

Exacq Technologies, headquartered in Indianapolis, Indiana, is a leading developer of open architecture, Video Management System (VMS) solutions for security and surveillance applications. Our exacqVision VMS client-server solutions are scalable from a small single camera solution to large scale corporate or campus systems with thousands of cameras. Real-time and recorded video can be viewed, managed and configured from any location on the network.

For additional information, contact:

Exacq Technologies, Inc.

11955 Exit Five Parkway

Fishers, IN 46037 USA

Phone: +1 317 845-5710

Web: <https://www.exacq.com>

E-mail: [exacqinfo@tycoint.com](mailto:exacqinfo@tycoint.com)

## VIDEO MANAGEMENT SYSTEM

### DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

**28 00 00 Electronic Safety and Security**

**28 20 00 Electronic Surveillance**

**28 23 00 Video Surveillance**

**28 23 13 Video Surveillance Control and Management Systems**

#### Notes to Specifier:

1. Where several alternative parameters or specifications exist, or where, the specifier has the option of inserting text, such choices are presented in **<bold text>**.
2. Explanatory notes and comments are presented in **colored** text.

**Important Note to Security Systems Specifiers**

CSI MasterFormat 2016 incorporates numerous significant changes affecting electronic safety and security. This document is written to provide flexibility in using either format, although adoption of MasterFormat 2016 is encouraged. The following is a guide to the MasterFormat numbers relevant and related to the product referenced in this specification.

**MasterFormat 2014:**

|          |  |
|----------|--|
| 27 20 00 | Data Communications                                      |
| 28 05 00 | Common Work Results for Electronic Safety and Security   |
| 28 13 00 | Access Control   |
| 28 13 16 | Access Control Systems and Database Management           |
| 28 16 00 | Intrusion Detection                                      |
| 28 16 33 | Intrusion Detection Control, GUI, and Logic Systems      |
| 28 23 00 | Video Surveillance                                       |
| 28 23 13 | Video Surveillance Control and Management Systems        |
| 28 23 16 | Video Surveillance Monitoring and Supervisory Interfaces |
| 28 23 19 | Digital Video Recorders and Analog Recording Devices     |
| 28 23 23 | Video Surveillance Systems Infrastructure                |
| 28 23 29 | Video Surveillance Remote Devices and Sensors            |

**MasterFormat 2016:**

|             |  |
|-------------|--|
| 27 15 01.xx | Video Surveillance Communications Conductors and Cables              |
| 27 20 00    | Data Communications  |
| 28 05 00    | Common Work Results for Electronic Safety and Security               |
| 28 05 xx    | Power Sources for Electronic Safety and Security                     |
| 28 05 xx    | Servers, Workstations and Storage for Electronic Safety and Security |
| 28 05 xx    | Storage Appliances for Electronic Safety and Security                |
| 28 05 xx.xx | Network Video Recorders  |
| 28 05 xx    | Cyber Requirements for Electronic Safety and Security                |
| 28 05 xx    | Communications Equipment for Electronic Safety and Security          |
| 28 05 xx    | Systems Integration and Interconnection Requirements                 |
| 28 05 xx.xx | Electrical   |
| 28 05 xx.xx | Information  |
| 28 10 00    | Access Control   |
| 28 10 xx    | Access Control Software  |
| 28 20 00    | Video Surveillance   |
| 28 2x 00    | Video Management System  |
| 28 30 00    | Security Detection, Alarm, and Monitoring                            |
| 28 3x 00    | Intrusion Detection  |
| 28 3x xx.xx | Intrusion Detection Interfaces to Security Monitoring and Control    |

## HYBRID NETWORK VIDEO RECORDER

### 1. GENERAL

#### 1.1. SUMMARY

- 1.1.1. Section includes a large-scale video management system.
- 1.1.2. Related Requirements
  - 1.1.2.1 28 23 19 – Digital Video Recorders and Analog Recording Devices
  - 1.1.2.2 28 23 23 – Video Surveillance Systems Infrastructure
  - 1.1.2.3 28 23 29 – Video Surveillance Remote Devices and Sensors
  - 1.1.2.4 28 23 13 – Video Surveillance Control and Management Systems

