
SENTRY VMS Architecture and Engineering Specification Document

1. System Description

- a. SENTRY VMS IP Video Management Systems are turnkey solutions featuring pre-installed software on a purpose built, non-proprietary hardware platform strategically designed for 24x7/365 operation.
- b. The VMS product line, PRO, EDGE and Enterprise will manage from four to an unlimited number of IP or analog cameras.
- c. SENTRY VMS provides a highly scalable, open platform solution for enterprise class systems. The SENTRY VMS shall be a digital video management solution which connects to an IP network.
- d. Video streams shall be delivered by IP cameras or video encoders and shall be recorded at pre-defined rates by a scheduling agent, upon detection of motion or by a defined policy.
- e. Live video and recorded archives shall be viewable via thick client software or web browser from any PC connected to the local area network (LAN), the wide area network (WAN) or via the Internet.
- f. Network video management, recording, monitoring, and control units shall be as manufactured by IPVideo Corporation.

1. VMS Server Licensing

- a. The VMS Server software shall provide simple per camera licensing available in single camera increments with no base or server fees.
- b. The VMS Server Software shall not use Individual camera MAC address registration for cameras and/or encoders.
- c. No per station licensing costs for client applications.
- d. Multi-stream connections only require one license.
- e. The VMS server software shall support Arecont 180° and 360° cameras with only a single license
- f. The VMS server software shall support megapixel virtual cameras (IQInvision & Arecont) within a single camera license.

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- g. The VMS Server software shall not require the administrator to contact the manufacturer to replace a camera.

2. VMS Server Software

- a. The VMS Server software shall be designed to run on a Windows platform, supporting both Desktop and Server class operating systems including Windows 7 and Windows 2008 Server.
- b. The VMS Server Software shall provide virtualization support for VMWare, Hyper-V and Xen.
- c. The VMS Server software shall run as a Windows Service. This service shall run as part of the local service account. This service shall be running as long as the system is booted and has started Windows. It shall not require the user to be logged in.
- d. The VMS Server software will store settings in SQL Express and shall not require a full MS-SQL license, however, The full version of SQL Server can be utilized.
- e. This service shall connect to the camera and handle streaming to the server. It shall not require each client to connect to individual cameras.
- f. This service shall allow the cameras to be placed on one network and the clients on a separate network using a different IP range.
- g. The server software shall support the ONVIF standard.
- h. A universal HTTP and RTSP option shall exist for adding cameras if they are not currently supported through native APIs
- i. The Universal HTTP support will allow iPhone/iPod/iPad and Android Tablets to be used as IP Cameras, where video streamed from the handheld device is captured and managed by the VMS Server Software in the same manner as a traditional IP Camera.
- j. The VMS server software shall only require two ports for streaming video as well as handling any setting changes or commands from the client software.
- k. The VMS Server Software shall support H.264, MPEG-4, MJPEG and MxPEG based cameras, including 1800 different models from over 80 different manufacturers.
- l. The VMS Server software shall support the following video resolutions :
 - 1. 320x240
 - 2. 352x240
 - 3. 640x480
 - 4. 704x240
 - 5. 704x480
 - 6. 800x600

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7. 1288x968
 8. 1280x1024
 9. 1600x1200 (*2 Megapixel*)
 10. 2048x1536 (*3 Megapixel*)
 11. 2592x1944 (*5 Megapixel*)
 12. 3648x2752 (*10 Megapixel*)
 13. Special sizes or odd aspect ratios supported
- m. The VMS Server software shall support reporting to a diagnostic tool to allow for troubleshooting the VMS Server.
 1. The server will report the number of active cameras.
 2. The server shall report active cameras offline.
 3. The version of the server.
 4. The amount of disk space left.
 5. The recording status of the server.
 - n. The VMS server software shall support an optional Failover server to allow for data and video migration in the event of a server failure. The failover server will replace and manage the cameras that were managed by a failed server.
 - o. The VMS Server software will export the server configuration and camera settings to an Excel format.
 - p. The VMS Server software will only stream video to clients that are actively requesting video. If live video is paused then the server shall stop streaming video to the clients to conserve bandwidth.
 - q. The VMS Server Software shall support Multicast and Unicast.
 - r. The VMS Server Software will support Auto Discover to allow for rapid camera configuration.

