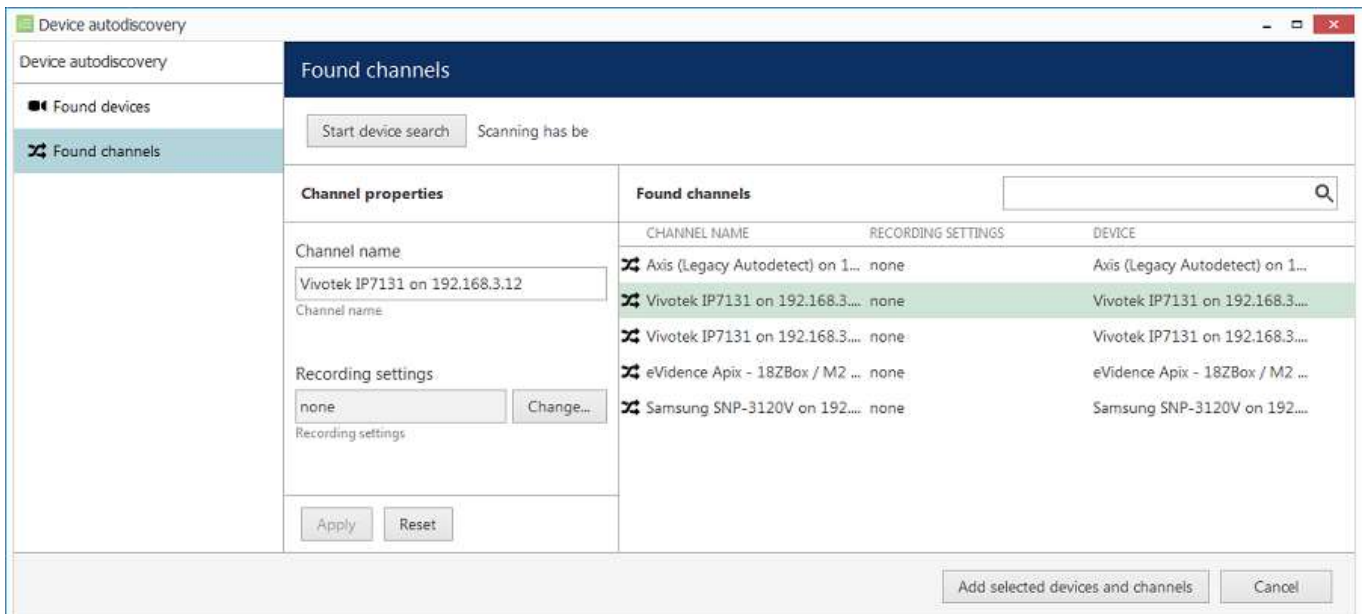
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If device is not integrated with the software (native support), it may be detected as generic type (e.g., ONVIF). If you think some devices have not been discovered, check if they have different HTTP ports; also, try adding them [manually](#).

Setting	Description	Default value
Device name	User-defined video source name	Autodetected model + IP, empty if not detected
Model	Device manufacturer and model, or generic type	Autodetected vendor and model, empty if not detected
Host	Device IP address	Autodetected
Port	Device HTTP port	Autodetected
Username	Device user credentials; note that you have to provide administrative profile credentials in order to be able to change device settings via software interface	Appropriate username from provided list or autodetected
Password	Device user password	Appropriate password from provided list or autodetected


Make sure you select all the devices you wish to add by putting a checkmark next to them. Devices with missing configuration (model and/or IP) are unchecked by default and will not be added to active server configuration.


Switch to *Channels* tab to review the detected video channels of the discovered devices: this is particularly important if you are using multichannel devices, e.g., capture boards and encoders. Use the *Search* field in the upper-right-hand corner to find specific channels by name or device name.



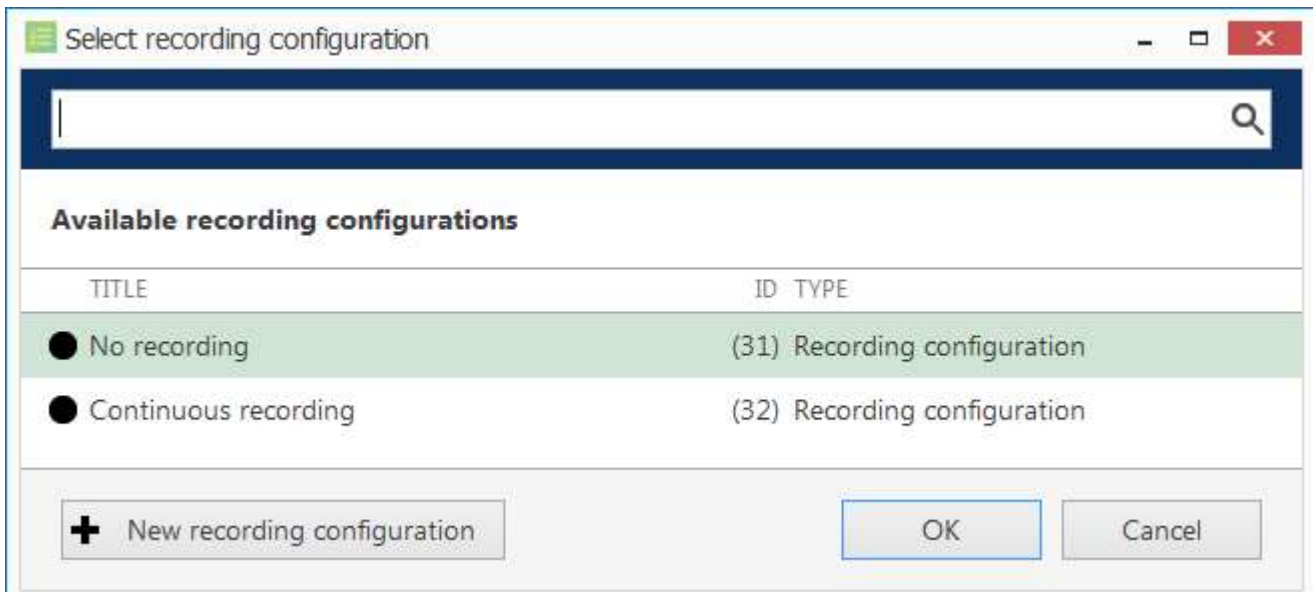
Set up discovered channels

Here you can edit the channel name and assign recording configuration. By default, recording is enabled for all channels: click the *Change* button near *Recording settings* to [manage recording profiles](#) and [assign them](#) to your channels. To add a new recording profile, click the + *New recording configuration* button below; you can find more details about recording profiles in the [corresponding section](#). Click *OK* to save and return back to devices and channels; click *Apply* to save configuration changes.

 After changing the channel recording configuration, do not forget to click *Apply*, otherwise the changes will not take effect.


 Recording configuration here is assigned to the **main streams** of the target channels. In order to set up substream recording, please go to [channel configuration](#).

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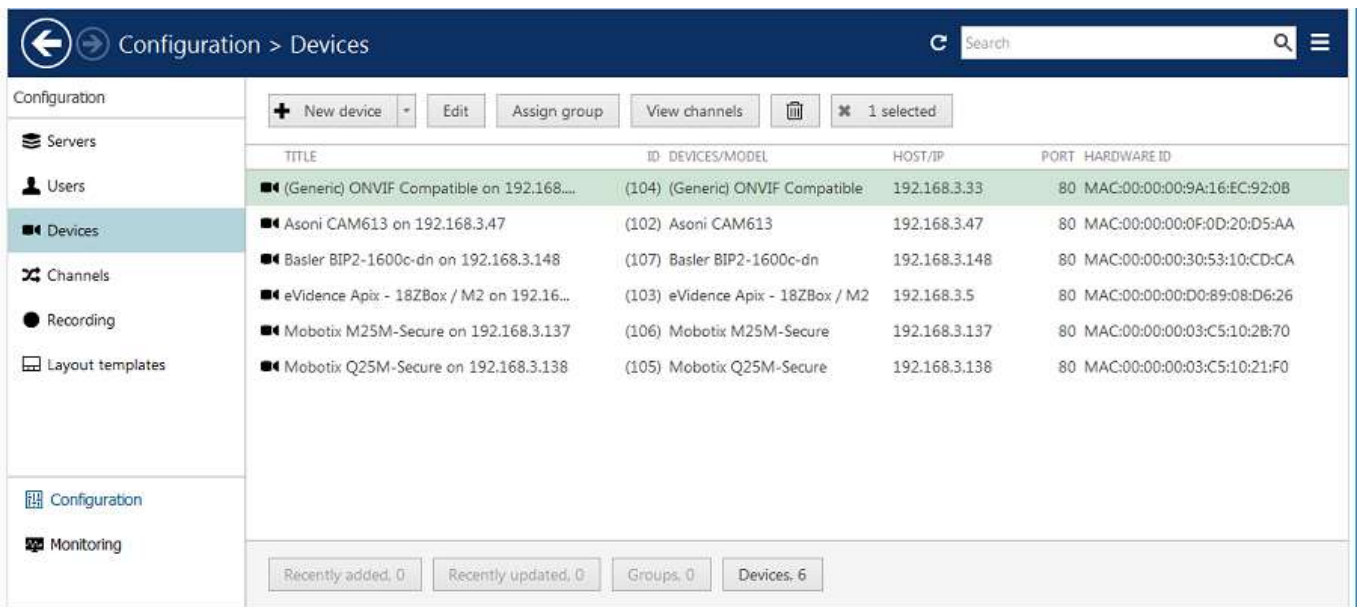


Select the recording configuration or create a new recording profile

Click the *Start device search* button above at any time to restart device discovery.


 All previously discovered devices and all configuration changes will be discarded if you restart camera autodiscovery.

When you are ready, click the *Add selected devices and channels* button below; all checked devices will be added with selected corresponding channels. Newly added devices and channels will be added to the item list.



Added devices will appear in the item list


Use the buttons on the upper panel to manage your devices. You can now add new devices and/or device groups, launch autodiscovery again, assign devices to groups, as well as removing both devices and groups.

 When deleting devices, remember that corresponding channels will **not** be **removed** at the same time and therefore your newly discovered devices may not be added due to license limitation. Go to the *Channels* tab to manage them separately.

28 Add Devices Manually

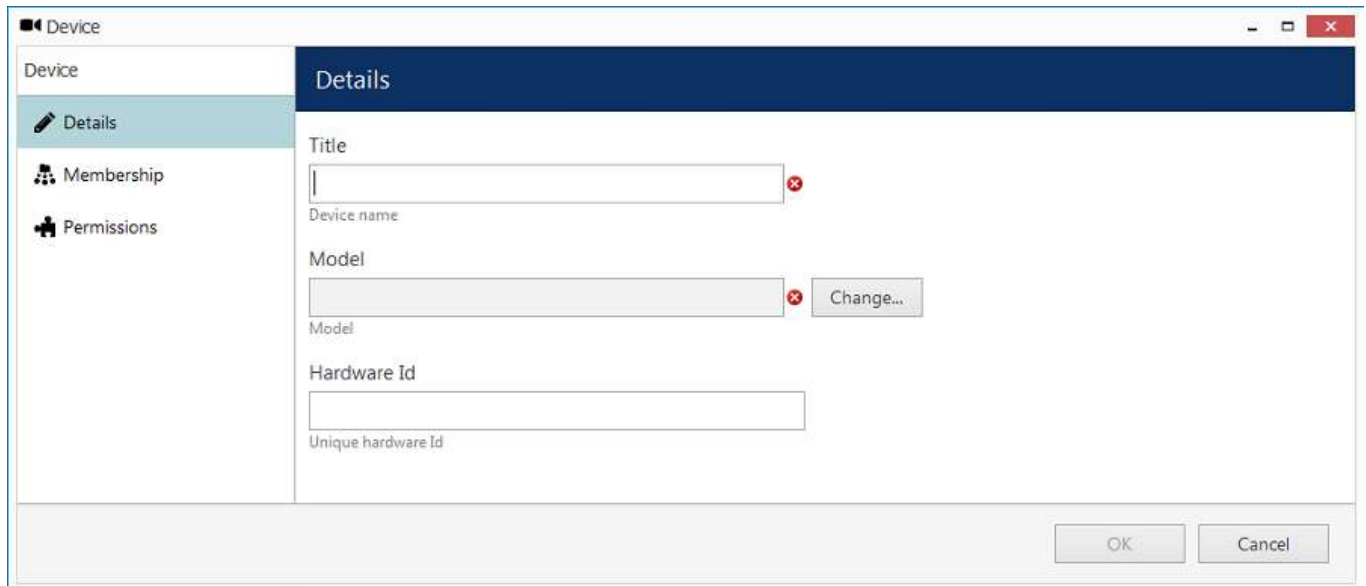
You can add devices manually instead of using autodiscovery in the following cases:

- actual devices have not been connected yet
- devices are not connected at the current deployment stage but it is planned that they will be connected later
- the server needs to be configured while being away from its future position
- some devices in use cannot be automatically discovered (not listed as models and do not support ONVIF Profile S at the same time)

 Only IP devices can be added manually. Attached devices (e.g., capture boards) require [autodiscovery](#).

Add single device

To access the configuration dialog box from Wavesys Console, open the *Configuration* section and select *Devices* in the menu on the left; in the upper panel, then click the + *New device* button.



The screenshot shows a configuration dialog box titled "Device". On the left is a sidebar with three items: "Details" (selected), "Membership", and "Permissions". The main area is titled "Details" and contains the following fields:

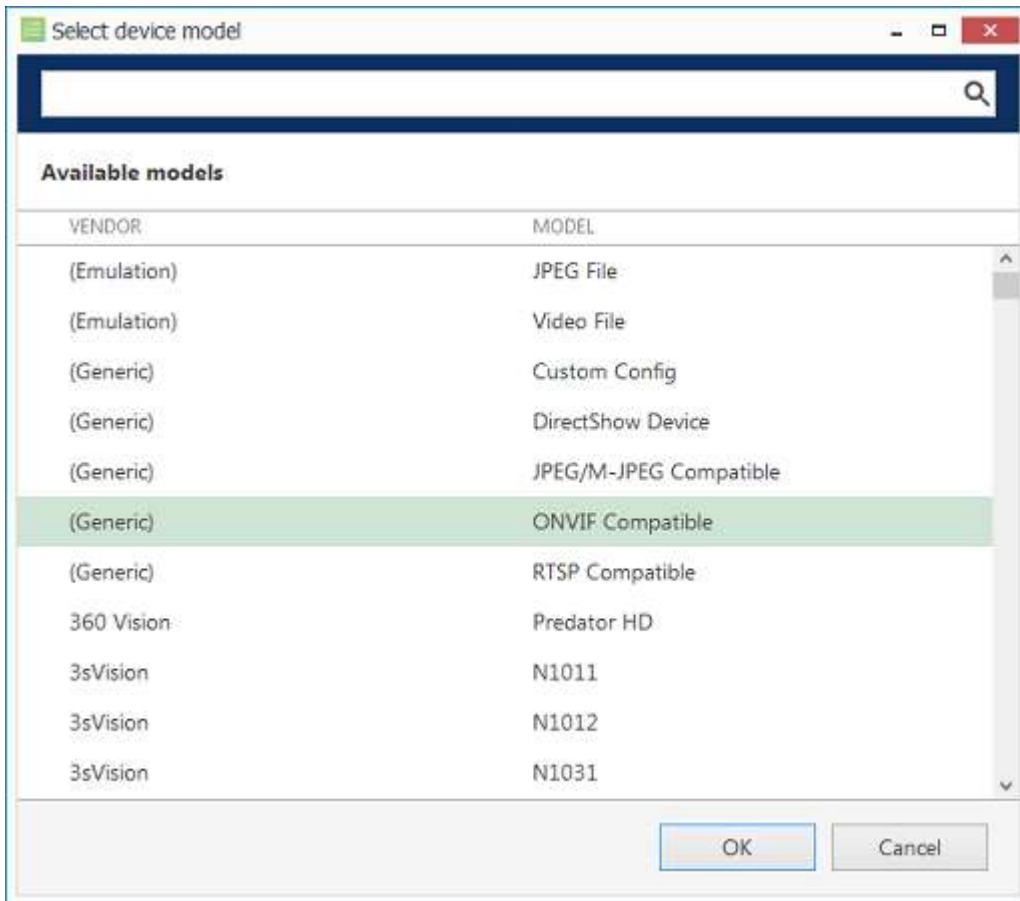
- Title**: A text input field with the label "Device name" below it.
- Model**: A dropdown menu with the label "Model" below it, and a "Change..." button to its right.
- Hardware Id**: A text input field with the label "Unique hardware Id" below it.

At the bottom right of the dialog are "OK" and "Cancel" buttons.

Add new device

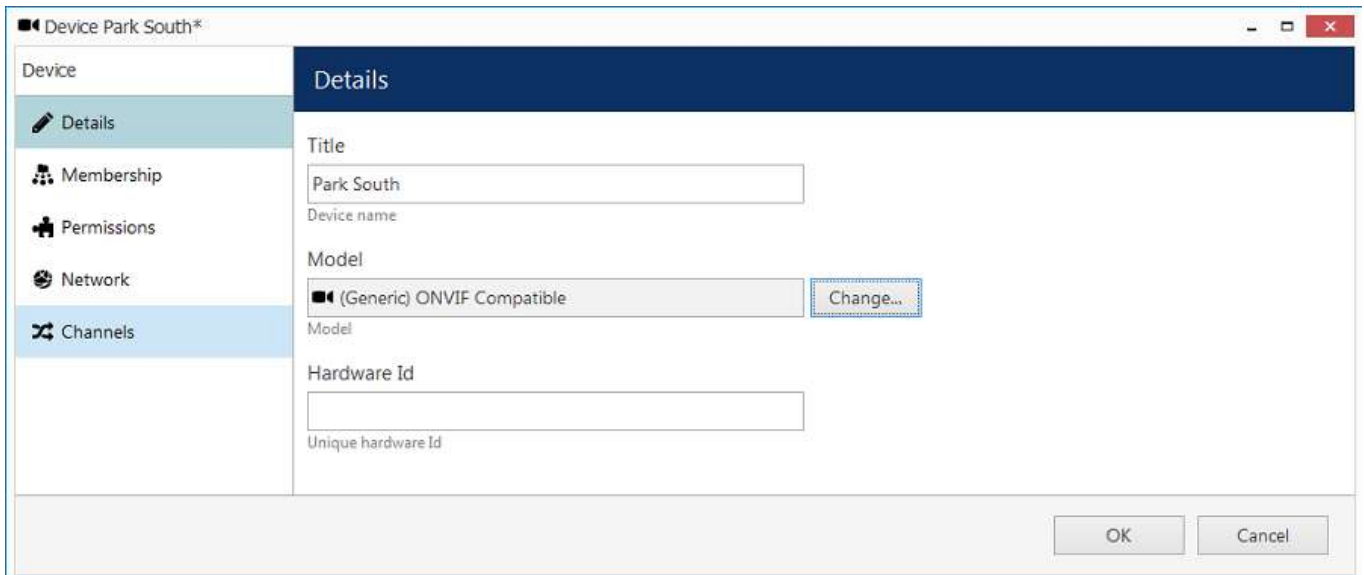
Enter a user-defined name for your new device and pick a model. If your camera model is not listed, select the closest similar model or choose a generic type.

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Select device model

After you have chosen manufacturer and model, additional tabs will become available in the main configuration dialog box: *Network* and *Channels*. These tabs are described in details later in this section.



Network and *Channels* become available after device model has been chosen

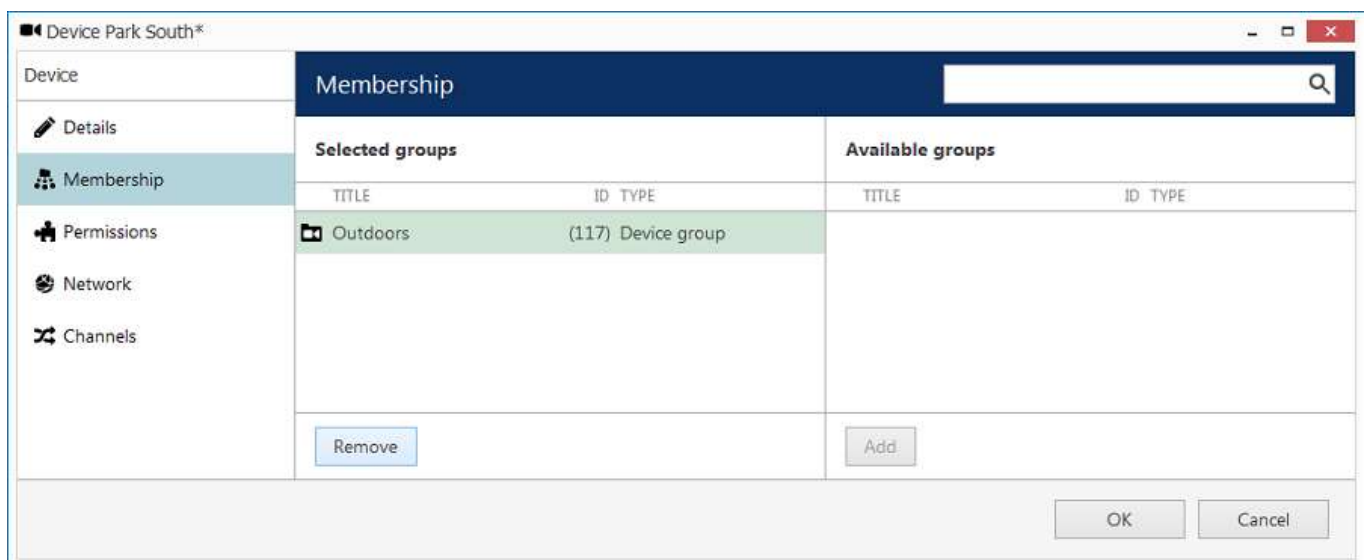
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Details

Setting	Description	Default value
Title	User-defined device name	[empty]
Model	IP device manufacturer and model, or generic type	[empty]
Hardware ID	Unique hardware identifier containing a device hardware identifier; this field should be left empty, as it will be filled automatically later, when the device has been connected and identified	[empty]

Membership

Choose groups for the current device to become a member of. Use *Add* and *Remove* buttons below or double-click to manipulate groups. One device may belong to several groups at once.

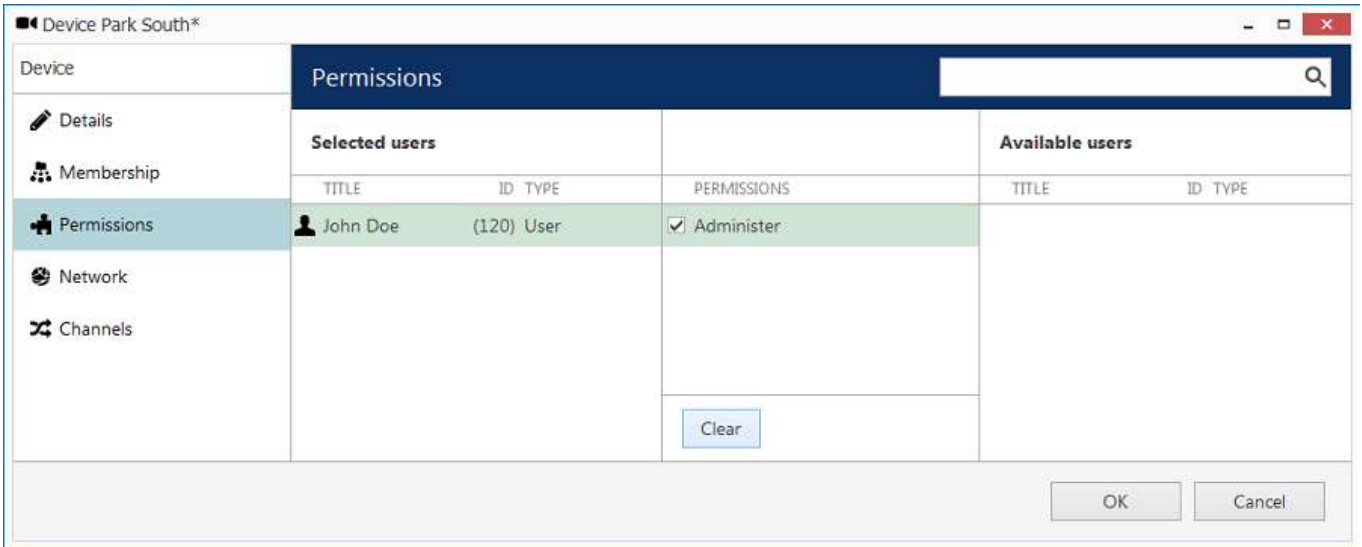


Define groups for the device being added

Permissions

Add users and/or user groups simply by checking at least one permission for the target server; remove by clearing permissions - either by deselecting them or by clicking the *Clear* button below. You can also double-click users to remove them from the list of privileged users. Devices with an empty permission list will not be available to anyone except for the root (global) administrator.

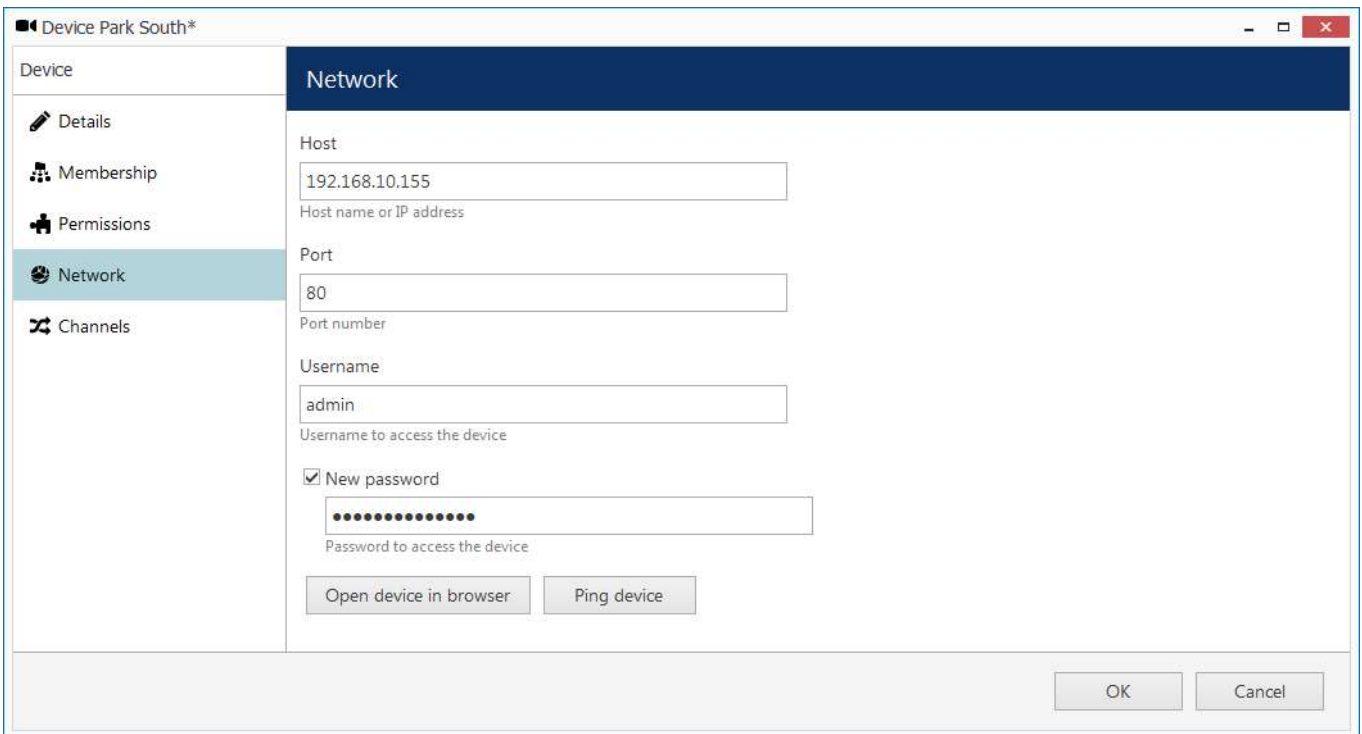
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Add user permissions for this device

Network

Enter TCP/IP settings for device access here.



Enter TCP/IP settings for device access

Before filling in the details, make sure the settings match those on the camera. If device has not been connected yet, ensure that the same settings are applied during the camera installation. You can use the *Ping Device* button to check camera availability and/or verify your settings; the *Open Device in Browser* button will try to reach your camera Web interface using you default browser.

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Setting	Description	Default value
Host	Device IP address	[empty]
Port	Device HTTP/HTTPS port. Use port 80 for HTTP and 443 for HTTPS connection (or change to corresponding forwarded ports).	80
Secure connection	Use HTTPS instead of HTTP (change port above to 443). Warning: if you have HTTPS enabled on the camera side , make sure to enable HTTPS here, too. Otherwise, some camera features may be unavailable.	Not enabled
Username	Device user credentials; note that you need to provide a valid administrative user profile to be able to change device settings via software	[empty]
Password	Password for camera access	Enabled

In order to enable HTTPS connection:

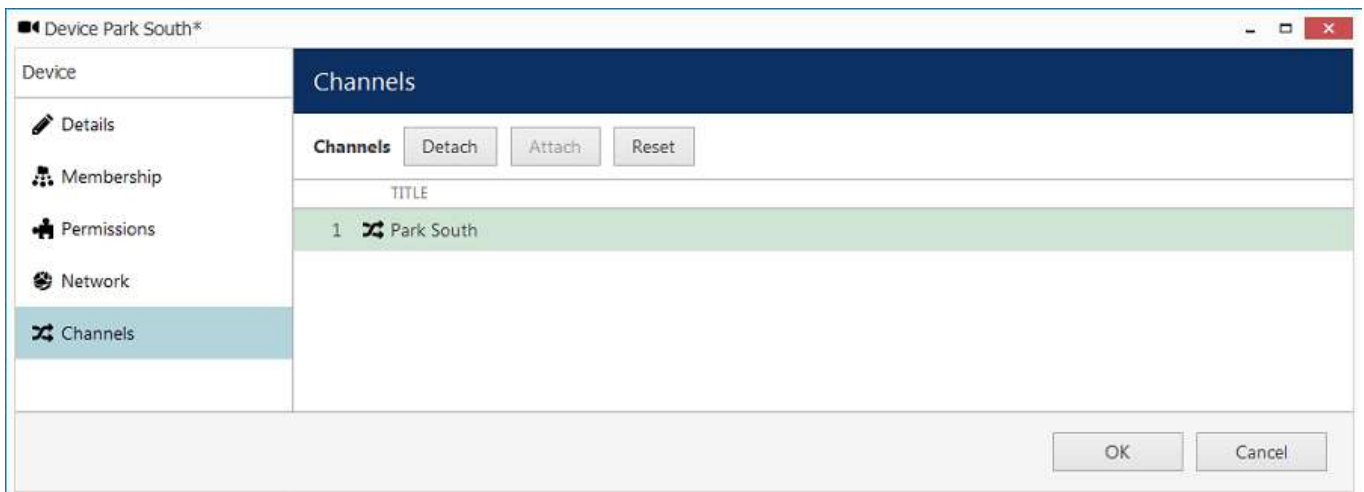
- change port to 443 (or whatever port is used/forwarded for secure HTTP)
- enable *Secure connection* option

Note that HTTPS must be enabled on the device side for this feature to work properly. On the other hand, if you are not planning to enable HTTPS in the software, disable HTTPS on the device side. Different settings on the device and software side may cause malfunctions (e.g., device metadata will not be available).

Channels

Here you can detach automatically detected channels from the device and replace them with one of the existing 'free' channels (not attached to any device). Use the *Reset* button to undo any changes made to the channels (this only works for current editing session, reset will not be available after you save the changes and reopen this dialog box).

If you wish the original camera channel(s) to stay attached to the device, just leave the channel list as it is.



Channels

Add multiple devices*

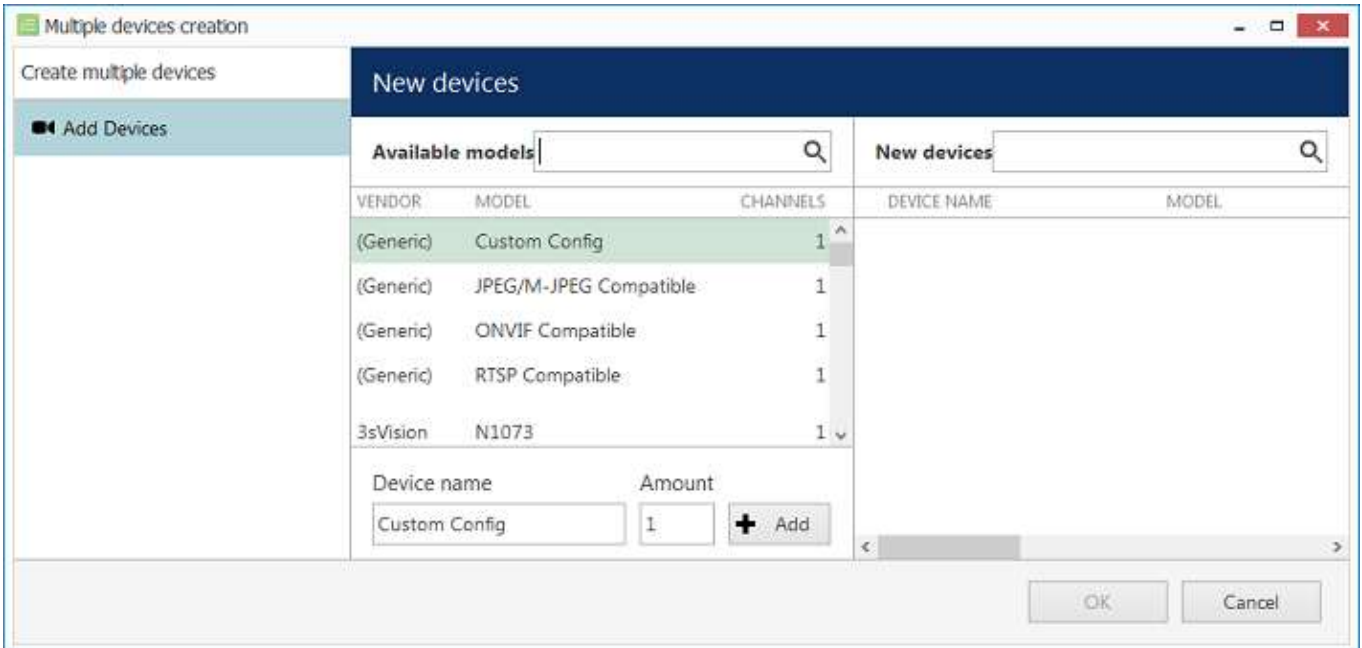
*Feature is subject to license limitations and may be **unavailable in some software editions**.

If you have a number of devices of the same type in your system, you can add them all at once to save time. This method is also suitable if you have multiple groups of devices of the same type.

Open the *Configuration* section and select *Devices* in the menu on the left; in the upper panel, click the little arrow next to the + *New device* button and select *Create multiple devices*.

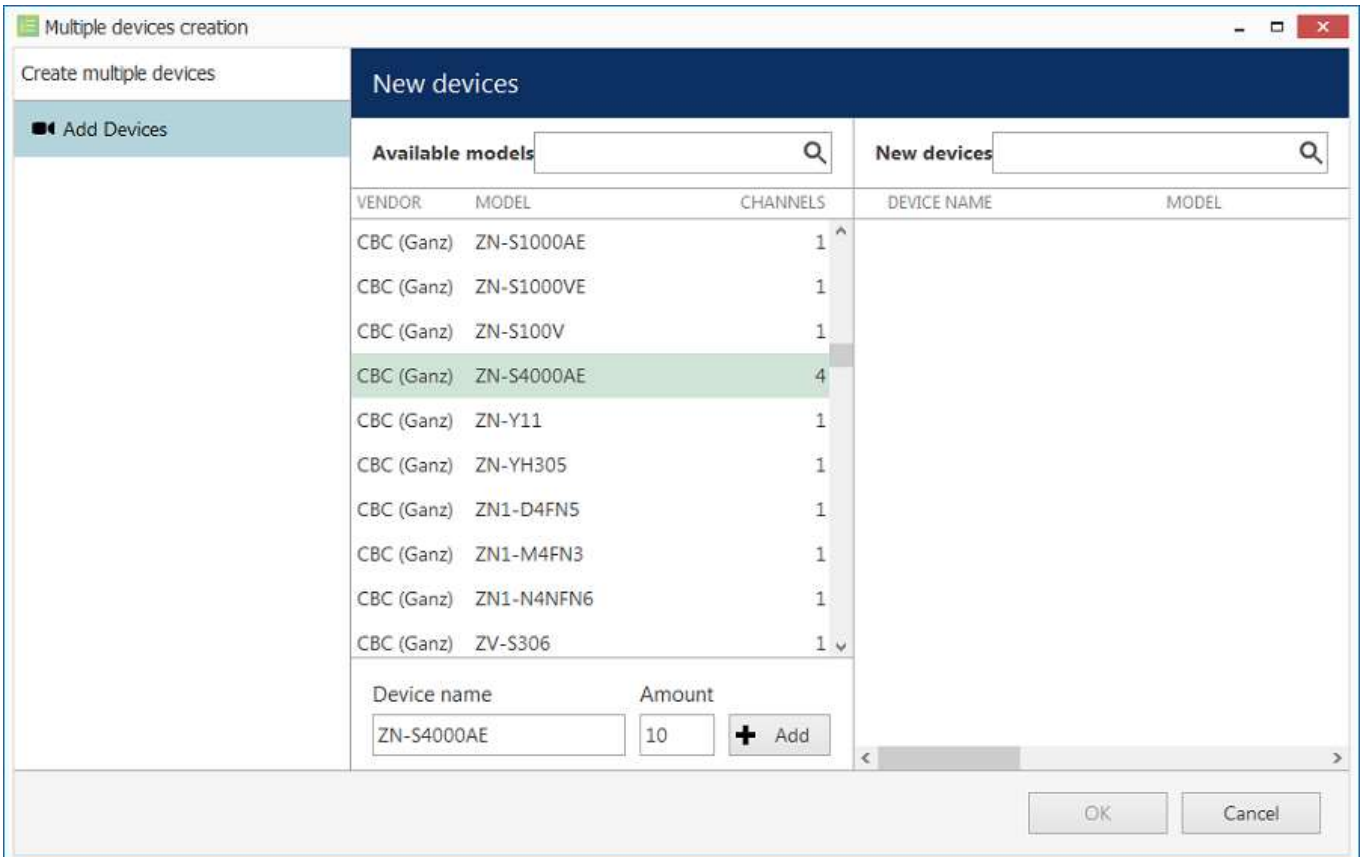
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Add devices



Create multiple devices dialog box

You can add any number of different devices here (assuming this is permitted by license limitations). First, select the device model from the list, and then enter your desired number of existing devices of the same model.

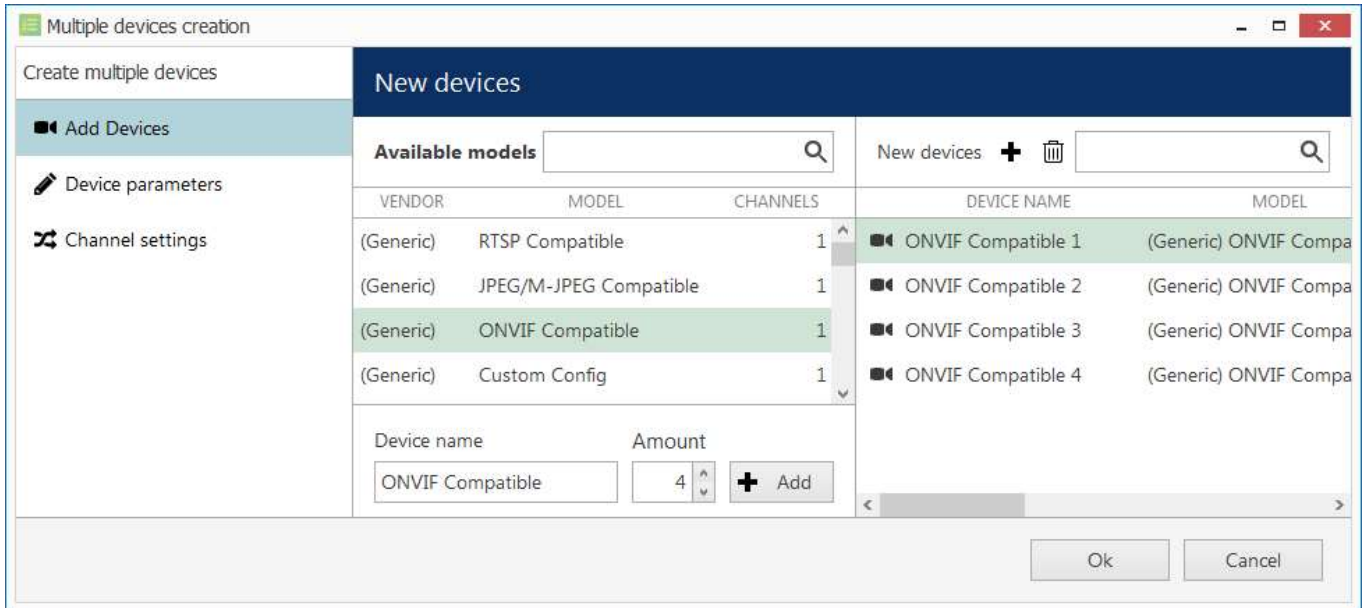


Select the desired model and number of devices

When you are ready, click the + *Add* button below to attach the camera set to the new devices list. As soon as there is at least one device, additional tabs will become available: *Device Parameters* and *Channel settings*. Device list on the right will be available in all tabs.

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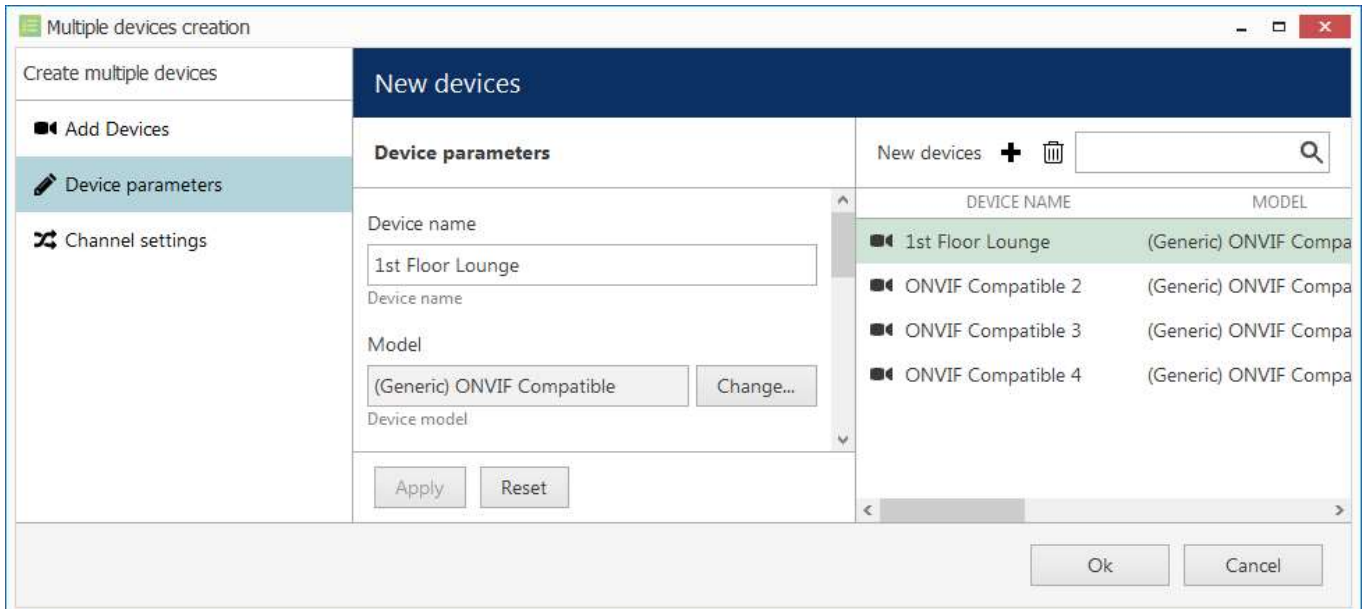
To **remove** any of the listed items, select them with your left mouse button (use *CTRL+click* or *Shift+click* to select multiple devices at once) and hit the *Delete* button on the upper panel or on your keyboard. Select any device and use the **+** *Add* button on the upper panel to add a copy of that device.



Add several new devices

Device parameters

For each added device, enter corresponding settings. Note that you can skip IP and port on this step if you wish to use automatic incremental IP assigning (see *IPs and Ports* tab description below).




Modify device parameters

Select a device by clicking on it in the item list: it will become highlighted green and related available settings will be displayed in the *Device parameters* window. You can select multiple devices by holding *CTRL* or *Shift* when clicking.

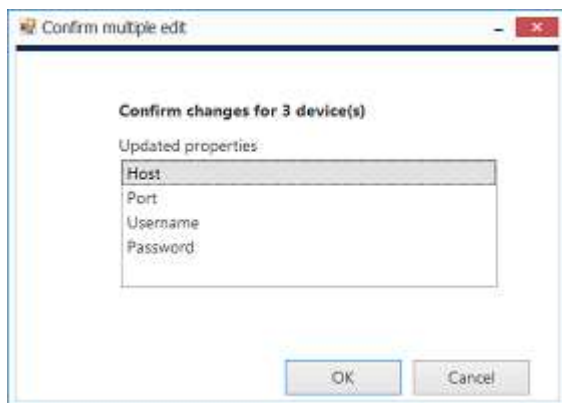
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Setting	Description	Default value
Device name	User-defined device name	Device model
Model	Device manufacturer and model, or generic type; click Change to alter	Loaded automatically
Host	Device hostname or IP address	[empty]
Port	Device HTTP port	80
Username	Device user credentials; note that you need to provide a valid administrative user profile to be able to change device settings via software	[empty]
Password	Password for camera access	[empty]
Server	Target server, to which the device will be attached	Central Server

When you have finished, click the *Apply* button below for the changes to take effect.

 If you do not apply the modifications, they will be discarded when you select a different device from the item list. Remember to always click the *Apply* button.

You will be asked to review the list of modified fields and confirm the changes.

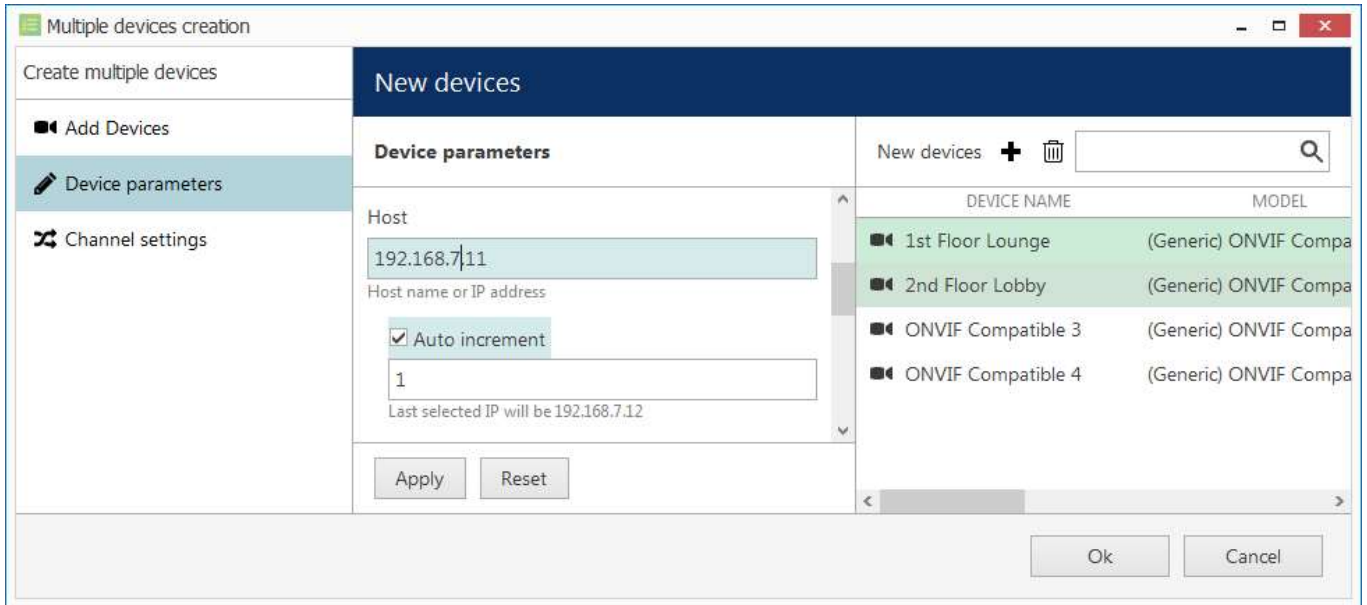


Confirm changes

Click *OK* to accept the changes and go back to the configuration dialog box.

You can select multiple devices and assign IP addresses incrementally with the defined increment. Similarly, it is possible to change the HTTP port for all devices at once, if required (port value stays the same for all selected devices, with no increment). In order to do this, select desired devices by using *CTRL+click* or *Shift+click*, then start entering the IP address: the field will expand, giving you the option to enter the increment.

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Assign IP addresses with increment

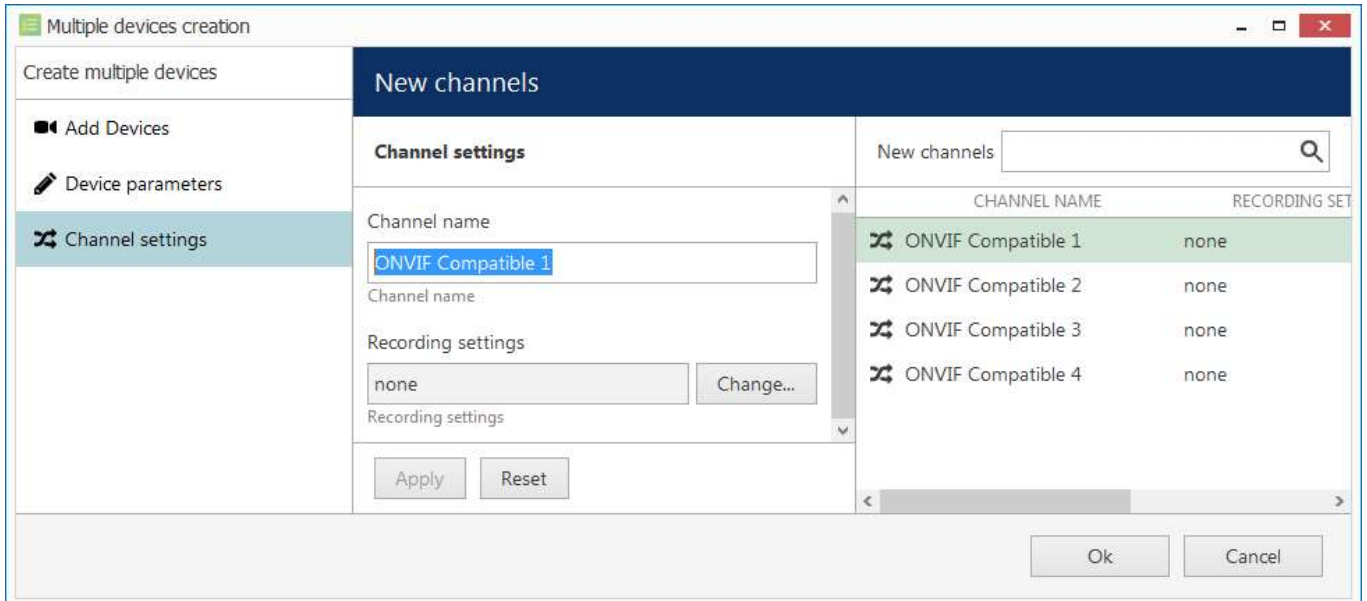
Click the *Apply* button below to save the changes, similarly to the previous step.

Channel Settings

Here you can modify channel names and recording configuration. Note that channel name is not copied from the device name.

Unlike with automatic device discovery, default recording configuration here is [none], meaning that recording is not conducted. Select one or multiple devices and then click the *Change* button in order to choose an existing recording configuration for the target devices or create a new one.

Depending on the selected device model, the number of channels may coincide with or exceed the number of devices, e.g., when device is a 4-channel encoder.



Channel properties

Select one or multiple devices and click *Change*, then select appropriate recording profile or [create a new one](#).

When you have finished, click *OK* to add all the new devices and their channels to your server configuration.

29 Manage Devices and Device Groups

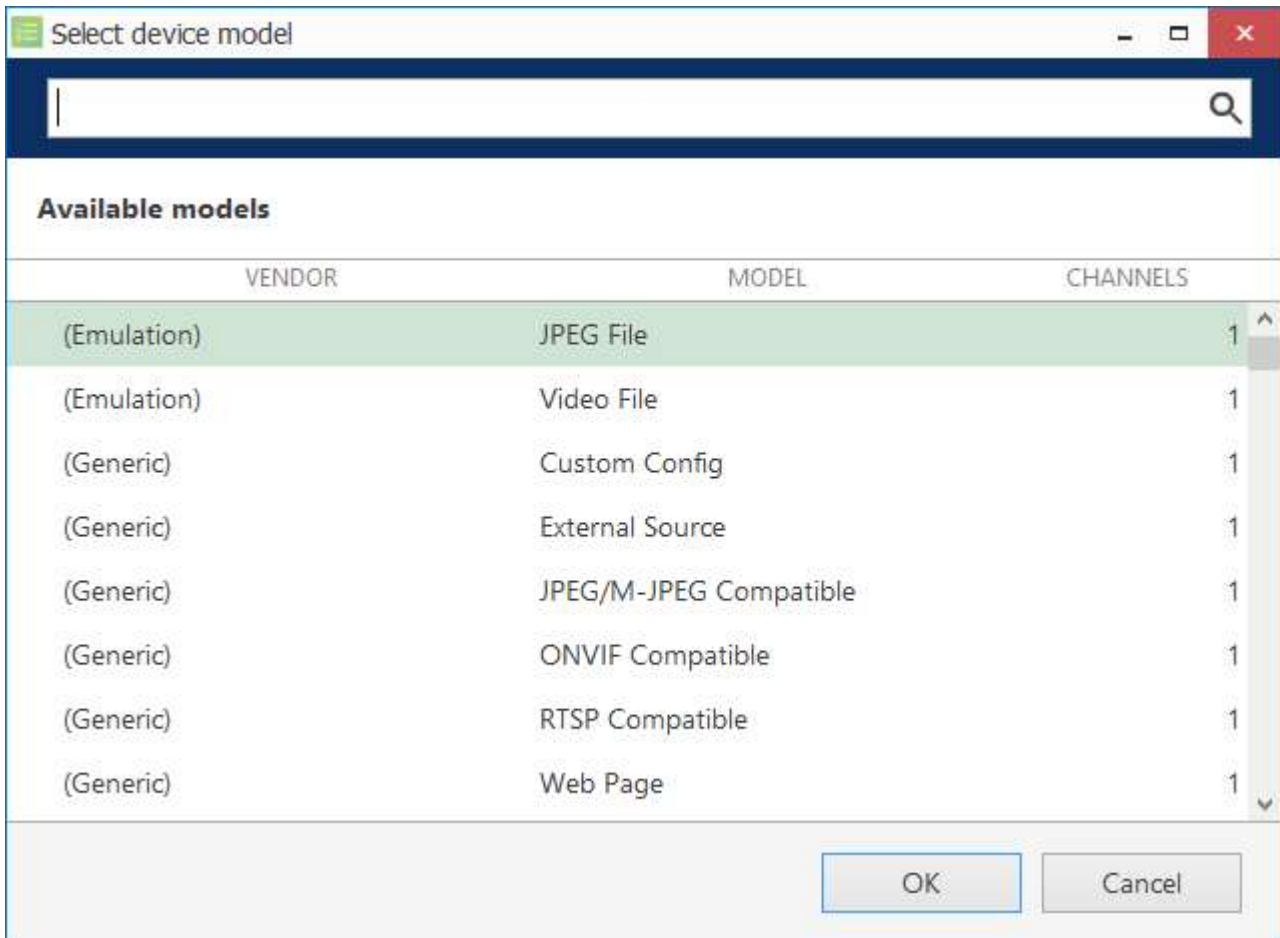
This topic describes general device handling as well as common use cases in device management.

Device Models

There are several device types available in the WVMS model list:

- emulation
- generic
- models by vendor

Each group of models is further explained in more details. The selected model affects device-specific functionality; server-side functions (e.g., motion detection, Open VCA) will be available regardless of the device model.



Generic device drivers

Emulation From File

Emulation devices allow using a video/image file as the video source. This is an auxiliary driver often used for demo purposes, or when configuring/troubleshooting [license plate](#) or [facial recognition](#). Still images must be in JPG/JPEG format. Video files must be in AVI format, encoded as MPEG4 AVC h.264; video files exported from WVMS Monitor or Portable Player will work, too, provided that they were exported as AVI with JPEG compression.

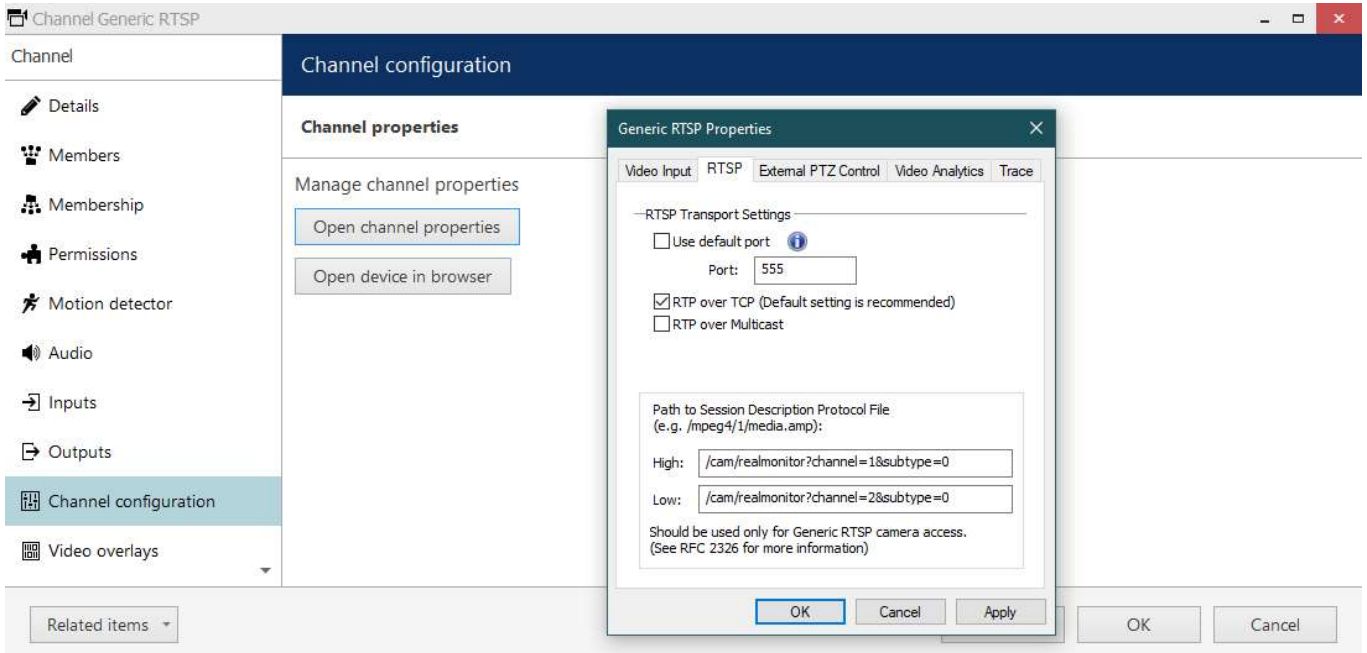
After creating an emulation device, go to its channel's properties and specify the full local path to the target video/image file (*Channels* > open channel for editing > *Channel configuration* tab > *Channel properties* > *Settings* > *Location*). If you move such a device to another server, make sure to copy the file to the new server, or adjust the path in the channel settings.

Generic Streaming Drivers

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Generic drivers are based on common video transfer protocols, so these can be used for legacy hardware, non-integrated cameras/video servers, or non-traditional video sources (e.g., screen capturing software).

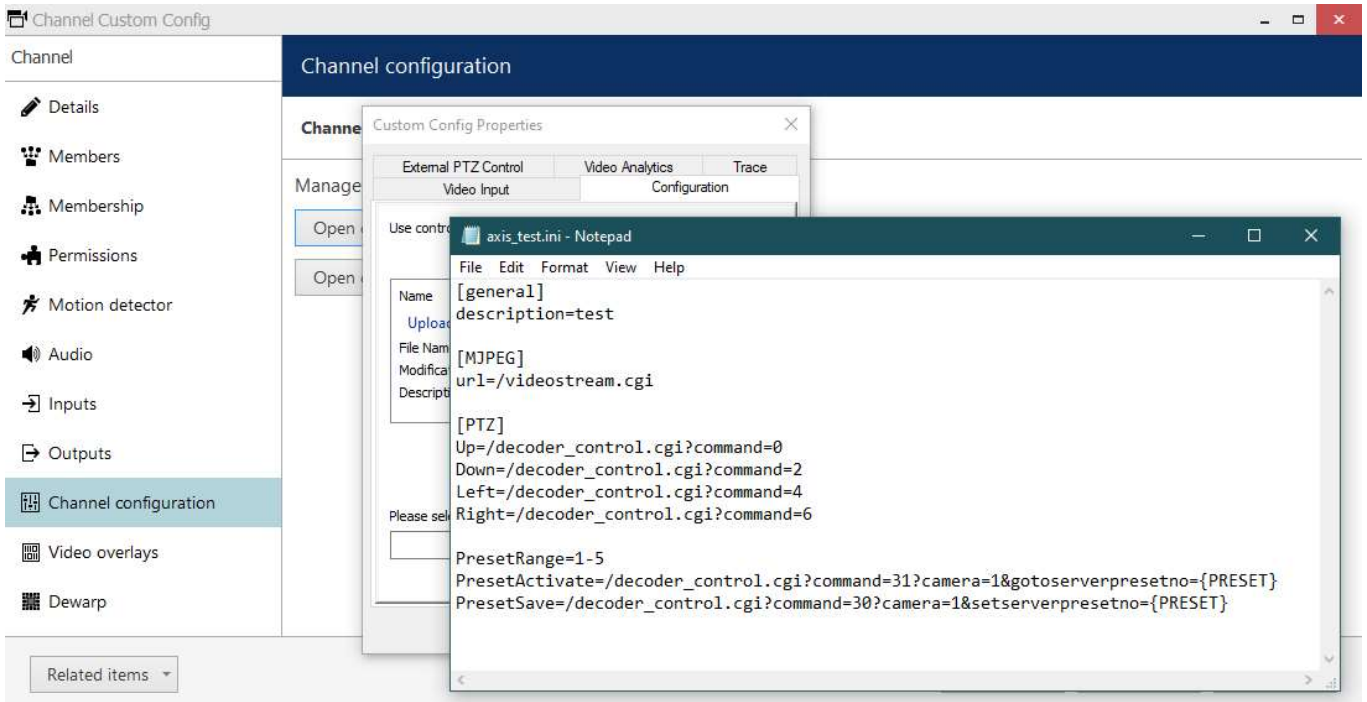
RTSP uses **generic RTSP** streaming over TCP/UDP, and includes two video streams and also audio (G.711). After adding this kind of device, go to its channel properties and specify the RTSP tag for both main and secondary video streams (*Channels > open channel for editing > Channel configuration tab > Channel properties > RTSP > Path to Session Description Protocol File*). The RTSP tag is the URL part after the IP address, so it should look something like */mpeg4/media.amp* or */videostream.cgi*. You can find this information in the device HTTP/CGI documentation provided by the manufacturer. You can also specify a **custom RTSP port** here, in case the device configuration uses a non-standard port, or if port forwarding is set up.



Example of channel properties for the generic RTSP driver

Custom configuration driver is similar to the generic RTSP driver, but it allows adding RTSP flags and PTZ commands via .INI file (text file with configuration, formatted in a special way). The file should contain the desired HTTP/CGI commands and URLs, according to the device documentation. The path to the configuration file is also specified in the channel properties, in the *Configuration* tab. Browse for the file, then hit *Apply*: you should see the configuration details appear above. If there are no details and the date is incorrect, the file has incorrect extension, or is not formatted properly.

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Custom config channel with a sample configuration file

JPEG/MJPEG driver is also similar to the generic RTSP driver, the only difference being that the transport here will use HTTP instead of RTSP. This model is rarely used, mostly for legacy devices not supporting RTSP/ONVIF.

ONVIF Driver

This driver can be used for all devices that are ONVIF Profile S conformant. By default, the *ONVIF Compatible* model is recommended (and it is also used when auto-detecting devices). It does not work with older cameras, try the *ONVIF Compatible (legacy)* driver.

In [device autodiscovery](#), this model will be used alongside with the native integrations: for not-yet-integrated brands/models, ONVIF model will be assigned wherever possible (i.e., if device responds properly to the ONVIF communication).

External Source

This device type is reserved for receiving streams from the Wavesys WVMS Mobile applications. Channels belonging to such devices are only counted by the license when the app streaming is active.

After adding this device, copy the *Code* from its properties to your Wavesys WVMS Mobile app to enable streaming from the app to the WVMS server. You will find more details in the [mobile app section](#) of this document.

HTML Source

Choose this model to add streaming emulation from a **website** UI. The contents rendered from the specified URL will be displayed as a single, **static** (non-interactive) live **video stream**, with an option to record it. You can use this device driver for streaming from public services, monitoring web services, sites with dynamic contents etc.

Unlike for the generic RTSP driver (where you set the device IP and then add the RTSP URL in the channel properties), here you need to specify the full URL in the device settings at once. [Channel properties](#) for webpages will have a [separate tab](#), *Web page configuration (Channels > open channel for editing > Web page configuration)*.

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Device Youtube test

Device

Uri

Details

Membership

Uri

Channels

Address

https://www.youtube.com/embed/27J4HUj6Ko0?autoplay=1

Address

Username

Username to access the resource

New password

Password will not be changed

Related items

Apply OK Cancel

HTML Source device example

The device settings include full resource URL (mandatory) and username/password (optional, you only need to specify the user account is the target web service requires it).

As the webpage contents will be static in the WVMS Monitor application, you need to take care of the contents transition. To force refresh contents from the WVMS side, use the auto refresh parameter in the channel properties. In the example here with YouTube streaming, the video is looped by adding URL parameters; the final link will look as follows:

<https://www.youtube.com/embed/VIDEOID?autoplay=1&mute=1&loop=1&playlist=VIDEOID> - video added in such a way will be played on repeat indefinitely.

Please note that this type of device uses WVMS **channel license** as any other regular IP camera.

CrossLink Devices

Two types of devices are available here: **interactive Web pages** and **interactive remote desktop** applications. Both are fully functional server-side devices that provide live and recorded contents. All interactive items require a special [license type](#) called CrossLink.

Models by Brand

Native device integrations are available for over 140 manufacturers and their 5000+ device models. This list includes cameras, NVRs, video encoders, and I/O modules. Models from this list are used when running device autodiscovery, and you can also use them when manually adding devices.

If you cannot find your exact device model in the list, try the closest available model: quite often, cameras within a series are intercompatible. Also, if you know the device's OEM brand, you can try models from that manufacturer.

Manage Devices

Device management is accessible via Wavesys Console *Configuration* section, by choosing the *Devices* category in the menu on the left.

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TITLE	ID	SERVER	DEVICES/MODEL	HOST/IP	PORT	HARDWARE ID
(Generic) ONVIF Com...	(... Primary (101)	(Generic) ONVIF Com...	192.168.3.33	80	MAC:00:00:00:9A:16:EC:92:0B	
Axis 215 PTZ on 192...	(... Primary (101)	Axis 215 PTZ	192.168.3.4	80	MAC:00:00:00:40:8C:8B:09:99	
Grundig GCI-H0522V...	(... Primary (101)	Grundig GCI-H0522V	192.168.3.14	80	MAC:00:00:B8:41:5F:01:B0:5F	
Samsung SNP-3120V...	(... Primary (101)	Samsung SNP-3120V	192.168.3.11	80	MAC:00:00:00:09:18:70:D1:F6	
Vivotek IP816A on 19...	(... Primary (101)	Vivotek IP816A	192.168.3.12	80	MAC:00:00:00:02:D1:31:B4:8F	
Vivotek PZ7131 on 1...	(... Primary (101)	Vivotek PZ7131	192.168.3.19	80	MAC:00:00:00:02:D1:0A:35:F8	

Configuration -> Devices

Upper panel items allow you to add devices [automatically](#) or [manually](#), edit, view and remove them, as well as quickly assign groups and servers. Double-click any device to open it for editing; click *View channels* on the upper panel to open channel-specific controls in the same window. If device has multiple channels, all of them will be listed.

If you have opened a device for editing but there is a need to **open** the associated **channel's properties at the same time**, use the *Related items* buttons in the bottom left corner of the *Edit device* dialog box.

Please refer to the *Add Devices Manually* section of this document for detailed description of all available tabs and settings.

Use bottom panel buttons to quickly filter recently added/updated devices, choose groups only or solely devices not assigned to any of the servers.

Remove Devices

To remove a device, select it in the item list and use the *Recycle bin* button on the upper panel to delete the target device. Use *Shift+click* or *CTRL+click* to select multiple devices, or *CTRL+A* to select all.

Delete request

Delete all channels that belong to the selected devices?


Please don't show this again

Yes No

You can choose to remove all associated channels together with the device(s)

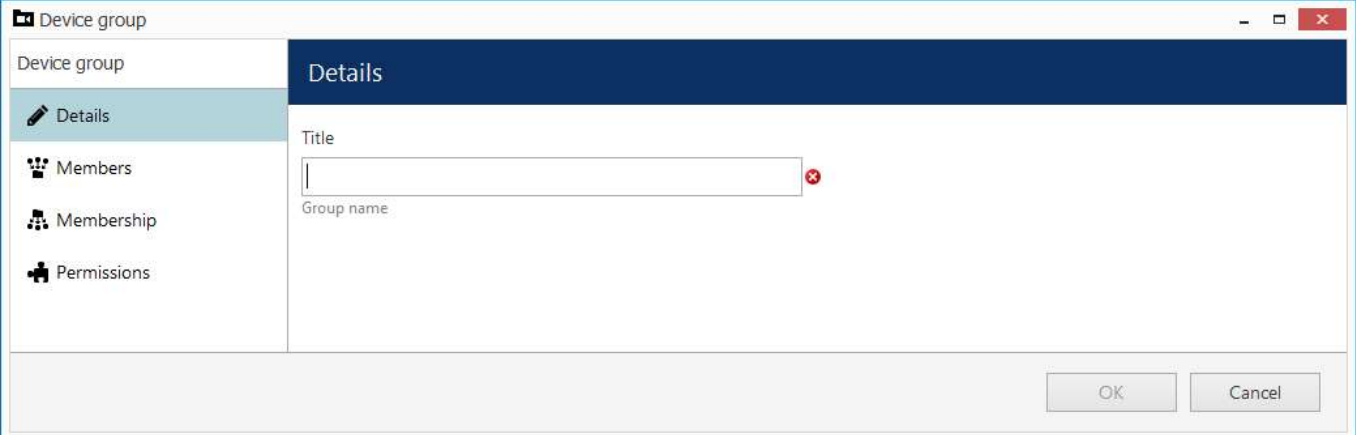
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You will be offered to remove all the attached channels together with the device(s). Press *Yes* to delete the channels or choose *No* to leave the channels: they will appear as detached in the channel list then and you will be able to re-attach them to other devices, keeping the channel recording configuration. If you choose *Yes*, all existing shared channels based on the channels of the target device will be removed automatically as well.

 If you try deleting a device that has **associated rules** in the [Event & Action Configurator](#), you will get a warning dialog box with those rules listed. You can either proceed with removing the target device, its channel(s) and its rule(s), or cancel the deletion.

Add Device Groups

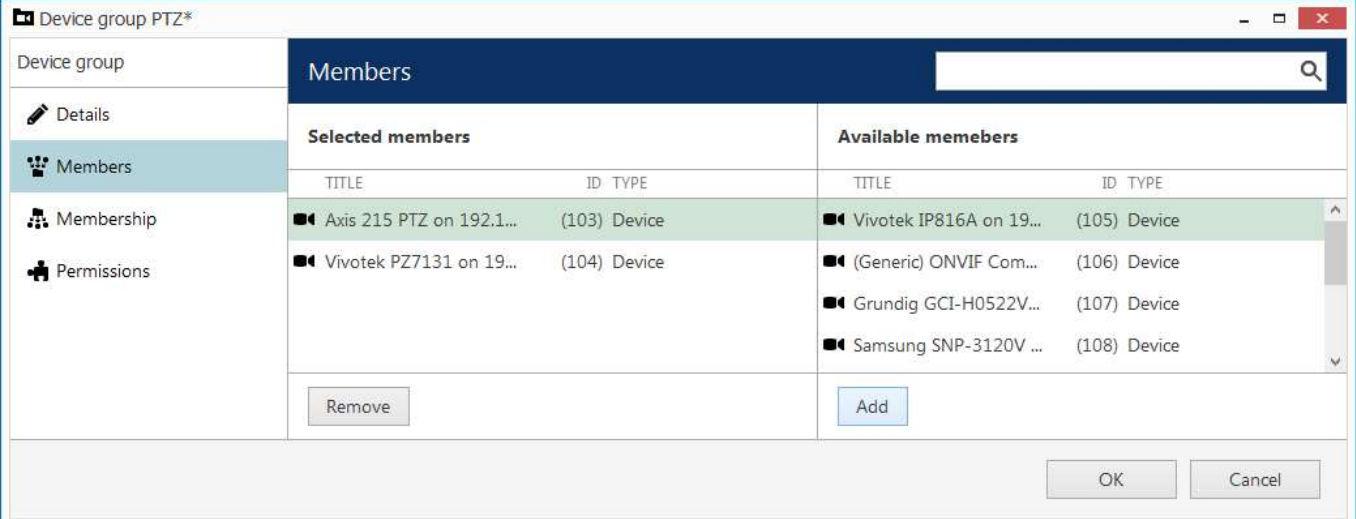
As with other resources, devices can be grouped together for easier management. Click the little arrow near + *New device* button and select *New device group*.



The screenshot shows a window titled "Device group" with a sidebar on the left containing "Details", "Members", "Membership", and "Permissions". The "Details" tab is active, showing a "Title" field with a red 'x' icon and a "Group name" field. The "OK" and "Cancel" buttons are at the bottom right.

Device group details

Enter a name for the device group in the *Details* tab, then switch to the *Members* tab and choose devices to join this group. Double-click items or use the *Add/Remove* buttons below to select and deselect devices.



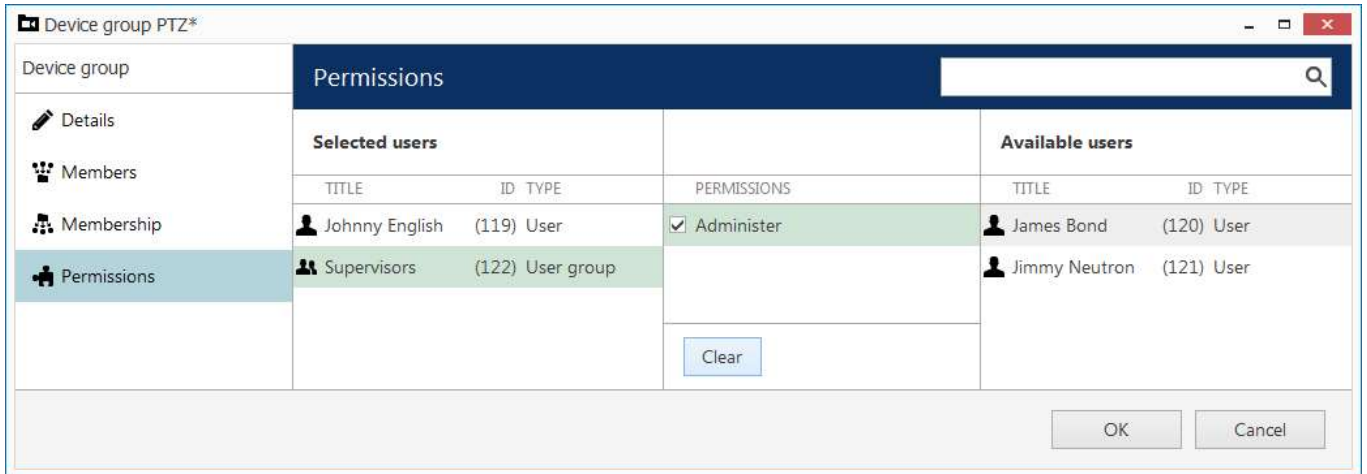
The screenshot shows a window titled "Device group PTZ*" with a sidebar on the left containing "Details", "Members", "Membership", and "Permissions". The "Members" tab is active, showing a table with "Selected members" and "Available members" columns. The "Selected members" column contains two devices: "Axis 215 PTZ on 192.1..." and "Vivotek PZ7131 on 19...". The "Available members" column contains four devices: "Vivotek IP816A on 19...", "(Generic) ONVIF Com...", "Grundig GCI-H0522V...", and "Samsung SNP-3120V ...". The "Remove" and "Add" buttons are at the bottom of the table. The "OK" and "Cancel" buttons are at the bottom right.

Selected members		Available members	
TITLE	ID TYPE	TITLE	ID TYPE
Axis 215 PTZ on 192.1...	(103) Device	Vivotek IP816A on 19...	(105) Device
Vivotek PZ7131 on 19...	(104) Device	(Generic) ONVIF Com...	(106) Device
		Grundig GCI-H0522V...	(107) Device
		Samsung SNP-3120V ...	(108) Device

Device group members

In the *Membership* tab, you can select 'higher' level groups to contain this device group (nested architecture).

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Device group permissions

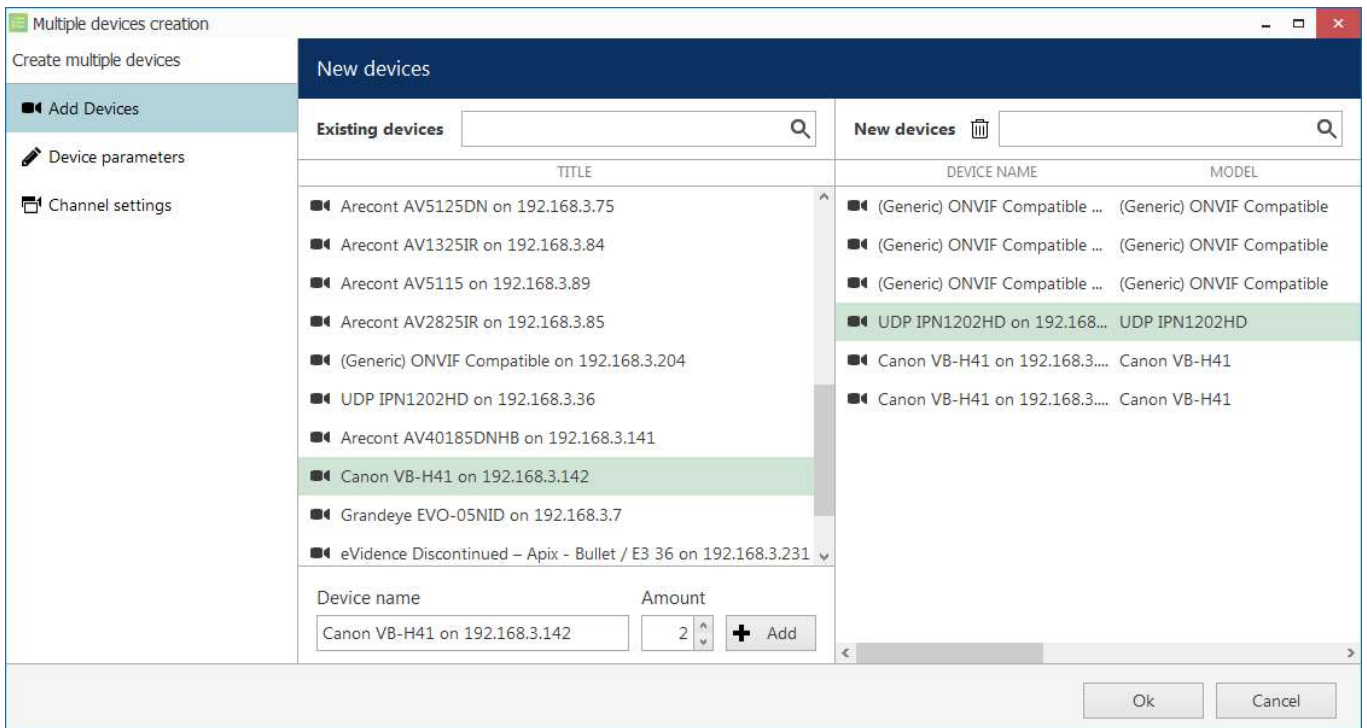
Finally, open the *Permissions* tab to assign user privileges for this device groups: check at least one permission to select the user or user group, uncheck all or use the *Clear* button below to deselect. When you have finished, click *OK*; the newly created group will then appear in the item list.

Double-click any group to open its contents in the same window; use the buttons on the upper panel to edit/remove it. Click *Edit* to adjust group settings: procedure is similar to that of creating a new device group.

Copy Device*

*Feature is subject to license limitations and may be **unavailable in some software editions**.

Starting from the WVMS version 1.11.0, it is possible to **copy an existing device** and its channel(s). To copy a device, click the little arrow next to the + *New device* button on the upper panel and choose *Create copy* from the drop-down list. The related channel(s) will be copied automatically.



Copy one or multiple devices

In the dialog box that appears, you can create one or multiple copies of any device(s) currently present in the WVMS server configuration. In the list on the left, all existing devices will be listed; in the list on the right, your copies will appear.

First, choose the source for the copy in the *Add devices* tab:

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- select one of the existing devices in the list on the left (a single device can be selected at a time),
- set the number of target copies below,
- when ready, click the + *Add* button to **create** the selected copies,
- repeat previous steps with other devices, if required.

To add a single device copy, you can simply double-click it in the list.

Use the search fields on top of the lists to find the necessary item in a long list. If you no longer wish to add any of the created copies, you can select multiple items using *CTRL+left click* or *Shift+click* and **remove** them using the *Recycle bin* icon above.

The screenshot shows a software window titled "Multiple devices creation" with a sidebar on the left containing "Add Devices", "Device parameters", and "Channel settings". The "Device parameters" tab is selected, displaying the following fields:

- Device name:** A text box containing "{Multiple values}" and a label "Device name" below it.
- Model:** A text box containing "Canon VB-H41" and a label "Device model" below it.
- Host:** A text box containing "192.168.3.142" and a label "Host name or IP address" below it.
- Auto increment:** A checked checkbox with a label "Auto increment" and a text box containing "1" below it. A note below the text box reads "Last selected IP will be 192.168.3.143".

At the bottom of the "Device parameters" section are "Apply" and "Reset" buttons. To the right is a "New devices" list with a search bar and a trash icon. The list has two columns: "DEVICE NAME" and "MODEL". It contains several entries, with one entry highlighted in green:

DEVICE NAME	MODEL
(Generic) ONVIF Compatible ...	(Generic) ONVIF Compatible
(Generic) ONVIF Compatible ...	(Generic) ONVIF Compatible
(Generic) ONVIF Compatible ...	(Generic) ONVIF Compatible
UDP IPN1202HD on 192.168...	UDP IPN1202HD
Canon VB-H41 on 192.168.3...	Canon VB-H41
Canon VB-H41 on 192.168.3...	Canon VB-H41

At the bottom of the window are "Ok" and "Cancel" buttons.

Change parameters of the target copies

In the *Device parameters* tab, you can adjust:

- the **name(s)** of the target copy (copies),
- their **IP addresses**, with an option to select multiple with CTRL+left click and then assign a range of IP addresses using auto increment with the specified step,
- **HTTP port** and **user credentials**.


After you have altered any settings here, do not forget to hit the *Apply* button to **save** them, otherwise the changes will be discarded when you deselect the device(s) or switch to a different tab. Use the *Reset* button to **roll back** to the original settings (this works if you have not applied the settings yet).

Note that, at this step, the new device **model** remains the same as the source device model and it cannot be changed at this point. This is necessary for the WVMS engine to successfully create a duplicate. You will be able to change the model later via editing the desired device.

The same applies to the **server** where the device is attached: at the moment of cloning, the new devices are created on the same server. If you are using Wavesys WVMS Enterprise, you will be able to move the devices to a different server after you have added the copies by editing the target device(s).

In the *Channel settings* tab, the only available parameter at this point is the **channel name**. You will be able to edit other settings after creating the copy (copies) by editing the target channel(s).

When finished with the settings, click the *OK* button to **save** your newly created device+channel copies. They will be automatically added into the server configuration database.

 After you have added new devices using this method, please allow **some minutes** for the configuration to be saved. After that, you will be able to change the newly created device and channel settings.

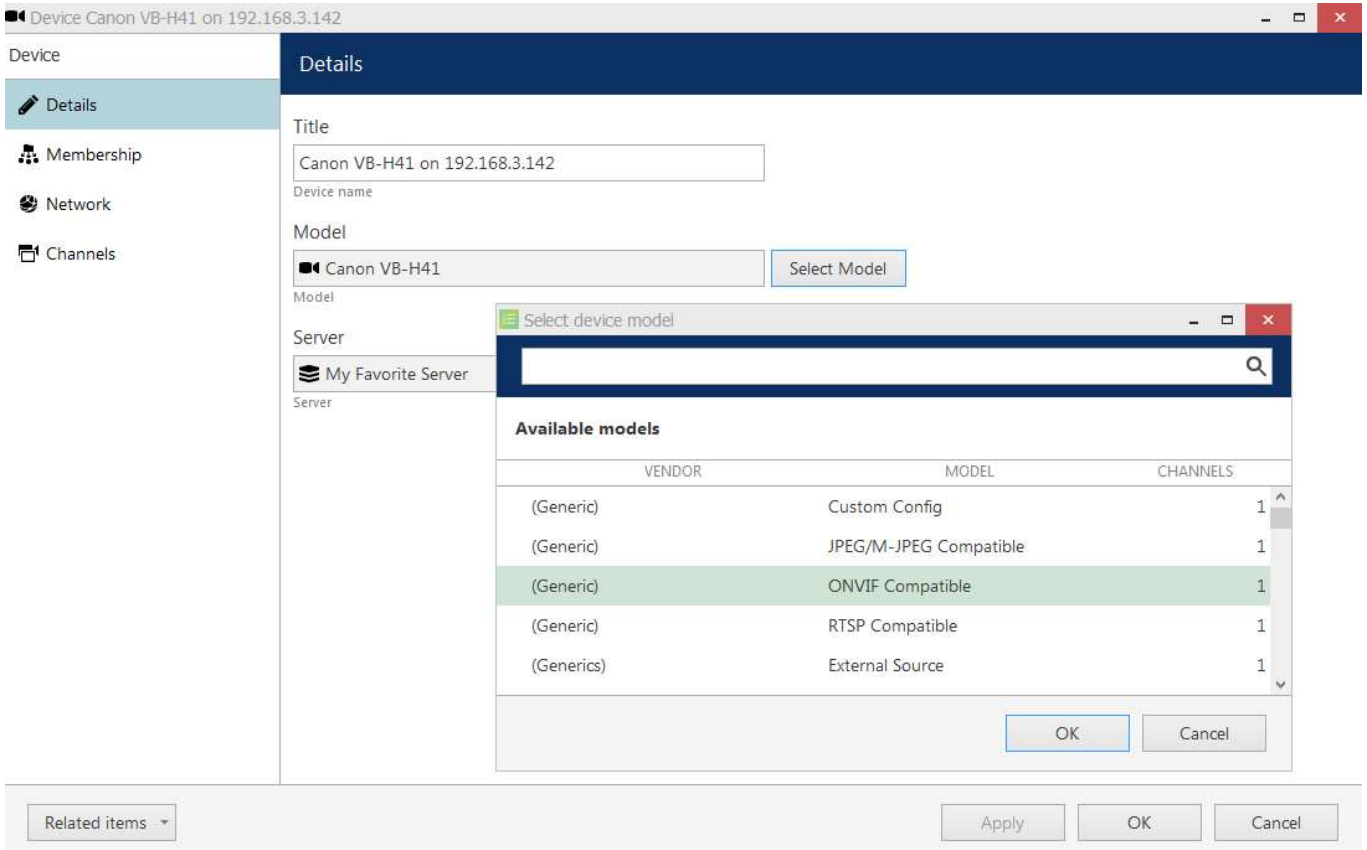
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The associated **channel(s)** will be added **automatically** with all the existing settings, including the assigned recording configuration.

Replace Camera

In the WVMS versions up to 1.11.0, it was impossible to alter the device model, so a special procedure was foreseen if the camera needed a replacement.

Now, if you replace the hardware, you can simply **change the device model** by opening the target device for editing - either by double-clicking it in the device list, or by using the *Edit* button on the upper panel. Note that, when you change the model of an existing device, you will only see model suggestions with the **same number of channels**, and not the whole list of available devices.



Change the device model

To quickly open the associated channel settings without closing this dialog box, use the *Related items* button in the bottom left corner.

⚠ When you change the device model, all the **channel settings** that are configured via *Channel properties* dialog box are **discarded**. These settings include video stream properties, audio, DI/DO etc.
Channel settings that are **preserved** are: motion detection, dewarp, data source, user permissions and recording configuration.

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30 Configure Channels


Channels are contents received from physical devices attached to the system. Several channels can originate from a single device - in the case of multichannel devices, i.e., capture boards, but single channel can only be attached to one device at a time, as it makes no sense for a video stream to come from two cameras at once. Channels are created automatically at the same time as the source device but can later be detached and attached to different devices.

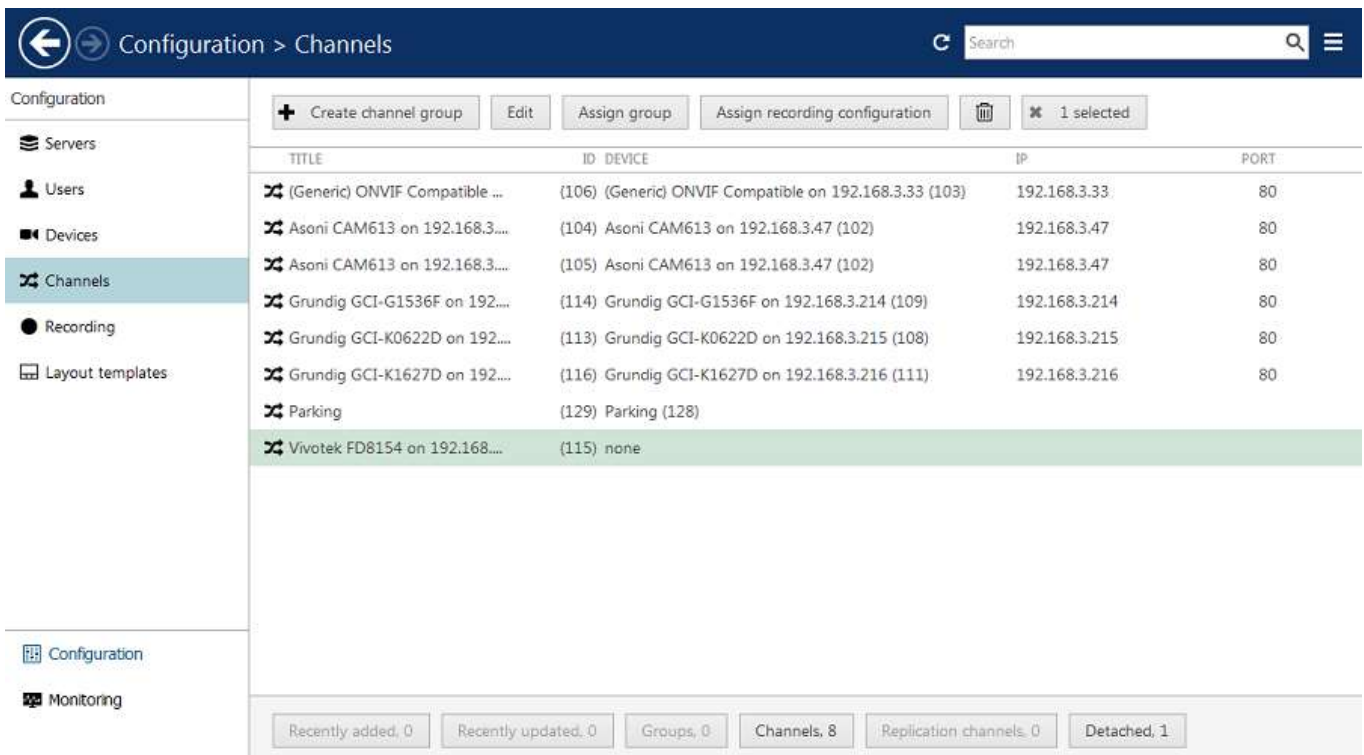
Channels include the video stream configuration settings - resolution, frame rate, bit rate and others - as well as all supplementary data streams, such as audio, motion and digital input/output events, PTZ control and camera-side analytics information. Recording configurations are assigned to channels. Finally, channels are displayed in WVMS Monitor and other clients.









To access the channel configuration dialog box in the Wavesys Console, open the *Configuration* section and select *Channels* from the menu on the left side. Use the filters on the bottom panel to quickly access specific channel sets.

The upper panel buttons enable you to create new items in this category, as described below, and perform channel-specific actions, such as editing, assigning groups, assigning recording configuration and deleting selected channels. To select multiple items, hold *CTRL* or *Shift* and click items in the list.

 Channels currently **bound to devices** cannot be deleted: the recycle bin  button will only appear when detached channels are selected. To **remove a channel**, go to *Devices*, open properties of the target device and disengage the channel on the *Channels* tab by clicking the *Detach* button; also, you will be offered to delete all associated channels when you remove the device itself - this will also remove any existing shared channels.

 Channels that have any associated **rules** in the [Event and Action Configurator](#) **cannot be removed**. If you try deleting such a channel, you will get an error saying *The channel cannot be removed because it is in use*. In order to remove such a channel, you need to delete the rules related to it first. To do so, just go to the *Events & Actions* section, choose *Rules* in the menu on the left, select the target server and open the configurator, then remove the necessary rules from the central column by using the < and > buttons.



TITLE	ID	DEVICE	IP	PORT
 (Generic) ONVIF Compatible ...	(106)	(Generic) ONVIF Compatible on 192.168.3.33 (103)	192.168.3.33	80
 Asoni CAM613 on 192.168.3...	(104)	Asoni CAM613 on 192.168.3.47 (102)	192.168.3.47	80
 Asoni CAM613 on 192.168.3...	(105)	Asoni CAM613 on 192.168.3.47 (102)	192.168.3.47	80
 Grundig GCI-G1536F on 192...	(114)	Grundig GCI-G1536F on 192.168.3.214 (109)	192.168.3.214	80
 Grundig GCI-K0622D on 192...	(113)	Grundig GCI-K0622D on 192.168.3.215 (108)	192.168.3.215	80
 Grundig GCI-K1627D on 192...	(116)	Grundig GCI-K1627D on 192.168.3.216 (111)	192.168.3.216	80
 Parking	(129)	Parking (128)		
 Vivotek FD8154 on 192.168...	(115)	none		

Configuration -> Channels

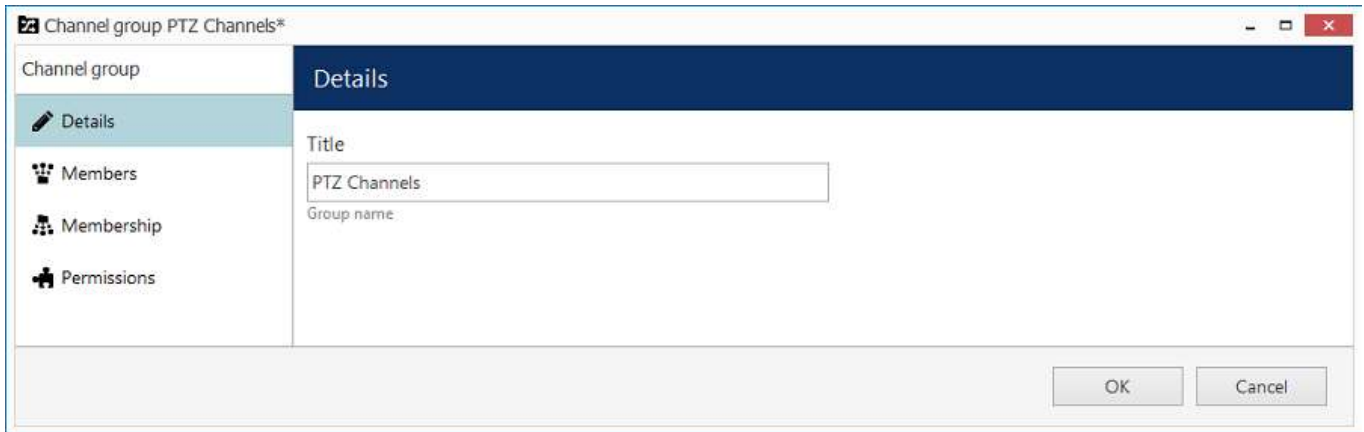
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All available channels and channels groups will be listed here. The upper panel offers a range of configuration opportunities.

Create Channel Group

Channel groups can be added for easier management in Wavesys Console; by default, there exist no built-in channel groups. Click + *Create channel group* button to bring up the corresponding dialog box.

Enter the group title here, select channels to be group members and select higher level group(s) to contain target group as a member, if desired. Set user permissions for channels in this group.



Edit Channel group properties

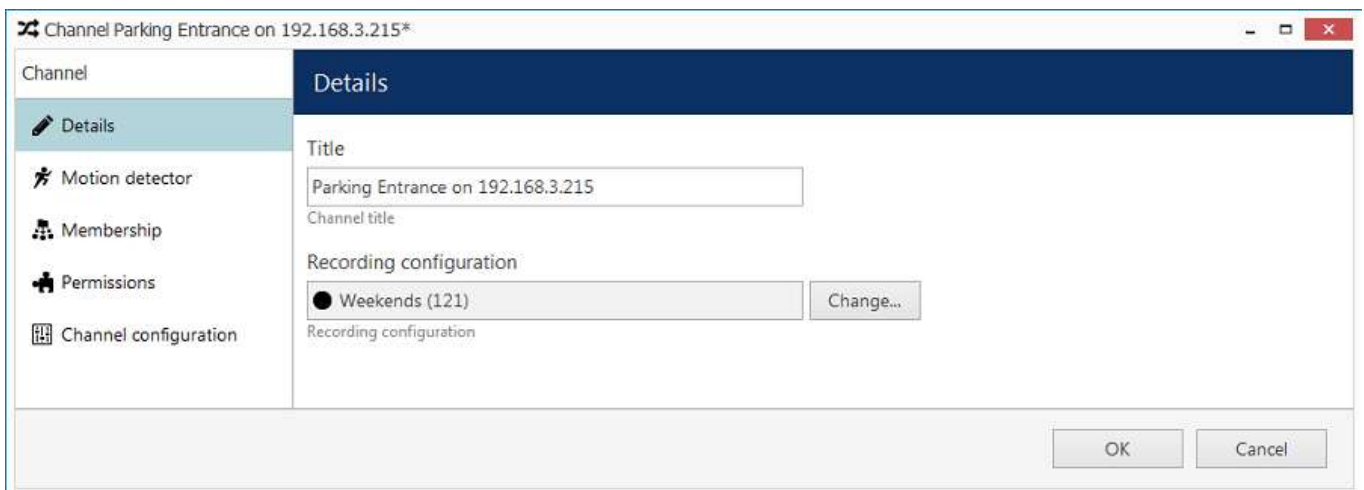
Click *OK* when you are ready: newly created group will appear in the item list.

Edit Channel Group

Double-click any existing channel group in the list or use the *Edit* button in the upper panel to bring up the configuration dialog box. Available options are analogous to the ones displayed during group creation time.

Edit Channel

Channels are automatically created together with each newly created device; it is not possible to create a channel separately. Click any channel in the list twice or use the *Edit* button on the upper panel to manage the channel properties.



Edit channel properties

The configuration dialog box enables the following changes:

- **Details tab:** change channel title and assign recording configuration
- **Members tab:** bind [user buttons](#) to channels so that they appear together in the WVMS Monitor
- **Membership:** make the channel a part of a channel group or a [visual group](#)

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- **Permissions tab:** grant channel access permissions to users and user groups
- **Video file configuration:** settings for the generic video emulation driver: main and substream file path and delay between frames
- **Motion detector* tab:** choose between a camera-side or software-side motion detector, default state is disabled
- **Video analytics:** server-side video analysis configuration
- **Audio tab:** combine current channel with audio from another source
- **Inputs/Outputs:** DI/DO settings
- **Channel configuration:** open an additional channel configuration dialog box to manage video stream settings, frame adjustments and DI/DO
- **Video overlay:** configure different overlay elements, e.g., textual contents received from [data sources](#)
- **Dewarp tab:** select dewarp profile for fisheye and Panomorph lenses
- **Video configuration:** main and secondary stream adjustment (for newer device drivers)
- **RTSP configuration:** RTSP port and transport selection (for newer device drivers)
- **Edge configuration:** configuration of edge (device-side) synchronization (for newer device drivers)

Please refer to the [Channel Settings](#) topic for detailed description for each of the tabs.

*Motion detector on the software side has two options: **high performance** and **high accuracy**:

High Performance mode: this type of analysis is performed for only key frames whose frequency can vary from several frames per second to one frame every few seconds - this is less sensitive for picture quality, but greatly affects detector operation. CPU consumption is significantly lower due to this, and it can be additionally reduced by increasing time interval between two analyzed frames.

High Accuracy mode: this mode performs motion analysis for the whole video stream, so we recommend selecting this option when you want to achieve best detection results. The lower time interval means higher precision. Keep in mind that CPU and virtual memory usage is much greater if this mode is selected.

If you have opened a channel for editing but there is a need to **open** the associated **device's properties at the same time**, use the *Related items* buttons in the bottom left corner.

Live Channel Preview

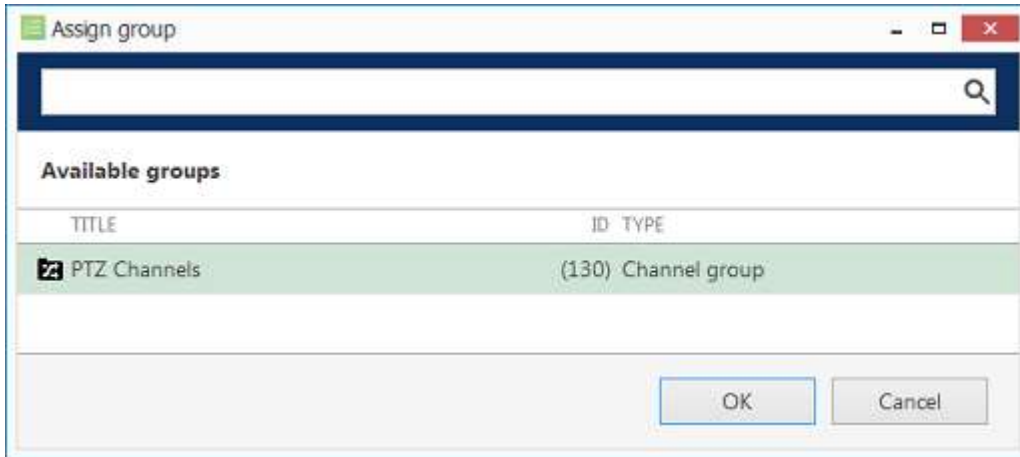
After a device and its associated channel has been added to the configuration, it is vital to check if the actual video is received. There are several methods to do this in Wavesys Console:

- click the *Show video* button on the upper panel in the *Configuration > Channels*: you can switch from main to the secondary stream and back
- go to the *Monitoring* section > *Channels* and check the channel status
- open the target channel for editing and go to *Dewarp* or *Data source* settings

Assign Group

Channel membership can be managed via the channel properties dialog box. To quickly assign group to any of existing channels, select desired channel(s) (use CTRL+click or Shift+click to select multiple items) and click *Assign group* button on the upper panel.

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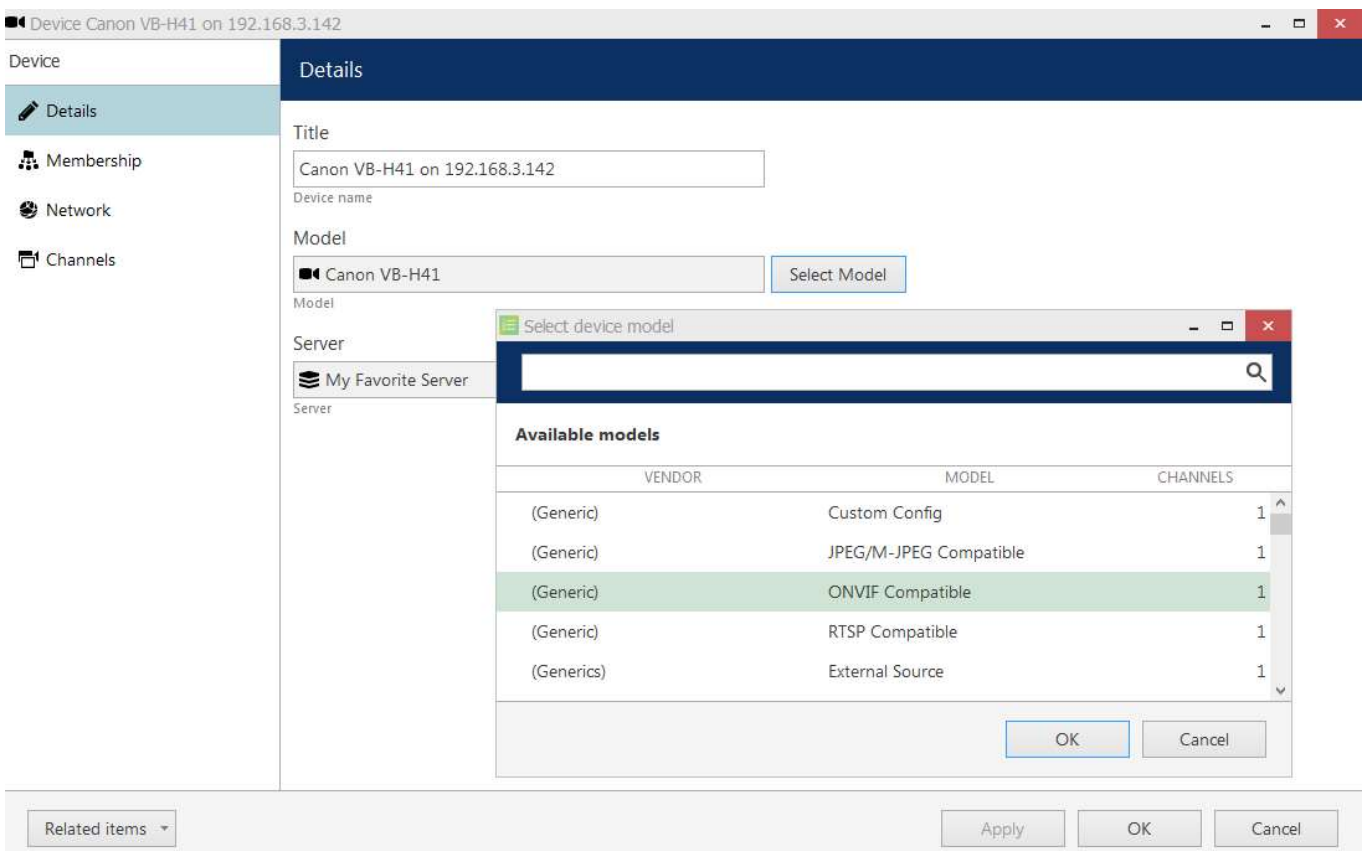
Assign channel group

Pick a group from the existing channel groups' list and click *OK* to save. If any of the channels already belonged to some group, it is not a problem: membership in multiple channel groups is allowed.

