



wavestore
Innovation with integrity

Wavestore

Video Management Software

Software Release Notes

Version 6.14

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1 Introduction to Wavestore Version 6

Welcome to Wavestore Version 6, the latest generation of the award-winning Video Management Software.

This document is an overview of this new software release and provides details of what's new in version 6 in relation to version 5, as well as considerations for migrating. It is very important to read this document carefully before considering a migration of an existing Wavestore installation to version 6.

If upgrading within version 6, it is recommended to read the sections for each intermediate release. For example if upgrading from v6.2 to v6.6, read the sections on versions 6.4 and 6.6.

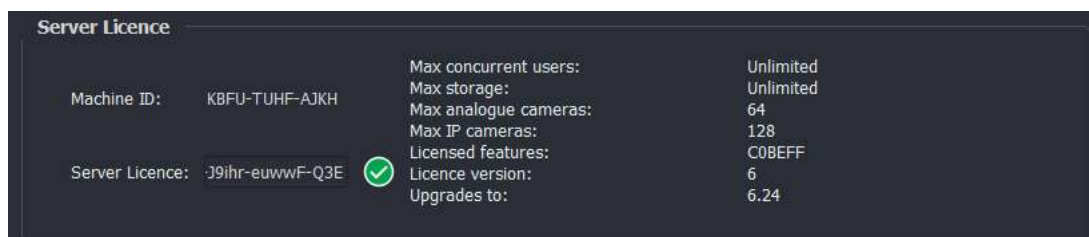
1.1 Important Information About Upgrading, Licensing, and Upgrade Bundles

Wavestore uses a system called *Upgrade Bundles* to allow flexible purchasing of software upgrades. This system is enforced as of version 6.12.

During the upgrade process, users of particularly old versions of the Wavestore server and new versions of WaveView may see a warning stating...

Warning: You appear to be upgrading to a software version which is later than your Upgrade Bundles permit. If you continue with the upgrade the system may become unlicensed. Do you want to proceed?

If upgrading to version 6.10 or earlier, this will not be an issue. However if upgrading to version 6.12 or later, it is important to check your Upgrade Bundle version before upgrading. This is displayed on the Server screen of *Setup* → *Devices* as "Upgrades to:". For example:



Server Licence			
Machine ID:	KBFU-TUHF-AJKH	Max concurrent users:	Unlimited
		Max storage:	Unlimited
		Max analogue cameras:	64
		Max IP cameras:	128
		Licensed features:	COBEFF
Server Licence:	J9ihr-euwwF-Q3E	Licence version:	6
		Upgrades to:	6.24

In this case the latest version which can be upgraded to 6.24. If an attempt is made to upgrade the unit to 6.26 or later, and the warning is ignored, the system will no longer be licensed after the upgrade is completed.

To prevent this happening, please do not proceed with the upgrade and contact your supplier to obtain an Upgrade Bundle.

When upgrading the software recordings are preserved. However it is important to note that the software is being continually improved and these improvements might mean that recorded data is not always backwards compatible. So for example a storage device formatted for V6.14 might not be readable if the system is downgraded to V6.10, but it will always be forwards compatible so you can upgrade to a later version without needing to be reformatted.

1.2 Compatibility Between Version 5 and 6 Client and Servers

Note that in this section, "client" means viewing software such as WaveView, WaveView Mobile, and the WaveSDK-Active SDK. "Server" means the Wavestore Recorder.

- Version 6 client software is fully compatible with Version 5 Wavestore servers running version 5.44 or later.
- Version 5.54 client software and later is partially compatible with Version 6 Wavestore servers. The limitations are:
 - It is not possible to configure a Version 6 server, so the Setup menu option is disabled.
 - It is not possible to save layouts.
 - It is not possible to save dewarped views.
- Version 5.52 and earlier of the client software is not compatible with Version 6 servers.

1.3 Considerations for Migrating From Wavestore Version 5

- The migration process requires a fresh installation of the Version 6 software on to the Wavestore server. This requires physical access to the Wavestore and cannot be performed remotely.
- In general, all recordings will be preserved. The exception is that any recordings on the operating system disk will be lost (this is normally configured as Disk D by default).
- All annotations will be lost when migrating from Version 5 to Version 6.
- Support for some older analogue capture devices has been discontinued. See [section 1.4.3 - Hardware Support](#).
- It is advisable to upgrade all remote client software first since the Version 6 clients are compatible with existing Version 5 servers. See [section 1.2 - Compatibility Between Version 5 and 6 Client and Servers](#).
- It is advisable to test the client software on any remote client PCs before attempting the migration. The method by which WaveView renders video to the display has changed and therefore it is possible that some client PCs which previously worked with Version 5 might have issues with Version 6. If testing uncovers any issues, please obtain a system report from the WaveView "Help | About | System Info" screen and contact our support team with details.

- When importing a configuration file from a Version 5 server, the network settings will be invalid and will need to be re-entered manually. If you accidentally import the configuration including the network settings, simply use the Advanced Configuration Editor to delete the [Network_X] sections, re-boot, then re-enter the network configuration manually.

1.4 Major New Features and Changes in Version 6

1.4.1 New LASS Filesystem

Version 6 has a new filesystem which provides many benefits over the Version 5 equivalent. If you are migrating from Version 5, existing recordings will be preserved, however the benefits of the new filesystem are not available. The benefits of the new filesystem are only available if you format your storage whilst running Version 6.

Here are some of the benefits of the new LASS filesystem in Version 6:

- Support for very large volumes...
 - Up to 26 volumes per Wavestore - where a volume is usually a disk, a partition on a disk, or a RAID array of multiple disks.
 - Up to 16 trillion images per volume - that's approximately 7.4 million days at 25 images per second, or the equivalent of 254 cameras for 80 years at 25 images per second! The Version 5 limit was 589 million images.
 - Approximately 16 PetaBytes per volume. Version 5 limit was 20 TebiBytes (Note: a TebiByte is approximately 1.1 TeraBytes).
 - 512 recording tracks per volume. Version 5 limit was 128.
- Improved disk performance

1.4.2 Failover

Version 6 introduces support for N+1 Failover.

The Standby server monitors the logical servers and takes over if any one fails. This leads to a brief interruption in recording and the recording while down is on another server. When the original server comes back up, it takes over again, and a redirect mechanism means the footage recorded by the standby machine appears as if it's on the original server so it's seamless to users viewing the recordings.

Full documentation is in the Wavestore Manual.

1.4.3 Hardware Support

The following older generations of Wavestore compatible analogue capture devices are no longer supported:

- The Wavelet Serial Multiplexer
- The Mach series

- The Warp series
- The Stretch S6 series

Note that you can check which analogue capture cards you have by accessing the server using WaveView and going to Setup|Devices, then clicking on the appropriate capture device in the device tree on the left. The Stretch S6 series have a "Subtype" beginning with "VRC6".

1.4.4 Software Installer Changes

The software installer now works from USB. Previously it was necessary to burn the ISO to a DVD.

The installer now has a more intelligent mechanism for determining which disk to install to. It will install to the smallest device which is greater than 26GB and not the device which the installer is on. i.e. 16GB devices will be ignored, 32GB will potentially be used.

Instructions for re-installing the Wavestore software are in the full manual which is provided on the DVD or ISO file.

1.4.5 Licensing Changes

- New BASE licence provides maximum 2 simultaneous users.
- Active Directory support is now licence controlled.
- Integration modules are now individually licensed.

