Wavestore
Video Management Software

Software Release Notes
Version 6.30

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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 22.4 – 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 23 – Upgrade Process.

If upgrading from version 5, any extra considerations are detailed in section 22.5 – Considerations for Migrating From Wavestore V5.

2 Version 6.30 Changes

Note: Once a server has been upgraded to this version, it can only be downgraded as far as v6.16.

2.1 Server Changes

- Event Names can now include non-ASCII characters
- New textual setup screens for servers with low graphical performance
- Default disk format changed to MTable4 – IMPORTANT: see section 22.4.1 – New Storage System Format (Sub3 and MTable4)
- Support for Azure cloud recording
- Improvements to cloud recording efficiency
- Updates AWS cloud storage integration
- Integration of new Wavestore analytics device
- Improved Wake-On-LAN utilities
- Major update of OS packages
- Disabled SSH CBC Ciphers and weak MAC Algorithm
- Added tools to allow potential remote fixing of duplicate packages in corrupt installation
- Various improvements to reading and writing configuration
- New Fault message when group type is ONVIF, Auto-configure is disabled, VMD enabled, and Profile3 not configured
- Failover improvement – gratuitous ARP helps gateways and other clients reconnect correctly
- Analytics supported for more Bosch cameras
- Support for more events from Uniview cameras
- Improved support for Partizan cameras
- Improved feedback when adding NFS volumes
- I/O devices stored as Alarm_N sections in configuration now allow gaps in numbering
- Added support for PERC H740 RAID Controllers
- New mechanism to prevent users reconfiguring HyperRAID array without reformatting
- Improved handling of slow disks in disk arrays
- Minor improvements to handling of hot-spares in HyperRAID arrays
- Improvements to shutdown mechanism, meaning faster software restarts
- Added log message when user account is locked
- Better error message logged to camera log when Subunit setting is invalid
- Better log messages for failed streams
- Better log messages if talkback is enabled but not supported by the camera
- Better Fault log message if suitable JPEG stream required for VMD and Motion Search is not available
- For ONVIF EMS (Encoder/Multi-Sensor) cameras, audio channel now takes the subunit into account
- Better handling of NVIDIA drivers on upgrade – old version is removed, new version installed, Fault message logged stating that the system needs to be rebooted
- RTSP Server does not send RTCP SR packets
- Locked accounts no longer trigger Login Denied events
- Fixed erroneous log message stating "Problem with IP address"
- Fixed rare case where after recovery from failover, redirected recordings could not be accessed
- Locked down IPMI admin interface for Supermicro motherboards – disabled by default
- Fixed issue where old invalid AMD drivers are still present when upgrading
- Fixed issue where, on upgrade, some packages would be listed for upgrade twice, causing minor delays
- Fixed rare crash which could occur when many MxPEG cameras failed in a short time period
- Better handling of unresponsive cameras
- Better auto-configuration of Oncam cameras
- Fixed various issues with Uniview cameras
- Fixed issue where image rotation wouldn't always work
- Fixed issue with PTZ on Bosch cameras
- Fixed issue where "Incorrect License" could be reported after misbehaving camera rebooted
- Various updates to camera database to add support for more cameras
- Various improvements to camera streaming

2.2 WaveView Changes

- Facility to import camera names, IPs, and more from spreadsheet
- Status Summary export now supports exporting in ODS (OpenDocument Spreadsheet) format
- Status Summary ODS export now includes snapshot of camera
- New setup screens for Cloud Recording
- New setup screens for integration of external analytics devices
- Many improvements to Analytics setup screen
- Analytics Smart Search now allows saved zones to be recalled and used
- Smart Search for multiple cameras re-instated
- Updated Oncam API to 2.0 to support new devices
- Improved PTZ operation when using Oncam dewarping
- Motion Search now remembers last mask and sensitivity per-camera
- Option to search for the layout name when loading layouts
- Event Names can now include non-ASCII characters
- Event types in Find > Search > Events are now alphabetically sorted
- Protocols in Setup > Server > IO Devices are now alphabetically sorted
- Some no-longer-needed UI elements removed
- Failed server within failover group now has "Failed" status indicated correctly in UI
- Minimum supported Ubuntu Linux version updated to 18.04 LTS
- Video clip sent by email now include subtitles
- Fixed crash occurring when doing AVI export from WSB export where original video channel had linked audio but the audio wasn't included in the WSB export
- Fixed some issues with the Load Layout dialog
- Fixed issue where Channel column was missing when exporting metadata search results
- Various UI language translation fixes and improvements
- Fixed issue where non-ASCII characters in email subject wouldn't work correctly
- Fixed issue where non-ASCII characters in WSB export file name would prevent launching from the included BAT file
- Fixed issue where Oncam cameras would show a corruption on the right side of the image in the Cameras setup screen
- Fixed issue where drag and drop of a Channel Group from the Device Tree wouldn't work
- Fixed slight inaccuracy in End Time of Event Search
- Fixed issue in Storage setup where disk partitions could not be added to HyperRAID arrays
- Fixed an issue with parsing external event notifications
- Re-instated WAV exports for audio-only channels
- Fixed issue where Sort ID in Live Event Stream was always -1 for non-video channels
- Fixed several issues with configuring motions masks in Setup > Cameras
- Fixed issue where Download Diags option was available even when not logged in
- Fixed issue in Event Rules where Audio track was incorrectly labelled as 'Authentication'
- Fixed issue where trailing spaces in configuration not shown in UI and therefore not editable
- Fixed issue where Status Summary could list cameras in unsorted order
- Various other performance and stability improvements

2.3 WaveAPI ActiveX API Changes

- IMPORTANT: This release is likely to be the last 32-bit release of the WaveAPI-ActiveX component. Future releases will be 64-bit only. This version will be able to connect to past and future versions of the server, but support for some new functionality in future version may require newer versions of the API which will only be available for 64-bit.
- Fixed inconsistent behaviour which could occur when using multiple WConnection instances

3 Version 6.28.25 Changes

Note: Once a server has been upgraded to this version, it can only be downgraded as far as v6.16.

3.1 Server Changes

- Fixed issue with reconnecting to iSCSI devices after reboot/restart
- Fixed issue with analytics for multiple cameras
- Fixed issue with ONVIF PTZ while reconfiguring camera
- Improved handling of unresponsive cameras
- Several other stability fixes

3.2 WaveView Changes

- Fixed issue with analytics for multiple cameras
- Fixed WaveView launcher for Ubuntu
- Fixed broken WaveView icon

4 Version 6.28 Changes

Note: Once a server has been upgraded to this version, it can only be downgraded as far as v6.16.