Replace Camera

In the WVMS versions up to 1.11.0, it was impossible to alter the device model, so a special procedure was foreseen if the camera needed a replacement.


Now, if you replace the hardware, you can simply **change the device model** by opening the target device for editing - either by double-clicking it in the device list, or by using the *Edit* button on the upper panel. Note that, when you change the model of an existing device, you will only see model suggestions with the **same number of channels**, and not the whole list of available devices.



Change the device model

To quickly open the associated channel settings without closing this dialog box, use the *Related items* button in the bottom left corner.

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 When you change the device model, all the **channel settings** that are configured via *Channel properties* dialog box are **discarded**. These settings include video stream properties, audio, DI/DO etc.

Channel settings that are **preserved** are: motion detection, dewarp, data source, user permissions and recording configuration.

Other

Select one or multiple channels/channel groups and click the *Disable* button on the upper panel to deactivate target items. **Disabled** channel contents will not be requested from actual physical devices, and, as a consequence, will not be recorded; neither will they be displayed in the WVMS Monitor application(s).


The filter panel at the bottom enables you to view recently added/updated items, as well as other relevant filters. The filter that is currently active is highlighted blue: click the *N filtered* button to reset all filters and display all the available items again.



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31 Channel Settings

Double-click a channel or use the Edit button on the upper panel to open the channel settings.

 Channels with the same device driver (e.g., ONVIF), can be edited **together**. You can select multiple channels by holding CTRL and then open the settings dialog box.

The channel configuration dialog box has several setting categories; these are described in details in this topic. As you move across the tabs and alter the configuration, the tabs containing **unsaved changes** will be marked with an asterisk (*).

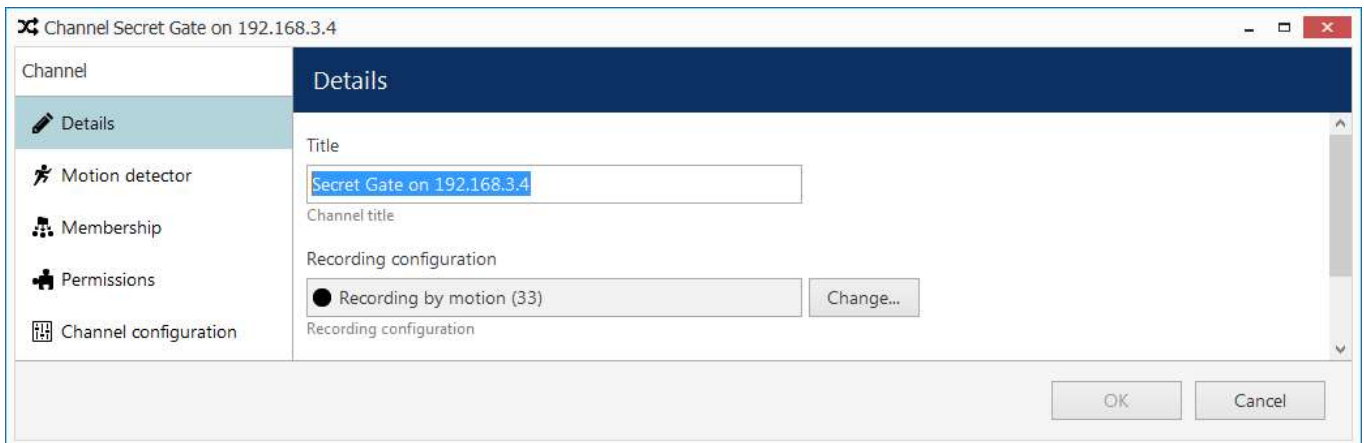
Some of the tabs are present for all channels. Other tabs only appear for special driver types (e.g., Web page, Video emulation etc.).

Details

Here you can change the channel title and assign recording configuration. Available fields:

- **Title:** user-defined channel name, as it will appear in Wavesys Console and WVMS Monitor applications
- **Main stream recording configuration:** choose how the first video stream (usually, higher resolution) will be recorded
- **Main stream storage:** destination storage for this stream (may differ from other streams)
- **Substream recording configuration:** choose how the second video stream (usually, lower resolution) will be recorded
- **Substream storage:** destination storage for this stream (may differ from other streams)
- **Edge stream recording configuration:** choose how the edge stream will be recorded, if used (available for ONVIF Profile G conformant devices and also for offline recordings made by Wavesys WVMS Mobile)
- **Edge stream storage:** destination storage for this stream (may differ from other streams)
- **Video lost time:** the amount of time in seconds for EVO to wait after all channel's video streams disappear and before triggering a *Video loss* event
- **Recording identifier** (only displayed if *Show object IDs* option is enabled in the application settings): unique channel identifier that is used as its folder name in the archive

If you enter a custom **title** for a channel, a special button on the right side will allow you to revert to the device title with a single click.



Channel details


You can either use the *Default* storage category for all target streams, or use different storages for different streams. The latter can be used for manually distributing streams between different directories:


- [storage directories](#) are marked with the relevant storage profiles (e.g., *Main*, *Substreams*, *Edge*),
- each channel and even channel's streams are then assigned different storages.

To choose a storage profile that is not *Default*, select a storage from the *Directories* list and click the *Change* button.

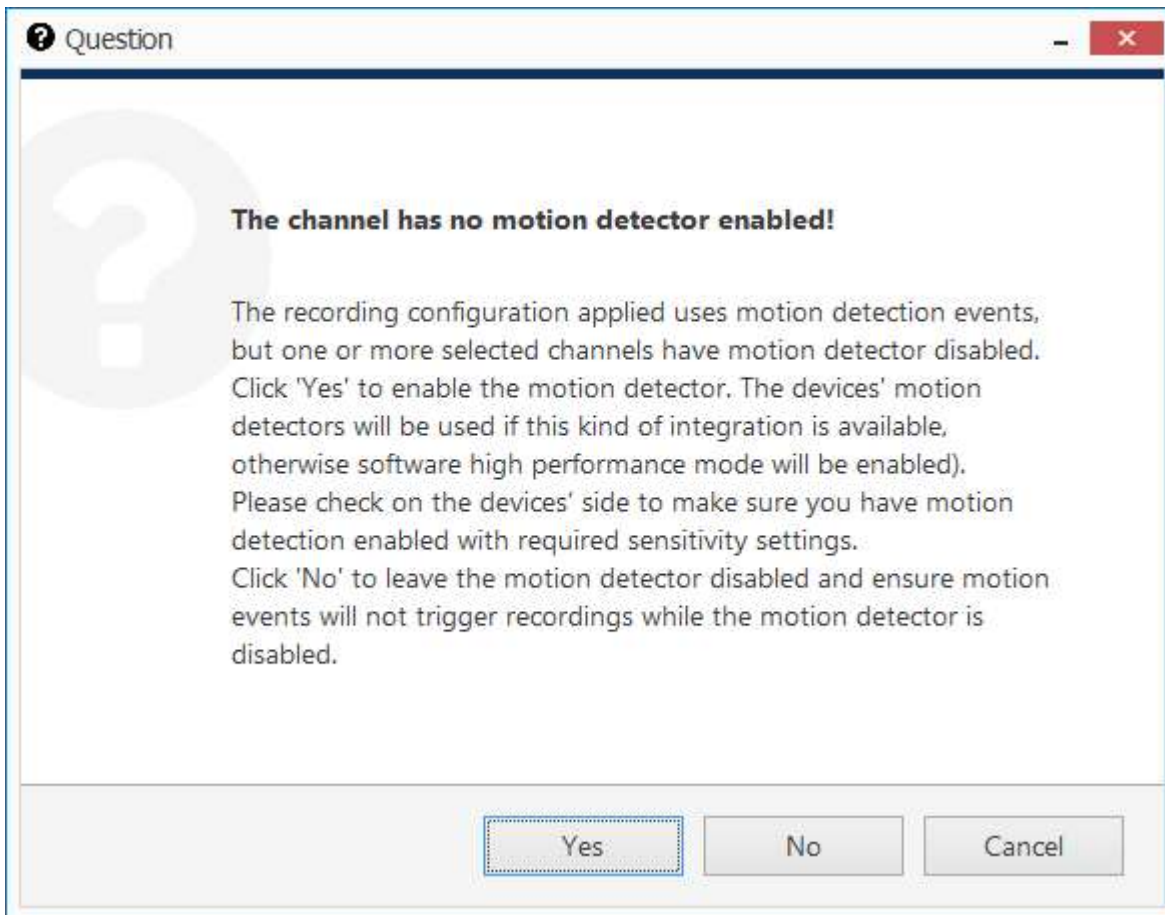
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Click the *Change* button to choose the recording configuration: you can pick an existing configuration or create a new one, or a schedule on the spot from the same dialog box.

 Please choose *Continuous Recording* configuration for **edge** streams to ensure proper recording.

 When you assign a **motion-based recording configuration** to a channel with a disabled motion detector, the software will automatically suggest enabling motion detection for the target channel. The camera-side detector is given priority; if it is not available, the software-side detector will be enabled and set to the high-performance mode. We recommend that you **review** the motion detector settings to make sure it operates as desired, especially if the camera-side detector is in use.

Note that if you leave motion detection OFF and assign motion-based recording configuration to the target channel, no data will be recorded.



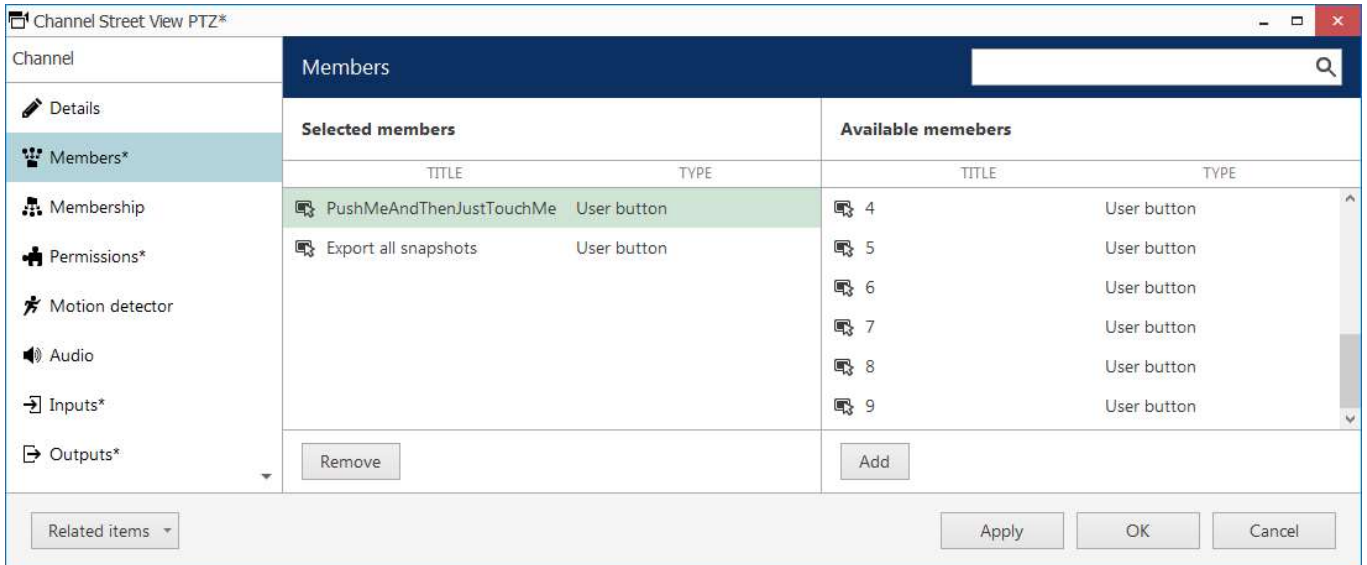
Automatically enable motion detection

Members

This section allows you to attach [user buttons](#) to channels, so that they appear together in the WVMS Monitor application. User buttons bound to channels in this way will appear as video overlay controls when the target channel is placed into a viewport.

If you are editing a channel group, this tab will allow you to put other channels and channel groups into the target group.

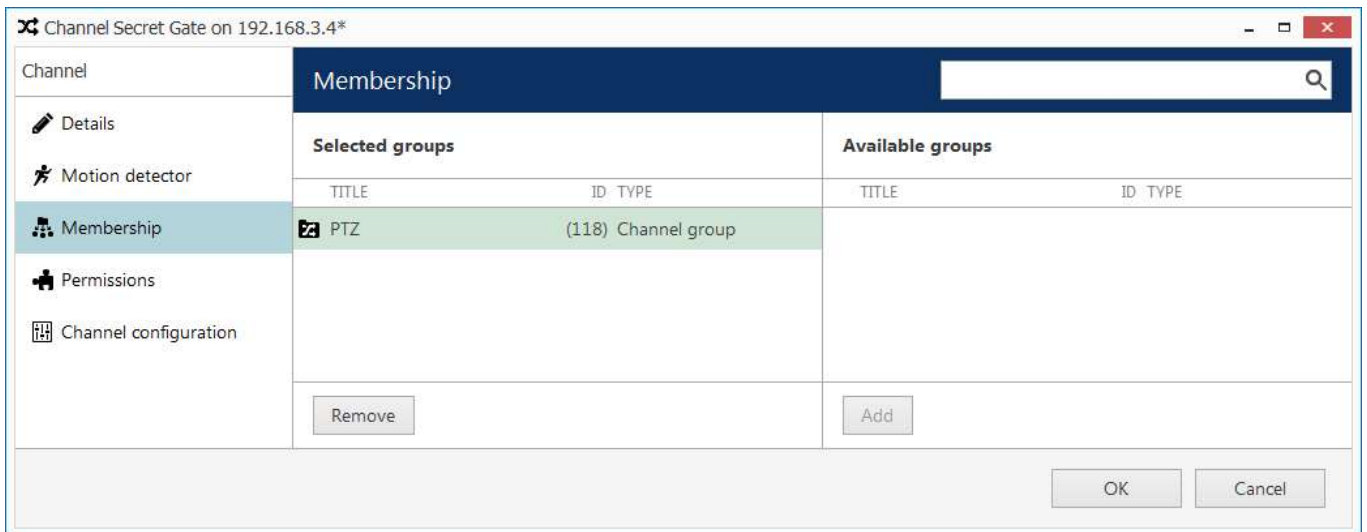
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User buttons can be bound to channels via *Members* tab

Membership

Choose the group(s) you want to contain the target channel as a member: double-click the relevant items or use the *Add/Remove* buttons below to select/deselect. You will have both channel groups (internal in Wavesys Console) and [visual groups](#) here.

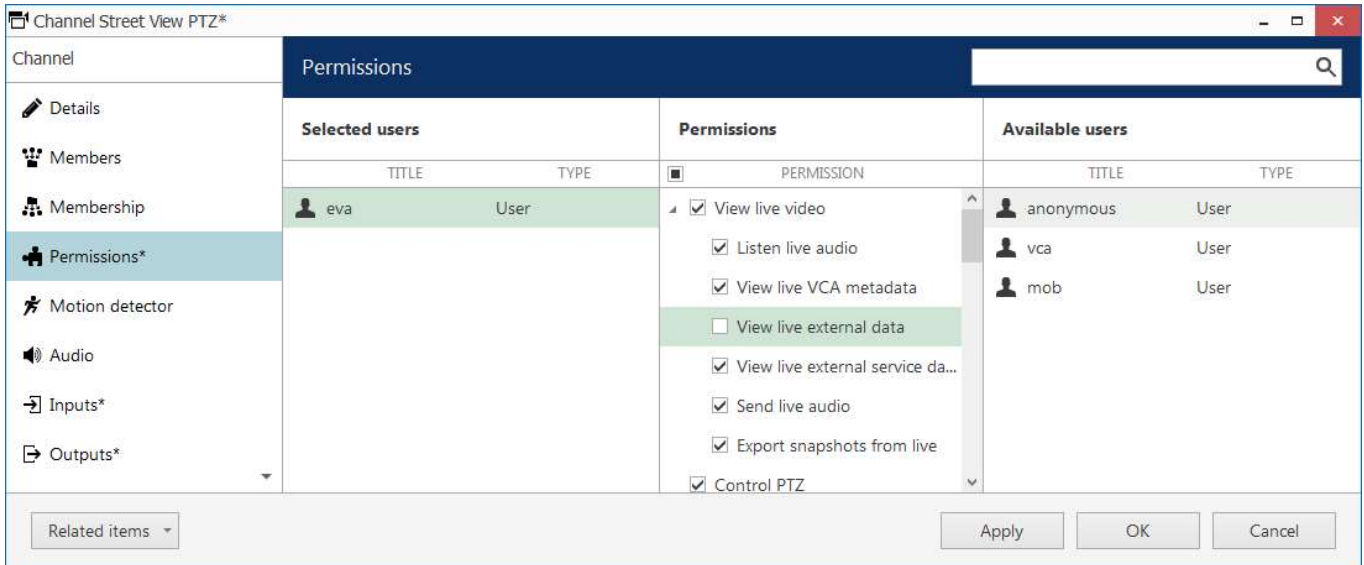


Choose channel membership

Permissions

Allow users and user groups to access and administer the target channel. To **add** a user or user group, simply select at least one permission, and the user (user group) will be automatically moved to the *Selected users* list. To **clear** all permissions, double-click the user in the left-hand column. You can also use the **checkbox** next to *Permissions* in the central column to toggle between **all/none** (if not all permissions are selected, the checkbox will be filled with a black rectangle).

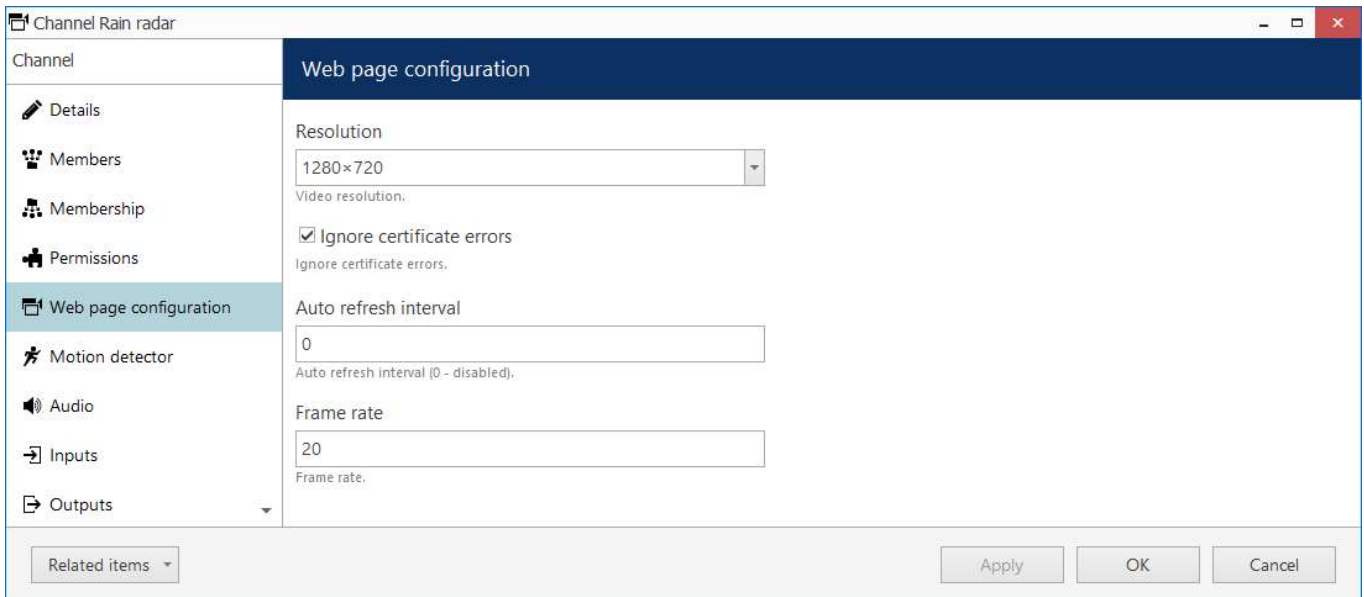
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Change user privileges

Webpage Configuration

This kind of tab will only appear for [Crosslink](#) channels and channels bound to [devices](#) with the *HTML Source* model (generic model specifically dedicated to static streaming from web), and will affect both live and recording.



Web page properties

The following settings may be available here are:

- **Ignore certificate errors:** if the target webpage has a self-signed certificate, the built-in browser may be unable to open it; choose this option to prevent certificate-related issues (unsafe but more likely to operate)
- **Auto refresh interval:** if the page contents is not dynamic (i.e., does not refresh itself), define a refresh period in seconds here (0=disabled, for dynamic contents)

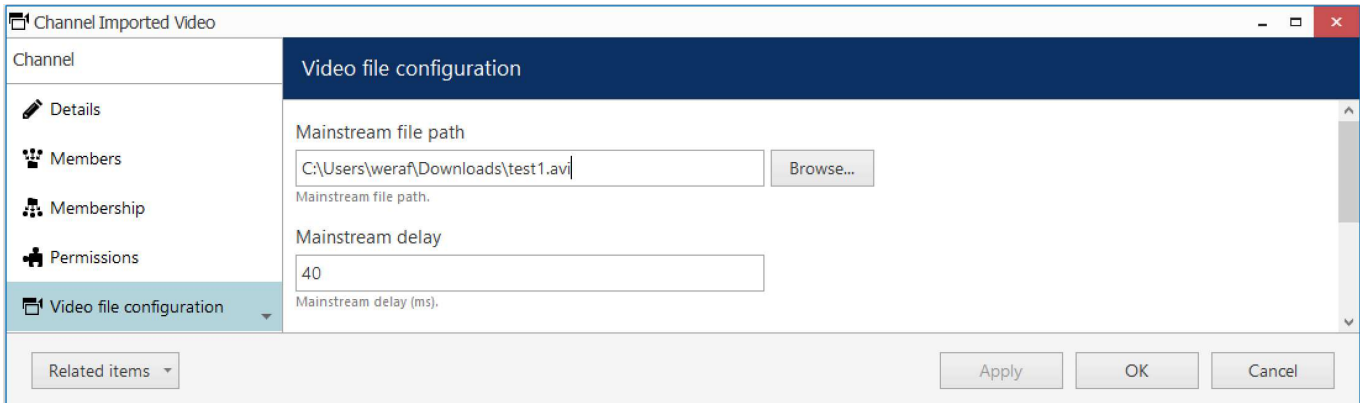
Resolution and frame rate settings have been moved to the *Video configuration* tab.

Video File Configuration

This tab only appears if the underlying device is of the (*Emulation*) *Video File* type. Here, you can specify the paths to the video streams that will act as main and secondary stream.

Click the *Browse* button to choose the file using Windows Explorer.

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Video file properties

For both streams, you can adjust the frame delay: this will affect the speed of the video.

Motion Detector (MD)

Choose between **camera-side** or **software-side** motion detectors (MD). The default detector state is *disabled*, meaning that no motion information is received or passed for recording for the target channel. If you are using motion-driven recording profiles, make sure to enable motion detection for the selected channel(s).

 When selecting **camera-side motion detection**, make sure to go to device Web interface to enable and configure motion detector. Settings may vary depending on device manufacturer; also, check with Wavesys Global to make sure hardware motion detection is supported for the target device.

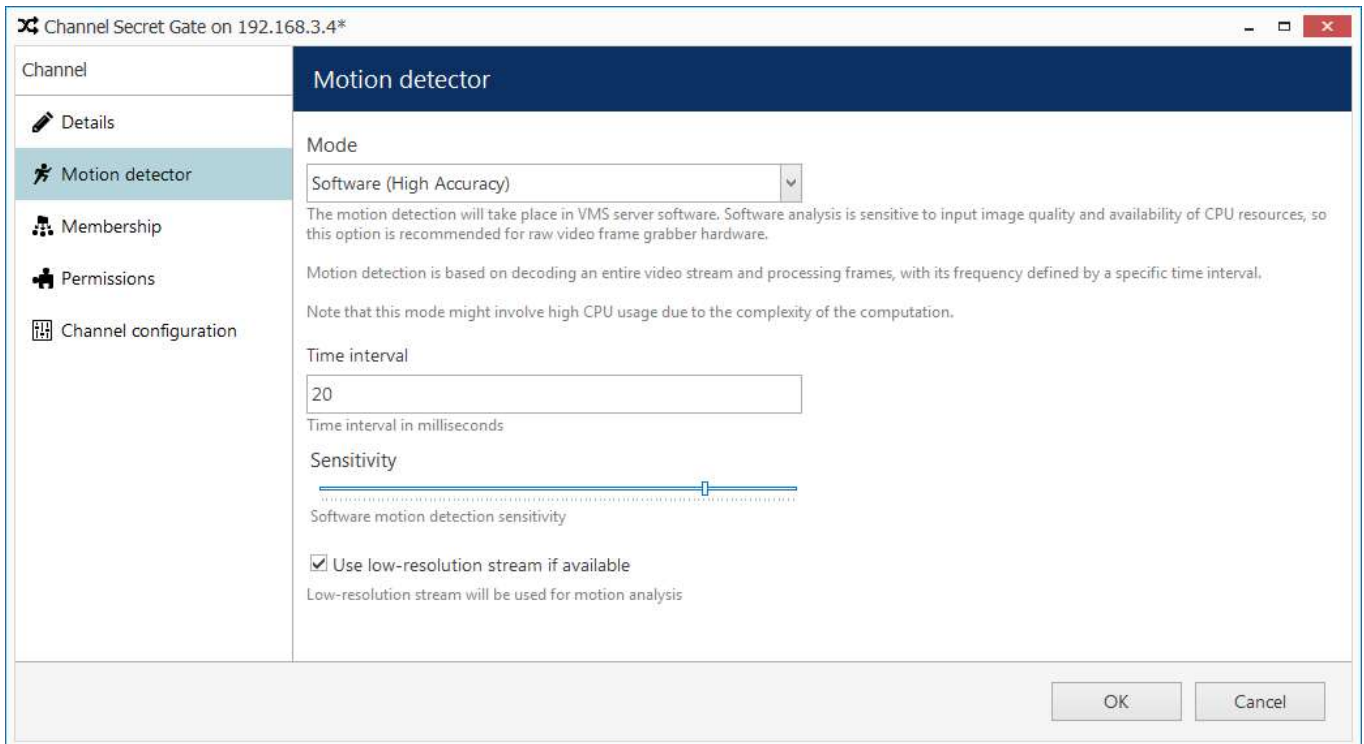
Camera-side motion detection is recommended for most cases for two basic reasons:

- computational load is transferred from servers to devices, decreasing server load, and
- on most devices, hardware-side motion detection is performed on raw video stream, which means superior accuracy compared to software-side detector, as software only gets access to compressed stream.

Software-side motion detector is a preferable choice if:

- legacy devices without MD support are used, or
- there is a necessity to use build heatmaps - in this case, grid-like MD on the software side is helpful.

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Software-side motion detection settings


The motion detector on the software side has two options: high performance and high accuracy:

High Performance mode: this type of analysis is performed for only key frames whose frequency can vary from several frames per second to one frame every few seconds - this is less sensitive for picture quality, but greatly affects detector operation. CPU consumption is significantly lower due to this, and it can be additionally reduced by increasing time interval between two analyzed frames.

High Accuracy mode: this mode performs motion analysis for the whole video stream, so we recommend selecting this option when you want to achieve best detection results. The lower time interval means higher precision. Keep in mind that CPU and virtual memory usage is much greater if this mode is selected.

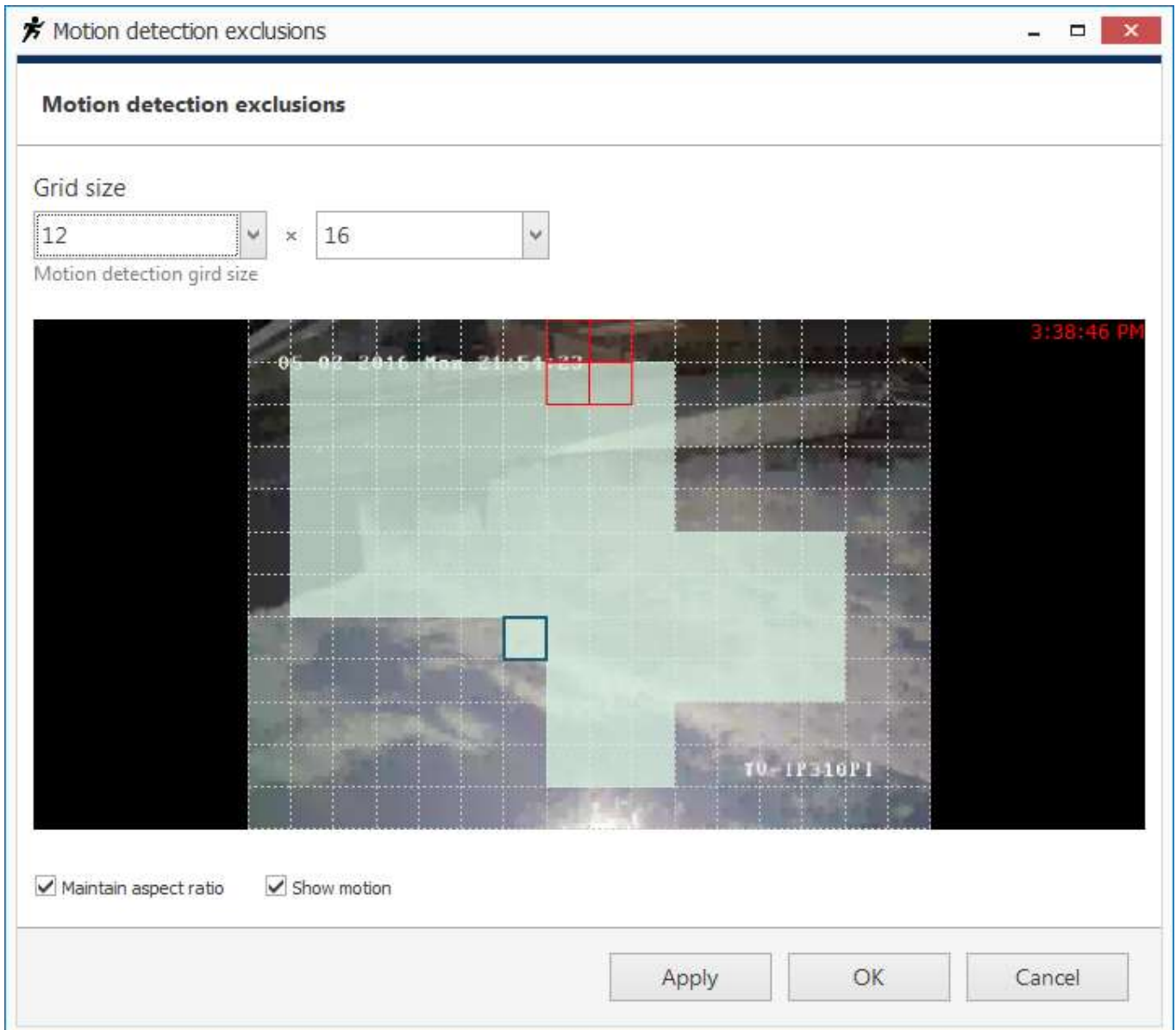
In both modes, the **level of sensitivity** can be adjusted, as can the time interval setting which defines the frequency of frame analysis.

Regardless of which mode you select, you can further decrease the amount of server-side calculations by using a **lower-resolution stream** (if available). For example, if your main stream is 3MP and your substream is D1, the motion detection engine will spend much less system resources on D1 analysis than it would spend on a 3MP image. Note that some cameras deliver lower-resolution streams as cropped high-resolution images (not resized, as it would be expected) - in such cases, using a substream for MD analysis will produce wrong results and therefore doing so is not advisable.

 Most cameras provide second stream as first stream image scaled to fit low resolution; however, some devices crop the centre of a high-resolution image to fit the small frame, and thus the substream picture appears as if it were zoomed in. Keep this in mind when you are using substream for live view and especially for software-side motion detector analysis.

Click the *Motion detection exclusions* button in order to set up **exclusion zones**. Note that these settings only cover the software-side motion detector; in order to configure the exclusions for the camera-side motion detector, go to the Web interface of the target device.

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Set up exclusion zones for the motion detector

First, choose the **grid size** for the detector: this will define the size of the smallest detection region. Minimum grid size is 2x2 cells (resulting in four detection areas), and maximum size is 64x64 cells. Then, mark your desired **exclusion area** simply by clicking and dragging on the viewport; you can **draw** several rectangles to form a complex polygonal area. Exclusion area(s) will be highlighted light green. In order to cancel the selection, simply draw a rectangle over it.

Settings in the bottom are here to ease the configuration process:

- *Maintain aspect ratio*: displays original picture proportions, if selected, or stretches the picture to fill the viewport
- *Show motion*: shows currently present motion, if selected


In order to test the behaviour of the selected grid size, enable the *Show motion* option, then click *Apply* and see how the detector works with your defined grid.


When you have finished, click *OK* to return to the main channel configuration dialog box.

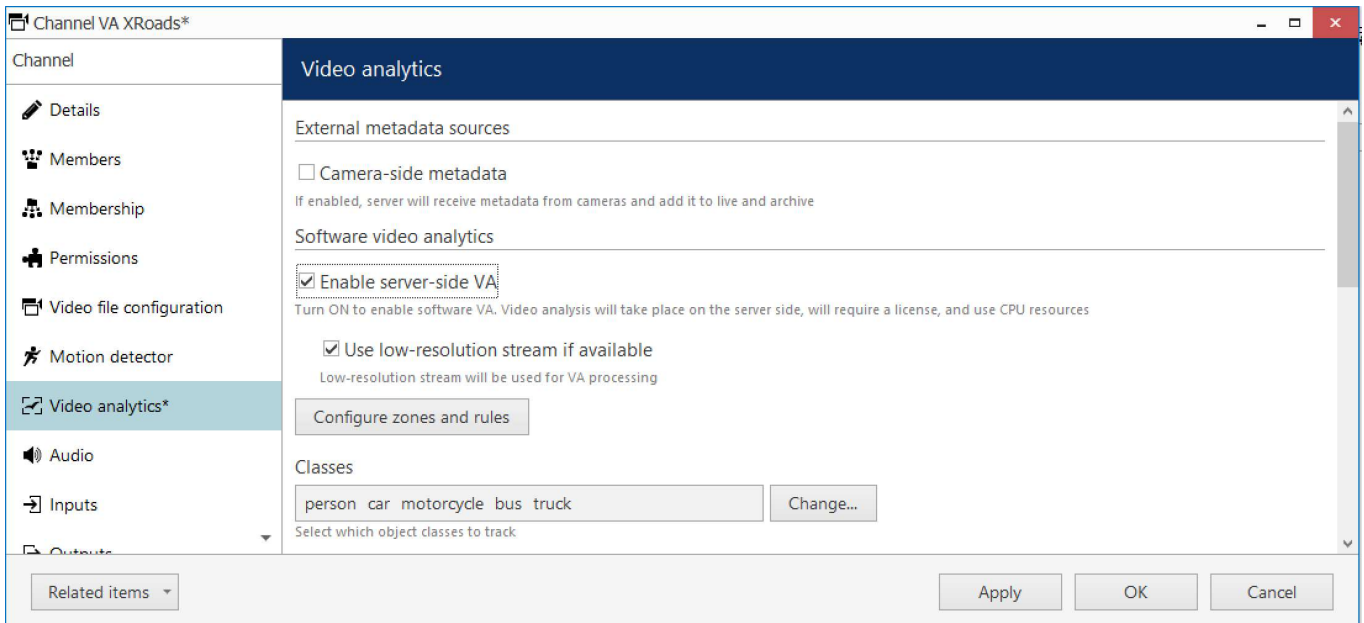
Video Analytics

WVMS servers have a built-in CNN-based engine for the video analysis (VA) with object classification, zones, lines, counters, and rules. In this tab, you can enable and configure the detection parameters for the target channel.

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 You can configure VA without enabling it for the target channel. This may be convenient when you have a limited VA license but still want to pre-configure the detection.

Before enabling VA for the channel, make sure your [VA license](#) allows it. Each WVMS installation included 1 (one) VA channel free of charge. You can check what channels are using VA license by adding the [corresponding column](#) in the Channels section. To do this, click the  grid icon in the upper right corner of Wavesys Console and move the *Video Analytics* column to the list on the left, then click *OK*.



Video analytics tab allows you to enable and set up VA for the target channel

The following sections with settings are available here:

External metadata sources: metadata coming from any source other than WVMS embedded video analytics. This also includes old generation Open VCA (embedded into older WVMS versions).

- **Camera-side metadata:** if enabled, metadata received from the device (edge VA) will be displayed in WVMS Monitor overlaying the video stream, and will also be used for event triggering.

Software video analytics: here, you can enable and configure server-side VA.

- **Enable:** if selected, the server will perform video analysis for the target video channel, and metadata overlay will be turned ON on the side (affects all connected WVMS Monitor applications)
- **Use low-resolution stream if available:** similarly to motion detector, VA can be performed on the secondary video stream in order to save server resources. We recommend that you keep this setting ON.
- **Configure zones and rules:** click the button to enter overlay setup
- **Classes:** click *Change* and choose the object classes that you want to be detected in the target video (deselected classes will be unavailable for rules)
- **Detection interval*:** time (delay) in milliseconds between two successive detections (similar to MD), default: 200ms
- **Object loss timeout:** time interval in seconds, after which the object out of sight will be considered lost (and will be detected as new object if appears again), default: 6 seconds
- **Scene dynamics**:** relative speed of the objects in the scene
- **Confidence threshold:** minimum level of confidence to decide if the object belongs to a class (detections with lower confidence will be disregarded), default: 70%
- **Object similarity threshold***:** the minimal level of object similarity between two detections to decide that it is the same object (objects with lower similarity will be detected as new), default: 85%, optimal range: 50-90%
- **Maximum object size:** percentage of the image height and width that can be occupied by a single object at max. Enable this option to eliminate false detections of large non-existent objects.

*This is the minimum time between two detections. If the video stream FPS is low, the actual interval may be longer.

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**This setting teaches the VA engine where to look for the same object in the next frame. Slower option means the object is present in more frames. Faster means the object is present in less frames during its appearance. Choose slower options for calm scenes with low-speed objects (e.g., people walking), and faster for dynamic scenes (highway etc.).


***Highly affects the engine ability to track the objects. If the value is too low for the target scene, different objects may be considered one. Too high (close to 100) causes each detection to produce a new object each time. We recommend that you start with the default value, and change it slowly when testing. Scenes with many similar objects (e.g., items on the conveyor belt) require slightly higher similarity and correct object speed (see above).

Create VA Zones and Rules

Click the *Configure zones and rules* button to bring up the video overlay dialog box. By default, only VA overlays are displayed, but you can use the *Show all* checkbox to see if there are other overlays (e.g., data sources) configured for this channel.

In the top right corner, there are VA markers: **counter**, counting **line**, and polygonal **zone**. Drag and drop the marker onto the picture to place it, then adjust its size and position.

 Please note that markers are just **visual** elements: you need to add **rules** and then create **E&A rules** to trigger some event chains.

 Zones are rectangular by default but you can add **new nodes** by right-clicking on the zone border and selecting *Add*.

For each **zone** or **line**, you can create rules, which can be later used to trigger events in E&A. For example, such rules can increment counters:

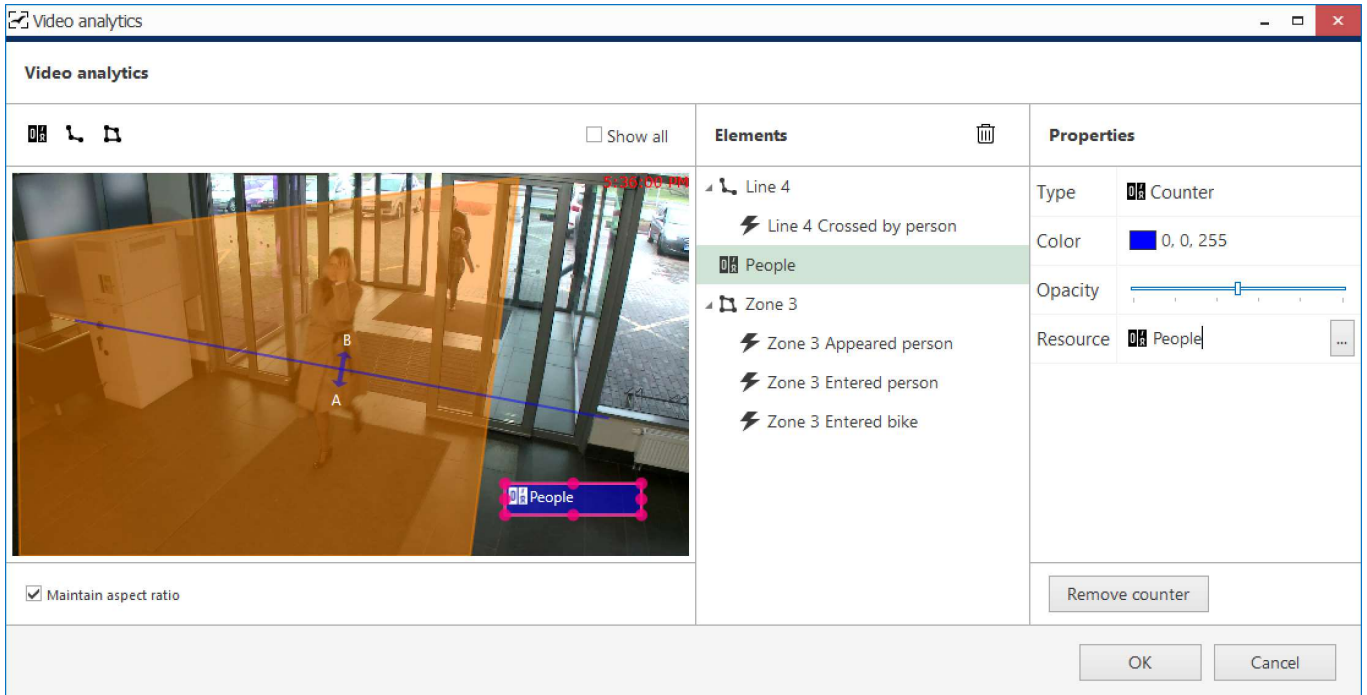
- for reflecting the current number of objects in the zone, use the special *Zone counter type*,
- for other rules, create new counters and then go to the E&A configurator to add rules that will increment those counters.

For each **counter marker** in VA, you will need to map it to a real counter to make it work.

- to **track the number of people in any zone**: create *Zone counter* under the zone, then drag and drop a counter marker, and bind it to the zone counter
- to **count objects** appearances for **lines** or **zones**: create a new counter (or choose an existing E&A counter from the list), then drag and drop the counter marker and bind it to the counter

In such a way, you can use the same counters from E&A for multiple channels' VA, for example, to count the total number of customers coming via different doors.

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Add zones, lines, counters, and rules

For each zone/line rule, you can choose one or multiple **object classes** to be tracked. You can only choose among classes that have been enabled for the current channel in the previous dialog box.

Available **line rules**:

- *Crossed AB* or *Crossed BA*: object has crossed the line in the specified direction
- *Crossed*: object has crossed the line in any direction

Available **zone events**:

- *Entered or appeared*: the object appeared in the zone either by crossing its border from outside to inside, or appeared directly inside (e.g., if the zone border is equal to the frame border, or there is a door inside the zone)
- *Leaved or disappeared*: the object departed from the zone either by crossing its border from inside out, or simply disappeared inside the zone (e.g., there is a door inside the zone)

Available counter types:

- zone counter: reflects the current number of certain objects in the zone
- counter: E&A [software counter](#)

Use the buttons below the objects and their properties to create and remove rules. Note that these rules only exist in VA configuration; in order to set up reactions, go to the [Events&Actions](#) section of Wavesys Console.

VA Configuration Examples

Workflow **example**: count the number of people who entered the zone.

1. Drag and drop a zone marker onto the picture. Stretch the zone and add new nodes to cover the desired area.
2. Click the *New rule* button, then select the *Entered or leaved* event type, and set class to *Person* on the right.
3. Drag and drop a counter marker onto the picture.
4. Click the counter, then click the ... (three dots) button in the properties column on the right and choose a counter. If there are none, create a new one using the *New counter* button below the list.
5. Save the video analytics settings.
6. Go to Events&Actions, create a new event of the *VCA event* type, choose your VA camera as source, and your VA zone event from step 2 as VCA rule. (Note that the rules will not be listed if VA is disabled for the target channel).

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7. Create a E&A rule using the event from step 6 and a built-in action *Increment counter* for the target counter.

Zone counters can only reflect the current number of typed objects in the zone, therefore, these cannot be incremented or decremented.

Example 2: pop up camera if there are 3 people in the zone.

1. Drag and drop a zone marker onto the picture. Stretch the zone and add new nodes to cover the desired area.
2. Click the *New zone counter* button below the zone list. The counter will appear in the same list.
3. Save the video analytics settings.
4. Go to Events&Actions, create a new event of the *Counter value* type. Select the counter you created on step 2 as event source. Set the operator to Equal and value to 3.
5. Create a E&A rule using the event from step 4 and a built-in action *Pop up camera on screen*. Set the desired channel as rule target to define, which camera pops up.

Audio

Here, select the **audio source** for the target channel. The available options are:

- **None:** the channel will have no audio track
- **Internal:** built-in or line-in camera microphone will be used as the audio source (G.711 only!)
- **Attached:** a microphone that is physically connected to the server will serve as the audio source (server must be the one having this channel in its configuration)
 - **Audio source:** select one of the devices from the drop-down list. If the list is empty, make sure that the server has a microphone connected and that it is visible/working in the Windows Control Panel.
- **External:** use audio from another channel. Audio will be combined with the target channel video in both live and playback.

When fetching audio from the device side (**internal** source), make sure to choose the **G.711** codec. Other codecs are not supported at this point, and selecting them may result in unavailable video stream, too, when both video and audio are packed into the RTSP stream.

For audio sources that are **attached** to the server: you can use both line-in microphones, as well as ones connected via audio board, which supports multiple microphones at once. There are three important requirements here:

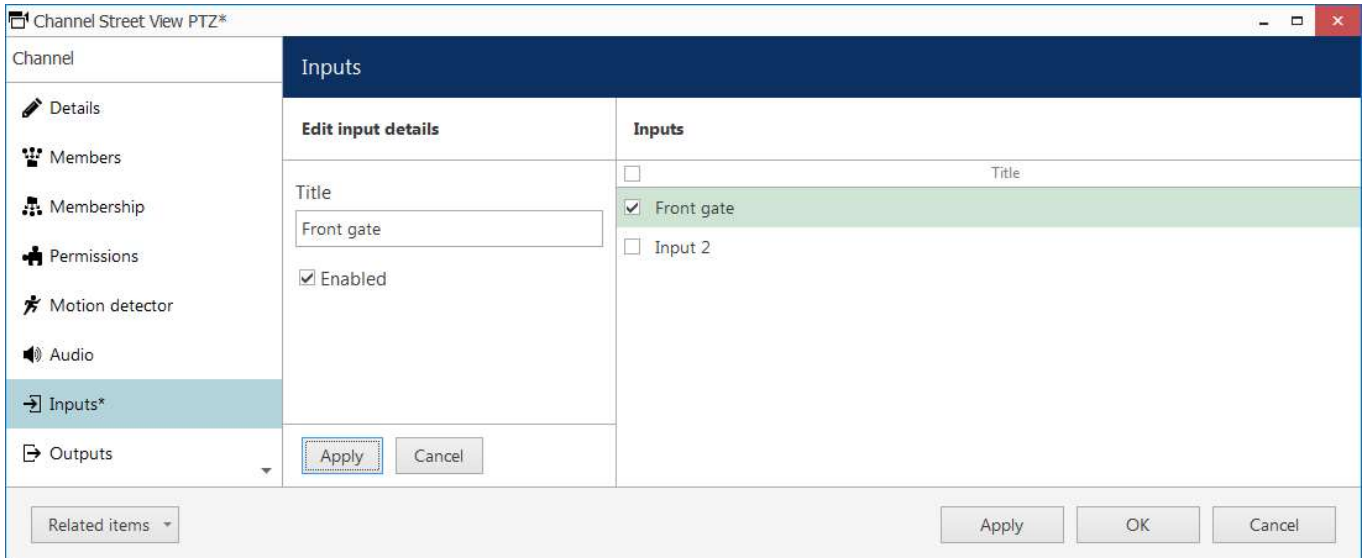
- the target channel and the target audio device must belong to the same server
- the attached audio device(s) must be recognized by the operating system
- the list of audio devices is retrieved live, so the target server must be online for you to apply the configuration

Digital Inputs

If **digital inputs** (DI) are supported for the underlying device, the available inputs will be listed here. Mark them in the list in order to allow event generation from those inputs: events can be later set up in the [E&A Configurator](#) using the *Digital input* event type. After changing the DI name, click *Apply* below for the changes to take effect: the setting will not be saved if you simply switch to another tab.

Note that the tab contents is retrieved in **real time** from the target device, therefore, it may take several seconds for the contents to become available. In case the target device is offline/unavailable, or if there is no support for DI for the selected device model, the list will be empty and a corresponding warning will appear.

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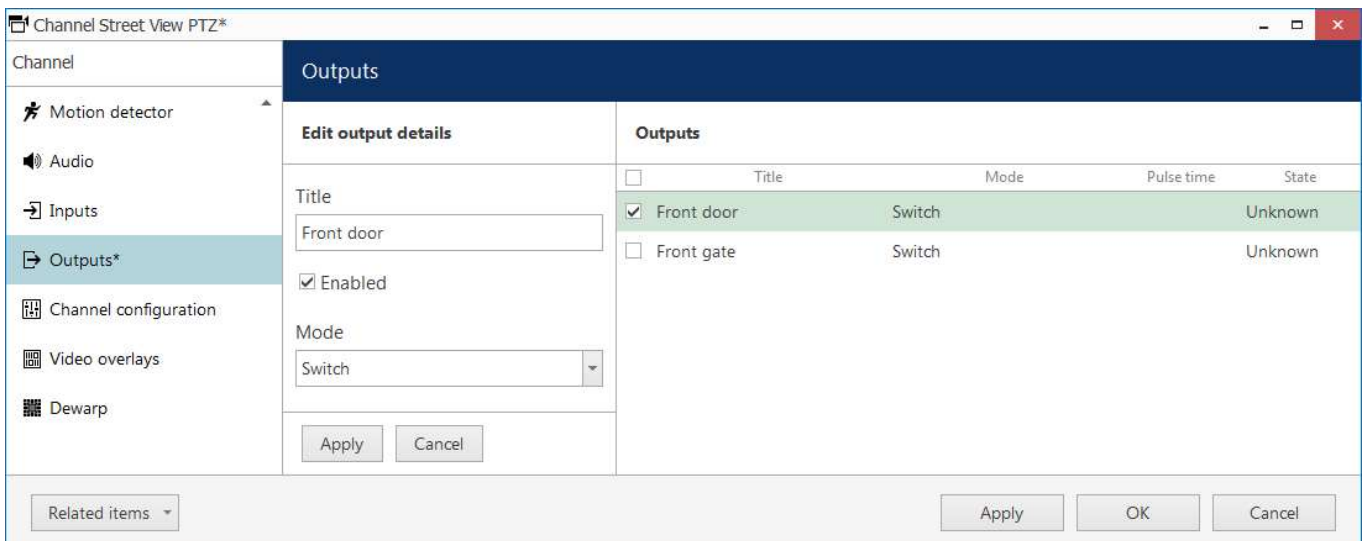
Enable event generation from the camera digital inputs (DI)

Digital Outputs

You can change the state of **digital outputs** (DO) from the [E&A Configurator](#) (target action type: *Control digital output*). For the DO to be available in actions, select them here by putting a mark in the corresponding checkboxes. Optionally, you can also change the DO names. Click the *Apply* button below the output details to save the changes before moving to other settings.

For each relay output, you can also specify the desired **mode**: switch, inverted switch or pulse. This defines the command that will be sent to the device when DO action is triggered in E&A.

Note that the tab contents is retrieved in **real time** from the target device, therefore, it may take several seconds for the contents to become available. If the target device is offline/unavailable, has no DO, or if there is no support for DO for the selected device model, the list will be empty and a corresponding warning will appear. In case your device does have DO but they are not supported by software, you can still change their state from WVMS [E&A](#) by using CGI/HTTP commands (action type: *Send HTTP request* or *Run program*). The exact command text depends on the device and can be found in the device documentation.



Mark relay outputs for further usage in E&A

Video Overlays

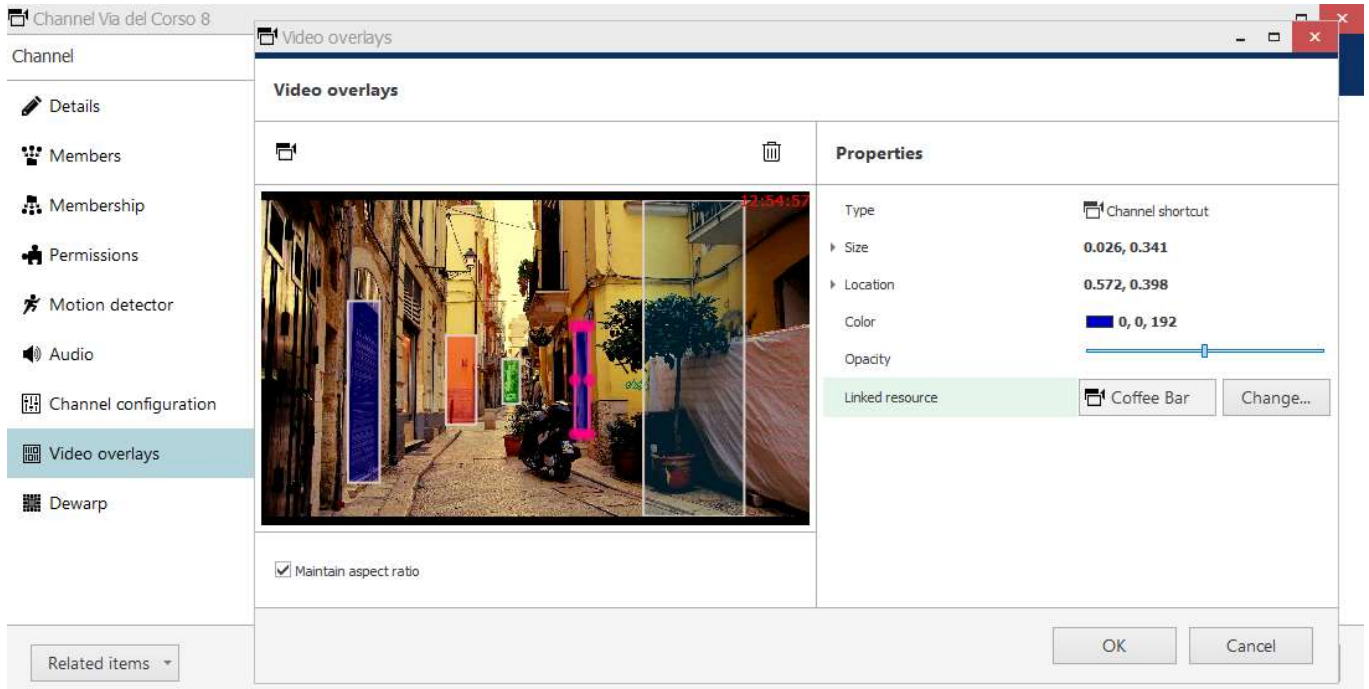
Here, you can create **channels shortcuts** and also choose a data provider to **embed** some **textual data** with the video. The section below explains channel shortcuts; for setup guidelines on the data overlay, please refer to the [Data Sources](#) section of this document. Video analytics visual elements are explained above.

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By default, only channel shortcuts and data source overlays are displayed here. Enable the *Show all* option above the video preview to **see all visual elements** (e.g., video analytics).

Channel shortcuts are interactive video overlay elements intended for instant switching between video channels in the WVMS Monitor application's live view mode. In other words, these are visual controls that appear on top of the video and clicking them will open other (pre-defined) video channels in the same viewport. These "portals" are configured in Wavesys Console and then used in the WVMS Monitor application.

Click the *Configure video overlays* button to bring up the dialog box.



Street view camera with visual shortcuts to other cameras

Start by dragging and dropping a channel shortcut from the panel above the video. A coloured rectangle will appear on top of the video: drag it around and use the visual controls to change its size, and place it where you want the shortcut to be. As the shortcut is a "portal" to another video channel, usual shortcut places are windows, doors, ends of streets or corridors, etc.

Make sure the video from the target channel is available before setting up the channel shortcuts in order to ensure correct shortcut placement.

On the right side of the configuration dialog box, there are **channel shortcut properties**:

- **Size:** visual element size (relative to the viewport size)
- **Location:** coordinates of the top left corner of the visual element in the viewport
- **Colour:** choose the element colour from one of the standard palettes (blue by default)
- **Opacity:** transparency of the visual element, from 100% transparent on the left to 100% opaque on the right
- **Linked resource:** target video channel (mandatory setting)

The **linked resource** is the video channel that will be displayed once the shortcut is clicked by user; it must be defined, otherwise the shortcut does not make any sense and will not be saved. Other settings are optional. The visual element size and location are listed for your reference: it is more convenient to change the rectangle size and position by manipulating it in the viewport. However, you can still change the numbers to adjust the size and position.

To **remove** any unneeded shortcut, select it in the video viewport and click the *Recycle bin* button in the panel above the video.

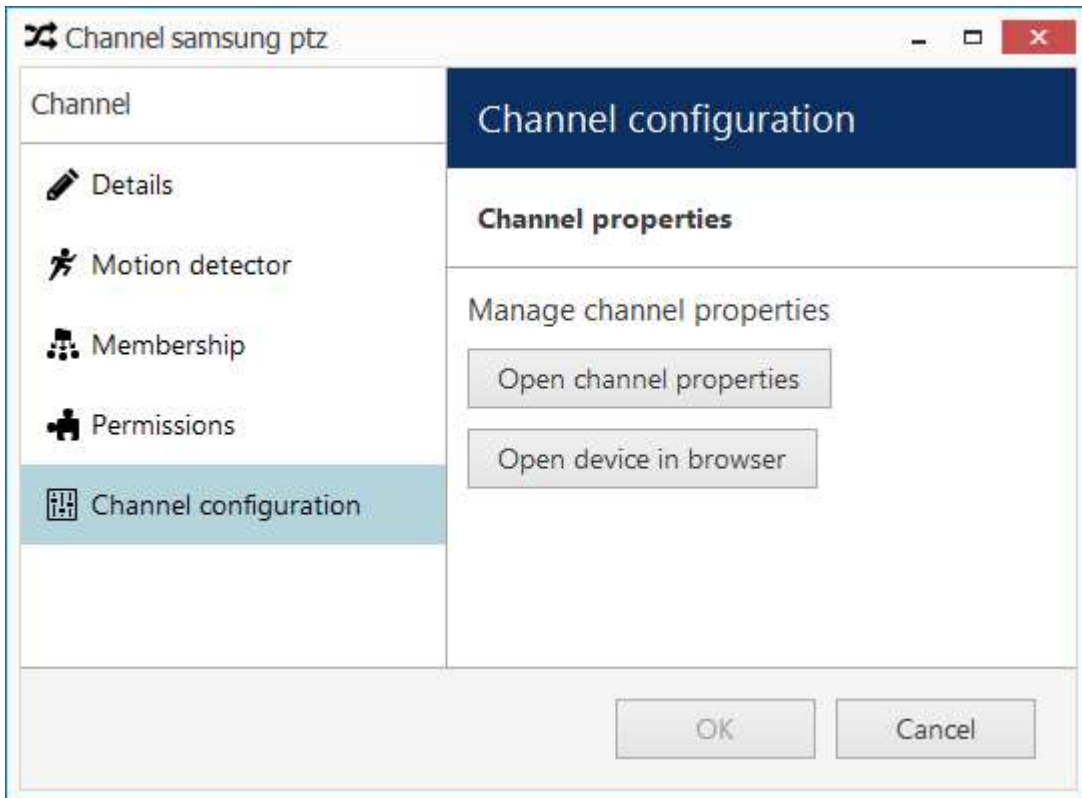
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To **save** the video overlay settings, click *OK* to close the dialog box and then click *Apply* or *OK* in the *Edit channel* dialog box. If you click *Cancel* to discard changes in the *Edit channel* dialog box, adjustments in the video overlays will not be saved.

Channel Configuration

The *Channel Configuration* tab allows you to adjust advanced channel settings. Some of these can be changed via Wavesys Console but sometimes software does not cover some of the device settings, so you are also given the option to go straight to the device Web interface - simply click the *Open device in browser* button to do this.

For ONVIF channels (if device model is set to (Generic) ONVIF Compatible), there is an option to set up **imaging settings**: the corresponding button will appear next to the *Channel properties* button. Please see below for more details.



You can open the target device in browser or go to the software provided settings dialog box

Click *Open channel properties* to access the additional channel configuration dialog box. The available tabs depend on the device model and capabilities: for some cameras, only basic configuration options are present, while for others, advanced settings are accessible. If you see that a camera has certain capabilities that are not configurable via Wavesys Console configuration interface, go to the device's Web interface in order to change that specific setting.

- **Video Input tab:** set video transport (the available list of options depends on the device type and model; common types include HTTP, RTSP* and native transport)
- **Video Adjustment tab:** fine-tune picture settings such as brightness and contrast level
- **Substream tab:** enable second (lower resolution) stream; some integrations also support stream settings
- **Video Configuration tab:** choose streaming settings**
- **Motion Detection tab:** with some devices, the camera-side motion detector must be explicitly enabled here
- **External PTZ tab:** adjust external PTZ controller settings; communication port must match the communication port that the RS232/485 controller is connected to, and baud rate has to match the baud rate of your PTZ controller/analog PTZ camera
- **RTSP tab:** appears if RTSP transport type has been chosen; set **RTSP port** and mode (TCP/UDP/multicast***) here

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*You may have to specify the RTSP port on the corresponding tab if it differs from default (port 554 is default for most devices). To do this, select the RTSP transport type and then click *Apply*: as a result, the RTSP tab will become available. For ONVIF devices, the RTSP port is set automatically.

**Remember, the higher the resolution/bitrate/quality/frame rate you set, the more storage space and bandwidth it will use when recording. These settings also affect CPU/virtual memory resource consumption for live video and software-side motion detection.

***Multicast mode availability depends on device integration.



Note that a valid administrative account login and password for the camera should be provided in *Device* settings in order to access and set the device configuration.

Imaging Settings

For ONVIF device channels, it is possible to adjust the image settings like brightness, saturation etc. To access these settings, open the channel for editing, choose the *Channel configuration* tab, then click the *Open imaging properties* button.

Adjust the settings, then click *Apply*. If you like the result, click *OK* to close the dialog box and exit.

Use the *Reset* button to revert the latest changes. If you save the changes and close the window, next time you open it Wavesys Console will treat the previous settings as default and will reset to them (and not some other set of values). To reset the imaging settings to the factory defaults, use the camera Web interface.

Setting	Value
Focus mode	AUTO
Focus default speed	1.00
Focus near limit	0.00
Focus far limit	0.00
Brightness	59.00
Color saturation	79.00
Contrast	88.00
Sharpness	81.00

Use the low resolution stream for image preview to compare the pictures and make sure the applied imaging settings look good on both streams (e.g., make sure important elements are visible).

Dewarp


Here, you can configure generic [dewarp settings](#) or enable dewarp engine for the Panomorph Enables® lens. For details, please see the subsequent topic on dewarp setup.

Video Configuration

This tab is only available for certain device drivers like ONVIF. For other devices, go to the *Channel Configuration* tab (described above).

Here, you can select stream properties for both **main** and **secondary** video streams. The options are fetched from the device so the availability may differ depending on the vendor.


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 The settings are changed on the device side, too, so make sure the target device is not configured in some other video management software in order to avoid configuration conflict.

Available settings:

- **Profile:** choose one of the video stream profiles (built-in or pre-configured on the device side)
- **Encoding, resolution, quality, GOV length*, frame rate, bitrate, bitrate mode:** choose one of the available settings according to your needs

By default, camera-side settings are used (whatever is currently set on the device side). You can override all settings or only some of them.

 Note that a valid administrative account login and password for the camera should be provided in *Device* settings in order to access and set the device configuration.

*Too long GOV intervals (hence, low i-frame rate) may cause recording and **playback issues**. Channels with too low i-frame rate will have a warning (orange colour) in the *Monitoring* section of Wavesys Console, under *Channels*. To view this column, click the grid icon  in the upper right corner and move the columns *Main stream GOP size* and *Substream GOP size* to the left, then click *OK*.

RTSP Configuration

This tab is only available for certain device drivers like ONVIF. For other devices, go to the *Channel Configuration* tab (described above).

By default, the **default port of 554** is used for obtaining video over RTSP. Here, you can **override** the default port, and also choose between unicast and multicast.

Edge Configuration

This tab is only available for certain device drivers like ONVIF. For other devices, go to the *Channel Configuration* tab (described above).

For some devices, WVMS can fetch the recording done on the device side (on camera SD card). This tab contains some settings related to the edge stream synchronization.

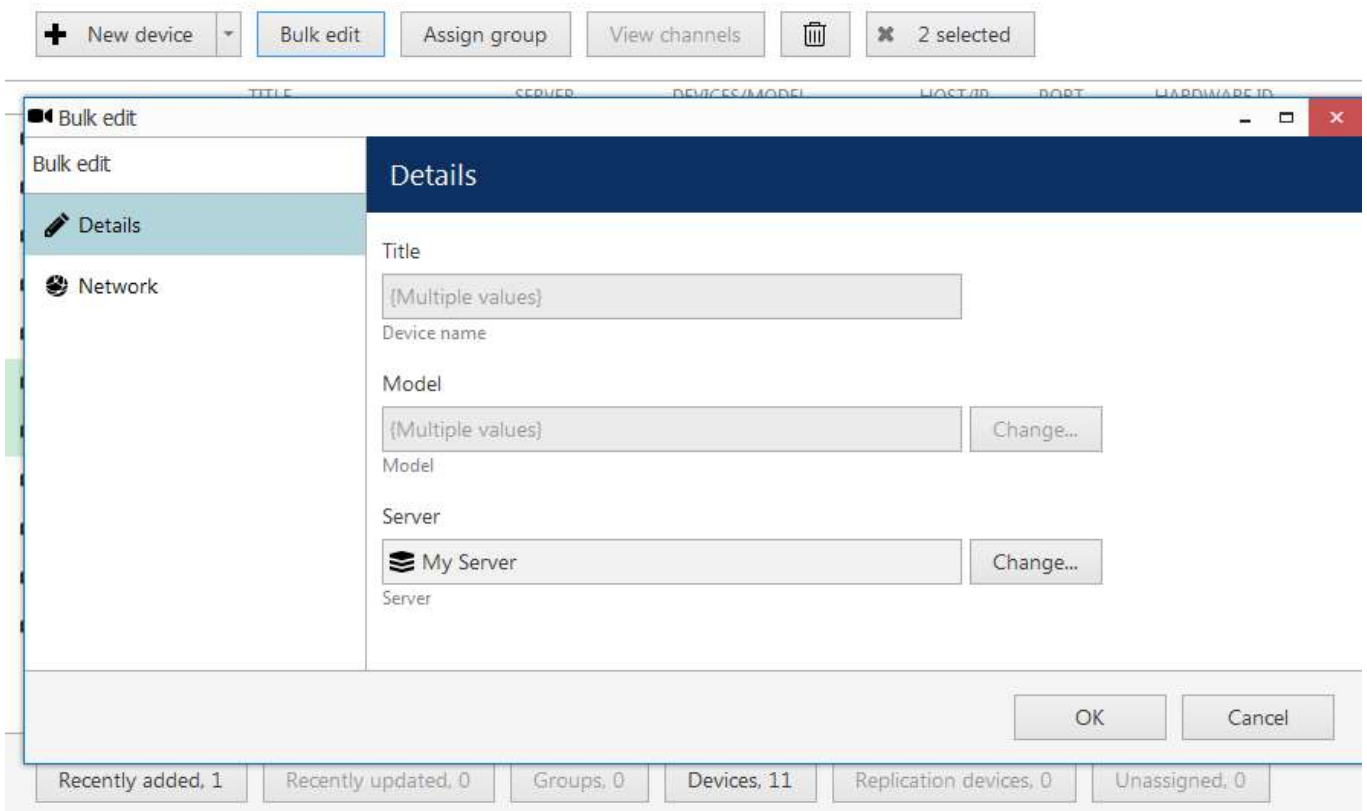
32 Bulk Edit for Devices and Channels

For easier resource management, it has been made possible to edit certain settings of devices and channels, e.g., recording settings and motion detection, for multiple items at once. To do so, simply select more than one device or channel in the item list using CTRL+click or Shift+click (use CTRL+A to mark all) and then click the *Bulk Edit* button on the top panel. Note that the button will not be there unless at least two items are selected.

- Some settings will be grayed out, indicating that these either cannot be changed at all or specifically via bulk edit
- *{Multiple values}* text in the setting field indicates that selected items have different options, e.g., have different recording configurations
 - leave such a field untouched if you wish to keep these settings different
 - change the value of such a field to something specific using the *Change* button to assign the same setting to all selected items
- Fields containing specific values or empty fields indicate that all selected items have the same setting (often default); change the value to assign the setting to all items at once

Edit Multiple Devices

Select at least two devices in the list and click *Bulk Edit* on the top panel to bring up the corresponding dialog box. Some settings will be grayed out, indicating that these settings either cannot be changed at all or specifically via bulk edit.



Edit multiple devices using bulk edit

For devices, you will be able to modify the following settings:

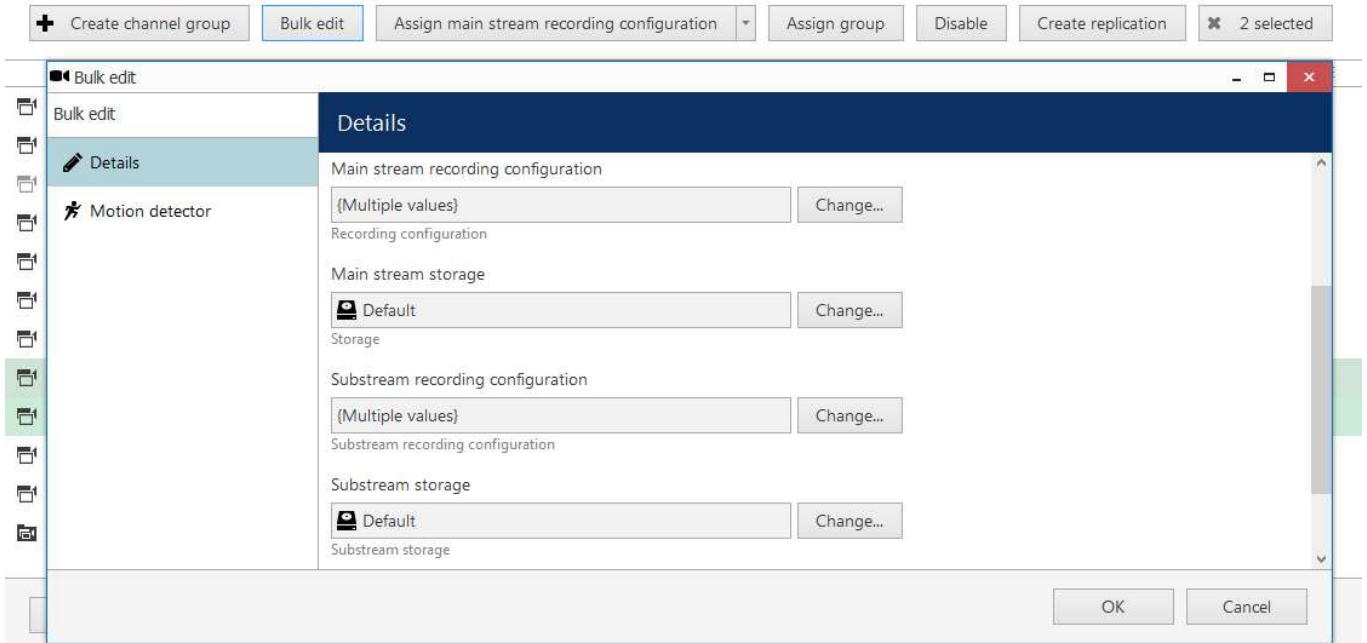
- *Details* tab:
 - **Server:** the server where the devices belong
- *Network* tab:
 - **Port:** HTTP port to connect to the device (for IP devices)
 - **Username and password:** user credentials to log in with

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When done, click *OK* to save and close the dialog box: the settings will be applied to all the selected devices.

Edit Multiple Channels

Select at least two channels in the list and click *Bulk Edit* on the top panel to bring up the corresponding dialog box. Some settings will be grayed out, indicating that they either cannot be changed at all or specifically via bulk edit: for instance, it is impossible to change the title field this way, as each channel normally has its own name, which therefore should be edited for each channel individually.



Edit multiple channels using bulk edit

For channels, the following settings can be changed via bulk edit:

- *Details* tab:
 - **Organisation***: the organisation the channel belongs to
 - **Main stream recording configuration**: default recording setting for the main stream
 - **Main stream storage**: main stream recording destination
 - **Substream recording configuration**: default recording setting for the secondary stream, if available
 - **Substream storage**: secondary stream recording destination
 - **Edge** recording configuration**: set *Continuous Recording* here for proper operation
 - **Edge** storage**: recording destination for the footage fetched from the device
 - **Video lost time**: timeout for streams absence, after which the video stream is considered lost and the corresponding event is raised in the E&A engine
- *Motion detector* tab:
 - **Mode*****: choose between camera-side or software-side (high performance or high accuracy software modes available) motion detection

*Wavesys WVMS Enterprise edition only

**Only for channels coming from ONVIF devices

***You will find more details on the motion detection modes in the *Channel Configuration* topic

When done, click *OK* to save and close the dialog box: the settings will be applied to all the selected channels.

33 Configure Recording Profiles


This topic describes how to create and configure stream recording profiles. For global server storage settings, please see the [Storage](#) section of this document.

To access recording configuration dialog boxes in Wavesys Console, select the *Configuration* section and choose *Recording* in the menu on the left.

There are three types of resources in the *Recording* setup:

- **profile**: choose what data streams are recorded and in what mode (continuous/alert triggered)
- **schedule**: set a recording timetable based on profiles
- **configuration**: profile- or schedule-based recording configuration to be assigned to channels

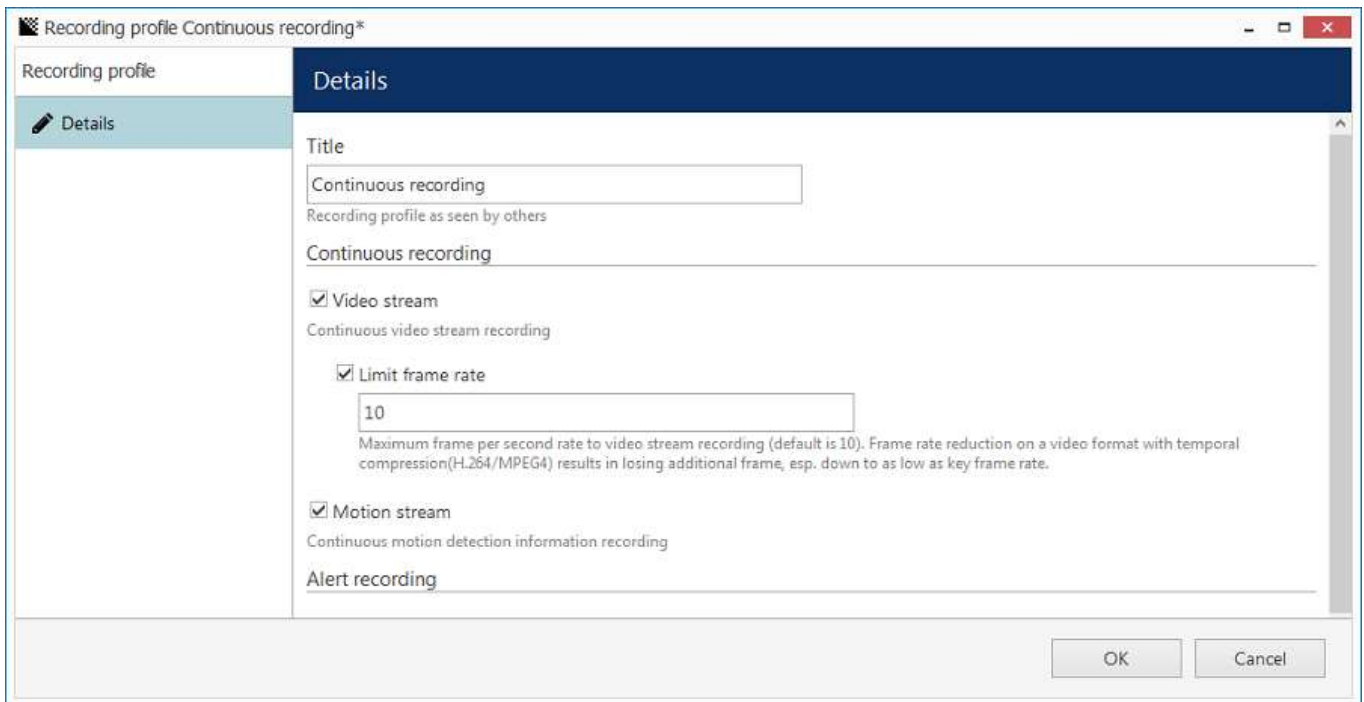
Buttons on the upper panel give the option to create, edit and remove recording resources.

 Recording resource cannot be deleted if it is currently in use, i.e., when a recording profile is assigned to a recording configuration or a schedule, or when any of the recording resources are assigned to a channel.

Create Recording Profile

Recording profiles allow users to set which data streams are recorded and how. Profiles cannot be assigned directly to devices; rather, these are used as components for recording schedules and recording configurations. For this reason, profiles do not include such settings as pre-recording interval: this setting is defined per-channel and, therefore, is set in the recording configuration.

To add a new recording profile, click the down arrow button near *New recording configuration* and select *+ New recording profile*. The profile creation dialog box will appear.




Recording profile properties

The dialog box has two sections: for continuous and event-driven recording. Note that you only can select one mode at a time: if continuous recording is selected, alert-based recording options will be greyed out.

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To configure **motion-based recording**, enable *Video stream* in the *Alert recording* section and enable *Detected motion triggers alert* setting. If you wish to record still frames at low rate during non-motion period, keep the *Video stream* option in the *Continuous recording* section enabled and set your desired frame rate - e.g., 1FPS - then set high FPS or no limit in the *Alert recording* section. If you only wish to record while motion is present, deselect the *Video stream* option in the *Continuous recording* section.

 When you assign a **motion-based recording configuration** to a channel with a disabled motion detector, the software will automatically suggest enabling motion detection for the target channel. The camera-side detector is given priority; if it is not available, the software-side detector will be enabled and set to the high-performance mode. We recommend that you **review** the motion detector settings to make sure it operates as desired, especially if the camera-side detector is in use.

Setting	Description	Default Value
Title	User-defined recording profile name	[empty]
Video stream (continuous)	Select to enable continuous video recording	Disabled
Limit frame rate (for continuous video recording)	Set frame rate restriction for recorded video; note that for compressed video streams (e.g., H.264) actual frame rate may differ due to compression algorithms	10 FPS
Audio stream (continuous)	Select to enable continuous audio recording	Disabled
Data stream	Select to enable data recording from the associated the data source	Disabled
VCA stream	Select to enable continuous video analytics event recording	Disabled
Video stream (alert)	Select to enable alert-driven video recording; video will only be recorded after alert generation, for the time period defined in the <i>Post-recording interval</i>	Disabled
Limit frame rate (for alert video recording)	Set frame rate restriction for recorded video; note that for compressed video streams (e.g., H.264) actual frame rate may differ due to compression algorithms	10 FPS
Post-recording interval	The time period during which alert-driven recording will be conducted after alert generation	10 seconds
Detected motion triggers alert	Motion will act as a trigger for recording; enable this setting to set up motion-based recording	Disabled

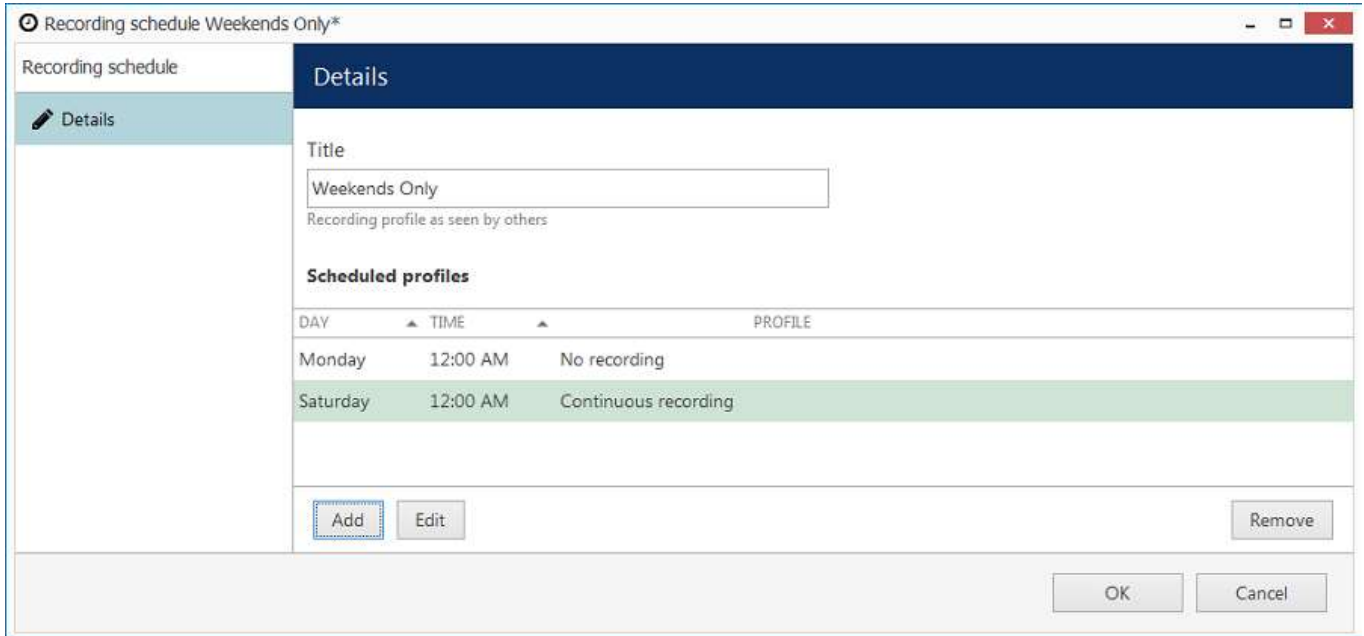
When done, click *OK* to save recording profile: it will appear in the item list of the *Recording* section. The profile is now ready for further configuration.

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Create Recording Schedule

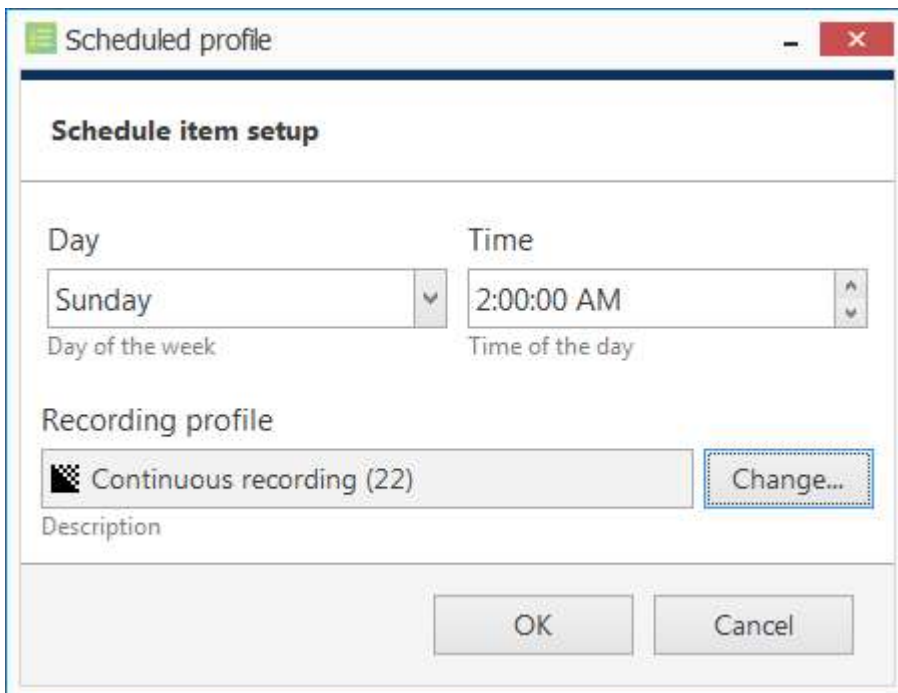
Recording schedules are sets of recording profiles that define what recording profiles are used depending on the day and time of the week.

To add a new recording schedule, click the down arrow button near + *New recording configuration* and select + *New recording schedule*. The schedule creation dialog box will appear, allowing you to enter a user-defined name for the new schedule and add multiple profiles to define recording behaviour.



Recording schedule properties

Click the *Add* button below to insert a new profile with defined start time.



Add a profile to the recording schedule

Note that only begin time is set for each added profile: the end time is determined by the start time of the next profile. For example, if you require continuous recording during weekdays and motion-driven recording during weekends, your continuous recording profile should be scheduled to start on Monday at 12 a.m. and motion-driven one - on Saturday at 12 a.m..

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Click *OK* to save and add the profile to the schedule. Multiple profiles will be automatically sorted based on their start time.

Use the *Edit* and *Remove* buttons below to manage the profiles added. When you are finished, click *OK* to save; the newly created schedule will be added to the item list in the *Recording* section.

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Create Recording Configuration

Recording configurations are global recording arrangements that can be assigned to a per-channel recording setup. Recording configurations can be based on a single recording profile or on a pre-defined recording schedule.

To add a new configuration, click the down arrow button next to + *New recording configuration*.

The screenshot shows a window titled "Recording configuration Weekends*" with a "Details" tab selected. The configuration fields are as follows:

Field	Value	Description
Title	Weekends	Recording profile as seen by others
Controlled by	Weekends Only (120)	Profile or schedule
Prerecording interval	10	Time interval to keep recording before alert was signalled in seconds (default is 10)
Amount quota (GB)	0	Maximum amount of data to be kept in stored archive
Duration quota (days)	5	Number of days to keep stored in archive footage

Buttons for "OK" and "Cancel" are located at the bottom right of the dialog.

Recording configuration dialog box

The corresponding dialog box will then appear, allowing you to enter the configuration properties.

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Setting	Description	Default Value
Title	User-defined recording configuration name	[empty]
Controlled by	Choose existing recording profile or schedule for current configuration or create a new one from the sub-dialog	[none]
Pre-recording interval	Set the pre-recording interval for alert-driven recording, if applicable; note that large pre-recording interval will increase virtual memory usage - if the used profile is not alert or motion driven, set 0 here to decrease memory usage. Maximum value accepted by server is 60 seconds .	10 seconds
Amount quota	Storage quota in GB: the maximum amount of space that can be taken up by recordings on each storage, if the maximum size is reached, the oldest footage will be deleted; set 0 to disable any limitations	0 (unlimited)
Duration quota	Duration quota in days: the maximum number of days that recordings are kept in the archive on each storage; after this, recordings will be erased; set 0 to disable any limitations	0 (unlimited)

Before setting recording limitations, make sure there is sufficient space in the server storage for all cameras. The quotas may be ignored if actual storage size is insufficient, and this will result in shorter footage durations.

Note that maximum the **pre-recording** time is 60 seconds. Larger values will be ignored by server core. Also, actual pre-recording buffer may be smaller if the server detects that it is not required (see below). The **actual buffer size** in seconds will be displayed in the *Monitoring* section, under *Streams*. It may differ from your pre-recording setting in the recording configuration. WVMS server applies smart logic here and traces situations when larger buffer is not necessary, or even preventing the system from normal operation. Thus:

- if the currently used recording profile does not involve any pre-recording (e.g., *Continuous recording*, or event-driven with no defined E&A events), the buffer size will be reduced to 0 - this is absolutely normal, once you add any recording-triggering events, WVMS will automatically increase the buffer size
- if there is not enough memory for all channels (the server is overloaded), the server will reduce pre-recording buffers; channels with largest frame cache size will have their buffers reduced first of all
- upon server startup, the buffer size is increased gradually for smoother start

If your pre-recording buffer size requires more memory than there available, you will see channels with top buffer size (in MB) appear marked red and with an * (asterisk) in the *Monitoring* section, under *Streams*. Also, the *Audit* section of Wavesys Console will contain events from the corresponding server stating that there is *Not enough memory to process frames*. If this happens regularly, review your server hardware using Wavesys Global provided hardware calculator and add more RAM to your server, or decrease the pre-recording interval duration wherever possible.



Note that quotas do **not** give priority to channels that are assigned configuration. For example, if you set the duration quota to ten days, it merely means that the maximum recording duration will be ten days for a channel with given configuration; this will **not** reduce recording duration for other channels.

When you have finished, click *OK* to save and exit. Recording configuration will now be added to the item list and will become available in channel recording configuration.

34 Assign Recording Configurations

Recording configurations can be assigned to channels and channel groups to define how data streams are recorded. There are several ways to assign a recording configuration:

- when using device autodiscovery: via *Found channels* tab (automatically discovered channels are assigned the *Continuous recording* configuration by default)
- when creating multiple devices: from multiple channel creation dialog box, *Channel settings* tab (manually added devices are set not to be recorded by default)
- after adding a single device manually: via *Channels* section, *Edit channel* dialog box, *Details* tab (manually added devices are set not to be recorded by default)
- for existing channels, per channel: via *Edit channel* dialog box, *Details* tab
- for existing multiple channels: via *Channels* section, using *Assign recording configuration* button on the upper panel

Topic body below explains how to assign configurations via main Wavesys Console window (latter option). All the rest alternatives are similar: you are offered configuration selection list at once from corresponding setup window.

Enable Recording

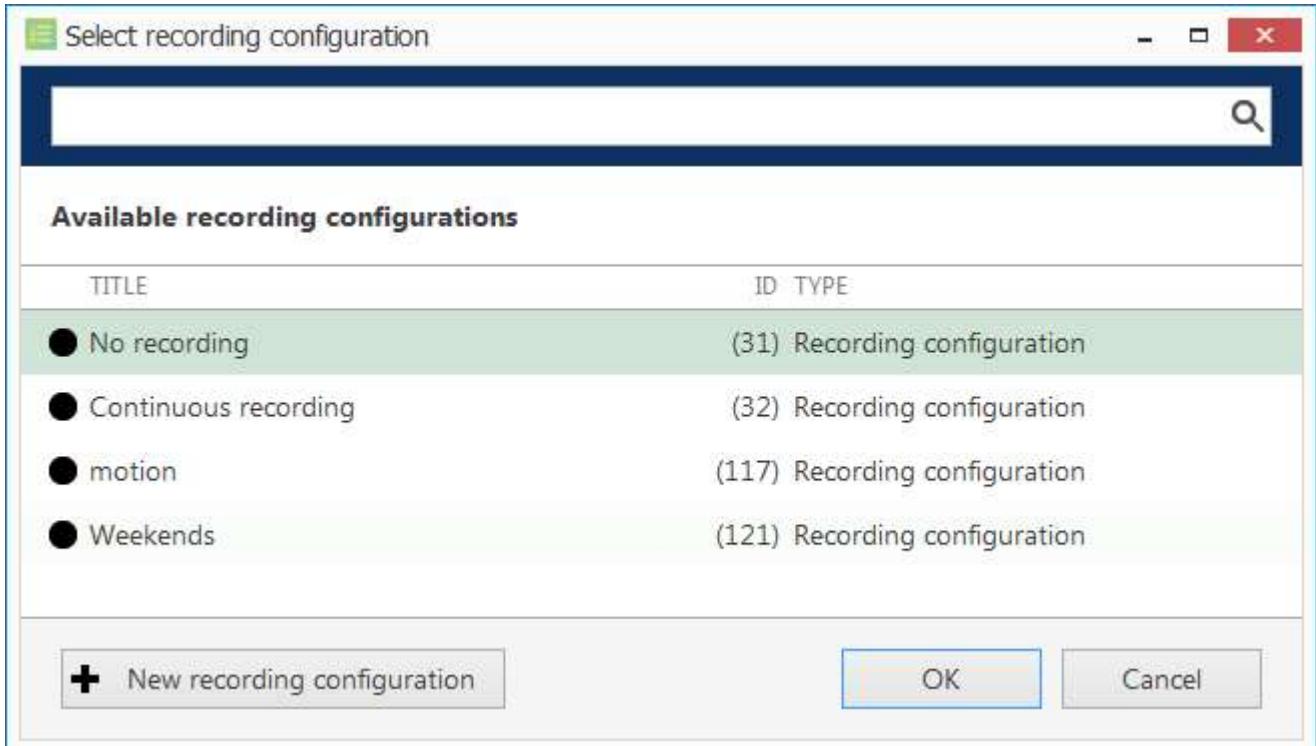
The screenshot displays the 'Configuration > Channels' interface. On the left, a navigation menu includes Servers, Users, Devices, Channels (selected), Recording, and Layout templates. The main area features a table of channels with columns: TITLE, ID, DEVICE, and IP. The table lists various camera models like ONVIF Compatible, Asoni CAM613, Grundig GCI-G1536F, Grundig GCI-K0622D, Grundig GCI-K1627D, Vivotek FD8154, and Vivotek IP7131, along with a 'First Floor' entry. Above the table, there are buttons for '+ Create channel group', 'Edit', 'Assign group', and 'Assign recording configuration'. A '4 selected' indicator is present. Below the table, a summary panel shows: 'Recently added, 1', 'Recently updated, 5', 'Groups, 1', 'Channels, 8', 'Replication channels, 0', and 'Detached, 0'.

TITLE	ID	DEVICE	IP
(Generic) ONVIF Compatible ...	(106)	(Generic) ONVIF Compatible ...	192.168.3.33
Asoni CAM613 on 192.168.3....	(104)	Asoni CAM613 on 192.168.3....	192.168.3.47
Asoni CAM613 on 192.168.3....	(105)	Asoni CAM613 on 192.168.3....	192.168.3.47
Grundig GCI-G1536F on 192....	(114)	Grundig GCI-G1536F on 192....	192.168.3.214
Grundig GCI-K0622D on 192....	(113)	Grundig GCI-K0622D on 192....	192.168.3.215
Grundig GCI-K1627D on 192....	(116)	Grundig GCI-K1627D on 192....	192.168.3.216
Vivotek FD8154 on 192.168....	(115)	Vivotek FD8154 on 192.168....	192.168.3.212
Vivotek IP7131 on 192.168.3....	(112)	Vivotek IP7131 on 192.168.3....	192.168.3.211
First Floor	(122)		

Select the channels that are subject to recording configuration changes

In Wavesys Console, choose *Configuration* section and select *Channels* from the menu on the left. Select one or multiple channels and/or channel groups (use *CTRL+click* or *Shift+click* to select several items at once) and then click the *Assign recording configuration* button on the upper panel. The list of available configurations will appear.


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Choose a recording configuration for the channels selected

Note that you can only directly assign **configurations**, not profiles or schedules. Configurations are based on profiles or schedules (sets of profiles); please refer to the *Configure Recording Profiles* section of this document for details.

Click the + *New recording configuration* button below to create additional configurations from existing profiles/schedules at this point.

 When you assign a **motion-based recording configuration** to a channel with a disabled motion detector, the software will automatically suggest enabling motion detection for the target channel. The camera-side detector is given priority; if it is not available, the software-side detector will be enabled and set to the high-performance mode. We recommend that you **review** the motion detector settings to make sure it operates as desired, especially if the camera-side detector is in use.

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Recording configuration Weekends*

Recording configuration

Details

Details

Title

Weekends

Recording profile as seen by others

Controlled by

Weekends Only (120) Change...

Profile or schedule

Prerecording interval

10

Time interval to keep recording before alert was signalled in seconds (default is 10)

Amount quota (GB)

0

Maximum amount of data to be kept in stored archive

Duration quota (days)

5

Number of days to keep stored in archive footage

OK Cancel

Add new recording configuration


Press *OK* to save and go back to the channel list: newly created recording configuration will be automatically assigned to channels previously selected.

Disable Recording

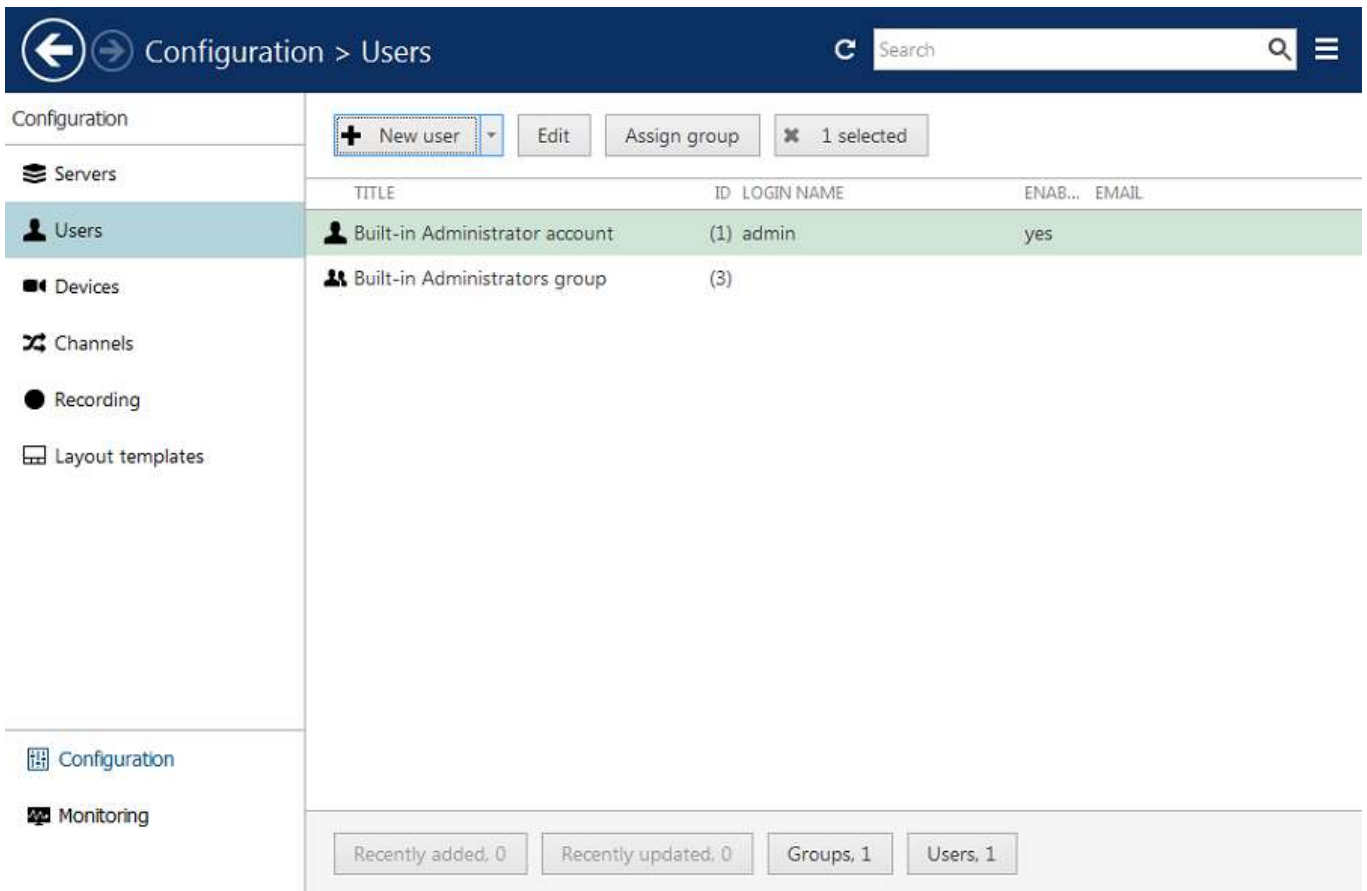
To disable recording for any channel(s), choose the *No recording* configuration, which is present in the list by default. If you have deleted it, simply create a new recording profile without any streams selected for recording and then create a recording configuration for this profile.

35 Add Users and User Groups

User management is accessible via the *Users* component of the *Configuration* section. By default, the system already features a built-in global Administrator account and built-in Administrators group.

 The built-in Administrator user account and built-in Administrators group are root users with access to absolutely all the available resources. As a result, resources choice is unavailable for the Administrators group, and it is also impossible to add Administrator user to any other group.

Any users added as members to the built-in Administrators group will have the same full authority as root users.



TITLE	ID	LOGIN NAME	ENAB...	EMAIL
Built-in Administrator account	(1)	admin	yes	
Built-in Administrators group	(3)			

Configuration -> Users

Add Users

Click the + *New user* button on the upper panel to bring up the configuration dialog box.

Details

Enter user login information here.

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Enter user details


The table below details the available settings.

Setting	Description	Default Value
User login name	Alphanumeric user name for login, no spaces allowed	empty
Active	Allow the user to log in via Wavesys Console and WVMS Monitor: any users who have been disabled will not be able to use software	Enabled
User full name	User full name	empty
Email address	User email address used for notifications	empty
Set/new password	Enable to enter a password and re-enter it to make sure no typos were made; mandatory when creating a new user	empty
Password never expires	User will not be prompted to change his password once in a while; enable this to ensure a permanent password for this user account (this setting can be overridden by the <i>User must change password..</i> setting in the same dialog box); otherwise, password will expire after the number of days specified in the server security policy	Disabled (not selected)
User must change password at next logon	User will be prompted to change his password upon his next logon attempt; enable this if you want to force user change the password even if his password is set to never expire	Disabled (not selected)
User cannot change password	Enable this to prevent the user from changing his password; this option is not available if user password is not permanent or if you have selected to force user change their password at next logon using the settings above	Disabled (not selected)
PTZ Priority	0 = lowest, 10 = highest	5
Override default limit of simultaneous	Maximum number of simultaneous connections allowed from this user account; the setting has priority over server-defined limitations; 0=unlimited	Disabled (not selected)

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connections

 Deleting a user also removes all the settings related to that user; restoring these may be time-consuming. Use the *Active* setting to enable/disable users and temporarily block access for those.

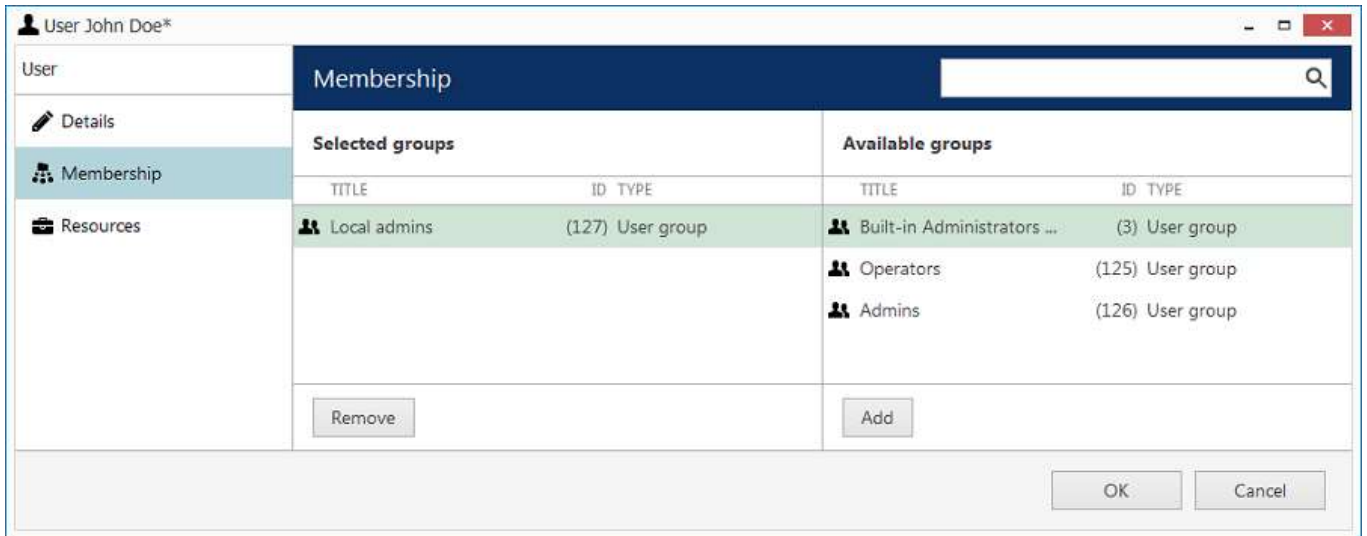
 If two or more users try using PTZ control of a device at the same time, **PTZ priority** is used to decide who gains access first: user with a lower priority is blocked for ten seconds to allow a higher-priority user to use PTZ. If two users with the same PTZ priority have an access conflict, they will be both granted PTZ access simultaneously.

Default PTZ priority for all users, including those built-in and imported, is equal to five (medium priority). You can assign any user a higher PTZ priority (six to ten) or a lower one (four to zero) by editing individual user properties.

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Membership

Choose which groups you want the selected user to be a member of. Every user can participate in one or multiple groups, depending on the system structure.



