



CCTV SYSTEM SPECIFICATIONS

## 1. INTRODUCTION

- 1.1 The following specifications need to be adhered to when bidders submit their proposals. Failing to do so will lead to disqualification.
- 1.2 Specifications is not system-specific, but rather solution-driven.
- 1.3 The SABS requires an enterprise solution
- 1.4 If and when a bidder feels there is a need to deviate from the specifications, the bidder must identify these deviations and provide reasons for deviations.
- 1.5 In some instances below, we require the bidder to provide specifications to meet the solution requirement.
- 1.6 There is no maintenance agreement linked to this contract.

## 2. CCTV SYSTEM SPECIFICATION – GENERAL

- 2.1 The purpose of this section is to outline a video management system and the specifications required for a reliable platform and the required functions thereof.
- 2.2 The client is to be provided with a stable, reliable and functional working solution that operates on an open platform and does not have scalability or model limitations.
- 2.3 This system must also provide a backwards compatibility period of 10 years.
- 2.4 All equipment offered shall have a minimum MTBF of 50 000 hrs. Of continuous use.
- 2.5 The manufacturer's warranty shall be valid for a minimum of 24 months beginning with on the day of delivery.
- 2.6 The system shall offer open and documented interfaces. The manufacturer shall supply upon request a complete software developers' kit (SDK) for integration with third-party equipment free of charge including free developer support. Interfaces available shall be TCP/IP (network interfaces) or RS-232/USB.
- 2.7 The manufacturer and the bidder shall commit to 2 years warrantee including spare part delivery or functional replacement for all equipment as listed under the BOQ.
- 2.8 Software updates shall be available free of charge from the manufacturer or his representative.
- 2.9 The system shall allow for functional upgrades via simple software license installation without hardware changes
- 2.10 No recurring license fees will be applicable
- 2.11 Security Information Management software systems shall form part of the proposal to bridge from existing video management system assets to the newly specified technology as per this document
- 2.12 The video management system shall allow the ability to integrate to open video standards such as ONVIF for existing IP cameras

- 2.13 The video management system shall allow the ability to integrate to open video standards such as ONVIF for encoding any existing analogue camera products into compatible video encoders (Full IP or OMNIBRID options)

### **3. SPECIFICATIONS - VIDEO MANAGEMENT SOFTWARE**

- 3.1 The Video Management Software (VMS), Network Video Recorder (NVR) Hardware, Network Surveillance Cameras and related components shall be installed and commissioned by authorized integrators trained and certified by the manufacturer. Certification and training for authorized integrators shall be available from the manufacturer or his local representative.
- 3.2 The manufacturer's warranty, extended warranty and replacement policies shall be included for each specified component. All major components are to carry a 36-month warranty
- 3.3 Interconnectivity between systems shall allow a powerful, flexible, multi-function software solution designed to simplify the monitoring and management of IP and analogue security video
- 3.4 The system apart from being easily inter-connectable shall be highly scalable, allowing for connections to and monitoring of hundreds of recorders and thousands of cameras
- 3.5 The system shall in addition, have the ability to add options for Health Dashboard, Maps, Reporting for BIRS – business intelligence reporting
- 3.6 The VMS solution shall be cyber protected by a manufacturer that takes pro-active steps to ensure that the products follow secure product development practices, execute rigorous internal and external testing, have configuration guidelines for compliancy, and actively monitor for any threats that can impact the solutions in the field. The products shall adhere to the following:
- 3.6.1 Backed by a dedicated cross-functional Cyber Protection Team to rapidly respond to any newly discovered threats that could impact the system.
- 3.7 VMS client shall provide a completely user-customizable 'Site View': enabling the organization of cameras, recorders, tours, salvos into user-defined, multi-level folders, similar to Windows Explorer-style file organization. On a large or distributed system, a Site will automatically be created in the Site List when a SAS is started.
- 3.8 VMS client shall support ability to manually track any person or object across multiple cameras and/or virtual PTZ pre-sets when configured with surveillance tracking arrows.
- 3.9 VMS client shall include an integrated Web Browser tab that can be combined with other user interface components (Video Views, Site View, Event Viewer, etc.) into an Application Layout. The Web Browser tab shall allow operators to continue monitoring their security system while also receiving weather or news updates from web-based information sources.
- 3.10 VMS client shall support the ability to provide Client-to-Client "Push" enabling a workstation the ability to "push" any layout (e.g. video, alerts, web site, etc.) to another workstation's monitor based on roles, security and license settings when using an Application Server. The receiving Client shall have the ability to accept or reject the incoming request.

### 3.11 SPECIFICATIONS - SOFTWARE INCLUSIVE ANALYTICS AND FUNCTIONALITY

- 3.11.1 The VMS client shall support ability to execute video intelligence analytic searches on VMS recorders that have the optional VMS add-on license for Video Analytics. The analytic search types can be conducted on cameras that have the analytic search feature enabled and shall include:
- a. Object Detection
  - b. Direction
  - c. Linger
  - d. Enter
  - e. Exit
  - f. Abandoned/Detected
  - g. Dwell
  - h. Crowd Formation
  - i. Queue Analysis (Length Monitoring)
  - j. Heat Map generation
- 3.11.2 The VMS client shall support ability to execute video face analytic searches on VMS recorders that have the optional VMS add-on licenses for Face Recognition and Verification. The analytic search types can be conducted on cameras that had analytic search feature enabled and shall include:
- a. Face Detection
  - b. Face Recognition
- 3.11.3 The VMS client shall support ability to execute license plate recognition searches on VMS recorders that have the optional VMS add-on licenses for License Plate Recognition. The analytic search can be for specific license plates or unrecognized license plates.
- 3.11.4 The VMS client shall support edge-based analytic events when VMS recorders are configured with supported camera models. Edge-based analytics shall include face and blur detection events.
- 3.11.5 The VMS client shall support searching on alarm rules that were defined on VMS recorders.
- 3.11.6 The VMS client shall support data visualization that enables the ability to easily chart graphically across timeline all searchable data, send reports in emails and drill-down to single events to view patterns for data mining and reporting.
- 3.11.7 The VMS client shall support dynamic bandwidth management with VMS recorders by selecting the current bandwidth connection speed, to help optimize the viewing experience over a WAN environment. For policy management, it shall also support enforcing the maximum bandwidth allowed based on the Role or Operator.

- 3.11.8 The VMS client shall support a health monitoring dashboard to allow access to the status updates of their systems with ability to easily drill-down to flagged items for identifying root causes.
- 3.11.9 The VMS client shall support de-warping of fish-eye cameras supported by VMS servers. De-warping is available for panoramic broad views and rectilinear for high quality view of particular area within the full image. De-warped views can be saved as part of designated layouts and the <SHIFT> key can be used to select the desired de-warp area.
- 3.11.10 The VMS client shall support fish-eye cameras supported by select VMS recorders within the product family tree and multi-streams configured on the camera.
- 3.11.11 The VMS client shall support managing all of the information associated for an incident and/or event and utilize a template to generate a single report containing video, still images, report data, report charts, notes, and any externally supported files. The VMS Player shall support playing exported incident package for Incident Builder.
- 3.11.12 VMS Client shall support creating single point in time bookmark or bookmark with begin and end time.

### 3.12 SPECIFICATIONS - INTELLIGENCE ANALYTIC SEARCHING

- 3.12.1 The VMS shall support the following video intelligence analytic search functions:
  - a. Object Detection to locate objects that move into a region of interest for the first time.
  - b. Object Direction to locate objects moving in a certain direction through a region of interest.
  - c. Object Linger to locate objects lingering in a region of interest for a minimum time period.
  - d. Object Enter to locate objects entering a field-of-view through a doorway or threshold.
  - e. Object Exit to locate objects exiting a field-of-view through a doorway or threshold.
  - f. Object Abandoned/Detected to locate objects when they become stationary, then moved or removed, over a set time period.
  - g. Queue Length to identify when a queue reaches a certain length when searched over a certain time period.
  - h. Crowd Formation to identify when a certain number of people or objects are found in a region of interest when searched over a certain time period.

- i. Colour Definitions to apply a colour filter to further refine analytic searches on access control and video data for Object Detection, Direction, Linger, Enter, Exist Abandoned/Removed and Dwell.

### 3.13 SPECIFICATIONS - FACIAL RECOGNITION ANALYTIC SEARCH

- 3.13.1 VMS site must have the facial recognition database site license and the VMS recorders must have one or more facial recognition channels licensed in order to support integrated facial recognition engine.
- 3.13.2 VMS shall utilize the information available from the VMS to apply the following Face Recognition search criteria on the recorded video:
  - a. Search against up to 1,000 indexed faces per VMS recorder database for faster identification and investigation.
  - b. Search across the entire enterprise to find facial matches
  - c. Search for inclusion or exclusion of specific persons and visually see the associated corresponding video.
  - d. Search specific area of interest on the scene
  - e. Search requires specific percentage of an object within the area of interest
  - f. Load pre-existing alert rules configured on the VMS
  - g. Alerts operators to take immediate action when a face is detected.

