Nx Witness
VIDEO MANAGEMENT SYSTEM

Nx Witness VMS A&E Specification

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Video. Powered.

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1.0 - General

1.01 - System Description

A. General Requirements

1. The specified product shall be an open, extensible video platform designed for use in any video application.

2. The specified software shall include, free of charge, any API or SDKs necessary to integrate 3rd party devices and systems.

3. The specified Video Management solution's architecture should include Desktop, Server, Mobile, and Cloud applications.

1.02 - Definition & Standards

A. General Abbreviations, Acronyms, and Standards

1. ACC: Video Codec “Active Content Compression
2. ADDS: Active Directory Domain Services
3. AGC: Automatic gain control
4. API: Application Programming Interface
5. AVI: Audio Video Interleave
6. Bit Rate: The number of bits/time unit sent over a network
7. DHCP: Dynamic Host Configuration Protocol
8. FPS: Frames per Second
9. FTP: File Transfer Protocol
10. GbE: Gigabit Ethernet (1000Mbps)
11. H.264/5 (Video Compression Format)
12. HTTP: Hyper Text Transport Protocol
13. IEEE 802.1x: Authentication framework for network devices
14. IP: Internet Protocol
15. JPEG: Joint Photographic Experts Group (image format)
16. LAN: Local Area Network
17. MJPEG: Motion JPEG
18. MKV: Matroska video format
19. MP4: MPEG Layer-4 Video Format
20. MPEG: Moving Picture Experts Group
21. NTP: Network Time Protocol
22. NTSC: National Television System Committee – a color encoding system based on 60Hz

23. ONVIF: Global standard for the interface of IP-based physical security products
24. PoE: Power over Ethernet (IEEE 802.3af/at) standard for providing power over network cable
25. PTZ: Pan/Tilt/Zoom
26. SDK: Software Development Kit
27. RAID: Redundant Array of Independent Disks
28. RTSP: Real-Time Streaming Protocol
29. RADASS: Resolution and Algorithmic Data Adaptive Scaling System
30. SMTP: Simple Mail Transfer Protocol
31. SSL: Secure Sockets Layer
32. TCP: Transmission Control Protocol
33. TLS: Transport Layer Security
34. Unicast: Communication between a single sender and single receiver on a network
35. VMS: Video Management System

1.03 - Quality Assurance

A. Basic Level of Support

1. Complete product and technical data specification sheets that include all material and equipment shall be provided by the System Integrator and be available freely online.

1.04 - Proposal Submittals

A. Basic Level of Support

1. Complete product and technical data specification sheets that include all material and equipment used on this project shall be included in the submitted solution proposal.

B. System Documentation

1. The System Integrator will provide

    a. List of all equipment with part numbers, manufacturer, firmware, and assigned IP addresses.

2. Locations and details for all components to be installed under this scope of work proposal.

C. Planning

1. Placement Diagram - the System Integrator will provide a placement diagram showing the proposed location of all system hardware devices.

2. System Calculation - the System Integrator will provide a calculation of all network bandwidth and storage requirements for System Servers to ensure proper planning of computing and networking infrastructure

D. Qualifications

1. Manufacturer shall have a minimum of five (5) years' experience in producing IP video equipment and software.

2. Installers shall be trained and authorized by the Manufacturer to install, integrate, test, commission, and provide ongoing support for the solution.

1.05 - Ongoing Support & Warranty

A. Integrator Warranty

1. The security system VMS software and labor furnished by the integrator including wiring, software, hardware and third party products shall be fully warranted for parts, materials and labor for a minimum of 1 year from date of the final acceptance of the Video Surveillance System.

B. Software Licensing & Warranty

1. Software licensing should be on a per device basis (e.g. 1 x license for 1 IP Camera or I/O device) with no base license for additional features or capabilities.

2. The VMS Software should be completely free for live streaming or playback of offline media files (images, videos).

3. Lifetime software upgrades shall be provided by the Manufacturer without cost and without the need for an annual maintenance agreement.