2 Version 6.14 Changes

Version 6.14 is a major new release strongly influenced by customer feedback. The major areas of focus were ease-of-setup and delivering new improved storage technologies, although many other changes and improvements were also developed.

Be sure to read [section 2.4.1 - Important Information about New Configuration Format](#) before upgrading.

2.1 Server Changes

- New HyperRAID, HyperRAID Plus, and EcoStore technologies - see [section 2.4.2 - HyperRAID and Eco-Store](#)
- Support for recording to disks in sequence
- New facility to identify Faulty and Spun-down Hard Drives via SAS Sideband LEDs
- New facility to identify disks by Drive Bay numbers for supported enclosures
- Improved events on HDD Failure for HyperRAID and single drives
- Support for Camera Groups
- Improved Camera Discovery mechanism
- Improved detection and configuration of multi-lens cameras and encoders
- Support for HTTP Digest authentication
- Improved licensing for integration modules
- Improvements to network licensing to allow easier virtual machine cloning
- PTZ for ONVIF devices now automatically enabled if supported
- New recording modes including facility for scheduled Permanent Recording and Event Recording on the same track
- Ability to Boost framerate on schedule
- Smart Search and motion mask improvements
- Support for internal motion detection for IP cameras - see [section 2.4.3 - Internal Motion Detection - Supported Cameras](#) for requirements.
- Support for Audio and Talkback on same channel as video, rather than as a separate channel

- Nightly logs now report range of recording, not just earliest
- Ability to remotely view OS kernel log
- Ability to show blank image when Virtual Spot Monitor channel has no camera assigned
- Support for SNMP v2c protocol including for SNMP Traps
- Added Wavestore RTSP type to RTSP profile list
- Better text provided for ONVIF flags options
- New facility to auto-backup configuration weekly and when a configuration is loaded
- Email video clip script can now take container format as an option
- Added generic multi-channel Axis encoder request strings
- Added Dedicated Micros HTTP request string
- New Maintenance Menu option to force monitor resolution for client on server
- Added wear monitoring for Supermicro SATADOM SSD
- Sensor and SSD-monitoring configuration moved to separate "wavestore-hardware" package to allow easier backporting
- Disabled motherboard audio in hardware detection by default, optionally enable
- Support for auto-focus via ONVIF and other PTZ improvements
- Improved handling of Resolution and Encoding settings when using "Auto-configure camera streams"
- Improved disk fault reporting
- Fixed issue where errors with emailing video clips could be re-logged multiple times
- Fixed issue with emailing to more than 10 potential recipients
- Fixed issue with timestamps in non-UTC time zones when sending emails
- Fixed issue where server didn't unsubscribe from ONVIF PullPoint
- Fixed several issues relating to failover and failover recovery
- Various ONVIF and RTSP streaming improvements and fixes
- Fixed USB ISO "Recovery Mode"
- Fixed some cases where server unnecessarily requested restart
- Fixed issue with preserving server license when defaulting config through "maint" menu

2.2 WaveView Changes

- New Simpler Camera Setup
 - "All tracks" settings
 - "Auto" type

- Automatically enable PTZ for ONVIF devices if supported (Client)
 - Audio and Talkback on same channel as video
 - HD Options in Resolution Dropdown field
 - Implement client polling for network discovery of ONVIF cameras
- New Server Setup Screen containing submenus with formerly top-level setup screens
- New Licence screen and support for new licence levels
- Opening associated cameras from event/metadata performs best fit
- Smart search and motion mask improvements
- Disk Setup Screen updates for HyperRAID and EcoStore, plus "Flash Good Drives" facility
- Export improvements including...
 - Tidied up list of encoders for transcoded exports, removing old codecs which don't function well and fixing many others
 - Find screen no longer has export toolbar as the Find screen flags should be used instead
 - Improved handling of 'from' and 'to' flags to ensure they are correct
 - Fixed issue where linked audio channels > 128 wouldn't work in WSB export
 - Fixed issue exporting when audio is continuous but video has gaps
 - Fixed issue where exported WSB export could have an inactivity logout timer if the user that made the export had this configured
 - Other general improvements and fixes
- Preset and Tour support for joysticks/keyboards
- Added support for Videotec DCZ keyboard
- Enhanced quick annotation time selection
- Fixed major freezing on live streaming (client)
- Added GUI buttons for auto-iris and auto-focus
- Metadata improvements
 - Moved metadata visualisation settings to the server configuration file
 - Point of Sale and overlay console visualisation now start streaming automatically
- Facility to list and restored backed up configs
- User's layouts are now deleted with the user
- Removed Execute Command function from Config Editor screen as it's available under Tools
- Added support for "force failover" event action
- Better descriptions for certain event types, e.g. "Generic Fault" now shows "Fault (see System Log)"
- Custom event causes now available on Events Preferences and Event Search
- Added support for integration with KeyScan

- Fixed clicking sound on audio playback
- Fixed some issues with "Live Buffering" mode which could cause spinning wheel
- Re-added mechanism for de-highlighting selected items in live event stream
- Fixed issue where client could fail to automatically reconnect to server when "Too Many Connections" error occurs
- Improved Linux packaging to fix issues deploying to some Linux distributions
- Fixed issue where the camera would become smaller when the video stream has different resolutions over time
- Fixed issue where map images with spaces in filename wouldn't upload

2.3 WaveSDK ActiveX SDK Changes

- Support for auto-iris and auto-focus
- Support for audio and talkback on same channel as video
- Some export containers and codecs have been removed due to lack of reliable operation. Please check the new list using the API as described in the ActiveX manual or contact our SDK Support team for more information
- The PtzfEnabled property is now deprecated. See ActiveX manual for details
- This release is ABI compatible with the previous version 6.12

2.4 More Information

2.4.1 Important Information about New Configuration Format

One of the main focal points of version 6.14 was to simplify ease-of-setup. This has been achieved by introducing several new features including Camera Groups and the "Auto" group type which will try to automatically detect the camera type and set it up with sensible defaults without requiring manual settings.

One effect of these changes is that the configuration format written by WaveView version 6.14 is new, and therefore cannot be understood by old versions of the Wavestore client software, including *WaveView*, *WaveSDK-ActiveX*, and *WaveView Mobile*. Therefore any client devices needing to access a v6.14 server configured with these new facilities need to be up-to-date. If using the on-server client display, this does not restart automatically, so a reboot is recommended.

The new version 1.14 WaveView Mobile client will be required for any servers configured with 6.14. However it's important to note that this version does not support Android 4.4.4 (KitKat) or below. Android 5.0+ is required. This is due to the manufacturer dropping support for these older versions.

Also note that exports are backwards compatible but not forwards compatible, meaning that exports made in v6.14 can't be played back in older WaveView versions, but exports made in older WaveView versions can be played by v6.14.

The version 6.14 client is compatible with servers as far back as version 5.54 and can be used to configure those servers, however some of the new setup conveniences such as "Auto" mode and Camera Groups may not be available.

Upon upgrading to version 6.14, the server automatically makes a backup of the configuration. Should anything go wrong, this backup can be quickly restored by going to *View → Setup → Server → Configuration Editor → Load Backup*.

When a server is upgraded to version 6.14, the server's configuration is not changed automatically. However the first time a v6.14 client is used to make changes in the Cameras setup screen, these settings will be written back in the new format.