#### 1.2. REFERENCES

- 1.2.1. Abbreviations
  - 1.2.1.1. API – Application Programming Interface
  - 1.2.1.2. CPU – Central Processing Unit
  - 1.2.1.3. FPS – Frames Per Second
  - 1.2.1.4. HDD – Hard Disk Drive
  - 1.2.1.5. HMAC – Hash Message Authentication Code
  - 1.2.1.6. HTTP – Hypertext Transfer Protocol
  - 1.2.1.7. IP - Internet Protocol
  - 1.2.1.8. JPEG – Joint Photographic Experts Group
  - 1.2.1.9. LDAP – Lightweight Directory Access Protocol
  - 1.2.1.10. MAC – Media Access Control
  - 1.2.1.11. MJPEG – Motion JPEG
  - 1.2.1.12. MPEG – Moving Pictures Experts Group
  - 1.2.1.13. PTZ – Pan, Tilt, Zoom
  - 1.2.1.14. RAID – Redundant Array of Independent Disks
  - 1.2.1.15. SDK – Software Development Kit
  - 1.2.1.16. SSD – Solid State Drive
  - 1.2.1.17. SSL – Secure Sockets Layer
  - 1.2.1.18. TLS – Transport Layer Security
  - 1.2.1.19. Mbps – Megabits per second
  - 1.2.1.20. NVR – Network Video Recorder
  - 1.2.1.21. POS – Point of Sale
  - 1.2.1.22. PSIM – Physical Security Information Management
  - 1.2.1.23. VMS - Video Management System
- 1.2.2. Definitions
  - 1.2.2.1. LDAP – an open, vendor-neutral industry standard application protocol for accessing and maintaining distributed directory services over an Internet Protocol (IP) network.

1.2.3. Reference Standards

1.2.3.1. ISO / IEC 14496 – MPEG-4

1.2.3.2. ISO / IEC 14496 – 10 – MPEG-4, Part 10 (H.264)

1.2.3.3. ISO / IEC 10918 – JPEG

**1.3. SUBMITTALS**

1.3.1. Product Data

1.3.1.1. Manufacturer's printed or electronic data sheets

1.3.1.2. Manufacturer's installation and operation manuals

**1.4. QUALIFICATIONS**

1.4.1. Manufacturer shall have a minimum of five years' experience in manufacturing digital storage equipment and associated interfaces.

1.4.2. Manufacturer's products shall be manufactured in the United States of America.

**1.5. LICENSES**

1.5.1. The video management system (VMS) shall license the total number of cameras and encoders on the system.

1.5.2. There shall be no charge for concurrent clients connecting to the video management system.

**1.6. WARRANTY AND SUPPORT**

1.6.1. Manufacturer shall provide software updates to the video management system for one year without charge.

1.6.1.1. An extended support option shall be available.

**END OF SECTION**

## 2. PRODUCTS

### 2.1. EQUIPMENT

- 2.1.1. Manufacturer: Exacq Technologies, Inc.  
11955 Exit Five Parkway  
Fishers, IN 46037 USA  
Phone: +1 317 845-5710  
Web: <https://www.exacq.com>  
E-mail: [exacqinfo@tycoint.com](mailto:exacqinfo@tycoint.com)
- 2.1.2. Model: exacqVision Enterprise VMS
- 2.1.3. Alternates: None

### 2.2. DESCRIPTION

- 2.2.1. The Video Management System (VMS) shall be a software package for comprehensive management of live and recorded video, and associated audio and data.
- 2.2.2. General Functionality – The VMS shall possess the following general characteristics:
  - 2.2.2.1. Provide effective monitoring of video from IP cameras and encoding devices, two-way audio and data in real time over local wide area networks.
  - 2.2.2.2. Interactive and multi-level mapping.
  - 2.2.2.3. Data integration from retail and access control systems.
  - 2.2.2.4. Single-screen administration across multiple servers and systems, including:
    - 2.2.2.4.1. Global configuration and monitoring of camera, encoder, and storage settings across the enterprise.
    - 2.2.2.4.2. Administration of all users on multiple servers.
    - 2.2.2.4.3. E-mail and text (SMS) notifications.
  - 2.2.2.5. Open architecture supporting IP cameras and encoders and access control systems from multiple manufacturers.
  - 2.2.2.6. Available client software to allow remote access to live and recorded video, including access from mobile devices.
    - 2.2.2.6.1. Support simultaneous access to video from multiple servers.
  - 2.2.2.7. Virtual matrix functionality.
  - 2.2.2.8. Provides an option to push currently viewed and recorded video to other feature-enabled client and mobile client instances.
  - 2.2.2.9. Provides dynamic client connection management.
  - 2.2.2.10. Provisioned as a service without requiring any application to be running in order to operate.
  - 2.2.2.11. 2-way audio support between server, client, and camera.

- 2.2.2.12. The VMS shall provide advanced options and health monitoring.
  - 2.2.2.12.1. Provide a health dashboard of exacqVision NVRs and attached cameras.
  - 2.2.2.12.2. Advanced user roles and management.
  - 2.2.2.12.3. Scheduled version updates to server and web services.
  - 2.2.2.12.4. Scheduled configuration backups and recovery.
  - 2.2.2.12.5. Failover and failback server management.
  - 2.2.2.12.6. LDAP/Active Directory integration.
  - 2.2.2.12.7. Camera inspection workflow.