### 3.14 SPECIFICATIONS - FACIAL VERIFICATION ANALYTIC SEARCH

- 3.14.1 VMS recorders must have one or more facial verification channels licensed in order to support integrated facial verification engine.
- 3.14.2 VMS shall be a seamless integrated system with the Access Control System(ACS).
- 3.14.3 VMS shall utilize the information available from VMS and ACS to apply the following Face Verification search criteria on the live video:
- 3.14.4 Automatically provide visual notification when an access card is used by an unauthorized person.
- 3.14.5 Display live video for Swipe-and-Show to provide real-time cross-reference of access card user.
- 3.14.6 Confirm authorized access card user by displaying associated card holder name under live video.
- 3.14.7 VMS can control access control points for authorized personnel.

### 3.15 SPECIFICATIONS - LICENSE PLATE RECOGNITION ANALYTIC SEARCH

- 3.15.1 VMS recorders must have one or more license plate recognition channels licensed in order to support integrated license plate recognition engine.
- 3.15.2 VMS shall utilize the information available from the VMS to apply the following License Plate Recognition search criteria on the recorded video:
  - a. Support fuzzy matching for similar alpha-numeric characters
  - b. Search for all captured license plates
  - c. Search for inclusion or exclusion of specific license plates
  - d. Sort LPR search results
  - e. Generate thumbnail for any LPR search results
  - f. Generate reports and data visualization for any LPR search result
  - g. Instant review of video associated with any LPR search result
  - h. Save any LPR search result as an alarm rule
  - i. Search LPR alarm entries in the Journal with filter option
  - j. VMS shall support License Plate Management by creating a black-and-white list by individual or bulk upload license plates for specific cameras for license plate recognition.

### 3.16 SPECIFICATIONS - INTEGRATION OPTIONS

- 3.16.1 In addition to the abovementioned inclusive requirements, the Integration Platform Software Development Kit (IP SDK) shall enable seamless integration of video analytics algorithms and other third-party applications in VMS Client and Management Client.
- 3.16.2 It shall be compatible with transactional software, which integrate video surveillance with point-of-sale (POS) and enterprise resource planning (ERP) systems for managing loss prevention and fraud.
- 3.16.3 It shall be compatible with Access Control for video enabled physical security, which integrates with access control and intrusion systems.
- 3.16.4 It shall be compatible with LPR for automatic reading and tracking of vehicle license plates.
- 3.16.5 Generic event integration shall enable easy and fast integration of third-party applications and systems via a simple message-based socket communication interface.
- 3.16.6 The integration option shall support ONVIF Bridge that enables full video interoperability in multivendor installations using a standardized ONVIF compliant video-out interface.
- 3.16.7 The system configuration API shall enable external applications to make changes to the system's configuration.

### 3.17 SPECIFICATIONS - RECORDING SERVER/FAILOVER RECORDING



- 3.17.1 The system shall facilitate simultaneous digital multi-channel MJPEG, MPEG4, MPEG-4 ASP, MxPEG, H.264 and H.265 video recording of IP cameras and IP video encoders without any software limitations on number of cameras per server
- 3.17.2 The two-way audio shall allow users to transmit and record audio from connected microphones and audio from the operator's microphone to attached speakers.
- 3.17.3 Pre-recording buffer (used for event/motion-based recording) in RAM shall minimize the disk read/write operations when no video is recorded.
- 3.17.4 The generic framework shall receive and store metadata from compatible devices and clients.
- 3.17.5 Route traffic between multiple connected cameras and multiple clients shall be able to request live view, playback and export.
- 3.17.6 The system shall multicast one video stream to all VMS Clients. The infrastructure must support IGMP to reach remote networks.
- 3.17.7 Multi-live streaming shall give the possibility to define multiple streams for live viewing with different properties. It shall optimize VMS Client viewing performance according to the available bandwidth and view layouts, which is ideal for deployments with remote viewing.
- 3.17.8 A dedicated recording stream shall enable optimization stream properties (resolutions, encodings and frame rate) for video storage and forensic usage.
- 3.17.9 The system shall secure high speed recording database holding JPEG images or MPEG4, MPEG-4 ASP, MxPEG, H.264 or H.265 streams.
- 3.17.10 Flexible control of recording characteristics for MPEG4/H.264/H.265 streams, shall make it possible to toggle between recording key frames only or the full stream.
- 3.17.11 The system shall record more than 30 frames per second per camera, limited only by hardware.
- 3.17.12 Recording quality shall depend entirely on camera and video encoder capabilities with not software limitations.
- 3.17.13 Pre-recording buffer (used for event/motion-based recording) in RAM shall minimize the disk read/write operations when no video is recorded.
- 3.17.14 Edge Storage with flexible retrieval shall enable video retrieval from camera storage based on time schedules, events or manual requests. This shall enable users to effectively retrieve video recordings across low-bandwidth connections.
- 3.17.15 Scalable Video Quality Recording shall enable seamless merging of video stored centrally in the recording server, and video retrieved from a camera associated edge storage, or interconnected system.
- 3.17.16 The system shall enable the possibility to import pre-event images recorded locally in camera or video encoder.



- 3.17.17 Built-in, real-time, camera-independent motion detection with the ability to generate motion metadata for VMS Search.
- 3.17.18 The recording server shall run as a Windows service under local system account or optional local Windows user or Microsoft Active Directory account with run-as-a-service privileges.
- 3.17.19 Port forwarding shall enable clients to access the recording servers from outside a network address translation (NAT) firewall.
- 3.17.20 The system shall support for both IPv4 and IPv6 addressing.
- 3.17.21 The 64-bit recording servers shall allow more cameras to be run on a single server unit.
- 3.17.22 The secure HTTPS camera connection on devices shall support HTTPS.

### 3.18 SPECIFICATIONS - HIGH AVAILABILITY

- 3.18.1 The VMS shall offer two levels of redundancy on the recording servers: Cold and hot stand-by failover.
- 3.18.2 Both mechanisms shall offer fully automatic and user transparent failover in the event of hardware or system failure, with automatic synchronization at system recovery.
- 3.18.3 Cold stand-by failover is a cost-efficient redundancy solution where one, or a group of, failover recording servers shall act as backup to one or multiple recording servers.
- 3.18.4 Hot Stand-by failover is a high-security redundancy solution that shall provide minimal interruption in recording and live streams, where a dedicated failover recording server is preconfigured for a recording server
- 3.18.5 Specifications for these recording servers must be provided by the bidder.

### 3.19 SPECIFICATIONS - PAN-TILT-ZOOM (PTZ)

- 3.19.1 Clients with user priority shall "Pass-through" control of manual PTZ operation.
- 3.19.2 The VMS shall be able to identify PTZ priority levels for control of rights between different operators and automatic patrolling schemes.
- 3.19.3 The VMS shall execute rule-based go-to preset position on events and patrolling.
- 3.19.4 The VMS shall pause PTZ patrolling on event and resume patrolling after manual session timeout.
- 3.19.5 The VMS shall import PTZ presets defined in the PTZ camera.
- 3.19.6 The VMS shall rename imported PTZ presets.
- 3.19.7 The VMS shall support devices with one or more input and output ports.

- 3.19.8 The Powerful rule processing engine shall execute start and stop actions triggered by events or time profiles.
- 3.19.9 The system shall act as a simple network management protocol (SNMP) agent that can generate an SNMP trap as a result of a rule activation.
- 3.19.10 Shall enable logging of system, audit and rule entries to the management server with local caching during offline scenarios.

### 3.20 SPECIFICATIONS - MANAGEMENT SERVER AND MANAGEMENT CLIENT

- 3.20.1 The Management server shall enable user authentication logon, system configuration and logging.
- 3.20.2 The Management Client shall enable central administration of the system such as recording servers, devices, security, rules and logging.
- 3.20.3 The Management Client shall be compatible with both current and older versions not extending beyond 2012.
- 3.20.4 All configuration and logs from the entire system shall be stored in a centralized Microsoft SQL database and accessible by the management server only.
- 3.20.5 The Failover solution for the management server shall provide a resilient system solution based on Windows Server Clustering, ensuring high system availability.
- 3.20.6 The Management server manager shall be available in the local console notification area (icon tray) for status messages and to start/stop the service.
- 3.20.7 The management server shall run as a Windows service under local system account or optional local Windows user or Microsoft active directory account with run-as-a-service privileges.
- 3.20.8 To register and validate your licenses, the system shall offer easy-to-use automatic or manual online activation via the Internet and alternatively, offline activation via email and web for closed surveillance networks.
- 3.20.9 The VMS shall support both IPv4 and IPv6 addressing.