To summarise these points:

- Version 6.14 can read and write to any server version back as far as version 5.54.
- If using v6.14 or later, any settings made in the Cameras setup screen will be in the new format, which can't be understood by older client versions.
- Exports made by v6.14 after updating to the new configuration format can't be read by older WaveView clients.
- Upon upgrading to v6.14, the configuration is automatically backed up to allow rolling back if necessary.
- The new WaveView Mobile only supports Android v5.0 and later.
- If using the on-server client display, a reboot is recommended.

2.4.2 HyperRAID and EcoStore

HyperRAID™ is a new technology unique to Wavestore providing cost-effective redundancy in storage arrays whilst performing faster than traditional RAID without requiring a traditional hardware RAID card to operate. This technology is compatible with a wide range of Wavestore servers and various disk controllers. Full details can be obtained upon request.

Along with HyperRAID™, version 6.14 adds the ability to record to multiple 'disk groups' in sequence. A disk group could be a single disk or a HyperRAID array. These disk groups can then be spun down, or de-activated when idle, to save energy consumption and heat output. The combination of these technologies is known as EcoStore®.

EcoStore is a registered trademark of Wavestore Global Limited.

2.4.3 Internal Motion Detection - Supported Cameras

The new internal motion detection is designed to work for ONVIF Profile S compliant cameras which are capable of transmitting a JPEG stream of 648x648 pixels or less. Note that this JPEG stream is used as an additional stream from the camera on top of any existing configured streams, so the camera must be capable of this.

The JPEG stream is a low resolution stream at 4 frames per second and so some extra bandwidth is used for this.

This functionality is described in detail in the section "Configuring Motion Detect Recording" of the Wave-store manual.

3 Version 6.12 Changes

3.1 Server Changes

- Upgrade Bundles are now enforced. IMPORTANT - please read [section 1.1 - Important Information About Upgrading, Licensing, and Upgrade Bundles](#) before upgrading.
- Support for capture and record of multicast streams from ONVIF devices.
- Support for connecting to ONVIF devices via TLS/SSL.
- Support for Recording Lock facility (was available in version 5, now added to version 6).
- New Executable Command to reboot the camera.
- Various I/O improvements for 3rd party integrations.
- Improved logging in RTSP Server.
- Improvements to Network Licensing mechanism include better error messages.
- New command to query status of event causes, used primarily by Maps in WaveView.
- Email sending mechanism now has a new throttling mechanism.
- Increased size of root partition for new installs from 6GB to 10GB. Overall requirement for system disk increases from around 17GB to 21GB. Should still fit easily on even the smallest SSDs.
- General improvements to IP camera compatibility.
- Some minor improvements relating to failover.
- General improvements relating to sending emails.
- Fixed issue where "force user to change password on next login" wouldn't always work.
- Fixed issue where "Shutdown System" via remote client wouldn't successfully shut down A-Series.
- Fixed problem with PTZ control when using RTSP dual streaming.
- Fixed problem with RTSP re-streaming when capturing with RTSP dual streaming.
- Several fixes relating to Virtual Spot Monitor sequences.

3.2 WaveView Changes

- Various map improvements including...
 - Map configuration and images are now saved on server instead of client, easier system setup.
 - Maps now show current alarm status on entry.
 - Maps edit mode now moved to the setup screens.
 - Maps now correctly handle Digital Inputs within server groups.
- New Status Summary Screen allowing quick view of all cameras in the server group.
- Various improvements and fixes relating to metadata visualisations including...
 - Metadata visualisations are now associated with cameras via the setup screen. No need to choose each time one is opened.
 - "In-display" visualisations such as Text Overlay are now opened automatically.
- For ONVIF stream settings, a custom resolution can now be entered.
- Various improvements to the File Manager.
- Various improvements to allow better integration of 3rd party systems such as ANPR/LPR.
- When maximising a camera from a layout it now automatically switches to high resolution stream.
- Enforcement of Upgrade Bundles including checking and warning when appropriate.
- Re-added concept of "viewed" events in live event stream (was in version 5 but not version 6 until now).
- Fixes and improvements to Virtual Spot Monitors including...
 - Dwell time now defaults to 5 seconds instead of 1.
 - Number of Virtual Spot Monitors channels limited to 2, otherwise undesirable issues may occur.
- Setup screen support for ONVIF Multicast devices.
- "Server awaiting restart" now shown on setup status bar to make it more obvious.
- The behaviours of the various "Tools" windows are now more consistent.
- The "auto control toolbar" functionality is now removed as it wasn't predictable. Can still be used manually.
- Adding cameras to a free layout now tiles displays (a little down and to the right compared to previous camera).
- New preference to enable/disable "Lower resolution threshold when panning".
- Manually triggered events from Event Rule screen (Test On / Test Off) now logged to System Log.
- Annotation storage settings now configurable.
- Old limit of 255 users increased to 9,999.
- Improved UI for "Flash Good Drives" function.

- Improved joystick Shuttle and Jog functions on Linux, to match Windows functionality.
- Email Server setup screen improvements to support new email throttling mechanism.
- Improved decoders and logging of decoding issues.
- Fixed issue where streams with changing resolutions could cause display to get smaller each time.
- Fixed issues with duplicated event causes when adding multiple actions.
- Fixed several issues with adding new I/O devices for integration modules.
- Fixed issue where tooltip text on Windows was hard to read.
- Fixed issue where dismantling server group could leave old erroneous configuration.
- Fixed issue where setup screens wouldn't work on some laptops with new NVIDIA drivers.
- Fixed issue where schedule setup would not allow continuous overnight period.
- Fixed issue where opening password-protected WSB export taken from server group could cause password prompt to appear once per server.

3.3 WaveSDK ActiveX SDK Changes

- **IMPORTANT** - The ActiveX SDK now requires version 5 or version 6.12 and above, earlier version 6 servers not supported.
- Added support for encrypted recordings.
- Added support for licensed integration modules
- Fixed issue where the ActiveX DLL version number was incorrect
- Various other fixes and improvements. See the WaveSDK ActiveX Reference Guide for more information.

4 Version 6.10 Changes

4.1 Server Changes

- Major update to the operating system. IMPORTANT: This can affect the graphical interface on the Wavestore because of driver changes, see [Changes relating to graphics drivers](#) for more information.
- Performance improvements relating to live streaming
- New "Recording less than intended" event cause
- Many improvements to ONVIF camera compatibility and features such as automatic camera configuration, audio and talkback, multi-streaming, and device discovery. Includes improved error logging.
- Fewer IP camera setting changes require server restart
- RAID Faults now trigger Disk Fault event cause
- Reboots caused by watchdog are now logged as a fault after system comes back
- Allow suppression of Pullpoint messages from cameras in Live Event Stream
- Commands for jumping time forwards and jumping back with deletion of footage
- Ability to do graphics driver install and uninstall remotely
- Pre-event framerate boost now fully supported in V6 LASS file format.
- Upgraded proprietary NVIDIA and AMD graphics drivers
- Significant improvements in Axis-HTTP PTZ protocol
- Nightly reports are now output at midnight localtime, not UTC
- Various improvements to allow integrations with more 3rd party devices
- Various improvements relating to handling of LSI RAID cards
- Various failover improvements
- Fixed issue where fault messages could occur for disabled IP audio channels
- Fixed potential problems switch to and from bonded network interfaces
- Note: Software Support Agreements are not enforced in this version. They will apply to v6.10.

