



## Configuring VLANs

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This chapter describes how to configure VLANs on the Cisco Nexus 5000 Series switch. It contains the following sections:

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## Configuring VLANs

You can use virtual LANs (VLANs) to divide the network into separate logical areas. VLANs can also be considered as broadcast domains.

Any switch port can belong to a VLAN, and unicast, broadcast, and multicast packets are forwarded and flooded only to end stations in that VLAN. Each VLAN is considered a logical network, and packets destined for stations that do not belong to the VLAN must be forwarded through a router.

## Information About VLANs

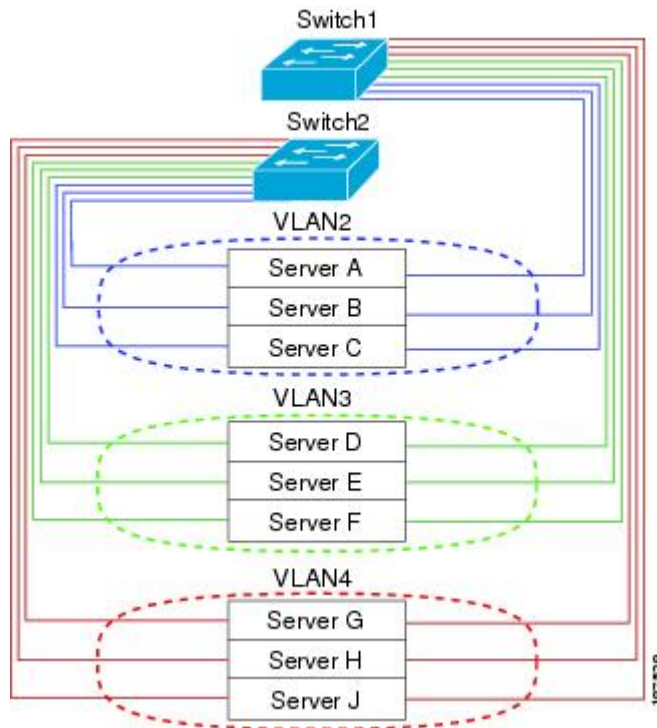
### Understanding VLANs

A VLAN is a group of end stations in a switched network that is logically segmented by function, project team, or application, without regard to the physical locations of the users. VLANs have the same attributes as physical LANs, but you can group end stations even if they are not physically located on the same LAN segment.

Any port can belong to a VLAN, and unicast, broadcast, and multicast packets are forwarded and flooded only to end stations in that VLAN. Each VLAN is considered a logical network. Packets destined for stations that do not belong to the VLAN must be forwarded through a router.

The following figure shows VLANs as logical networks. In this diagram, the stations in the engineering department are assigned to one VLAN, the stations in the marketing department are assigned to another VLAN, and the stations in the accounting department are assigned to yet another VLAN.

**Figure 1: VLANs as Logically Defined Networks**



VLANs are usually associated with IP subnetworks. For example, all the end stations in a particular IP subnet belong to the same VLAN. To communicate between VLANs, you must route the traffic.

By default, a newly created VLAN is operational. To disable the VLAN use the **shutdown** command. Additionally, you can configure VLANs to be in the active state, which is passing traffic, or the suspended state, in which the VLANs are not passing packets. By default, the VLANs are in the active state and pass traffic.



**Note**

The VLAN Trunking Protocol (VTP) mode is OFF. VTP BPDUs are dropped on all interfaces of a Cisco Nexus 5000 Series switch. This has the effect of partitioning VTP domains if other switches have VTP turned on.

## Understanding VLAN Ranges

The Cisco Nexus 5000 Series switch supports VLAN numbers 1 to 4094 in accordance with the IEEE 802.1Q standard. These VLANs are organized into ranges. You use each range slightly differently. The switch is physically limited in the number of VLANs it can support. The hardware also shares this available range with its VSANs

The following table describes the details of the VLAN ranges.

**Table 1: VLAN Ranges**

VLANs Numbers	Range	Usage
1	Normal	Cisco default. You can use this VLAN, but you cannot modify or delete it.
2—1005	Normal	You can create, use, modify, and delete these VLANs.
1006—4094	Extended	You can create, name, and use these VLANs. You cannot change the following parameters: <ul style="list-style-type: none"> <li>• State is always active.</li> <li>• VLAN is always enabled. You cannot shut down these VLANs.</li> </ul>
3968—4047 and 4094	Internally allocated	These 80 VLANs, plus VLAN 4094, are allocated for internal use. You cannot create, delete, or modify any VLANs within the block reserved for internal use.

**Note**

VLANs 3968 to 4047 and 4094 are reserved for internal use; these VLANs cannot be changed or used.

Cisco NX-OS allocates a group of 80 VLAN numbers for those features, such as multicast and diagnostics, that need to use internal VLANs for their operation. By default, the system allocates VLANs numbered 3968 to 4047 for internal use. VLAN 4094 is also reserved for internal use by the switch.

