State of the art hyper-optimized video management platform designed for ease, speed and efficiency.

Attention: This document is intended to serve as a quick reference guide. See the DW Spectrum® IPVMS full manual for more information on features and functionality.
INTRODUCTION

Welcome to DW’s DW Spectrum® IPVMS System reference guide. This document is supplemental to the DW Spectrum® IPVMS user manual and provides examples of the major features within the DW Spectrum® IPVMS client software.

In this presentation we will review the following topics:

- **DW Spectrum® IPVMS architecture**
- **The DW Spectrum® client user interface**
- **Connecting to servers**
- **Displaying video sources**
- **Controlling video sources**
- **Panoramic cameras**
- **Viewing archived video**
- **Exporting images and video**

DEMONSTRATION SYSTEM

All content collected for this document was captured using the DW Spectrum® IPVMS demonstration servers. These servers can be accessed from a DW Spectrum® client and an internet connection. Feel free to try the functions described within the document on the same servers to replicate the results. The information required to connect to these servers is provided in the below image.

*Connecting to and retrieving video sources over the internet does require a robust internet connection. A connection speed of at least 50Mbps is recommended for viewing multiple cameras over the internet.*

*Video files for many of the functions are presented in this document are available via “Watch:” hyperlinks.*

*These hyperlinks will connect to video files are stored on YouTube which requires an internet connection to view.*

DW SPECTRUM® IPVMS ARCHITECTURE

DW Spectrum® IPVMS is Open to be deployed on common computing hardware platforms running both Windows® and Linux® operating systems. Factory integrated hardware and software server sets are available as part of DW’s Complete IP End-to-End Solution. Additionally, DW Spectrum’s open architecture supports thousands of devices.
including cameras, encoders and I/O modules from leading manufacturers. The architecture depicted here is a simplified view of a DW Spectrum® IPVMS composed of the most common elements of the DW® product line.

The purpose of this diagram is to provide a relational view of the typical components of the architecture. The numbers (#) preceding each component name correspond with the number descriptions below the diagram.

**VIDEO SENSORS**
1. IP cameras: DW® MEGApix® IP cameras are internet protocol ready cameras that connect to the system via 10/100BaseT cabling.
2. Analog HD cameras: DW® HD over COAX® cameras that connect using existing closed-circuit coax cables.

**VIDEO IP RECORDERS**
3. Network video recorder: Blackjack® NVRs powered by DW Spectrum® IPVMS server providing video storage and management functions.
4. Analog to IP encoders: DW® Compressor™ analog to IP video encoders convert analog cameras to IP signals so that they can be recorded by network video recorders (NVRs).
5. NVR monitor and KB: A video monitor, keyboard and mouse connected directly to the NVR. This monitor can act as an administrator or user work station on small systems.

**NETWORK HARDWARE**
The number, type and configuration of the IP network that supports the connectivity will be determined by the number of cameras, camera placement in the facility, availability of client networks and other factors.
6. PoE switch: 10/100 T or 10/100/1000 T power over ethernet network switch. Power over ethernet provides low voltage power to the camera and housing.
7. Network switch / router: A router or switch that provides the branching function to multiple PoE routers.
USER WORK STATIONS

8 DW Spectrum® client: User computing devices (PC, MAC, tablets, smart phones) loaded with the appropriate client application. Client workstations can be local to the installation or remotely connected to the server. Access to servers from remote locations is determined by the client’s internet connection which includes security devices and firewalls. The client’s internet connection must be configured to allow external connections to the DW Spectrum® IPVMS servers.

DW CLOUD™

9 DW Cloud™ client: Powered by Amazon Web Services, makes connecting to and managing DW Spectrum® IPVMS System(s) simple. Set up in seconds. Connect from anywhere. Share with an unlimited number of users.

CONNECTING TO A SERVER

After starting the DW Spectrum® client, the initial landing page is where you select the server to which you wish to attach. In the middle of the screen there will be one or more boxes displaying the most recent servers that have been accessed with this instance of the client.

Each box will contain the name of the server. The IP address assigned to the server and the user name of the last user to log onto the server with current instance of the client.

If the desired server does not show up in the center of the screen, the user can search through a list of those located by the client on the network.

• Select the Connect to Another Server Button to open the Search Window.

• Using the Drop down, scroll through the list of servers and select the desired server.
If the desired server does not show up in the center of the screen, the user can search through a list of those located by the client on the network.

- Select the connect to another server button to open the search window.
- Using the drop down, scroll through the list of servers and select the desired server.

