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. In EXEC mode, issue this command in order to enter VLAN configuration mode:
   
   ```plaintext
   Router(vlan)#
   !--- Issue this command in privileged EXEC mode. !--- not in global configuration mode.
   ```

   Issue this command in order to set the VTP domain name:
   
   ```plaintext
   Router(vlan)#vtp domain domain-name
   ```

   Issue this command in order to set the VTP mode:
   
   ```plaintext
   Router(vlan)#vtp {client | server | transparent}
   ```
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 statistics

**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
   ```

<table>
<thead>
<tr>
<th>Domain Name</th>
<th>Domain Index</th>
<th>VTP Version</th>
<th>Local Mode</th>
<th>Password</th>
</tr>
</thead>
<tbody>
<tr>
<td>--------------</td>
<td>--------------</td>
<td>-------------</td>
<td>------------</td>
<td>---------</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>server</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Vlan-count</td>
<td>Max-vlan-storage</td>
<td>Config Revision</td>
<td>Notifications</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>----------------</td>
<td>--------------</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1023</td>
<td>0</td>
<td>enabled</td>
<td></td>
</tr>
<tr>
<td>Last Updater</td>
<td>V2 Mode</td>
<td>Pruning</td>
<td>PruneEligible on Vlans</td>
<td></td>
</tr>
<tr>
<td>0.0.0.0</td>
<td>disabled</td>
<td>disabled</td>
<td>2-1000</td>
<td></td>
</tr>
<tr>
<td>bing (enable)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
   ```

   ```
   bing (enable)
   ```
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

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:
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:

```plaintext
--- On bing: VTP: tx vtp request, domain test, start value 0 !--- This is where the advertisement request is sent. ------------------------FRAME 2------------------------
```

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:

```plaintext
--- 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: tx vtp request, domain test, start value 0 !--- This is where the advertisement request is sent. ------------------------FRAME 2------------------------
```
Management Domain Name = "test" VTP: Number of Padding bytes = 28 VTP: Configuration revision number = 0x0000000b 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: 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: 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: 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: 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: 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: 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: 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: 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 = "fdi-default" VTP: # padding bytes in VLAN Name = 0 VTP: Reserved 8 bytes 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: 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 = "fdi-net-default" VTP: # padding bytes in VLAN Name = 1 VTP: Reserved 8 bytes 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:

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

<table>
<thead>
<tr>
<th>Domain Name</th>
<th>Domain Index</th>
<th>VTP Version</th>
<th>Local Mode</th>
<th>Password</th>
</tr>
</thead>
<tbody>
<tr>
<td>test</td>
<td>1</td>
<td>2</td>
<td>server</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vlan-count</th>
<th>Max-vlan-storage</th>
<th>Config</th>
<th>Revision</th>
<th>Notifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>1023</td>
<td>11</td>
<td>disabled</td>
<td></td>
</tr>
</tbody>
</table>

Last Updater: V2 Mode: Pruning: PruneEligible on Vlans

| 0.0.0.0     | disabled        | disabled |

```plaintext
bing (enable) show vlan
```
### VLAN Name, Status, IfIndex, Mod/Ports, Vlans

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

### 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
```

### 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.

Related Information

- LAN Product Support
- LAN Switching Technology Support
- Technical Support & Documentation - Cisco Systems