2.0 - VMS

2.01 - VMS Overview

A. VMS Software Components

The specified VMS System shall consist of four(4) software applications which work together seamlessly.

1. Cloud

   A cloud-based application layer that enables simple remote connectivity, viewing, configuration, and management of an unlimited number of connected Systems and Users.

   a. The Cloud application should be an optional component that is free to use.

2. Server

   A lightweight, cross-platform media server responsible for discovering devices, enabling secure connections between clients and connected devices, system resources, and associated metadata.

   a. The Server application should be able to run on Windows, Ubuntu Linux, in Virtual Machines, and on Debian-Linux operating systems for ARM embedded devices.

   b. The Server install package should be <200 MB in size and require no prerequisite software (e.g. MySQL, SQL, Visual Studio, .Net, etc) to install and use.

3. Desktop Client

   A lightweight, Desktop application capable of acting as a stand-alone media player, a connected client used to actively configure, manage, and view devices and related data, or a video wall / remote monitor.

   a. The Desktop Client application should be able to run on Windows, Mac, and Ubuntu Linux devices.

   b. The Desktop Client application installation package should not exceed 200 MB in total size and require no prerequisite software to install and use on supported

operating systems.

B. VMS Developer & Integration Tools

The VMS shall have built-in developer tools which are accessible from any System Server's Web Admin Interface (compatible with all major browsers) and should include, at a minimum:

1. **A Generic Events Generator**
   A tool which helps build HTTP Generic Event calls, a method of sending events from 3rd party systems to the VMS, which can be used to trigger system actions in the VMS.

2. **Server/Cloud API**
   An HTTP CRUD REST API that includes the following:
   a. System API
   b. Server API
   c. Cloud API
   d. Video API
   e. Audio API
   f. Proxy API
   g. WebSocket API
   h. Authentication & Encryption
   i. Breaking Change Log

3. Video Source Integration SDK

   Should provide the ability to integrate virtually any live or recorded video source (IP Cameras, NVRs, DVRs, etc) into the VMS with methods for discovering, displaying, analyzing and recording video, as well as integrating device I/O ports and related motion detection information.

4. Storage SDK

   Should provide the ability to integrate any storage into System, allowing developers to read from or write to any storage location: local, remote, or even cloud-based storage locations.

5. Metadata SDK

   An SDK designed for rapidly integrating object-driven video analytics from 3rd party software or hardware to pull in object coordinates and associated metadata, as well as generate events and context actions in Desktop client UI.

C. VMS Architecture

1. The VMS shall have a Server Hive Architecture wherein:

    a. All servers in a system are equal and synchronize system databases (device configurations, system configuration, user rights) in real-time without the need for operator configuration or an additional administrative interface.

    b. A user can connect to any system server to see and manage the entire system

    c. Servers support automatic camera failover to ensure limited loss of video recording in the event of hardware or network failure.

2. The VMS shall support one-click system wide updates.

    a. System Administrators shall be able to upgrade an entire system via a single button in the Desktop Application.

    b. System Administrators shall be able to upgrade on demand to the latest release or specific builds with specific functionality or bug fixes

    c. System Administrators shall be able to apply an OTA (over-the-air) update

    d. System Administrators shall be able to generate a URL to download a portable system- specific update package in .zip file format which can be used to update servers without an active Internet connection.

