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Wisenet WAVE- Video Management System for remote devices and sensors

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

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: See further notes on the following page.

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 to the product referenced in this specification.

Primary Specification Area:

MasterFormat 2014:

28 20 00	Electronic Surveillance
28 23 00	Video Surveillance
28 23 29	Video Surveillance Remote Devices and Sensors

MasterFormat 2016:

28 20 00	Video Surveillance
28 2x xx	Surveillance Cameras
28 2x xx	IP Cameras

Related Requirements:

MasterFormat 2014:

27 20 00	Data Communications
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

MasterFormat 2016

27 15 01.xx	Video Surveillance Communications Conductors and Cables
27 20 00	Data Communications
28 05 xx.xx	PoE Power Sources 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	Safety and Security Network Communications Equipment
28 2x 00	Video Management System

Wisenet WAVE- Video Management System for remote devices and sensors**Hanwha Wisenet Wave****v4.0.0.29988**

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1. General

1.01 System Description

A. General Requirements

1. The specified product shall be an open 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 Audio
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. Product Documentation

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
 - List of all equipment with part numbers, manufacturer, firmware, and assigned IP addresses.
 - Locations and details for all components to be installed under this scope of work

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. Product

2.01 VMS Overview

A. VMS Software Components

1. The System shall be comprised of four (4) applications which work together seamlessly.
 - Cloud - a cloud application that enables simple remote connectivity, viewing, and management of an unlimited number of systems and users.
 - Server - a media server responsible for discovering, connecting to, and managing system users, devices, and associated data.
 - Desktop - a desktop application capable of acting as a stand-alone media player or as a client application for connecting to and managing systems.
 - Mobile - a mobile application for iOS and Android devices that allows users to connect to, view, search, and control IP cameras over Wifi or Data networks.

B. VMS Developer & Integration Tools

1. 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:
 - 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.
 - Server API – SUNAPI implementation that gives developers the ability to access every system feature available.
 - API Change Log - list of breaking changes in API from version to version
 - Video Source Integration SDK - provides 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.
 - Storage SDK - provides the ability to integrate potential storage into System. It allows developers to read from or write to any storage location: local, remote, and even cloud one. Creating a storage plugin requires implementing standard functions such as: I/O stream, if file exist, delete file, list of files in the folder, etc.Storage SDK also contains an example for using an FTP server as a storage location.

C. VMS System Architecture

1. The VMS shall have a Server Hive Architecture wherein:
 - All servers in a system are equal and synchronize system databases in real-time
 - A user can connect to any system server to see and manage the entire system
 - Servers support automatic camera failover to ensure limited loss of video recording in the event of hardware or network failure.
 - Servers will use a SQLite - a free database technology - included in the installation package

2. The VMS shall support one-click system wide updates.
 - System Administrators shall be able to upgrade an entire system via a single button in the Desktop Application.
 - System Administrators shall be able to upgrade on demand to the latest release or specific builds with specific functionality or bug fixes
 - System Administrators shall be able to apply an OTA (over-the-air) update
 - 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.
 - OpenSSL for network connections - deprecated and insecure protocols and use only TLS v1+.
 - Server to Client (Mobile, Desktop, Web) Communications – Option to force encryption between Client and Server for API data.
 - Option to force HTTPS video traffic encryption between Client and Server.
 - HTTPS Email notification - TLS / SSL - TLS is the default option for Email Server communications.
 - 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. The system shall support exceeding these recommended maximums by consulting with engineering support.
 - The system shall support a maximum of 100 Servers in a system.
 - The system shall support a maximum of 10,000 resources in a system.
 - 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 be able to run on any of the following operating systems.

Operating System	Versions
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Microsoft Windows	<ul style="list-style-type: none">• Windows 7• Windows 8• Windows 8.1• Windows 10• Windows Server 2012• Windows Server 2012 R2• Windows Server 2016 (Long-Term Servicing Channel) 1607• Windows 10 Enterprise
Ubuntu Linux	<ul style="list-style-type: none">• Ubuntu 16.04 LTS: "Xenial Xerus"• Ubuntu 18.04 LTS
NVIDIA Jetson Support	<ul style="list-style-type: none">• NVIDIA Tx1 and Tx2

B. Minimum Compatible Computing Hardware

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. Initial Installation & Setup

1. The VMS Server application installer should not exceed 100 MB (megabytes).
2. The VMS Server application should be a publicly available, free download.
3. The VMS Server application should require no prerequisite proprietary or 3rd party software and database technologies during installation.
4. The VMS Server installation process should require no user input once initiated
5. 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 framerate, limited only by hardware.
5. The VMS Server application shall support automatic camera failover without any additional licenses.
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

2.03 - VMS Desktop Application

A. Supported Operating Systems

Operating System	Versions
Microsoft Windows	<ul style="list-style-type: none"> • Windows 7 • Windows 8 • Windows 8.1 • Windows 10 • Windows Server 2012 • Windows Server 2012 R2 • Windows Server 2016 (Long-Term Servicing Channel) 1607 • Windows 10 Enterprise
Ubuntu Linux	<ul style="list-style-type: none"> • Ubuntu 14.04 LTS • Ubuntu 16.04 LTS: "Xenial Xerus" • Ubuntu 18.04 LTS
Apple / Mac	<ul style="list-style-type: none"> • OSX 10.11: "El Capitan" • OSX 10.12: "Sierra" • OSX 10.13: "High Sierra"