### 2.2.3. Architecture

- 2.2.3.1. The VMS shall have a client/server-based architecture that can be configured as a standalone VMS with the client software running with equal functionality on the server hardware and/or the client running on any network-connected TCP/IP workstation.
- 2.2.3.2. User Interfaces – The VMS shall support installed client and web client interfaces.
  - 2.2.3.2.1. The VMS shall record and retrieve video, audio, and alarm data and provide it to the VMS clients upon request.
  - 2.2.3.2.2. Installed client characteristics:
    - 2.2.3.2.2.1. Downloadable at no charge from the Manufacturer’s website.
    - 2.2.3.2.2.2. Full compatibility with all available features of the VMS server software.
    - 2.2.3.2.2.3. View live video and audio, recorded video and audio and be able to configure the complete system all from a single application.
    - 2.2.3.2.2.4. Add and remove features based on the permissions of the user and the licensed functionality.
  - 2.2.3.1.2. Virtual Appliance – The VMS may be run in an approved virtual environment.
  - 2.2.3.1.3. PC Web Client – The web client interface shall operate without requiring installation of any software.
    - 2.2.3.1.3.3. Functions:
      - 2.2.3.1.3.3.1. View live video.
      - 2.2.3.1.3.3.2. View recorded video.
      - 2.2.3.1.3.3.3. Control pan-tilt zoom (PTZ) cameras
      - 2.2.3.1.3.3.4. Activate triggers and associations.
      - 2.2.3.1.3.3.5. Allow connections to multiple VMS servers simultaneously.
    - 2.2.3.1.3.4. The VMS server shall be able to transcode video into a JPEG file sized for compatibility with the browser screen before sending it to the client browser.
    - 2.2.3.1.3.5. The web client shall be capable of decoding JPEG and H.264 and H.265 video streams.
  - 2.2.3.1.4. Mobile web client – A free mobile application shall be available from the Manufacturer.
    - 2.2.3.1.4.3. The mobile application shall support Apple iOS and Google Android operating systems.
    - 2.2.3.1.4.4. Functions:
      - 2.2.3.1.4.4.1. Remote view of live and recorded video through the Video Server.

- 2.2.3.1.4.4.2. PTZ control and the monitoring and activation of alarms and events from the mobile device.
- 2.2.3.1.4.4.3. Simultaneous interaction with multiple NVR, server, and storage devices from the Manufacturer.
- 2.2.3.1.4.4.4. Monitoring of events configured by a Client.
- 2.2.3.1.4.5. The web service supporting the mobile application shall size the video stream to accommodate both low bandwidth and high bandwidth networks.
- 2.2.3.2. The VMS shall allow the user to have any combination of VMS client applications running on any of the supported operating systems and be able to connect to any of the VMS servers running on any of the supported operating systems.
  - 2.2.3.2.2. Multiple client workstations shall be capable of simultaneously viewing live and/or recorded video from one or more servers.
- 2.2.3.3. The VMS shall have the capability to run multiple client applications simultaneously on one workstation with multiple monitors.
  - 2.2.3.3.2. Up to 12 monitors shall be configurable on a single workstation with one (1) client application running on each monitor.
- 2.2.3.4. Multiple servers shall be able to simultaneously provide live and/or recorded video to one or more workstations.
- 2.2.3.5. The VMS server software shall have the ability to be installed on an IP edge device – such as an IP camera or encoder that allows for third-party applications – allowing the device to server as both a server and IP video recording device.
- 2.2.4. Specific Functionality – The VMS shall have the following elements:
  - 2.2.4.1. Video Streaming
    - 2.2.4.1.2. Video formats supported: MJPEG, MPEG-4, H.264, H.265
    - 2.2.4.1.3. Each video stream shall have the ability to be recorded, viewed live, saved to views, exported, and available in search and playback.
    - 2.2.4.1.4. Streams shall be individually configurable for recording schedules, storage rules and multistreaming.
    - 2.2.4.1.5. Multistreaming – The VMS shall allow the setting of multiple independent video streams from the IP camera, each configurable for frame rate, resolution, and quality level.
      - 2.2.4.1.5.3. Streams shall be able to be recorded, viewed live, saved to views, exported, and available in search and playback.
      - 2.2.4.1.5.4. All streams can be individually configurable for recording schedules and storage rules.
  - 2.2.4.2. Recording
    - 2.2.4.2.2. Functions:
      - 2.2.4.2.2.3. Continuous, uninterrupted, and unattended recording of all video and audio transmitted to the VMS, including during times of administration and configuration of any feature.
      - 2.2.4.2.2.4. Recording triggered by video motion detection within a defined region of interest of the camera's view.
        - 2.2.4.2.2.4.1. Configurable recording of video prior to the detection of the motion.