3. The VMS will use secure technologies for inter-application communication and security.

    a. OpenSSL for network connections - deprecated and insecure protocols and use only TLS v1.2+.

    b. Server to Client (Mobile, Desktop, Web) Communications – Option to force encryption between Client and Server for API data.

    c. Option to force HTTPS video traffic encryption between Client and Server.

    d. HTTPS Email notification - TLS / SSL - TLS is the default option for Email Server communications.

   e. Salted/Hashed Passwords - Local Credentials will be protected using a salted MD5 hash, Cloud Credentials should use a complex multi-level hash

4. The VMS will not require any licenses to increase the number of supported devices, users, or servers.

5. The system shall support scaling to support the maximum recommended system sizes shown below with no engineering support or extra licensing. The system shall support exceeding these recommended maximums by consulting with engineering support.

   a. The system shall support a maximum of 100 Servers in a system.
   b. The system shall support a maximum of 10,000 resources in a system.
   c. The system shall support a maximum of 1,000 concurrent users in a system.

2.02 - VMS Server Application

A. Supported Operating Systems

The VMS Server application shall support the following operating systems.

1. Microsoft Windows
    a. Windows 8.1
    b. Windows 10
    c. Windows Server 2012
    d. Windows Server 2012 R2
    e. Windows Server 2016
    f. Windows Server 2019
    g. Windows Server 2022

2. Ubuntu Linux
   Ubuntu 18.04 LTS
    a. Ubuntu 20.04 LTS
    b. Ubuntu 22.04 LTS

3. ARM / Debian Developer Boards
   NVIDIA Jetson Devices
    a. Raspberry Pi Devices

4. Virtualization / Containerization Platforms
    a. VMWare
    b. VirtualBox
    c. Docker

B. Minimum Hardware Requirements

1. The VMS Server application will be capable of operating on any hardware able to run a compatible operating system.

2. The VMS Server will be capable of recording 128 dual-streaming IP cameras (256 streams) on a single core of an Intel Core i3 processor.

C. Installation & Configuration

1. The VMS Server application should be a publicly available, free download.

2. The VMS Server application should require no prerequisite proprietary or 3rd party software and database technologies during installation.

3. The VMS Server installation process should require no user input once initiated

4. After installation is complete the VMS server setup process will allow system administrators to create a new system or to merge newly installed server(s) with existing systems.

D. Features

1. The VMS Server Application shall automatically discover, stream, and record any ONVIF Profile S IP camera located on the same subnet as the server application.

2. The VMS Server Application shall manually discover, stream, and record RTSP, HTTP, or UDP (multicast, unicast) streams.

3. The VMS Server application shall support up to 1000 concurrent TCP connections

4. The VMS Server application shall record and stream video of any resolution and frame rate, limited only by hardware.

5. The VMS Server application shall support automatic camera failover without any additional licenses.

6. 6. The VMS Server application will support an unlimited number of users and custom user roles

7. The VMS Server application shall support any type of storage medium - HDD's, SSD's, SD cards, DAS, NAS, or other network-attached storage devices or locations.

8. The VMS Server application shall support LDAP / Active Directory / Open LDAP integration for user login credential management

9. The VMS Server application shall record and stream H.264, H.265, and MJPEG streams

10. The VMS Server application shall record and stream AAC, PCM (Mu-Law, A-law), g726, and MP3 audio

11. The VMS Server application shall transcode streams on demand for delivery to 3rd party systems or devices in H.265, H.264, MJPEG or WebM codecs.

12. The VMS Server application shall be able to provide pass-through high or low-res HLS streams from connected devices.

13. The VMS Server application shall store archive indices in the same location as recorded video files.

14. The VMS Server application shall allow system administrators to recover archives from any storage medium using a re-index archive feature.

15. The VMS Server application will contain a boolean events engine allowing operators to program and trigger system actions based on system, connected device, or HTTP events sent from 3rd party system or device.

16. The VMS Server application shall be able to send HTTP PUT or GET requests to 3rd party systems or devices.

17. The VMS Server application shall support IPv4 or IPv6 addressing.

18. The VMS Server application shall allow operators to set custom network routing configurations for system servers to optimize network routing and usage.

19. The VMS Server application shall allow operators to monitor the CPU, RAM, NIC, and HDD usage in real time.

20. The VMS Server application shall track all operator actions to allow audits.

21. The VMS Server application shall generate automatic crash files every time there is an unexpected crash of the Server application.