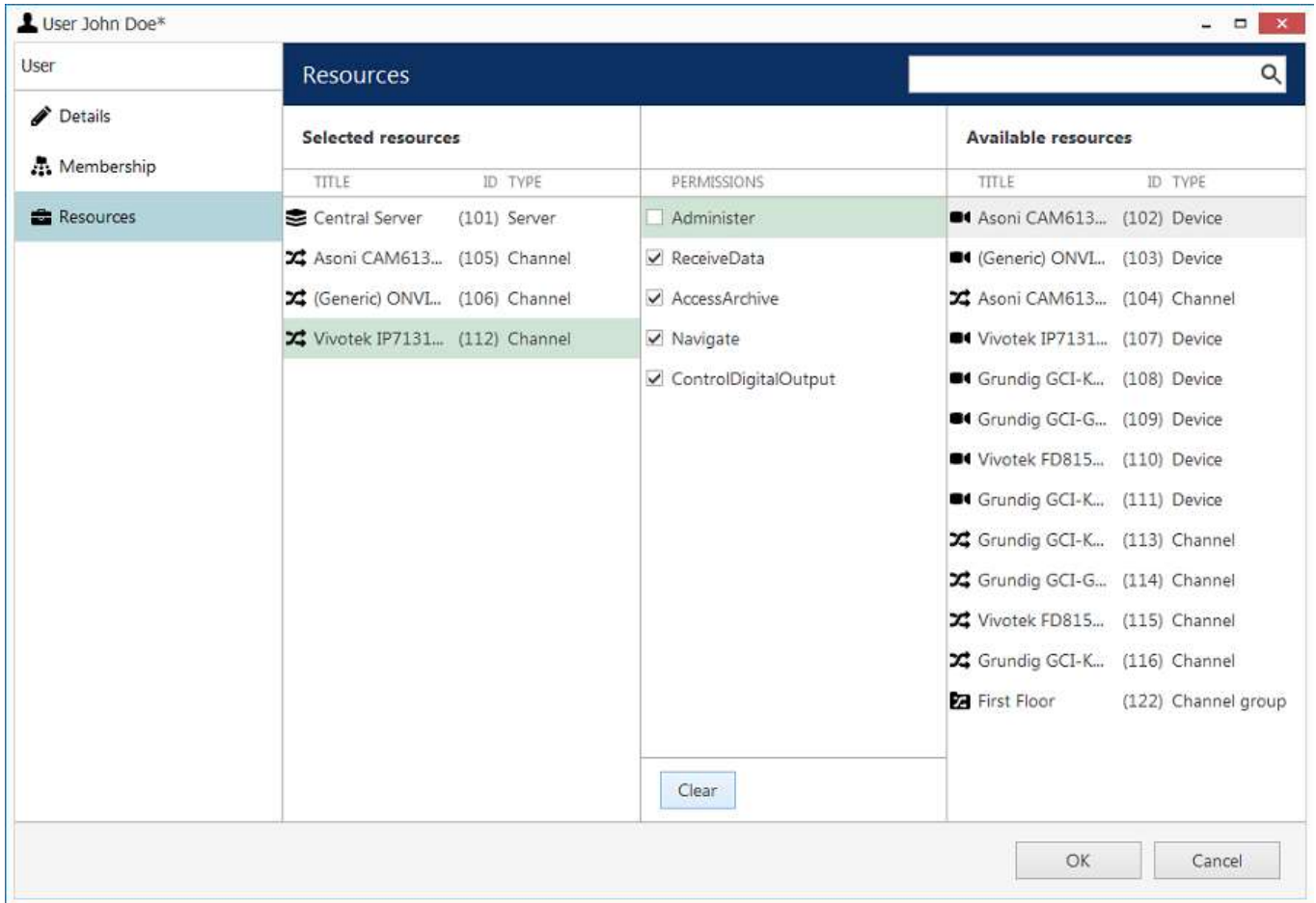
Add the groups you want the selected user to be a member of

Manipulate the groups by double-clicking a group or using the *Add/Remove* buttons below. Use the *Search* field in the upper-right-hand corner to filter the groups available.

Resources

Each user can be granted [permissions](#) for server and channel/channel group administration. Select resources by adding at least one permission; remove them by clearing permissions using the *Clear* button below, or simply by double-clicking them in the *Selected resources* list.

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Add resources for the selected user

Click *OK* when you have finished to return to *Users*; the newly created account will be added to the item list. Use the buttons on the upper panel to edit user details at any time, to quickly assign groups and remove specified users (hold *CTRL* or *Shift* to select multiple items at once).

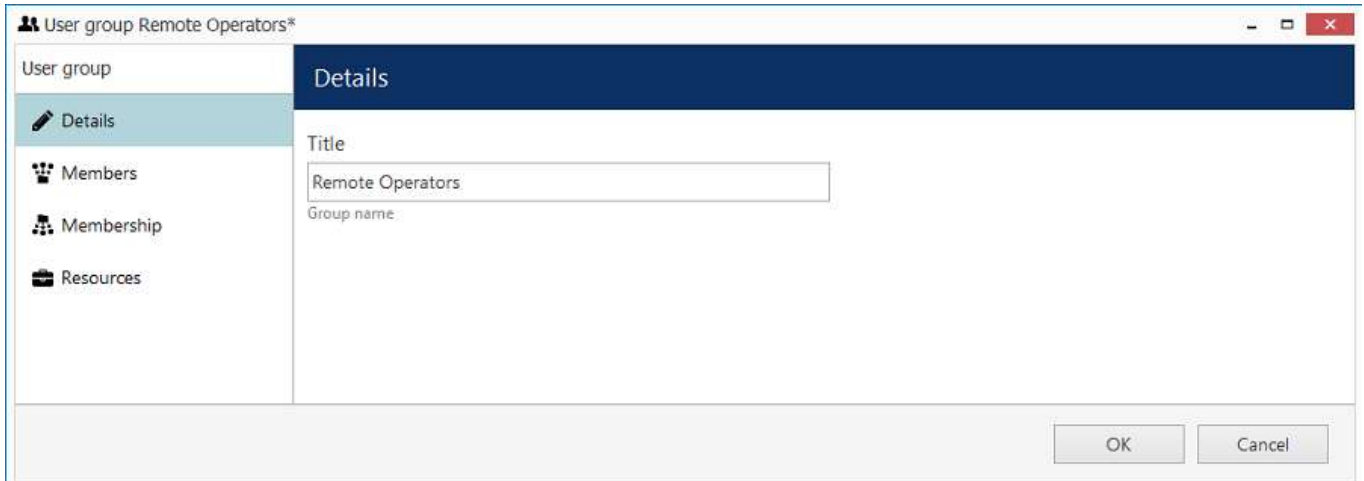
If there are a large number of user accounts, the *Search* field in the upper-right-hand corner and the content filters in the bottom panel can help you quickly find the accounts you are looking for.

Add User Groups

When the number of users is large, it may be more convenient to create multiple user groups and then distribute resources between user groups, rather than between individual users. One user can be a member of several groups.

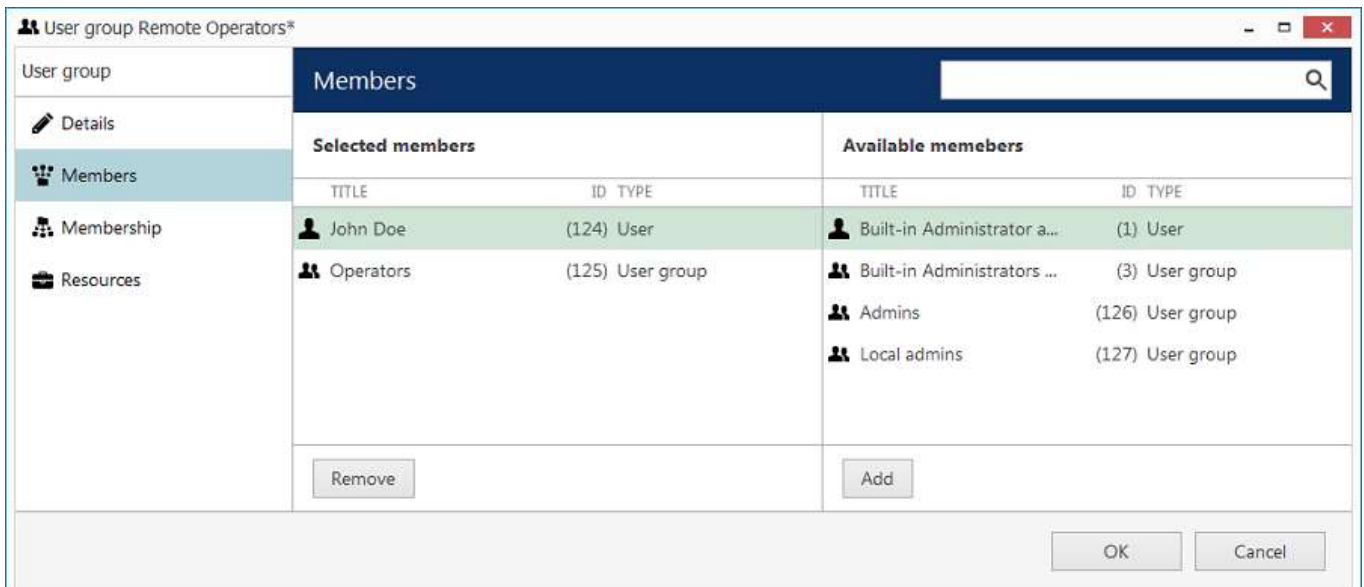
Click the down arrow near the + *Create new user* button and select *New user group* from the drop-down list to bring up the configuration dialog box.

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New user group

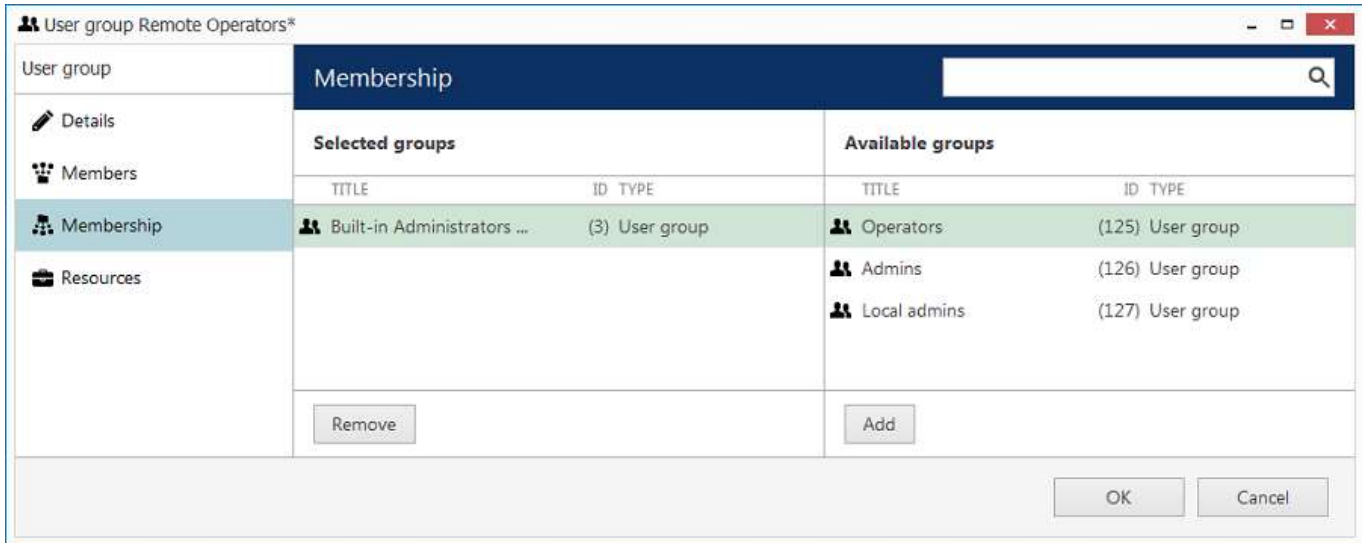
In the *Details* tab, enter group name.



Choose group members

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In the *Members* tab, choose which users and/or user groups will become members of the target group: manipulate items by double-clicking them or using the *Add/Remove* buttons below.



Choose group membership

In the *Membership* tab, select the group(s) you want to include the current group as a member: manipulate items by double-clicking them or use *Add/Remove* buttons below.

Finally, you can grant resources permissions using the *Resources* tab in a similar way to adding a single user. Select resources by adding at least one permission; remove them by clearing the permissions using the *Clear* button below, or simply by double-clicking them in the *Selected resources* list.

Click *OK* when you have finished to return to *Users*; the newly created group will be added to the item list. Use the buttons on the upper panel to edit the group details at any time. If there are a large number of user accounts, the *Search* field in the upper-right-hand corner and the contents filters in the bottom panel can help you to quickly find the accounts you are looking for.


36 Active Directory and LDAP User Import

WVMS allows you to import users and user groups from the existing Active Directory/LDAP service database. The only thing that is left to do is to specify permissions for the imported users and/or user groups (referred to as *AD users* further in this topic).


Please keep in mind that in multi-server systems - using Wavesys WVMS Enterprise - all recording servers must belong to the domain for the AD/LDAP imported users to be able to access their resources - streams and the recorded video archive. If some of the servers are out of the domain, external users will be unable to connect to them (this happens automatically, in background) and there will be errors instead of the video streams.


Active Directory and LDAP user import is available in the following WVMS versions:

- Wavesys WVMS Enterprise - fully supported for all versions
- Wavesys WVMS Professional v.1.4.1 - 10 users
- Wavesys WVMS Professional v.1.5.0 and newer - fully supported

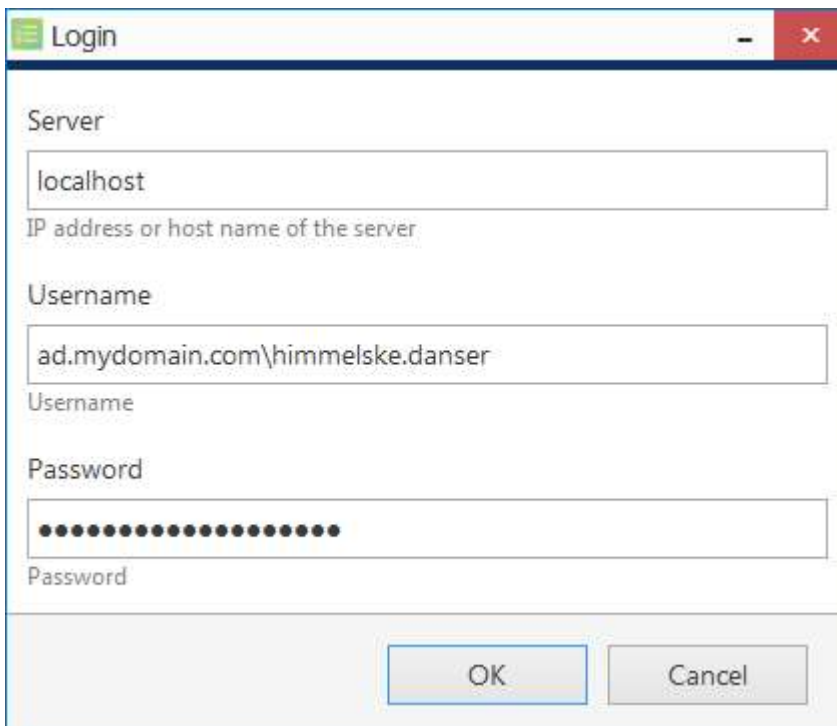
 AD/LDAP imported user accounts can be used to log into Wavesys Console, WVMS Monitor, and Web client for Wavesys WVMS Streaming Server. These user accounts **cannot** be used in Wavesys WVMS Mobile applications at this point.

Note that it is not necessary for you to be logged into Windows under the same AD account; rather, once AD accounts are imported as external users into WVMS, you can use any valid AD account credentials to log into Wavesys Console or WVMS Monitor. Also, note that you are always required to enter the password for the AD account, even if you are logged under the same user account in your current Windows session.

 If you are using [AD/LDAP](#) user accounts for the **Web login**, we strongly recommend that you [turn on HTTPS](#) for enhanced safety. Plain HTTP will work, too, but is not recommended for security reasons.

 For you to be able to log into a WVMS server with an AD user account, you must be able to log into the target server computer with the same AD account. If you are unable to do so, contact your Windows administrator and let him check the effective policies.

In order to use your imported AD account with WVMS, type in your full domain name and user name, and then specify the password. Please see the description below on how to add your AD users into WVMS.



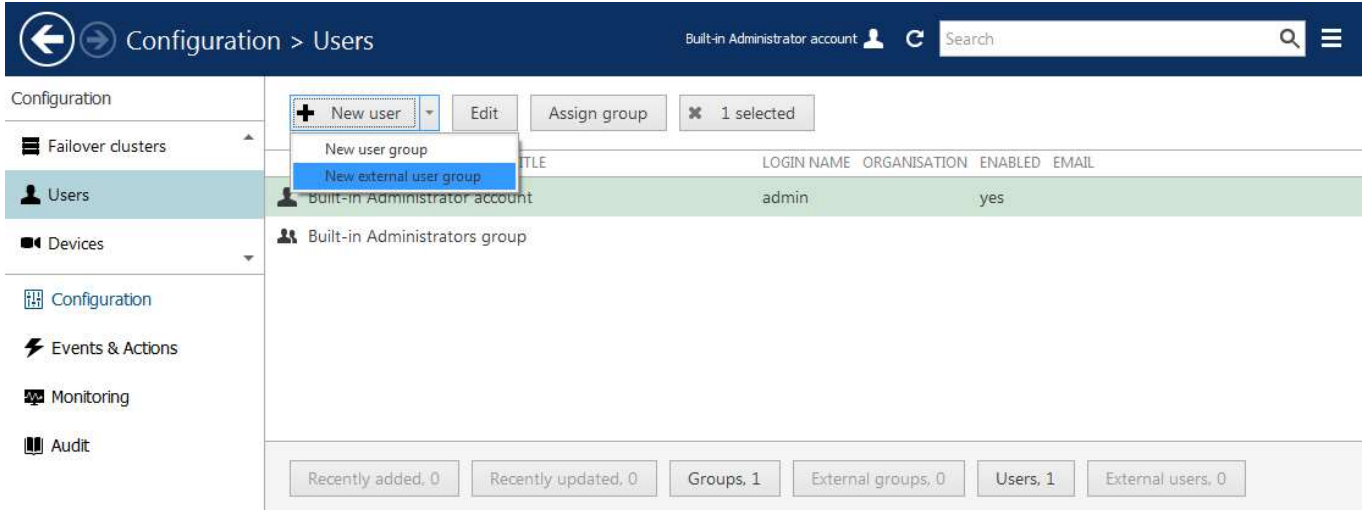
The screenshot shows a standard Windows login dialog box. The title bar is labeled 'Login'. It contains three text input fields. The first field is labeled 'Server' and contains the text 'localhost'. Below it is the label 'IP address or host name of the server'. The second field is labeled 'Username' and contains the text 'ad.mydomain.com\himmelske.danser'. Below it is the label 'Username'. The third field is labeled 'Password' and contains a series of black dots representing a masked password. Below it is the label 'Password'. At the bottom of the dialog box, there are two buttons: 'OK' and 'Cancel'.

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AD user login example

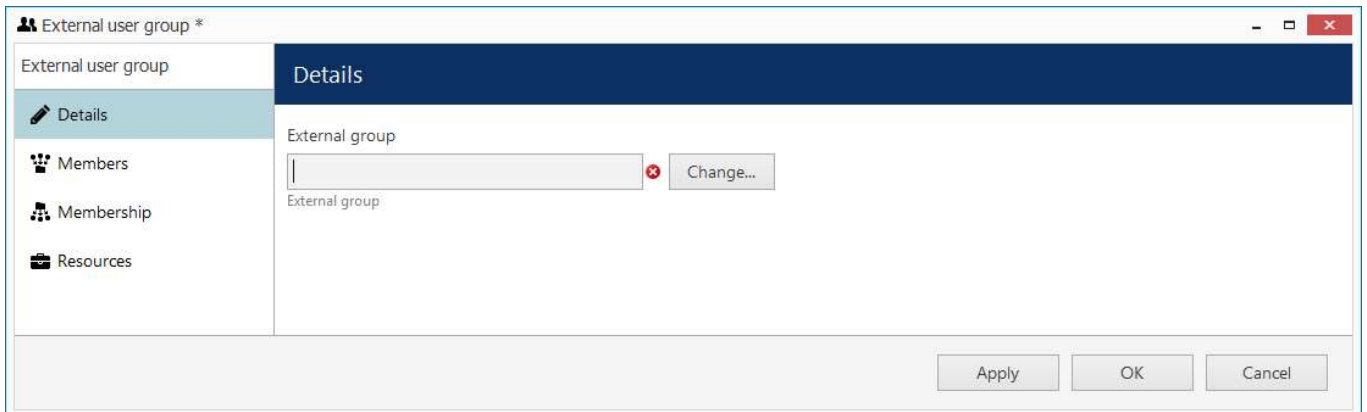
Add Active Directory and LDAP Users

In Wavesys Console, open the *Configuration* section and choose *Users* from the menu on the left; then, click the little arrow next to the *+New user* button and choose *New external user group* from the drop-down list.



Create new external user group from the *Users* menu section

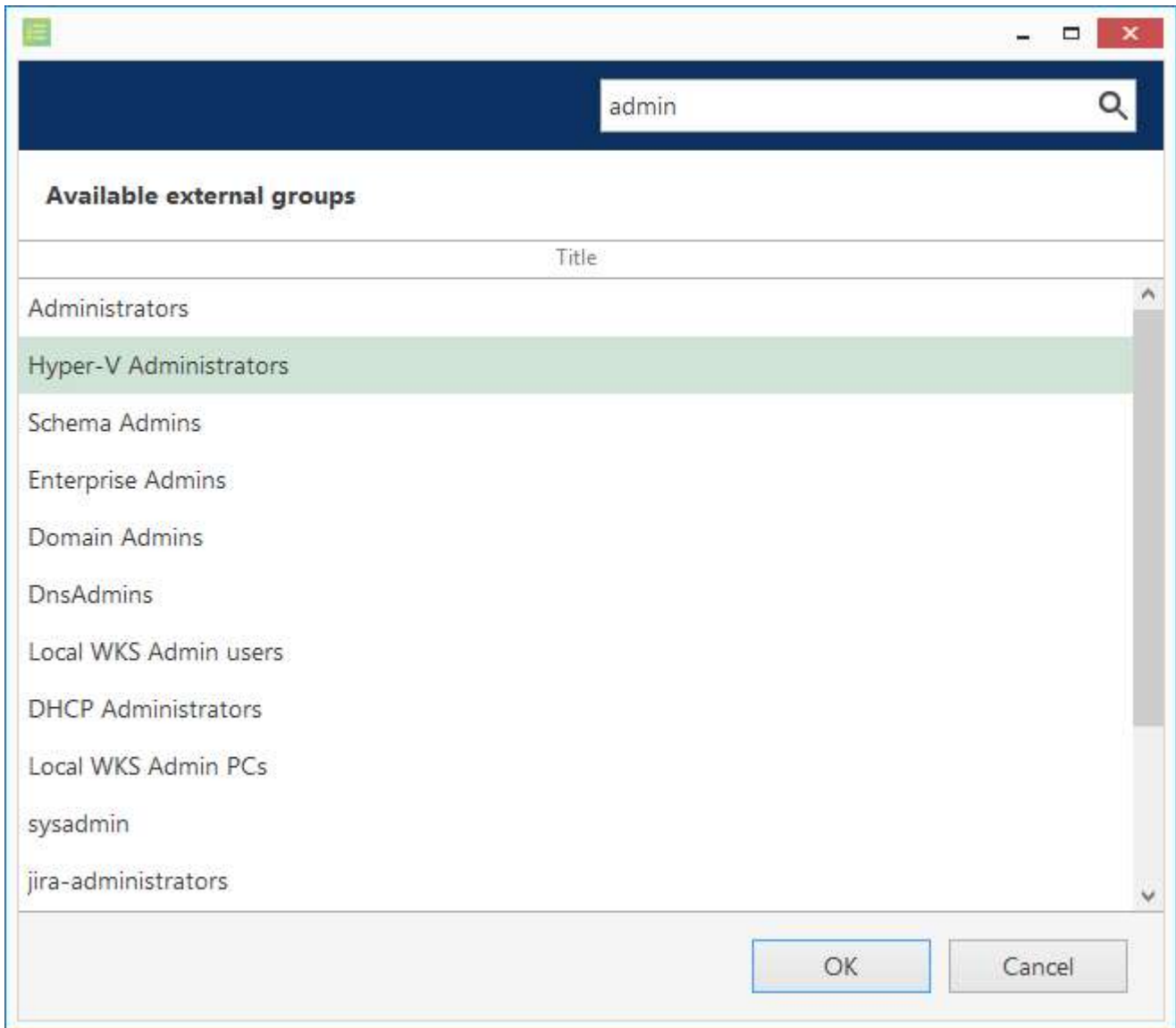
On the *Details* tab, click the *Change* button next to the empty *External group* field in order to load the available AD group list in a separate dialog box.



New external user group

WVMS will automatically fetch all user groups available via your Windows AD service. Pick a group from the list of available AD user groups and confirm your choice either with a double-click or using the *OK* button below.

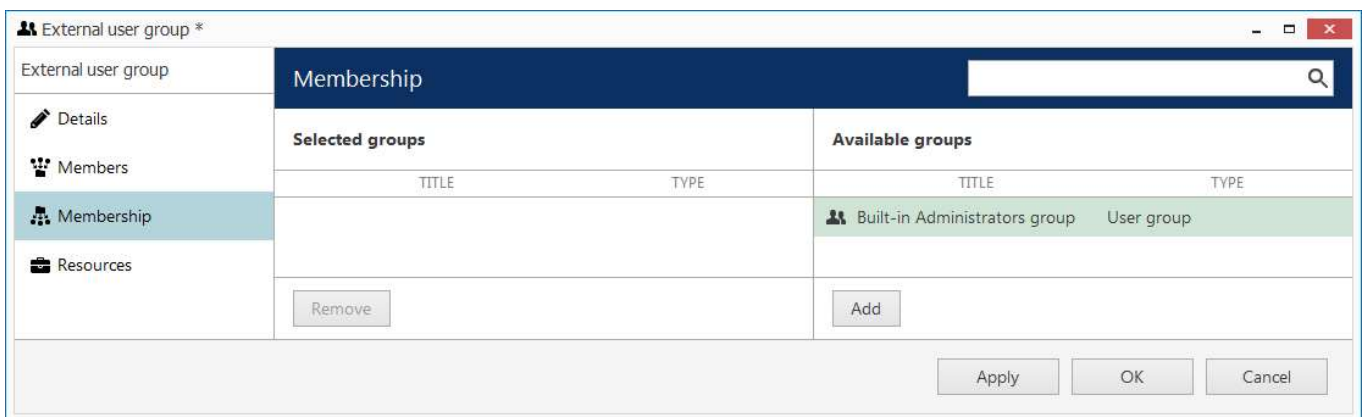
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Available AD groups

The selected user group will appear in *External group* field in the *Details* tab. Switch to the *Members* tab to view the imported user list.

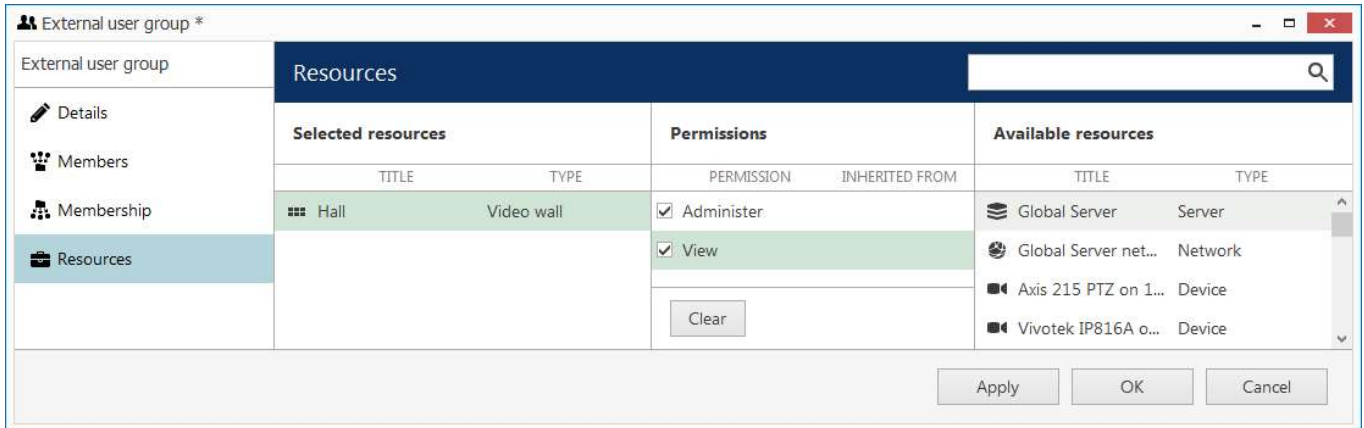
On the *Membership* tab, you can choose an internal user group to contain the newly imported external user group (nested grouping). All user permissions inherited from the higher level group will be applied to the members of the imported external user group and will be displayed as grayed out in the *Resources* tab.



You can make the external user group a part of some other internal user group

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If you have decided to make no nested groups or wish to add more permissions specifically to the AD user group, go to the *Resources* tab to manage the user permissions.



Manage user permissions on the *Resources* tab

Select resources by adding at least one permission; remove them by clearing the permissions using the *Clear* button below, or simply by double-clicking them in the *Selected resources* list.

Click *OK* when you have finished to return back to *Users*; the newly created external user group as well as all users contained in that AD group will be added to the item list. Use the buttons on the upper panel to edit the group details at any time. If there are a large number of user accounts, the *Search* field in the upper-right-hand corner and the contents filters in the bottom panel can help you to quickly find the accounts you are looking for.

Edit External Users Or User Groups

After adding the external user group, you can edit the group properties as well as individual external users. In order to do this, select the target user/user group in the list and click the *Edit* button on the upper panel, or, alternatively, simply double-click the desired item to bring up the configuration dialog box.

Editing an external user group will be pretty much the same as adding a new one; individual external user settings will have some differences comparing to the regular, built-in user settings.

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The screenshot shows the 'User ad\vera' window in WVMS Professional Administration. The 'Details' tab is active, displaying the following fields and options:

- User login name:** ad\vera (Account name to log into the system. Case-sensitive)
- Active:** Active (Remove to disable account for any connection type)
- User's full name:** Vera F (Insert user's first name and last name)
- Email address:** vera@lu.com (Email address for notifications)
- New password:** New password (Password will not be changed)
- Organisation:** none (Organisation to which the user belongs) with a 'Change...' button.
- PTZ priority:** 5 (PTZ priority)

At the bottom right, there are 'OK' and 'Cancel' buttons.

Edit imported user

On the *Details* tab, the only settings available for editing will be user account status (enabled by default) and PTZ priority (which will be 5, by default). All the other properties will be greyed out as they cannot be changed via WVMS and should be changed via Active Directory instead.



If two or more users try using PTZ control of a device at the same time, **PTZ priority** is used to decide who gains access first: user with a lower priority is blocked for ten seconds to allow a higher-priority user to use PTZ. If two users with the same PTZ priority have an access conflict, they will be both granted PTZ access simultaneously.

Default PTZ priority for all users, including those built-in and imported, is equal to five (medium priority). You can assign any user a higher PTZ priority (six to ten) or a lower one (four to zero) by editing individual user properties.


On the *Membership* tab, you can choose an internal user group to contain the AD user as a member. All user permissions inherited from the group will be applied to the target AD user and will be displayed as grayed out in the *Resources* tab. You can assign additional user-specific permissions on the *Resources* tab.


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37 Permissions and Membership

You can handle the user and user group **access permissions** for channels, devices, servers and other resources via the *User* and *User group* configuration dialog box -> *Resources* tab, or via resource settings -> *Permissions* tab.

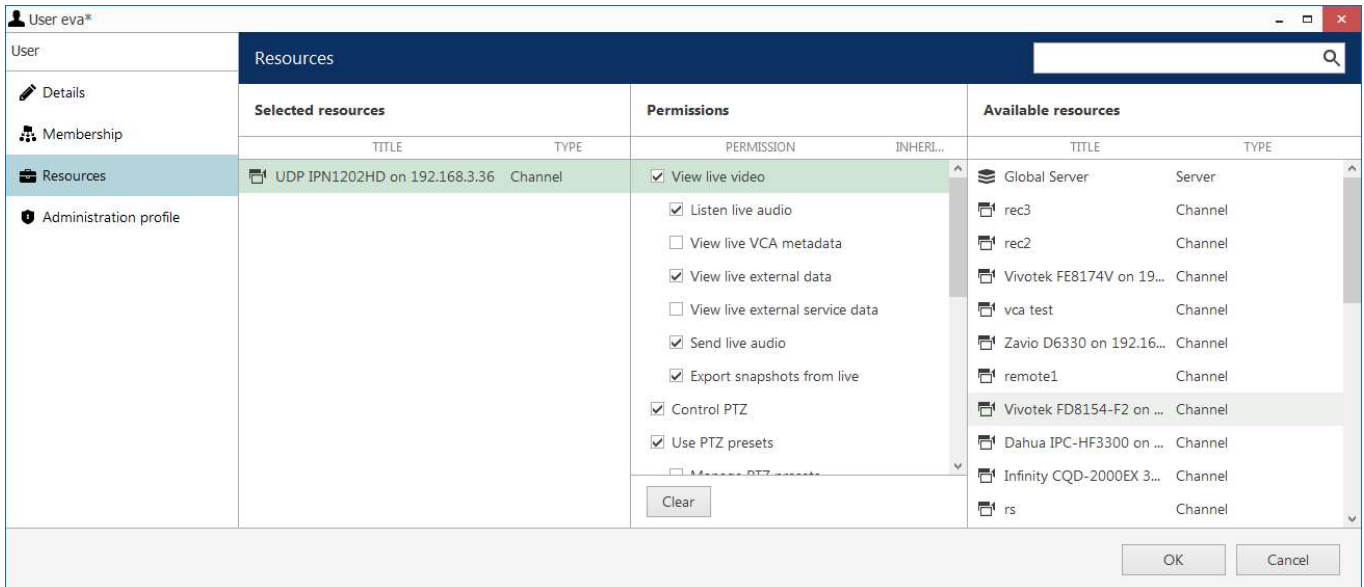
Administrative permissions are handled in the *Edit User/User group* dialog box, under the *Administration profile* tab. Most of the events that are raised as a permission is used are logged in the *Audit log* and are available in the *Audit* section of Wavesys Console.

 Please note that some of the permissions may not be applicable to your software license edition.

 In WVMS version **1.6.0**, major changes were made to permission management. As a result, configuration imported from an **XML** file (from first generation WVMS) will **not** contain any user permissions: you will need to **review and set all user permissions after importing the configuration**.


Access Permissions

All the available resources are listed in the column on the right; click any item to load the permission list in the central column. Then, **mark** all the permissions you wish to grant; resources having at least one permission enabled will be automatically moved to the left column.



Permission management example

To **remove** all permissions for some resource, simply double-click it in the *Selected resources* list on the left.

 It is not possible to select **multiple** resources for the permission management. You are welcome to use resource **grouping** (e.g., channel groups) for easier and faster permission management.

When permissions are inherited from some group(s), a corresponding mark will appear in the central column next to the permission type.

The following types of permissions are available (each one can be defined separately):

- **Server**
 - **Playback:** allows users to access recorded video, audio, VCA metadata and external data from the specified server for those recordings that do not have corresponding channels in the server configuration (i.e., **orphan archive tracks**)
 - **Export:** allows users to export video clips and snapshots from such recordings
- **Channel**
 - **Live:** access live video, audio, VCA metadata, external service data, external data (from *Data Sources*), send audio OUT and export snapshots from the live view mode
 - **PTZ:** general **PTZ control**, preset and tour usage, preset and tour management OR

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- **interactive control** of [CrossLink](#) devices
- **Playback:** access to recorded video, audio, VCA metadata, external service data, external data (from *Data Sources*), snapshot and video clip export from all playback modes, view and manage bookmarks
- **Restricted playback:** same permission set with a time limitation**
- **Uncategorized:** back up and delete archive, protect archive from deletion, remove protection
- **External Service Group**
 - **View live data:** see the live data coming from the external services in the target group
 - **External service search:** browse recorded external service data
- **Layout**
 - **View:** see and use the layout in WVMS Monitor
 - **Manage:** delete or replace existing layouts via WVMS Monitor
- **Layout Group**
 - **View:** see and use layouts from the target group in WVMS Monitor
 - **Manage:** add new shared layouts from WVMS Monitor and delete existing layouts
- **Visual Group**
 - **View:** see visual group contents in WVMS Monitor*
- **Map**
 - **View:** see and use the map in WVMS Monitor
- **Webpage**
 - **View:** see and use the webpage in WVMS Monitor
- **Software Counter**
 - **Access archived VCA metadata:** see the counter in Reports in WVMS Monitor
- **Video Wall**
 - **View:** see and use the video wall in WVMS Monitor
 - **Manage:** change video wall contents via WVMS Monitor
- **User Button**
 - **View:** see and use the target user button to viewports in WVMS Monitor and in Wavesys WVMS Mobile applications

Starting from the software version 1.15.0, it is possible to grant individual rights for software counters. However, if the *Access archived VCA metadata* permission has been given for the **whole server**, the target user or user group will have access to **all counters** on that server, regardless of the individual counter permissions.



*A visual group will only be displayed in WVMS Monitor if the user has permissions to see at least one visual group element.

The permission sets under **time-limited Restricted video playback and **full Video playback** are essentially the same. The difference is that restricted access only allows users to access the last N minutes/hours/days of the archive. Therefore, the two sets are mutually exclusive. The **restricted interval** is defined individually for each server in the server **storage settings**.

When you have finished, click *OK* to save and exit.

Administrative Permissions

Administrative permissions for the resources, servers and connections can be managed via *Administration profile* tab in the user management dialog box.



Giving a user at least one permission from the *Console* section will allow this user to log into the target server via Wavesys Console. The corresponding resources will be available for configuration and all the rest of the contents will be hidden.

The following types of permissions are available for per-user/per-user group configuration:

- **Client**

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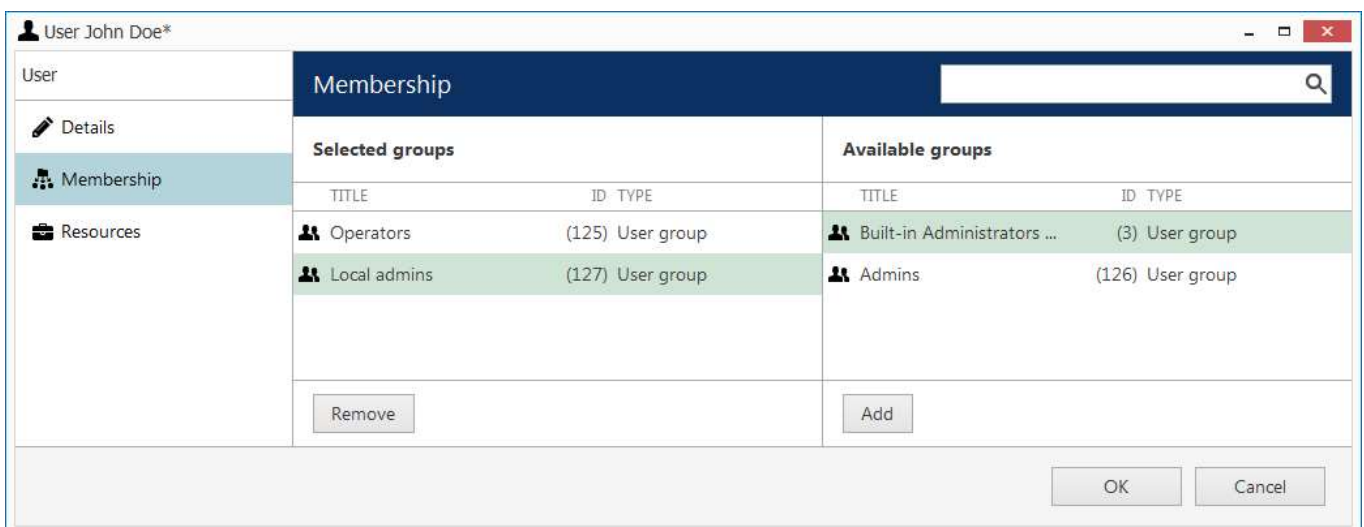
- Login via **Monitor**: connect to the target server via WVMS Monitor application
- Login via **Monitor** without entering **login reason**: if unchecked, the user will be prompted to enter a justification (comment) before logging in
- Login via **HTTP**: connect to the target server via Web client and from external services, including LPR and FR
- Login via **Mobile**: connect to the target server from Wavesys WVMS Mobile and OS X app
- **Console**
 - Manage **organisations, servers, users, permissions, networks, external services**: enables the user to access the configuration of the corresponding server contents
 - Manage **devices, device channels, visual groups, layouts, layout templates, video walls, maps, data sources, user buttons, shared channels**: enables the user to edit existing and create new (if applicable) resources of the given type
 - Manage recording: create and edit **recording profiles, schedules** and **configurations**
 - Manage Event & Action rules: create, remove and edit events, actions and all the related resources in the **Events & Actions section**, including mail servers, conditions etc., regardless of permissions for the source items
 - Access **audit log** and **monitoring section**: view all the information in the server *Audit* and in the *Monitoring* sections
 - Manage **auto backup**: access scheduled backup configuration
 - Start wizard: allows users to run the **quick setup wizard** via Wavesys Console for step-by-step configuration
 - **Remote upgrade**: access the remote upgrade section of Wavesys Console, set up and do the remote upgrade procedure
 - **Import configuration**: load configuration from XML (from the old product version) and import existing WVMS database

Starting from version 1.13.0, there is an additional user permission under *Administration profile*: log into Monitor application without entering **login reason**. If this permission is granted, users will log into the WVMS Monitor application as usual; if not, an additional prompt will pop up, asking them to enter a justification for logging into the server.

Membership

Users can be grouped logically to make permissions management easier. Groups can overlap, meaning that a single user can belong to multiple groups at once, and some groups can be nested - i.e., one group can contain one or more other groups. In addition to own permissions, each user inherits permissions from all the groups he is currently in.

To manage user membership from the user configuration dialog box, double-click any user. This will open the properties window, where you can switch to *Membership* tab. Here you can pick which group - or groups - this user will be a member of.



User membership

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Double-click on groups or use the *Add/Remove* buttons below to move groups between columns. When you have finished, click *OK* to save changes and exit.

Alternatively, you can select one or multiple users from the users list, then click the *Assign group* button on the upper panel: a list of available groups will appear, allowing you to select one of the existing groups. After this, click *OK* to add selected users to the target group.

The screenshot shows the 'Configuration > Users' page. At the top, there's a navigation bar with a search box and a user profile for 'Built-in Administrator account'. Below this is a toolbar with buttons: '+ New user', 'Edit', 'Assign group', a trash icon, and '2 selected'. The main content is a table with the following data:

TITLE	ID	LOGIN NAME	EMAIL
Built-in Administrator account	(1)	admin	
John Doe	(124)	john DOE	john DOE@em...
Admins	(126)		
Built-in Administrators group	(3)		
Local admins	(127)		
Operators	(125)		

At the bottom of the interface, there are summary statistics: 'Recently added, 0', 'Recently updated, 1', 'Groups, 4', and 'Users, 2'.

Select multiple users and assign them to a group

We strongly recommend grouping users and resources as it makes the permission management process much easier. Individual user permissions can be combined with permissions inherited from multiple groups at once.

Permission Sets and Dependencies

Permission management in WVMS is flexible and allows each individual user permission to be enabled separately, thus giving the WVMS administrator full control over the system. Sometimes, in order to give enough user rights for specific use case, several different permissions should be granted. This section covers some examples and gives you an idea of what permissions may be related, as well as explains some peculiarities about the permission management in WVMS.

General

Administration profile permissions to manage maps, visual groups, live podcasts etc. include access to all channels from the *Edit* dialog of these entities. For example, a user is granted permission to manage maps but does not have any per-channel permissions: when creating a map, he will be able to put channel markers on it and associate these markers with any channels on the server. At the same time, he will have no access to the channel management whatsoever.

Allow a User to Add New Devices

In order to enable a user to add new cameras or devices of other types, it is necessary to grant the following permissions from the *Administration profile*:

- *Manage devices*
- *Manage device channels*

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This is necessary as devices and channels are related entities in WVMS and a single Manage devices permission is not enough as new channels are created automatically alongside with the newly added devices.

The *Manage devices* permission itself allows the user to change device settings (e.g., IP address, group membership) and create new device groups.

Access Data from Third Party Services

To see the data from external services (e.g., LPR/FR recognitions, third-party integrations via HTTP API) in the live view notification panel or search the past records, the following permission sets are required:

- **Live:**
 - *View live external service data* (per-channel permission under *View live video* permission group)
 - *View live external service data* (permission for the external service group)
- **Archive:**
 - *External service search* (per-channel permission under *Video playback* permission group)
 - *External service search* (permission for the external service group)

This allows to cover the case when one channel belongs to several different external service groups.

Archive Backup

Archive backup permissions have the following logic:

- *Make archive backups* permission from the *Administration profile* allows Archive Backup Wizard login
- *Backup archive* per-server permission from the *Video playback* permission group grants access to the orphaned archive tracks (recordings that exist on the server but do not have any existing channels in the system configuration associated with them)
- *Backup archive* per-channel permission under *Video playback* permission group grants access to the footage of the target channel via Archive Backup Wizard

Snapshot Export

For a user to be able to save multichannel snapshots from the *Archive playback* mode, the *Export snapshots from playback* permission must be granted for all channels present in the layout.

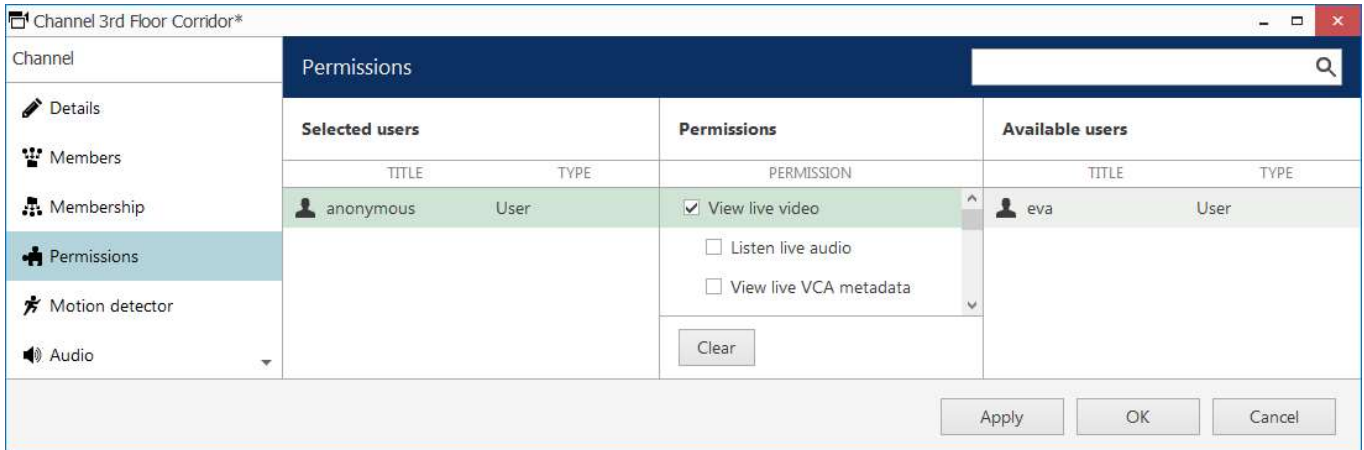
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38 Anonymous User

Anonymous user is a built-in user account, which has been designed for unauthorised access to video streams via HTTP API - a very basic example of WVMS API usage.

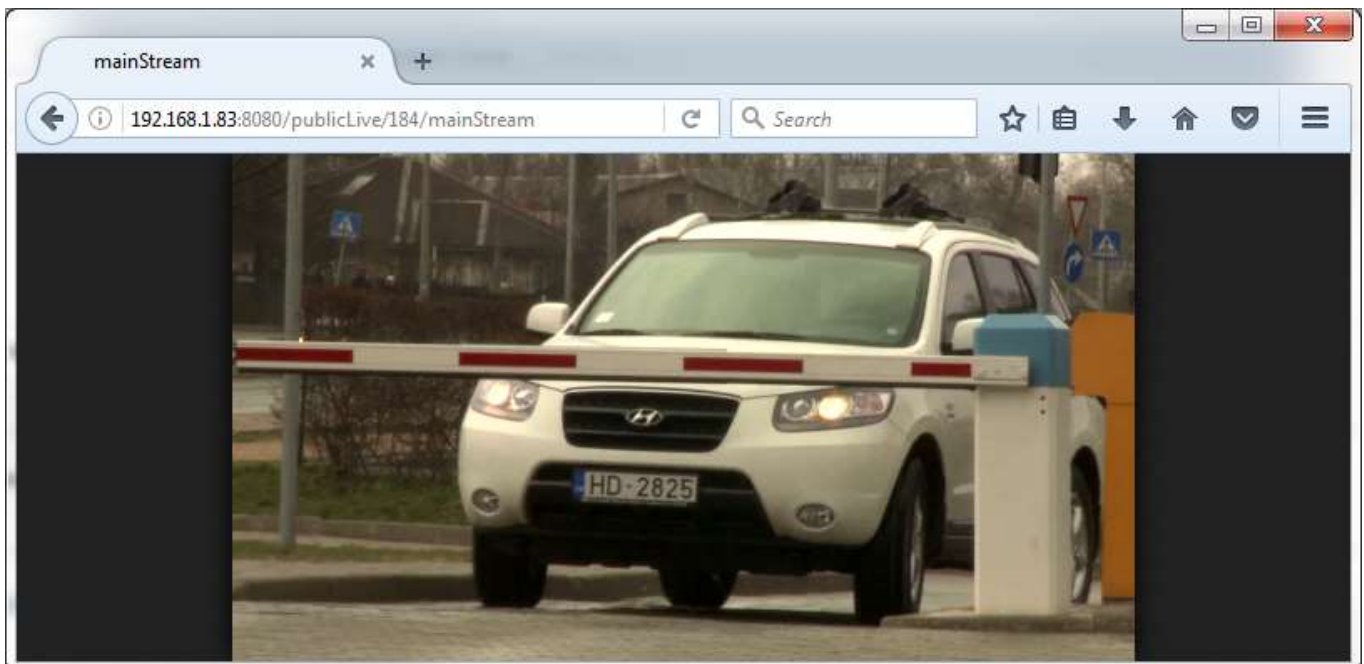
The anonymous user is disabled by default and does not have any permissions. In order to allow HTTP access:

- **enable** the anonymous user: double-click him in the user list, mark him as active, then save;
- **add** the *View live video* **permission** for this user in the properties of the target channel(s).



Add permission for the anonymous user to receive live view data


Now you can use a short link to receive live video feed over HTTP from your configured channels without authorisation.



Live stream received with anonymous URL

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The link can be embedded into your own webpage to provide 'Live Cam' functionality.


 HTTP **link** is built as follows:

IP:PORT/publicLive/<channel_id>/mainStream

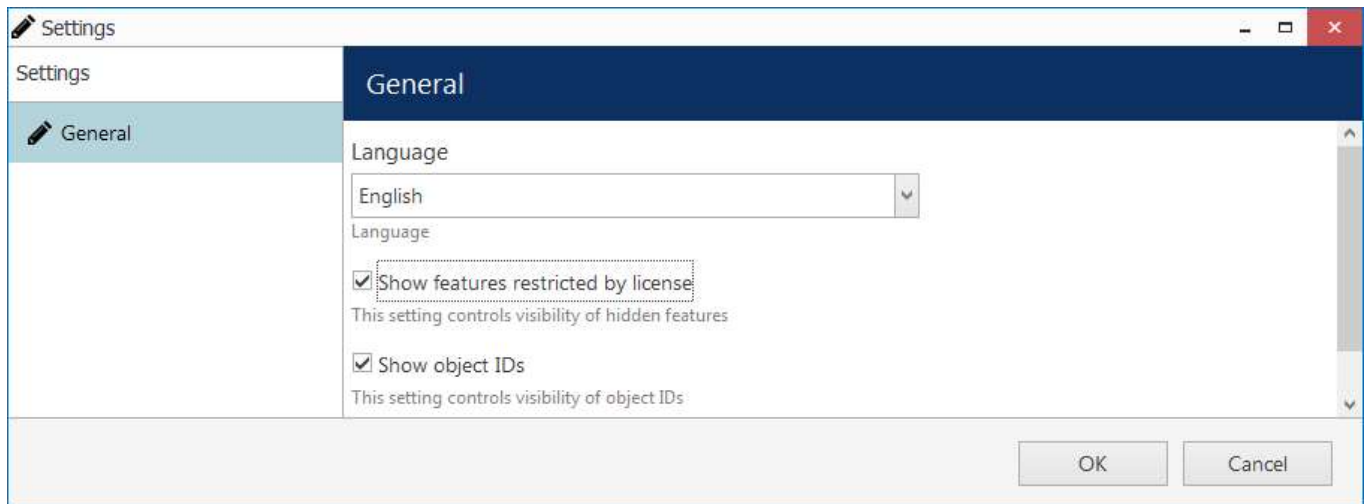
where

- *IP* is server IP address or hostname,
- *PORT* is server HTTP port (8080 by default),
- *<channel_id>* is internal channel identifier, which can be looked up in Wavesys Console when IDs are enabled in the application settings.

Example: *192.168.1.83:8080/publicLive/184/mainStream*

 This functionality requires that [Streaming Server](#) is enabled (HTTP port is not set to zero in the target server settings).

In order to see the channel identifiers in Wavesys Console, go to the application settings via main menu button in the upper-right-hand corner and choose *Settings*. In the dialog box, enable the *Show object IDs* option and save.




Enable object identifiers in Wavesys Console


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39 Streaming Server Configuration

The Wavesys WVMS Streaming Server allows quick and easy access to your cameras via web browser and/or native mobile applications.

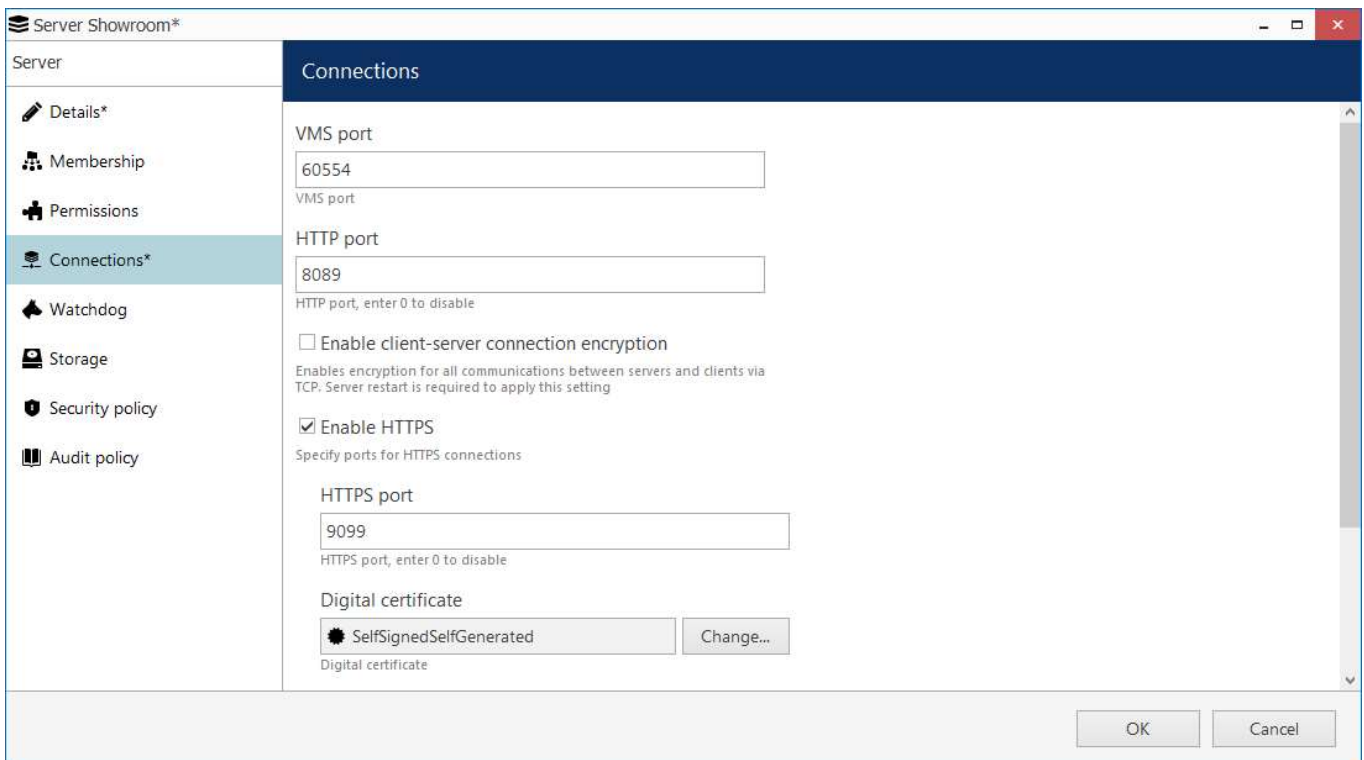
Wavesys WVMS Streaming Server is a part of WVMS software integrated into the WVMS core. It is designed for video streaming to multiple web-browsing platforms such as Mozilla Firefox and Google Chrome. Some major Wavesys WVMS Streaming Server features are: video stream live view, archive playback, Pan-Tilt-Zoom control. The Wavesys WVMS Streaming Server optimises video streaming for web or mobile clients, to a degree dependent on connection speed and device viewing capabilities.

 If you are using [AD/LDAP](#) user accounts for the Web client login, we strongly recommend that you [turn on HTTPS](#) for enhanced security.

 At this point, the recommended **browsers** (100% supported) for clients are Google Chrome and Mozilla Firefox (under any operating system).


Wavesys WVMS Streaming Server Configuration

Wavesys WVMS Streaming Server configuration on the Wavesys Console side is simple and only consists of setting up the HTTP port for streaming connections. To access the Wavesys WVMS Streaming Server setup in Wavesys Console, go to the *Configuration* section and then click *Servers* in the menu on the left; double-click the target server to bring up the configuration dialog box, and switch to the *Connections* tab.



HTTP and HTTPS port settings under server connections

You only need to define a HTTP port for Wavesys WVMS Streaming Server; the default port is 8080. On top of that, you can secure your connection and use a HTTPS port for the same purpose. Secure HTTP will require a valid digital certificate, either a self-generated (generate on the fly, will require trust confirmation everywhere) or issued by authority (paid, bound to your domain).


 Please make sure that your chosen HTTP port:

- is opened on the target server firewall;
- is properly configured for port forwarding on all intermediate network equipment, if necessary;
- is not being used by any other application or service on the target server.

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If you are using HTTPS with your own **CA certificate** (bound to your domain name), remember these important guidelines for the mobile app setup:

- when connecting via local network, use server IP address
- when connecting over internet (4G etc.), use the hostname instead of IP (main domain must be the same as in the certificate)
- if port forwarding is used (local HTTPS port is different from external), enter the port number as the "Internet port" in the server connection configuration

 If you are using your own CA certificates, create a *.pem* file with your certificate chain as described here: <https://www.digicert.com/ssl-support/pem-ssl-creation.htm>

This is necessary for the certificate to be recognized correctly by all HTTP clients - Web browsers and WVMS mobile applications. If you simply apply your CA certificate in Wavesys Console, there is a chance it is not recognized because some applications require the entire certificate chain.

Then, apply the *.pem* file as the certificate together with your key when the importing certificate into Wavesys Console.

Once you are done with the setup, click *OK* to save and close the dialog box.

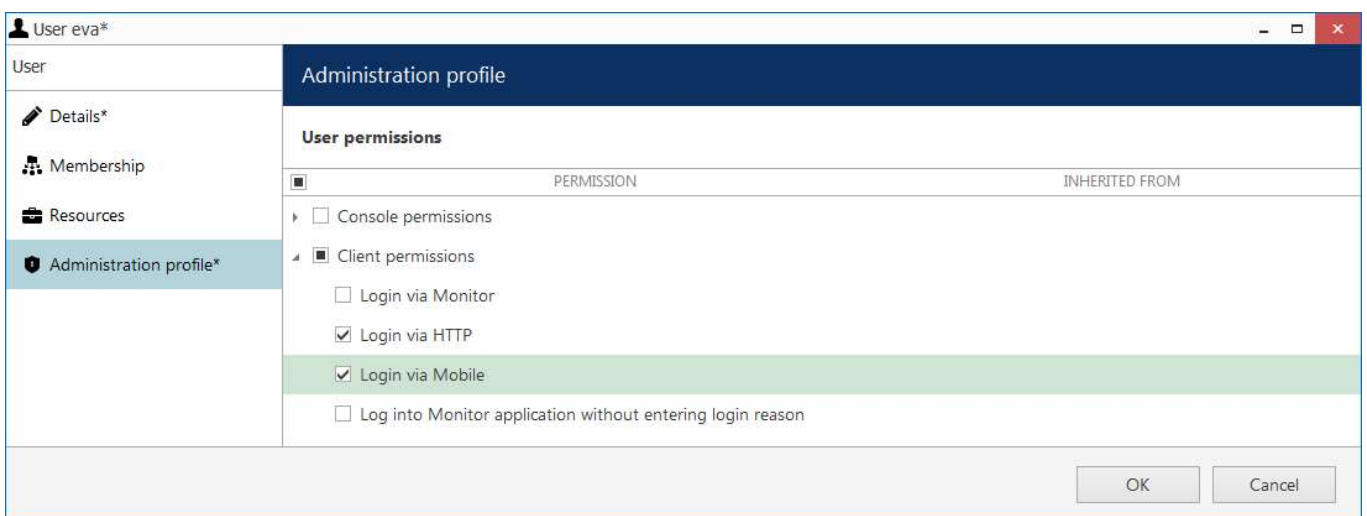
Your Wavesys WVMS Streaming Server will now be set up and accessible via local - and, if used, external - IP address. You can immediately check if the connection is working: just open your browser and type: *<local IP>*: *<HTTP port>*; for example, server configuration for the snapshot above will require *192.168.1.83:8089*.

User Permissions for Wavesys WVMS Streaming Server

If you are going to create a non-administrative user account for Wavesys WVMS Streaming Server access (designated or combined with other permissions sets), the following user permissions should be granted in the user properties dialog box:

- for Web browser and API login: under *Administration profile > Client permissions > Login via HTTP* (includes HTTPS)
- for the Wavesys WVMS Mobile access: *Login via Mobile*
- to allow editing HTTP connection properties: *Console permissions > Manage servers* (this will automatically enable Wavesys Console login, and also grant access to other server settings)

In the *Resources* tab, select channels and features you wish to grant access to. There are separate permissions for live and archive access, PTZ, audio, and bookmarks.



User permissions for Wavesys WVMS Mobile and Web browser login

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40 Streaming Server User Interface

Wavesys WVMS Streaming Server provides HTTP connections for Web browsers and native Wavesys WVMS Mobile applications, OS X Thin Client (similar in functionality to Wavesys WVMS Mobile), as well as services that use WVMS HTTP API, which includes Wavesys Global own external services (License Plate Recognition, Face Recognition modules) and third-party integrations. While the Web browser client functionality is very basic, Wavesys WVMS Mobile applications support many useful features, such as two-way audio, push notifications, mobile edge recording, streaming from device camera to the WVMS server and many more.



Authentication required

When configured, Wavesys WVMS Streaming Server is accessible via browser from the server itself and from computers on the local network, and, if system is not isolated, from the Internet. This is the simplest way to make sure your Wavesys WVMS Streaming Server is running and reachable. To access the Wavesys WVMS Streaming Server, open your browser and type:

<Server IP>:<HTTP port>

then press *Enter*. Your browser will connect to Wavesys WVMS Streaming Server, and user authentication will be requested: enter your user name and password to proceed.



Starting with WVMS version 1.14.0, you can also use your **AD/LDAP user accounts** for the Web browser login. The user name should be entered in the following format:

domain.name\user.name

The field is case-insensitive, meaning that you can use either *user.name* or *User.Name* notation.

After logging in, you will see Wavesys WVMS Streaming Server Web browser user interface:

- **left menu:** channel list and setup tabs
- **main window:** live streaming/playback area
- **upper-right-hand corner:** layout templates and layouts
- **upper-left-hand corner:** the Wavesys WVMS Streaming Server logo; click the logo to extend viewing area by minimising the menu on the left

Access Permissions

The channel and feature availability depends on the user permissions; the built-in administrator has access to all resources. For the Web browser connections, only HTTP connection, live, archive and PTZ access permissions are applicable, as other functionality (e.g., audio) is not present.

In order to allow a user to connect to Wavesys WVMS Streaming Server, go to *Configuration* section of Wavesys Console, choose *Users*, then select the user or user group for editing and open the *Administration profile* tab:

- add the *Login via HTTP* permission to allow Web browser and/or HTTP API connections
- add the *Login via Mobile* permission to allow connections from mobile apps and OS X client

To allow channel access, add per-channel or per-channel group privileges in the *Permissions* tab:

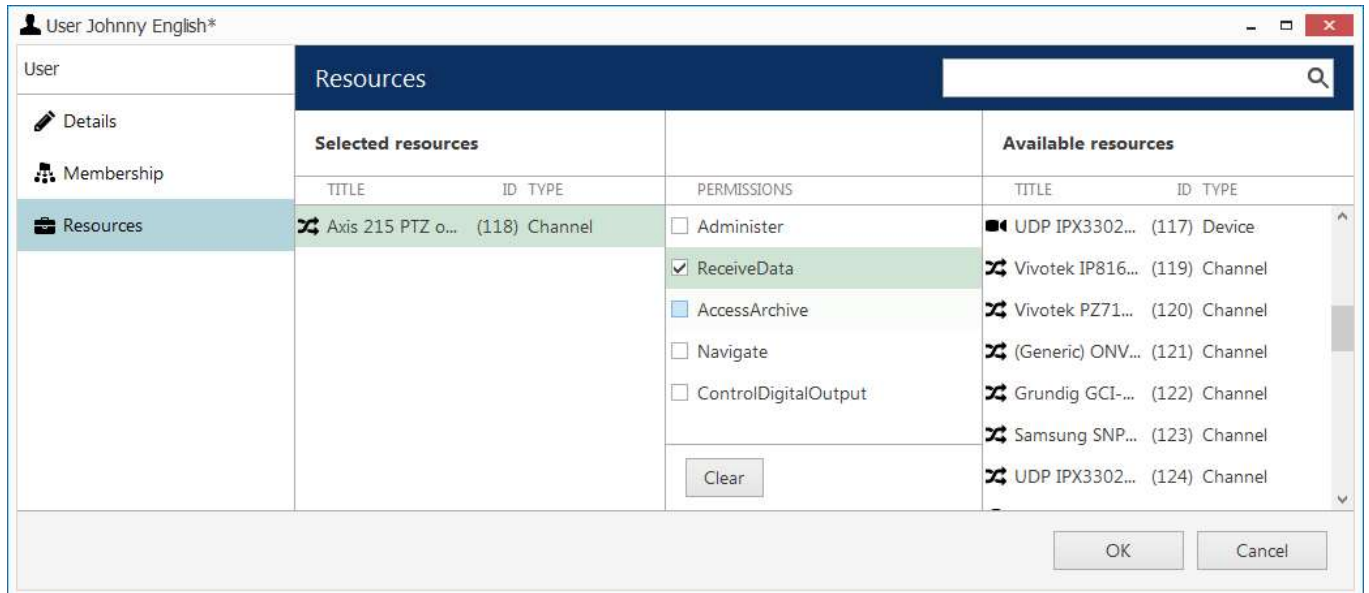
- *View live Video:* enables live view
- *Listen live audio:* enables incoming audio (from the camera)
- *Send live audio:* send audio to camera (talk back)
- *Control PTZ:* pan, tilt and zoom controls
- *Use PTZ presets:* access to existing PTZ presets

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- *Use PTZ tours*: access to existing PTZ tours
- *Video playback*: enables access to recorded video data
- *Audio playback*: access to the recorded audio data

Additional permissions for the Wavesys WVMS Mobile applications:

- for *User Buttons*: the *View* permission allows you to see and use the user button



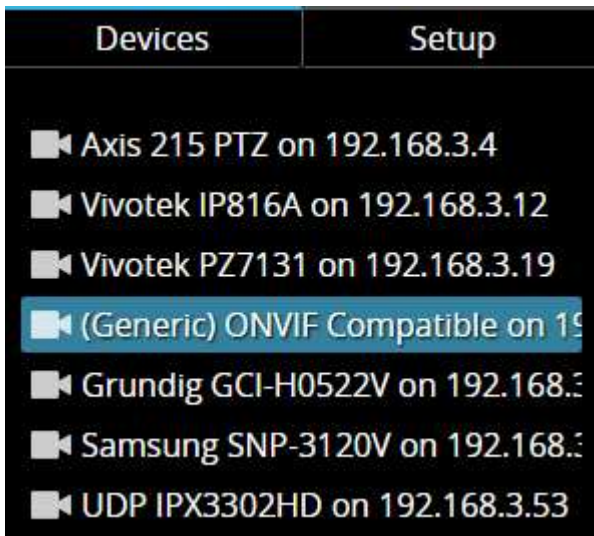
Set user permissions in order to see channels in Wavesys WVMS Streaming Server

Channel, channel group and user button permissions can also be changed in the *Channels* section, by double-clicking the corresponding channel or channel group in the list and then selecting the *Permissions* tab.

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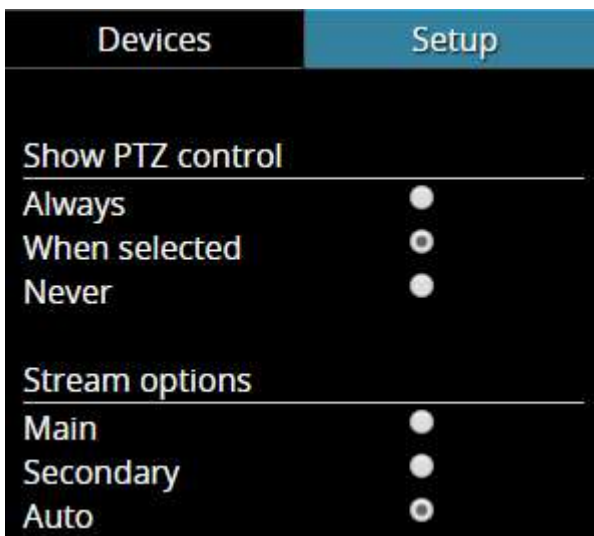
Web Interface: Configuration

The menu on the left has two tabs: *devices*, which shows which channels are available, and *setup*, which contains streaming settings. Click on the titles to switch between them.



Devices

The video sources are loaded in a single list. To start streaming from a particular device, select layout template from the menu in the upper-right-hand corner, then click your desired viewport so that it is highlighted blue, and then click a device from the list.



Setup

The *Setup* tab allows you to choose PTZ control behaviour and configure stream options:

- **PTZ controls:**
 - **Always:** if the camera supports Pan-Tilt-Zoom, virtual PTZ sphere will be always shown as overlay control
 - **When selected:** if the camera has PTZ capabilities, the virtual PTZ sphere will be shown when the corresponding stream is selected
 - **Never:** do not show PTZ controls at all, meaning that PTZ functionality will be disabled
- **Stream options:**
 - **Main:** only the first (main) stream, [usually] of a larger resolution will be used for all devices
 - **Secondary:** only the secondary stream (substream), [usually] of a smaller resolution will be used for all devices
 - **Auto:** the most appropriate stream will be selected automatically based on viewport size

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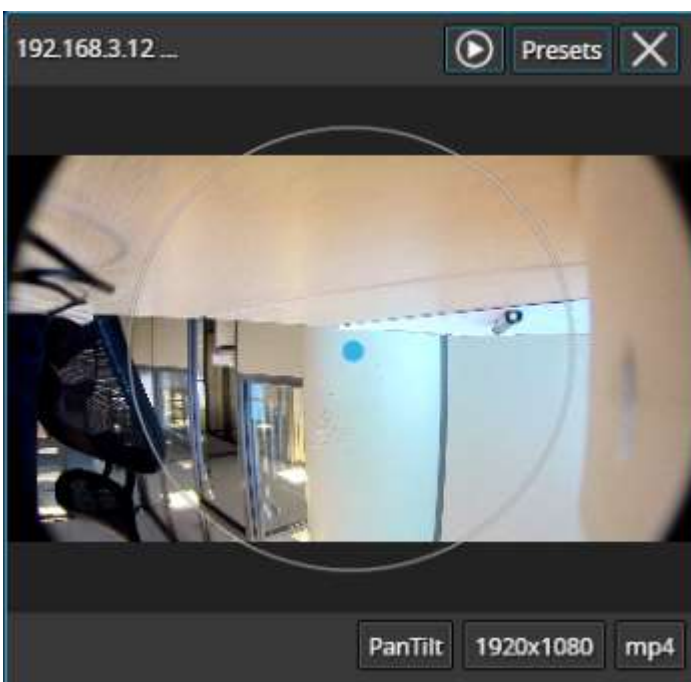
Web Interface: Streams

The Web browser client allows you to view live video and to play back recorded video from the available channels. For live view mode, PTZ controls are available.

Live

To start live-streaming, select a layout template from the upper-right-hand menu (1x1, 1x2, 2x1 or 2x2), then click your desired viewport so that a blue frame selection appears around it, and then choose the target stream from the *Devices* list on the left. To replace the existing live stream, either select it and choose a device 'on top' of it, or click the *X* button in the upper-right-hand corner of the viewport to close it and then assign a new stream to this viewport.

Notice that some images may appear with horizontal or vertical black stripes at the sides: this happens because image aspect ratio is maintained instead of it being stretched to fill the viewport. When the picture size is smaller than the target viewport, there will be a black background on either sides.



Live view with overlay PTZ controls

Each live view item contains the following information and controls:

- upper-left-hand corner: stream name (static info)
- upper-right-hand corner: archive playback (if applicable), presets button (click to load preset list), *X* button (press to close the live stream and free the viewport)
- bottom-right-hand corner: PTZ mode (if applicable), stream resolution, stream codec (MP4/JPEG/WEBM) (static info) and zoom mode ON (static info)
- centre: stream picture, virtual PTZ sphere (overlay control) (if applicable)

To **pan and tilt** the PTZ-capable cameras, use overlay PTZ controls: left-click and hold in the desired direction. By default, pan/tilt mode is enabled for PTZ cameras: notice the *PanTilt* label in the bottom-right-hand corner of live view.

In order to **zoom** IN and OUT: first, scroll your mouse wheel DOWN to enable zoom mode - in the bottom-right-hand corner, a *Zoom* label will appear. In this mode, virtual PTZ sphere works for zoom only: click and drag UP (upper hemisphere) to zoom IN, and DOWN (lower hemisphere) to zoom OUT. To release zoom mode and go back to the pan-tilt sphere, simply scroll your mouse wheel UP until the *Zoom* label disappears.

For some cameras, you may notice that the further you drag the cursor from the sphere centre, the faster the camera goes: in this way, PTZ speed is controlled; however, for other cameras, only the constant speed is supported either by software or device itself, and the pan/tilt speed will remain constant no matter what position your mouse cursor is in.

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Archive Playback

If recording is enabled for the target channel, the stream overlay controls will include an archive playback button in the upper-right-hand corner. Press the button to begin **playback**: the target stream will be displayed in single channel mode. To switch **back to live view**, press the 'eye' button in the upper-right-hand corner; this will restore your previous layout.



Archive playback view

Playback view contains the following information and controls:

- upper-left-hand corner: stream name (static info)
- upper-right-hand corner: 'eye' icon to go back to live view, X button (press to close the live stream and free the viewport)
- bottom-right-hand corner: timestamp (current time and server time zone shift)
- centre: stream picture
- centre bottom: playback controls

Overlay controls allow you to start/pause playback and jump back/forward by ten seconds, one minute, ten minutes or an hour.

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Web Interface: Layouts

Layout templates allow you to choose viewport layout: 1x1, 2x1, 1x2 and 2x2 are currently available options.



Default layout templates

Click on any thumbnail at any time to immediately load the corresponding **layout template** on the screen. If there are any active streams, they will be discarded. If the target layout template has been already used in the same browser and cookies have not been cleared, previously used channels will be loaded; if not, an empty template will be displayed.

If you wish to **save the layout** currently being displayed, click on the 'portrait' button.



Layouts menu button

The layouts menu will appear, allowing you to save your layout under a user-defined name: enter the layout name and click the *Save* button. Note that, at this point, only Latin characters [A-Za-z] and Arabic digits [0-9] are supported for layout names; special symbols or characters from non-Latin alphabets are not allowed.



Layouts menu

From here, you can also load the previously saved layouts simply by clicking them; if your layout list is longer than the menu window, use the mouse wheel to scroll down.

The layouts are saved in your browser **cookies**, so:

- Wavesys WVMS Streaming Server layouts cannot be transferred to other browsers, user accounts or computers
- layouts are removed when browser cookie data is cleared

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41 Mobile Application for Streaming Server

Wavesys WVMS Mobile app for WVMS servers provides mobile client functionality for smartphones, tablets and phablets. Its feature range is much wider than that of the Web browser client.

You can install the Wavesys WVMS Mobile application from Play Store (for Android users) or iTunes (for iOS users).

Supported OS:

- Android 4.4 and higher
- iOS 8.2 and higher

Thin client for macOS has almost identical functionality. It can be downloaded from <https://www.wavesysglobal.com>. Just as WVMS Monitor, the mobile and macOS clients are free of charge and do not require any additional license to run. Using these, you can connect to any of your WVMS servers, provided that Wavesys WVMS Streaming Server functionality is enabled in their settings, as described earlier.

Below, you will find guidelines on your Wavesys WVMS Mobile configuration and usage.

Getting Started

Install Wavesys WVMS Mobile from the corresponding app store, or by following a link from our website <https://www.wavesysglobal.com>.

Interface Overview

Wavesys WVMS Mobile user interface is mostly intuitive: you can interact with the app by tapping or long tapping the interface elements, and also by swiping.

In the top left corner, you will find the **application menu**. It contains:

- an option to add a new server connection,
- a possibility to record offline in-app video for further upload to any sever,
- app settings,
- details about the app version.

After you connect to any server, the application menu will be replaced by **server menu** containing server-specific resources and actions:

- view selection (channel arrangement for live view),
- event log (push notifications from the server),
- bookmarks,
- user buttons,
- camera streaming option (device >> server),
- log out option.

The server menu also has a **submenu** 'three dot' button next to the server name. Apart from the *Log out* option, it allows you to edit the connection settings (e.g., change the user account) without returning to the server list. The 'three dot' button is also present in other places within the app, and it offers extra option or actions.

Finally, wherever it is impossible to place the submenu button, a 'hidden' drop-down menu is available. **Long tap** any channel in the multichannel view to see the available quick actions.



When running in foreground, the app will prevent you phone from going to sleep, so the display will not be switched off automatically. Keep this in mind and do not forget to exit the app or lock the device/turn the display OFF when you do not need the app anymore.

When you first start Wavesys WVMS Mobile, you will have a demo server connection present by default: feel free to use it for a tryout. You can start adding your own server connections at once but we recommend that you first review the app settings and adjust them to fit your needs.

Settings

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Tap the menu button in the top left corner to bring up the main app menu, then tap *Settings*. The parameters here define global app behaviour (for all servers); they are preserved as you upgrade the app but are discarded if you uninstall it.

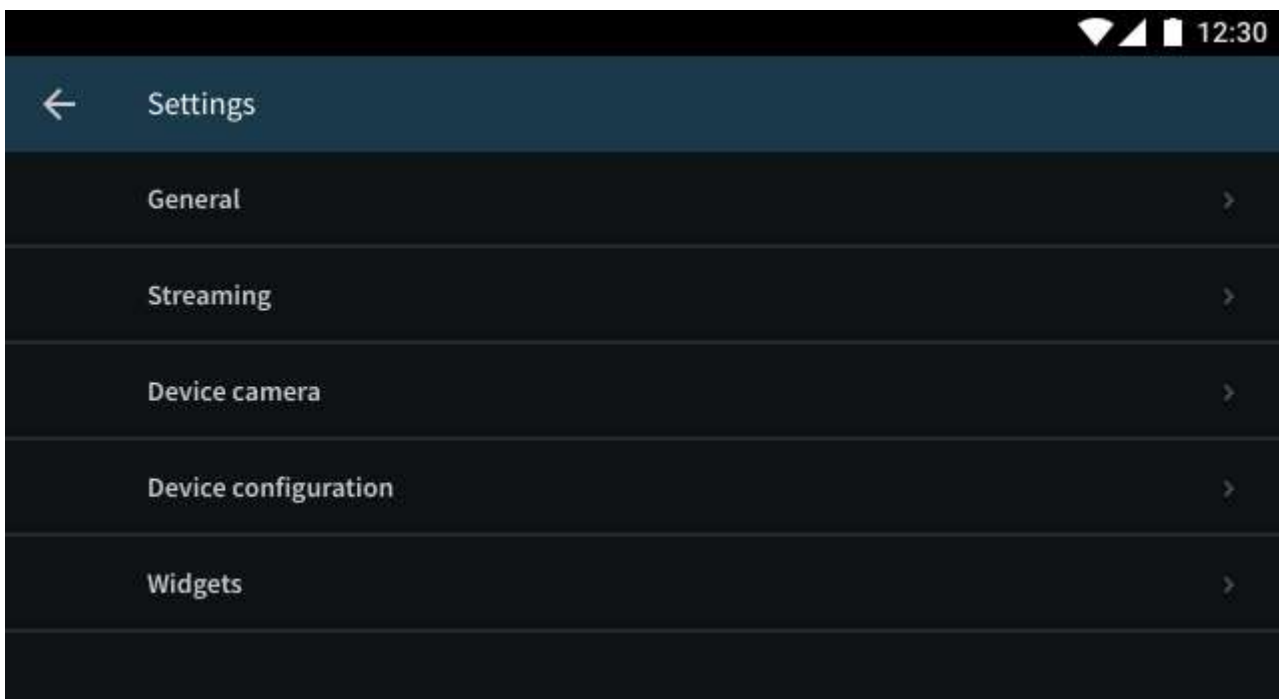
The settings are logically grouped for your convenience. Tap a category to access the settings.

- **General**
 - *Language*: set application interface language here (matches device locale by default)
 - *Date format*: set the date presentation format you want the application to use, e.g., YYYY/MM/DD
 - *Time format*: set the time presentation format you want the application to use, e.g., HH:MM:SS (24h)
 - *Timezone*: choose between your mobile client or connected server time zone
- **Streaming**
 - **Quality** preference
 - *Main*: only the first (main) stream, [usually] of a larger resolution will be used for all devices
 - *Secondary*: only the secondary stream (substream), [usually] of a smaller resolution will be used for all devices
 - *Auto*: the most appropriate stream will be selected automatically based on the connection
 - Display **video statistics**
 - *ON/OFF*: defines if the video stream properties (FPS, bitrate) are shown for both incoming and outgoing streams
 - **Decoder** configuration: choose how the incoming streams will be decoded
 - *Hardware only*: hardware decoding modules available on your phone will be used automatically (recommended for battery saving)
 - *Hardware and software*: software decoders will be used if required (**warning**: software decoding is battery intensive!)
 - *Per codec configuration*: choose decoding settings individually for each of the expected codecs
 - **Icons**: descriptive elements overlaying the video
 - *Show battery intensive decoder icon*: the icon will appear in case a software decoder is in use
- Device **camera**: settings related to your phone's camera; the first time you open this section, you will be prompted to run camera detection
 - Camera choice and preferences for the reverse streaming (device >> sever) for both live and offline recording modes
 - *Off*: choose this if you do not plan to stream device's video to the server
 - *Camera 1*: main mobile device camera (normally, back camera)
 - *Camera 2*: secondary camera (normally, front camera with less megapixels)
 - Resolution/FPS/bitrate/codec preference, **microphone** ON/OFF
 - Preview: camera preview with the settings defined above
 - **Detect** cameras: allow the app to retrieve your phone's camera configuration (detection may take some time, making the app unresponsive - expected behaviour)
 - Stream **device GPS location** with video to server: when ON, the video streamed from the device camera will be overlaid with GPS coordinates and device marker will be displayed on the geo maps, if configured
 - **Offline video**: settings for offline video recording (for further upload)
 - *Store offline video*: choose whether you want to store the recorded files in the app directory on the internal storage or on the external storage (SD card)
 - *Offline video storage limit*: restrict the space available for recordings to 100, 200 or 500 MB, 1, 2, 5, 10 or 20 GB, or unlimited
 - *When no space left*: the app can either overwrite the oldest file(s) or stop recording new files

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- *Default video upload server*: choose server every time you upload the video or set one of the configured servers to be the default destination
- Device configuration: **network** and other settings related to your phone (but not directly to its cameras)
 - *Allow app/widgets to use*: choose preferred network type for the app and for the app widgets separately
 - *WiFi only*: the app will only connect to the server(s) if it is connected to a wireless network (including servers available via VPN)
 - *WiFi and mobile data*: the app will use both wireless networks and enabled data services (3G/4G)
- **Widgets**: all settings related to the app widgets (application extensions)
 - *Widget update interval*: automatically load a new frame every 30 seconds, every 1, 2, 5, 10 or 15 minutes
 - *Allow widgets to use*: WiFi only, or both WiFi and 3G/4G
 - **Panic button**: choose the default server for streaming (panic buttons is a widget-like buttons that can be placed on the home screen; tapping the button will start streaming live video to the pre-defined server (device must be registered on the server)

 When enabling a camera and turning ON sound, you may be asked to confirm **permissions** for the app to access your phone's camera(s) and microphone. Select YES to grant access to these components if you wish to be able to stream video and audio from your phone to the server and clients connected to it.



Application settings

To exit, tap the arrow icon in the upper left corner, or use your device's *Back* button (software or hardware) or gesture.

Add a New Server

Tap the "plus" button in the bottom right corner to create a new server connection. Alternatively, you can also tap the main app menu in the top right corner, and then select *Add server*. The following parameters should be filled in:

- **Host**: server IP or domain name from your WVMS configuration
- **Port**: HTTP or HTTPS port to use (must match the one configured on the server side), 8080 by default
- **Username and password**: user account credentials to connect to the WVMS server (a [corresponding permission](#) to connect via mobile must be granted)
- **Name**: user-defined connection title (the value from the *Host* field will be used automatically if you leave this field empty)

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Additional options:

- **Use HTTPS:** use HTTPS over TLS instead of plain HTTP (target [server](#) must have [HTTPS enabled](#) and configured)
- **Enable event notifications:** turn ON push notifications from WVMS servers (notifications should be pre-configured via [Events & Actions](#) using the *Send event to client* [action](#))
- **Trust all certificates from this session:** accept all digital certificates provided by target server (required in case you are using a self-signed certificate on the server side)
- **Set as startup server:** turn this ON if you wish the app to connect to the target server upon startup: when started, the app will load the server list and try to connect to the selected server automatically
- **Show trusted certificates:** display all accepted digital certificates from the target server; tap the certificate to discard it

Server settings

When you are ready, tap *Save* to save the settings and exit the dialog box, or tap the "<-" *Back* to discard the changes and simply go back to the main menu.

To edit the settings for an existing server connection, tap the vertical dots on the right side next to the server name, and then tap the *Edit* button that will appear in the drop-down menu. Use the *Delete* menu option to remove any existing entry.

Live View

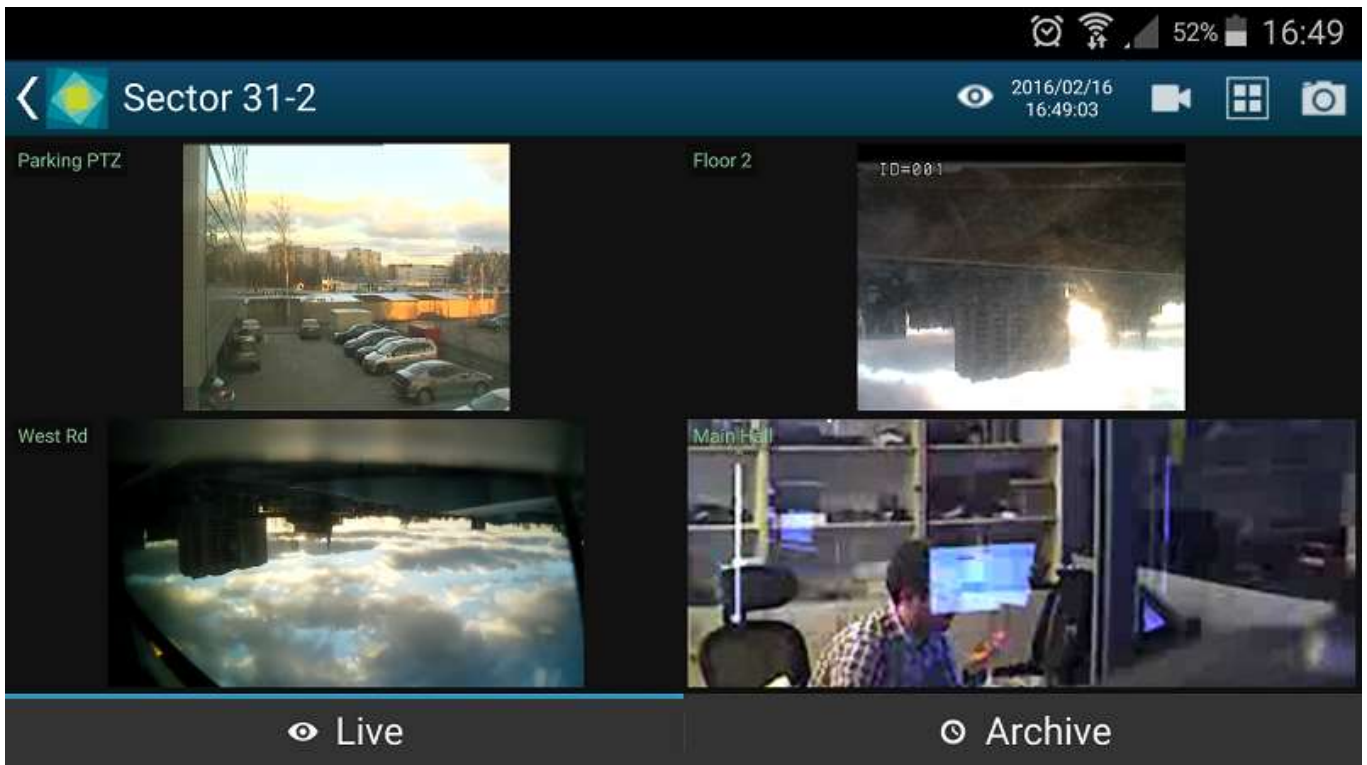
Tap your pre-configured server in the list to establish connection. If you are using HTTPS with a self-signed certificate, you will have to confirm that you trust the server certificate.

When you connect to a server, the **live view** mode is loaded by default. If you have already connected to the selected server previously, the most recent live view layout will appear. Each channel's name will be displayed in the top left corner of the picture, together with video stream properties - codec, bit rate, frame rate and resolution; stream statistics can be turned OFF via app settings (see above).

Tap any camera live view video to switch to the **single channel** view. Tap the "<-" *Back* button in the upper left corner to return back to the channel list. In both multi- and single channel view, you can **swipe** up and down to **switch** between channels. In the single channel view, they will appear one by one. In the multichannel view, the new portion of channels will be shown.

You can change the multichannel **layout** by tapping the server menu in the upper left corner > *View* > choose the desired layout (1x1, 2x1, 2x2, and 3x2 options are available).

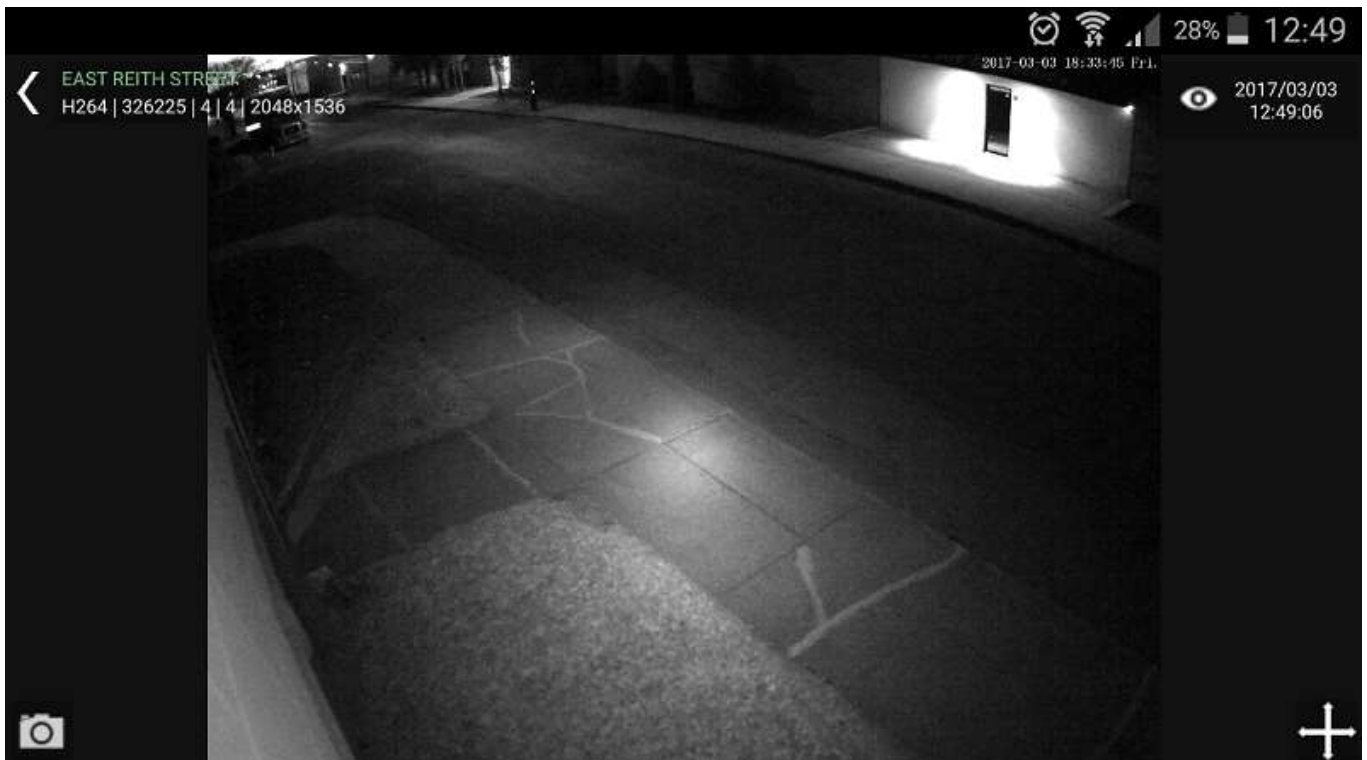
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Live view

Swipe left/right (while holding the device horizontally) or up/down (for vertical mode) to scroll the channels. Tap and hold channel live view to bring the available channel list (similarly to the channel selection menu, chosen item will replace the selected channel).

In both single and multichannel view, you can pinch the picture to **zoom IN/OUT** (digital zoom). A tiny picture-in-picture preview will appear in the upper left corner of the channel: tap it to reset the DPTZ to the normal zoom level. Alternatively, double tap the picture to clear the zoom.



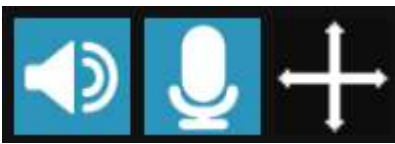
Single channel live view

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Tap any channel to replace the currently displayed layout with a single channel view with extra controls. The available controls are:

- Bottom left corner:
 - **Camera icon:** take a snapshot. Tap to save the currently displayed frame onto your device.
 - **Speaker icon:** audio IN (from the camera). Tap once to enable incoming audio (the icon will turn blue), tap once again to stop. The icon will only appear if the target channel has sound enabled.
 - **Microphone icon:** audio OUT (talk to the remote camera). Tap once to start sending audio back to the camera (the icon will turn blue), tap once again to stop. **Note:** you do **not** need to tap and hold the mic icon, like in the regular WVMS Monitor application, simply tap once to enable audio streaming. This icon will only appear if the related functionality is available.
- Bottom right corner - three dots' menu:
 - **PTZ:** toggle PTZ controls (for PTZ capable cameras). While having overlay PTZ controls ON:
 - tap/long tap *inside* the sphere to pan and tilt (the closer you tap to the sphere edge, the faster the PTZ speed will be)
 - tap/long tap the ends of the zoom bar to zoom IN/OUT
 - **PTZ presets:** tap to see the list of available PTZ presets; tap any to make camera go to the specified preset
 - **PTZ tours:** tap to see the list of available preset tours; tap any to start the tour; tap *Stop PTZ Tour* to terminate any currently executed tour
 - **Cast** to device: tap to cast the current channel to one of the available Chromecast devices
 - Maintain **aspect ratio:** toggle aspect ratio (original/stretch to fit); the setting is applied to **all** channels

Tap the picture again to switch to **full screen** (remove extra controls). You can still swipe up/down (or left/right for landscape screen orientation) to switch between channels.



Audio IN, audio OUT and PTZ controls

 **PTZ Tours** button will only appear if the target camera has at least one tour configured. PTZ tours can be created and managed via WVMS Monitor application.

While in this mode, you can swipe left or right to load previous or next channel in the list. Long tap on the free space (where there is no stream) or on the stream itself (when PTZ controls are OFF) to bring up the list of all available channels: swipe down and up to browse the list, tap any channel to display it.

Server Menu

You can find the server control buttons in the upper-right-hand corner. For vertical screen orientation, all menu controls (except for the timer) collapse into a single button with drop-down list.

- **Eye icon/timer:** shows current server time. When you tap it, you are given the option to select the time (the app will automatically switch to Archive mode afterwards)
- **Cameras:** tap to select a channel from the list of available ones. Note that every channels can only be mapped once and attempts to map a channel for the second time will result in it being placed in the new position and removed from the old one
- **Views:** tap to open layout selection. The layouts currently available are: 1x1, 2x1, 2x2, 3x2. "Add Current" enables you to save current layout under a specified name. If a larger layout has been selected, existing channels will be mapped automatically and all the extra slots will appear blank. To add more channels, tap the "Cameras" button and pick one; all the slots will become marked with blue frames, tap any of them to place the new video channel there.
- **Make snapshot:** tap to save a snapshot to the gallery.
- **Cast:** stream to Chromecast
- **Stream camera:** send the video stream from your phone's camera back to the WVMS server

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- **Camera to widget:** assign one of the channels to a widget (widget should be added to the phone's desktop beforehand, see below for details)
- **User buttons:** tap a user button to trigger the action assigned to it (see below for details)
- **Events:** push notifications from the target server (configurable via *Event & Action* section in Wavesys Console)



Stream Camera

It is possible to send the video captured by your phone's main or front camera back to the WVMS server for further live view on other connected clients and also for server-side recording. To do so, you need to add your mobile device to WVMS configuration and then confirm it in your app.


First, go to your server configuration via Wavesys Console, go to the *Configuration* section and choose *Devices* from the menu on the left. On the upper panel, click the + *New device* button in order to create a new device; enter your desired name and set the *Model* to (*Generics*) - *External Source*, then save. Note the value appearing in the *Code* field: you will need to enter it into your app.

Next, go to your app -> server list -> tap *Settings* in the bottom, find *Camera* in the list and choose your video preferences; the contents of each item may vary depending on your mobile device capabilities:

- **Camera:** back/front (primary/secondary)
- **Resolution:** [the actual list depends on the mobile device capabilities]
- **FPS:** from 10 up to max allowed by device
- **Camera Microphone:** disable/enable sound

Below the settings, you will see the camera preview. Save your preferences and go back to the server list.

💡 For Android 6.0 and newer, you may need to go to your mobile device's system permissions and explicitly allow Wavesys WVMS Mobile to use the camera in case you were not asked for this permission or if you have chosen to deny access to this components.

Then, connect to your WVMS server, tap the menu icon in the upper right corner and choose  *Stream camera*. You will see your camera preview and a message in the bottom saying *Click icon to stream*. Click the *Play* button in the bottom right corner to initiate streaming (the button will turn blue); when asked, enter the code from the Wavesys Console in the *Registration token* dialog box. For example, if your device configuration in the Wavesys Console says CODE:FZL3XT3L, you just need to enter the FZL3XT3L part in the *Registration token* field.

Wavesys WVMS Mobile will automatically start streaming and you will see the contents of your mobile device stream in all other Wavesys WVMS Mobile and/or WVMS Monitor applications. The message in the bottom line will change to *Streaming* and will show your video stream statistics. In order to stop streaming, tap the *Play* button once again.

You can now manage this stream as a usual channel in Wavesys Console meaning that you can record both video and audio from it, analyze it for motion etc. To remove this entity, simply delete the device via Wavesys Console.

💡 If you re-install the application on your mobile device, you will need to go to the Wavesys Console and add your mobile device anew, basically, following the algorithm of adding a new device, or go to the device settings and click *Reset* near the *Code* field to generate a new code, then enter the new code in your app.

Once you have registered your phone on the server, you can set up a **panic button** on your mobile device. This button is placed on your home screen and, when tapped, **initiates live streaming** to the pre-defined server immediately - you do not need to open the app and search for the server. To set up this panic button, go to the mobile application settings and:

- define the panic server where the stream should be sent to, then
- create a panic button and place it onto the home screen.

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Archive Playback

To switch to playback mode, tap the *Archive* tab on the bottom panel. Alternatively, tap the eye/timer icon to go to a specific time: choose a point in time to begin playback at, then tap *Set*. **Timer** can be manipulated in the following manner:

- use UP/DOWN arrows or swipe UP/DOWN to change the value of each position
- switch between the *Time* and *Date* tabs by tapping them
- press *Cancel* to go back to Live mode, or tap *Set* to proceed with playback

When switching to Archive mode from a multiple camera view: all viewports will be highlighted blue - tap a camera to select it. Note that this mode enables you to view one camera at a time: selecting a larger layout will result in an automatic switch to live view.

Archive **timeline controls**:

- **green** colour represents data, **maroon** means there is no recorded data for that period
- tap the **Next/Previous Frame** arrows on the sides to go to the next/previous available picture
- use the **Play** button in the centre to start/pause playback
- tap the +/- labels to **jump** back/forward by ten seconds, one minute, ten minutes or an hour
- tap the camera icon in the bottom-left-hand corner to save a **snapshot**
- if the channel has several recorded **streams** (e.g., main and secondary), corresponding choice will appear above the timeline on the left



Archive view

Swipe left/right to switch between cameras within the current layout; tap and hold the image to bring up the available camera list (just as in the camera selection menu, this will exit the current layout and switch to single-camera layout). Use the timeline below to browse the recorded video and use the play/stop buttons to control the playback.

Widgets

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Widgets are information elements that can be placed on the home screen on Android devices and in the Today view on iOS devices. Individual channels that require frequent monitoring can be placed as Wavesys WVMS Mobile widgets with moderate or low (from twice per minute down to four times per hour) refresh rate so that you do not have to open the whole app each time you need to check the channel. For channels accessible via Internet, this means you can monitor them even if you are in a remote location on 3G or 4G: relatively low frame refresh frequency does not use much bandwidth. You can also limit widgets to use WiFi connection only.

General steps to add and use a widget are the following:


- add as many widgets as you need, one widget per channel,
- go to Wavesys WVMS Mobile app settings and set widget update and network usage preferences (for details, see the *Settings* section above),
- assign channels to widgets.

To add a widget on an **Android device**:

- tap on a blank space on the home screen and hold for a couple of seconds until the menus appear,
- tap the *Widgets* menu at the bottom of the screen, locate Wavesys WVMS Mobile widget and then drag to place it onto the desired place. Widget of default size (2x2 cells) will appear with a *Slot not configured* message inside:
 - drag the orange borders to adjust the widget size, then tap outside the widget to exit the adjustment mode (you can change the widget position and size at any time later by long tapping the widget and then moving it)
 - tap the widget once: Wavesys WVMS Mobile application will open, allowing you to choose the channel,
- then, in the Wavesys WVMS Mobile app:
 - go to the app settings before connecting to the server and choose how frequently the widgets will be refreshed, and also their network usage preference (see the *Settings* section above for details),
 - connect to a server of your choice, choose *Camera to widget* from the main menu, then tap a channel to choose it (all channels will be highlighted with blue frames, swipe left or right to load more channels to choose from), and then choose a widget slot from the list by tapping it, too (the slot may be empty or already contain a channel),
- go back to your home screen: the assigned channel should now be present in the widget, with the channel name in the top left corner, slot number in the bottom left corner, and last refresh time in the bottom right corner.

To replace the channel, follow the steps 3-4 above; to remove the widget, simply tap and hold it until the menus appear and then drag and drop it onto the Recycle bin icon. Tapping a widget will result in opening the corresponding app, as described above.

To add a widget on an **iOS device**:


- swipe down over the Home screen, Lock screen or Notification centre to bring the Today view screen, scroll to the bottom to reach for the Edit menu, tap *Edit*,
- locate the Wavesys WVMS Mobile app and tap (+) sign to the left of it: the app will be added to the list above,
- tap *Done* when you have finished; the widget will appear under *Widgets*, allowing you to add and resize the slots - tap any slot to open the Wavesys WVMS Mobile app,
- then, in the Wavesys WVMS Mobile app:
 - go to the app settings before connecting to the server and choose how frequently the widgets will be refreshed, and also their network usage preference (see the *Settings* section above for details),
 - connect to a server of your choice, choose *Camera to widget*  from the main menu, then tap a channel to choose it (all channels will be highlighted with blue frames, swipe left or right to load more channels to choose from), and then choose a widget slot from the list by tapping it, too (the slot may be empty or already contain a channel),
- go back to your Today view: the assigned channel should now be present in the widget, with the channel name in the top left corner, slot number in the bottom left corner, and last refresh time in the bottom right corner.

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You can drag widgets to rearrange them in the Today view; tapping a widget will open the associated app. To remove a widget, go back to the widget list in the Today view, as described above, and tap the (-) sign next to the Wavesys WVMS Mobile name, then tap the *Remove* button. If you remove the widget and then add it anew, it will retain its view (slots).

User Buttons

User buttons are software buttons, controls used in WVMS Monitor and Wavesys WVMS Mobile for manual event triggering: upon clicking or tapping a user button, the action associated with it is triggered. The action, the user button itself and the rule that makes the user button work are all pre-configured via Wavesys Console; see corresponding sections of the server management manual for details.

If you are connected to a server that has configured user buttons and your user account has permissions to use them, the buttons will be available in the app. To access them, tap the main menu and choose *User buttons* (vertical view) or simply tap the corresponding button  on the top panel (horizontal screen orientation). Then, choose the button you want to use and tap it: the associated action will be triggered and you will receive a confirmation in the bottom of the screen.

Events

Wavesys WVMS Mobile app allows you to receive push notifications from the WVMS server once they have been set up via Wavesys Console *Event & Action* management.