### 3.21 SPECIFICATIONS – INTERCONNECT

- 3.21.1 The VMS shall be inter-compatible with multiple VMS systems of the same type allowing the VMS to be connected with a central VMS to gain central surveillance operation across geographically dispersed sites.

### 3.22 SPECIFICATIONS - VMS FEDERATED ARCHITECTURE

- 3.22.1 The system concept that shall enable individual VMS systems to be interconnected with a central VMS system in a hierarchical architecture for infinite scalability and central management.
- 3.22.2 It shall provide centralized management access to all federated sites.
- 3.22.3 The VMS includes resilient architecture that shall allow the individual systems to function as autonomous sites in the event of network problems.
- 3.22.4 The site details (name, address, administrators and additional information) defined in the federating parent system shall be available in the site navigation.

### 3.23 SPECIFICATIONS – STORAGE

- 3.23.1 Allows the definition of one or more storage containers with individual archiving schemes and retention times. The recording capacity shall be limited only by disk space.
- 3.23.2 Each storage container shall be defined as live database and one or more optional archives, where the video data is moved from the live database to secondary disk systems or network drives. The archived data shall be still online and available for clients.
- 3.23.3 The storage functionality shall enable the ability to allocate individual devices to different storage containers.
- 3.23.4 The VMS shall allow to move a device or a group of devices between two storage containers.
- 3.23.5 Storage overview shall give instant indication of used vs. available storage in total and for individual cameras.
- 3.23.6 The VMS shall manage maximum recording time for manual recordings.

### 3.24 SPECIFICATIONS – DEVICES

- 3.24.1 The Hardware wizard shall add devices; automatically using Universal Plug and Play (UPnP) discovery, via IP network range scanning, or using manual device detection. All methods support automatic or manual model detection.
- 3.24.2 The Wizard shall enable swift replacement of malfunctioning devices with preserved configuration settings and recordings.
- 3.24.3 The Wizard shall enable easy moving of hardware devices (with attached cameras, microphones, speakers, inputs, outputs and metadata devices) between recording servers in runtime without losing settings, recordings, rules, permissions etc. It shall enable and disable devices if they are not used or are down for maintenance.
- 3.24.4 It shall allow to adjust settings such as brightness, color level, compression, maximum bit rate, resolution and rotation per camera or camera group; select

- and configure video format, frames per second (FPS), resolution and quality for the video streams used per camera; select and configure one, or more, video streams per camera to be used for live viewing. Each stream can be in different video format, FPS, resolution and quality.
- 3.24.5 The VMS shall enable adjustable group of pictures (GOP) length for MPEG4 and H.264 encoded video. It also shall enable assigning camera shortcut number for easy operation by clients and shall provide optional preview window for immediate verification of video settings per camera or for a group of cameras.
- 3.24.6 The VMS shall allow to define multiple PTZ preset positions on the server, to import PTZ preset positions from cameras and to enable PTZ scanning on supported devices.
- 3.24.7 The VMS shall allow to define multiple PTZ patrolling schemes with adjustable wait time between shifts and customizable transitions with disabling of motion detection to avoid false alarms.
- 3.24.8 The VMS shall allow to run multiple patrolling schedules per camera per day, for example, run different schedules for day/night/weekend.
- 3.24.9 Privacy mask shall consistently hide certain areas in the camera view in live and playback video and in exported material.
- 3.24.10 It shall allow to configure device events like motion detection with pre- and post-buffers, or input signal behavior options and allow to fine-tune motion detection sensitivity per camera manually or automatically.
- 3.24.11 The VMS shall allow to apply one or multiple exclusion zones for where motion detection is to be disabled to avoid unwanted detection.
- 3.24.12 The VMS system and connected devices shall support a wide set of events that can be used to trigger actions using the rule system. Events shall be grouped in the following categories:
- Hardware: events that relate to physical hardware devices connected to the system
  - Devices: events that relates to certain functions and states of devices available to the VMS system via the connected hardware devices
  - External Events: events that relate to VMS integrations
  - Recording server: events that relate to failover, archiving and database functions.
  - Analytics: events from integrated applications and systems
- 3.24.13 Start actions: The triggering events may initiate a wide set of actions in the VMS system, connected devices or integrated systems. Stop actions: The rule engine may also trigger stop actions in the VMS system, connected devices or integrated systems upon the completion of a rule.
- 3.24.14 The VMS shall enable multi-recipient customizable email notification with image and/or AVI attachment of incidents.

### 3.25 USER RIGHTS MANAGEMENT

- 3.25.1 User rights management shall enable common and central management of all user rights across all user and programmatic (IP SDK) interfaces.
- 3.25.2 Overall system security definition shall make it possible to globally allow or deny permission to devices and functions (such as manage, read, edit and delete).
- 3.25.3 Device-specific security definition shall make it possible to allow or deny permission to individual devices and functions (such as manage, read, edit and delete).
- 3.25.4 User rights management shall control roles, user and administrator access to:
  - a. General: Management Client and VMS Client profiles, dual authorization rights, system log-in time profile
  - b. Cameras: visibility, administrate, live view (within time profile), playback (within time profile), search sequences, export, VMS search, AUX commands, manual recording, bookmark functions
  - c. Microphones and speakers: visibility, administrate, listen to live audio (within time profile), playback audio (within time profile), search sequences, export, manual recording, bookmark functions, speak to speakers
  - d. Inputs and outputs: visibility, administrate, status, activation
  - e. PTZ: manual control, activate PTZ presets, PTZ priority, manage PTZ presets and patrolling, lock/unlock PTZ presets, reserve and release PTZ session
  - f. Remote recordings: retrieve remote recordings
  - g. VMS VMS Wall: visibility, administrate, control, playback
  - h. External events: visibility, administrate, trigger
  - i. View groups privileges  
Servers: VMS Enterprise server access and authentication details, VMS Federated Architecture site permissions
  - j. Alarms: visibility of alarms and ability to manage alarms
  - k. MIP: Plug-in permissions
  - l. Application: manager, VMS Client/Web Client/Mobile, live/playback/setup, status API and service registration API

### 3.26 LOGGING

- 3.26.1 Logs of system, audit and rule entries shall consolidate from all recording servers and clients.
- 3.26.2 Each log file shall have adjustable size and time limitations.

### 3.27 CLIENT PROFILES

- 3.27.1 Centralized management of VMS Client application options shall enable optimization of the Management Client for different user categories and skill levels.
- 3.27.2 Management Client profiles shall enable the ability to three different profiles.
- 3.27.3 VMS Client profiles shall enable ability to enforce or recommend optional Client application options for a user or group of users, using a maximum of three Client profiles.
- 3.27.4 Profiles shall enable defining general VMS Client application options, including (listing not exhaustive): visibility of time, visibility of camera live indicators, default image quality, default frame rate, keyboard and joystick setup, startup mode and de-interlacing filters.
- 3.27.5 Client profiles also shall:
  - a. provide access to live mode and the availability of individual control panes and overlay buttons
  - b. Shall provide access to playback mode and the availability of individual control panes, overlay buttons and settings for specific functions, such as default export path
  - c. provide access to setup mode and the availability of individual control panes and setup functions
  - d. provide access to Sequence Explorer, Alarm Manager, System Monitor
  - e. provide access to setup mode and the availability of individual control panes and setup functions
  - f. define available view layouts

### 3.28 SYSTEM ADMINISTRATION

- 3.28.1 System administration shall include built-in backup and restore support for manual system backup of all configuration data, including (listing not exhaustive): system configuration data, maps, alarm settings and definitions and client views.
- 3.28.2 The system monitor with customizable dashboard shall enable task or component specific live monitoring.
- 3.28.3 System administration shall enable historic performance and usage investigation and reports of; storage usage, network use, server and camera performance.
- 3.28.4 The system monitor shall enable customizable Normal, Warning and Critical system monitor and event triggers for; CPU and Memory usage on servers, used space, recording and live FPS on cameras, free space on disks and predicated retention time for storage definitions.
- 3.28.5 Configuration Reporting shall enable complete or partial documentation of system configuration. Custom and site-specific free-text information, integrator's notes and logo can be added to the printer-friendly reports.

