

# VISIONARY

## NETWORK AUDIO VIDEO

### E4100 • Encoder | D4100 • Decoder User Manual



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## INTRODUCTION

Visionary Solutions 4K UHD over IP cinema quality, ultra-low latency [~1 frame - visually lossless] encoder and decoder bypass the constraints of traditional switch matrix distribution systems by harnessing the flexibility and scalability of converged IP networks.

With the growing demand for 4K UHD video, professional AV designers and IT directors—in an increasingly converged AV/IT environment—can use Visionary Solutions products as an alternative to conventional distribution systems.

Visionary's PacketTV® and PacketAV® products can be deployed on any industry standard IP network. They can be used on existing enterprise IP networks or on a physically separate parallel network [private network] to offload traffic, using the same network protocols, methods, and devices but without intermingling video traffic with data or voice, and with equal ease of installation.

An encoder is connected to an [HDMI] AV source signal [a camera, STB, media player, PC or server, BluRay player, or digital signage player, etc.]. The signal is converted into a packetized network stream that is compatible with off-the-shelf IGMP enabled Gigabit Ethernet (GbE) switches (Jumbo Frames enabled). Using an existing CAT 5/6 infrastructure, users can connect CAT 5/6 to any decoder anywhere on the same GbE network. The decoder takes the IP packets received over CAT 5/6 cables, converts them back into an HDMI signal connecting directly to a display, delivering visually lossless video along with USB over IP (KVM) and RS-232 over IP controls. A signal from any encoder can be sent to any decoder on the same network. The signals can easily be controlled with our Vision Lite software to create different outputs on the display side, including video wall or matrix switching.

## NETWORK AV INFRASTRUCTURE PREREQUISITES

This section is intended to provide a basic understanding of applicable networking technologies and the infrastructure requirements needed for a successful Visionary Solutions E/D4100 system installation, and to ensure a rapid deployment and seamless integration. Many network issues can be minimized or solved before they occur with appropriate knowledge and proper planning.

The E/D4100 will work with most non-blocking, IGMP with IGMP Snooping, 8K or better Jumbo Packet 1GbE network switches. At least one layer-3 switch with IGMP-query capability is required. For PIM (multicast routing) of E/D4100 video streams, the network switches would need to be capable of PIM (Sparse, Dense, or Sparse-Dense).

Do not connect any encoders or decoders to a switch until the switch is configured for multicasting and IGMP Snooping is enabled.

Check with your switch manufacturer for the default configuration settings.

## NETWORK PROTOCOLS

All data on a network is encapsulated in packets, according to the TCP/IP protocols. Data packets are routed through the network to their destination(s) by switches using information in the header of IP packets. Transmission can be unicast or multicast. Unicast transmissions are point-to-point, from a single source to a single destination. Multicast transmissions originate from a single device and are received by a group of devices on the network, according to the Internet Group Management Protocol (IGMP). Multicast transmission is ideal for bandwidth-intensive application such as media distribution as it allows for efficient use of network bandwidth. Only a single copy of the data is distributed to multiple destinations. On the other hand, unicast distribution of media to multiple destinations is an extremely inefficient use of network bandwidth because duplicate copies of the data are sent, point-to-point, from the source to each destination. E/D4100 devices make use of the multicast protocol.

More information concerning IGMP may be found here at:

[http://docwiki.cisco.com/wiki/Internet\\_Protocol\\_Multicast#Internet\\_Group\\_Management\\_Protocol](http://docwiki.cisco.com/wiki/Internet_Protocol_Multicast#Internet_Group_Management_Protocol)

There are two ways to implement multicast routing when using our equipment:

- **IGMP** (Internet Group Management Protocol): Allows video streams (groups) to be dynamically routed only to those ports requesting the video stream. The IGMP feature prevents the multicast video traffic from flooding the network and can significantly reduce traffic in a layer-3 network. This is the recommended setting for our equipment.
- **PIM** (Protocol Independent Multicast): Functions independently of IP routing protocol. PIM Dense Mode (PIM-DM) is less preferred for this application because it floods the network using unicast routing protocols to build routing tables. For more information, visit: [http://docwiki.cisco.com/wiki/Internet\\_Protocol\\_Multicast#Protocol-Independent\\_Multicast](http://docwiki.cisco.com/wiki/Internet_Protocol_Multicast#Protocol-Independent_Multicast).

## NETWORK REQUIREMENTS

For help determining the network requirements for your Visionary Solutions installation, please contact [support@vsicam.com](mailto:support@vsicam.com).

### POWER OVER ETHERNET (PoE)

Power over Ethernet (PoE) is a system that uses an PoE Ethernet switch as a power source to provide both electrical power and data over a single cable to devices on a network, such as the E/D4100 devices. This reduces the number of cables and power supplies that are required to power the devices in the network. The result is lower cost, less downtime, easier maintenance, and greater flexibility for the network installation.

When selecting a PoE power supply scheme, is it important to select a PoE Ethernet switch that is capable of providing enough power per port, as well as total power to accommodate all devices simultaneously. You should plan on the maximum available PoE power per port for E/D4100 (15.4W). In some operating conditions less power will be demanded per E/D4100, call Visionary Solutions for details.

To calculate the number of devices that can be used on a PoE Ethernet switch, divide the total PoE power capability of the switch by the power required for each port and round down. For example, many PoE Ethernet switches can provide up to 370W of DC power. If each port needs 15.4W of power, a switch can supply power to a total of 24 ports.

#### Examples:

- A Cisco SG300-52P has a PoE power output of 375W and the ports require 15.4W:  $375 / 15.4 = 24.35$ . Therefore, 24 devices can be powered by this switch.
- A Cisco SG300-52MP has a PoE power output of 740W and the ports require 15.4W:  $740 / 15.4 = 48$ . Therefore, 48 devices can be powered by this switch.

Some switches can only supply PoE power to a certain number of ports. If it is necessary to use this type of switch, PoE injectors can be used or a local power supply can be provided for the switch, or you may need to disable the detection of the PoE for those ports in the Ethernet switch.

Exceeding the PoE switch limit can cause erratic behavior on the network system. The PoE switch cuts power to prevent overloading, which may cause units to reset at seemingly random intervals.

PoE specification standards are:

- IEEE 802.3-2008 provides up to 10W of DC power.
- IEEE 802.3af provides up to 15.4W of DC power. Only 12.95W is assured to be available at the device.
- IEEE 802.3at, known as PoE+ or PoE plus, provides up to 32W of DC. Only 25.5W is assured to be available at the device.

Class 0 devices comply with the PoE standard that provides up to 15.4W of DC power for each port. The real power draw is between 5-10W.

Class 3 devices comply with IEEE 802.3-2008 that provides up to 10W of DC power.

### SWITCH SPEED

The E4100 encoder will produce up to 50Mb/s of data. Therefore, 10 encoders will require  $10 \times 50\text{MB/s} = 0.5\text{Gbps}$ . E/D4100 requires the switch to be GbE. E/D4100 technology is used to transmit visually lossless 8~10:1 compressed video up to 4K along with other AV signals such as audio, USB, and control signals. For video alone, this means raw bandwidth of up to 800Mbps for 4K.

### CHOOSING AN ETHERNET SWITCH

Switches must support these functions:

- Multicast forwarding or filtering
- Jumbo Frames (enabled)
- IGMP Snooping
- IGMP Querier
- IGMP Snooping Fast Leave

If the switches are used for multi-switch networking, they must also support PIM Routing (Sparse, Dense, or Sparse-Dense).

These features may be helpful as well:

- Dynamic multicast router port
- Forwarding unknown multicast to multicast router ports only

Any network switch should have a backplane capacity of at least  $(2 \times 1000\text{-Mbps} \times N)$  where N is the number of ports on the switch passing the video traffic. For example, a 24-port switch where all available ports may be used to pass video traffic should have a  $(2 \times 1000 \times 24) = 48\text{Gbps}$  backplane. One channel of encoder video can be sent or received from each port in this switch example although full bandwidth may not be used at any one time.

The maximum distance between devices is 100m (328ft) over CAT 5e (or better) cable. This distance can be extended in increments of 100m (328ft) by using a gigabit switch as a repeater between devices. Copper to fiber adapters can extend the maximum distance between devices up to 10km through the use of fiber.

Since different brands and models of switches perform differently when handling multicast IP packets, functional verification and pressure testing are also recommended in any installation. Switches that perform well in smaller installations may not work well in larger installations. Recommended configuration settings may vary based on your switch.

Visionary Solutions offers sample switch configuration files, optimized for Network AV, for certain switch brands/models for testing purposes. Contact [support@vsicam.com](mailto:support@vsicam.com) to obtain the files.

## SWITCH GUIDELINES

1. **Enable IGMP querying and snooping (set IGMP Version to IGMP V2 if the switch is capable).** To enable the transmission of a source to multiple destinations, E/D4100 devices make use of multicast. The default behavior of a layer-2 switch is to broadcast those packets, which means that every packet will be transmitted to all possible destinations. IGMP snooping checks IGMP packets passing through the network, picks out the group registration, and configures multicasting accordingly. A layer-2 switch supporting IGMP Snooping can passively snoop on IGMP Query, Report, and Leave (IGMP version 2) packets transferred between IP multicast routers/switches and IP multicast hosts to determine the IP multicast group membership. This is why any network switch used with E/D4100 must support IGMP Snooping. Our end points use IGMP protocol to assign the end points into multicast groups and the router uses IGMP snooping to efficiently route multicast packets only to the receivers that want to receive them.

IGMP Snooping is used to identify multicast IP packets, assign IP packets into multicast groups so that the router only sends to devices that want to receive the packets, establish membership in a multicast group, and register a router to receive designated multicast traffic. Multicast filtering is achieved by dynamic group control management. Many switches have the IGMP Snooping feature disabled by default and manual configuration is required. Often, checking the **Enable IGMP Snooping** option is the only setting needed to enable IGMP Snooping. Implementing IGMP Snooping is vendor specific and additional configuration is often needed.

IGMP Snooping Querier is used to send out group membership queries on a timed interval, retrieve IGMP membership reports from active members, and update the group membership tables. The Leave Group packet is sent when a device wants to leave a group.

Because multicasting video traffic can flood a network and significantly reduce the flow of traffic, it is important to ensure that your network infrastructure and backbone switches support IGMP Snooping so that your core network is able to ignore the traffic streams multicasting can generate. By default, all multicast traffic should be blocked until requested by a multicast group member. Without IGMP Querying/Snooping, multicast traffic is treated in the same manner as a broadcast transmission, which forwards packets to all ports on the network. With IGMP Querying/Snooping, multicast traffic is only forwarded to ports that are members of that multicast group. IGMP Snooping generates no additional network traffic, which significantly reduces the multicast traffic passing through your switch.

**Note:** Some switches require that the routing table be pre-loaded so that the switch does not have to interrogate each IP packet to determine its destination. Static routing can be used to route multicast traffic. Protocols similar to Generic Routing Encapsulation (GRE) can be used to encapsulate multicast packets in unicast wrappers for point-to-point transmission between switches, and when the packets arrive at the destination IP address, the unicast wrapper is removed.



2. **Enable Fast Leave.** The switch may also support IGMP Snooping Fast Leave, which shortens the time takes for a device to leave a group and be made available to join to a different group. A switch can be informed that a device wants to leave a multicast channel by sending it a IGMP Leave Group packet. Once received, the time it takes for the switch to apply the new configuration may vary from one switch to another. Most switches have a Fastleave configuration option. When enabled, Fastleave speeds up the time needed for a port assigned to one multicast group to leave the group and join a different multicast group. This significantly reduces the video switching time. Always enable the Fastleave option when it is available.
3. **Allow multicast traffic on all network ports through which video streams pass.**
4. **Ensure current Access Control Lists (ACLs) are not filtering multicast or control traffic.**
5. **Remove Flow Control and/or Storm Control on any network port passing the video stream.**
6. **Enable VLANs to separate video traffic from data and voice.**
7. **Enable Jumbo Frames.**
8. **Disable Green Ethernet (or efficiency mode).** Some switches have the ability to lower the power consumption on the ports as a “Green” feature. This can cause issues with bandwidth intensive devices (like our encoders and decoders).

## IMPLEMENTATION CONSIDERATIONS

E/D4100 devices can be installed on a physically separate network or converged onto an existing GbE network. When implementing, it is important to decide at the earliest stages of planning if the system will be integrated into the rest of the network or if it will reside on a dedicated AV network. Each has its own advantages and disadvantages, but wherever possible we recommend the use of a dedicated AV switch. Using the existing network is of course possible—but it adds extra complexity to the installation and often removes control of the networking equipment from the site’s AV staff or installer.

The first thing to consider is how much control the install and site teams have over the network configuration. Do they have access and clearance to change the managed switch configurations on the fly? Is the network administrator willing to make the necessary changes to support multicast and IGMP traffic on their network? Will they allow the creation of a VLAN or change their existing VLAN configuration to support the required configuration? If the answer to these questions is no, then it is highly recommended that the system be installed on a separate dedicated network switch. If this is not an option, then a conversation needs to take place with the network admin staff to ensure they are aware of the requirements.

## INSTALLING ON A CONVERGED NETWORK

Figure 1 illustrates how E/D4100 endpoints can be installed on an existing (converged) network. When using an existing infrastructure, a dedicated VLAN is recommended to separate the AV traffic from other network data. All switches that will handle AV traffic must be 1 GbE capable per the specifications in *Network Requirements*.

Visionary Solutions recommends that all encoders be turned off before connecting to an existing network. Once connected, encoders can be turned on one at a time to determine network impact.

