



Wavestore

Architectural & Engineering Specifications

Reference: WST-0126-11 (Wavestore VMS version 6.36 onwards)

Introduction

The purpose of this document is to describe the Wavestore video recording and management solution for viewing, controlling, recording and distribution of video surveillance signals.

All equipment and materials utilised in the solution procurement shall be standard components that are regularly manufactured or approved by the manufacturer.

All software and components shall be tested for the systems operation.

Major features that are unique to Wavestore's VMS are **written in red text**

Newly introduced or enhanced capabilities are **written in blue**

Note: this document is subject to changes without notice.

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1 System architecture

- A The system architecture shall be based on an open platform design and shall provide a modular, fully scalable and future proof video recording and management solution.
- B The software shall be based on server/client architecture; the server shall be based on a Linux operating system, whilst a client shall be available for Windows, Linux, iOS and Android platforms.
- C The system shall not require separate administration, health check, events or management servers. It shall be self-contained.
- D A nominated server shall be able to centralize events from other servers in the group, if required.
- E The system shall be able to support a wide range of cameras from different manufacturers providing the ability to concurrently record video streams using combinations of video formats, such as: H.265, H.264, MPEG-4, MJPEG, JPEG2000, and MxPEG.
- F The system shall be capable of concurrently displaying images (live and recorded) directly from combinations of analogue, network/Internet Protocol (IP) and thermal cameras without the deployment of video encoders.
- G The system shall be fully ONVIF Profile-S conformant and its road map development shall be biased towards ONVIF Profile G , Profile T and Profile C compliance.
- H The system shall be able to communicate with cameras over Real Time Streaming Protocol (RTSP) or Hypertext Transfer Protocol (HTTP) and shall utilize standard Transmission Control Protocol/Internet Protocol (TCP/IP) networks.
- I The system shall provide a metadata management capability to enable specific data to be recorded, searched and maintained, and associated video linked and easily accessed.
- J The system shall include a watchdog timer (WDT) function to provide a server auto-reboot in the event of an abnormal circumstance occurring in the server.
- K When loss of power is experienced, the system shall automatically power on, boot-up and resume normal operation within three (3) minutes of resumption of mains power.
- L The system shall support remote capabilities such as monitoring, diagnostics and maintenance to ensure operational efficiency.
- M The system shall be capable of receiving, recording and displaying video at any resolution provided by surveillance cameras, including non-standard sizes and aspect

ratios, high-megapixel resolutions above 20Mpixels, and high frame rates up to 100 frames per second, without distorting or harming the images or pixel aspect ratio, apart from scaling them to fit screen resolutions.

- N It shall be possible to deploy the system in a virtualised environment, either with or without external (internet) access in such a manner that cloning of machine identities is not possible. For systems running in a virtual environment that do use an internet-based authentication, the system will have redundancy such that protection is given against disruption to any external server or connectivity for a period of up to 5 days. For systems that do not use external authentication then a unique hardware dongle shall be the means of protection against cloning.

2 Server functions

2.1 Devices and cameras

- A The system shall have the ability to simultaneously accept video from analogue, network/IP and High Definition analogue cameras.
- B The system shall accept both Phase Alternating Lines (PAL) and National Television Standard Committee (NTSC) video standards.
- C The system shall support analogue rate at D1 up to 25/30 frame per second (PAL or NTSC) per input and up to 1600/1920 frames per second per recorder.
- D The system shall have the ability to associate an audio channel with each video channel.
- E The system shall have audio to video synchronization (lip sync audio).
- F The system shall have the ability to name the camera channel using alpha numeric characters.
- G The system shall have the ability to apply custom privacy masks to any cameras, whether analogue or IP, and whether live, in playback or in exports. Removal of these masks must be possible for authorized users.
- H The system shall have the ability to add motion masks on analogue and IP cameras.
- I The system shall have the ability to adjust sharpness, hue, saturation, brightness and contrast settings from analogue channels.
- J The system shall have the ability to stream both MJPEG and H.264 video formats from analogue cameras connected directly to servers.
- K The system shall be able to record each analogue channel in at least a dual stream mode and each IP channel in at least triple stream mode.
- L The system shall be able to configure any frame rate for each analogue or IP channel independently; the maximum frame rate for each analogue channel should be at real time 30 images per second.
- M The system shall have the ability to configure group of pictures (GOP) sizes for analogue or IP cameras on H.265, H.264 or MPEG-4 streams, with a minimum size of 1 (i-frames only).
- N The system shall support D1, CIF, QCIF, 2CIF and DCIF resolutions for each analogue video stream.