- Enter your user name and pass word in the required spaces.

- At this point it is a good idea to use the test feature to validate that the user name and password provided are valid for the server.
- If the server can be accessed by the client, a success message is displayed.
- After a brief period, the client should open with the user interface displaying the feed from the selected server.
DW SPECTRUM® CLIENT USER INTERFACE

The user interface for the DW Spectrum® client is based on an open architecture. The open architecture provides a consistent look and feel to the client across multiple user platforms. User platforms include the DW Spectrum® IPVMS server applications, The DW Spectrum® IPVMS computer client and apps for Apple® and Android® devices.

SCENE SPACE

The large area in the center is the scene space, where video items from the video system’s resources are displayed.
VIDEO RESOURCES

Apple® and Android® devices support display of the following video resources:

- Cameras: live and archived
- Web pages: internal and external HTML sites
- Locally stored: video and still image files

Live and recorded camera video

Web sources

Locally stored media
DISPLAY LAYOUTS

Video sources are displayed in the scene space in containers called layouts.

- Within layouts, video sources can be arranged on the scene space as:
  - a single window or
  - a frame containing multiple video sources.
- Layouts can be composed of a combination of different source types.
- Layouts are explained in further detail in displaying video sources.

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**Single video source**

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**Multiple video source**

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**Mixed media source**
MAIN MENU

In the top left of the screen is the main menu button. The main menu provides the following:

- Connect to a new server: selecting this menu item will bring up the "connect to server" pop up screen as demonstrated in the "Connecting to a Server" section. The current server connection is maintained until a new server is selected in the pop-up window.

- Disconnect from the server: selecting this menu item will disconnect the client from the current server and will return the client to the initial landing page as shown in the "Connecting to a Server" section.

- New: opens a sub menu that contains menu options for creating a new tab, window or showreel.

- Open: opens a sub menu that contains menu options for opening previously saved video or image files, folders containing stored multiple saved video or image files or previously saved showreel.

- Start / stop screen recording: this menu option toggles between start and stop for screen recording. Screen recording captures all content on a designated workstation screen. All video and screen shots provided in this document were initially recorded using this feature.

- Bookmark log: DW Spectrum® IPVMS provides the ability to bookmark periods of video for logging events or observations. These bookmarks are saved so that a period of video can be retrieved at a later time. This menu opens a window displaying all bookmarks saved on the server.
RESOURCE TREE

The resource tree occupies the left side of the user interface screen and is broken into the following sections:

- **Server connection:** at the top of the resource tree is a box that contains the name of the current server to which the DW Spectrum® client is attached.
- **Client user name:** below the server name is the user ID for the current user logged into the DW Spectrum® client.
- **Cameras & resources:** in this section of the tree is a list of all video resources connected to the given server. As spectrum is an IP based system, video sources can be comprised of more than cameras. In this example the list of resources includes several server status feeds. These video sources make up the first group of resources that can be added to the scene space for the display of live or recorded images.
- **Layouts:** resources added to the scene space are contained in layouts which are explained in further detail in the Working with Layouts.
- **Showreels:** showreels provide the ability to cycle through multiple layouts on a single workstation screen. Showreels are displayed in full screen mode.
- **Webpages:** as an IP system, the DW Spectrum® IPVMS server and client can connect to HTML sources on the network. Depending on the external connections, these sources can include internet sites such as the home page displayed here and in video resources.
- **Local files:** local files is the list of video and image files that have been located on the local workstation by the client. AVI files created by screen recording and PNG still images saved when taking screen shoots are listed here. If the desired file does not appear in this list, use the open menu under the main menu to locate and open the file.
NAVIGATION BAR

The navigation bar across the top contains the main menu, the tab navigator, and window control buttons.

TAB NAVIGATOR

- The tab navigator is used to switch between currently open layouts, open an existing layout and to create new layouts.
- Each time a layout is open or a new layout is created, the layout will appear as a tab across the navigation bar.
- The x on each tab is used to close the tab.
- The + button is used to create a new layout. The new layout will initially be empty until new resources are added.
- The v drop-down menu will provide a list of all layouts stored on the server in which the current user has access. The list displayed here is identical to the list displayed under layouts in the resource tree.
- Tabs can be rearranged by the user. Click the name of the tab and hold in the mouse. Drag the tab to the new location in the tab navigator and release the mouse button.

CLOUD BUTTON

- The cloud button indicates the status of a current cloud connection; selecting the cloud button allows the user to open the DW Cloud™ portal.