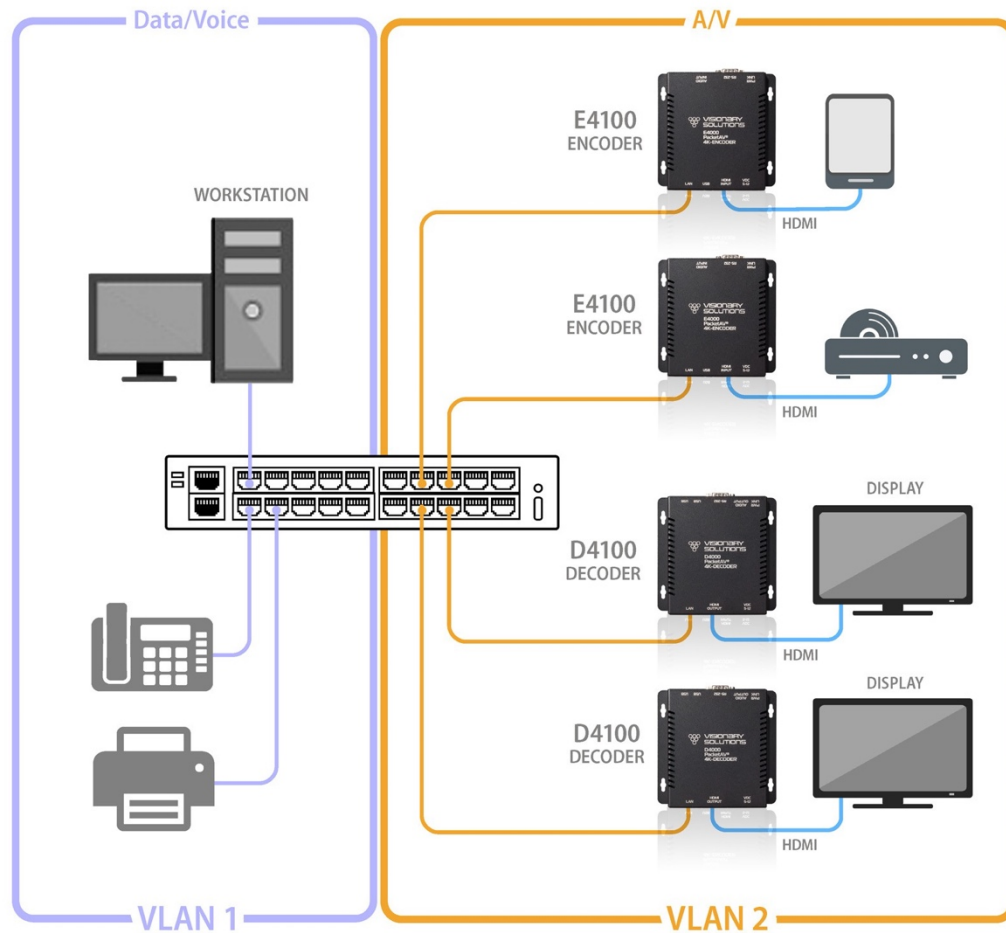


Figure 1. Converged Network Diagram



## INSTALLING ON A DEDICATED NETWORK

Figure 2 illustrates how E/D4100 endpoints can be installed on a dedicated network. A dedicated network is recommended for transmitting AV over IP. We offer various models of preconfigured switches for resale to our partners. These switches are shipped pre-configured for AV over IP from the factory. Please contact [sales@vsicam.com](mailto:sales@vsicam.com) for more information.

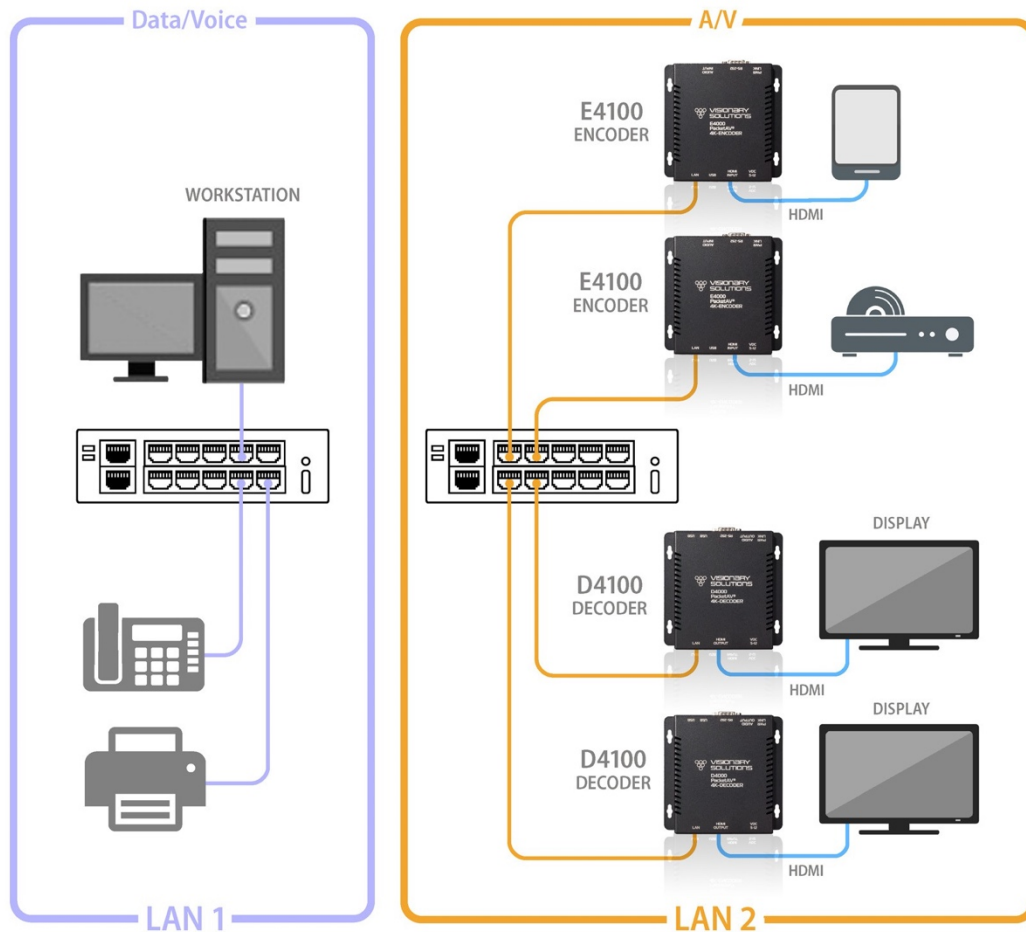


Figure 2. Dedicated Network Diagram

## SINGLE SWITCH NETWORKING

Single switch networking can be used when there are no more than 100m (328ft) from the central distribution point. Any network switch should have a backplane capacity of at least  $(2 \times 1000\text{-Mbps} \times N)$  where N is the number of ports on the switch passing the video traffic. For example, a 24-port switch where all available ports may be used to pass video traffic should have a  $(2 \times 1000 \times 24) = 48\text{Gbps}$  backplane.

## MULTIPLE SWITCH NETWORKING

The maximum distance between devices is 100m (328ft) over CAT 5e (or better) cable. This distance can be extended in increments of 100m (328ft) by using a gigabit switch as a repeater between devices. Copper to fiber adapters can extend the maximum distance between devices up to 10km through the use of fiber.

When using multiple switches, we recommend at least 10Gbps bi-directional connections between switches.

- $(\text{Link Bandwidth}) / (800\text{Mbps}) = \text{Number of simultaneous streams across link for 4K}$  and  $(\text{Link Bandwidth}) / (200\text{Mbps}) = \text{Number of simultaneous streams across link for 1080p}$ .
- The maximum number of streams possible between switches =  $\text{link bandwidth (10Gbps)} / 800\text{Mbps (for 4K)} \times \text{number of encoders (or 200Mbps for 1080p)}$ .

- For 4K streaming, the total number of streams (800xn) must be  $\leq 10,000$ .
- For 1080p streaming, the total number of streams (200xn) must be  $\leq 10,000$ .

$$\frac{\text{Link Bandwidth}}{\text{800 Mbps for 4K or 200 Mbps for 1080p}} = \text{Total \# of Streams}$$

## INSTALLATION AND CONNECTIONS (SYSTEM EXAMPLES)

This section provides installation and connection instructions for five configuration examples. For each encoder and decoder in the system examples below, follow these step-by-step connection instructions.

1. Use an HDMI cable to connect the AV source to the **HDMI Input** port on the encoder unit.
2. (Optional) Use a second HDMI cable to connect the HDMI Loop-through port on the encoder unit to a local display.
3. Connect an HDMI cable from the display to the **HDMI Output** port on the decoder unit.
4. Connect a CAT 5 (or better) cable from the Ethernet port on the encoder unit to a PoE port on the network switch.
5. Connect a CAT 5 (or better) cable from the Ethernet port on the decoder unit to a PoE port on the network switch.
6. (Optional) Connect the included 5V DC power supplies to both the encoder and decoder units. Connect the included AC power cords from the power supplies to available electrical outlets.

### ONE SOURCE TO ONE DISPLAY

In this basic installation scenario, sending video from a single source to a single display, a single encoder and decoder (point-to-point) can be linked directly together or over a network. If linked directly, the CAT 5e (or better) cable linking the devices should not run more than 100m (328ft).

The devices do not connect automatically and must first be configured through embedded web interfaces. This step requires a connection to a network. Once the devices are linked on the network, they can be connected directly. See section *Configuration*.



Figure 3. One Source to One Display Diagram

## ONE SOURCE TO MANY DISPLAYS

Sending video from a single source to multiple displays requires a network switch. A single encoder can be linked to multiple decoders (point-to-multipoint) over a network. Implementing a one to many installations dramatically decreases the amount of equipment required at the source location.

The encoder and each decoder can be located no more than 100m (328ft) from the switch.

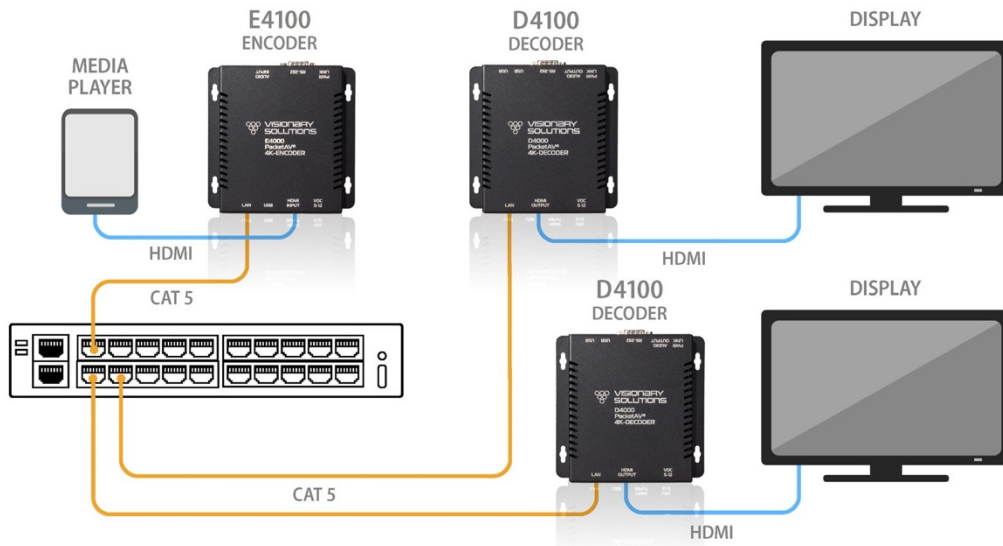


Figure 4. One Source to Many Displays Diagram

## MANY SOURCES TO MANY DISPLAYS

Sending video from multiple sources to multiple displays requires a network switch. Multiple encoders can be linked to multiple decoders (multipoint-to-multipoint) over a network. The many encoders to many displays configuration allows almost any number of sources and displays. Multiple switches can be linked by fiber, providing flexibility and scalability, and expanding the size and reach of the configuration to a practically limitless scale.

Each encoder and each decoder can be located no more than 100m (328ft) from the switch.

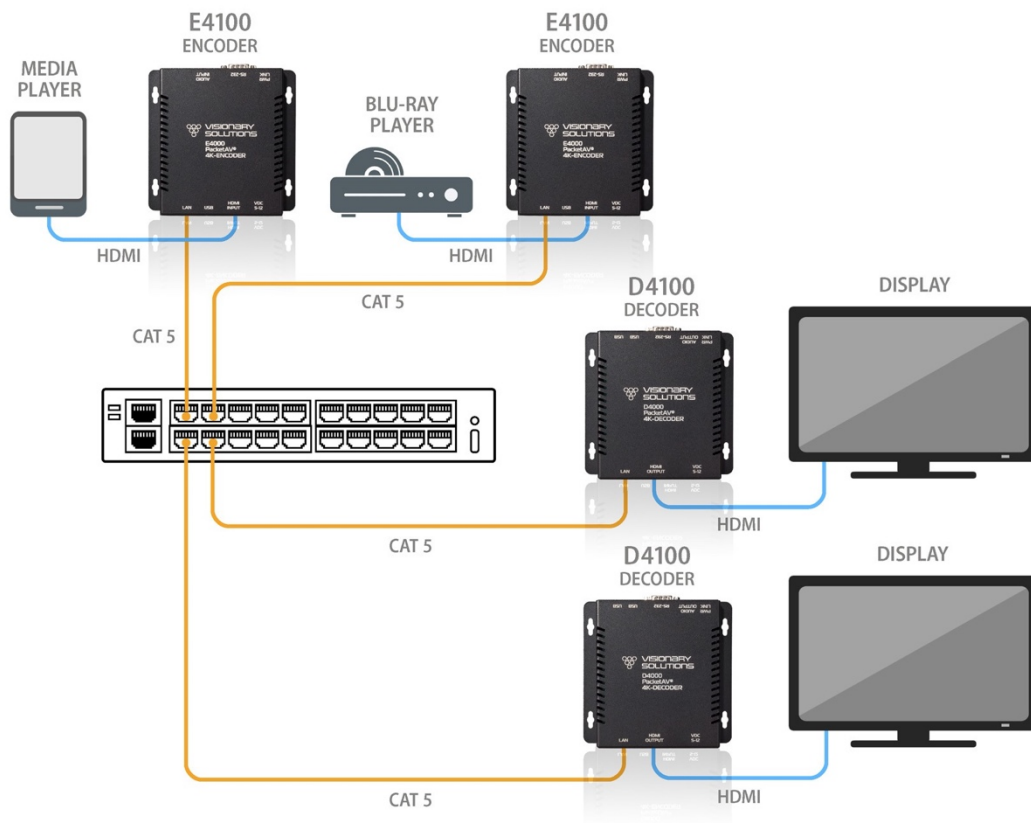


Figure 5. Many Sources to Many Displays Diagram

## MANY SOURCES TO MANY DISPLAYS WITH USB OVER IP (KVM)

Allowing users to remotely access and control computers from multiple sources with multiple displays requires a network switch. Multiple encoders can be linked to multiple decoders (multipoint-to-multipoint) over a network. The many encoders to many displays configuration allows almost any number of sources and displays. Multiple switches can be linked by fiber, providing flexibility and scalability, and expanding the size and reach of the configuration to a practically limitless scale.

Each encoder and each decoder can be located no more than 100m (328ft) from the switch.