4.1 Server Changes

- Support for capture of video analytics metadata from ONVIF cameras, allowing real–time analytics event detection and historical analytics search, including:
  - Object Class and Subclass search (e.g. Vehicle/Car), and probability of each.
  - Object speed.
  - Line Crossing
  - Box Entry, Box Exit, Box Entry or Exit
  - Object Removed
  - Object Idle
  - Crowding
- Metadata search performance enhancements.
- Facility to push and pull camera names to and from cameras.
- Various improvements to facility 3rd party integrations.
- New 'encrypt–keys' command to generate encryption keys.
- New 'licences' (or 'licenses') command to output information about licences in use.
- New 'track' command to report current and daily bandwidth used per recording track.
- Diagnostics download now includes server statistics.
- Statistics logging of CPU utilisation per CPU.
- Fixed issue where failover standby server wouldn't take over if the logical server had a greater number of physical network interfaces.
- Better error handling of Foreign MegaRAID arrays.
- Fixed issue where Diagnostic Download could time out.
- Fixed some issues which could cause OS partition to fill.
- Fixed issue where disks could be listed twice.
- Fixed some error reporting of out of memory.
- Fixed potential video freeze and client time out when failover standby server is down.
- Improved handling of intermittently failing disk in HyperRAID array.
- Fixed issue of getting ONVIF Profile list for ONVIF cameras routed via a gateway (NAT).
- Fixed sending email via SMTP servers requiring no authentication.
- Many other minor fixes and improvements.

4.2 WaveView Changes

- Major update to main screen Smart Search facility to allow:
  - Existing motion search.
  - All the new video analytics search types provided by the server.
  - More detailed search results.
- New setup screen for Video Analytics.
- Event Rules setup for Video Analytics rules.
- Status Summary screen now includes camera IP address and duration of recording for each record–
  ing track, including in CSV export.
- Supporting for pushing and pulling camera names to/from cameras.
- Support for all EU languages.
- Default language is now automatically detected based on the operating system. It can still be overridden in Preferences.
- Dewarping resolution downgrade when panning is now disabled by default.
- Camera IP address is now a tag available for inclusion in subtitles.
- Facility to preserve current "install" user details when importing a config file.
- Fixed issue where main screen Smart Search would only play Track 1 by default. It now uses Event playback preferences.
- Fixed video export from metadata search results.
- Fixed issue where, on first login, two dialogs appear, one to change password and one to set time–zone. They now appear in sequence.
- Fixed full–screen behaviour of multiple Video Display Areas.
- Fixed issue where changing Camera Group type could cause incorrect motion detection settings to be locked in and unchangeable.

- Fixed corrupted dewarping for Oncam cameras on Linux.
- Fixed handling of events from Central Event Server.
- Fixed crash when clicking Export Preview in Export dialog.
- Fixed issue where layouts would not be saved when Config Editor has sorting enabled.
- Fixed issue where disabled Event Rules would show as Invalid.
- Fixed issue where Default Track setting in Event preferences would be ignored when double clicking in Live Event Stream to play back events.
- Fixed issue where a sequences of Client Actions would not complete if there was an error with a Play Sound action.
- Fixed issue with showing ONVIF Profiles in Camera Setup.
- Per-user language facility is now removed as it was not behaving well.
- Many other minor fixes and improvements.

4.3 WaveAPI ActiveX API Changes

- Fixed issue where spinning wheel, used during synchronised playback when there is a gap in one or more streams, was not working.

5 Version 6.26 Changes

Note: Once a server has been upgraded to this version, it can only be downgraded as far as v6.16.

5.1 Server Changes

- New facility for configuring static network routes
- Redirected channels no longer use additional channel licence – see section 5.4.1 – Redirected Channels
- Support for new MTable4 storage system – IMPORTANT: see section 22.4.1 – New Storage System Format (Sub3 and MTable4)
- New separate licensing for Failover standby servers
- Metadata search performance enhancements
- Added configurable timeout and number of tries for password lockout
- "stream" command now shows metadata stream from camera, if present
- Added facility to stream video anaytics data via ONVIF, currently supporting only certain Bosch cameras
- Improved feedback to user that the maximum number of recording tracks is about to be/has been reached
- Increased visibility of messages received from MegaRAID card indicating that a drive is starting to fail
- Added support for raising Faults and appropriate events when individual units within a redunant PSU fail
- Removed DHCP fallback to 192.168.0.1 as it could conflict with other interfaces on that subnet
- Added new event action to email a copy of the current configuration file
- The "user" user is no longer present by default – to ensure that the only user is "install" and this user's password is forced to be changed on first login
- More specific fault message when connecting using RTSP to a device which is locked due to entering the wrong username and password multiple times
- Disk write rate now stored in server statistics
- ONVIF cameras will be rebooted if reporting a 500 server error
- Improved handling of failed attached iSCSI devices
- Added new Hanwha AI camera events to the device database
- Added new Honeywell ONVIF events to device database
- Now uses correct talkback type when using Auto camera group type and Axis P8221 device
- Fixed issue where Pre-event Framerate Boost was shorter than expected
- Fixed excessive server logging relating to HTTP-Pull
- Fixed issue where recordings older than the maximum age could still be visible if they are after a locked recording region
- Fixed issue where metadata search would return one entry after end time
- SMTP (email) settings are now copied to Standby server upon failover
- Fixed some issues with disk statistics
- Fixed issue where cameras could report incorrect license when the server just needs a restart
- Fixed issue with incorrect error handling of video loss for Stretch analogue video channels
- Fixed potential crash when invalid encryption key entered
- Fixed video streaming for American Dynamics cameras configured using Auto configure
- Fixed PullPoint issues with Eye Sonic cameras
- Fixed PullPoint issues with Dahua cameras when using SSL
- Fixed issue with Hikvision cameras lockout after failed attempts to login
- Fixed issue where disabled RTSP channels could continue streaming
- Fixed issue where Bosch Starlight camera image could flip upside after server restart
- Fixed issue where quality settings could beincorrectly chosen when configuring ONVIF media profile
- Fixed issue where Auto camera group type might not recognise change in IP address
- Fixed issue where FLIR camera could fail to stream H264 when VMD is ON
- Fixed issue with dual streaming cameras with same resolution but different framerate
- Various other fixes and performance improvements

5.2 WaveView Changes

- Added support for drawing bounding boxes and polygons for analytics objects
- Updated Oncam Dewarping API
- Metadata Search performance and functional enhancements

- Ability to add multiple camera IPs in range
- Synchronised playback improvements
- Added support for configuring timeout and number of tries for password lockout
- Various fixes and improvement to File Manager
- Several fixes and improvements for Oncam dewarping
- Fixed issue where the number of event causes in Event Search would keep increasing
- Various fixes to metadata search including inconsistent number of results and incorrect timezones
- Various other fixes

5.3 WaveAPI ActiveX API Changes

- Fixed issue where Server Group ID would always increase every time a group was connected to. The IDs are now freed after disconnection.