In order to do this, create an action of the *Send event to client* type via Wavesys Console and enable the *Display event in mobile application* option, then attach this action to your desired event in the *Rules* section. When creating the rule, do not forget to set the target channel for it: the notifications will appear for that particular channel and their availability can be controlled via channel access permissions. It is possible to limit the reception of the notifications to certain user profile or user group. You will find more details on how this is done in the *Events & Actions* section, under [Actions](#).

Triggered notifications will immediately appear on the mobile device(s) that have Wavesys WVMS Mobile app installed with the target WVMS server configured (connected user account must have permissions for the target channel). The app itself may be not running; events will pop up as regular text message notifications. If the target mobile device is offline, the notifications will arrive shortly after it re-connects to a network that provides required server connection.

Offline Camera

Starting from version 1.7, Wavesys WVMS Mobile allows you to record offline video clips for further upload to the server. The video can be recorded from the device camera in the app and stored as long as required until the server connection is available.

To enable this, you first need to:

- set up the target server connection in the app
- choose your camera preferences
- register your smart device on the WVMS server as *External Model* as you would do for live streaming from device camera
- enable Edge Recording for the newly created channel

You only have to do this once for each device (unless you re-install the app). From then on, you will be able to record as many video clips as you wish, and then upload them to the target server.

If you do not have paired your device with the server yet, go to your WVMS server configuration via Wavesys Console, go to the Configuration section and choose Devices from the menu on the left. On the upper panel, click the + *New device* button in order to create a new device; enter your desired name and set the *Model* to (*Generics*) - *External Source*, then save. Note the value appearing in the *Code* field: you will need to enter it into your app.

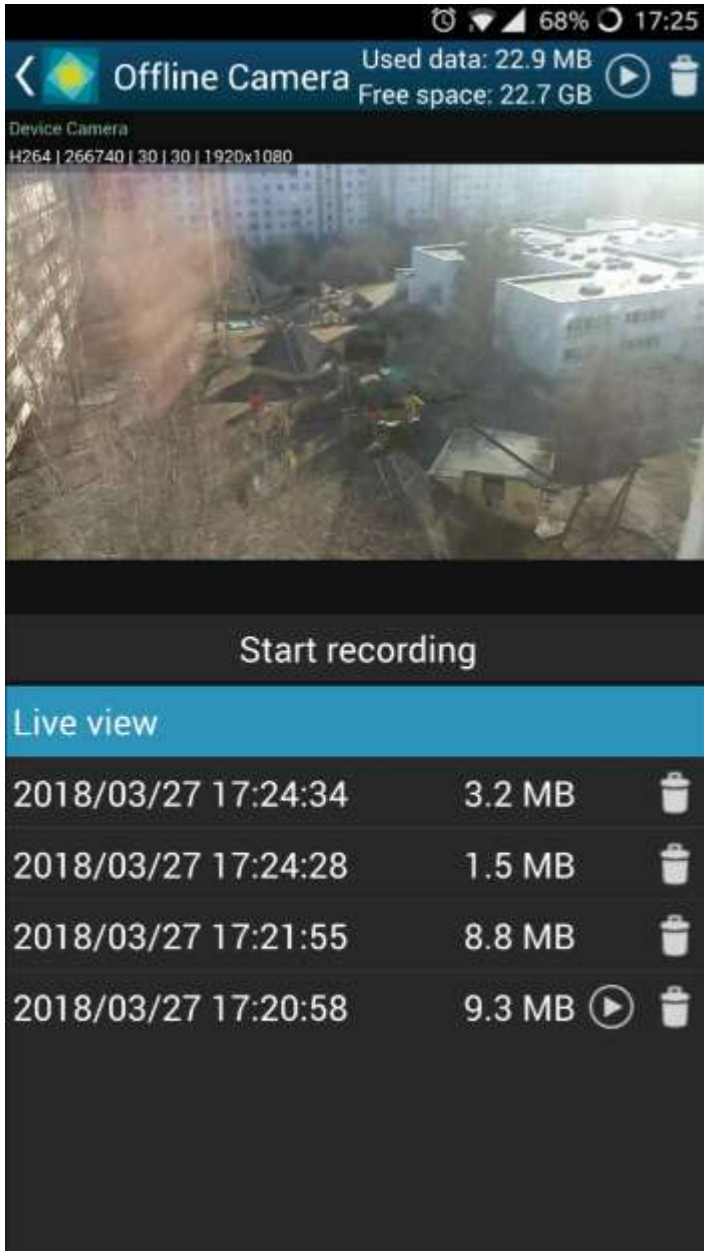
Next, go to your app -> server list -> tap *Settings* in the bottom, find *Camera* in the list and choose your video preferences; the contents of each item may vary depending on your mobile device capabilities:

- **Camera:** back/front (primary/secondary)
- **Codec:** H.264/H.265 (depends on device capabilities)
- **Resolution:** [the actual list depends on the mobile device capabilities]

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- **FPS:** from 10 up to max allowed by device
- **Camera Microphone:** disable/enable sound

Below these settings, you will see the camera preview. Save your preferences and go back to the server list. Here, tap the *Offline Camera* option in the bottom to open the offline recording mode.



Offline recordings

Rotate your device the way you want to hold it during the process and tap the *Start recording* button: it will turn red indicating that the **recording** is happening. Tap it again to **stop**: a **new file** will appear in the list and the camera preview will return to live.

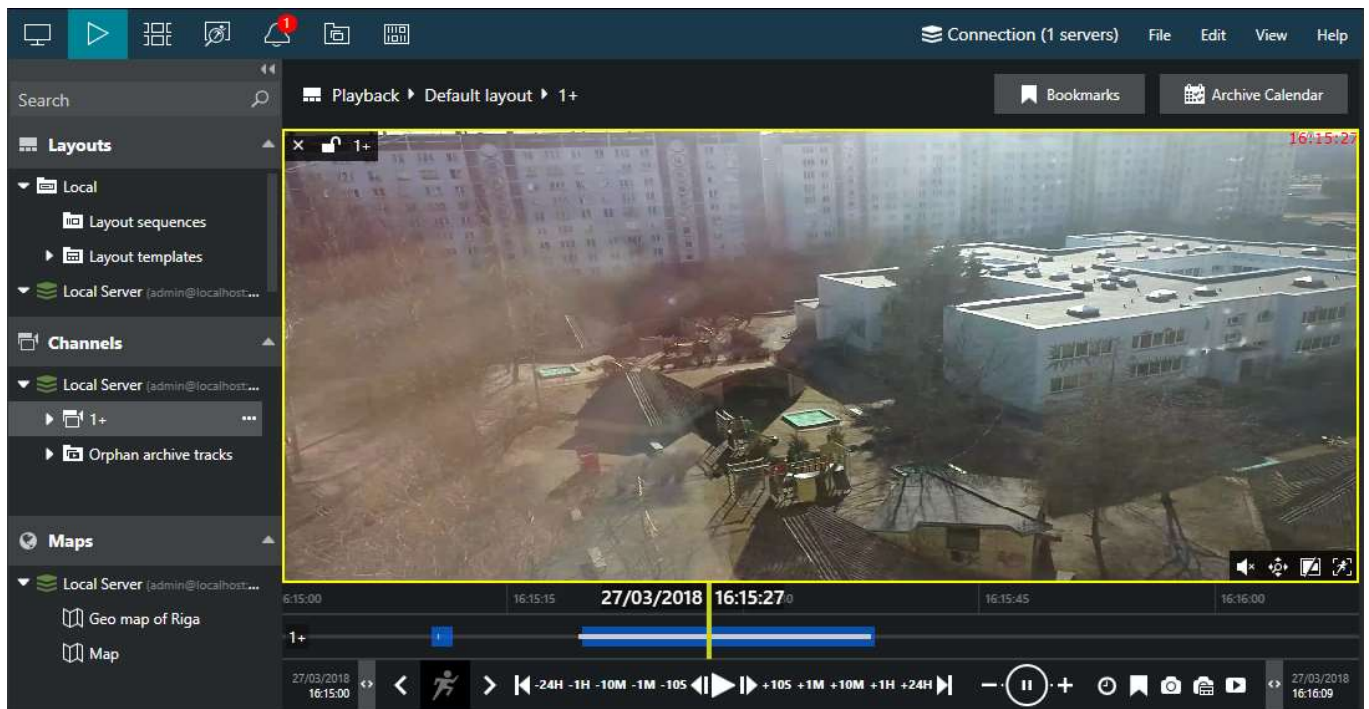
Tap any file in the list to **play it back**; the play/pause button will appear below the picture allowing you to start/stop the playback. Use the recycle bin icon next to the file name to **remove** individual recordings. The details on the upper right will show how much **storage** space has been used. The *Recycle bin* icon in the top right corner will remove all the recorded videos.

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Now, to **upload** the recordings to the server, use the *Play* button: the one in the top right corner will upload all the files; there is also a possibility to upload the last recording only by using the *Play* button next to the file name. You will be presented with file details and server choice: when ready, tap the *Upload* button. The video file(s) will be uploaded to the selected WVMS server and stored as **edge stream** for your device's channel. Do not worry if the upload is interrupted due to network issues: the upload will resume as soon as the connection to the target server is available again.

GPS Tracking

Starting from the Wavesys WVMS Mobile version 1.7 and WVMS version 1.8.0, it is possible to send the GPS coordinates of the smart device to the WVMS server. The coordinates are then displayed on top of the live and recorded video, and they are also used to trace the device on geo maps.

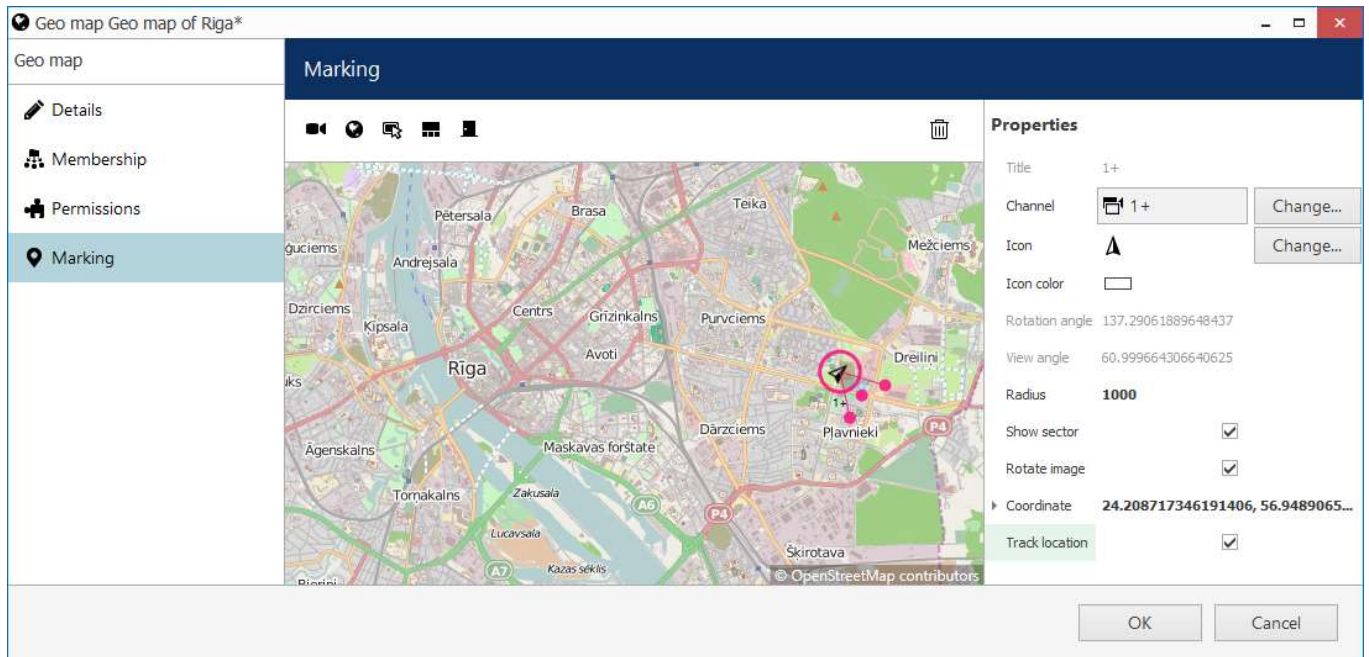


GPS coordinates displaying on top of the video streamed from Wavesys WVMS Mobile

Setup:

- enable sending of GPS data in your app settings
- register your device on the server as described above in the *Stream Camera/Offline Camera* sections so that it exists in the server device/channel configuration
- create a geo map on the server via Wavesys Console
- place a camera marker on the map, set your smart device as the target channel and enable tracking in the properties

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Geo map with a marker that has location tracking enabled

Now, if you move and stream video from your phone to the WVMS server, the marker on the map will move as well, displaying your location. GPS coordinates will be also shown on top of the live video stream and also when it is played back. Note that for the offline recorded stream (clips recorded and then uploaded to the server) the coordinates will not be displayed.

42 Event and Action Overview

Event and action (**E&A**) management is a component of WVMS, which provides additional opportunities for handling surveillance system work under certain conditions. The main task is to assign flexible device/server reactions on a user-defined basis. These scenarios may work within a single server, as well as in distributed systems with Wavesys WVMS Enterprise where events originating from one server can trigger actions on one or more different servers.

Events are entities that arise when something happens in the system - namely, when system or system component states changes, for instance, a video stream has been lost, a recording or disk error has appeared etc. These changes can be set up to trigger certain **actions** so that system administrators and/or users are notified and can react to them in a timely fashion. Additionally, there are also extra controlling entities that allow a flexible and advanced setup of event-action rules: conditions, delay times and schedules.

Using event & action management, you can specify your desired outcome for your video surveillance system's operation and determine how software reacts to any event caught on any server and how it turns them into an automated process. Send emails, activate DI/DO, interact with any other software or just bring the attention of the operator to the device that requires their immediate action. The functionality can be used not just for a single event, but on a set of sequenced events to get rid of false alarms and improve the efficiency of the surveillance system.

Possible **E&A scenarios** may be:

- sending alerts through the server based on camera digital input events;
- starting or stopping video recording based on motion in specific regions during specific hours;
- switching to some camera PTZ preset if the door sensors go off at night;
- directing the camera to a specific PTZ preset if another camera registers the same movement;
- etc, etc.

Event & action management offers the following **functionalities**:

- event & action configurator rules
- standard (default) events (available for all servers)
- standard (default) actions (available for all servers)
- custom events of certain types (configurable)
- custom actions of certain types (configurable)
- global events (server-to-server data transmission)
- delay timers (postpone actions)
- special conditions (combine several events)
- schedules (timetables)
- mail server configuration

Each of these components is described in details in the corresponding sections of this document.

Setup in Brief

Actual setup of E&A depends greatly on your system configuration, E&A usage scenarios, required automation level and other things. However, we recommend that, regardless of system scale and architecture, you stick to the following **order of E&A configuration** steps for optimum results:

1. Preliminary actions
 - a. Create a plan of your E&A scenarios on paper or in any diagramming/smart draw software - this will ensure you always have a basis to check against
 - b. Set up the your WVMS system so that you have all the servers, devices, channels, users, external system connections, and optional elements pre-created
 - c. Pre-configure all the necessary hardware equipment (e.g., camera IO wires, external physical alarms, buttons) and connect it
 - d. Pre-configure all third-party programs/scripts/executable files, if necessary
2. Extra setup in Wavesys Console
 - a. Create User Buttons, if you are going to use them for manual action triggering
 - b. Create Maps, Layouts, PTZ Presets if necessary

3. E&A Management setup per server
 - a. Add mail servers if you are going to use e-mail notifications
 - b. Add custom events
 - c. Add conditions, if needed
 - d. Add custom actions
 - e. Create rules using all elements; add extra events/rules, if required
 - f. Add timers, schedules and conditions to the rules
 - g. Check your rule map against your initial plan from 1.1
 - h. Test your rules

43 Rules

All rules defined via *Event & Action Configurator* are listed in the *Rules* section. Click the *Change* button near server name to select a different server from the list: for each server, only relevant rules are displayed. You can perform the following actions from the *Rules* section without opening the *E&A Configurator*:

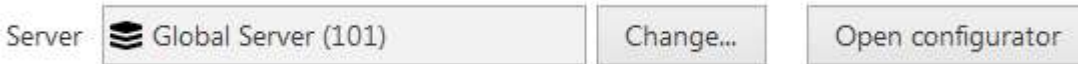
- **view** the complete list of existing rules, per server, and their properties
- **disable** a specific rule or a set of rules by using the *Disable* button on the upper panel
- **enable** a specific rule or a set of rules by using the *Enable* button on the upper panel
- **test** a specific rule (the rule must be enabled)

In order to **add**, **remove** and **modify** the rules, choose the target server and click the *Open Configurator* button on the top panel.

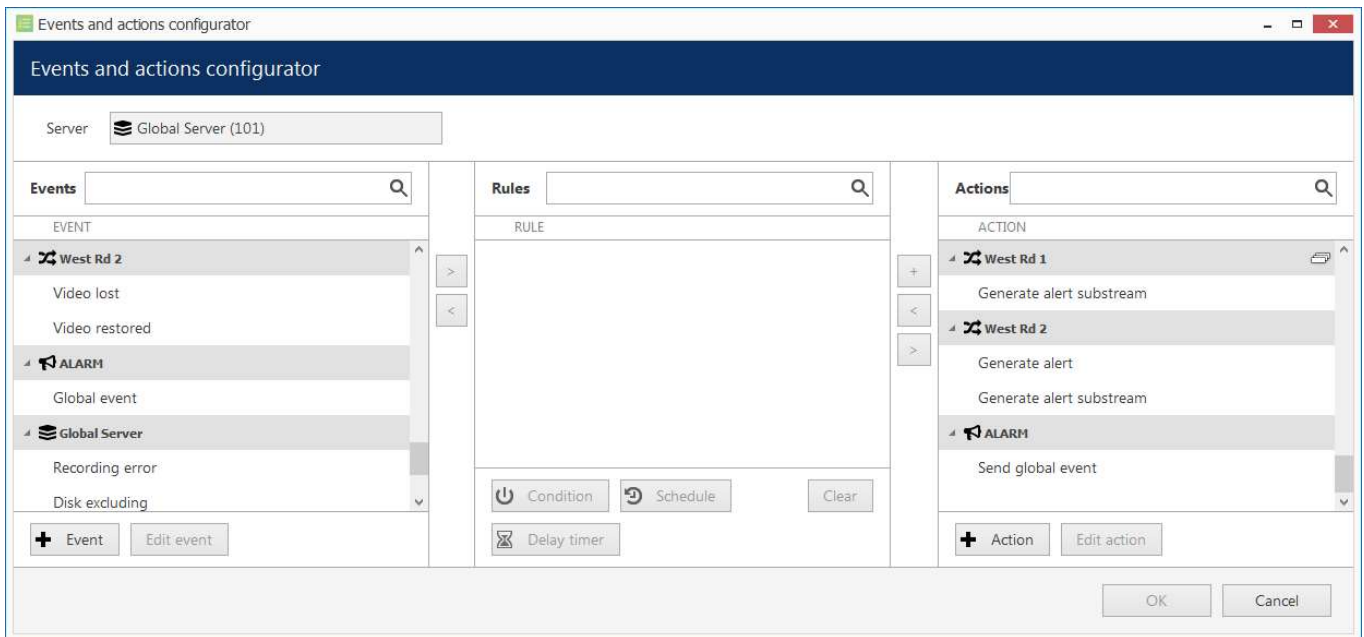
44 Add Rules

All existing and added entities of E&A can be combined to create **rules** (rule map) for each server, which will define server behaviour if events are triggered. This section will guide you through related features, explain the meaning and purpose of used items and provide usage examples.

The rule map is created via the **Event & Action Configurator**: to open it, go to the *Events & Actions* section in Wavesys Console and then click *Rules* in the menu on the left, then select the target server for which you wish to add the E&A setup, and then click the *Open configurator* button on the upper panel. To change the target server, click the *Change* button next to the server name and then pick one from the available server list.



The *Event & Action Configurator* will open in a new window; by default, no rules are defined.




Event & Action Configurator

You can pre-create all events, actions, conditions and schedules beforehand using the relevant menu sections in Wavesys Console, or create necessary items as you go from the configurator. Delay timers can only be created as you go for the specified rule and are not saved as independent entities.

Add and Edit Events

Choose the target item from the Events list and then click the + *Event* button below: configuration dialog box will then open with the target device pre-selected. Here you can add alerts from device digital inputs, VCA notifications and other types of events; see the detailed description of how to create events in the [Add Events](#) section.

Events are arranged by **sources**. Typical event sources are: channels, channel groups, servers, user buttons, video walls, external services.

 Built-in (default) types of events - lost/restored video, recording errors etc. - cannot be edited. This is also the case for all built-in actions.

Add and Edit Actions

Choose a target item from the Actions list and then click the + *Action* button below: the configuration dialog box will then open with the target device pre-selected. Here you can add different reactions any type of event:

- trigger device digital output
- write to OS Application log

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- activate target device's PTZ preset
- activate main/secondary stream recording profile
- send an email notification
- run a third-party program
- etc.

See the detailed description of how to create and configure actions in the [Add Actions](#) section.

Manage Rules

To start combining events, actions and additional controls, simply follow this scheme:

- find your desired **event** in the *Events* list - use search filter on the top panel, if required
- use the < and > arrows or double-click events to add/remove them to/from the *Rules* list
- click free space of the target rule in the *Rules* list (use CTRL or Shift to select multiple ones) - the selected rows will then become highlighted green
- find your desired **action** in the *Actions* list - use search filter on top, if required
- use the < and > arrows or double-click actions to add/remove them to/from the *Rules* list, and the + button to add more than one action for a single event
- select desired actions and add auxiliary controls by clicking buttons on the bottom panel (see description below for details)

Useful tips:

- double-click a device (highlighted grey) to add **all** its events to the rule map
- to **add** an action to an existing rule, use the + button instead of the < button: the original event will be duplicated and new action will be added to the copy
- use the + button between *Rules* and *Actions* lists to add **multiple actions** of the same type to the selected rule(s)
- to clear the *Rules* list, select all rules using Shift or CTRL+A, then press < button on the left to remove all events
- use the *Expand/Collapse list* button on top of each column to hide all contents and only display node titles

The rule header displays the event source and event itself; below, related actions are listed, each with its own set of special controls. Actions of the same type are listed under the same rule header; for all other cases, the events are duplicated, resulting in a separate rule. One condition, one schedule and one delay timer can be attached to **each action**.

Platform 3/4 >> Main Gate Opened

Gate Open >> Set condition

Working Hours

Platform 3/4 >> Main Gate Opened

ALARM >> Send global event

Platform 3/4 >> Main Gate Opened

West Rd 1 >> > Activate PTZ preset > Gate

Working Hours 00:00:10 extend

Example of a rule set for the same event source

Once the rule map has been created, click the *OK* button in the bottom right corner to **save and exit**. Note that simply closing the *Event & Action Configurator* is analogous to clicking *Cancel*: no changes will be saved.

Conditions, Schedules and Delay Timers

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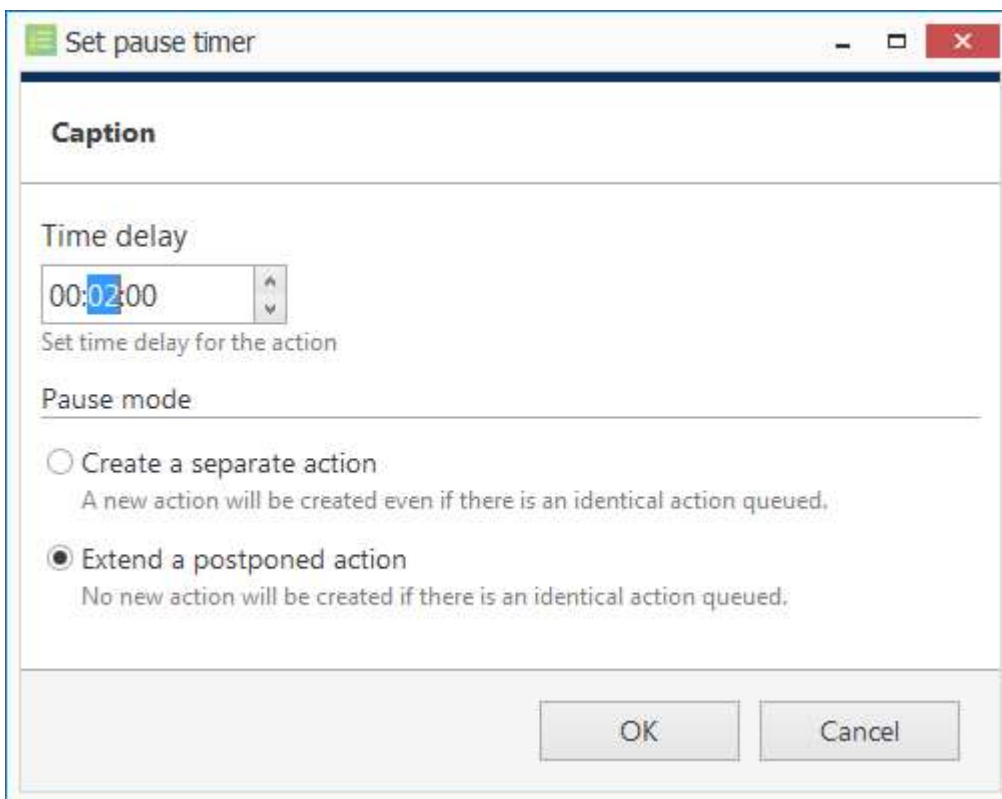
For each event/action pair that is added to the rule map, additional options can be defined in the form of [conditions](#), [delays periods](#) and [schedules](#). Select one or multiple target events from the *Rules* list and then click desired control item in the bottom panel.



To remove auxiliary controls from a rule, select it in the *Rules* list and click the *Clear* button on the bottom panel. Note that all defined conditions, timers and schedules will be removed from the target rule, and it is not possible to de-attach them one by one.

Delay Timers

To add a pause timer for specific actions, select one or more of the mapped rules (use *CTRL+click* or *Shift+click* to mark multiple items) subject to delay, and then click the *Delay Timer* button on the bottom panel of the central part of the *Event & Action Configurator*.



Delay timer properties

Set the delay period for the target timer. Time can be adjusted in the following ways:

- click hours/minutes/seconds and then use the UP and DOWN arrows on the right, or
- click hours/minutes/seconds and use the mouse scroll, while still holding mouse cursor over the relevant timestamp section, or
- enter the time manually using the keyboard numpad.

Next, choose the pause mode:

- **Create a separate action:** new actions of the same type will be created regardless of the acting delay timer, and queued in the same way as the original delayed action
- **Extend a postponed action:** new events of the same type will restart the timer, postponing the resulting action for the specified amount of time

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When you have finished, click *OK* to save and exit the dialog box. The newly created delay timer will be assigned to the pre-selected actions.



Extending an action allows you to postpone the action execution repeatedly if more events of the same type arrive within the chosen time period. For example, if incoming events are of a *Recording Error* type, there may come too much of them at once e.g. in case of a major storage issue, causing a lot of triggered actions of the same type, while only a single action may be desirable.

Say, if required action is *Write to application log*, setting a delay timer to *5 minutes + extended action* will postpone the email sending for 5 minutes every time a new recording error appears; when, at a certain point, more than 5 minutes have passed without new incoming events, a single log entry will be eventually created. The **separate action** option, on the contrary, will force logging for every single triggered event.

To remove a delay timer from rule configuration, click the timer to highlight it within the rule, and then click the *Clear* button in the bottom panel. Note that, if there are schedules and/or conditions attached to the same rule, they will be removed as well.

Schedules

Schedules are used when you wish a rule to be active based on a pre-defined itinerary. You can create any number of custom schedules via the *Conditions* section in the Wavesys Console and then use them for rule control: see [Create Schedules](#) section in this document for a detailed explanation of this.

Select one or multiple target events from the *Rules* list and then click *Schedule* button in the bottom panel.

Conditions

Conditions are supplementary variables that can allow or prevent action execution. The decision is taken based on the condition state: if the condition is **ON**, the planned action will be executed; if the condition is **OFF**, the action will not be performed regardless of the frequency of the triggered event. The condition state can be changed as a result of some other event, so an additional rule should be added to perform this task; alternatively, you can manually set and unset conditions at your will. Thus, conditions allow the activation and deactivation of rules without requiring them to be entirely deleted.

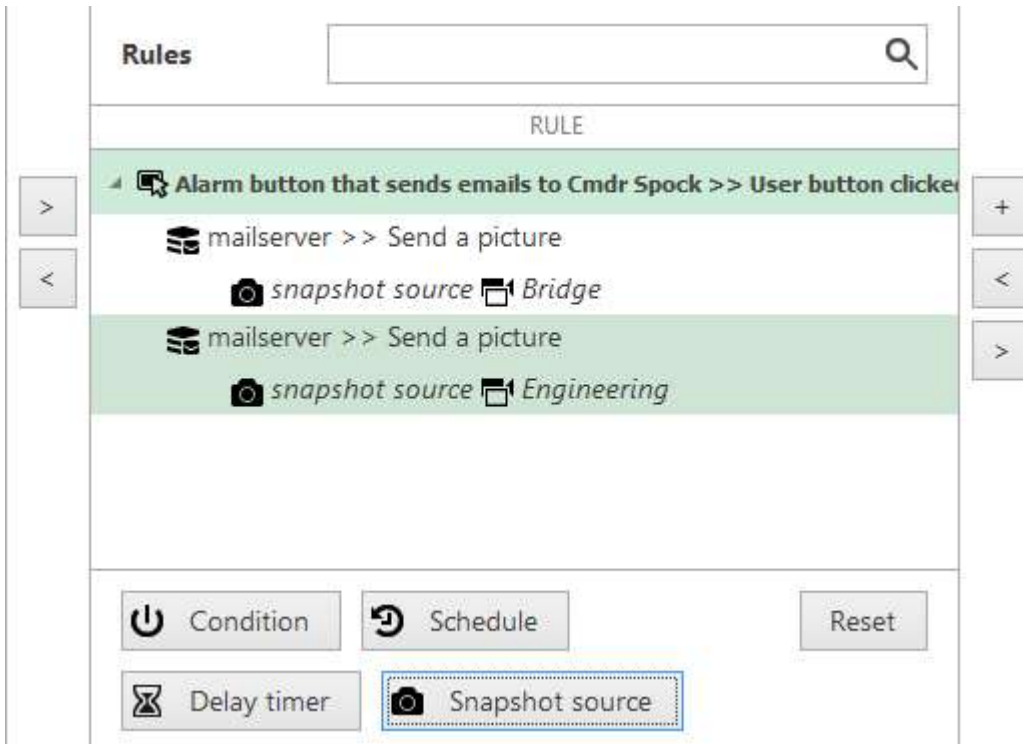
To assign a condition to the rule, choose one or multiple target events from the *Rules* list and click the *Condition* button on the bottom panel, then either select target condition from the list or create a new one.

Please read the [Conditions](#) topic of this document if this feature is new to you: it contains detailed description and usage examples.

Source and Target Channels

Some actions participating in the rule creation need a related channel to be specified so that these rules can be properly executed. For such actions, the source/target channel is specified when you create a rule involving such an action: corresponding additional buttons appear on the bottom panel or the rule map section, next to conditions, schedules and delay timers. Each action allows exactly one related channel; if you need, for instance, two snapshots to be sent via email, just add two actions of the same type and specify different source channels.

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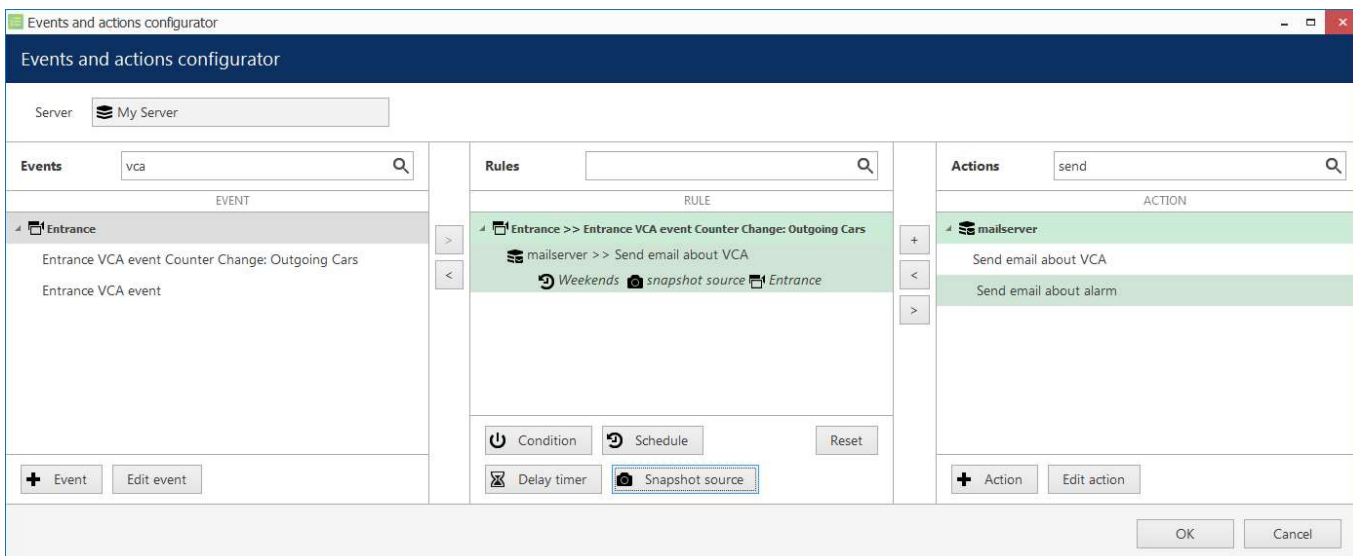
Use the *Snapshot Source* button to attach different snapshots to several actions of the same type

When you combine such actions with events that already are related to some channel (e.g., *Video Lost, Motion, VCA, DI*), that channel is selected automatically for the resulting action. For the rest of events, the channel is not set by default and you need to use the **target/source channel** buttons on the panel below the rules. Also, you can set a different channel instead of the one selected automatically by using the same buttons.

Attaching Snapshots

The *Send Email* action allows you to attach a snapshot from one channel and deliver it together with the email to the recipient. The snapshot can be taken either from the main stream or from the secondary stream (substream), if available. At the action creation time, you just enable the snapshot from either main or secondary stream, and then you will have an option to specify the source channel when creating the rule that involves such an action.

When creating the [Send Email](#) action, you can choose to attach a snapshot by selecting the necessary stream option (main/sub) from the drop-down list. The channel itself is not specified at this step as it is not known beforehand, to which channel this action will be applied in future - this makes the action universal, applicable to any target channel.



Specify a snapshot source for the target rule

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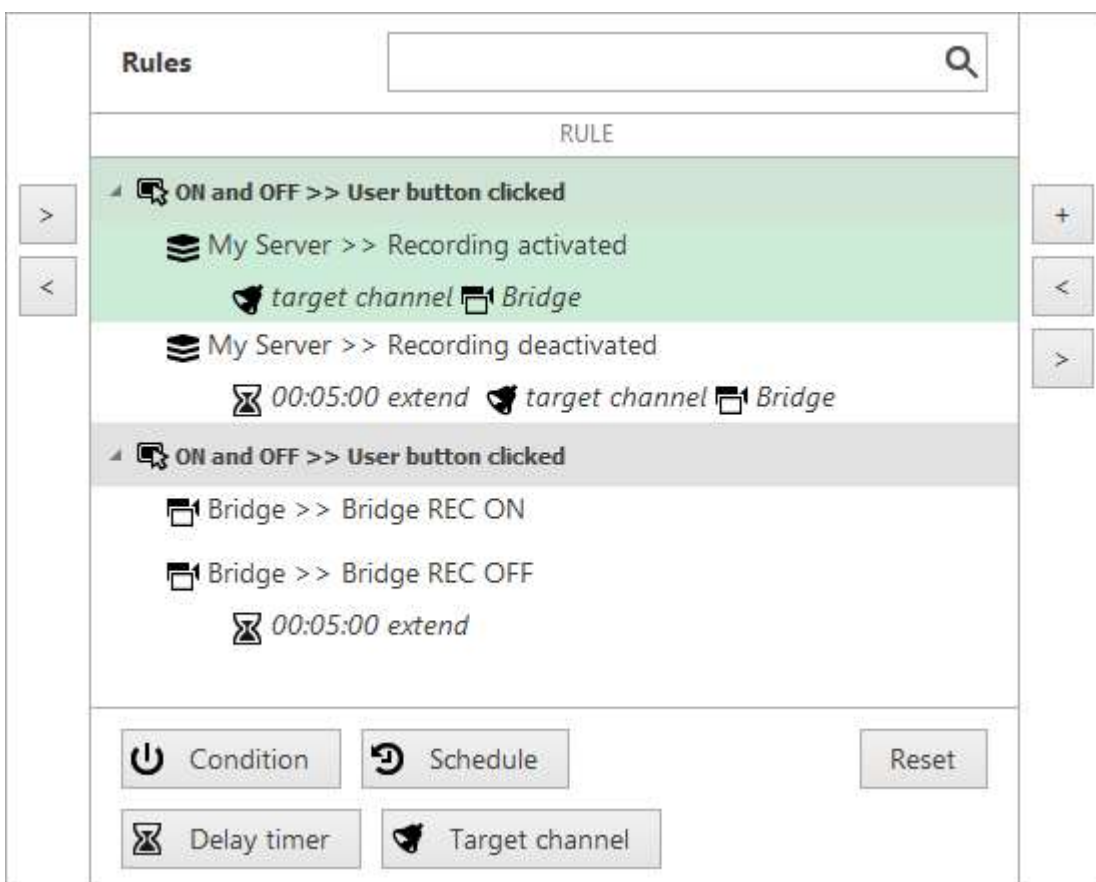
The source channel is specified when you attach the *Send Email* action to an event, i.e., create a rule in the *Event & Action Configurator*:

- if the event in the rule has some channel as a source (e.g., motion, VCA, DI), this channel is set automatically as a snapshot source
- for events having sources other than channels (e.g., user buttons, server events), you can specify the source channel by using the *Snapshot source* button on the panel below the rule map
- you can modify the source channel by using the same button, and also disable snapshot attachment by selecting *none* as the source

Email sending rules can accept any extra modifiers just like any other rules - [delay timers](#), [conditions](#) and [schedules](#), each of them once.

Adding Target Channels to Rules

There are other actions, apart from *Send Email with a Snapshot*, that are related to channels and may use them as action targets. These are, namely, *Create Bookmark* and *Send Event to Client*.



Recording changes are logged in the notification area of the target channel

The *Create Bookmark* action requires a channel to add the bookmark to. To add bookmarks to multiple channels simultaneously, add several actions of the *Create Bookmark* type and specify different target channels for each.

The *Send Event to Client* action only needs a target channel to be specified in case the action has the *Display event in notification panel* option enabled: as a result, the pre-defined message will appear in the notification area of the specified channel (overlay area in live view, the same place where the stream errors appear - see WVMS Monitor user manual for more information). Similarly to bookmarks, you can add more than one action of the same type and add different channels as targets in order to display the message in the notification areas of these channels.

Examples

Here are a few examples of the *Event & Action Configurator* usage. You will find more examples in each of the related topics.

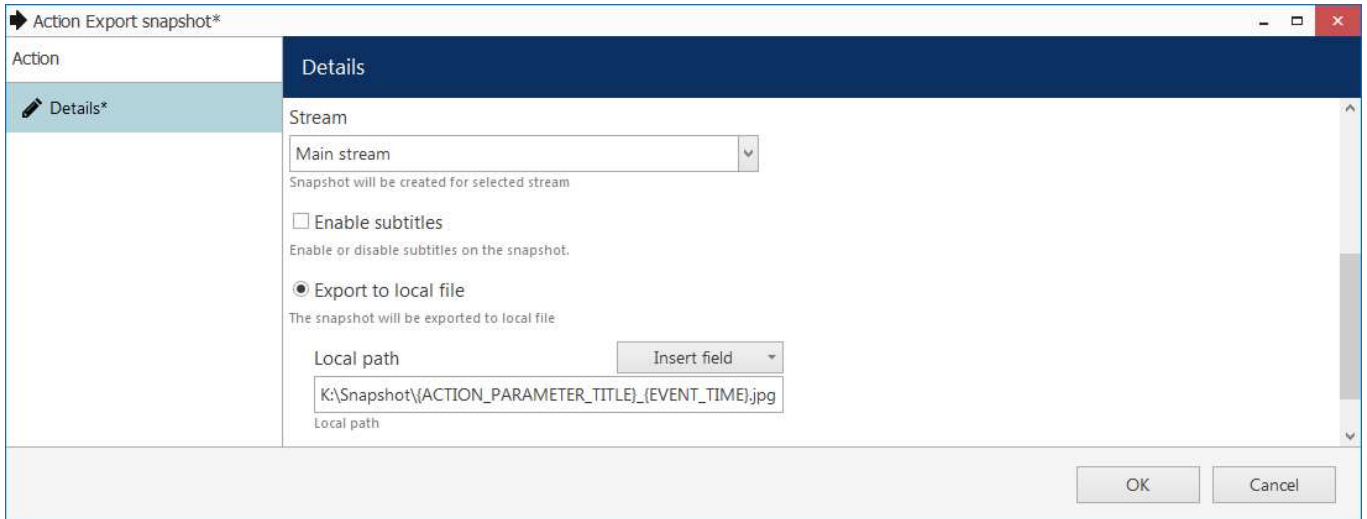
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Export Snapshots From All Channels

Task: upon a user button click, save a snapshot from every existing channel on one server.

Preliminary setup:

- create a [user button](#) with your desired name
- create an action: export snapshot to a specified location



Export snapshot to a specified location using text macros for the file name

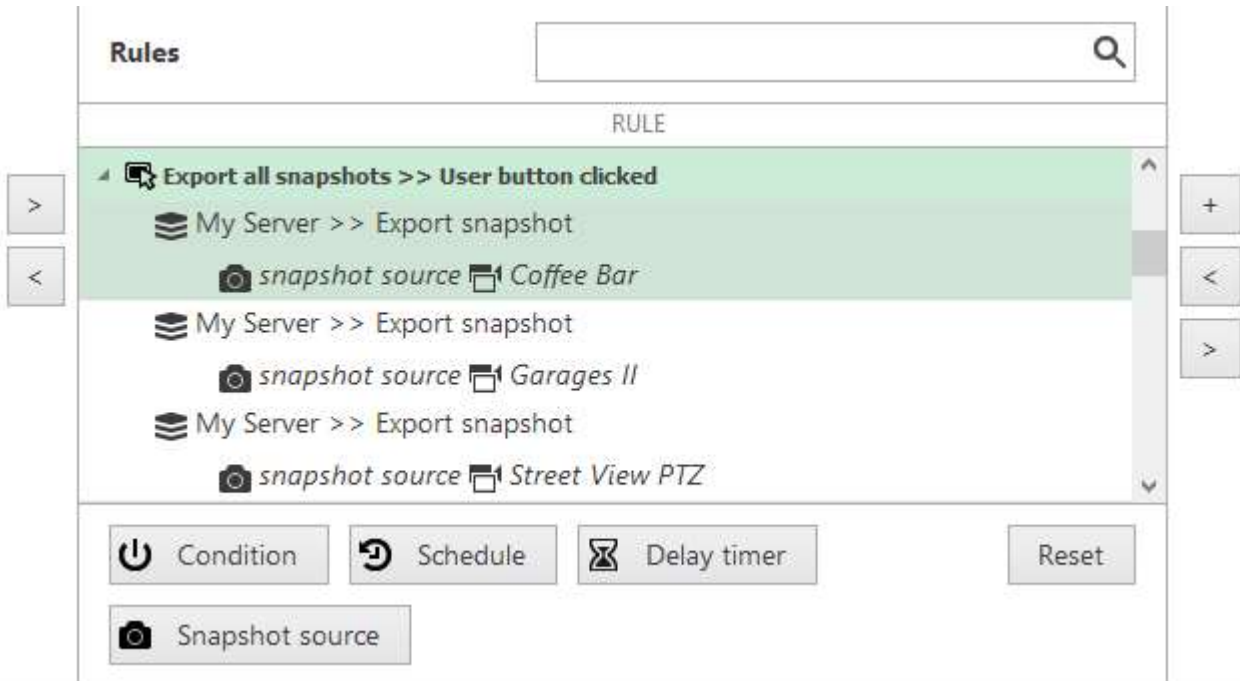
Note that the action itself does not contain any fields for the channel to serve as the snapshot source. Thus, the action is universal and can be used repeatedly for many rules; the target channel for the snapshot is then to be specified for each rule in the E&A Configurator.

Use the text macros in the file name and/or path: this is necessary for each snapshot to have a unique name. Otherwise, the snapshots in the same directory will overwrite each other. {ACTION_PARAMETER_TITLE} here is the best option here to differentiate between channels because the originating event (user button clicked) and the action target (server) are the same for all rules. For example, here are two different applications for the same macros:

K:\Snapshot\{ACTION_PARAMETER_TITLE}_{EVENT_TIME}.jpg - each file name contains channel name (snapshot source specified at the rule creation step) and a timestamp

K:\Snapshot\{ACTION_PARAMETER_TITLE}\{EVENT_TIME}.jpg - directories with channel names are created, and all snapshots from the same source are put into the same folder and have timestamps as their names

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Each rule has its own snapshot source

Rules:

- add the *user button click* event once, click it so that it is selected (highlighted green)
- add the *export snapshot* action multiple times for all channels using + button (the rule will be copied automatically)
- define the *snapshot source* (=channel) for each rule using the button in the bottom

As a result, when the user button is clicked in the WVMS Monitor or in the Wavesys WVMS Mobile application, snapshots from all available (those having video) channels will be saved into the specified location.

Email Notification on Video Loss

Task: send an email notification when the video stream from certain channel(s) is not available for more than five minutes.

Preliminary setup:

- in the channel settings, set the video loss timeout to 300s (five minutes) for each target channel (select multiple channels and use the *Bulk Edit* button on the upper panel to modify several channels at once)
- configure a [mail server](#) with your desired parameters
- create an action: send email to the responsible person using the pre-configured SMTP server

Rules:

- the *Video lost* event from each of the target devices triggers the *Send email* action

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RULE

Camera A >> Video lost

Gmail >> Send email to admin

Camera B >> Video lost

Gmail >> Send email to admin

Camera C >> Video lost

Gmail >> Send email to admin

Email Notification on Video Loss

Note that you do not need to create the *Video lost* event as it is already exists by default for each channel.

Pop Up Channel on Video Analytics Event

Let's see how to pop up video channels if built-in video analytics (VA) trigger a line cross event. Such rules let you efficiently load operators' monitors, so that they only see relevant video instead of tons of static channels.

Task: if video analytics on Channel X detect a person crossing a line, pop up Channel A on all operators' screens.

Preliminary setup:

- Channel A: [enable VA](#), add a [crossing line](#), add a line event of the *Crossed* type with the *Person* class enabled

Rule for Channel A:

- *VCA rule* with the *Line crossed* parameter triggers the *Pop up on screen* action

If you want to limit the popup to a specific video wall display, simply create an additional action of the *Popup object* type. In the action properties, you will be able to specify the video wall display and even viewport index as the channel destination.

Global Handling of Recording Errors

This example will cover a use case with a **global event**, showing how multiple servers within a single system can be involved in a more sophisticated chain of events and actions.

Task: if there are recording errors on Server A, log this event locally and also add corresponding entry to Windows Application log on the central server. The *Recording error* event is there by default and so there is no need to create it.

Preliminary setup:

- Server A: *Write to A Application log* action
- Central Server: *Write to CS Application log* action
- Global event *Recording Error on Server A*

Rules for Server A:

- *Recording error* event triggers local *Write to A Application log* action
- *Recording error* event triggers *Send global event* action for the *Recording Error on Server A* event

Central Server rules:

- *Recording Error on Server A* global event triggers its own *Write to CS Application log* action

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RULE

Server A >> Recording error

Server A >> Write to A application log

Server A >> Recording error

Recording Error on Server A >> Send global event

Rules for the Server A

Server A generates a global alert and sends it to all servers in the system.

RULE

Recording Error on Server A >> Global event

Central Server >> Write to CS application log

Rules for the Central Server

The Central Server is subscribed to the global alert and therefore reacts with the assigned action.

45 Default Events

Events are entities that appear when something happens in the surveillance system - namely, when the system or system component state changes. These changes can be set up to trigger certain actions so that system administrators and/or users can react to them in a timely fashion.

For each WVMS server, there are a set of default events, which behave in an identical way on all servers and cannot be altered or deleted. These are:

- **Central Server Connected:** the connection with central server has been restored; event is available for non-central **servers**
- **Central Server Disconnected:** the connection with central server marked as unavailable because the timeout defined in the server settings has been reached; event is available for non-central **servers**
- **Disk Excluding:** one of the storage locations has been marked as unusable and has been excluded from the recording configuration; event is available for every **server**
- **Failover Activating:** a recording server has failed and has been automatically replaced by a failover node
- **Fallback Activating:** main storage has failed, server has automatically switched to fallback storage; event is available for each **server**
- **Global Event:** global (system-wide) event from one of the servers has been fired; event is available for all defined [global events](#) and on all servers with Wavesys WVMS Enterprise
- **Motion:** motion has been detected; event is available for each **channel**
- **Motion Started:** some motion has been detected (single motion event has occurred); event is available for each **channel**
- **Motion Stopped:** no more motion is being detected; event is available for each **channel**
- **Recording Error:** problem encountered while recording video data to the storage; event is available for each **server** and for each **channel**
- **Recording Recovered:** server has recovered from the recording error; available for each **channel**
- **User Button Clicked:** user button was pressed; event is available for all created **user buttons**
- **Video Lost:** no video stream available for this specific channel for the defined amount of time, which is set in the channel settings; event is available for each **channel**
- **Video Restored:** video stream connection re-established; event is available for each **channel**

The screenshot shows the 'Events & Actions' configuration page in the Wavesys WVMS interface. The page has a dark blue header with navigation icons and a search bar. Below the header, there is a sidebar with various configuration options like Rules, Events, Actions, Global events, Conditions, Schedules, Mail servers, Configuration, Events & Actions, and Monitoring. The main content area shows a table of default events. The table has three columns: TITLE, EVENT TYPE, and SOURCE. The first row is highlighted in green and shows 'Central server connected' with event type 'CentralServerConnected'. Other events listed include 'Central server disconnected', 'Disk excluding', 'Global event', 'Recording error', 'User button clicked', 'Video lost', and 'Video restored'. At the bottom of the table, there are two buttons: 'Recently added, 0' and 'Recently updated, 0'.

TITLE	EVENT TYPE	SOURCE
⚡ Central server connected	CentralServerConnected	
⚡ Central server disconnected	CentralServerDisconnected	
⚡ Disk excluding	Disk excluding	
⚡ Global event	Global event	
⚡ Recording error	Recording error	
⚡ User button clicked	Button pressed	
⚡ Video lost	Video lost	
⚡ Video restored	Video restored	

Default events

Default events are available in the *Event & Action Configurator* and can be used in the same way as user-defined events, except for they cannot be edited. Events are arranged by **sources**. Typical event sources are: channels, channel groups, servers, user buttons, video walls, external services.

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46 Add Events

Events are entities that appear when something happens in the system - namely, when system or system component state changes. These changes can be set up to trigger certain actions so that system administrators and/or users can react to them in a timely fashion.

In addition to the the [default set of events](#), certain types of events can be added manually and customized. Continue reading to learn about event types and their settings.

To access event management in Wavesys Console, select the *Events & Actions* section and then select *Events* from the menu on the left.

To create an event, click + *New event* button on the upper panel; event configuration dialog box will open. It is also possible to add events as you go, from the *Event & Action Configurator*. Fill in the settings, then click *OK* to save and close the dialog box. The newly created event will appear in the item list under *Events* and will be available for setup in the *Event & Action Configurator*.

Once you have created an event, it is impossible to change its type, only its source and properties.

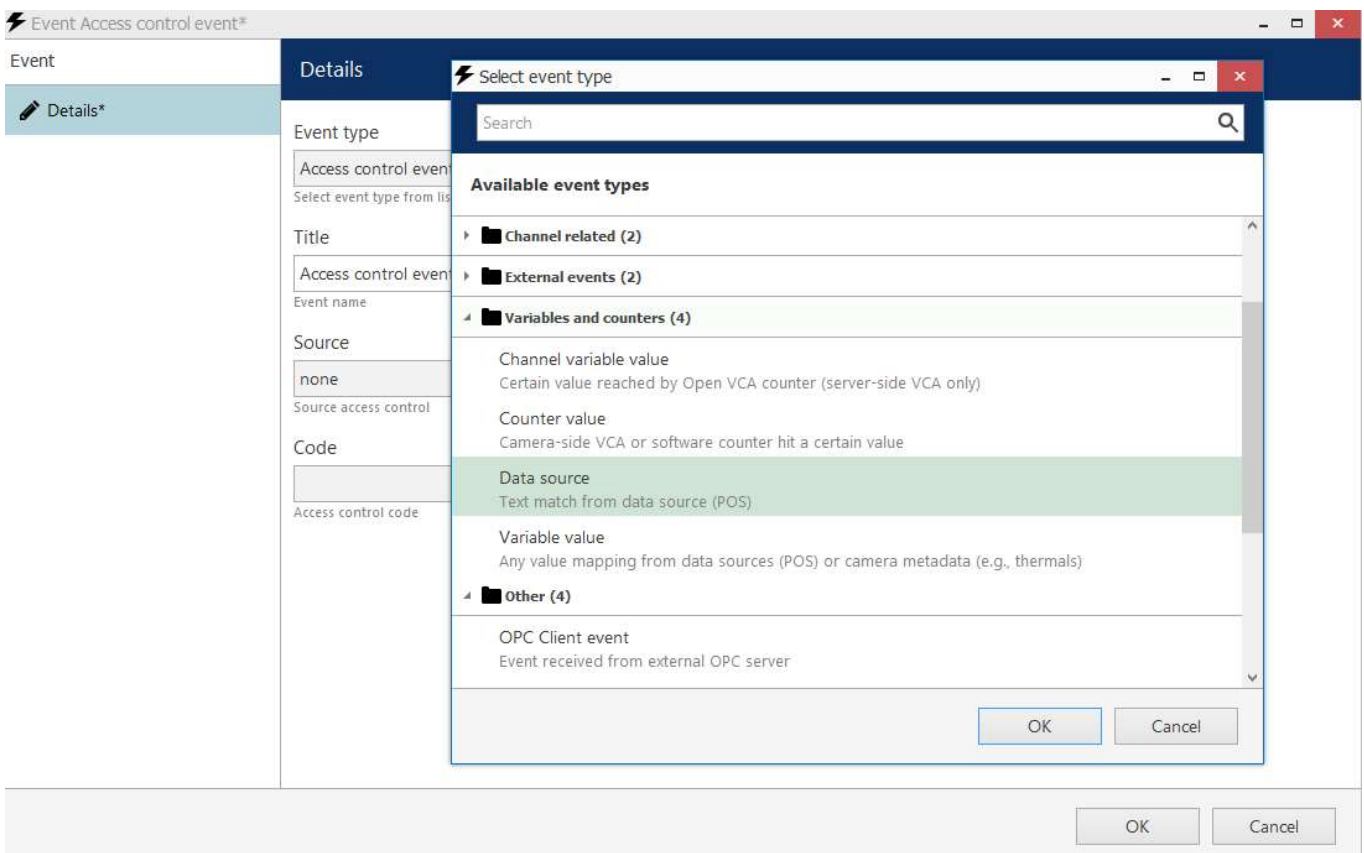
Below, you will find explanations about every available event type.



Before creating events from camera DI, VCA source, or external services, make sure to:

- enable alert generation in [channel settings](#) via Wavesys Console for device digital inputs (DI);
- enable and set up rules via camera Web interface for edge VCA and set up rules via channel settings for software-side Open VCA;
- set up the External Service event generation logic for external services (license plate recognition, face recognition etc.)

Without these settings, the event source will be not available for the target device in the event settings.



Choose event type

Prior to software version 1.17.0, events and actions were simply listed alphabetically. Starting with v.1.17.0, events and action are additionally grouped for your convenience.

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Access Control Events

Events in this group originate from connected [access control](#) systems.

Access Control Event

This type of event is triggered by the status code coming from the access control integration, whenever the status code is not related to any door (making it impossible to use *Door event*). The codes are vendor-specific and will vary depending on the access control suite type.

- **Title:** user-defined event name, as it will appear in the *E&A Configurator*
- **Source:** access control server that will send the status changes
- **Code:** vendor-specific event code

The screenshot shows a configuration window titled "Event Keri Access control event*". The window is divided into two main sections: "Event" and "Details". The "Details" section is currently active and contains the following fields:

- Event type:** A dropdown menu set to "Access control event". Below it, the text "Select event type from list of available event types" is visible.
- Title:** A text input field containing "Keri Access control event". Below it, the text "Event name" is visible.
- Source:** A text input field containing "Keri". To its right is a "Change..." button. Below it, the text "Source access control" is visible.
- Code:** A text input field containing "IN8: Input line activated". To its right is a "Change..." button. Below it, the text "Access control code" is visible.

At the bottom right of the window, there are "OK" and "Cancel" buttons.

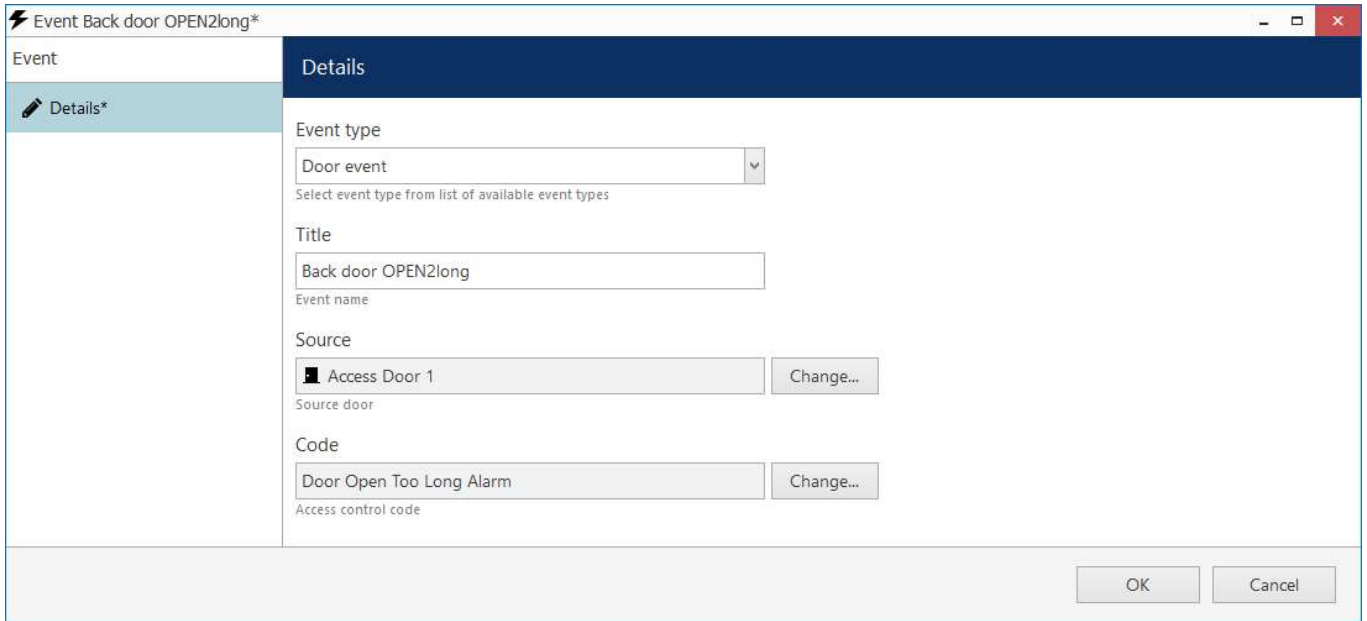
Access control event

For successful event generation, the target access control system must be connected and running.

Door Event

This type of event is used to set up WVMS server reactions based on door status changes, which are received from the integrated third-party [access control software](#).

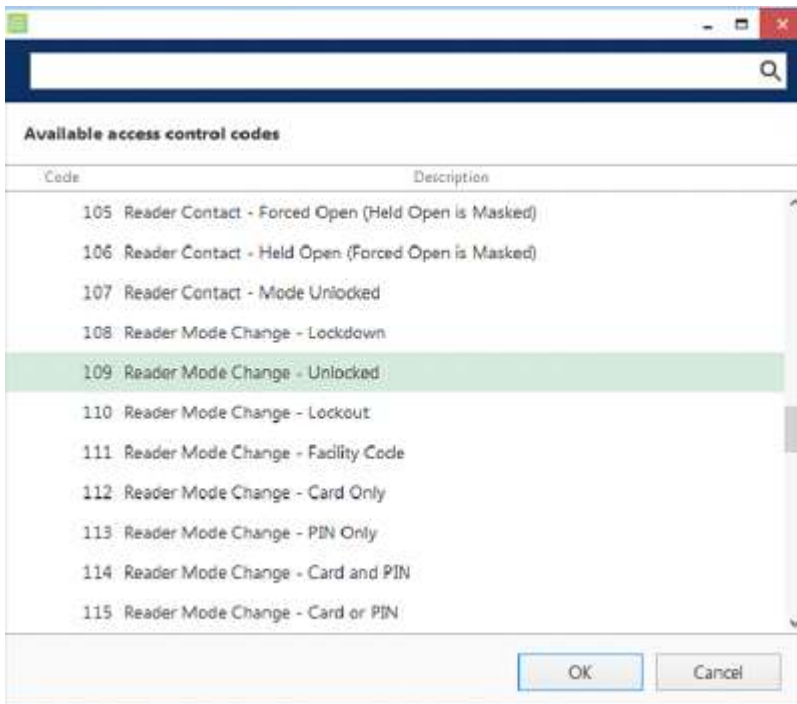
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Door event

Settings:

- **Title:** user-defined event title
- **Source:** a door from the access control module (choose from list)
- **Code:** received status or error code from the access control module (choose from list)



Door codes fetched from the access control module

The list of codes will differ depending on the access control type. For details about each code, please refer to your access control software documentation.

Channel Related Events

Events in this category have channels as sources.

Before creating such events - from camera DI or VCA source - make sure to:

- enable alert generation in [channel settings](#) via Wavesys Console for device digital inputs (DI)

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- enable and set up rules via camera Web interface for edge VCA, or set up server-side analytics rules

Without these settings, the target channel will not have corresponding DI or VCA items available in the event settings (the item list will be empty).

Digital Input

This event is triggered when a device's DI (digital input) state is changed. Before creating the event, make sure you have enabled DI event generation in the device channel's properties.

The following settings are available for *Digital Input* event:

- **Title:** user-defined event name
- **Source:** choose the device from which the DI event originates; event generation must be enabled in the [channel settings](#)
- **Digital Input:** select one of the DIs of the target device to serve as event trigger; the number of inputs depends on the total available and configured inputs
- **Digital Input Mode:** the binary input state to trigger alert; must conform with the DI state set up in the [channel settings](#)

The screenshot shows a web-based configuration window titled 'Event *'. The window is divided into two main sections: 'Event' on the left and 'Details' on the right. The 'Event' section has a 'Details' tab selected. The 'Details' section contains the following fields and controls:

- Event type:** A dropdown menu set to 'Digital input'. Below it is the text 'Select event type from list of possible event types'.
- Title:** A text input field containing 'Gate > Digital input >'.
- Event name:** A text input field, currently empty.
- Source:** A dropdown menu showing 'Canon VB-S800D on 192.168.3.40 (123)' with a 'Change...' button to its right.
- Digital input:** A dropdown menu set to 'Input 1'.
- Digital input mode:** A dropdown menu set to 'Activated'.
- Reload:** A button located below the 'Digital input mode' dropdown.

At the bottom right of the window, there are 'OK' and 'Cancel' buttons.

Settings for the *Digital Input* event type

VCA Event

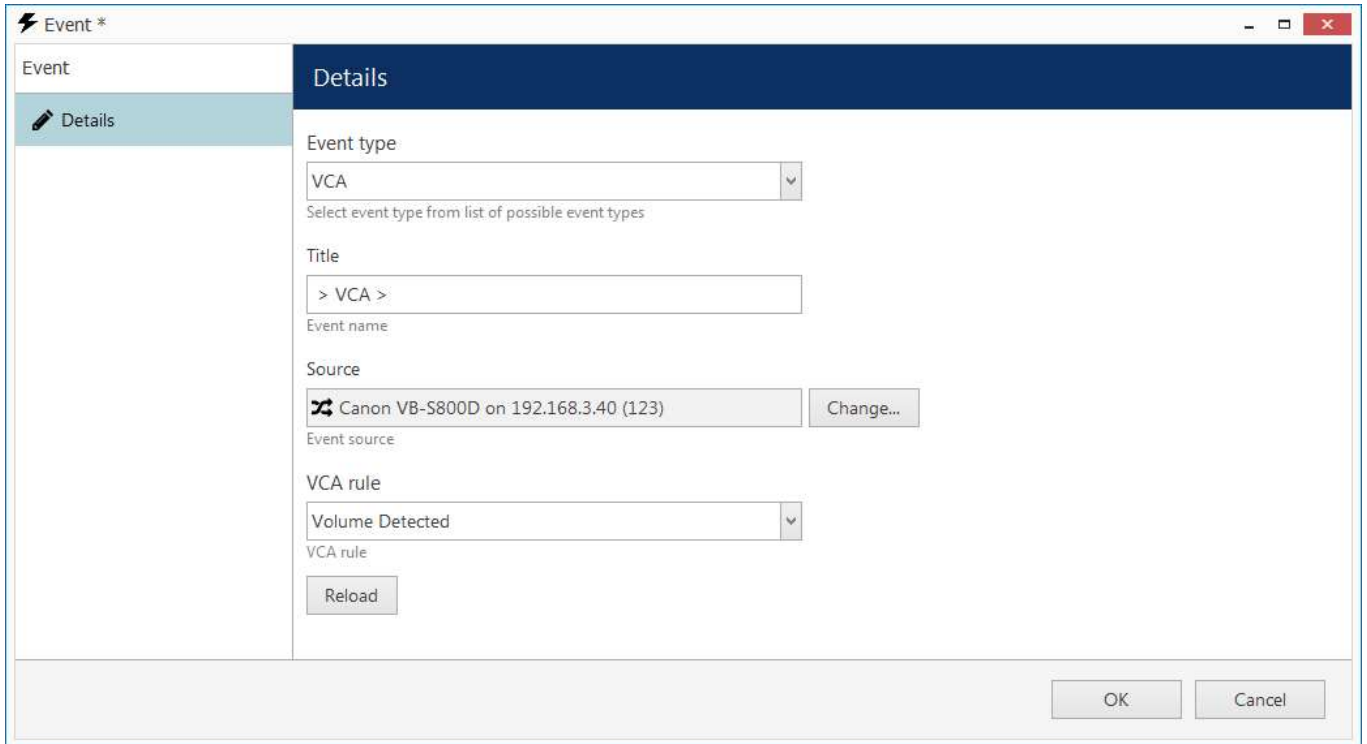
For **camera-side VCA** and software-side **Open VCA** events. Note that this event only covers triggered VCA **rules**, and not counters. In order to set up reactions for VCA counter changes, use the *Channel variable value* event (for Open VCA) or *Counter value* event (for camera-side counters).

The available settings are:

- **Title:** user-defined event name
- **Source:** choose a channel from which the video analytics event originates; analytics rules must be enabled via the camera Web interface (some cameras have basic VCA events enabled by default, e.g. volume detection) or pre-configured using the Wavesys Console for the software-side Open VCA module (see corresponding documentation for configuration details)

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- **VCA Rule:** video analytics rule to trigger event alert; may come from the camera side, Open VVA engine, or built-in VA engine; available rules depend on device model, capabilities and VCA configuration



The screenshot shows a configuration window titled "Event *". The window is split into two panes. The left pane is labeled "Event" and has a "Details" tab selected. The right pane is titled "Details" and contains the following fields:

- Event type:** A dropdown menu with "VCA" selected. Below it is the text "Select event type from list of possible event types".
- Title:** A text input field containing "> VCA >". Below it is the text "Event name".
- Source:** A text input field containing a camera icon, "Canon VB-S800D on 192.168.3.40 (123)", and a "Change..." button. Below it is the text "Event source".
- VCA rule:** A dropdown menu with "Volume Detected" selected. Below it is the text "VCA rule".
- Reload:** A button located below the "VCA rule" dropdown.

At the bottom right of the window are "OK" and "Cancel" buttons.

Settings for VCA event type

If you do not see a recently created VCA event in the drop-down list, try clicking the *Reload* button: this will refresh the source event list. For guidelines on how to enable and configure Open VCA, please see the related document.

External Events

These events come from all kinds of external systems via WVMS HTTP API.

External Service

External Service type events are messages from modules that are operating via WVMS HTTP API and are listed in Wavesys Console as [external services](#). By default, license plate recognition and face recognition services are integrated, and any other third-party integrations can be connected.

The following settings should be defined:

- **Title:** user-defined event name
- **Source:** the channel that is used by the target external service
- **Service group:** the group the external service belongs to in Wavesys Console settings
- **Target event:** service-specific result type, e.g., recognition result
 - *Known:* recognition result has a match within the external service database (black/white list in LPR, subjects' database in FR), matching any tag
 - *Unknown:* recognition result has no matches within the external service database
 - *Tags:* recognition result was found in the external service database and it has a specific tag assigned to it

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The screenshot shows a configuration window titled "Event VIP license plates*". The "Event type" dropdown is set to "ExternalService". Below it, a note says "Select event type from list of possible event types". The "Title" field contains "VIP license plates". The "Source" field is set to "axis" with a "Change..." button. The "Service group" field is set to "lprs" with a "Change..." button. The "Target event" dropdown is set to "VIP". At the bottom right, there are "OK" and "Cancel" buttons.

External Service event from the License Plate Recognition module

The example event here accepts events from the License Plate Recognition (LPR) module and will report plates recognised from the specified source channel if these results are present in the known plates' list with a *VIP* tag.

External

External events are HTTP requests from third-party software: integrations, scripts, Web browsers etc. These are a basic example of WVMS HTTP API: an **URL** is used to trigger the event.

The screenshot shows a configuration window titled "Event Trigger via URL". The "Event type" dropdown is set to "External". Below it, a note says "Select event type from list of available event types". The "Title" field contains "Trigger via URL". The "Source" field is set to "My Server" with a "Change..." button. The "Event Id" field contains "666". Below it, a note says "Event Id. Only latin letters and numbers are allowed.". At the bottom right, there are "OK" and "Cancel" buttons.

Event triggered by an external HTTP request

For the external request to trigger an event, create the event with a pre-defined identifier on your desired WVMS server:

- **Title:** user-defined event name
- **Source:** WVMS server that will accept the HTTP request

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- **Event ID:** alphanumeric event identifier, **only** Latin letters [a-zA-Z] and digits [0-9] allowed

The request link is built as follows:

`http://<server_address>:<http_port>/externalEvent/activate?id=<event_id>`, where

- **<server_address>** is the target server's IP address or hostname (in Wavesys WVMS Enterprise systems, use the exact Wavesys WVMS Enterprise Recording server address, not Wavesys WVMS Enterprise server address)
- **<http_port>** is the server's HTTP port (8080 by default)
- **<event_id>** is an alphanumeric identifier of the event, which is defined at the event creation step

Example: <http://192.168.1.99:8080/externalEvent/activate?id=666>

Variables and Counters

Events in this category are triggered by certain **value changes**. These values can be text variables, software or VCA counters, mappings from data sources (POS or other serial text), channel metadata etc. Each event is dedicated to a specific kind of variable or counter.

- *Counter value:* for camera-side VCA counters and also software counters
- *Data source:* text match from Data sources
- *Open VCA counter value:* server-side VCA (Open VCA) counters
- *Variable value:* pre-defined variable value analysis

Counter Value

Solely for **camera-side counters** and **software counters** (server-side, NOT VCA).

[Software counters](#) can be created in Wavesys Console to count any events in the system. Camera-side counters are only available for certain integrations (e.g., Dahua with smart tools).

This event is similar to the previous one, with the difference that you do not have to set the data type, but rather simply select a pre-created counter. Counters from the cameras must be also explicitly added in Wavesys Console under *E&A > Counters > New VCA Counter*.

- **Title:** user-defined event name
- **Source:** choose one of the pre-created software or camera-side counters
- Condition: define what the counter value will be compared to
 - **Conditional operator:** choose the comparison type - greater, less, equal, etc.
 - **Value:** an integer value for the counter to be compared to

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The screenshot shows a configuration window titled "Event 1000 visitors hooray*". The window has a "Details" tab selected. The configuration fields are as follows:

- Event type:** Counter value (with a "Change..." button). Below it, the text "Select event type from list of available event types" is visible.
- Title:** 1000 visitors hooray (with "Event name" label below).
- Source:** People IN from D-cam (with a "Change..." button). Below it, the text "Event source" is visible.
- Condition:**
 - Conditional operator:** Equal (with a dropdown arrow).
 - Value:** 1000 (with "Value used in condition" label below).

At the bottom right of the window are "OK" and "Cancel" buttons.

Event triggered when camera-side counter reaches 1000

For actions further linked to this event, you can **pass the counter value** by using the **text macro** (field) `{ADDITION_INFORMATION}` (you can insert it in any textual action by right-clicking the text area or by clicking the *Insert field* button). The format will be `[counter_name]=[counter_value]`. For example, for a counter named *Total* hitting a value of five, the macro will show *Total=5*.

Data Source

The server will monitor incoming text from [Data sources](#), triggering an event in case the specified **string** (textual value) is received. This can be used to react to certain keywords from POS terminals and any other serial data sources. The string for comparison is defined in free **text** form (not regex). The server will be looking for an **exact match**, i.e., the field is case-sensitive and all extra symbols (commas, spaces) are accounted for.

The screenshot shows a configuration window titled "Event if POS operator is J.Winter*". The window has a "Details" tab selected. The configuration fields are as follows:

- Event type:** Data source (with a dropdown arrow). Below it, the text "Select event type from list of available event types" is visible.
- Title:** if POS operator is J.Winter (with "Event name" label below).
- Source:** POS emulation (with a "Change..." button). Below it, the text "Source" is visible.
- Text:** Winter (with "Text that will be triggering event" label below).

At the bottom right of the window are "OK" and "Cancel" buttons.

Trigger events based on incoming POS data

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Available settings:

- **Title:** user-defined event name
- **Source:** data source to be used as event source; text from data provider will be analyzed for matches
- **Text:** case-sensitive keyword or key phrase; when an exact match is found in the text, the event will be triggered

For the event to operate, it is **not necessary** for the target data source to be bound to any channel. Associating data sources with channels only affects video overlay in the WVMS Monitor application; text detection will work on the server side, and therefore the data source may be independent.

Open VCA Counter Value

This event is dedicated to Open VCA **counters** (those set up on the server side for a specific channel). Each counter value update triggers a comparison of the integer counter value to the pre-defined value. The comparison operation is carried out using two integer data types and returns true (event is triggered) if the condition is true. The available conditions are: equal/not equal, greater/less, greater/less or equal.

To react to Open VCA rules, use the *VCA Event* under channel-related events.

- **Title:** user-defined event name
- **Source:** a channel that has Open VCA enabled and at least one counter set up
- **Condition:** define what the counter value will be compared to
 - **Variable:** Open VCA counter name
 - **Type:** must be **integer** (other types are listed to ensure event compatibility with older software versions)
 - **Conditional operator:** choose type of comparison - greater, less, equal, etc.
 - **Value:** an integer value for the counter to be compared to

The screenshot shows a configuration window titled "Event Current number of people in the zone = 3". The window is divided into two main sections: "Event" and "Details". The "Details" section contains the following fields:

- Event type:** A text box containing "Open VCA counter value" and a "Change..." button. Below it, a small text says "Select event type from list of available event types".
- Title:** A text box containing "Current number of people in the zone = 3". Below it, a small text says "Event name".
- Source:** A text box containing "vca test" and a "Change..." button. Below it, a small text says "Source channel".
- Condition:** A section with four sub-fields:
 - Variable:** A text box containing "Current". Below it, a small text says "Variable name".
 - Type:** A dropdown menu showing "Integer". Below it, a small text says "Value type".
 - Conditional operator:** A dropdown menu showing "Equal". Below it, a small text says "Conditional operator".
 - Value:** A text box containing "3". Below it, a small text says "Value used in condition".

At the bottom right of the window, there are two buttons: "OK" and "Cancel".

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Event triggered if the counter named *Current* is equal to 3

For actions further linked to this event, you can **pass the counter value** by using the **text macro** (field) `{ADDITION_INFORMATION}` (you can insert it in any textual action by right-clicking the text area or by clicking the *Insert field* button). The format will be `[counter_name]=[counter_value]`. For example, for a counter named *Total* hitting a value of five, the macro will show *Total=5*.

Variable Value

If you have some **variables** set up in the E&A section, you can use E&A manager to trigger events when these variables meet some specific condition. Mostly, these variables are mappings from [Data sources](#): thus, this event supplements the previous *Data Source* event by matching **any data type** (not just text).

The second purpose of this event is analysis of **metadata** received **from cameras** (or other devices). A typical example of this is variables from **thermal cameras** containing exact temperature measurement. To use this feature, first create channel variables under *Variables* in the E&A section. Then, use them as

The screenshot shows a configuration window for an event titled "Event Bill total is over 100\$*". The window is divided into a left sidebar with a "Details*" tab and a main configuration area. The configuration area includes the following fields:


- Event type:** A text input field containing "Variable value" and a "Change..." button. Below it, a note says "Select event type from list of available event types".
- Title:** A text input field containing "Bill total is over 100\$". Below it, a label reads "Event name".
- Source:** A dropdown menu showing "Sum" with a "Change..." button. Below it, a label reads "Source variable".
- Condition:** A section containing:
 - Type:** A dropdown menu set to "Floating-point". Below it, a label reads "Value type".
 - Conditional operator:** A dropdown menu set to "Greater". Below it, a label reads "Conditional operator".
 - Value:** A text input field containing "100.0". Below it, a label reads "Value used in condition".

At the bottom right of the window are "OK" and "Cancel" buttons.

An event is raised when the *Sum* variable is strictly greater than 100.0

This event has the following settings:

- **Title:** user-defined event name
- **Source:** a channel to be analysed for the variable (which is set in the corresponding data source profile or has VCA configured); if none selected, the event will be visible for all channels
- **Variable:** variable name, must match the mapping name in the data sources profile or the VCA counter name
- **Type:** variable type; may be integer, double or string for a data source mapping, and integer for VCA counters
- **Conditional operator:** depends on the variable type
- **Value:** value that will be compared with the variable value

 For VCA counters, there are a few special requirements:

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- type must be **integer**
- **event source** must be selected (the channel that has VCA configured, either camera-side or software side)

Other Events

Events having no special category (or, at this point, unique), are grouped under *Other events*.

OPC Client Event

Data received from OPC servers can be analysed - compared to specified values using conditional operators - so that an event is triggered when the target OPC node value meets the defined condition.

For this type of event to work, there should be at least one [OPC server configuration](#) available with at least one data node.

Event OPC #1 has 5 or more clients*

Event

Details

Event type

OPC Client event

Select event type from list of available event types

Title

OPC #1 has 5 or more clients

Event name

Source

OPC #1

Change...

Source OPC client

Condition

Variable

@ClientCount

Change...

Variable name

Value type

Int

Value type

Conditional operator

GreaterOrEqual

Conditional operator

Value

5

Value

OK

Cancel

This event will be triggered if the target OPC server has 5 or more connected clients

Settings:

- **Title:** user-defined event name
- **Source:** [OPC client configuration](#) (connection to an OPC server)
- **Condition:** defines a requirement for the OPC data item that will trigger the event
 - **Variable:** OPC data node, must be of compatible type and have a read permission
 - **Value type:** one of the standard data types, auto detected
 - **Conditional operator:** list of possible conditional operators, depends on the data type
 - **Value:** value to compare the variable to, must match the variable value type

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For some conditional operators, the *Value* field may be different, e.g., represent a range, a regular expression, or a bit mask. This depends on the selected data type and conditional operators available for it.

Recording Server Connected/Disconnected*

In the Wavesys WVMS Enterprise system, when a recording server goes down, this event will be triggered on the central management server. (Built-in events only include central server disconnection and failover activation events.) You can add both connection and disconnection events, or either one, for every recording server in the system.

Settings:

- **Title:** user-defined event name
- **Source:** central management server (unchangeable)
- **Recording server:** target secondary server to trigger the event, or *Any* to enable this event for all recording servers
- **Connection event:** connected/disconnected (one at a time)

The screenshot shows a configuration window titled "Event Any RS disconnected*". The window is divided into two panes: "Event" on the left and "Details" on the right. The "Details" pane contains the following fields:

- Event type:** A dropdown menu with "Recording server connected/disconnected" selected. Below it is the text "Select event type from list of available event types".
- Title:** A text input field containing "Any RS disconnected". Below it is the text "Event name".
- Source:** A text input field containing "My Server" with a server icon. To its right is a "Change..." button. Below it is the text "Source server".
- Recording server:** A text input field containing "Any server" with a server icon. To its right is a "Change..." button. Below it is the text "Recording server".
- Connection event:** A dropdown menu with "Disconnected" selected. Below it are two other options: "Connected" and "Disconnected".

At the bottom right of the window are "OK" and "Cancel" buttons.

Event: recording server offline

So, if you need to get a notification about a particular server going offline or online, choose that server in the event properties. To cover all recording servers with a single event, choose *Any* in the Recording server field: if your associated action is textual (email, alert, etc.), use the {ADDITION_INFORMATION} macro to display the name of the recording server in question.

From each recording server's side, there also exist two default (built-in) events: *Central server connected* and *Central server disconnected*. You do not need to add them manually, they will appear for each existing recording server.

*This feature is only available in Wavesys WVMS Enterprise software edition.

Scheduled Event

The server can create automatic events on a daily or weekly basis, or at certain intervals. Such an event does not have any underlying source to originate from, it is simply generated by the system in the specified moment(s) of time. Note that the time defined here is server time.

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The screenshot shows a dialog box titled "Event Every hour event*" with a "Details" tab. The "Event type" dropdown is set to "Scheduled event". The "Title" field contains "Every hour event". The "Source" is set to "Main server". The "Periodical" radio button is selected, and the "Interval" field is set to "3600". The "Scheduled" radio button is unselected. The dialog has "OK" and "Cancel" buttons at the bottom right.

A scheduled event that occurs every hour

There are two types of automatic events: periodical and scheduled. Periodical events arise at the specified intervals, e.g., every hour or every ten minutes. Scheduled events follow the specified timetable, e.g., are triggered at 8AM every day.

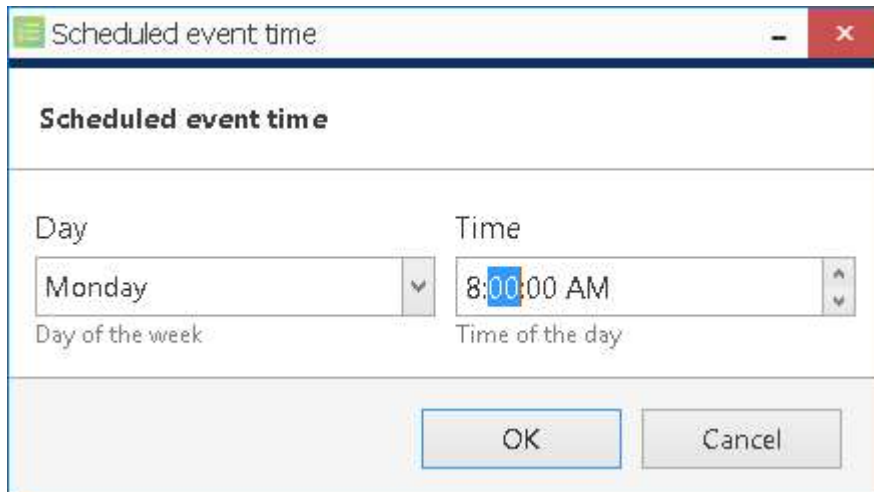
For a scheduled event, you need to define:

- **Title:** user-defined event name
- **Source:** target server to generate the event on
- **Periodical:** choose this type if you need the events to be generated every N seconds
 - **Interval:** time interval in seconds between two automatically generated events, minimum interval is fifteen seconds
- **Scheduled:** choose this mode if you wish to build a timetable to serve as a basis for the event generation
 - **Event schedule:** weekly timetable for the event generation

 Minimum time interval for the periodic event is 15 seconds and maximum is 86400 seconds (which is equal to 24 hours).

To add a schedule, simply click the *Add* button below and append as many items as you like. You can add multiple moments per day as well.

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Add schedule element

Remember that you can enter the time either manually from the keyboard or by clicking the timestamp elements and then using your mouse wheel, while still hovering your mouse cursor over the element that is being adjusted. To edit any of the items, select one and click *Edit*, or simply double-click an item; to remove, select one or many (use *CTRL+click* or *Shift+click* to select multiple items, or also *CTRL+A* to select all) and then click *Remove*.

Video Wall*

This type of event is raised when the **video wall state is changed**. This happens when objects are sent to video wall from the resources' menu in WVMS Monitor, when they pop up automatically based on another event, or when users manage the video wall via dedicated tab in the WVMS Monitor application. Note that events of this type are **not generated** if screen contents is changed directly via **local** screen management - drag-and-drop or double-click.

Advanced options let you specifically define the nature of that change, the video wall screen and even the target viewport.

This event can happen on three levels, depending on the defined scope:

- any part of the video wall (video wall is defined, other settings set to *any*)
- specific video wall screen (video wall and its screen are defined, leaving viewport choice to *any*)
- specific viewport in the video wall screen (all settings defined)

The triggered events for all these areas will differ slightly (see examples below).

Available settings:

- **Title:** user-defined event name
- **Source:** video wall
- **Mode:** the type of changes
 - *Updated:* **any change** in the specified location (any or a specific object has been placed on or removed from the target location)
 - *Added:* the target object has been added to the specified location for the very **first time**
 - *Removed:* the target object has been **completely removed** from the target location
- **Video wall screen:** target video wall display
- **Viewport index:** number of the port to trigger the event, set 0 (zero) for any viewport
- **Object:** any object (if *updated*), or a specific map/channel (*updated/added/removed*)

Note that the target object must be specified for *added/removed* modes: there are no events for "any object added" or "any object removed". These two modes are intended to be used with concrete objects. If you do not care, which object was added or removed, use the *updated* mode.

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Event Detect: City map appeared on VW Screen 2, port 9

Event

Details

Event type
Video wall
Select event type from list of available event types

Title
Detect: City map appeared on VW Screen 2, port 9
Event name

Source
Matrix Video Wall
Source videowall
Change...

Video wall screen
2 - Main
Video wall screen

Viewport index
9
Index of viewport in screen (0 - any available viewport)

Object
City
Object shown on videowall
Change...

OK Cancel

Video wall event example

The viewports are numbered starting from 1, from top to bottom and from left to right. Zero index means the event will be triggered, when the target object appears in any viewport of the target video wall display.

Examples:

1) An event is set to be produced when Channel S is *removed*. Depending on the defined settings, the event triggering will differ in the following way:

- if only **video wall** is defined without any details: event will be triggered after all instances of Channel S are removed. In other words, if Channel S is present several times on different video wall screens, the *Removed* event will only be triggered after the last instance of Channel S is removed, and the exact video wall screen or viewport do not matter.
- if a **video wall screen** is defined: same behaviour but limited to this specific screen. If Channel S is currently displayed on other video wall screens, its presence is ignored. The last Channel S instance removed from the target screen will trigger the event.
- if a specific **viewport** is defined: the event will be triggered every time Channel S is removed or replaced by any other channel.

2) Event settings are set to maximum precision: video wall, video wall screen, and viewport are specified. In this case, the event area is limited to the **viewport**, and replacing Channel E with Channel X will trigger the following events (if they have been set up):

- *Removed* event for Channel E
- *Added* event for Channel X
- *Updated* event (no object needs to be specified)

3) The event is set to be generated when Channel Y is *added*. Consider the following scenarios:

- only video wall or video wall screen is defined for the event; the target video wall screen has a 2x2 layout, and:
 - Channel Y pops up in any viewport, filling in an empty space or replacing any other channel: event is **triggered**
 - Channel Y pops up again in the same viewport, replacing itself (so there are no changes): event is **not triggered**

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- Channel Y is then displayed in another viewport (so that it now appear in two viewports): event is **not triggered**
- video wall, its screen and a viewport index are defined:
 - every time Channel Y pops up or is placed into the target viewport, the event is **triggered**

*This feature is only available in the Wavesys WVMS Enterprise software edition.



Removing and adding event sources again (e.g., deleting and creating edge VCA rule with the same name) may render them **unusable** if they are already included in the *Event & Action* configuration. Make sure to verify the event operability and then re-create and re-insert the event after modifying it, if necessary.

47 Default Actions

For each WVMS server, there exists a set of default actions that have identical behaviour on all servers and cannot be altered (edited) or deleted. These are:

- **Generate Alert:** generate an alarm that can be used as recording basis in recording profiles; this action is available for each channel
- **Generate Alert Substream:** generate an alarm that can be used as recording basis in recording profiles; this action is available for each channel substream
- **Send Global Event:** send a global event notification to all servers; this action is available for each defined [global event](#)
- **Pop-up On Screen:** display the object on all WVMS Monitor windows that accept pop-ups of the target object type; action is available for channels, maps and shared layouts
- **Pop-up Playback On Screen:** display instant playback for a channel in WVMS Monitor application while keeping the live view mode; action is available for all channels
- **Set Condition:** change the target condition state to *ON*; this action is available for each [condition](#)
- **Unset Condition:** change the target condition state to *OFF*; this action is available for each [condition](#)
- **Increment/Decrement/Reset:** change counter value; this action is available for each [software counter](#)
- **Send global event:** broadcast a global notification to all servers; this action is available for every [global event](#)

TITLE	ID	ACTION TYPE	TARGET
Generate alert	(46)	Generate alarm	
Send global event	(43)	Send global event	
Set condition	(44)	Set condition	
Unset condition	(45)	Unset condition	

Default actions

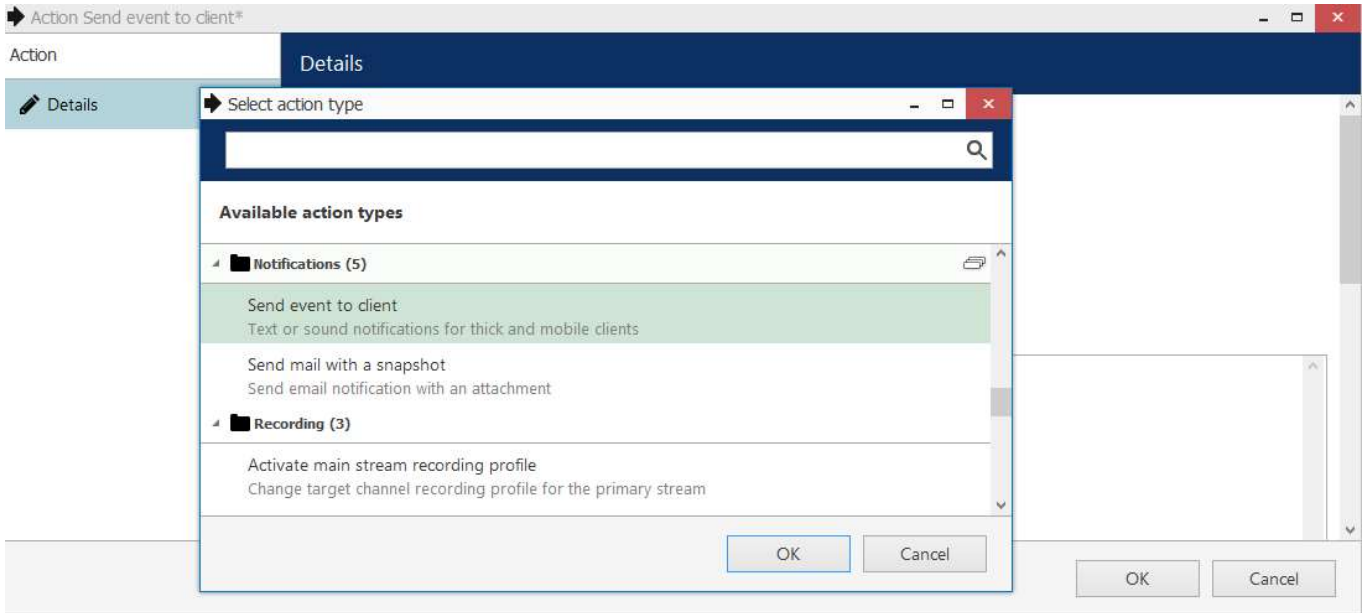
When you generate an **alert** for main stream or substream, all channels having alert-based recording enabled will start recording for the duration of time period defined in the profile as **post-recording time**; after that, the profile operation will be terminated and target channel will return to its normal recording configuration.

Default actions are available in the *Event & Action Configurator* and can be used in the same way as the user-defined actions.

48 Add Actions

In addition to the [default actions](#), certain types of actions can be added manually and customized.

To access action management in Wavesys Console, choose the *Events & Actions* section and select *Actions* from the menu on the left. In order to create an action, click the + *New action* button on the upper panel; an action configuration dialog box will open. It is also possible to add actions as you go using the *Event & Action Configurator*.



Choose action type

All available actions are grouped according to their purpose. Choose your desired action type from the list to see action-specific settings.

Access Control Actions

Actions in this sections are related to the [access control](#) integrations. Typically, these are used to control the door state.

Door Action

If you have a third-party access control module connected, you can change the door state from here. You must have at least one door added in the access control profile to make this work.

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The screenshot shows a dialog window titled "Action Keri Test Door action*". The window has a "Details" tab selected. The "Details" section contains the following fields:

- Field Caption:** A dropdown menu with "Door action" selected.
- Multiline description ...:** An empty text area.
- Title:** A text box containing "KERI Test Door action".
- Event name:** An empty text box.
- Target:** A dropdown menu with "KERI Test" selected, and a "Change..." button to its right.
- Code:** A dropdown menu with "Unlock" selected.

At the bottom right of the dialog, there are "OK" and "Cancel" buttons.

Action example: unlock a door using access control integration

As a **target**, specify the [access control configuration](#) added earlier. The specific door for this action will be chosen at the rule creation step, allowing you to use this action for many different doors within the same Keri configuration.

Available **action codes** here are: lock, unlock, temporarily unlock, and lock down (standard access control door states). Once the action is triggered, the corresponding command will be sent to the access control software.

Channel Related Actions

Actions in this category have direct relation to channels, e.g., PTZ presets and tours, digital output (DO) state change etc.

Activate PTZ Preset

This action type allows you to make a PTZ camera go to a specific pre-configured preset. You just need to specify:

- **Title:** a user-defined action name
- **Target:** the target device which is to accept the PTZ command
- **PTZ priority:** priority to execute PTZ action with (0 = lowest, 10 = highest, higher priority will override tours and user commands*)
- **Preset:** pick one of the automatically loaded target device presets from the drop-down list (you might need to create some first via WVMS Monitor)

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The screenshot shows a dialog box titled "Action *" with a "Details" tab. The "Action type" dropdown is set to "Activate PTZ preset". Below it is a text box for "Title" containing "Axis 215; Activate Preset #1". The "Target" field shows "Axis 215 PTZ on 192.168.3.4 (112)" with a "Change..." button. The "PTZ priority" dropdown is set to "10". The "PTZ preset" dropdown is set to "Preset #1". There is a "Reload" button below the PTZ preset dropdown. At the bottom right are "OK" and "Cancel" buttons.

Action: activate PTZ preset

*PTZ priority parameter is used when two or more simultaneous PTZ command requests (either from action or from direct user input) are sent at the same time. When this happens, request with a higher priority is fulfilled while request with a lower priority is delayed for ten seconds. Default **PTZ priority** for all actions is equal to **five** (medium priority), which also coincides with the **default per-user** PTZ priority. You can assign any action a higher PTZ priority (six to ten) or a lower one (four to zero) by editing the *Activate PTZ Preset* action properties. All PTZ tours have zero priority.

Use the *Reload* button to refresh the list of presets: this will be useful if you have created new presets while keeping the action creation dialog box open.

Activate PTZ Tour

This action is similar to the previous one but instead of activating a single PTZ profile you run a series of presets called a PTZ tour. PTZ tours must be pre-created via WVMS Monitor application. For each tour, you define the order of presets and their duration.

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The screenshot shows a software window titled "Action Street View PTZ Activate PTZ tour Perimeter*". The window is divided into two main sections: "Action" on the left and "Details" on the right. The "Details" section contains several input fields and buttons:

- Event type:** A dropdown menu showing "Activate PTZ tour" with a "Change..." button. Below it is the text "Select event type from list of available event types".
- Title:** A text input field containing "Street View PTZ Activate PTZ tour Perimeter". Below it is the text "Event name".
- Target:** A dropdown menu showing "Street View PTZ" with a "Change..." button. Below it is the text "Target channel".
- PTZ tour:** A dropdown menu showing "Perimeter" with a "Change..." button. Below it is the text "PTZ tour".
- A "Reload" button is located below the PTZ tour field.
- At the bottom right of the window are "OK" and "Cancel" buttons.

Action: activate a custom pre-configured PTZ tour

- **Title:** the user-defined action name
- **Target:** the target channel that has a pre-configured PTZ tour
- **PTZ tour:** the target PTZ preset sequence to be activated

When this action is executed, the target PTZ tour is activated and looped endlessly. You can stop the tour manually via WVMS Monitor or Wavesys WVMS Mobile application. Tours that do not have the autostart property will also be stopped when the WVMS server is restarted.

Control Digital Output

Devices having relay (digital) outputs (DOs) can have them triggered as a result of the *Control digital output* action. You are asked to enter the following details for this action type:

- **Title:** user-defined action name, by default it is `> Activate PTZ preset >`, suggesting that before and after `>>` arrows you can insert the camera name and DO number/target - or, alternatively, re-define the whole title according to your own naming convention
- **Target:** the target device which is to accept the digital input control command
- **Digital Output:** pick one of the available DOs of the target device to be triggered
- **Digital Output Mode:** choose whether an activation or deactivation command is sent to the target relay output

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Action Street View PTZ open gate via DO*

Action

Details*

Details

Action type

Control digital output Change...

Select action type from list of available action types

Title

Street View PTZ open gate via DO

Action name

Target

Street View PTZ Change...

Action target

Digital output

Digital Output 1

Digital output

Digital output mode

Activate

Digital output mode

OK Cancel

Action: change digital output state



Digital output(s) must be enabled in [channel settings](#) for the target camera; otherwise, you not will see any available DOs in the drop-down list after selecting the target device. Also, make sure that digital output operation has been allowed via device Web interface.

Device Action

This action is reserved for special device-side actions like wiper control, arm/disarm, lights ON/OFF etc. This functionality depends on the device integration.

- **Title:** the user-defined action name
- **Target:** the target channel to accept the command
- **Device action:** integration-specific device action

Currently, device actions are only supported for few devices. If you do not see any available action for your camera, try using the *Send HTTP Request* action described further: that action allows you to enter a CGI/HTTP command from device API.

Export Snapshot

A snapshot from the main or secondary stream of any channel can be saved as a result of an action. The file can be saved either locally (on the target server) or to a remote server (FTP).

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The screenshot shows a window titled "Action Export snapshot*" with a "Details" tab. The "Action type" dropdown is set to "Export snapshot". The "Title" field contains "Export snapshot". The "Target" dropdown is set to "Main server". The "Stream" dropdown is set to "Main stream". Under the "Export to local file" option, the "Local path" field contains "C:\MyDirectory\{EVENT_TIMESTAMP}_snap.jpg". There are "OK" and "Cancel" buttons at the bottom right.

Export snapshot to the local server

The following settings are to be defined here:

- **Title:** user-defined action name
- **Target:** the server to execute this action on
- **Stream:** main stream or substream of the target channel (the channel is to be defined at the action rule creation step)
- **Enable subtitles:** enable this setting to activate subtitles and expand additional settings
 - **Text:** subtitle text (plain text and/or macros)
 - **Position:** subtitle alignment (top/bottom, left/right, corners)
 - **Font:** subtitle font (choose from the system dialog)
 - **Colours:** background (transparent by default), foreground (text itself), shadow (text shadow)
- **Export to local file:** the snapshot will be saved to the target server chosen above using the specified path
 - **Local path:** full path and filename, e.g., C:\MyDirectory\{EVENT_SOURCE_TITLE}_{EVENT_TIMESTAMP}.jpg
- **Export to FTP directory:** the snapshot will be saved onto a different machine that is not a part of the system
 - **FTP path:** full path and filename
 - **Host:** target machine's IP address or domain name
 - **Port:** port to be used for FTP connection
 - **Username:** user account name to connect to the remote server
 - **Set password:** specify a password, if required to log into the remote server

You can include text macros in the filename, for example, insert timestamps and event source title automatically to create files with different names every time the action is executed.

Start Playing an Audio File

It is possible to send an audio file to the connected device in case it has a built-in or a connected speaker: WVMS server can use a .wav file to send audio to the remote camera or video server.

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The screenshot shows a Windows-style dialog box titled "Action Reception: start playing alarm*". The dialog is divided into two panes: "Action" on the left and "Details" on the right. The "Details" pane contains the following fields and controls:

- Action type:** A dropdown menu set to "Start playing an audio file". Below it is the text "Select action type from list of available action types".
- Title:** A text box containing "Reception: start playing alarm". Below it is the text "Action name".
- Target:** A button with a folder icon and the text "Reception". To its right is a "Change..." button. Below it is the text "Channel. If none is selected, the action will be visible on all channels."
- File path:** A text box containing "C:\sounds\alarm.wav". Below it is the text "Audio file path".
- Duration:** A text box containing "0". Below it is the text "Duration in seconds (0 - play all)".
- Repeat count:** A text box containing "3". Below it is the text "Repeat count (0 - infinite)".

At the bottom right of the dialog are two buttons: "OK" and "Cancel".

Send a pre-defined audio recording to the camera

You need to specify:

- **Title:** user-defined action name
- **Target:** the channel for the sound to be sent to (if none selected, the action will be available for all channels)
- **File path:** full path to the local *.wav file that should be used for audio output
- **Duration:** the amount of time for the audio to be played (set zero to play the whole file)
- **Repeat count:** the number of times for the audio file to be repeated (set zero for the file to played non-stop)

If you need the audio to be played continuously until another event stops it, set the *Repeat count* parameter to zero and use the *Stop playing an audio file* action to terminate the playback.

Stop Playing an Audio File

This action is used as a complement for the *Start playing an audio file* action: it stops the audio transmission in case you need to force stop it earlier than specified in the *Start playing an audio file* action, e.g., if the starting action lets the audio file to be played infinitely.

The following settings are available here:

- **Title:** user-defined action name
- **Target:** target channel (leave *none* for the action to be available for any channel)

Logging

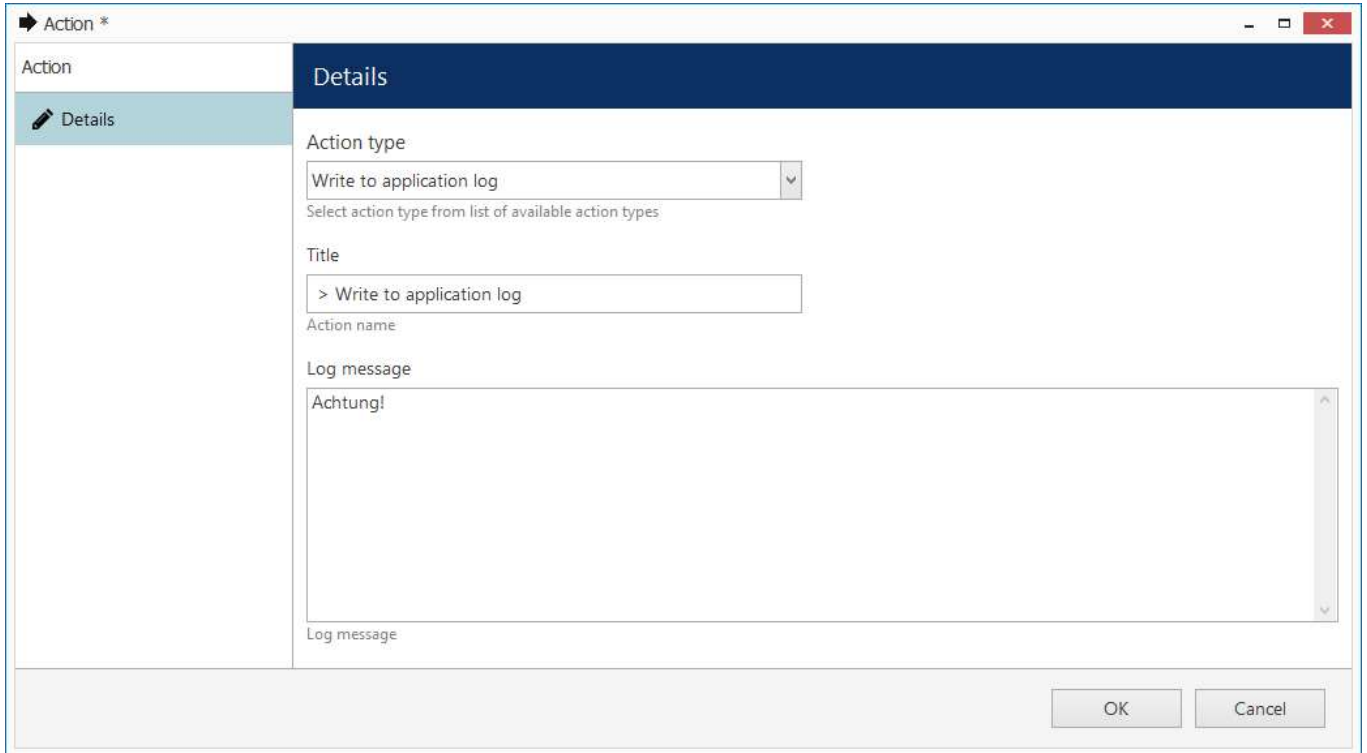
In addition to default [audit log](#), you can choose custom events to be appended to the WVMS server audit log or to Windows application log.

Write to Application Log

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The *Application log* action type allows you to write a log entry into the Windows Application log, which will be accessible via Windows Event Viewer. The log entry level is *Information* and entry source is WVMS Server. You can define:

- **Title:** a use-defined action name inside the Wavesys Console; by default it is *Write to Application log*
- **Log Message:** the message text to appear in Windows Application log



The screenshot shows a dialog box titled "Action *". On the left, there is a sidebar with "Action" and "Details" (selected). The main area is titled "Details" and contains the following fields:

- Action type:** A dropdown menu with "Write to application log" selected. Below it is the text "Select action type from list of available action types".
- Title:** A text box containing "> Write to application log". Below it is the text "Action name".
- Log message:** A large text area containing "Achtung!". Below it is the text "Log message".