3. VMS Server Software - User Management

- a. Multi-level security including restriction of setup, management, live and recorded viewing, PTZ operation, access to layouts, facility maps, rules and clip creation
- b. The VMS server software shall support an unlimited number of users.
 1. Users can be drawn from either an Active Directory server, Novell eDirectory or entered manually.
 2. There will be five different levels of user.
 3. Users can be members of a group with settings set for the group. Individual user settings can override the group settings.
 4. Permissions can be set for live viewing, access to recorded video, control of PTZ cameras, access to audio, the ability to export video, custom layouts, facility maps and rules. Permissions can be defined on a per camera basis.

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5. Users only see assigned cameras regardless of the number of VMS Servers.
 6. The VMS server shall support the option of having the users limited to being signed in to a single location.
 7. The VMS Server Software will provide PTZ Prioritization where users can be ranked to determine who has PTZ operations at a specific time

4. VMS Server Software - Video Recording

- a. Storage options shall be determined individually for each managed camera. Video shall be stored at user selectable rates in increments of Frames per Second (FPS) or Frames per Minute (FPM) with complete control over image size and compression. Each camera shall have a specific storage path, and quotas can be set separately for each camera to ensure that the allocated space on the storage drive is not exceeded.
- b. The Server shall record the video streams from different cameras.
 1. The service shall handle transcoding of the camera streams if the cameras are MJPEG based. The video shall be re-encoded to WMV to reduce storage needs and to reduce the impact of streams to clients on the server.
 2. For MPEG-4 based cameras, the video shall be stored in the native codec of the server.
 3. For H.264 based cameras the video shall be stored in the native codec of the server.
 4. Each camera will have the option to be able to be stored in different locations (i.e. One locally, another on a NAS, a third on a different network share)
 5. The VMS Server Software must have Pivot 3 and Veracity Coldstore integration.

5. VMS Server Software - Motion Detection

- a. The VMS Server software shall support both server side motion detection as well as camera side motion detection.
- b. The VMS Server software shall provide graphic examples of what it determines as motion to thick clients if the thick client requests it.
 1. The software shall display the motion detection as an outline around the area moving.

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2. The software shall provide a bar showing the total percentage of change. This bar shall have a slider on it to allow the user to quickly set motion detection.
- c. The VMS Server software shall allow for multiple zones to be set within an image that support differing motion detection values within a cameras field of view.
 1. There shall be no limit on the total number of zones allowed, either on a per camera or per server basis.
 2. Zones should allow the ability to ignore motion within an area.
 3. The user shall have the ability to move the zones after the fact.
 4. Motion zones should be able to be tied into a rules engine to allow the software use them as triggers for events.
 - d. The VMS server software shall support pre-motion and post motion recording.

6. VMS Server Software - Rules Processor

- a. The VMS Server software shall include a wizard driven rules processor to allow the server to manage more complex macro events or tasks.
- b. Triggers will include:
 1. Dry contacts (DIO)
 2. Motion detection of a camera stream.
 3. Scheduled events. Events can be scheduled on daily, weekly, or monthly basis.
 4. Individual events can be handled as well.
 5. An Action Button for the user interaction in the Monitor Station.
 6. Inputs sent programmatically via appropriate APIs.
- c. Actions will include:
 1. Logging the event.
 2. Opening or closing a dry contact.
 3. Sending an e-mail with a custom text message tied to the trigger. Multiple texts will be allowed for different triggers.
 4. Sending an e-mail with an .avi clip from a selected camera.
 5. Sending an e-mail with a .jpg of a selected event from a camera.
 6. Opening a live window for a user who is viewing.
 7. Move a PTZ to a certain preset location.
 8. Force recording.
 9. Force recording with audio.
 10. Instant Replay
 11. Sending video to a Network Decoder
 12. Switching single camera or layout views.
 13. Message Instruction
 14. Moving, copying or deleting of files