HELP BUTTON

- ‘?’ The question mark button invokes the Help look up function. Clicking on the button converts the mouse cursor to an arrow with a ?.
- Selecting any menu item within the DW Spectrum® client will open the DW Spectrum® IPVMS help file stored on the local workstation during installation.
- The file will open to the appropriate section of the help file.

WINDOW CONTROL BUTTONS

- The window control buttons allow the user to minimize the DW Spectrum® IPVMS window, switch between full screen and windowed screen, and the current window.
PLAYBACK PANEL

Across the bottom of the screen is the video playback panel. In this panel the user can locate and control live and recorded video from the server. See working with archived video for more detail on these functions.

SPEED SLIDER
- The speed slider adjusts the payback speed of recorded resources.

PLAYBACK BUTTONS
- The playback buttons are used for controlling the playback of recorded resources. They can also be used to pause and rewind live video.

THUMBNAILS
Thumbnails are single snapshots taken from archived video footage that are displayed on the Time Line. To open thumbnails:
- Drag upper edge of time line up so that the thumbnails area of the playback panel shows up.
- Click on the desired camera focus on the thumbnails for that resource.
- Remember that all cameras may not be recorded full time based on schedule or event triggers. Thumbnails will only be available for the periods in which the selected camera was recorded.

VOLUME CONTROL
- The volume control adjusted the sound level of voice and sound functions within the client.

PAN-TEMPORAL TIME LINE
- Pan-temporal time line provides the ability to browse and select live and archive resources.

LIVE:
- Live button, returns the displayed resource to the current feed when viewing archived video.

SYNC:
- Synchronizes the archive feeds when playing multiple archived sources of varying refresh rates.

BOOKMARK
- Places a bookmark in the video archive at the time selected on the pan-temporal time line. Bookmarks can be recalled later for fast retrieval of desired segment of archived video.

CALENDAR SEARCH
- Initiates the search by date and time feature.
DISPLAYING VIDEO SOURCES

SELECTING EXISTING LAYOUTS

Opening existing layouts can be accomplished by selecting them from a drop down on the navigation menu or from the resource tree.

The first time a client logs onto a server the scene space will likely be blank as no cameras or layouts have been selected by the current client.

The tab navigator in the top navigation bar will likely display nothing more than a tab for a new layout.

USING THE NAVIGATION MENU

- Select the V drop down menu.
- The list of available Layouts will display.
- Identify the desired Layout
- Select the layout name and it will open.

USING THE RESOURCE TREE (DRAG & DROP)

- Select the desired layout by clicking and holding the mouse.
- Drag the mouse into the scene space and release
- Layout will open.

Repeating any of these steps will open additional layouts. Each layout opened will now appear in the tab navigator across the top of the screen. The layout displayed in the scene space can be changed by selecting one of the other listed tabs displayed in the tab navigator.
CREATING AND CHANGING LAYOUTS

Creating new layouts or adding cameras to an existing layout is very much like selecting existing layouts using the double click, drag and drop and the mouse focus menu options.

ADDING CAMERAS TO LAYOUT

- Identify desired camera
- Option 1: double click on camera.
- Option 2: drag and drop the camera
- Option 3: use focus menu (right click or Ctr click). Select “open”.

CREATE NEW LAYOUT

- Select the + on the navigation menu.
- A blank scene space will appear.
- Add cameras to layout.
- Right click on tab name.
- Select “Save As”.

- Enter name for new layout and enter.
REMOVING VIDEO SOURCES

- Identify desired video window
- Option 1: click on the x to close window.
- Option 2: right click
- (Ctrl & click on mac) to open the focus menu. Select “Remove from layout”.

Repeating any of these steps will open additional cameras into the existing layout.
CAMERA CONTROL

VIDEO CONTROL MENU

DW Spectrum® IPVMS integrates all control and adjustment functions for cameras into the client user interface. Functions such as pan, tilt, zoom and camera setup can be managed using the client. The images received from the camera can also be digitally manipulated to support enhanced monitoring and investigations. Within each video source window is a series of menu functions that are specific to the video source within the window.

![Video Camera Source](Image)

ZOOM WINDOW

The zoom window functions provide the ability to use the image collected from the source to create one or more windows each enlarging a selected area of the camera. This feature is useful for live and archival viewing. The following are the steps to create multiple windows of a single camera’s scene:

- Within the viewing window of any camera, select the “Create Zoom Window” menu item.
- Using the mouse, click and hold in the button to create a window of the desired section of the camera scene.
- Drag the mouse to the desired window size and position. Do not worry about perfect placement as DW Spectrum® IPVMS will allow adjustments later.
• A new resource window will open in the existing layout that is a live zoom of the selected space. A colored box will remain on the source scene to denote that a zoom is created for the area.

