

11W NET3011

CCNP SWITCH – Chapter 2

Implementing VLANs (Part 1)

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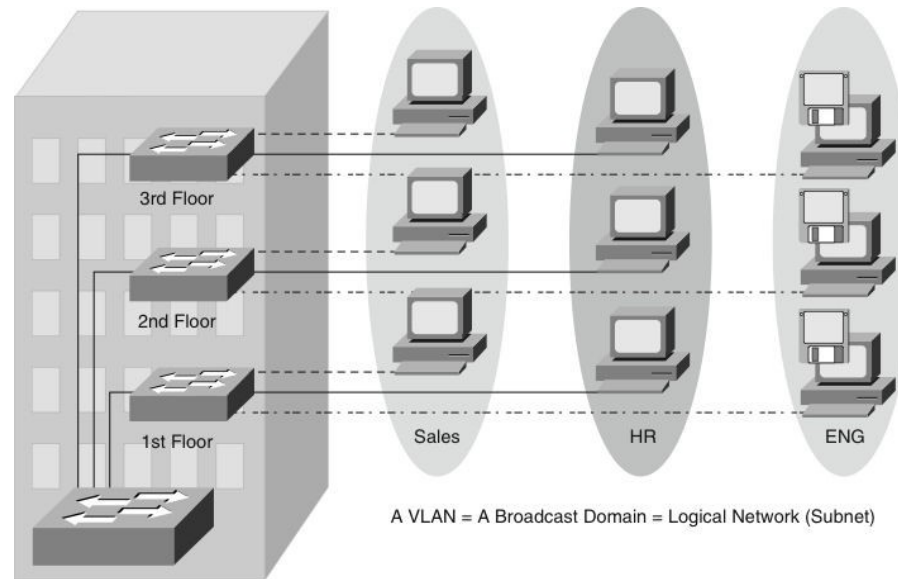
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with contributions obtained from Rick Graziani & Cisco

Review VLAN-Related Topics

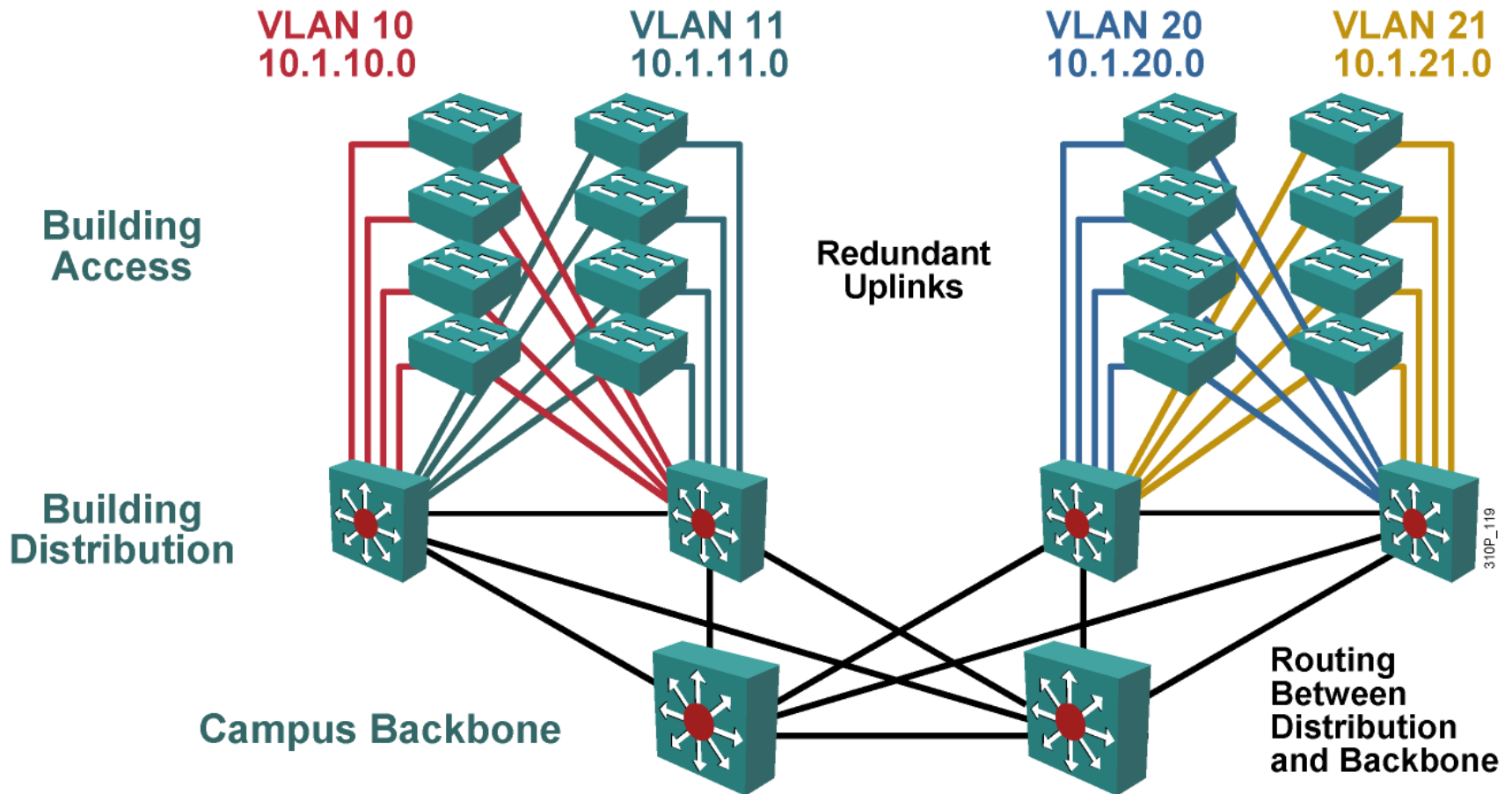
- In Part 1, we will review the following topics (possibly with some added depth):
 - VLANs
 - VTP
 - Trunking
 - DTP
- These topics will be examined in more detail in Part 2.