- 2.2.4.2.2.5. Record video based on metadata generated by an edge network device and included in the video stream sent to the VMS server.
- 2.2.4.2.2.6. Configure each video input's recording time on an hourly basis, to further allow the user to schedule when to record on motion, when to record on event and when to not record.
- 2.2.4.2.3. File system and operations:
  - 2.2.4.2.3.3. The VMS shall use the operating system's native file system for recording the video.
  - 2.2.4.2.3.4. The video file shall contain the data of the video, audio, and associated metadata.
  - 2.2.4.2.3.5. The index file shall contain the index of the metadata from the network device.
  - 2.2.4.2.3.6. When the VMS searches for video, it shall receive and display the information in the index files.
  - 2.2.4.2.3.7. When a client requests to display the video, the VMS shall transmit the video file data from the server to the client.
- 2.2.4.2.4. Bookmarking
  - 2.2.4.2.4.3. A bookmarking feature shall allow the tagging, naming, and retention of video clips.
- 2.2.4.2.5. Recording Storage
  - 2.2.4.2.5.3. Content
    - 2.2.4.2.5.3.1. The VMS shall provide for recording of video as well as associated audio and data files, as determined by rules, events, or manual selection.
    - 2.2.4.2.5.3.2. The VMS shall support recording video based on the following classifications:
      - 2.2.4.2.5.3.2.1. Free run video (all video).
      - 2.2.4.2.5.3.2.2. Time-lapse video @ 1 fps or less.
      - 2.2.4.2.5.3.2.3. Video associated to triggered alarm states as configured by Event Linking.
      - 2.2.4.2.5.3.2.4. Video associated to triggered alarm states as configured by Associations.
    - 2.2.4.2.5.3.3. The VMS shall support the configuration of unique weekly recording schedules per camera.
    - 2.2.4.2.5.3.4. The VMS shall support a graphical representation of drive status for associated RAID-based storage.
  - 2.2.4.2.5.4. Storage Types
    - 2.2.4.2.5.4.1. The VMS shall support local SSD disk storage.
  - 2.2.4.2.5.5. Storage Retention
    - 2.2.4.2.5.5.1. The VMS shall support configurable "at most" rules that will automatically delete video for a camera after a specified amount of time.
    - 2.2.4.2.5.5.2. The VMS shall support configurable "at least" rules that will delete newer video on other cameras to preserve older video from cameras with an "at least" rule specified.
- 2.2.4.2.6. Video Archiving
  - 2.2.4.2.6.3. Content



- 2.2.4.2.6.3.1. The VMS shall provide for the archival of video, audio, and data files, as determined by rules, events, or manual selection.
- 2.2.4.2.6.3.2. Each archive target has its own set of rules for what cameras and video archived and when.
- 2.2.4.2.6.4. Location
  - 2.2.4.2.6.4.1. The VMS shall support CIFS and NFS network shares for archive target locations.
  - 2.2.4.2.6.4.2. The VMS shall be able to archive to multiple locations and base the archive on camera, event type, or an archive schedule.
- 2.2.4.2.6.5. Schedules – The VMS shall be able to archive continuously or on a scheduled basis.
  - 2.2.4.2.6.5.1. Archive tasks shall continue until completion of the current requirement or terminate at a scheduled time.
  - 2.2.4.2.6.5.2. Weekly schedules shall be supported.
  - 2.2.4.2.6.5.3. Multiple schedules may be combined to derive specific schedules.
- 2.2.4.3. Events – The VMS software shall use events to initiate desired actions, including the following:
  - 2.2.4.3.2. Events:
    - 2.2.4.3.2.3. Video motion, operating on the encoded video.
    - 2.2.4.3.2.4. Video loss of analog video signals.
    - 2.2.4.3.2.5. Input trigger.
    - 2.2.4.3.2.6. ASCII input string, including POS information.
    - 2.2.4.3.2.7. Device, server, and system health.
    - 2.2.4.3.2.8. IP camera connection.
    - 2.2.4.3.2.9. Software initiated trigger through VMS display.
    - 2.2.4.3.2.10. Analytics rule.
    - 2.2.4.3.2.11. Date and time.
    - 2.2.4.3.2.12. Source group
      - 2.2.4.3.2.12.1. The software shall allow the combination of connected sources to create a source group to base events on.
    - 2.2.4.3.2.13. Outbound connection
      - 2.2.4.3.2.13.1. The software shall allow a persistent connection to a service outside the system's network.
    - 2.2.4.3.2.14. Security Integration Connection, Alert, or Alarm.
      - 2.2.4.3.2.14.1. The software shall allow the addition of supported third-party access control and intrusion products as a Security Integration.
    - 2.2.4.3.2.15. No recording for a desired time.
  - 2.2.4.3.3. Actions:
    - 2.2.4.3.3.3. Record video.
    - 2.2.4.3.3.4. Output trigger.
    - 2.2.4.3.3.5. Output analog video.