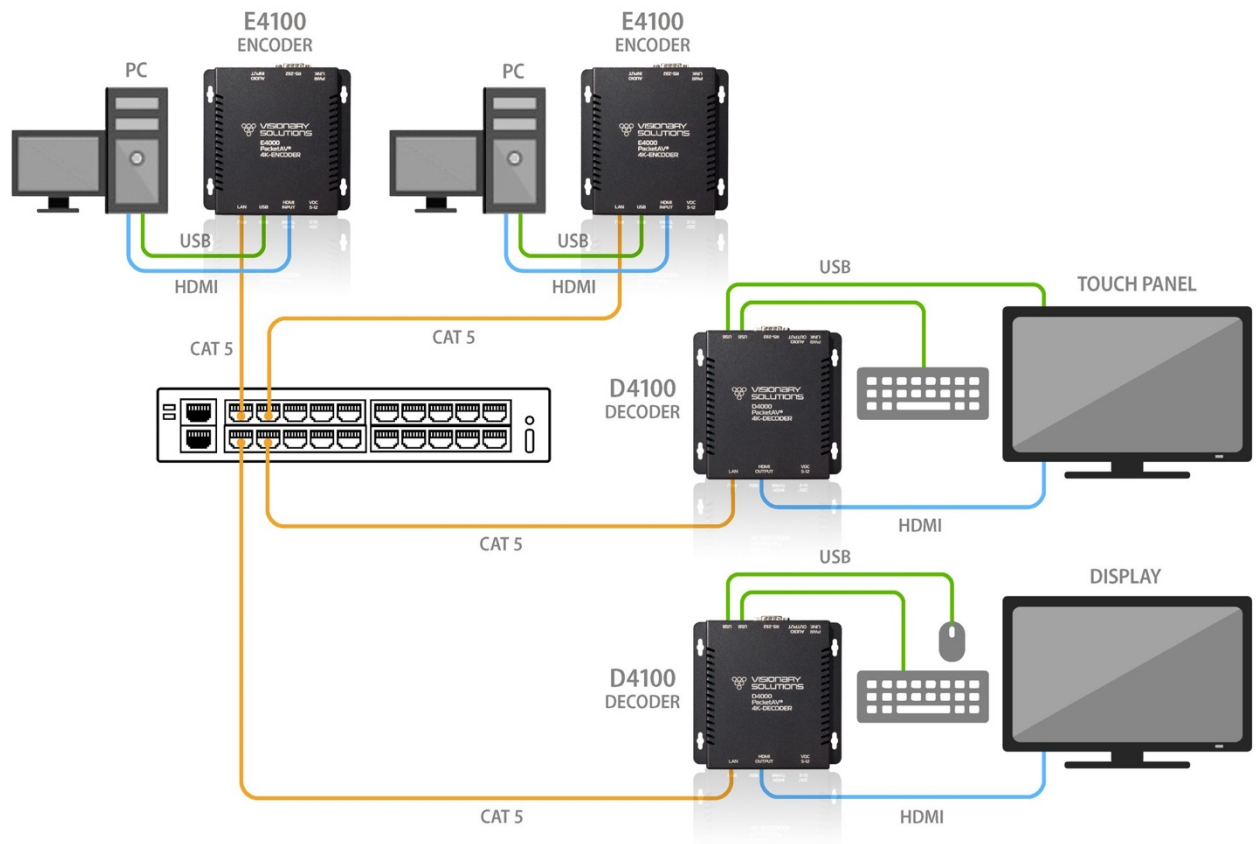


Figure 6. Many Sources to Many Displays with USB over IP Diagram

## VIDEO WALL

The video wall configuration requires a network switch to display multiple video sources to many displays or a single display in any combination of video streams. Multiple encoders can be linked to multiple decoders (multipoint-to-multipoint) over the network. The video wall configuration allows almost any number of sources and displays. Multiple switches can be linked by fiber, providing flexibility and scalability, and expanding the size and reach of the configuration to a practically limitless scale.

Each encoder and each decoder can be located no more than 100m (328ft) from the switch.

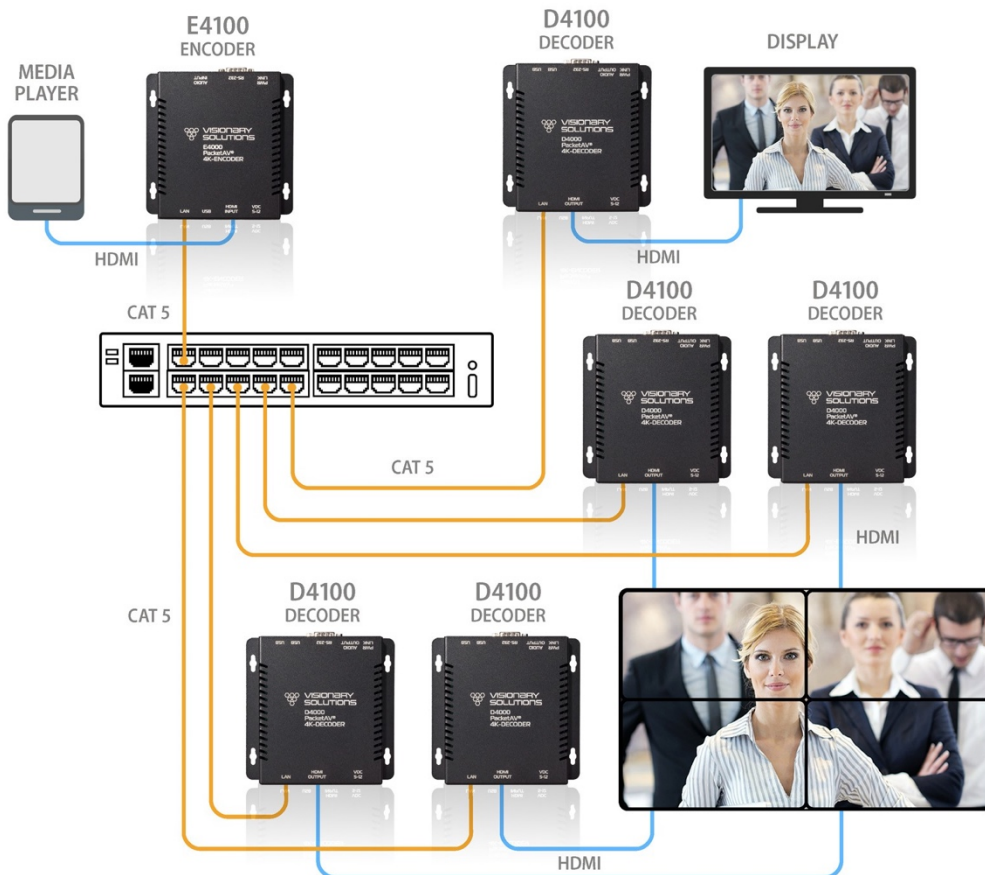


Figure 7. Video Wall Diagram

## NETWORK DISCOVERY

Discover your E/D4100 endpoints on the network.

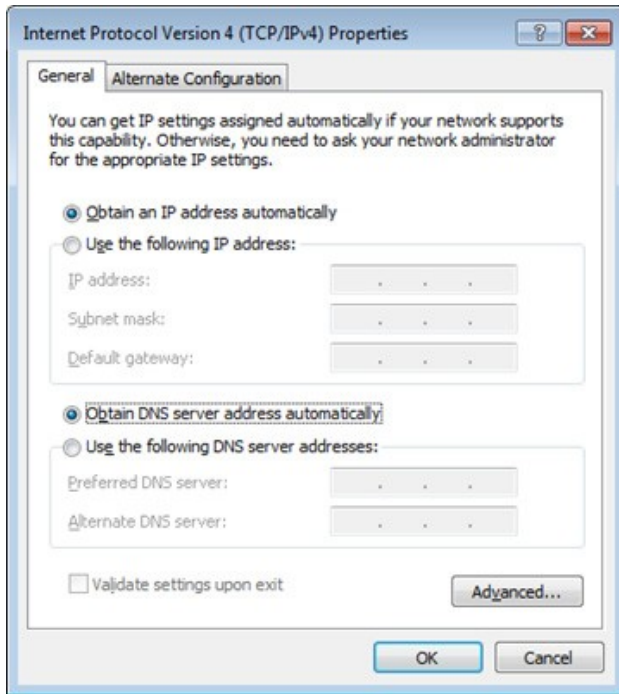
By default, the encoders and decoders are shipped from the factory in DHCP mode with Auto IP Failover. In DHCP mode, each encoder and decoder unit is automatically assigned a unique IP address by the DHCP server. If there is no DHCP server on the network, the encoders and decoders (after about one minute) will “failover” to Auto IP mode where each encoder and decoder unit assigns itself a unique IP address within the range of 169.254.1.0–169.254.254.255, with a 255.255.0.0 subnet mask and a gateway address of 169.254.0.254.

To configure the units, you must access the web interface of each encoder and decoder using a computer.

In order to communicate with the E/D4100 endpoints, the devices must be on the same subnet as your computer. You may need to change the computer’s network settings to accomplish this.

On a Microsoft Windows computer, configure your network settings as follows:

1. Click **Start** menu, go to **Control Panel > Network and Sharing center > Change Adapter Settings > Local Area Connection**. Right-click and choose **Properties**.
2. Highlight **Internet Protocol Version 4 (TCP/IPv4)** then click **Properties**. This opens the window you use to configure your network settings.



To set up your computer to communicate with endpoints that are using **DHCP**:

- **Method 1:** If there is a DHCP server on the network, accept **Obtain an IP address automatically** (the default). The computer will be automatically assigned a unique IP address by the DHCP server on the same subnet, allowing communication with the E/D4100 endpoints.
- **Method 2:** Configure your computer with a static IP address within the defined DHCP range for your network (the subnet (VLAN) defined by the DHCP netmask for your network). Choose **Use the following IP address**. Enter an IP address then click **OK**. To avoid address conflicts, enter a static address that is not in the range of addresses that will be given out by the DHCP server. For example: If the DHCP range = 192.168.1.100–192.168.1.150 and netmask = 255.255.255.0, you can assign 192.168.1.151.

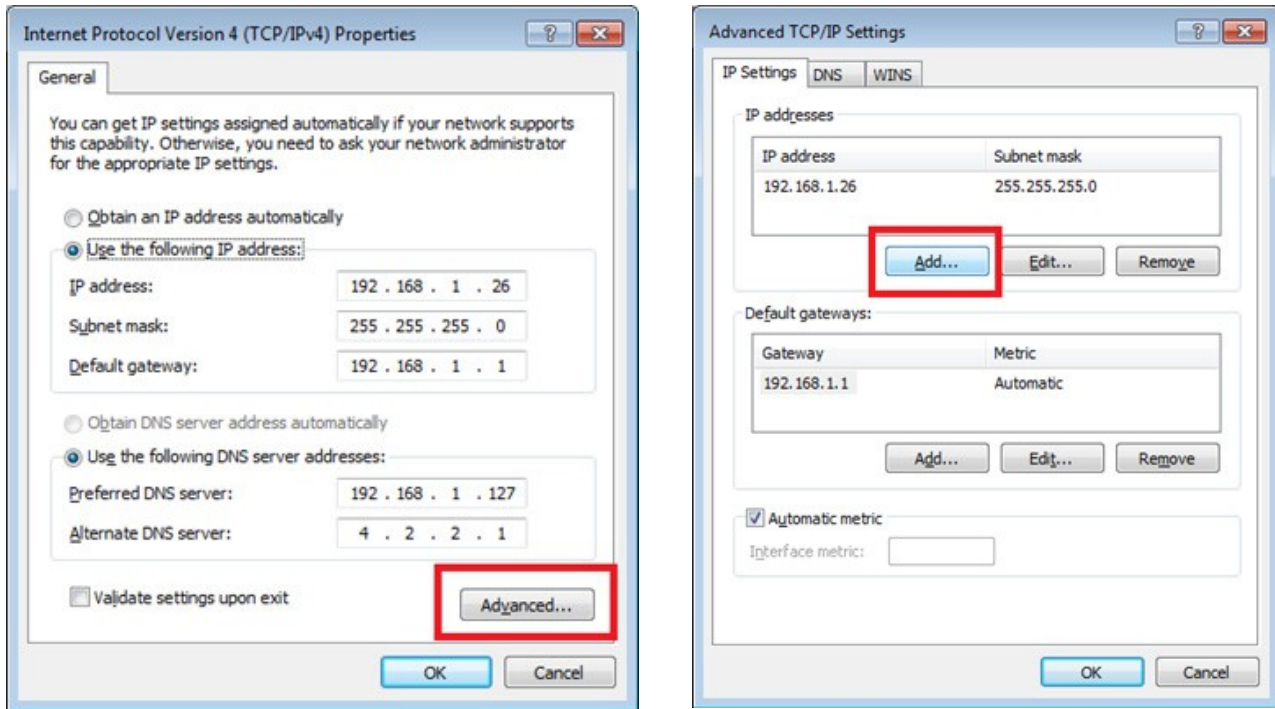
To set up your computer to communicate with endpoints that are using **Auto IP**:

- **Method 1:** If there is no DHCP server on the network, a Windows PC will “failover” to Auto IP in a similar way as the encoders and decoders. Accept **Obtain an IP address automatically** (the default). After about one minute the computer will assign itself a unique IP address within the range of 169.254.1.0–169.254.254.255, with a 255.255.0.0 subnet mask, allowing communication with the encoders and decoders on the network that are also assigned IP addresses via Auto IP.

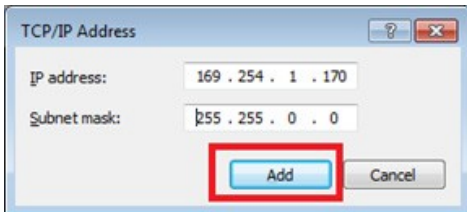


- **Method 2:** If the computer already has a statically-assigned IP address:

1. Click **Advanced > Add**.



2. Click **Add** to enter a unique IP address within the range of 169.254.1.0–169.254.254.255, with a subnet of 255.255.0.0.



- **Method 3:** Configure the computer with a unique static IP address within the range of 169.254.1.0–169.254.254.255, with a subnet of 255.255.0.0. If your address is not unique conflicts will occur.

There are multiple ways to discover (find the assigned IP address) the encoders and decoders on your network.

1. Use the Vision Lite application to auto-discover units. **RECOMMENDED** – refer to section *Vision Lite*.
2. Look at the DHCP server list of assigned IP addresses.
3. Use **avahi-browse** (requires avahi-daemon to be running) to find the unit IP addresses.
4. Using a Linux operating system (OS) on the network, ping 226.0.0.19 from the same subnet (VLAN) as the unit to return a list of assigned IP addresses. On a Windows OS, the ping command only displays the first responding address.
5. Use **nmap** to scan for Visionary Solutions MAC Addresses.
6. For decoders only: Connect to the network via HDMI to a display. The IP address displays on the bottom right of the **Boot up screen image** on the display device when there is no source connected.