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15. Execute Programs and/or Batch Files
 16. Audio Alert
 17. Time Lapse Recording
 18. ASCII message to TCP/IP Socket

7. VMS Server Software - Access Control Integration

- a. The VMS server software shall support integration with various access control platforms, including:
 1. Imron
 2. S2
 3. Lenel
 4. RS2
 5. DSX
 6. Isonas
 7. Paxton

8. VMS Server Software - Video Analytics Support

- a. The VMS server software shall support integration with various in camera Video Analytics, including:
 1. Video IQ
 2. Pelco
 3. Canon
 4. UDP
 5. Sightlogix

9. VMS Health Monitor

- a. The VMS Server Software will include a separate Health Monitor application that will listen for reports given by the VMS Server software service as to its status.
- b. If the VMS Health Monitor detects anything abnormal, it will give a visual display through GUI front end, or by sending out an e-mail to one or more users.
- c. The VMS Health Monitor will be able to support an unlimited number of servers.
- d. The VMS Health Monitor will be hosted locally or across the internet.
- e. The VMS Health Monitor shall have the option to be run as a service.

10. VMS Client Software : Live Video

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- a. The VMS Client software will be a thick client for viewing live and recorded video, along with handling administrative tasks.
 - b. The VMS Client software shall be able to run concurrently on multiple workstations throughout the network, and will not require any additional licensing per workstation.
 - c. The VMS Client software will not be limited in the number of servers it can connect to.
 - d. The VMS Client Software will support an encrypted XML file for storing settings. The file can be set up to be shared between many clients, allowing the administrator to update all clients with a single file push.
 - e. The VMS Client software shall include an Auto Update feature which allows the client to update automatically each time the VMS Server software is upgraded.
 - f. Clients shall have user name and password authentication for access.
 - g. Clients shall be able to use Active Directory to authenticate users.
 - h. Clients shall be able to use Novell E-directory.
 - i. Clients shall be able to use permissions that are built into VMS Server Software.
 - j. The VMS Client software shall display the available connected servers along with the managed cameras in a tree view on the left hand side.
 1. The tree view will allow the user to see the status of the servers that the VMS Client software has been configured to connect to.
 2. The tree view will also include access to custom layouts, facility maps and action buttons.
 3. There will be an option to hide the tree on start up of the monitor station.
 4. The user shall be able search for cameras/servers using a searchable box on the left hand tree.
 - k. Live view will allow views of 1, 4, 8, 9, 10, 13, 16, 25 and 36 cameras. A widescreen option for 18 and 24 cameras will also be available.
 1. Layouts will be selectable via icon or keyboard function keys.
 2. Layouts will not be limited to cameras from a single server.
 3. Users will be able to get any combinations of layouts to cycle through on the main screen.
 4. Users will be able to cycle between multiple cameras from multiple servers.
 5. Layouts shall be able to be cycled
 - l. If motion is detected on a camera then the software, then the camera shall have a red pulse around the edge of the window.
 - m. Live view will allow cameras to be dragged and dropped onto the live view from the left hand tree. Cameras can be duplicated in a view.
 - n. Users will be able to invoke a digital zoom by drawing a box.