5.4 More Information

5.4.1 Redirected Channels

For most Camera Group types the Wavestore supports dual, or even triple streaming from each camera. For some older types however, such as MxPEG, it does not. For that reason Wavestore has a system whereby two channels can be configured to stream as different Camera Group types, and the streams from one can be redirected to be a secondary stream on the other.

This feature was added in version 6.24, however it required a channel licence for each channel, even though they are streamed from the same camera. In version 6.26 it does not require an extra channel licence as long as the redirected channel is disabled and has the same IP address or hostname as the channel to which it is being redirected.

6 Version 6.24 Changes

Note: Once a server has been upgraded to this version, it can only be downgraded as far as v6.16.

6.1 Server Changes

- Improved handling of sudden power loss so as little recording as possible is lost
- Improved timestamp accuracy for metadata (e.g. for analytics)
- Added support for re-streaming MxPEG over RTSP
- Disabled S.M.A.R.T. disk checks on iSCSI devices
- Improved performance for Smart Search and Metadata Search
- New "streams" command to show current live streams for a camera
- New "UDP-out" integraton protocol
- Added support for analytics events from Avigilon cameras
- Support for custom configuration to be added on Failover
- Better handling of network interfaces on failover
- Improved data recovery mechanisms
- New facilities to handle cameras with diverse multi-streams and unusual motion detection streams
- Upgraded Linux kernel
- Improved startup time of camera streams with SSL enabled
- Improved support for install to QNAP devices
- Improved camera support
- Improved hardware support
- New option module for integration with Eaton UPS
- Fixed issue where diagnostics download could time out when many large files involved
- Fixed issue with PTZ control when using cameras streaming over HTTP
- Fixed issue with failover when two servers directly connected, not via a switch
- Fixed issue where logical server in failover group wouldn't raise a Fault when standby server offline
- Fixed several camera streaming issues
- Workarounds for issues with faulty HTTPS implementations on several camera makes
- Fixed issue where the time in "Time & Region" setup screen wouldn't update when timezone was changed
- Fixed issue with handling multiple frames in same metadata packet
- Fixed issue where sensor reporting might not show all sensors
- Fixed issue with JPEG restreaming from Mobotix cameras
- Fixed issue with formatting iSCSI volumes
- Various other minor fixes and improvements
- Fixed auto-configuration of Avigilon cameras, camera could get stuck at 1fps

6.2 WaveView Changes

- Multi-playback of Smart Search results allowing quick analysis of search results
- Invalid or corrupt event rules would previously be hidden but now they are shown and marked as invalid, allowing them to be deleted
- Attempts to cancel a required password change are no longer accepted
- Users that don't have permission to export footage now cannot save snapshots
- The log names in "System Log > Extra Logs" are now ordered alphanumerically
- Now supports showing status of secondary failover standby server
- Fixed some issues with translations and updated all translations
- Batch Config Tool now allows mass backup of configuration files
- Added ability to export to UNC network location
- Improved playback of many cameras in Find screen on network with latency spikes
- Fixed issue with aspect ratio setting being lost when double-clicking to go full-screen and back
- Fixed issue where double-clicking subtitle setup icon could cause the setup window to be lost
- Fixed issue where "Windows" menu wouldn't set correct initial states if in non-default language

6.3 WaveAPI ActiveX API Changes

- Added animated "busy" wheel, used when performing synchronised playback and a camera has a gap in recordings but others don't

7 Version 6.22 Changes

Note: Once a server has been upgraded to this version, it can only be downgraded as far as v6.16.

7.1 Server Changes

- 3rd stream can now be configured by Wavestore. Previously it had to be a pre-configured Profile or stream.
- New 'PTZ Tour' Event Action
- Support for metadata search of object Idle, Removed, Speed
- Several improvements to Event Rules system
- Initial support for Hybrid cloud recording (see section 7.4.1 – Initial Support for Hybrid Cloud Recording)
- New facility to upload sensor monitoring data
- Improved disk retention time in HyperRaid arrays
- User account locking after repeated failed logins
- Support for several new hardware platforms
- Default config now has no timezone set, user prompted to set it correctly on first login
- User is asked to select keyboard layout on first boot up
- Canon PTZ cameras now support Pan Flyback when in Auto mode
- Several improvements to failover with multiple standby servers
- Support for several more EMS (Encoder or Multi-Sensor) cameras
- Improved disk corruption recovery mechanism
- Fixed issue where low-privileged users could issue ONVIF Camera commands
- Fixed issue where Smart Search data would take up excessive disk space
- Fixed some issues with Talkback when using Mobotix MxPEG
- Many other minor fixes and improvements

7.2 WaveView Changes

- New user permissions for editing and showing/hiding subtitles
- New 'Extra Logs' tab under 'System Log' to show additional server logs for cameras, disks and more
- New setup functionality for Central Event Server, under 'Setup > Server Group'
- New Camera Setup option to disable large GOP size warning
- Mechanism to ensure user configures a Timezone if not already set
- Support for 3rd stream Auto-configuration
- Various fixes to new Event Rules screen
- Event rule Text Match configuration for Causes
- Fixed subtitle issue occurring when jumping server clock backwards
- Fixed issue showing server sound files when configuring 'Play Sound' event rules
- Fixed issue with wrong resolution stream shown when returning to single camera view from grid layout
- Fixed issue where configuration could be broken by copy/pasting newlines into various configuration fields
- Stopped Client Event Actions from triggering on event Off
- Some fixes for "Show motion" in Camera Setup
- Fixed a timeout issue when retrieving Server Statistics

7.3 WaveAPI ActiveX API Changes

- New facility to disable information and error messages in WVideoDisplayWidget
- Fixed issue where ActiveX component would not jump gaps in video or support properly synchronised playback
- Fixed limitation where it was not possible to export from multiple individual servers simultaneously

7.4 More Information

7.4.1 Initial Support for Hybrid Cloud Recording

This release has initial support for Hybrid Cloud recording. That means that, whilst it is recommended to use the normal storage mechanisms for primary recording, it is possible to configure another recording track to record to a cloud storage target.

There are currently no WaveView configuration screens to set up this functionality. It is recommended to contact our pre-sales or support teams to discuss this feature in advance of using it.

