

# Configuring VLAN Trunk Protocol (VTP)

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## **Introduction**

This document provides information on how to configure VLAN Trunk Protocol (VTP). VTP reduces administration in a switched network. When you configure a new VLAN on one VTP server, the VLAN is distributed through all switches in the domain. This reduces the need to configure the same VLAN everywhere. VTP is a Cisco–proprietary protocol that is available on most of the Cisco Catalyst series products.

## **Prerequisites**

### **Requirements**

There are no specific requirements for this document.

### **Components Used**

This document is not restricted to specific software and hardware versions.

### **Conventions**

Refer to Cisco Technical Tips Conventions for more information on document conventions.

## **Understand VTP**

Refer to Understanding VLAN Trunk Protocol (VTP) for more information on VTP.

# VTP Configuration Guidelines

This section provides some guidelines for the configuration of VTP in the network.

- All switches have the same the VTP domain name, unless the network design insists for different VTP domains.

**Note:** Trunk negotiation does not work across VTP domains. Refer to the Data Traffic Blocked between VTP Domains section of Troubleshooting VLAN Trunk Protocol (VTP) for more information.

- All switches in a VTP domain must run the same VTP version.
- All switches in a VTP domain has the same VTP password, if there is any.
- All VTP Server switch(es) should have the same configuration revision number and it should also be the highest in the domain.
- When you move a VTP mode of a switch from Transparent to Server, VLANs configured on the VTP Transparent switch should exist on the Server switch.

## VTP Configuration on Catalyst Switches

This section provides some basic commands in order to configure VTP on the most commonly used Catalyst switches.

**Note:** The Catalyst 2948G–L3 and Catalyst 4908G–L3 Layer 3 (L3) switches do not support several Layer 2 (L2)–oriented protocols that are found on other Catalyst switches. Such protocols include VTP, DTP, and Port Aggregation Protocol (PAgP).

### Catalyst 6500/6000 Series Cisco IOS Software/Catalyst 4500/4000 Cisco IOS Software (Supervisor Engine III/Supervisor Engine IV), Catalyst 2950, 3550, and 3750 Series Switches

There are two methods that you can use in order to configure VTP, as this section shows. Method 2 (the global configuration mode method) is not available in earlier software on Catalyst 6500 series switches that run Cisco IOS® Software.

#### 1. In VLAN database mode:

In Cisco IOS Software, you can configure the VTP domain name, the VTP mode, and the VLANs in VLAN configuration mode.

- a. In EXEC mode, issue this command in order to enter VLAN configuration mode:

```
Router#vlan database
!--- Issue this command in privileged EXEC mode,
!--- not in global configuration mode.

Router(vlan)#

!--- This is VLAN configuration mode.
```

- b. Issue this command in order to set the VTP domain name:

```
Router(vlan)#vtp mode {client | server | transparent}
```

- c. Issue the **exit** command in order to exit VLAN configuration mode.

**Note:** The **end** and the **Ctrl-Z** commands do not work in this mode.

```
Router(vlan)#end

Router(vlan)#^Z

% Invalid input detected at '^' marker.

Router(vlan)#

Router(vlan)#exit

APPLY completed.
Exiting...
Router#
```

## 2. In global configuration mode:

In Cisco IOS Software global configuration mode, you can configure all VTP parameters with Cisco IOS Software commands. This is the command format:

```
Router(config)#vtp ?

domain      Set the name of the VTP administrative domain.
file        Configure IFS filesystem file where VTP configuration is stored.
interface   Configure interface as the preferred source for the VTP IP updater
            address.
mode        Configure VTP device mode
password    Set the password for the VTP administrative domain
pruning     Set the administrative domain to permit pruning
version     Set the administrative domain to VTP version
```

## 3. Issue these commands in order to monitor VTP operation and status:

```
Router#show vtp status

Router#show vtp counters
```

## Catalyst 4500/4000, 5500/5000, or 6500/6000 Series CatOS

Complete these steps:

### 1. Issue this command in order to set the domain name:

```
set vtp domain name
```

**Note:** When you configure a new switch, the VTP domain name should be configured before you create any non-default VLANs.