22. The VMS Server application shall allow operators to change the size of reserved disk space for storage drives.

23. The VMS Server application shall automatically disable any system drive (drive containing the operating system) in computing hardware with more than one drive to ensure the operating system drive does not become full.

24. The VMS Server application shall support configuration and events from binary I/O contacts on supported devices - including IP cameras and I/O devices.

25. The VMS Server application shall support sending email notifications via SMTP using TLS, SSL or unsecured connections.

26. The VMS Server application shall support scheduled backup of recording archives to local, networked, or cloud storage locations.

27. The VMS Server application shall allow on-demand backup of recording archives to local, networked, or cloud storage locations.

28. The VMS Server application shall allow concurrent-recording of all connected cameras / streams to two (2) servers in real-time.

29. The VMS Server application will allow server-side, CPU-based motion analysis for all connected IP cameras with no perceptible increase (<3%) in CPU usage.

30. The VMS Server application will require no dedicated GPU in order to perform at maximum capacity.

31. The VMS Server application will have a web administration interface that allows users to view live or recorded video from a single camera at a time in high or low resolutions.

32. The VMS Server application will have a web administration interface that allows system administrators to view real-time server health monitoring statistics (CPU, NIC, and HDD usage).

33. The VMS Server application will have a web administration interface that allows operators to cloud merge two systems together or disconnect the VMS Server from the VMS cloud application.

34. The VMS Server application will have a web administration interface that allows users to view all available servers in the system.

35. The VMS Server application will have a web administration interface that allows operators to switch between server interfaces.

36. The VMS Server application will have a hidden advanced page that gives system administrators the ability to modify advanced system settings.

37. The VMS Server application will support any RAID configuration of storage medium

38. The VMS Server should support ingesting and storage of object-driven metadata collected from in-camera, server-based, or cloud-based video analytics solutions using a common and freely available Metadata SDK / Plugin deployment model.

39. The VMS Server should support archive encryption with a user-defined key using AES 128 bit encryption.

40. All VMS Server connections use SSL/TLS Certificate pinning to render man-in-the-middle attacks impossible. VMS Servers and Clients also use new session-based (bearer token) authentication by default.

2.03 - VMS Desktop Client Application

A. Supported Operating Systems

The VMS Desktop Client application shall support the following operating systems.

1. Microsoft Windows
    a. Windows 8.1
    b. Windows 10
    c. Windows Server 2012
    d. Windows Server 2012 R2
    e. Windows Server 2016
    f. Windows Server 2019
    g. Windows Server 2022

2. Ubuntu Linux
   Ubuntu 18.04 LTS
    a. Ubuntu 20.04 LTS
    b. Ubuntu 22.04 LTS

3. Apple MacOS
   macOS 11
    a. macOS 12
    b. macOS 13
4. ARM / Debian Developer Boards
   NVIDIA Jetson Devices

B. Minimum Hardware Requirements

1. The VMS Desktop application will be capable of operating on any hardware able to run a compatible operating system with a CPU that supports OpenGL 2.1 and Intel HD Graphics 3000 (or higher).

2. The VMS Desktop application shall not require any dedicated graphics drive to work at full capacity (64 streams on a 64 bit OS) and shall use the CPU for all video decoding and rendering.

C. Installation & Configuration

1. The VMS Client application should be a publicly available, free download.

2. The VMS Client application should require no prerequisite proprietary or 3rd party software and database technologies during installation.