Virtual Local Area Network (VLAN)



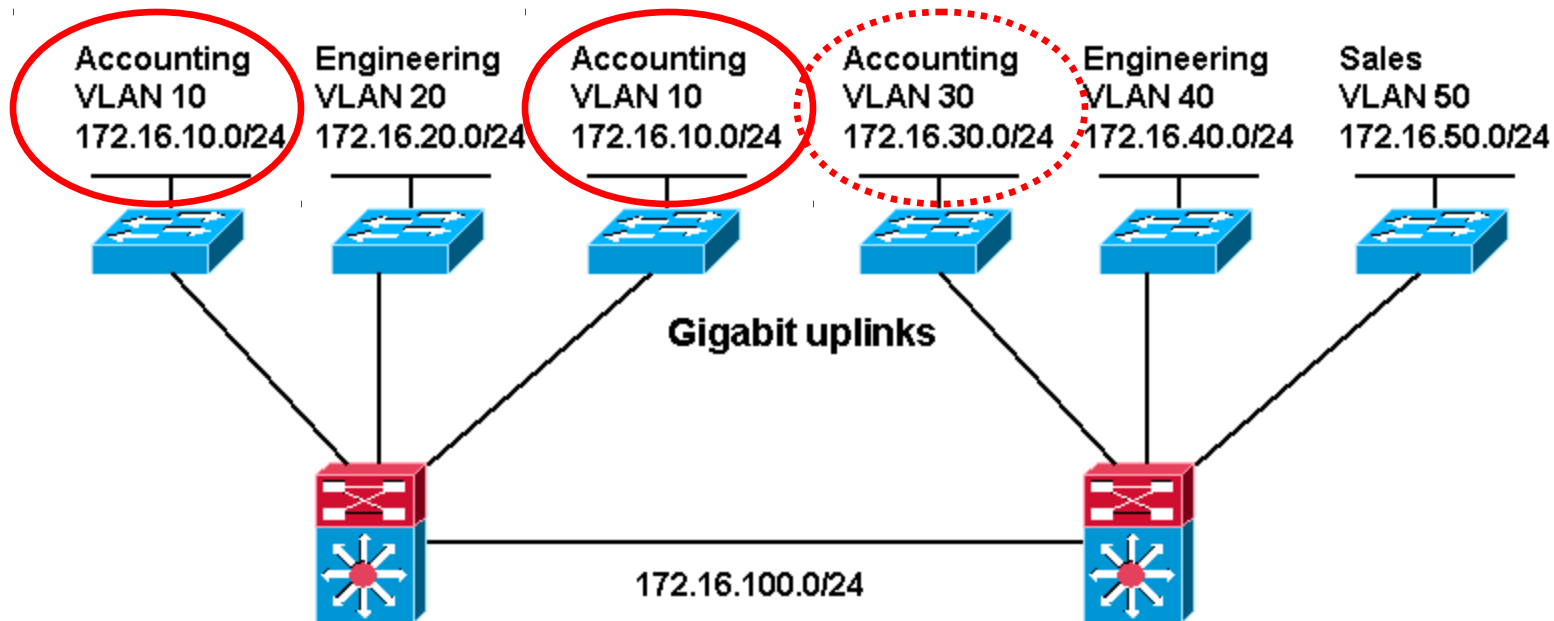
- A VLAN is a logical group of end devices.
- Broadcasts are contained within each VLAN.
- Modern design has 1 VLAN = 1 IP subnet.
- Trunks interconnect switches to transport traffic for multiple VLANs over a single link.
- Layer 3 devices are used to route traffic between VLANs.

Two Approaches to VLAN Design



- End-to-End VLANs, or
- Local VLANs
- What type is depicted here?

