VLAN Trunking Protocol

Lecture 4

SWITCHING BASICS

Mark Cummins – Institute of Technology Blanchardstown

LECTURE OVERVIEW

In this lecture:

- Explain the role of VTP in a converged switched network.
- Describe the operation of VTP including domains, modes, advertisements, and pruning.
- Configure VTP on the switches in a converged network.

LECTURE OVERVIEW

- As the size of the network for a small- or medium-sized business grows, the management involved in maintaining the network grows.

- In this lecture, we explore how you can use the VLAN Trunking Protocol (VTP) of Cisco Catalyst switches to simplify management of the VLAN database across multiple switches.

WHAT IS VTP?

- VTP allows a network manager to configure a switch so that it will propagate VLAN configurations to other switches in the network.
- VTP only learns about normal-range VLANs (VLAN IDs 1 to 1005).
- Extended-range VLANs (IDs greater than 1005) are not supported by VTP.

WHAT IS VTP?

- After a trunk is established between the two switches, VTP advertisements are exchanged between the switches.

- Both the server and client leverage advertisements from one another to ensure each has an accurate record of VLAN information.

WHAT IS VTP?

- VTP maintains VLAN configuration consistency by managing the
  - addition,
  - deletion, and
  - renaming

  of VLANs across multiple Cisco switches in a network.

VTP BENEFITS

- VLAN configuration consistency across the network
- Accurate tracking and monitoring of VLANs
- Dynamic reporting of added VLANs across a network
- Dynamic trunk configuration when VLANs are added to the network

VTP COMPONENTS

- **VTP Domain**

  Consists of one or more interconnected switches. All switches in a domain share VLAN configuration details using VTP advertisements.

- **VTP Advertisements**

  VTP uses a hierarchy of advertisements to distribute and synchronize VLAN configurations across the network.

- **VTP Modes**

  A switch can be configured in one of three modes: server, client, or transparent.

VTP Server

- VTP servers advertise the VTP domain VLAN information to other VTP-enabled switches in the same VTP domain.
- VTP servers store the VLAN information for the entire domain in NVRAM.
- The server is where VLANs can be created, deleted, or renamed for the domain.

VTP COMPONENTS

VTP Client

- VTP clients function the same way as VTP servers, but you cannot create, change, or delete VLANs on a VTP client.
- A VTP client only stores the VLAN information for the entire domain while the switch is on.
- A switch reset deletes the VLAN information.
- You must configure VTP client mode on a switch.

VTP Transparent

- Transparent switches forward VTP advertisements to VTP clients and VTP servers.
- Transparent switches do not participate in VTP.
- VLANs that are created, renamed, or deleted on transparent switches are local to that switch only.

VTP Pruning

- VTP pruning increases network available bandwidth by restricting flooded traffic to those trunk links that the traffic must use to reach the destination devices.

- Without VTP pruning, a switch floods broadcast, multicast, and unknown unicast traffic across all trunk links within a VTP domain even though receiving switches might discard them.

VTP VERSIONS

- VTP has three versions, 1, 2, and 3.
- Only one VTP version is allowed in a VTP domain.
- The default is VTP version 1.

SHOW VTP STATUS

- The Cisco IOS command `show VTP status` displays the VTP status.

```
S1#show vtp status
VTP Version                     : 2
Configuration Revision          : 0
Maximum VLANs supported locally : 255
Number of existing VLANs        : 5
VTP Operating Mode              : Server
VTP Domain Name                 :
VTP Pruning Mode                : Disabled
VTP V2 Mode                     : Disabled
VTP Traps Generation            : Disabled
MD5 digest                      : 0x3F 0x37 0x45 0x9A 0x37 0x53 0xA6 0xDE
Configuration last modified by 0.0.0.0 at 3-1-93 00:14:07
S1#
```

SHOW VTP STATUS

- **VTP Version**

  Displays the VTP version the switch is capable of running. By default, the switch implements version 1, but can be set to version 2.

