Wavestore
Video Management Software

Software Release Notes
Version 6.18.15

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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 provides details of what's new in each new version 6 software release as well as important considerations for upgrading from earlier releases. Newest releases are listed first.

If upgrading from an earlier version 6 release, it is strongly recommended to read section 14.4 – Considerations for Upgrade From Earlier Wavestore V6 Releases as well as 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.

Details of how to upgrade from an earlier version 6 release are in detailed in section 15 – Upgrade Process.

If upgrading from version 5, any extra considerations are detailed in section 14.5 – Considerations for Migrating From Wavestore V5.

2 Version 6.18.15 Changes

2.1 Server Changes

- Added support for recording to files and improved NFS storage via new LASS-LIFT technology
- Added new "Auto+" encoding which will favour H.265 for video and AAC for audio. Existing "Auto" encoding will maintain H.264 and G.711
- Added support for restreaming H.265 over RTSP
- Added support for audio-only IP devices
- Added support for AAC Audio including configuring it in Auto mode where available
- Added lots of performance statistics gathering which can be downloaded as CSV
- Added support for triple streaming from IP cameras – see section 2.4.1 – Triple Streaming
- Added support for talkback via Axis VAPIX
- Added support for Moxa alarm boards
- Improved camera error reporting
- Added extra "Unlicensed" state for disks (for when a configured storage feature isn't available due to licence restrictions)
- Added support for ONVIF PTZ Preset events (PTZPresetInvoked, PTZPresetReached, PTZPresetAborted, PTZPresetLeft)
- Added new command for "Execute Command" to download config backup file: idownload-config
- File capture type now supported with new Camera Groups system
- Added log rotation rule for LSI MegaRAID log file (MegaSAS.log) to avoid filling OS disk
- Added more event handling for Avigilon, Dahua, Hikvision and Mobotix
- Added sensors support for Gigabyte H87M-HD3, and Supermicro X11SCH-LN4F motherboards
- Faster camera startup
- Added new command for "Execute Command" to list and delete locked recordings: getlock and clearlock
- Various improvements to TCP and HTTP alarm output mechanism
- IPv6 support for SNMP, VAPIX, and Failover
- Removed 5 second startup kernel selection for UEFI systems
- AMD graphics drivers changed to use "auto" instead of attempting to install old proprietary driver which would fail
- Fixed talkback for Mobotix cameras when using Auto or ONVIF mode.
- Fixed some issues playing audio clips on event
- Fixed some rare issues with Pullpoint event subscriptions
- Fixed issue with potential latency on Virtual Spot Monitors
- Fixed "restore configuration backup" option in maint menu
- Fixed issue where PTZ on Uniview cameras sometimes wouldn't stop

2.2 WaveView Changes

- Added support for multiple Video Display Areas
- Added a waveform visual representation for audio
- Added support for PTZ control via mouse within Video Display
- Added support for audio-only and talkback-only IP devices
- Added ability to automatically start Layout Sequence on login
- Added support for triple streamed cameras
- Added a "Window" menu which can be used to show/hide the dock widgets in the Main screen
- Added Encoding and Audio Encoding settings to Camera setup, including Auto+ mode
- Added extra functionality to DCZ joystick (Clear Layout, Wipe, Wash, Next Display Area, Select All)
- Enhanced options when importing server configuration file (can ignore importing network settings, licence, disk assignments, and system monitoring settings)
- Support for multi-streaming to Virtual Spot Monitors
- Added support for Unlicensed and Foreign statuses in Storage setup screen
- Improved camera error reporting – clearer messages
- Improved performance of transcoded exports
- Fixed issue which could cause slow update of setup screens after visiting Cameras setup screen
- Fixed issue where talkback couldn't be turned off after visiting the setup screens
- Fixed issue with Free layouts in Layout Sequence not displaying correctly when full screen
- Fixed several issues with the event filter preferences when receiving custom events
- Fixed several issues with configuring integration modules in I/O Devices setup screen
- Fixed some issues with privacy and motion masks relating to dual/triple streaming

- Fixed erroneous DHCP warning message for disabled network interfaces during Failover setup
- Fixed issue where export directory wasn't automatically created by Waveview if non-existent
- Fixed issue where progress information wasn't shown for transcoded exports
- Fixed issue with playing through recordings with gaps in audio stream

2.3 WaveAPI ActiveX API Changes

- Added facillity for getting recording index data for timeline
- Added facility for opening WSB archives
- Added mouse double-click events
- Added drag and drop events
- Added slow playback functionality (x0.1 to x2.0 speed)
- Added snapshot function to WVideoDisplayWidget
- Example application now shows how to take snapshots
- Example application now shows how to do Live Recording
- New output window to show mouse events

2.4 More Information

2.4.1 Triple Streaming

Note that Stream 3 is only available for the group types RTSP, and ONVIF with "Auto-configure Camera Streams" set to No. Stream 3 cannot be used for live viewing, only for recording.

3 Version 6.16.66 Changes

3.1 Server Changes

- Fixed problem with NVIDIA drivers – important for PT–Series and PD–Series owners
- Corrected drive numbering for AIC–12G–4U24SAS3EOB enclosure with Supermicro–X11SSH–LN4F motherboard

4 Version 6.16.62 Changes

Version 6.16 is a new releasing containing many new features. There is also a major update to the underlying operating system in order to provide support for the latest hardware. Note that the OS updates are only provided when installing version 6.16 afresh. Wavestore systems installed with earlier versions and upgraded to v6.16 will remain on the existing underlying Operating System. This is not a problem as these updates are only required for newer hardware platforms.

