What is VTP?

VTP uses lay 2 multicast frames on Native VLAN (VLAN 1) to synchronize VLAN information among a group of switches in the same VTP domain.

VTP versions:

- VTP version 1&2: only support VLAN ID range 1-1005, in which VLAN 1, 1002-1005 are set aside for dedicated use. In order to support extended-range VLANs (1-4094), the only way for VTP version 1&2 node is to enable VTP Transparent mode.
- VTP version 3: natively supports extended-range VLANs. However, it can be enabled only on CatOS based switches.
- VTP version 1 is by default enabled, and switching the whole VTP domain to VTP Ver 2 only requires you to enable VTP ver 2 on VTP Server mode switch.

How does VTP works?

VTP mechanism relies on 3 VTP Roles (Server / Client / Transparent; and 3 VTP Advertisement (Summary / Request / Response).

VTP Server:

- Originate VTP Summary adv every 300 secs, but never forward VTP Summary adv.
- VTP version change on VTP server will automatically propagate throughout the whole domain.

VTP Client:

- Originate VTP Summary adv every 300 secs, and also forward VTP Summary adv originated from other VTP Server Nodes.

VTP Transparent:

- Configuration version value always equals 0.
- Only forwards VTP Advertisements but never originates, and its local VLAN database is never overwritten according to VTP Advertisements.
- Normally used to clear all local VLAN Information.

How VLAN database is stored:

IOS switch in Server & Client mode: VLAN databases into vlan.dat file in Flash, to clear all configurations, you need to delete the vlan.dat file in flash after command "erase startup-config".

IOS switch in Transparent mode: VLAN database is stored in configuration file in NVRAM, thus "erase startup-config" will clear all VLANs.

CatOS switch: VLAN database stored in memory. VLAN database disappears after reloading and configuration version becomes 0.

VTP Pruning:

- It makes more efficient use of Trunk link BW.
- Broadcast and unknown unicast frames on a VLAN are forwarded over a trunk link only if the receiving switch currently has active port on that VLAN.
- Note that SVI of a VLAN will also be shutdown automatically if there is no Active port on that VLAN.

Basic Operational Parameters

Layer-2 multicast address:	01-00-0C-CC-CC-CC
VTP Operation VLAN range:	Vlan 1 to 1005
VTP message Interval:	5 mins

VTP Advertisement Types

Summary adv:
Every 300 secs, and change triggered.

Version (1 byte)	Type (Summary Adv) (1 byte)	Number of subset advertisements to follow (1 byte)	Domain name length (1 byte)
Management Domain Name (zero-padded to 32 bytes)			
Configuration Revision Number (4 bytes)			
Updater Identity (orginating IP address: 4 bytes)			
Update Time Stamp (12 bytes)			
MD5 Digest hash code (16 bytes)			

Subnet adv:
Response to request from client, includes detailed info for specific vlan.

0	1	2	3
Version (1 byte)	Type (Subset Adv) (1 byte)	Subset sequence number (1 byte)	Domain name length (1 byte)
Management Domain Name (zero-padded to 32 bytes)			
Configuration Revision Number (4 bytes)			
VLAN Info Field 1 (see below)			

0	1	2	3
Info Length	VLAN Status	VLAN Type	VLAN Name Length
VLAN ID	MTU Size		
802.10 SAID			
VLAN Name (padded with zeros to multiple of 4 bytes)			

Adv Request from client:
Request updates when higher config version number in summary adv is heard.

Version (1 byte)	Type (Summary Adv) (1 byte)	Number of subset advertisements to follow (1 byte)	Domain name length (1 byte)
Management Domain Name (zero-padded to 32 bytes)			
Configuration Revision Number (4 bytes)			
Updater Identity (orginating IP address: 4 bytes)			
Update Time Stamp (12 bytes)			
MD5 Digest hash code (16 bytes)			

Configuration Commands

```
Switch(config)# vtp version {1 | 2}
Switch(config)# vtp mode server
Switch(config)# vtp domain Enterprise
Switch(config)# vtp password cisco
Switch(config)# vtp pruning
Switch(config-if)# switchport trunk pruning vlan {none | {add | except | remove (vlan-list)}   }
```

Troubleshooting

```
Switch# show vtp status
Switch# show vtp counters
Switch# show vlan brief
```

Basic Concepts

What is DTP?
- Cisco proprietary point-to-point protocol that negotiates whether a link should be a trunk link, and whether ISL or 802.1Q should be used for encapsulation

How does it work?
- DTP frames are sent out per 30 secs to keep informing neighbor of its link mode, regardless of which trunk mode (trunk | dynamic desirable | dynamic auto) the switchport is on.
- The only way to disable these DTP frames exchange is "switch(config-if)# switchport nonegotiate".
- A trunk negotiation only happens between two switches who belong to the same VTP domain or if one or both switches have not defined their VTP domain (that is, the NULL domain).

Types of switchport mode

Switchport mode trunk:
- Place port in permanent trunking mode unconditionally, regardless all other configs (VTP domain, etc). However, DTP frames is still sent out.
- In other words, setting up the trunk forcely, and DTP frames can be manually disabled in this mode.

Switchport mode dynamic desirable (default):
- Proactively ask the far-end to setup the trunk link, and will succeed when dynamic desirable or dynamic auto is configured on the far-end.

Switchport mode dynamic auto:
- Passively wait far-end to proactively attempt to setup the trunk link when dynamic desirable is configured on the far-end.

Default Behaviors

Default Configuration on Trunk port:
Switch(config)# **interface fa0/1**
Switch(config-if)# **switchport mode dynamic desirable**
Switch(config-if)# **switchport trunk encapsulation negotiate**
- ISL is preferred over 802.1Q.
- In case of 802.1Q, Native VLAn is 1 by default.
- By default, all VLANs (1-4094) are allowed on trunk.

DTP Configuration

Switch(config)# **interface fa0/1**
Switch(config-if)# **switchport**
Switch(config-if)# **switchport mode {trunk | dynamic (desirable | auto)}**
Switch(config-if)# **switchport trunk encapsulation {isl | dot1q | negotiate}**
Switch(config-if)# **switchport trunk native vlan (**vlan-id**)**
Switch(config-if)# **switchport trunk allowed vlan {**vlan-list **| all | (add | except | remove)** vlan-list**}**

Disable unnecessary DTP frames: You should disable DTP negotiation if a switch has a trunk link connected to a non-trunking router or firewall interface because those devices cannot participate in DTP negotiation.

Troubleshooting

Switch# **show interface fa0/0 trunk**