4.2 WaveView Changes

- Changes to layout double-click mode - see [Changes to behaviour of double-clicking displays](#)
- ONVIF Camera Setup - "Allow Wavestore to configure streams" and "Enable PullPoint" now enabled by default for easier setup.
- New Error Codes for video displays to show camera status more clearly
- Added support for new 'Recording less than intended' event cause
- Various minor UI improvements including:
 - Tidied up main screen dock widget containing playback, event, and PTZ controls
 - Thinner border for selected video displays
 - Clearer icons for alarms in map viewer
- Various improvements to joystick PTZ control
- Various fixes and improvements relating to Disks Setup and LSI RAID cards
- Exports are now correctly logged to system log
- Server UID is now written in client log upon connection
- Improvements to smoothness of video streaming over busy networks
- Various non-relevant screens are now disabled when viewing WSB export
- Front screen now remembers folded/unfolded state of dewarped view(s)
- Updated Immervision-enables dewarping library
- Fixed potential issues with configuration sync when network connection to server lost
- Fixed a rare and somewhat random crash which could occur when manipulating camera positions in layouts
- Fixed setup screen for analogue audio and volume level control
- Fixed some issues leaving Find screen with the on-server WaveView client
- Fixed some issues with configuring Virtual Spot Monitors
- Fixed issue where playback controls wouldn't always work on selected cameras when displaying multiple cameras
- Various improvements to export and playback of WSB files from server groups
- Many other minor bug fixes and improvements

4.3 WaveSDK ActiveX SDK Changes

A major new revision of the WaveSDK-ActiveX SDK is available in 6.10. The underlying components have been revamped with enhanced performance, modern architecture and improved flexibility. Keeping up

with the best development practice the API is now more consistent and easy to use. By improving the example code and including small snippets in the documentation the developers can quickly get up and running with the latest SDK. Several new features are available in the new release. The core features included in the SDK are listed below.

- Connect to various Wavestore servers.
- Wavestore server management routines such as restart process and reboot and shutdown server.
- Retrieve a list of cameras and audio inputs and outputs, configured on each server.
- Full playback control (e.g. live, play, fast-forward, rewind, frame-step back, frame-step forward, jump to beginning and jump to end of video)
- Full PTZ control (e.g. vector PTZ commands, focus, iris, wash, wipe, lamp, recall tours and presets.)
- Search in the pre-recorded video based on date and time.
- Receive information when the servers are changed (e.g. lost connection, reconnected, configuration changed, other changes or errors).
- Stream video to an ActiveX control or receive raw decoded data.
- Dual Streaming capability, i.e. switch between a high or low resolution stream.
- Additional functions are available for the video streaming ActiveX control:
 - Display a subtitle with image information overlaid on the stream.
 - Zoom in and out around a coordinate in the stream.
 - Keep aspect ratio or fill the whole control.
 - Receive mouse and wheel event.
- Bidirectional audio (audio and talkback).
 - Retrieve decoded audio data and play it through a provided audio player.
 - Input raw data to a talkback channel either through an audio file or using the provided recording device class.
- Create annotations to identify events.
- Receive events from the server. Each event includes:
 - The date and time of when the event occurred.
 - The cause of the event.
 - Other information such as the source name, server name and additional text related to the specific cause of the event.
- Trigger rules (event causes/actions) configured on the server.
- Export recordings from different tracks to different formats (both transcoding as well as to our own .wsb format).

4.3.1 SDK Changes versus Version 5

- Dewarping is no longer supported.
- Encrypted recordings are no longer supported.
- Event notification system is no longer supported. All the events are now automatically passed through to the ActiveX SDK.

Note that if the above features are required, the version 5.54 WaveSDK-ActiveX SDK can still be used with version 6 servers. It is planned that features missing in the new SDK will be added within the next few releases, in an improved form.

4.4 More Information

4.4.1 Changes to behaviour of double-clicking displays

When viewing a multi-camera layout in previous versions of WaveView, the behaviour was as follows:

- Double-clicking a camera would enter a "solo mode", showing just that camera, yet leaving the layout in its previous state, e.g. "3x3"
- Double-clicking the camera again would make that camera full-screen
- Double-clicking again would return to the original layout

This concept of the "solo mode" has now been removed as it could result in unexpected behaviour in certain circumstances. As of version 6.10 a double-click of a camera in a layout will full-screen it, and another double-click will return to the layout.

If it is desired to solo a camera, simply select the camera and change to a 1-way layout.

4.4.2 Changes relating to graphics drivers

When the Wavestore is first installed, if it contains an NVIDIA or AMD (formerly ATI) graphics card, the proprietary graphics drivers for the manufacturer would be recommended for install. If factory supplied, this option would be accepted.

When upgrading to v6.10, the old graphics drivers are incompatible with the latest operating system and will be automatically removed. Normally this won't cause an issue but it's usually recommended to install the latest proprietary drivers.

A new menu option is available so that this can be performed locally or remotely. Here is how:

- Using WaveView, log in to the server
- Go to *Tools* → *Server Maintenance*
- Choose *Configure server graphics drivers*
- Choose *Configure Drivers*
- Choose the appropriate option to install proprietary drivers.

If performing this operation remotely it's advisable to have someone available to check that the graphical interface is working after any change. A reboot is required after installing or removing proprietary drivers.

5 Version 6.8.78 Changes

5.1 Server Changes

- New facility to record any track to two disks simultaneously
- Resolved issue where dual-streaming would not always work for secondary stream
- Support for pre-event framerate boost
- Fixed issue with failover redirection of recordings
- Fixed issue with failover incorrect handling of multiple and bonded network interfaces
- Fixed issue where faulty cameras could cause "Too Many Open Handles" error in server
- Fixed issue with 'slewtimefast' command for clock correction
- Improved logging for disk performance

5.2 WaveView Changes

- New Map Edit permission per user
- Support for new server Disk2 parameter, to record to two disks simultaneously
- Fixed issue with opening WSB exports of multiple cameras from multiple servers
- Fixed issue with opening very long WSB exports split across multiple files
- Fixed issue where PTZ Lamps, Washers, and Wipers would not latch on

6 Version 6.8.22 Changes

6.1 Server Changes

- Support for virtual machines via hardware dongle
- Support for network licences
- New facilities for copying data between disks and Wavestores (currently advanced feature for use only guided by Wavestore technical support)
- Disk throughput performance improvements
- Improvements to performance of logging facilities
- Option to reverse PTZ tilt operations
- Camera Database Update: Motion recording using ONVIF Pullpoint from Samsung SNV-6013 camera reported to stop working after server upgrade from V6.4 to V6.6
- Various failover improvements
- Improved handling of LSI MegaRAID cards
- Fixed issue with switching off output of AXIS P8221 device
- Improved tools for slewing server clock when incorrect time is set up but recordings need to be preserved
- Fixed issue which could cause log partition on server to fill up
- Fixed issue which could cause events to be triggered too many times

6.2 WaveView Changes

- Several improvements to main screen Device Tree including...
 - Ability to search/filter items in the tree
 - Folded/unfolded states of servers and cameras are remembered
 - Settings are stored in local preferences so remembered each time WaveView runs
 - Ability to expand all or collapse all items
 - Performance improvements when connecting to large server groups