Local (or Geographic) VLANs

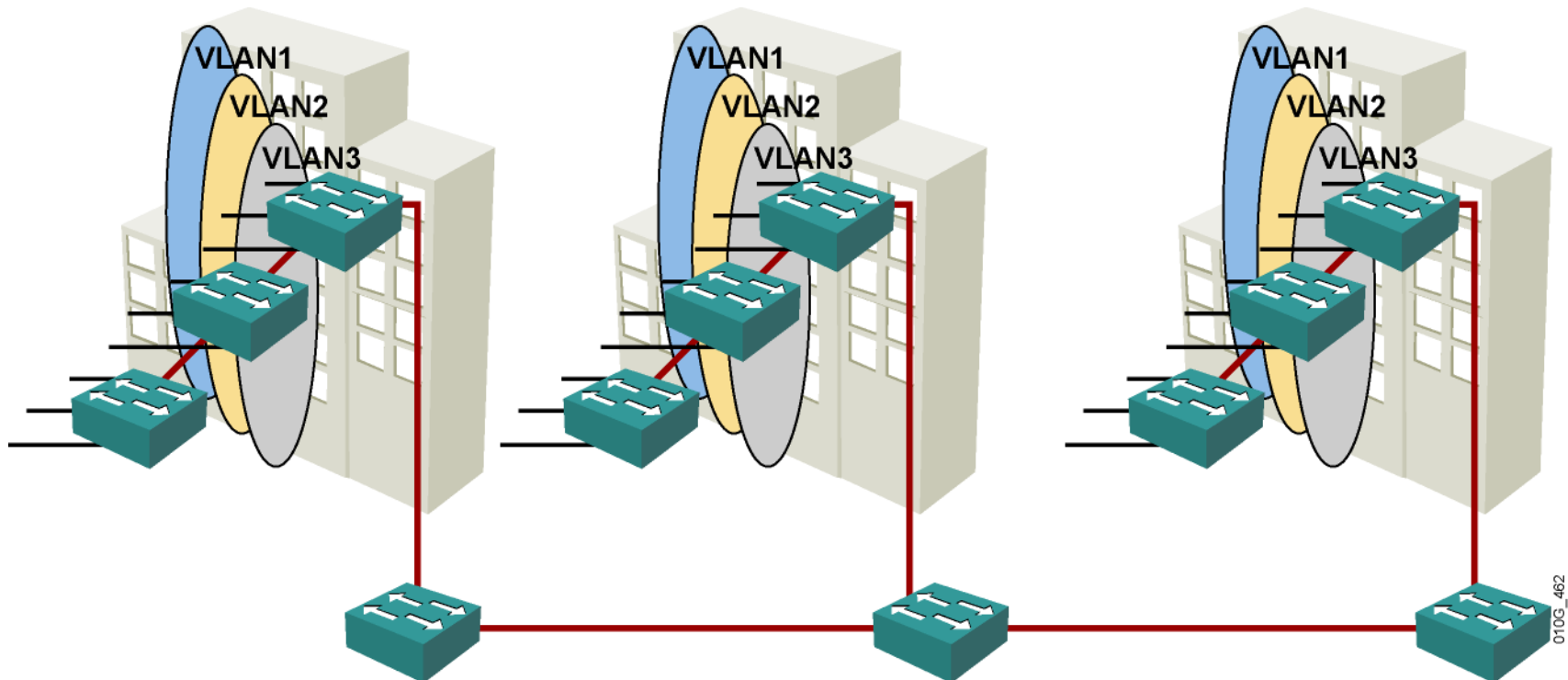


Local or Geographic VLAN Model

- VLANs based on physical location
- VLANs dedicated to each access layer switch cluster
- Accounting users connected to different layer 3 switches are on different VLANs, i.e. Accounting VLAN 10 and VLAN 30