- O The system shall support native resolutions of each IP camera video stream; including VGA, SVGA, 720p, 1080p, 4K, 8K, 20MP and 30MP.
- P The system shall be able to control average bit rates and maximum bit rates for each analogue or IP video stream, and feature a constant quality setting that maintains a steady image quality without wasting space or exceeding these limits.
- Q The system shall have the ability to record any 360-degree (fisheye) images, providing options to set custom dewarping parameters and provide multiple user client dewarping.
- R The system shall have the ability to configure 360-degree (fisheye) camera orientation to vertical up (desk), vertical down (ceiling) horizontal (wall) and any arbitrary angle (e.g. vaulted ceiling).
- S The system shall have the ability to configure multi-sensor IP cameras and analogue/HD analogue encoders (TVI/CVI/AHD). The manufacturer shall provide a specific channel license for such technology.
- T The custom dewarping should be adjustable to enable accurate dewarping of narrower-angle images, for example to remove lens distortion from more conventional wide-angle cameras.
- U The system shall have the ability to control the PTZ functions of ONVIF compliant PTZ cameras, other IP cameras over HTTP, and standard analogue PTZ cameras via RS-485 telemetry controls.

2.2 Camera streams

- A The system shall have the ability to record each camera/device stream to three independent recording tracks. Each recording track shall independently control drive allocation (where the video is stored), recording rate, recording duration in number of days or event-based recording. Each track can be the same or different streams from the camera. Each track shall be capable of being recorded to two different storage volumes simultaneously.
- B The system shall support at least triple streaming from ONVIF IP cameras of any resolution available from the camera.
- . These streams shall be capable of being recorded to different tracks within the server and also at least two of these streams should have the ability to be selected automatically in the client display area depending upon screen layout.

2.3 Recording and storage

- A The system shall have the ability to record in the native resolution requested from network/IP cameras.
- B The system shall be able to record both ONVIF and non-ONVIF IP cameras.
- C The system shall allow real-time recording and permit other recording options.
- D The system shall provide the option for recording only when an event rule is triggered. The recording period can have a defined pre-event and post-event time appended.
- E The system shall provide the option for framerate boost on activation of an event trigger or a schedule
- F The system shall allow pre-event recording and this can be optionally at a boost rate.
- G The system shall provide the option for schedule and event recording onto a single track.
- H Non-ONVIF cameras shall be supported via standard RTSP/HTTP streaming.
- I Non-ONVIF cameras must be supplied with standard application programming interface (API) documentation.
- J The system shall be able to record on both 2.5" and 3.5" enterprise level single hard drive disk and redundant array of independent disks (RAID) storage configurations.
- K Indexing of recorded images will be stored in triplicate.
- L The system shall be capable of recording more than 15 trillion images per data volume.
- M The system shall be capable of making logical volumes from 2 or more physical disks from within the VMS application and without the use of dedicated RAID controller hardware.
- N The system shall be able to spin down disks which are not in active use in order to save power (see section 2.3.1, Energy saving).
- O The system shall be able to record on RAID 0/1/5/6/10 formats.
- P The system shall support up to N+5 RAID redundancy using an atomic index method to allow shut down simply by removing the power with no loss of data and no "write holes"; when power is reapplied, the server shall restart automatically. This may be known as 'HyperRAID'.
- Q The system shall be able to record to Internet Small Computer System Interface (iSCSI) and external Serial Attached SCSI (SAS) RAID storage devices.

- R The system shall be able to record on network attached storage (NAS) devices connected via local area network (LAN).
- S The system design shall support varying storage capacities up to 520 petabytes of storage.
- T The system design shall not present a size limit per image so image sizes of several megabytes can be recorded continuously.
- U The fault tolerant disk storage system shall constantly verify for consistency in operation.
- V The system shall require just two disk reads to access any image at any time, regardless of the size of the archived storage system.

2.3.1 Energy saving

- A The system shall have the capability to 'spin down' HDDs when not in a read or write state to save energy. This may be known as "EcoStore".
- B The HDD 'spin down' feature shall be controlled by the VMS.
- C The HDD 'spin down' feature shall work in conjunction with RAID and be able to spin down groups of HDDs so that N+5 disk redundancy is maintained.
- D The 'spin down' feature shall be able to operate on compatible non-proprietary hardware.
- E The 'spin down' feature shall have the ability to operate on up to 2.04PB per server.