8 Version 6.20 Changes

Note: Once a server has been upgraded to this version, it can only be downgraded as far as v6.16.

8.1 Server Changes

- Major update to Event Rules engine (see section 22.4.2 – New Event Rules System). Changes include...
  - Support for Boolean logic for event causes (e.g. Input 1 AND Motion on Camera 3). Allows AND, OR, XOR, NOT. (Note that "NOT" support is not currently configurable in WaveView – will be in a subsequent release).
  - Support for custom Event Action types.
  - Improved "Post Event Time" mechanism – allows extending duration of event, adding delays, and more.
  - Improvements to handling of schedules with events.
  - Metadata parameter matching (Note that this is not currently configurable in WaveView – will be in a subsequent release).
  - Improved Event Logging.
  - Event causes for integrations are automatically added to Event Causes list visible in the Setup screen.
  - EventP security enhancement to restrict IP of sources sending events to server.
  - New Event Actions: CopyTrack, Door control.
  - Event causes for network slow (link down) or network down.
  - Legacy configured Events have Legacy post event time behaviour.
  - Improvements when two or more events triggered together (no longer suppresses some of them).
- Support for recording and playback of talkback channels
- Support for Image Rotation, also known as Corridor Mode (Note that "NOT" support is not currently configurable in WaveView – will be in a subsequent release).
- Improvements in iSCSI disk handling: automatic reconnect after a disconnect
- HTTP Simple interface improvements:
  - BOUNDS – provides range of recordings for a channel/track
  - RECORDINGS – provides a list of recordings for a channel/track
- Some upgrade errors due to small install partition have been resolved
- Improved messages on newmid/oldmid Machine ID commands
- Failover:
  - A new mode allowing Standby Streaming before failover
  - Handling of SECONDARY STANDBY machines improved (more than one Standby is allowed)
  - Failover: a limit of 40 failover servers in group has been enforced
  - Failover redirect improved
- Metadata Capture from ONVIF cameras
- Improvements in camera setup and streaming:
  - Ability to switch from RTSP to ONVIF streaming without restarting
  - Additional entries in Device Database for more cameras
  - ONVIF Imaging support for IRIS control
  - Improved Auto-detect of camera type if not ONVIF
  - Camera cache is cleared if unlicensed (or disabled) to ensure fast startup when licensed
  - Improved handling of multiple channels on video encoders
  - Better logging (alog) for HTTP and MxPEG cameras
  - Multicast setup commands
  - Auto-focus and auto-iris for Axis-http protocol
  - Better Talkback support using Device Database in Auto mode
  - H265 handling improved for out of band SPS,PPS,VPS
  - Automatic switching to HTTP tunnelling if persistent failure on RTSP connection
  - Imaging setting improvements
  - ONVIF Relay outputs fixed
  - ONVIF Digital Input numbering corrected
  - Correct message shown if the wrong password configured for a camera
  - Rotate and Video enabled/disabled are cached for rapid change detection when reconfigured
  - Improvements in AAC detection
  - Camera N clear-cache command added
  - PTZF profile selection improved in Auto/ONVIF types

  - Fixed issue with occasional corruption of images using Boost Pre-record
  - Multicast improvements (SOAP)
  - Camera streaming improvements
  - Improved fault reporting when server fails to stream from camera
- Secondary NTP address (for failover, etc); NTP server feedback
- More Statistics: Camera jitter; Ntp sync
- Support for deletion of a MegaRAID array via the GUI
- Device database entry for non ONVIF devices like VCA or Paxton
- Authentication:
  - new master certificate to extend expiry date
  - new self-signed authentication certificate by default, so it is no longer necessary to contact Wavestore Global
  - The server immediately starts using a new authentication certificate
- Simpler setup: Miscellaneous tracks configured using CameraGroup as default
- Excessively large GOP size will now raise a fault; option to disable
- Diagnostic log zip download
- SSD Wear indication: Fault when about to wear out
- Integrations:
  - Axis VAPIX I/O: Input now supported
  - HTTP-Out ability to set Cookie, to receive Multipart
- Logging:
  - Network link speed is logged in syslog
  - MachineID logged in syslog at startup
- The frequency of the Patrol Read function on LSI MegaRAID cards has been automatically amended
  to reduce disk wear
- Restrict IP now allows multiple entries
- ONVIF/HTTP/RTSP Server:
  - additional services offered by Wavestore Recorder are disabled by default to ensure maximum security
  - Improved RTSP restreaming: JPEG restreaming
  - RTSP Server "Speed:" field for faster playback
  - RTSP Server clock: field now allows all ISO-defined formats
  - Restreaming multiple streams per camera via RTSP Server
- PTZ:
  - PTZ configuration for multilens cameras and encoders updated
  - PTZ Stop command is used in preference to Move x=0 y=0 to support buggy cameras
- Command 'showports' to produce list of running services with open firewall ports
- Samsung SSD smart monitoring used wrong attribute, now fixed. Note this might give a surprising "wear" indication on first upgrade when it switches from the wrong attribute to the right one, and as such this warning can be ignored if seen immediately after upgrade, but do pay attention to subsequent warnings of SSD wearing out fast. The warning is given only when a lot of wear occures in a short time. Use the "ssd" command to see the life left: if it's over 50
- Minor issues relating to Metadata Search invalid queries and motion detection fixed
- Unnecessary logging has been removed from Failover and LDAP
- Tunnelled RTSP over HTTP slow startup fixed
- Server Login now no longer triggers two pulses for LoginSuccessful
- Log messages tidied up when login fails
- Fixed issue where Talkback used wrong channel when configured using old method
- Camera command has now more information and has been tidied up
- Some old modes have been removed from LiveServer which should improve performance
- Malformed EventRule text fields now give correct error
- Y2038 and Y2036 issues resolved
- Server support for Camera Groups for more Group types (e.g. File)
- Image-Optimisation: Virtual Spot Monitor optimised
- Storage menu improvements: no longer shows two entries listed for the same physical disk (one shown as 'Missing', the other shown as 'Unconfigured')
- An issue with repeated heading names in the server statistics csv file fixed
- Supermicro X11SSH-LN4F motherboard detection fixed
- Disk Array Failed now shows state of each disk
- The clear-tmp command no longer deletes server stats files
- alog logging output now correctly handles UTF8 characters in string
- Time display now updates when zone updates

- Server charset was not explicitly UTF-8 for text/plain HTTP served pages
- Memory checks added for large numbers of channels
- Execute command now returns error messages
- Better logging of SystemStart
- Fixed Unexpected 'Sensors: fan1 = 0.0 rpm triggered alarm' message on Supermicro X11SSV-Q
- Fixed an Audio lipsync error where the audio could be delayed
- Issues with automatic network autoconfiguration (where changes made automatically but no "C" lines logged) improved to avoid erroneous network configuration.
- User initiated time jump improvements: better instructions for users
- Update OS packages to versions fixing latest CentOS vulnerabilities
- Various other security fixes