### 2. Issue this command in order to set the mode:

```
set vtp mode [server | client | transparent]
```

### 3. Issue these commands in order to monitor the VTP operation and status:

```
show vtp domain
show vtp status
```

## Catalyst 2900XL, 3500XL, 2950, and 3550

Complete these steps:

1. Issue these commands from the VLAN database mode:

**Note:** This is similar to the method for Cisco 6500 series switches that run Cisco IOS Software.

```
vtp [client | server | transparent]
vtp domain name
```

2. From enable mode, issue these commands in order to monitor VTP operation:

```
show vtp counters
show vtp status
```

**Note:** The Catalyst 2900XL series switches with Cisco IOS Software Release 11.2(8)SA4 and later support VTP protocol. The Cisco IOS Software Release 11.2(8)SA3 and earlier code do not support VTP protocol on Catalyst 2900XL series switches.

## Catalyst Express 500 Series Switches

Catalyst Express 500 series switches support only VTP transparent mode. There is currently no support for VTP client or VTP server mode. The user must manually configure all VLANs that are used on the switch.

Open the **Switch Management**, choose **Configure > VLAN > Create**, and fill out the available fields in order to configure a VLAN on a Catalyst Express 500 series switch.

Refer to the *Create, Modify, and Delete VLANs* section of Customization for more information.

## Practical Examples

### Example 1:

This example involves two Catalyst 4000 switches that are connected by a Fast Ethernet link:

1. Bing is a new switch that has no VTP domain name and no VLAN. Clic is a switch that currently exists and runs with 12 VLANs in the VTP domain test.
2. In this sample output from the **show vtp domain** command, you can see that the VTP version is set at 2. This means that the switch is VTP V2-capable. However, the switch does not run VTP V2 in this case. The switch only runs VTP V2 if the V2 mode is enabled with the **set vtp v2 enable** command:

```
bing (enable) show vtp domain
```

Domain Name	Domain Index	VTP Version	Local Mode	Password
-----	1	2	server	-

Vlan-count	Max-vlan-storage	Config Revision	Notifications
-----	-----	-----	-----
5	1023	0	disabled

Last Updater	V2 Mode	Pruning	PruneEligible on Vlans
-----	-----	-----	-----
0.0.0.0	disabled	disabled	2-1000

```
bing (enable)
```

```
bing (enable) show vlan
```

VLAN Name	Status	IfIndex	Mod/Ports, Vlans
-----	-----	-----	-----
1 default	active	67	2/1-2,2/4-48

```

1002 fddi-default          active    68
1003 token-ring-default    active    71
1004 fddinet-default       active    69
1005 trnet-default         active    70

```

clic (enable) **show vtp domain**

```

Domain Name                Domain Index VTP Version Local Mode Password
-----
test                        1            2            server      -

Vlan-count Max-vlan-storage Config Revision Notifications
-----
12          1023              11           disabled

Last Updater    V2 Mode  Pruning  PruneEligible on Vlans
-----
0.0.0.0        disabled disabled 2-1000

```

clic (enable) **show vlan**

```

VLAN Name                Status    IfIndex Mod/Ports, Vlans
-----
1    default              active    65      2/1-2,2/4-50
2    VLAN0002              active    77
3    VLAN0003              active    78      2/3
4    VLAN0004              active    79
5    VLAN0005              active    73
6    VLAN0006              active    74
7    VLAN0007              active    76
10   VLAN0010              active    80
1002 fddi-default        active    66
1003 token-ring-default  active    69
1004 fddinet-default     active    67
1005 trnet-default       active    68      68

```

3. At this stage, a trunk is created between the two switches. Notice how they synchronize and watch the VTP packet exchange:

```
MAC 005014BB63FD is clic
```

```
MAC 003019798CFD is bing
```