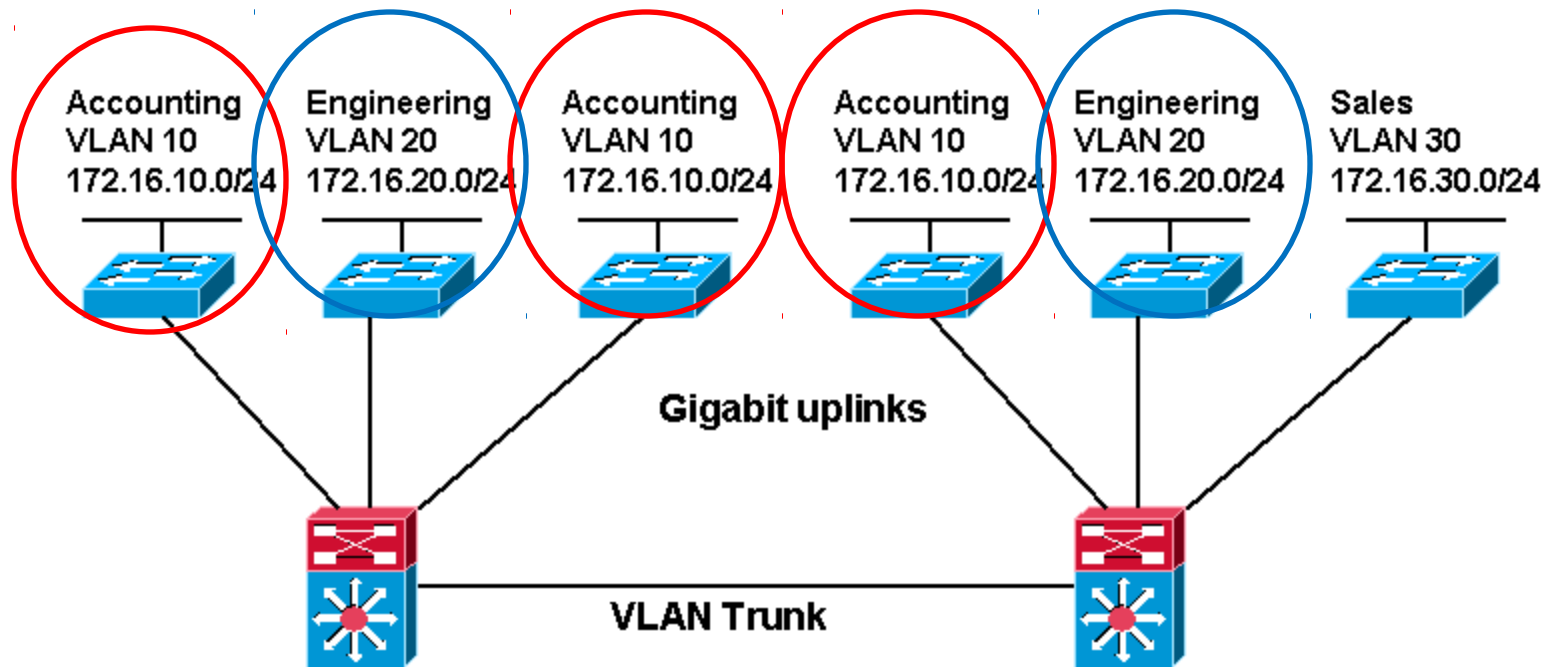
Recommendation: No more than 3 VLANs per access layer switch.

What Is an End-to-End VLAN?



- Users are grouped into VLANs independent of physical location.
- If users are moved within the campus, their VLAN membership remains the same.

End-to-End (or Campus-wide) VLANs



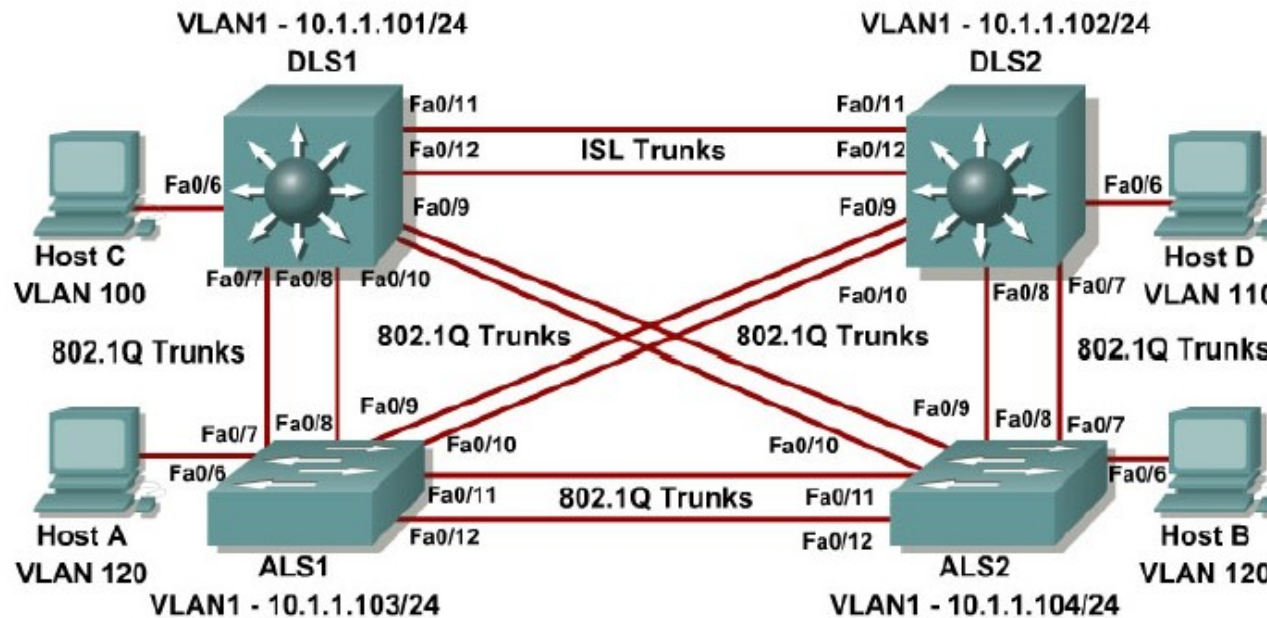
Campus-wide or End-to-End VLAN Model

- VLANs based on functionality
- “VLAN everywhere” model
- VLANs with the same VLAN ID, i.e. Accounting VLAN 10, can be anywhere in the network

