Powered by Nx VMS
A&E Specification

V6.0.x/24.1.x - July 2024

Table of Contents

1.0 - General

1.1 – System Description

1.1.1– General Requirements

a) The specified software product shall be an open, extensible video platform designed to receive and record data streams, display and export data, analyze video data, and optionally take predefined actions based on analyzed data or when a predefined platform state is achieved.

b) The specified software product shall include, free of charge, APIs and/or SDKs that can enable the integration of 3rd party devices and systems.

c) The specified platform architecture for the Video Management System shall incorporate a Desktop Client, a standalone Server application, a Mobile device client, and Cloud-Hosted applications that are required to meet the requirements in this specification.

1.2 – Abbreviations and Standards

1.2.1 – Abbreviations & Acronyms

Abbreviation or Acronym	Description or Definition
ACC	Active Content Compression
ADDS	Active Directory Domain Services
AGC	Automatic gain control
API	Application Programming Interface
AVI	Audio Video Interleave
Bit Rate	The number of bits over time
DHCP	Dynamic Host Configuration Protocol
FPS	Frames per Second
FTP	File Transfer Protocol
GbE	Gigabit Ethernet
H.264	Advanced Video Coding

Abbreviation or Acronym	Description or Definition
H.265	High Efficiency Video Coding
HTTP	Hypertext Transport Protocol
IEEE 802	Authentication framework for network devices
IP	Internet Protocol
JPEG	Joint Photographic Experts Group
LAN	Local Area Network
MJPEG	Motion JPEG
MKV	Matroska video format
MP4	MPEG Layer-4 video format
MPEG	Moving Picture Experts Group
NTP	Network Time Protocol
NTSC	National Television System Committee
ONVIF	Open Network Video Interface Forum
PoE	Power over Ethernet (IEEE 802.3af/at)
PTZ	Pan, Tilt, and Zoom
SDK	Software Development Kit
RAID	Redundant Array of Independent Disks
RTSP	Real-Time Streaming Protocol
RADASS	Resolution and Algorithmic Data Adaptive Scaling System
SMTP	Simple Mail Transfer Protocol
SSL	Secure Sockets Layer
TCP	Transmission Control Protocol
TLS	Transport Layer Security

Abbreviation or Acronym	Description or Definition
VMS	Video Management System

1.2.2 – Standards Compliance

1.3 – Quality Assurance

1.3.1 – Basic Level of Support

a)   All material and equipment shall be provided by the System Integrator and be available freely online.

1.4 – Proposal Submittals

1.4.1 – Basic Level of Support

a)   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.

1.4.2 – System Documentation

a)   The System Integrator will provide:

   i)   A list of all equipment with part numbers

   ii)   The manufacturer and firmware version (when applicable)

   iii)   Assigned IP addresses.

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

1.4.3 – Planning

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

b) 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

1.4.4 – Qualifications

a) The manufacturer shall have a minimum of five (5) years' experience producing IP video equipment and software.

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

1.5 – Ongoing Support & Warranty

1.5.1 – Integrator Warranty

a) 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 one year from the date of the final acceptance of the Video Surveillance System.

1.5.2 – Software Licensing, Service Subscriptions, an dWarranty

a) The Professional Edition shall provide software licensing on a per-device basis (e.g. 1 license for 1 IP Camera, 1 license for an I/O device) with no base license for additional features or capabilities

b) The Enterprise Edition shall provide subscription services that are billed on a month to month basis (1 recording service for a month). Professional licenses are not supported on the Enterprise Edition

c) The VMS Software shall demonstrate, at no cost, live streaming or playback of locally stored media files for five (5) minutes or less.

d) The Manufacturer shall provide lifetime software upgrades to the application without cost and without the need for an annual maintenance agreement

2.0 – Video Management System (VMS)

2.1 – VMS Overview

2.1.1 – VMS Software Components

The specified VMS platform shall consist of four (4) primary software applications that share data and resources.

a) Cloud - A cloud-based application that provides access to system resources, data, and configuration information to an unlimited number of users by way of standard internet browser protocols.