4. Clic sends a summary advertisement to bing. Bing learns the VTP domain name from this packet, in FRAME 1 in this sample output:

```
!--- On bing:
```

```
received vtp packet: mNo = 2 pNo = 1
VTP: i summary, domain = test, rev = 11, followers = 0
```

```
!--- This indicates that bing has received its
!--- first summary advertisement.
```

```
domain change notification sent
VTP: transitioning from null to test domain
```

```
!--- This is where bing gets the VTP domain name.
```

```
VTP: summary packet rev 11 greater than domain test rev 0
VTP: domain test currently not in updating state
VTP: summary packet with followers field zero
```

```
-----FRAME 1-----
DLC:  ----- DLC Header -----
```

```

DLC:
DLC: Frame 1988 arrived at 15:01:00.1223; frame size is 99 (0063 hex) bytes.
DLC: Destination = Multicast 0100CCCCCCC
DLC: Source = Station 005014BB63FD
DLC: 802.3 length = 85
DLC:
LLC: ----- LLC Header -----
LLC:
LLC: DSAP Address = AA, DSAP IG Bit = 00 (Individual Address)
LLC: SSAP Address = AA, SSAP CR Bit = 00 (Command)
LLC: Unnumbered frame: UI
LLC:
SNAP: ----- SNAP Header -----
SNAP:
SNAP: Vendor ID = Cisc01
SNAP: Type = 2003 (VTP)
SNAP:
VTP: ----- Cisco Virtual Trunk Protocol (VTP) Packet -----
VTP:
VTP: Version = 1
VTP: Message type = 0x01 (Summary-Advert)
VTP: Number of Subset-Advert messages = 0
VTP: Length of management domain name = 4
VTP: Management domain name = "test"
VTP: Number of Padding bytes = 28
VTP: Configuration revision number = 0x0000000b
VTP: Updater Identity IP address = 0.0.0.0
VTP: Update Timestamp = "930525053753"
VTP: MD5 Digest value = 0x857610862F3015F0
VTP: 0x220A52427247A7A0
-----

```

5. With the **trace** command set, bing receives a summary advertisement with no followers. Therefore, bing updates its domain name and sends advertisement requests to obtain the VLAN information, in FRAME 2 in this sample output:

```

!--- On bing:

VTP: tx vtp request, domain test, start value 0

!--- This is where the advertisement request is sent.

-----FRAME 2-----
DLC: ----- DLC Header -----
DLC:
DLC: Frame 1683 arrived at 17:38:55.9383; frame size is 60 (003C hex) bytes.
DLC: Destination = Multicast 0100CCCCCCC
DLC: Source = Station 003019798CFD
DLC: 802.3 length = 46
DLC:
LLC: ----- LLC Header -----
LLC:
LLC: DSAP Address = AA, DSAP IG Bit = 00 (Individual Address)
LLC: SSAP Address = AA, SSAP CR Bit = 00 (Command)
LLC: Unnumbered frame: UI
LLC:
SNAP: ----- SNAP Header -----
SNAP:
SNAP: Vendor ID = Cisc01
SNAP: Type = 2003 (VTP)
SNAP:
VTP: ----- Cisco Virtual Trunk Protocol (VTP) Packet -----
VTP:
VTP: Version = 1
VTP: Message type = 0x03 (Advert-Request)

```

```

VTP: Reserved
VTP: Length of management domain name = 4
VTP: Management domain name          = "test"
VTP: Padding bytes                    = 28
VTP: Start value                      = 0 (all VLANs)

```

6. Clic sends another summary advertisement with field followers to VLAN 1. The subset advertisement that contains all VLANs, in FRAME 3 in this output, follows this packet. Then, bing configures all the VLANs:

*!--- On bing:*

```

received vtp packet: mNo = 2 pNo = 1
VTP: i summary, domain = test, rev = 11, followers = 1

```

*!--- Bing has received its second summary advertisement.*

```

VTP: domain test, current rev = 0 found for summary pkt
VTP: summary packet rev 11 greater than domain test rev 0

```

*!--- This configuration revision is higher than that on bing.*

```

VTP: domain test currently not in updating state
received vtp packet: mNo = 2 pNo = 1
VTP: i subset, domain = test, rev = 11, seq = 1, length = 344