- Upgraded to latest Ampleye SDK
- Improved UI for setting dewarped views (Oncam and Immervision)
- Local preference to hide "connect to server group" checkbox
- Change Password tool now warns if current server is in group but not connected to group
- New setup option to reverse PTZ tilt operation
- New handling for server failover status codes
- Upgrade Bundles now checked before performing upgrades and warning issued if expired
- Significant performance improvements when connecting to large server groups and when reading and writing configuration
- Various improvements to synchronising users in a server group, including when a mixture of version 5 and version 6 servers
- Fixed issue where configuration could report as "locked" when adding ONVIF cameras
- Fixed issue with ad-hoc dewarping views not being saved in layouts correctly
- Fixed various issues with non-Latin characters in events and exports
- Fixed graphical issues on systems with no hardware OpenGL support
- Various minor GUI and setup fixes
- Display area no longer solos camera when double-clicked, it full-screens instead

7 Version 6.6 Changes

7.1 Server Changes

- Support for many more event cause types - see [New Event Cause Types](#) for more information.
- EVENTX command - support more event types
- Server event system support for ONVIF Topic string parameters
- Changes to Live Event Stream revamp to support new types
- New "CopyTrack" functionality to allow recordings to be moved between storage devices
- Support Motion Search (Smart Search)
- New "TCP-out" I/O protocol, providing support for new 3rd party integrations
- Various improvements to support a range of new Dell hardware
- New configurable connection timeout
- Added support for more bonded network interfaces
- Added support for Supermicro AOC-SAS2LP-MV8 disk controller
- Added support for various new Supermicro boards
- Fixed issue with Pelco encoder where channels wouldn't restore after video loss
- Fixed issue with Uniview cameras including Pullpoint problems and ONVIF Streaming over HTTP when port not 80
- Fixed Video Loss issue with Mobotix cameras
- Fixed issue with camera host names not working correctly
- Various other fixes and improvements

7.2 WaveView Changes

- New Motion Search function in Find screen
- Add support for new custom event causes in event rules setup page
- Updated live event stream to support new event types

- New configurable connection timeout
- New option to restrict "install" login IP address range
- Upgraded to latest Oncam SDK
- Improved audio synchronisation
- Various improvements to integration module selection and parameter entry
- Various fixes relating to saving dewarp views and exports
- New progress percentage output on the status bar for CopyTrack operations
- Fixed issue where sometimes the client would flash/flicker white in the Find screen
- Fixed issue where playback of recorded footage on a camera configured for dewarping appears jerky sometimes
- Fixed issue with "image authentication" failing for audio channels
- Several fixes in I/O device setup screen relating to integration modules
- Fixed issues configuring analogue spot monitor sequence using Stretch VRC7016LX spot outputs

7.3 More Information

7.3.1 Changes to motion sensitivity sliders

Prior to WaveView version 6.6 the motion detection sensitivity slider went from 0 to 255. During the v6.6 development it was determined that the sensitivity did not go low enough. Therefore the new scale is 0 to 1000. The old value of 255 will now display as 1000, but it is actually the same sensitivity. The old value of 0 will now be displayed as 745.

7.3.2 New Event Cause Types

The Wavestore now has new Event Cause types. Previous the list of available "Event Causes" was a fixed list. Now there are two extra ways in which new event cause types may appear.

- An ONVIF IP camera has sent an event of a type not seen previously by Wavestore.
- An integration module has been installed which defines new Event Cause types.

Note that well-defined ONVIF event types are already mapped to Wavestore types. For example, the ONVIF event type for "Motion" is already mapped to the Wavestore "Motion" event cause.

Further information on this is in the latest Wavestore Manual.

8 Version 6.4 Changes

8.1 Server Changes

- Support for interacting with LSI RAID cards via the WaveView Disks Setup Screen
- Syslog alarms for Multiple MegaRAID LSI RAID cards
- Software Support Agreements now enforced
- Email scripts now handle secure connections (e.g. SSL/TLS)
- Improved NVIDIA driver handling in graphics driver setup
- Added "uifstats" command for getting network throughput statistics
- Added "lspci" command as a way of listing hardware devices
- Added "aplay" command as a way of listing audio devices
- Improvements to alog command - new "-a" and "-d" options
- Support for ONVIF Auxiliary commands
- Support for ONVIF JPEG/RTP Streaming extension
- Installer no longer automatically reboots at end of install process
- Automatic hardware configuration now writes a log message when run
- Support for operating system disks greater than 2 TeraBytes
- Notification protocol: Protocol D with time and timezone
- Disabled auto-carving for 3Ware cards since version 6 supports much higher storage capacity
- Added facility for deleting exports in maint menu when desktop not available
- Fixed issue with ONVIF RTSP/HTTP reconnections after network outage
- Fixed issue where ONVIF UDP could not be correctly configured
- Fixed issue where ONVIF Pullpoint streams wouldn't always reconnect automatically
- Fixed issue where WaveView player not included when footage exported using local client
- Fixed issue where "User agent" string said "Wavestore/5.0" (ONVIF over HTTP)
- Fixed issue where Wavestore home page claimed to be version 5

- Fixed issue where the recording indicator would flash when viewing a camera live with RTSP dual streaming
- Fixed issues with log file rotation
- Fixed issue where xrandr tool could not be run
- Update kernel to provide mitigation of "dirty cow" vulnerability
- Security improvements

8.2 WaveView Changes

- Support for interacting with LSI RAID cards via the WaveView Disks Setup Screen
- Major rewrite of display area and layout system including:
 - Ability to switch video items between slots in a grid layout
 - Ability to save more settings with layouts such as "preserve aspect ratio", "contours and tracking", and "show subtitles"
 - Ability to save resolution high/low for each display
 - Ability to save audio mode setting for each item in the layout (Mute / Enable / Solo)
 - Significant improvements to undo/redo operations for layouts
 - Fixed issue with automatic layout loading at login
 - Fixed issue where cameras would always switch to live when returning from full-screen
- Server field in login dialog is now auto-populated with "localhost" on first boot after install
- Access to ONVIF Devices menu now denied for lower level users
- Experimental support for hardware accelerated decoding via NVIDIA CUDA
- Fixed issue where sometimes dewarped and panorama virtual camera presets weren't saved in the right position - see [New dewarping serialisation format](#) for more information.
- Fixed issue where server and cameras could be listed twice when opening WSB files
- Fixed autologin function for Linux client on server
- Fixed issue where files could not be deleted in WaveView file manager

8.3 More Information

8.3.1 New dewarping serialisation format

Prior to WaveView version 6.4 there were 4 different techniques for serialisation of dewarping settings:

- Wavestore V5 serialization
- Wavestore V6 serialization

- Oncam serialization
- Immervision serialization

Investigations during the development of version 6.4 discovered a flaw in the Wavestore serialization techniques whereby they could lose some information, resulting in saved dewarping views sometimes being saved incorrectly.

Consequently from version 6.4 a new serialization technique "V6_2" has been introduced whereby the values are saved correctly.

These serialization techniques have a number used to differentiate them. Wavestore v5 uses 0, Wavestore v6 uses 1 and so on. This number is the first number seen in the venus config file under Camera_X->Lens where the number is recorded in hexadecimal. So for example, if the view is recorded with V6 serialization the data would begin with 01XXXXXXXXX...

When WaveView is under version 6.4 no views recorded with the "V6_2" serialization can be seen, as the software doesn't recognize the number under Camera_X->Lens.

One drawback here is that if the user tries to add views on a camera that already uses "V6_2" technique it will have a black window when clicking on the "dewarped" or "panoramic" buttons.

To fix this issue there are two possible work-arounds. The former (and recommended) is to download a WaveView version >= 6.4, the latter is to click on "Use Dewarping Options" to disable it, save and set new views. However this will have the consequence of removing all views set with the new serialization technique.