### 3.29 LICENSE ADMINISTRATION

- 3.29.1 License overview shall include add-on products, Care coverage and renewal date. The License owner information shall synchronize with the software registration page on the VMS website.
- 3.29.2 The “Changes without activation” function shall allow additions and replacements of limited number of devices without requiring license activation.
- 3.29.3 ONLY a once off license fee is required

### 3.30 AUTHENTICATION

- 3.30.1 System log-in shall use Microsoft Active Directory, local Windows or basic user account. Hereby, current windows logon shall be used for authentication.
- 3.30.2 Dual authorization shall offer an optional additional level of system security, where Management Client users are granted access to the system only when a second user or supervisor has confirmed the log-in with a successful authorization of the second user.

### 3.31 ALARM MANAGER

- 3.31.1 The alarm manager shall manage single-point alarm management of all internal system alarms and external security alarms. It shall provide alarm descriptions and work instructions to make alarms actionable for operators.
- 3.31.2 An alarm location map shall be linked to each alarm providing instant situational awareness to the operator dealing with the alarm.
- 3.31.3 Customizable alarm priorities shall allow operators to focus on the most critical alarms and shall enable logical grouping of alarms dependent on their type and nature.
- 3.31.4 Customizable alarm statuses shall enable alignment of the alarm handling workflow with existing workflows and security systems.
- 3.31.5 The alarm handling result code shall enable tracking of the outcome of the alarms.
- 3.31.6 The alarm manager shall enable automatic allocation to alarm owner with escalation and alarm forwarding possibilities.
- 3.31.7 The alarm manager shall enable time profiles for definition of active alarms. It shall provide the possibility to associate one or more cameras to an alarm (maximum 15 cameras can be displayed simultaneously in the alarm preview window).



- 3.31.8 A set of alarm handling reports shall give valuable information about alarm inflow and alarm handling performance.
- 3.31.9 The alarm manager shall enable extensive logging of alarms.
- 3.31.10 Microsoft Clustering shall support the event server enables secure and redundant alarm handling.

### 3.32 GENERAL

- 3.32.1 VMS Client shall provide dedicated task-oriented tabs for the Sequence Explorer, Alarm Manager and System Monitor, in addition to the traditional Live and Playback tabs.
- 3.32.2 The client shall provide application theme support with choice of dark or light themes.
- 3.32.3 VMS Client shall provide true multi-window support where secondary windows have full functionality and can be operated in independent mode or synchronized mode where they follow the control of the main window.
- 3.32.4 It shall enable shortcuts to select a specific window or specific camera in a window.
- 3.32.5 The client shall provide a camera search function that promptly finds cameras, types of cameras and views in the system with the ability to create temporary views to display all or a subset of cameras matching the search criteria.
- 3.32.6 VMS Client shall display metadata bounding boxes from supported devices in live views and playback.

### 3.33 CUSTOMIZATION

- 3.33.1 The application options shall enable customization of the general behavior and look of the VMS Client. The customization shall be able to either be made as individual personalization managed by each operator, or centrally enforced using VMS Client Profiles. The application shall offer a simplified user interface with the possibility option to toggle between “Simple” and “Advanced” modes, where advanced mode is default.
- 3.33.2 The VMS Client shall enable control of general look & feel and navigation properties, such as color mode, camera title bar, grid sizes etc.
- 3.33.3 The client shall provide the availability of control panels and functions in live and playback tabs, and in setup mode, as well as the behavior and availability of the expert function.
- 3.33.4 The application shall allow to include information in time line in the playback tab, setup keyboard short cuts and joystick controls, as well as specific behavior of alarms and access control notifications.
- 3.33.5 The VMS Client shall include advanced application settings such as use of multicast, hardware acceleration, videos diagnostics overlay and time zone settings.

### 3.34 LIVE VIEW

- 3.34.1 VMS Client shall enable to view live video from 1-100 cameras per computer monitor/view.
- 3.34.2 Multiple computer monitor support shall provide a main window and any number of either floating windows or full screen views.
- 3.34.3 Live view digital zoom shall allow a full view of recordings while the operator can digitally zoom in to see details.
- 3.34.4 Live view shall support multiple view layouts optimized for 4:3 and 16:9 display settings in both landscape and portrait.
- 3.34.5 Independent playback capability shall allow for instant playback of recorded video for one or more cameras, while in live mode.
- 3.34.6 Centralized storage of shared and private camera views, shall enable coherent access to views across the system.
- 3.34.7 Live view provide possibility to instantly re-arrange cameras in views for optimized monitoring of incidents, with single click restore of original view.
- 3.34.8 Live view shall enable instant camera placement in live view allows for instant replacement of cameras in a view, where new cameras can be placed in a particular view and positioned through a simple drag-and drop operation.
- 3.34.9 Live view shall update on “motion only” optimizes CPU use by allowing motion detection to control whether or not the image should be decoded and displayed.
- 3.34.10 Global hotspot function shall allow users to work in detail with any camera selected from any view. Local hotspot function shall allow users to work in detail with a camera selected from the same view.
- 3.34.11 Carousel function shall allow a specific view item to rotate between pre-defined cameras that are not necessarily present in the view at the same time. Operators shall select default or custom display times for each camera, and they are able to manually switch to the next or previous camera in the carousel list.
- 3.34.12 Matrix function shall show live video from multiple cameras in any view layout with customizable rotation paths, remotely controlled by computers sending matrix remote commands.
- 3.34.13 Live view shall import static or active HTML maps for fast navigation to cameras and to provide a good overview of premises.
- 3.34.14 It shall hide HTML page toolbar in HTML page views.
- 3.34.15 Live view shall activate matrix via graphical maps of premises using JavaScript or integrate with centralized access control systems.

- 3.34.16 It shall allow the operator can assign outputs, PTZ presets and views as actions to joystick buttons and as keyboard shortcuts.
  - 3.34.17 Two-way audio support shall enable VMS Client to record and play live audio from camera-connected microphones and outgoing audio from the operator's microphone to one or multiple camera speakers.
  - 3.34.18 Live view shall enable adaptive de-interlacing option secures high video quality, based on the actual video content received. VMS Client shall optionally apply a filter to areas of the image where jagged edges would otherwise show up.
  - 3.34.19 Operators shall start/stop manual recording on individual cameras, where the recording status is propagated to all VMS Client users active in the system.
- 3.35 PTZ
- 3.35.1 Control PTZ cameras by using;
    - a. PTZ preset positions
    - b. PTZ point-and-click control
    - c. Overlay buttons
    - d. PTZ zoom to a defined rectangle
    - e. Video overlaid PTZ control
    - f. Virtual joystick function
    - g. Joystick
    - h. Manage PTZ presets
    - i. View who have PTZ control and time to automatic release
  - 3.35.2 Live view shall enable to take manual control of a PTZ camera that is running a patrolling scheme. After a timeout with no activity, the camera reverts to its scheduled patrolling scheme.
- 3.36 I/O AND EVENTS
- 3.36.1 Overlay buttons shall provide intuitive control of cameras, camera-integrated devices and other integrated systems directly from the camera view.
  - 3.36.2 I/O and events shall enable to manually trigger output port relay operation, for example when controlling gates.
  - 3.36.3 I/O and events shall enable to manually trigger events by activating a server-defined event from a list.
- 3.37 BOOKMARKING
- 3.37.1 Bookmarking shall enable to manually define quick or detailed bookmarks with the bookmark function.
  - 3.37.2 Bookmarks shall be shown in timeline with instant preview.
  - 3.37.3 The function shall enable to listen and preview bookmarks in recording search.
  - 3.37.4 Bookmark reports shall enable effortless incident documentation.
  - 3.37.5 Direct video export of a bookmark shall reduce the time needed to prepare forensic video material.

### 3.38 PLAYBACK

- 3.38.1 Playback shall provide playback video from 1-100 cameras per computer monitor/view.
- 3.38.2 Advanced video navigation shall include fast/slow playback, jump to date/time, single step and video motion search.
- 3.38.3 Playback shall include integrated video timeline with time navigation and playback controls, including an integrated function to select a time interval for export or video retrieval from Edge Storage devices and interconnected systems.
- 3.38.4 Playback shall allow to toggle between simple and advanced timeline mode.
- 3.38.5 The function shall provide overview of recorded sequences and bookmarks.
- 3.38.6 Independent playback capability shall allow the independent playback of recorded video from one or more cameras.
- 3.38.7 Instant camera placement in playback view shall allow users to instantly replace cameras in a view, where a new camera can be placed in a particular view and position with a simple drag-and drop operation.
- 3.38.8 Digital zoom shall allow the operator to see magnified details in the recorded video.