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 installer should not exceed 100 MB (megabytes).
2. The VMS Client application should be a publicly available, free download.
3. The VMS Client application should require no prerequisite proprietary or 3rd party software and database technologies during installation.
4. 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:
 - 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.
 - 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.
 - Notifications Panel (Right) - shows all system or rules-engine generated notifications which can be clicked on to display relevant resource in the Viewing Grid
 - Timeline Panel (Bottom) - allows for navigation and search of recorded video files
 - Viewing Grid (Main Viewing Area) - a flexible adaptive grid interface which allows operators to create and share customized layouts of system resources.
2. The VMS Desktop application shall allow operators to view and interact with the following types of media:
 - Live Streams: H.265, H.264, MJPEG
 - Offline Media: AVI MKV MP4 MOV TS M2TS MPEG MPG FLV WMV 3GP JPG PNG GIF BMP TIFF
 - I/O Devices: Status and Triggers
 - 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 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. Bookmarks shall also be able to be created using the Rules engine.
7. 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.
8. 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.
9. 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.
10. 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.
11. The VMS Desktop application will allow users to search live cameras by name, manufacturer, IP address, MAC address, and status (e.g. live).
12. The VMS Desktop application shall allow operators to search video archives by date and time with a responsive, adaptive timeline.
13. The VMS Desktop application will allow operators to customize the background image of the application with supported image types.
14. The VMS Desktop application will support digital mapping by allowing operators to add and customize background images - including opacity and number of grid points.
15. 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.
16. The VMS Desktop application will allow operators to log in to the Cloud application in order to quickly connect to any shared system.

17. 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.
18. 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.
19. The VMS Desktop application will allow management and configuration of all System devices, users, and resources in a single unified interface.
20. The VMS Desktop application will allow fast-forward and fast-reverse of archived video up to 16x normal speed.
21. The VMS Desktop application will show operators which system server they are connected to.
22. The VMS Desktop application will allow operators to connect to previous versions by automatically downloading and switching to compatible versions.
23. The VMS Desktop applications will automatically discover available systems on the same network as the computer running the Desktop application.
24. 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.
25. The VMS Desktop application will allow operators to show or hide adaptive thumbnails in the timeline panel.
26. 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.
27. 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.
28. The VMS Desktop application will allow batch configuration of camera recording schedules, fps, and quality.
29. The VMS Desktop application will allow operators to drag and drop multiple system resources onto the Viewing Grid at the same time.
30. 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.
31. The VMS Desktop Application will allow system administrators to view a full list of system cameras and devices in a single dialog.
32. The VMS Desktop application will allow operators to view, search and export all system events.
33. The VMS Desktop application will allow operators to view, search and export all system bookmarks.
34. The VMS Desktop application will allow operators to view, search, and export system logs.
35. The VMS Desktop application will allow operators to view, search, and export an audit trail of all operator actions and replay related video.

36. The VMS Desktop application will allow administrators to backup and restore the system database.
37. The VMS Desktop application will allow administrators to create an unlimited number of custom user roles.
38. The VMS Desktop application will allow administrators to create and share lockable layouts.
39. The VMS Desktop application will allow administrators to update layouts in real time.
40. The VMS Desktop application will allow users to record their screen in full resolution and up to 30fps.
41. The VMS Desktop application will allow users to add a local folder to add local files for search and playback.
42. The VMS Desktop application will have a Video Wall mode which will allow operators to control the application remotely.
43. The VMS Desktop application will have a Media Player mode which will allow operators to use the application as a media player.
44. The VMS Desktop application will remember past system connections and user credentials and will allow operators to quickly search for and switch between systems.
45. 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.
46. 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.
47. 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.
48. 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.
49. 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.
50. 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).
51. The VMS Desktop application will support two-way audio between operators and supported devices.
52. The VMS Desktop application will support audio alerts as an action that can be played on users' computers or connected system devices.
53. The VMS Desktop application will support PTZ presets and tours.

54. The VMS Desktop application will support PTZ presets and tours in fisheye cameras using de-warp mode.
55. The VMS Desktop application will allow operators to schedule recording for connected cameras and devices with options to force minimum and maximum storage durations.
56. The VMS Desktop application will allow operators to configure pre and post recording for motion events.
57. 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.
58. The VMS Desktop application will allow users to export video by selecting an area on the timeline and right clicking to export.
59. 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.
60. 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.
61. 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).
62. The VMS Desktop application shall allow system administrators to activate or deactivate system licenses on Internet connected systems.
63. 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.
64. The VMS Desktop application will have a hidden configurable method of increasing the amount of items allowed on the viewing grid.
65. The VMS Desktop application shall allow users to adjust configuration of devices.
66. The VMS Desktop application shall support keyboard shortcuts to control various interface options including PTZ mode, Smart Search mode, & layout control.
67. VMS will allow analytics from Wisenet and other supported device with analytics (Axis, DW, Hikvision)
68. The VMS Desktop application will force users to set an initial password for Wisenet camera upon enrollment, for best cyber security practices.

2.04 - Mobile Application

A. Supported Operating Systems

Operating System	Versions
Google Android	<ul style="list-style-type: none"> • Android 8.0, 8.1: "Oreo" • Android 9.0
Apple iOS	<ul style="list-style-type: none"> • iOS 11.4 • iOS 12.1 • iOS 12.2 • iOS 12.3

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 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 de-warping 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 allow users to control the display of any connected "Lite Clients" in the system.
10. The VMS Mobile application will utilize a custom media player to render and display live thumbnails and video.
11. The VMS Mobile application will allow users to search video using a calendar.
12. The VMS Mobile application will allow users to search video using a flex timeline.
13. The VMS Mobile application will allow "Smart Motion Search" to search archived video by selecting an entire video or specific area.

2.04 - VMS Cloud Application

A. Supported Browsers

1. The VMS Cloud application will allow users to log in from any modern web browser (Google Chrome, Mozilla Firefox, Microsoft Edge, Opera, etc.) from any type of device (mobile, pc, etc.)

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 allows two systems to be merged together to operate as one system without the need for port forwarding or local access.