8.3.2 New layout format

In version 6.4 it was decided that many improvements would be made to the way that layouts are saved and loaded in order to make the feature more reliable as well as to add more functionality.

Unfortunately it was not possible to maintain backwards compatibility so layouts created with version 6.2 and earlier are not viewable in version 6.4. Similarly, layouts created in version 6.4 are not viewable in version 6.2 and earlier. Going forward however, the new layout system should be forwards and backwards compatible from version 6.4 onwards.

9 Version 6.2 Changes

9.1 Server Changes

- Support for Dual Streaming from supported ONVIF IP cameras
- New Auto Camera Setup for support ONVIF IP cameras
- Ability to load metadata protocol from file
- Integration modules now licence checked
- Improvement to sensor monitoring, supports IPMI and lm_sensors back-ends, better configurability
- Support for SES external disk enclosure monitoring
- System Drive SMART parameters now monitored
- Failover: ForceFail option for maintenance
- Integration of LSI RAID cards via Wavestore interface and storcli, including syslog alarms and hot-swap
- New "clear-fault" exec script
- Added new "Backup" capture type
- Corrected ONVIF identity string
- Various security improvements and bug fixes

9.2 WaveView Changes

- Integration module functions selectable from dropdown list
- Integration of Oncam Dewarping SDK.
- Integration of Immervision Dewarping SDK.
- Facility to upload audio files to server for playback on event
- Setup screens for network configuration of ONVIF devices
- Setup screens for ONVIF dual-streaming
- Support for dual-streaming resolution selection
- New method for adding capture devices including improvements for adding ONVIF cameras

- Various terms renamed to match industry standards
- Some improvements to layout handling
- Many improvements to I/O Devices Setup screen
- Positions of 'Add Column' and 'Add Row' buttons on Video Display Toolbar are fixed
- Enable/disable audio input and output in WaveView
- Upgraded Ampleye SDK
- New Linux software repositories for v6 WaveView on RedHat and Ubuntu systems
- Various security improvements and bug fixes

9.3 Known Issues

- There is an issue with the "undo layout" operation where it can need to be performed twice to actually perform the operation. This is due to be addressed in version 6.4.

10 Version 6.0 Changes vs Version 5

10.1 Server Changes

- Major update to base operating system providing better hardware compatibility, performance, and more.
- Major update to the LASS filesystem. See [section 1.4.1 - New LASS Filesystem](#).
- N+1 failover support. See [section 1.4.2 - Failover](#).
- NFS support in server (new DiskNames syntax).
- LASS6: disk nfs/cifs support in multiple files.
- Support for up to 32 network interfaces.
- New Alarm Board support (Axis VAPIX).
- Support for IPMI sensors to be inspected via SNMP.
- Support for multiple instances of WaveView client to be run, one per connected monitor.
- Identify Faulty Hard Drive.
- Various security updates including...
 - SSH procedure changed.
 - DVR Security: Privilege separation.
 - Config file transmission now encrypted.
 - Dropped support for old protocols for security reasons.
 - No need to run as root.
 - PASSWORD: password algorithm with "work-factor".
 - All users are forced to change password on first login.
- The installer now works from USB and has a more intelligent mechanism for determining which disk the operating system should be installed to. See [section 1.4.4 - Software Installer Changes](#).
- Multiple log files - EXEC command.
- New mechanism for identifying audio devices.
- Support for opaque script files.

10.2 WaveView Changes

- Major user interface update including...
 - Updated icons and graphics.
 - Dockable components in the main screen.
 - Improved configurability of the live event stream window.
- New automatic login option.
- New option for automatic opening of layout upon login.
- New option for automatic full-screen on login.
- New Password Policy system.
- Arbitrary camera orientation/ wall angle for dewarping.
- New setup screen for LDAP/Active Directory.
- New setup screen for Failover. See [section 1.4.2 - Failover](#).
- Many improvements to I/O Devices Setup Screen including ability to configure outputs via VAPIX.
- Improvements to Network setup screen including support for network port bonding and jumbo frames.
- Improvements to Disks setup screen including ability to identify faulty hard drive.
- Support for InputSelect option for selecting analogue audio device input (e.g. Line or Mic).
- New shortcut for opening cameras via keyboard numpad (hold Ctrl, then press "/" followed by camera number, then numpad Enter).
- Local settings now stored to file ("%USERPROFILE%\AppData\Roaming\Wavestore" on Windows, "~/.config/Wavestore" on Linux).

10.3 Known Issues

- There is no publicly available Ubuntu client for 6.0.
- LASS volume usage percentage is not currently available in version 6 via the Disks Setup screen.

11 Upgrade Process

The Upgrade Server menu (menu path View → Setup → Upgrade) allows the Wavestore server software to be upgraded to the latest version.

Note: Upgrades will be applied to all connected servers in the server group and can be carried out from a networked PC or laptop, or on the server itself, using the latest Wavestore install ISO.

To upgrade from an ISO file, the ISO first needs to be "mounted" or written to a USB memory stick or DVD. If the ISO is on a Windows PC, the easiest method is simply to mount the ISO. This is done by right-clicking the ISO file and choosing "*Mount*". The ISO is then available as a separate disk (e.g. "F:"), as if a pre-written USB stick or DVD had been inserted.

If it is necessary to upgrade the Wavestore by connecting to it directly rather than from a remote client PC, it will be necessary to write the ISO file to a USB memory stick or DVD. On Windows we recommend the use of a program called Rufus. See [section 11.3 - Writing an ISO with Rufus](#).