   i) The Cloud application shall be an optional, free-to-use component for Professional versions of the VMS platform.

   ii) The Cloud application shall be a required, free-to-use component of the Enterprise version of the VMS platform.

b) Server - A lightweight, high-performance cross-platform application that shall perform the following activities and have the attributes described below:

   i) The Server provides for the active discovery of devices on the network

   ii) The Server shall record or playback data streams

   iii) The Server shall stream video and other data to connected and authorized clients

   iv) The Server shall establish and maintain secure connections.

   v) The Server shall configure System resources and manage associated metadata.

   vi) The Server shall provide an embedded, web-broswer-based administration service that operates over a local network with no internet connection required.

   vii) The Server application shall be fully functional when installed on supported versions of the Microsoft Windows and the Ubuntu Linux Virtual Machines.

   viii) The Server application shall be fully functional when installed on supported versions of the Microsoft Windows and the Ubuntu Linux operating systems.

   ix) The Server application shall be fully functional when installed on supported versions of the Debian-Linux operating systems for ARM-powered devices.

   x) The Server installation package shall be less than 200 MB in size

   xi) No prerequisite software installations are required to install and run the Server on each supported operating system..

c) Desktop Client – A lightweight, high-performance cross-platform application that shall have the following attributes:

  i)   The Desktop Client shall function as a stand-alone media player.

  ii) The Desktop Client shall be capable of configuring connected devices, users, and related metadata.

  iii) The Desktop Client shall act as a presentation video wall or remote display using screen monitoring and mirroring technologies.

  iv) The Desktop Client installation package shall be available for supported versions of Microsoft Windows, macOS, and Ubuntu operating systems.

  v)   The Desktop Client shall support two-factor authentication when required by the server.

  vi) The Desktop Client application installation package shall not exceed 200 MB in total size

  vii) No prerequisite software installations are required to install or use the Desktop Client on supported operating systems.

d) Mobile Client - A native mobile application that shall perform the following activities and have the described attributes:

  i)   The Mobile client shall be able to render video and audio data streams from devices connected to the system server..

  ii) The Mobile Client shall run on supported versions of the iOS and Android operating systems.

  iii) The Mobile Client application installation package should not exceed 100 MB in total size and require no prerequisite software to install and use on supported operating systems.

2.1.2 – VMS Developer & Integration Tools

The VMS shall have built-in developer tools that are accessible from the Web administration interface and shall include, at a minimum:

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.

b) Server/Cloud API – A HTTP CRUD REST API stack hat includes the following:

  i)   System API

ii)   Server API

iii)   Cloud API

iv)   Video API

v)   Audio API

vi)   Proxy API

vii)   WebSocket API

viii)   Authentication & Encryption

ix)   Breaking Change Log

c) Client (Java Script API)

Enables developers to integrate web applications running in the embedded browser into a System.

d) Video Source Integration SDK

i)   The Video Source SDK shall enable the integration of compatible live or recorded video sources (IP Cameras, NVRs, DVRs, etc) into the VMSmethods for discovering devices, integrating I/O ports, and incorporating motion detection information.

ii)   The Video Source SDK shall enable the displaying, analyzing, and recording of audio and video sources.

e) Storage SDK

Enables developers to read and write to mass storage (local, network, cloud) services.

f) Metadata SDK

An SDK designed for integrating object-driven video analytics from third-party software or hardware. The metadata SDK pulls in object coordinates and associated metadata and generates events and context actions in the Desktop Client user interface.