• Repeat these steps to create multiple zoom windows of the single camera resource.
• Each window will update in synchronous with the source window.
• The highlighted boxes on the source scene can be moved or resized using the mouse to get the desired view in the zoom window.
PTZ CONTROL

When the video resource displayed in the video window is a pan-tilt-zoom or manual zoom camera the PTZ button will be visible in the camera control window. Manual Pan-Tilt-Zoom functions similar to those found on a conventional joystick control are replicated as an on-screen function. DW Spectrum® IPVMS also provides some automated camera positioning functions not found with a joystick control.

ENABLING THE ON SCREEN PTZ FUNCTION

- For a PTZ enabled camera, select the PTZ Control button on the camera control menu.
- A dashed crosshair and zoom + and – icons will appear in the screen as an overlay to the video.
- In the center of the crosshair is a circle Icon. Click and hold on this Icon to control the pan and tilt functions.

MANUAL PTZ

- Click and hold on the circle Icon to control the pan and tilt functions.
- Drag the mouse left, right, up or down and a triangle icon will appear.
- The further the triangle is moved away from the center the faster the pan / tilt motor will operate.
- The camera will simultaneously pan and tilt when the triangle is dragged on a diagonal.

MANUAL ZOOM

- Select and hold the + button to zoom in
- Select and hold the – button to zoom out.
- A single click on either button will increment the zoom in / out one step per click.

- Double clicking the mouse in the camera’s frame will cause the camera to zoom out to its maximum viewing angle.

ABSOLUTE MOVE CAMERAS

Cameras Equipped with Absolute Move provide additional on-screen mouse controls:

PAN / TILT TO A LOCATION (ABSOLUTE)

- This feature will pan and tilt the camera so that a selected location on the screen becomes the center of the screen space.
- Identify the location on the current scene, click and release the mouse key once in the location.
- A circle will emanate from the center of the mouse click.
- The camera will pan and tilt so that the selected location is the center of the screen.

PAN/TILT/ZOOM TO A LOCATION (ABSOLUTE)

- This feature will pan/tilt and zoom the camera so that a selected area on the screen becomes the camera frame.
- Identify the location on the current scene, click and hold the mouse, drag the mouse to create a box over the desired portion of the screen.
- A square will appear as the mouse is dragged resulting in a rectangle for the target zoom window.
- Releasing the mouse key will invoke the PTZ function resulting in the desired portion of the scene displayed in the camera’s frame.
STORING SCREEN SHOTS
During live and archived video there may be times when a screen shot of a single camera is of value. Documenting an incident or activity to share with others is a good example.

SCREEN CAPTURE
• Select the camera icon in the desired video window.
• A “Save Screen Shot As” window will appear.
• Enter the desired name for the file or accept the name provided.
• Select the save button to save the file.
• The newly saved file will appear in the Local Files section of the Resource Tree.
• To view the screen shot, locate it in the Local Files tree and add it to a new or existing layout.

SMART MOTION SEARCH
Smart Motion Search enables the user to perform a search of archived video based on motion detected within a camera scene. Step by step instructions for this feature are within the Video Playback and Search section.

• Double clicking the mouse in the Camera’s frame will cause the camera to zoom out to its maximum viewing angle.
IMAGE ROTATE

There are occasions where the image provided by the camera is limited by the physical location available for mounting. Sometimes the resulting view creates an uncomfortable perspective for the user. Image rotate function provides the ability to change the perspective of the camera scene to enable an improved viewing perspective.

ROTATE IMAGE

- Within the frame for the desired camera, select and hold the Image rotate menu item with the mouse.
- The rotation Arrows will appear on the screen.
- Rotate the image to the desired orientation.
- Resize the image frame and arrange the layout as desired.
- Save the layout to retain the rotation for future use.

Watch: Image Rotation
PANORAMIC CAMERAS

OVERVIEW

Panoramic cameras provide potential solutions for a wide range of large scale scenes. Large scale scenes are those where the dimensions of the space are larger than could be captured by a single camera. One can think of large scale scenes in three categories: wide-angle, tall and omni-directional. Panoramic cameras provide solutions to these challenges by creating a single image of the large-scale scene without sacrificing image quality and spatial perspective. Panoramic cameras come in two form factors: multi-sensor cameras and single-sensor with fish-eye lens cameras.