8.2 WaveView Changes

- Windows 7 and Windows Server 2008 no longer officially supported due to going End-Of-Life with Microsoft. Windows 8.1 and Windows Server 2012 are the minimum supported versions.
- New Event Rules setup screen to support new server Event Rules engine (see section 22.4.2 – New Event Rules System). Changes include...
  - Support for Boolean logic for event causes (e.g. Input 1 AND Motion on Camera 3). Allows AND, OR, XOR. (Note that "NOT" support is not currently configurable in WaveView – will be in a subsequent release).
  - Triggerable events on main screen now show as "Pulse" or "On/Off" type
  - "Test on" and "Test off" buttons on Event Rules screen now work for Causes and Actions and for all types, as do the triggerable events on the main screen
  - Improved setup for many event actions such as email sending or audio playback
  - Support for "Any" event source when configuring event causes
- New "Client Actions" setup screen for configuring actions reacting to server events, including...
  - Display of saved layouts
  - Display of associated camera(s)
  - Play sound
  - Delay (timer)
- Support for recording and playback of talkback channels
- New Server Statistics tool showing graphs of many different statistics such as network usage, disk usage, server status, etc.
- New tool to make obtaining client and server diagnostics simpler
- Updated to latest Immervision API to support latest Panomorph lenses
- Support for new user permission to grant/deny ability to send events to the server, and restrict source IP addresses.
- Improvements to zoom speed when using mouse to control PTZ cameras
- Easier setup for recording image authentication signatures, events, and metadata.
- Improvements to image authentication to allow self-signed certificates and new master certificate
- Certain ONVIF services now disabled by default with option to enable
- Add new "Talkback Type" parameter to allow using different methods for audio talkback for certain Camera Group types.
- Minor simplifications to failover setup
- Failover setup screen now imposes new limit of 40 physical servers in a "failover group"
- Several fixes for issues in event rules screen due to newly implemented event rules system.
- Fixed an issue relating to resuming streaming after connection lost and restored.
- Fixed issue where recording duration was limited in setup UI to only 99 days. Now 999.
- Fixed issue with Status Summary screen showing times in UTC only.
- Fixed issue with mouse PTZ control not always being available when it should be.
- Fixed some issues dragging and dropping between Video Display Areas.
- Fixed issue with playback when trying to skip recording gaps when metadata enabled but no metadata recorded.
- Fixed some subtitles issues relating to different display modes (server time, client time, or UTC).
- Many other minor improvements and fixes.

9 Version 6.18.27 Changes

Note: Once a server has been upgraded to 6.18.27 or later, it can only be downgraded as far as v6.16.

9.1 Server Changes

- Updated Italian translations
- Added new GET_RECORDINGS command to allow the ActiveX API to request a list of recording start and end times of a track
- Improved handling where jumping time backwards then rebooting could cause time jump to not work. Note that it's still advisable not to reboot for a while after jumping time backwards. The manual describes the correct process in detail
- Improved upgrade mechanism to better handle low disk space
- WS-Discovery protocol is now restricted to local networks
- Fixed some H.265 capture issues
- Fixed an issue where HikVision encoders weren't correctly identified as encoders
- Fixed incorrect handling of permitted cameras for IDs 29+
- Improved handling of some cases of faulty camera streams
- Fixed an issue with switching Virtual Spot Monitor on events when using new sub-stream functionality
- Fixed an issue where AAC audio could fail to stream
- Fixed an issue which could cause multicast capture to fail
- Fixed an issue with licensing multiple EMS (Encoder/Multi-Sensor) devices
- Fixed an issue with audio lip-sync
- Fixed an issue with audio failing to capture from some misbehaving devices
- LSI RAID card "patrol reads" now disabled to reduce disk wear
- Fixed support for Supermicro-X11SSH-LN4F motherboard with no extenal disk enclosure

9.2 WaveView Changes

- Updated Italian translations
- Improved warning message shown when large time changes occur in Time & Region setup screen

10 Version 6.18.15 Changes

10.1 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 10.4.1 – 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

10.2 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

10.3 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

10.4 More Information

10.4.1 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.

11 Version 6.16.66 Changes

11.1 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

12 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.

12.1 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 12.4.4 – 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 12.4.2 – 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 12.4.3 – 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.

12.2 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 12.4.1 – 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.

12.3 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).

12.4 More Information

12.4.1 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".

12.4.2 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.

12.4.3 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.

12.4.4 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

13 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 22.4.3 – Important Information about New Configuration Format before upgrading.

13.1 Server Changes

- New HyperRAID, HyperRAID Plus, and EcoStore technologies – see section 13.4.1 – 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 13.4.2 – 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

13.2 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

13.3 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

13.4 More Information

13.4.1 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.

13.4.2 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.

14 Version 6.12 Changes

14.1 Server Changes

- Upgrade Bundles are now enforced. IMPORTANT – please read section 22.1 – 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.

14.2 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.

14.3 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.

15 Version 6.10 Changes

15.1 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.

15.2 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

15.3 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).

15.3.1 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.

15.4 More Information

15.4.1 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.

16 Version 6.8.78 Changes

16.1 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

16.2 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

17 Version 6.8.22 Changes

17.1 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

17.2 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

18 Version 6.6 Changes

18.1 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

18.2 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

18.3 More Information

18.3.1 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.

18.3.2 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.

19 Version 6.4 Changes

19.1 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

19.2 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

19.3 More Information

19.3.1 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.

19.3.2 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.

20 Version 6.2 Changes

20.1 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

20.2 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

20.3 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.

21 Version 6.0 Changes vs Version 5

21.1 Server Changes

- Major update to base operating system providing better hardware compatibility, performance, and more.
- Major update to the LASS filesystem. See section 22.5.3 – .
- 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 22.5.3 – .
- Multiple log files – EXEC command.
- New mechanism for identifying audio devices.
- Support for opaque script files.

21.2 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).

21.3 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.