4.1 Server Changes

- Added support for H.265 video (note that RTSP re-streaming of H.265 is not yet supported).
- Added support for IPv6. See section 4.4.4 – IPv6 Support.
- Added support for separate licensing of encoder and multi-sensor camera channels. See section 28.4.1 – Separate licensing of encoder and multi-sensor cameras for more information.
- New Central Event Server feature allowing forwarding of events from servers in a group to a central server where rules can be applied. See section 4.4.2 – Central Event Server for more information.
- Support for installation to UEFI systems.
- Major update of OS kernel and other OS packages.
- Added support for whitelist of permitted cameras for users, in addition to the existing blacklist.
- Added support for ONVIF Media2 Service including camera configuration.
- Improved ONVIF camera configuration mechanism to give faster startup and wider compatibility, including allowing automatic camera configuration with Failover.
- Improved fault reporting policy in the System Log and Event Stream
- Improved camera disconnect messages.
- Added facility to device database for selecting H.264 Profiles.
- Added facility to device database for enabling or disabling Digest Authentication.
- Added new "Failover" event cause.
- Added network problem detection for camera streaming.
- When a camera is being reconfigured the old stream now continues until the new one is ready. This reconfiguration is signalled to clients.
- Support for Virtual Spot Monitors to switch to low-resolution stream.
- Support for Virtual Spot Monitor Trigger Rollover. See section 4.4.3 – Virtual Spot Monitor Trigger Rollover for more information.
- Added Axis event causes: IO, Signal Loss, Global Scene Change, Image Too Dark, Tampering, Virtual Input.
- Added Hanwha event causes: Appear, Disappear, Loitering, Virtual line, Enter/Exit, Defocus Detection, Fog, Motion Detection, Tampering, Face Detection, Audio Detection.
- Added Mobotix event causes: Motion events.
- Added support for MODBUS over TCP such as Advantech ADAM
- Added 4K to list of default resolutions.
- Added setting to determine whether internal or external motion events should be used.
- Improved logging of disk performance issues.
- Improved logging of SSD Wear.
- Improved logging of ONVIF camera configuration.
- Improved handling for talkback when enabled but not supported by the camera.
- Better management and reporting of RAM usage.
- Better logging of received events.
- Support for Video Guard/SIRA Specification.
- Many improvements to camera compatibility.
- Fixed issue with enclosure detection for Supermicro devices.
- Fixed issue where Recording indicator could remain active when recording to failed HyperRAID arrays.
- Fixed issue with syncing to NTP sources via hostname.
- Fixed 'Hue' setting on Stretch analogue capture cards.
- Fixed issue where Login Denied event could trigger event action twice.
- Fixed issue where disabled cameras could raise Faults.
- Fixed issue with streaming MPEG-4 over RTSP.
- Fixed issue with password synchronisation between servers in a Failover group.

4.2 WaveView Changes

- Added support for H.265 video.

- Added support for IPv6.
- Added support for special licensing of encoder and multi-sensor camera channels. See section 4.4.1 – Separate licensing of encoder and multi-sensor cameras for more information.
- Added support for whitelist/blacklist of permitted cameras for users.
- Added new Shared Layouts facility. Layouts created by one user can be shared with other users.
- Added new Layout Sequences facility. Allows showing layouts for a configurable period of time before switching to another layout, repeated in a loop.
- Improved UI scaling for high DPI displays.
- Added ability to select joystick to use in case multiple devices detected.
- Removed unnecessary steps when switching to Dewarp mode.
- Further improvements to new Cameras setup screen.
- Added Volume and Input Selection (line or mic) controls for audio channels.
- Added "Camera Setup Page" browser shortcut to the Cameras setup screen.
- Added error highlighting to the Cameras setup screen.
- Added 4K to list of preset resolutions.
- New "Main View" setup screen which contains the existing Channel Groups and Metadata Display setup screens, as well as a new setup screen for Layout Sequences.
- New setup screens for Advantech ADAM and Moxa I/O devices.
- New setup screen for SNMP configuration.
- Added integration event facility for launching cameras from different times and servers in the server group.
- Increased default log size to 100 MB.
- Disk Setup Screen now indicates when disks are in Readonly mode.
- Encryption Setup Screen now shows public encryption key.
- Added a subtitle entry that indicates whether the camera is currently being reconfigured.
- Subtitles now show bitrate in bits/s instead of Bytes/s by default.
- New preference "Gap Threshold" to determine when to skip areas with no recordings.
- Improved "Execute Command" window to be faster, always append output to end, and auto-scroll to end.
- Improved handling of automatic user logoff.
- Improved speed and fixed some problems with the System Log window.
- Fixed issues with WSB exports where invalid characters in camera names or filename could cause problems playing back.
- Fixed issue where properties for Custom Events would not be applied in Events Preferences.
- Fixed issue where initial dewarping view could be corrupted.
- Fixed several issues with transcoded exports including glitchy audio with mp4 and mov.
- Fixed issue where Global Talkback button didn't work reliably.
- Fixed issue where maximum sensitivity for motion or smart search would always detect motion.
- Fixed tab order in Network setup screen.
- Fixed issue where digital inputs could be numbered incorrectly.
- Limited analogue spot monitor configuration to only the allow analogue cameras.

4.3 WaveAPI ActiveX API Changes

- Added support for H.265 video.
- Added support for IPv6.
- Resolved limitation where it was not possible to export from multiple servers (note that for WSB exports, only one server group is supported).

4.4 More Information

4.4.1 Separate licensing of encoder and multi-sensor cameras

Version 6.16 introduces a new licensing option for encoders and multi-sensor cameras to lower the cost of deploying systems that utilise these technologies. The new Encoder and Multi-Sensor (EMS) licence type is available at all levels (BASE, PREMIUM, ENTERPRISE and ULTIMATE) which licenses the entire encoder or multi-sensor camera instead of each individual channel.

EMS licences can be mixed and matched as necessary with individual IP channel licenses across a solution. This means that Wavestore customers who wish to continue using legacy analogue cameras, now only require a single EMS licence in order to use a 16-channel standard definition encoder, a 4-channel AHD/TVI/CVI encoder or a multi-sensor camera from a host of world leading brands.

Note that old style licences which do not have a separate field for "permitted EMS devices" will continue to work as in previous versions. That is, each channel on the device requires one "permitted IP channel".

For new licences supplied with one or more "permitted EMS devices", any EMS device configured on the system will only be checked against the permitted number of EMS devices and won't fall back to using "permitted IP channels".

4.4.2 Central Event Server

The Central Event Server (CES) is a powerful and extensible feature of Wavestore which allows all (or some) events from the Live Event stream on a number of Wavestore servers to be forwarded to a central server which we call the "Central Event Server" or "CES", which can process the events.