MULTI-SENSOR CAMERAS

Multi-sensor cameras are composed of 2 or more sensors which can create independent views of portions of a scene or the camera video can be interlaced to create one large format view the scene. Multi-sensor devices can be used for both wide and tall scenes.

The below image is a view of a parking created by a DW\textsuperscript{3} three-sensor Panoramic camera with video processing software that stitches these individual sensor images into one wide-format view of the parking lot.

FISHEYE LENS CAMERAS

Fisheye cameras are equipped with a single high-resolution video collection sensor paired with a special lens to collect imagery 360° around the camera. Fisheye cameras can be used for tall or wide scenes as well as those that are both tall and wide. Their major advantage is the ability to capture images from all directions at the same time in tight quarters. Images created by fisheye cameras are hemispheric in nature where the image is distorted and warped as shown below.
DW SPECTRUM® IPVMS Advantage with Panoramic

DW Spectrum® IPVMS creates a completely new way of thinking when it comes to video camera placement and recording. In this new paradigm, the camera is an omni-directional collection device that captures high resolution data from its field of view. Now think of this data collected and recorded as the source for multiple user-configurable virtual cameras. Each with individual view points of the space captured by the camera and recordable by DW Spectrum® IPVMS.

DEWARPING

An unprocessed image from a fish-eye camera is hemispheric and hard to interpret. The image must be de-warped in order to create usable images.

- Fisheye lens cameras have a special menu button in the camera control menu.
- The globe icon is used to perform de-warping.
- Selecting the globe button creates a linear image that represents a 90°, 180° or 360° image of the space.

- The initial image is a 90° scene. In the left corner of the image is a circle with the current degree image inside.
- Clicking this circle will change the image to 180° and then to 360°.
DW SPECTRUM® IPVMS ADVANTAGE WITH PANORAMIC

Watch: Fish-eye De-warping
PANORAMIC VIRTUAL CAMERAS

While the ability to create multiple zoom windows within camera is available for all video sources, the difference with VIRTUAL CAMERAS is that zoom windows drawn from a higher resolution image, resulting in a higher resolution zoom window image.

VIRTUAL CAMERAS

The combination of a panoramic camera, zoom window function and de-warping within the DW Spectrum® IPVMS system results in the ability to create multiple virtual cameras from a single source.

While the ability to create multiple zoom windows within camera is available for all video sources, the difference with Panoramic cameras is that zoom windows drawn from a higher resolution image, resulting in a higher resolution zoom window image.

PANORAMIC VIRTUAL CAMERAS

The image below was captured from the DW Spectrum® client and the video frames across the bottom are all zoom windows created from the multi-sensor camera in the top of the image. Because the super wide field of view is composed of 3 high resolution cameras, the pixel density for each zoom window remains high.
FISHEYE VIRTUAL CAMERAS

While the ability to convert hemispheric fisheye image into 90°, 180° or 360° linear scenes is impressive, the zoom window takes the flexibility of these cameras to a new level.

Using the Zoom Windows, de-warped segments of the camera’s data can be created directly from the hemispheric image.

DE-WARPING WITH ZOOM WINDOW

• In the video frame for the warped fisheye image, select the zoom window button from the Video Control Menu.
• Click and drag the mouse over the desired area of the hemispheric image.
• A new frame will open with a de-warped image of the selected area of the camera’s field of view.

• Repeat these to create the number of views desired for the scene.
• If the resulting zoom window does not expectations, the corresponding colored box for the window can be repositioned on the hemispheric image as needed.
SEARCH AND VIEW ARCHIVED VIDEO

SMART MOTION SEARCH

Smart motion search enables the user to perform a search of archived video based on motion detected within a camera scene.

For example: a cart is found on the warehouse floor. The user is asked to determine when the cart was left in that location and by whom. By using the following steps using the smart motion search the required information can be found.

• Identify the camera and the area of the camera to be searched.
• Initiate the smart search by selecting the magnifying glass icon in the camera’s frame.

• The red matrix will overlay on the camera’s scene.
• Using the mouse, click and drag a box over the area of interest.
• Red bars will appear in the pan-temporal time line to reflect when motion was detected within the archived video files.

• In this scene there is a lot of traffic in the location of the object, therefore it will take some time to look through the results. But with smart motion search the time frames to search are greatly reduced.

• Look through the video associated with the red bars to find in the time-line earlier in the day in which the object was not in place.