Best Practices for VLAN Design

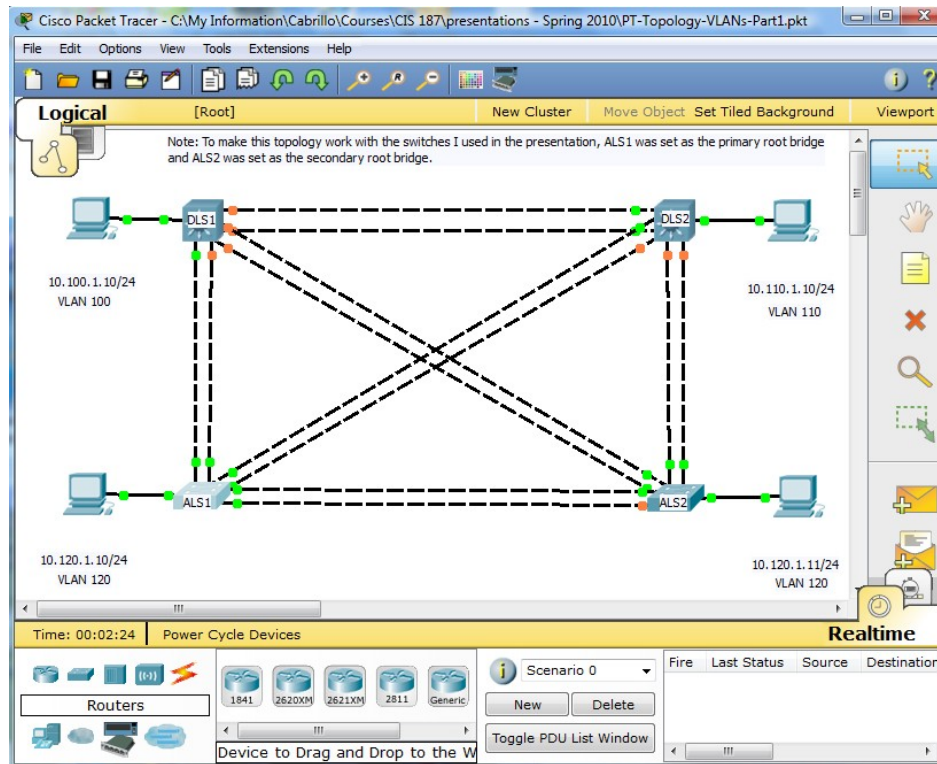
- One to three VLANs per access module and limit those VLANs to a couple of access switches and the distribution switches.
- Avoid using VLAN 1 as the "blackhole" for all unused ports. Use a dedicated VLAN separate from VLAN 1 to assign all the unused ports.
- Separate the voice VLANs, data VLANs, the management VLAN, the native VLAN, blackhole VLANs, and the default VLAN (VLAN 1).
- Avoid VTP when using local VLANs; use manually allowed VLANs on trunks.
- For trunk ports, turn off Dynamic Trunking Protocol (DTP) and configure trunking. Use IEEE 802.1Q rather than ISL because it has better support for QoS and is a standard protocol.
- Manually configure access ports that are not specifically intended for a trunk link.
- Keep all data traffic off VLAN 1; only permit control protocols to run on VLAN 1 (DTP, VTP, STP BPDUs, PAgP, LACP, CDP, etc.).
- Avoid using Telnet because of security risks; enable SSH support on management VLANs.

Topology for this presentation



- Basic Switch Configuration
- Configure VLANs
- Configure Trunking
- Configure VTP

Follow along with Packet Tracer



- Download from Bb: PT-VLANs-1.pkt

Clearing switches

```
Switch# delete vlan.dat
Delete filename [vlan.dat]?
Delete flash:vlan.dat? [confirm]
Switch#

Switch# erase startup-config
Erasing the nvram filesystem will remove all configuration files!
Continue? [confirm]
[OK]
Erase of nvram: complete
Switch#
```

- To review what's required to completely clear a switch, refer to Cisco labs 1-1 and 1-2 as previously provided.