The Central Event Server is just one of the Wavestore servers in the Server Group, it does not require any special hardware, just a suitably licensed system.

For example: consider a system with 5 Wavestore servers all in one Server Group. Server 1 can be set as the Central Event Server, and this will pull events from the other servers in the group automatically (providing the CES has been enabled).

There are a number of ways of configuring it, depending on requirements. Usually it is used to aggregate events from sources on different servers. This will generally be required by certain Integration Modules and configuration instructions will be provided with the Integration Module. By default the Central Event Server functionality is disabled.

Currently there is no UI for configuring this, but the Configuration Editor can be used to enable it with guidance from our support team. A full configuration UI will come in the next software release.

4.4.3 Virtual Spot Monitor Trigger Rollover

Up to version 6.14 the Virtual Spot Monitor feature allows events to cause cameras to be switched to another camera feed. For example camera 100 might be a Virtual Spot Monitor and cameras 1 to 50 might be configured to route their video to camera 100 when motion occurs. This new Rollover facility allows these events to be passed to "free" virtual spot monitors if the first one is busy. For example if camera 100 is showing camera 1 due to motion, then motion occurs on camera 2, it can "rollover" to camera 101 (another spot monitor).

Currently there is no UI for configuring this, but the Configuration Editor can be used to enable it with guidance from our support team. A full configuration UI will come in the next software release.

4.4.4 IPv6 Support

In version 6.16, support for IPv6 is introduced. However a few less commonly used features do not fully support IPv6 as yet. These will be added in future releases. The not-yet-supported with IPv6 features:

- Axis I/O Devices using the VAPIX interface such as the Axis P8221
- SNMP v2c Traps (for sending event notifications)
- Failover
- Capture of multicast streams

5 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 14.4.3 – Important Information about New Configuration Format before upgrading.

5.1 Server Changes

- New HyperRAID, HyperRAID Plus, and EcoStore technologies – see section 5.4.1 – HyperRAID and EcoStore
- 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 5.4.2 – 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

5.2 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

5.3 WaveAPI ActiveX API 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 API 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

5.4 More Information

5.4.1 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.

5.4.2 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 Wavestore manual.

6 Version 6.12 Changes

6.1 Server Changes

- Upgrade Bundles are now enforced. IMPORTANT – please read section 14.1 – 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.

6.2 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 continous overnight period.
- Fixed issue where opening password-protected WSB export taken from server group could cause password prompt to appear once per server.

6.3 WaveAPI ActiveX API Changes

- IMPORTANT – The ActiveX API 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 WaveAPI ActiveX Reference Guide for more information.

7 Version 6.10 Changes

7.1 Server Changes

- Major update to the operating system.
- 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.

7.2 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

7.3 WaveAPI ActiveX API Changes

A major new revision of the WaveAPI-ActiveX API 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 API. Several new features are available in the new release. The core features included in the API 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).

7.3.1 API 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 API.

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

7.4 More Information

7.4.1 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.

8 Version 6.8.78 Changes

8.1 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

8.2 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

9 Version 6.8.22 Changes

9.1 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

9.2 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 API
- 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

10 Version 6.6 Changes

10.1 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

10.2 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 API
- 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

10.3 More Information

10.3.1 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.

10.3.2 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.

11 Version 6.4 Changes

11.1 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

11.2 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

11.3 More Information

11.3.1 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.

11.3.2 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.

12 Version 6.2 Changes

12.1 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

12.2 WaveView Changes

- Integration module functions selectable from dropdown list
- Integration of Oncam Dewarping API.
- Integration of Immervision Dewarping API.
- 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 API
- New Linux software repositories for v6 WaveView on RedHat and Ubuntu systems
- Various security improvements and bug fixes

12.3 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.

13 Version 6.0 Changes vs Version 5

13.1 Server Changes

- Major update to base operating system providing better hardware compatibility, performance, and more.
- Major update to the LASS filesystem. See section 14.5.3 – .
- N+1 failover support. See section ?? – ??.
- 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 14.5.3 – .
- Multiple log files – EXEC command.
- New mechanism for identifying audio devices.
- Support for opaque script files.

13.2 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 ?? – ??.
- 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).

13.3 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.

14 Important Upgrade Considerations

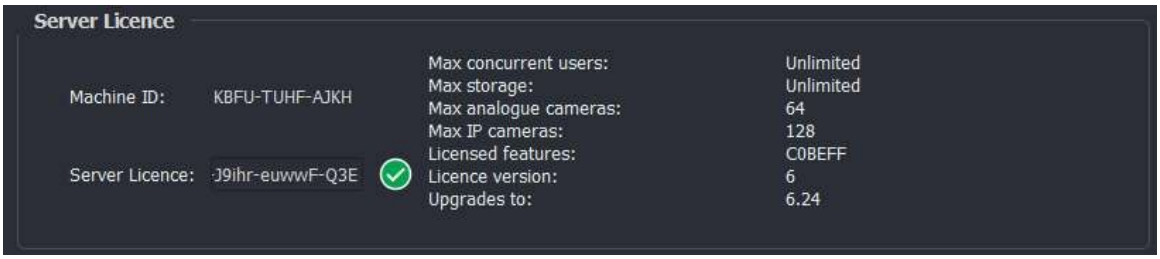
14.1 Important Information About Upgrading, Licensing, and Upgrade Bundles

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:



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.

14.2 Considerations For Upgrade From V6.46 And Earlier to V6.48 Or Later

When upgrading from version 6.46 or earlier to version 6.48 or later, you will only be able to downgrade to version 6.48. It is not possible to downgrade to version 6.46 or earlier.

If there is a desperate need to downgrade to version 6.46 or earlier, it will be necessary to re-install afresh.

For that reason, it is strongly recommended to backup the configuration file of each Wavestore before performing the upgrade (see section 14.3.2 – Backing Up Configuration Files).

Also, if the "annotations" feature is in use, these should also be backed up (see section 14.3.3 – Backing Up Annotations).

Some significant changes have been made in version 6.48 which should be noted before upgrading...