At the bottom right of the dialog are "OK" and "Cancel" buttons.

Action: write to application log

Use the *Insert Field* button on the right-hand side (it appears when you have clicked inside the text area) or right-click the text area and choose *Insert* to add a text macro (see *Action Parameters* further in this topic for details).

Write to Audit Log

The *Audit log* action type is similar to that of *Application log*: it allows you to write a log entry into the WVMS own Audit log, which will be accessible via Wavesys Console, in the *Audit* section. The log entry is added in the Server audio section and its event type will be *User defined*. You can set:

- **Title:** a use-defined action name inside to be used in E&A; by default it is *Write to Audit log*
- **Log Message:** the message text to appear in the Audit log

Use the *Insert Field* button on the right-hand side (it appears when you have clicked inside the text area) or right-click the text area and choose *Insert* to add a text macro (see *Action Parameters* further in this topic for details).

Notifications

Actions in this section allow you to send all kinds of alerts to clients and also email notifications.

Highlight On Map

If your target item appears on one or more maps, you can visually accent it on the map as a result of the triggered event. It is possible to define one particular map or make the device become highlighted on all maps where it has been placed.

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The screenshot shows a configuration window titled "Action Hall Panorama - Highlight on map". The window is divided into two main sections: "Action" and "Details". The "Details" section is active and contains the following fields:

- Action type:** A dropdown menu showing "Highlight on map or all maps where corresponding Acti...". Below it is a note: "Select action type from list of available action types".
- Title:** A text input field containing "Hall Panorama - Highlight on map".
- Action name:** A text input field, currently empty.
- Target:** A dropdown menu showing "Hall Panorama (104)". To its right is a "Change..." button.
- Action target:** A text input field, currently empty.
- Highlight on:** A dropdown menu showing "All maps". To its right is a "Change..." button.
- Map or all maps:** A text input field, currently empty.

At the bottom of the window, there are "OK" and "Cancel" buttons.

Action: highlight target device on a map

The following objects are supported for this action as targets:

- **Channels** (channel markers will be highlighted)
- **User buttons** (user button markers will be highlighted)

Pop Up Object On Screen

You can set up individual channels, maps and layouts to appear on a specific **video wall** display as a result of some triggered event, e.g. motion detected in certain regions. If you wish an object to pop up in all connected WVMS Monitor applications without using video walls, use the built-in (default) event of the *Pop up on screen* type.



Additional setup is required from the WVMS Monitor application side:

- shared layouts should be pre-created in order to be used in action creation
- target WVMS Monitor window must be allowed to accept either channels/maps or layouts
- target WVMS Monitor window must be set to be a part of the target video wall

What you need to specify in the action properties is:

- **Title:** user-defined action name, by default it is *[channel] Pop up and object on screen [Video wall name]*
- **Target:** a channel, map or a pre-created shared layout to appear on the screen
- **Video wall:** target video wall for the object to appear on
- **Video wall screen:** a specific display in the video wall layout for your object to appear on
- **Viewport index:** the exact position of the video output cell in the grid (starting from 1, left to right, top to bottom), leave 0 to use the first available viewport

If you do not care, which viewport is used for popup, leave the viewport index parameter equal to 0. This will send the popup object to the first empty viewport; if all viewports are occupied, the object will pop up to the first non-locked one. When all viewports are occupied and locked and the viewport index is set to 0 (=any viewport), the popup will not work on that screen.

If the target viewport is set (is different from 0) but it is occupied and locked on the WVMS Monitor side, the target channel will force pop up anyway, and the viewport state will stay locked.

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The screenshot shows a configuration window titled "Action: Pop-up city map*". The window is divided into two main sections: "Action" on the left and "Details" on the right. The "Details" section contains the following fields and controls:

- Action type:** A dropdown menu with "Pop-up an object on screen (-s)" selected. Below it is the text "Select action type from list of available action types".
- Title:** A text input field containing "Pop-up city map". Below it is the text "Action name".
- Target:** A button with a location pin icon and the text "City center". To its right is a "Change..." button. Below it is the text "Action target".
- Videowall:** A button with a grid icon and the text "Showroom". To its right is a "Change..." button. Below it is the text "Videowall".
- Videowall screen:** A text input field containing the number "2". Below it is the text "Videowall screen".

At the bottom right of the dialog, there are two buttons: "OK" and "Cancel".


An action that will pop up a map on the specified video wall display

You can create new maps, geo maps and layouts right from the object selection dialog in case you have not created them beforehand.

Send Email

In order to send an email notification, you are requested to define the following values in the action settings:

- **Title:** a user-defined action name; by default it is *<mailserver> Send email*, you can insert the device name and target email address - or, alternatively, you can re-define the whole title according to your own naming convention
- **Target:** specify the SMTP server to be used for email sending; if none are selected, the action will be available for selection on any of the existing configured mail servers when creating a rule
- **To:** notification recipient email address
- **Subject:** email notification subject (use the *Insert field* button to add text macros)
- **Body:** email notification body text (use the *Insert field* button to add text macros)

 [Configure your SMTP server\(s\)](#) before creating email-related actions.

The screenshot shows a 'Details' dialog for an 'Action' of type 'Send mail'. The fields are as follows:

- Action type:** Send mail (dropdown menu)
- Title:** > Send email
- Target:** Gmail SMTP (139) (with a 'Change...' button)
- To:** admin@torchwood.gov
- Subject:** Achtung
- Body:** Catastrophic failure

Buttons: OK, Cancel

Action: send email

Send Email with a Snapshot

This action is similar to the *Send Email* action described above, with all the settings being the same plus snapshot adjustments: attach a snapshot from a channel and send it together with the email. The channel is specified when creating a rule with this action.

Additional settings:

- **Attach snapshot:** choose if you want to take a snapshot of main stream or substream of a channel and deliver it together with the message
- **Snapshot title:** user-defined file name, e.g., *Snap.jpg*, or *Snap_{EVENT_TIME}_from_{ACTION_PARAMETER_TITLE}.jpg*
- **Enable subtitles:** enable this setting to activate subtitles and expand additional settings
 - **Text:** subtitle text (plain text and/or macros)
 - **Position:** subtitle alignment (top/bottom, left/right, corners)
 - **Font:** subtitle font (choose from the system dialog)
 - **Colours:** background (transparent by default), foreground (text itself), shadow (text shadow)

The subtitles will be hard merged with the exported image.

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Action Send mail with a snapshot*

Action

Details

Snapshot title

Taken_from_{ACTION_TARGET_TITLE}_at_{EVENT_TIME}

Snapshot file name.

Enable subtitles

Add custom subtitles to the snapshot.

Text Insert field

{ACTION_TARGET_TITLE} (EVENT_TIMESTAMP)

Text template for subtitles.

Position

Bottom

Relative position of the subtitles.

Font

Arial, 12

Text font to be used.

Background color

0, 0, 0, 0

Background color.

Foreground color

ControlLightLight

Foreground color.

Shadow color

ActiveCaptionText

Shadow color.

OK Cancel

Subtitle settings



In the *Send Email with a Snapshot* action, you only need to define whether this specific action will take a snapshot from the main or from the secondary stream. Actual channel for the snapshot to be taken from will be defined when you create a rule involving this action:

- if the source event originates from some channel, that channel will be automatically used as a snapshot source; you will be able to change the target channel using the *Snapshot source* button below the rule map in the E&A Configurator
- if the source event does not come from a channel (e.g., user button click event), you will have an option to define the target channel using the *Snapshot source* button below the rule map in the E&A Configurator

If you specify no snapshot source when creating the rule, a regular email will be sent. You will find more details on attaching the snapshot in the [Rules](#) section of this document.

Send Event to Client

This event allows to send a push notification to all or specific WVMS Monitor applications. This may be just a pop-up message, or an event in the channel notification area with a sound, or all of these combined.

Available settings:

- **Title:** user-defined (custom) action name that will appear in the E&A Configurator
- **Message:** notification body text (use the *Insert field* button to add text macros)
- **Display event in alerts:** mark this if you want a message to be appended to the WVMS Monitor log in the *Alerts* section
- **Display a warning message box:** mark this if you want a **dialog box to pop up** on the WVMS Monitor side (to be closed by the user)

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- **Display event in notification panel:** the message will be shown in the **notification panel** of the live view of a specific channel (you will have to set the channel when creating the rule)
- **Display event in mobile application:** the message will be sent as a push notification to all **Wavesys WVMS Mobile clients** that have the target server configured
- **Play audio notification:** play a sound on the WVMS Monitor side; sounds themselves are defined in each WVMS Monitor application
 - **Audio notification:** sound notification number, from 1 to 10 (here, you just specify the number, actual sound is defined per client and may not coincide in different application instances)
- **Send event to specific user or user group:** show the notification only to a specific user or user group

Recording Related Actions

Several actions are related to recording: these can change main and secondary stream recording profiles, as well as append new items into the archive, such as bookmarks.

Activate Recording Profile

Any of the existing recording profiles can be activated for the channel of your choice as a result of a triggered event. You can separately activate **main** stream and **substream** recording: use the *Activate Recording Profile* action for main stream and the *Activate Substream Recording Profile* action for secondary stream. Enter action details as follows:

- **Title:** the user-defined action name
- **Target:** the target device for which recording is to be activated
- **Recording profile:** the pre-configured recording profile to be activated as an action; you will find profile configuration tips further in this section of the manual

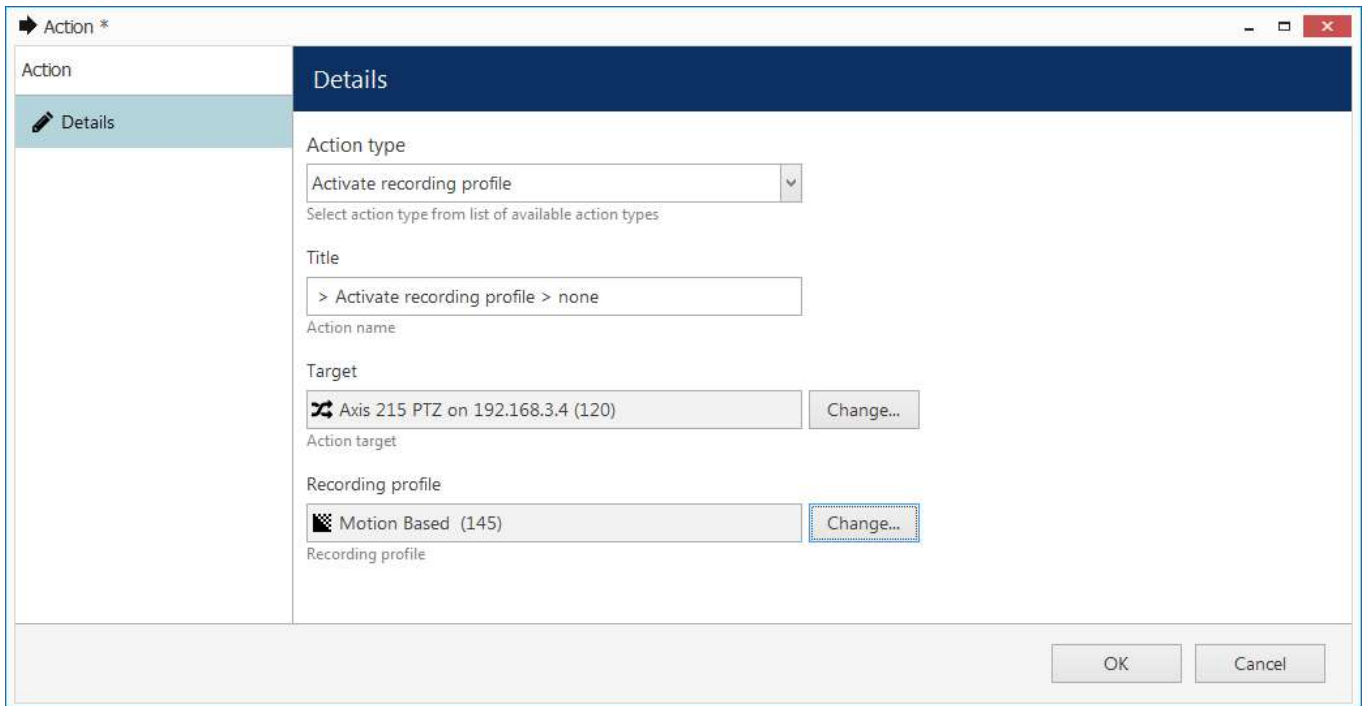
The recording profiles are changed within the channel's recording configuration. Thus, for example, if the channel's recording configuration has a 3-second pre-recording duration, it will stay 3s for any recording profile you activate via E&A.



The recording profile is activated permanently; to switch to a different recording profile, use another action of the same type and different target profile.

Example of emergency recording scenario: create a user button and bind 2 actions to it, one action activating continuous recording, and the other one activating no recording (will activate the recording default profile). Then, add a delay timer to the second action with a required duration, e.g., 1 minute. You will be able to trigger the emergency recording manually from both WVMS Monitor and Wavesys WVMS Mobile applications.

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Action: activate recording profile

Recording profile activation **cannot call off** the default recording configuration (the one currently assigned to the target channel); rather, **this action can only add more** recordings. Thus, channel default recording configuration must define the minimum required recording scheme (based on a single profile or on a schedule) and E&A scenarios will add to that.

Example: a channel is set to record based on motion. There are two user buttons: one of them sets the channel to *Constant recording*, and the other sets the *No recording* profile. Triggering the first button will activate constant recording, and triggering the second button will return channel recording to its default state (which is *Recording by motion*) instead of disabling the recording at all.

Recording Triggering Examples

When channel recording profile includes **alert-based** recording, recording can be activated as a result of a *Generate Alert* type action and its engagement time is determined by the profile's *post-recording time* parameter. In this case, actual recording profile is not changed and the current recording profile is used (the one assigned to the channel through its recording configuration). The default (built-in) recording profiles have post-recording intervals of 10 seconds, which may be fine when conducting, e.g., motion-based recording (video is recorded for 10s after motion event), but may not be suitable for other types of events. In such case, you can pre-configure any number of different recording profiles and use them for action setup.

If a recording profile is triggered by an *Activate Recording Profile* type action, the recording profile used for the target channel is complemented with the profile triggered from E&A, and recording duration can be controlled using action delay timers.

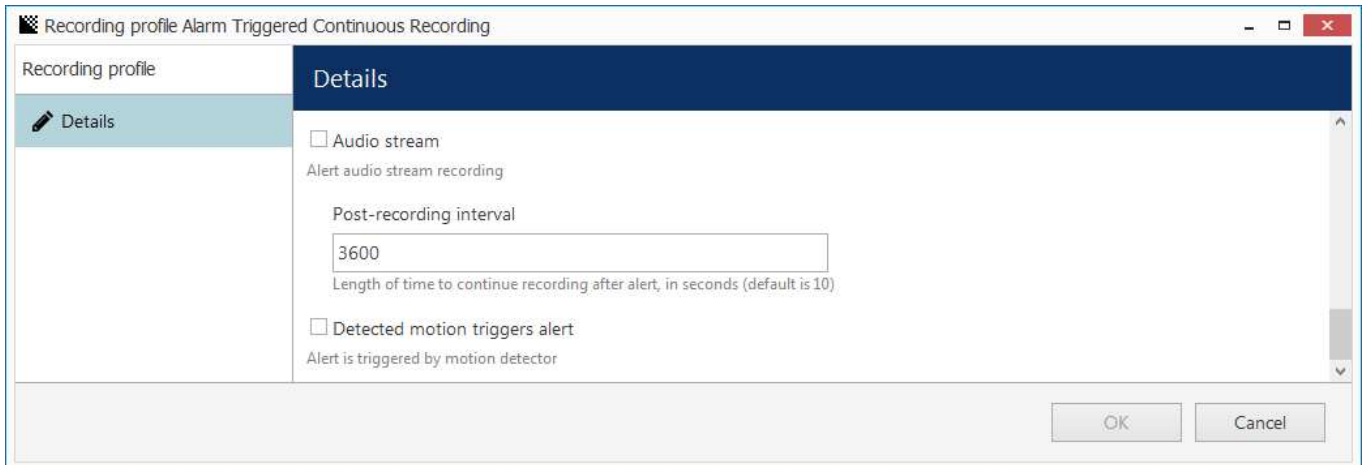
Scenario 1. The camera's recording configuration is normally motion-based. The action is intended to be used for recording based on digital input events, which are triggered when someone opens main entrance door; starting from that point, the video and audio streams will be recorded continuously for one minute.

- channel base recording configuration: motion-based video recording
- actions triggering recording profiles:
 - action #1 triggers a recording profile with continuous video + audio (e.g., built-in Continuous Recording profile)
 - action #2 triggers the built-in *No Recording* profile: as a result, channel recording is returned to its default (configured) state
 - action #2 is delayed for one minute using a [Delay Timer](#)

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Scenario 2. The camera normally records continuous video with low FPS during the daytime, and does not record anything at night and during weekends. If camera VCA detects fire or smoke in the area, continuous recording at full frame rate will be conducted for 30 minutes.

- channel base recording configuration: based on schedule, continuous recording at restricted FPS + no recording
- action triggering recording profiles:
 - action #1 triggers continuous video recording without frame rate limitation
 - action #2 triggers the built-in *No Recording* profile: as a result, channel recording is returned to its default (configured) state
 - action #2 is delayed for thirty minutes using a [Delay Timer](#)



Set desired post-recording interval in the target profile

Create Bookmark

Bookmarks can be created by the server, based on any available event. This can be done either completely automatically or complemented with user input - from the users who are connected via WVMS Monitor application.

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The screenshot shows a window titled "Action Create new bookmark" with a "Details" tab. The form contains the following fields and options:

- Action type:** A dropdown menu with "Create bookmark" selected. Below it is the text "Select action type from list of available action types".
- Title:** A text box containing "Create new bookmark".
- Action name:** A text box containing "Create new bookmark".
- Target:** A dropdown menu with "My Server" selected and a "Change..." button. Below it is the text "Server. If none is selected, the action will be visible on all servers."
- Bookmark title:** A text box containing "Achtung".
- Description:** A large text area containing "Auxiliary power to the Holodeck matrices".
- Bookmark description:** A section containing a checked checkbox for "Request user description". Below it is the text "Request user description".
- Request timeout:** A text box containing "300". Below it is the text "User request timeout (seconds)".
- Request specific user or user group:** A dropdown menu with "admin" selected and a "Change..." button. Below it is the text "Request only specific user or user group. None - send to all."

At the bottom right of the window are "OK" and "Cancel" buttons.

Action: add a bookmark with user confirmed description

Available settings:

- **Title:** custom (user-defined) action name
- **Target:** server to add the bookmark on (select *none* to make the action visible on all servers in the system)
- **Bookmark title:** name that will appear in the archive and also displayed to users, if user description is requested (use the *Insert field* button to add text macros)
- **Description:** extra information to be stored with the bookmark (use the *Insert field* button to add text macros)
- **Severity:** bookmark severity level (info = lowest, critical = highest); you can change the severity level colours via [server settings](#), *Bookmark policy* tab
- **Request user description:** enable this if you want to obtain bookmark description from WVMS Monitor users - this comes useful when you require feedback from users and/or when the description may differ from time to time
 - **Request timeout:** defines for how long the description request will be displayed on the WVMS Monitor side
 - **Request specific user or user group:** display confirmation dialog box only to the target user or user group; if not defined, the request will be sent to all connected users

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Note that the target channel is not specified at this step: you will have an option to specify it using the *Target Channel* button when you create a rule with this particular *Add Bookmark* action. If the source event of such a rule is channel-specific (e.g., *Video Lost, Motion*), the channel will be set automatically. Please see the [Add Rules](#) section for examples.

Scenario 1: fully automated

In the *Add Bookmark* action settings, do not enable the *Request user description* option. Instead, specify desired bookmark title and description. Now, when you use this action in a rule, a bookmark will be added automatically with the pre-defined description.

Scenario 2: bookmark with user confirmation

Enable the *Request user description* option and specify the bookmark title: make sure to make the title comprehensible as it will be displayed to the WVMS Monitor user when prompting for the comment. Optionally, you can specify the description - it will be used when no user input is specified (users ignored or missed the description dialog box).

After you have added the action, you can go ahead and use it in the E&A Configurator: there, upon adding a rule, you will have an option to specify the **target channel** for the bookmark to be added to.

Other Actions

Actions having no special category are listed here.

External Service

For external services that have their own events (e.g., third party integrations via HTTP API), it is possible to trigger these as actions from WVMS servers. You need to specify:

- **Title:** user-defined action title
- **External service:** external service (connected to the WVMS system via HTTP API) to accept the data
- **Target action:** choose one from the list of available items (availability is ensured on the external service side)

This type of action is handy when you have your own service integrated via WVMS HTTP API.

OPC Client Action

This action type uses an existing [OPC client configuration](#) to send write commands to an OPC server, thus changing values of its nodes.

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Action OPC #1 Disable ACL File Monitoring*

Action

Details

Event type
OPC Client action
Select event type from list of available event types

Title
OPC #1 Disable ACL File Monitoring
Event name

Target
OPC #1
Change...
Target OPC client

Action

Variable
#MonitorACLFile
Change...
Variable name

Value type
Bool
Value type

Value
0
Value

OK Cancel

Action example: change OPC node value to false

You need to define:

- **Title:** user-defined action name
- **Target:** [OPC client configuration](#) (connection to an OPC server)
- **Action:** operation to be performed with the data node value
 - **Variable:** target OPC server data node (choose one from the list), must be of compatible type and have a write permission
 - **Value type:** one of the standard data types, auto detected
 - **Value:** new value to be assigned to the variable, must match the variable value type

Run Program

The *Run program* option gives you the opportunity to define an executable file (script, batch or a GUI application) that will be launched as a reaction to defined events.

The following parameters should be specified:

- **Title:** a user-defined action name
- **Target:** target WVMS server to execute program on
- **File Path:** full path to the executable file
- **Parameters:** input parameters, if the program launched accepts any (e.g., a batch file) (use the *Insert field* button to add text macros)
- **Run Mode:** execution mode - hidden (silent, invisible to server user), minimised (minimised to taskbar) or normal (program will run in its default state)

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The screenshot shows a configuration window for an action. The window title is "Action *". On the left, there is a sidebar with "Action" and "Details" (selected). The main area is titled "Details" and contains the following fields:

- Action type:** A dropdown menu with "Run program" selected. Below it is the text "Select action type from list of available action types".
- Title:** A text box containing "Run program > open gate script". Below it is the text "Action name".
- Target:** A dropdown menu with "Global Server (101)" selected. To its right is a "Change..." button. Below it is the text "Target server. If none is selected, the action will be visible to all servers."
- File path:** A text box containing "C:\opengate.bat". Below it is the text "Executable file path".
- Parameters:** An empty text box. Below it is the text "Parameters passed to the executable".
- Run mode:** A dropdown menu with "Hidden" selected. Below it is the text "Run mode".

At the bottom right of the window are "OK" and "Cancel" buttons.

Action: run third-party program

Use the *Insert Field* button on the right-hand side (it appears when you have clicked inside the text area) or right-click the text area and choose *Insert* to add a text macro (see *Action Parameters* further in this topic for details) into the *Parameters* field.

Send HTTP Request

As a result of a triggered event, HTTP/CGI requests can be sent from WVMS servers to any third-party servers or devices that can accept such commands. The target devices can be third-party software, Web servers, cameras or any access control hardware. This event is similar to the previous one, with the difference that here there is a single HTTP request, while using the *Run Program* action you can program multiple requests with necessary delays and internal logic.

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Details

Action type
Send HTTP request
Select action type from list of available action types

Title
Action name

Target
Server Change...
Target server. If none is selected, the action will be visible to all servers.

Host
192.168.3.4
Host name or IP address

Port
80
Port number

Username
root
Username

Set password
Password to log into the server

Request
/axis-cgi/io/output.cgi?action=1%3A%2F
Request text

OK Cancel

Send a HTTP request to open the digital output circuit on a camera

Things to be defined:

- **Title:** user-defined action name, by default it is *Send HTTP request [target host]*
- **Target server:** a server for the action to be available on; if no server is defined, the action will be available on all servers
- **Host:** an IP or hostname that will be accepting the HTTP request
- **Port:** port number to accept the request, port 80 is default
- **Username:** a username to log into the target host, if necessary
- **Password:** a password to log into the target host, if necessary; to change the password when editing the action, put a check mark on the *Set password* and define a password below
- **Request:** HTTP command string

Use the *Insert Field* button on the right-hand side (it appears when you have clicked inside the text area) or right-click the text area and choose *Insert* to add a text macro (see *Action Parameters* further in this topic for details) to be passed as a parameter in the HTTP request.

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SNMP Trap

This event allows WVMS server to act as an **SNMP agent** and generate and send trap messages to a **third-party SNMP manager**.

The screenshot shows a configuration window for an SNMP trap action. The window title is "Action RS SNMP trap 192.168.15.4:162*". The "Details" tab is active. The configuration fields are as follows:

- Action type:** A dropdown menu set to "SNMP trap". Below it is the instruction: "Select action type from list of available action types".
- Title:** A text box containing "RS SNMP trap 192.168.15.4:162".
- Action name:** An empty text box.
- Target:** A dropdown menu set to "RS (162)". To its right is a "Change..." button. Below it is the instruction: "Target server. If none is selected, the action will be visible to all servers."
- Host:** A text box containing "192.168.15.4". Below it is the instruction: "Host name or IP address".
- Port:** A text box containing "162". Below it is the instruction: "Port number".

At the bottom right of the window are "OK" and "Cancel" buttons.

SNMP trap type action

You need to define:

- **Title:** user-defined action name, by default it is *[server] SNMP trap [host] [port]*
- **Target:** WVMS server for the action to exist on; if none selected, the action will be visible on all servers
- **Host:** target SNMP manager address
- **Port:** target port
- **Community:** SNMP community expected by the SNMP manager
- **Trap ID:** automatically generated ID
- **Message:** text message to be sent

Use the *Insert Field* button on the right-hand side (it appears when you have clicked inside the text area) or right-click the text area and choose *Insert* to add a text macro (see *Action Parameters* further in this topic for details) to be passed as a parameter.

Action Parameters (Macros)

Actions that handle text information (log messages, send emails and run third-party program) can accept macro commands. Currently, the available parameters are:

- {EVENT_ID} - internal identifier of the triggered event
- {EVENT_TITLE} - user-defined name of the triggered event
- {EVENT_SOURCE_ID} - internal identifier of the event source
- {EVENT_SOURCE_TITLE} - user-defined name of the event source
- {EVENT_UTCIME} - event UTC time
- {EVENT_UTCATE} - event UTC date
- {EVENT_TIME} - event local time
- {EVENT_DATE} - event local date
- {EVENT_TIMESTAMP} - event UTC timestamp in a system-independent format YYYY-MM-DD hh:mm:ss.ms
- {ADDITION_INFORMATION} - extra information for *Disk Excluding*, *Fallback activating* and

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Recording Error events

- {ACTION_ID} - internal identifier of the action
- {ACTION_TITLE} - user-defined name of the action
- {ACTION_TARGET_ID} - internal identifier of the action target (usually, a server)
- {ACTION_TARGET_TITLE} - user-defined name of the action target (usually, a server)
- {ACTION_PARAMETER_ID} - internal identifier of the additional action parameter (e.g., target channel defined in the rule)
- {ACTION_PARAMETER_TITLE} - user-defined name of the additional action parameter (e.g., target channel defined in the rule)

Example of a text string containing a macro: "{EVENT_TITLE} event occurred on {EVENT_UPDATE} at {EVENT_UTIME}".

Event sources are listed for every rule in the *Rules* section of *Events & Actions*; typically, these are servers, devices and other resources capable of generating events (e.g., user buttons). **Action parameter** is a supplementary item added to the rule, e.g., *target channel* for the text notification, *source snapshot* for the attaching snapshots to emails or exporting them.

When you have finished, click *OK* to save and close the dialog box. The newly created action will appear in the item list under *Actions* and will be available for configuration.

49 OPC Client

WVMS servers can act as OPC clients and connect to different OPC servers, which communicate with various industrial hardware devices. In this way, WVMS servers support thousands of devices from different manufactures without even knowing what those devices and their models are at any particular moment of time: OPC servers take care of that. Once the connection is established, WVMS can receive data from OPC servers, compare it to pre-defined values and trigger events based on specific changes in these values; also, WVMS can send commands to change the data on the OPC servers, which, in their turn, pass the commands to the hardware devices.

This topic describes how OPC client functionality is configured and used within WVMS.



OPC servers provided by different vendors can be used with WVMS. The present document does not cover OPC server installation and configuration, as well as related Windows settings necessary for valid OPC client-server connection setup: these are vendor-specific and can be found in the OPC server documentation.

OPC Functionality

Any WVMS server can connect to a third-party OPC server, thus acting as an **OPC client**. These connections are then used within the [E&A Configurator](#) to create events and actions based on OPC data (variables): events compare the variable contents to pre-defined values in a specified way; actions change the variable contents to a pre-defined value.

Communication with OPC servers can be maintained in one of two ways: **synchronous** and **asynchronous**. When in synchronous mode, WVMS server polls an OPC server and receives updates with the latest data set as a result; this happens every few seconds. In the asynchronous mode, WVMS server "subscribes" to the updates and then waits for a list of updated items from the OPC server.



Asynchronous reading and writing is a preferred method and is typically more efficient. However, some modifications of Windows security policies and DCOM permissions might be required for this connection mode to work, and these are vendor- and use-case specific. Please follow the guidelines in your OPC server documentation carefully to ensure the operability: there are no settings on the WVMS side that could affect your OPC server connection availability.

Before getting to OPC setup on the WVMS side, install and configure your OPC server with hardware devices, and adjust Windows settings (if required). Configuration instructions below imply that you have done so and a remote OPC server with some data is reachable and operational.

Create and Manage OPC Client

OPC client configurations are located in this section as main OPC integration purpose is event and action scenarios (rules). In your Wavesys Console, switch to the *Events & Actions* section and choose OPC in the list on the left.

To add a new configuration, click the + *New OPC client configuration* button in the upper panel.

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New OPC client configuration

The table below details the available settings.

Setting	Description	Default value
Title	User-defined configuration name	[none]
Server*	WVMS server that will act as OPC client (you will be unable to change the server once it has been set!)	[none]
Host	OPC server host name or IP address	[none]
Prog ID**	OPC server program ID, vendor-specific	[none]
Username	User name from the Windows account to connect to the OPC server computer	[none]
Password	Password from the Windows account to connect to the OPC server computer	[none]

Fill in the settings and click *OK* to close the configuration dialog box and save.

*Once you assign the OPC client configuration to a **server**, the *Server* field will become greyed out, meaning that you **cannot change this setting anymore**. In other words, it is impossible to move an OPC client configuration between servers. To do this, you will need to create a new OPC connection for another server.

The **Prog ID parameter is mandatory and it is supplied by your OPC server. Typically, it is available in the OPC server settings; check your OPC server configuration manual for the exact information.

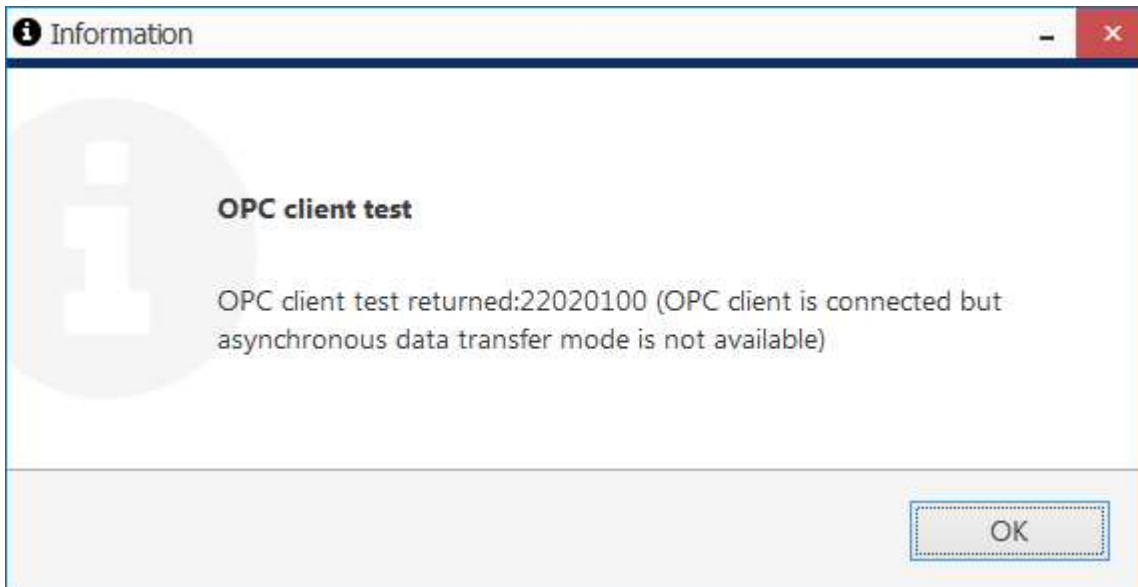
The newly created profile will appear in the list. Select it and hit the *Test* button on the panel above to **validate** the configuration; the following **responses** may be received:

- *OPC client test passed*: asynchronous connection with the configured OPC server has been successfully established
- *Code 22020100 (asynchronous data mode not available)*: connection established successfully but only synchronous mode is available
- *Code -2147023174 (RPC server is unavailable)*: connection unavailable due to invalid OPC client settings (e.g., incorrect target host name or IP), Windows settings or connectivity issues

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- *Code -2147024809 (parameter is incorrect)*: incorrect OPC client configuration (e.g., no username was entered while expected)
- *Code -2147024891 (access denied)*: OPC server denied connection due to lack of permissions (e.g., invalid user name and/or password was used)
- *Code -2147221164 (class not registered) or code -2147221005 (invalid class string)*: typically, incorrect program ID format or program ID itself

The first two responses indicate successful connection with synchronous or asynchronous read/write mode; other codes mean no connection has been established so it is necessary to review the settings and troubleshoot. Other codes may appear as well in case of miscellaneous Windows configuration and/or connectivity issues.



OPC client test detected that synchronous connection mode is available

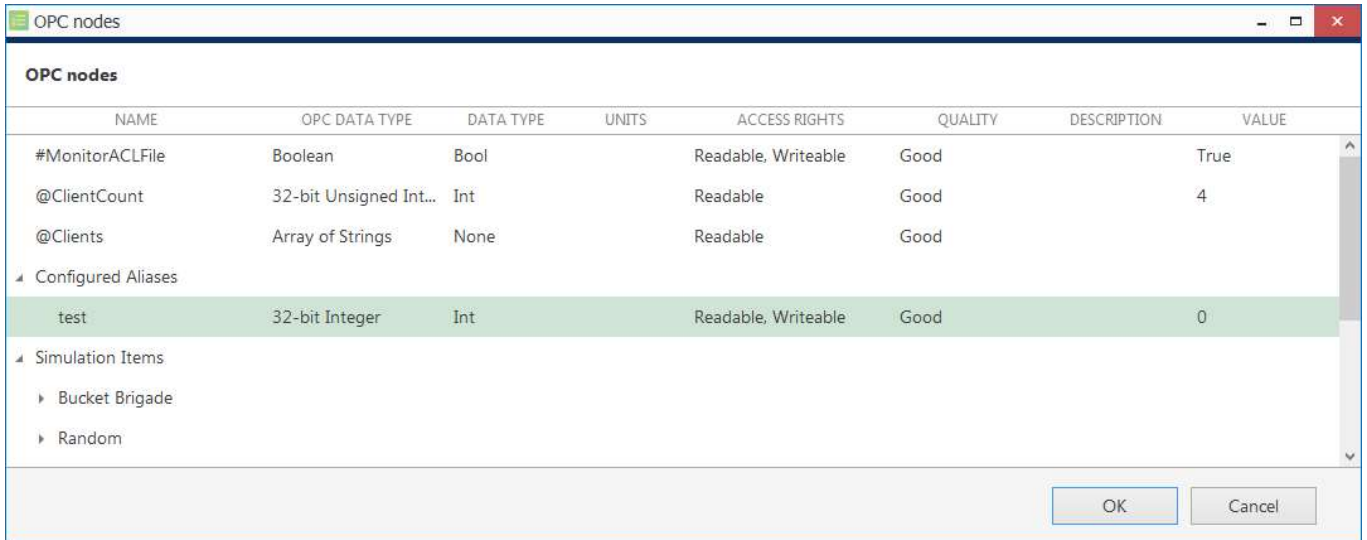
Use the *Disable/Enable* button on the upper panel to disable the OPC client temporarily and then enable it again: this is useful when OPC server is offline so WVMS audit log is not flooded with errors. You can create any number of OPC clients and any number of events and actions based on them.

Events and Actions

Once you have created an OPC server connection, WVMS server can retrieve the list of existing data items (nodes) from the OPC server and work with it. All the available nodes, their attributes and their values are listed when you create an event or an action of the *OPC Client* type.

Events allow you to create conditions - react to specific changes in the node values by applying conditional operators: for example, if variable type is boolean, you can check if it is equal to 1 (=true) or 0 (=false). For other variable types, there are other (corresponding) conditional operators.


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NAME	OPC DATA TYPE	DATA TYPE	UNITS	ACCESS RIGHTS	QUALITY	DESCRIPTION	VALUE
#MonitorACLFile	Boolean	Bool		Readable, Writeable	Good		True
@ClientCount	32-bit Unsigned Int...	Int		Readable	Good		4
@Clients	Array of Strings	None		Readable	Good		
Configured Aliases							
test	32-bit Integer	Int		Readable, Writeable	Good		0
Simulation Items							
Bucket Brigade							
Random							

OPC nodes retrieved from an OPC server

Actions triggered from WVMS servers send write commands to the OPC server, in this way replacing the node value with the pre-defined one. Value of the nodes, which have non-compatible types or do not have the write permission, cannot be changed.

 **OPC data types** are converted to standard data types for further use in WVMS: for example, both 16-bit and 32-bit integers are converted to the *Int* (integer) type. Some of the data types are not converted (e.g., currency, date&time, miscellaneous arrays) so it is not possible to use them as variables in the events and actions.

 Pay attention to the **access rights** of the nodes: for events, it is enough to have the read permission; for actions, the node must be writable, otherwise you will not be able to select it as the target action variable.

For detailed information on the creation of [events](#) and [actions](#), please refer to the corresponding topics of this document.

50 Create Schedules

Apart from [conditions](#) and [delay timers](#), there are **schedule** elements that determine if a rule has been executed based on a pre-defined itinerary.

To add, remove and manage event and action schedules in Wavesys Console, go to *Events & Actions* section and choose *Schedules* from the menu on the left. Schedules can be also added as you go from the [Event & Action Configurator](#).

Click the + *New schedule* button on the upper panel to bring up schedule configuration dialog box.

DAY FROM	TIME FROM	DAY TO	TIME TO
Sunday	10:00 PM	Monday	8:00 AM
Monday	10:00 PM	Tuesday	8:00 AM
Tuesday	10:00 PM	Wednesday	8:00 AM
Wednesday	10:00 PM	Thursday	8:00 AM
Thursday	10:00 PM	Friday	8:00 AM
Friday	10:00 PM	Saturday	8:00 AM
Saturday	10:00 PM	Sunday	8:00 AM

Add new schedule

Enter a user-friendly **title** for the new schedule and then add one or multiple time intervals to form the timetable. Manipulate **schedule items** with the button in the bottom panel.

For each time interval, you can define its starting point (day and time) and ending point (day and time).

Days can be selected from the drop-down list; time can be entered manually or adjusted using the arrows on the right; you can also manipulate time by selecting (highlighting) the hours/minutes/seconds and scrolling your mouse wheel up/down, while still hovering your mouse cursor over the relevant highlighted value.

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Schedule item

Schedule item setup

Day from: Sunday (Day of the week)

Time from: 10:00:00 PM (Beginning of the period during which the event will be fired)

Day to: Monday (Day of the week)

Time to: 8:00:00 AM (End of the period during which the event will be fired)

OK Cancel

New schedule item

Click *OK* when you have finished to save and close the dialog box. The newly created schedule will appear in the item list and will become available for selecting in the *Event & Action Configurator*.

Use the buttons on the upper panel to edit and remove the existing schedules; the filters on the bottom panel will help you load recently added or recently edited items.

Events & Actions > Schedules

Built-in Administrator account

Search

Events & Actions

Rules

Events

Actions

Configuration

Events & Actions

Monitoring

+ New schedule Edit [trash] 1 selected

TITLE

- Day Watch
- Have a Nice Weekend
- Night Watch
- Sinners Never Sleep
- Twilight Watch

Recently added, 5 Recently updated, 0

Multiple schedules

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51 Understanding Conditions

Conditions are auxiliary controls for event/action rule operation: these are **condition variables**, 'locks' for the defined event/action mappings.

Each condition can only be in one of two states: **OFF** or **ON** (0 or 1, *false* or *true*, to put it in terms of formal logic). When applied to a rule, the condition serves as an additional clause for the action execution: the action will only be performed if attached condition is ON, and is never performed if condition is OFF - regardless of whether the event has been triggered. The condition **state** can be manipulated using the *Set condition* and *Unset condition actions* (these exist by default for each and every created condition), which, in their turn, can be set off by some other events.

The conditions are available in the *Event & Action Configurator*: click the *Conditions* button in the bottom part of the *Rules* section to load the existing condition list or create a new one.

Add Condition

To add, remove and manage the conditions in the Wavesys Console, go to the *Events & Actions* section and choose *Conditions* from the menu on the left. Conditions can be also added as you go from the [Event & Action Configurator](#).

Click the + *New condition* button on the upper panel to bring up the condition configuration dialog box. Here you have to:

- enter an comprehensible **title** for the condition - usually, the best ones are those which express a state, e.g., camera offline, motion present, door opened etc.
- choose the **target server** - conditions, as non-global events, are local and operate within a single server
- set condition **default state**, i.e., the state it is in before it is set or unset for the first time; this can be either ON or OFF

The screenshot shows a dialog box for configuring a new condition. The title bar reads "Condition Gate Opened*". On the left, there is a sidebar with "Condition" and "Details" (selected). The main content area is titled "Details" and contains the following fields: "Title" (text input with "Gate Opened"), "EventCondition name" (text input), "Server" (dropdown menu showing "Global Server (101)" and a "Change..." button), and "Default state" (dropdown menu showing "Off"). Below the "Default state" dropdown is a small text note: "The initial value that EventCondition takes at sever startup". At the bottom right of the dialog are "OK" and "Cancel" buttons.

New Condition dialog box

When you have finished, click *OK* to save and close the dialog box; the newly created condition will appear in the item list and will become available in the *Event & Action Configurator*.

Use the buttons on the upper panel to edit and remove the conditions; the filters on the bottom panel will help you load recently added or recently edited items.

Condition Usage Examples

Consider a system that has three cameras installed: *Camera A* overlooking area A, *Camera B* overlooking area B that is just next to area A, and *Camera C*, which is a supplementary PTZ device and can be turned to view both areas and even more, and overlooks area C by default. If a person walks into area A, he/she will be detected by *Camera A*'s video analytics; if he moves on, he will enter area B and the security guard will see him on *Camera B*.

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Now, imagine that *Camera B* suddenly goes offline. The security guard is OK with that, until there is someone in area B; he notices some motion in area A and takes control of *Camera C*, and makes it overlook area B, but the person of interest is long gone by that time, and there is no footage of him being present in area B. So, the task is to automate the process so that *Camera 3* serves as a backup while *Camera B* is offline; the configuration in such a case may look as follows:

- Event 1: *VCA*, source: *Camera A*
- Event 2: *Video Lost*, source: *Camera B*
- Condition: *Camera B Offline*, default state: *OFF*
- Action 1: make *Camera C* go to preset *Area B*
- Action 2: *Set Condition*, target: condition *Camera B Offline*

Rules:

- Event 2 triggers Action 2 (that switches the state of condition *Camera B Offline* to ON)
- Event 1 triggers Action 1 upon the condition *Camera B Offline*

Thus, Action 1 (go to the PTZ preset) is only actually triggered then and then only if *Camera B Offline* condition state is ON, which is not possible while *Camera B* is online.

Now, we need this to work both ways, i.e., we want to return *Camera C* to its home position and reset condition state back to *OFF* when *Camera B* comes online again. New configuration elements will be added:

- Event 3: *Video Restored*, source: *Camera B*
- Action 3: *Unset Condition*, target: condition *Camera B Offline*
- Action 4: make *Camera C* go to preset *Area C*

Rules:

- Event 3 triggers Action 3 (that switches condition state to OFF)
- Event 3 triggers Action 4

These new rules ensure that, once *Camera B* is streaming again, *Camera C* will go back to its original position, thus terminating it as a backup device; and the condition is *OFF*, meaning that the triggering of *VCA* rules in area A will not make *Camera C* move.

The whole setup in *Event & Action Configurator* is as follows:

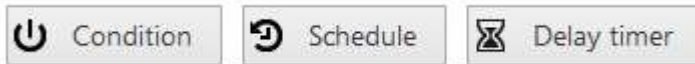
RULE

- ▶ Camera A >> VCA: motion in Zone1
 - ▶ Camera C >> Activate PTZ preset > Area B
 - ▶ Camera B Offline
- ▶ Camera B >> Video lost
 - ▶ Camera B Offline >> Set condition
- ▶ Camera B >> Video restored
 - ▶ Camera B Offline >> Unset condition
- ▶ Camera B >> Video restored
 - ▶ Camera C >> Activate PTZ preset > Area C

Sample rules

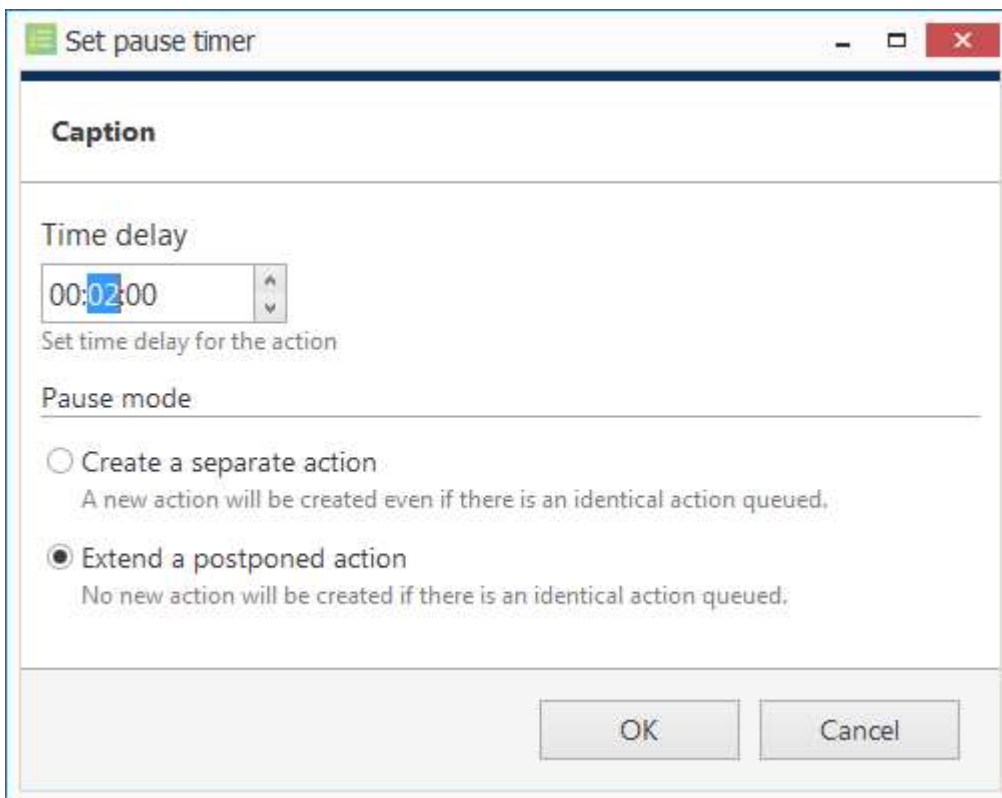
52 Delay Timers

Delay timers are supplementary entities for controlling action launching. Unlike conditions and schedules, timers cannot be pre-created in the main Wavesys Console *Events & Actions* section, but rather are defined as you go for each rule with the *Event & Action Configurator*, which is available via the *Rules* section.



Delay Timer button in the *Event & Action Configurator*

To add a pause timer for specific actions, select one or more of the mapped rules (use *CTRL+click* or *Shift+click* to mark multiple items) subject to delay, and then click the *Delay Timer* button on the bottom panel of the central part of the *Event & Action Configurator*.



Delay timer properties

Set the delay period for the target timer. Time can be adjusted in the following ways:

- click hours/minutes/seconds and then use the UP and DOWN arrows on the right, or
- click hours/minutes/seconds and use the mouse scroll, while still holding mouse cursor over the relevant timestamp section, or
- enter the time manually using the keyboard numpad.

Next, choose the pause mode:

- **Create a separate action:** new actions of the same type will be created regardless of the acting delay timer, and queued in the same way as the original delayed action
- **Extend a postponed action:** new events of the same type will restart the timer, postponing the resulting action for the specified amount of time

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When you have finished, click *OK* to save and exit the dialog box. The newly created delay timer will be assigned to the pre-selected actions.



Extending an action allows you to postpone the action execution repeatedly if more events of the same type arrive within the chosen time period. For example, if incoming events are of a *Recording Error* type, there may come too much of them at once e.g. in case of a major storage issue, causing a lot of triggered actions of the same type, while only a single action may be desirable.

Say, if required action is *Write to application log*, setting a delay timer to *5 minutes + extended action* will postpone the email sending for 5 minutes every time a new recording error appears; when, at a certain point, more than 5 minutes have passed without new incoming events, a single log entry will be eventually created. The **separate action** option, on the contrary, will force logging for every single triggered event.

To remove a delay timer from rule configuration, click the timer to highlight it within the rule, and then click the *Clear* button in the bottom panel. Note that, if there are schedules and/or conditions attached to the same rule, they will be removed as well.

53 Counters, Indicators and Variables

Apart from actions, events and rules, the *Event & Action* section of Wavesys Console contains additional resources, which can be used for building even more versatile automated scenarios.

Software Counters

Software **counters** are entities that contain a certain integer value, which can be altered based on some occurred event. These can be used in WVMS, for example, to count events that do not originate from VCA and therefore cannot be accounted for using VCA counters.

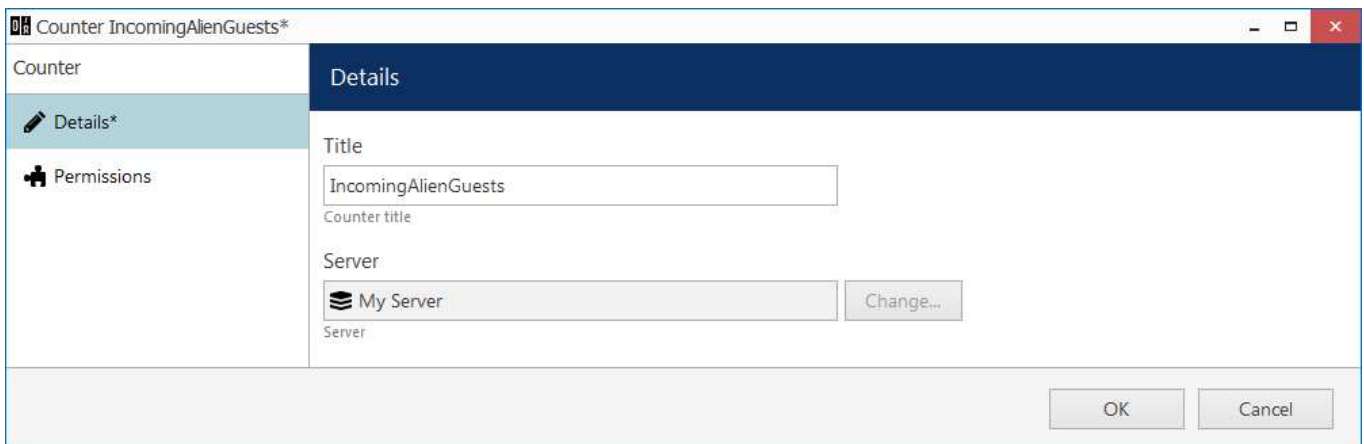
Counters can be created in the [Events & Actions](#) section of Wavesys Console, under the *Counters* subsection. Each one has a title and a server where it resides (as the *Event & Action* scenarios are defined per server; use global events to transfer events from one server to another - for Wavesys WVMS Enterprise installations).

Reports can be then built based on the software counter values, along with VCA counters: [automatic reports](#) are available for configuration in Wavesys Console, and manual reports can be created in the WVMS Monitor application. Both modes also permit report export in PDF format.

Add and Remove Counters

To add, remove and manage the software counters in the Wavesys Console, go to the *Events & Actions* section of Wavesys Console and choose *Conditions* from the menu on the left. Click the + *New counter* button on the upper panel to bring up the counter configuration dialog box. Here you have to:

- enter an comprehensible **title** for the counter - e.g., what is going to be counted
- choose the **target server** - counters, as non-global entities, are local and operate within a single server



A counter creation example

In the *Permissions* tab, you can grant **access** to this counter's **data** to individual users and user groups. Anyone with the rights to access archived VCA metadata for the target counter will have it in the WVMS Monitor application in the *Reports* section. If the *Access archived VCA metadata* permission has been granted for the **whole server**, the target user or user group will have access to **all counters** on that server, regardless of the individual counter permissions.

When you have finished, click *OK* to save and close the dialog box; the newly created counter will appear in the item list and will become available in the *Event & Action Configurator*. You can create any number of software counters.

Use the buttons on the upper panel to edit and remove the counters; the filters on the bottom panel will help you load recently added or recently edited items.

How to Change Counter Values

Counter values can be changed based on any event in the [Event & Action](#) scenarios, when building rules. Counter value changes can be a separate action or an additional one to serve for counting the number of times when the rule was triggered.

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There are three **built-in actions** that are available by default for any created counter:

- **Increment:** increase counter value by one
- **Decrement:** decrease counter value by one
- **Reset:** set the counter's value to zero

The initial state of any newly created counter is zero.

Manage Counter Data

Internal WVMS counters can be removed at will at any point: select all redundant counters and click the *Recycle bin* button on the upper panel.

However, only software (user-created) counters can be deleted in this way. Counters originating from VCA cannot be deleted in this way, as they exist in the VCA configuration (either camera-side or server-side video analytics). Those entities do not even appear in the list in the *Counters* section. To view them, press the *Manage data* button on the upper panel: an additional dialog box will pop up, displaying **all counters**, both user-defined and VCA imported.

The screenshot shows the 'Manage data' dialog box for counters. The dialog box has a title bar 'Counters' and a search bar. Below the search bar, there are buttons for 'Delete data' and '1 selected'. The main content is a table with the following data:

TITLE	SERVER	CHANNEL	STATUS
MotionCounter	My Server	MotionCounter	
Counter 0	My Server	UDP IPX3302HD on 192.168.3.53	
Counter 1	My Server	UDP IPX3302HD on 192.168.3.53	Deleted
Counter 2	My Server	UDP IPX3302HD on 192.168.3.53	

Hidden menu with data for all counters

Here, you will see **all counters** with **some value**, including those, which have been removed from VCA configuration and are therefore out-of-date. Select the unnecessary items and press *Delete data* above: all information about the target counter will be then removed from the database:

- for software counters, this means that only the past counter values are wiped out; the counter itself stays in the list (you can remove it from the list as described above)
- for VCA counters, the counter itself is deleted from the database, too (but not from the VCA configuration)



Removing the counter's data does not reset it to zero.

For example: there is a VCA counter for incoming cars, which is currently equal to 100. If you delete its history and the next day new data are received from VCA, the counter's value will be consistent with the previous data, i.e., equal to 101.

If there are no new incoming data for the removed counter, it will disappear from *Reports* shortly - both in Wavesys Console and WVMS Monitor. If it still exists and WVMS continues receiving data from the target counter, it will reappear in this list automatically. So, in other words, the *Manage data* dialog box reflects the current state of the counter's database.

Usage Example

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Consider a use case where it is required to count how many times during the day the office door was unlocked; the door is opened by an access control module, which is also wired to the digital input of a camera so that the system is notified when the door is unlocked.

Required E&A items in this case are:

- Event 1: *Digital Input*, source: corridor camera
- Event 2: *Scheduled event*, type: scheduled, every day 12:00AM
- Counters: *HowManyTimesDoorWasOpened*
- Action 1: *Increment*, target: counter *HowManyTimesDoorWasOpened*
- Action 2: *Reset*, target: counter *HowManyTimesDoorWasOpened*

Events 1&2 are not default and should be added, and the counter has to be created as well. Actions associated with the counter will be added automatically so there is no need to create these.



Rules that control the counter state

The final set of rules for this scenario looks as follows:

- Rule 1: Event 1 triggers Action 1
- Rule 2: Event 2 triggers Action 2

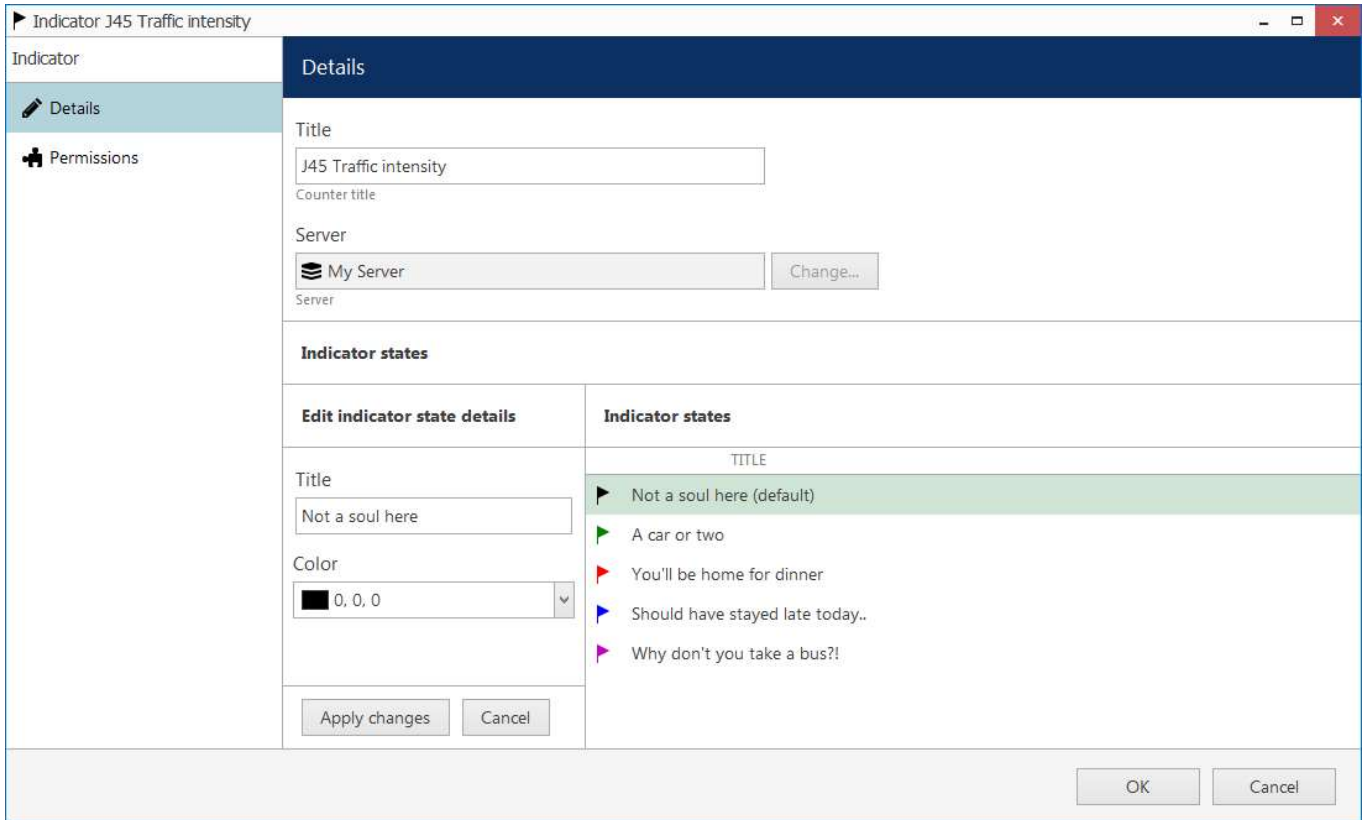
Thus, every time the door is opened, this event is accounted for by the software counter; the counter is reset based on schedule every midnight. Using the counter data, it is possible to build a [report](#) and see, for example, most and least popular times, the average number per week etc.

Indicators

Indicators are objects with several **states**. These states (conditions) can be changed based on any events in the *Event&Action Configurator*. Indicators can be placed on **maps**, thus helping you build an interactive dashboard.

You can create indicators in the *Events & Actions* section of Wavesys Console, under *Indicators*, then place them onto maps - either regular or geo maps. The indicator state and colour can be then changed based on E&A events: once you create an indicator, it is automatically added to the *Actions* section of the E&A Configurator and actions for changing its state are created.

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Example of an indicator

Create and Manage Indicators

To add, remove and manage the indicators in the Wavesys Console, go to the *Events & Actions* section of Wavesys Console and choose *Indicators* from the menu on the left. Click the + *New indicator* button on the upper panel to bring up the counter configuration dialog box.

The following settings are available here:

- **Title:** user-defined name
- **Server:** WVMS server, to which the indicator belongs (related actions will be only available in the target server E&A Configurator)
- **States:** 5 different indicator conditions with custom names and colours

When adjusting the state details, do not forget to hit the *Apply* button for the changes to take effect.

Change Indicator State

The indicator state can be changed based on any event in the [Event & Action](#) scenarios, when creating rules. The indicator state can be changed as a separate action, or it can be combined with any other one, thus helping visualize the state of other items.

There are five **built-in actions** for every indicator that allow to set the indicator to any of its states. If you only need two or three, simply do not trigger other conditions. The actions will appear automatically after you create the indicator.

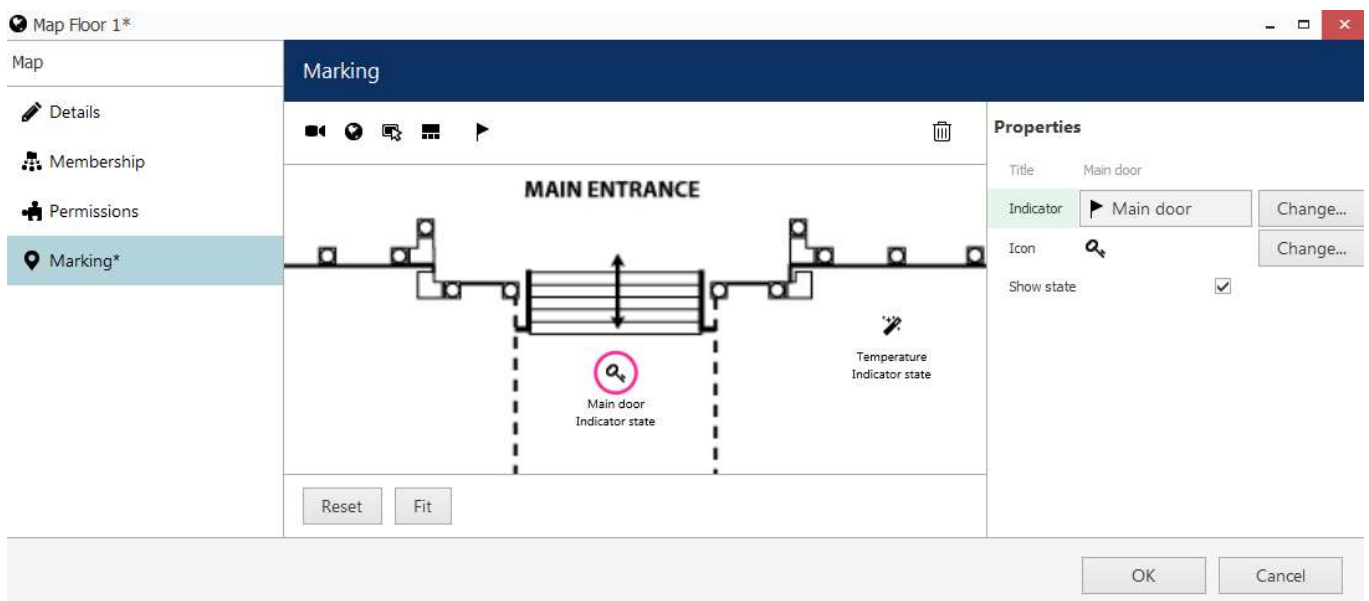
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J45 Traffic intensity

- Change Indicator State ▶ Why don't you take a bus?!
- Change Indicator State ▶ Not a soul here
- Change Indicator State ▶ A car or two
- Change Indicator State ▶ You'll be home for dinner
- Change Indicator State ▶ Should have stayed late today..

Maps

When placed onto maps, indicators change their colour and display the comment according to their state. Both regular and geographic maps have an **indicator marker** available on the panel above the map, alongside with other markers. Thus, you can build interactive panels that will reflect the condition of the system.



A map with two indicators on it

Usage examples

Depending on your needs, indicators can help in many different scenarios.

Use case #1: external sensors are sending temperature data. Based on the value, the indicator state is set to very low/low/normal/high/very high.

Use case #2: [conditions](#) are used throughout the system for door status (open/locked). The indicator is used to visualize the condition state (in this case, only 2 out of 5 states are involved).

Variables

Variables in WVMS are entities having a certain value that changes over time. Create variables if you wish to set up reactions (via [E&A](#)) to certain variable values, e.g., certain temperature readings from thermal cameras.

To access the variables management in Wavesys Console, choose the *Events & Actions* section and switch to *Variables* in the menu on the left.

Variables differ by source. Currently, there are two groups of sources: devices (IP cameras or other) and [data sources](#).

Channel Variables

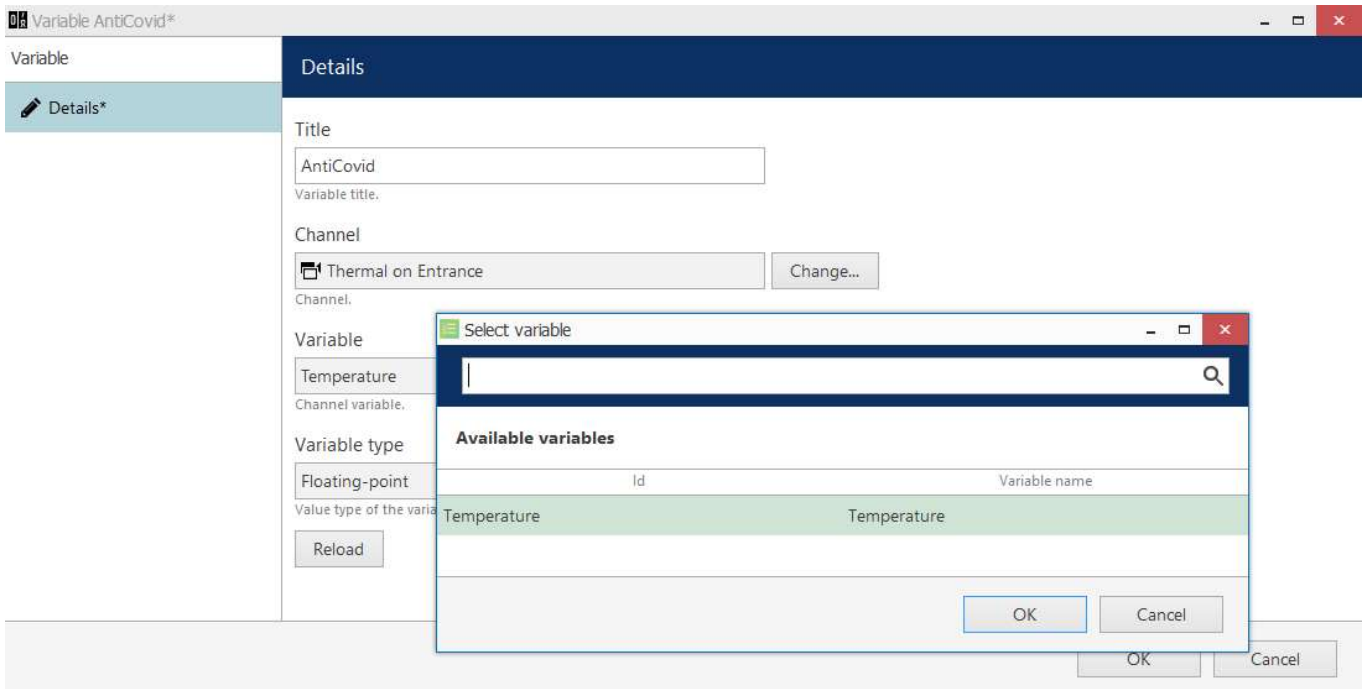
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Some device integrations support receiving certain variable values from cameras. For example, some thermal devices send the temperature measurements as floating point numbers. In order to "catch" the data on the server side, simply create variables for these cases. Afterwards, you will be able to use these variables in events: for example, trigger events if the value is greater or less than certain threshold.

To create a new item, click the + *New channel variable* button on the upper panel. In the dialog box, choose the source channel and fill in the settings.

- **Title:** user-defined variable name
- **Channel:** source channel (device integration must be supporting variables, please contact support@wavesysglobal.com for details)
- **Variable:** choose one from the list of available items (if none are available, the device has none or the integration does not support variables)
- **Variable type:** variable data type

For most variables, the data type is fixed, so you only need to choose the variable source and give it a name.



Temperature variable from a thermal camera

Click *OK* when done; the newly created variable will be appended to the list.

After you have added the channel variable, use the *Variable value event* to define the value range you want to trigger the event-action rules.

Data Source Variables

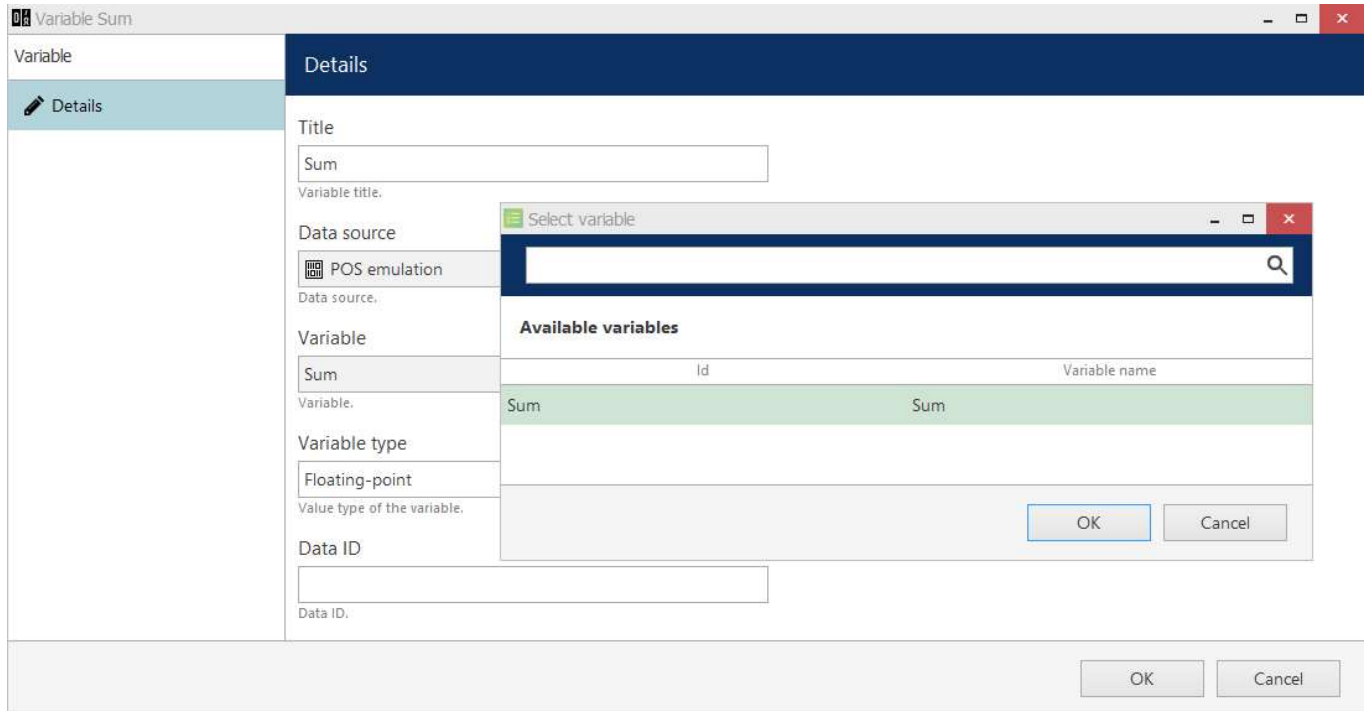
Data source variables are based on the pre-defined [data source](#) mappings. First, create some regex mappings for your data sources as described in the corresponding section of this document. Then, create a data source variable in the *Variables* subsection by clicking the drop-down arrow on the upper panel and selecting the + *New data source variable* option.

The following settings are to be defined:

- **Title:** user-defined variable name
- **Data source:** choose one of your existing (pre-configured) data sources
- **Variable:** choose one of the pre-configured mappings
- **Variable type:** choose the data type of the selected variable (for further comparison in events)
- **Data ID:** enter your POS identifier in case the data source delivers data from multiple terminals or other sources

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The *Data ID* field is optional and is only required if your data source has combined streams from multiple sources. If there is only one data stream, leave the *Data ID* field empty.



A new variable from a data source mapping

Click *OK* when done; the newly created variable will be appended to the list.

After you have added the data source variable, use the *Variable value* [event](#) to define the value range you want to trigger the event-action rules.

54 Layout Templates

Layout templates are arrangements of empty viewports. These can be later filled with channels and maps in your WVMS Monitor application and later saved as layouts. Each template can be used any number of times for creating both local or [shared layouts](#).

You can create your own, **custom layout templates** and then use them in any WVMS Monitor applications connected to the target server.

To access layout templates via Wavesys Console, go to the *Configuration* section in the bottom left panel and select the *Layout templates* component in the menu on the left. Use the *Search* field in the upper-right-hand corner to filter existing items; press *Refresh* button to reload the item list.

The screenshot displays the 'Configuration > Layout templates' interface. On the left is a navigation menu with options: Servers, Users, Devices, Channels, Recording, Layout templates (selected), Configuration, and Monitoring. The main area features a toolbar with '+ New layout template', 'Edit', a trash icon, and '1 selected'. Below this is a table:

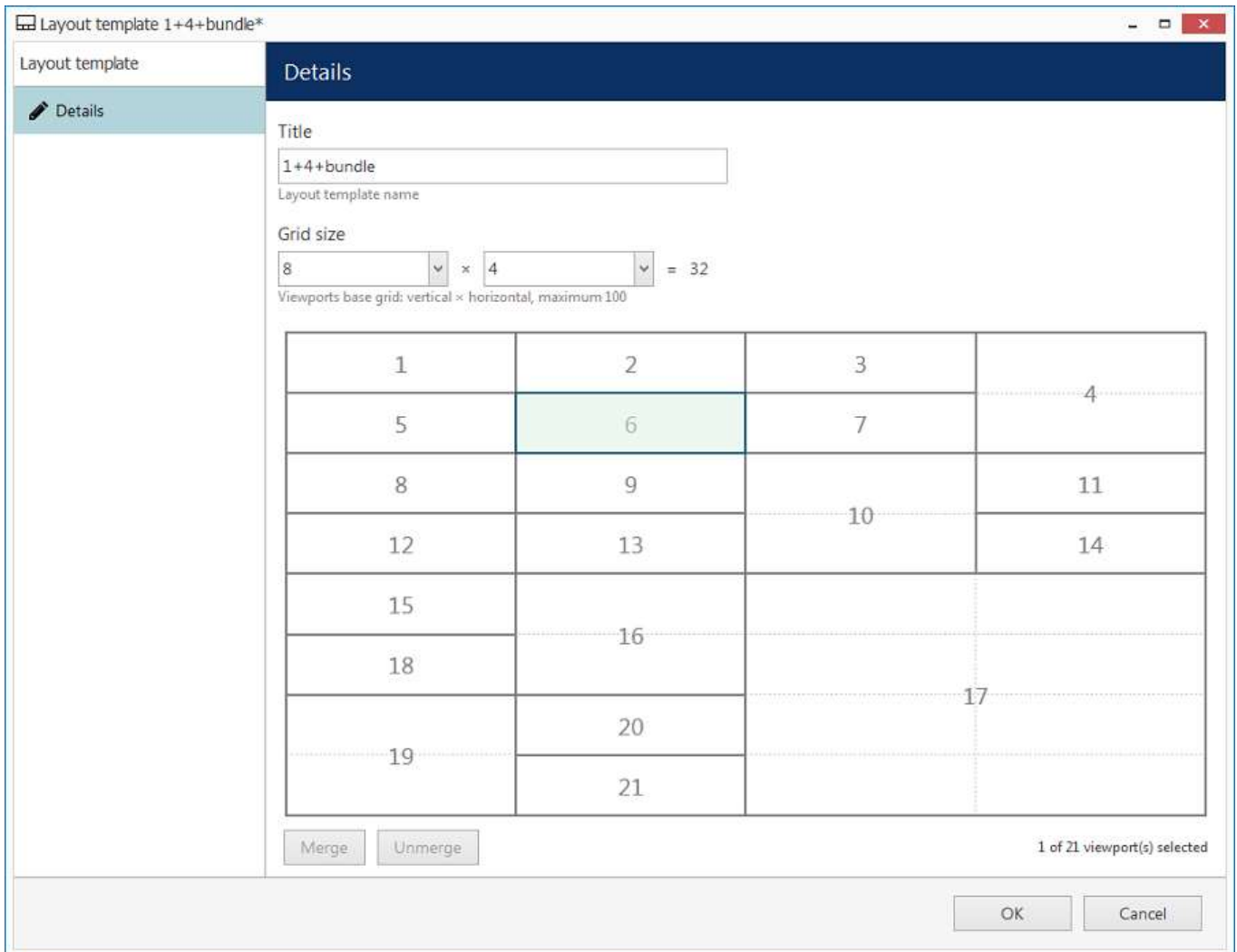
TITLE	ID	MATRIX	VIEWPORTS
1+2	(117)	2 × 2	3
1+4+bundle	(118)	8 × 4	21

At the bottom of the table area, there are two status boxes: 'Recently added, 2' and 'Recently updated, 0'. A search bar is located in the top right corner of the main panel.

Layout templates

Click the + *New layout template* button on the upper panel to bring up the configuration dialog box.

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Create new custom layout template

Enter the template **name**, choose **grid size** and then **modify the grid**, if desired: you can select multiple cells at once with your mouse and then use the *Merge* and *Unmerge* buttons below to create custom cell combinations. Note that you can only create rectangular regions, not just any polygonal areas.

- For corridor view cameras, merge several cells vertically, so that the image fits the target viewport without much stretching/distortion
- For surround view cameras or 180/360-degree dewarp, merge a row of cells

When you have finished, click the *OK* button; the newly created layout template will appear in the item list and it will also appear in any connected WVMS Monitor applications after synchronisation.


Use the *Edit* button to alter any template at any time: modifications will immediately be synchronised with WVMS Monitor after you save the changes and modified templates will be available for use. However, if the modified layout was already in use, its current output will not be altered, allowing you to save the old layout in WVMS Monitor. Drag and drop the new layout template to the WVMS Monitor live view display to load the updated template version.

55 Shared Layouts

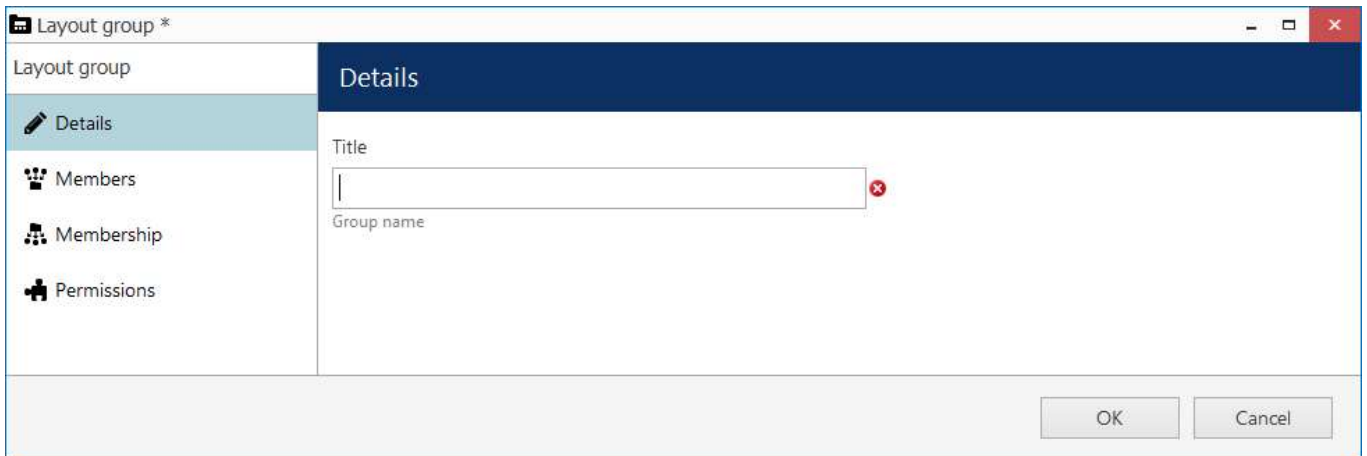
Layout is a pre-configured viewport configuration with channels assigned for live view and archive playback.

Layouts are created in the WVMS Monitor application by filling a layout template with video channels. There are two main groups of layouts: **local**, which are created and stored locally on the same computer where the WVMS Monitor is installed, and **shared**, server-side layouts, which are kept on each server and are available for all users that are connected to the same server from other client computers. If the license or server policy limits the number of max client connections to 1, layouts can still be shared between non-concurrent client connections from different machines.

Layouts themselves are created via WVMS Monitor application but layout sharing should be pre-enabled from Wavesys Console. In order to make server users able to share and access this resource, **shared layout groups** should be pre-created on the server side. Groups are used for handling user permissions and also for logical arrangement of the shared layouts.

 If **no layout groups** exist in the server configuration, layout sharing will be disabled for the target server from the WVMS Monitor side.

To create a new group in Wavesys Console, open the *Configuration* section and choose *Layouts* from the menu on the left. Click the + *New layout group* button in the upper panel to bring up the shared layout group creation dialog box.




New shared layout group

In the *Details* tab, enter a user-defined name for the target layout group. This name will appear in all connected WVMS Monitor applications when creating a shared layout.

Use the *Members* and *Membership* tabs to create nested groups; *Members* tab will also allow you to manage group contents after some layouts have already been created.

In order to **allow access** to specific shared layout groups for selected users, go to the *Permissions* tab:

- *Administer* permission grants access to the layout group in Wavesys Console and allows the user to share layouts via this group (put new layouts into target group)
- *View* permission allows users to see the contents of the group, i.e., shared layouts, when they connect to the target server from the WVMS Monitor application, and use these layouts in WVMS Monitor

 All users with the *View* permission will be able to see and use the shared layouts from the target layout group. However, visibility of the contents of each layout will depend on each user's channel and map permissions.

Shared layouts can be used in *Layout Sequences* in WVMS Monitor independently or combined with regular layouts as well.

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56 Maps

Maps are resources that allow you to use an image of the building plan or some area and place interactive markers on it. Cameras, doors, user buttons, and other items put on maps can then be clicked in the WVMS Monitor application to provide the desired interaction and facilitate the operators' work. Links to other maps help create multi-layered building plans for better navigation.

To access map management via Wavesys Console, select the *Configuration* section from the bottom-left-hand menu and then click *Maps* in the menu on the left.

Two types of maps are available at this point: regular **maps** based on user image, and **geo maps**.

Create Map

Click the + *New map* button on the upper panel to bring up the map configuration dialog box.

Map Section 31*

Map

- Details
- Marking
- Membership
- Permissions

Details

Title

Section 31

User name

Organisation

Section 31 (115) Change...

Organisation to which the user belongs

Map image


Select image...

Select image of the desired plan in PNG, JPG, TIF, BMP or static GIF format. Please note, the system will reproduce the provided image without scaling or effects. The best results will be with 16:9 images of approximately 1600x900 pixels.

OK Cancel

Map details

On the map *Details* tab, enter a user-friendly name for your new map, then select the organisation it represents, if applicable, and upload a picture that will be used as plan basis. All major raster picture formats are supported: JPG/JPEG, BMP, PNG, TIF/TIFF and GIF.

 There are the following limitative requirements for the pictures loaded as maps:

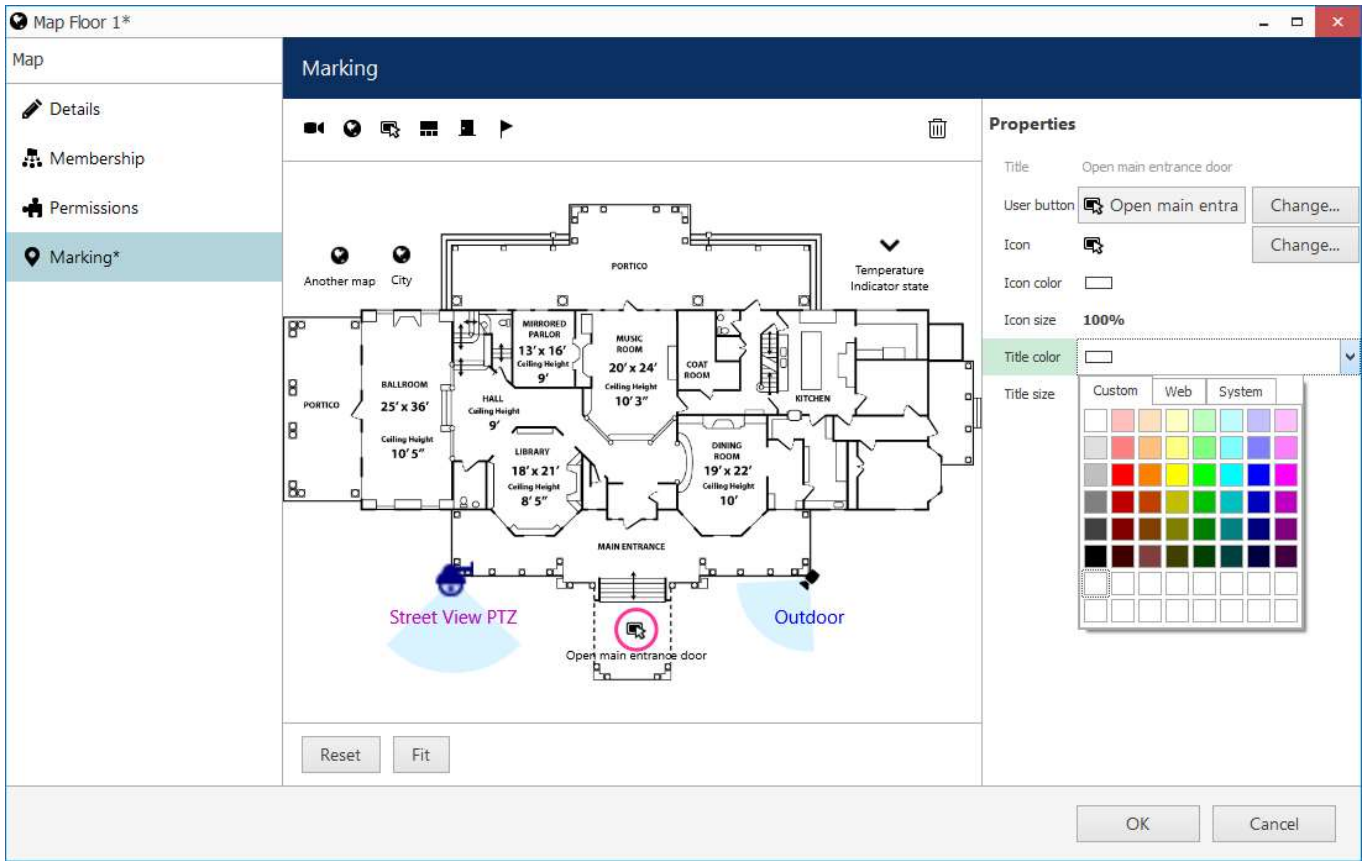
- picture resolution should be less than 8.25MP
- file size should be less than 5MB

Files not meeting these limitations will not be uploaded.

Place Camera Markings


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Switch to the *Marking* tab to place cameras on the map.



Map marking

Manipulate your map picture by zooming IN and OUT with the mouse wheel, dragging the picture with the left mouse button and using the *Reset* and *Fit* buttons below. *Reset* shows non-zoomed 100% size picture (or a picture fragment, if it is larger than the window), and *Fit* zooms your picture so that it fits into the preview window.

To place a **camera marker**, drag the  camera icon from the upper-left-hand corner and drop it on the scene. Camera markers will allow you to pop up channels by double-clicking the markers in WVMS Monitor. They will also have a **red mark** on them in the WVMS Monitor application if the target channel is **offline** (if the *Video lost* event has been triggered): the channel's *Video loss* parameter is used as a timeout, which is 15s by default. The following actions are possible:

- select the camera by clicking the  camera icon on the plan (and **not** the blue sector representing the viewing area)
- move the camera around by dragging it (the sensitive area is within the pink circle)
- change coverage sector by dragging two pink dots on the sides of the blue sector: drag to the sides to adjust the vertical angle up to fisheye (full circle)
- correct camera position: drag the central pink dot to the sides to rotate camera, drag to/from the centre to change radius
- remove the marking by selecting it and pressing the *Delete* button on your keyboard or the recycle bin button on the upper panel


The properties window on the right enables you to:

- choose target device for the currently selected marking
- view information about marking angles and radius
- turn ON/OFF displaying of coverage area
- change the marker icon colour and size
- adjust the marker title colour and size


Other Markings

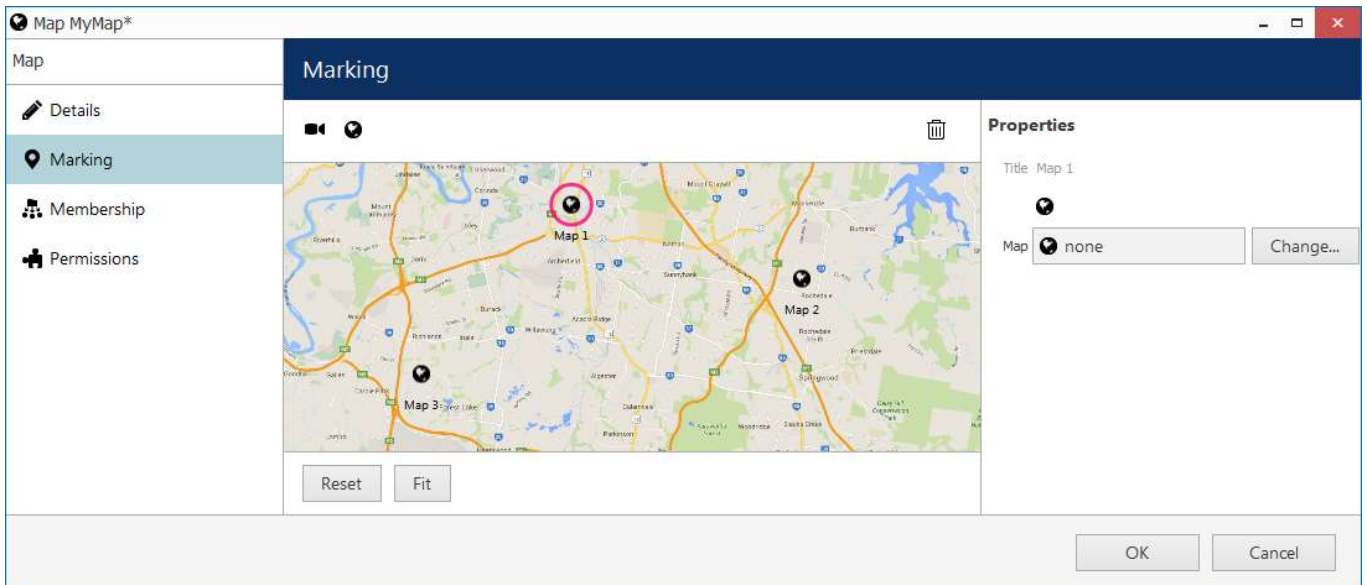
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Several other marker types turn your map into a fully featured control panel.

Add **map markers** and use them as shortcuts to other maps: target maps will pop up when the corresponding map markers are clicked in WVMS Monitor. To place a map marker, drag the  map icon from the upper-left-hand corner and drop it onto the scene.

Click a map marking and use the properties window on the right to browse for a map that you wish to be a target for the current shortcut. Remove markers by selecting them and then hitting the *Delete* button on the keyboard.

In the same way you can also add **user buttons**  to your map and trigger assigned actions by double-clicking the buttons in WVMS Monitor. Select your desired user button on the map and then use the properties section on the right to bind a user button to the marking.



Map markers

Similarly to individual channels, it is possible to place **layout markers** for shared layouts to be displayed when double-clicked on the map in WVMS Monitor. The target shared layout and the icon style can be defined in the properties section on the right.

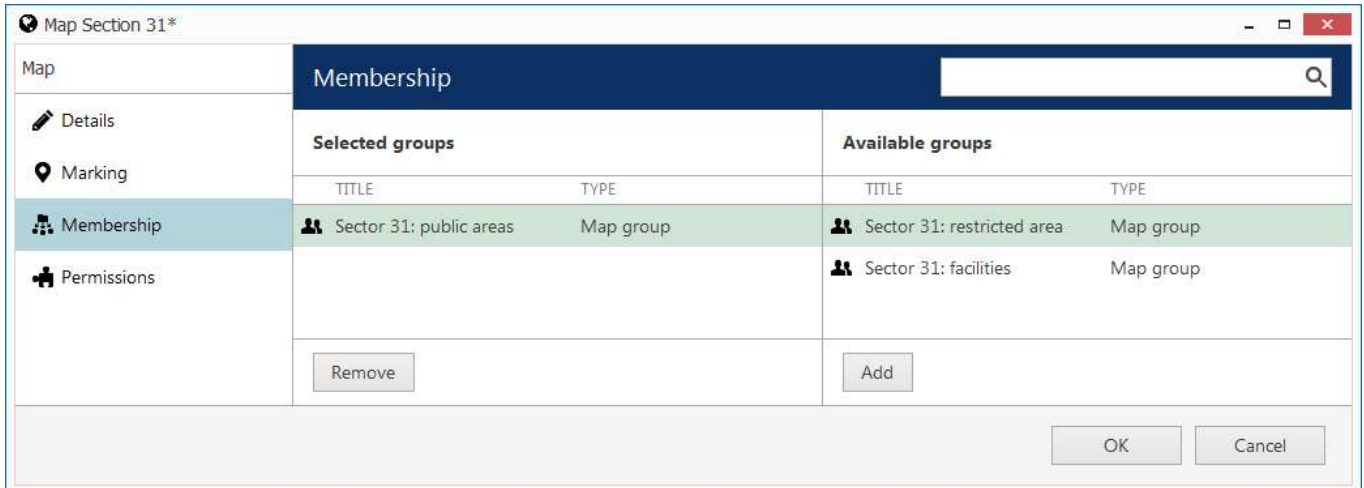
Door markers are intended to be bound to doors from the [access control](#) integration: door statuses are then displayed on the map in the WVMS Monitor application. The target door and icon styles for different door states is to be defined in the properties section on the right.

Finally, **indicators** are multi-state entities that can [change their state](#) - and, therefore, their colours on the maps - based on events. These may be temperature ranges, condition states, or any other system component states that have related events.

Membership and Permissions

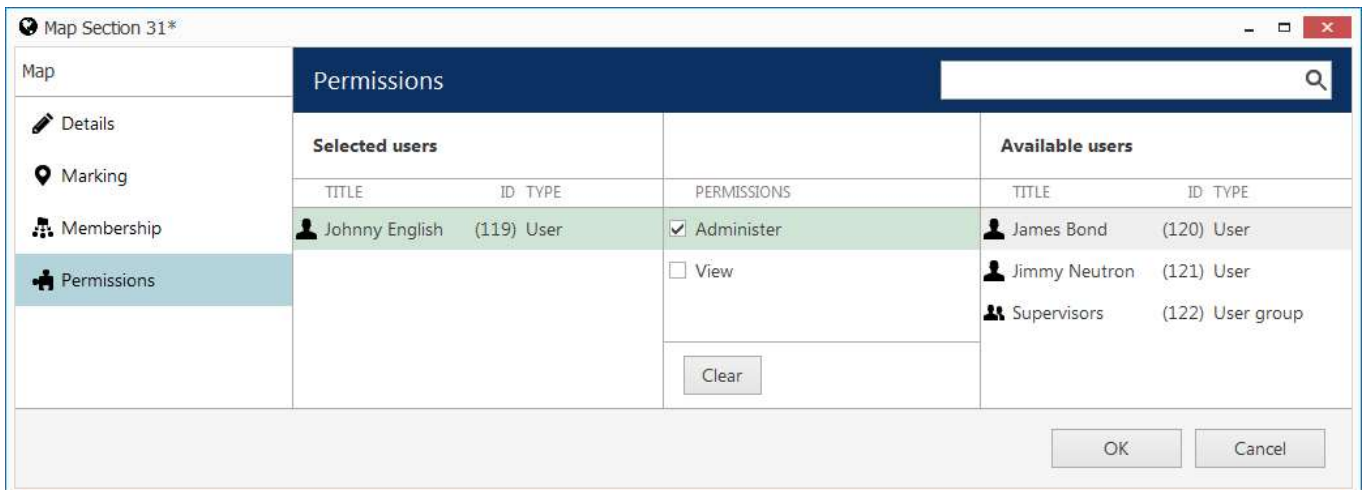
Just as other resources, maps can be grouped and assigned user permissions.

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Map membership

In the *Membership* tab, you choose groups for this map to become a member of: select groups by double-clicking items in both columns or by using the *Add/Remove* buttons below.



Map permissions


Permissions tab enables you to choose the users and user groups that will have access to this resource. Select at least one permission to select a user/user group; uncheck all manually or using *Clear* button below to deselect. *Administer* permission means user will be able to see, open and edit map via Wavesys Console, and *View* only allows user to load the map in WVMS Monitor.

When you have finished, click *OK* to save and close the dialog box. The newly created map will appear in the item list of the *Maps* section.

Use the buttons on the upper panels to perform item-specific actions: remove, edit and quickly assign map group; the filters on the bottom panel will help you switch between recently created/updated items and display maps/map groups only.

Create Geo Map

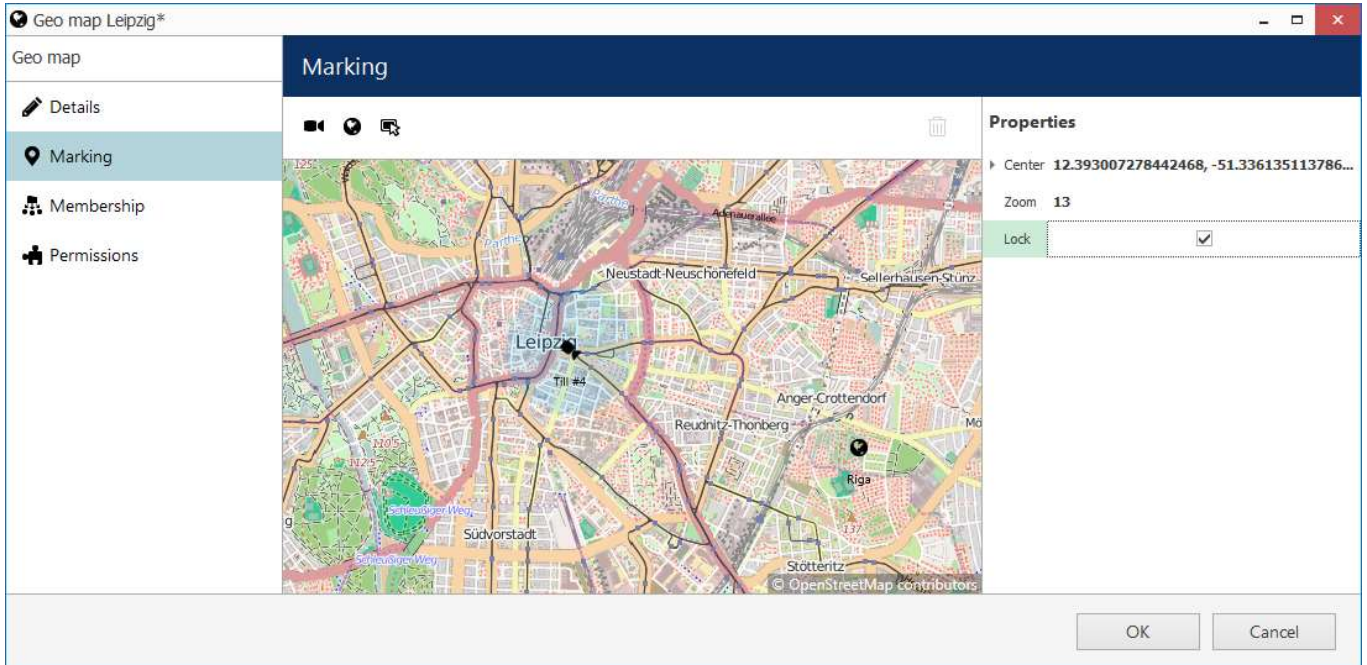
It is also possible to use any part of the **world map** instead of user-defined pictures to put the markings on it. To create a new geo map, click the drop-down arrow near the + *New map* button and select *New geo map* to bring up the geo map creation dialog box.

 Geo map functionality requires that constant **Internet connection** is present in order the world map to be loaded from the remote server. Internet connection is required from WVMS Monitor as well to load the map and present it to the end user.

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Geo map creation is similar to the creation of a regular map, with the difference that you do not need to specify the image to be used: instead, the world map is loaded from the server provided by Wavesys Global. You just need to find the right place on the map by zooming IN/OUT and moving the map:

- use your mouse wheel to zoom IN and OUT
- click and drag with your left mouse button to move the map around



Markers on a geo map

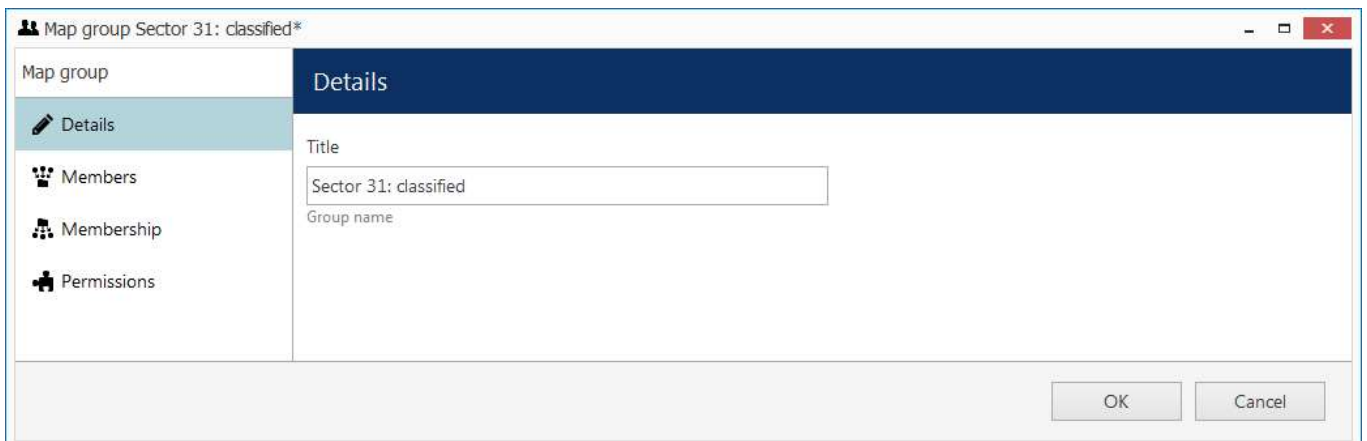
Markers of all available kinds can be placed on the geo map in the same manner as with the regular map, and the rest of the tabs also provide the same functionality.

 Use the *Lock* option in the right-hand-side panel to prevent users from moving or zooming the map IN/OUT in the WVMS Monitor application.

Create Map Group

Map groups can be used for easier management in Wavesys Console. Note that map groups are not displayed in WVMS Monitor; to group maps and geo maps in Wavesys Console, use [Visual Groups](#).

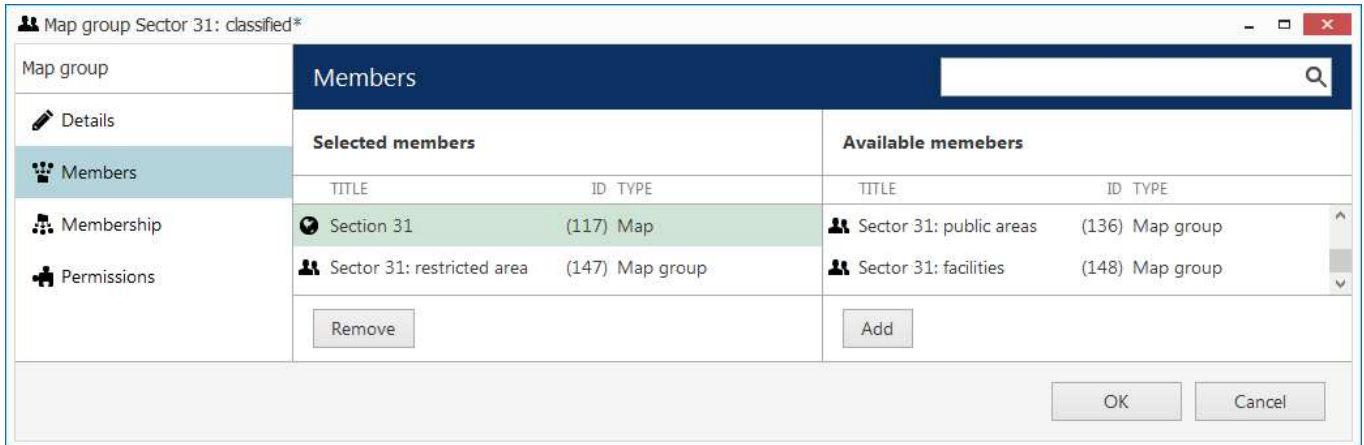
Click the drop-down arrow near the + *New map* button and select *New map group* to bring up the map configuration dialog box.



