Lab - Configure Extended VLANs, VTP and DTP

1. Topology



Objectives

Part 1: Build the Network and Configure Basic Device Settings

Part 2: Use Dynamic Trunking Protocol (DTP) to Form Trunk Links

Part 3: Configure VLAN Trunking Protocol (VTP)

Part 4: Create extended VLAN

1. Background / Scenario

In this lab you will configure a switched environment where trunks are negotiated and formed via DTP, and VLAN information is propagated automatically through a VTP domain. You will create an extended VLAN and to add it to the VTP domain.

Scalability and management are two critical considerations when creating a large network. VTP and DTP are protocols that improve management and scalability. Extended VLANs enable better scalability in large environments by extending the number of VLANs that can be configured in a switch. VLAN Trunking Protocol (VTP) allows the switches to automatically communicate VLAN information, improving management and scalability. Dynamic Trunking Protocol (DTP) allows the switches to automatically negotiate and establish trunk links. DTP also improves scalability.

1. Required Resources

* 3 Switches (Cisco Catalyst 2960)
* Console cables to configure the Cisco IOS devices via the console ports
* Ethernet cables as shown in the topology

1. Build the Network and Configure Basic Device Settings

In Part 1, you will set up the network topology and configure basic settings on the routers.

* + 1. Cable the network as shown in the topology.
    2. Initialize and reload the network devices as necessary.
    3. Console into the device and enable privileged EXEC mode.
    4. Enter configuration mode.
    5. Disable DNS lookup to prevent the switches from attempting to translate incorrectly entered commands as though they were host names.
    6. Configure the hostnames according to the topology.
    7. Save the running configuration to the startup configuration file.

1. Use Dynamic Trunking Protocol (DTP) to Form Trunk Links

While access links transport single VLAN frames, trunk links are links designed to carry frames belonging to multiple VLANs. While trunk links can be manually configured, DTP can be used to allow the switches to negotiate and establish trunk links.

* + 1. Based on the topology, enable and configure DS1 ports F0/1 and F0/3 as DTP desirable:

DS1(config)# **interface range F0/1, F0/3**

DS1(config-if-range)# **switchport mode dynamic desirable**

DS1(config-if-range)#

\*Mar 1 00:18:00.821: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down

\*Mar 1 00:18:00.830: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to down

\*Mar 1 00:18:03.841: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

\*Mar 1 00:18:03.858: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to upBased on the fact that the ports above were made DTP desirable, should DS1 ports F0/1 and F0/3 become trunk links?

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* + 1. Verify that AS1 port F0/1 was in fact configured as DTP auto (the default setting). If not, use the commands below to configure AS1 port F0/1 as DTP auto:

AS1# **sh interfaces F0/1 switchport**

Name: Fa0/1

Switchport: Enabled

Administrative Mode: dynamic auto

Operational Mode: trunk

Administrative Trunking Encapsulation: dot1q

Operational Trunking Encapsulation: dot1q

Negotiation of Trunking: On

Access Mode VLAN: 1 (default)

Trunking Native Mode VLAN: 1 (default)

Administrative Native VLAN tagging: enabled

Voice VLAN: none

Administrative private-vlan host-association: none

Administrative private-vlan mapping: none

Administrative private-vlan trunk native VLAN: none

Administrative private-vlan trunk Native VLAN tagging: enabled

Administrative private-vlan trunk encapsulation: dot1q

Administrative private-vlan trunk normal VLANs: none

Administrative private-vlan trunk associations: none

Administrative private-vlan trunk mappings: none

Operational private-vlan: none

Trunking VLANs Enabled: ALL

Pruning VLANs Enabled: 2-1001

Capture Mode Disabled

Capture VLANs Allowed: ALL

Protected: false

Unknown unicast blocked: disabled

Unknown multicast blocked: disabled

Appliance trust: none

What portion of the output above shows the DTP configuration of AS1 port F0/1?

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What portion of the output above shows the current status of AS1 port F0/1?

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If AS1 F0/1 was not configured as DTP auto, what commands should be used to do so?

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* + 1. Similarly, verify and configure AS2 port F0/3 as DTP auto if it is not already configured as such:

AS2(config)# **interface range F0/3**

AS2(config-if-range)# **switchport mode dynamic auto**

AS2# **show interfaces F0/3 switchport**

Name: Fa0/3

Switchport: Enabled

Administrative Mode: dynamic auto

Operational Mode: trunk

Administrative Trunking Encapsulation: dot1q

Operational Trunking Encapsulation: dot1q

Negotiation of Trunking: On

Access Mode VLAN: 1 (default)

Trunking Native Mode VLAN: 1 (default)

Administrative Native VLAN tagging: enabled

<output omitted>

1. Configuring VLAN Trunking Protocol (VTP)

VTP is protocol used to communicate VLAN information among VTP domain participating switches. To configure a new VTP domain, follow the steps below:

* + 1. Configure switch DS1 as VTP server:

DS1(config)# **vtp mode server**

DS1(config)#

Device mode already VTP Server for VLANS.