2.4 Event Response and Display

- A The system shall have the capability to display and respond to events from multiple sources such as IP cameras, Digital Input/Output modules and 3rd party systems such as video content analytics systems, access control and intrusion detection systems. These events can be combined using single or multiple AND, OR and XOR Boolean operators. The system shall also have the capability to send event messages to external systems in response to events it receives.
- B Events shall be able to be displayed in real-time as they arrive into the system in an area dedicated to that purpose in the GUI screen. Filters should be provided such that only selected event types are displayed in the GUI screen. Colour coding of event types should also be possible. Customised response capability shall be provided, by means of a scripting service provided by the system vendor.

- C Events shall not be restricted to predefined types but shall be extensible. The system will detect new event types automatically upon first receipt and allow complex cause-and-effect responses thereafter.

2.5 Time and region

- A The system shall have the ability to set time zone and region to local time.
- B The system shall deliver the ability to synchronise to Network Time Protocol (NTP), National Marine Electronics Association (NMEA) Global Positioning System (GPS) or Inter-Range Instrumentation Group (IRIG) time sources, or allow users to manually set the system time. Associated servers should be able to maintain permanent time synchronization with each other, regardless of how the source time is derived.
- C In order to avoid losing footage or creation of large unrecorded gaps in the video, the system shall provide the ability to slew when large time changes are applied, and should prevent step time changes during recording.

2.6 Network

- A The system shall be able to support multiple network adaptors on one server.
- B The system shall allow for separate IP addressing of each network adapter, and also link aggregation (also known as port bonding) to combine the capacity of some adapters on a single address and provide fault tolerance.
- C Network data transfer shall be limited only by the capacity of the incoming network connections. Each Ethernet connection shall be capable of receiving and handling data at the maximum rate possible for that type of connection. There shall be no internal bandwidth limitations applied to these connections by the system.
- D The system shall provide the ability to configure IP address, subnet mask, gateway and DNS (Domain Name System).
- E Network diagnostic tools shall be present within the server to measure such things as received and transmitted Bytes and packets per Ethernet port and per second or averaged over a period.
- F The system shall offer HTTP Proxy functionality to enable remote management and maintenance of other devices on the surveillance network, using only one external connection to the recorder, and without compromising the security of any network.
- G IPv4 and IPv6 network addressing shall be supported.
- H Actual negotiated network link speed shall be reported in a system log file which is readily accessible to an operator with sufficient user privileges.

2.7 Email sending

- A The system shall have the ability to configure Simple Mail Transfer Protocol (SMTP) email servers with unlimited number of recipients. This facility shall enable notification by email of faults and other system conditions, in addition to sending compressed video clips of relevant cameras in response to events on the system, as prescribed by user-defined rules.
- B It shall be possible to transmit email notifications using secure protocols such as SSL and TLS.
- C It shall be possible to limit the number of emails sent within a defined period.

2.8 Server groups

- A The system shall be able to configure groups of servers.
- B The system shall enable users to view all cameras of the servers in the group from any client login by connecting to only one server.
- C The system shall manage and maintain all user details and rights across all the servers in the group automatically, from a single interface.

2.9 Schedules

- A The system shall have the ability to configure schedules to define when individual users can log in to the system, how recording is to be performed and when event rules are enabled.

2.10 Upgrade

- A The system shall have the ability to upgrade the server software, both locally and remotely using the existing client. Disruption to recording should not be greater than 10 seconds during this process.
- B The system upgrade, once initiated, shall be automatic and should be capable of being completed in under 5 minutes per server.
- C Additional features, such as adding extra camera channels or software features and capabilities enabled by licence upgrade should be capable of being achieved locally and remotely, using the existing client. This should not require the re-installation of any software and disruption to recording should not be greater than 10 seconds during this process.

2.11 Disk configuration

- A The system shall have the ability to configure and maintain disks both locally and remotely using the same application as is used for the system operation and system configuration. It shall provide information on all the installed hard drive disks, such as capacity, model and serial number, and should give warning of detected imminent failure, high temperature and notification of failure.
- B The system shall have the facility to format hard drive disks and shall provide a visual indicator confirming that all disks have been successfully formatted.
- C The system shall provide the ability to assign drive letters on each hard drive disk or RAID volume.
- D The system shall have the ability to export and import all server settings.

