

Christie Terra

SDVoE Network Switch Configuration and Connectivity Requirements

VERSION 1.5
LAST MODIFIED 3/12/2019

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Christie Terra SDVoE devices operate over 10G Ethernet

Network switches supplied for Terra SDVoE applications must supply the following configuration and performance. Zero-touch SDVoE network switches are highly recommended since they are pre-configured to support IGMPv2 multicast requirements out of the box.

Network Switch Requirements

Requirement	Further Detail
10G Ethernet	Clock speed per port required for uncompressed SDVoE video
Full 10G line rate	Full duplex 10G data rate supported from network ports in and out of backplane
Non-blocking design	Switch fabric or backbone of system supports non-blocking performance with sustained, uninterrupted, line rate data service in and out of every port simultaneously under all operating conditions <i>Note: Product specification sheets do not call this out often. Designer must certify this.</i>
L2/L3 Managed Switch	Switch is programmable, supporting VLANs, inter-VLAN routing, IGMPv2 Snooping and Query features <ul style="list-style-type: none"> • Layer2 multicast will be used by configurations that operate from a single switch • Note: Layer2 switches normally do not offer a querier service
IPv4	Addressing format used by SDVoE systems
IGMPv2	IGMP version 2 multicast protocols required, other versions are not fully tested Multicast traffic can be forwarded to every Terra device in the system. <ul style="list-style-type: none"> • Note: IGMP v3 is not recommended as it requires special configurations to be fully backward compatible
IGMP Snooping	IGMP snooping prevents devices from receiving traffic for a multicast group they have not explicitly joined.
IGMP Querier	The IGMP querier sends out membership inquiries periodically, to identify active multicast subscribers, and to update the group membership tables. A network switch will flood ports with multicast traffic if the IGMP query and snooping services are not configured properly. This is an essential multicast management function. The querier is configured to persist in all conditions. A loopback control is applied if required. <ul style="list-style-type: none"> • Note: Supplying the querier service directly from the SDVoE switch is the most reliable configuration. • Note: IGMP v3 is not recommended as it requires special configurations to be fully backward compatible
IGMP Fast-Leave	Produces quick switching between sources when using multicast groups (nice to have)
Drop Unregistered Multicast	Removes unnecessary traffic from the network (nice to have)
Advanced Traffic Management Configurations are not used	Advanced traffic management configurations are not in use and are disabled. <ul style="list-style-type: none"> • Please Note: Advanced traffic management includes, but is not limited to: Cueing management, buffer management, class and policy mapping, traffic policing, QoS, port data rate management, flow control, multicast or broadcast storm control, and ACL-type packet filtering functions. They can interfere with delivery of time-sensitive multicast video traffic. The simplest IGMPv2 multicast management configurations provide the most reliable results.
Static Addressing plan will be applied	Static addressing is the preferred method for managing networked audiovisual systems. DHCP Addressing will not be used. <ul style="list-style-type: none"> • Starting address and last address are supplied in Programmed Network Configuration Table. The number of addresses = 2 x Number of Terra and SDVoE devices plus Terra Controllers or other devices required to operate in the same broadcast domain.

Requirement	Further Detail
No filtering of SDVoE Network traffic	Refer to Appendix below for network application ports used by SDVoE systems
Programming software	<ul style="list-style-type: none"> Terra Startup Assistant and Terra Manager software can be installed on control PCs using Administration rights during the installation and service visits. 3rd Party Control Systems can switch and recall Terra configurations communicating directly to the Terra Manager using Terra JSON and XY Switcher protocols
Diagnostic tools	<ul style="list-style-type: none"> Software utility applications such as Wireshark, Microsoft Netmon are approved for use during the installation and service visits.
Resource Access	<ul style="list-style-type: none"> AV Programmers and Customer IT staff with management responsibility for the network switch will be physically present on-site, available to interact in-person with Commissioning and Support Staff, and will be authorized to make configuration changes.