- Stretch analogue capture cards are no longer supported. If your server contains one of these, it can be left installed, but it will not be usable after the upgrade. It may be necessary to remove the "[Capture_N]" configuration section using the Configuration Editor, to prevent errors.
- Multi-monitor support for the on-server WaveView client is not yet available.
- If using a Wavestore server with an NVIDIA graphics card, video performance may be slightly reduced. This is due to NVIDIA no longer providing up-to-date Linux drivers for the "GT750" and "GTX1080" cards. These cards will still function, but with slightly reduced performance.

14.2.1 Potential Issues After Upgrade

After upgrading from v6.46 or earlier to v6.48 or later, some issues may occur in certain circumstances. These are documented below, along with instructions on how to resolve them.

Disks Missing

If the System Log is reporting "Missing disk", that is likely due to the operating system having changed the way the disks are labelled. Normally the Wavestore labels the disks using slot numbers which do not suffer from this issue but some installations might still have disks labeled in other ways.

To resolve this:

- Login to the server with WaveView
- Go to *Tools > Execute Command...*
- Ensure the correct server is selected from the drop-down list in the top-left corner of the *Execute Command* window
- Run the command "upgrade-disks"
- Reboot the server

14.2.2 Backing Up Configuration Files

The configuration file for a server can be exported using WaveView as follows:

- Go to *View > Setup > Server > Configuration Editor*
- Click *Save To File*
- Choose the file location and filename
- Click *Save*

If there are other servers in the server group, choose them using the drop-down at the top-left and repeat the process.

14.2.3 Backing Up Annotations

Annotations can be backed up using the *Execute Command* function of WaveView, as follows:

- Go to *Tools > Execute Command...*
- Run the command "save-annotations"
- Repeat for all servers in the group by selecting each server in the drop-down list at the top-right of the *Execute Command* window
- Close the *Execute Command* window
- Go to *Tools > File Manager...*
- For each server in the server group, expand the server name, and it's *misc* sub-folder, then select the "annotations.zip" file.
- Click *Download...*

If the annotations need to be restored later, simply Upload them to the same location as they were downloaded from, using the *File Manager.* Be sure to upload the correct annotations file to the correct server.

14.3 Considerations For Upgrade From V6.32 And Earlier to V6.34 Or Later

When upgrading from version 6.32 or earlier to version 6.34 or later, you will only be able to downgrade to version 6.34. It is not possible to downgrade to version 6.32 or earlier.

If there is a desperate need to downgrade to version 6.32 or earlier, it will be necessary to re-install afresh.

For that reason, it is strongly recommended to backup the configuration file of each Wavestore before performing the upgrade (see section 14.3.2 – Backing Up Configuration Files).

Also, if the "annotations" feature is in use, these should also be backed up (see section 14.3.3 – Backing Up Annotations).

14.3.1 Potential Issues After Upgrade

After upgrading from v6.32 or earlier to v6.34 or later, some issues may occur in certain circumstances. These are documented below, along with instructions on how to resolve them.

Disks Missing

If the System Log is reporting "Missing disk", that is likely due to the operating system having changed the way the disks are labelled.

To resolve this:

- Login to the server with WaveView
- Go to *Tools > Execute Command...*
- Ensure the correct server is selected from the drop-down list in the top-left corner of the *Execute Command* window
- Run the command "upgrade-disks"

- Reboot the server

Errors relating to Stretch capture card

Such errors may occur on the first boot after upgrading. Simply reboot and the system should function correctly afterwards.

No user interface when using NVIDIA graphics card

This issue may occur on the first boot after upgrading. Simply reboot and the system should function correctly afterwards.

14.3.2 Backing Up Configuration Files

The configuration file for a server can be exported using WaveView as follows:

- Go to *View > Setup > Server > Configuration Editor*
- Click *Save To File*
- Choose the file location and filename
- Click *Save*

If there are other servers in the server group, choose them using the drop-down at the top-left and repeat the process.

14.3.3 Backing Up Annotations

Annotations can be backed up using the *Execute Command* function of WaveView, as follows:

- Go to *Tools > Execute Command...*
- Run the command "save-annotations"
- Repeat for all servers in the group by selecting each server in the drop-down list at the top-right of the *Execute Command* window
- Close the *Execute Command* window
- Go to *Tools > File Manager...*
- For each server in the server group, expand the server name, and it's *misc* sub-folder, then select the "annotations.zip" file.
- Click *Download...*

If the annotations need to be restored later, simply Upload them to the same location as they were downloaded from, using the *File Manager.* Be sure to upload the correct annotations file to the correct server.

14.4 Considerations for Upgrade From Earlier Wavestore V6 Releases

14.4.1 New Storage System Format (Sub3 and MTable4)

Two new filesystem enhancements have been introduced into the Wavestore LASS filesystem over recent releases. There are potential issues with downgrading after using these enhancements so it is important to read this section.

The first enhancement is called Sub3, an improvement on the earlier Sub2. Sub3 provides the following improvements:

- Improved disk read/write performance
- Larger number of images per disk volume
- More efficient usage of disk space

The second is called MTable4, an improvement on the earlier MTable3. MTable4 provides the following improvements:

- Disk read/write performance improvements
- Support for more tracks per disk volume

These changes have been introduced over several different versions. The MTable4 changes are dependent on the version used to format the disks. The Sub3 changes are dependent on the version being used whilst recording, no matter which version was used to format.

Compatibility is as follows:

- Version 6 releases prior to v6.24 can only read and write Sub2 and MTable3. Formatting disks uses MTable3.
- Version 6.24 can read Sub2 or Sub3. It writes Sub2. It can only read or write MTable3. Formatting disks uses MTable3.
- Version 6.26 can read Sub2 or Sub3. It writes Sub3. It can read or write MTable3 or MTable4. Formatting disks uses MTable3.
- Version 6.30 introduces support for recording MTable4 by default. This version can read Sub2 or Sub3, and it writes Sub3. It can read or write MTable3 or MTable4. Formatting disks uses MTable4.

For this reason, it is important to consider that if the system were upgraded to a later version and then downgraded, some recordings may no longer be readable. For example, if a v6.18 is upgraded to v6.26, it will start recording with Sub3. If it is then downgraded back to v6.18, the Sub3 recordings will not be visible. If it is upgraded to v6.26 again, all the recordings will be visible again.