Configure Hostname and VLAN 1

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# hostname DLS1
DLS1(config)# interface vlan 1
DLS1(config-if)# ip address 10.1.1.101 255.255.255.0
DLS1(config-if)# no shutdown
DLS1(config)# end
DLS1#
```

- Configure hostname
- Configure interface VLAN 1 – the SVI (Switch Virtual Interface) for VLAN 1
 - Default: Management VLAN is VLAN 1
 - Allows us to communicate with the switch as an IP host on the network (e.g. ping, telnet)
- Configure DLS1, DLS2, ALS1 and ALS2 switches on Packet Tracer
 - Hostname
 - VLAN 1

Configurations for the other switches

Host names already configured in .pkt

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# hostname DLS2
DLS2(config)# interface vlan 1
DLS2(config-if)# ip address 10.1.1.102 255.255.255.0
DLS2(config-if)# no shutdown
```

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# hostname ALS1
ALS1(config)# interface vlan 1
ALS1(config-if)# ip address 10.1.1.103 255.255.255.0
ALS1(config-if)# no shutdown
```

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)# hostname ALS2
ALS2(config)# interface vlan 1
ALS2(config-if)# ip address 10.1.1.104 255.255.255.0
ALS2(config-if)# no shutdown
```

Configure the line console information (makes your life easier)

Already done in PT file

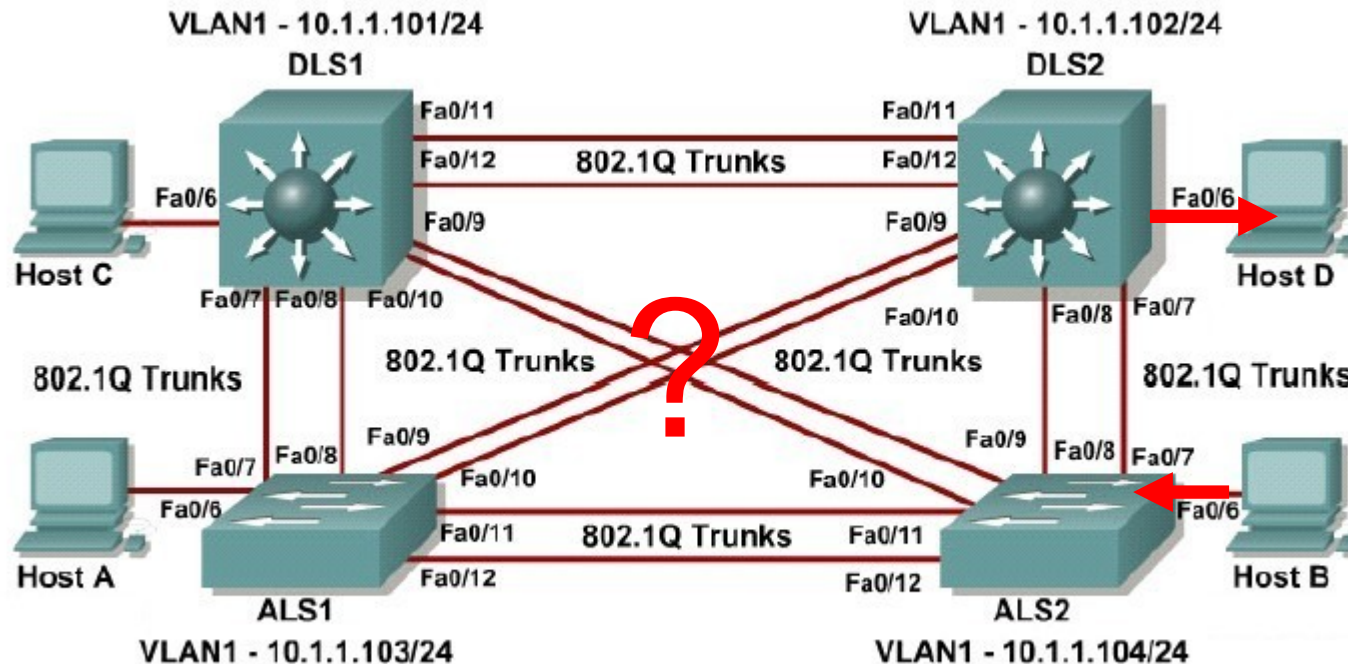
```
DLS1(config)# no ip domain-lookup
DLS1(config)# line console 0
DLS1(config-line)# logging synchronous
DLS1(config-line)# exec-timeout 0 0
```

```
DLS2(config)# no ip domain-lookup
DLS2(config)# line console 0
DLS2(config-line)# logging synchronous
DLS2(config-line)# exec-timeout 0 0
```

```
ALS1(config)# no ip domain-lookup
ALS1(config)# line console 0
ALS1(config-line)# logging synchronous
ALS1(config-line)# exec-timeout 0 0
```

```
ALS2(config)# no ip domain-lookup
ALS2(config)# line console 0
ALS2(config-line)# logging synchronous
ALS2(config-line)# exec-timeout 0 0
```

Our Topology



- Redundancy between switches
- By default, are all links forwarding (active)? Why or why not?
 - No, Spanning Tree Protocol
 - Later we will examine how to make use of these blocked links either with PVST or Etherchannel.
- How can we determine which links are forwarding and which are blocked?

