Emerald4K Network Requirements

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Overview

Emerald4K will require specific network requirements so that high quality video and low latency are experienced. The technology can utilize unicast and multicast packets, so having a good network backbone that is properly configured is required. Unicast is a protocol designed to send network packets from a single transmitter to a single receiver (*about 10Gbps of bandwidth*), and Multicast is a protocol designed to send network packets from a single transmitter to more than 1 receiver.

In Unicast mode, every Receiver will use up to 10Gbps of data. This means that with 4 Receivers, you are sending a total of (10Gbps x 4 = 40Gbps) from the Transmitter (note this isn't possible so use Multicast for sharing or it won't work).

In Multicast mode, every Receiver can get up to 10Gbps of data still, however the transmitter will send the data once via Multicast and the network switch will then determine who is part of the IGMP group and properly disperse that data to those selected receivers. This is more network switch intensive, but allows for a lot of multimedia data to be transposed across a network of a single or multiple switches.

If using Multicasting technology on a network switch that cannot handle it will result in the network switch taking in the 10Gbps from a transmitter and broadcasting it out to every port whether that device wants the info or not; so selecting the proper network switch that can support Multicasting is extremely important. The network switch that isn't capable of handling this traffic will begin to make every status LED on the switch to blink all at the same time in synchrony, indicating something is wrong.

Recommended Switches

EMS10G28 (28-Port 10Gig Switch) will be capable of handling this type of traffic, whether it is in a single switch or multi-switch setup. You may also use a 10G version EMS10G28 with the LFP416 SFP.

Recommended Network Design

It is best practice to put Transmitters on the same switch as the Receivers who are accessing those most frequently to reduce overhead on the network switch trunks. This isn't always the case though, so placing Transmitters and Receivers on different switches is completely acceptable and it happens a lot; just validate that the switch trunks can handle all the bandwidth.

Multi-Subnet Support

Emerald4K is capable of going over multi-subnets and the internet if properly configured. To go from one subnet to another, you will need to utilize a Layer 3 switch to accommodate the connection (or you may want to consider using VLANs). If going over the internet, you must assign an external IP address to an internal one, and then configure the device to use the internal IP. The Router will know how to handle it if properly configured.

TCP/UDP Port Usage

	Application	Port	Emerald4K	EmeraldSE/PE/ZU
Appliance				
	Appliance REST HTTP	TCP: 7778	Yes	Yes
	Appliance REST HTTPS	TCP: 8888	Yes	Yes
	Stats gathering Internal Port	TCP: 9998 (internal use only; might show on scan)	Yes	Yes
	Communications	TCP: 22	Yes	Yes
	Manager Discovery (to Appliance): Multicast 224.0.1.249. Appliance listens on UDP Port	UDP: 39150	Yes	Yes
	(4K Only) Default Slave Multicast IP Port (IP: 239.0.0.1)	UDP: 8000	Yes	No
	(4K only) Default Master Multicast IP Port (IP: 239.0.0.1)	UDP: 8001	Yes	No
	Audio (Private/Multi Unicast)	TCP: 9000	Yes (1.2 onwards)	Yes (5.0.x onwards)
	Video EMDSE & 4K	TCP: 16384	Yes	Yes (5.3.x onwards)
	Video, 2nd channel, (Paired only)	TCP: 16385	No	Yes (5.4.x only)
	Reserved – Future	TCP: 16387		
	Reserved – Future	TCP: 16388		
	Multicast 225.0.0.37 (Appliance – recovery)	UDP: 12345	Yes	Yes
	RDP VM & RDP Broker	TCP: 3389 (default)	Yes (Default)	Yes (Default)
	Horizon Client	??		
	TX connections	TCP: 3389	Yes	Yes
Boxilla				
	Boxilla REST HTTPS	TCP: 443		
	Boxilla Smart Proxy HTTP	TCP: 8000 (Boxilla internal only)		
	Communications	TCP: 22		
	Discovery: Multicast 224.0.1.249 (Send)	UDP: 39150		

Note: *Firewalls on the WAN may cause audio to fail due to a protocol issue that prevents it traversing some firewalls. The audio channel does not perform the SYN/SYNACK sequence which leads to some of these streams being blocked.*

Network Switch Requirements

The following network switch specs are required to handle Emerald4K Multicasting properly.

Requirement	Switch Setting	Description
Must	IGMP Capable	Usually switches will support IGMP V1, V2, and V3
Must	10Gig Ports	Each port on the switch needs to support 10G for best operation
Recommended	Backplane Support	If you have a Gig 28-Port switch, the backplane should be capable of handling 28Gbps. Some switches will have say 28 ports but the backplane supports 24Gbps or less.
Must	Switch CPU	The network switch should have a heavy duty CPU that can handle the constant processing on the IGMP groups
Not needed as of now, but doesn't hurt	Jumbo Frames / MTU	Jumbo frames or MTU should be above 9000 bytes, however using a smaller setting may not cause many issues unless you begin seeing horizontal screen tearing or poor video quality.
Must	VLAN Configuration	We recommend you setup a VLAN for the Emerald4K system to keep it separate from other devices on the network. This is not required though, just a suggestion to keep things easy to manage. If using the EMS10G28, you are REQUIRED to make a secondary VLAN as you cannot configure multicasting on the default VLAN1
Recommended	Switch Trunks	If you plan on using more than 1 network switch, it is a good recommendation to use a switch capable of at least 40 or 80Gbps between switches for optimal performance.

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