### 3.39 EXPORT AND PRINT

- 3.39.1 The snapshot function shall enable operators to produce instant visual documentation of a camera by saving the camera image to a file or sending it directly to a printer.
- 3.39.2 The VMS shall have storyboarding function that shall make it possible to include video sequences from different or overlapping time intervals from different cameras in the one and the same export.
- 3.39.3 The export and print function shall provide export in the VMS format; including the standalone VMS Client - Player application for instant and easy viewing by authorities.
- 3.39.4 The function shall allow export preview with looped playback.
- 3.39.5 Export and print shall enable encryption and password protection of exported video material with a choice of following strong encryption algorithms: 56-bit DES 128, 192 and 256-bit AES.
- 3.39.6 Secure video evidence handling with a digital signature of exported video material that shall enable users to verify the video has not been modified or tampered with when viewing the export in the VMS Client – Player.
- 3.39.7 Export and print shall allow to create evidence material in media player format (AVI files), MKV format, or still image format (JPEG images).
- 3.39.8 The function shall allow to disable re-export option to prevent undesirable distribution of sensitive evidence material.

- 3.39.9 Export and print shall allow to bulk camera export in multiple formats to multiple destinations, including direct export to optical media, results in more efficient video exports and more secure handling of evidence material.
- 3.39.10 Export comment function shall enable users to add general and/or camera-specific comments to a video export when exporting to the VMS format.
- 3.39.11 In media player format comments shall be added as pre/post slides.
- 3.39.12 The VMS shall allow to print incident reports including image, surveillance details and free-text user comments.

#### 3.40 SEQUENCE EXPLORER

- 3.40.1 The VMS client shall include a dedicated tab for the Sequence Explorer.
- 3.40.2 The search options shall be: recording sequences (with support for time slicing), bookmarks and VMS Search.
- 3.40.3 The sequence explorer shall include smooth navigation with sliding preview and “drag-and-throw” function for video thumbnails.
- 3.40.4 The VMS shall include preview of selected sequence with auto play and direct export support.

#### 3.41 MAP FUNCTION

- 3.41.1 The VMS shall have a built-in map function in the VMS Client and shall provide intuitive overview of the system and offers integrated access to all system components.
- 3.41.2 Map images shall be in standard graphic file formats including JPG, GIF, PNG and TIF.
- 3.41.3 Map function shall include any number of layered maps such as city, street, building and room.
- 3.41.4 The function shall enable instant camera preview on “mouse over” and one-click shows all cameras on map.
- 3.41.5 Map function shall provide one-click function to open floating window with all cameras (maximum 25 cameras) on the map.
- 3.41.6 The function shall allow depiction of camera view zones on map with clickable PTZ zones for instant PTZ control.
- 3.41.7 Map function shall allow easy drag-and-drop and point-and-click definition of: cameras, servers, microphones, speakers, I/O devices, hot-zones for map hierarchies, camera view zones and PTZ camera presets position view zones.
- 3.41.8 The function shall provide integrated control of speakers, microphones, and events and output I/O control, including: doors, gates, light and access control systems.
- 3.41.9 Map function shall also:
  - a. provide real-time status monitoring indication from all system components including cameras, I/O devices and system servers
  - b. provide graphical visualization of the system status through color coding

- c. provide hierarchical propagation of status indications to higher ordered maps
- d. make different levels of status indications available (alarm, warning and errors)
- e. provide system performance data for cameras and servers including camera resolution, FPS, network use and disk space
- f. be able to suppress status indications (such as error and warning) for a given device
- g. provide the possibility to edit device names in a map and assign map-specific names and references to devices in a map
- h. Map editing subject to user rights

### 3.42 VMS MAP FUNCTION

- 3.42.1 Map function that shall provide seamless geo-navigation, with seamless drilldown across different layers.
- 3.42.2 The functionality shall support at least one of:
  - a. Bing, Google and OpenStreetMap map services
  - b. geo-referenced GIS maps (shapefiles)
  - c. geo-referenced CAD drawings (dwg and dxf files)
  - d. offline OpenStreetMap
- 3.42.3 VMS Maps shall also enable the ability for users to toggle different layers on and off in the map. Examples of such layers are cameras (names, view of field, name), quick links and different layers provided by the maps and drawings used (street names, buildings, etc.).
- 3.42.4 Location links shall enable quick navigation across different sites and locations. Map links shall enable drilldown to existing Client maps.
- 3.42.5 Additionally, the VMS Map function shall support:
  - a. Instant one-click camera preview
  - b. Easy multi-camera selection with camera preview
  - c. Easy drag-and-drop and point-and-click definition of: cameras, camera field of view, location links and quick links
  - d. Selection of 10 different camera icons
  - e. Depiction of camera field of view on map
- 3.42.6 It shall include the possibility to edit device names in a map and assign map-specific names and references to devices in a map. Camera object aggregation shall preserve the overview when several cameras are closely located.

### 3.43 CAMERA NAVIGATOR

- 3.43.1 The camera navigator shall provide consistent and comprehensive visual verification, ensuring easier tracking of moving objects in geographically complex environments.

- 3.43.2 The navigator shall automatically display thumbnail views of nearby cameras.
- 3.43.3 The camera navigator shall provide add-on to the map application with no special configuration needed.

#### 3.44 ALARM MANAGER

- 3.44.1 The VMS Client shall provide dedicated snap on tab for the Alarm Manager.
- 3.44.2 The alarm manager shall include alarm list with extensive filtering capabilities and an alarm preview in both live and playback mode.
- 3.44.3 The alarm manager shall enable extensive alarm sort and filtering functions allow operators to focus on most critical alarms.
- 3.44.4 Instant preview of primary and related cameras shall reduce the number of false alarms.
- 3.44.5 Tight integration with the map function shall allow operators to indicate and acknowledge active alarms in the map.
- 3.44.6 Alarm descriptions and work instructions shall make alarms actionable for operators.
- 3.44.7 Alarm escalation and alarm forwarding possibilities shall allow operators with appropriate skills to handle different alarms.
- 3.44.8 Alarm reports shall enable incident documentation.
- 3.44.9 Alarm location map shall present the alarm operator with a map showing the alarm area when an alarm is selected.
- 3.44.10 The alarm manager shall provide alarm notification to a single or groups of Mobile client users using Push Notifications.
- 3.44.11 The manager shall provide optional sound notifications for different alarm priorities for notification of new incoming alarm.
- 3.44.12 Alarm disabling option shall enable users to suppress alarms from a given device in a certain time period.
- 3.44.13 The alarm manager shall enable instant access to both live and recorded video from the cameras that are related to the alarm.
- 3.44.14 Alarm handling reports shall give valuable information about alarm inflow and alarm handling performance.

#### 3.45 SYSTEM MONITOR

- 3.45.1 The system monitor shall provide dedicated snap on tab with system performance and use information.
- 3.45.2 It shall provide dashboard for task or component specific live monitoring.
- 3.45.3 The system monitor shall provide historic performance and usage investigation and reports of; storage usage, network use, server and camera performance.

#### 3.46 SETUP AND MANAGEMENT



- 3.46.1 Download and installation of the VMS Client from a web page on the management server shall enable notification about new updates at log-in.
- 3.46.2 Application options shall allow users to adapt the layout and personalize the application to their particular preferences.

### 3.47 AUTHENTICATION

- 3.47.1 System log-in shall use Microsoft Active Directory, local Windows or a basic user account. Furthermore, it shall use current Windows login for authentication, and use Auto-log-in and auto-restore views.
- 3.47.2 Dual authorization shall offer an optional additional level of system security, where VMS Client users are granted access to the system only when a second user or supervisor has confirmed the log-in with a successful authorization of the second user.

### 3.48 SYSTEM

- 3.48.1 The system shall support for IPv4 and IPv6 addressing.
- 3.48.2 The 64-bit Windows® operating system support shall enable better performance when viewing and operating many cameras.
- 3.48.3 The system shall support multicast streams.
- 3.48.4 It shall support for hardware accelerated decoding using Intel Quick Sync video.

