

VOICE VLAN SUPPORT IN THE DELL™ POWERCONNECT™ 6200



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VOICE VLAN SUPPORT IN THE DELL POWERCONNECT

INTRODUCTION

This paper describes the Voice VLAN support in the Dell™ PowerConnect™ PC6224, PC6248, PC6224P, PC6248P, and PC6224F Ethernet switches, requirements, and configuration.

Voice VLAN enables switch ports to carry voice traffic with a defined priority in order to enable the separation of voice and data traffic coming onto the port. A primary benefit of using Voice VLAN is to ensure that the sound quality of an IP phone is safeguarded from deteriorating when the data traffic on the port is high.

The inherent isolation provided by VLANs ensures that inter-VLAN traffic is under management control and that network attached clients cannot initiate a direct attack on voice components. QoS based on IEEE 802.1P class of service (CoS) uses classification and scheduling to send network traffic from the switch in a predictable manner. The system uses the source MAC address of the traffic traveling through the port to identify the IP phone data flow.

REQUIREMENTS

There are no standards available right now for Voice VLAN, so the implementation is vendor specific. Our implementation meets the following requirements:

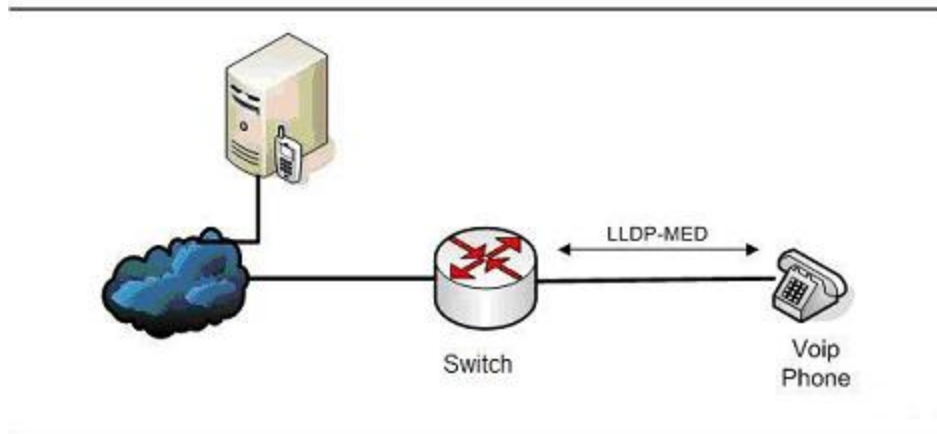
1. The Voice VLAN feature is disabled by default.
2. Voice VLAN is enabled on a per port basis. A port can participate in one Voice VLAN at a given instance of time.
3. For the Voice VLAN to be operational on the port so that the connected IP phone can correctly communicate on the Voice VLAN:
 - Voice VLAN should be configured on the interface.
 - LLDP-MED needs to be operational on the port.
 - Configured Voice VLAN should be one of the active VLANs from the dot1q database.
 - The port should be authorized and link is active.
 - The port should not be part of a Guest VLAN or LAG interface.
4. Voice VLAN becomes non-operational if the Voice VLAN ID is deleted from the dot1q database.
5. Voice VLAN uses LLDP-MED to pass on the VLAN ID, 802.1p Priority, and DSCP values to the IP phone.
6. The Voice VLAN operates in two modes – trusted mode and untrusted mode. The default mode is trusted mode.
7. In untrusted mode, the CoS value is not trusted for 802.1p or 802.1q tagged traffic, and all untagged traffic is forwarded with CoS value of 0.
8. In trusted mode, the CoS values of the 802.1p or 802.1q tagged traffic are forwarded based on the embedded priority info.
9. All untagged traffic except the Voice VLAN traffic (if untagged) is associated to the default priority of the port.
10. When Voice VLAN is enabled on a port, then the port is configured as an edge port (dot1s configuration) and when Voice VLAN is disabled, then the edge port remains configured.
11. Voice VLAN can be enabled on a port only if it is configured as "General".