You cannot use, modify, or delete any of the VLANs in the reserved group. You can display the VLANs that are allocated internally and their associated use.

## Creating, Deleting, and Modifying VLANs

VLANs are numbered from 1 to 4094. All configured ports belong to the default VLAN when you first bring up the switch. The default VLAN (VLAN1) uses only default values. You cannot create, delete, or suspend activity in the default VLAN.

You create a VLAN by assigning a number to it. You can delete VLANs as well as move them from the active operational state to the suspended operational state. If you attempt to create a VLAN with an existing VLAN ID, the switch goes into the VLAN submode but does not create the same VLAN again.

Newly created VLANs remain unused until ports are assigned to the specific VLAN. All the ports are assigned to VLAN1 by default.

Depending on the range of the VLAN, you can configure the following parameters for VLANs (except the default VLAN):

- VLAN name
- Shutdown or not shutdown

When you delete a specified VLAN, the ports associated to that VLAN are shut down and no traffic flows. However, the system retains all the VLAN-to-port mapping for that VLAN, and when you reenables, or recreates, the specified VLAN, the system automatically reinstates all the original ports to that VLAN.

**Note**

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Commands entered in the VLAN configuration submode are immediately executed.

VLANs 3968 to 4047 and 4094 are reserved for internal use; these VLANs cannot be changed or used.

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## About the VLAN Trunking Protocol

The VLAN Trunking Protocol (VTP) is a Layer 2 messaging protocol that maintains VLAN consistency by managing the addition, deletion, and renaming of VLANs within a VTP domain. A VTP domain includes one or more network switches that share the same VTP domain name and that are connected with trunk interfaces. Each switch can be in only one VTP domain.

Layer 2 trunk interfaces, Layer 2 port channels, and virtual port channels (vPCs) support VTP functionality.

**Note**

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In the Cisco Nexus 5000 Series switches, VTP works only in transparent mode, allowing you to extend a VTP domain across the switch.

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When the switch is in the VTP transparent mode, the switch relays all VTP protocol packets that it receives on a trunk port to all other trunk ports. When you create or modify a VLAN that is in VTP transparent mode, those VLAN changes affect only the local switch. A VTP transparent network switch does not advertise its VLAN configuration and does not synchronize its VLAN configuration based on received advertisements.

**Note**

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VLAN 1 is required on all trunk ports used for switch interconnects if the VTP protocol is to be supported in the network. Removing VLAN 1 from any of these ports prevents VTP from functioning.

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VTP is disabled by default on the switch. You enable and configure VTP using the command-line interface (CLI). When VTP is disabled, the switch does not relay any VTP packets.

If you enable VTP, you must configure either version 1 or version 2. If you are using VTP in a Token Ring environment, you must use version 2.

## Configuring a VLAN

### Creating and Deleting a VLAN

You can create or delete all VLANs except the default VLAN and those VLANs that are internally allocated for use by the switch. Once a VLAN is created, it is automatically in the active state.

**Note**

When you delete a VLAN, ports associated to that VLAN shut down. The traffic does not flow and the packets are dropped.

**SUMMARY STEPS**

1. switch# **configure terminal**
2. switch(config)# **vlan** {vlan-id | vlan-range}
3. switch(config-vlan)# **no vlan** {vlan-id | vlan-range}

**DETAILED STEPS**

	Command or Action	Purpose
<b>Step 1</b>	switch# <b>configure terminal</b>	Enters configuration mode.
<b>Step 2</b>	switch(config)# <b>vlan</b> {vlan-id   vlan-range}	Creates a VLAN or a range of VLANs.  If you enter a number that is already assigned to a VLAN, the switch puts you into the VLAN configuration submode for that VLAN. If you enter a number that is assigned to an internally allocated VLAN, the system returns an error message. However, if you enter a range of VLANs and one or more of the specified VLANs is outside the range of internally allocated VLANs, the command takes effect on <i>only</i> those VLANs outside the range. The range is from 2 to 4094; VLAN1 is the default VLAN and cannot be created or deleted. You cannot create or delete those VLANs that are reserved for internal use.
<b>Step 3</b>	switch(config-vlan)# <b>no vlan</b> {vlan-id   vlan-range}	Deletes the specified VLAN or range of VLANs and removes you from the VLAN configuration submode. You cannot delete VLAN1 or the internally allocated VLANs.

This example shows how to create a range of VLANs from 15 to 20:

```
switch# configure terminal
switch(config)# vlan 15-20
```

**Note**

You can also create and delete VLANs in the VLAN configuration submode.

**Entering the VLAN Submode and Configuring the VLAN**

To configure or modify the VLAN for the following parameters, you must be in the VLAN configuration submode:

- Name
- Shut down

**Note**

You cannot create, delete, or modify the default VLAN or the internally allocated VLANs. Additionally, some of these parameters cannot be modified on some VLANs.