### 3.49 VMS CLIENT - PLAYER

- 3.49.1 The VMS Client - Player shall be able to play back recorded or archived video and audio evidence, including edited storyboard exports.
- 3.49.2 The player shall include same user-friendly interface and most functions as the VMS Client.
- 3.49.3 The player shall offer a simplified user interface with the possibility option to toggle between “Simple” and “Advanced” modes.
- 3.49.4 It shall provide instant one-click playback for easy viewing of exported video evidence.
- 3.49.5 Advanced second-level investigation tools shall make it easy to refine exported video and re-export the most essential evidence.
- 3.49.6 Metadata bounding boxes included in exports shall be displayed time synchronized in VMS Client – Player.
- 3.49.7 The project tool shall allow users to merge video exports or archives from two different locations or systems together into one new export.
- 3.49.8 The VMS Client – Player shall also:
  - a. provide view up to 100 cameras time-synched during playback

- b. provide camera search function promptly finds cameras, types of cameras and camera views in the system
  - c. provide scrollable activity timeline with magnifying feature
  - d. provide instant search on recordings based on date/time and activity/alarm (video motion detection)
  - e. Shall allow to view, modify or add general and/or camera-specific comments for a given video export
  - f. Shall allow de-interlacing of video from analog cameras
- 3.49.9 Evidence shall be generated as a printed report, a JPEG image, an AVI or MKV film or in the VMS format
- 3.49.10 Shall include export audio recordings in WAV, MKV or AVI format.
- 3.49.11 Exported video shall be digitally zoomed to view an area of interest and minimize export footprint size.
- 3.49.12 The player shall enable re-export evidence containing the relative format and VMS Client - Player for instant, easy viewing by authorities.
- 3.49.13 Verification of digital signatures added as a part of the export, shall enable users to verify that the video has not been modified or tampered with.
- 3.49.14 The player shall provide encryption and password protection of exported video material with a choice of the following strong encryption algorithms: 56-bit DES 128, 192 and 256-bit AES.
- 3.49.15 Secure video evidence handling with a digital signature of re-exported video material shall enable users to verify that the video has not been modified or tampered with when viewing the export in the VMS Client – Player.

### 3.50 WEB CLIENT

- 3.50.1 Views shall be accessed through the browser and avoid advanced setup.
- 3.50.2 Shared views shall be managed centrally via the server with administrator/user rights and user groups.
- 3.50.3 Camera search function shall promptly find cameras, types of cameras and camera views in the system.
- 3.50.4 The client shall include:
  - a. Easy multi camera video playback including fast/slow playback, single frame step and jump to date/time with frame preview while adjusting time.
  - b. Investigation function with ability to save exports for later usage or download
  - c. List of alarms, that shall enable users to get a quick overview and act if needed
  - d. Option for client-side video decoding via browser plug-ins (please refer to <http://www.sys.com/Product-System-Requirements/> for details on supported browsers)
  - e. Control PTZ cameras remotely, including preset positions
  - f. Dynamic bandwidth optimization when streaming from server to client gives better use of bandwidth
  - g. Create AVI files or save JPEG images
  - h. Preview exports on the server without downloading them
  - i. Trigger outputs and events with live view of related camera
  - j. System log-in using user name and password
  - k. System log-in using Microsoft Active Directory user
  - l. Secure connection through HTTPS
- 3.50.5 The Web Client shall allow to export on the server to avoid moving large video files back and forth. The client shall allow to only download needed files or save them for downloading when on a faster connection.
- 3.50.6 There shall no installation be needed on client computer.

### 3.51 VMS MOBILE

- 3.51.1 VMS mobile shall support any mobile device running Android® 2.2, iOS5, and Windows® Phone 8, or newer versions.
- 3.51.2 Add log-in credentials for multiple servers in Mobile shall allow to easily switch between sites or different connection addresses.

- 3.51.3 Views shall be inherited from the connected VMS system. The client shall automatically obtain the user's private and shared views from the system to be used as camera lists in Mobile.
- 3.51.4 A view with all cameras shall be automatically generated, allowing Mobile to be used when no views are set up. It shall also provide a quick way of searching through cameras.
- 3.51.5 Camera search function shall promptly find cameras, types of cameras and camera views in the system.
- 3.51.6 Cameras shall be viewed in full screen to take better advantage of the device's screen. It is also possible to search through cameras in a view while in full screen by swiping left or right.
- 3.51.7 Digital pinch-to-zoom shall enable users to zoom in on a part of the image for closer review and conduct detailed investigation of video when using megapixel or high-definition cameras.
- 3.51.8 VMS Mobile shall allow to play back recordings from the database and select a specific time or recorded sequence to start playback, step through recordings and select a playback speed.
- 3.51.9 VMS Mobile shall allow to view recordings from the database while keeping an eye on what is currently happening. The client shall display a live picture-in-picture frame of the same camera when in playback mode. The picture-in-picture shall be moved by dragging and double-tapping and will return to live view.
- 3.51.10 Control over the PTZ cameras shall be given with Mobile either manually or by selecting predefined presets for quick navigation.
- 3.51.11 Video Push shall allow users to use their mobile devices' cameras as cameras in the VMS. It is easy to use and requires no setup in the mobile device.
- 3.51.12 VMS Mobile shall include the option to include location metadata in Video Push.

### 3.52 LICENSING STRUCTURE

- 3.52.1 An Expert server base license is required
- 3.52.2 The base server license shall permits the following deployments within the legal entity purchasing the base server license:
  - a. Unlimited number of Management Servers
  - b. Unlimited number of Recording Servers
  - c. Unlimited number of VMS Clients, Web Clients and VMS Mobile applications

**4. SPECIFICATIONS - Thermal Network Bullet Camera**

- 4.1 1/2.8" 4 Megapixel progressive scan CMOS
- 4.2 Support ROI, motion detection, colour palettes
- 4.3 Support temperature measurement
- 4.4 Support fire detection & alarm
- 4.5 Built-in 2/2 alarm in/out
- 4.6 Uncooled thermal sensor technology
- 4.7 Thermalized lens (thermal camera), focus-free
- 4.8 IP67 Rating
- 4.9 PoE and ePOE

**5. SPECIFICATIONS - 2MP LPR Camera**

- 5.1 1/2.8 inch 2Megapixel Progressive scan CMOS
- 5.2 WDR, Day/Night(ICR), 3DNR,BLC, HLC
- 5.3 H.265& H.264 dual-stream encoding
- 5.4 Powerful 2.7-13.5mm motorized lens and IR light, ideal for monitor ANPR distance 3-8m
- 5.5 IP67 rating, and superior performance for outdoor applications
- 5.6 Embedded LPR algorithm inside the camera

**6. SPECIFICATIONS - 4MP Outdoor High Speed PTZ**

- 6.1 1/2.8" 2Megapixel CMOS
- 6.2 Powerful 45x optical zoom
- 6.3 Max. 50/60fps@1080P
- 6.4 Auto tracking and IVS
- 6.5 Support Hi-PoE
- 6.6 IR distance up to 300m
- 6.7 IP67
- 6.8 Aluminium pole mount bracket

**7. SPECIFICATIONS - 2MP Temperature and Humidity Camera**

- 7.1 Max 30fps@1080P
- 7.2 3.6mm fixed lens (2.8mm, 6mm optional)
- 7.3 Max. IR length 20m, Smart IR
- 7.4 Built-in temperature & humidity sensor
- 7.5 Detection range: -40°C~60°C, 10-95% RH
- 7.6 IP67

**8. SPECIFICATIONS - 4 MP IR Bullet Outdoor Camera**

- 8.1 1/3" 4Megapixel progressive CMOS
- 8.2 H.265 & H.264 dual-stream encoding
- 8.3 20fps@4M(2688×1520)&25/30fps@3M(2304×1296)
- 8.4 WDR(120dB), Day/Night(ICR), 3DNR, AWB, AGC, BLC
- 8.5 Multiple network monitoring: Web viewer, CMS(DSS/PSS) &
- 8.6 DMSS
- 8.7 Micro SD card slot, up to 128GB
- 8.8 2.7~13.5mm varifocal lens
- 8.9 Max IR LEDs Length 60m
- 8.10 IP67
- 8.11 PoE

**9. SPECIFICATIONS - 4 MP IR Dome Network Camera**

- 9.1 4MP, 1/2.8" CMOS image sensor, low illuminance, high image definition
- 9.2 Outputs 2MP (1920 × 1080)@25/30 fps
- 9.3 H.265 codec, high compression rate, ultra-low bit rate
- 9.4 Built-in IR LED, max IR distance: 40 m
- 9.5 ROI, SMART H.264/H.265, flexible coding, applicable to various bandwidth and storage environments
- 9.6 Rotation mode, WDR, 3D DNR, HLC, BLC, digital watermarking, applicable to various monitoring scenes
- 9.7 Intelligent detection: Intrusion, tripwire
- 9.8 Abnormality detection: Motion detection, video tampering, no SD card, SD card full, SD card error, network disconnected, IP conflict, illegal access, voltage detection
- 9.9 Alarm: 1 in, 1 out; audio: 1 in, 1 out; supports max. 256 GB Micro SD card
- 9.10 PoE power support
- 9.11 IP67 Protection grade
- 9.12 IK10 protection grade

**10. SPECIFICATIONS - High capacity enterprise server**

- 10.1 Intel Processor
- 10.2 Dual Controller architecture
- 10.3 Max 512 IP Camera Inputs
- 10.4 Max 1024 Mbps Incoming/recording Bandwidth
- 10.5 48 HDDs, SAS, Hot-Swap
- 10.6 Supports RAID 0/1/5/6/10/50/60/JBOD, Hotspare
- 10.7 iSCSI and Mini SAS for Expanded Storage Space
- 10.8 Support standard iSCSI Protocol Storage
- 10.9 Modular & Cableless Design
- 10.10 Redundant Power

**11. SPECIFICATIONS - Enterprise Drive for Bulk Data Applications**

- 11.1 Minimum 8 TB per hard drive, x 48
- 11.2 2 million hour MTBF rating and support workloads of 550TB
- 11.3 Cache, on-the-fly error correction
- 11.4 Algorithms and rotational vibration design.
- 11.5 Performance in replicated and RAID multi-drive systems.
- 11.6 Magnetic recording (CMR) technology,
- 11.7 Easy integration into bulk storage systems
- 11.8 12Gb/s SAS and SATA interface.