• Move forward in the time line selecting the red bars to narrow down the range of time when the cart arrived.
DATE AND TIME SEARCH

Date and time search enables the user to perform a search of archived video based on a time and date range.

For example: A cart is found on the warehouse floor at the date reflected in the photo. It is also known that the cart was not there at 1400 on the same day. The user is asked to determine when the cart was left in that location and by whom. By using the following steps for the date and time search, the user can go back into the archives to narrow down the time when the cart was left.

- Identify the camera and the timeframe of the camera to be searched.
- Initiate the date/time search by selecting the calendar icon in the bottom right of the client interface.
- The calendar will first appear.
- Select the date desired for the start of the search.
- The time matrix will then appear.
- Select the time desired for the start of the search.

IMPORTANT. Smart motion search in DW Spectrum® IPVMS assumes the selected camera supports motion detection. It is important to perform motion setup as well. See “Setting up motion mask and motion sensitivity” in the DW Spectrum® IPVMS user manual.
• The cursor on the Pan-Temporal Time Line will move to the selected time frame. Clicking anywhere on the time line will recall the video archive associated with that timeframe.
• Look through the video associated archive, find in the time-line earlier in the day in which the object was not in place.
• Move forward in the time line selecting new time segments to narrow down the range of time when the cart arrived.
• The thumbnails for the video archive are a helpful tool to help determine when the scene changes.

Once the time frame is narrowed down, let the video play to find the exact time of the object’s arrival.
• Using the pause and frame increment buttons to pin point the time when the object arrives.
• Using the screen shot and or the bookmark functions note the time the object arrived.
• Using the electronic zoom function to determine identity of the person.
EXPORTING ARCHIVE DATA

DW Spectrum® IPVMS provides powerful and flexible export capabilities. It is possible to perform export in different formats, export several videos simultaneously and perform synchronous playback of such videos, add metadata to exported videos etc.

SINGLE CAMERA EXPORT

• In the two previous examples, a segment of video was found pertaining to an object being left in the warehouse.
• Either of the two search functions can be used to locate a video segment to be exported.
• Using the mouse, click and hold on the timeline at the first point of the desired segment.
• Drag the mouse to the second point and release.
• The segment of timeline should be highlighted.
• Right Click with the mouse to open the focus menu.
• Select “Export Selected Range”.

• A pop up will open asking for the name and format of the export.
• After entering the file name and selecting the file format select “Save”.
• The file will download and provide notification once complete.
MULTI-CAMERA EXPORT

- Multi-camera export is very similar to that of a single camera. The key difference is the ability to retain the meta data associated with the cameras and then perform searches against the files using the spectrum client.
- As with the single camera export, identify the segment of video to be exported.
- If a frame does not exist with the desired cameras, create a new frame and insert the cameras.
- Using the mouse, highlight the desired segment of the timeline.
- Open the focus menu with the mouse and select “Export Multi Video”.
- The pop up will open to enter the filename and select the file type. NOV is recommended.
- Select save and the file will download.
# SYSTEM REQUIREMENTS

## Recommended Specs for the Full Client

<table>
<thead>
<tr>
<th>Processor</th>
<th>Intel Core i5 or greater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video Card</td>
<td>Intel HD Graphics 2500 (or higher) with 1GB Dedicated Memory</td>
</tr>
<tr>
<td>Resolution</td>
<td>1920 x 1080</td>
</tr>
<tr>
<td>RAM</td>
<td>4GB</td>
</tr>
<tr>
<td>NIC</td>
<td>10 / 100 / 1000 Base-T Ethernet</td>
</tr>
</tbody>
</table>

### OS Supported

#### Media Server
- **Windows**: 7 Standard, 7 Pro, 7 Ultimate, 8/8.1 Pro, 8.1 Enterprise, 10 Pro/Enterprise
- **Linux**: Ubuntu 14.04, Ubuntu 16.04

#### Client
- **Windows**: 7 Home, 7 Standard, 7 Pro, 7 Ultimate, 8/8.1 Standard, 8/8.1 Pro, 8.1 Enterprise, 10 Home/Pro/Enterprise
- **Linux**: Ubuntu 14.04, Ubuntu 16.04
- **Mac**: OSX 10.11, OSX 10.12

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* Except Storage Server version
** For Windows 10, recommend 6th Generation Intel i3/i5/i7 processors with 16GB RAM and video card with 1GB or higher RAM

Important: OS not listed will be not be supported by DW.Spectrum Tech Support