Map group details

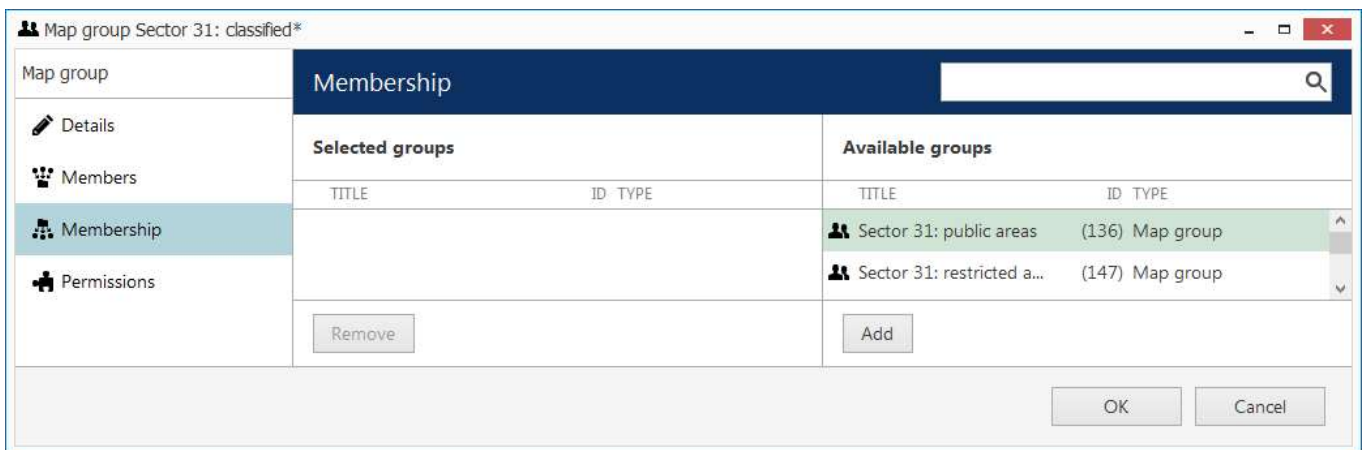
Enter group name on the *Details* tab and proceed with selecting maps for this group on the *Members* tab.

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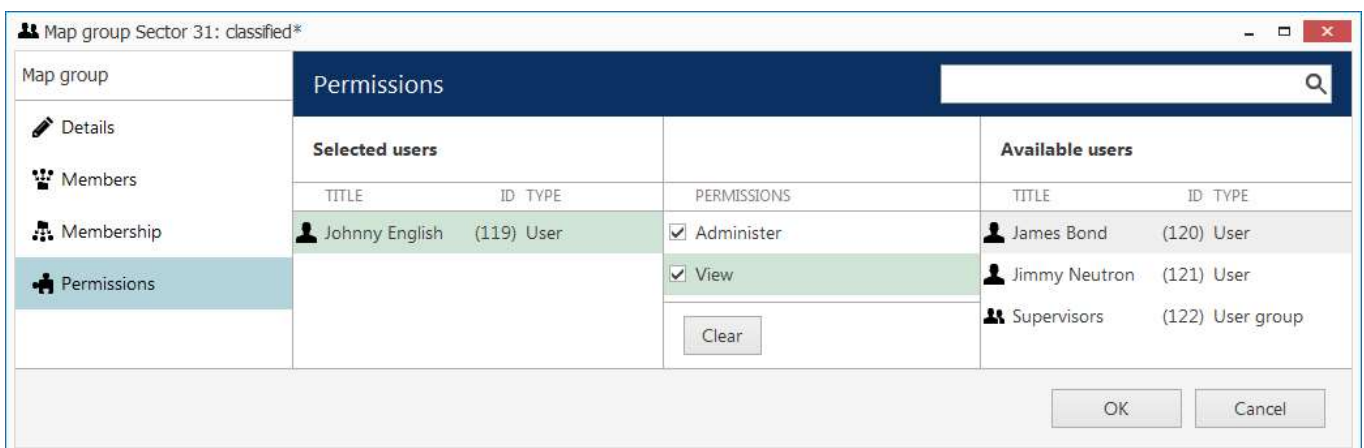
Choose members for the target map group

You can select both maps and map groups to be members of any map group.



Map group membership

On the *Membership* tab, choose groups to contain target map group as a member, thus creating nested groups.



User permissions for map group

Switch to the *Permissions* tab to assign user privileges for the target map group. Select at least one permission to select user/user group; deselect by unchecking manually or by using the *Clear* button below to remove all. *Administer* permission means user will be able to see, open and edit all maps in this and nested groups via Wavesys Console, and *View* only allows user to load the maps in WVMS Monitor.

When you have finished, click *OK* to save and close the dialog box. The newly created map group will appear in the item list in the *Maps* section. Use the buttons on the upper panels to perform item-specific actions: remove, edit and quickly assign map group; filters on the bottom panel will help you switch between recently created/updated items and load maps/map groups only.

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57 Webpages and CrossLink Channels

WVMS servers can work with several types of **interactive resources** - meaning that the user can not only watch and record the feed, but also control it from the WVMS Monitor application. These resources are called CrossLink channels. CrossLinks provide a direct interactive interface to SCADA, access and flight control, radars and lidars, other VMS software, and other applications.

CrossLinks require a special license and are represented by **interactive web applications** and by interactive **desktop applications**. Depending on the setup, these allow capturing, recording, and controlling the remote contents in an intuitive manner.

CrossLink Types

How to choose the required resource type based on your use case scenario:

- remote desktop: the [device](#) is created on the server side (like for any camera) to allow live & recording
- webpage device: the device is created on the server side (like for any camera) to allow live & recording
- direct webpage: no device on the server side, live Web contents goes directly to WVMS Monitor
- non-interactive webpage device: static video feed to the server for recording and non-interactive display (does not require CrossLink license, just a regular channel)

Basically, you need to determine whether you want to

1. Have a remote **Web interface** (website, Web server) or a **workstation**.
2. In case it is a Web application, choose if
 - a. The user should only be able to **control** the remote contents,
 - b. It needs it to be **recorded** on the server side.

Below, you will find more detailed information about each type and step-by-step configuration guidelines.

Prerequisites

For all interactive contents, you need a special [license channel type](#) called **CrossLink**. The required number of CrossLink channels is added to your license alongside regular channels and VA channels. There are two different types of **CrossLink licences**:

- **Basic**: interactive Web with or without recording
- **Advanced**: interactive Remote Desktop (server-side device)

Advanced CrossLink license includes Basic CrossLink options as well. For non-interactive Web devices, a regular channel license is used.

Feature	Regular Channel	CrossLink Basic	CrossLink Advanced
Display and record live web pages without user interaction	+	+	+
Display interactive webpages	-	+	+
Record interactive webpages as channels	-	+	+
Display and record interactive desktop applications as channels	-	-	+

For every remote **workstation** you wish to add under CrossLink Advanced, you need to install any **VNC server software** on the remote side and ensure its accessibility via given IP/host and port. (For Mac computers, simply enable it in the settings.)

We strongly recommend using [visual groups](#) for CrossLink Advanced channels, so that the users can differentiate between video streams and interactive contents.

CrossLink Basic: Interactive Web Device

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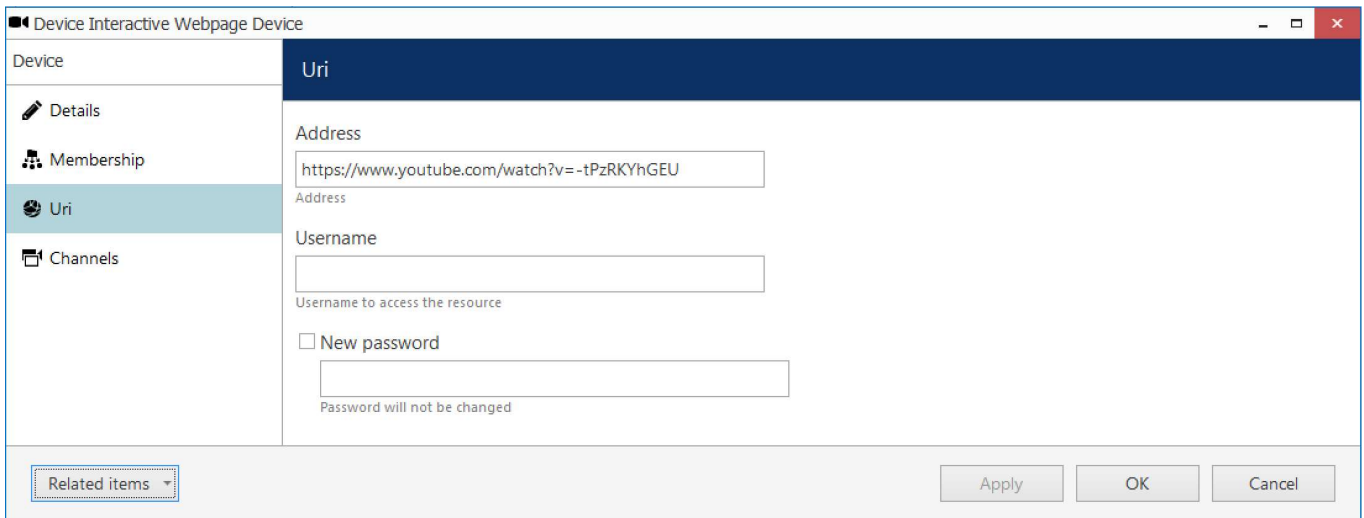
CrossLink Basic provides access and interaction with **Web applications**. These may be websites, device interfaces, or Web services, and you can stream and record any of these. Special device model, (*CrossLink*) *Interactive URL*, is reserved for this. Each device of this kind uses 1 (one) CrossLink Basic channel license.

To create an interactive web device in Wavesys Console, go to the *Configuration* section in the bottom left panel, choose *Devices* on the left, then click the + *New device* button in the upper panel to bring up the item creation dialog box.

In the model list, choose the **(CrossLink) Interactive URL** model. Then, switch to the *Uri* tab and fill in the settings:

- **Address***: full target URL
- **Username**: if required
- **Password**: if required

*Note that redirects from the specified domain are not allowed. Therefore, the specified link must not be a shortened URL (e.g., youtu.be, or goo.gl)



The screenshot shows a configuration window titled "Device Interactive Webpage Device" with a "Uri" tab selected. The left sidebar contains "Details", "Membership", "Uri", and "Channels". The main area has three input fields: "Address" (containing a YouTube URL), "Username" (empty), and "Password" (empty). A checkbox for "New password" is present, with a note "Password will not be changed" below it. At the bottom, there are "Apply", "OK", and "Cancel" buttons, and a "Related items" button in the bottom left corner.

Enter the target URL for the Interactive URL device

Click *Apply* to save the settings, then switch to the corresponding channel using the *Related items* button in the bottom left corner or the dialog box.

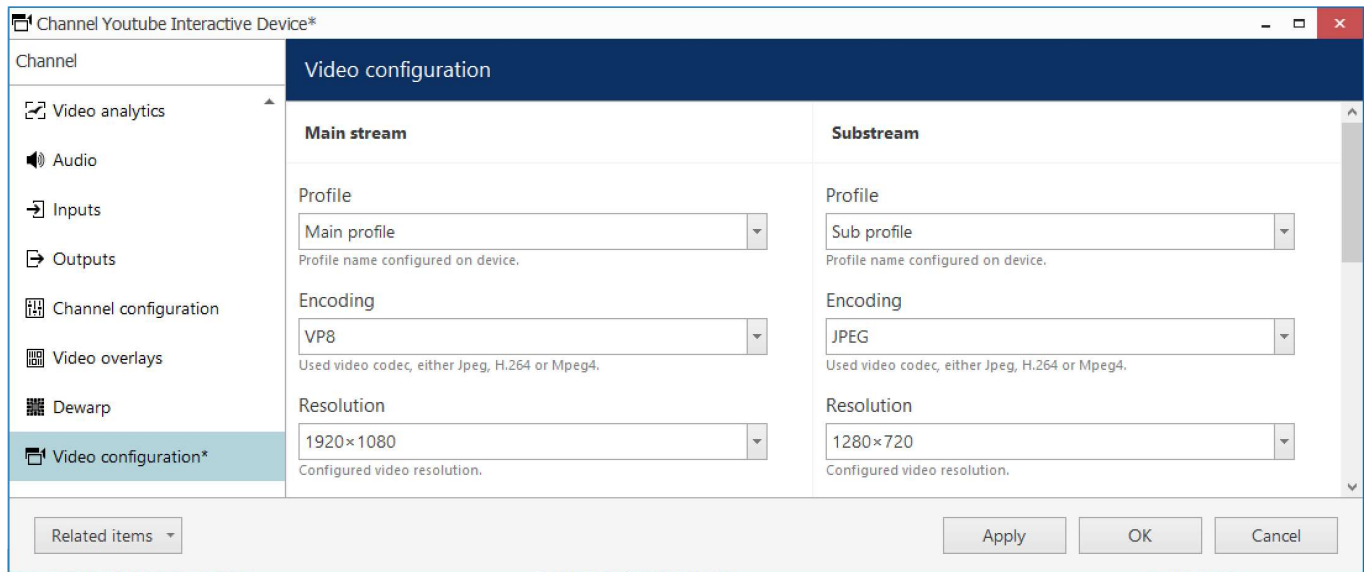
Basic channel settings are the same as for the traditional channels with the following elaboration:

- recording can be configured for **both main and secondary** streams
- **audio** is not available
- remote control **permission** is granted using *PTZ Control* permission
- **video parameters** can be set up in the *Video configuration* tab:
 - choose between JPEG (higher quality, bigger size) and VP8 (smaller recording size at the expense of picture quality) **compression**
 - select **resolution** (but be careful when combining VP8 with lo-res and low bitrate, it may make the text unreadable)
 - set bitrate and target frame rate

Use VP8 cautiously as it may decrease image quality dramatically, and render the text unreadable on smaller resolutions. Larger resolutions will increase CPU usage on the server side and may produce sluggish image display. The main advantage of using VP8 is that it uses much less storage space thanks to compression, so the recommended usage profile would be to use one stream with VP8 for recording, and another one with JPEG for live view and interaction. You will be able to switch between streams in the WVMS Monitor application.

When setting VP8 with a specific bitrate, keep in mind that it will be the maximum possible bitrate, not the target bitrate.

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Stream settings in the CrossLink channel settings

There is also a **dedicated tab** with CrossLink-specific settings. The following settings are available here:

- **Ignore certificate errors:** if enabled, invalid certificates will be ignored, and the page will be opened even if something is wrong with the site certificate
- **Auto refresh interval:** enable this if the remote Web contents is dynamic and you want the page to be refreshed without user interaction

As Web contents poses certain threats, we do not recommend ignoring certificate errors unless you trust the page completely. Also, the following **rules** will apply to **browsing**:

- **no redirects** from the specified **domain** (sub-domains are allowed)
- **no pop ups** (including floating windows and new pages opened in a new tab)

Keep this in mind when configuring your interactive URL device. You will get a corresponding error message in the **channel's notification panel** in WVMS Monitor if some of these restrictions are activated.

Example: the link to *youtu.be* will not work as it is a shortened link and it redirects to another domain, *youtube.com*. Use the full URL in the device configuration.

CrossLink Basic: Interactive Web

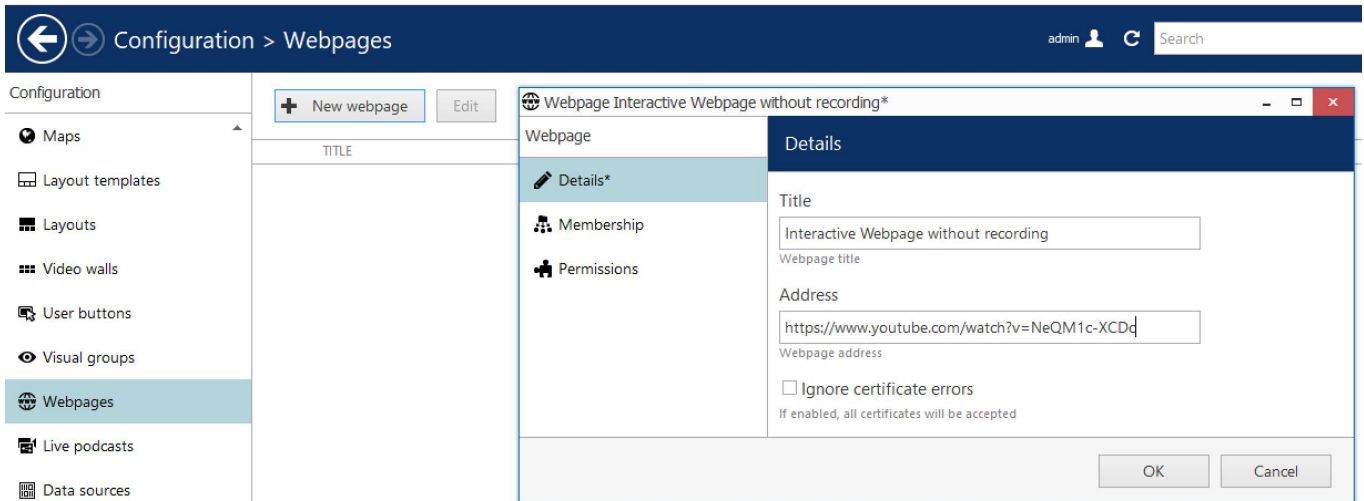
If you do not need to record the web contents, but would rather like to **access the Web page directly** from WVMS Monitor, you do not need to add a device: instead, simply create a Webpage in Wavesys Console, and it will go directly to the WVMS Monitor application. This item requires one CrossLink Basic license.

You can use this type of resource for:

- configuration of IP cameras
- configuration of any Web services
- remote control of any non-integrated, or advanced setup of integrated devices
- providing variety of resources while in kiosk mode (operator instructions etc.)

To create the webpage, go to the *Configuration* section of Wavesys Console, choose *Webpages* on the left, then click the + *New webpage* button on the upper panel.

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Enter webpage channel name and target URL

Settings:

- **Title:** webpage name that will appear in WVMS Monitor
- **Address:** full webpage URL (no shortened links!)
- **Ignore certificate errors:** if enabled, invalid certificates will be ignored, and the page will be opened even if something is wrong with the site certificate

Click *OK* to save and close the window. The newly created webpage will appear in the list. Your WVMS Monitor application will now have an extra section in the *Resources* panel (on the left) containing webpages.

As Web contents poses certain threats, we do not recommend ignoring certificate errors unless you trust the page completely. Also, the following **rules** will apply to **browsing**:

- **no redirects** from the specified **domain** (sub-domains are allowed)
- **no pop ups** (including floating windows and new pages opened in a new tab)

Keep this in mind when configuring your webpage. You will get a corresponding error message in the **Alerts tab** in WVMS Monitor if some of these restrictions are activated.


Example 1: you cannot configure the webpage to google.com and let the user search: they will be unable to navigate to a specific result as it involves domain change.

Example 2: you can add a Wiki webpage and let user choose the language, as it will redirect them to the third-level domain (say, en.wikipedia.org or de.wikipedia.org), which is OK.

CrossLink Advanced: Remote Desktop

On top of the previous features, CrossLink Advanced adds the opportunity to remotely control any workstation from WVMS Monitor. The target machine may run Linux or macOS, the one requirement is that the remote party must have VNC server software (any) up and running.

Using one CrossLink Advanced license, you can configure any of the interactive channels - be it a webpage, webpage channel, or a remote workstation channel.

 Be careful when you grant access to this kind of device, as it gives the user **full control** of the remote PC. You may want to use **additional security**, e.g., ask user for a password on behalf of OS.

Usage examples:

- remote access to Linux workstations with non-integrated software
- recording of operator workstations running WVMS Monitor or any other software

Each Remote Desktop channel will use one CrossLink Advanced license. If your license only includes Basic CrossLink channels, you will not be able to add a new device of this kind.

Add Device

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To create an **remote desktop** controlling device in Wavesys Console, go to the *Configuration* section in the bottom left panel, choose *Devices* on the left, then click the + *New device* button in the upper panel to bring up the item creation dialog box.

In the model list, choose the **(CrossLink) Remote Desktop** model. Then, switch to the *Network* tab and fill in the settings:

- **Host:** target machine IP or hostname
- **Port:** the port for VNC connection (5900 by default)
- **Secure connection:** enable to use HTTPS (must be enabled in the VNC server settings), or leave empty for insecure connection
- **Password:** enter the password, as defined on the remote side

Use the *Ping device* button below to check the remote workstation availability.


The screenshot shows the configuration window for a device named 'Device XLink Advanced - Office PC*'. The 'Network' tab is selected, displaying the following settings:


- Host:** 192.168.1.84 (Host name or IP address)
- Port:** 5900 (Port number)
- Secure connection** (Secure connection (HTTPS must be enabled on the device))
- New password** (Password to access the device)

Buttons at the bottom include 'Open device in browser' and 'Ping device'. The overall interface includes a left sidebar with navigation options like Users, Devices, Channels, and Recording, and a top panel with actions like 'New device', 'Edit', and 'Assign group'.

Enter the connection settings matching the remote VNC server configuration

When you have finished, click *OK* to save and exit; the newly created device share will appear in the item list, and its channel also immediately appear in the WVMS Monitor application(s) for eligible users.

 If your created *Remote Desktop* device does not work and you think all settings are correct, install a local VNC client on the WVMS server and see if you can reach the remote machine this way.

To edit any of the previously created devices, double-click it in the item list or select any with single mouse click and then hit the *Edit* button on the upper panel. Use the *Search* field in the upper-right-hand corner to quickly find the existing items, and the *Disable* button to **disable and enable** channel sharing. Use the  recycle bin button in the upper-right-hand corner to remove one or multiple items: hold *CTRL* or *Shift* to select several items at once, or *CTRL+A* to select all.

Filters in the bottom panel allow you to load recently added/modified items.

Channel Configuration

Most of the channel settings are the same as for the traditional channels with the following elaboration:


- recording can be configured for **main stream** only, as there is no secondary stream
- **audio** is not available but you can combine the video with audio stream from a camera (use the *External* option in the *Audio* tab and choose the source channel)
- remote control **permission** is granted using *PTZ Control* permission
- **video parameters** can be set up in the *Video configuration* tab:
 - choose between JPEG (higher quality, bigger size) and VP8 (smaller size at the expense of

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picture quality) compression

- select resolution (but be careful when combining VP8 with lo-res and low bitrate, it may make the text unreadable)
- set bitrate and target frame rate

Frame rate will be **dynamic** during remote control and recording, meaning that FPS will be low while nothing happens, but it will grow if the remote user starts doing something or if there is video playback.

 Optimal interactive video configuration for most use cases is JPEG @1080p.

Output Area

CrossLink Configuration is a dedicated tab for CrossLink-specific settings. Currently available settings include **cropping** setup, which allows you to select the region that will be displayed in the WVMS Monitor application. In other words, you can crop the whole incoming image and only show/record a specific area. This comes useful, for example, when the remote workstation has multiple displays. Cropping affects both WVMS Monitor **display and recording**.


Crop rectangle


X	<input type="text" value="0"/>	Y	<input type="text" value="0"/>
Width	<input type="text" value="0.5"/>	Height	<input type="text" value="1"/>

Crop rectangle in relative coordinates.

By default, the output area is full - X=0, Y=0, Width=Height=1. The coordinates and size are relative. Crop examples:

- Full image: X=0, Y=0, Width=1, Height=1
- Display 1 of 2: X=0, Y=0, Width=0.5, Height=1
- Display 2 of 2: X=0.5, Y=0, Width=0.5, Height=1

 If the remote workstation is configured to ask for a **password**, and you intend to control it remotely from WVMS Monitor (not just record), make sure you can see the right display.

 Remote control does not allow to send **system key combinations** (e.g., CTRL+Alt+DELETE) to the remote workstation; local OS will catch these key combinations. Therefore, make sure to disable the “Press Ctrl+Alt+Del to Log on” option on remote Windows workstations.

Non-Interactive Web Device

If you want to record and use non-interactive webpages in WVMS Monitor, use a special device driver type called [HTML Source](#). These represent static webpages, which are available for recording as any other channels, and are visible in the WVMS Monitor application. As this type of device is non-interactive, no CrossLink license is used: HTML source devices require a **regular channel license**.

Usage examples:

- Display media contents for marketing purposes
- Digital signage
- Statistics and dashboards

To create a non-interactive page, create a new device and set its model to **HTML Source (view only)**, then assign it to the desired server. Similarly to interactive webpage, set the **target address** in the *Uri* tab. The user will be unable to navigate away from this address, so make sure you specify the full and exact URL. If the target page requires **authentication**, enter the username and password in the device properties.

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The screenshot shows a configuration window titled "Device Static Webpage". On the left is a sidebar with "Uri" selected. The main panel has a "Uri" header and fields for "Address", "Username", and "New password". The "Address" field contains a YouTube embed URL. The "Username" field has a subtext "Username to access the resource". The "New password" checkbox is unchecked, with a subtext "Password will not be changed". At the bottom are "Apply", "OK", and "Cancel" buttons.

Available settings for the static webpage device

Next, click the *Related items* button and switch to the channel edit dialog box.

As the webpage contents will be static in the WVMS Monitor application, you need to take care of the **contents transition**. To force refresh contents from the WVMS side, use the auto refresh parameter in the channel properties.

In the *HTML source configuration* tab, you can edit the following **settings**:

- **Ignore certificate errors**: if enabled, invalid certificates will be ignored, and the page will be opened even if something is wrong with the site certificate
- **Auto refresh interval**: enable this if the remote Web contents is dynamic (e.g., graphs) and you want the page to be refreshed without user interaction (set 0 to disable auto-refresh)

There is no need to set auto-refresh for video contents; however, you may wish to enable video auto-replay.

In the example here with YouTube streaming, the video is looped by adding URL parameters; the final link will look as follows:

<https://www.youtube.com/embed/VIDEOID?autoplay=1&mute=1&loop=1&playlist=VIDEOID> - video added in such a way will be played on repeat indefinitely.

This link is formed by clicking the *Share* button next to the YouTube video and adding the parameters. This ensures that nothing but the video is displayed in the viewport (no comments or other stuff present in the regular YouTube page). Similarly, if you wish to use video from other websites, make sure to provide the exact link to the video itself, not to the whole page containing the video.

58 User Buttons

User buttons are visual controls used in WVMS Monitor and Wavesys WVMS Mobile for manual event triggering. Once you create a user button, it will become available in the [Event & Action Configurator](#) and you will be able to **assign actions** to the *User button clicked* event.

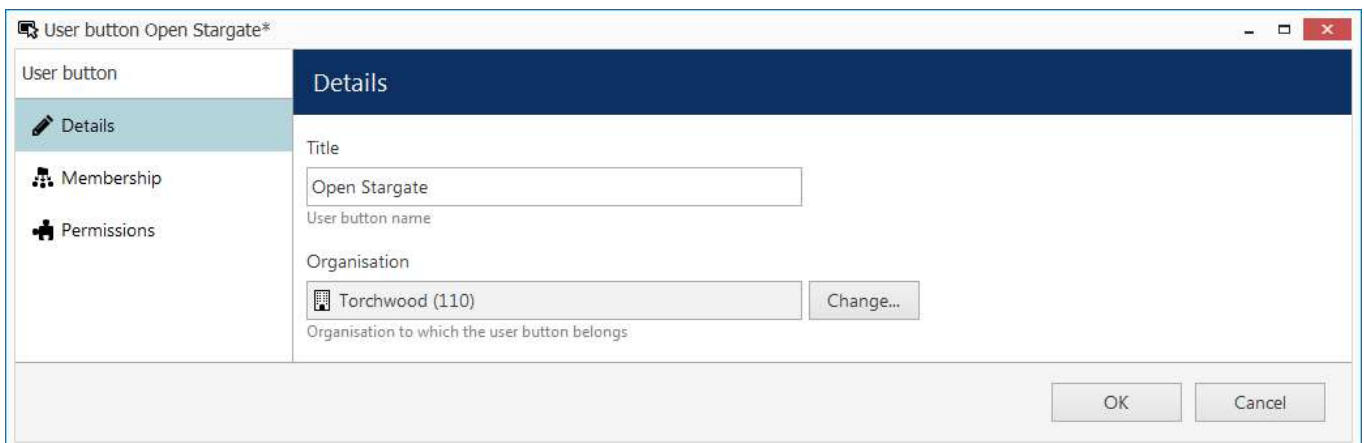
After a user button has been created and associated with at least one action, you will be able to use it in the following ways:

- bind the user button to a channel or channels so that it appears as a live video overlay control in the WVMS Monitor application
- place the user button marker onto [maps](#)
- trigger it from the WVMS Monitor application from the user button list, from any map or from the channel overlay controls
- [highlight it on a map](#) or all maps where the corresponding marker is present
- trigger it from the Wavesys WVMS Mobile application

To access user button management via Wavesys Console, select the *Configuration* section from the bottom left menu and then click *User buttons* in the menu on the left.

New User Button

Click the + *New user button* on the upper panel to bring up the configuration dialog box. On the *Details* tab, enter a name for the resource and choose organisation attachment.



Enter title for the user button

Switch to the *Membership* tab to choose groups for this user button to become a member of: select groups by double-clicking items in both columns or by using the *Add/Remove* buttons below. Apart from grouping, this tab allows you to bind user buttons to particular channels.



Starting from the software version 1.5.0, user buttons can be **bound to one or more channels** for their presentation in WVMS Monitor. This means that once such a channel is put into a viewport, the related user button automatically appears with it. The same user button can be also manually put into other viewports and also removed from the bound channels in the live view without any limitations. Multiple user buttons per channel are allowed.

In order to set this up, open the target user button for editing, go to the *Membership* tab and add the desired channel(s) from the right-hand column (the same one that contains user button groups).

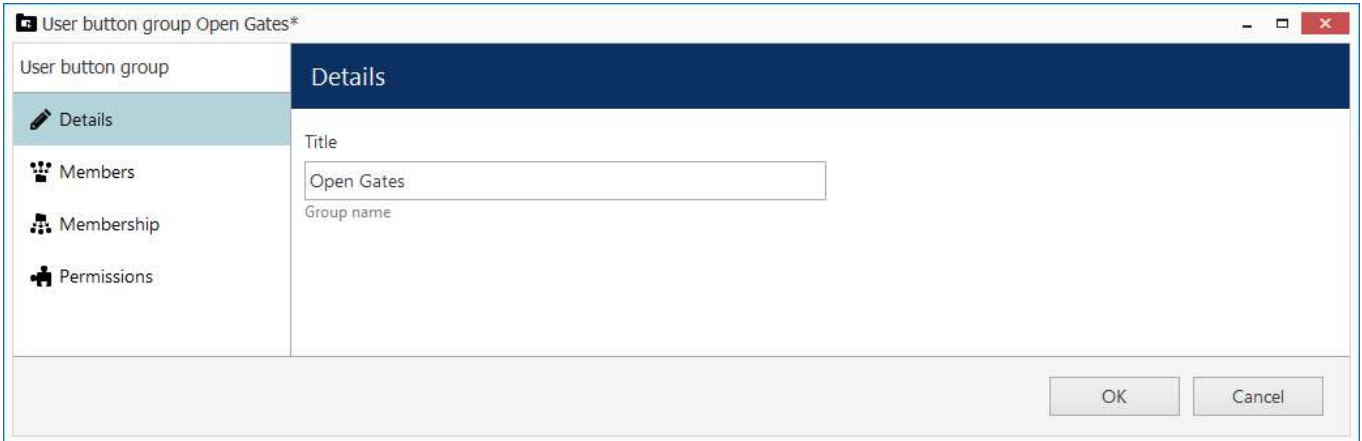
The *Permissions* tab allows you to choose which users and user groups will be privileged to have access to this resource. Select at least one permission to select the user/user group; deselect by unmarking manually or using the *Clear* button below.

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When you are finished, click *OK* to save and close the dialog box. The newly created user button will appear in the item list. Use the buttons on the upper panels to perform item-specific actions: remove, edit and quickly assign user button group; filters on the bottom panel will help you switch between recently created/updated items and load user buttons/button groups only.

New User Button Group

For easier management, user buttons can be grouped together. Click the drop-down arrow next to the + *New user button* and select *New user button group* to bring up the configuration dialog box.



The screenshot shows a configuration dialog box titled "User button group Open Gates*". The dialog is divided into a sidebar on the left and a main content area on the right. The sidebar contains four tabs: "Details" (which is selected and highlighted in light blue), "Members", "Membership", and "Permissions". The main content area, under the "Details" tab, has a dark blue header with the word "Details" in white. Below the header, there are two text input fields: "Title" with the value "Open Gates" and "Group name" which is currently empty. At the bottom right of the dialog, there are two buttons: "OK" and "Cancel".

Enter the title for the user button group

Switch to the *Members* tab to choose resources for this group. Double-click items or use the *Add/Remove* buttons below to manipulate resources; use the *Search* field in the upper-right-hand corner to quickly find entries in the list.

Using the *Membership* tab, you can choose groups for this user button to become a member of; select groups by double-clicking items in both columns or by using the *Add/Remove* buttons below.

Permissions tab allows you to choose users and user groups privileged to have access to this resource. Select at least one permission to select the user/user group; deselect by unchecking manually or using the *Clear* button below to remove all permissions.

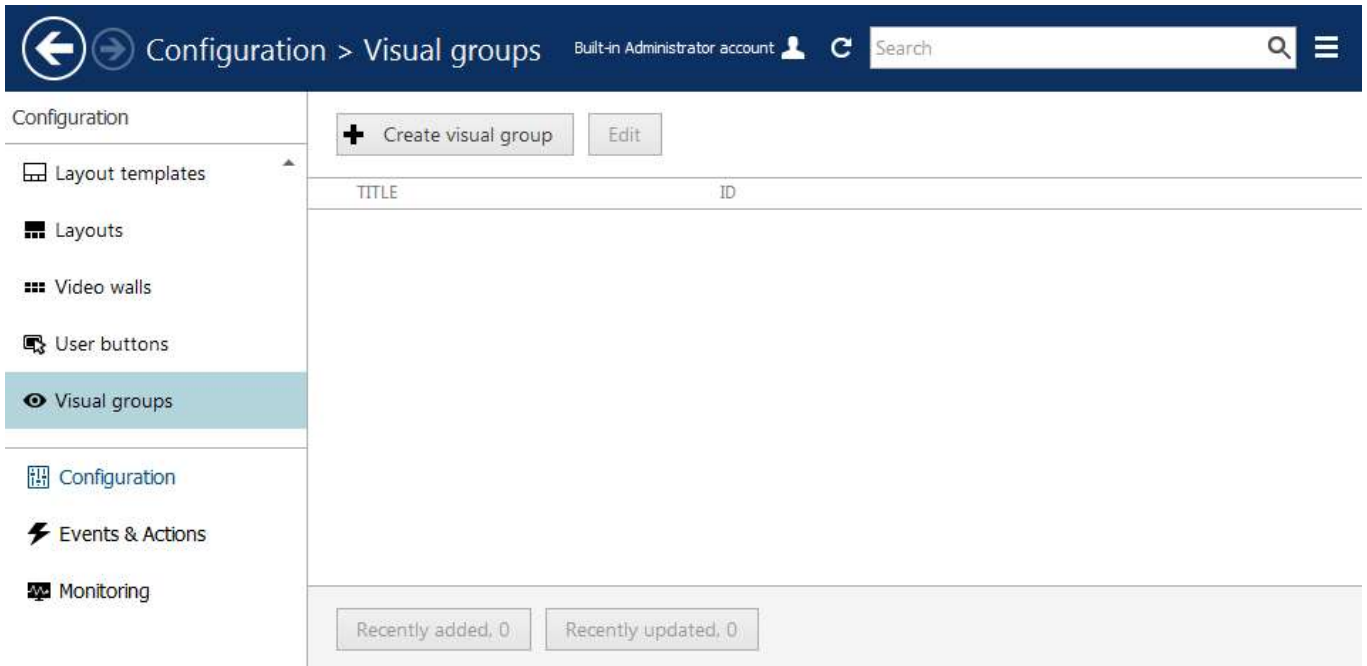
When you have finished, click *OK* to save and close the dialog box. The newly created user button will appear in the item list. Use the buttons on the upper panels to perform item-specific actions: remove, edit and quickly assign user button group; filters on the bottom panel will help you switch between recently created/updated items and load user buttons/button groups only.

59 Visual Groups

Device, channel and map groups are used solely for management and are only accessible in Wavesys Console.; in order to set up resource arrangement for WVMS Monitor, **visual groups** are used. They allow custom grouping for channels and maps displayed in the connected WVMS Monitor applications. You can create single-level or **multi-level** (nested) visual groups by putting them inside one another. Nested visual groups will also appear in the *Resources* section of the WVMS Monitor application.

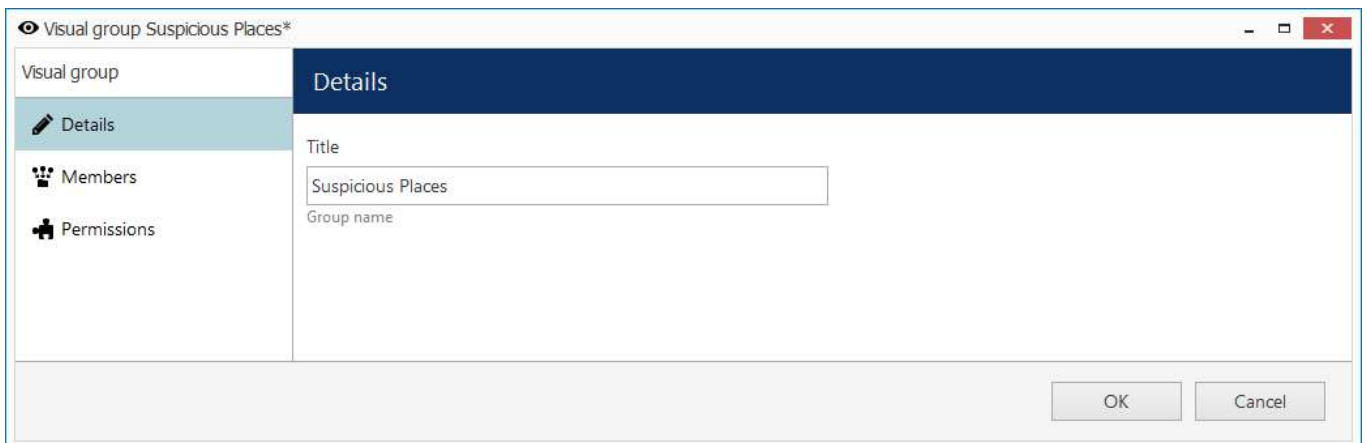
Starting from software version 1.17.0, visual groups are also available in the [Archive Backup Wizard](#).

To access visual group management in Wavesys Console, go to the *Configuration* section in the bottom left panel and select the *Visual Groups* component in the menu on the left.



Configuration -> *Visual groups*

Click the + *Create visual group* button in the upper panel to bring up visual group creation dialog box.

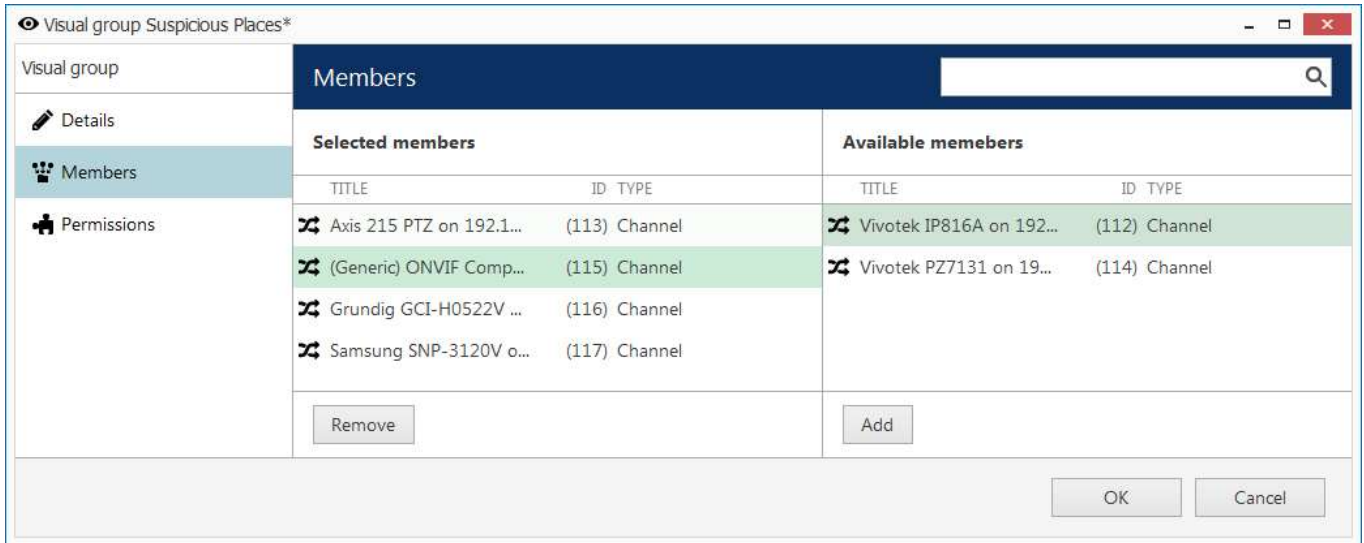


Enter title for the new visual group

In the *Details* tab, enter a user-defined name for the target visual group. This name will appear in connected WVMS Monitor applications.

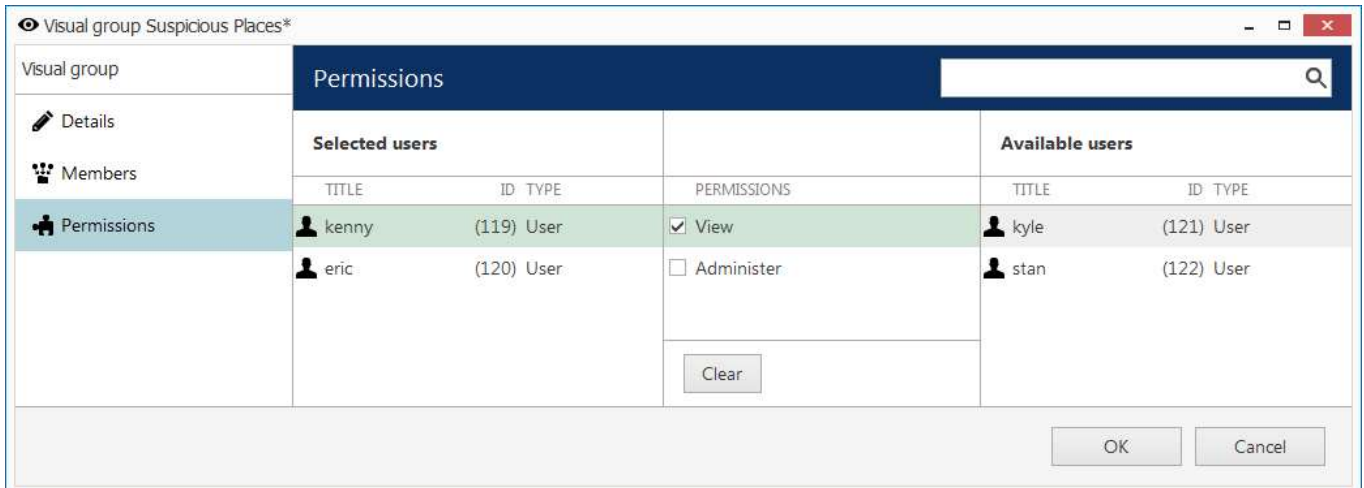
Switch to the *Members* tab to choose resources for this group. You can create nested visual groups (i.e., group inside group) - they will appear as a tree in the WVMS Monitor application.

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Choose channels to participate in this group

Double-click items or use the *Add/Remove* buttons below to manipulate resources; use the *Search* field in the upper-right-hand corner to quickly find entries in the list.




Add user permissions for the target visual group

Switch to the *Permissions* tab to allow user access to this visual group. There are two available permissions types:

- **View:** users have access to this resource in WVMS Monitor
- **Administer:** user are permitted to edit this group via Wavesys Console


When you have finished, click *OK* to save and exit; the newly created visual group will appear in the item list.

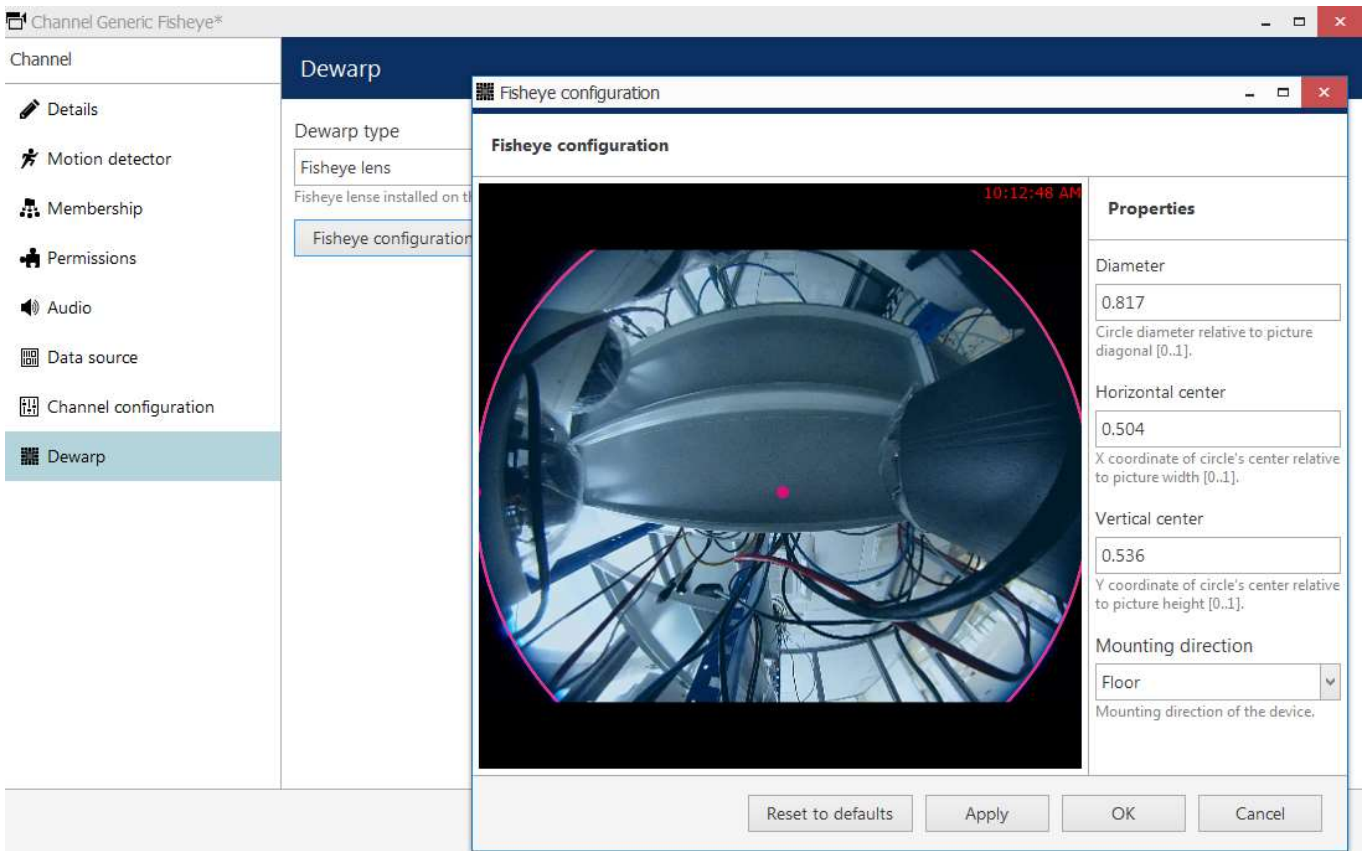
To edit any of the previously created visual groups, double-click it in the item list or select any with single mouse click and then hit the *Edit* button on the upper panel. Use the *Search* field in the upper-right-hand corner to quickly find the existing items; the filters in the bottom panel allow you to load recently added/modified items. Use the  recycle bin button in the upper-right-hand corner to remove one or multiple visual groups: hold *CTRL* or *Shift* to select several items at once, or *CTRL+A* to select all.

60 Dewarp For Fisheye Cameras

Fisheye lens is an ultra-wide-angle lens that produces a wide panoramic image at the cost of strong visual distortion. Usually, devices with such lenses capture a 360-degree geometrically distorted image and projects it as a circle within the image frame. Fisheye lens can be either built-in by design or purchased separately and installed on your desired camera. WVMS dewarp feature allows to correct the perspective and obtain several "normal" views from a single distorted fisheye picture.

In order to access dewarp settings via Wavesys Console, open the *Configuration* section and choose *Channels* from the menu on the left. Find the channel you wish to dewarp in the list (use *Search* or filters, if necessary) and double-click it in order to open it for editing (alternatively, use the *Edit* button on the upper panel to open the dialog box), then switch to the *Dewarp* tab.

 Please note that the location of dewarp settings has changed starting from the product version 1.5.0. For previous software versions, the corresponding settings can be found in the general *Channel Properties* dialog box.



Dewarp settings


You have the following options here:

- **Regular lens:** choose this option if you wish to disable the dewarp engine (selected by default)
- **Immervision Enables® lens:** choose this option if your camera has a Panomorph lens installed (you can check this in the camera specification)
- **Fisheye lens:** choose this option if your camera has a regular 360-degree view lens
- **Fisheye lens (large resolution):** dewarp engine optimised for image resolutions of 6MP+

If your fisheye image has a resolution of **6 megapixels or higher**, it is better to use the last option in the drop-down list - fisheye lens **optimised for high resolutions**. This mode will provide smoother DPTZ experience with the dewarped image. If your graphics card supports **OpenCL version 1.2** or higher, this dewarp driver will use GPU (you can check this in your video driver properties, or request info from the video card manufacturer). Otherwise, more CPU time will be required, compared to the basic fisheye mode. We recommend that you do not use this driver for smaller resolutions, as it may use more CPU yet there will be no difference for the user.

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For devices having a Panomorph lens, choose the lens model from the drop-down list - you can find this information in your camera specification or request it from the device manufacturer. You do not need to define any parameters manually in this case; rather, you only need to choose your camera mounting position, and the dewarp engine will automatically produce a correct dewarping result.


 Note that the dewarp engine will fail to operate if you choose a wrong Panomorph lens model. Check with your camera documentation and manufacturer for the precise lens model information.

For a generic fisheye lens, you are requested to define the fisheye sphere size and camera position by using the **overlay controls** and settings on the right side:

- Hemisphere **diameter**: click and drag any of the small pink circles on the overlay sphere to change its size and align it with the actual fisheye sphere in the picture
- **Horizontal** and **vertical** centre: automatically positioned in the picture centre, to change it click and drag the small pink circle inside the sphere
- **Mounting** direction: select camera mounting position from the drop-down list (wall/ceiling/floor)

For your convenience, the defined parameters are also displayed in the numeric form on the right side of the dialog box. Use the button below the preview to **reset** all dewarp settings to the default ones.

 In case you change the stream resolution at some point, its **aspect ratio** may also be changed and this will affect dewarp operation. Therefore, check the dewarp settings after changing the resolution and adjust the parameters, if necessary.

 Note that all **dimensions** are given not in pixels but in reference to the video stream size, therefore, **relative values** are used instead of absolute ones.

When finished, click *OK* to save the changes and close this dialog box and return to the general channel configuration. Dewarp results will immediately become available in the WVMS Monitor application; you can find the details on usage in the corresponding section of the WVMS Monitor documentation.


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61 Audio

WVMS is capable of receiving audio streams from cameras, recording and playing them back, as well as sending audio back to the cameras from WVMS Monitor stations. It is also possible to bind an external audio source to a video channel.

There are a few conditions stipulating audio feature availability:

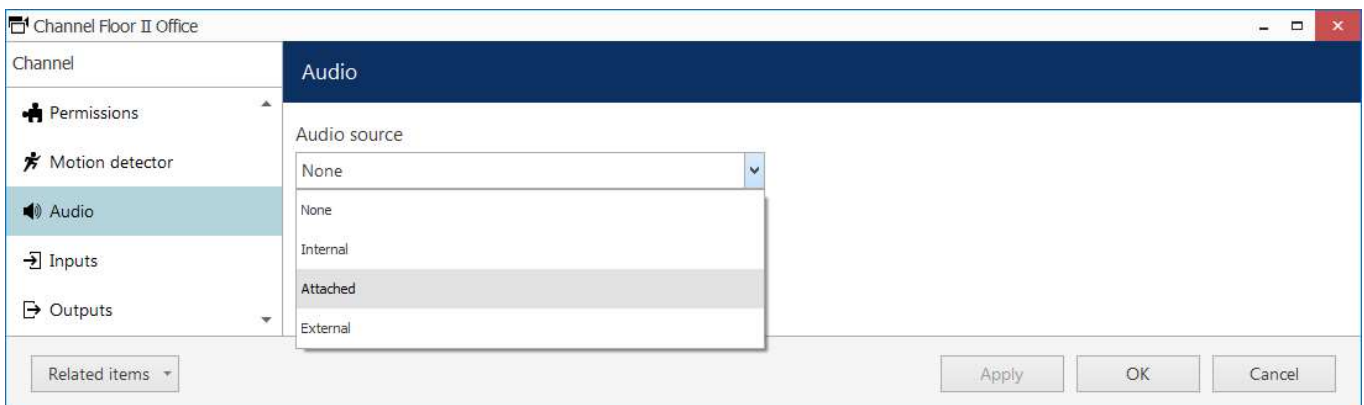
- the target device should be capable of sending/receiving audio
- relevant additional equipment should be plugged into the device (microphone and/or speakers), if necessary (if these are not built in by design)
- one-way or two-way audio should be enabled and set up on the device side so that it is available via device Web interface
- G.711 should be selected as audio codec on the target device side
- audio should be enabled in the channel settings via Wavesys Console (see below)
- feature should be supported by WVMS integration for the target device (see the list of supported devices and features provided by Wavesys Global)
- in order to send audio to the device, WVMS Monitor workstation must have a microphone connected to it - either a built-in or an external one
- if you plan to use an external audio source, relevant audio capturing equipment should be plugged into the server, to which the target device is connected, and enabled via Windows audio settings

 G.726 and AAC audio codecs, which are often implemented on the camera side, are not supported at this point, so please always select the **G.711** option. Setting other codecs on the device side may result in WVMS being unable to decode the incoming video stream.

Enabling Audio

If you plan to use camera-side audio and have not checked audio configuration on the camera side yet, go to the device Web interface and adjust the audio settings, then make sure that audio is operable in the browser preview (you may need to install an ActiveX control in order to get it working; please check with your device's user guide for tips and browser requirements).

To **enable audio** for your desired device in Wavesys Console, open the *Configuration* section and choose *Channels* from the menu on the left. Then, open your target channel for editing - either by double-clicking it or by selecting it with a single click and clicking the *Edit* button on the upper panel. In the channel properties dialog box, switch to the *Audio* tab by selecting it on the left.



Access *Audio* tab in the channel properties

Here, you have 4 options. Depending on your selection, additional fields may appear.

- **None**: **disable** audio functionality for the target channel (default), no additional settings
- **Internal**: enable audio reception **from the device** side and sending the reverse audio to the device
 - choose an audio input from the drop-down list, if the target device has multiple ones
 - if there are none configured or available on the device side, the list will appear empty (this also refers to cases when audio is not supported for the selected device)

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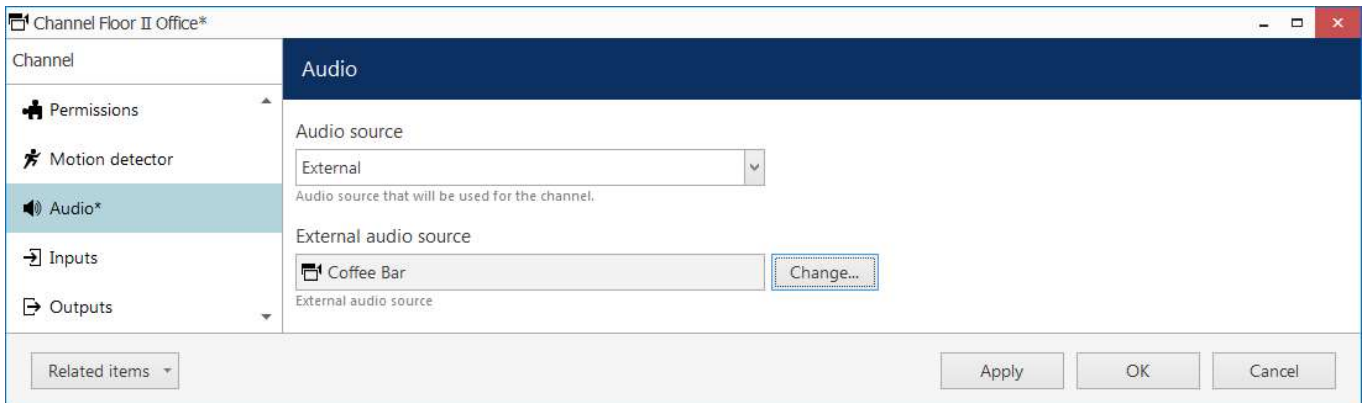
- *Attached*: use an external audio source **connected to the same server** as the device, from which the target channel originates
 - choose an audio input device from the drop-down list, if the target server has multiple ones connected to it
 - all microphones recognised by Windows will appear here
- *External*: use **another channel's audio** as audio for the current channel (see below for more details)
 - choose a channel to serve as audio source

When you have chosen your preferred option, click *OK* to save and close the *Channel settings* dialog box. You should now be able to listen to live audio, record it along with the video stream and talk back to your camera via WVMS Monitor and Wavesys WVMS Mobile applications.

Combining Video and Audio Sources


WVMS allows channels to use audio coming from a different channel in case the target channel does not have its own incoming audio, or in case you wish to combine audio and video data from different sources. Such combinations are used for both live and recording. A common example of this method is to use audio from intercom channels in combination with nearby video cameras.

In order to do this, double-click the target channel (the one without audio) in the channel list to open it for editing, then choose the *Audio* tab on the left.




Choose another channel as audio source


Choose *External* from the drop-down list, then select a channel to be used as the new audio source: click the *Change* button to see the list of channels and choose the one that you want audio to be coming from. Hit *Apply* or *OK* to save your changes.

 Audio must be configured for the channel used as an external audio source via channel configuration as described earlier. Both cameras and audio-only devices (intercoms) can be used as external audio sources.

62 Live Podcasts

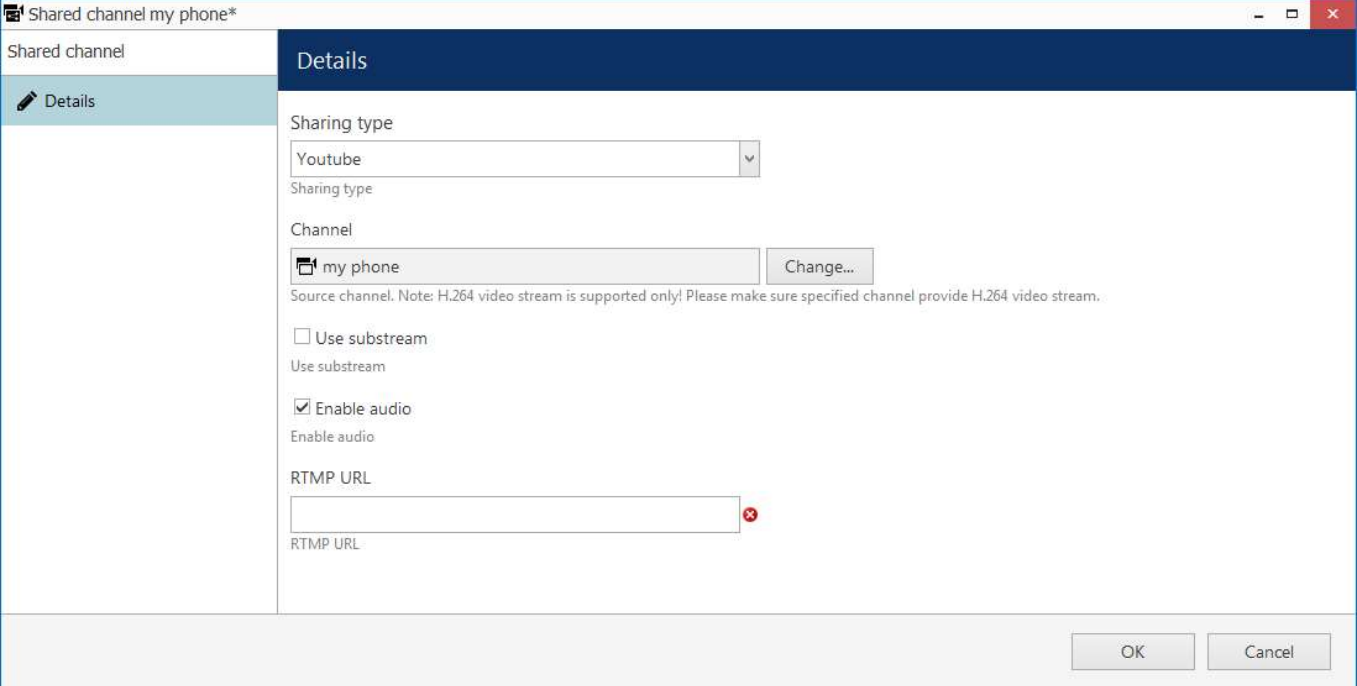
WVMS channels can be shared by streaming over RTMP and thus be used for live casting - either with popular streaming services or with your own RTMP server. This manual covers examples of how to set up live streaming for Youtube and Wowza live casts - working with other RTMP servers is similar.

-  Before sharing a channel, check its settings and make sure that:
- the channel is enabled in the configuration and video is available,
 - stream codec is **H.264** (other codecs will not work!),
 - if you want to use substream and/or audio, make sure you have enabled them in the channel properties.

 Wavesys WVMS Lite free edition only allows 1 (one) podcast per server.

To access **shared channel management** in Wavesys Console, go to the *Configuration* section in the bottom left panel and select the *Live Podcasts* component in the menu on the left.

Click the + *New live podcast* button in the upper panel to bring up the shared channel creation dialog box.



Shared channel my phone*

Shared channel

Details

Sharing type

Youtube

Sharing type

Channel

my phone Change...

Source channel. Note: H.264 video stream is supported only! Please make sure specified channel provide H.264 video stream.

Use substream

Use substream

Enable audio

Enable audio

RTMP URL

RTMP URL

OK Cancel

Sharing a channel for Youtube live streaming

First, choose where you are going to stream the channel: it can be a specific public service or generic RTMP streaming to a service that is not listed, including your own RTMP server; depending on your choice, settings may vary to suit the specific service. Then, enter streaming configuration.

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The table below explains the settings in details.

Setting	Description	Default value
Sharing type	Choose between Youtube, Wowza or generic RTMP streaming	Generic RTMP
Channel	Target channel to be streamed	[none]
Use substream	When not enabled, main (higher resolution) stream will be used; enable this option if you want to cast the lower resolution stream	Disabled
Enable audio	Enable this option to include sound for the shared channel, works both for main and secondary streams	Enabled
RTMP URL	Full URL to be used for casting, the link is normally provided by the RTMP streaming engine	[empty]

Youtube Live Streaming

Youtube live casting can use RTMP streams from your WVMS server for further streaming.

In order to set up live streaming with Youtube, log in to your account on youtube.com and go to [Creator Studio tools](#) -> Live streaming -> Stream now. If you have never created any live casts before, you may have to verify your account - just follow the guidelines on the website.

 You need to have a valid Youtube (Google) account in order to be able to use this type of streaming, and comply with Youtube live streaming conditions. Wavesys Global is not responsible for the third-party service operability and policies.


Scroll down to the *Encoder Setup* section: you will need the link and the secret stream key in order to build the RTMP link.

In Wavesys Console, open the *Shared Channels* section and add a new shared channel, fill in the settings as follows:

- **Sharing type:** Youtube
- **Channel:** target channel from the list of existing channels
- **Use substream:** up to you
- **Enable audio:** up to you
- **RTMP URL:** *rtmp://<server_URL>/<stream_key>*, where
 - *rtmp://* indicates that RTMP protocol will be used for streaming
 - *<server_URL>* is Server URL link provided by Youtube, e.g., *a.rtmp.youtube.com/live2/*
 - *<stream_key>* is Stream Name/Key generated by Youtube in the form of *xxxx-xxxx-xxxx-xxxx*

Wowza Streaming

Alike Youtube, Wowza streaming engine can receive video feeds from WVMS server and stream them out to any device. You need to install Wowza Streaming Engine first and then configure live streaming as described below.

 WVMS does not include any installation files or licenses for Wowza Media Systems software. Wowza engine is used as a third-party agent capable of receiving RTMP streams; all installation, setup and management of this engine is to be handled by you or your Wowza administrator, and Wavesys Global is not responsible for the third-party engine operability and policies.

First, go to your Wowza Streaming Engine Manager and create a **new application** of the *Live* type.

 Once you have created a new application, go to the *Source Security* settings of that application in your Wowza Streaming Engine Manager and set **RTMP Sources** security to **Open** (no authentication). This is required as WVMS currently does not support authentication for RTMP streaming.

Then, go to Wavesys Console, open the *Shared Channels* section and add a new shared channel, then fill in the settings as follows:

- **Sharing type:** Wowza

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- **Channel:** target channel from the list of existing channels
- **Use substream:** up to you
- **Enable audio:** up to you
- **RTMP URL:** `rtmp://<ip>:<port>/<app_name>/<stream_name>`, where
 - `rtmp://` indicates that RTMP protocol will be used for streaming
 - `<ip>` is Wowza Streaming Engine server address - either IP or domain name
 - `<port>` is target (remote) RTMP port, 1935 by default
 - `<app_name>` is the name of the application you have created in Wowza
 - `<stream_name>` is a custom name for the RTMP stream (can be any name, use underscores instead of spaces), will appear in Wowza automatically

When you have finished, click *OK* to save and exit; the newly created channel share will appear in the item list and WVMS server will attempt to stream the data to the target URL at once. If you wish to pause the streaming, use the *Disable* button on the top panel. After sharing the channel, you should be able to view the stream on the RTMP server side and start the casting, if it has not started automatically.



If you have trouble receiving the stream on the RTMP server side, check the following:

- make sure all used software is allowed through the firewall(s),
- restart the RTMP server,
- refresh connection list on the RTMP server side or refresh the webpage;
- remove the shared channel in Wavesys Console and try sharing the channel anew.

To edit any of the previously created channel shares, double-click it in the item list or select any with single mouse click and then hit the *Edit* button on the upper panel. Use the *Search* field in the upper-right-hand corner to quickly find the existing items, and the *Disable* button to **disable and enable** channel sharing. Use the  recycle bin button in the upper-right-hand corner to remove one or multiple shares: hold *CTRL* or *Shift* to select several items at once, or *CTRL+A* to select all (actual original channels will not be affected).



When you remove the original channel (with or without its originating device), all shared channels based on it are removed from the configuration automatically as well.

Filters in the bottom panel allow you to load recently added/modified items.

63 Data Sources

This WVMS server functionality allows you to receive information in textual form from **third-party serial data providers** like Point of Sale (POS) systems, bank machines and a multitude of other devices capable of delivering data strings over the following connection types:

- UDP port (remote connection)
- TCP port (remote connection)
- COM port (direct hardware connection to the server)

The **procedure of configuring** the data reception from these sources is briefly as follows:

- create a data source, then
- create a data source profile, then
- go back to the data source settings and use the data source profile as a basis for the data source, and then
- assign the data source to the desired channel(s).

Gathered data is then stored and displayed embedded with the video stream from the channel(s) you choose to associate with it.

Add Data Source

First, go to the *Configuration* section of Wavesys Console and choose the *Data Sources* component from the menu on the left. Then, click the + *New data source* button on the upper panel to open the data source creation dialog box.

Give your data source a comprehensive name. Then, choose the server that is going to be accepting the serial data. Leave the *Data source profile* field **empty** for now and select the desired transport for the data connection. You will need to return here and choose the profile after you create the profile itself.

There are three possible connection types: UDP port, TCP port and COM port.

TCP/UDP Connection

Choose this option if your data provider is configured to feed the textual data into a specific TCP or UDP port.

The screenshot shows a configuration window titled "Data source UDP Data Source". The window has a sidebar on the left with "Data source" and "Details" options. The "Details" section is active and contains the following fields:

- Title:** A text input field containing "UDP Data Source". Below it is the label "Data source title".
- Server:** A dropdown menu showing "My Favourite Server" with a "Change..." button to its right. Below it is the label "Server".
- Data source profile:** A dropdown menu showing "UDP Profile" with a "Change..." button to its right. Below it is the label "Data source profile".
- Data source type:** A dropdown menu showing "Udp". Below it is the label "Data source type".
- Port:** A text input field containing "4060". Below it is the label "UDP port".

At the bottom right of the window are "OK" and "Cancel" buttons.

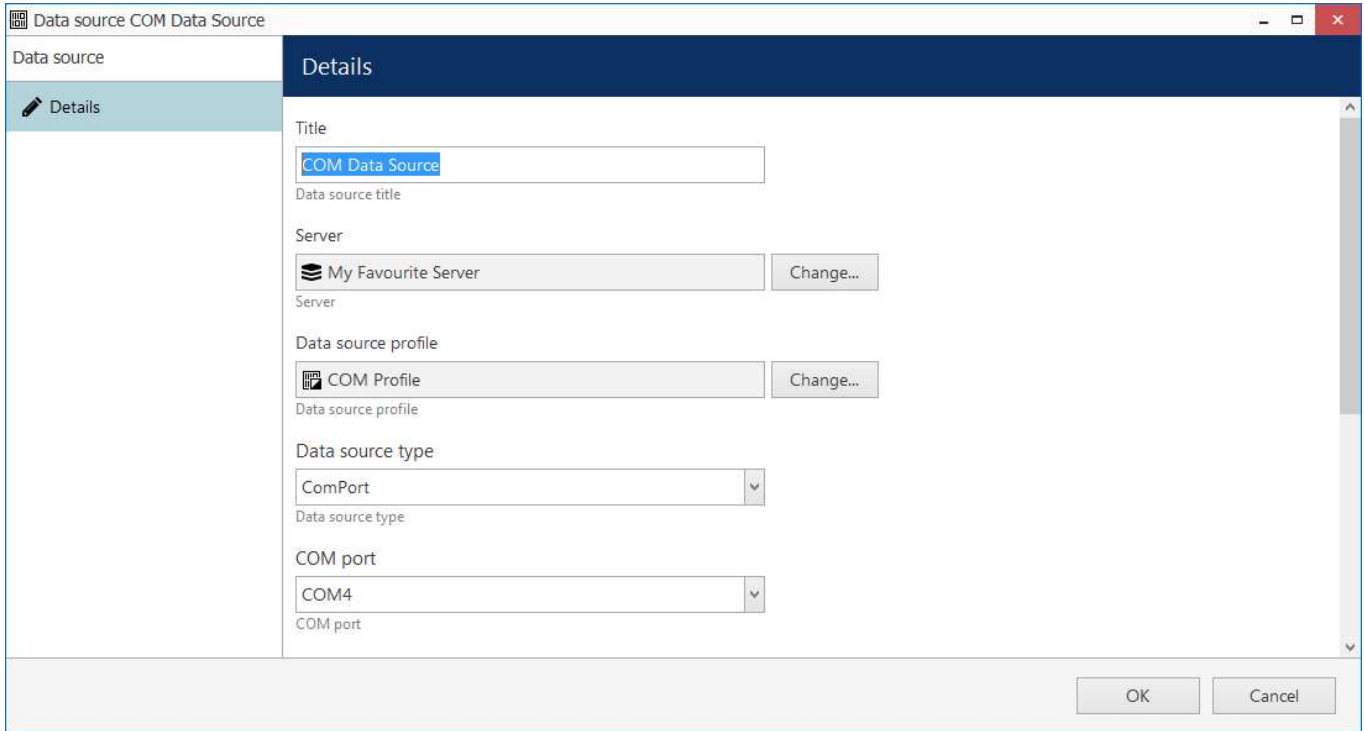
New data source of UDP type

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You simply need to specify the incoming port for the server to listen to in the settings here. Make sure the port is opened on all intermediate firewalls and not used by any other software on the server machine.

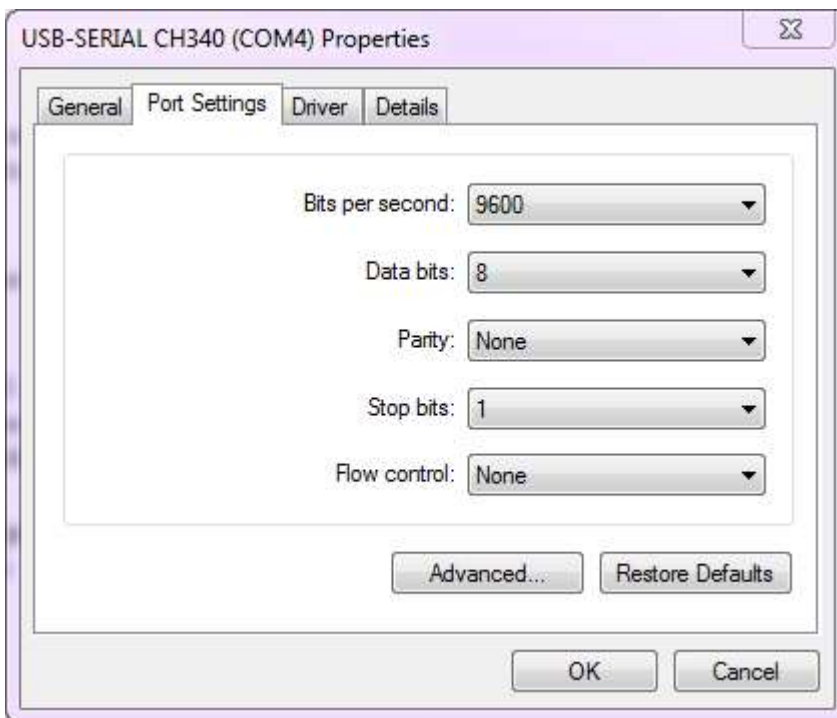
COM Port Connection

Choose this connection type if your data provider is connected directly into the WVMS server's COM port.



New data source of COM port origin

For this configuration, you need to match the serial connection settings with those used from the device side. Normally, this can be checked via Windows Device Manager for your target COM port.



COM port settings in the Windows Device Manager properties

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The following serial port settings should be specified:

- **COM port:** serial port to read the data from, choose from the list of active ports
- **Baud rate:** information transfer rate (9600 by default)
- **Data bits:** the number of bits transmitted over the serial interface (8 by default)
- **Stop bits:** the number of bits to specify the end of a byte; if you select data bits to be 6, 7, or 8, then the default value is 1 and the other available choice is 2; if you select data bits to be 5, then the only correct choice for the stop bits is 1.5
- **Parity:** how the parity is checked (no parity by default)

Other serial port parameters are not required for the WVMS server.

Click *OK* to save and close the data source creation dialog box. The next step is to create a data source profile to help the server determine how the textual data should be parsed.

Add Data Source Profile

In the *Data Sources* section, click the little arrow next to the data source creation button and choose the *+ New data source profile* from the list. In the *Details* tab, enter a custom name for your data source profile and switch to the *Configuration* tab.

It is now necessary to use an example of the data strings to set up the profile. This part of the setup is the same regardless of what type of data source you have.

You can either use the **actual data source** you have configured on the previous step, or use a **text file** that contains the lines of data in the expected format (note that the same encoding should be used). Use the buttons on the right side of the text field to load the sample from either source. Use the *Stop* button to finish displaying new text from the data source (do this if you see that the loaded data lines are sufficient to facilitate the configuration process); use the *Clear* button to erase whatever is in the preview window before loading a different file or strings from a data source.

TYPE	NAME	TEXT	REGULAR EXPRESSION	CASE SENSITIVE
BeginTransaction	Transaction Start		no	no
EndTransaction	Transaction End		no	no
GetId		^.\+(POS(\d+)\.+\)	yes	no
Variable	Age	^[0-9]{0-3}\$	yes	no

Load a text sample to configure the data source profile

Based on the loaded sample, set the required parameters on the left:

- **Encoding:** pick the correct encoding to ensure your text is readable
- **Line ending:** choose what character(s) represent the end of the line, available options are:

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- CR - carriage return
- LF - line feed
- CR+LF - both together
- Custom - user-defined symbol or group of symbols

If line delimiter in use is one of the standard non-printable ones (LF, CR or CR+LF) but you are not sure, whichever is used, press the *Detect* button for the software to identify automatically, which delimiter is present in the pre-loaded text. If you know that the provided serial data does not include any standard delimiters, choose the *Custom* option in the drop-down list and define your own delimiting character.

Mappings

Mappings are pre-defined character combinations expected in the data flow, which can serve different purposes. There are three built-in mappings (existing by default and non-removable):

- **Transaction start:** specify text that designates the beginning of the data block (transaction)
- **Transaction end:** the very last data line of the expected data block
- **Data ID:** use a regular expression to break a single data source profile into multiple data streams based on some field (e.g., POS ID) and assign each one to different video channel

For the transaction start and end, you can specify a **regular expression** (regex rule) to define the start/end pattern instead of static text. You can also copy and paste the strings for transaction start and end directly from the sample preview field.

Additionally, you can create any number of mappings of the **user variable** type: this mapping uses a regular expression to extract a specific piece of data into a variable for further usage in the **E&A event Variable Condition**. Variables can be used, for instance, to detect exceptions in the cash operation in case the data source is a Point-of-Sale system. To create a **new variable**, click the + *New* button in the *Mappings* section, fill in the settings on the left and click *Apply changes*. The following settings are available:

- **Type:** variable (cannot be changed)
- **Name:** user-defined variable title
- **Text:** a regular expression that defines what character combination should be extracted into the variable
- **Case sensitive:** enable this if uppercase/lowercase is important (disabled by default)

Use the *Test* button to check if your settings work: if everything is fine with the setup, lines should be detected correctly, transaction start and end marked as such and variables extracted as specified.

Click *OK* to save and close the profile configuration dialog box. The next step you need to take is to **go back to your data source settings** and specify the newly created data source profile that was missing in the initial configuration. You can use a single data source profile for different data sources.

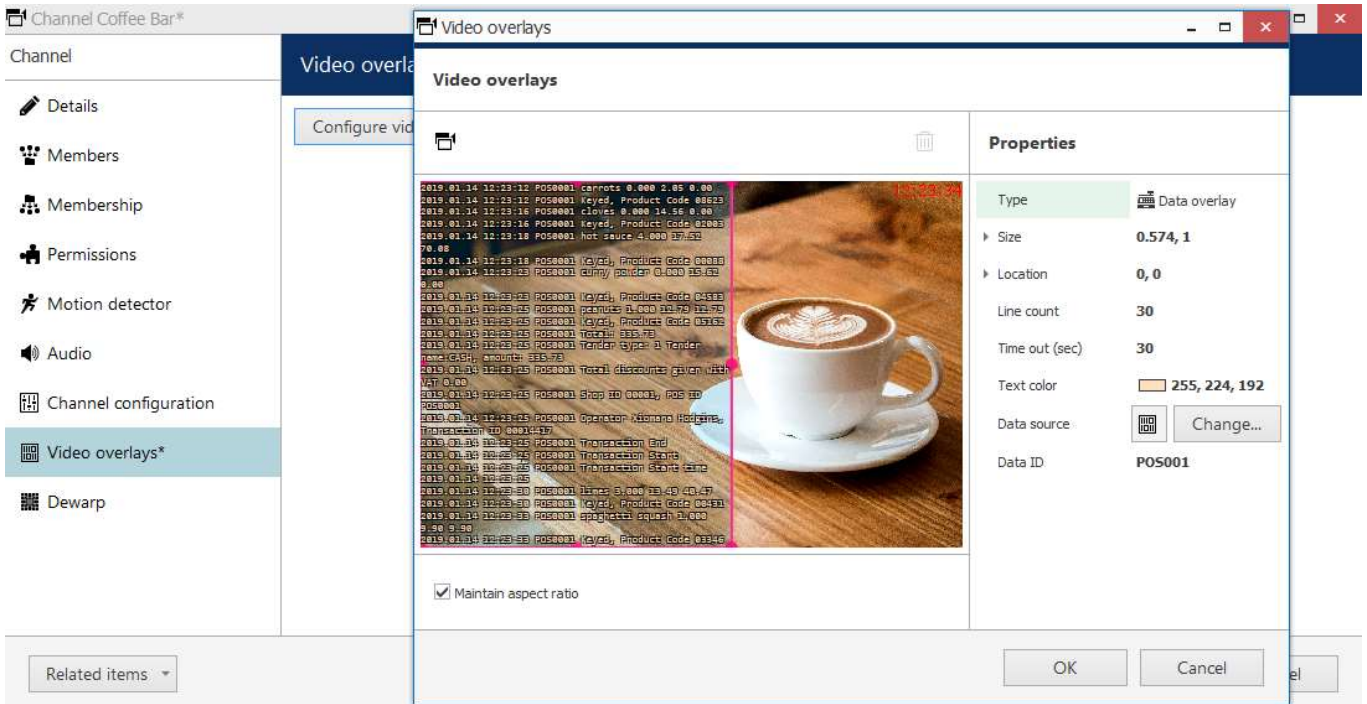
Assign Data Sources to Channels

Finally, go to the *Channels* section and pick a channel that needs to be associated with the a data source. Double-click the channel to open it for editing and switch to the *Video overlays* tab. Click the *Configure video overlays* buttons to bring up an additional dialog box.

Here, different kinds of video overlays can be configured. The *Data overlay* element is already present by default. On the right side, you will have the available **settings**.

Click the *Change* button and select one of your pre-created **data source** for this channel. If the serial data is currently arriving, you will see the text appear in the frame. Then, adjust settings on the right to define where and how the text should appear on top of the video stream.

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Set up overlay text alignment in the viewport

Use the visual control - the pink rectangle - to specify the **text output area** within the video stream viewport. There are other types of video overlay elements available in the same window, but the one you need is called *Data overlay* and it exists by default, so you do not have to add it. There are also numerical coordinates on the right side of the preview for your reference: you do not have to edit them manually.

Also, note that the visual control cannot be removed from the configuration; if there are no data to display, this element simply will not exist in the WVMS Monitor application. The visual control is only present in this configuration window for your convenience. There is exactly one *Data overlay* element per viewport, meaning that each channel can only have text output from a single data source.

⚠ Make sure the video from the target channel is available before setting up the text overlay in order to ensure correct text placement.

Additional settings:

- **Line count:** set the desired number of text lines to be fitted into the overlay area (default value is 20); this will affect the text font size
- **Timeout:** the amount of time in seconds for every line of data to stay on the screen at maximum (older text will disappear and text will be shifted upwards)
- **Text colour:** choose a colour for the overlay text from the standard palettes (default is white)
- **Data ID:** data source identifier, if present (leave empty if not used)

In the *Data ID* field, you can enter the source identifier in case the serial data is being **split** between two or more channels; leave the field **blank** if this channel is the only destination for all the data received from the selected data source.

💡 If there are data from multiple devices combined in a single *Data source* feed so that the text comes from the same IP and port via the same protocol, it is possible to use the **Data ID** field in the *Data source profile* configuration to differentiate between the transactions based on their source identifier and split the text between multiple channels for further overlay.

Example: if the feed contains serial data from multiple Point-of-Sale terminals and their identifiers look like *POSxxx* where *xxx* contains the terminal number so that the identifiers are POS0001, POS0002 and so on, the following **regular expression** can be used to extract these IDs: `^.+?(POS\d+).+`

In this case, the *Data ID* field in every channel configuration is to contain the actual POS ID: POS0001, POS00023, POS6592 etc.

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When ready, click *OK* to save and close the data overlay dialog box, then click *OK* to save and close the channel configuration window.

Now your textual data from the data provider will be displayed overlaying the video stream in WVMS Monitor and both live view and in the instant/regular archive playback mode in case the corresponding option is enabled in the recording profile for the target channel; also, it will be possible to search through the recorded data.




If you wish the serial data to be available in the video **playback** mode in WVMS Monitor application, make sure to set the *Data stream* to be recorded in the corresponding recording profile.

The overlay text will only be visible in live view and regular/instant playback, and will not be displayed in other views (e.g., smart search). In order to export video from the archive with the text overlay, use MKV file format + VP8 compression + hard or soft subtitles.


64 Manage Mail Servers

Several WVMS components require an SMTP server in order to be able to send emails to a specified address. Specifically, these are email sending [actions](#) in [E&A](#) and automatic [reports](#); a pre-configured mail server is required for these features to be operational.

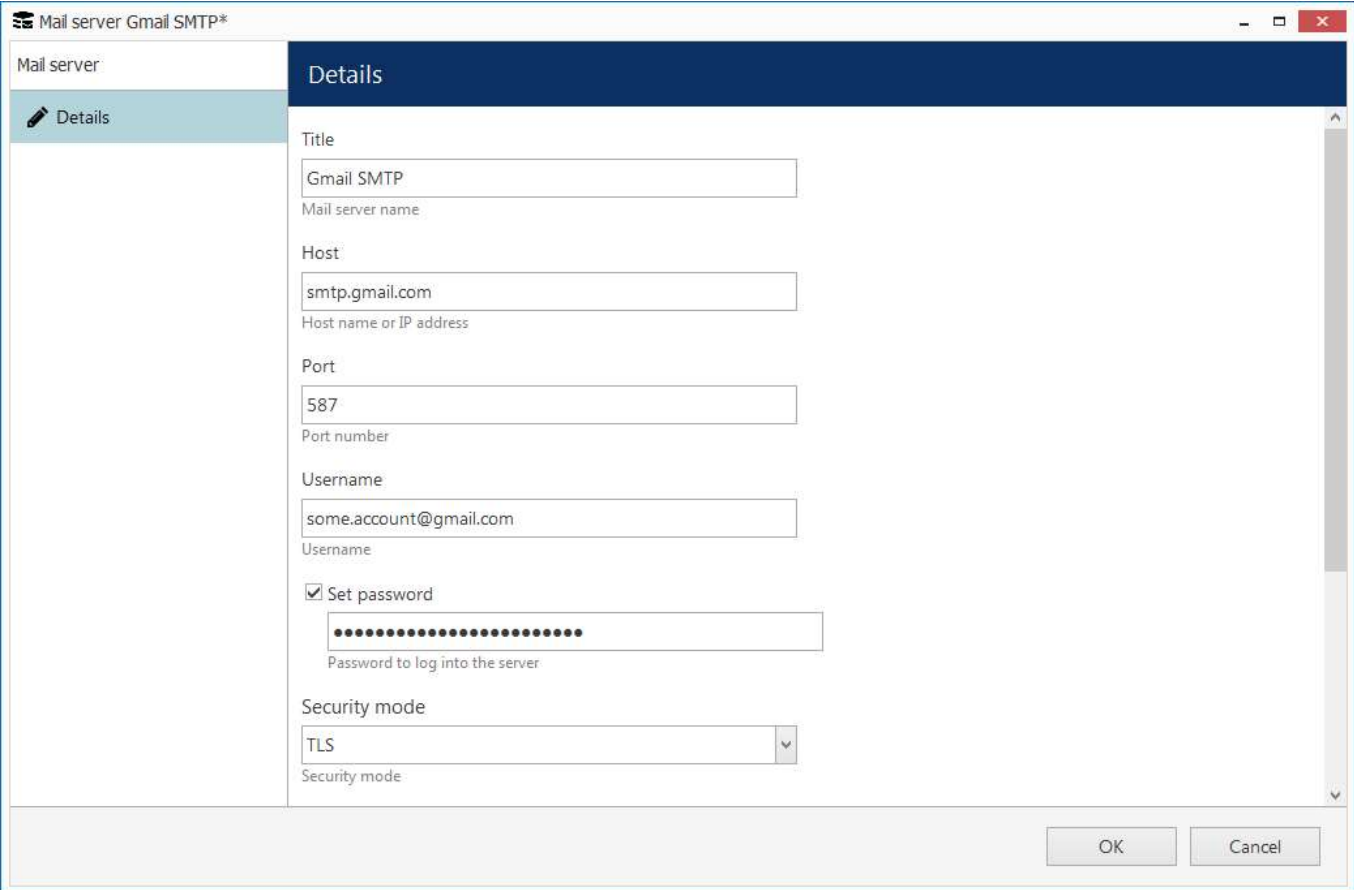
One or multiple different outgoing SMTP servers can be configured in order to send notification emails through them. You can use/set up your own SMTP server, if your organisation already has one and/or it is affordable for your organisation; alternatively, free Internet services can be used for this purpose.

 SMTP servers provided by popular free services and/or ISPs usually have limitations on the number/frequency of emails going through them daily. Make sure you check with SMTP service provider to learn about this.

To access mail server setup via Wavesys Console, open the *Configuration* section and select *Mail servers* from the menu on the left. Click the + *New mail* server button on the upper panel or double-click an existing mail server from the item list to open the configuration dialog box.

 Prior to WVMS version 1.7.0, mail server configuration was accessible via *Events & Actions* section of Wavesys Console.

Note that there are not any default (pre-configured) mail servers.



Mail server Gmail SMTP*

Mail server

Details

Details

Title

Gmail SMTP

Mail server name

Host

smtp.gmail.com

Host name or IP address

Port

587

Port number

Username

some.account@gmail.com

Username

Set password

.....

Password to log into the server

Security mode

TLS

Security mode

OK Cancel

SMTP server settings

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Setup here is similar to configuring an email client. The table below contains detailed information on the available settings.

Setting	Description	Default Setting
Title	User-defined mail server name	[empty]
Host	Outgoing SMTP server IP address or hostname	[empty]
Port	Outgoing SMTP server port; common ports are 25 and 587, and 465 for encrypted connections	0
Username	Enter valid user account details to log onto the target SMTP server	[empty]
Password	Enter valid user account details to log onto the target SMTP server	[empty]
Security Mode	Logon authentication type according to the SMTP server configuration requirements (STARTTLS, SSL (TLS version 1.2), or no security)	none
Sender	Email address on whose behalf emails will be sent	[empty]
Aggregation* Count	Max number of notifications to be aggregated into a single email	10
Aggregation* Time	Max time period in seconds during which notifications are collected together to be sent in a single email	10



*Email aggregation can be used to accumulate alert notifications and send them in bunches rather than one at a time. This decreases SMTP server load and does not 'spam' your notification inbox, making it easier to search and analyze alerts, and is thus especially useful if the number or frequency of events is high.

Maximum [time/number of occurrences] in this context means that it will not be exceeded under any circumstances. The actual time or number of occurrences may be either max or less - depending on which aggregation parameter is triggered first.

Example: aggregation time is set to 60 seconds and aggregation count - to 15. If the notifications arrive frequently, and 15 items are collected in under one minute, the email will be sent immediately. If there is just 1 or 2 notifications but 60 seconds have passed, an email will be sent, too.

Click **OK** to save mail server settings; newly created configuration will appear in the item list. Your mail server is now ready to be used for sending notifications and reports.



Some mail servers require additional settings to be changed on the server side to allow third-party applications to send emails through their SMTP service. For example, Google security requires that you log into your account via a browser using the server that will be utilising the SMTP service in order to enable account access from that computer.

If you can successfully use SMTP settings to send emails from the same computer, WVMS will also have no trouble sending your notifications.

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65 Reports

Wavesys Console application provides an opportunity to send automatic reports. There are two types of them:

- Reports based on the counter data, which has been recorded with the video stream(s). Depending on the collected information context, these reports can be used, for example, to estimate the average number of customers during specific hours, compare the number of passing cars to the number of trucks etc. Counter information is collected from WVMS **Open VCA** video analytics, **camera-side VCA** (for certain manufacturers) and [software counters](#).
- Reports based on the [facial recognition](#) (FR) module data. These include the counted detections (by tag) and miscellaneous estimators (age, gender, temperature, sentiment, etc.).

The report configuration process is similar to the manual procedure of reporting in the WVMS Monitor application, with the difference that here the settings are defined once and then are used by the WVMS servers for automatic report generation.

There are three report types: **bar**, **line** and **pie** diagram. Regardless of the chosen type, all reports are based on the **counters** and have configurable report interval and days and times of interest. Counter values are compared for the given period and with the specified scale, and the results are then reflected in the chart of the selected type. Reports can be configured to be created **automatically** on a **daily**, **weekly** or **monthly** basis and then **emailed** to the specified email address.



Regardless of the report settings, the report will be emailed after the selected report interval has ended.

Example 1: the report interval is previous day with time filter set to 8AM to 6PM. The report will be emailed next day 12:01AM.

Example 2: the report interval is previous week with only working days selected (weekends deselected). The report will be emailed 12:01AM next Monday, i.e., when the week is over.

Prerequisites

Reporting in Wavesys Console is primarily aimed at automatic report sending via email. In order to achieve this, you need to **configure** a [mail server](#) for the emails to be sent through, according to the steps explained in the [corresponding section](#) of this document. You can do this prior or after the report setup. If you need a one-time report for a custom time interval, you are welcome to use the reporting function in the WVMS Monitor application.

For a counters report to be created successfully, there must be some counter data present in the database. You can use Open VCA, camera-side VCA (for certain manufacturers) or [software counters](#). Open VCA setup in WVMS is described in a separate document provided by demand.

For the FR report to be created, you must have at least one channel being analyzed by [facial recognition](#) module for the specified period, and the target FR service must be connected.

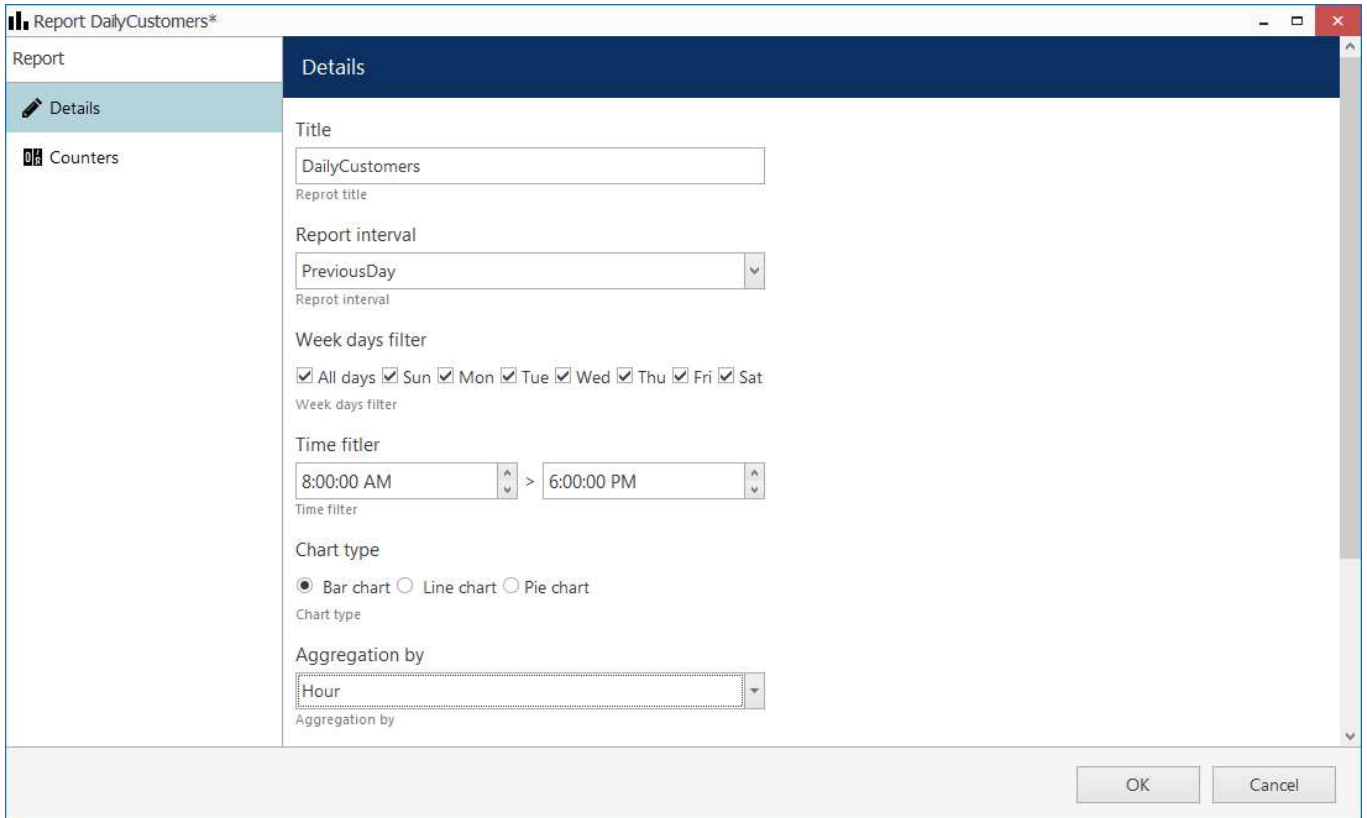
Report Configuration

In order to start report setup, go to the *Configuration* section of Wavesys Console and choose *Reports* from the menu on the left. Press the + *New report* button on the top panel to bring up the report configuration dialog box. There are two options: **new counters report** and **new external service report**. These two types differ slightly.

Reports Based On Counters

This type of report is based on camera-side VCA, Open VCA, or [software counters](#). The configuration options are similar to those in WVMS Monitor when you create a graph in the *Reports* section.

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Edit counters report dialog box

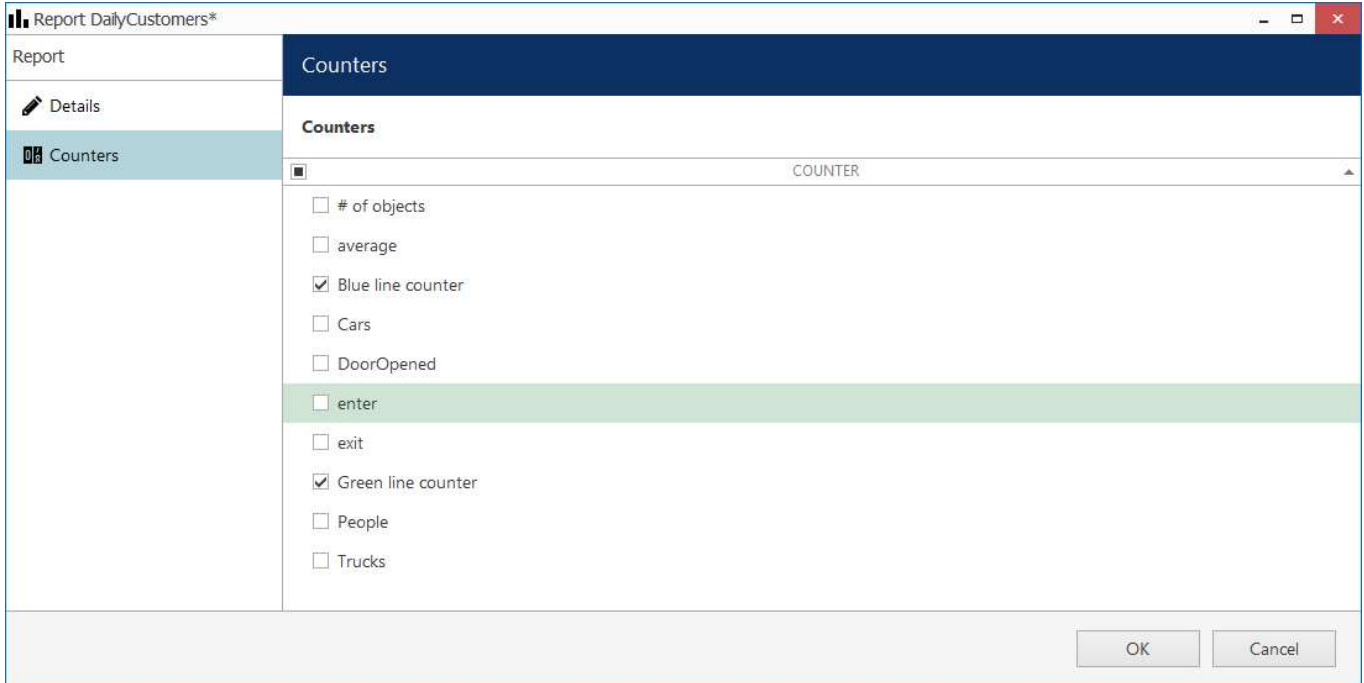
Specify the **reporting criteria** in the *Details* tab; the following settings are available:

Setting	Description	Default Value
Title	User defined title for the report	[empty]
Report interval	Time interval to be represented in the report; can be previous day, week or month	Previous day
Week days filter	Days of the week to be included in the report (e.g., ignore weekends)	All days
Time filter	Target audit interval to be analysed for each of the selected days	12AM > 12AM (whole day)
Chart type	Diagram type: bar, line or pie	Line chart
Aggregation by	Scale factor for the target diagram - results can be presented for months, weeks, days, hours or minutes (also, the data can be aggregated by counters if the selected chart type is pie diagram)	Day
Value	Counter value to be taken for each report time interval on the X axis (day etc.): <ul style="list-style-type: none"> • Absolute: actual counter value • Relative: difference compared to the previous interval • Average: arithmetic mean of the given interval • Minimum: minimal value during the given interval • Maximum: maximal value during the given interval 	Absolute
Sum counters	Choose whether you want each counter to be represented separately or all counters are to be added up (for bar and line type diagrams only)	Disabled
Show labels	Display value labels on the chart	Disabled

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File type	Choose whether you want the report to be in PDF or CSV format	PDF
Automatic	Generate the report and send it automatically to the specified email	Disabled
Mail server	A pre-configured SMTP server to be used for email sending (the setting is revealed when automatic report sending is enabled)	[none]
To	Email recipient the report to be emailed to; enter exactly one valid email address here (the setting is revealed when automatic report sending is enabled)	[empty]

Next, switch to the *Counters* tab: here, you can select the required counters from the list.



The list of counters available for report

All the counters available in the system are listed here - from Open VCA, camera-side VCA (for certain manufacturers) and [software counters](#) as well - in case their data is present in the database.

 For the exact list of supported camera-side VCA counters, kindly contact our support engineers at support@wavesysglobal.com.

When ready, hit the *OK* button in the bottom to save the report configuration based on your selected criteria. To edit and remove reports, use the corresponding buttons on the upper panel.

Reports Based External Service Data

This type of report is based on the data received from [external services](#) (specifically, **detections and attributes from the facial recognition** module instances). The configuration options are similar to those in WVMS Monitor when you create a graph in the *FR* section. The logic is analogous to that of the counters reports, yet the settings are a bit different.

Specify the **reporting criteria** in the *Details* tab (other settings like target week days are available in the *Filters* tab). The following settings are available:

Setting	Description	Default Value
Title	User defined title for the report	[empty]
Report interval	Time interval to be represented in the report; can be previous day, week or month	Previous day
Chart type	Diagram type: bar, line or pie	Line chart

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Group by	Main report values (targets): can be tags, temperature, age, sentiment, or gender estimation	Tag
Aggregation by	Results can be aggregated by months, weeks, days, hours or minutes (for bar and line type diagrams only)	Day
Sum values	Choose whether you want each target group to be represented separately or all values are to be added up (for bar and line type diagrams only)	Disabled
Show labels	Display value labels on the chart	Disabled
File type	Choose between PDF or CSV	PDF
Automatic	Generate the report and send it automatically to the specified email	Disabled
Mail server	A pre-configured SMTP server to be used for email sending (the setting is revealed when automatic report sending is enabled)	[none]
To	Email recipient the report to be emailed to; enter exactly one valid email address here (the setting is revealed when automatic report sending is enabled)	[empty]

The choice between absolute/relative/min/max/avg value is not present here; all values are **relative**, i.e., the chart reflects the value change since the previous aggregation interval.

Next, switch to the *Channels* tab: here, you can select the target channels. The report will include the recognition data from the specified channels.

On the *Filters* tab, you can limit the report sample range by (de)selecting various options. The filters include days, time of the day, and attributes from the external service detections:

- **Tags** from FR
- Temperature range from the readings that were received by FR (works for certain camera integrations; please refer to our for the exact vendor list)
- **Age, gender, and sentiment** estimators
- **Week days:** select **days of the week** that you want to be included in the report (e.g., ignore weekends) (all days are selected by default)
- **Day time interval:** choose the target **audit interval** to be analysed for each of the days in the selected report interval

When ready, hit the *OK* button in the bottom to save the report configuration based on your selected criteria. To edit and remove reports, use the corresponding buttons on the upper panel.

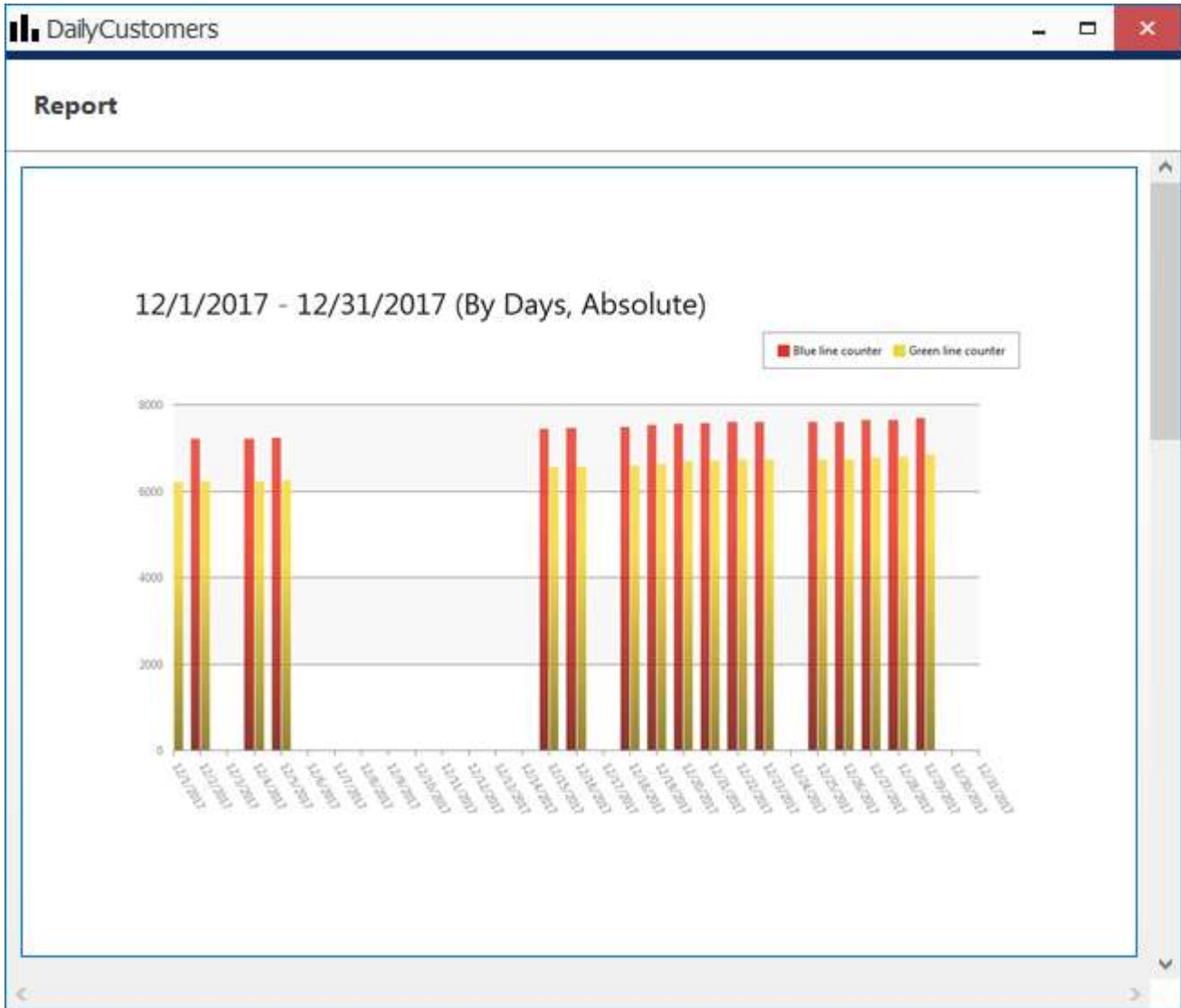
Report Preview

After you have created a report, you can check how it will look like by using the *Preview* and *Test* buttons on the upper panel. The **preview** button will generate a report and display it on your screen; the **test** option will create a report and email it to the specified address in PDF format immediately. In either case, the report preview will be based on its configured time interval, so, if you get an empty report, make sure that counter data are present for the previous day, week or month, whichever specified.