- 2.2.4.3.3.6. Send an email.
  - 2.2.4.3.3.6.1. Support SSL and TLS protocols for encrypted communications.
- 2.2.4.3.3.7. Export to a CD/DVD connected to a workstation.
- 2.2.4.3.3.8. Call a camera PTZ preset.
- 2.2.4.3.3.9. Utilize a webhook to send data to an HTTP-generated endpoint.
- 2.2.4.3.3.10. Send video to supported analytics device for analyzation.
- 2.2.4.3.3.11. Switch the current display in live view.
  - 2.2.4.3.3.11.1. Switch the live panel to a new live panel or view of panels.
  - 2.2.4.3.3.11.2. Switch the live audio to a different source.
- 2.2.4.3.3.12. Play a sound included with the client software.
- 2.2.4.3.3.13. Security Integration action.
- 2.2.4.4. Search and Playback from client interface – This function shall allow a user to:
  - 2.2.4.4.2. Search and play back recorded video, audio and events from VMS servers.
  - 2.2.4.4.3. Search and play back video from multiple cameras simultaneously in a synchronized multi-camera layout.
  - 2.2.4.4.4. Search recorded video based on time, date, video source and image region, with results displayed as a clickable timeline, thumbnail, or list.
  - 2.2.4.4.5. Search and play back audio in synchronization with video.
  - 2.2.4.4.6. Search a specific area of recorded video to display only frames where motion occurred.
  - 2.2.4.4.7. Perform a visual thumbnail search, selecting one image per camera per set time period.
    - 2.2.4.4.7.3. Play video from a selected image.
    - 2.2.4.4.7.4. Zoom into a time range around a selected image.
  - 2.2.4.4.8. Search recorded video based on time, data and type of event that occurred.
    - 2.2.4.4.8.3. Filter results of event search by type of event.
    - 2.2.4.4.8.4. Sort results by time of event, length of event or type of event.
  - 2.2.4.4.9. Select a preference of the source of recorded video, audio and events.
    - 2.2.4.4.9.3. Select to prefer system video.
    - 2.2.4.4.9.4. Select to prefer archive video.
    - 2.2.4.4.9.5. Disable any preferences and search all simultaneously.
  - 2.2.4.4.10. Search recorded video based on cases made from bookmarks created.
  - 2.2.4.4.11. Search recorded video based on cameras and devices added to a map.
- 2.2.4.5. Video and Information Display
  - 2.2.4.5.2. The VMS shall have a live display mode, wherein a user shall be able to view live video, live audio, POS data, associations, and alarm information.
  - 2.2.4.5.3. The VMS shall allow users to view multiple video streams per device, depending on the device's streaming capability.
  - 2.2.4.5.4. The VMS client shall be able to use OpenGL and Direct 3D to decompress and render video.
  - 2.2.4.5.5. The VMS client shall support using GPU resources of the client workstation, if available, to accelerate decoding of video streams.

- 2.2.4.5.6. The VMS shall allow cameras in logical groups and preset views.
- 2.2.4.5.6.3. Views shall save the location of video streams, audio streams, POS data, maps and event views.
- 2.2.4.5.6.4. Views shall be accessible in both live and recorded modes.
- 2.2.4.5.6.5. The VMS shall be able to automatically cycle through two or more saved views to create a video tour, with a configurable dwell time for each view.
- 2.2.4.5.7. The VMS shall allow the viewing of live video from guard tour sequences.
- 2.2.4.5.8. The VMS shall support the use of a panoramic lens on an analog or IP camera.
- 2.2.4.5.8.3. The VMS client shall de-warp the image on both live and recorded video.
- 2.2.4.5.9. The VMS shall be able to organize the camera video view panel in the following layout patterns:
- 2.2.4.5.9.3. 1- camera (full screen)
- 2.2.4.5.9.4. 4-camera (2x2)
- 2.2.4.5.9.5. 7-camera (3 large panels and 4 small panels)
- 2.2.4.5.9.6. 10-camera (2 large panels and 8 small panels)
- 2.2.4.5.9.7. 13-camera (1 large panel and 12 small panels)
- 2.2.4.5.9.8. 16-camera (4x4)
- 2.2.4.5.9.9. 8-camera (1 very large panel and 7 small panels)
- 2.2.4.5.9.10. 9-camera (3x3)
- 2.2.4.5.9.11. 6-camera (2x3) widescreen
- 2.2.4.5.9.12. 12-camera (4x3) widescreen
- 2.2.4.5.9.13. 20-camera (5x4) widescreen
- 2.2.4.5.9.14. 30-camera (6x5) widescreen
- 2.2.4.5.9.15. 48-camera (8x6) widescreen
- 2.2.4.5.9.16. 16:9 display panels
- 2.2.4.5.9.17. Custom
- 2.2.4.5.10. The VMS shall allow the customization of the user interface to display software (soft) triggers and initiate actions.
- 2.2.4.5.10.3. The VMS shall also display the status of any soft triggers on connected VMS servers.
- 2.2.4.5.11. Overlay controls shall appear when hovering over a camera in live view.
- 2.2.4.5.11.3. Appearance: text color, font, style, transparency, location
- 2.2.4.5.11.4. Control types: audio inputs and outputs, alarm outputs, input events, soft triggers, serial data, manual record.
- 2.2.4.5.12. System information shall be capable of display on a single page to include the following:
- 2.2.4.5.12.3. Status of all servers and cameras currently connected.
- 2.2.4.5.12.4. Alarms, events, MAC addresses, camera configuration, format, and frame rate from each individual camera.
- 2.2.4.5.13. The VMS shall be able to display the following additional system information:
- 2.2.4.5.13.3. User currently logged in to the system.