Once discovered, you can use the embedded web interface on each encoder and decoder unit to configure and change the network settings. To log in to the web interface, enter the unit's IP address in a web browser for the URL OR click the IP address in the Vision Lite application **Configuration** page. Log in with **username=admin password=admin**.

## CONFIGURATION

### CONFIGURING ENCODER AND DECODER IP ADDRESSES

As previously mentioned, by default, the encoders and decoders are shipped from the factory in DHCP mode with Auto IP Failover. For a permanent installation, and to ensure system consistency, it is recommended to configure all of the encoders and decoders with static IP addresses.

**Important:** IP configuration changes must be done correctly to avoid any communication disruptions with the units. Communication with the Vision Lite Server and the computer that the application resides on is dependent upon the computer being in the same IP address range as the encoders and decoders on the network. Therefore, before making any IP address changes to the units, we recommend having two statically-assigned IP addresses on the computer.

When using DHCP, configure the first static IP address to an address within the defined DHCP range for your network (the subnet (VLAN) defined by the DHCP netmask for your network). Be sure that the static address you assign is not in the range of addresses that will be given out by the DHCP server to avoid address conflicts. For example: If the DHCP range = 192.168.1.100 – 192.168.1.150 and netmask = 255.255.255.0, you can assign 192.168.1.151.

When using Auto IP, assign an address within the range of 169.254.1.0 – 169.254.254.255, with a 255.255.0.0 subnet mask  
AND

Configure a second static IP address in the range of the IP addresses you are planning to assign to the units.

Assign new IP addresses to the encoder and decoder units as follows:

1. Access the web interface for the encoder or decoder unit.
2. Log in with **username=admin password=admin**.
3. Click the **Network** tab.
4. Set **IP.MODE** to **Static**.
5. Set the **IP.ADDRESS**. Example: 192.168.1.45
6. Set the **IP.NETMASK**. Example: 255.255.255.0
7. Set the **IP.GATEWAY**. Example: 192.168.1.1
8. Set the **IP.DNS\_SERVER** (optional). Example: 4.2.2.1
9. Click **Save** to save the new settings. The unit will automatically reboot.

The unit is now configured with the new network settings.

Once the initial configuration is complete, you will be primarily using the Vision Lite matrix routing control software (or other third party control systems) to route the encoder and decoder streams to each other. When using these systems, the **STREAM.ADDRESS** and **STREAM.HOST** settings, described in the following sections, are automatically updated each time a routing/switch occurs.

In the absence of a control system, it is still possible to manually configure the stream settings. The instructions are included below.

## CONFIGURING STREAM SETTINGS (MANUALLY)

### UNICAST MODE

The term unicast is used to describe a configuration where information is sent from one point to another point. A unicast transmission sends IP packets to a single recipient on a network. It is possible to have multiple encoder and decoder units connected in a system. However, in unicast mode, an encoder unit can communicate with only one decoder unit at a time (see Figure 1).

1. Access the web interface for the encoder and decoder units that will be using unicast mode.
2. Log in with **username=admin password=admin**.
3. Click the **Configuration** tab.
4. Set **STREAM.MODE** to **Unicast**.
5. On the encoder:
  - a. Set the **STREAM.ADDRESS** to the IP address of the decoder.
  - b. Click **STREAM.ENABLE = True**.
  - c. Click **Save** on to save the new settings. The unit will automatically reboot.
6. On the decoder:
  - a. Set **STREAM.HOST** to the IP address of the encoder that the decoder is tuned in to.
  - b. Set **STREAM.ADDRESS** to the IP address of the decoder itself or 127.0.0.1.
  - c. Click **Save** on to save the new settings. The unit will automatically reboot.

The units are now connected in unicast mode.

### MULTICAST MODE

The term multicast is used to describe a configuration where information is sent from one or more points to a set of other points. For example, a single encoder unit can transmit data to multiple decoder units. In addition, if multiple encoder units are used, each encoder unit can transmit data to any decoder that is not already receiving data from another encoder unit (see Figures 2-5).

To view the stream at multiple concurrent locations, set the encoder's **STREAM.ADDRESS** to a valid multicast IP address (224.0.0.0–239.255.255.255). While the multicast IP address range is from 224.0.0.0–239.255.255.255, the first octet (224.xxx.xxx.xxx) is generally reserved for administration. Visionary Solutions recommends setting the first octet to 225 and the remaining three octets to the encoder's IP address. For example, if the encoder's IP address is 192.168.1.53, set the **STREAM.ADDRESS** to 225.168.1.53 for multicast streaming.

**Note:** Visionary's **E/D4100** encoders default to a **STREAM.ADDRESS** based on their serial numbers. We recommend that you leave this as the stream address unless the range (225.168.0.0–225.169.255.255) conflicts with other multicast streams on your network. This default ensures that all encoders have a unique **STREAM.ADDRESS** and that there is no conflict between encoder streams.

1. Access the web interface for the encoder or decoder unit that will be using multicast mode.
2. Log in with **username=admin password=admin**.

3. Click the **Configuration** tab.
4. Set **STREAM.MODE** to **Multicast**.
5. On the encoder:
  - a. Set the **STREAM.ADDRESS** to a valid multicast IP address. For example, if the encoder's IP address is 192.168.1.53, set the **STREAM.ADDRESS** to 225.168.1.53.
  - b. Click **STREAM.ENABLE = True**.
  - c. Click **Save** to save the new settings. The unit will automatically reboot.
6. On the decoder:
  - a. Set **STREAM.HOST** to the IP address of the encoder that the decoder is tuned in to.
  - b. Set **STREAM.ADDRESS** to the multicast **STREAM.ADDRESS** of the encoder.
  - c. Click **Save** to save the new settings. The unit will automatically reboot.
7. Repeat steps 1–4 and step 6 for each decoder you want to tune into the encoder's multicast stream.

The units are now connected in multicast mode.

### STREAM BIT RATE

The bit rate (**STREAM.BIT\_RATE**) defaults to **auto**. This means that the encoder will choose the optimal bit rate for the input resolution and content. This can range up to a maximum of 850Mbps for highly complex 4K video. If you are trying to limit bandwidth used, you can set this to 200Mbps (this gives excellent 1080P60) down to 50Mbps. You can experiment with your normal content and see what bit rate setting is best for your use case, or just leave this in **auto** if you are not limited on bandwidth between switches.

### STREAM FRAME RATE

The frame rate (**STREAM.FRAME\_RATE**) of the incoming video may be reduced to allow higher resolutions at lower bandwidth. For instance, you might have 1080P60 content that is of slow moving scenes or other less complex video. You could then use the 50% setting to lower the frame rate to 30fps. You could also set the stream bit rate to a lower value to make sure that the stream only uses that amount of bandwidth.

### FAST(ER) SWITCHING

Below are some options for decreasing switch time (faster switching):

1. Set the decoders to scale the HDMI output for the monitor resolution. This is the VIDEO.FORMAT value on the config.html page. If the decoders are set to VIDEO.FORMAT=SOURCE then switching time can be longer due to changes in format.
2. All of the sources must have the same resolution and refresh rate. Ensure that the encoders' input format matches the formats of the monitors connected to the decoders. Make sure that all encoders are using VIDEO.HDCP\_FORCE\_ON, or that all sources are the same (HDCP on or off but not a mix).

### USB OVER IP (KVM)

When connecting USB devices to encoders and decoders, the function is similar to that of a video matrix. Connecting a computer to an encoder unit and a Human Interface Device (HID) device to a decoder unit allows you to control the computer from the decoder unit.

USB over IP enables non-isochronous USB devices to be used remotely. USB over IP is enabled by default.

There are three USB modes available: Auto Select, Active per Request, and Active on Link.

## AUTO SELECT MODE

The device chooses between Active per Request or Active on Link mode based on the casting mode (multicast or unicast) chosen.

- Multicast uses Active per Request.
- Unicast uses Active on Link.

## ACTIVE PER REQUEST MODE (DEFAULT)

The USB connection initiates once a decoder and encoder are communicating. Multiple decoders can communicate with and have simultaneous USB control of the same encoder. All decoders automatically activate USB control of the encoder they switch to, and every decoder watching that encoder has USB control.

## ACTIVE ON LINK MODE

Multiple USB devices may be connected to one or more decoder units. However, only one encoder unit can have USB control at a time. In other words, only one decoder can communicate with the encoder at any given time. By default, the first decoder unit connected has USB control.

## FAST(ER) KVM SWITCHING

USB.KVM\_FAST: Default FALSE. When set to TRUE (Checked) allows for rapid transition of KVM control when switching between two encoders. Not compatible with touchscreen. Both the encoder and decoder need to have the value of setting match (and a reboot) to take effect.

## RS-232 OVER IP

The encoders and decoders support RS-232 over IP and RS-232 pass-through, allowing the control of remote RS-232 devices. The encoder and decoder units used to pass through the RS-232 data must be set to the same baud rate as the RS-232 host and client. In unicast mode, an encoder unit is able to communicate with only one decoder unit at a time. In multicast mode, an encoder unit is able to communicate with multiple decoder units simultaneously.

There are three RS-232 modes available: Simple, Simple Guest, and Advanced.

## SIMPLE MODE (DEFAULT)

Bi-directional RS-232 Pass-through (Static Baudrate).

In this mode, commands entered into the RS-232 port on an encoder will come out of the RS-232 port on all decoders that are connected to that encoder. Similarly, commands entered in to the RS-232 port on a decoder will come out of the RS-232 port on the encoder that the decoder is connected to.

1. Access the web interface for the encoder unit and log in with **username=admin password=admin**.
2. Click the **Configuration** tab.
3. Set **SERIAL.MODE** to **Simple**.
4. Locate the **SERIAL.SETTINGS** and change the RS-232 settings to match the settings of the RS-232 device being used. See example in the table below.

Table 1. RS-232 Settings for an Example RS-232 Device

Description	Setting
Baud Rate	19200
Data Bits	8
Parity	None
Stop Bits	1

5. Set **SERIAL.ENABLED** to true by clearing the **False** check box.

6. Click **Save**. The unit will automatically reboot.
7. Repeat for the decoder unit.
8. Send commands.

### SIMPLE GUEST MODE

Bi-directional IP/Ethernet to RS-232 (Static Baudrate).

This mode requires an Ethernet (telnet) connection at the sending end and an RS-232 cable at the responding end. Commands are entered via a telnet connection to port 6752. Anything entered into the telnet session at the sending side will be sent out of the RS-232 port on the responding side.

1. Access the web interface for the encoder or decoder unit and log in with **username=admin password=admin**.
2. Click the **Configuration** tab.
3. Set **SERIAL.MODE** to **Simple Guest**.
4. Locate the **SERIAL.SETTINGS** and change the RS-232 settings to match the settings of the RS-232 device being used. See example in the table below.

Table 2. RS-232 Settings for an Example RS-232 Device

Description	Setting
Baud Rate	19200
Data Bits	8
Parity	None
Stop Bits	1

5. Set **SERIAL.ENABLED** to true by clearing the **False** check box.
6. Click **Save**. The unit will automatically reboot.
7. Connect using telnet or other TCP socket port 6752 to the IP address of the encoder or decoder connected to the responding RS-232 device.
8. Send commands.

### ADVANCED MODE

RS-232 Redirection (Dynamic Baudrate).

In this mode, the client's RS-232 baudrate is configurable through special RS-232 commands sent from the command line interface. The redirection is controlled by the PC's RS-232 connection to the encoder. A fixed baud rate (default is 115200–8n1) is used to attach to the encoder and issue commands to connect to specified decoders, and then start RS-232 redirection. The connection can be dynamically changed.

**Example:** You have a computer with an RS-232 port and you want to use this computer's RS-232 port to communicate with different remote RS-232 devices. Those devices may have different RS-232 baudrate settings. The communication is RS-232 dual direction, and the computer talks to remote RS-232 devices one at a time. You will need to develop RS-232 control software.

Contact Visionary Solutions support for details.

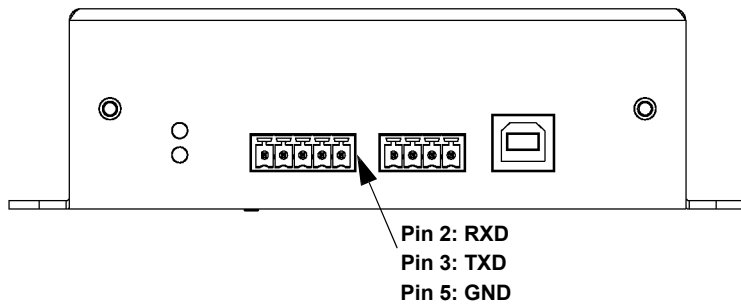


Figure 8. RS-232 Connector Pinout Diagram

## VIDEO FORMAT SETTING—DECODERS ONLY

By default, the **VIDEO.FORMAT** field on the D4100 decoder is set to **Source**. This means that the same source resolution being encoded by the currently “tuned” E4100 is passed through to the output. This is for cases where you are certain that the display connected to the D4100 can handle any of the source resolutions that it may be tuned to. If the connected display cannot show an encoded resolution, set this field to a value that the display can decode. For example, if you are tuning a 4K encoded stream and are using an HD display, set this value to 1080P60. The decoder will scale the tuned stream to 1080P60 and allow the display to show the stream.

## AUDIO SETTINGS

### AUDIO SOURCE

The E/D4100 series is capable of using HDMI or Analog audio sources.

- The E4100 encoder uses the **STREAM.AUDIO** to select the source of audio sent over the AV over IP stream.
- The D4100 decoder uses the **STREAM.AUDIO** to select what audio is sent out the HDMI output.

#### STREAM.AUDIO=HDMI

E4100 – **STREAM.AUDIO** = HDMI

Encoder receives HDMI input with embedded audio and encodes it into the AV over IP stream that includes video.

D4100 – **STREAM.AUDIO** = HDMI

1. Decoder receives AV over IP stream with both audio and video and decodes it to the HDMI output.
2. Sends the first two LPCM channels out the Analog audio (unbalanced consumer line level via Euroblock connector).

#### STREAM.AUDIO=Analog (Encoders only)

E4100 – **STREAM.AUDIO**=Analog

Uses the Analog audio (unbalanced consumer line level via Euroblock connector) and sends it out the AV stream.