2.12 Failover

- A The system shall have the ability to configure one or more standby servers (hot-spare servers) to be maintained in standby mode and take over when any server becomes unavailable or experiences a fault defined by the installer as requiring substitution.
- B The system shall have the ability to configure hot spare servers as backups in a standby mode, immediately available should any of the primary servers go offline or fail. The system shall detect the failure, replicate the failed server's entire configuration and detailed settings and automatically switch to the hot spare server.
- C The entire failover process shall be capable of completing automatically and resume recording in no more than twenty (20) seconds. Client connection to the replacement server shall also be automatic.
- D The system will automatically display both live and recorded footage to any connected client workstation by means of a redirection capability without any user intervention and irrespective of the failover state.
- E The system shall have the ability incorporated within the configuration interface to force a server into a failure mode to instigate a failover for both maintenance and testing purposes.

2.13 Health monitoring

- A The system shall have the ability to configure Simple Network Management Protocol (SNMP) for external health monitoring of the security system. This shall extend beyond the physical servers to capture systems, cameras, storage systems etc.

- B It shall be possible to monitor the health of multiple servers using dedicated Health Monitoring system. The architecture of this system will be such that data is pushed periodically to a central health monitoring server and will not require port-forwarding or other similar mechanisms but will rely on data being pushed from the video management servers at regular intervals and collected and stored on a central server which is to be either cloud or on-premise based. Configurable dashboards displaying the health of the system, in part or complete, will be available using standard web-browsers rather than a dedicated health monitoring application.

2.14 Watchdog

- A The system shall have a built-in software and hardware watchdog function. The watchdog shall monitor the server and reboot the system automatically if needed in the case of system failure.

2.15 Configuration files

- A The system shall have the ability to make automatic configuration back-ups each week that can be reapplied if required.
- B It shall be possible to send the configuration file by email in response to an event e.g. fault being detected.

3 Integrations

- A The system shall have a software development kit (SDK) available for third-party integration. The SDK shall be available in both Windows 32bit and 64bit environments.
- B The system manufacturer shall have an integration service to integrate with third-party technologies such as cameras, access control, intruder detection, video analytics, PIDs & sensors, audio devices and others.
- C The system shall be compatible with Modbus and Axis VAPIX I/O devices.

4 Client functions

4.1 User functions

- A The system shall have the ability to configure unlimited number of concurrent users and shall provide the ability to configure three different user levels, delivering the following functions:
1. Install level – Full access to all server functions;
 2. Admin level – Access to live view, search, playback and export with the ability to create and edit Admin and User levels;
 3. User level – Access to live view, search, playback and export.
- B It shall be possible to limit the IP Address from which an Install level user can connect.
- C It shall be possible to configure the number of failed login attempts can be made before a lockout is applied. The lockout period should also be configurable.

4.2 Camera set-up

- A It shall be possible to set cameras up via the client software.
- B Cameras shall be automatically discovered on the network.
- C It shall be possible to place cameras in “Groups” so that cameras will be automatically set to record at maximum resolution and frame-rate automatically on first connection.
- D It shall be possible for an Admin (with suitable permissions) or Install user to adjust the settings for resolution, frame rate, retention period and quality settings to all the cameras in a Group as a single action.
- E It shall be possible to replace cameras and use the existing channel license without any further steps.
- F It shall be possible to add one or more cameras by their IP address range and this range may be outside the subnet of the server itself.
- G It shall be possible to import camera settings from a spreadsheet. The following settings must be importable as a minimum:
- Channel ID
 - Camera Name
 - IP address or hostname of camera
 - Position used to display camera in an arbitrary order in device tree
 - Camera Group to be assigned to camera

4.3 Active Directory/LDAP

- A The system shall be capable of supporting Active Directory via LDAP for authenticating users, so that it will not be necessary to create and manage users separately on the video server.
- B Users should be capable of being configured within the Active Directory server to be a member of a relevant group and the permissions attributed to that group should then be used at user login.

4.4 User Permissions

- A The system shall have the ability to configure the following permissions for each user:
 - Name – User name
 - Level – User level (install/admin/user)
 - Max bandwidth – Permitted bandwidth for a user connection to the system with options of 256, 512, 1024, 1536, 2048, 2560, 3072, 4096, 6144, 8192 and unlimited kb/sec per connection
 - Disabled cameras – Access to certain restricted cameras can be denied to certain users
 - Language – Multiple languages support, including: Arabic, Chinese, English (UK and US), French, Hebrew, Hindi, Hungarian, Italian, Romanian, Russian (Cyrillic), Slovak, Spanish, and Turkish
 - Load layout on login – Load a defined layout upon a user login into the system
 - Logoff time – Option to specify a certain time (defined in minutes) when user is automatically logged off the system
 - Inactivity logoff time – Option to specify a certain time (defined in minutes) when user is automatically logged off the system after inactivity
 - Change password – Ability for users to change their own password
 - Force user to change password on next login – Ability to force users to change their password on next login into the system
 - An enforceable password policy for complex passwords
 - Login permitted schedule – Ability to permit users to login only on scheduled times
 - Playback – Ability to permit users to playback saved videos
 - Restrict playback to recent recording only– Ability to restrict time (defined time in minutes) to playback video
 - PTZ – Ability to control PTZF (pan/tilt/zoom/focus) cameras
 - PTZ priority – Ability to restrict users’ PTZF priority (lowest/low/medium/high/highest)
 - See through privacy mask – Ability to see through any privacy mask that have been set on the system