- **Configuration Revision**

  Current configuration revision number on this switch. You will learn more about revisions numbers in this chapter.

- **Maximum VLANs Supported Locally**

  Maximum number of VLANs supported locally.

SHOW VTP STATUS

- **Number of Existing VLANs**

  Number of existing VLANs.

- **VTP Operating Mode**

  Can be Server, Client or Transparent

- **VTP Domain Name**

  Name that identifies the administrative domain for the switch.

- **VTP Pruning Mode**

  Displays whether pruning is enabled or disabled.

SHOW VTP STATUS

- **VTP V2 Mode**

  Displays if VTP version 2 mode is enabled. VTP version 2 is disabled by default.

- **VTP Traps Generation**

  Displays whether VTP traps are sent to a network management station.

- **MD5 Digest**

  A 16-byte checksum of the VTP configuration.

- **Configuration Last Modified**

  Date and time of the last configuration modification. Displays the IP address of the switch that caused the configuration change to the database.

SUMMARY ADVERTISEMENTS

- Summary advertisements contain the VTP domain name, the current revision number, and other VTP configuration details.

SUMMARY ADVERTISEMENTS

Summary advertisements are

- sent every 5 minutes by a VTP server or client to inform neighbouring VTP-enabled switches of the current VTP configuration revision number for its VTP domain

- Immediately after a configuration has been made

SUBSET ADVERTISEMENTS

- A subset advertisement contains VLAN information. Changes that trigger the subset advertisement include:
    - Creating or deleting a VLAN
    - Suspending or activating a VLAN
    - Changing the name of a VLAN
    - Changing the MTU of a VLAN
- It may take multiple subset advertisements to fully update the VLAN information.

REQUEST ADVERTISEMENTS

- When a request advertisement is sent to a VTP server in the same VTP domain, the VTP server responds by sending a summary advertisement and then a subset advertisement.

REQUEST ADVERTISEMENTS

Request advertisements are sent if:

- The VTP domain name has been changed
- The switch receives a summary advertisement with a higher configuration revision number than its own
- A subset advertisement message is missed for some reason
- The switch has been reset

SERVER MODE

- In server mode, you can create, modify, and delete VLANs for the entire VTP domain.
- VTP server mode is the default mode for a Cisco switch.
- VTP servers advertise their VLAN configurations to other switches in the same VTP domain and synchronize their VLAN configurations with other switches based on advertisements received over trunk links.

SERVER MODE

- VTP servers keep track of updates through a configuration revision number.

- Other switches in the same VTP domain compare their configuration revision number with the revision number received from a VTP server to see if they need to synchronize their VLAN database.

CLIENT MODE

- If a switch is in client mode, you cannot create, change, or delete VLANs.
- In addition, the VLAN configuration information that a VTP client switch receives from a VTP server switch is stored in a VLAN database, not in NVRAM.
- Consequently, VTP clients require less memory than VTP servers.
- When a VTP client is shut down and restarted, it sends a request advertisement to a VTP server for updated VLAN configuration information.

CLIENT MODE

- Switches configured as VTP clients are more typically found in larger networks, because in a network consisting of many hundreds of switches.
- Often there are many network administrators working at different times of the day. Having only a few switches that are physically able to maintain VLAN configurations makes it easier to control VLAN upgrades and to track which network administrators performed them.
- For large networks, having client switches is also more cost-effective

TRANSPARENT MODE

- Switches configured in transparent mode forward VTP advertisements that they receive on trunk ports to other switches in the network.
- VTP transparent mode switches do not advertise their VLAN configuration and do not synchronize their VLAN configuration with any other switch.
- Configure a switch in VTP transparent mode when you have VLAN configurations that have local significance and should not be shared with the rest of the network.

TRANSPARENT MODE

- In transparent mode, VLAN configurations are saved in NVRAM (but not advertised to other switches), so the configuration is available after a switch reload.

- This means that when a VTP transparent mode switch reboots, it does not revert to a default VTP server mode, but remains in VTP transparent mode.