\*\*\*D4100 is always passing analog audio via the Euroblock connector. D4100 allows volume level setting of analog audio output. This output is always the first two channels of audio in the AV over IP stream (encoded source audio must be LPCM).



## AUDIO CONNECTIONS

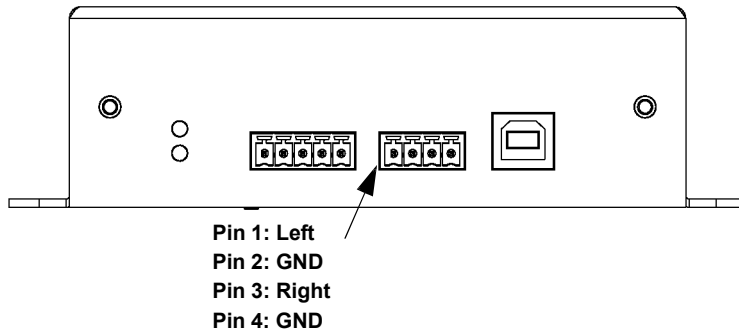


Figure 9. Audio Connector Pinout Diagram

## VIDEO WALL

Multiple D4100 decoders can be grouped together to create a video wall. Setup involves assigning each decoder to its position in the video wall. The decoders create a video wall by scaling the video content to a size that matches the full video wall.

When video walls are square (same number of rows and columns), the content will be scaled appropriately because the aspect ratio is maintained. When video walls have a different number of rows and columns, the content will be stretched by the video wall processor. Standard 16:9 content will appear wider or taller than normal. To maintain the proper aspect ratio on video walls that have a different number of rows and columns, content should be custom created. The decoders also have the capability to rotate the video output clockwise.

**Note:** Check the **Zoom** settings on each display to get the best fit. Look for options like **Screen Fit** (Samsung), **Full Pixel** (Sony), **Dot-by-Dot** (Sharp), or **Just Scan** (LG). The effect of these preferences is to turn off HDMI Overscan.

The following step-by-step instructions describe how to configure a 2x2 video wall. As you change these parameters, the diagram representing these settings automatically adjusts to provide you with a visual guide.

1. Access the web interface for each decoder unit that will be part of the video wall and log in with **username=admin** **password=admin**.
2. Click the **Configuration** tab.
3. On each decoder:
  - a. Set **VW.ENABLED** to **True** on by selecting the check box.
  - b. Assign a user defined video wall name to each decoder that will be part of the video wall: **VW.NAME**.  
Assign the same name to each decoder that will be part of the video wall you are creating. For example: Videowall\_1. The Vision Lite software uses this name to automatically group all of the decoders into a video wall object that can then have sources routed to it in the Vision Lite drag and drop "routing" user interface.
  - c. Set the **VW.STRETCH\_TYPE**. This options chooses how a video is scaled to the wall area. The default is **Fit**, which scales the video to fit the wall area, changing the aspect ratio as needed.
  - d. Set the video wall rotation **VW.ROTATION**. Options are 0, 90, 180, or 270 degrees clockwise.
  - e. Set the Bezel and Gap settings: **VW.OVERALL\_WIDTH**, **VW.VISIBLE\_WIDTH**, **VW.OVERALL\_HEIGHT**, **VW.VISIBLE\_HEIGHT**. Units = 0.1mm.
  - f. Set the Row and Column settings: **VW.MAX\_ROWS**, **VW.MAX\_COLUMNS**.

In this 2x2 video wall example, set the **VW.MAX\_ROWS** to **2** and set the **VW.MAX\_COLUMNS** to **2**.

- g. Set the position on the video wall for the decoder to display: **VW.ROW**, **VW.COLUMN**.

In this 2x2 video wall example, set the position of the decoder as follows:

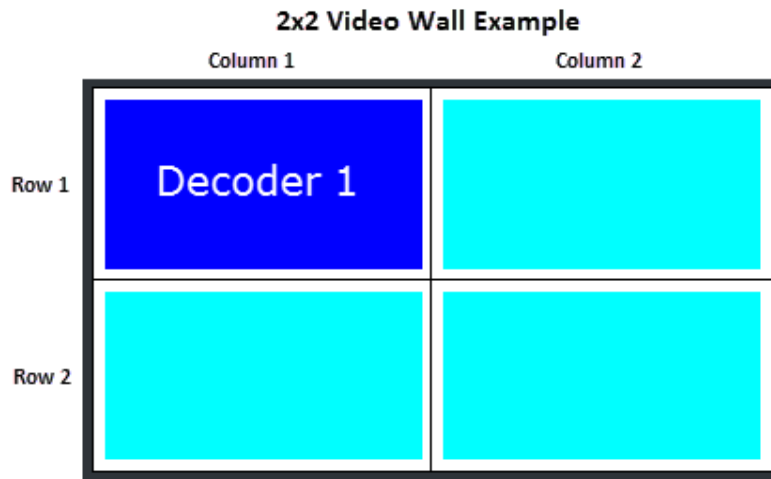
First decoder: **VW.ROW** = 1 and **VW.COLUMN** = 1

Second decoder: **VW.ROW** = 1 and **VW.COLUMN** = 2

Third decoder: **VW.ROW** = 2 and **VW.COLUMN** = 1

Fourth decoder: **VW.ROW** = 2 and **VW.COLUMN** = 2

The display highlighted in dark blue indicates the position of the decoder that you are configuring in the video wall, based on your settings.



- h. Click **Save** to save the new settings. The unit will automatically reboot.

The units are now configured in video wall mode.

## EDID

The default EDIDs that come with the E4100 encoder cover a range of resolutions and audio formats that are widely supported. There may be some instances where the default EDIDs do not produce the expected or desired results for a unique system, such as for certain special resolutions, color-space options, and audio formats. In those cases, produce the desired result by capturing the EDID settings from your display and updating the EDID on the E4100 encoder. You can use EDID capture software such as **Monitor Asset Manager 2.9** (<http://www.entechtaiwan.com/util/moninfo.shtml>) to copy the EDID from your display.

The EDID describes the formats for audio and video that an HDMI sync can process. The source device uses this information to determine the audio and video format that is output. The source gets its EDID from the encoder. The E4100 encoder is the only device that is presenting an EDID to the source. No matter how many displays are in the system, the devices never report their EDID to the source.

Most source devices are set to output according to the EDID it is receiving. Therefore, to make the source device output a different audio or video format you must update the EDID on the E4100 encoder.

## CUSTOMIZING THE EDID

E4100 encoders can import custom-built EDIDs. An EDID is a string of 256 bytes of information formatted in hexadecimal notation. These bytes share information about all of the capabilities of the endpoint device, and different devices format the EDID in their own way.

The EDID file must be formatted properly in order to be imported to an E4100 encoder.

1. Create a text file with the extension `.edid`.
2. Format the 256 bytes of EDID data as in the example below (substituting your values).

**Example:**

```
0x00, 0xff, 0xff, 0xff, 0xff, 0xff, 0xff, 0x00, 0x59, 0x24, 0x03, 0x00, 0x01, 0x00, 0x00, 0x00,
0x05, 0x19, 0x01, 0x03, 0x80, 0x3d, 0x23, 0x78, 0x2a, 0x5f, 0xb1, 0xa2, 0x57, 0x4f, 0xa2, 0x28,
0x0f, 0x50, 0x54, 0xbf, 0xef, 0x80, 0x71, 0x40, 0x81, 0x00, 0x81, 0xc0, 0x81, 0x80, 0x95, 0x00,
0xa9, 0xc0, 0xb3, 0x00, 0xd1, 0x00, 0x04, 0x74, 0x00, 0x30, 0xf2, 0x70, 0x5a, 0x80, 0xb0, 0x58,
0x8a, 0x00, 0x60, 0x59, 0x21, 0x00, 0x00, 0x1e, 0x00, 0x00, 0x00, 0xfd, 0x00, 0x18, 0x4b, 0x1e,
0x5a, 0x1e, 0x00, 0x0a, 0x20, 0x20, 0x20, 0x20, 0x20, 0x20, 0x00, 0x00, 0x00, 0xfc, 0x00, 0x47,
0x65, 0x6e, 0x65, 0x72, 0x69, 0x63, 0x5f, 0x34, 0x4b, 0x0a, 0x20, 0x20, 0x00, 0x00, 0x00, 0xff,
0x00, 0x30, 0x0a, 0x20, 0x20, 0x20, 0x20, 0x20, 0x20, 0x20, 0x20, 0x20, 0x20, 0x20, 0x20, 0x01, 0x3f,
0x02, 0x03, 0x39, 0xc3, 0x4b, 0x90, 0x04, 0x1f, 0x13, 0x03, 0x12, 0x20, 0x0f, 0x1e, 0x24, 0x26,
0x35, 0x09, 0x7f, 0x04, 0x0f, 0x7f, 0x04, 0x15, 0x07, 0x50, 0x3d, 0x1f, 0xc0, 0x5f, 0x54, 0x01,
0x57, 0x06, 0x00, 0x67, 0x54, 0x00, 0x83, 0x5f, 0x00, 0x00, 0x0e, 0x03, 0x0c, 0x00, 0x10, 0x00,
0x80, 0x3c, 0x20, 0x10, 0x80, 0x01, 0x02, 0x03, 0x04, 0x02, 0x3a, 0x80, 0xd0, 0x72, 0x38, 0x2d,
0x40, 0x10, 0x2c, 0x45, 0x80, 0x60, 0x59, 0x21, 0x00, 0x00, 0x1e, 0x01, 0x1d, 0x00, 0x72, 0x51,
0xd0, 0x1e, 0x20, 0x6e, 0x28, 0x55, 0x00, 0x60, 0x59, 0x21, 0x00, 0x00, 0x1e, 0x02, 0x3a, 0x80,
0x18, 0x71, 0x38, 0x2d, 0x40, 0x58, 0x2c, 0x45, 0x00, 0x60, 0x59, 0x21, 0x00, 0x00, 0x1e, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x9d
```

3. Save the `*.edid` file.
4. Upload the EDID to the encoder.
5. Power cycle the encoder to use the new EDID file.

The source device may need to be power-cycled in order to accept the new EDID. Physically remove power from the source device then reapply it.

## CUSTOM SPLASH SCREEN—DECODERS ONLY

A custom splash screen may be uploaded to the decoder for use when there is no audio source, or a source time out occurs. The file must be a JPEG (`*.jpg`) and be less than 500KB (524287 bytes) in size. Resolution should be 1920x1080. Other resolutions will result in lower quality or aspect ratio mismatch.

## ADVANCED CONFIGURATION

### VIDEO SOURCE TIMEOUT—DECODERS ONLY

**VIDEO.SOURCE\_TIMEOUT** – When there is no source available, time out TRUE will cause the decoder to switch to the splash screen after approximately 10 seconds.

### VIDEO POWER SAVE—DECODERS ONLY

**VIDEO.POWER\_SAVE** – After the time out, turn off the HDMI output.

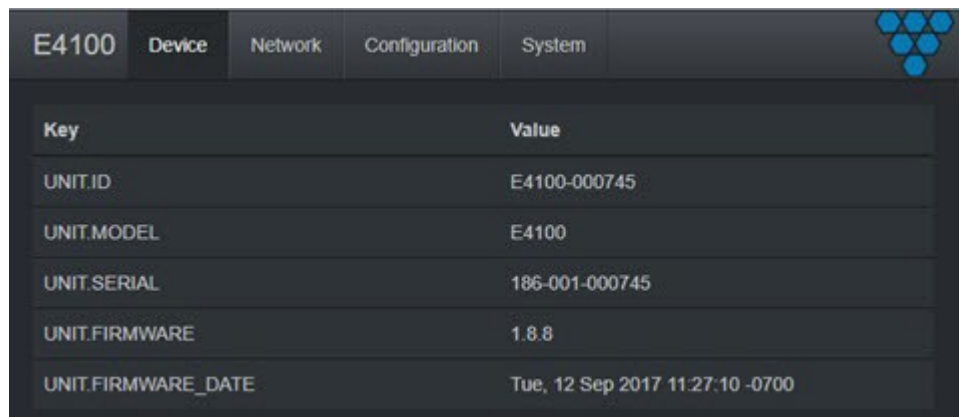
### HDCP FORCE ON—ENCODERS AND DECODERS

**Encoder:** Force the encoder to accept only HDCP sources.

**Decoder:** Force the decoder to HDCP encrypt the output.

## ENCODER OPTIONS

### E4100 DEVICE TAB



Key	Value
UNIT.ID	E4100-000745
UNIT.MODEL	E4100
UNIT.SERIAL	186-001-000745
UNIT.FIRMWARE	1.8.8
UNIT.FIRMWARE_DATE	Tue, 12 Sep 2017 11:27:10 -0700

UNIT.ID – By default, the UNIT.ID of the encoder is the Model Number and the MAC Address (e.g., E4100\_00:0E:14:4F:00:31). This can be changed by the user on the **Network** tab.

UNIT.MODEL – E4100 (encoder) or D4100 (Decoder).

UNIT.SERIAL – The serial number of the unit. The serial number can also be found on the bottom label of each unit.

UNIT.FIRMWARE – The current firmware version of the unit.

UNIT.FIRMWARE\_DATE – The date the firmware was released.

## E4100 NETWORK TAB

Field	Value
UNIT.ID	E4100-000745
SET.UNIT_ID	
UNIT.LOCATION	
MAC.ADDRESS	00:0E:14:40:02:85
IP.MODE	dhcp
IP.DHCP_STATUS	valid
IP.ADDRESS	192.168.8.209
IP.NETMASK	255.255.255.0
IP.GATEWAY	192.168.8.1
IP.DNS_SERVER	192.168.1.127

UNIT.ID – By default, the UNIT.ID of the encoder is the MAC Address. This can be changed by the user on the **Network** tab.

SET.UNIT\_ID – User defined device name. For example: Display\_1 or Source\_3 (letters, numbers, dashes, and underscores only).

UNIT.LOCATION – User defined device location. For example: Office\_1 or Conference\_Room\_2 (letters, numbers, dashes, and underscores only).

MAC.ADDRESS – The MAC address of the unit.

IP.MODE – Modes are Static or DHCP. See section *Configuring Encoder and Decoder IP Addresses*.

IP.DHCP\_STATUS – Shows the unit's current status: valid or invalid.

IP.ADDRESS – Shows the current value based on the unit's mode. In Static mode, shows the unit's static settings. In DHCP mode, shows if the values are valid. If DHCP is failed, the mode shows as Auto IP (even though you cannot select this mode directly), and the Auto IP values display in the IP.xxxxx fields. See section *Configuring Encoder and Decoder IP Addresses*.