- Editing of subtitles
- Showing or hiding of subtitles
- Export – Ability to make exported copies of video, audio and metadata
- Decrypt – Ability to decrypt archive in proprietary file type
- Re-encrypt – Ability to re-encrypt proprietary file type archive with password
- Transcoding/exporting
- Decrypt for transcoding
- Restart servers – Ability to restart servers
- Shutdown servers – Ability to shutdown servers

4.5 Annotations

- A The system shall have the ability to allow events to be logged by users in a text format.
- B The system shall have the ability to insert text notes (annotations) which are associated with one or more recording tracks. These can be date stamped and accessed by other authorised users.
- C The system shall have the ability to search all annotations or by individual camera and display the first associated recording track at the time when the annotation was entered.

4.6 Docking and Undocking of Elements of the GUI

- A The system shall have the capability to dock major elements of the GUI, such as the Device Tree and Playback controls and these shall also be able to be positioned anywhere within the viewing screen area to suit individual operators' preferences.

4.7 Custom channel tree

- A The system shall have the ability to configure custom channel trees, allowing grouping of cameras from different servers in various logical arrangements that best suit their use, and grouping of cameras in a different order to how they have been connected to the servers.

4.8 Status indicators

- A The system shall have visual colour coded status indicators in the GUI to indicate all devices recording correctly, warning, fault, unlicensed server, server awaiting restart, disk full, or recording not enabled.

4.9 Camera Selection

- A It shall be possible to use the qwerty keyboard number pad to select cameras into the current active segment of the video display area.

- B It shall be possible to select multiple cameras simultaneously for display on the video display area.

4.10 Programmable On-Screen Buttons

- A It shall be possible to configure on-screen buttons (Hot Spots) that are overlaid on the current active segment of the video display area and appear when a mouse is positioned over that segment. Pressing these on-screen buttons will not only cause another camera to be displayed in that segment but also trigger predefined events or actions.
- B Hot Spots shall be displayed in both live display and when playing back recorded video.
- C Each Hot Spot shall have configurable properties including shape, colour, and icon.
- D The system shall allow users to define events or actions to be triggered upon pressing a Hot Spot.
- E Events or actions triggered by Hot Spots may include, but are not limited to:
 - Displaying another camera feed in the segment.
 - Initiating preset camera movements.
 - Activating alarms or alerts.
 - Starting or stopping recording.
 - Triggering external devices or systems.
- F The configuration interface shall provide intuitive tools for defining and managing Hot Spots and associated events.
- G The system shall provide feedback to users upon pressing a Hot Spot to confirm that the associated action or event has been successfully triggered. It shall be possible to define the shape, colour and icon of each individual on-screen button.

4.11 Virtual spot monitor

- A The system shall have the ability to configure virtual spot monitors. The virtual spot monitor shall be configured to display specific video inputs upon various user-configured conditions.
- B The virtual spot monitor function shall support both analogue and IP cameras.
- C The system shall have the ability to configure multiple virtual spot monitors.

- D The virtual spot monitor images shall also be available as a network video stream for display on other decoding devices, or for example for use in external video analytics systems.
- E It shall be possible to display a selected camera in the Virtual Spot Monitor in response to the triggering of an event.

4.12 Layout Sequences (display salvos)

- A It shall be possible to define layouts of cameras so that they can be included in sequences such that the video display will show each layout for a pre-determined time before automatically switching to another layout, which itself will be displayed for time which may be different to the first.
- B This sequence should be able to have more than 20 individual layouts, each with its own display time.
- C The display sequence should continue indefinitely until commanded to stop by the operator using an on-screen button.

4.13 PTZ cameras

- A The system shall provide controls for controlling Pan/Tilt/Zoom cameras. These controls shall be disabled if the camera is not a PTZ camera and if the user does not have permission to control PTZ on this camera. Depending upon the type of camera, certain controls may also be disabled.