**12. SPECIFICATIONS - Video surveillance Server**

- 12.1 512Mbps incoming bandwidth
- 12.2 256-channel IP video access
- 12.3 64-channel perimeter protection
- 12.4 32-channel face recognition with normal IPC
- 12.5 80-channel face recognition with face detection IPC
- 12.6 16-channel video metadata
- 12.7 300,000 face pictures database
- 12.8 Supports RAID 0/1/5/6/10
- 12.9 SAS3.0 for storage extension
- 12.10 Metadata of human and vehicles
- 12.11 Automatic Number Plate Recognition
- 12.12 High reliable redundancy N+M Hot Standby
- 12.13 Automatic tracking PTZ feature



### 13. SPECIFICATIONS - Rack mount 24 port 2 gigabit switch as per spec

Switching capacity	256 Gbit/s
Fixed port	24 x 100/1000Base-X optical port (8 x Combo port) 4 x 10G BASE-X SFP+ optical port
Link aggregation	Supports the following link aggregation features: <ul style="list-style-type: none"> <li>•GE/10GE port aggregation</li> <li>•Dynamic aggregation</li> <li>•Cross-device aggregation</li> </ul>
Port	Supports the following port features: <ul style="list-style-type: none"> <li>•IEEE802.3x-based traffic control (full duplex)</li> <li>•Storm suppression based on port rate percentage</li> <li>•PPS-based and BPS-based storm suppression</li> </ul>
IRF2	Supports the following IRF2 features: <ul style="list-style-type: none"> <li>•IRF2</li> <li>•Stacking via standard Ethernet interfaces</li> <li>•Local stacking and remote stacking</li> <li>•Distributed device management and distributed link aggregation</li> </ul>
IP routing	Supports static routing.
VLAN	Supports the following VLAN features: <ul style="list-style-type: none"> <li>•Port-based VLANs</li> <li>•Protocol-based VLANs</li> <li>•QinQ and flexible QinQ</li> <li>•VLAN mapping</li> <li>•Voice VLANs</li> <li>•Guest VLANs</li> </ul>
ACL	Supports the following ACL features: <ul style="list-style-type: none"> <li>•Packet filtering on layer 2 (L2) to layer 4 (L4)</li> <li>•Flow classification based on the source MAC address, destination MAC address, source IP address, destination IP address, TCP/UDP port, IP protocol type, and VLAN</li> <li>•ACLs based on time ranges</li> <li>•Global issuance of ACLs based on ports or VLANs</li> </ul>
QoS	Supports the following QoS features: <ul style="list-style-type: none"> <li>•Restriction of the packet receiving rate and packet transmission rate on ports</li> <li>•Packet redirection</li> <li>•Eight output queues on each port</li> <li>•Queue scheduling on ports (SP, WRR, and SP+WRR)</li> <li>•Re-marking of 802.1p and DSCP priorities of packets</li> </ul>
DHCP	Supports the following DHCP features: <ul style="list-style-type: none"> <li>•DHCP Client</li> <li>•DHCP Snooping</li> <li>•DHCP Snooping option82</li> <li>•DHCP Relay</li> <li>•DHCP Server</li> <li>•DHCP auto-config (zero configuration)</li> </ul>
Multicast	Supports the following multicast features: <ul style="list-style-type: none"> <li>•IGMP Snooping/MLD Snooping</li> <li>•Multicast VLANs</li> </ul>
Layer-2 ring network protocol	Supports STP, RSTP, MSTP, and PVST.
OAM	Supports 802.1ag and 802.3ah.
Mirroring	Supports the following mirroring features: <ul style="list-style-type: none"> <li>•Port mirroring</li> <li>•Remote switched port analyzer (RSPAN)</li> <li>•Traffic mirroring</li> </ul>

#### 14. SPECIFICATIONS – Network Video Decoder

- 14.1 Standard 2.5U case, elegant appearance
- 14.2 Plug-in board design, easy to use and maintain
- 14.3 H.265/H.264/MJPEG/MPEG4/MPEG2 video decoding
- 14.4 Ultra-high decoding ability, up to 12 Megapixels
- 14.5 2ch HDMI and 2ch DVI-I input, support 4K collection(HDMI)
- 14.6 Support 1/4/9/16 display split
- 14.7 Support audio, alarm, bi-directional talk, RS485
- 14.8 Splicing screens control for zoom/merge/roam/overlay
- 14.9 4K decoding
- 14.10 4K collection

#### 15. SPECIFICATIONS - Shielded Cat 6 Cable

- 15.1 The Category 6 Cable shall be of the highest quality.
- 15.2 The cable shall conform to the following flame-resistant standard:
- 15.3 IEC 60332-1: IEC 60754
- 15.4 The cable shall support network data transmission up to 100m.
- 15.5 The cable shall be sufficiently shielded to counteract Electromagnetic Interference especially when the cabling shall run in close proximity to power cables.
- 15.6 Construction
  - a. Bare Copper Wire conductor shall have a diameter of at least 0.56mm (AWG23/1)
  - b. The insulator shall be a Foam PE with a nominal diameter of 1.34mm
  - c. The sheath material shall be constructed from Low Smoke Zero Halogen materials.
  - d. The overall screen shall be a copper braid tinned material of which the drain wire shall be AWG26 tinned.
  - e. The outer diameter of the cable shall be at least 8.05mm.

#### 15.7 Mechanical Properties

Minimum bending Radius without load	8 x Diameter
Minimum bending Radius without load	8 x Diameter
Temperature range during operation	-10 degrees Celsius up to 60 degrees Celsius
Temperature range during installation	-10 degrees Celsius up to 60 degrees Celsius
DC Loop resistance	Less than or equal to 176 $\Omega$ /km
Resistance unbalanced	Less than or equal to 2%
Insulation Resistance (500V)	More than or equal to 2000 M $\Omega$ * km
Mutual Capacitance at 800Hz	Nom 43nF/km

Capacitance unbalanced (pair to ground)	Less than or equal to 1500 pF/km
Mean characteristics impedance 100MHz	$(100 \pm 5) \Omega$
Nominal velocity of propagation	Nom 79 %
Propagation delay	Nom. 427 ns/100m
Delay Skew	Nom. 12 ns/100m
Test Voltage (DC, 1min) Core/core and Core Screen	Nom. 1000 V
Transfer Impedance	@ 1 MHz: $\leq 20 M\Omega /m$ @ 10 MHz: $\leq 50 M\Omega /m$ @ 30 MHz: $\leq 100 M\Omega /m$
Coupling Attenuation	$\geq 55$ dB

## 16. SPECIFICATIONS - Fibre 8 Core Single Mode Fibre

- 16.1 The fibre layout shall be deployed on the ring principle to ensure redundancy.
- 16.2 Splicing shall comply to the relative IEC or SANS standard, whichever is greater.
- 16.3 The contractor shall provide a layout drawing detailing the rack layout and splicing diagrams.
- 16.4 Splicing methodologies shall be included in each contractor's submission.
- 16.5 The manufacturer shall imprint on the cable at 1m intervals the following information:
- 16.5.1 Manufacturers Name
  - 16.5.2 Cable Type
  - 16.5.3 Cable Size
  - 16.5.4 Manufacture Year
  - 16.5.5 Mark Of Meters Din Rail Mountable
- 16.6 The colour of the marking shall be white however should reprinting be required this shall be done in yellow in a different position.
- 16.7 Each cable end shall be sealed to heat shrinkable end caps to prevent water ingress.
- 16.8 Fibre Cable Performance
- 16.8.1 All four pairs shall be protected

Item	Specification
Type of fibre	Single Mode
Fibre material	Doped Silica
Attenuation coefficient	
@ 1310 nm	$\leq 3.5$ ps/ (nm. Km)
@ 1383 nm	$\leq 5.3$ ps/ (nm. Km)
@ 1550 nm	$\leq 18$ ps/ (nm. Km)
@ 1625 nm	$\leq 22$ ps/ (nm. Km)
PMD <sub>Q</sub> (Quadrature average*)	$\leq 0.2$ ps/km $\frac{1}{2}$
Attenuation at the water peak @1383nm $\pm 3$ nm	$\leq 0.7$ dB/km
Attenuation with temperature (-40°C ~ +85°C)	$\leq 0.05$ dB
1550nm bending loss (75mm mandrel, 100 turns)	$< 0.05$ dB