IP.NETMASK – Shows the current value based on the unit's mode. In Static mode, shows the unit's static settings. In DHCP mode, shows if the values are valid. If DHCP is failed, the mode shows as Auto IP (even though you cannot select this mode directly), and the Auto IP values display in the IP.xxxxx fields. See section *Configuring Encoder and Decoder IP Addresses*.

IP.GATEWAY – Shows the current value based on the unit's mode. In Static mode, shows the unit's static settings. In DHCP mode, shows if the values are valid. If DHCP is failed, the mode shows as Auto IP (even though you cannot select this mode directly), and the Auto IP values display in the IP.xxxxx fields. See section *Configuring Encoder and Decoder IP Addresses*.

IP.DNS\_SERVER – (optional) Shows the current value based on the unit's mode. In Static mode, shows the unit's static settings. In DHCP mode, shows if the values are valid. If DHCP is failed, the mode shows as Auto IP (even though you cannot select this mode directly), and the Auto IP values display in the IP.xxxxx fields. See section *Configuring Encoder and Decoder IP Addresses*.

**E4100 CONFIGURATION TAB**

Setting	Value
STREAM.ENABLED	<input checked="" type="checkbox"/> TRUE
STREAM.ADDRESS	225.168.2.133
STREAM.MODE	multicast
STREAM.BIT_RATE	auto
STREAM.FRAME_RATE	100%
STREAM.AUDIO	HDMI
VIDEO.HDCP_FORCE_ON	<input type="checkbox"/> FALSE

STREAM.ENABLED – Setting for turning streaming on or off. See section *Configuring Stream Settings (Manually)*.

STREAM.ADDRESS – See section *Configuring Stream Settings (Manually)*.

STREAM.MODE – Unicast or multicast. See section *Configuring Stream Settings (Manually)*.

STREAM.BIT\_RATE – See section *Stream Bit Rate*.

STREAM.FRAME\_RATE – See section *Stream Frame Rate*.

STREAM.AUDIO – Select the source of audio for the AV over IP stream - HDMI, Analog - See section *Audio Settings*.

VIDEO.HDCP\_FORCE\_ON – Force the encoder to accept only HDCP sources. See section *HDCP Force On—Encoders and Decoders*.

## CONFIGURATION &gt; CONTINUED

The screenshot shows the 'Configuration' tab for the E4100 device. The settings are organized into sections: USB settings and SERIAL settings. The USB section includes 'USB.ENABLED' (checked), 'USB.KVM\_FAST' (unchecked), and 'USB.MODE' (set to 'Active On Link'). The SERIAL section includes 'SERIAL.ENABLED' (unchecked), 'SERIAL.MODE' (set to 'Simple'), and 'SERIAL.SETTINGS' (Baudrate: 300, Data bits: 5, Parity: None, Stop bits: 1).

Setting	Value
USB.ENABLED	<input checked="" type="checkbox"/> TRUE
USB.KVM_FAST	<input type="checkbox"/> FALSE
USB.MODE	<input type="radio"/> Auto Select <input checked="" type="radio"/> Active On Link <input type="radio"/> Active Per Request
SERIAL.ENABLED	<input type="checkbox"/> FALSE
SERIAL.MODE	<input checked="" type="radio"/> Simple <input type="radio"/> Simple Guest <input type="radio"/> Advanced
SERIAL.SETTINGS	Baudrate: 300 Data bits: 5 Parity: None Stop bits: 1

USB.ENABLED – Turn on or off USB over IP. See section *USB over IP (KVM)*.

USB.KVM\_FAST – See section *USB over IP (KVM)*.

USB.MODE – See section *USB over IP (KVM)*. Options are: Auto Select, Active On Link, and Active Per Request.

SERIAL.ENABLED – Turn on or off RS232 over IP. See section *RS-232 over IP*.

SERIAL.MODE – See section *RS-232 over IP*. Options are: Simple, Simple Guest, and Advanced.

SERIAL.SETTINGS – See section *RS-232 over IP*. Options are: Baudrate, Data bits, Parity, and Stop bits.

## CONFIGURATION TAB (CONT.)

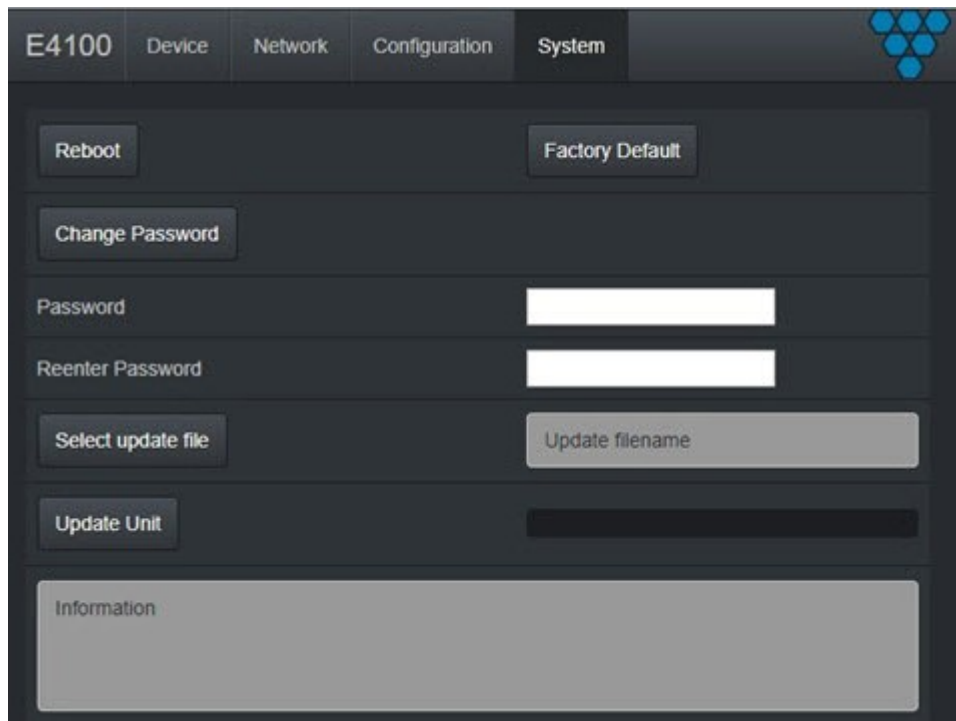
The screenshot shows the 'Configuration' tab for the E4100 device, specifically the EDID file selection and upload section. It includes a 'Select EDID file' button, a 'Filename' input field, and an 'Upload file' button.

**Select EDID file** – Browse to select the EDID file. The filename must be in the format \*.edid. See section *EDID*.

**Upload file** – Upload the selected EDID file. See section *EDID*.



## E4100 SYSTEM TAB



**Reboot** – This button reboots the unit.

**Factory Default** – This button factory defaults the unit. See section *Troubleshooting*.

**Change Password** – This button changes the unit's web interface login password to values entered below (default is `admin`).

- Password – enter new password
- Reenter Password – reenter new password

**Important:** Make sure you write the new password down. If it is lost or forgotten, you will need to call Visionary Solutions support to assist in a console factory default of the unit.

**Set update file** – Browse to a new firmware file supplied by Visionary Solutions or downloaded from [www.vsicam.com](http://www.vsicam.com).

**Update Unit** – This button will initiate a firmware update per the specified file above.

**Information** – Real-time status messages displayed during a reboot, firmware update, or factory default action.

## DECODER OPTIONS

### D4100 DEVICE TAB


D4100

Device

Network

Configuration

System



Key	Value
UNIT.ID	D4100-000792
UNIT.MODEL	D4100
UNIT.SERIAL	186-002-000792
UNIT.FIRMWARE	1.8.8
UNIT.FIRMWARE_DATE	Tue, 12 Sep 2017 11:34:37 -0700

UNIT.ID – By default, the UNIT.ID of the encoder is the Model Number and the MAC Address (e.g., D4100\_00:0E:14:4F:00:31). This can be changed by the user on the **Network** tab.

UNIT.MODEL – E4100 (encoder) or D4100 (decoder).

UNIT.SERIAL – The serial number of the unit. The serial number can also be found on the bottom label of each unit.

UNIT.FIRMWARE – The current firmware version of the unit.

UNIT.FIRMWARE\_DATE – The date the firmware was released.

### D4100 NETWORK TAB

D4100	Device	Network	Configuration	System
<div>Save</div>				
UNIT.ID	D4100-000792			
SET.UNIT_ID	<input type="text"/>			
UNIT.LOCATION	<input type="text"/>			
MAC.ADDRESS	00:0E:14:50:02:B4			
IP.MODE	dhcp			
IP.DHCP_STATUS	valid			
IP.ADDRESS	192.168.8.205			
IP.NETMASK	255.255.255.0			
IP.GATEWAY	192.168.8.1			
IP.DNS_SERVER	192.168.1.127			

UNIT.ID – By default, the UNIT.ID of the encoder is the MAC Address. This can be changed by the user on the **Network** tab.

SET.UNIT\_ID – User defined device name. For example: Display\_1 or Source\_3 (letters, numbers, dashes, and underscores only).

UNIT.LOCATION – User defined device location. For example: Office\_1 or Conference\_Room\_2 (letters, numbers, dashes, and underscores only).

MAC.ADDRESS – The MAC address of the unit

IP.MODE – Modes are Static or DHCP. See section *Configuring Encoder and Decoder IP Addresses*.

IP.DHCP\_STATUS – Shows the unit's current status: valid or invalid

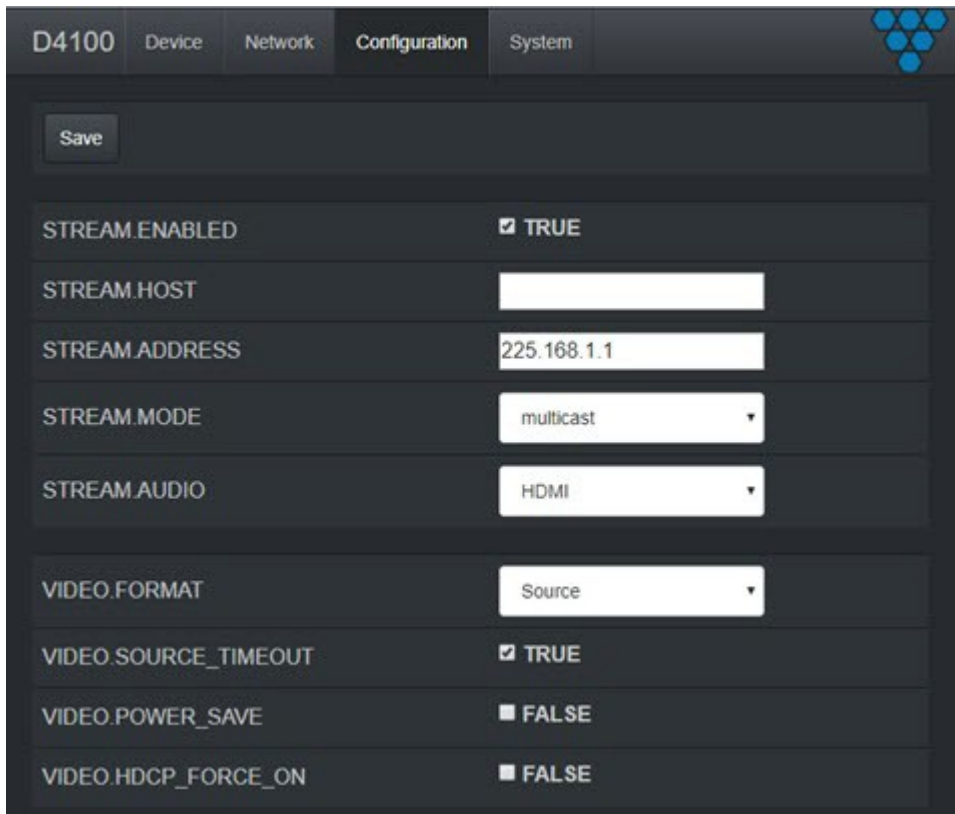
IP.ADDRESS – Shows the current value based on the unit's mode. In Static mode, shows the unit's static settings. In DHCP mode, shows if the values are valid. If DHCP is failed, the mode shows as Auto IP (even though you cannot select this mode directly), and the Auto IP values display in the IP.xxxxxx fields. See section *Configuring Encoder and Decoder IP Addresses*.

IP.NETMASK – Shows the current value based on the unit's mode. In Static mode, shows the unit's static settings. In DHCP mode, shows if the values are valid. If DHCP is failed, the mode shows as Auto IP (even though you cannot select this mode directly), and the Auto IP values display in the IP.xxxxxx fields. See section *Configuring Encoder and Decoder IP Addresses*.

IP.GATEWAY – Shows the current value based on the unit's mode. In Static mode, shows the unit's static settings. In DHCP mode, shows if the values are valid. If DHCP is failed, the mode shows as Auto IP (even though you cannot select this mode directly), and the Auto IP values display in the IP.xxxxxx fields. See section *Configuring Encoder and Decoder IP Addresses*.

IP.DNS\_SERVER – (optional) Shows the current value based on the unit's mode. In Static mode, shows the unit's static settings. In DHCP mode, shows if the values are valid. If DHCP is failed, the mode shows as Auto IP (even though you cannot select this mode directly), and the Auto IP values display in the IP.xxxxxx fields. See section *Configuring Encoder and Decoder IP Addresses*.

## D4100 CONFIGURATION TAB



Setting	Value
STREAM.ENABLED	<input checked="" type="checkbox"/> TRUE
STREAM.HOST	
STREAM.ADDRESS	225.168.1.1
STREAM.MODE	multicast
STREAM.AUDIO	HDMI
VIDEO.FORMAT	Source
VIDEO.SOURCE_TIMEOUT	<input checked="" type="checkbox"/> TRUE
VIDEO.POWER_SAVE	<input type="checkbox"/> FALSE
VIDEO.HDCP_FORCE_ON	<input type="checkbox"/> FALSE

STREAM.ENABLED – Setting for turning streaming on or off. See section *Configuring Stream Settings (Manually)*.

STREAM.HOST – See section *Configuring Stream Settings (Manually)*.

STREAM.ADDRESS – See section *Configuring Stream Settings (Manually)*.

STREAM.MODE – Unicast or multicast. See section *Configuring Stream Settings (Manually)*.

STREAM.AUDIO – Select the source of audio for the AV over IP stream - HDMI. See section *Audio Settings*.

VIDEO.FORMAT – See section *Video Format Setting–Decoders Only*.

VIDEO.SOURCE\_TIMEOUT – See section *Video Source Timeout–Decoders Only*.