Available controls are:

- Pan left/right
 - Tilt up/down
 - Zoom in/out
 - Focus in/out/Auto
 - Iris open/close/Auto
 - Wash & Wipe
 - Lamp toggle
 - Track left/up – for cameras on rails
 - Track right/down – for cameras on rails
- B It shall be possible to configure a PTZ camera such that Pan and/or Tilt controls can be reversed within the client application on a camera-by-camera basis to facilitate non-standard cameras and installation orientations.
- C It shall be possible to operate the pan and tilt functions by clicking and dragging with the mouse on the video display area. The direction of camera movement will closely

match the direction of dragging of the mouse. The speed of movement will be controlled by the distance of drag from the original mouse click position and both direction and speed will dynamically adjust as the mouse is dragged around the video display area.

4.14 Views

- A The system shall have a fully dynamic viewing area. The system shall be able to select video channels by double clicking, dragging, or mouse wheel scrolling over camera selection tools.
- B The system shall have a customisable multi-image display with options to save more than 50,000 custom layouts per user, which that user can recall from any client station on the system.
- C The system shall have a configurable video display to allow each user to configure their unique display of cameras images by size, position and format.
- D The system shall have the ability to unlock the aspect ratio of any camera.
- E The system shall have pre-defined layouts of 1, 2x2, 3x3, 4x4, 3x2, 4x3, 5x4 and 5x3, and allow easy addition of rows or columns to a current grid.
- F The system shall provide each user the ability to easily add and remove cameras they want to view.
- G When playing back cameras, either singly or as part of a layout of multiple cameras, the playback time will be preserved as other cameras or layouts of cameras are selected.

4.15 360-degree (fisheye) cameras

- A The system shall have the ability for every client to dewarp any 360-degree (fisheye) camera image independently, with a simple two (2) click process.
- B The system shall have the ability to select dewarped or conic panorama views for any 360-degree (fisheye) camera.
- C The system shall have the ability to adjust the camera orientation within the configuration interface from +90 to -90 degrees in 1-degree increments.
- D The system shall have the ability to create, save and recall virtual views from 360-degree (fisheye) cameras.

- E The system shall have the ability to Pan, Tilt and Zoom within the 360-degree view of a 360-degree (fisheye) camera.
- F The system shall have the ability to pan dewarped views continuously by dragging in the direction of pan.
- G The system shall have the ability for each dewarped view to be treated as a completely independent view with full playback and export facilities without affecting other views from the same camera.
- H The system shall have the ability to save specifically aimed dewarped views as named virtual cameras, and to use them in layouts, playback and exported recordings in just the same way as real cameras.
- I The system shall have the ability to include all the operator's pan, tilt and zoom movements in exports made from 360-degree (fisheye) cameras.
- J The system shall have the ability to use Immervision, Oncam in addition to its own native dewarping engine.

4.16 Camera Cloning

- A It shall be possible to populate two or more areas of the camera viewing screen with the stream from the same camera without bringing a separate stream from the server to the client. These separate cloned streams can then be independently electronically zoomed and positioned to provide different camera views. Cloning is currently limited to the case of 360 cameras, the cloned views can be independently dewarped to show different areas of the 360 camera view.

4.17 Server-side Video Motion Detection

- A It shall be possible to set up server-side Video Motion Detection (VMD) for both analogue and IP cameras.

4.18 Smart Search

- A It shall be possible to perform retrospective searches for recordings where there has been movement in areas definable by the user at the time of the search. This will be based upon either motion detection on the server itself or by a searching of video analytics metadata. Selection of the time and date range and an adjustment of the level of sensitivity when performing this search will be available.

- B It shall be possible to play back multiple motion events simultaneously either singly or with sequential instances played back in a multiscreen grid of 2 x 1 or greater, where there has been movement detected by the smart search.

4.19 Bounding Boxes and Polygons

It shall be possible to enable the display of boxes or polygons to highlight objects of interest in the Video Display Area. These boxes and polygons will be created by the client software itself and not be overlaid by an associated 3rd. party piece of equipment.

It shall be possible to select whether a box, polygon or both are displayed and their line thickness.

It shall be possible to select one colour for the bounding box and a different one for the polygon.

4.20 Find screen

- A The system shall have a Find screen showing a timeline of video for all the tracks on all the channels on each server as standalone or in the currently connected server group.
- B The Find screen shall allow rapid navigation within the archived video, exporting video in multiple formats, making annotations (notes) against areas of video, and searching of notes and events.
- C The Find screen shall consist of:
- Video display area
 - Timeline
 - Menu bar
 - Archive range section
 - Selection range section
 - Current time indicator
 - Play controls

4.21 Find screen Video display area

- A The Find video display area shall have a similar design to that of the main screen. All video streams in the Find screen will be kept synchronised and shall not be independently controlled. The current time for all video displays will be based upon the current time marker in the timeline and this will be displayed as text in a current time indicator field on the screen.