Spanning Tree Protocol (More later!)

```
ALS1# show spanning-tree
```

```
VLAN0001
```

```
Spanning tree enabled protocol ieee
```

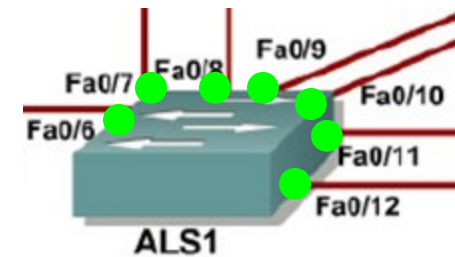
```
Root ID      Priority      32769
Address      001b.0c98.8100
```

```
This bridge is the root
```

```
Hello Time    2 sec  Max Age 20 sec  Forward Delay 15 sec
```

```
Bridge ID  Priority      32769 (priority 32768 sys-id-ext 1)
Address    001b.0c98.8100
Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
Aging Time 300
```

Interface	Role	Sts	Cost	Prio.Nbr	Type
Fa0/6	Desg	FWD	19	128.6	P2p
Fa0/7	Desg	FWD	19	128.7	P2p
Fa0/8	Desg	FWD	19	128.8	P2p
Fa0/9	Desg	FWD	19	128.9	P2p
Fa0/10	Desg	FWD	19	128.10	P2p
Fa0/11	Desg	FWD	19	128.11	P2p
Fa0/12	Desg	FWD	19	128.12	P2p



```
ALS1#
```

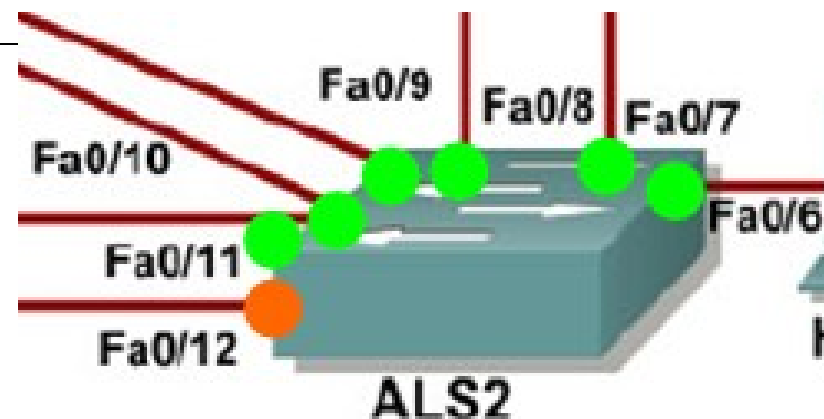
Spanning Tree Protocol

```
ALS2#show spanning-tree
```

```
<output omitted>
```

Interface	Role	Sts	Cost	Prio.	Nbr	Type
Fa0/6	Desg	FWD	19	128.6		P2p
Fa0/7	Desg	FWD	19	128.7		P2p
Fa0/8	Desg	FWD	19	128.8		P2p
Fa0/9	Desg	FWD	19	128.9		P2p
Fa0/10	Desg	FWD	19	128.10		P2p
Fa0/11	Root	FWD	19	128.11		P2p
Fa0/12	Altn	BLK	19	128.12		P2p

```
ALS2#
```

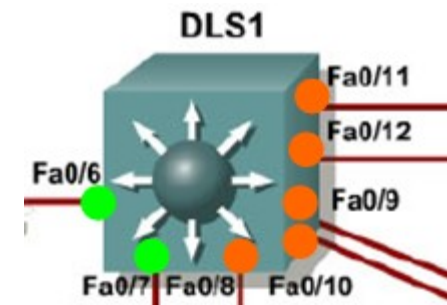


Spanning Tree Protocol

DLS1#show spanning-tree

<output omitted>

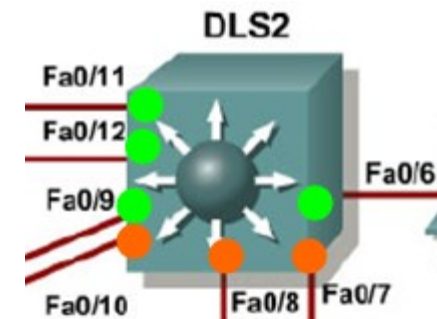
Interface	Role	Sts	Cost	Prio.	Nbr	Type
Fa0/6	Desg	FWD	19	128.8		P2p
Fa0/7	Root	FWD	19	128.9		P2p
Fa0/8	Altn	BLK	19	128.10		P2p
Fa0/9	Altn	BLK	19	128.11		P2p
Fa0/10	Altn	BLK	19	128.12		P2p
Fa0/11	Altn	BLK	19	128.13		P2p
Fa0/12	Altn	BLK	19	128.14		P2p