When you have created a new report and wish to test it, please wait about 10-30 seconds before pressing the *Test* button: this time is required to retrieve the counter information from the database.

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Report preview

On each diagram, the **horizontal axis** (X) represents time in the specified scale, and the **vertical axis** (Y) reflects counter values. The counter values for each time interval are calculated based on the selected setting and can reflect absolute, relative, average, minimum or maximum counter value for the given interval. In the **pie diagram** type, each sector can represent either a time interval or a counter, depending on the aggregation setting parameter.

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Each chart also contains a **legend** that provides information about colours used in the diagram:

- if you have selected to analyse every counter separately, each counter will be represented with its own colour and the legend will reflect counter titles
- if you have chosen to sum the counter values:
 - bar diagram will have just one column for each interval, every column consisting of specified counters and its total height reflecting the total
 - line diagram will contain graphs for each individual counter and the total
- pie chart will reflect the counter sum for each time interval if aggregation by time intervals is chosen, so the legend will contain timestamps; if aggregation by counters is selected, the pie will reflect the proportion of the counter values for the whole selected audit interval

Apart from the diagram itself, each report in PDF format will also contain a table with the reference counter values.

Report Status Monitoring

Report execution status can be tracked from the *Monitoring* section of Wavesys Console, by choosing *Reports* in the menu on the left.

TITLE	STATUS	REPORT STATUS	EXECUTION TIME	NEXT EXECUTION TIME	STATUS TIME	INFORMATION
DailyCustomers	Normal	NotExecuted			1/5/2018 2:02:38 PM	
WeeklyCustomers	Normal	NotExecuted		1/7/2018 12:00:00 AM	1/5/2018 2:02:38 PM	

Recently added, 1 Recently updated, 0 Critical, 0

Report status

If a report has been sent at least once (by schedule, not as a test), the last execution time is shown here. For the reports that are currently set to be emailed automatically, the next (scheduled) execution time is also displayed.

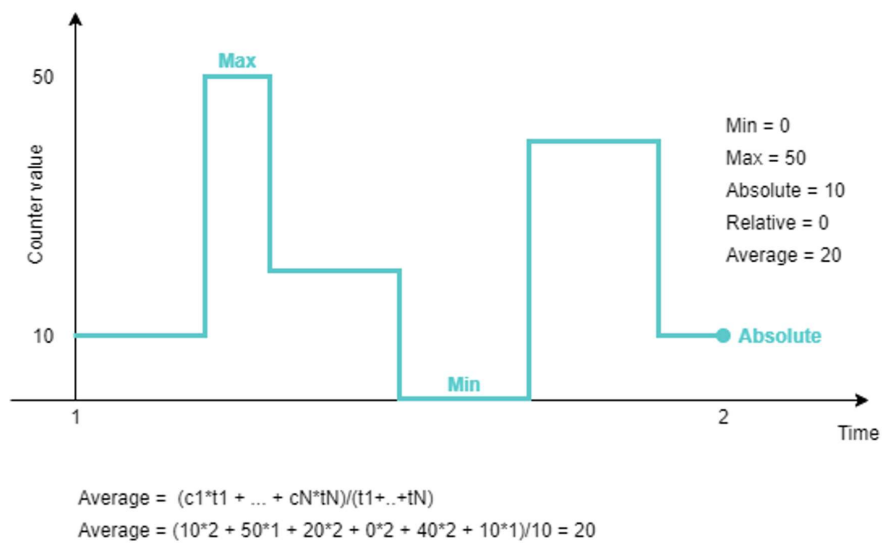
Math Behind Counters

Different **counter value** settings will produce different results, so you need to understand which value to select in order to get the appropriate result. Below, you will find some details on how **these values are calculated** inside WVMS.

For each and every selected interval, five counter values are calculated: **absolute, relative, min/max, and average**. The minimal internal interval is equal to **1 (one) minute**; no matter how the counter value changes during that minute, these five values are recorded into the database. For longer periods (hours, days, etc), these values are calculated using the intermediate results.

In the snapshot below, there is an example of how the counter value might change during one minute, and what values are calculated based on these changes.

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An example of counter changes within report interval with corresponding peak values

For correct report results, it is also essential to keep in mind whether the counter in question is increment-only, or if it is both incremented and decremented based on some events.

1. Absolute

Absolute counter value is its exact value at the **end** of the measurement period. E.g., If the interval is 1h, the absolute counter value is equal to the absolute counter value for the last minute of that hour.

Usage examples:

- increment-only: estimate the total people flow, e.g., incoming customers
- increment/decrement: current number of people in the zone/building

2. Minimum and maximum

Here, WVMS simply takes the min and max value from the aggregation interval. For longer intervals, min/max are selected from the list of min/max of smaller periods (regular min/max function).

Note that min/max has nothing to do with absolute value: the counter value may peak inside the aggregation period with the total change (absolute value) being zero. The latter, of course, is only possible for the counters that are both incremented and decremented over time. For increment-only counters, max value will be equal to absolute value.

3/4. Relative

Relative counter value is the sum of all relative changes for the given period, or, even simpler, the difference between the current absolute value and the previous one. Relative value shows how much the counter value has changed for the given period compared to the previous one.

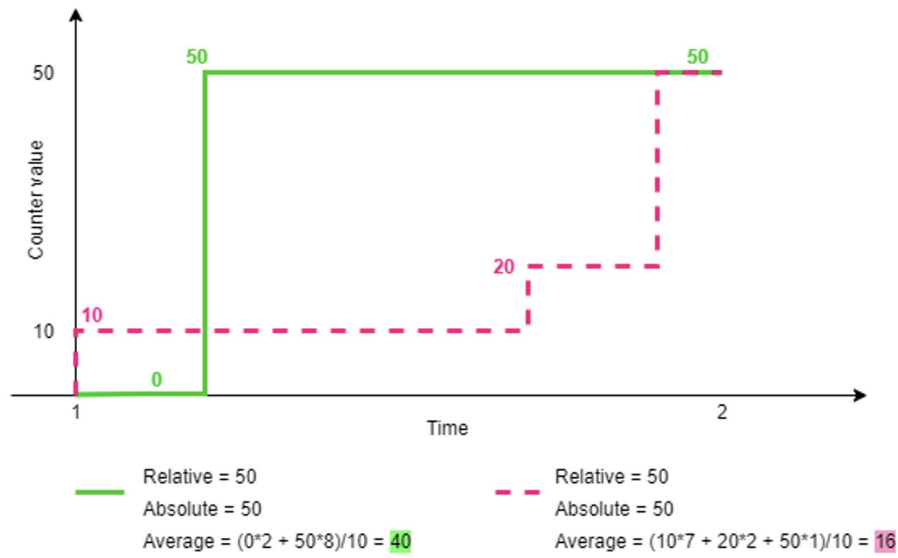
5. Average

Average counter value is counted as weighted arithmetic mean, with the duration serving as weight.

Simple arithmetic mean would not be as useful as it does not take into account the value duration.

Consider the two examples in the snapshot below: two counters have the same absolute and relative values for the given period. Their arithmetic mean would be very similar (25 vs 26.6), while it is obvious that the first (green) counter value stayed higher for a longer period, and this should be taken into account.

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Example of two counters with the same absolute values and different average


Usage example: average number of customers in the store per hour, average check total for estimating effectiveness.

66 External Services

External modules are modules that have been integrated with WVMS, including these, which have been designed to work with WVMS - license plate and face recognition engines. They operate either independently or based on streams received from WVMS server, and WVMS server can receive event metadata from these modules and then use these events for Event & Action configuration, as well as provide the opportunity to view these events in both live and investigation mode in the WVMS Monitor application.

All the external modules can be connected using the same logic, the main important steps being as follows:

1. Prepare channels to be used for the target external module
2. Install the target external module
3. Connect to the WVMS server from the external module and enable HTTP notifications in it, if such an option is explicitly available - this will make the external service automatically appear in Wavesys Console
4. Create a group for external services in Wavesys Console and add your external service to the group
5. External service will now be available for E&A configuration and its events will be visible in WVMS Monitor

 Important notice for Wavesys WVMS Enterprise systems: prior to WVMS version 1.15.0, external services only operate via central management server.


Starting with 1.15.0, you can link external services **directly to recording servers** (Wavesys WVMS Enterprise Recording server instances). Note, however, that this functionality will not be covered for failover servers in case the target Wavesys WVMS Enterprise Recording server goes offline. When your external service is linked to Wavesys WVMS Enterprise, streaming will automatically switch from/to failover.

This works for all kinds of external services, except for [Camio](#), which is integrated in a slightly different way.

This administrator's manual covers an example on how to connect to the LPR (License Plate Recognition) module. Other external services are added in a similar way, the only difference being the external module interface. Also, you will find more details in LPR/FR own user guides.

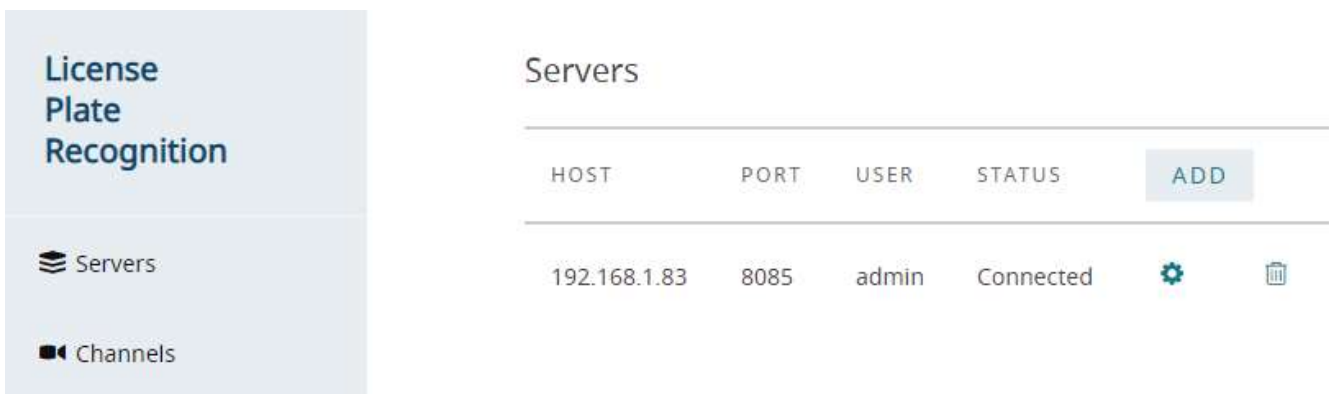
Install External Module

Start LPR installation by double-clicking the installation package, and go through the wizard's steps. Activate LPR using your purchased LPR license and run the software with empty configuration.



 Please use LPR version 2.x with WVMS. If you already have an older LPR installation that works with first generation WVMS, you will need to re-install it to make it work with WVMS or use a separate LPR installation.

Set Up External Module

In the LPR module, add a new server connection and enter your WVMS server connection details. Make sure that the target HTTP port is reachable and that the user account has the *Login via HTTP* permission granted.



The screenshot shows the 'License Plate Recognition' module interface. On the left, there is a sidebar with 'Servers' and 'Channels' options. The main area displays a table titled 'Servers' with the following data:

HOST	PORT	USER	STATUS	
192.168.1.83	8085	admin	Connected	 

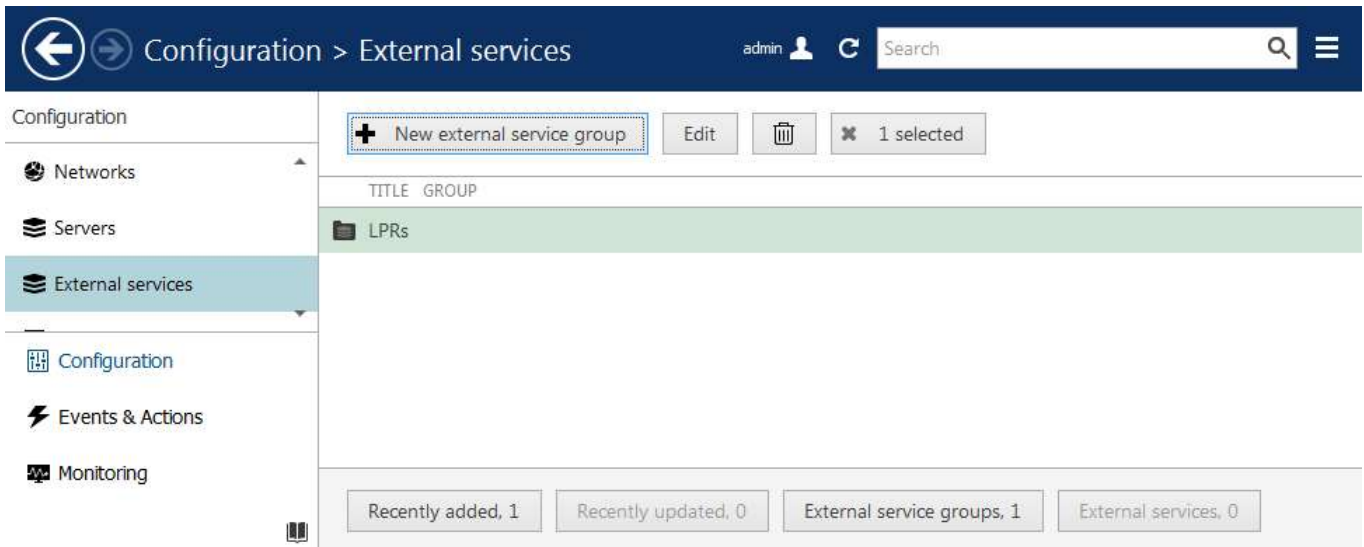
Add new server connection via LPR Web interface

Then, add your desired channels for LPR analysis and set up license plate recognition as usual. For details on the setup, please refer to the LPR user manual.

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Add External Service

In Wavesys Console, go to the *Configuration* section and choose *External Services* from the left-hand-side menu. On the upper panel, press the + *New external service group* button; in the dialog box, enter a group name and click *OK* to save. The newly created group will appear in the item list.



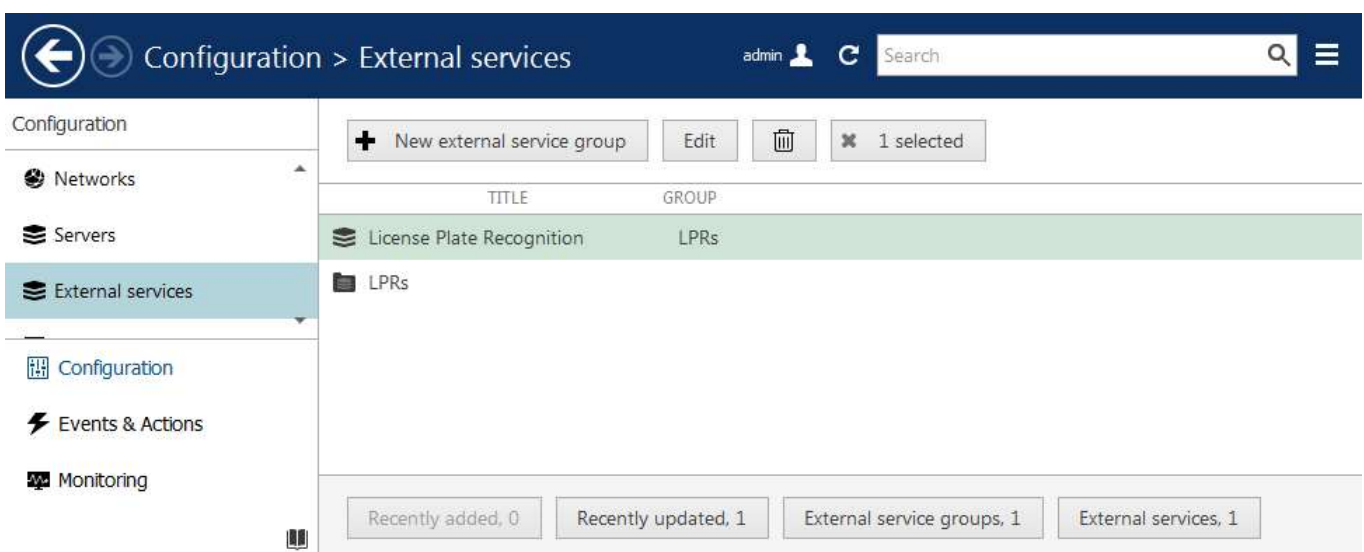
External services group

After you have set up LPR to send VMS notifications, as described above, the target service should automatically appear in the *External Services* list. Double-click it to bring up the service settings:

- **Title:** you can either keep the default (auto generated) name, or change it
- **Server:** target server for the external service to connect to (must match server address in the external service configuration)
- **Group:** add it to the group you have just created

Click *OK* to save and close the dialog box.

In the additional tabs - *Events and actions*, *Related resources* - you will see some relevant data, all in one place. *Events and actions* will display actions linked to the target service events, while *Related resources* will reflect the list of channels used by target service (in this case, LPR).



LPR service with its corresponding External Service group

From now on, your configured external service will become available in the [Event & Action Configurator](#), and its event streams will also become available for investigation in the WVMS Monitor application. Please refer to the WVMS Monitor and LPR user guides for details on the investigation mode.

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67 Access Control

Starting from version 1.8., WVMS has an integration with **access control systems**. WVMS server is now capable of receiving events from and sending requests to third party access control software.



The current integration includes the following **access control software**: Keri, Feenics, Gallagher, Roger RACS 5, and Visual Access System by GSF Corporation.

WVMS obtains the **list of doors**, their **statuses** (opened/closed, locked/unlocked), **cardholder list** and relevant events, and enables you to lock and unlock the doors based on internal WVMS server events (e.g., user button pressed) and also from the WVMS Monitor application. Information about doors, their events and cardholders is searchable from WVMS Monitor application as well.

Supported functionality overview:

- Receive events, door list and their status, list of cardholders (users)
- Change door status by sending corresponding commands back
- Live door status with linked video channels
- Interactive markers on the maps and geographical maps
- Notifications and other actions based on door events
- Search event history based on doors, cardholders, and time
- Get mobile app notifications
- Lock and unlock doors from the mobile application

Integrations with different access control software are similar. However, there may be nuances in configuration. If you encounter any difficulties with the setup, feel free to contact our support engineers at support@wavesysglobal.com.

WVMS Configuration with 3rd Party Access Control

This topic briefly describes the configuration necessary to make use of the access control software integrations with WVMS software.

Prerequisites

Keri uses port 11000 as default and ports 11000 through 110xx for connections so these should be opened and forwarded on the intermediate routers and firewalls.

WVMS connection to the Doors.NET system uses a certain license type – **OnSSI**. Make sure that your Keri license includes this type of client license (at least one) and that it is not used by other client connections.



In earlier WVMS versions, a different Doors .NET license connection - RollCallClient - was used. It still works but Kery Systems strongly recommend using the OnSSI license instead.

For Keep by Feenics, there are no special requirements. You just set it up as usual, and WVMS servers already have a connection to api.feenicshosting.com via HTTP hard-coded. Make sure to allow this connection on your local firewalls.

For Roger RACS 5, there are also no special configuration requirements, set up your VISO as usual. Just make sure you have applied a valid **license** to the access control software. Without it, the integration services on the Roger side will be inactive. You can check the license status by running the RACS Services Manager and then selecting *License service*.

Add Access Control Configuration

In Wavesys Console, open the *Configuration* section and choose *Access Control* in the menu on the left. Here, you need to create a connection to the Keri server: click the *New access control configuration* button on the upper panel and fill in the settings, then click *OK* to save:

- User-defined **title**
- **Type**: select your access control software name
- **Host**: access control server IP address (required for some types)

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- **Instance:** instance name for Feenics (defined on the Keep side)
- **Port:** access control server port
 - Keri: the default port is 11000, ports 11000 through 110xx can be used otherwise, depending on the Keri configuration
 - Roger: leave 0 to use the default port of 8892
- **Username and password** to connect to the access control server
- **Merge:** enable this option if you have multiple access control systems and you want to have them all in a single tab in the WVMS Monitor application

The screenshot shows a configuration window for 'Access control Keri Test'. The window title is 'Access control Keri Test*'. The main content area is titled 'Details' and contains the following fields:

- Title:** Keri Test
- Access control type:** Keri
- Host:** 192.168.1.120
- Port:** 0
- Username:** admin
- Enter password

At the bottom right of the window are 'OK' and 'Cancel' buttons.

Access control configuration example for Keri Doors .NET

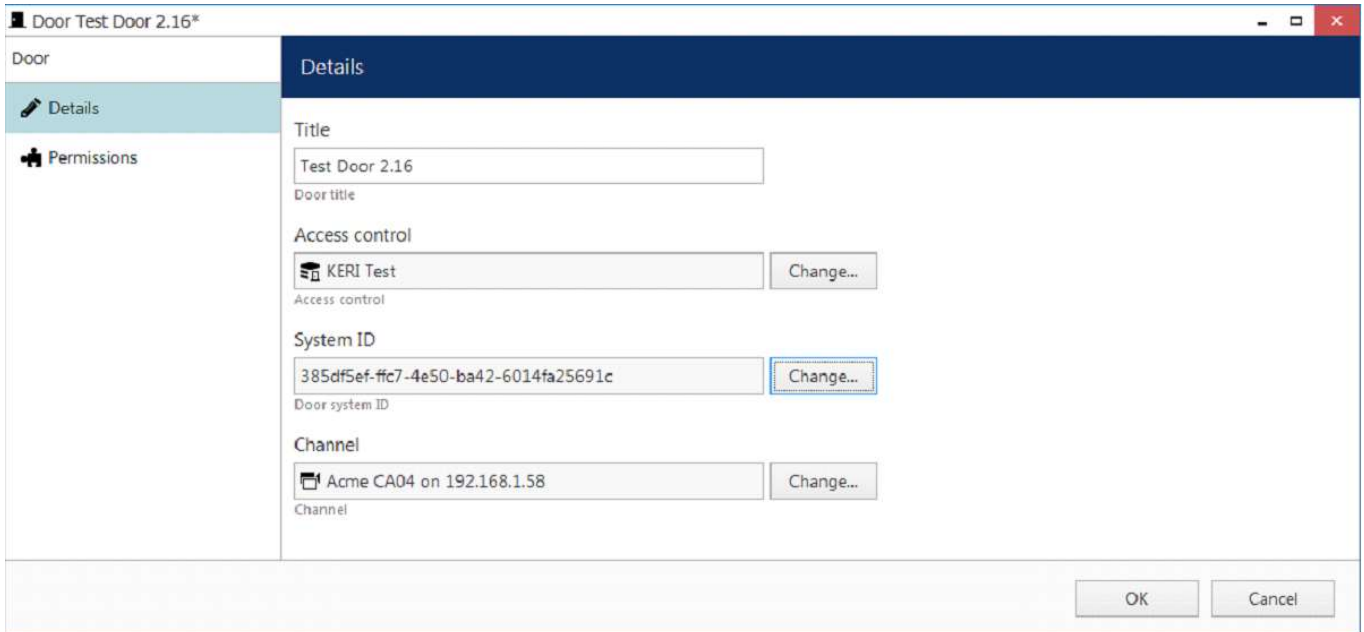
For Roger RACS 5, you check and change the service IP address and port by running the RACS Services Manager and then selecting *Integration service*.

For Gallagher access control, there is a special pairing procedure with additional settings, please see the [corresponding topic](#) of this document for more details.

Add Doors

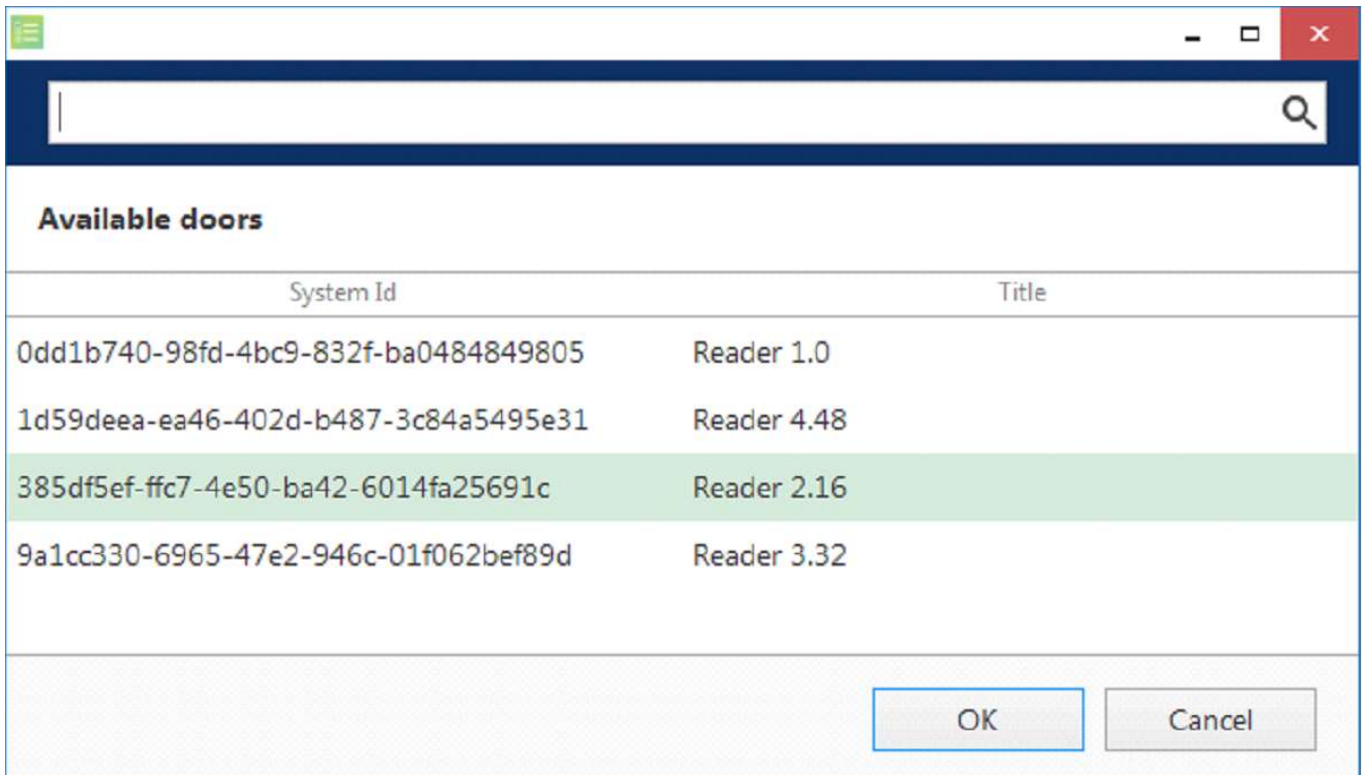
Next, click the arrow next to the *New access control configuration* button and select *New door* in the drop-down list. Choose the access control configuration created on the previous step.

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Add new door

Click the *Change* button next to the *System ID* field to view the list of available doors: if the access control configuration is correct, WVMS server will successfully fetch it from the Keri server. Choose the required door and click *OK*.



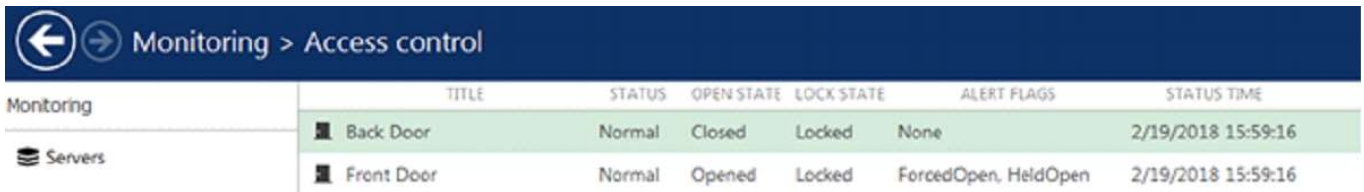
List of available doors fetched from Keri

If you wish to bind a video channel to a door, choose a channel in the corresponding field. This channel will appear when viewing events from that door in the WVMS Monitor application, and the event list will be bound to the recorded footage.

Monitoring

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For all the doors that have been added it is possible to view their current states in the Wavesys Console application: to do so, switch to the *Monitoring* section and select *Access Control* in the list on the left.



Monitoring	TITLE	STATUS	OPEN STATE	LOCK STATE	ALERT FLAGS	STATUS TIME
Servers	Back Door	Normal	Closed	Locked	None	2/19/2018 15:59:16
	Front Door	Normal	Opened	Locked	ForcedOpen, HeldOpen	2/19/2018 15:59:16

Door status monitoring

The following information is available from Doors.NET:

- **Open state:** opened/closed
- **Lock state:** locked/unlocked
- **Alert flags:** additional information, if any
- **Status time:** last status update time

Use the *Search* field in the top right corner to filter the door list, and the *Refresh* button (or F5) to reload it.

Maps

Apart from the dedicated *Access Control* sections in Wavesys Console, it is also possible to place door markers onto maps – either regular ones or geo maps. Markers on the map will reflect door open state and lock state.

To do this, select *Maps* in the *Configuration* section of Wavesys Console and create a map or open an existing one. On the *Marking* tab, place as many markers as you need – the ones looking as doors – from the top panel. Click any marker to edit its settings on the right side of the dialog box: assign a door to it and adjust colours and icons for different door statuses.

For more details, please see the [Maps](#) section of this document.

Events and Actions

After the necessary connection and door(s) have been added, it is possible to use the door status changes as events in the *E&A Configurator* and also send commands to the access control server as door related actions.

To add events and actions in Wavesys Console, switch to the *Events & Actions* section and choose *Events* or *Actions* on the left; click the *New <item>* button to add a new entry. Alternatively, you can add new events/actions right from the *E&A Configurator* by clicking the *+ New <item>* button in the bottom of the leftmost and rightmost columns.

There are two events related to the access control integration:

- *Access control event:* items not related to doors but still coming from the access control side (vendor-specific; e.g., other components' status change)
- *Door event:* codes related to door status (i.e., bound to specific nodes)

Door Event

This event category is triggered when the specified code is received from the access control server. Choose the target door as the event source here (the door must be added to the WVMS server configuration beforehand), then select the code you wish to set up the reaction for.

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Event Back door OPEN2long*

Event

Details

Event type
Door event
Select event type from list of available event types

Title
Back door OPEN2long
Event name

Source
Access Door 1
Source door

Code
Door Open Too Long Alarm
Access control code

Change... Change...

OK Cancel

Door event

The **code list** is retrieved from the access control software and contains possible event types that can be received and understood by WVMS server. Choose the one you want to set up a reaction for.

Available access control codes

Code	Description
105	Reader Contact - Forced Open (Held Open is Masked)
106	Reader Contact - Held Open (Forced Open is Masked)
107	Reader Contact - Mode Unlocked
108	Reader Mode Change - Lockdown
109	Reader Mode Change - Unlocked
110	Reader Mode Change - Lockout
111	Reader Mode Change - Facility Code
112	Reader Mode Change - Card Only
113	Reader Mode Change - PIN Only
114	Reader Mode Change - Card and PIN
115	Reader Mode Change - Card or PIN

OK Cancel

Door codes fetched from Keri

Access Control Event

Use this event type if the notifications from the access control are not door-specific.

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The screenshot shows a dialog box titled "Event Keri Access control event*". It has a "Details" tab selected. The form contains the following fields:

- Event type:** A dropdown menu with "Access control event" selected. Below it is the text "Select event type from list of available event types".
- Title:** A text input field containing "Keri Access control event". Below it is the text "Event name".
- Source:** A dropdown menu with "Keri" selected. To its right is a "Change..." button. Below it is the text "Source access control".
- Code:** A dropdown menu with "IN8: Input line activated" selected. To its right is a "Change..." button. Below it is the text "Access control code".

At the bottom right of the dialog are "OK" and "Cancel" buttons.

Access control event

The exact list of event codes here depends on the vendor; some access control integrations may not support this kind of message.

Actions

Similarly, you can send notifications to the access control servers based on WVMS events. To do this: in Wavesys Console, choose *Actions* in the Events & Actions section and create a new one by pressing the *New action* button on the upper panel. Alternatively, press the + *New action* button on the *E&A Configurator*. You will need the *Door action* type.

The screenshot shows a dialog box titled "Action Keri Test Door action*". It has a "Details" tab selected. The form contains the following fields:

- Field Caption:** A dropdown menu with "Door action" selected. Below it is the text "Multiline description".
- Title:** A text input field containing "KERI Test Door action". Below it is the text "Event name".
- Target:** A dropdown menu with "KERI Test" selected. To its right is a "Change..." button. Below it is the text "Target access control configuration".
- Code:** A dropdown menu with "Unlock" selected. Below it is the text "Code".

At the bottom right of the dialog are "OK" and "Cancel" buttons.

Door action

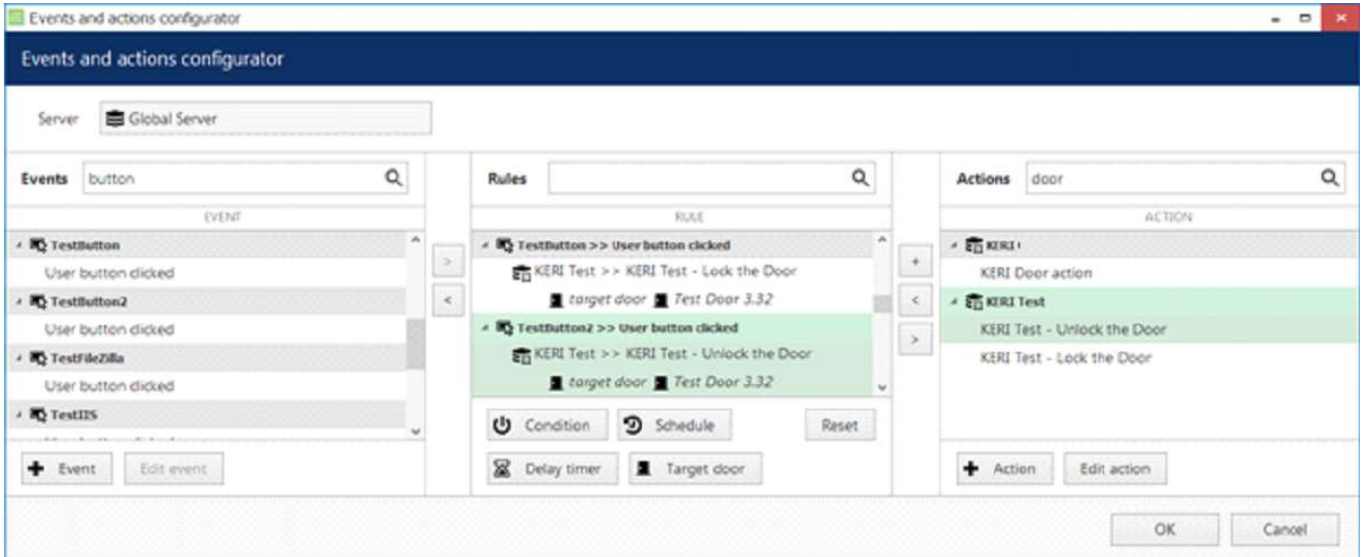
As a target, specify the access control configuration added earlier. The specific door for this action will be chosen at the rule creation step, allowing you to use this action for many different doors within the same access control configuration.

Available **action codes** here are: lock, unlock, temporarily unlock, and lock down (standard access control door states). Once the action is triggered, the corresponding command will be sent to the third party access control module.

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E&A Rules

Once you have created necessary events and actions, combine them into rules in the *E&A Configurator*. For door related actions, remember that you need to specify the target door by using the *Target door* **button** in the bottom of the middle column.



Combine events and actions into rules

Selected door status changes will trigger events in WVMS, and actions triggered by internal WVMS events will change door state, which will also be reflected in the access control UI.

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68 Gallagher

WVMS has several integrations with third-party [access control](#) software suites. This part of the documentation provides details on how to make WVMS work together with your **Gallagher Command Centre**.

The integration ensures two-way information exchange between WVMS servers and access control software servers:

- WVMS server receives **events**, **door** list and status, and **cardholder** list
- in Wavesys Console, you can see door status, add them to maps and geo maps, as well as create door-related events and actions
 - E&A events help monitor the changes in the door status
 - E&A actions and maps allow you to change the door status (lock/unlock)
- in WVMS Monitor, you can search door and cardholder events for the desired period

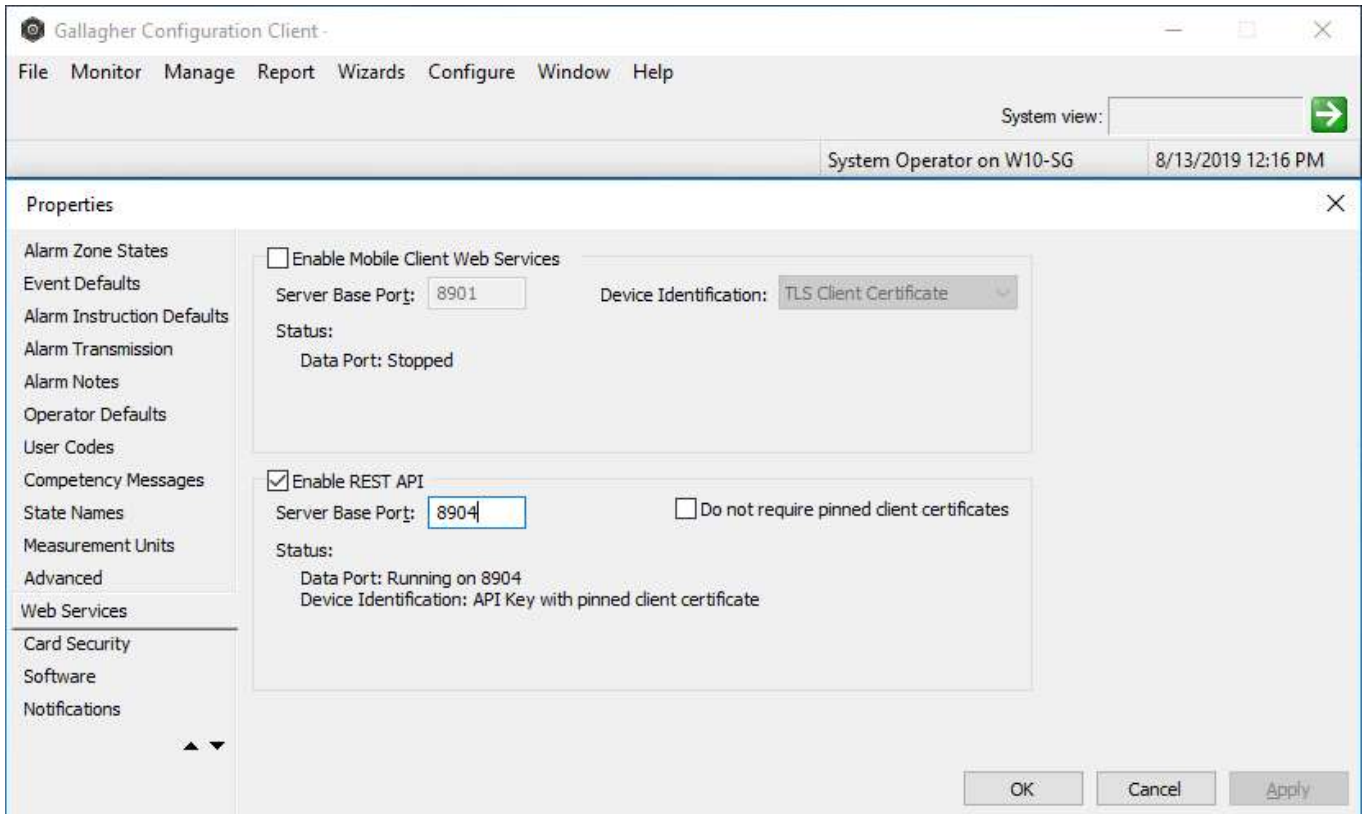
The details below will help you set up WVMS to work with the Gallagher software. It is presumed that you already have the Gallagher Command Centre up and running, and are familiar with its initial configuration process. For details on the Gallagher software setup, please see its own supporting documentation.

Gallagher Configuration

For the two servers to be able to communicate, a few things should be first set up on the Gallagher side. The integration operates over secure HTTP, therefore, from Gallagher's point of view, WVMS will act as a REST API Client. The steps here describe the necessary settings in the Gallagher software.

Run Gallagher Configuration Client and log in using your username and password.

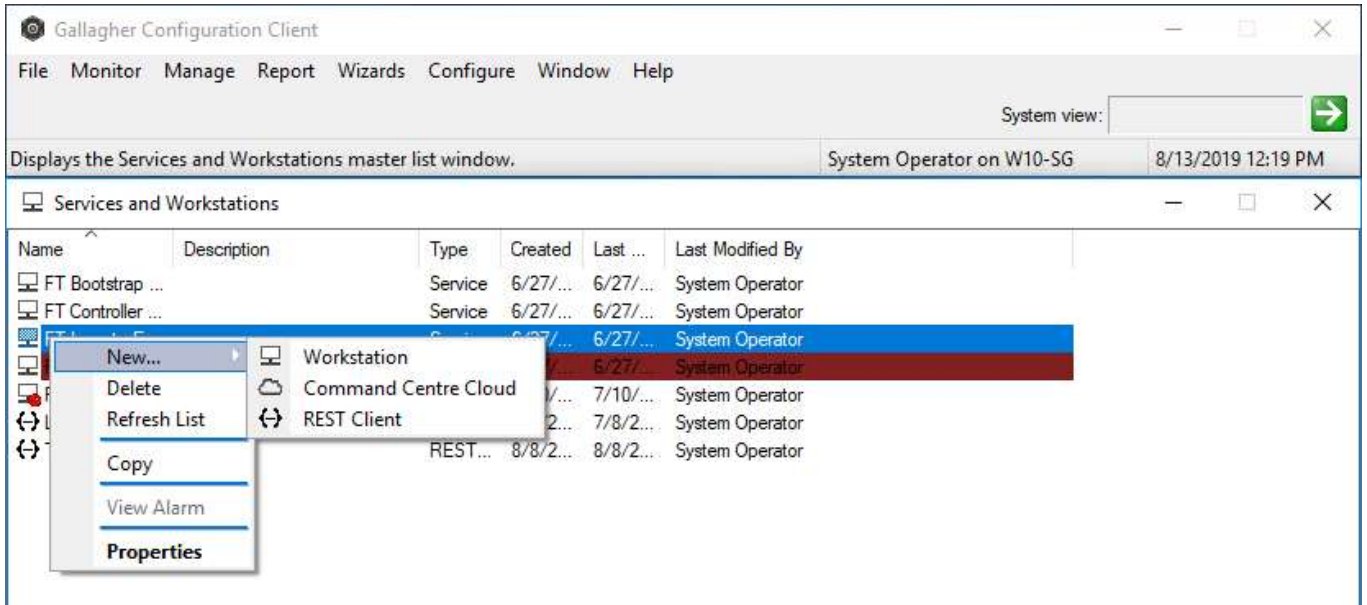
In the panel containing the main menu, go to *File > Server Properties*, and select *Web Services* on the left. Here, turn ON the *Enable REST API* setting, and specify a HTTPS **port** for server-to-server communication.



Enable REST API and specify a HTTPS port

Next, go to the main menu *Configure > Services & Workstations*. In the dialog box that appears, right-click anywhere and select *New > REST Client*.

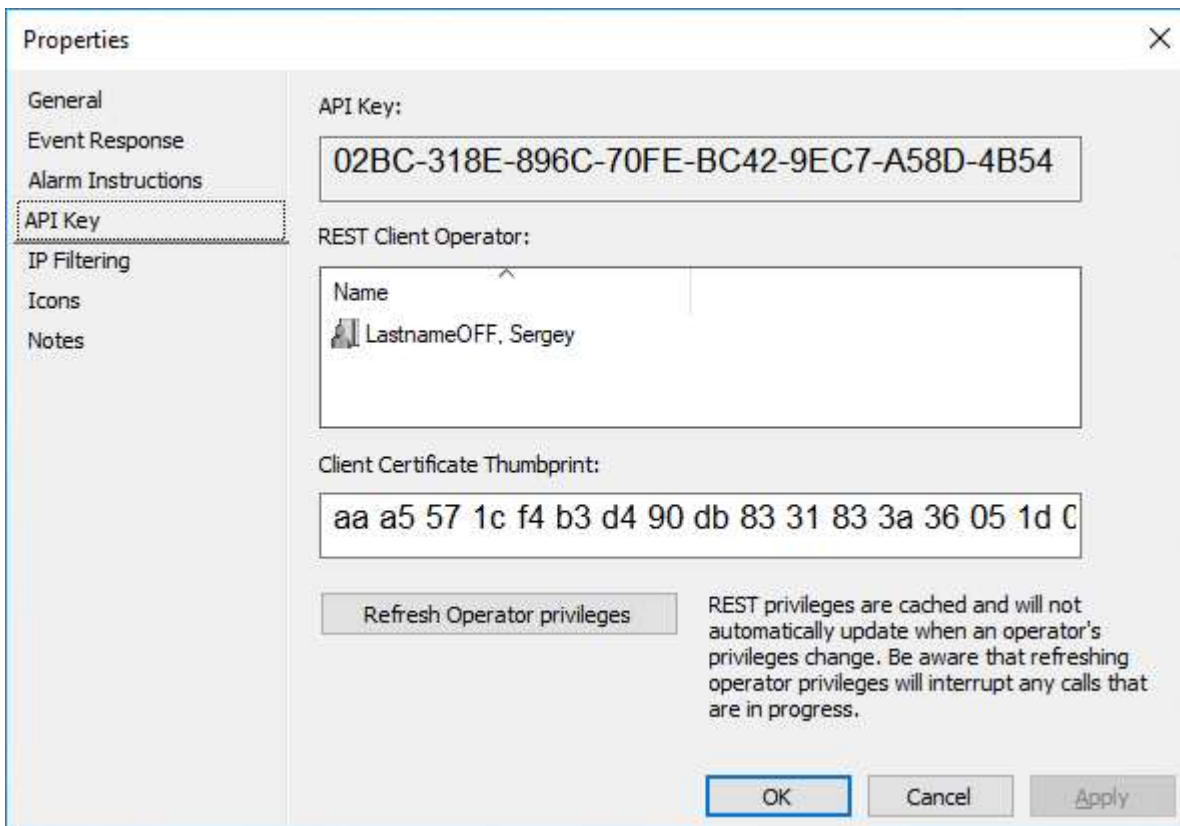
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Add a new REST API Client

All settings here are up to you or default, except for those in the *API Key* tab. Here:


- Copy the **API Key** from the read-only field and paste in into Wavesys Console later, as described below
- Drag and drop your desired **operator*** into the *REST Client Operator* field from the main menu *Manage > Cardholders*
- Copy the *Client Certificate Thumbprint* from Wavesys Console (see below)



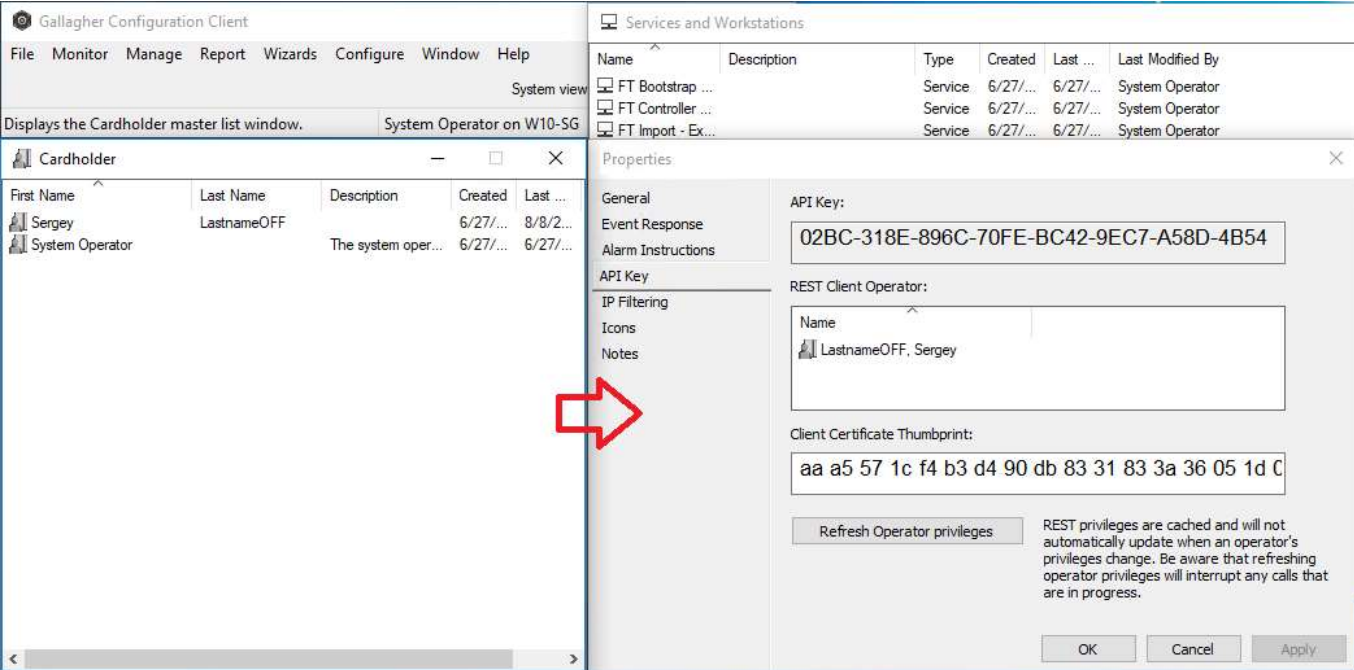
Copy API key from the REST API Client settings to Wavesys Console

The certificate thumbprint is hard-coded into WVMS and Wavesys Global is responsible for it renewal. You do not have to obtain your own certificate; simply copy the alphanumeric string from the Gallagher configuration dialog box in Wavesys Console.

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 *For the REST API integration to work properly, the cardholder acting as operator here **must have** the *Advanced user privilege*.

The rest of the settings here are default/up to you.



The screenshot shows the Gallagher Configuration Client interface. On the left, a 'Cardholder' list contains entries for 'Sergey' and 'System Operator'. On the right, the 'Properties' dialog box is open, showing the 'REST Client Operator' settings. A red arrow points from the 'System Operator' entry in the list to the 'REST Client Operator' field, which contains the name 'LastnameOFF, Sergey'. Other fields include 'API Key' (02BC-318E-896C-70FE-BC42-9EC7-A58D-4B54) and 'Client Certificate Thumbprint' (aa a5 57 1c f4 b3 d4 90 db 83 31 83 3a 36 05 1d C).

Drag cardholder to the REST API Client settings

WVMS Server Configuration

The rest of the setup will be on the Wavesys Console side. WVMS server must have a Wavesys WVMS Enterprise or a Wavesys WVMS Professional license applied to it for you to have the *Access Control* tab. If you are running Wavesys WVMS Enterprise, make sure to connect to the central server, and use a privileged user account.

Create New Gallagher Connection

In your Wavesys Console, open the *Configuration* section and choose the *Access control* component on the left. Click the *New access control* configuration button on the upper panel and fill in the settings in the dialog box.

- **Title:** user-defined service name, which will appear in Wavesys Console
- **Access control type:** Gallagher
- **Host:** IP or hostname of the Gallagher server
- **Port:** server base port from the REST API settings (as specified above)
- **API key:** copy from Gallagher configuration, as shown above
- **Client certificate thumbprint:** copy and paste it into Gallagher REST API Client settings, as described above
- **Merge:** enable this option if you have multiple access control systems and you want to have them all in a single tab in the WVMS Monitor application

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Access control GALLAGHER

Access control

Details

Details

Title
GALLAGHER
Access control title

Access control type
Gallagher
Access control type

Host
192.168.1.151
Host name or IP address

Port
8904
Port number

API key
DE9A-6F44-142C-4FDD-C0EA-6303-C60E-EA83
API key generated by Gallagher Command Centre

Client certificate thumbprint
AA A5 57 1C F4 B3 D4 90 DB 83 31 83 3A 36 05 1D 03 98 EE 10
Copy thumbprint to Gallagher Command Centre to allow access

OK Cancel

Create new Gallagher access control connection

When done, click OK to save the settings and close the dialog box. The newly created connection will appear in the list. Use the buttons on the upper panel to alter the connection details and to disable it temporarily, if required.

Add Doors

Once the Gallagher connection is created, you can start adding **doors**. To do so, stay in the same section of Wavesys Console (*Configuration > Access control*), click the drop-down list icon (down arrow) next to the *New access control* configuration and select the *New door* option. A dialog box will pop up, allowing you to enter the door configuration.

Note that an active connection to the target Gallagher instance must be present for WVMS to be able to retrieve the current door list.

The following settings should be specified for each door:

- **Title:** user-defined door name, which will appear in WVMS
- **Access control:** select your Gallagher connection from the list
- **System ID:** door identifier in the access control software; select one from the list
- **Channel:** select one of your video channels to associate it with the target door (they will appear linked in WVMS Monitor)

If the door list appears empty, check that:

- the doors are present in the Gallagher configuration
- you have added a REST API Client with a privileged operator, and that it has the certificate thumbprint copied from Wavesys Console, as described above
- you have copied the correct API key from that REST API Client into the Gallagher configuration in Wavesys Console

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Door Door 1

Door

Details

Details

Permissions

Title

Door 1

Door title

Access control

GALLAGHER

Change...

Access control

System ID

566

Change...

Door system ID

Channel

(Generic) ONVIF Compatible on 192.168.3.230

Change...

Channel

OK

Cancel

Add a new door

Use the *Disable/Enable* button on the upper panel to temporarily turn OFF the connection and restore it. The recycle bin button will remove doors and/or access control connection entries from the WVMS configuration.

To see the **status of the doors** you have added into the WVMS server configuration, go to the *Monitoring* section of Wavesys Console and select the *Access control* component on the left. You will be able to see the **current** door lock **state**, as well as related **alert flags**. Pay attention to the status **update time**. If a door status shows *Unknown*, it means either the Gallagher service is not connected, or the door may have been removed from the Gallagher configuration.

Monitoring > Access control

admin

Search

Export to CSV

1 selected

TITLE	STATUS	OPEN STATE	LOCK STATE	ALERT FLAGS	STATUS TIME
Door 1	Normal	Closed	Locked	None	8/9/2019 12:16:59
Door 2	Normal	Closed	Unlocked	None	8/9/2019 12:16:59
Door 3	Normal	Closed	Unlocked	None	8/9/2019 12:16:59
Door 4	Normal	Closed	Locked	None	8/9/2019 12:16:59
Door 5	Normal	Closed	Locked	None	8/9/2019 12:16:59

Recently added, 0

Recently updated, 0

Critical, 0

Check door status in Wavesys Console

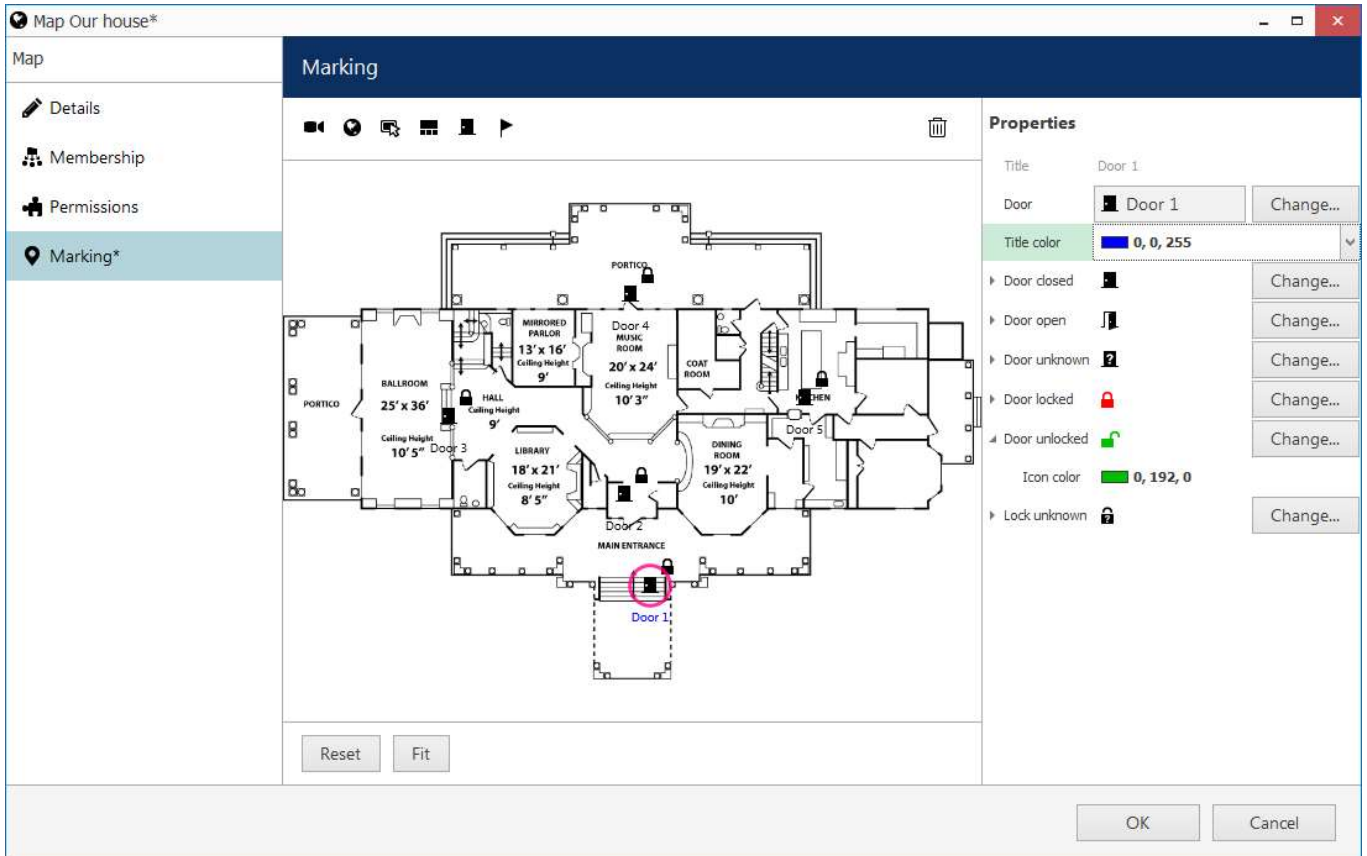
Use Doors in WVMS

After you have added Gallagher doors to the WVMS server configuration, there are several applications for them.

Add Doors to Maps

You can place **door markers** onto maps and geo maps. These markers will reflect the current **door status** in the WVMS Monitor application, and provide interactive **actions** upon single or double click.

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Add door markers to maps or geo maps

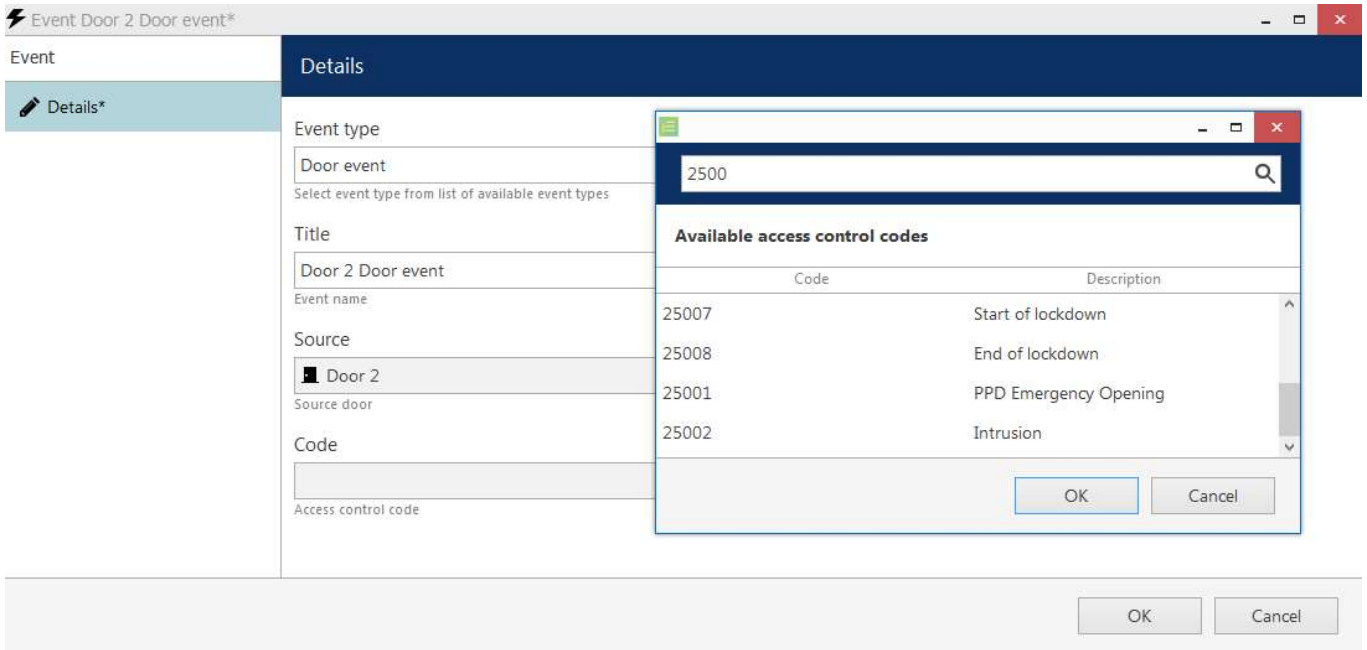
To put a marker onto the map, **drag and drop** it from the panel above. In the settings on the right, select the **target door** from the list. You can also adjust the **marker appearance** for each door state by selecting the target icon and its colour.

Events & Actions

WVMS [Event & Action Manager](#) (E&A) provides support for both door events (status changes) and actions (change door state).

Changes in the door status are sent from Gallagher to WVMS. You can set up different reactions for different codes via WVMS E&A. Later, these events can be used for building rules, e.g., for logging the events in WVMS, bookmarking them, automatically interacting with other system components etc.

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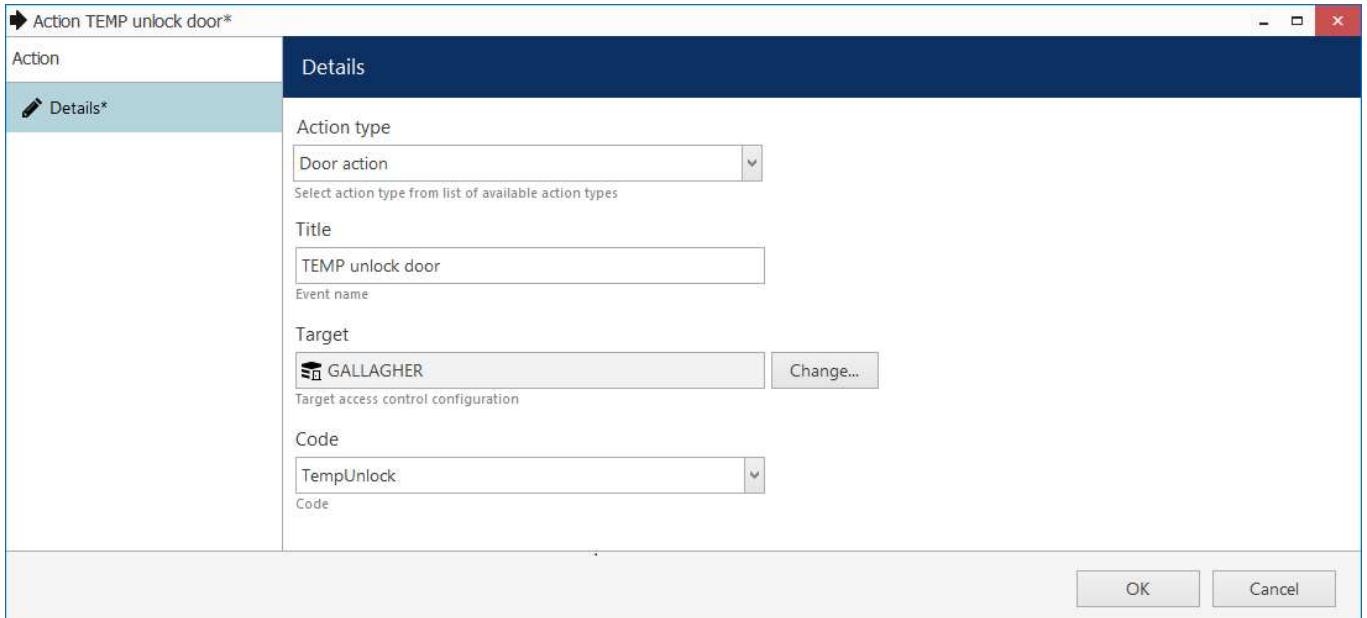


Add door event in E&A

To create a new **door event** in Wavesys Console, go to the *Events & Actions* section > *Events* > click the + *New event* button on the upper panel. In the appeared dialog box, fill in the settings:

- **Event type:** Door event
- **Title:** user-defined event name to be used in E&A Configurator
- **Source:** select a door from the list
- **Code:** desired door status change code received from Gallagher, select one from the list

Thus, such events will be triggered each time the corresponding code is received from Gallagher. One event corresponds to one code from a specific door: create multiple events if required.




Add door action in E&A

Correspondingly, door action can be created from the *Events & Actions* section > *Actions* by clicking the + *New action* button from the upper panel. Available settings:

- **Action type:** Door action
- **Title:** user-defined action name, which will appear in E&A Configurator

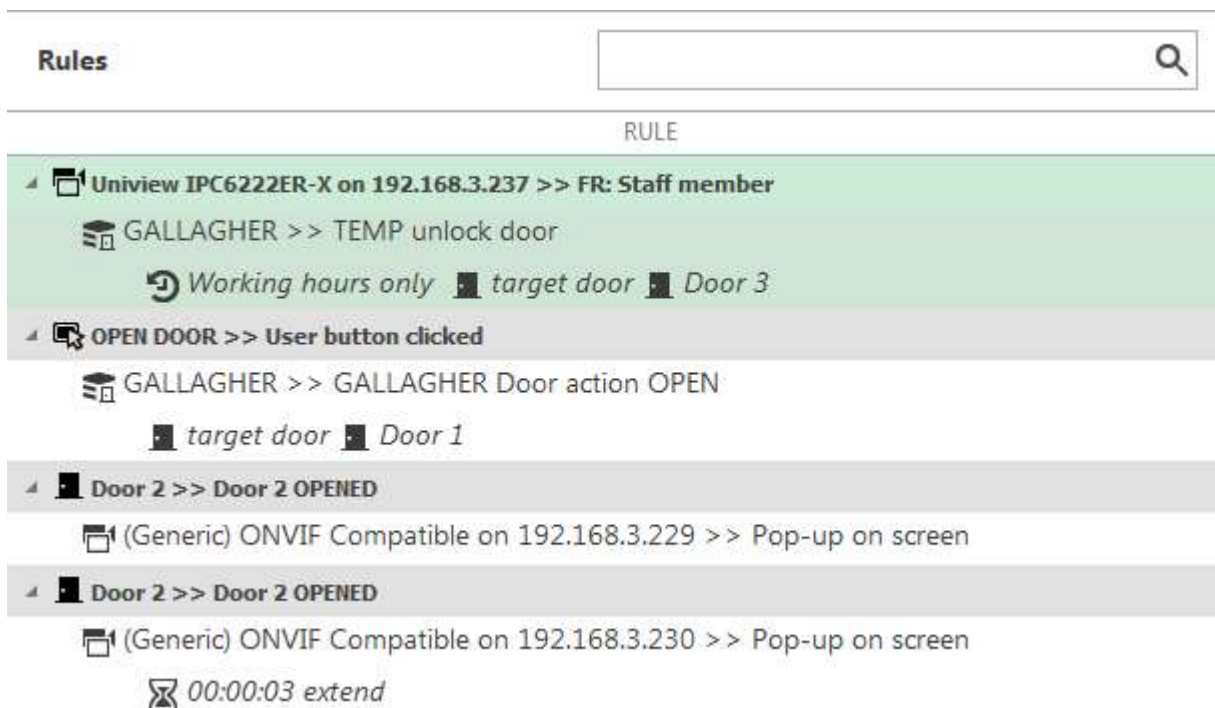
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- **Target:** your Gallagher connection
- **Code:** select the desired action from the list
 - *Lock:* change the door state to *Locked*
 - *Unlock:* change the door state to *Unlocked*
 - *TempUnlock:* open (unlock) the door temporarily, then lock it back after ~5s

 The *Lock* and *Unlock* actions will only operate if the target door is the only **one** in the target **access zone** in Gallagher configuration. If there are multiple doors in the same access zone, these actions will still be available in Wavesys Console but will not actually work. For **multi-door** areas, use the *TempUnlock* action (open the door and close it automatically after a short timeout).

Finally, go to the Events & Actions section > choose Rules on the left > click the Open configurator button on the upper panel to bring up the E&A Configurator dialog box.

Here, you can use all your [events](#) and [actions](#), including those related to Gallagher, to build [automated scenarios](#). Every rule can also have modifiers: a [delay timer](#), a [condition](#), and a [schedule](#).



Rules

RULE

- Uniview IPC6222ER-X on 192.168.3.237 >> FR: Staff member
 - GALLAGHER >> TEMP unlock door
 - Working hours only target door Door 3
- OPEN DOOR >> User button clicked
 - GALLAGHER >> GALLAGHER Door action OPEN
 - target door Door 1
- Door 2 >> Door 2 OPENED
 - (Generic) ONVIF Compatible on 192.168.3.229 >> Pop-up on screen
- Door 2 >> Door 2 OPENED
 - (Generic) ONVIF Compatible on 192.168.3.230 >> Pop-up on screen
 - 00:00:03 extend

Create rules using door events and actions

Example: you can temporarily unlock a door by clicking a user button, or make it open automatically when a face from the staff database is recognized.

Gallagher in WVMS Monitor

Once your Gallagher service is paired with WVMS, you will see a new tab appear in the WVMS Monitor application. If you do not, make sure you are connected to the correct WVMS server.

Switch to the *Access control* tab to start working with its contents. Similarly to other [access control](#) integrations, there are three subsections here:

- **Events:** all events received from Gallagher
- **Doors:** the door list and related actions
- **Cardholders:** the list of cardholders

Note that the door list here will be loaded according to the user permissions. There are two user permissions for each door resource in Wavesys Console:

- *View:* see the door and its status in WVMS Monitor
- *Door actions:* have the Lock/Unlock/Temporarily Unlock buttons in WVMS Monitor

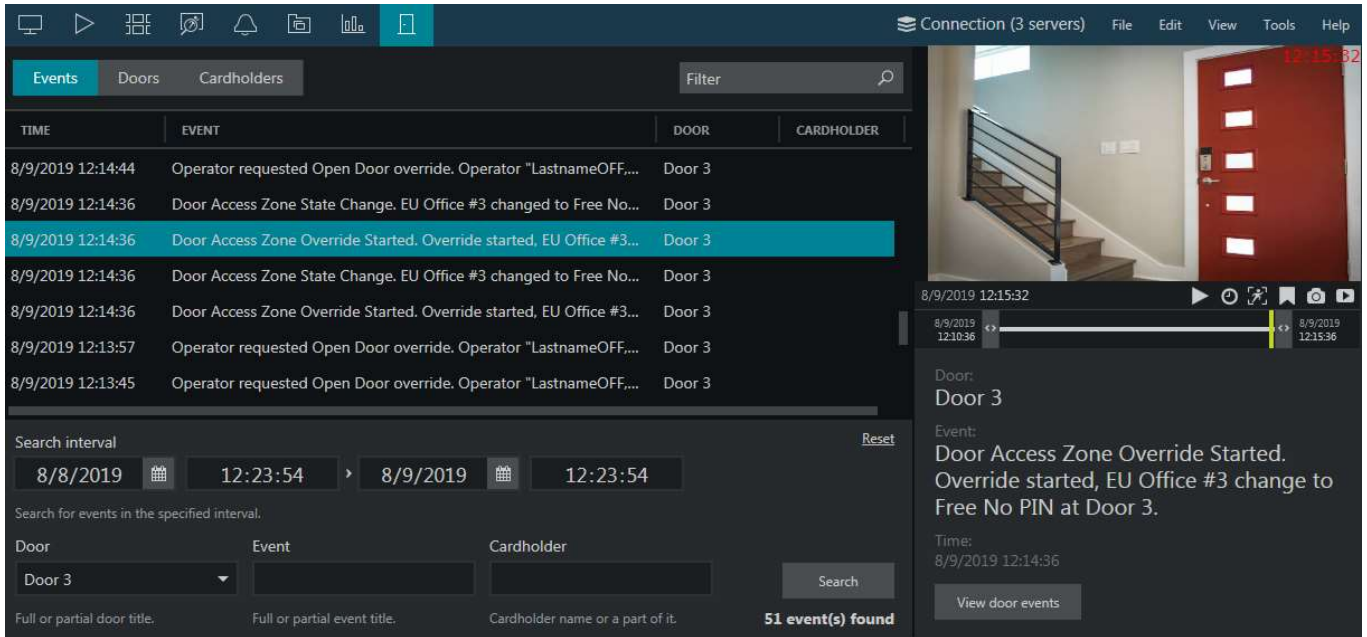
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Apart from this permission management via Wavesys Console, you can hide the *Access control* tab from all users via WVMS Monitor Restrictions (main menu *Tools > Administration Tool*).

Events

This section is almost identical to the *Event Trail* section in Gallagher Command Centre. Here, you will find door **events** - status changes, lock/unlock operations etc. - as well as other Gallagher events, such as: database maintenance notifications, configuration changes (e.g., new cardholder added), etc.

Enter the search **time range** and **criteria** in the bottom and click *Search*. The results will appear as a list. Use the *Reset* button to **discard** any entered criteria and use the default search settings (any event type, past 24h).



The screenshot displays the WVMS Monitor interface. At the top, there is a navigation bar with icons for home, play, list, search, and help, along with a menu (Connection (3 servers), File, Edit, View, Tools, Help). Below this is a tabbed interface with 'Events', 'Doors', and 'Cardholders' tabs. The 'Events' tab is active, showing a table of events for Door 3. The table has columns for TIME, EVENT, DOOR, and CARDHOLDER. One event is highlighted in blue: '8/9/2019 12:14:36 Door Access Zone Override Started. Override started, EU Office #3... Door 3'. Below the table is a search section with a 'Search interval' field set to '8/8/2019 12:23:54' to '8/9/2019 12:23:54', and a 'Search' button. To the right of the table is a video player showing a live feed of a red door. Below the video player is a detailed view of the selected event, showing the door name 'Door 3', the event description 'Door Access Zone Override Started. Override started, EU Office #3 change to Free No PIN at Door 3.', and the time '8/9/2019 12:14:36'. A 'View door events' button is also present.

TIME	EVENT	DOOR	CARDHOLDER
8/9/2019 12:14:44	Operator requested Open Door override. Operator "LastnameOFF,...	Door 3	
8/9/2019 12:14:36	Door Access Zone State Change. EU Office #3 changed to Free No...	Door 3	
8/9/2019 12:14:36	Door Access Zone Override Started. Override started, EU Office #3...	Door 3	
8/9/2019 12:14:36	Door Access Zone State Change. EU Office #3 changed to Free No...	Door 3	
8/9/2019 12:14:36	Door Access Zone Override Started. Override started, EU Office #3...	Door 3	
8/9/2019 12:13:57	Operator requested Open Door override. Operator "LastnameOFF,...	Door 3	
8/9/2019 12:13:45	Operator requested Open Door override. Operator "LastnameOFF,...	Door 3	

Gallagher events in the WVMS Monitor application

Click any event in the list to see **details** on the right. If the clicked event is related to a door, you will see the linked channel's video appear in the **instant playback** mode. Click the *View door events* button below to view the target door events for the past 24h.

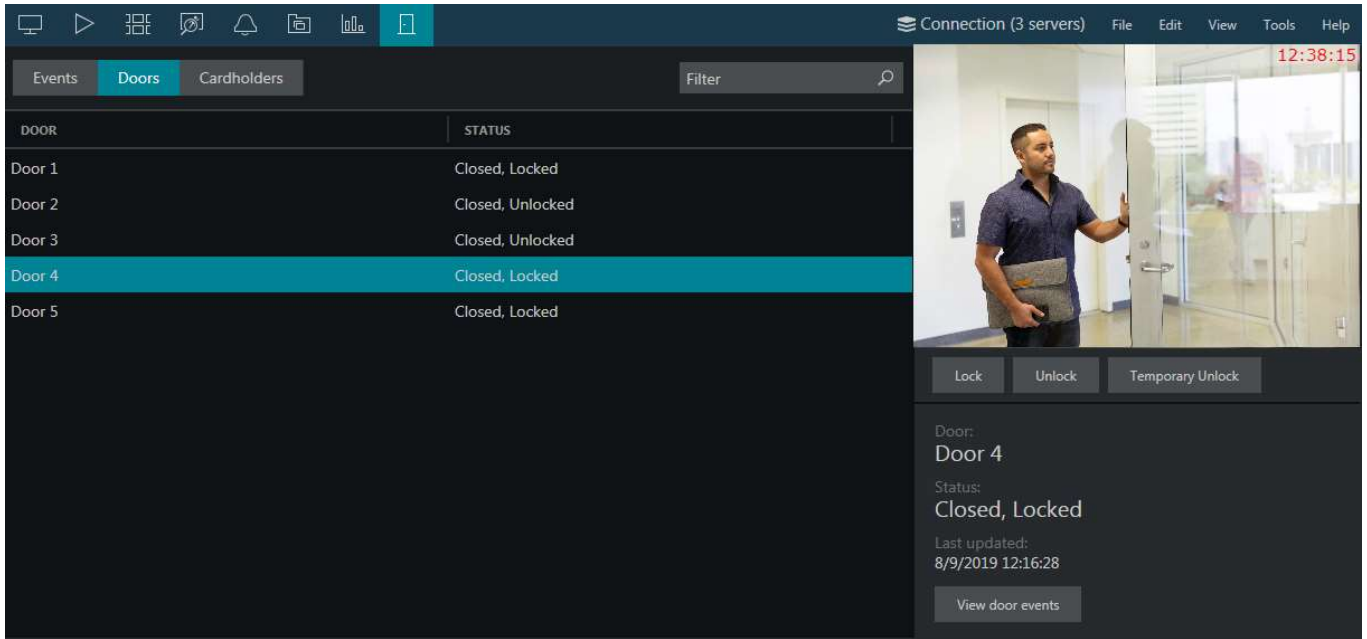
Doors

This tab contains the **list of doors** retrieved from Gallagher. Each door will have its current state reflected in the *Status* tab.

Click any door to see more details on the right:

- see the live video from the associated video channel
- click the *Lock*, *Unlock*, or *Temporarily Unlock* buttons to perform the corresponding action (similarly to E&A actions, *Lock/Unlock* will only work for single door zones)
- click the *View door events* button to switch to the *Events* tab: target door events for the past 24h will be shown automatically

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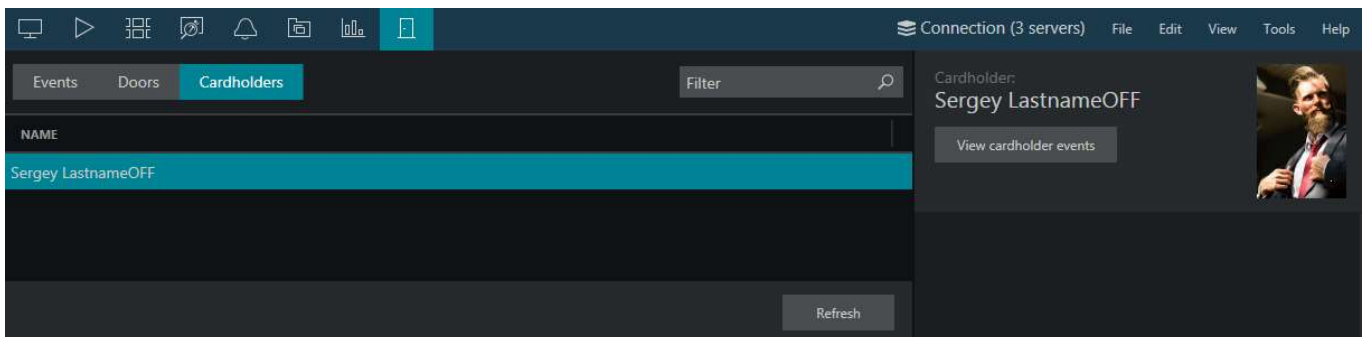


Door list in the *Access Control* tab

Cardholders

You will see all existing **cardholders** fetched from Gallagher here. As there are no cardholder associated actions, the extra details here will be the name and picture.

Click the *View cardholder events* button to switch to the *Events* tab and see the related events for the past 24h. Use the *Refresh* button in the bottom to **reload** the cardholder list and details - this comes useful if there have been changes on the Gallagher side, which have not been synchronised with WVMS yet.



List of cardholders

Maps

If you have created **maps** with **door markers** on them, you will be able to use these maps in the *Live* and *Playback* tabs, as usual. Each door marker, when clicked (or double-clicked, depending on your application setting), will provide an opportunity to lock, unlock, or temporarily unlock the target door. This functionality is identical to door actions in E&A and door buttons in the *Access control* tab.

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69 Camio

Camio video analytics is a cloud service that can do intelligent video analytics based on the provided video stream. Its integration with WVMS is built using REST API. To link WVMS server to your existing Camio account, add it as an [external service](#) by following the steps below.

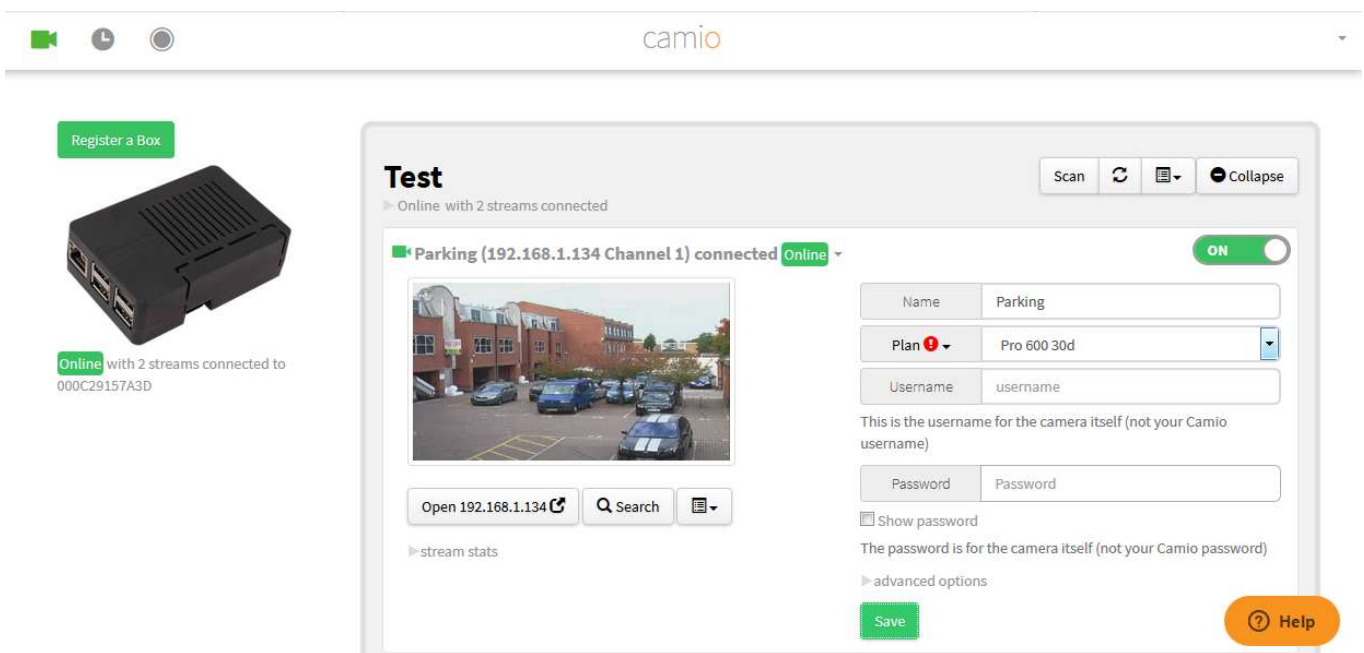
WVMS already has the Camio cloud service address. All you need to do is make sure you have added your Camio box to the service Web interface, then add the service connection in Wavesys Console and configure a channel (or channels) to be processed. WVMS will then receive analytical events and will also allow searching the result database. The architecture is such that your WVMS server connects to the Camio cloud service. Then, Camio boxes accept H.264 RTSP streams from WVMS for video analysis. Whenever there is an event, the box sends it to the Camio cloud service, and then it is forwarded to the WVMS server.

The steps described below will help you connect to Camio from your WVMS server and take advantage of its video analytics. Note that this document does not provide detailed details on Camio services. For elaborate Camio configuration and usage guidelines, please refer to its own supporting documentation and/or technical support.

Prepare Camio

Log into your Camio account via Web browser and add a **box**. You can do this by clicking your account name in the upper right corner and then by clicking the *Register Box* button. This will allow you to add WVMS channels in Wavesys Console later.

⚠️ Your Camio **box must be in the **same network** as your Wavesys WVMS Professional or Wavesys WVMS Enterprise server.**



Camio Web interface

One more preliminary step here is to generate a **token** for the WVMS connection. To do this, click your account in the upper right corner and go to *Settings > Integrations*, then click the *Generate Token* button in the API section. Save your token somewhere: you will need to enter it when creating a Camio connection in Wavesys Console. If you forget/lose the existing token, you will have to generate a new one, and all current connections using the old token will cease to function.


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The screenshot shows the 'Integrations' page in the Camio web interface. At the top, there are 'Feed' and 'Live' status indicators. The main heading is 'Integrations'. Below this, there are two sections: 'API' and 'API Client'. The 'API' section contains a 'Developer OAuth Token' field with a value 'KC215xSW-aAw1NNFB9vuC2i6K51fO KC' and a 'Regenerate Token' button. The 'API Client' section contains an 'Application Settings' form with fields for 'Client ID', 'Client Secret', 'Application Name', 'Application Description', 'Website URL', and 'Redirect URI'. The values for these fields are: Client ID: Leu5WQoVrpaQ957mcKx-c5ev0xsJWQoV; Client Secret: LJGYuti0UVFpKUFd1maYyRlor_KPmSM0RHFXkz49-Jd7BBJn9rK0Kf988WQoV; Application Name: Camio; Application Description: Camio; Website URL: http://82.193.82.11:7905; Redirect URI: http://82.193.82.11:7905. There are 'Delete' and 'Save' buttons at the bottom of the form.

WVMS server address and HTTP port in the Camio Web interface settings

From the WVMS server side, make sure you have the external server address (**Internet address**) specified, internet HTTP **port** enabled (different from zero) and opened on the firewall/router. A simple test to check if the configuration is valid is to try entering your WVMS server URL into the browser address bar: you should be able to see the streaming server interface. Use this **address and port in the Camio Web** interface to pair it with WVMS server.

Example: if your WVMS address is 82.193.82.11 and internet HTTP port is set to 7865, enter <http://82.193.82.11:7865> into your browser (better test it from another computer, and another network) and verify that you can see the WVMS Web client. If successful, use the same address for Camio Web.

 Make sure that your **port forwarding** setup works and that your WVMS server is **reachable** from the **Internet** via **HTTP**. (You should be able to open the WVMS Web UI from other PC over the Internet, otherwise, Camio will be unable to connect, and it will not work.)

In other words: Camio can connect to WVMS servers only using the HTTP API, which is available at the same URL as the WVMS Web interface. So, in order for the system to function correctly, specify the WVMS Web interface URL and the HTTP port in the Camio settings under API Client, on the same screen where the token is generated.

Add External Service

The next step is to add Camio **connection** into the WVMS server configuration. This integration supports Camio as an [external service](#), with a slight difference: external services like LPR and FR appear in Wavesys Console automatically while Camio service must be added **manually**. For Wavesys WVMS Enterprise systems, Camio works only with the central server, and not with any of the recording servers directly.

Connect to your WVMS server via Wavesys Console. Open the *Configuration* section and select *External services* on the left. Add a new connection by clicking the *New Camio service* button on the top panel.

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The screenshot shows a dialog box titled 'External service Camio Service 1*'. On the left, there is a sidebar with 'External service' selected, and sub-items for 'Details*', 'Cameras', and 'Events'. The main area is the 'Details' tab, which contains the following fields:

- Title:** A text box containing 'Camio Service 1'. Below it is the label 'External service title'.
- Group:** A dropdown menu showing 'Camio Group'. To its right is a 'Change...' button. Below it is the label 'Group to which the external service belongs'.
- Token:** A text box containing '8Sv399x5JVmBxj8BtlbzTyc-FoCLYrgt'. Below it is the label 'Token'.
- Public URL:** A text box containing 'http://82.193.82.1:17901'. Below it is the label 'Public URL'.

At the bottom right of the dialog, there are 'OK' and 'Cancel' buttons.

Create a new Camio service connection

The following settings are to be specified here in the *Details* tab:

- **Title:** user-defined service name, which will appear in Wavesys Console and WVMS Monitor
- **Group:** external service group, mandatory*
- **Token:** copy and paste the token generated in the Camio Web interface (as described above)
- **Public URL:** external WVMS address (IP/hostname and HTTP port) for the Camio cloud connection**
- **Server:** local IP address of the Wavesys WVMS Professional server (this field is ONLY for Wavesys WVMS Professional)

*You will need to create an external service group to put the Camio connection into. The group is necessary for the permission management and also ensures that the service appear in the WVMS Monitor application. Without the group, your Camio connection will not be visible in WVMS Monitor. If there are multiple Camio connections, you can either create a new group for each one, or put all similar external services into one group. Do not mix different external services by putting them into one group.

**Simply forward your WVMS server HTTP port to an external port, and/or open this HTTP port on your router firewall. Camio services are not available without the Internet connection, as the company only provides cloud services.

When done, click *OK* to save and close the dialog box. Your new Camio connection will appear in the list. To check the service status, go to the *Monitoring* section in Wavesys Console and select *External services* on the left.

Add Channels For Analysis

Camio can use HTTP connection with or without authorization, and WVMS can work with either option.

1) To set up a connection **without authorization**: WVMS has a special built-in *Anonymous user* account for such situations. All you need to do is **enable** the **anonymous user** and then allow him to receive **live video** for the required channel(s).

- Enable the **anonymous user account**: *Configuration > Users > select anonymous in the list > Edit* (or double-click the user in the list) > *Enable > OK*.
- Add **permission**: *Configuration > Channels > click target channel > Edit* (or double-click it in the list) > *Permissions > select the anonymous user account on the right > grant the View live video permission*.

2) A more secure way is to specify the WVMS **user** and use **digest authentication** with Camio. For this, specify the internal WVMS **user name** and **password** in the camera details (see below).

Back in the *Configuration* section > *External services*, double-click your Camio service, or select it and click *Edit* on the upper panel. Select the *Cameras* tab on the left.

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Here, click the **+New** button and **fill in the camera details**. Basically, you need to bind an existing WVMS channel to one of your Camio boxes. To do this, first select the channel, and then specify the Camio box by selecting it from the list. Click **OK** to save and close the dialog box.

⚠ Camio only supports H.264 RTSP streams. HEVC (H.265) or JPEG streams will have an error in the service Web interface and will not be analysed.

⚠ Make sure the channel name does **not** have any special characters, especially **backslashes**, otherwise Camio will be unable to parse the channel name.

If the box list appears empty, double-check your Camio connection parameters: the token may be incorrect. If the connection does not work and you know the token is correct, try generating a new token via service Web interface and then pasting the new token into Camio connection in Wavesys Console.

CHANNEL	CAMIO BOX
1080p Emul (105)	Test #2

Add video channels to be sent to Camio for analysis

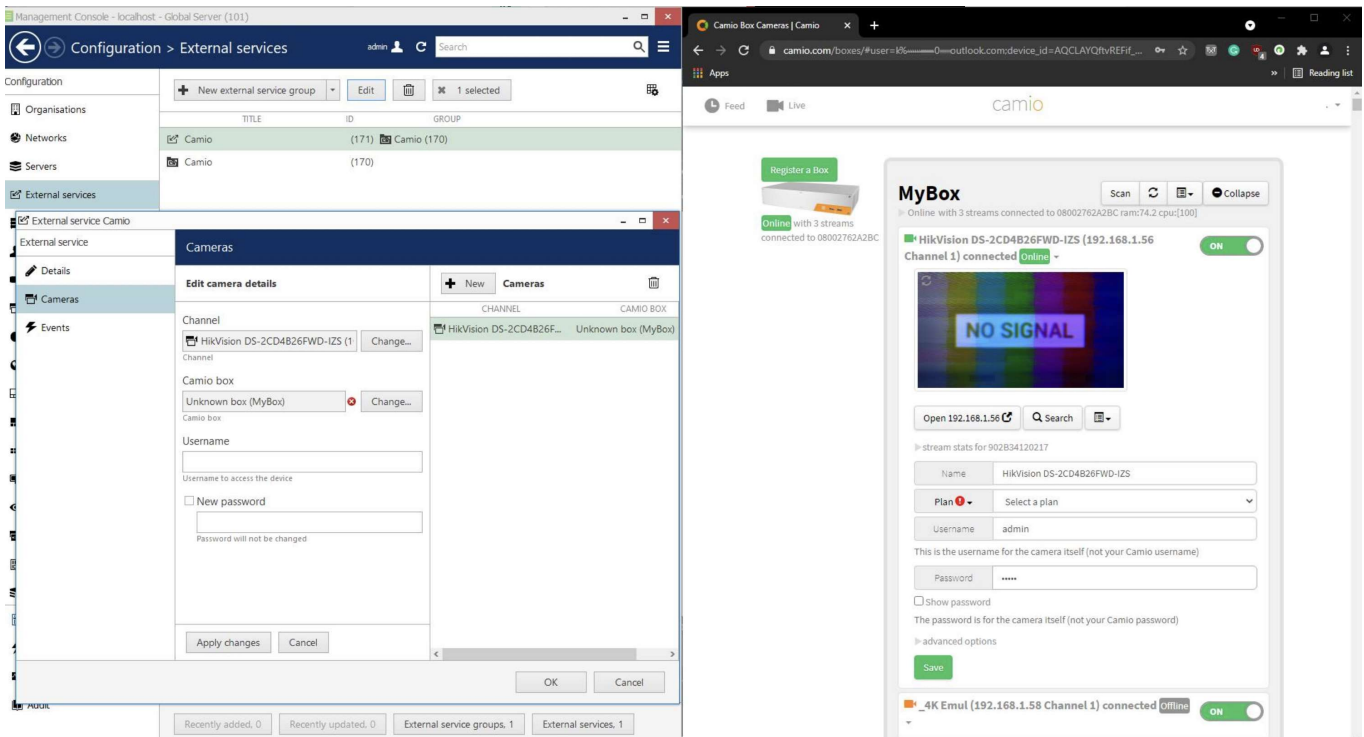
Next, make sure your Camio channel is set to **continuous recording** in Wavesys Console.

Then, go to the Camio Web interface: your channel will appear **live** in the *Boxes* section. This will happen **automatically**, you do **not** need to add the camera manually in the Web interface.

⚠ If you did everything right, your channel will appear on Camio Web **automatically**. Do not add it in Camio UI!


All is left to do is select a **plan** for the target channel (you may have to purchase it from the Camio provider). If the channel is inactive, click the ON/OFF toggle button on the right to activate. The ON position (green) indicates that the channel analysis is activated.

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*Configuration result: if everything is correct, the channel will appear in Camio Web UI as the **first** one in the list*

Next to the channel title, you will see its **status**: if the video is coming through, the status should be *Online*. If you disable the channel in Wavesys Console or there is no actual video, the channel status will appear as *Offline*. Click the *Stream stats* under the live preview to see the video parameters. If something is wrong (e.g., stream codec is not supported), you will see a red exclamation mark: click on it to see more information.

 Some channels may not have the live preview video alongside with the ON/Online status, no errors, and video presence in Wavesys Console and WVMS Monitor. This does not depend on WVMS. Usually, this does not affect video analysis and you are able to see the search results. For troubleshooting this and other Web-related issues, kindly contact Camio support.

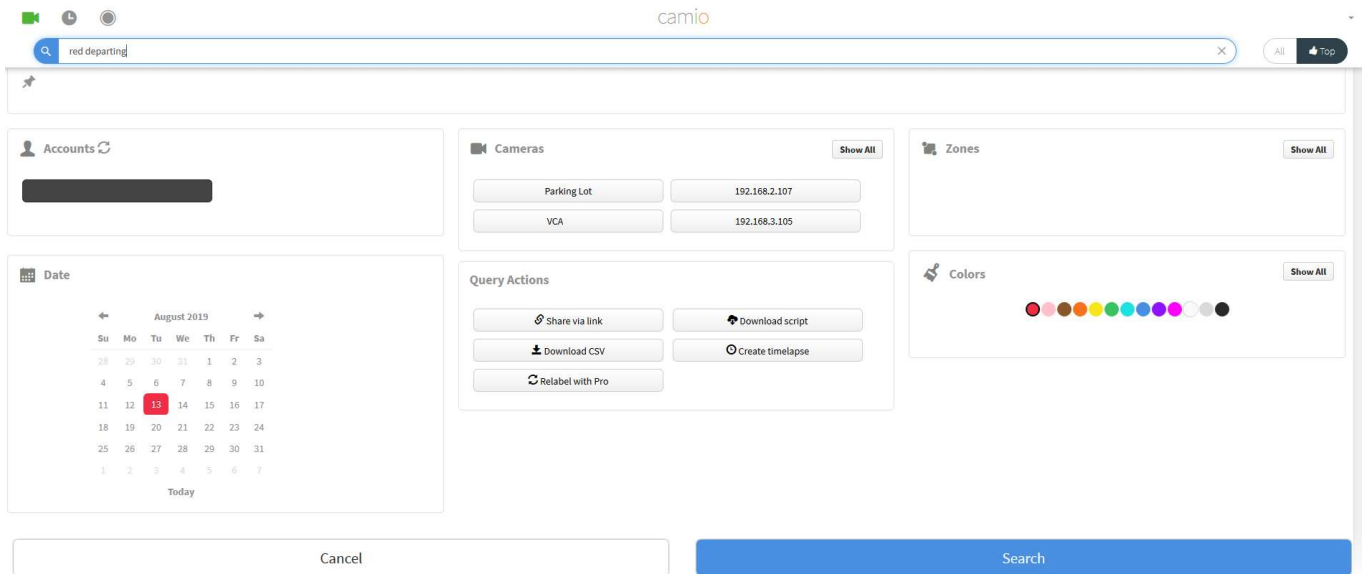
Camio will now start analysing your video stream and send the results back to WVMS. You can also search the event archive on the service Web.

Web Search

On Camio Web, click the *Search* button below the channel live preview to enter the search mode. The Web search for your WVMS channels works in the same way as for any other channels in Camio.

If Web search does not work, kindly contact Camio technical support.

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Use Web based search for your channel

WVMS Monitor Search

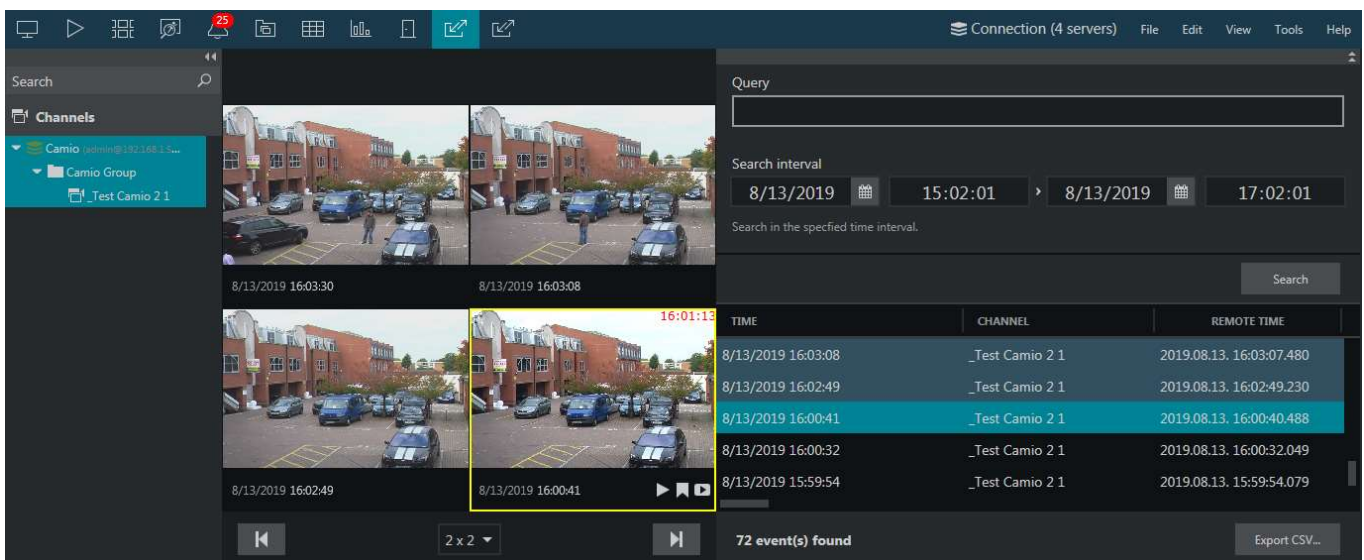
The current integration allows searching the Camio events from the WVMS Monitor application.

Open your WVMS Monitor application and connect to any WVMS server that is linked with Camio. You will see an extra tab on the upper panel named after your Camio external service group.

The search logic is similar to that for other external services:

- in the *Resources* panel on the left, click the + (plus) icon next to the channels you wish to see results from: the **selected** channel(s) will be marked **blue**
- in the right-hand-side panel, enter the **search parameters**:
 - **Query**: text tag to search for, e.g., car, human, truck, also colours
 - **Search interval**: the time range to be searched for events

When ready, hit *Search*. If there are any **results** for your request, they will appear in the list below and in the grid in the central area. Click any picture to play back the corresponding portion of the video archive. The video clip will be played in a loop.



Camio event search in WVMS Monitor

Wavesys WVMS Professional Administration Guide

You can change the grid size by selecting it from the drop-down list below the grid. The available options range from 1x1 and up to 6x6. The single viewport option will provide you will fully functional instant playback, and the rest of the options (2x2..6x6) are similar to the result preview in *Smart Search* mode., allowing you to add bookmarks, export the result video clips, and switch to the regular playback mode.

Use the arrows |< and >| to load the previous/next portion of the results. You can also do the same by browsing the result list: upon clicking a result from the faraway time range, the target results and its neighbours will be placed onto the preview area.

⚠ If the search produces **no results** at all, try the same request on Camio Web: if there are no results on the **Web**, too, kindly contact Camio technical support.

You can also **save** the list of your **search results** by clicking the *Export CSV* button in the bottom right corner.

Events & Actions

WVMS E&A Manager provides a powerful mechanism to automate things in your CCTV ecosystem. There are **Camio-specific events** supported by current integration that include reactions to certain keywords. The whole configuration is done via Wavesys Console. First, you pre-set the **keywords** (tags) of interest in the Camio service settings, and then set up events using these tags in the Event & Action Configurator. These events can be later added to E&A rules, as usual.

Preliminary event setup: in Wavesys Console, go to the *Configuration* section > *External services* > open your Camio service for editing > switch to the *Events* tab.

Click the + *New* button and enter a keyword or a keyword combination that should trigger the event. Click *Apply changes* to save the current entry, or click *cancel* to discard the changes. To add another one, click the + *New* button again and repeat. To remove any entry, use the recycle bin button in the upper right corner (also works for several items selected using *CTRL+click*).

The screenshot shows a web application window titled "External service Camio Service 2*". On the left, a sidebar contains "Details", "Cameras", and "Events*" (selected). The main area is split into two panels. The left panel, titled "Edit event details", has a "Query" section with a text input field containing "red departing" and a "Query text" label below it. At the bottom of this panel are "Apply changes" and "Cancel" buttons. The right panel, titled "Events", has a "+ New" button and a trash icon. Below is a list of keywords under the heading "QUERY": "black departing", "red departing" (highlighted in green), "black approaching", "house gray vehicle", "car luxury", "pedestrian human walk", "volkswagen orange brown", and "street road lane infrastructure". At the bottom right of the window are "OK" and "Cancel" buttons.

Camio event preparation

Main setup: switch to the *Events & Actions* section > choose *Events* on the left. Click the + *New event* button on the top panel to bring up the dialog box.

Set event type to *External service* and fill in the parameters:

- **Title:** user-defined event name
- **Source:** video channel that serves as the event source
- **Service group:** select your Camio service group
- **Target event:** choose one of the keyword sets you have specified earlier

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If the group list is empty, make sure you have followed the steps above to create both external service and a group for it, and that one field above you have selected a channel that is actually used by that service group. And, if the event list is empty, follow the steps above to add the keywords of interest in the external service settings.

Event Red car departing - Camio*

Event

Details

Details*

Event type

External service

Select event type from list of possible event types

Title

Red car departing - Camio

Event name

Source

_Test Camio 2 1

Change...

Event source

Service group

Camio Group

Change...

Service group

Target event

none

house gray vehicle

volkswagen orange brown

black departing

red departing

black approaching

pedestrian human walk

street road lane infrastructure

car luxury

OK

Cancel

New Camio event

When done, click *OK* to save and close the dialog box. The newly created event will appear in the list, and also in the E&A Configurator (for the server containing the target channel). Now you can use this event for building your automated scenarios.



Events from Camio service arrive with a **30-60s delay**. This does not depend on the WVMS software. Please keep this in mind when configuring rules with Camio events.