- B It shall be possible to have up to 4 independent video display areas, each capable of showing more than 25 cameras in any combination of live and playback. These video display areas will be controlled from a single instance of the client viewing software.

4.22 Find screen Timeline

- A The timeline shall be presented horizontally left-to-right such that oldest recordings shall be to the left. Gaps in the timeline shall indicate that no recordings are present for that time.
- B The timeline shall be controlled as follows:
 - a) left-click and drag the mouse on the horizontal bars to move the current time position and display the relevant video in the video display area;
 - b) double-left-click the mouse on the horizontal bar associated with a track to show the associated channel in the video display area;
 - c) hover the mouse over one of the horizontal bars to see the precise time at that point in the recordings;
 - d) hover the mouse over a camera or track number on the left to see details of that camera or track;
 - e) click a span drop-down box to change the size of the timeline view, allowing a timeline for many days or just a few minutes to be presented.
- C The timeline shall have three (3) markers:
 - a) current position marker, indicating the current position in time; the system shall not provide the option to be moved this marker, but shall allow dragging the timeline relative to this marker;
 - b) from marker, with the option to be dragged to select a start time for various operations;
 - c) to marker, with the option to be dragged to select an end time for various operations.
- D These markers shall set the area of interest for making exports, adding annotations, or searching events.

4.23 Find screen Menu bar

- A The menu bar shall consist of:
 - a) File – Close: to close the find screen;
 - b) View – Menu:

- Track 1, Track 2, Track 3 – These tracks shall toggle whether track 1/2/3 is shown in the timeline;
- Show Time Grid – This command shall toggle whether a grid is shown under the timeline;
- Show Annotations – This command shall toggle whether a horizontal bar is shown for each channel to show associated notes;

c) Annotation: to create and edit annotations;

d) Search: to search events.

4.24 Archive range

A The archive range shall consist of two date/time displays; these shall show the oldest and newest recordings for the currently selected recording track.

4.25 Selection range

A The selection range shall show the currently selected region of interest and the system shall provide the options to control it by clicking and editing the values, or clicking the down-arrow for a calendar.

4.26 Current time indicator

A The current time indicator shall show the current time for all video displays in the video display area. When a new time is selected, all video displays in the video display area shall jump to that time.

4.27 Play controls

A These play controls shall behave exactly like the main screen play controls, except for the live button which shall be disabled and all video displays which shall be synchronised.

4.28 Rapid find

A The system shall enable the user to search video of one or several cameras simultaneously, from live seamlessly back to the first available recording by means of a scrub-bar. The scrub-bar shall move video through time in a logarithmic fashion such that its scale is progressively stretched to give fine control around the current time-point, without making any recordings out of range of the scrub-bar. The results will be displayed instantaneously.

B The background of the scrub-bar shall indicate recordings and gaps, and also a ruler of relative time graduations to help the user navigate. Playback time shall also be stepped by corresponding amounts when clicking on graduations of the ruler. The scrub-bar

shall indicate the location of any start and stop points defined for export using coloured flags.

- C Access to recordings on direct attached storage shall take less than 1 second using a local client or a remote client on the local network and it shall be possible to move freely and randomly through recordings of unlimited length without delay or interruption to the video display. The speed of random access to video recordings shall be limited only by the hardware involved, and never by limitations in the design and format of the storage.

4.29 Images

- A The system shall provide the option by clicking the edit button within a video display to capture and display the currently displayed image in a new window. This window shall allow saving the image as PNG, JPEG, or BMP file, printing the image and editing the image (crop, sharpen, blur, mosaic, desaturate, invert, equalise, brightness +/-, contrast +/-, gamma +/-).
- B The edit feature shall provide a selection of image processing functions which either operate on the entire image, or on selected areas which shall be selected by left-clicking and dragging the mouse.

4.30 Archive and export

- A The system shall have the ability to export video from both the main screen and the find screen.
- B The system shall have the ability to allow exporting of video and audio in the design's default format and have the option to include the default video player with the export file.
- C The default format shall permit image authentication and encryption to be selected by the operator.
- D The system shall have the ability to export video and audio in multiple user selectable formats.
- E The system shall have the ability to transcode video into the following formats: AVI, MP4, WMV, MOV, MKV or MJPEG.
- F The system shall have the ability to transcode exports using MP4 and H.264 codecs as a minimum.
- G The system shall have the ability to export one or multiple cameras from one or more servers in a server group.