Mode field diameter @ 1310 nm	9.2±0.4 µm
Mode field diameter @ 1550 nm	10.4±0.8 µm
MFD concentricity error@1310nm	≤ 0.5 µm
Core / Cladding concentricity error	≤ 0.5 µm
Core diameter (Nominal)	8.3µm
Cladding diameter	125.0 ± 0.7 µm
Cladding non-circularity	≤1.0%
Primary coating diameter	245 ± 5 µm
Color coating diameter	250 ± 10 µm
Radius of curvature	≥ 4m
Coating-cladding concentricity	<10µm
Proof test level	100 kpsi(=0.69 Gpa), 1%

16.9 The cable bending radius shall be as follows

16.9.1 10 x Cable diameter (static)

16.9.2 20 x Cable diameter (dynamic)

16.10 Main Mechanical and Environmental Performance Testing

16.10.1 Over and above the below table of tests, the fibre cable shall be Quality certified and physically tested. These tests and certifications shall be included within the submission directly from the fibre cable manufacturer and not the installer.

16.10.2 The fibre shall be expected to align with the following standards:

No	Item	Test Method	Acceptance Conditions
1	Tensile Strength IEC 794-1-E1	Load: short time:500N Length of cable under load: 50 m	Loss change ≤ 0.1 dB @1550 nm No fibre break and no sheath damage.
2	Crush Test IEC 794-1-E3	Load: 450N/100 mm Load time: ≥1min.	Loss change ≤ 0.1 dB @1550 nm No fibre break and no sheath damage.
3	Impact Resistance IEC 794-1-E4	Points of impact: 5 Times of per point: 5 Impact energy:4.5 N.m Radius of hammer head: 15mm Impact rate: 2 sec/cycle	Loss change ≤ 0.1 dB @1550 nm No fibre break and no sheath damage.
4	Repeated Bending IEC 794-1-E6	Bending radius:20 x cable diameter Load: 150 N Flexing rate: 3 sec/cycle No. of cycle: 30	Loss change ≤ 0.1 dB @1550 nm No fibre break and no sheath damage
5	Torsion IEC 794-1-E7	Length: 1 m - Load: 150 N Twist rate: 1 min/cycle Twist angle: ±180° No. of cycle: 10	Loss change ≤ 0.1 dB @1550 nm - No fibre break and no sheath damage
6	Temperature Cycling Test IEC 794-1-F1	Temperature step: +20oC→20oC→+70oC →+20oC - Time per each step: 12 hrs Number of cycle: 2	Loss change ≤ 0.05 dB/km@1550 nm No fibre break and no sheath damage.

7	Compound Flow IEC 794-1-E14	Sample length: 30 cm - Temp: 70°C ± 2°C	No compound flow
8	Sheath High Voltage Test	On line test - 9t KV (t-sheath thickness)	No sheath breakdown

## 17. SPECIFICATIONS - Surge Protection

17.1 The Surge Arrestor shall support the following features

- 17.1.1 Single Port Poe Ethernet Surge Arrestor
- 17.1.2 Din Rail Mountable
- 17.1.3 IEEE 802.3af and IEEE 802.3at compliant
- 17.1.4 All four pairs shall be protected
- 17.1.5 Suply Protection for PoE, Poe+ and HPoE
- 17.1.6 1000 Mbps data rate

### SINGLE PORT PoE SURGE ARRESTOR TECHNICAL SPECIFICATIONS

Standards Compliance	IEEE 802.3af, IEEE 802.3at
Ethernet input	RJ45 Socket PoE 10/100/1000BASE-T
Ethernet output	RJ45 Socket PoE 10/100/1000BASE-T
Grounding	300mm of 1.5mm stranded earth cable (requires connection to a good electrical earth)
<b>Ethernet and PoE Protection</b>	
Operating Voltage	48 V
Max Voltage	62 V
Operating Current	1.5 A
Max Discharge Current	10KA */20µs
Impulse Life (10/1000µs)	400 times
Operating Temp	--40°C to 75°C
Operating Humidity	0% to 95%; non-condensing

## 18. SPECIFICATIONS - Rack Mount Ups

18.1 1500VA 230V Rack Mount

18.2 Output

- 18.2.1 Output power capacity - 1.0k Watts / 1.5kVA
- 18.2.2 Max Configurable Power (Watts) -1.0k Watts / 1.5kVA
- 18.2.3 Nominal Output Voltage - 230V
- 18.2.4 Output Voltage Note - Configurable for 220 : 230 or 240 nominal output voltage
- 18.2.5 Output Voltage Distortion - Less than 5% at full load

- 18.2.6 Output Frequency (sync to mains) - 47 - 53 Hz for 50 Hz nominal, 57 - 63 Hz for 60 Hz nominal
- 18.2.7 Other Output Voltages - 220, 240
- 18.2.8 Topology - Line Interactive
- 18.2.9 Waveform type - Sine wave
- 18.2.10 Output Connections - (4) IEC 320 C13 (Battery Backup) (2) IEC Jumpers (Battery Backup)
- 18.2.11 Transfer Time - 2ms typical
- 18.3 Input
  - 18.3.1 Nominal Input Voltage - 230V
  - 18.3.2 Input frequency - 50/60 Hz +/- 3 Hz (auto sensing)
  - 18.3.3 Input Connections - IEC-320 C14
  - 18.3.4 Input voltage range for main operations - 160 - 286V
  - 18.3.5 Input voltage adjustable range for mains operation - 151 - 302V
  - 18.3.6 Other Input Voltages - 220, 240
- 18.4 Batteries & Runtime
  - 18.4.1 Battery type - Maintenance-free sealed Lead-Acid battery with suspended electrolyte: leak-proof
  - 18.4.2 Typical recharge time – 3 hour(s)
  - 18.4.3 Expected Battery Life (years) - 4 - 6
  - 18.4.4 Battery Volt-Amp-Hour Capacity - 432
- 18.5 Communications & Management
  - 18.5.1 Interface Port(s) - RJ-45 Serial, SmartSlot, USB
  - 18.5.2 Control panel - Multi-function LCD status and control console
  - 18.5.3 Audible Alarm - Alarm when on battery : distinctive low battery alarm : configurable delays
  - 18.5.4 Emergency Power Off (EPO) - Optional
  - 18.5.5 Available SmartSlot™ Interface Quantity - 1
- 18.6 Surge Protection and Filtering
  - 18.6.1 Surge energy rating - 459Joules
  - 18.6.2 Filtering - Full time multi-pole noise filtering : 0.3% IEEE surge let-through : zero clamping response time : meets UL 1449

## 19. SPECIFICATIONS - Control Room Ups

Capacity	400KVA
UPS Structure	Online Double Conversion
Appearance	Low Frequency with Output Isolated Transformer
Overall Efficiency (AC-AC)	94% (With Optional Accessories)
ECO	98%
Noise (In 2 Meters)	67dB
Working Temp.	0-40°C
Storage Temp.	-15 ~ 50°C ( without batteries)
Humidity	< 95% Non-Condensing
Protection	Overload, Short-Circuit, Over Temp., Utility Power Voltage High/low, BAT Voltage High/low
DC Start	N/A
Generator Compatibility	Yes
Display	LCD Display(Multi-Language with all kinds of messages)+LED
Mute	Auto
Cabinet Standard	IP20
Cooling System	Intelligent Speed Control Cooling Fan
Elevation	< 1500M, Without Derated
Output Freq	±0.02% (BAT Mode)
Crest Ratio	3:1
Short-Circuit	Circuit Auto-Protection, Bypass Switch Tripping
Output Abnormal	INV. Output Auto-Locked Protection
<b>Bypass Specification</b>	
Static Bypass Transfer Time	0ms
Static Bypass Range	380/400/415Vac(±10%,±15%,±20% Selectable)3 Phase+N(3 Phase+N+PE)
Frequency Range	50/60Hz±10%

Bypass -> INV Transfer Time	2ms
Bypass Overload Ability	200%: 5 Mins; 1000%:10 Seconds
Manual Maintenance Bypass	Available
<b>Battery Specification</b>	
Type	Sealed Lead Acid Maintenance Free
Std. Model Rated Volts/Units	12V,384Vdc/32 Units
Float Charge Voltage	Equalized Charge, Float Charge, Intelligent Battery Management
BAT Low	Shutdown Protection