VIDEO.POWER\_SAVE – See section *Video Power Save–Decoders Only*.

VIDEO.HDCP\_FORCE\_ON – Force the decoder to HDCP encrypt the output. See section *HDCP Force On–Encoders and Decoders*.

### CONFIGURATION TAB (CONT.)

The screenshot shows the 'Configuration' tab for a D4100 device. The settings are as follows:

Setting	Value
VW.ENABLED	FALSE
VW.NAME	[Empty text field]
VW.STRETCH	Fit
VW.ROTATE	0
BEZEL AND GAP SETTINGS UNITS=0.1mm	
VW.OVERALL_WIDTH	1600
VW.VISIBLE_WIDTH	1560
VW.OVERALL_HEIGHT	900
VW.VISIBLE_HEIGHT	860

To the right of these settings is a visual representation of a video wall, shown as a solid cyan rectangle.

VW.ENABLED – Setting for turning Video Wall mode on or off. See section *Video Wall*.

VW.NAME – User defined Video Wall name. For example: Videowall\_1 or Videowall\_3. (letters, numbers, dashes, and underscores only). See section *Video Wall*.

VW.STRETCH – See section *Video Wall*.

VW.ROTATE – See section *Video Wall*.

#### BEZEL AND GAP SETTINGS UNITS

VW.OVERALL\_WIDTH – See section *Video Wall*.

VW.VISIBLE\_WIDTH – See section *Video Wall*.

VW.OVERALL\_HEIGHT – See section *Video Wall*.

VW.VISIBLE\_HEIGHT – See section *Video Wall*.

## CONFIGURATION TAB (CONT.)

The screenshot shows the 'Configuration' tab for the D4100 device. It features a navigation bar with 'D4100', 'Device', 'Network', 'Configuration', and 'System'. The 'Configuration' tab is active, displaying 'ROW AND COLUMN SETTINGS' and 'USB' settings. The 'ROW AND COLUMN SETTINGS' section includes four input fields: 'VW.MAX\_ROWS' (2), 'VW.MAX\_COLUMNS' (2), 'VW.ROW' (1), and 'VW.COLUMN' (2). To the right of these fields is a 2x2 grid of colored squares (cyan, blue, cyan, cyan). The 'USB' section includes a 'USB ENABLED' checkbox (checked), a 'USB.KVM\_FAST' checkbox (unchecked), and a 'USB MODE' dropdown menu with three options: 'Auto Select', 'Active On Link', and 'Active Per Request'.

ROW AND COLUMN SETTINGS	
VW.MAX_ROWS	2
VW.MAX_COLUMNS	2
VW.ROW	1
VW.COLUMN	2

USB ENABLED	<input checked="" type="checkbox"/> TRUE
USB.KVM_FAST	<input type="checkbox"/> FALSE
USB MODE	<input type="radio"/> Auto Select
	<input type="radio"/> Active On Link
	<input type="radio"/> Active Per Request

## ROW AND COLUMN SETTINGS VW.MAX\_ROWS

– See section *Video Wall*. VW.MAX\_COLUMNS

– See section *Video Wall*. VW.ROW – See

section *Video Wall*. VW.COLUMN – See section *Video Wall*.

USB.ENABLED – Turn on or off USB over IP. See section *USB over IP (KVM)*.

USB.KVM\_FAST – See section *USB over IP (KVM)*.

USB.MODE – See section *USB over IP (KVM)*. Options are: Auto Select, Active On Link, and Active Per Request.

## CONFIGURATION TAB (CONT.)

The screenshot shows the 'Configuration' tab for the D4100 device. The interface includes a top navigation bar with tabs for 'D4100', 'Device', 'Network', 'Configuration', and 'System'. The 'Configuration' tab is active. Below the navigation bar, there are several sections: 'SERIAL ENABLED' with a toggle switch set to 'FALSE'; 'SERIAL MODE' with three radio button options: 'Simple' (selected), 'Simple Guest', and 'Advanced'; 'SERIAL SETTINGS' with four dropdown menus for 'Baudrate' (300), 'Data bits' (5), 'Parity' (None), and 'Stop bits' (1). At the bottom, there are two buttons: 'Select Splash file' and 'Upload file'. The 'Select Splash file' button is next to a text input field labeled 'Filename'. The 'Upload file' button is next to a file upload area.

**SERIAL.ENABLED** – Turn on or off RS232 over IP. See section *RS-232 over IP*.

**SERIAL.MODE** – See section *RS-232 over IP*. Options are: Simple, Simple Guest, and Advanced.

**SERIAL.SETTINGS** – See section *RS-232 over IP*. Options are: Baudrate, Data bits, Parity, and Stop bits.

**Select Splash file** – Browse to a file to use as a splash. See section *Custom Splash Screen—Decoders Only*.

**Upload file** – Upload the selected splash file. See section *Custom Splash Screen—Decoders Only*.

## D4100 SYSTEM TAB

The screenshot shows the 'System' tab of the D4100 web interface. It features a dark background with light-colored text and buttons. The top navigation bar includes tabs for 'D4100', 'Device', 'Network', 'Configuration', and 'System'. The 'System' tab is selected. Below the tabs, there are several functional areas: a 'Reboot' button and a 'Factory Default' button; a 'Change Password' button; two input fields for 'Password' and 'Reenter Password'; a 'Select update file' button and an 'Update filename' button; an 'Update Unit' button; and an 'Information' section at the bottom.

**Reboot** – This button reboots the unit.

**Factory Default** – This button factory defaults the unit. See section *Troubleshooting*.

**Change Password** – This button changes the unit’s web interface login password to values entered below (default is `admin`).

- Password – enter new password
- Reenter Password – reenter new password

**Important:** Make sure you write the new password down. If it is lost or forgotten, you will need to call Visionary Solutions support to assist in a console factory default of the unit.

**Set update file** – Browse to a new firmware file supplied by Visionary Solutions or downloaded from [www.vsicam.com](http://www.vsicam.com).

**Update Unit** – This button will initiate a firmware update per the specified file above.

**Information** – Real-time status messages displayed during a reboot, firmware update, or factory default action.

## CONTROL

### VISION LITE

Vision Lite is a 4K Matrix Switching, Video Wall Control, and configuration software for use with our E4100 Encoder and D4100 Decoder endpoints.

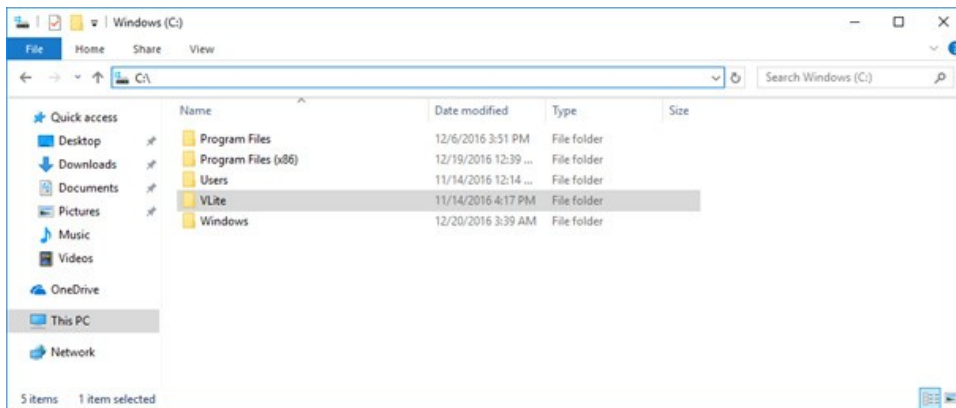
The Vision Lite Server Application is cross-platform capable (or OS agnostic), meaning that the software works on Windows, Mac, and Linux. The Vision Lite User Interface is a browser-based application that works on PCs, Apple or Android tablets, and mobile devices. Browsers supported are Chrome, Firefox, Internet Explorer, and so on.

Vision Lite automatically discovers units on your network without any configuration.

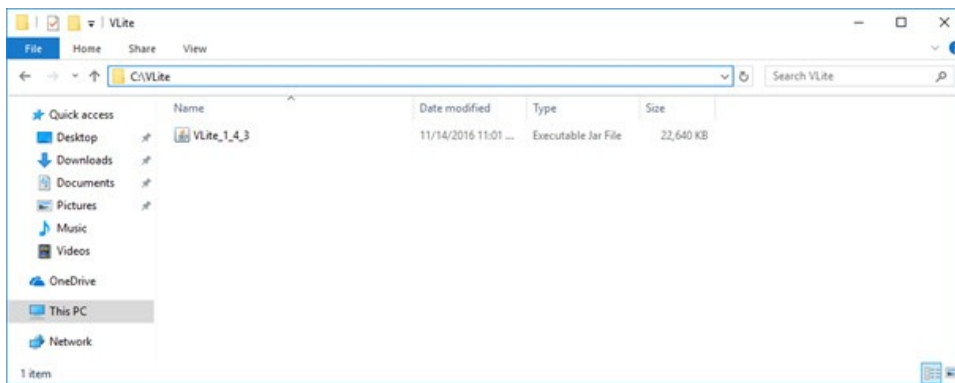


Follow these instructions to install the Vision Lite software.

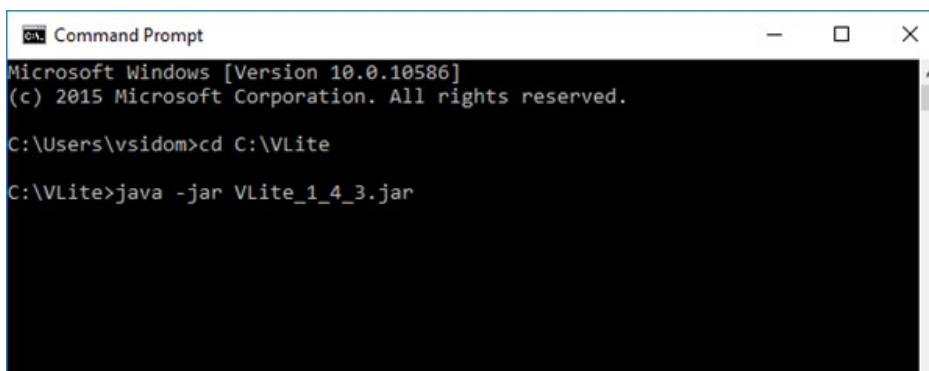
1. The latest Java JRE runtime is a prerequisite on the machine running VLite. The JRE can be found here: <http://www.oracle.com/technetwork/java/javase/downloads/jre8-downloads-2133155.html>.
2. Download the latest Vision Lite software from [www.vsicam.com](http://www.vsicam.com).
3. Manually create a read/write-able folder/directory `C:\VLite` at the root of your `C:\` drive. This is the recommended directory to place the downloaded `VLite.jar` file, but you can place the file anywhere on your computer.



4. Save the `VLite.jar` file that you downloaded to the `\VLite` folder you just created.



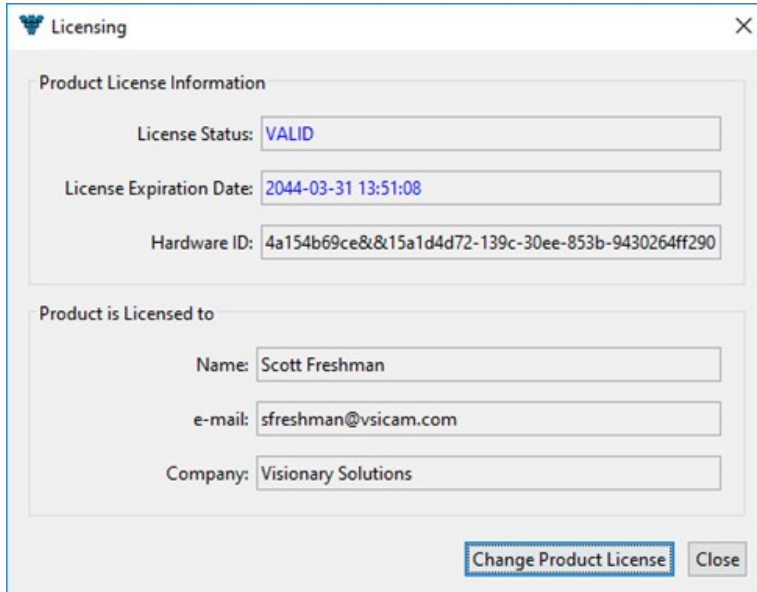
5. Launch the Vision Lite Server application by double clicking the `VLite.jar` file, OR from a command line interface using the following command: `java -jar VLite.jar`.



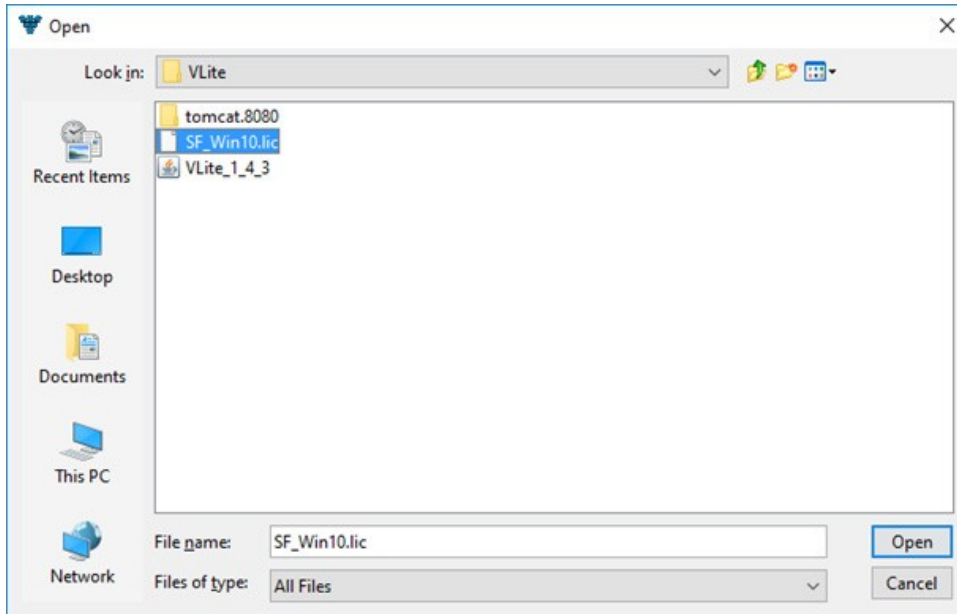
- The Vision Lite Server window opens.