2.1.3 – VMS Architecture

a) The VMS shall have a Server Hive Architecture wherein:

i)   All servers in a system are equal and peer to each other.

ii)   Operational databases (device configuration, system settings, user rights) are synchronized in near real-time without the need for operator configuration or an additional administrative interface.

iii)   The VMS architecture shall provide an automatic camera failover mechanism (move cameras to another server) to limit the loss of video recording in the event of hardware or network failure.

iv)   The Professional Edition shall allow users to connect to any server in the system and perform tasks enabled by their permission group membership.

v)   The Enterprise Edition shall provide a hierarchy where systems belonging to an Organization can be placed in folders. Each folder can have a unique set of permitted users belonging to the same Organization.

vi)   The VMS shall provide Server failover service to move cameras between servers and continue recording in case of a hardware or network issue; previously recorded data is not moved by the failover mechanism.

b) The VMS shall support automated System updates.

i)   The Professional Edition shall allow System Administrators to upgrade or deploy a specific VMS version to an entire system via a single button in the Desktop Client.

ii)   <mark>The Enterprise Edition shall provide a mechanism to update or deploy a specific VMS version to all sites (servers) within an Organization.</mark>

iii)   ~~System Administrators shall be able to apply an OTA (over the air) update~~

iv)   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.

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

i)   Continuously deprecated and insecure protocols.

ii)   OpenSSL for network connections.

iii)   Only use TLS v1.2+.

iv)   Provide an option to force encryption between the Client and the Server for API data

v)   Provide an option to force encryption of HTTPS video traffic between Client and Server.

vi)   Set TLS as is the default option for e-mail Server communications.

vii)   Local user credentials shall be protected using a salted MD5 hash,

viii)   Cloud Credentials shall use a complex multi-level hash.

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

e) The system shall scale 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.

  i) The system shall support a maximum of 10 Servers.

  ii) The system shall support a maximum of 2,560 dual-stream sources.

  iii)

  iv) The system shall support a maximum of 1,000 concurrent users in a system.

2.2 – VMS Server Application

2.2.1 – Supported Operating Systems

The VMS Server application shall support the following operating systems.

a) Microsoft Windows

  i) Microsoft Windows 10

  ii) Microsoft Windows 11

  iii) Microsoft Windows Server 2016

  iv) Microsoft Windows Server 2019

  v) Microsoft Windows Server 2022

b) Ubuntu Linux

  i) Ubuntu 20.04 LTS

  ii) Ubuntu 22.04 LTS

c) macOS (Desktop Client only)

  i) macOS 12

  ii) macOS 13

  iii) macOS 14

d) ARM powered Debian Developer Boards

    i)   NVIDIA Jetson Devices

    ii)   Raspberry Pi Devices starting from Raspberry Pi 4 (Server only)

e) Virtualization and Containerization Platforms

    i)   VMWare

    ii)   VirtualBox

    iii)   Docker

2.2.2 − Minimum Hardware Requirements

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

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

2.2.3 − Installation & Configuration

a) The VMS Server application shall be a publicly available download.
Availability is subject to local laws.

b) The VMS Server application shall not require prerequisite proprietary or 3rd party software and database technologies during installation.

c) The VMS Server installation process shall not require user input once initiated

d) 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.

2.2.4 − Features

a) 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.

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

c) The VMS Server application shall support up to 1000 concurrent TCP connections

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

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

f) The VMS Server application will support an unlimited number of users who belong to permission groups.

g) The VMS Server application shall support any type of storage medium - HDD's, SSD's, SD cards, m.2, DAS).

h) The VMS Server application shall connect to (read/write) from network-attached storage that can be mapped and configured in the application.

i) The VMS Server application shall connect to (read/write) from Cloud storage services that provide a persistant address that can be configured in the application.

j) The Enterprise Edition shall provide a subscription service for cloud storage.

k) The VMS Server application shall support LDAP via Microsoft Active Directory, OpenLDAP, and JumpCloud and integrate LDAP user groups with the VMS user permission groups.

l) The VMS Server application shall record and stream H.264, H.265, and MJPEG

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

n) The VMS Server application shall transcode streams on demand for delivery to third-party systems or devices: H.265, H.264, MJPEG, or WebM.

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

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

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

r) 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 a 3rd party system or device.

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

t) The VMS Server application shall support IPv4 and IPv6 addressing.

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

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

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

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

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

z) The VMS Server application shall automatically disable any system drive (drive containing the operating system) in computing hardware with more than one drive to prevent the operating system drive from becoming full.