```

*!--- Bing has received its subset advertisement.*

```

VTP: domain test, current rev = 0 found for subset pkt
domain change notification sent
vlan 1 unknown tlv change notification sent
vlan 2 unknown tlv change notification sent
vtp_vlan_change_notification: vlan = 2, mode = 1
(ADD,ACTIVE), mNo = 2 pNo = 1 vlan = 2
vlan 3 unknown tlv change notification sent
vtp_vlan_change_notification: vlan = 3, mode = 1
(ADD,ACTIVE), mNo = 2 pNo = 1 vlan = 3
vlan 4 unknown tlv change notification sent
vtp_vlan_change_notification: vlan = 4, mode = 1
(ADD,ACTIVE), mNo = 2 pNo = 1 vlan = 4
vlan 5 unknown tlv change notification sent
vtp_vlan_change_notification: vlan = 5, mode = 1
(ADD,ACTIVE), mNo = 2 pNo = 1 vlan = 5
vlan 6 unknown tlv change notification sent
vtp_vlan_change_notification: vlan = 6, mode = 1
(ADD,ACTIVE), mNo = 2 pNo = 1 vlan = 6
vlan 7 unknown tlv change notification sent
vtp_vlan_change_notification: vlan = 7, mode = 1
(ADD,ACTIVE), mNo = 2 pNo = 1 vlan = 7

```

-----FRAME 3-----

```

DLC: ----- DLC Header -----
      DLC:
      DLC: Frame 2008 arrived at 15:01:03.9661; frame size is 99 (0063 hex) bytes.
      DLC: Destination = Multicast 01000CCCCC
      DLC: Source       = Station 003019798CFD
      DLC: 802.3 length = 85
      DLC:
LLC: ----- LLC Header -----
      LLC:
      LLC: DSAP Address = AA, DSAP IG Bit = 00 (Individual Address)
      LLC: SSAP Address = AA, SSAP CR Bit = 00 (Command)
      LLC: Unnumbered frame: UI
      LLC:

```

```
SNAP: ----- SNAP Header -----
      SNAP:
      SNAP: Vendor ID = Cisc01
      SNAP: Type = 2003 (VTP)
      SNAP:
VTP: ----- Cisco Virtual Trunk Protocol (VTP) Packet -----
      VTP:
      VTP: Version = 1
      VTP: Message type = 0x01 (Summary-Advert)
      VTP: Number of Subset-Advert messages = 1
```