- 2.2.4.5.13.4. Plug-in file version information number and status.
- 2.2.4.5.13.5. System log containing a detailed history of system processes.
- 2.2.4.5.13.6. Login history of users to the server.
- 2.2.4.5.13.7. Audit trail of changes made to the server.
- 2.2.4.5.14. The VMS shall support creation of user views, based on permission level of the user.
- 2.2.4.5.15. The VMS shall support display of notification to the user for common setup tasks that should be performed, including:
  - 2.2.4.5.15.3. Configuring motion on all cameras.
  - 2.2.4.5.15.4. Changing the default password, including forcing strong passwords.
  - 2.2.4.5.15.5. Configuring email notifications.
  - 2.2.4.5.15.6. Configuring of multistreaming.
  - 2.2.4.5.15.7. Time delta between server and camera.
- 2.2.4.5.16. The VMS shall support configuration of sending and receiving live and recorded video.
  - 2.2.4.5.16.3. Configuring the Receiving Display option.
  - 2.2.4.5.16.4. Send a panel or view of live or recorded video to a client or mobile client with the Receiving Display option enabled.
  - 2.2.4.5.16.5. Send a panel or view of live or recorded video to a video wall with the Receiving Display option enabled.
  - 2.2.4.5.16.6. Send a still frame of recorded video to a client, mobile client, or video wall with the Receiving Display option enabled.
- 2.2.4.6. Pan Tilt Zoom (PTZ)
  - 2.2.4.6.2. The VMS shall allow control of PTZ cameras to authorized users and be used to maneuver and zoom a PTZ camera at adjustable speed.
  - 2.2.4.6.3. When used on a non-PTZ camera, the VMS shall allow a user to digitally pan, tilt and zoom on any video, whether live or recorded.
  - 2.2.4.6.4. The VMS shall allow the following methods of controlling a PTZ camera to be available:
    - 2.2.4.6.4.3. PTZ graphics control windows.
    - 2.2.4.6.4.4. Live graphic overlay PTZ control icons.
    - 2.2.4.6.4.5. Keyboard control (up, down, left, right arrows; page up, page down for zoom).
    - 2.2.4.6.4.6. PTZ presets.
    - 2.2.4.6.4.7. Digital PTZ.
    - 2.2.4.6.4.8. USB joystick.
    - 2.2.4.6.4.9. Proportional PTZ control using a mouse.
- 2.2.4.7. Mapping
  - 2.2.4.7.2. The VMS shall have a map capability, accessible to users with the appropriate permission levels.
  - 2.2.4.7.3. The map capability shall provide the following:
    - 2.2.4.7.3.3. Display video sources and their status.
      - 2.2.4.7.3.3.1. Display the field of view for cameras on the map using an adjustable FOV visualization triangle.
    - 2.2.4.7.3.4. Place, view and activate soft triggers from a map.