3. The VMS Client installation process should require no user input once initiated.

D. Features

1. The VMS Desktop application will have the following basic structure:

    a. Navigation Panel - with a main menu button, an interactive cloud-login icon, tabbed layouts, minimize and maximize icons, a contextual help icon, and a close application icon.

    b. Resource Panel (Left) - contains all system resources (Servers, Devices, Users, Layouts, Offline files, etc.) with collapsible structure and a keyword search mechanism to allow operators to quickly search for a display live streams / cameras, offline video and image files, or any combination thereof.

    c. Notifications Panel (Right) - shows all system or rules-engine generated notifications which can be clicked on to display relevant resource in the Viewing Grid as well as Motion Events, Bookmarks, System Alerts, and Detected Objects with the ability to launch an Advanced Object Search dialog.

    d. Timeline Panel (Bottom) - allows for navigation and search of recorded video files

    e. Viewing Grid (Main Viewing Area) - a flexible adaptive grid interface which allows operators to create and share customized layouts of system resources.

    f. Advanced Object Search Dialog - the VMS should allow operators to search for detected objects by type and attributes.

2. The VMS Desktop application shall allow operators to view and interact with the following types of media:

    a. Live Streams: H.265, H.264, MJPEG

    b. Offline Media: AVI MKV MP4 MOV TS M2TS MPEG MPG FLV WMV 3GP JPG PNG GIF BMP TIFF

c. I/O Devices: Status and Triggers

d. Servers: Real-Time Server Health Monitoring Status

3. The VMS Desktop application shall allow the operator to scroll to zoom in to any part of the Viewing Grid.

4. The VMS Desktop application shall allow the operator to drag & drop to reassign cameras from one server to another server.

5. The VMS Desktop application will have a flexible timeline that allows operators to view the dates of any and all archived video in the System for a specific camera, or groups of cameras.

6. The VMS Desktop application will allow operators to manually create bookmarks - with a start time, end time, name, description, and tags - for later search. Automated Bookmarks shall also be able to be created using the Rules engine.

7. The VMS Desktop application should allow operators to create automations using the Rules Engine with the following Events & Actions::

    a. Events
        i. User Defined Events

        User Defined Events are custom Events which must be programmed by a user before they can be utilized and include:

            1. Analytics Event
            2. Analytics Object Detected
            3. HTTP Generic Event (covered in Advanced Training)
            4. Input Signal on Device
            5. Motion on Camera
            6. Plugin Event
            7. Soft Trigger

        ii. Default Events

        Default Events are configurable Events which are populated in the Rules Engine when a new Nx Witness System is installed.

            1. Archive Backup Finished
            2. Device Disconnected
            3. Device IP Conflict
            4. License Issue
            5. Network Issue
            6. Server Conflict
            7. Server Failure
            8. Server Started

9. Storage Issue

iii. System Generated Events

System Generated Events are built-in Events which the System will generate a notification to operators and cannot be modified by System users.

1. Archive Integrity Check Failure
2. Email Address Not Set
3. Email Not Set for Users
4. Email Server Not Configured
5. Error while Sending Email
6. Licenses Not Configured
7. Local storage is used for analytic and motion data
8. Reindexing Archive Canceled
9. Reindexing Archive Complete
10. Remote Archive Synchronization
11. Storage not Configured
12. System in Safe Mode
13. Time Synchronization Issue
14. Server Certificate Error

b. Actions

1. Bookmark
2. Device Output
3. Do Recording
4. Do HTTP Request
5. Execute PTZ Preset
6. Exit Fullscreen
7. Open Layout
8. Panic Recording
9. Play Sound
10. Repeat Sound
11. Send Email
12. Set to Fullscreen
13. Send Mobile Notification
14. Send Desktop Notification
15. Show on Alarm Layout
16. Show Text Overlay
17. Speak
18. Write to Log

8. The VMS Desktop application shall allow operators to create Soft Triggers - programmable, customizable buttons which sit on top of streams in the Viewing Grid - to trigger any available system action.

9. The VMS Desktop application shall have icons located on the top of live camera streams which allow operators to dewarp fisheye cameras, control PTZ cameras, apply client-side image enhancement, execute smart motion search, create zoom windows, rotate items to any orientation, and activate stream or file info.