*!--- Here are the numbers.*

```
VTP: Length of management domain name = 4
VTP: Management domain name = "test"
VTP: Number of Padding bytes = 28
VTP: Configuration revision number = 0x0000000b
VTP: Updater Identity IP address = 0.0.0.0
VTP: Update Timestamp = "930525053753"
VTP: MD5 Digest value = 0x857610862F3015F0
VTP: 0x220A52427247A7A0
```

```
DLC: ----- DLC Header -----
      DLC:
      DLC: Frame 2009 arrived at 15:01:03.9664; frame size is 366 (016E hex) bytes
      DLC: Destination = Multicast 01000CCCCCCC
      DLC: Source = Station 003019798CFD
      DLC: 802.3 length = 352
      DLC:
```

```
LLC: ----- LLC Header -----
      LLC:
      LLC: DSAP Address = AA, DSAP IG Bit = 00 (Individual Address)
      LLC: SSAP Address = AA, SSAP CR Bit = 00 (Command)
      LLC: Unnumbered frame: UI
      LLC:
```

```
SNAP: ----- SNAP Header -----
      SNAP:
      SNAP: Vendor ID = Cisc01
      SNAP: Type = 2003 (VTP)
      SNAP:
```

```
VTP: ----- Cisco Virtual Trunk Protocol (VTP) Packet -----
      VTP:
      VTP: Version = 1
      VTP: Message type = 0x02 (Subset-Advert)
      VTP: Sequence number = 1
      VTP: Management Domain Name length = 4
      VTP: Management Domain Name = "test"
      VTP: Number of Padding bytes = 28
      VTP: Configuration revision number = 0x0000000b
      VTP:
      VTP: VLAN Information Field # 1:
      VTP: VLAN information field length = 20
      VTP: VLAN Status = 00 (Operational)
      VTP: VLAN type = 1 (Ethernet)
      VTP: Length of VLAN name = 7
      VTP: ISL VLAN-id = 1
      VTP: MTU size = 1500
      VTP: 802.10 SAID field = 100001
      VTP: VLAN Name = "default"
      VTP: # padding bytes in VLAN Name = 1
      VTP:
      VTP: VLAN Information Field # 2:
      VTP: VLAN information field length = 20
      VTP: VLAN Status = 00 (Operational)
      VTP: VLAN type = 1 (Ethernet)
      VTP: Length of VLAN name = 8
```

```

VTP: ISL VLAN-id = 2
VTP: MTU size = 1500
VTP: 802.10 SAID field = 100002
VTP: VLAN Name = "VLAN0002"
VTP: # padding bytes in VLAN Name = 0
VTP:
VTP: VLAN Information Field # 3:
VTP: VLAN information field length = 20
VTP: VLAN Status = 00 (Operational)
VTP: VLAN type = 1 (Ethernet)
VTP: Length of VLAN name = 8
VTP: ISL VLAN-id = 3
VTP: MTU size = 1500
VTP: 802.10 SAID field = 100003
VTP: VLAN Name = "VLAN0003"
VTP: # padding bytes in VLAN Name = 0
VTP:
VTP: VLAN Information Field # 4:
VTP: VLAN information field length = 20
VTP: VLAN Status = 00 (Operational)
VTP: VLAN type = 1 (Ethernet)
VTP: Length of VLAN name = 8
VTP: ISL VLAN-id = 4
VTP: MTU size = 1500
VTP: 802.10 SAID field = 100004
VTP: VLAN Name = "VLAN0004"
VTP: # padding bytes in VLAN Name = 0
VTP:
VTP: VLAN Information Field # 5:
VTP: VLAN information field length = 20
VTP: VLAN Status = 00 (Operational)
VTP: VLAN type = 1 (Ethernet)
VTP: Length of VLAN name = 8
VTP: ISL VLAN-id = 5
VTP: MTU size = 1500
VTP: 802.10 SAID field = 100005
VTP: VLAN Name = "VLAN0005"
VTP: # padding bytes in VLAN Name = 0
VTP:
VTP: VLAN Information Field # 6:
VTP: VLAN information field length = 20
VTP: VLAN Status = 00 (Operational)
VTP: VLAN type = 1 (Ethernet)
VTP: Length of VLAN name = 8
VTP: ISL VLAN-id = 6
VTP: MTU size = 1500
VTP: 802.10 SAID field = 100006
VTP: VLAN Name = "VLAN0006"
VTP: # padding bytes in VLAN Name = 0
VTP:
VTP: VLAN Information Field # 7:
VTP: VLAN information field length = 20
VTP: VLAN Status = 00 (Operational)
VTP: VLAN type = 1 (Ethernet)
VTP: Length of VLAN name = 8
VTP: ISL VLAN-id = 7
VTP: MTU size = 1500
VTP: 802.10 SAID field = 100007
VTP: VLAN Name = "VLAN0007"
VTP: # padding bytes in VLAN Name = 0
VTP:
VTP: VLAN Information Field # 8:
VTP: VLAN information field length = 20
VTP: VLAN Status = 00 (Operational)
VTP: VLAN type = 1 (Ethernet)
VTP: Length of VLAN name = 8