- 2.2.4.7.3.5. Create single-layer maps.
- 2.2.4.7.3.6. Create multi-layer maps.
- 2.2.4.8. Export
  - 2.2.4.8.2. The VMS software shall have the capability to export video, maps, POS data and audio files, without overwriting previous exports.
    - 2.2.4.8.2.3. Export file formats supported: .exe, .avi, .ps, .mov, .psx, .mp4
  - 2.2.4.8.3. The VMS software shall have a feature to export a video segment from specific cameras or audio inputs to a CD or DVD upon an event.
  - 2.2.4.8.4. VMS standalone player
    - 2.2.4.8.4.3. The VMS standalone player shall package all the exported video into a single executable file.
    - 2.2.4.8.4.4. The VMS standalone player shall be able to authenticate that the video has not been tampered with using keyed Hash Message Authentication Code (HMAC).
- 2.2.4.9. Administration and Configuration
  - 2.2.4.9.2. User administration functions:
    - 2.2.4.9.2.3. Permissions
      - 2.2.4.9.2.3.1. Authenticate the user's permission level by:
        - 2.2.4.9.2.3.1.1. Combination of username and password.
      - 2.2.4.9.2.3.2. Allow for a user's permissions to be configured across multiple servers from a single client interface.
      - 2.2.4.9.2.3.3. Allow for granularity of permissions by creating custom user groups.
    - 2.2.4.9.2.4. Audit – record and audit trail of when users log in that shows the changes they have made, what video they have viewed and what they have exported.
  - 2.2.4.9.3. Privacy Enforcement
    - 2.2.4.9.3.3. The VMS software shall provide a configuration option to require two (2) users enter unique passwords to authorize tasks involving the viewing of video (2<sup>nd</sup> Reviewer).
      - 2.2.4.9.3.3.1. The following tasks can be individually enabled or disabled
        - 2.2.4.9.3.3.1.1. View live video
        - 2.2.4.9.3.3.1.2. Search and view recorded video
        - 2.2.4.9.3.3.1.3. Export video
        - 2.2.4.9.3.3.1.4. Allow sending video display
  - 2.2.4.9.4. Third-party integrations – supported methods: command line, API, web SDK.
  - 2.2.4.9.5. Native integrations controlled from exacqVision interfaces.
- 2.2.5. Native Integration to Security and Access Control Systems
  - 2.2.5.1. The VMS shall natively integrate with Kantech Entrapass access control systems.
    - 2.2.5.1.2. The security integration software shall be able to recognize access control equipment by accepting the following information about the equipment:
      - 2.2.5.1.2.3. Equipment type.
      - 2.2.5.1.2.4. IP address
      - 2.2.5.1.2.5. Port number.

- 2.2.5.1.2.6. Username and password.
- 2.2.5.1.3. Upon selection of an access control device, available controls for that device shall be displayed on the user's console to include:
  - 2.2.5.1.3.3. Device name.
  - 2.2.5.1.3.4. Device type.
  - 2.2.5.1.3.5. Actions.
- 2.2.5.1.4. The system shall support the following actions on access control devices.
  - 2.2.5.1.4.3. Lock and unlock door.
  - 2.2.5.1.4.4. Unlock for 10, 30, 60 seconds.
  - 2.2.5.1.4.5. Unlock for 5, 10 minutes.
  - 2.2.5.1.4.6. Disable/Enable reader.
  - 2.2.5.1.4.7. Allow/Bypass Request to Exit button.
  - 2.2.5.1.4.8. Activate/deactivate input.
- 2.2.5.1.5. The system shall have the capability to superimpose icons for access control devices on the live video screen.
  - 2.2.5.1.5.3. The system shall display the status of those devices.
  - 2.2.5.1.5.4. The system shall support control of those devices via the superimposed icons.
- 2.2.5.2. The VMS shall natively integrate with DSC PowerSeries Neo Intrusion systems.
  - 2.2.5.2.2. Intrusion devices to be recognized by the security integration software shall be identified by the following parameters:
    - 2.2.5.2.2.3. System type.
    - 2.2.5.2.2.4. Panel connection type.
    - 2.2.5.2.2.5. Panel IP address.
    - 2.2.5.2.2.6. Local port number.
    - 2.2.5.2.2.7. Panel port number.
    - 2.2.5.2.2.8. Panel integration encryption key.
    - 2.2.5.2.2.9. Application integration encryption key.
    - 2.2.5.2.2.10. Installer access code.
  - 2.2.5.2.3. Upon selection of an intrusion device, available controls for that device shall be displayed on the user's console to include:
    - 2.2.5.2.3.3. Device name.
    - 2.2.5.2.3.4. Device ID.
    - 2.2.5.2.3.5. Device type.
    - 2.2.5.2.3.6. The system shall support the following actions.
      - 2.2.5.2.3.6.1. Arm and disarm partition.
      - 2.2.5.2.3.6.2. Activate and bypass zone.
- 2.2.5.3. The system shall have the capability to superimpose icons for intrusion devices on the live video screen.
  - 2.2.5.3.2. The system shall display the status of those devices.
  - 2.2.5.3.3. The system shall support control of those devices via the superimposed icons.

- 2.2.5.3.4. When performing an action, the system shall require input of access control system credentials or intrusion system key codes to validate the action.
  - 2.2.5.3.4.3. The system shall support the option to cache these credentials.
- 2.2.6. Updates – The Manufacturer shall have available timely updates of the VMS software.
  - 2.2.6.1. Updates shall be discoverable by the software when Internet connectivity to <https://exacq.com> is available.
  - 2.2.6.2. The VMS software shall support the ability to update without losing any configuration.
  - 2.2.6.3. The VMS software shall provide the ability to update the software from within the software.
  - 2.2.6.4. The VMS software shall provide the ability to run an executable update program in the operating system to update the software.