11.1 Performing the Upgrade

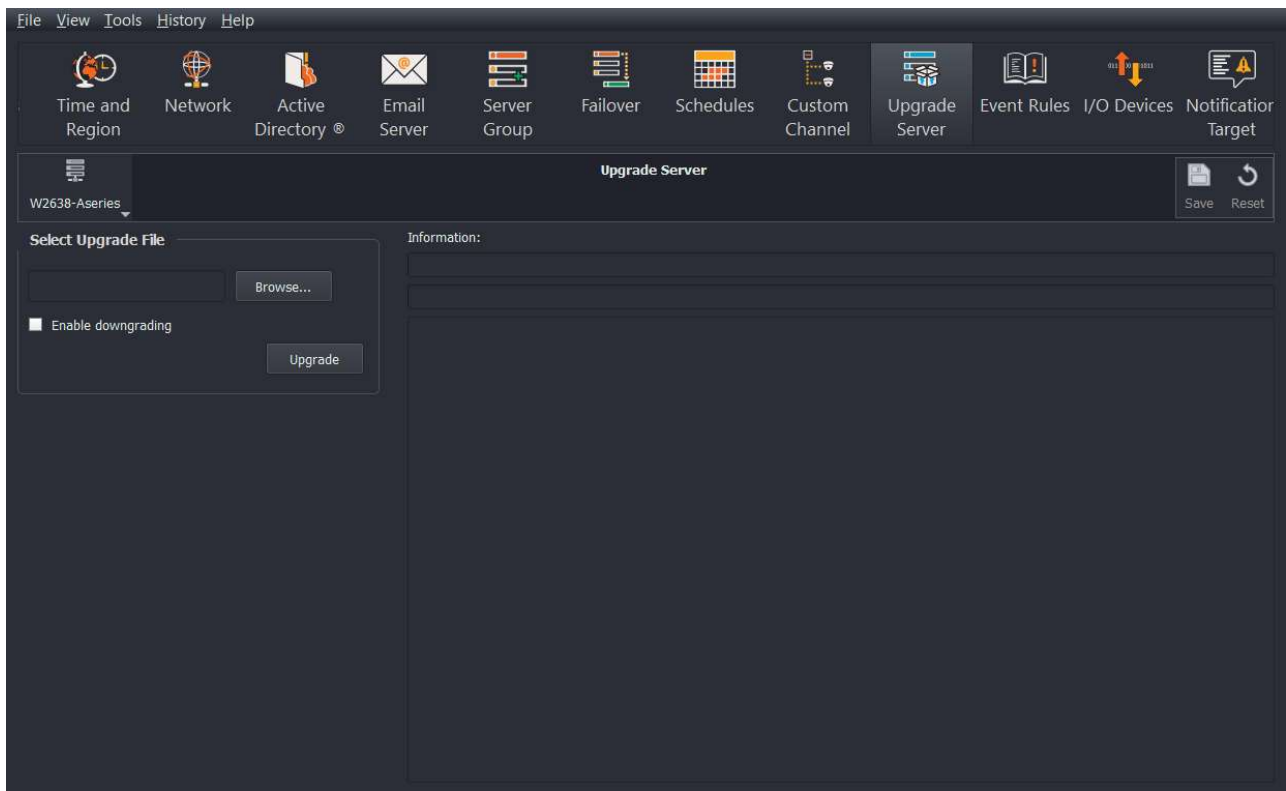


Figure 11.1: Upgrade Server Screen

To perform the upgrade, first browse to the location of the upgrade file ('upgrade.txt').

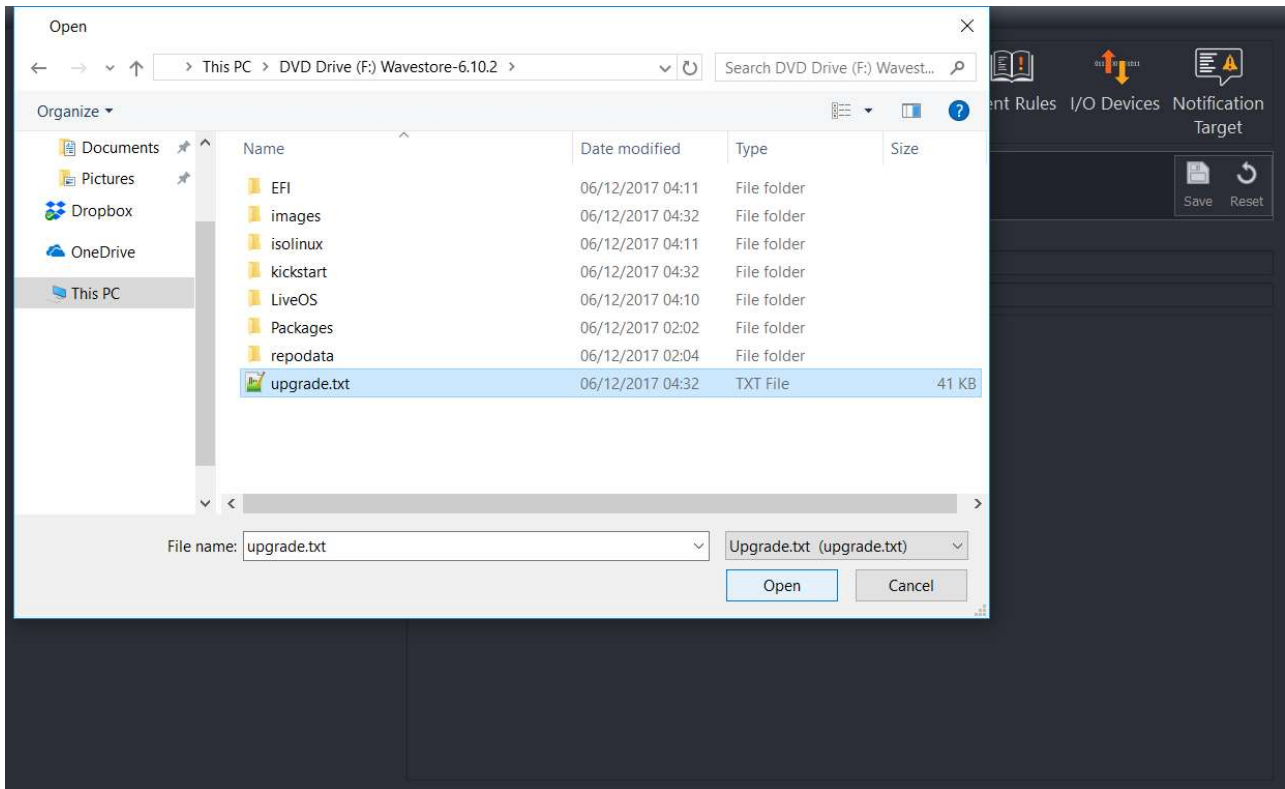


Figure 11.2: Upgrade Server screen – browsing to locate 'upgrade.txt' file

Once you have located the 'upgrade.txt' file, select it then click on 'Open'.

The *Select Upgrade File* field will now show the upgrade file that you have chosen.

Click on 'Upgrade', and the Information window will show progress of the upgrade, as the upgrade files are copied across to the server:

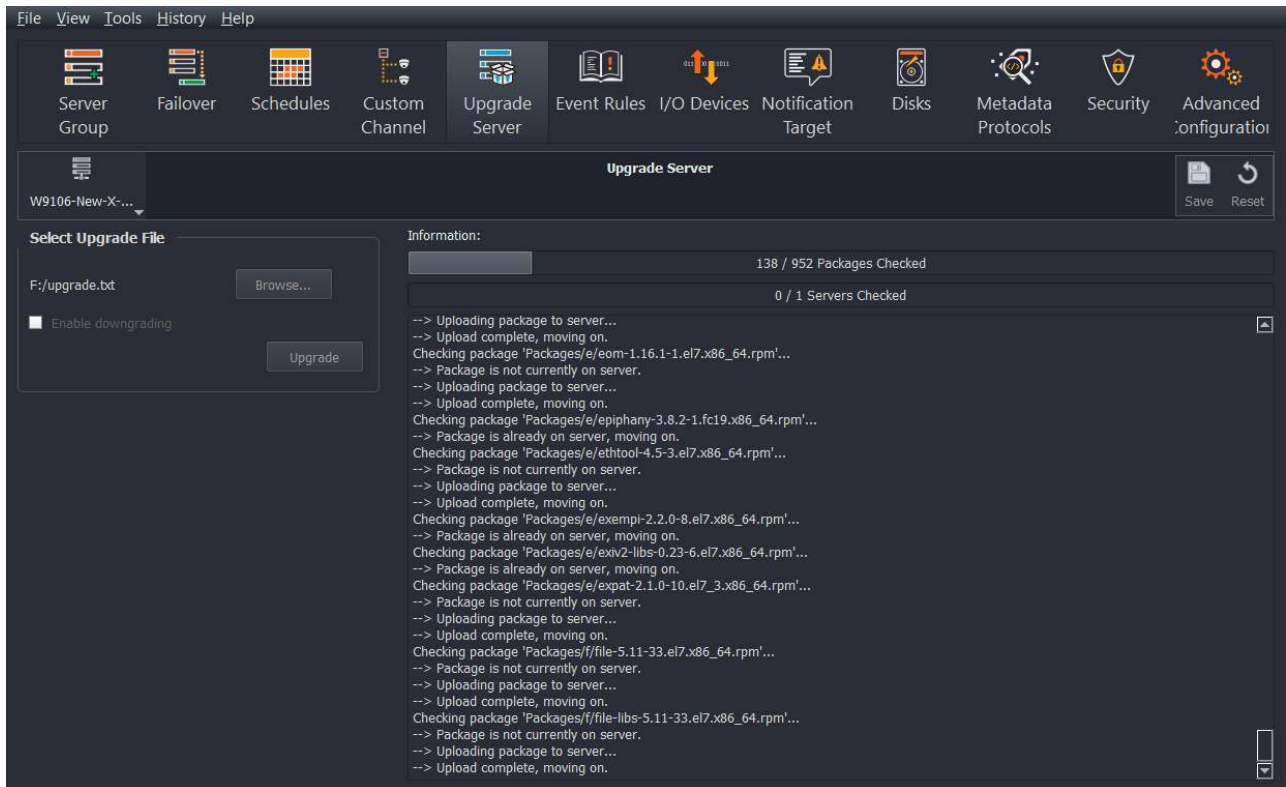


Figure 11.3: Upgrade Server screen – upgrade files being copied to the server

Please note that some software upgrades may be applied in two stages. In this case, you will be prompted to start each stage, take care not to disconnect from the server while the update is being applied. Once all of the upgrade files have been copied to the server, a confirmation message will appear:

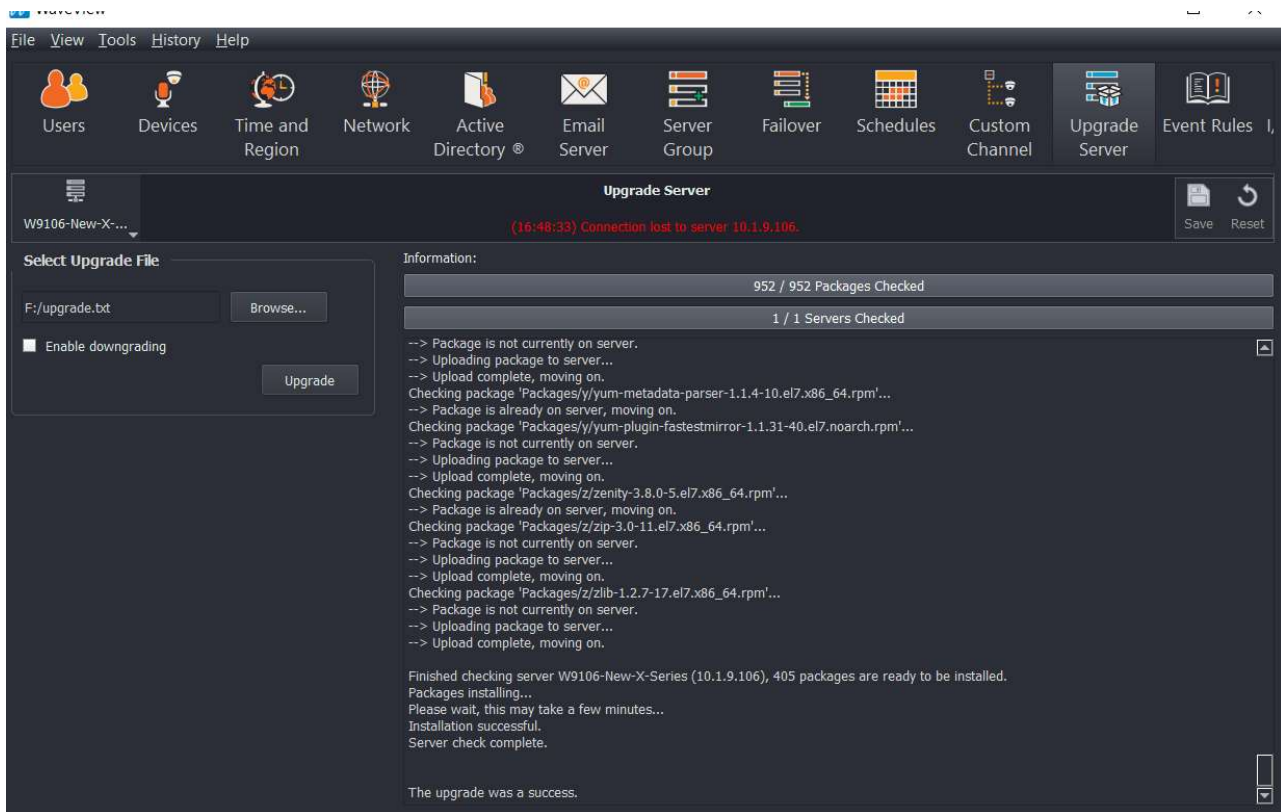


Figure 11.4: Upgrade Server screen – upgrade completed

11.2 Potential Issues

If the upgrade fails, it will usually either show a failure message in the Upgrade screen. Or a message saying the upgrade completed without sending a status reply.

If this is the case, go to *Tools* → *System Log* and look for any Warning or Fault messages.

The possible errors are listed below with an explanation of what to do:

Upgrade failed: installing package XXX needs nMB on the / filesystem

Certain upgrades such as v6.10 require a large amount of temporary space on the operating system disk and some Wavestore servers may already be using a lot of that temporary space.

It is possible to clear the temporary files to make more space available. The process is as follows:

- Click *Tools* → *Execute Command*.
- Enter the command "*clear-tmp*" and click Run.
- Try the full upgrade process again.

In version 6.8 and earlier the *clear-tmp* command didn't successfully clear out all temporary files, so version 6.10 contains an improved version. So if you are experiencing issues upgrading to v6.10 or later, it is

advisable to install just the new clear-tmp command, run it, then perform the upgrade again.

To upgrade just the package containing the clear-tmp command:

- In the *Setup* → *Upgrade Server* screen, click *Browse....*
- When the file dialog appears change the file type from *"Upgrade.txt"* to *"All file types"*.
- Navigate to the mounted ISO, then the *"Packages/v"* sub-directory.
- Find and Open the file with the name beginning *"venusd-exec"*, e.g. *"venusd-exec-6.10.7-1.el7.noarch.rpm"*.
- Click the Upgrade button.

SSD wearing out too fast

This message may appear in the log because some upgrades perform a large amount of writing to the operating system disk. Unless you are going to do a full system upgrade every week, this is not a concern and can be ignored, and the SSD will still last for many years.

Note that the message is a check on rate of wear, not an indication it is worn out. If you want to see how much life left (in percentage terms) it is shown in the configuration file which is viewable in the *"Advanced Configuration"* screen under the *"SmartSSD"* section.

11.3 Writing an ISO with Rufus

To install or upgrade Wavestore from a USB memory stick it is necessary to extract the ISO to the USB stick. The way to do this depends on the Operating System. Most commonly Microsoft Windows is used, in which case the Rufus program is recommended.

Assuming the installation ISO has already been obtained, the process is as follows:

- On Windows, download Rufus from <http://rufus.akeo.ie>
- Run Rufus.
- Plug in the USB stick. Rufus should recognise the USB and populate the *"Device"* box.
- On Rufus: *"Format Options"/"Create a bootable disk using"* and select *"ISO Image"*.
- On Rufus: click the icon to the right of the above text and select the ISO.
- On Rufus: click [Start] to start the write to USB.
- Select *"Write in ISO Image mode (recommended)"* and click OK if Rufus asks about deleting files on the USB stick.
- It'll take a few minutes to create the bootable USB.