USING VOICE VLAN

When an IP phone is connected to the switch, the voice traffic from the phone and the data traffic from the network could potentially deteriorate the voice quality. You can overcome this in multiple ways using different options in Voice VLAN.

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Voice VLAN



You can configure the switch to support Voice VLAN on a port that is connecting the VoIP phone. Both of the following methods segregate the voice traffic and the data traffic in order to provide better service to the voice traffic.

- When a VLAN is associated with the Voice VLAN port, then the VLAN ID information is passed onto the VoIP phone using the LLDP-MED mechanism. By this method, the voice data coming from the VoIP phone is tagged with the exchanged VLAN ID, thus regular data arriving on the switch is given the default PVID of the port, and the voice traffic is received on a pre-defined VLAN. As a result, both kinds of traffic are segregated in order to provide better service to the voice traffic.
- When a dot1p priority is associated with the Voice VLAN port instead of a VLAN ID, then the priority information is passed onto the VoIP phone using the LLDP-MED mechanism. By this method, the voice data coming from the VoIP phone is tagged with VLAN 0 and with the exchanged priority; thus regular data arriving on the switch is given the default priority of the port (default 0), and the voice traffic is received with a higher priority.

You can configure the switch to override the data traffic CoS. This feature can override the 802.1 priority of the data traffic packets arriving at the port enabled for Voice VLAN. Therefore, any rogue client that is also connected to the Voice VLAN port does not deteriorate the voice traffic.

INTERACTION WITH LLDP-MED

The interactions with LLDP-MED are important for Voice VLAN:

- LLDP-MED notifies the Voice VLAN component of the presence and absence of a VOIP phone on the network.
- The Voice VLAN component interacts with LLDP-MED for applying VLAN ID, priority and tag information to the VoIP phone traffic.

The Voice VLAN feature can only be used by IP phones that support LLDP-MED, e.g. 4610SW Avaya phones.

VOICE VLAN CONFIGURATION

The Voice VLAN feature is disabled by default. The Voice VLAN parameters are configured using CLI, Web, and SNMP.

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CLI CONFIGURATION

The following examples use the switch's Command Line Interface (CLI) for configuring Voice VLAN. See the *Dell™ PowerConnect™ 6224 Systems CLI Reference Guide* for more detailed information about the commands.

VOICE VLAN

Use this Global Configuration mode CLI command to enable the Voice VLAN capability on the switch globally. An example is shown below.

```
console>enable
console#configure
console(config)#voice vlan
```

COMMAND	DESCRIPTION
enable	Sets the CLI mode to enable privilege mode.
configure	Sets the CLI mode to configuration mode.
voice vlan	Enables the Voice VLAN capability on the switch globally.
exit	Puts the CLI back into the Privileged EXEC mode.

VOICE VLAN {<VLANID> | DOT1P <PRIORITY> | NONE | UNTAGGED}

Use this Interface Configuration (Ethernet) mode CLI command to enable the Voice VLAN capability on the interface with appropriate parameters. An example is shown below.

```
console>enable
console#configure
console(config)#interface ethernet 1/g1
console(config-if-1/g1)# voice vlan 1
console(config-if-1/g1)# voice vlan dot1p 1
console(config-if-1/g1)# voice vlan none
console(config-if-1/g1)# voice vlan untagged
console(config)#exit
```

To set the feature back to the default (disabled), use the no form of the command.

```
console(config)#no voice vlan
```

The following table describes the commands used in the previous example.

