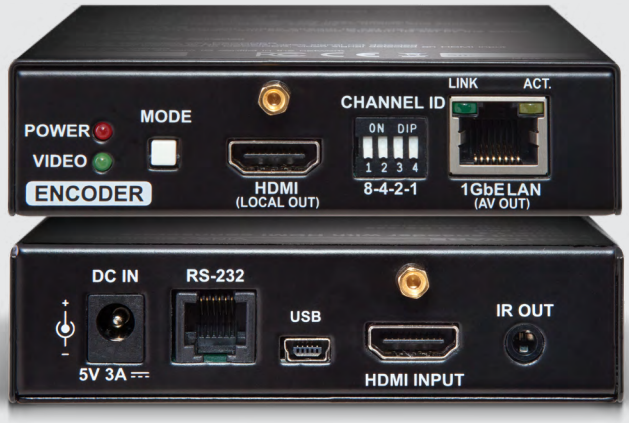
GIGABIT NETWORK SWITCH REQUIREMENTS FOR

VINX ENCODER AND DECODER



VINX-120-HDMI-ENC

VINX-110-HDMI-DEC

Network Properties

Network-based AV products use different network protocols for different operations. The network protocol can be UDP/IP and TCP/IP, the transmission mode can be Broadcast, Unicast, and Multicast.

These network protocols should be familiar to any network engineer. Because our network-based AV solutions bridge the gap between the audio-visual (AV) and information technology (IT) worlds, Lightware suggests involvement of both AV and IT departments in any installation.

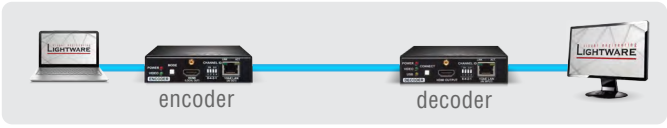
Lightware products are designed to be plug-and-play. The figures in the next section illustrate the basic installation of one decoder and one encoder. A video source provides the digital video content to the encoder which converts to Ethernet packets and sends to the attached decoder. The decoder reconstitutes the video with synchronized audio for presentation to the attached display.

Point-to-point vs Network Connection

VINX encoders and decoders have two typical applications:

- Point-to-point connection
- Point-to-multipoint connection

Point-to-point Connection



- Unicast routing is required

Unicast routing: uses a one-to-one association between the source and the destination: each destination address uniquely identifies a single decoder endpoint.

Point-to-Multipoint Connection

- Multicast routing protocol is required

Multicast routing: uses a one-to-many-of-many or many-to-many-of-many association; datagrams are routed simultaneously in a single transmission to many recipients.

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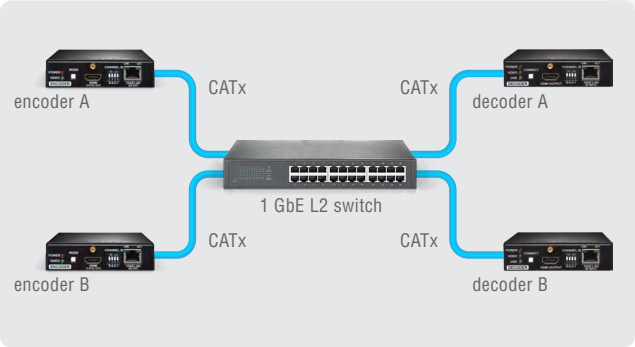
Unicast Routing

The network routing requirement of the VINX devices for point-to-point connection is the unicast routing protocol. Please note the unicast routing is not the default setting of the encoder and decoder, users have to set it in the devices.



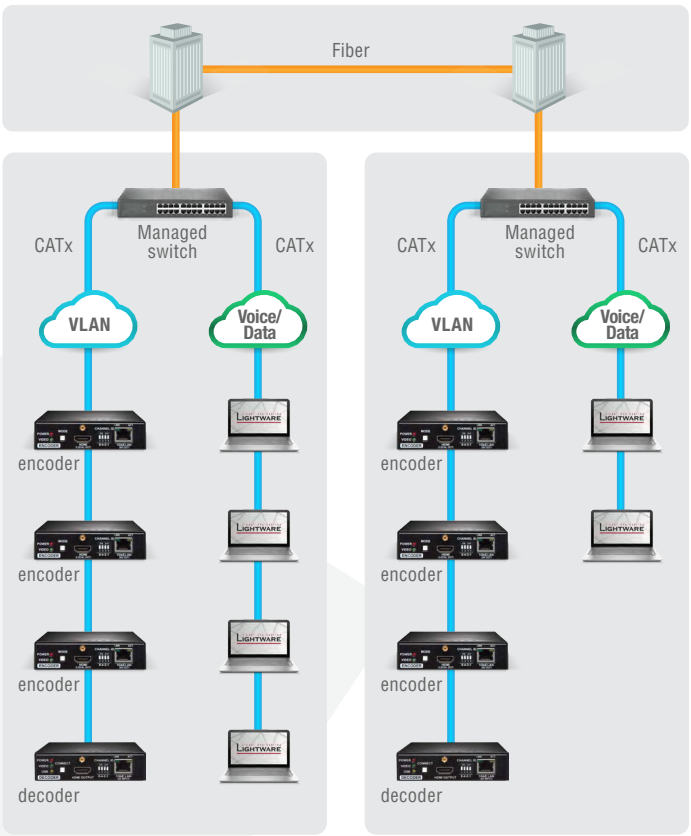
Hardware Requirement:

- 1 GbE Layer 2 (L2) switch

ATTENTION! VINX encoder and decoder send certain system commands over multicast packages. If the multicast routing is disabled on the network, the signal transmission can fail.