* + 1. Create the VTP domain by assigning it a name. The VTP domain name is CCNA-LAB.

**Note:** VTP domain names are case-sensitive.

DS1(config)# **vtp domain CCNA-LAB**

Changing VTP domain name from NULL to CCNA-LAB

\*Mar 1 01:12:07.498: %SW\_VLAN-6-VTP\_DOMAIN\_NAME\_CHG: VTP domain name changed to CCNA-LAB.

DS1(config)#

* + 1. Use the command **vtp password** to assign a password to the VTP domain. VTP domain passwords are optional, but recommended because they increase security.

DS1(config)# **vtp password cisco12345**

Setting device VTP password to cisco12345

* + 1. Verify the domain was properly created with **show vtp status**:

DS1# **show vtp status**

VTP Version capable : 1 to 3

VTP version running : 1

VTP Domain Name : CCNA-LAB

VTP Pruning Mode : Disabled

VTP Traps Generation : Disabled

Device ID : 001e.4914.6980

Configuration last modified by 0.0.0.0 at 0-0-00 00:00:00

Local updater ID is 0.0.0.0 (no valid interface found)

Feature VLAN:

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VTP Operating Mode : Server

Maximum VLANs supported locally : 1005

Number of existing VLANs : 5

Configuration Revision : 0

MD5 digest : 0xFE 0x1A 0x4F 0xF2 0xF3 0x21 0x57 0xC5

0x01 0xDC 0x3C 0x4A 0xB1 0xCB 0x4A 0x54

Based on the output above, what is the revision number of the CCNA-LAB domain? What does that mean?

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What portion of the output above indicates a VTP password has been configured for the domain?

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* + 1. Use DS1, the VTP server, to add five VLANs to domain:

DS1(config)# **vlan 10**

DS1(config-vlan)# **vlan 20**

DS1(config-vlan)# **vlan 30**

DS1(config-vlan)# **vlan 40**

DS1(config-vlan)# **vlan 100**

DS1(config-vlan)# **end**

DS1#

* + 1. Add the access layer switches AS1 and AS2 to the domain as VTP clients:

**Note:** It is important to set a new switch to VTP client before adding it to an existing domain. If the new switch contains any leftover VTP configuration, setting it as VTP client minimizes the risk of the new switch modifying the VLANs already present in the domain.

AS1(config)# **vtp mode client**

Setting device to VTP Client mode for VLANS.

AS1(config)# **vtp domain CCNA-LAB**

Changing VTP domain name from NULL to CCNA-LAB

AS1(config)#

\*Mar 1 01:36:06.161: %SW\_VLAN-6-VTP\_DOMAIN\_NAME\_CHG: VTP domain name changed to CCNA-LAB.vtp pass

AS1(config)# **vtp password cisco12345**

Setting device VTP password to cisco12345

AS1(config)# **end**

* + 1. Verify that AS1 has learned the VLANs added to the domain by DS1:

AS1# **show vlan**

VLAN Name Status Ports

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1 default active Fa0/1, Fa0/2, Fa0/3, Fa0/4

Fa0/5, Fa0/6, Fa0/9, Fa0/10

Fa0/11, Fa0/12, Fa0/13, Fa0/14

Fa0/15, Fa0/16, Fa0/17, Fa0/18

Fa0/19, Fa0/20, Fa0/21, Fa0/22

Fa0/23, Fa0/24, Gi0/1, Gi0/2

10 VLAN0010 active

20 VLAN0020 active

30 VLAN0030 active

40 VLAN0040 active

100 VLAN0100 active

1002 fddi-default act/unsup

1003 token-ring-default act/unsup

1004 fddinet-default act/unsup

1005 trnet-default act/unsup

VLAN Type SAID MTU Parent RingNo BridgeNo Stp BrdgMode Trans1 Trans2

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1 enet 100001 1500 - - - - - 0 0

10 enet 100010 1500 - - - - - 0 0

VLAN Type SAID MTU Parent RingNo BridgeNo Stp BrdgMode Trans1 Trans2

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20 enet 100020 1500 - - - - - 0 0

30 enet 100030 1500 - - - - - 0 0

40 enet 100040 1500 - - - - - 0 0

100 enet 100100 1500 - - - - - 0 0

1002 fddi 101002 1500 - - - - - 0 0

1003 tr 101003 1500 - - - - srb 0 0

1004 fdnet 101004 1500 - - - ieee - 0 0

1005 trnet 101005 1500 - - - ibm - 0 0

Remote SPAN VLANs

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Primary Secondary Type Ports