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

bb) The VMS Server application shall support sending email notifications via SMTP using TLS, SSL or unsecured connections. Cloud SMTP Server should be an available option.

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

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

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

ff) 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.

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

hh) The VMS Server application shall 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.

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

jj) The VMS Server application shall have a web administration interface that allows operators to merge two systems together through Cloud or disconnect the VMS Server from the VMS Cloud application.

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

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

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

nn) ~~The VMS Server application will support any RAID configuration of storage medium~~

oo) 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.

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

qq) All VMS Server connections use SSL/TLS Certificate pinning to render man-in-the-middle attacks impossible.

rr) VMS Servers and Clients also use new session-based (bearer token) authentication by default.

2.3 – VMS Desktop Client Application

2.3.1 – Supported Operating Systems

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

a) Microsoft Windows

    i) Microsoft Windows 10

    ii) Microsoft Windows Server 2012

    iii) Microsoft Windows Server 2012 R2

    iv) Microsoft Windows Server 2016

    v) Microsoft Windows Server 2019

    vi) Microsoft Windows Server 2022

b) Ubuntu Linux

    i) Ubuntu 18.04 LTS

    ii) Ubuntu 20.04 LTS

    iii) Ubuntu 22.04 LTS

c) Apple macOS

      i)   macOS 11

     ii)   macOS 12

    iii)   macOS 13

d) ARM

      i)   Debian Developer Boards

     ii)   NVIDIA Jetson Devices

2.3.2 − Minimum Hardware Requirements

a) The VMS Desktop application shall 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).

b) The VMS Desktop application shall not require a discreetework at full capacity (64 streams on a 64 bit OS) and shall use the CPU for all video decoding and rendering.

2.3.3 − Installation & Configuration

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

b) The VMS Client application should require no prerequisite proprietary or 3rd party software or technologies during or after installation.

c) The VMS Client installation process shall not require user input once initiated.

2.3.4 − Features

a) The VMS Desktop application will have the following basic structure:

  i) Navigation Panel (Top) − provides a main menu button, an interactive cloud-login icon, tabbed layouts, a contextual help icon, and buttons to minimize, maximize, and close the application.

  ii) Resource Panel (Left) − displays system resources (Servers, Devices, Layouts, Offline files, etc.) within a collapsible structure and a resource search mechanism.

  iii) Notifications Panel (Right) − contains tabs that toggle the display of system or rule generated notifications, motion events, bookmarks, system alerts, and detected objects with the ability to launch an advanced object search dialog.

  iv) Timeline Panel (Bottom) − allows for the navigation and searching of recorded video files with optional indicators for bookmarked chunks for data.

v) Viewing Grid (Main Viewing Area) – an adaptive grid interface that allows operators to create and share customized layouts containing system resources.

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

    i) Live Streams: H.265, H.264, MJPEG

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

    iii) I/O Devices: Status and Triggers

    iv) Servers: Real-Time Server Health Monitoring Status

    v) Webpages?

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

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

e) 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.

f) 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.

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

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

    i) Analytics Event

    ii) Analytics Object Detected

    iii) HTTP Generic Event (covered in Advanced Training)