10. The VMS Desktop application shall allow operators to create Zoom Windows (up to 63 zoom windows on a single item in a 64 bit OS) - a magnified view of a part of a live stream, recorded videos, or static images.

11. The VMS Desktop application shall allow operators the ability to execute a Smart Motion search by selecting a subset of a live camera stream with results shown in red on the flexible timeline. Smart Motion search should be able to search a year (12 months, 365 days) of archived video in less than one (1) second.

12. The VMS Desktop application will allow users to search live cameras by name, manufacturer, IP address, MAC address, and status (e.g. live).

13. The VMS Desktop application shall allow operators to search video archives by date and time with a responsive, adaptive timeline.

14. The VMS Desktop application will allow operators to customize the background image of the application with supported image types.

15. The VMS Desktop application will support digital mapping by allowing operators to add and customize background images - including opacity and number of grid points.

16. The VMS Desktop application will utilize adaptive scaling technology to automatically switch between high and low resolution streams during live and recording playback to optimize CPU and network usage.

17. The VMS Desktop application will allow operators to log in to the Cloud application in order to quickly connect to any shared system.

18. The VMS Desktop application will allow operators to quickly switch between previously connected or cloud-accessible systems using searchable tiles that show system name and status.

19. The VMS Desktop application will have a Storage Analytics feature allowing operators to analyze storage capacity of the system based on available drives and real-time and historical bandwidth analysis.

20. The VMS Desktop application will allow management and configuration of all System devices, users, and resources in a single unified interface.

21. The VMS Desktop application will allow fast-forward and fast-reverse of archived video up to 16x normal speed.

22. The VMS Desktop application will show operators which system server they are connected to.

23. The VMS Desktop application will allow operators to connect to previous versions by automatically downloading and switching to compatible versions.

24. The VMS Desktop applications will automatically discover available systems on the same network as the computer running the Desktop application.

25. The VMS Desktop application will automatically recover and reconnect to a system in the instance the server the operator is connected to becomes inaccessible for any reason.

26. The VMS Desktop application will allow operators to show or hide adaptive thumbnails in the timeline panel.

27. The VMS Desktop application will allow operators to synchronize all items on a layout or disable synchronization to view live and recorded video at the same time.

28. The VMS Desktop application will have adaptive settings dialogs, allowing operators to switch dialog content while the dialog is open by clicking on a resource.

29. The VMS Desktop application will allow batch configuration of camera recording schedules, fps, and quality.

30. The VMS Desktop application will allow operators to drag and drop multiple system resources onto the Viewing Grid at the same time (including the resources located in different systems connected to the same Cloud account).

31. The VMS Desktop Application will allow administrators to modify time synchronization settings for the system to utilize online resources (NTP servers) or to set a dedicated local time server.

32. The VMS Desktop Application will allow system administrators to view a full list of system cameras and devices in a single dialog.

33. The VMS Desktop application will allow operators to view, search and export all system events.

34. The VMS Desktop application will allow operators to view, search and export all system bookmarks.

35. The VMS Desktop application will allow operators to view, search, and export system logs.

36. The VMS Desktop application will allow operators to view, search, and export an audit trail of all operator actions and replay related video.

37. The VMS Desktop application will allow administrators to backup and restore the system database.

38. The VMS Desktop application will allow administrators to replace a camera while preserving the archive from the previous-one.

39. The VMS Desktop application will allow administrators to create an unlimited number of custom user roles.

40. The VMS Desktop application will allow administrators to create and share lockable layouts.

41. The VMS Desktop application will allow administrators to update layouts in real time.

42. The VMS Desktop application will allow users to record their screen in full resolution and up to 30fps.

43. The VMS Desktop application will allow users to add a local folder to add local files for search and playback.

44. The VMS Desktop application will have a Video Wall mode which will allow operators to control the application remotely.

45. The VMS Desktop application will have a Media Player mode which will allow operators to use the application as a media player.

46. The VMS Desktop application will remember past system connections and user credentials and will allow operators to quickly search for and switch between systems.