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COMMAND	DESCRIPTION
enable	Sets the CLI mode to enable privilege mode.
configure	Sets the CLI mode to configuration mode.
interface ethernet 1/g1	Sets the CLI mode to configure gigabit ethernet port 1 (referred to in the command as '1/g1'). NOTE: Value '1' in "1/g1" specifies the unit number, this number depends on the Stack unit number and can be between 1 to 12.
voice vlan 1	Configures the IP phone to forward all voice traffic through the specified VLAN. Valid VLAN IDs are from 1 to 4094 (maximum supported by the platform).
voice vlan dot1p 1	Configures the IP phone to use 802.1p priority tagging for voice traffic and to use the default native VLAN (VLAN 1) to carry all traffic. Valid priority is 0 to 7.
voice vlan none	Allows the IP phone to use its own configuration to send untagged voice traffic.
voice vlan untagged	Configures the phone to send untagged voice traffic.
exit	Puts the CLI back into the configuration mode.

VOICE VLAN DATA PRIORITY {TRUST | UNTRUST}

Use this Interface Configuration (Ethernet) mode CLI command to either trust or untrust the data traffic arriving on the Voice VLAN port. An example is shown below.

```
console>enable
console#configure
console(config)#interface ethernet 1/g1
console(config-if-1/g1)# voice vlan data priority untrust
console(config-if-1/g1)# voice vlan data priority trust
console(config)#exit
```

The following table describes the commands used in the previous example.

COMMAND	DESCRIPTION
enable	Sets the CLI mode to enable privilege mode.
configure	Sets the CLI mode to configuration mode.
interface ethernet 1/g1	Sets the CLI mode to configure gigabit ethernet port 1 (referred to in the command as '1/g1'). NOTE: Value '1' in "1/g1" specifies the unit number, this number depends on the Stack unit number and can be between 1 to 12.
voice vlan data priority untrust	Denotes to not trust (untrust) the data traffic arriving on the Voice VLAN port.
voice vlan data priority trust	Denotes to trust the data traffic arriving on the Voice VLAN port.
exit	Puts the CLI back into the configuration mode.

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SHOW VOICE VLAN

Use this Privileged EXEC mode CLI command to display global or interface Voice VLAN parameters. An example is shown below.

```
console>enable
console#show voice vlan

Administrative Mode                               Disabled

console#show voice vlan interface 1/g1

Interface                                         1/g1
Voice VLAN Interface Mode                       Enabled
Voice VLAN Untagging                            True

Voice VLAN COS Override                         False
Voice VLAN Port Status                         Disabled

console#show voice vlan interface all

Interface                                         1/g1
Voice VLAN Interface Mode                       Enabled
Voice VLAN ID                                   1
Voice VLAN COS Override                         False
Voice VLAN Port Status                         Disabled
Interface                                         1/g2
Voice VLAN Interface Mode                       Enabled
Voice VLAN Untagging                            True
Voice VLAN COS Override                         False
Voice VLAN Port Status                         Disabled

console#exit
```

The following table describes the commands used in the previous example.