- H The system shall have the ability to make exports, either in native format or transcoded, from previously exported native recordings. This subsequent export may be of a shorter duration than the original native export.
- I The system shall have the ability to choose a different time range for each camera when performing a single export so that a number of individual export files are then created which will play sequentially in a compatible media player to create video story boards.
- J The system shall have the ability to support encrypted images.
- K The system shall have the ability to support image authentication.
- L The system shall have the ability to select start time and end time of an export whilst playing video.

4.31 Interactive maps

- A The system shall have the ability to display the map screen in a second window or another monitor. It shall be possible to zoom in to a specific area of a map and scroll around using just the mouse wheel and button.
- B The system map shall have the ability to accept site plans or graphics in generic PNG, GIF, JPG or BMP formats.
- C The system map shall have the ability to display cameras with their specific FOV (field of view).
- D The system shall have the ability to automatically display images from multiple cameras when selecting them on the map using the selection tool or by dragging the mouse over the camera icons on the map. The most appropriate display layout (1, 2 x 2 etc.) will automatically be selected to allow the display of all the cameras.

4.32 Client Actions

- A The system shall support the configuration of events that trigger the automatic pop-up of relevant camera feeds.
- B Users shall be able to define conditions for event triggering, including time-based conditions and client action conditions.
- C Client action conditions shall include specifying a list of users whose actions can trigger camera pop-ups.
- D Camera pop-ups triggered by events shall display relevant camera feeds in predefined locations on the user interface.
- E Users shall have the option to manually close camera pop-ups.

- F The system shall provide the capability to automatically close camera pop-ups after a configurable duration or event
- G Configuration of client actions and associated camera pop-ups shall be group-wide, applying to all users within the specified group.

5 Video Analytics

- A The system shall be capable of capturing and storing video content analytics metadata of object type and position from both edge and centralised sources.
- B It shall be possible to configure event rules purely within the video management system using this metadata. It shall be possible to program the following event rule triggers within the video management system as a minimum:-
- Line Crossing
 - Box Entry, Exit, Entry or Exit
 - Object Removed
 - Object Idle
 - Crowding
- C It shall be possible to perform forensic searching using video content analytics metadata to identify instances of objects of a selected type performing any of the following behaviour:-
- Line Crossing
 - Box Entry, Exit, Entry or Exit
 - Object Removed
 - Object Idle
 - Crowding

The boxes and lines which form part of these forensic searches can be drawn as part of the search itself and can be independent of any boxes and lines used in event triggers.

6 Video Wall

- A The VMS manufacturer shall offer a video wall solution that allows both live and playback functions
- B The video wall shall be capable of having an unlimited number of license-free users
- C The video wall shall be able to change layout on event
- D The video wall shall be able to display up to 1080p or 4K resolution (as appropriate)

7 Channel license types

- A The channel license level shall be capable of managing up to 32 IP cameras per server and 2 concurrent connections to the client software application. This may be known as 'Base' level.
- B The channel license level shall be capable of managing up to 128 IP cameras per server, unlimited concurrent connections to the client software and have the ability to form a 5 server group. This may be known as 'Premium' level.
- C The channel license level shall be capable of managing up to 254 IP cameras per server, unlimited concurrent connections to the client software and have the ability to form a 255 server group and perform Hard Drive 'spin down' functionality. This may be known as 'Enterprise' level.
- D The channel license level shall be capable of managing up to 254 IP cameras per server, unlimited concurrent connections to the client software, have the ability to form a 255 server group and allow up to 5 hard drives in any one volume fail and still maintain full recording and playback facilities. This may be known as 'Ultimate' level.

8 Compliance

- A The VMS shall be approved by SIRA and meet the 'SIRA Preventative Systems Manual Compliance 2018' specification with integration to VideoGuard.
- B The VMS shall be Kuwait MOI compliant.
- C The VMS shall meet compliance with Abu Dhabi 'ADMCC V5 regulations'.

9 Commercial

- A The VMS manufacturer shall not apply a financial charge for standard technical support.
- B The VMS system should not carry compulsory recurring maintenance/update charges
- C The VMS system should offer flexible Upgrade Bundles. There should be no charge to back-fill missed updates.
- D The VMS system should not require a base or foundation license before individual channel licenses can be purchased.
- E The VMS recording system shall not carry an Operating System (OS) charge.