47. The VMS Desktop application will allow operators to adjust the aspect ratio and streaming quality (high resolution or low resolution) of items displayed on the viewing grid.

48. The VMS Desktop application will display I/O devices as an individual item on the viewing grid and allow operators to create custom names for inputs and output.

49. The VMS Desktop application will allow users to customize the layout of I/O panels on the item in the viewing grid including indicators for inputs and buttons for outputs.

50. The VMS Desktop application will allow users to de-warp any fisheye lens using automatic calibration or manual calibration without the need for any third (3rd) party SDKs.

51. The VMS Desktop application will allow users to create fully customizable viewing tours which include any combination of live video streams, offline videos, images, websites (or URLs), I/O devices, and Server health monitoring status.

52. The VMS Desktop application will allow system administrators to modify and save a shared layout to affect an instantaneous change to that layout on the VMS Desktop application of any user connected to the system viewing that layout (when the system administrator saves the layout the layout will update in real time for any user viewing that layout).

53. The VMS Desktop application will support two-way audio between operators and supported devices.

54. The VMS Desktop application will support audio alerts as an action that can be played on users' computers or connected system devices.

55. The VMS Desktop application will support PTZ presets and tours.

56. The VMS Desktop application will support PTZ presets and tours in fisheye cameras using de-warp mode.

57. The VMS Desktop application will allow operators to schedule recording for connected cameras and devices with options to force minimum and maximum storage durations.

58. The VMS Desktop application will allow operators to configure pre and post recording for motion events.

59. The VMS Desktop application will allow operators to optimize camera streaming quality from connected devices automatically using low, medium, high, best quality selectors or manually in the camera.

60. The VMS Desktop application will allow users to export video by selecting an area on the timeline and right clicking to export.

61. The VMS Desktop application will support single video export in .avi, .mp4, or .mkv formats and will offer the option to transcode any client-side effects (image enhancement, de-warping, timestamps) as part of the exported video.

62. The VMS Desktop application will support multi-video export in an executable format to create a fully portable version of the VMS Desktop application including all exported

video files.

63. The VMS Desktop application shall have a rapid review export feature which will allow operators to compress any length of video into a short video (e.g. export 8 hours of archives into a 30 second video clip).

64. The VMS Desktop application shall allow system administrators to activate or deactivate system licenses on Internet connected systems.

65. The VMS Desktop application shall allow users to force open an alarm layout triggered by any system or 3rd party event with one or many associated cameras or resources.

66. The VMS Desktop application will have a hidden configurable method of increasing the amount of items allowed on the viewing grid.

67. The VMS Desktop application shall allow users to adjust configuration of devices.

68. The VMS Desktop application shall support keyboard shortcuts to control various interface options including PTZ mode, Smart Search mode, & layout control.

69. VMS will allow analytics from Wisenet and other supported devices with analytics (Axis, DW, Hikvision).

70. The VMS Desktop application will force users to set an initial password for Wisenet camera upon enrollment, for best cyber security practices.

71. The VMS Desktop application should allow operators the ability to create and send custom Push Notifications to Mobile Application users.

72. The VMS Desktop application should allow operators to access a camera web page as part of the Camera Settings dialog both locally and remotely (proxied via VMS) with a dedicated browser window embedded in the Camera Settings Dialog.

73. The VMS Desktop will allow users to enable client-side Intel Quicksync decoding.

74. The VMS Desktop application should allow operators to enable encrypted connections and archiving.

2.03 - VMS Mobile Client Application

A. Supported Operating Systems

The VMS Mobile application shall support the following operating systems.

a. Google Android

i. Android 8
ii. Android 9
iii. Android 10
iv. Android 11
v. Android 12
vi. Android 13

b. Apple iOS

i. iOS 12
ii. iOS 13
iii. iOS 14
iv. iOS 15
v. iOS 16
vi. iPadOS 14
vii. iPadOS 15
viii. iPadOS16

B. Installation

1. The VMS Mobile application will be available as a free download from Google Play or Apple iTunes stores.

C. Features

1. The VMS Mobile application will automatically discover available Systems on a local area network (LAN).

2. The VMS Mobile application will store past system connections and credentials and will allow users to quickly search for and switch between systems.