Similarly, if a system is installed with v6.30 and the disks are formatted, if it is downgraded to v6.24 or earlier, the data will not be readable or writeable until the disks are reformatted.

14.4.2 New Event Rules System

A major change in version 6.20 onwards is the introduction of the new Event Rules system. It's important to be aware that the old and new event rules engines are not compatible. When a Wavestore server is upgraded to version 6.20 or later and has existing event rules, those rules will continue to work as before and the Event Rules setup screen will show "Using legacy Event Rules mode" at the top. The behaviour of the event system will be the same as before. To enable usage of the new engine with all its new features it is necessary to remove all existing event rules, then exit the Event Rules screen and re-enter it.

The new Event Rules system is fully documented in the product manual. However some likely questions about the new system are answered below.

What happened to the old "Show on main screen" function?

In the new Event Rules engine, there is no "Show on main screen" checkbox for an event rule, as there was with older versions. The new engine requires you to add a Cause of type "Manual Trigger", with an ID, to the rule.

For example, in the old system you might configure a rule which says "Motion on camera 3" triggers "Output 5".

In the new system you would configure the rule to say "Motion on camera 3" OR "Manual Trigger 1" triggers "Output 5".

The Events panel on the main screen will show the rule name for any rules which have a manual trigger, and activating that rule will trigger the "Manual Trigger" cause with the associated ID.

What happened to the "Enable logging" function?

In the new engine, there is no "Enable logging" checkbox for an event rule, as there was with older versions. When using the new engine, all event logs are written to a new "Event" log automatically. You can access this log by running "alog Event" via the Execute Command tool. In a future client version, the System Log viewer will allow browsing these logs.

What happened to the Schedule setting for a rule?

In the new engine, Schedule is an Event Cause of its own, allowing powerful rules to be built. In simple terms you would normally just do an AND logical operation with an existing Event Cause.

For example, you might configure the rule with causes: "Motion on camera 3" AND "Schedule 1", and actions: "Output 5". This would mean it will trigger output 5 when there is motion on camera 3 and schedule 1 is On.

14.4.3 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, WaveAPI-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.

Note that the default recording setting in version 6.14 is to record for an absolute maximum of the specified days. Previously the default behaviour was to record for as long as possible, using the configured days as a guideline of how to balance the available space between the various recording tracks. It is important to check that these new default settings are desirable and change them if not.

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.
- The default recording setting in version 6.14 is now to record for an absolute maximum of the specified days.

14.5 Considerations for Migrating From Wavestore V5

- The migration process requires a fresh installation of the Version 6 software on to the Wavestore server. This requires physical access to the Wavestoreand 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 14.5.2 – 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 14.5.1 – 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, reboot, then re-enter the network configuration manually.

14.5.1 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 WaveAPI-Active API. "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.

14.5.2 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".

14.5.3 Major New Features and Changes

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

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.

Licensing Changes

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

15 Upgrade Process

The Upgrade Setup Screen (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.

If upgrading from a remote PC, it is recommended to update the WaveView software on that PC first, before upgrading the servers.

There are two methods of upgrading the system to a new version:

File Upgrade

> The system will be upgraded using an ISO file which has been downloaded. No internet connection is required.

Network Upgrade

> The system will download updates from the internet. Therefore, the Wavestore servers must be connected to the internet.

15.1 Performing a File Upgrade

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 15.4 – Writing an ISO with Rufus.

Before performing the upgrade, navigate to the Server setup screen (View → Setup → Server) and inspect the "Distribution" field. This is displayed on the "General" tab which is the default.

If the distribution requires a major OS update, it is necessary to perform the upgrade twice. The first upgrade will update the Wavestore software but not the operating system. The second will update the entire operating system. This is only ever necessary once per major upgrade and subsequent upgrades will only need to be performed once. You will be informed if the upgrade process needs to be repeated to complete the full upgrade.

If in doubt, performing the upgrade twice is sensible. If there is nothing to upgrade on the second pass it will complete very quickly.