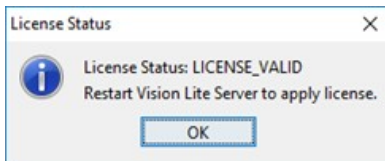
- Highlight the Hardware ID in the Vision Lite server window and copy the Hardware ID to your clipboard.
- Email the hardware ID to [support@vsicam.com](mailto:support@vsicam.com). Visionary Solutions will then generate a license file and return it to you via email. Please plan ahead to be sure to contact Visionary during normal business hours. Usually the response is within 10-15 minutes.
- Once you receive the license file from Visionary Solutions, save it to the C:\VLite folder.
- On the Vision Lite Server window, select **Licensing > Change Product License**.



11. Browse to and select the license file in the C:\VLite folder.



12. A confirmation that the license file is valid appears and you will be prompted to restart the Vision Lite Server (see Step 3 above)



13. Go to the **Network Interface** menu and select the appropriate network interface.

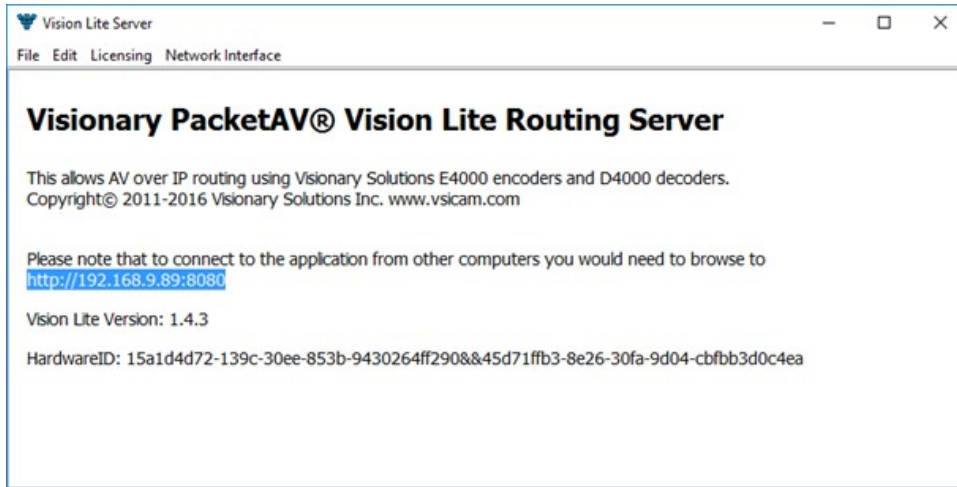


Select the network interface that the Vision Lite Server will be “listening” on. If your machine has more than one network interface, you will need to select the interface that is connected to the same network as the units.

**Important:** The Vision Lite Server window can be minimized in the background; however it must always be running.

14. Copy the Vision Lite Server IP Address from the Vision Lite Server window to your clipboard.

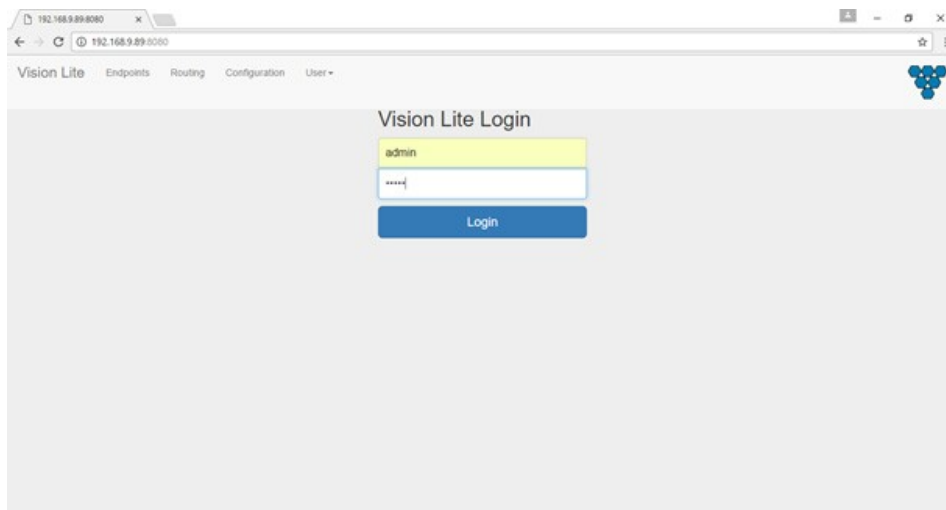
15. To launch the Vision Lite User Interface, open a browser page and copy the Vision Lite Server IP Address IP Address to the URL.



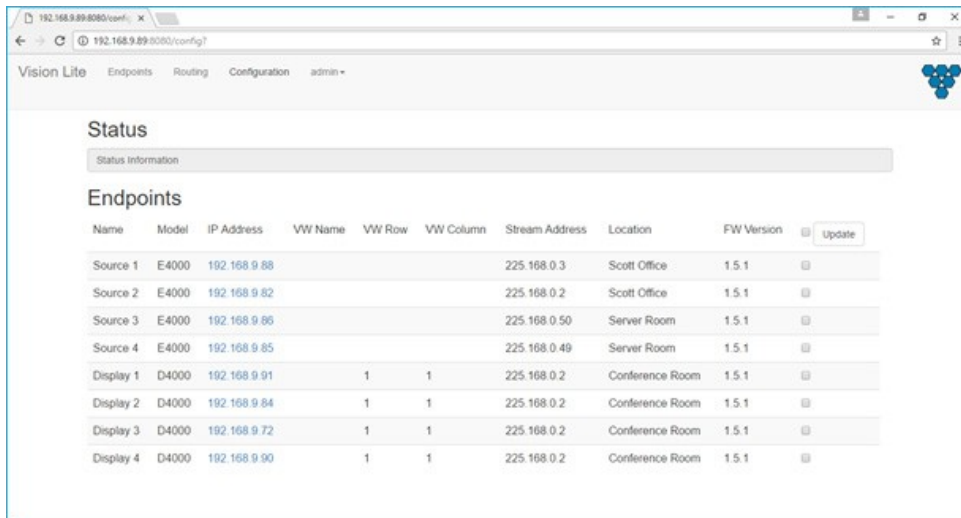
**Note:** You can log in from any machine on the network.

16. Log in with **username=admin password=admin**.

**Note:** A second user type with limited access rights is available. Log in with **username=user1 password=user1**.



17. The **Configuration** page opens. You now have access to configure each unit.



The screenshot shows the Vision Lite web interface with the 'Configuration' tab selected. Below the 'Status' section, there is an 'Endpoints' table. The table lists various units (Source 1-4 and Display 1-4) with their respective IP addresses, VW names, VW rows, VW columns, stream addresses, locations, and firmware versions. Each row has an 'Update' button next to the firmware version.

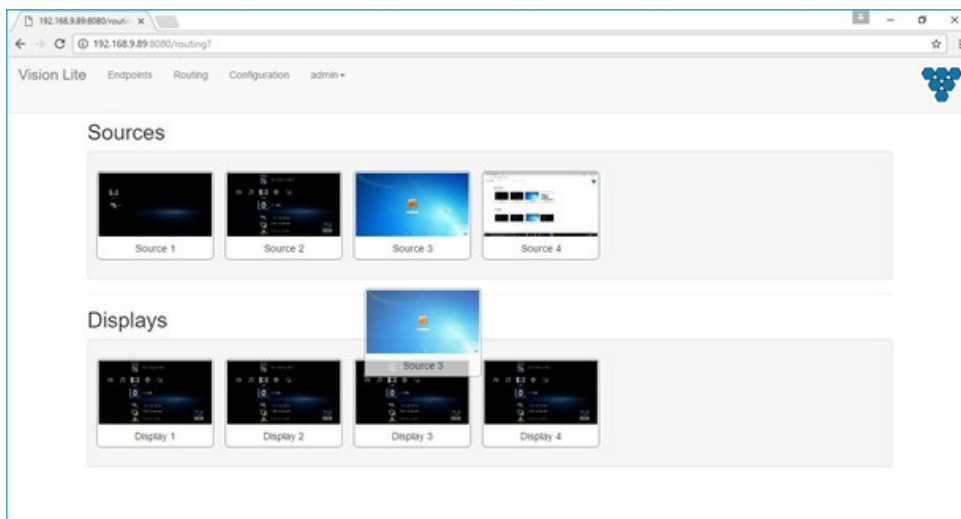
Name	Model	IP Address	VW Name	VW Row	VW Column	Stream Address	Location	FW Version	Update
Source 1	E4000	192.168.9.88				225.168.0.3	Scott Office	1.5.1	[Update]
Source 2	E4000	192.168.9.82				225.168.0.2	Scott Office	1.5.1	[Update]
Source 3	E4000	192.168.9.86				225.168.0.50	Server Room	1.5.1	[Update]
Source 4	E4000	192.168.9.85				225.168.0.49	Server Room	1.5.1	[Update]
Display 1	D4000	192.168.9.91		1	1	225.168.0.2	Conference Room	1.5.1	[Update]
Display 2	D4000	192.168.9.84		1	1	225.168.0.2	Conference Room	1.5.1	[Update]
Display 3	D4000	192.168.9.72		1	1	225.168.0.2	Conference Room	1.5.1	[Update]
Display 4	D4000	192.168.9.90		1	1	225.168.0.2	Conference Room	1.5.1	[Update]

- On the **Configuration** page, you can click on the IP Address (hyperlink) of any E/D4100 endpoint to open the embedded web interface for each unit. On the unit's web interface, you can rename the units and/or set a user defined location.

**Important:** SPECIAL CHARACTERS ARE NOT ALLOWED FOR UNIT ID AND LOCATION. Example: -@#\$\$% are *not* allowed.

**Note:** When making changes to the endpoints, the endpoints briefly disappear from the Vision Lite User Interface while they are rebooting and the application rediscovers them.

- From the **Configuration** page, you can update the firmware for any units that may be out of date. The Vision Lite software displays a message if a newer firmware is available.
- On the **Routing** tab, you can drag-n-drop to route and switch sources to displays.



### THIRD PARTY CONTROL DRIVERS AND PLUGINS

Various third party control drivers and plugins, such as QSC, Symetrix, Crestron, AMX, etc., are available. Please contact [support@vsicam.com](mailto:support@vsicam.com) for details.

## API

An API providing access to the full range of features on the encoders and decoders is offered to qualified System Integrators. Please contact [support@vsicam.com](mailto:support@vsicam.com) for details.

## TROUBLESHOOTING

This section provides useful information to help you to resolve any difficulty you might have with your E/D4100 endpoints.

### LED INDICATORS

Power LED (Green) – Blinking: Power on and the unit is booting up.

– Solid On: Power on and the unit is active

Link LED (Green) – Blinking: 1) The unit is connecting with encoder or decoder. 2) The HDMI source is removed.

– Solid On: All the connections are working.

### CHECKING THE FIRMWARE

It is important to know the version of the E/D4100 firmware in order to troubleshoot the unit. To find the firmware version of your E/D4100 from the embedded device web Interface, navigate to the **Device** tab and the firmware version is shown.

### SUPPORT

Should you require any technical assistance, please contact your Visionary Solutions reseller. If your questions cannot be answered immediately, your reseller will forward your queries through the appropriate channels to ensure a rapid response.

You can also:

- Download user documentation. Go to [www.vsicam.com/downloads](http://www.vsicam.com/downloads).
- Find answers to resolved problems in the FAQ database. Search by product, category, or phrases. Go to [www.vsicam.com/faqs](http://www.vsicam.com/faqs).
- Report problems to Visionary Solutions support staff by sending an email to [support@vsicam.com](mailto:support@vsicam.com).
- Visit the Customer Support section of the Visionary Solutions web site at [www.vsicam.com](http://www.vsicam.com).

### FACTORY DEFAULT SETTINGS

This procedure provides a way to reset the E/D4100 units back to the factory default settings, which may be necessary or desirable in certain circumstances.

The unit will reboot to its factory default settings. Note that a factory default causes all of the settings, including the network settings, to be reset to factory default values. Performing a factory default reset will restore the **IP.MODE** settings to DHCP, causing the unit to acquire a new IP address. If there is no DHCP server available on the network, the unit will use Auto IP addressing. See section *Network Discovery*.

1. Access the web interface for the unit that will be factory defaulted.
2. Log in with **username=admin password=admin**.
3. Click the **System** tab.
4. Click **Factory Default**.
5. Click **OK** on the pop-up.
6. The unit will reset to its factory default settings.

## RACK MOUNT KIT

The optional rack mount system for encoders/decoders is available as a kit from Visionary Solutions.



Figure 10. Rack Mount System



## PRODUCT SPECIFICATIONS

Specifications	E4100	D4100
Size	123/147mm(w/Flange) x 132mm(L) x 40mm(h), 370g	
Ethernet Port	POE, UTP/STP 1000Mbps (8K Jumbo Frame required)	
Protocol	IP, UDP, TCP, ICMP, IGMP	
HDMI Port	19 pin type A female	
RS232 Port	Phoenix Euro Block 3.81mm pitch - 5 pins	
DC Jack (Power)	2.0/DC5V, 2A	
Audio Jack (Line In/Out)	Phoenix Euro Block 3.81mm pitch - 4 pins	
USB Port	Type-B USB2.0	Type-A USB2.0
LAN Bandwidth	850Mbps max. for each source	
Max. Supported Timing	2160p 30Hz @60fps	
Max. Distance	120m (UTP) between 2 devices (Encoder/Decoder/Ethernet Switch)	
Built-in Output Scaler		Downscale to 1/2 Upscale from horizontal pixels < = 1920
Latency	~1 frame ~ 17ms at 60 fps, ~33ms at 30fps	
Video Wall		Up to 8 x16 display Image rotation (180/270°) Accurate frame gap compensation Tearing free
USB Redirection	KM over IP: dedicated for KVM application USB over IP: support any kind of USB HID devices	
HDMI Audio Redirection	2 Ch LPCM 8 Ch LPCM 5.1 Ch NLPCM 7.1 Ch NLPCM	
HDMI Audio Extraction	2 Ch LPCM (32KHz ~96KHz)	
Stereo Audio Redirection	LINE IN (switch off HDMI audio)	LINE OUT
RS232 Redirection	Transparent binary data transmission	
HDMI 3D Support	HDMI 2.0 3D: TnB, SbS, F.P.	
Compression Technology	Full Frame based visually lossless video compression algorithm	
Certificate	CE/FCC	
Compliance	HDMI 2.0/HDCP 2.24/RoHS	
Operating Temperature	0~70°C	
Operating Humidity	10~85% RH (no condensation)	
Storage Temperature	-10~80°C	
Storage Humidity	5~95% RH (no condensation)	