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- o. After invoking the digital zoom, the VMS Client Software shall support the use of picture in picture within the zoomed image.
 - p. Digitally zoomed areas will be treated as a digital PTZ.
 - q. PTZ Presets shall be listed in a drop down menu in the camera window.
 - r. Users shall be able to move the PTZ movements simply by clicking on the image or by using the scroll wheel.
 - s. The VMS Client Software will support USB Joysticks to control telemetry, zoom, focus and iris.
 - t. Live view will support a full screen mode that hides the UI. User shall be able to start the VMS Client software in full screen mode with a setting.
 - u. Live view shall allow the user to de-warp the video provided by Sentry 360, Mobotix, ONCAM/Grandeye cameras and ImmerVision lenses.
 - v. The VMS Client software will allow users of Sentry 360 cameras to de-warp live video in a Panorama or a Quad Display.
 - w. Right clicking on a camera in live view will have the following behaviors:
 - 1. Right clicking on a camera within live view will allow the user to be able to review the recently recorded video for that camera.
 - 2. Right clicking on a camera within live view will also allow access to the properties dialog box for that camera.
 - 3. Right clicking on a camera will bring up the option to save a still image of the live view.
 - 4. Live audio will be able to be accessed by right clicking on a camera in the live view.
 - 5. Allowing access to recorded video.
 - x. The user will be able to enable or disable the following settings in the VMS Client software:
 - 1. Display Server name in the live view.
 - 2. Display Camera Name in the live view.
 - 3. Audio notification on motion.
 - 4. Forcing aspect ratio.
 - 5. Use Direct Show for display.
 - 6. Double clicking to change the server layout.
 - 7. Double clicking expands the camera.
 - 8. Allowing multiple live windows.
 - 9. Block live windows from popping up.
 - 10. Live window always on top.
 - 11. The speed in which layouts cycle.
 - 12. Hiding left tree on start up.
 - 13. Launching Facility maps on start up.
 - y. The VMS Client Software shall allow users to send video to other users in the form of a video popup window.

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- z. The VMS Client Software will allow users to send messages to other users, in the form of a pop up window that includes a typed message allowing for notification of important events.
 - aa. The VMS Client software shall support the ability to open a live window pop up that can be moved around and resized. This window will be able to access the view of any camera or layout the user has access to.
 - bb. The VMS Client software shall support both 1-way and 2-way live audio communication.

11. VMS Client Software : Video Wall Component

- a. The VMS system shall include a Video Wall Component.
- b. The first VMS Video Wall component shall be added to the standard VMS Client Software and will enable a new navigation platform which allows the client to push video to the Video Wall via a drag and drop user interface.
- c. The second VMS Video Wall component shall be installed separately on a Workstation that is connected to multiple monitors, to be designated as a Video Wall.
- d. The VMS Video Wall shall support up to 64 separate monitors.
- e. The VMS Video Wall shall allow monitoring of a large quantity of cameras at one time, by controlling the display of multiple public display monitors from a single console.
- f. The VMS Video Wall shall allow each monitor to display a single camera, a server or a customized layout.

12. VMS Client Software : Recorded Video

- a. Access to recorded video will be controlled by user, on a camera by camera basis.
- b. Recorded video will be able to be accessed in the live view, expanding the camera in the tree view, or by opening the media player via the pull down menus.
- c. The Media player shall support the following functionality:
 - 1. The ability to fast forward and rewind video at up to 16x normal playback speed.
 - 2. The ability to save video directly to a CD or to a local hard drive or network share.
 - 3. If motion detection and logging are enabled, a timeline of video will be displayed. The user will be able to zoom in on the timeline and use it to select where video will start playing from.

4. Users will have access to a motion log which will show motion events and how long they occurred for. Clicking on the entry will start the video from the appropriate spot.
 5. The player will support digital zoom.
 6. The player shall support audio playback.
 7. The player controls will include the ability to quickly scrub through single and multiple clips for rapid review.
 8. The player will have the option to allow an object search. The user will be able to define an area and seek out changes in the image within that area.
 9. The User shall have the option of exporting the video as WMV, MPEG-4 or MJPEG.
 10. User will have the option to burn time-date into the video as a clip.
 11. Users will have the option to create a time index file for clips.
- d. Synchronized playback will allow for cameras to simply be dragged and dropped into the player.
 - e. The VMS Client Software will include a repair utility for corrupted video.
 - f. The VMS Client Software will support an Alarm Log to make it easier to find DIO and Motion based events.