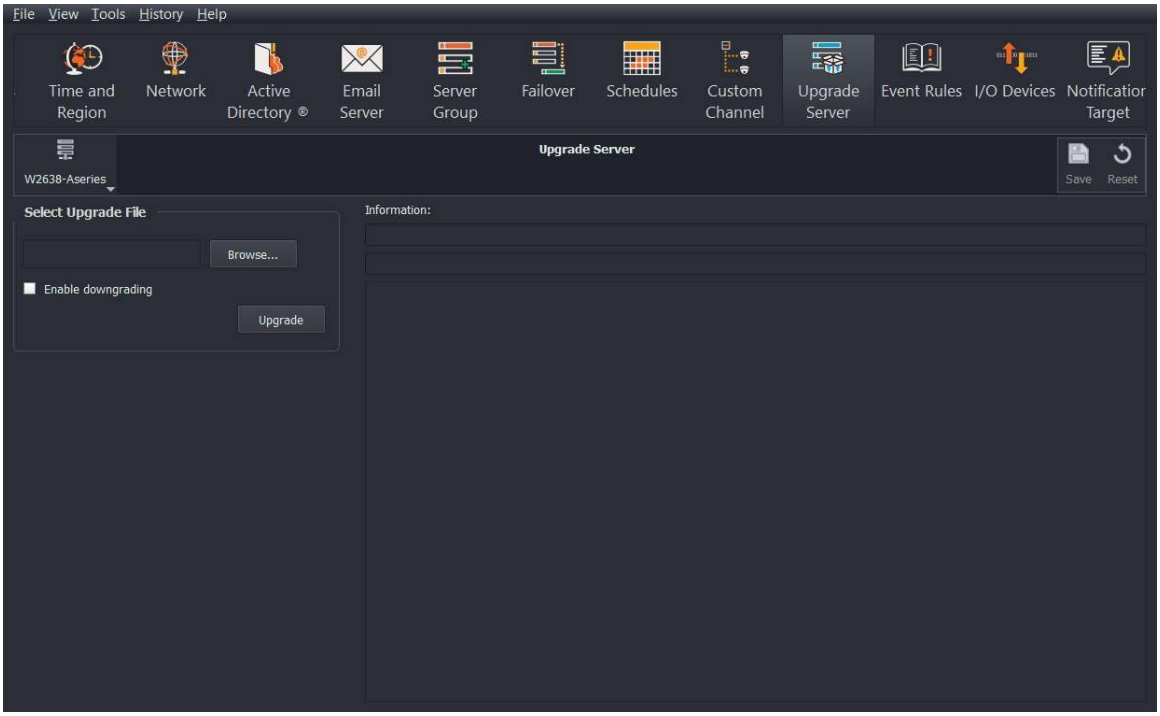


Figure 39.1: Upgrade Server Screen

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

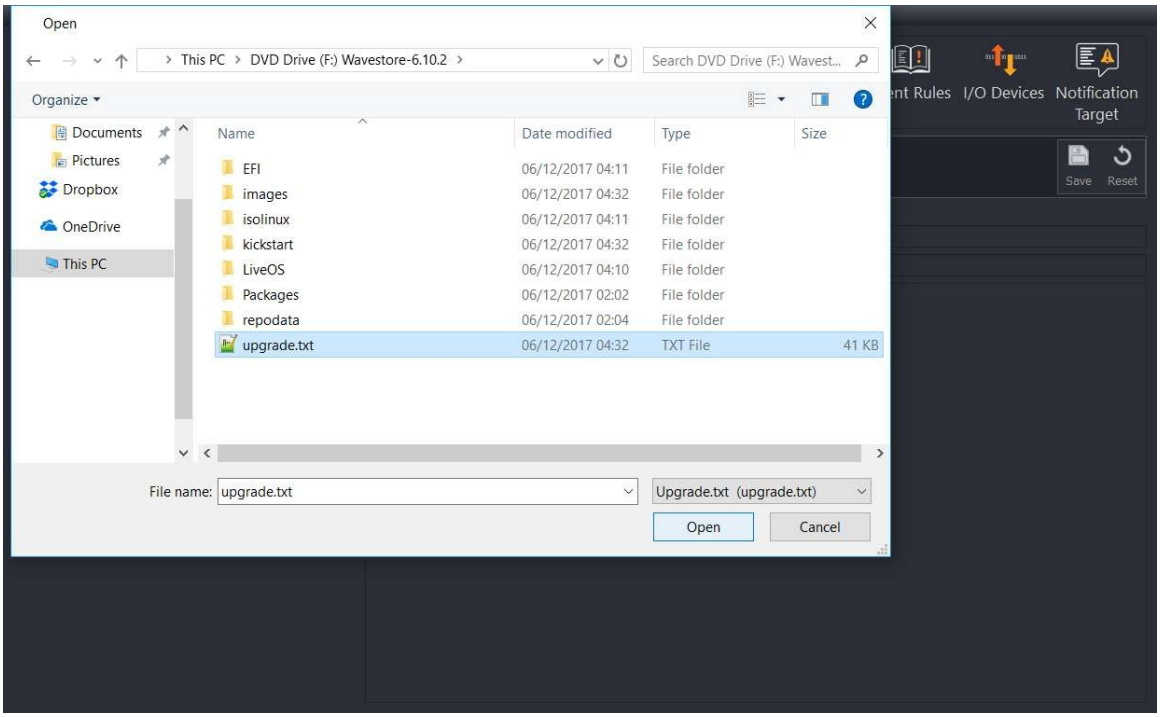


Figure 39.2: Upgrade Server screen – browsing to locate 'upgrade.txt' file

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.

If performing a downgrade, ensure the "Enable downgrading" checkbox is checked. Only enable this checkbox if deliberately downgrading to an earlier version.

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

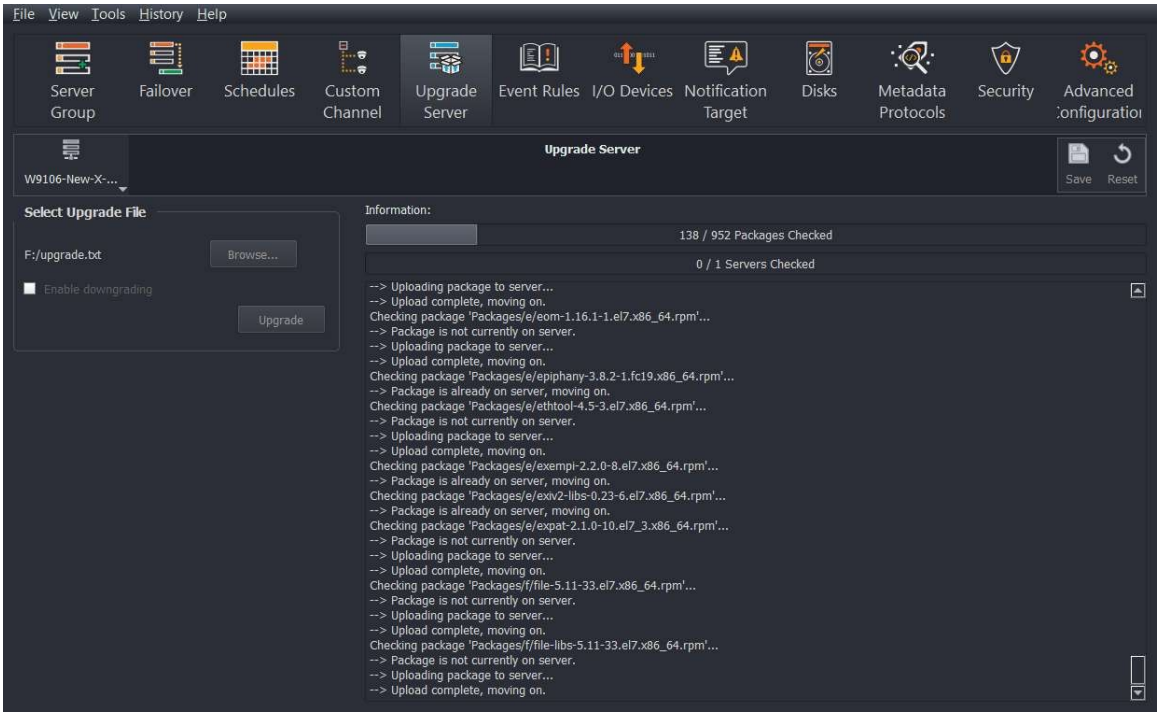


Figure 39.3: Upgrade Server screen – upgrade files being copied to the server

Once all the files have been checked and copied, the upgrade process will start. The system will tell you to wait and this may take a few minutes.