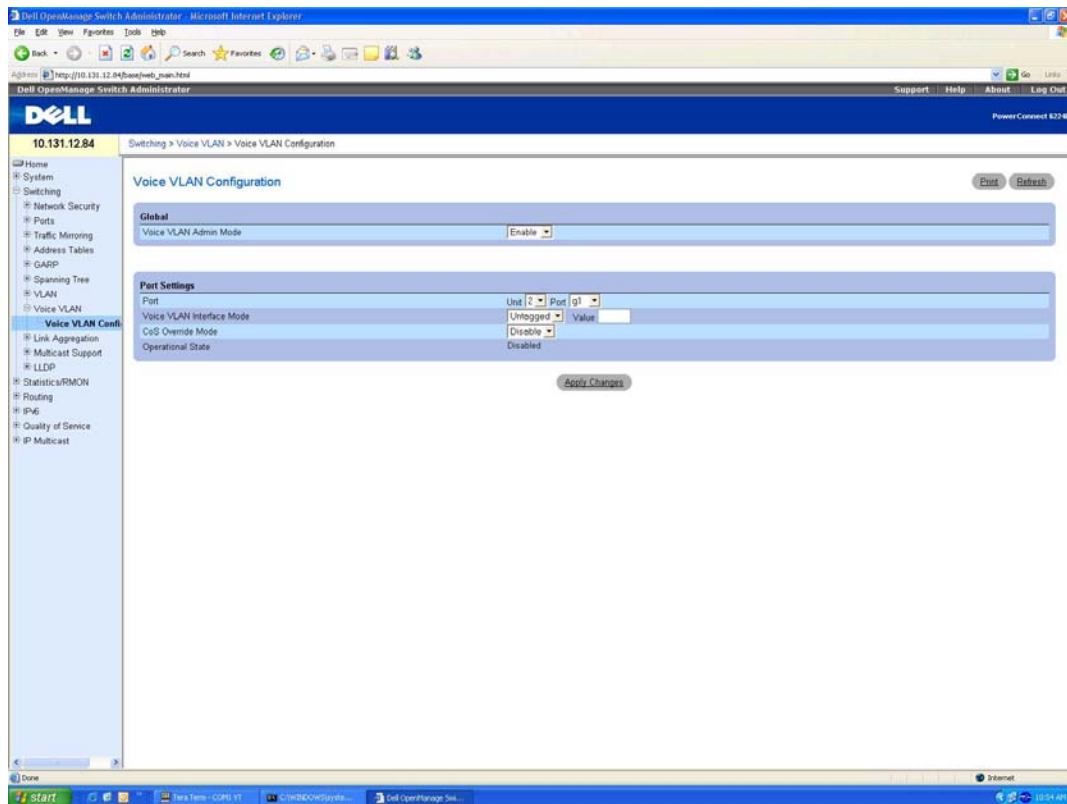
COMMAND	DESCRIPTION
enable	Sets the CLI mode to enable privilege mode.
show voice vlan	When the <i>interface</i> parameter is not specified, only the global mode of the Voice VLAN is displayed.
show voice vlan interface 1/g1	When the <i>interface</i> parameter is specified, the interface Voice VLAN parameters are displayed.
Voice VLAN Interface Mode	The admin mode of the voice VLAN on the interface.
Voice VLAN Untagged	Configure the VoIP phone to send untagged voice traffic.
Voice VLAN COS Override	The Override option for the voice traffic arriving on the port.
Voice VLAN Port Status	The operational status of Voice VLAN on the port.
show voice vlan interface all	The Voice VLAN parameters for all interfaces are displayed.
exit	Puts the CLI back into the User EXEC mode.

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WEB CONFIGURATION

If desired, you can use the Web Based Interface (WBI) to configure global and port Voice VLAN settings on the Dell PowerConnect PC6224P and PC6248P switches as well. See the *Dell™ PowerConnect™ 6200 Series User's Guide* for a description of the Dell WBI.

Figure 1. Voice VLAN Configuration



SNMP CONFIGURATION

FASTPATH-SWITCHING-MIB

- agentSwitchConfig Group
 - agentSwitchVoiceVLANGroup

OBJECT	ACCESS	DESCRIPTION
agentSwitchVoiceVLANAdminMode	Read-Write	Used to enable/disable Voice VLAN capability globally.

- agentPortConfigTable

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OBJECT	ACCESS	DESCRIPTION
agentPortVoiceVLANMode	Read-Write	Describes and configures the Port Voice VLAN Mode.
agentPortVoiceVLANID	Read-Write	Describes and configures the Port Voice VLAN ID if the Voice VLAN Mode is VLAN ID.
agentPortVoiceVLANPriority	Read-Write	Describes and configures the Port Voice VLAN Priority if the Voice VLAN Mode is dot1p.
agentPortVoiceVLANDataPriorityMode	Read-Write	Describes and configures the Port Voice VLAN Data Priority Mode.
agentPortVoiceVLANOperationalStatus	Read-Write	Describes the Port Voice VLAN Operational Status.

CONCLUSION

The Voice VLAN feature enables switch ports to carry voice traffic with defined priority. The priority level enables the separation of voice and data traffic coming onto the port.

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