Best Practices

Best Practice	Details
Static Addressing plan is applied	Devices will maintain the same IP addresses and will be easier to support.
Layer 3 switch is used that includes a Querier function	Layer 3 switches support creation of VLANs, inter-VLAN routing and querier service support
Querier is programmed directly on the switch serving the SDVoE system	Supplying the querier service directly from the switch delivers the highest performance and most reliable configuration.
Layer 2 multicast implementation	Layer 2 multicast implementations are the simplest to implement and support.
IGMPv2 multicast protocols is used	The SDVoE system has been tested and proven with IGMPv2. Other protocols such as IGMPv3 require extra configuration to ensure backward compatibility.
Network switch backplane and interconnection requirements are examined during system designs	Ensures system bandwidth will be supported transmitting or receiving traffic by every endpoint
Configure SDVoE devices to Static IP addresses, establish an IP list	This insures the device will maintain same IP address if it drops off line and back on, and avoids device conflicts and routing issues

Common Issues

Issue	Cause
IGMPv2 protocols not in use	SDVoE systems have been tested and proven using IGMPv2. Other versions have not been proven.
IGMPv2 Multicast Snooping and Querier protocols not enabled prior to installation	SDVoE multicast traffic will flood ports and the system will not function efficiently if multicast configurations are not in place before the installation begins. The majority of network switches require multicast configuration.
Querier service is supplied from a switch outside the SDVoE network	Querier service can become unreliable or disabled if it is served from another switch. Disconnection of one cable and the service can be lost. The network switches will be flooded with too much network traffic without both the Querier and Snooping features.
Advanced Traffic Management Configurations such as QoS, or multicast and storm control are operating or not disabled	Advanced Traffic Management features use network resources and attempt to change network traffic behavior using techniques that can disrupt and slow down time sensitive UDP/multicast SDVoE traffic. <i>Please Note: Advanced traffic management includes, but is not limited to: Cueing management, buffer management, class and policy mapping, traffic policing, QoS, port data rate management, flow control, multicast or broadcast storm control, and ACL-type packet filtering functions. They can interfere with delivery of time-sensitive multicast video traffic. The simplest IGMPv2 multicast management configurations provide the most reliable results.</i>
DHCP server operating in SDVoE network	DHCP service will work against efficient address management for the SDVoE system.

Multicast addresses used by SDVoE

Multicast Start Range	Multicast end Range	Multicast All TX	Multicast all RX
224.1.1.1	224.1.3.255	224.1.1.253	224.1.1.254

Ports and protocols used by SDVoE

Protocol	Port Number	Type	Description
TCP	6970	Unicast	Used for communications between control software and Server.
UDP	6969	Multicast, Unicast, Broadcast	Used between Control Server and devices to discover devices, exchange control information, and for Point-to-Point advertisements. All devices must be reachable by this traffic (225.225.225.225).
UDP	10001 to 10004	Unicast, Broadcast and Multicast. • Note: In general case, these ports can be limited to a subset, depending on how RS-232 is routed. For example, unicast only, broadcast only, etc.	Used by Control Server and to exchange RS-232 and Infrared control data.
UDP	6137	Used for (USB) Device Configuration	Used for USB to Network Protocol

Standard Terra SFP+ and Fiber Details

Multimode	Technical Details
Cable Type	OM3 duplex multimode up to 300m
Cable Type	OM4 duplex multimode up to 400m
Fiber Type	50/125 μm
Wavelength	850/1300 nm
Connector	LCLC – full duplex
Terra SFP+ Transceiver	10GBASE-SR 850nm, 10.3125Gbps, Coded Generic for Terra, multimode
Switch SFP+ Transceiver	10GBASE-SR 850nm, 10.3125Gbps, Coded to Manufacturer, multimode
Singlemode	Technical Details if Substituted (Typical)
Cable Type	OS1 duplex singlemode cable up to 2km
Cable Type	OS2 duplex singlemode up to 10km
Fiber type	9/125 μm (8.3 μm)
Wavelength	1310/1550 nm
Connector	LCLC – full duplex

Typical Distance Maximums for 10G Cables

Connection Format/Device	Cable Options	Typical Maximum Distance
Direct Attached Cables (DAC) <i>SFP+ attached directly to cable ends</i>	Twinax DAC Passive Copper Cables	5m • <i>Note: 3m cables are used frequently. Longer cables should be tested.</i>
	Twinax Active DAC Copper Cables	7m
	Active Optical DAC Cables	20m
SFP+ Transceivers	LCLC connector, Multimode OM3 cable	300m
	LCLC connector, Multimode OM4 cable	400m
	LCLC connector, Single mode	10km
	RJ45 connector, CAT6a, CAT7 or CAT8	30m
10G Media Converter	CAT6a, CAT7 or CAT8 cable plus Converter and DAC or multimode fiber with SFP+ Transceivers	100m