22 Important Upgrade Considerations

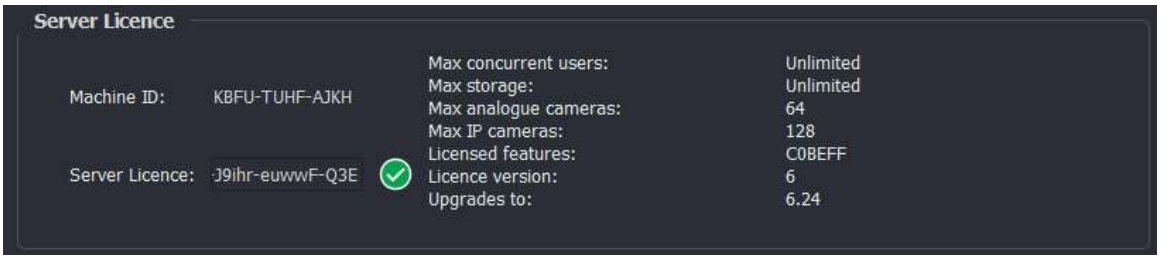
22.1 Important Information About Upgrading, Licensing, and Upgrade Bundles

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.

22.2 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 22.3.2 – Backing Up Configuration Files).

Also, if the "annotations" feature is in use, these should also be backed up (see section 22.3.3 – 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.

22.2.1 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

22.2.2 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.

22.2.3 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.

22.3 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 22.3.2 – Backing Up Configuration Files).

Also, if the "annotations" feature is in use, these should also be backed up (see section 22.3.3 – Backing Up Annotations).

22.3.1 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.

22.3.2 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.

22.3.3 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.

22.4 Considerations for Upgrade From Earlier Wavestore V6 Releases

22.4.1 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.

22.4.2 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.

22.4.3 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.

22.5 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 22.5.2 – 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 22.5.1 – 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.

22.5.1 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.

22.5.2 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".

22.5.3 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.

23 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.

23.1 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 23.4 – 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.

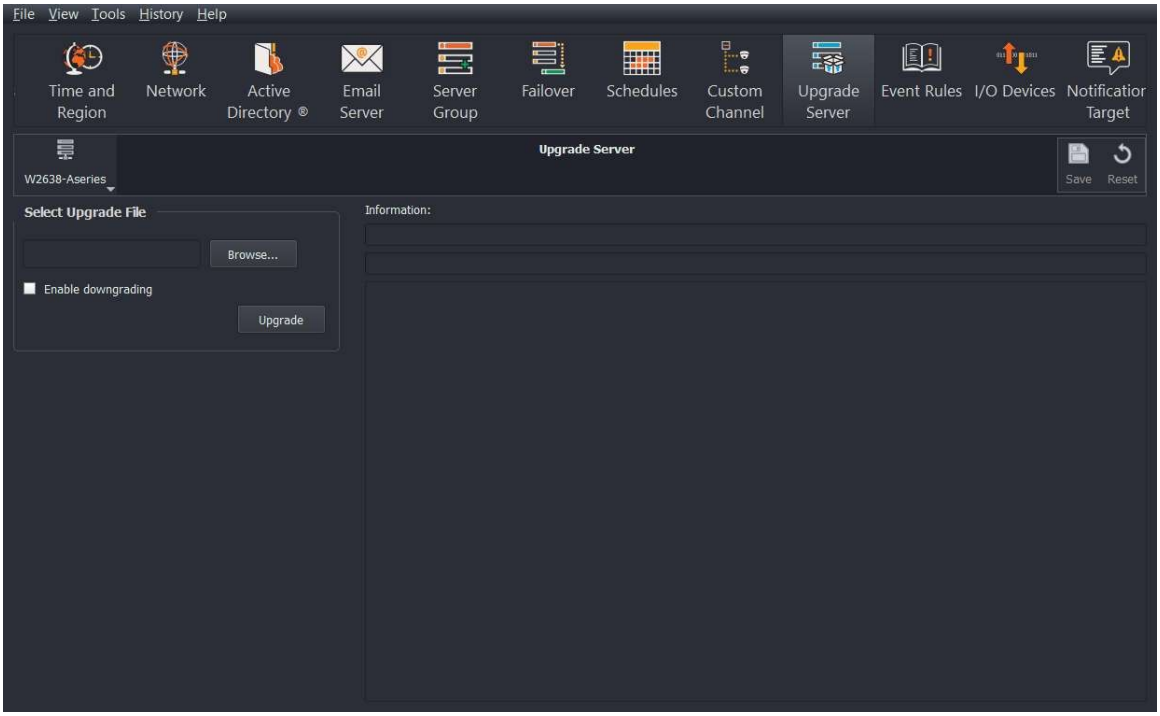


Figure 39.1: Upgrade Server Screen

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

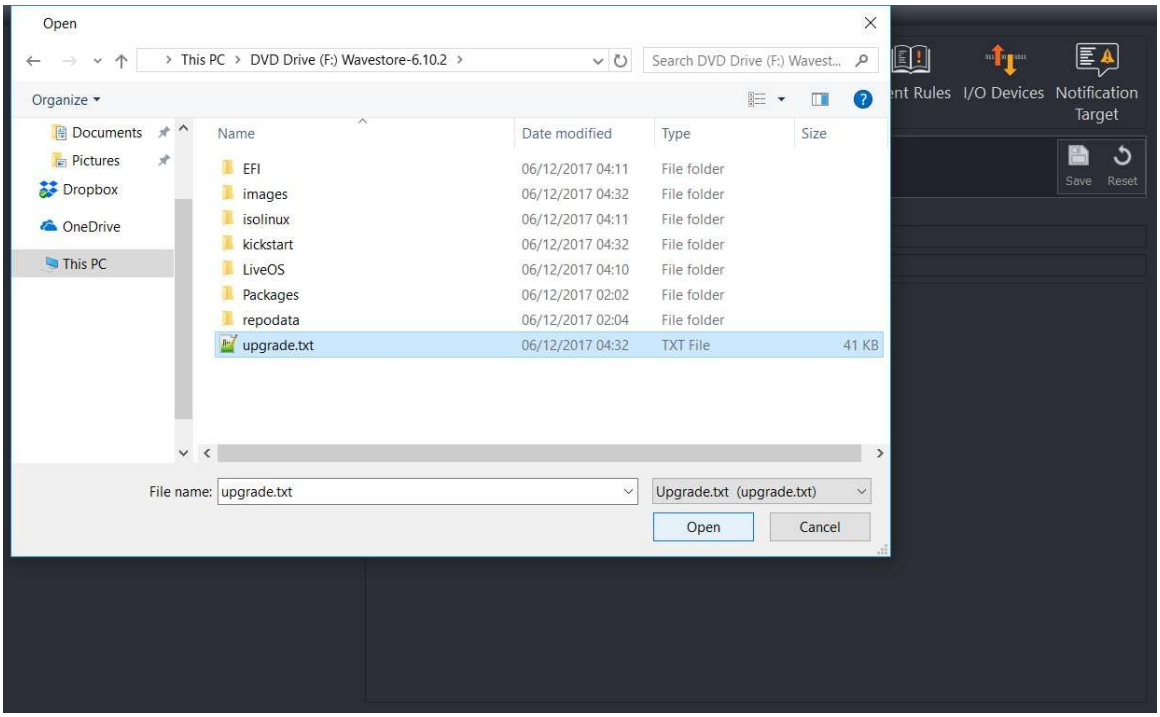


Figure 39.2: Upgrade Server screen – browsing to locate 'upgrade.txt' file

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:

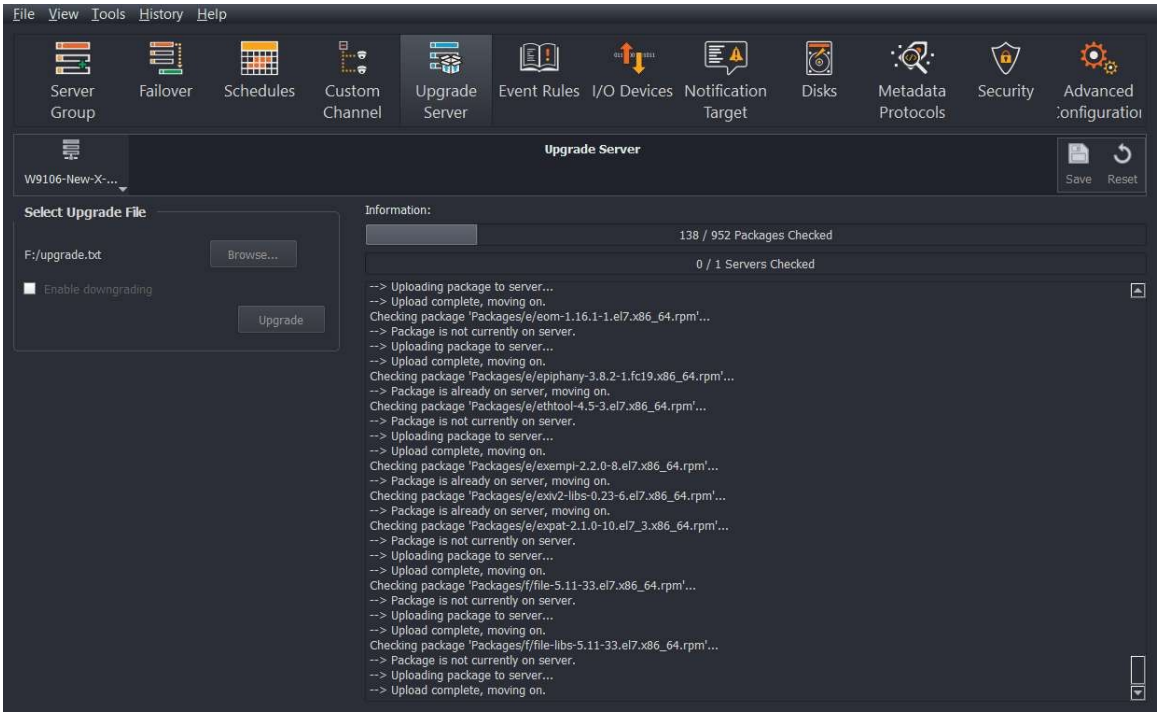


Figure 39.3: Upgrade Server screen – upgrade files being copied to the server

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.

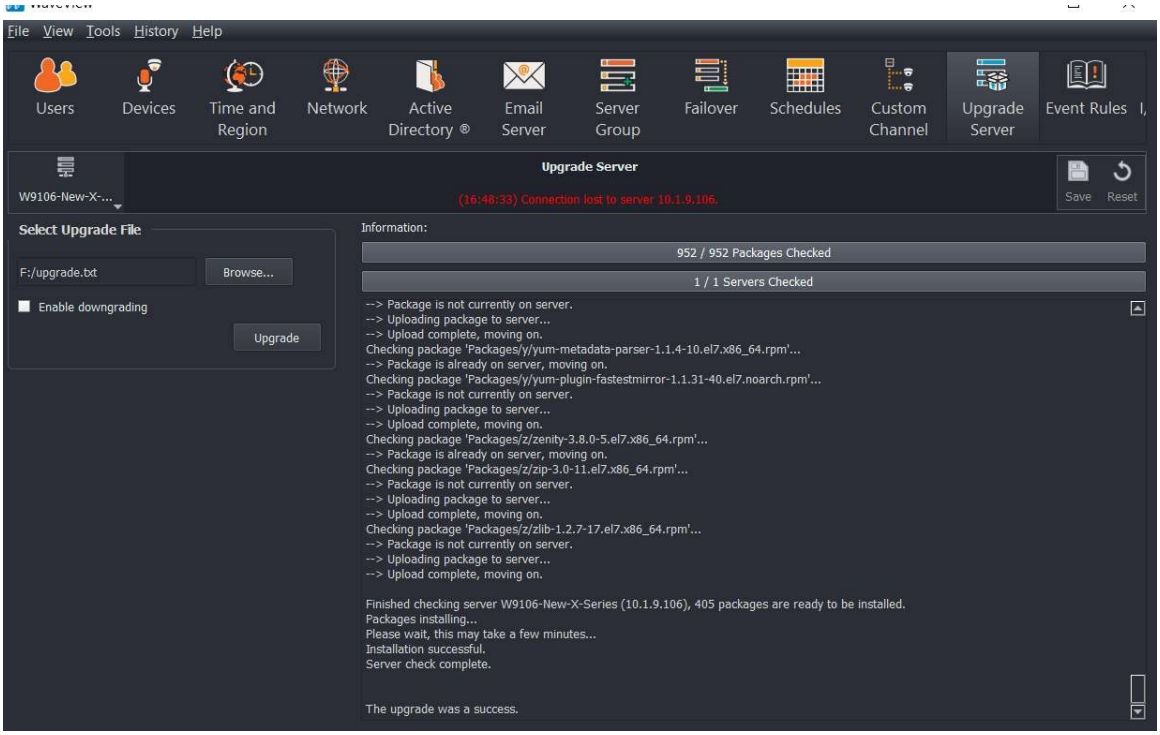
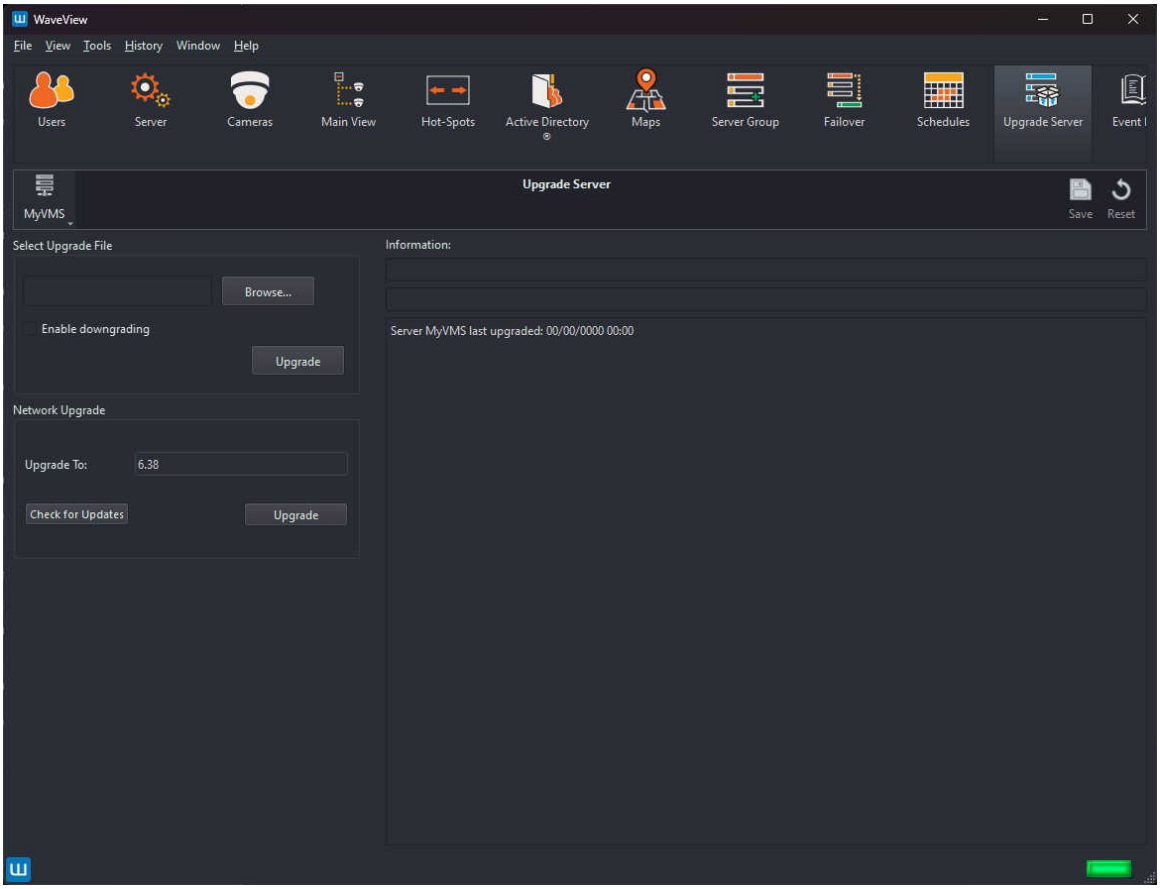