Managed Switch for Multicast Routing

In TCP/IP terminology Layer 2 is the data link layer that is resposible for splitting the information coming from higher layers in the TCP/ IP stack into Ethernet frames. An Ethernet frame includes, among others, labelling information with source and destination physical addresses (called source and destination MAC address). These physical addresses uniquely identify the source and destination physical devices (e.g. a VINX encoder and a VINX decoder). Ethernet frames provide error resilience by incorporating a redundancy check field through which transmission errors can easily be detected. The device that uses only the physical address information found in the Ethernet frame to root a packet from one of its input ports to one or more of its output ports is an unmanaged switch.



A managed switch, on the other hand, can handle the traffic and forward input packets to output packets by utilizing information from higher layers. This gives the managed switch more flexibility and also allows for more sophisticated functions like multicast forwarding. Since even a simple VINX network, where one VINX encoder supplies more VINX decoders, relies on multicasting, a multicast capable switch (i.e. a managed one) is mandatory. If non-managed switches transmit the multicast packages, the multicast traffic is usually converted to broadcast and transmitted over all interfaces.

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GIGABIT NETWORK SWITCH REQUIREMENTS FOR

VINX ENCODER AND DECODER

Hardware Requirement:

- 1 GbE Layer 3 (L3) switch

Why is it important?

By default, Lightware Video-over-IP encoders and decoders use multicast routing. The managed switch in the network shall offer the following capabilities:

- IGMPv2
- IGMP snooping
- IGMP fast leave
- IGMP Querier
- Multicast filtering
- 9k MTU - Jumbo/Giant frames

Managed Switch Properties in Details

IGMPv2

IGMPv2 is version 2 of the Internet Group Management Protocol. This protocol is used by end-point devices to signal their interest in receiving a specific multicast content via subscribing to the multicast group corresponding to the content. Using IGMPv2 packets, the end-point devices can send a leave message to indicate that they are no longer interested in receiving the stream of the multicast group. Moreover, a multicast capable router can periodically poll the end-point devices on its interfaces which multicast streams they are interested to receive. The answer to such a query is called a membership report. IGMPv2 must be supported by the managed switch.

IGMP Snooping

IGMP snooping is a feature which allows the switch to monitor IGMP traffic when enabled. The information collected from the IGMP packets is used by the managed switch to determine which interfaces the multicast traffic should be forwarded to. In other words, IGMP snooping is used to converse bandwidth by allowing the switch to root multicast traffic to those interfaces where it is really required.

IGMP Fast Leave

IGMP fast leave (or immediate leave), when configured, reduces the amount of time it takes for the managed switch to stop sending multicast traffic (corresponding to a multicast group defined by a multicast address) to an interface, where all end-point devices that used to be interested in a stream have sent a IGMP leave message. Without fast leave being enabled the managed switch would first send out a query message and then would stop forwarding when no end-points answered within a pre-specified time interval. If fast leave is enabled, the switch stops forwarding the traffic without sending a query message.

IGMP Querier

In order for IGMP snooping to work properly, IGMP messages must traverse in the subnet between managed switches. However, if there is no multicast capable router present periodically sending out query messages and receiving answers to those queries, IGMP messages are usually not forwarded upstream from one switch to another. By enabling the IGMP querier feature in a managed switch, the managed switch will act like a router and periodically query the devices in the subnet (even other managed switches) to send their membership reports. From those report all the listening switches with IGMP snooping enabled will be able to determine where multicast traffic should be rooted to.

Multicast Filtering

Some control information from VINX devices is transmitted via multicast packets. However, these packets are not registered during certain startup intervals or not registered at all. In order for all VINX devices in the subnet to receive such control information, multicast filtering must be set up, so that unregistered groups are forwarded to all interfaces on the managed switch.

Jumbo/Giant Frames

Ethernet frames consist of a header and a payload. Since the header has a fixed length (20 or 26 bytes) the bigger the payload, the higher the useful bandwidth is. Similarly, the higher the useful bandwidth, the better the picture quality of the encoded video stream will be. To maximize picture quality, the Ethernet frame size (and consequently, the payload) should be as high as possible. In a normal Ethernet frame, the payload can be at most 1500 bytes. An Ethernet jumbo frame, however, can carry up to 9000 bytes of payload. Since the goal of the transmission is to provide the best possible picture quality in all circumstances, the VINX encoder device produces Ethernet jumbo frames. Thus, the handling of jumbo frames has to be enabled in the managed switches.

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