Whilst the upgrade takes place, recording continues. However once the upgrade is complete, the server will either do a software restart or a reboot, depending on what is necessary to complete the upgrade. Obviously recording is interrupted briefly at this time. Downgrades will always perform a reboot.

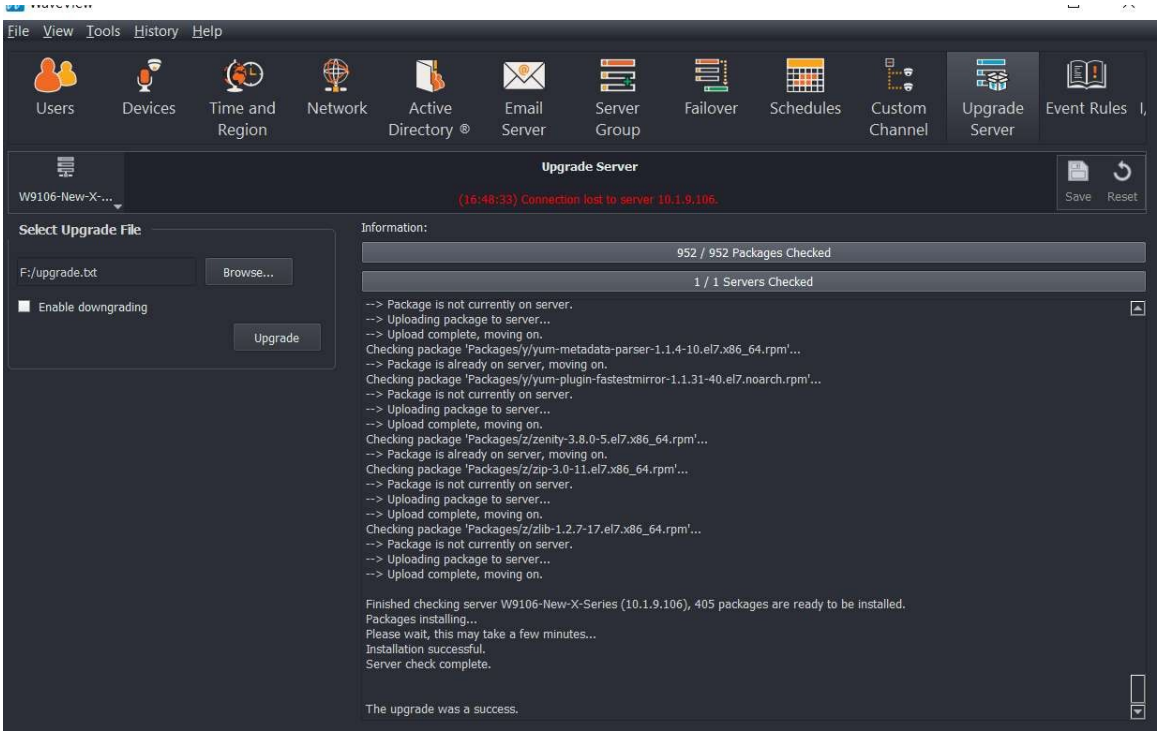
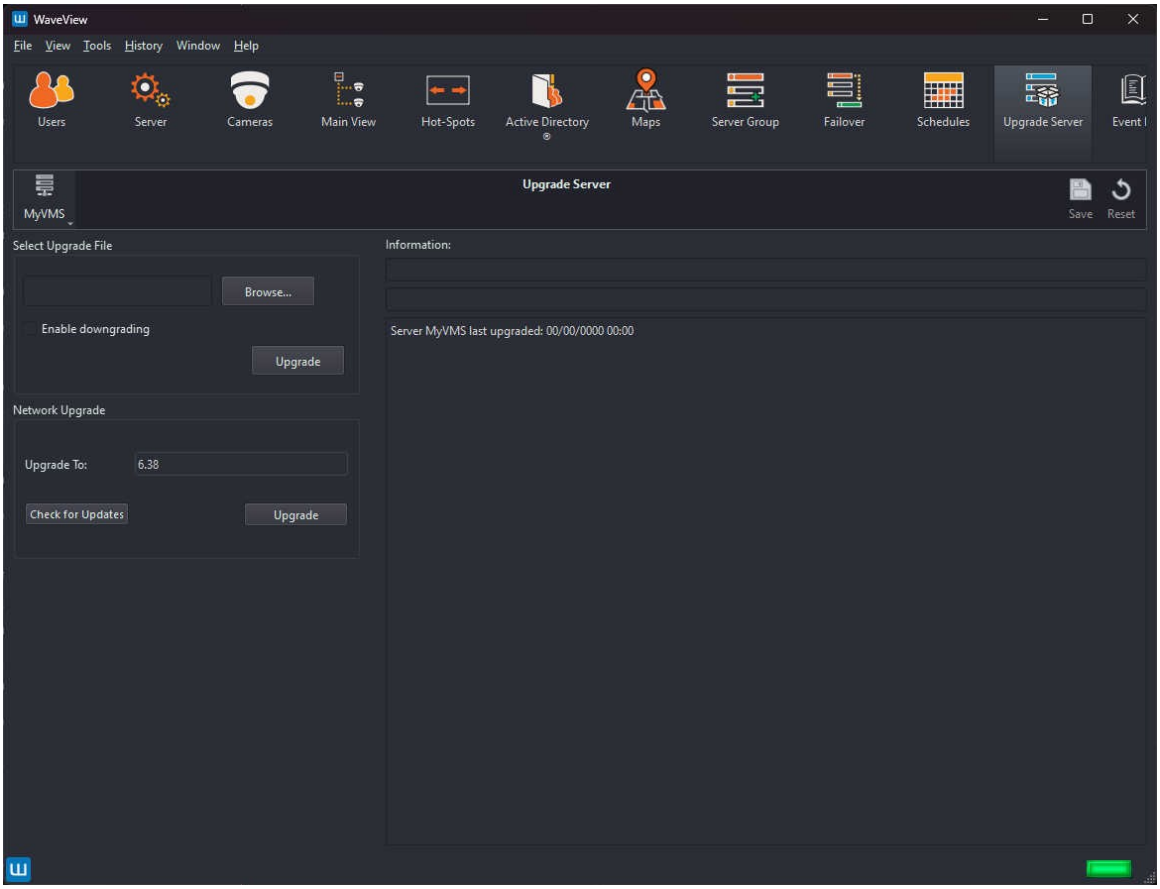


Figure 39.4: Upgrade Server screen – upgrade completed

15.2 Performing a Network Upgrade

Servers running version 6.38 or later can be upgraded over the internet. Each server in the server group will need to be connected to the internet.

