

## Understanding 802.1X and LLDP and LLDP-MED on EX-series Switches

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EX-series switches use Link Layer Discovery Protocol (LLDP) and Link Layer Discovery Protocol Media Endpoint Discovery (LLDP-MED) to learn and distribute device information on network links. The information allows the switch to quickly identify a variety of devices, resulting in a LAN that interoperates smoothly and efficiently.

LLDP-capable devices transmit information in Type Length Value (TLV) messages to neighbor devices. Device information can include specifics, such as chassis and port identification and system name and system capabilities. The TLVs leverage this information from parameters that have already been configured in the JUNOS software.

LLDP-MED goes one step further, exchanging IP-telephony messages between the switch and the IP telephone. These TLV messages provide detailed information on PoE policy. The PoE Management TLVs let the switch ports advertise the power level and power priority needed. For example, the switch can compare the power needed by an IP telephone running on a PoE interface with available resources. If the switch cannot meet the resources required by the IP telephone, the switch could negotiate with the telephone until a compromise on power is reached.

The switch also uses these protocols to ensure that voice traffic gets tagged and prioritized with the correct values at the source itself. For example, 802.1p CoS and 802.1Q tag information can be sent to the IP telephone.

EX-series switches support the following basic TLVs:

- **Chassis Identifier**—The MAC address associated with the local system.
- **Port identifier**—The port identification for the specified port in the local system.
- **Port Description**—The user– configured port description. The port description can be a maximum of 256 characters.
- **System Name**—The user– configured name of the local system. The system name can be a maximum of 256 characters.
- **System Description**—The system description containing information about the software and current image running on the system. This information is not configurable, but taken from the software.
- **System Capabilities**—The primary function performed by the system. The capabilities that system supports are defined; for example, bridge or router. This information is not configurable, but based on the model of the product.
- **Management Address**—The IP management address of the local system.

EX-series switches support the following 802.3 TLVs:

- **Power via MDI**—A TLV that advertises MDI power support, PSE power pair, and power class information.
- **MAC/PHY Configuration Status**—A TLV that advertises information about the physical interface, such as autonegotiation status and support and MAU type. The information is not configurable, but based on the physical interface structure.

- **Link Aggregation**—A TLV that advertises if the port is aggregated and its aggregated port ID.
- **Maximum Frame Size**—A TLV that advertises the Maximum Transmission Unit (MTU) of the interface sending LLDP frames.
- **Port Vlan**—A TLV that advertises the VLAN name configured on the interface.



**NOTE:** If the IP address isn't configured on the Avaya IP phone, the phone sends an ARP request to the DHCP server and references the VLAN ID for the VLAN on which it is a member. If the VLAN ID is incorrect, the IP phone's request for an IP address is denied. To bypass this issue, configure the **voip** statement on the interface. With the interface designated as a VoIP interface, the switch can forward the VLAN name and VLAN ID for the voice VLAN to the IP telephone. The IP telephone then uses the voice VLAN (that is, it references the voice VLAN's ID) to make an ARP request and receive an IP address.

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EX-series switches support the following LLDP-MED TLVs:

- **LLDP MED Capabilities**—A TLV that advertises the primary function of the port. The capabilities values range 0 through 15:
  - 0— Capabilities
  - 1— Network Policy
  - 2— Location Identification
  - 3— Extended Power via MDI-PSE
  - 4— Inventory
  - 5–15— Reserved
- **LLDP-MED Device Class Values:**
  - 0— Class not defined.
  - 1— Class 1 Device.
  - 2— Class 2 Device.
  - 3— Class 3 Device.
  - 4— Network Connectivity Device
  - 5–255— Reserved.
- **Network Policy**—A TLV that advertises the port VLAN configuration and associated Layer 2 and Layer 3 attributes. Attributes include the policy identifier, application types, such as voice or streaming video, 802.1Q VLAN tagging, and 802.1p priority bits and Diffserv code points.

- **Endpoint Location**— A TLV that advertises the physical location of the endpoint.
- **Extended Power via MDI**— A TLV that advertises the power type, power source, power priority, and power value of the port. It is the responsibility of the PSE device (network connectivity device) to advertise the power priority on a port.

- Related Topics**
- Example: Setting Up VoIP with 802.1X and LLDP-MED on an EX-series Switch
  - Configuring LLDP-MED (CLI Procedure)
  - Configuring LLDP (CLI Procedure)