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* + 1. Verify that AS2 has learned the VLANs added to the domain by DS1:

AS2# **show vlan**

VLAN Name Status Ports

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1 default active Fa0/1, Fa0/2, Fa0/3, Fa0/4

Fa0/5, Fa0/6, Fa0/7, Fa0/8

Fa0/11, Fa0/12, Fa0/13, Fa0/14

Fa0/15, Fa0/16, Fa0/17, Fa0/18

Fa0/19, Fa0/20, Fa0/21, Fa0/22

Fa0/23, Fa0/24, Gi0/1, Gi0/2

10 VLAN0010 active

20 VLAN0020 active

30 VLAN0030 active

40 VLAN0040 active

100 VLAN0100 active

1002 fddi-default act/unsup

1003 token-ring-default act/unsup

1004 fddinet-default act/unsup

1005 trnet-default act/unsup

VLAN Type SAID MTU Parent RingNo BridgeNo Stp BrdgMode Trans1 Trans2

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1 enet 100001 1500 - - - - - 0 0

10 enet 100010 1500 - - - - - 0 0

VLAN Type SAID MTU Parent RingNo BridgeNo Stp BrdgMode Trans1 Trans2

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20 enet 100020 1500 - - - - - 0 0

30 enet 100030 1500 - - - - - 0 0

40 enet 100040 1500 - - - - - 0 0

100 enet 100100 1500 - - - - - 0 0

1002 fddi 101002 1500 - - - - - 0 0

1003 tr 101003 1500 - - - - srb 0 0

1004 fdnet 101004 1500 - - - ieee - 0 0

1005 trnet 101005 1500 - - - ibm - 0 0

Remote SPAN VLANs

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Primary Secondary Type Ports

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1. Creating Extended VLANs
   * 1. Extended VLANs, ranging from 1006 to 4094, are a useful in large networks. Create an extended VLAN on AS1:

AS1(config)# **vlan 1010**

AS1(config)# end

% Failed to create VLANs 1010

Extended VLAN(s) not allowed in current VTP mode.

%Failed to commit extended VLAN(s) changes.

Was the extended VLAN 1010 created? Why?

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* + 1. Make AS1 VTP mode to transparent:

AS1(config)# **vtp mode transparent**

Setting device to VTP Transparent mode for VLANS.

AS1(config)# **end**

* + 1. Verify AS1 is in VTP transparent mode:

AS1# **show vtp status**

VTP Version capable : 1 to 3

VTP version running : 1

VTP Domain Name : CCNA-LAB

VTP Pruning Mode : Disabled

VTP Traps Generation : Disabled

Device ID : 0025.83e6.9980

Configuration last modified by 0.0.0.0 at 3-1-93 02:39:34

Feature VLAN:

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VTP Operating Mode : Transparent

Maximum VLANs supported locally : 255

Number of existing VLANs : 10

Configuration Revision : 0

MD5 digest : 0x38 0x18 0xBA 0x48 0x7F 0x7B 0x4C 0xBB

0x03 0x52 0x07 0x2B 0x33 0xC1 0xC9 0xE6

* + 1. Create the extended VLAN 1010 on AS1:

AS1(config)# **vlan 1010**

AS1(config-vlan)# **end**

AS1#

* + 1. Verify the extended VLAN 1010 was created on AS1:

AS1# **show vlan**

VLAN Name Status Ports

---- -------------------------------- --------- -------------------------------

1 default active Fa0/1, Fa0/2, Fa0/3, Fa0/4

Fa0/5, Fa0/6, Fa0/9, Fa0/10

Fa0/11, Fa0/12, Fa0/13, Fa0/14

Fa0/15, Fa0/16, Fa0/17, Fa0/18

Fa0/19, Fa0/20, Fa0/21, Fa0/22

Fa0/23, Fa0/24, Gi0/1, Gi0/2

10 VLAN0010 active

20 VLAN0020 active

30 VLAN0030 active

40 VLAN0040 active

100 VLAN0100 active

1002 fddi-default act/unsup

1003 token-ring-default act/unsup

1004 fddinet-default act/unsup

1005 trnet-default act/unsup

1010 VLAN1010 active

<output omitted>

Was extended VLAN 1010 created on AS1? Explain

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Is extended VLAN 1010 propagated to DS1 or AS2? Why?

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* + 1. For verification purposes only, attempt to change AS1 from VTP transparent mode to VTP server mode:

AS1(config)# **vtp mode server**

Device mode cannot be VTP Server for VLANS because extended VLAN(s) exist

AS1(config)#

As expected, AS1 can not be made a VTP version 1 server while it hosts extended VLANs.

What is the solution if the network design requires extended VLANs to be added to a VTP domain?

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