13. VMS Client : Video Export

- a. The VMS Client Software will provide the ability to generate clips of recorded video. The clips can be defined by either frame numbers or by the use of slider bars visible on the player.
- b. The VMS Client Software will also allow users to save JPEG images or print snapshot.
- c. Exported video clips include server based date/time stamp and camera name.
- d. Option to include MD5 checksum watermark in each clip, use Standalone Player to validate.
- e. Recorded video is saved in cameras native or MJPEG compression in AVI file.
- f. Exported clips include audio.
- g. Synchronized video export of up to 9 video streams in single AVI file.
- h. Standalone Player with Watermark Validation allows users to review recorded video on any PC while viewing thumbnails and using a scroll bar for precise investigation. Also included is the option to validate a watermark.

14. VMS Client : Map Based Navigation

- a. The VMS Client software shall support the use of imported maps to show camera placement. These maps will be in .jpg, .gif, or .bmp formats as determined by the user.
- b. Hovering over a camera on a map shall cause it to be displayed in a dedicated window.
- c. When the camera is displayed, the option to review recently recorded video will be available to them.
- d. Alarms from DIOs shall be able to be embedded as well.
- e. Clicking on a different embedded map shall bring up that map.
- f. If motion is detected at the camera, the camera will change color on the map.
- g. Cameras will display where they are pointed.
- h. Embedded layouts will change the layout of the Monitor station if they are clicked on.
- i. Embedded Facility maps will cause the current map to change to the embedded map if clicked on.

15. VMS Client : Server Administration

- a. The VMS Server software shall not require a separate application to setup and administer the system.
- b. Users with Administrator privileges will be able to configure the server and camera settings using the VMS Client Software.
- c. Users without Administrator privileges will not be able to use the VMS Client software to make changes to any server or camera settings
- d. Administrators shall be able to add cameras to the selected VMS Server.
- e. Administrators shall be able to configure the IP Address, User Name, Password and Ports for a given camera or encoder.
- f. Administrators shall be able to specify the frame rate of the camera, including the option to have the server record continuously at 1 fps with the option to go to the cameras maximum frame rate on motion detection.
- g. Administrators shall be able to select various time-lapse options for the camera.
- h. Administrators shall be able to select the camera stream type.
- i. Administrators shall be able to select camera or server side motion detection.
- j. Administrators shall be able to access a graphic representation of what the server's motion detection settings are picking up.
- k. Administrators shall be able to specify the video recording path.

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- l. Administrators shall be able to define Privacy Zones on MJPEG cameras.
 - m. Administrators shall be able to configure User Settings to define permissions to specific system resources, add/delete/edit user permissions, create user groups and specify PTZ prioritization order.
 - n. Administrators shall be able to configure and define camera layouts
 - o. Administrators shall be able to configure and define Maps.
 - p. Administrators shall be able to create/add/edit Rules for the Rules Processor.
 - q. Administrators shall also be able to test SMTP settings and database settings.
 - r. Administrators shall be able to setup and connect to Health Monitor servers.
 - s. Administrators shall be provided real time status updates for server status and camera status, including the CPU usage, disk usage, bandwidth usage and number and names of users who are logged in.
 - t. Administrators shall be able to display logging information, such as changes to the server, lost camera signals, who exported recorded video, when did users log-on/off and other errors. The log will be exportable as txt or to the Windows clipboard.

16. VMS Web Client

- a. The VMS Web Client will be a thin client, using either an active-x control or an MJPEG streaming method. The plug-in is only required for h.264 streaming.
- b. The VMS Web Client will not be limited to Windows platforms only.
- c. The VMS Web Client shall support IE, Firefox, Safari, Chrome and Opera.
- d. Users will not be able to change any settings within the server via the thin client.
- e. Users will be able to select layouts for live viewing, or individual cameras or groups of cameras.
- f. Users will be able to access recorded video.
- g. Users will be able to download recorded video from the system.
- h. Users will be able to use the motion log to find recorded video.
- i. The VMS Web Client shall support the use of facility maps.
- j. The VMS Web Client will support the use of custom layouts.
- k. The VMS Web Client will use IIS as its web server.
- l. The VMS Web Client shall allow remote access for iPhone, Blackberry, Windows Mobile, and Android mobile phones without the installation of an app.
- m. The VMS Web Client shall support SSL Certificates for secure connections.