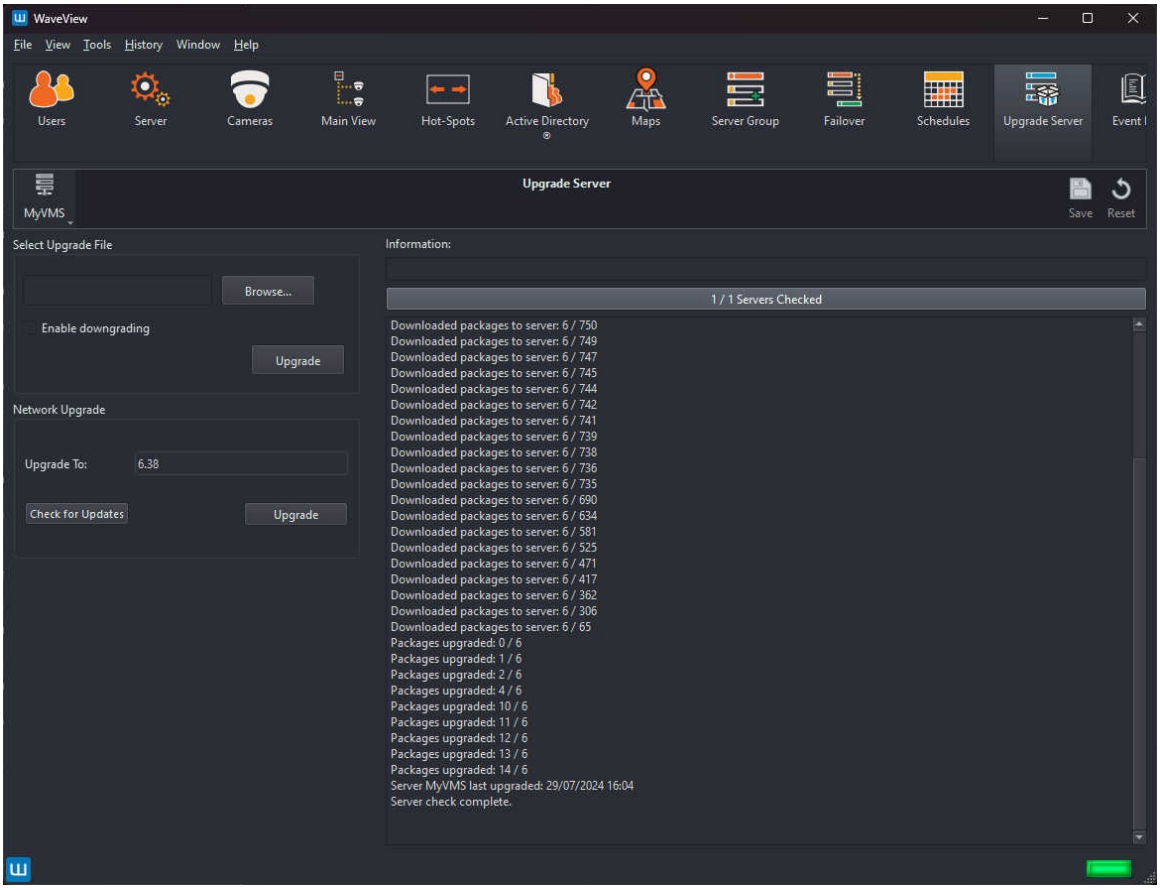
Note: If any server in the server group does not support network upgrades, network upgrades will be disabled for the whole group. In that case it will be necessary to log in to each server (which does support network upgrades), and perform the upgrade individually.



To perform a network upgrade, enter the version to which the servers should be upgraded in the *'Upgrades To'* text box, for example *'6.38'*, then click *'Upgrade'*.

The process performed by each server is:

- Check that the requested upgrade version is available
- Download the packages (i.e. components) for the upgrade
- Install the packages



The progress of the upgrade will be reported in the *'Information'* panel.

15.3 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".

In this case, gathering more information depends on the currently running version.

For servers running version 6.24 or later, this information is available in WaveView by navigating to *Tools → System Log,* clicking the *'Extra Logs'* tab, then choosing *'Upgrade'* from the drop-down box, then clicking *'Download'*.

For servers running version 6.16 or later, a more detailed log of the upgrade is available by following this procedure:

- Select *Tools → Execute Command...*
- Run the command *alog -a Upgrade*
- Send this output to our support team for assistance
  For servers running version 6.14 or earlier, the information is in the system log, available in WaveView by
  navigating to *Tools → System Log.*

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 to v6.16 require a large amount of temporary space on the operating system disk and those originally installed with an early version of Wavestore (version 6.10 or earlier) may not have enough space to complete a full upgrade.

It may be possible to free up space on the system using the file manager although this requires physical access to the server. Using the client display on the server itself, move the mouse to the top-left of the screen and a toolbar should drop down. Choose the icon which resembles a filing cabinet. If there are any large files in there, deleting them may free up enough space to complete the upgrade.

If the above steps do not work, it may not be possible to perform the operating system upgrade without a re-installation. Re-installation requires being on-site and usually takes around 20 minutes. Performing the re-installation creates a larger partition so that future upgrades do not have this issue.

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), in WaveView go to *Tools → Execute Command* and run the command *"ssd".*

15.4 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.