```

```

VTP: ISL VLAN-id = 10
VTP: MTU size = 1500
VTP: 802.10 SAID field = 100010
VTP: VLAN Name = "VLAN0010"
VTP: # padding bytes in VLAN Name = 0
VTP:
VTP: VLAN Information Field # 9:
VTP: VLAN information field length = 32
VTP: VLAN Status = 00 (Operational)
VTP: VLAN type = 2 (FDDI)
VTP: Length of VLAN name = 12
VTP: ISL VLAN-id = 1002
VTP: MTU size = 1500
VTP: 802.10 SAID field = 101002
VTP: VLAN Name = "fddi-default"
VTP: # padding bytes in VLAN Name = 0
VTP: Reserved 8 bytes
VTP:
VTP: VLAN Information Field # 10:
VTP: VLAN information field length = 40
VTP: VLAN Status = 00 (Operational)
VTP: VLAN type = 3 (Token-Ring)
VTP: Length of VLAN name = 18
VTP: ISL VLAN-id = 1003
VTP: MTU size = 1500
VTP: 802.10 SAID field = 101003
VTP: VLAN Name = "token-ring-default"
VTP: # padding bytes in VLAN Name = 2
VTP: Reserved 8 bytes
VTP:
VTP: VLAN Information Field # 11:
VTP: VLAN information field length = 36
VTP: VLAN Status = 00 (Operational)
VTP: VLAN type = 4 (FDDI-Net)
VTP: Length of VLAN name = 15
VTP: ISL VLAN-id = 1004
VTP: MTU size = 1500
VTP: 802.10 SAID field = 101004
VTP: VLAN Name = "fddinet-default"
VTP: # padding bytes in VLAN Name = 1
VTP: Reserved 8 bytes
VTP:
VTP: VLAN Information Field # 12:
VTP: VLAN information field length = 36
VTP: VLAN Status = 00 (Operational)
VTP: VLAN type = 5 (TR-Net)
VTP: Length of VLAN name = 13
VTP: ISL VLAN-id = 1005
VTP: MTU size = 1500
VTP: 802.10 SAID field = 101005
VTP: VLAN Name = "trnet-default"
VTP: # padding bytes in VLAN Name = 3
VTP: Reserved 8 bytes

```

-----  
7. At this point, both switches are synchronized:

bing (enable) **show vtp domain**

Domain Name	Domain Index	VTP Version	Local Mode	Password
test	1	2	server	-

  

Vlan-count	Max-vlan-storage	Config Revision	Notifications
12	1023	11	disabled

```

Last Updater      V2 Mode  Pruning  PruneEligible on Vlans
-----
0.0.0.0           disabled disabled 2-1000

```

```
bing (enable) show vlan
```

VLAN	Name	Status	IfIndex	Mod/Ports, Vlans
1	default	active	127	2/2-48 3/1-6
2	VLAN0002	active	132	
3	VLAN0003	active	133	
4	VLAN0004	active	134	
5	VLAN0005	active	135	
6	VLAN0006	active	136	
7	VLAN0007	active	137	
10	VLAN0010	active	138	
1002	fddi-default	active	128	
1003	token-ring-default	active	131	
1004	fddinet-default	active	129	
1005	trnet-default	active	130	

### Example 2:

This example shows how to verify the VTP configuration on a Catalyst 6000 that runs Cisco IOS Software:

```
Router#show vtp status
```

```

VTP Version:                2
Configuration Revision:     247
Maximum VLANs supported locally: 1005
Number of existing VLANs:   33
VTP Operating Mode:         Client
VTP Domain Name:            Lab_Network
VTP Pruning Mode:           Enabled
VTP V2 Mode:                 Disabled
VTP Traps Generation:       Disabled
MD5 digest: 0x45 0x52 0xB6 0xFD 0x63 0xC8 0x49 0x80
Configuration last modified by 0.0.0.0 at 8-12-99 15:04:49
Router#

```

### Example 3:

This example shows how to display VTP statistics on a Catalyst 6000 that runs Cisco IOS Software:

```
Router#show vtp counters
```

```

VTP statistics:
Summary advertisements received: 7
Subset advertisements received: 5
Request advertisements received: 0
Summary advertisements transmitted: 997
Subset advertisements transmitted: 13
Request advertisements transmitted: 3
Number of config revision errors: 0
Number of config digest errors: 0
Number of V1 summary errors: 0
VTP pruning statistics:

```

Trunk	Join Transmitted	Join Received	Summary advts received from on-pruning-capable device
Fa5/8	43071	42766	5

# Troubleshoot VTP

Refer to Troubleshooting VLAN Trunk Protocol (VTP) for information to troubleshoot VTP.

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