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70 Health Monitoring

WVMS provides **health monitoring data** for servers, devices and channels, as well as **live status** of connected user sessions and other resource information. In the *Archive statistics section*, it is possible to view the stream details and also **un-protect** footage that has been locked via WVMS Monitor application.

To access the live monitoring data in Wavesys Console, choose the *Monitoring* section in the bottom-left-hand panel and switch between components using the menu on the left. Use the *Search* field in the upper-right-hand menu to filter the records; press the *Refresh* button or **F5** on your keyboard to **reload** the item list. The statistics are not refreshed automatically, so do not forget to reload the list in order to obtain the most recent information.

The contents of any subsection in *Monitoring* can be exported in **CSV** (comma-separated value) format using the button on the upper panel.

Each section here contains a number of columns with miscellaneous information. Not all of them are available by default; to modify the displayed details and their layout, use the grid icon  in the upper right corner: an additional configuration window will pop up. You can hide the fields you do not need, and also freeze the leftmost columns for convenient horizontal scrolling. Hidden fields cannot be used for search or sorting.

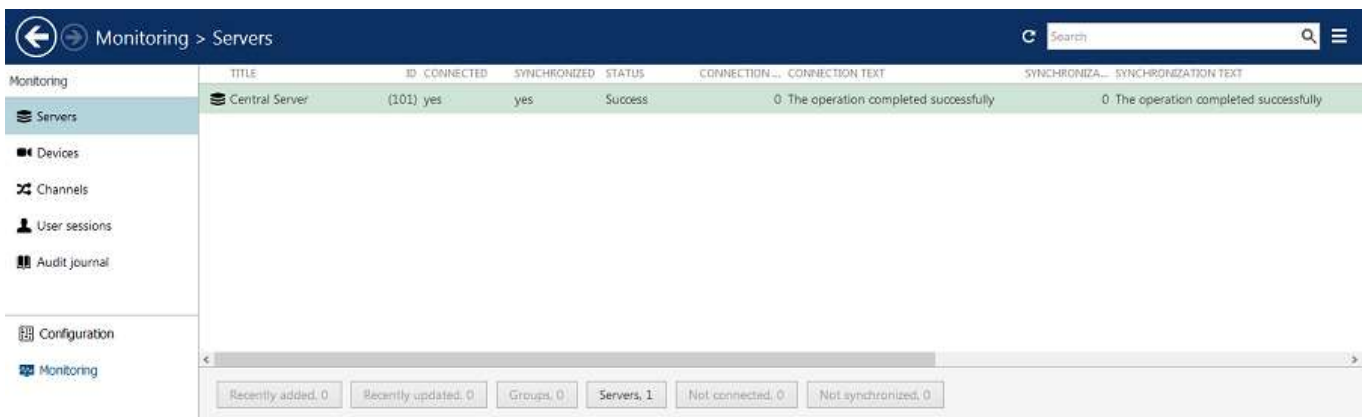
The *Details* button (available for some of the sections) on the top panel allows you to view **detailed information about important events** related to the target resource. For example, you can view the list of recent connection and VCA license errors for every channel. The details are discarded after each server reboot.

All information written in plain black is informative. When things go wrong, there are two levels of errors here: **critical** and **warning**. Critical errors are marked **red**; those usually indicate important stuff like missing main stream video, no connection to services etc. Warnings are **yellow** and are used to highlight minor issues like missing secondary stream, too long GOP period, or not enough space on the disk. You can ignore warnings by right-clicking the selected items and selecting *Ignore > (preference)*. This helps if the warning is irrelevant, e.g., if you do not use substreams. Critical errors cannot be ignored as they need to be fixed for correct server operation.

Further in this chapter you will find a brief description of each information field.

Servers

The server status includes information about connection and synchronisation: both have numeric status code and corresponding textual status.



TITLE	ID	CONNECTED	SYNCHRONIZED	STATUS	CONNECTION...	CONNECTION TEXT	SYNCHRONIZA...	SYNCHRONIZATION TEXT
Central Server	(101)	yes	yes	Success	0	The operation completed successfully	0	The operation completed successfully

Summary statistics: Recently added: 0, Recently updated: 0, Groups: 0, Servers: 1, Not connected: 0, Not synchronized: 0

Servers live monitoring

Devices

The device summary provides configuration update status and the time of the last communication between the server and device.

The following fields are available:

- **Title:** device name
- **Status:** current device condition
 - *Normal:* the device is functioning properly

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- **Unknown:** the device's channel is disabled, or the device core has not been loaded yet (may appear shortly after server startup)
- **Server:** current server that has this device assigned (may be regular recording server or failover)
- **Devices/model:** device type or model
- **Status update time:** last sync/connection attempt timestamp
- **Information:** additional information, if any, will be displayed here (usually, errors; normally, the field is empty)
- **Host:** device IP address or hostname
- **Port:** device HTTP/HTTPS port (from device settings, used to exchange service information, not data)

TITLE	ID	SERVER	DEVICES/MODEL	TIME	CONFIGURA...	CONFIGURATION UPDATE RESULT TEXT	STATUS
(Generic) ONVIF Compatible ...	(103)	Central Server (101)	ONVIF Compatible	11:57:44 AM	0	The operation completed successfully	Success
Asani CAM613 on 192.168.3...	(102)	Central Server (101)	CAM613	11:57:44 AM	0	The operation completed successfully	Success
Grundig GCI-G1536F on 192...	(109)	Central Server (101)	GCI-G1536F	11:57:44 AM	0	The operation completed successfully	Success
Grundig GCI-K0622D on 192...	(108)	Central Server (101)	GCI-K0622D	11:57:44 AM	0	The operation completed successfully	Success
Grundig GCI-K1627D on 192...	(111)	Central Server (101)	GCI-K1627D	11:57:44 AM	0	The operation completed successfully	Success
Vivotek FD8154 on 192.168...	(110)	Central Server (101)	FD8154	11:57:44 AM	0	The operation completed successfully	Success
Vivotek IP7131 on 192.168.3...	(107)	Central Server (101)	IP7131	11:57:44 AM	0	The operation completed successfully	Success

Monitoring > Devices

Monitoring

Servers

Devices

Channels

User sessions

Audit journal

Configuration

Monitoring

Recently added, 0

Recently updated, 0

Groups, 0

Devices, 7

Devices live monitoring

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Channels

The channel monitoring section contains details about channel streams. Wherever relevant, there is information about both main and secondary video streams in separate columns.

Channels can have critical errors (red) and/or **warnings** (yellow). Warnings usually appear due to minor issues - e.g., missing substream, too big GOP length etc. You can **ignore** them by right-clicking item(s) and selecting *Ignore warnings > (preference)*. If you want the warnings to be shown again, right-click the items and select *Reset warnings*. To **reset** all warnings, go to the Wavesys Console application settings (main menu > Settings) and select the corresponding option.



4 critical errors and 10 warnings for channels in the *Monitoring* section

- **Title:** channel name
- **Server:** the server currently handling the target channel's device
- **Device:** the name of the underlying hardware piece for the target channel
- **Device model:** underlying device type
- **Organisation:** if the channel belongs to an organisation, it will be displayed here
- **Status:** current channel condition (e.g., Disabled means the channel has been turned OFF in the *Channels* section)
- **Status update time:** timestamp of when the channel status was last checked
- **Online:** shows channel uptime in percents compared to the total server run time
- **Video loss duration:** shows if the video stream is not available; if yes, for how long the video stream has been lost
- **Kbit/s:** stream bit rate (Kbits per second), separate columns for the main and secondary streams
- **FPS:** stream frame rate (frames per second), separate columns for the main and secondary streams
- **Resolution:** frame size in pixels, separate columns for the main and secondary streams
- **Codec:** stream compression, for both main and secondary streams, separate columns for the main and secondary streams
- **GOP size:** key frame interval, for both main and secondary streams (only if recording is activated), separate columns for the main and secondary streams
- **Recording:** recording status ON/OFF (activated/not activated)
- **Recording error:** if any
- **Frame cache:** the amount of memory allocated for pre-recording of the target channel (total for all channel streams)
- **Stream storage:** destination storage, for main, secondary, and edge streams
- **Information:** additional information, if any, will be displayed here (usually, errors or warnings; normally, the field is empty)
- **Motion detection mode:** currently used motion detection setting (disabled/camera-side/software-side high accuracy mode/software-side high performance mode)
- **IP:** device IP address or hostname
- **Port:** device HTTP/HTTPS port (from device settings, used to exchange service information, not data)
- **Jitter:** frame latency; shows delay (in milliseconds) between expected and actual frame arrival time, separate columns for the main and secondary streams
- **Error:** the latest error related to the channel (same as in *Details*, reset upon server restart)
- **Error date:** the latest error timestamp

For any channel, you can press the *Details* button on the upper panel to see the list of all **channel-related errors**, starting from last the server start. This list is purged upon server restart.

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💡 Only channels attached to servers are shown here.

Note that *Not activated* recording status may both mean either that recording is not configured (disabled) or that recording has not been activated according to a schedule. The *Activated* status will appear if at least one of the channel streams is set to be recorded based on any configuration apart from *No recording*.

TITLE	ID	SERVER	STATUS	TIME	CONFIGURAT...	CONFIGURATION UPDATE RESULT	TEXT	VIDEO LOST	BITRATE
(Generic) ONVIF Compatible ...	(106)	Central Server (101)	Success	12:23:30 PM	0	The operation completed successfully			98893
Asoni CAM613 on 192.168.3...	(104)	Central Server (101)	Success	12:23:30 PM	0	The operation completed successfully	yes		0
Asoni CAM613 on 192.168.3...	(105)	Central Server (101)	Success	12:23:30 PM	0	The operation completed successfully	yes		0
Grundig GCI-G1536F on 192...	(114)	Central Server (101)	Success	12:23:30 PM	0	The operation completed successfully			471087
Grundig GCI-K0622D on 192...	(113)	Central Server (101)	Success	12:23:30 PM	0	The operation completed successfully			53273
Grundig GCI-K1627D on 192...	(116)	Central Server (101)	Success	12:23:30 PM	0	The operation completed successfully			68642
Vivotek FD8154 on 192.168...	(115)	Central Server (101)	Success	12:23:30 PM	0	The operation completed successfully			33169
Vivotek IP7131 on 192.168.3...	(112)	Central Server (101)	Success	12:23:30 PM	0	The operation completed successfully			29266

Channels live monitoring

Streams

This section displays the properties of **every recorded stream** separately. For example, if a channel has both main and secondary streams with audio activated, there will be three entries. Replication streams are also displayed separately.

- **Channel:** stream source, one of the existing enabled channels
- **Stream type:** video, audio, motion, external data (from [data sources](#)), or VCA metadata
- **Status:** current stream condition
- **Server:** originating server
- **Device:** originating device
- **Status time:** last status update timestamp
- **Recording storage:** target storage title
- **Recording directory:** one of the target storages on the corresponding server
- **Last recording time:** timestamp of the last recorded frame (useful for troubleshooting the recording)
- **Prerecording time:** actual number of second held in the pre-recording buffer (may be lower than the setting if not enough memory, or 0 when not required)
- **Information:** additional information, if any, will be displayed here (usually, errors; normally, the field is empty)

CHANNEL	STREAM TYPE	STATUS	SERVER	STATUS TIME	RECORDING STORAGE	LAST RECORDING TIME	PRERECORDING TIME
emul	Video stream	Normal	Global Server	7/12/2019 17:00:48	none	7/12/2019 16:59:18	0.0:00:05.000
emul 1	Video stream	Normal	Global Server	7/12/2019 17:00:48	none	7/12/2019 17:00:06	0.0:00:05.000
emul 10	Video stream	Normal	Global Server	7/12/2019 17:00:48	none	7/12/2019 16:59:50	0.0:00:05.000
emul 100	Video stream	Critical	Global Server	7/12/2019 17:00:48	none	7/12/2019 17:00:07	*0.0:00:03.950
emul 101	Video stream	Critical	Global Server	7/12/2019 17:00:48	none	7/12/2019 17:00:41	*0.0:00:03.099
emul 102	Video stream	Critical	Global Server	7/12/2019 17:00:48	none	7/12/2019 16:59:44	*0.0:00:02.150


Streams with reduced buffer size will have *Critical* status

Note that the **pre-recording** time here may differ from your pre-recording setting in the recording configuration. WVMS server applies smart logic here and traces situations when larger buffer is not necessary, or even preventing the system from normal operation. Thus:

- if the currently used recording profile does not involve any pre-recording (e.g., *Continuous recording*, or event-driven with no defined E&A events), the buffer size will be reduced to 0
- if there is not enough memory for all channels (the server is overloaded), the server will reduce pre-

Wavesys WVMS Professional Administration Guide

- recording buffers; channels with largest frame cache size will have their buffers reduces first pf all
- upon server startup, the buffer size is increased gradually for smoother start

 Removed and disabled channels will not be shown under this section: only active recorder tasks are displayed here.

Archive Statistics

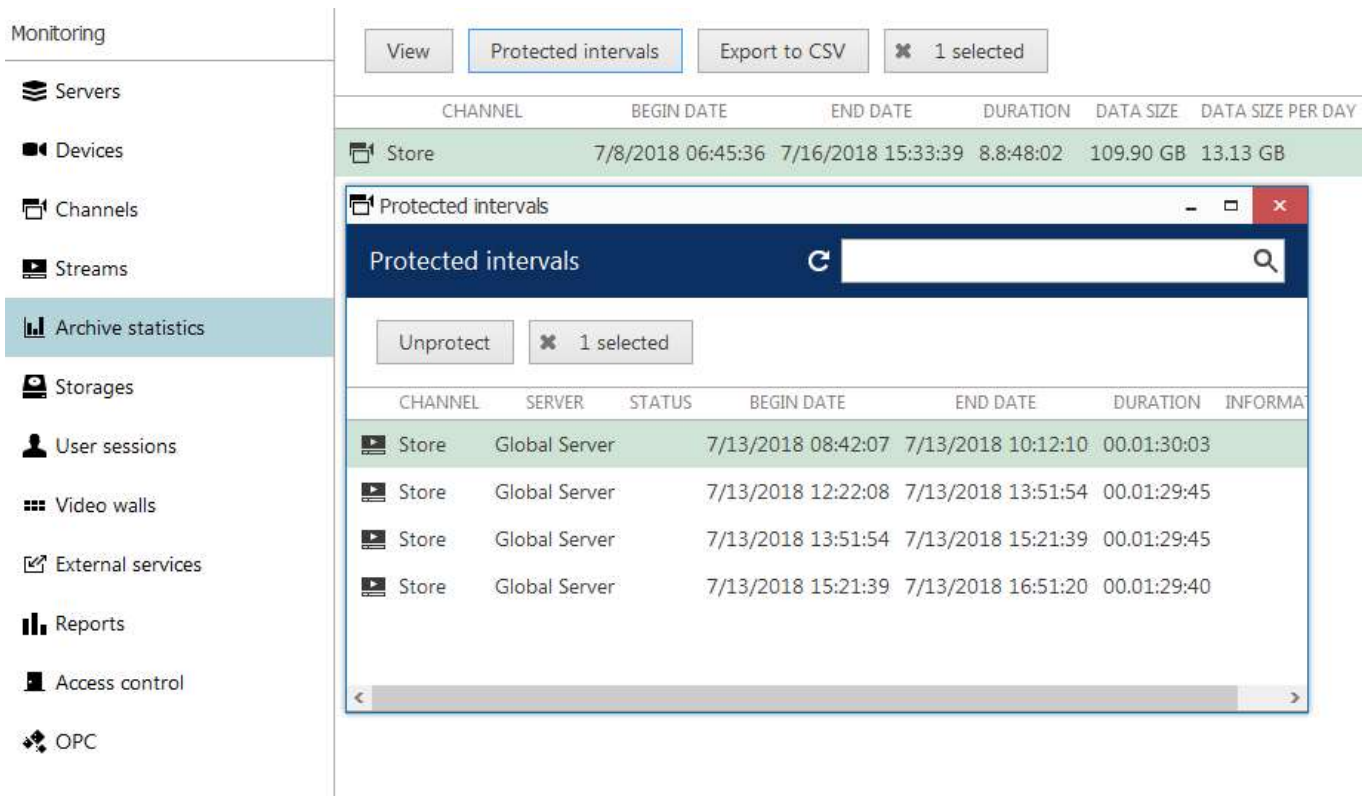
Here, you can see recording statistics for every channel (all streams and all storages included):

- Channel:** configured channel title
- Begin date:** the time of the very first recording for the target channel
- End date:** the time of the very last channel's recording
- Duration:** total archive duration for each channel
- Data size:** total archive size per channel, based on the time boundaries mentioned above
- Data size per day:** an estimate of how much space one day's recordings will take (average per day, calculated based on existing archive size)
- Protected interval:** total duration of the archive, which has been marked as protected, and will not be removed (erased)
- Protected data size:** total size of the protected archive

Double-click any entry or use the *View* button on the top panel to display details for each channel: view the recording statistics per storage and with detailed information on every stream including audio, motion, VCA and external data feeds.

To review and unlock the footage that has been protected from erasing via WVMS Monitor application, select the target channel(s) and click the Protected intervals button on the top panel.

From this dialog box, you can unlock the previously protected parts of the archive. If these recordings fall under quotas (storage or duration, server wide or individual), they will be erased immediately.



The screenshot shows the 'Archive statistics' section of the WVMS interface. The left sidebar contains a navigation menu with the following items: Servers, Devices, Channels, Streams, Archive statistics (selected), Storages, User sessions, Video walls, External services, Reports, Access control, and OPC. The main panel displays a table of channel statistics with columns: CHANNEL, BEGIN DATE, END DATE, DURATION, DATA SIZE, and DATA SIZE PER DAY. A single entry is shown for 'Store' with a duration of 8.8:48:02 and a data size of 109.90 GB. Below the table, there is a 'Protected intervals' dialog box. The dialog box has a title bar with 'Protected intervals' and a search icon. It contains an 'Unprotect' button and a '1 selected' indicator. Below the dialog box, there is a table of protected intervals with columns: CHANNEL, SERVER, STATUS, BEGIN DATE, END DATE, DURATION, and INFORMATION. The table shows four entries for 'Store' on 'Global Server' with various begin and end dates and durations.

CHANNEL	BEGIN DATE	END DATE	DURATION	DATA SIZE	DATA SIZE PER DAY
Store	7/8/2018 06:45:36	7/16/2018 15:33:39	8.8:48:02	109.90 GB	13.13 GB

CHANNEL	SERVER	STATUS	BEGIN DATE	END DATE	DURATION	INFORMATION
Store	Global Server		7/13/2018 08:42:07	7/13/2018 10:12:10	00.01:30:03	
Store	Global Server		7/13/2018 12:22:08	7/13/2018 13:51:54	00.01:29:45	
Store	Global Server		7/13/2018 13:51:54	7/13/2018 15:21:39	00.01:29:45	
Store	Global Server		7/13/2018 15:21:39	7/13/2018 16:51:20	00.01:29:40	

Archive statistics and protected archive intervals

Storages

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Statistics, properties and status for each storage unit are displayed here.

Some of the storages may have **warnings** (marked yellow) in case there is not enough space on the disk. In that case, check your assigned quotas in the storage management, and make sure you do not have too many protected intervals in the *Archive statistics* (see above).

- **Title:** storage label, either built-in or user-defined
- **Status:** operation status of the target storage
 - *Normal:* the storage can be used for recording and there are no issues detected
 - *Critical:* the storage cannot be used for recording due to one or more serious errors, check the Information column for description
- **Status update time:** last time the storage status was obtained (use the *F5* button on your keyboard to refresh the list)
- **Path:** storage path on its server of origin
- **Encrypted:** yes/no
- **Free space:** how much free space in gigabytes is left on the disk
- **Free space %:** same but shown as percentage in reference to the total storage size
- **Total space:** entire storage size
- **Information:** additional details, if any (e.g., storage related errors)
- **Disk queue length:** number of read/write requests (local storage only)*



All storage information is retrieved through the API of the underlying operating system. If you think some of the information may be incorrect, check the same statistics via Windows interface - Task manager, Resource monitor, or other utilities.

*The *Disk queue length* column is useful for assessing the **storage condition**. It reflects either the current or the average queue length (whichever is higher) per disk. Generally, 5+ requests per disk indicate a bottleneck in the disk subsystem. 2+ requests per disk for a long period of time may also indicate bottlenecks. For RAID storages, the queue length is summarized, so, for example, for a system with 8 disks the queue length should not exceed 16. A value of 0 means the storage is not overloaded. An absent value (**empty**) means it cannot be retrieved: the field will be empty for network storages and for unreachable disks (e.g., server offline).

If one or more storages have issues (e.g., incorrect password), the corresponding section will have a red circle with the number of detected issues next to the section name. Inaccessible storage units will have no total and free space information.

User Sessions

This monitoring area displays currently active incoming WVMS Monitor connections via both TCP and HTTP ports with the following details:

- user account
- remote address
- remote (outgoing) port
- session start time
- type (Wavesys Console/WVMS Monitor)

Disconnected sessions will automatically disappear from the list.

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USER	ID	REMOTE ADDRESS	START TIME
Built-in Administrator account	(1)	192.168.1.83:54237	12/22/2015 12:53:39 PM

User Sessions live monitoring

External Services

If License Plate Recognition, Face Recognition and/or other external services are connected, their session properties will be displayed here: service name, remote address and used user account.

Reports

This section contains health monitoring data for automatic VCA and software counter [reports](#).

TITLE	STATUS	REPORT STATUS	EXECUTION TIME	NEXT EXECUTION TIME	STATUS TIME	INFORMATION
DailyCustomers	Normal	NotExecuted			1/5/2018 2:02:38 PM	
WeeklyCustomers	Normal	NotExecuted		1/7/2018 12:00:00 AM	1/5/2018 2:02:38 PM	

Report status

If a report has been sent at least once (by schedule, not as a test), the last execution time is shown here. For the reports that are currently set to be emailed automatically, the next (scheduled) execution time is also displayed.

Access control

If any third-party services are connected, their connection properties and status will be displayed here.

OPC

If any third-party OPC servers are connected, their connection properties and status will be displayed here.


Indicators

All indicators configured in your system will be displayed here, so that you can see their status - all in one place.

71 Audit

To access the global audit log in Wavesys Console, choose *Audit* section in the bottom-left-hand panel.

The audit log contains detailed information about the most important user activities and server events. Events are organised in a way similar to the Windows Event log, and can be filtered and sorted by any field just by clicking on the relevant field. By default, entries are sorted by time, with latest on top. Use *Search* field in the upper-right-hand menu to filter the records; press *Refresh* button to reload the item list.

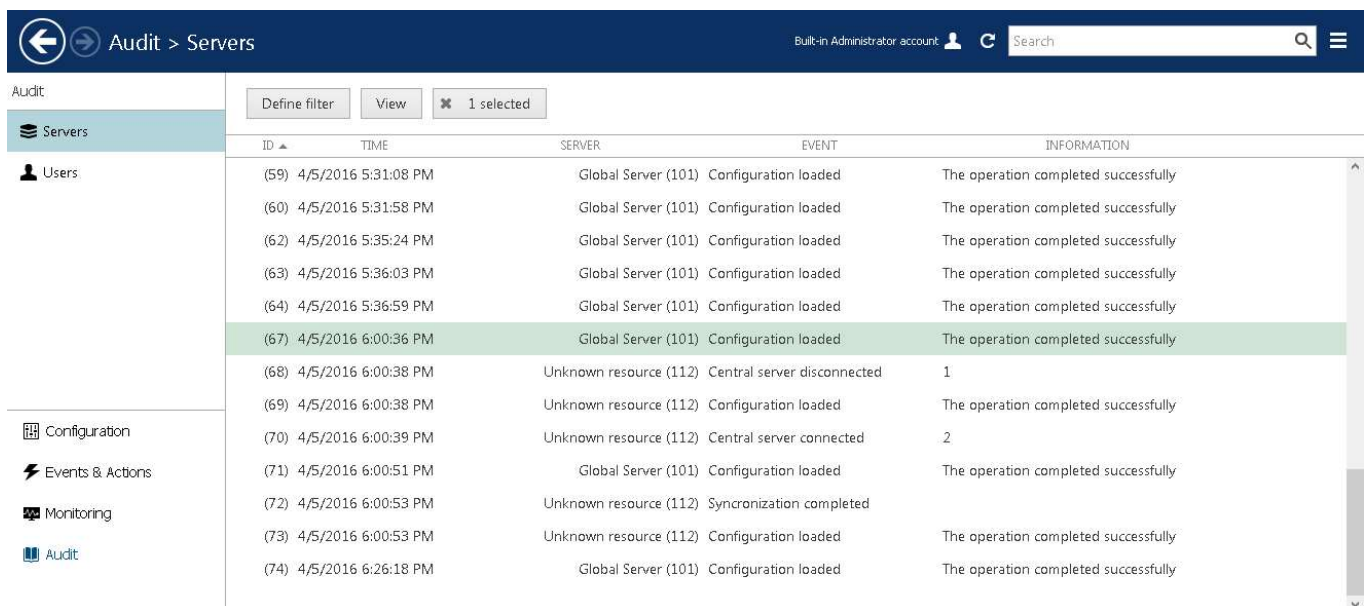
 Please note that your actual audited events may vary depending on the software license edition.

The log has two sections: *Servers* and *Users*; these can be accessed by clicking the corresponding items in the menu on the left, when in the *Audit* section.

Servers

Each event contains the following values:

- **Time:** event timestamp in the system locale-specific format
- **Server:** name of the server from which the event originates
- **Event:** a brief description of the event; see below for the detailed information about the logged event types
- **Information:** additional information relevant to the event, e.g., Open VCA error details



ID	TIME	SERVER	EVENT	INFORMATION
(59)	4/5/2016 5:31:08 PM	Global Server (101)	Configuration loaded	The operation completed successfully
(60)	4/5/2016 5:31:58 PM	Global Server (101)	Configuration loaded	The operation completed successfully
(62)	4/5/2016 5:35:24 PM	Global Server (101)	Configuration loaded	The operation completed successfully
(63)	4/5/2016 5:36:03 PM	Global Server (101)	Configuration loaded	The operation completed successfully
(64)	4/5/2016 5:36:59 PM	Global Server (101)	Configuration loaded	The operation completed successfully
(67)	4/5/2016 6:00:36 PM	Global Server (101)	Configuration loaded	The operation completed successfully
(68)	4/5/2016 6:00:38 PM	Unknown resource (112)	Central server disconnected	1
(69)	4/5/2016 6:00:38 PM	Unknown resource (112)	Configuration loaded	The operation completed successfully
(70)	4/5/2016 6:00:39 PM	Unknown resource (112)	Central server connected	2
(71)	4/5/2016 6:00:51 PM	Global Server (101)	Configuration loaded	The operation completed successfully
(72)	4/5/2016 6:00:53 PM	Unknown resource (112)	Synchronization completed	
(73)	4/5/2016 6:00:53 PM	Unknown resource (112)	Configuration loaded	The operation completed successfully
(74)	4/5/2016 6:26:18 PM	Global Server (101)	Configuration loaded	The operation completed successfully

Audit log, *Servers* section

The following **events** are logged in this section:

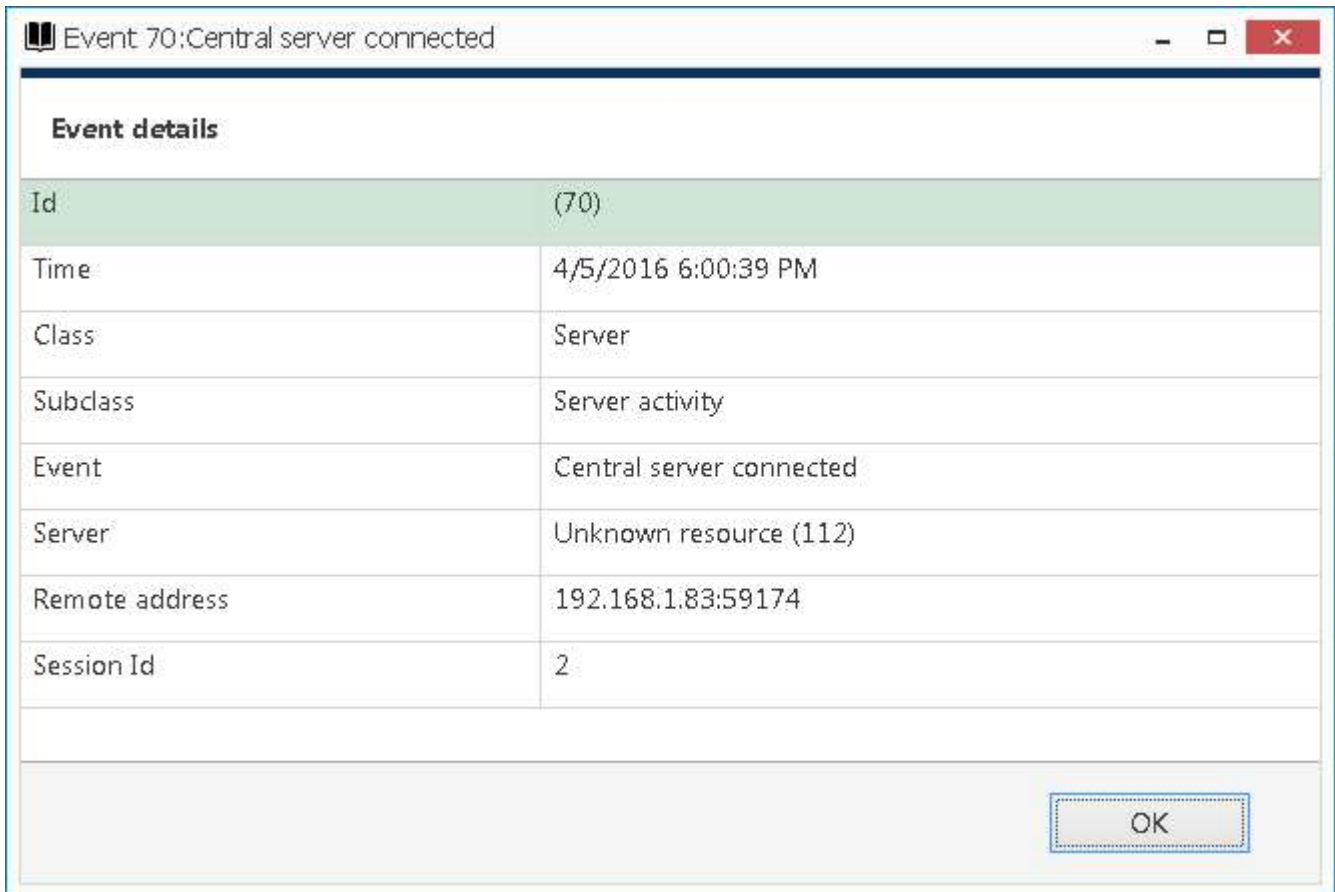
- **Internal server events**
 - **Audio output action completed:** an E&A action to send audio to device was executed
 - **Automatic backup failed:** an automatic backup was scheduled but failed for some reason
 - **Automatic backup succeeded:** a scheduled backup copy of the databases was successfully created
 - **Central server connected:** central server has successfully connected to the target recording server
 - **Central server disconnected:** central server has disconnected from the target recording server because the target server is offline, unreachable, has been removed from the central server configuration or has invalid configuration
 - **Configuration loaded:** configuration has been successfully loaded from the database and applied to the target server

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- **Configuration reset failed:** an attempt to reset the recording server configuration was made but failed for some reason
- **Configuration reset requested:** recording server configuration reset was requested via Wavesys Console (this message will be normally followed by another entry reflecting the rest status)
- **Configuration request succeeded:** recording server configuration was successfully reset
- **Configuration saved:** server configuration was saved to the database
- **Connected to mirroring server:** central server successfully connected to its configured mirror
- **Connected to recording server:** central server successfully connected to a recording server
- **Disconnected from mirroring server:** central server disconnected from its configured mirror (e.g., because the mirror is no longer available)
- **Disconnected from recording server:** central server disconnected from a recording server
- **Event action failed:** an E&A action execution attempt was made but failed, double-click the event entry for details
- **Event action succeeded:** an E&A action was successfully executed, double-click the event entry for details
- **External users added:** an attempt to add new external users via AD/LDAP was made, see additional information for status details
- **External users removed:** external users were removed from the server configuration
- **External users updated:** AD/LDAP user list was synchronised
- **Failover node activated:** failover server changed its state from *Idle* and received configuration to act instead of a recording server
- **Failover status changed:** server was included or excluded from a failover cluster, or its status changed from/to *Unknown* (see server [health monitoring](#) for details)
- **Number of external users exceeded maximum allowed:** the number of imported AD/LDAP users exceeds maximum allowed by the license
- **Open VCA notification received:** server VCA engine event (e.g., VCA license error)
- **Remote update initiated:** remote software update was initiated via Wavesys Console
- **Server restarted by watchdog:** server was restarted by the watchdog service (double-click the event entry for the details about restart reason)
- **Server started:** WVMS server service started
- **Server stopped:** WVMS server service stopped
- **Synchronisation completed:** central server has successfully synchronised configuration data with the target recording server
- **Resource access**
 - **Archive**
 - **Bookmark added:** a bookmark was added to the target channel on behalf of the server (via E&A action, no user interaction)
- **Uncategorized**
 - **Permissions updated:** user permissions were edited, double-click the event entry for details

Double-click any event to open it in a separate dialog box with **additional information** about event source, such as: backup file path for the *Automatic backup* event, error code for the *Open VCA notification* event etc.

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Event details	
Id	(70)
Time	4/5/2016 6:00:39 PM
Class	Server
Subclass	Server activity
Event	Central server connected
Server	Unknown resource (112)
Remote address	192.168.1.83:59174
Session Id	2

OK

Event example for the *Servers* audit log

Users

The events related to user input (configuration via Wavesys Console, resource access via client applications) are available here. Some of these (mostly configuration related) are triggered by user actions in Wavesys Console and some (mostly related to resource access) are based on user actions in WVMS Monitor. The following **events** are logged in this section:

- **Events & Actions**
 - **Rule modifiers:** events related to rule schedules and conditions
 - Event **condition** added/removed/updated: a condition was modified
 - Event **schedule** added/removed/updated: a schedule was modified
 - Event **schedule item** added/removed/updated: an individual schedule item was modified
 - **Action** added/removed/updated: an E&A action was modified
 - **Event** added/removed/updated: an E&A event was modified
 - Event-action **rule** added/removed/updated: a rule in the E&A table was modified
 - **Global event** added/removed/updated: a global event was modified
 - **Mail server** added/removed/updated: an SMTP server in E&A configuration was modified
- **External services:** events associated with external services operating via HTTP API, such as FR, LPR and third-party software integrations
 - **External service** added/removed/updated: external service connection was modified
 - **External service group** added/removed/updated: a group for external services was modified via Wavesys Console
- **Failover management**
 - Failover cluster added/removed/updated: failover cluster settings were modified via Wavesys Console
- **Installation:** events related to software installation and upgrade

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- Remote update requested: a user has requested remote server update via Wavesys Console (usually followed by the *Remote update initiated* event entry in the *Server* audit section)
- **Recording**: changes to recording setup via Wavesys Console
 - Recording **configuration** added/removed/updated
 - Recording **profile** added/removed/updated
 - Recording **schedule** added/removed/updated
 - Recording **schedule item** added/removed/updated
- **Resource access**: user actions concerning all types of resource access from connected clients
 - **Archive**: playback related events triggered from different WVMS Monitor playback modes
 - Archive **replication** accessed: recordings from a channel replica were accessed
 - Archive **search** accessed: recordings from a channel were
 - Archive **snapshot** exported: a single or multichannel snapshot was exported from one of the archive playback modes
 - Archive **timeline** accessed: archived data was accessed in a playback mode that has timeline
 - Archived **data accessed**: available recordings from a channel were played back
 - Archived **data exported**: a video clip was exported (double-click the event entry for details)
 - **Bookmark** added/removed: a new bookmark was appended to the channel timeline or deleted from it
 - **Bookmark popup** confirmed: bookmark popup caused by E&A action was approved by a user via WVMS Monitor application
 - **Bookmark search** accessed: bookmark were searched from the WVMS Monitor playback mode
 - **Live**
 - **Audio input** received from device: audio IN was activated from live view
 - **Audio output** sent to device: audio OUT was activated from live view
 - **External data** accessed: information from *Data sources* was streamed with live video
 - **Layout** added/removed/updated: a layout was modified in WVMS Monitor
 - **Live data** accessed: live video stream was displayed
 - **Motion data** accessed: motion information was streamed with live video
 - **VCA data** accessed: Open VCA metadata was streamed with live video
 - **PTZ**: pan, tilt, zoom, focus, iris related actions, as well as PTZ presets and tours for the target channel
 - **Navigate**: PTZ event from older database versions (backward compatibility)
 - PTZ **auto-focus/auto-iris** activated: device automatic focus/iris feature was activated
 - PTZ **focus/iris** started/stopped: device manual focus/iris capability was used
 - PTZ **pan/tilt started**: device was panned/tilted
 - PTZ **pan/tilt stopped**: this event is generated after five seconds after the last pan/tilt command (after the PTZ control was released)
 - PTZ **preset** saved/activated/deleted: PTZ preset was accessed
 - PTZ **tour** saved/activated/deactivated/deleted: PTZ tour was accessed
 - PTZ **zoom started**: device zoom IN/OUT capability was used
 - PTZ **zoom stopped**: this event is generated after five seconds after the last zoom IN/OUT command (after the PTZ control was released)
 - **User defined**: this event is generated when an audit entry is created based on a user-defined E&A action *Write to audit log*
 - **Video walls**: events based on video wall related user actions in WVMS Monitor via *Resources* panel and/or *Video Walls* section
 - Video wall **current layout saved as startup**: the currently displayed layout was set as startup for the target video wall display via video wall management
 - Video wall **layout saved as startup**: a layout was set as startup for the target video

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- wall display
- Video wall **layout sequence paused**: the layout sequence currently assigned to a video wall display was stopped
- Video wall **layout sequence set**: a pre-saved layout sequence was assigned to a video wall display
- Video wall **layout set**: a pre-saved layout was assigned to a video wall display
- Video wall **object popped up**: an E&A action that displays an object (channel/map/layout) on a video wall screen has been executed
- Video wall **viewport** updated: an individual viewport contents was changed within a layout of a video wall display
- **Copied exported items**: exported files were copied from the WVMS Monitor library to an external destination
- **External data search** accessed: archived information from *Data sources* was searched from WVMS Monitor
- **External service search** accessed: archived external service data was searched from WVMS Monitor
- **Live snapshot** exported: a snapshot was saved from the WVMS Monitor live view mode
- **VCA search** accessed: archived VCA data was searched from the WVMS Monitor playback mode
- **Resource administration**: resource related events caused by user actions in Wavesys Console management application
 - **Channels**
 - Channel added/removed/updated: target channel was modified in the described manner
 - Channel attached/detached: target channel was attached to/detached from its device
 - Channel enabled/disabled: target channel was activated/deactivated
 - Device channel group added/removed/updated: a channel group was modified in the described manner
 - **Data sources**
 - Data source added/removed/updated: a serial data source was modified in the described manner
 - Data source profile added/removed/updated: a profile for the data source was modified
 - **Devices**
 - Administer: device management event from older database versions (backward compatibility)
 - Device added/removed/updated: a device was modified in the described manner
 - Device group added/removed/updated: a device group was modified in the described manner
 - **Layouts** and layout **templates**
 - Layout template added/removed/updated: a layout grid was modified
 - Layout group added/removed/updated: a group for shared layouts was modified
 - **Live podcasts**
 - Live podcast added/removed/updated: a live broadcast was modified
 - Live podcast enabled/disabled: a live broadcast was activated/deactivated
 - **Maps**
 - Geo map added/removed/updated: a map based on the world map was modified
 - Map added/removed/updated: a picture-based map was modified
 - Map group added/removed/updated: a map/geo map group was modified
 - Map item added/removed/updated: an individual map item (e.g., channel marker) was modified on a map/geo map
 - **Networks**
 - Network added/removed/updated: a network connection was modified

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- **Organisations**
 - Organisation added/removed/updated: an organisation was modified
- **Servers**
 - **Connection** updated: server connection (IP, port, SNMP settings) was modified (it is added/removed together with the server)
 - **Server** added/removed/updated: a server was modified in the Wavesys WVMS Enterprise configuration
 - **Server configuration backed up**: server configuration was backed up manually via wizard (this event is only logged if the backup was run while WVMS server was stopped)
 - **Server configuration restored**: server configuration was restored manually via wizard (this event is only logged if the wizard was run while WVMS server was stopped)
 - **Server group** added/removed/updated: a server group was modified
- **Software counters**
 - Software counter added/removed/updated
- **User buttons**
 - User button added/removed/updated: a user button was modified
 - User button group added/removed/updated: a user button was modified
- **Video walls**
 - Video wall added/removed/modified: a video wall was modified
 - Video wall group added/removed/updated: a video wall was modified
- **Visual groups**
 - Visual group added/removed/modified: a visual group was modified
- **Access control** added/removed/updated, enabled/disabled
- **OPC client** added/removed/updated, enabled/disabled
- **Server security**: events related to server security, access and permission/policy/user management
 - **Administration permissions** updated: administrative permissions for Wavesys Console access were modified for a user or a user group
 - **Audit log** accessed: the *Audit* section of Wavesys Console was accessed
 - **Confirmed server warning** notification: a popup warning from the server E&A action was confirmed in WVMS Monitor
 - **External user group** added/removed/updated: AD/LDAP user group was modified
 - **Client connection** permissions updated: administrative permissions related to remote client access were modified
 - **Log in**: a user has successfully logged into the target server
 - **Log out**: a user has logged out of the server or his session timed out
 - **Monitoring data** accessed: the *Monitoring* section of Wavesys Console was accessed
 - **Object added** to group: some object in the server configuration was added into a group of the corresponding type
 - **Object removed** from group: some object in the server configuration was deleted from a group of the corresponding type
 - **Permissions** added/removed: user permissions were modified
 - **Security policy** added/removed/updated: server security policy was modified
 - **Unsuccessful log in**: a user has attempted to log into the server without success
 - **User** added/removed/updated: a user account was modified
 - **User group** added/removed/updated: user group settings were modified

Double-click an event entry to see **details** about the related resource, such as: resource name, the user who did the changes or executed the action, destination path for the copied exported files etc.

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ID	TIME	USER LOGIN NAME	USER'S FULL NAME	CONNECTION ADDRESS	CONNECTION TYPE	EVENT	SERVER	INFO
(24)	3/23/2016 3:27:25 PM	admin	Built-in Administrator account (1)	127.0.0.1:62454	Monitor	Log out	Global Server (101)	
(22)	3/23/2016 2:19:41 PM	admin	Built-in Administrator account (1)	127.0.0.1:62454		Receive Data	Global Server (101)	apix
(20)	3/23/2016 2:10:27 PM	admin	Built-in Administrator account (1)	127.0.0.1:62454		Receive Data	Global Server (101)	vvtk
(19)	3/23/2016 2:10:27 PM	admin	Built-in Administrator account (1)	127.0.0.1:62454		Receive Data	Global Server (101)	test
(16)	3/23/2016 2:06:55 PM	admin	Built-in Administrator account (1)	127.0.0.1:62454		Receive Data	Global Server (101)	vvtk
(12)	3/23/2016 1:55:42 PM	admin	Built-in Administrator account (1)	127.0.0.1:62454		Receive Data	Global Server (101)	test
(11)	3/23/2016 1:55:41 PM	admin	Built-in Administrator account (1)	127.0.0.1:62454	Monitor	Log in	Global Server (101)	
(10)	3/23/2016 1:55:35 PM	admin	none			Unsuccessful log in	Global Server (101)	
(9)	3/23/2016 1:55:30 PM	admin	none			Unsuccessful log in	Global Server (101)	
(8)	3/23/2016 1:55:27 PM	admin	none			Unsuccessful log in	Global Server (101)	
(7)	3/23/2016 1:55:24 PM	admin	none			Unsuccessful log in	Global Server (101)	
(3)	3/23/2016 1:54:14 PM	admin	Built-in Administrator account (1)	127.0.0.1:62443	Console	Log in	Global Server (101)	
(2)	3/23/2016 1:54:09 PM	admin	none			Unsuccessful log in	Global Server (101)	

Audit log, *Users* section

Define Filter

Audit logs can be filtered for easier analysis. Click the *Define filter* button on the upper panel to bring up the dialog box.

In the *Set period* tab, specify the time limits for log output. You can set the date and time manually or use automated controls for preset time boundaries: last day/week/month, the whole time, and also set start/end boundaries equal to the log beginning/end.

Filter

Filter

- Set period
- Select events
- Select resources

Set query period

All time

Last day

Last week

Last month

From date and time

10/15/2015 2:52:03 PM

From beginning

Starts query from the first time the system was set up.

To date and time

12/22/2015 2:52:03 PM

Description

Until now

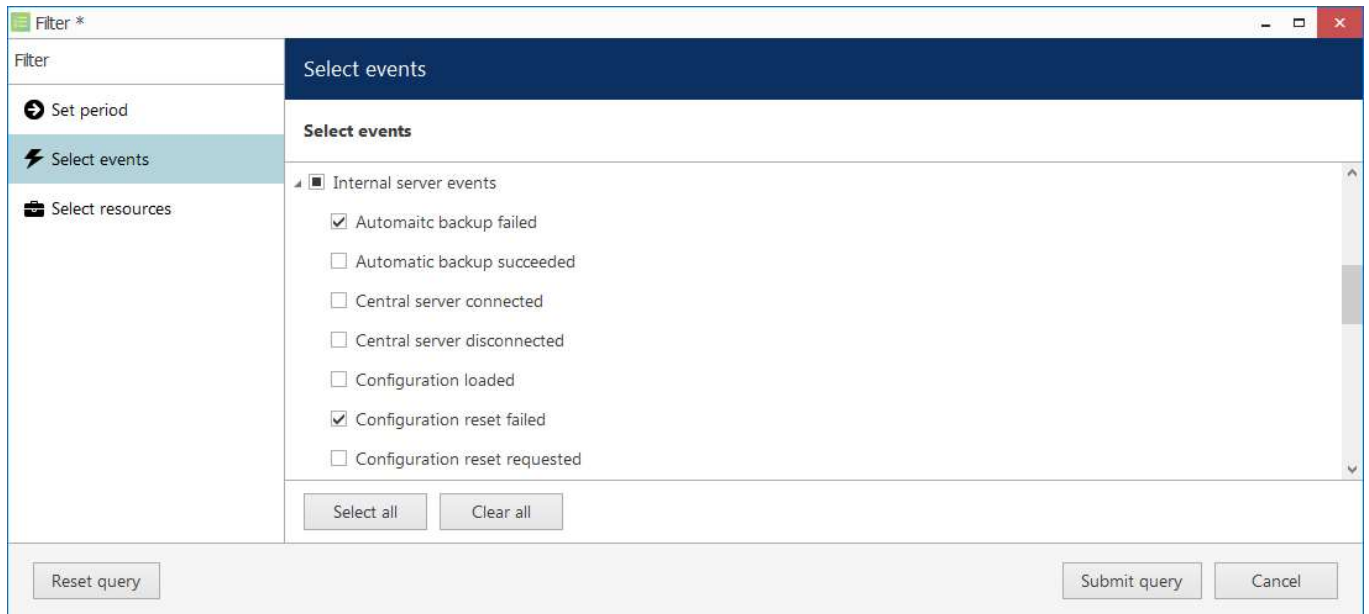
Ends query when timestamp submitted

Reset query Submit query Cancel

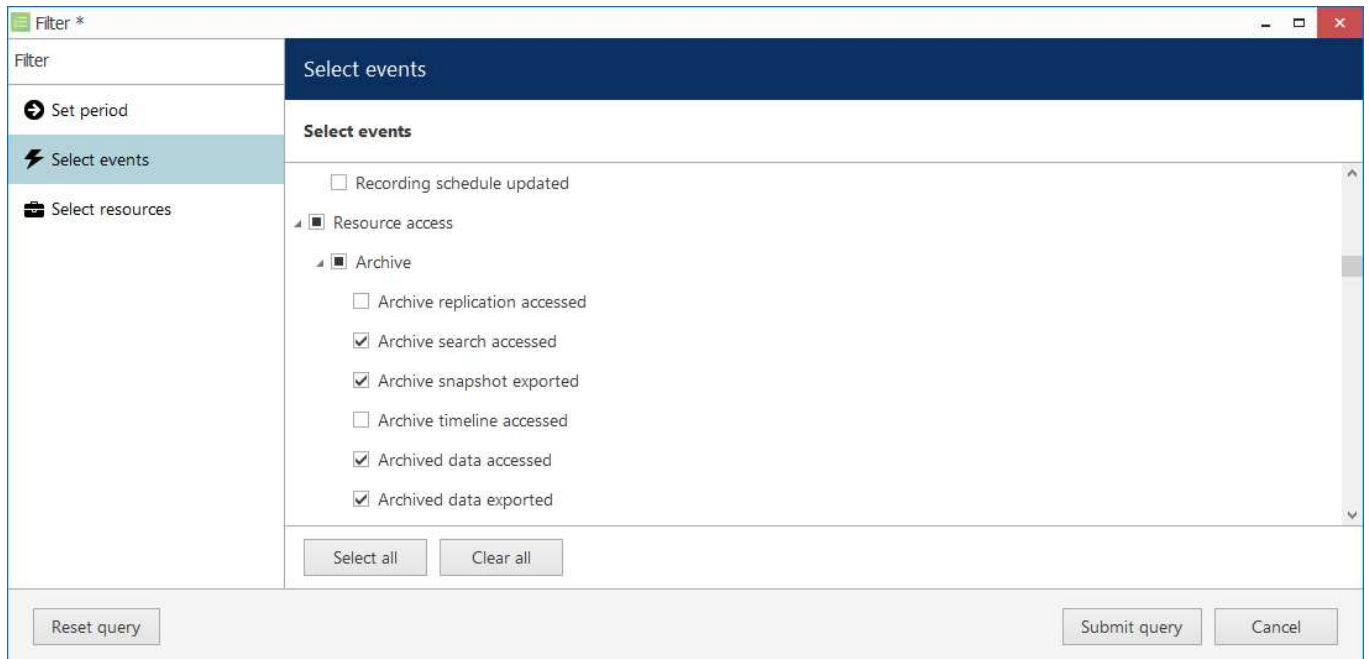
Set the time boundaries for audit log output

In the *Select events* tab, choose specific event types to narrow down the search. Note how the choice differs for the *Servers* and *Users* log filters.

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Specify event types for the *Servers* audit log output



Specify event types for the *Users* audit log output

In the *Select resources* tab, you can choose which resources will be mentioned in the log entries. Note that if multiple resources are chosen, the filter will apply *OR* logic, meaning that output log will only be displayed if it contains log entries for **at least one** specified resource, and not for the combination of all specified resources.

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Resources in query			All resources		
TITLE	ID	TYPE	TITLE	ID	TYPE
John Doe	(124)	User	Central Server	(101)	Server
(Generic) ONVIF Comp...	(106)	Channel	Built-in Administrator ...	(1)	User
			Admins	(126)	User group
			Built-in Administrator...	(3)	User group
			Local admins	(127)	User group
			Operators	(125)	User group
			Asoni CAM613 on 19...	(104)	Channel
			Asoni CAM613 on 19...	(105)	Channel
			Grundig GCI-G1536F ...	(114)	Channel
			Grundig GCI-K0622D ...	(113)	Channel
			Grundig GCI-K1627D ...	(116)	Channel
			Vivotek FD8154 on 1...	(115)	Channel
			Vivotek IP7131 on 19...	(112)	Channel
			First Floor	(122)	Channel group
			(Generic) ONVIF Com...	(103)	Device
			Asoni CAM613 on 19...	(102)	Device
			Grundig GCI-G1536F ...	(109)	Device

Narrow down your search by specifying resources

Use the *Search* field to filter the resource list; both the list of *Resources in query* and general *All resources* will be affected by the *Search* filter. Press the *Reset query* button in the bottom left corner at any time to restart filter configuration; when you have finished, click *Submit query* to view the results. To discard filtering, simply switch to a different section in the menu on the left and then switch back to your desired section.

72 Archive Backup Wizard

WVMS offers an option to **back up** any recordings from any server manually, in the proprietary WVMS archive format. **Video, motion information, audio, VCA data streams**, as well as **external serial data** can be extracted from the original archive and saved elsewhere, with an option to include the **portable player** tool so that the downloaded recordings can be played on any Windows-based computer, even if it has no WVMS installed.

The wizard is included with any WVMS installation, including Wavesys Console management application and WVMS Monitor application, and allows connection to **local and remote servers**.



The archive will be copied to the computer that has *Archive backup wizard* running on it. Thus, if you are connecting to a server remotely via *Archive backup wizard*, the archive copy will be **downloaded** to your computer from the server. As footage may be of significant size, make sure you have the required bandwidth available.

Start the Archive Backup Wizard from the Windows Start menu: *Start -> All Apps -> Wavesys Global -> Archive Backup Wizard* (in Windows 7 and older versions, use *Start -> All Programs -> software installation folder -> Tools -> Archive Backup Wizard*); alternatively, use *Search* to locate *Archive Backup Wizard* in the programs menu.

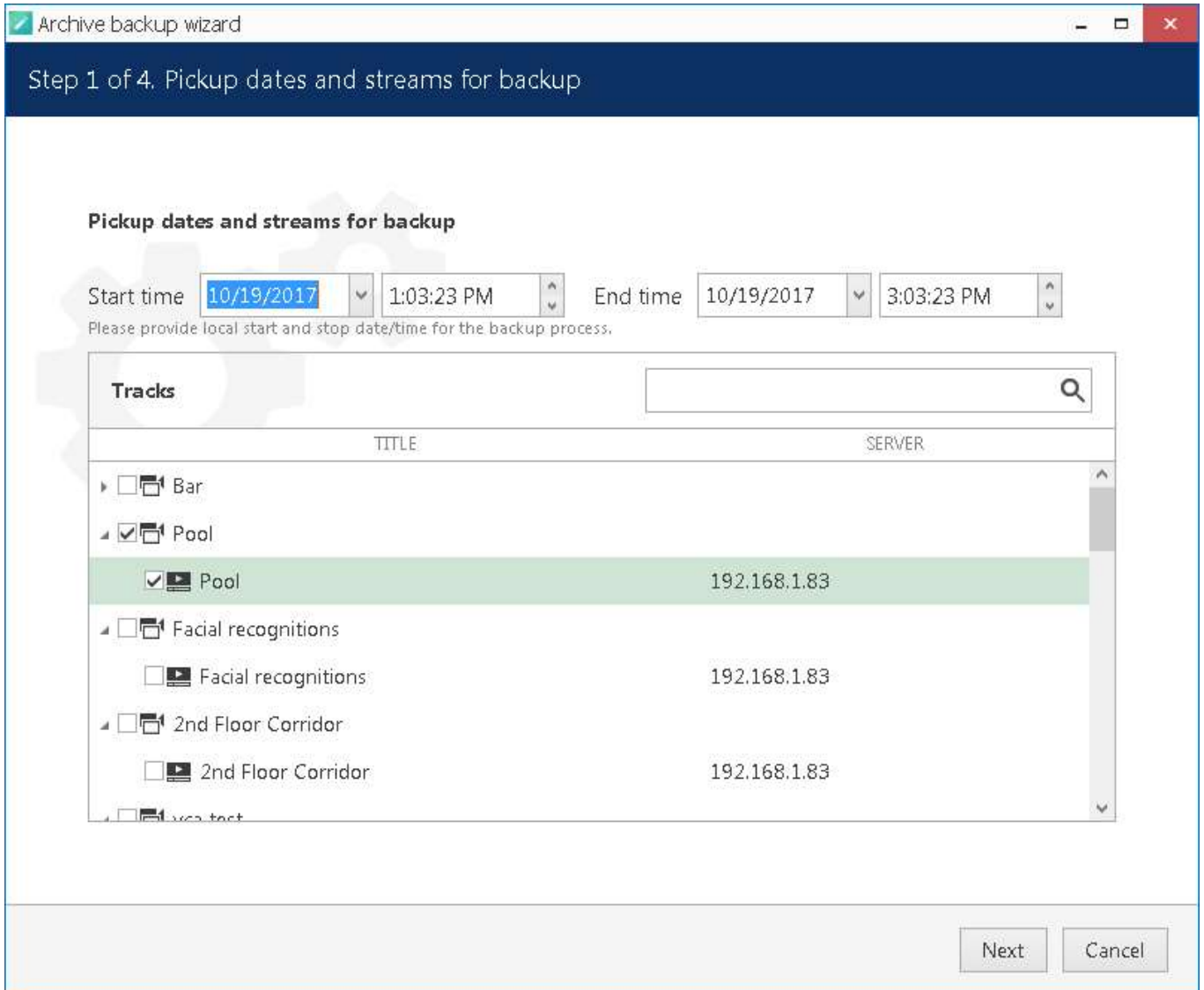
From the WVMS Monitor application, the wizard can be launched via main application menu by opening *View -> Archive Backup Wizard* and choosing the server (one of the connected ones). The address of the server, and also the username and password, will be taken from the currently configured server connection.

Using Archive Backup Wizard

First, you will be asked to log into the target server: your user account must have an administrative permission to make archive backups plus permissions to back up footage from individual channels/channel groups. You can create archive backups from the local server or from any remote server (login procedure is analogous to Wavesys Console login), including individual recording servers. If you run the wizard from the WVMS Monitor application, you will not be asked to log in; instead, your configured server connection will be used.

After you log in, you will be presented with the list of available recordings, grouped by channel and, if present, by [visual group](#). Select the channel(s) and/or visual groups you need by putting a checkmark next to each one; specify the required time range above the channel list and click *Next*.

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Choose the target time interval and required channels

Depending on the number of selected channels, their footage size, storage speed and connection latency, it may take a few moments to retrieve the stream information. Once it is done, you will be presented with a list of streams for each of the selected channels.

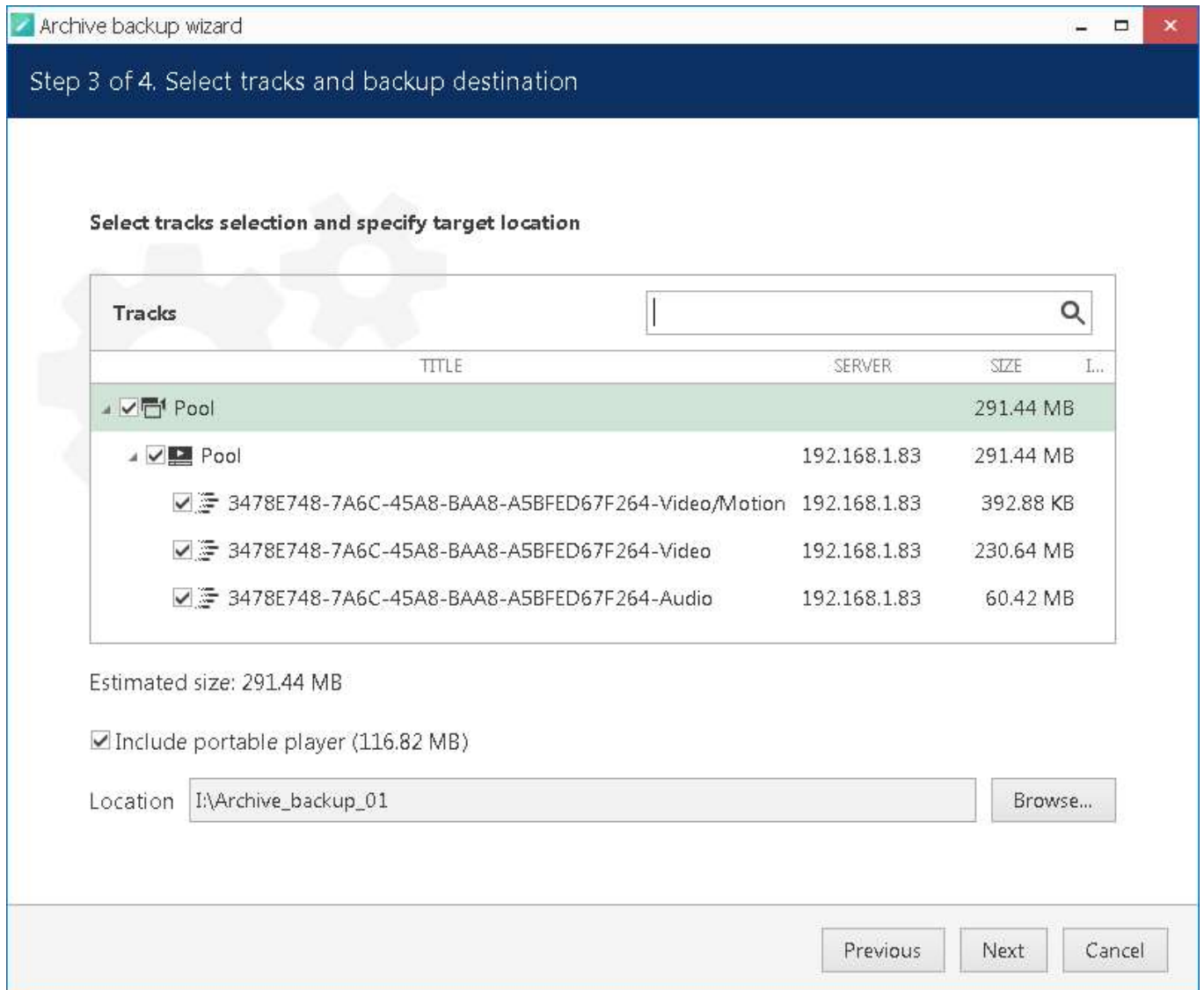
The **following tracks can be backed up**, depending on the channel recording settings and, therefore, stream availability:

- main video stream, substream and edge recordings
- video motion information
- audio stream
- VCA metadata
- external serial data from *Data sources*

Archive bookmarks and external service data (e.g., LPR/FR recognition results) are not available for backup.

Additionally, you can append the **portable player** tool with the copied part of the archive so that you can play the archive without having to install WVMS server on another machine. Guidelines on the portable player usage are available in your WVMS Monitor user guide.

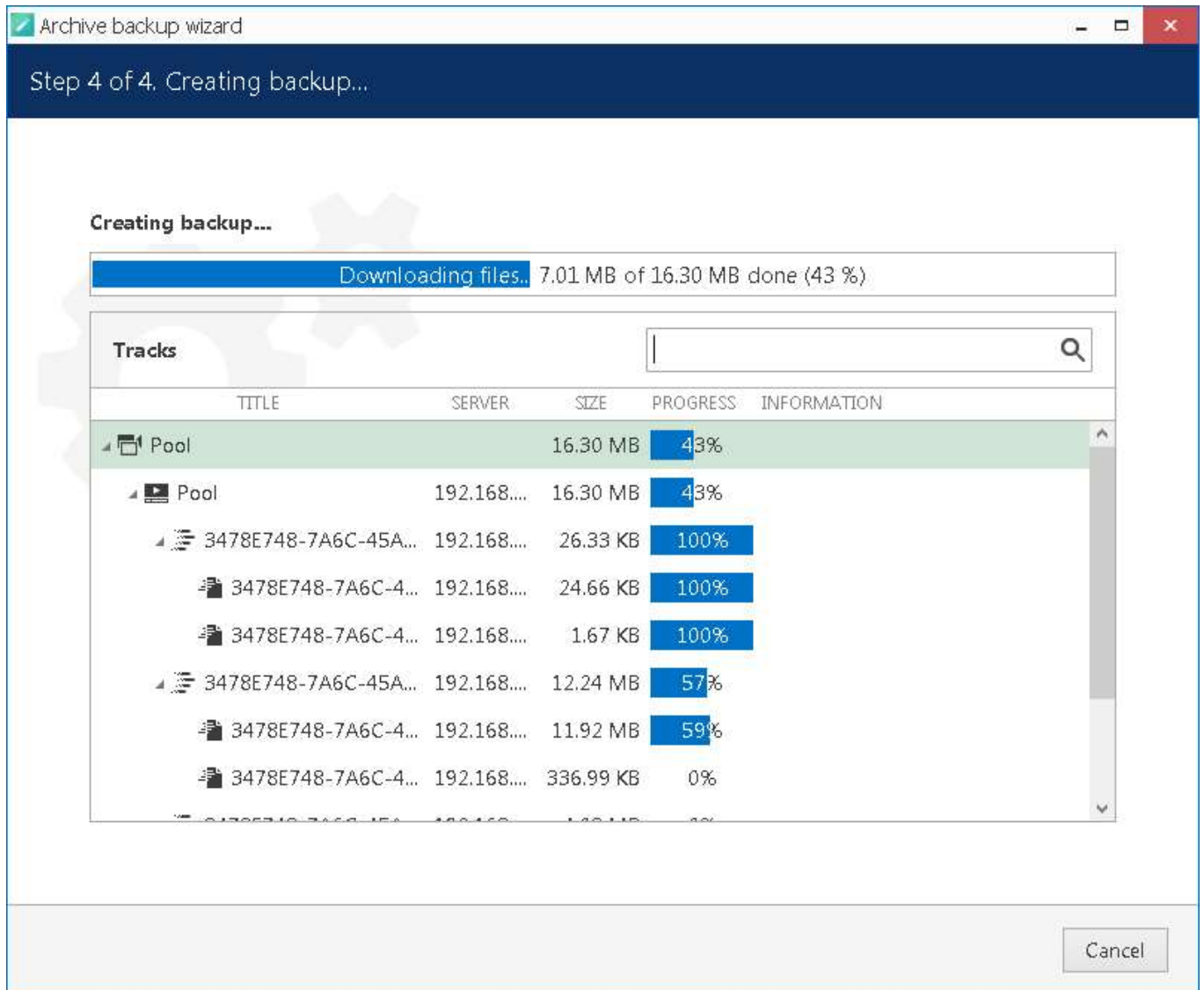
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Choose data streams and include portable player, if required

Here, you also need to specify a directory for the archive to be copied to: it may be a local hard disk, a shared network storage, or an attached USB drive. You are asked to choose an **empty folder** as a backup destination, so you may need to create a new folder from the standard *Select folder* dialog.

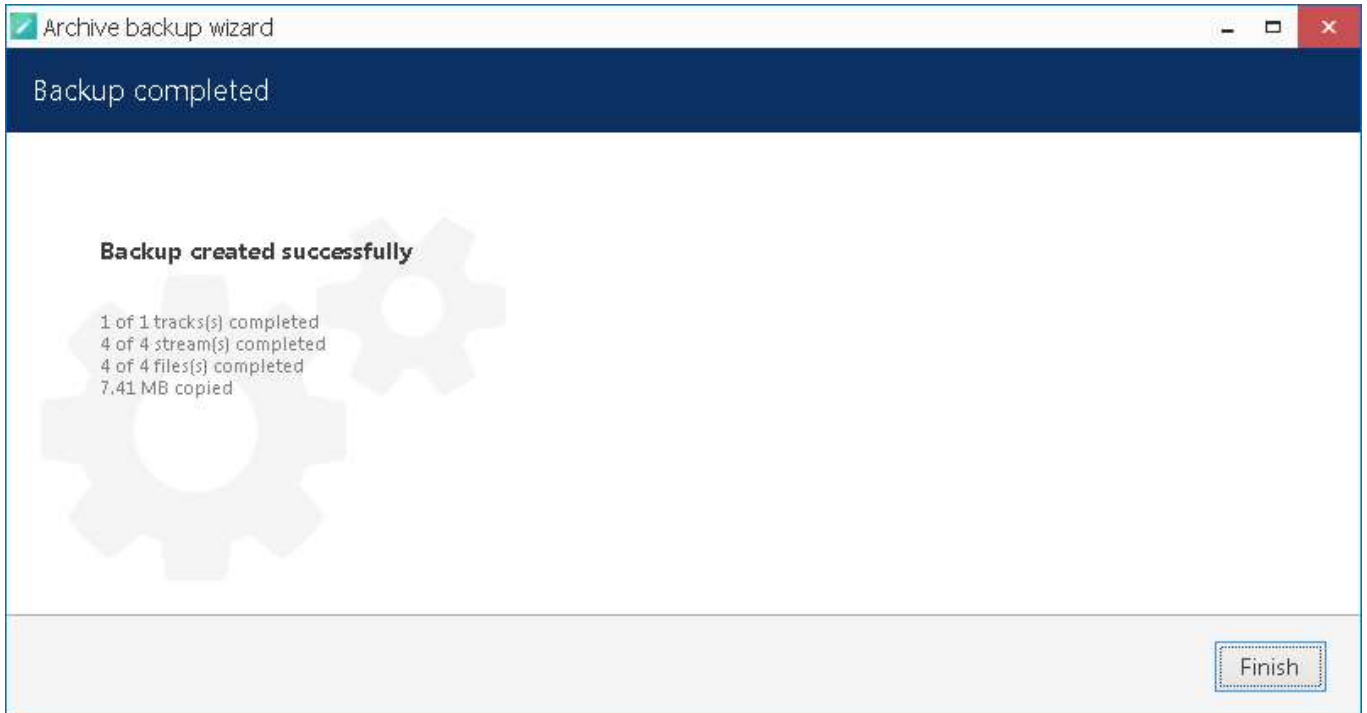
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Backup progress

When ready, hit *Next* for the wizard to proceed with backing up the selected information. Depending on the size of the selected archive, the backup procedure may take some time and its progress will be displayed in the wizard window. When it is finished, you will get a confirmation with a short description of what has been done.

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Archive backup succeeded

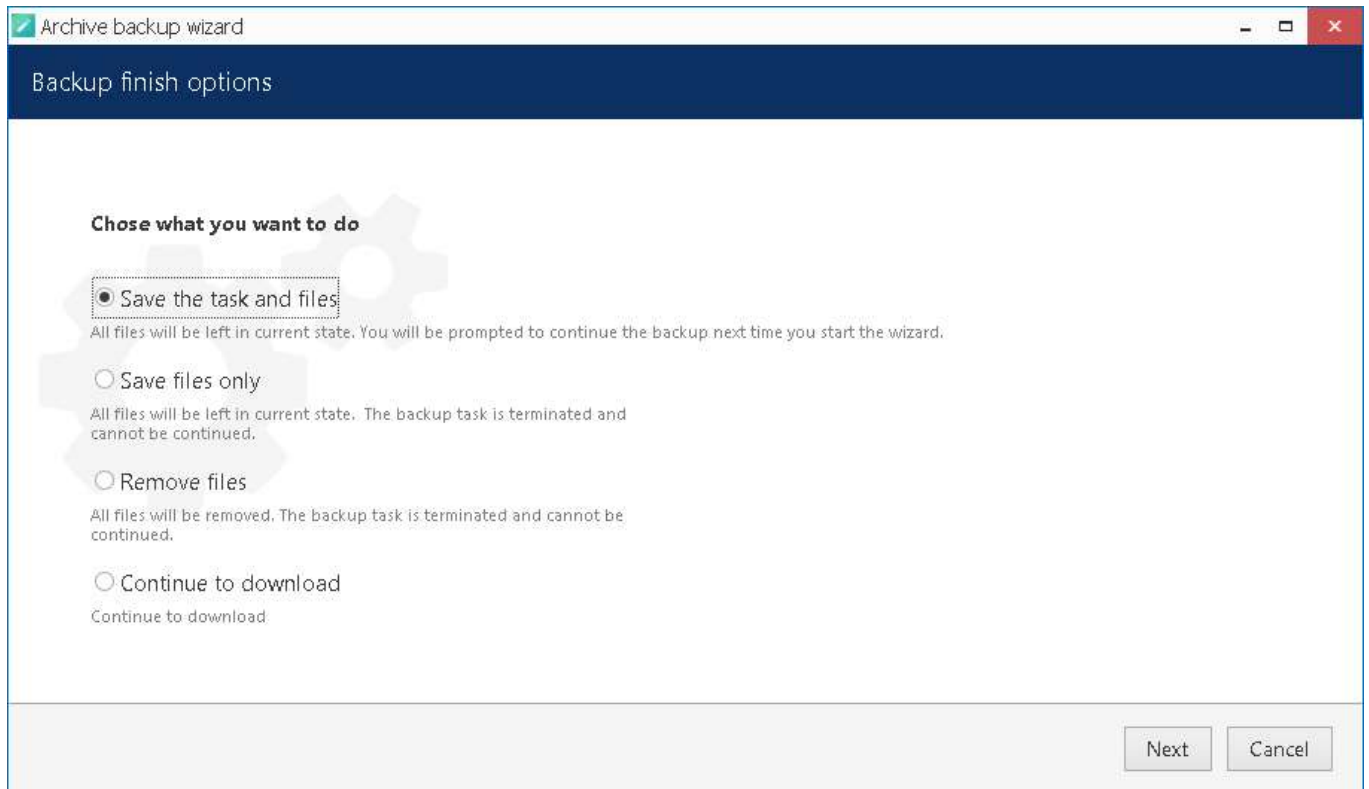
If you wish to back up more recordings, start the wizard again and follow the described procedure once again.

Postpone Your Archive Backup

If, during the backup progress, you decide to **stop** it for some reason, simply hit the *Cancel* button in the bottom right corner. You will then be presented with several options of how the wizard can proceed:

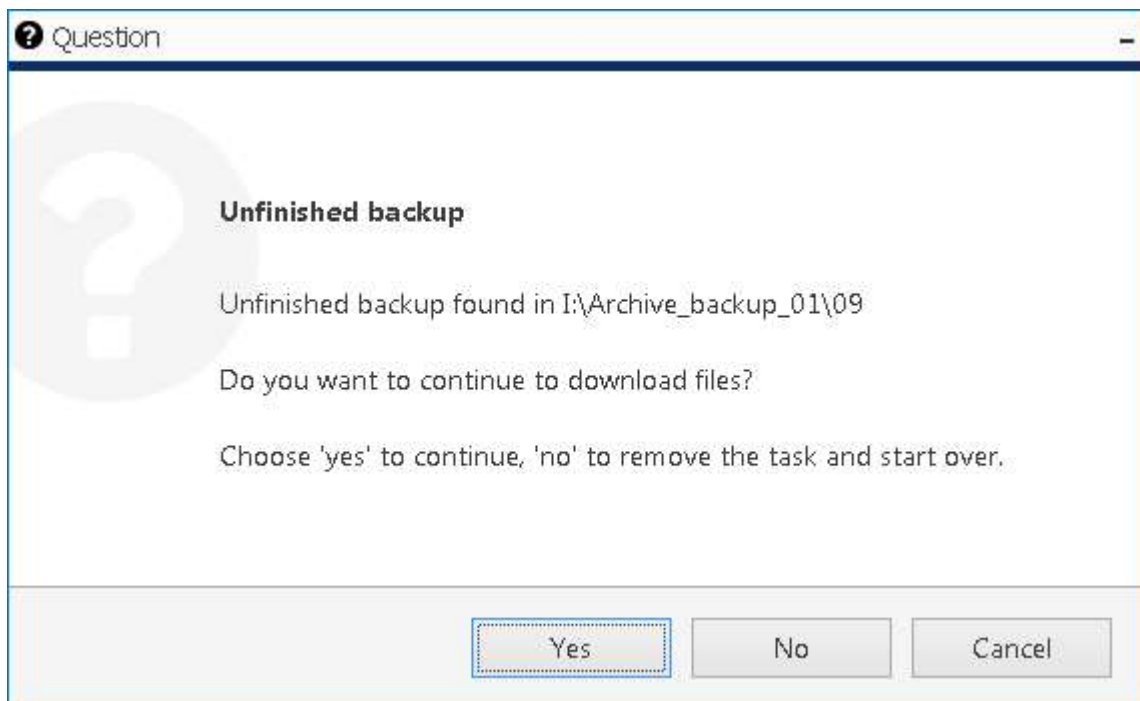
- save the task and files: save your current backup progress and preserve the wizard state until the next time you run it; you will be able to continue with the current backup item(s) then
- save files only: leave the files that have been downloaded so far but discard the wizard settings so that the next time you run it you will be presented with default choice
- remove files: discard current backup task completely and remove the downloaded files
- continue to download: go back and continue with the selected backup

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Archive backup termination options

If you have chosen to save both the task and the files, next time you start the wizard you will be reminded of the unfinished backup job and offered to continue with it. If you click *Yes* to proceed with the unfinished task, it will be started automatically right after you provide your user credentials for the server login.




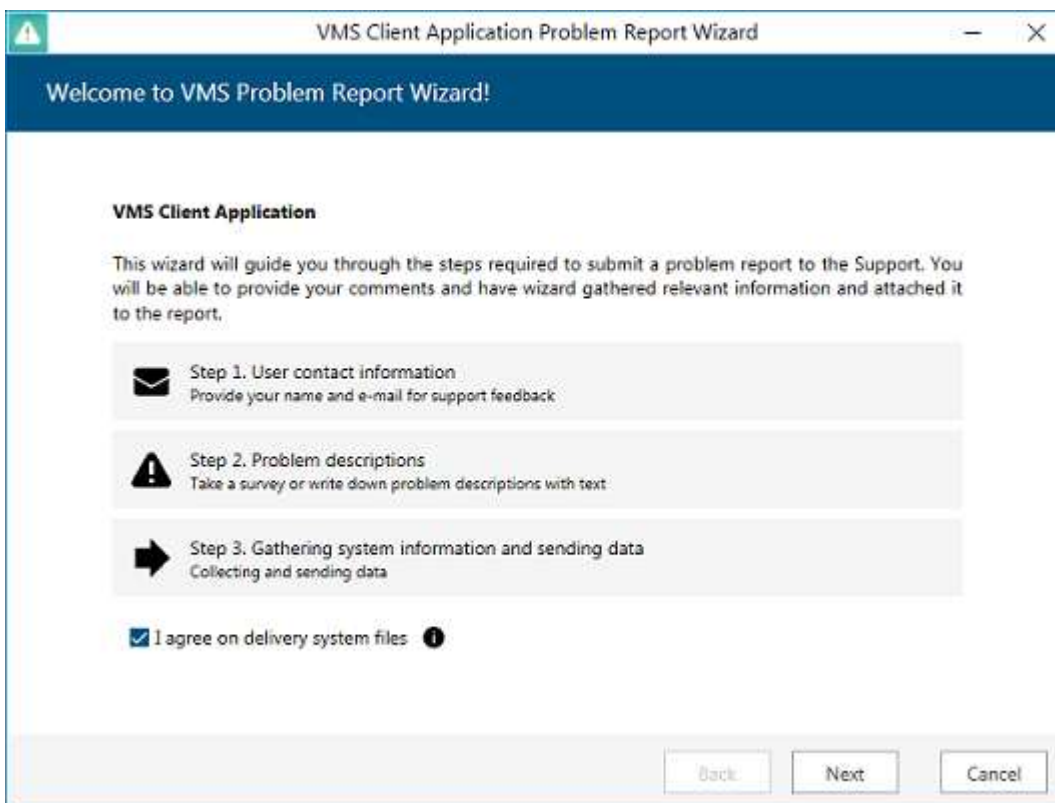
Continue with an unfinished backup task

73 Problem Report Wizard

WVMS features a comprehensive wizard-like tool for structured and detailed problem reporting. The tool is automatically installed at the same time as the the product and is thus available on any machine, where WVMS software is installed.

Access Problem Report Wizard via *Start -> All Apps -> Wavesys Global -> Problem Report Wizard* (in Windows 7 and older versions, use *Start -> All Programs -> software installation folder -> Tools -> Problem Report Wizard*). Alternatively, use Windows Start Menu *Search* to locate the Problem Report Wizard in the programs menu.

 Make sure you run the Problem Report Wizard on the right computer: it gathers information from the machine it has been launched on, and **not** from any of the servers connected via Wavesys Console or WVMS Monitor.



Run Problem Report Wizard from Windows Start menu

Agree to deliver system files to Wavesys Global support and hit *Next*. You can check which files are being taken from your system by clicking on the information button next to the agreement checkbox. Note that Wavesys Global will not transfer your data to any third-party companies; all the information gathered is required to help Wavesys Global efficiently resolve the reported problems.

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The screenshot shows a window titled "VMS Client Application Problem Report Wizard" with a warning icon in the top-left corner. The window has a dark blue header bar that reads "Step 1 of 3. User contact information". Below the header, the text "User name and valid e-mail address" is displayed. A paragraph of text states: "Provided information will be used to send back solution or any other instructions based on provided Problem Report. It is highly recommended to use valid email address." There are two input fields: "User Name" and "E-mail address". At the bottom of the window, there are three buttons: "Back", "Next", and "Cancel".

Enter your contact information

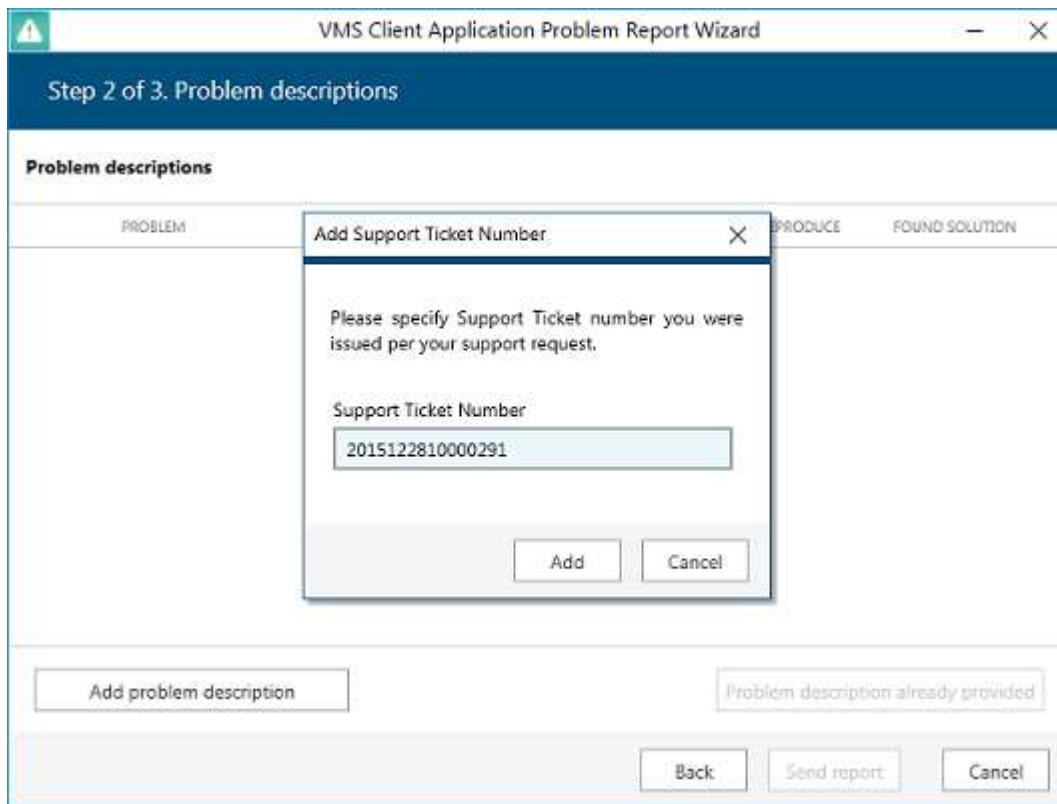
Enter your name and your email address so that the Wavesys Global support team can contact you. Click *Next* to proceed.

The screenshot shows a window titled "VMS Client Application Problem Report Wizard" with a warning icon in the top-left corner. The window has a dark blue header bar that reads "Step 2 of 3. Problem descriptions". Below the header, the text "Problem descriptions" is displayed. A table with three columns is shown: "PROBLEM", "STEPS TO REPRODUCE", and "FOUND SOLUTION". The table is currently empty. At the bottom of the window, there are three buttons: "Add problem description", "Problem description already provided", and "Back". At the very bottom, there are three buttons: "Back", "Send report", and "Cancel".

Problem description

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If you were asked by support team to generate a problem report, copy the **ticket ID** from the email communication and add it to the report by clicking the *Problem description already provided* button. This will help the support team to classify your report faster, and it will also guarantee that your report will go directly to the team member responsible for the thread.

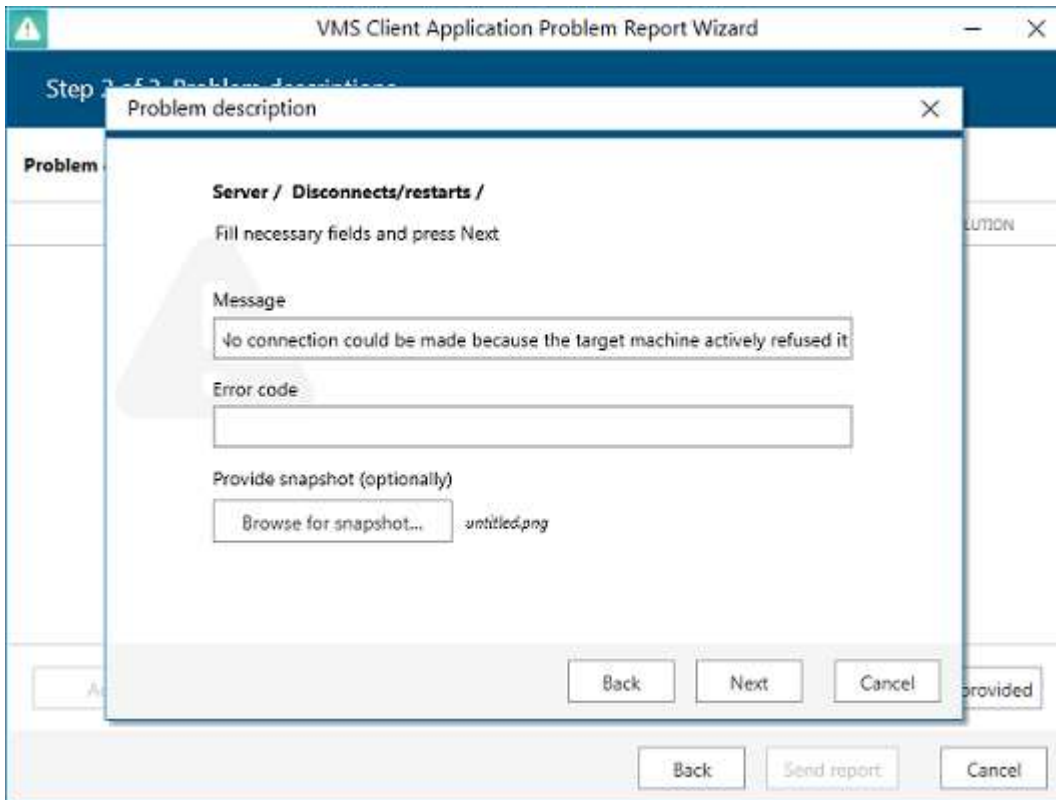


Insert ticket number

If you are applying a new, unreferenced problem report, click the *Add problem description* button.

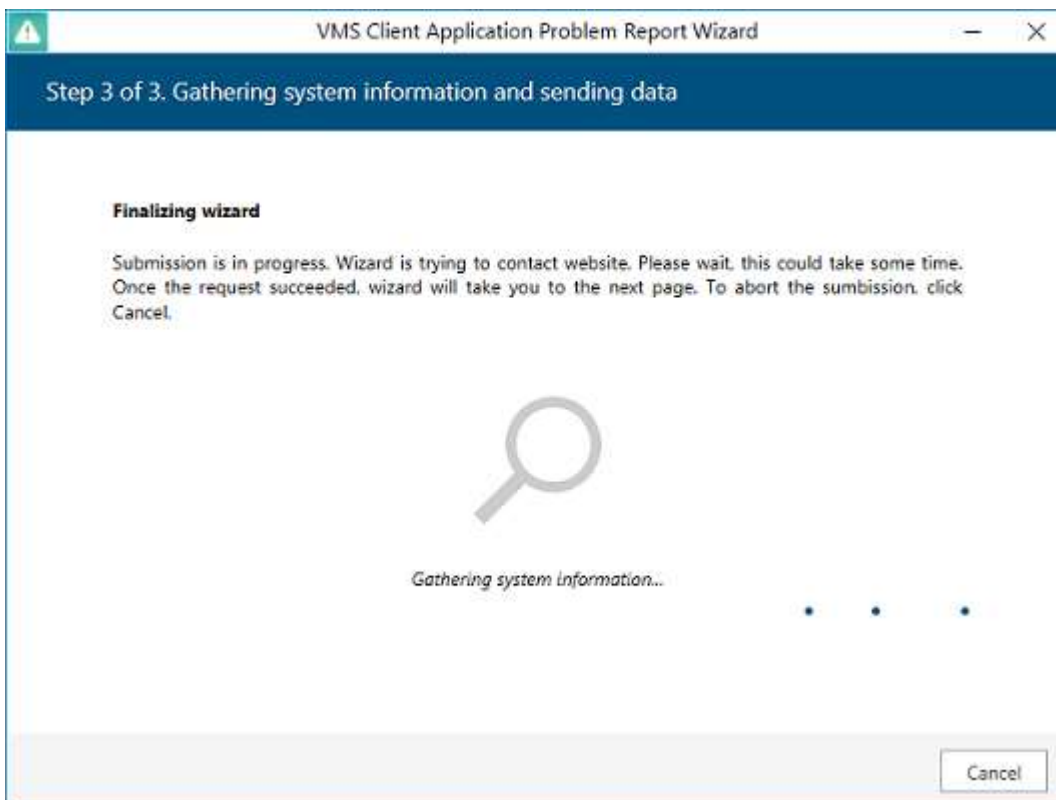
A short comprehensive wizard will guide you through the main issue categories, allowing you to choose the ones that are most applicable to your situation. You will be given the chance to enter error messages/codes, if there are any, and to attach snapshot(s). Make sure you provide the maximum amount of relevant information about the issue you are experiencing; always include **snapshots** if they are available.

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Enter problem classification and relevant details

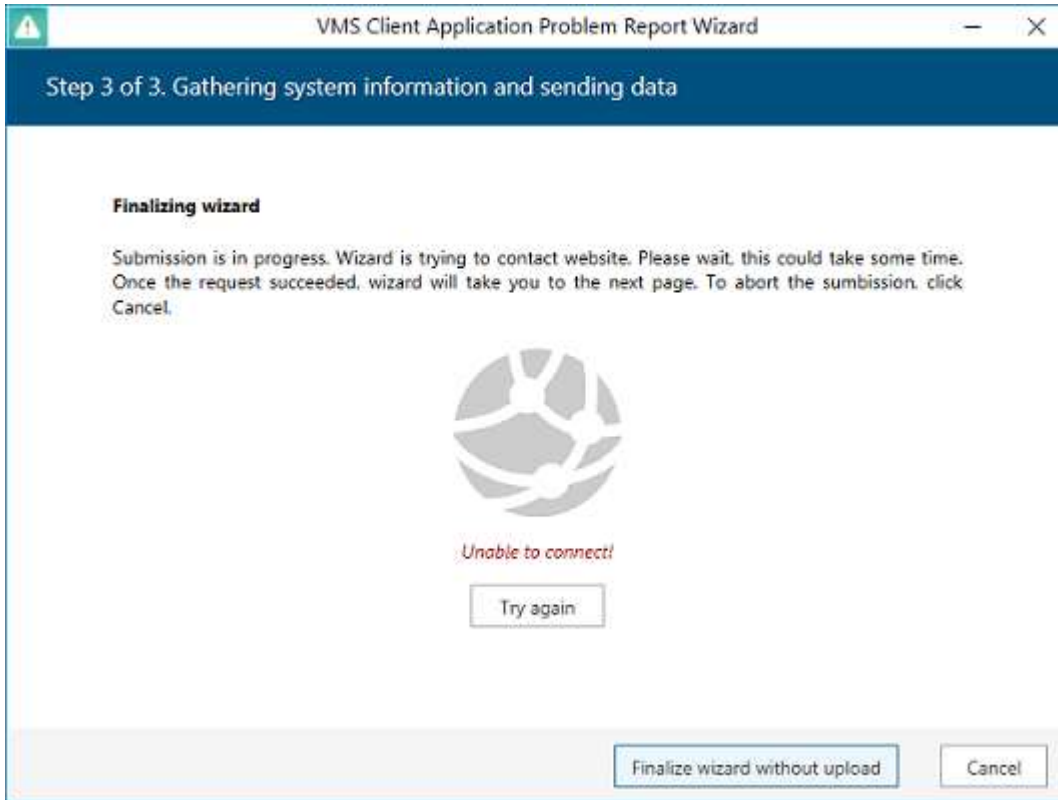
You can add **multiple** descriptions to a single report. When you are ready, press the *Send report* button; the wizard will then try to send the report automatically.



Submitting report

If the server is offline, wizard will not be able to submit the report to Wavesys Global; instead, you will be invited to save the generated report locally. Press the *Finalise wizard without upload* button to finish.

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Retry report submission or finish the wizard

Click *Save report as file* to save the compressed report on your computer; you are welcome to send it manually from any other computer to support@wavesysglobal.com. Click *Exit* to close the wizard.

74 Renderer Test Utility

WVMS can utilize GPU for some operations in order to decrease the CPU load. To enable GPU acceleration, run the *Renderer Test Utility* from the WVMS suite on the WVMS Monitor workstation.

There are two supported GPU operations are:

- frame **decoding** on WVMS Monitor side
- **rendering** on WVMS Monitor side



GPU acceleration limitations:

- Only Windows 10 and corresponding Windows server OS editions (2016, 2019).
- Only H.264 and H.265 streams for live view and digital PTZ in live view
- For fisheye image dewarp, only [Fisheye-II](#) is supported (choose the *Fisheye lens (6MP and larger resolution)* option in Wavesys Console)

All other cases will use CPU for decoding/rendering operations.

Before configuring GPU acceleration, make sure you have installed the latest official **drivers** for all your graphics cards. We also recommend having more **memory** for GPU (the more, the better). For integrated video cards, you can change this setting in BIOS. For discrete graphics, choose ones with more onboard memory (1GB per display or more).

For H.265: decoding is only available for the graphics cards that have HEVC support. Please check with the video card manufacturer for the specifications.

GPU Test and Configuration

On every client workstation where you want to enable GPU usage, launch the *Renderer Test Utility* by locating it in the *Start* menu, or simply by typing a part of the name in the Windows search. You can also run this wizard from the WVMS Monitor application itself via main menu *Tools > GPU configuration wizard*. The client application will be closed during the test and then re-opened.

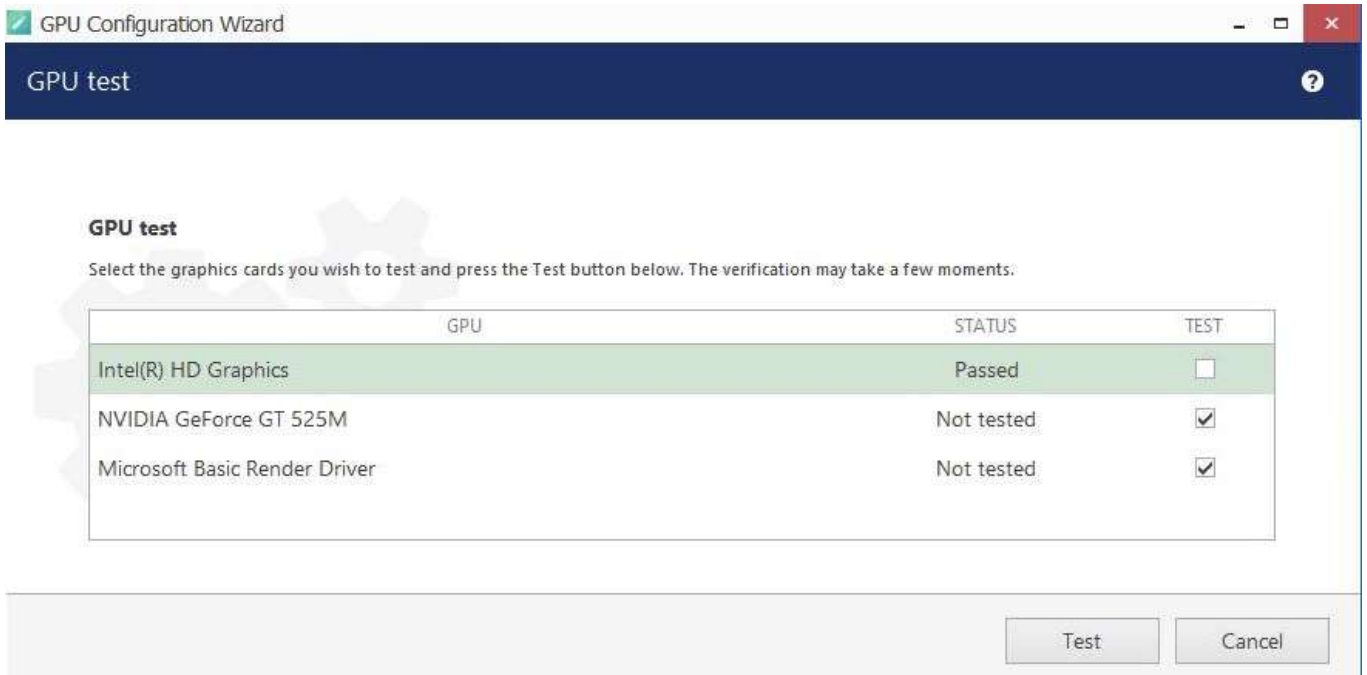
The first wizard screen is a **summary**. Here, you can select, which graphics cards will be used for decoding and for 3D rendering. To be able to do so, first run the GPU test so that WVMS can learn about your GPU capabilities and determine the maximum possible load. During the test, each GPU is consequently loaded with test videos of different resolutions, starting from bigger ones. As a result, a value list is created for each GPU, which is then used by the WVMS Monitor application for load balancing.



We recommend that you **re-run** the GPU test after each system change that may be related to graphics, as well as major OS updates (like feature updates) and WVMS software upgrade.

To run the **performance test**: hit the *Test GPU* button in the bottom left corner. In the list, mark all GPUs that you wish to engage by putting check marks in the *Test* column. Then, select the target codecs, and click the *Test* button below.

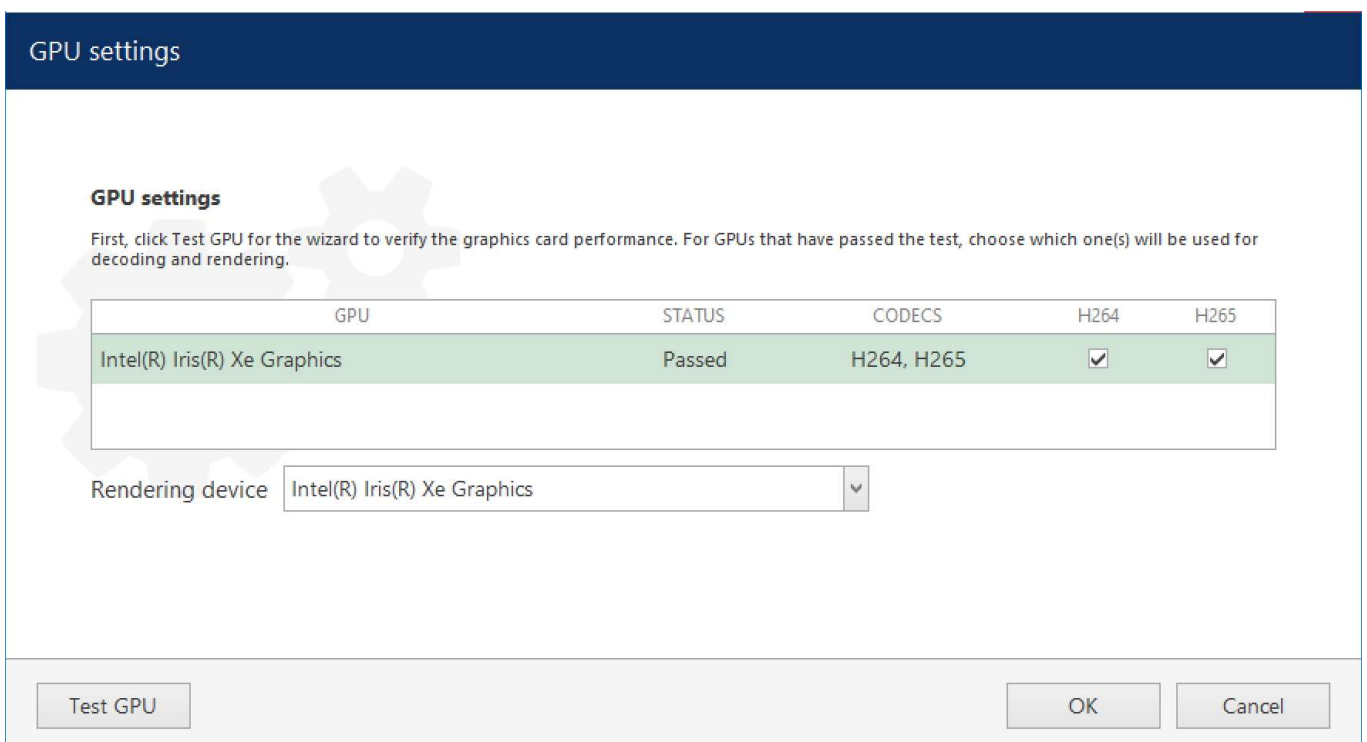
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Select graphics cards and run the test

If you have already launched the test earlier, the *Status* column will reflect the last test results. For the GPUs that have passed the test, there is no need to re-launch it, unless you have made changes to that video card configuration (e.g., added memory for the integrated card, installed a different device driver etc.). The test may take some time. If your WVMS Monitor application is open, the wizard will ask you to close it and re-open later (and offer to do so automatically).

During the test, click the *Show log* button to see how the test is going. After the test is finished, the wizard will automatically switch to the previous screen, and you still will be able to view the last test log.



An example of Intel graphics card that has successfully passed the test for both h.264 and h.265 decoding.

Log colours:

- red: most important (errors, failures)

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- yellow: warnings
- blue: information
- black: default
- gray: trace, details or low importance

Flags used in the test log indicate GPU capabilities:

- supported: graphics card is supported
- unsupported: hardware decoding is not supported by OS for this GPU
- legacy: video card is old or has old drivers, max resolution will be limited to 1080p
- canDecode: the GPU is OK to be used for decoding
- canRender: the GPU is OK to be used for rendering

As a result, the previously *Not passed* GPUs will change their status. GPUs that have passed the test, will be available for **decoding** (putting a check mark in the *Decode* column). Below the table, you can choose, which GPU will be used for **rendering**.

If you graphics card can decode both H.264 and H.265, you will have both codecs enabled after the test. However, you can deselect H.265 if you do not wish it to be decoded by GPU. Do not forget to restart WVMS Monitor if you have just opened the wizard to change the settings (without running the test).



Video output process on the WVMS Monitor side consists of two stages: decoding frames and rendering for displaying them. After decoding, the frames are converted and passed for rendering. If decoding and rendering operations happen on different GPUs, CPU is used in between so its load may grow a bit. Therefore, if only one GPU is used for decoding, it may be wiser to use the same GPU for rendering. Same logic is to be applied for cases when one GPU takes the most decoding load (this can be deduced from the GPU test log). But, if you happen to have a GPU that does not support decoding, you may want to use it for rendering, so that the total load is split between GPUs.

In general, according to our tests, **Intel GPUs have better decoding capabilities** (more channels can be decoded by them), and Nvidia GPUs (hi-end) are good at 3D rendering.

Click **OK** to **save** the settings and exit. If you close the wizard by clicking *Cancel* or *X*, the GPU settings will not be saved.



If you open the wizard and change **any settings** without running the test, please manually **restart** the **WVMS Monitor** application for the changes to take effect.

You can re-open the wizard at any time to run the test again and/or change the settings.

Usage in WVMS Monitor

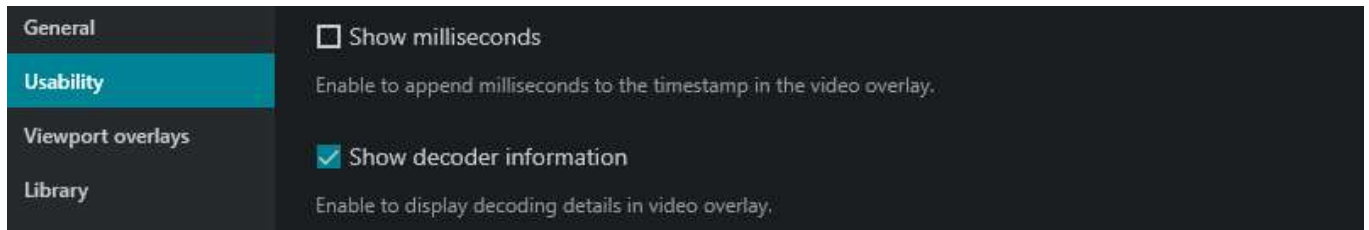
After you have enabled GPU settings via wizard, the WVMS Monitor application on the same machine will be able to use the GPU capabilities. Using GPU acceleration will significantly decrease the CPU load and will allow you to output more channels simultaneously on the same workstation. By combining GPU acceleration with substream usage you can gain even more, as using lower resolution streams for multichannel output is more efficient.

WVMS Monitor will automatically use GPUs enabled via wizard, you do not have to enable anything else in the application settings. Limitations:

- **live** view and **DPTZ**
- **fisheye dewarp** (supported dewarp mode must be set in Wavesys Console, as described above)
- stream codec must be **H.264** or **H.265**
- stream **resolution** must be supported (see GPU test log for details), e.g., legacy GPUs will not be used for resolutions greater than FullHD

If you want to check whether the decoding is currently performed by GPU, enable rendering info in the WVMS Monitor application settings. In the main menu, choose *Edit* > *Settings* > select the *Usability* tab > enable the *Show decoder information* option > *Save*.


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Enable GPU status in WVMS Monitor

After you have enabled this setting, each viewport in the live mode will have a **label next to the timestamp** (upper right corner):

- **CPU**: decoding is performed using CPU (GPU is not configured or overloaded, or stream codec/resolution is not compatible)
- **GPU**: the corresponding graphics card type will appear as a label - **Intel, Nvidia, AMD, or other GPU**.

 WVMS Monitor will automatically switch to CPU decoding if the configured GPU is **overloaded** (more than **80%** of its decoder, renderer or memory is used).

Make sure you have at least 512MB of dedicated video memory per display (recommended minimum is 1GB per display).

Troubleshooting

If, immediately after enabling hardware acceleration, your WVMS Monitor application behaves strangely, crashes, or causes other problems, try running it **without GPU** decoding. To do so a single time - for troubleshooting - use the *WVMS Monitor without GPU decoding* shortcut from the Start menu (similar icon but in gray colours). This shortcut activates a so-called "**safe mode**" for the WVMS Monitor application, which completely **ignores** the GPU settings configured via GPU test utility.

After launching the WVMS Monitor application in "safe mode", check if the issue is gone. If the no-GPU mode helps, disable GPU decoding via *Renderer test utility* by de-selecting GPUs in the list (remove the check mark in the *Decode* column). If you have multiple graphics cards, the issue may be caused by one of them, so a wise approach would be to enable/disable the graphics adapters one by one in order to find out, which one is causing problems.