3. The VMS Mobile application will have adaptive streaming and automatically adjust the stream being displayed based on network speed.

4. The VMS Mobile application will allow users to adjust streaming resolutions manually.

5. The VMS Mobile application will allow users to search for cameras by name.

6. The VMS Mobile application will allow fisheye dewarping of any fisheye lens without the need for any 3rd party SDK.

7. The VMS Mobile application will allow users to view live video from one system.

8. The VMS Mobile application will allow users to log in to the VMS Cloud layer in order to view and access all systems shared with a user.

9. The VMS Mobile application will utilize a custom media player to render and display live thumbnails and video.

10. The VMS Mobile application will allow users to search video using a calendar.

11. The VMS Mobile application will allow users to search video using a flex timeline.

12. The VMS Mobile application will allow “Smart Motion Search” to search archived video by selecting an entire video or specific area.

13. The VMS Mobile application shall support Push Notifications when connected to Cloud

14. The VMS Mobile application shall allow users to control cameras using Soft Triggers

15. The VMS Mobile application should support two-way audio

16. The VMS Mobile application should allow operators to navigate using shared Layouts

17. The VMS Mobile application should have live thumbnails for connected cameras in multi-camera view.

18. The VMS Mobile application should allow users to control PTZ cameras with single touch-to-move.

19. The VMS Mobile application should allow users to navigate through bookmarks.

20. The VMS Mobile application should support Push Notifications which can be separately configured for each System in a multi-System environment.

2.04 - VMS Cloud Application

A. Supported Browsers

1. The VMS Cloud application should allow users to log in from any modern web browser (Google, Chrome, Mozilla Firefox, Microsoft Edge, Opera, Brave, etc) on any device.

B. Features

1. The VMS Cloud application will be an optional add-on to the VMS requiring no additional licensing.
2. The VMS Cloud application will allow users to connect an unlimited number of systems to a single user account.
3. The VMS Cloud application will allow system administrators to share access to a system using only an email address.
4. The VMS Cloud application will allow system administrators to assign custom user roles when sharing system access.
5. The VMS Cloud application will allow users to quickly search for and connect to cloud-connected systems by name.
6. The VMS Cloud application will allow operators to view live or recorded video from one camera at a time on any cloud-connected system.
7. The VMS Cloud application will first attempt a direct connection to system servers using NAT Traversal technology and will be able to proxy traffic to ensure access to a system in the case of ISP or routing issues.
8. The VMS Cloud application will allow an unlimited number of connected users and systems with no additional licensing.
9. The VMS Cloud application will utilize secure networking technologies (OpenSSL, HTTPS) and a complex Salted MD5 hash for any stored passwords.

10. The VMS Cloud application will allow two systems to be merged together to operate as one system without the need for port forwarding or local access.

11. The VMS Cloud application should have a Health Monitoring Dashboard that shows all System devices, their status, and associated metrics with the ability to download a JSON log file containing all health information from the past 24 hours.

12. The VMS Cloud application will allow operators to view and modify camera settings including aspect ratio, rotation, audio, authentication, recording settings, quality of recording, and motion detection sensitivity.

13. The VMS Cloud application will allow operators to view, restart, rename, or change communication port settings for all Servers in a System.

14. The VMS Cloud application should allow operators to enable and force two factor / OAUTH2 authentication for all users in a System.

15. The VMS Cloud application should allow operators to export video archive portions.

16. The VMS Cloud application should provide two different skins (modes): Light and Dark.

17. The VMS Cloud application should allow system owners to transfer ownership to another user.