**SUMMARY STEPS**

1. switch# **configure terminal**
2. switch(config)# **vlan** {vlan-id | vlan-range}
3. switch(config-vlan)# **name** vlan-name
4. switch(config-vlan)# **state** {active | suspend}
5. (Optional) switch(config-vlan)# **no shutdown**

**DETAILED STEPS**

	Command or Action	Purpose
<b>Step 1</b>	switch# <b>configure terminal</b>	Enters configuration mode.
<b>Step 2</b>	switch(config)# <b>vlan</b> {vlan-id   vlan-range}	Enters VLAN configuration submenu. If the VLAN does not exist, the system first creates the specified VLAN.
<b>Step 3</b>	switch(config-vlan)# <b>name</b> vlan-name	Names the VLAN. You can enter up to 32 alphanumeric characters to name the VLAN. You cannot change the name of VLAN1 or the internally allocated VLANs. The default value is VLANxxxx where xxxx represent four numeric digits (including leading zeroes) equal to the VLAN ID number.
<b>Step 4</b>	switch(config-vlan)# <b>state</b> {active   suspend}	Sets the state of the VLAN to active or suspend. While the VLAN state is suspended, the ports associated with this VLAN are shut down, and that VLAN does not pass any traffic. The default state is active. You cannot suspend the state for the default VLAN or VLANs 1006 to 4094.
<b>Step 5</b>	switch(config-vlan)# <b>no shutdown</b>	(Optional) Enables the VLAN. The default value is <b>no shutdown</b> (or enabled). You cannot shut down the default VLAN, VLAN1, or VLANs 1006 to 4094.

This example shows how to configure optional parameters for VLAN 5:

```
switch# configure terminal
switch(config)# vlan 5
switch(config-vlan)# name accounting
switch(config-vlan)# state active
switch(config-vlan)# no shutdown
```

**Adding Ports to a VLAN**

After you have completed the configuration of a VLAN, assign ports to it. To add ports, perform this task:

## SUMMARY STEPS

1. switch# **configure terminal**
2. switch(config)# **interface** {*ethernet slot/port* | **port-channel number**}
3. switch(config-if)# **switchport access vlan** *vlan-id*

## DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	switch# <b>configure terminal</b>	Enters configuration mode.
<b>Step 2</b>	switch(config)# <b>interface</b> { <i>ethernet slot/port</i>   <b>port-channel number</b> }	Specifies the interface to configure, and enters the interface configuration mode. The interface can be a physical Ethernet port or an EtherChannel.
<b>Step 3</b>	switch(config-if)# <b>switchport access vlan</b> <i>vlan-id</i>	Sets the access mode of the interface to the specified VLAN.

This example shows how to configure an Ethernet interface to join VLAN 5:

```
switch# configure terminal
switch(config)# interface ethernet 1/13
switch(config-if)# switchport access vlan 5
```

## Verifying VLAN Configuration

To display VLAN configuration information, perform one of these tasks:

Command	Purpose
switch# <b>show running-config vlan</b> [ <i>vlan_id</i>   <i>vlan_range</i> ]	Displays VLAN information.
switch# <b>show vlan</b> [ <b>brief</b>   <b>id</b> [ <i>vlan_id</i>   <i>vlan_range</i> ]   <b>name</b> <i>name</i>   <b>summary</b> ]	Displays selected configuration information for the defined VLAN(s).

The following example shows all VLANs defined in the range of 1 to 21.

```
switch# show running-config vlan 1-21
version 4.0(1a)N1(1)
vlan 1
vlan 5
```

The following example shows the VLANs created on the switch and their status:

```
switch# show vlan
```

VLAN Name	Status	Ports
1 default	active	Eth1/1, Eth1/2, Eth1/3, Eth1/4 Eth1/5, Eth1/6, Eth1/7, Eth1/8 Eth1/9, Eth1/10, Eth1/11 Eth1/12, Eth1/15, Eth1/16 Eth1/17, Eth1/18, Eth1/19 Eth1/20, Eth1/21, Eth1/22 Eth1/23, Eth1/24, Eth1/25 Eth1/26, Eth1/27, Eth1/28 Eth1/29, Eth1/30, Eth1/31 Eth1/32, Eth1/33, Eth1/34 Eth1/35, Eth1/36, Eth1/37 Eth1/38, Eth1/39, Eth1/40 Eth3/1, Eth3/2, Eth3/3, Eth3/4 veth1/1
13 VLAN0005	active	Eth1/13, Eth1/14

The following example shows the details of VLAN 13 including its member ports:

```
switch# show vlan id 13
```

VLAN Name	Status	Ports
13 VLAN0005	active	Eth1/13, Eth1/14

VLAN Type	MTU
13 enet	576

```
Remote SPAN VLAN
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Disabled
```

Primary	Secondary	Type	Ports
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The following example shows the VLAN settings summary:

```
switch# show vlan summary
```

```
Number of existing VLANs      : 2
Number of existing user VLANs : 2
Number of existing extended VLANs : 0
```