Figure 39.4: Upgrade Server screen – upgrade completed

23.2 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.

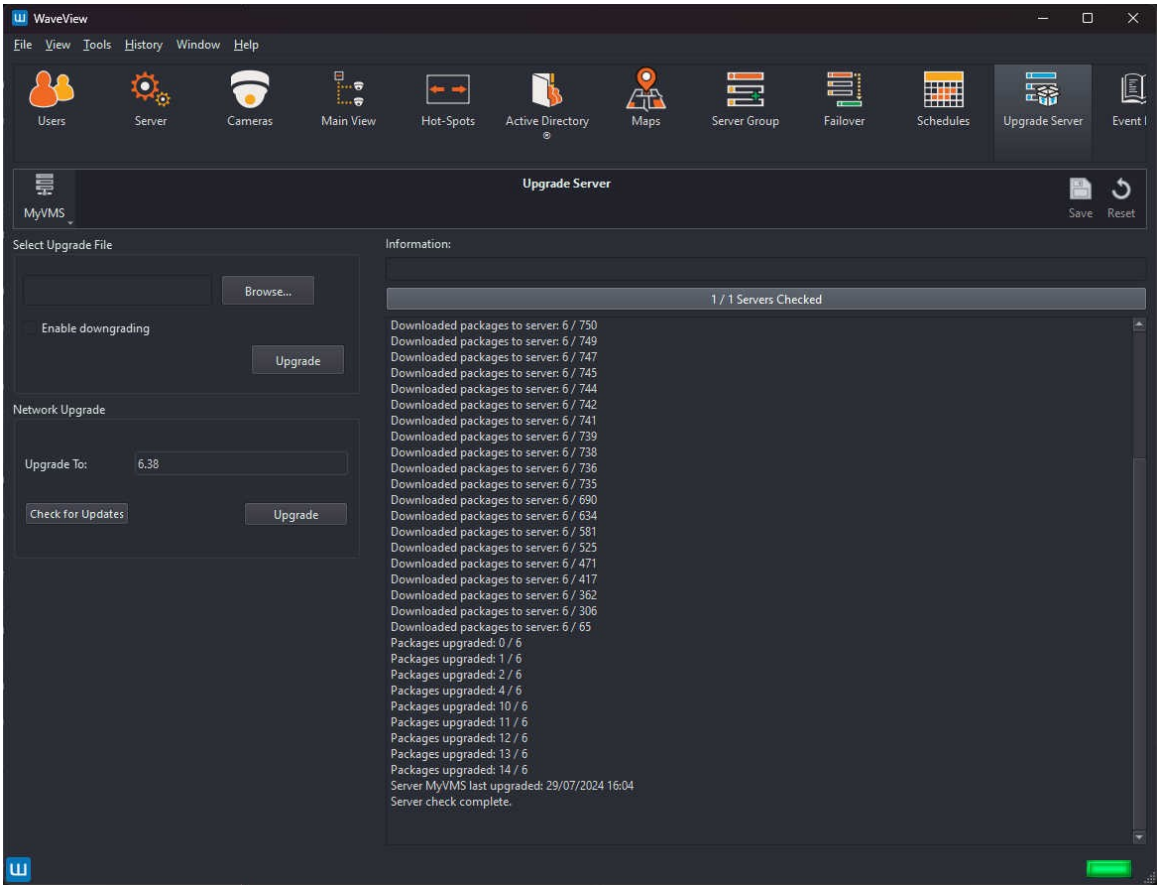
Note: If any server in the server group does not support network upgrades, network upgrades will be disabled for the whole group. In that case it will be necessary to log in to each server (which does support network upgrades), and perform the upgrade individually.



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.

23.3 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".*

23.4 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.