## 2.3. PERFORMANCE

- 2.3.3. Compatibility
  - 2.3.3.1. Video – The Video Server shall be compatible with the following video manufacturers: Illustra, Axis, Vivotek, ISD and IQEye.
  - 2.3.3.2. Access control – The Video Server shall be compatible with the following access control manufacturers:
  - 2.3.3.3. POS and retail analytics – The Video Server shall be compatible with the following POS and retail analytics manufacturers:
  - 2.3.3.4. PSIM - The Video Server shall be compatible with the following PSIM manufacturers:

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Specifier should complete the above sections to include manufacturers of those existing or new devices or software that will interface with the NVR.  
A list of integrations from exacq is available at <https://exacq.com/integration>.

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- 2.3.4. Maximum cameras per server
  - 2.3.4.1. Analog: 64
  - 2.3.4.2. IP: 128
- 2.3.5. Maximum number of simultaneous clients per server:
  - 2.3.5.1. Installed client: 512
  - 2.3.5.2. Web client: 16
- 2.3.6. Display
  - 2.3.6.1. Local client display rate:
    - 2.3.6.1.2. Windows OS: up to 1800 frames per second
    - 2.3.6.1.3. Linux OS: up to 1200 frames per second

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Client display rates (fps) are based upon the CPU installed in the workstation, as follows:

| <b>Processor (Intel Core):</b> | <b><u>i3</u></b> | <b><u>i5</u></b> | <b><u>i7</u></b> |
|--------------------------------|------------------|------------------|------------------|
| <b>Windows:</b>                | <b>480</b>       | <b>1100</b>      | <b>1800</b>      |
| <b>Linux:</b>                  | <b>600</b>       | <b>1100</b>      | <b>1200</b>      |

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## 2.4. Computing Requirements

- 2.4.3. Server requirements:
  - 2.4.3.1. Acceptable operating systems:
    - 2.4.3.1.2. Microsoft Windows Server: 2016/2012 R2
    - 2.4.3.1.3. Microsoft Windows: 10
    - 2.4.3.1.4. Linux Ubuntu: 18.04 64-bit
  - 2.4.3.2. Processor: Intel Celeron G5900 minimum
  - 2.4.3.3. RAM: 2 GB minimum
  - 2.4.3.4. Operating system drive: 32 GB minimum
  - 2.4.3.5. Network interface: 1000BASE-T Ethernet
- 2.4.4. Client workstation minimum requirements:
  - 2.4.4.1. Acceptable operating systems:
    - 2.4.2.1.2. Microsoft Windows Server: 2016/2012 R2
    - 2.4.2.1.3. Microsoft Windows: 10



|                           |                                  |
|---------------------------|----------------------------------|
| 2.4.2.1.4. Linux Ubuntu:  | 18.04 64-bit                     |
| 2.4.2.1.5. Apple Mac OSX: | 10.15, operating on an Intel CPU |
| 2.4.2.2. Processor:       | Intel Celeron G5900 minimum      |

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Because decompressing video is CPU-intensive, the PC workstation requires multiple core processors with a recommendation of one core for each VMS client application.

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|   |  |
|---|--|
| 2.4.2.3. RAM:                           | 2 GB minimum                               |
| 2.4.2.4. Network interface:             | 1000BASE-T Ethernet                        |
| 2.4.2.5. HDD Storage:                   | 10 GB minimum                              |
| 2.4.2.6. Graphics:                      | Intel UHD Graphics 610                     |
| 2.4.3. Multi-monitor client workstation |  |
| 2.4.3.1. Acceptable operating systems:  |  |
| 2.4.3.1.1. Microsoft Windows Server:    | 2016/2012 R2                               |
| 2.4.3.1.2. Windows:                     | 10   |
| 2.4.3.1.3. Linux Ubuntu:                | 18.04 64-bit                               |
| 2.4.3.1.4. Apple Mac OSX:               | 10.15, operating on an Intel CPU           |
| 2.4.3.2. Processor:                     | Intel Core i7-8700                         |
| 2.4.3.3. RAM:                           | 16 GB minimum                              |
| 2.4.3.4. Graphics:                      | Intel UHD630 or NVIDIA NVS Series          |
| 2.4.3.5. Network interface:             | 1000BASE-T Ethernet                        |
| 2.4.3.6. HDD Storage:                   | 128 GB SSD minimum                         |
| 2.4.4. Acceptable web browsers:         |  |
| 2.4.4.1. PC:                            | Microsoft Edge, Firefox, Safari and Chrome |
| 2.4.4.2. HTML compliance:               | HTML 4.0                                   |
| 2.4.4.3. Mobile device:                 | Apple iOS, Google Android                  |

## END OF SECTION

### **3. EXECUTION**

#### **3.1. INSTALLATION**

- 3.1.1. Contractor shall comply with all Manufacturer installation guidelines.
- 3.1.2. Contractor personnel shall comply with all applicable state and local licensing requirements.

#### **3.2. STORAGE**

- 3.2.1. Hardware shall be stored in an environment where temperature and humidity are in the range specified by the hardware manufacturer.

**END OF SECTION**