    iv) Input Signal on Device

    v) Motion on Camera

    vi) Plugin Event

    vii)   Soft Trigger

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

    i)   Device Disconnected

    ii)   Device IP Conflict

    iii)   License Issue

    iv)   Network Issue

    v)   Server Conflict

    vi)   Server Failure

    vii)   Server Started

    viii)   Storage Issue

    ix)   System Generated Events

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

    i)   Archive Integrity Check Failure

    ii)   Email Address Not Set

    iii)   Email Not Set for Users

    iv)   Email Server Not Configured

    v)   Error while Sending Email

    vi)   LDAP Sync Issue

    vii)   Licenses Not Configured

    viii)   Local storage is used for analytic and motion data

    ix)   Reindexing Archive Canceled

    x)   Reindexing Archive Complete

    xi)   Remote Archive Synchronization

    xii)   Storage not Configured

    xiii)   System in Safe Mode

    xiv)   Time Synchronization Issue

xv)   Server Certificate Error

k) Actions

i)   Bookmark

ii)   Device Output

iii)   Do Recording

iv)   Do HTTP Request

v)   Execute PTZ Preset

vi)   Exit Fullscreen

vii)   Open Layout

viii)   Panic Recording

ix)   Play Sound

x)   Repeat Sound

xi)   Send Email

xii)   Set to Fullscreen

xiii)   Send Mobile Notification

xiv)   Send Desktop Notification

xv)   Show on Alarm Layout

xvi)   Show Text Overlay

xvii)   Speak

xviii) Write to Log

l) 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.

m) 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.

n) 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.

o) 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.

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

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

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

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

t) 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.

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

v) 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.

w) 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.

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

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

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

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

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

cc)   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.

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

ee)   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.

ff) 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.

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

hh)   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).

ii) 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.

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

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

ll) The VMS Desktop application will allow operators to view, search and export all ystem bookmarks.

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

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

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

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

qq)   The VMS Desktop application will provide predefined user groups.

rr) The VMS Desktop application will provide guest temporary access to the system with limited permissions.

ss)   The VMS Desktop application will allow administrators to create an unlimited number of custom user groups and set the permissions.

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

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

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

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

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

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

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

aaa)   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.

bbb)   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.

ccc)   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.

ddd)   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.

eee)   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.

fff)   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).

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

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

iii) The VMS Desktop application will support PTZ presets and tours.

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

kkk)   The VMS Desktop application will support object following in real-time through different cameras (Camera Hotspot and Camera Linking)

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

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

nnn)   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.

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

ppp)   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.

qqq)   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.

rrr)   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).

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

ttt)   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.

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

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

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

xxx)   VMS will allow analytics from Wisenet and other supported devices with analytics (Axis, DW, Hikvision, Vivotek, Bosch, Dahua,).

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

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

aaaa)   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.

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

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

2.4 – VMS Mobile Client Application

2.4.1 – Supported Operating Systems

The VMS Mobile application shall support the following operating systems.

a) Google Android

    i)   Android 9

    ii)   Android 10

    iii)   Android 11

    iv)   Android 12

    v)   Android 13

    vi)   Android 14

b) Apple iOS

    i)   iOS 16

    ii)   iOS 17

    iii)   iPadOS 16

    iv)   iPadOS 17

2.4.2 − Installation

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

2.4.3 − Features

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

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

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

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

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

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

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

h) 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.

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

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

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

l) The VMS Mobile application will allow "Smart Motion Search" to search archived video by selecting an entire video or specific area.

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

n) The VMS Mobile application shall allow users to control cameras using Soft Triggers

o) The VMS Mobile application should support two-way audio

p) The VMS Mobile application should allow operators to navigate using shared Layouts

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

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

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

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

2.5 – VMS Cloud Application

2.5.1 – Supported Browsers

a) The VMS Cloud shall properly function on Internet Browser Applications that are compliant with the following specifications:

    i) W3C

    ii) HTTP v# (living spec?)

    iii) CSS?

    iv) JavaScript

    v) WWW3

    vi) << consider linking standards>>

2) 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.

2.5.2 – Features

a. The VMS Cloud application will be an optional add-on to the VMS requiring no additional licensing.

b. The VMS Cloud application will allow users to connect an unlimited number of systems to a single user account.

c. The VMS Cloud application will allow system administrators to share access to a system using only an email address.

d. The VMS Cloud application will allow system administrators to assign custom user roles when sharing system access.

e. The VMS Cloud application will allow users to quickly search for and connect to cloud-connected systems by name.

f. The VMS Cloud application will allow operators to view live or recorded video from one camera at a time on any cloud-connected system.

g. 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.

h. The VMS Cloud application will allow an unlimited number of connected users and systems with no additional licensing.

i. The VMS Cloud application will utilize secure networking technologies (OpenSSL, HTTPS) and a complex Salted MD5 hash for any stored passwords.

j. 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.

k. 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.

l. 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.

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

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

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

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

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