DLS2#show spanning-tree

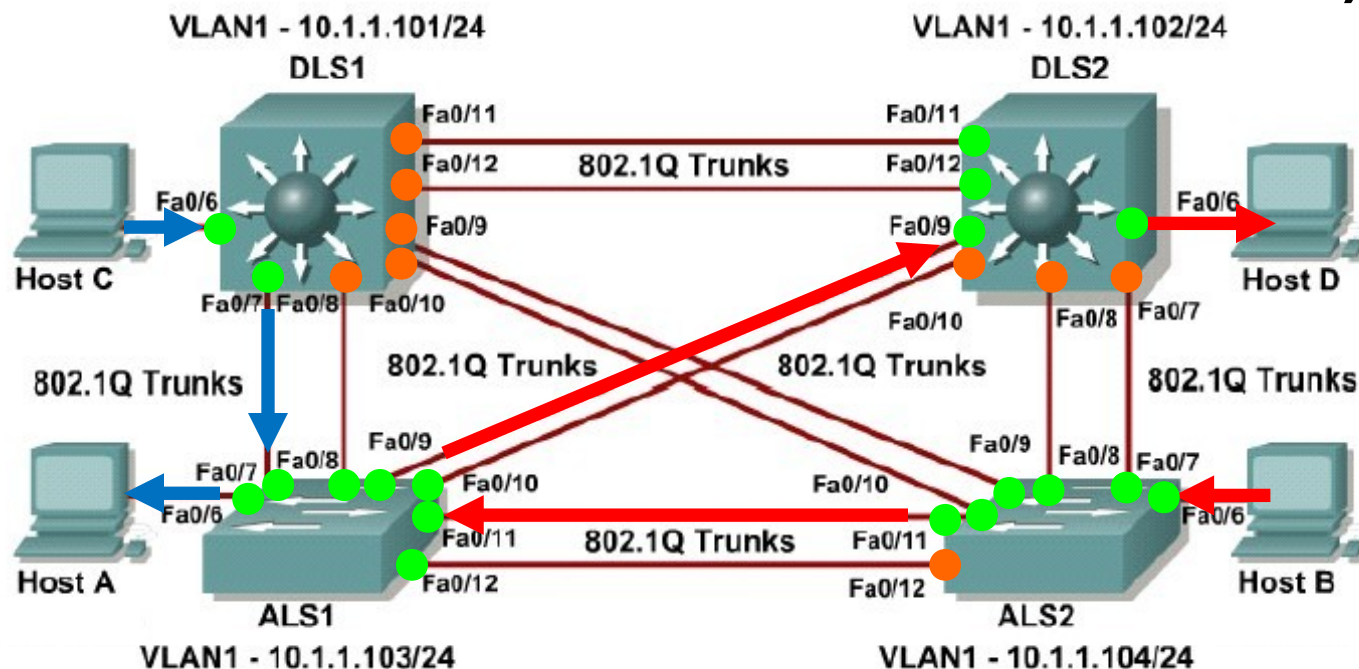
<output omitted>

Interface	Role	Sts	Cost	Prio.	Nbr	Type
Fa0/6	Desg	FWD	19	128.8		P2p
Fa0/7	Altn	BLK	19	128.9		P2p
Fa0/8	Altn	BLK	19	128.10		P2p
Fa0/9	Root	FWD	19	128.11		P2p
Fa0/10	Altn	BLK	19	128.12		P2p
Fa0/11	Desg	FWD	19	128.13		P2p
Fa0/12	Desg	FWD	19	128.14		P2p



What does this mean?

(All hosts in the same broadcast domain.)



Host C sends
a frame
to Host A

Host B sends
a frame
to Host D

Do show vlan on ALS1

```
ALS1# show vlan
```

VLAN Name	Status	Ports
1 default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, Fa0/6, Fa0/7, Fa0/8 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
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
1	enet	100001	1500	-	-	-	-	-	0	0
1002	fddi	101002	1500	-	-	-	-	-	0	0
1003	tr	101003	1500	-	-	-	-	-	0	0
1004	fdnet	101004	1500	-	-	-	ieee	-	0	0
1005	trnet	101005	1500	-	-	-	ibm	-	0	0

- Notice default VLAN numbers, names, types.
- Ports operating in **trunk mode** will not appear in any of the VLANs.
- Are there any? No – All ports are in VLAN 1 by default.

Do show vtp status on DLS1

```
DLS1# show vtp status
VTP Version                : 2
Configuration Revision     : 0
Maximum VLANs supported locally : 1005
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                : 0x57 0xCD 0x40 0x65 0x63 0x59
                          0x47 0xBD
Configuration last modified by 0.0.0.0 at 0-0-00 00:00:00
Local updater ID is 10.1.1.101 on interface V11 (lowest numbered
VLAN interface found)
DLS1#
```

```
1    default
1002 fddi-default
1003 token-ring-default
1004 fddinet-default
1005 trnet-default
```

- How many VLANs does a 3560 switch support?
 - 1005 VLANs (this is Model- and IOS-dependent)
- How many built-in VLANs are there?
 - 5

Same show vtp status on DLS1

```
DLS1# show vtp status
VTP Version                : 2
Configuration Revision     : 0
Maximum VLANs supported locally : 1005
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                 : 0x7D 0x5A 0xA6
Configuration last modified by 0.0.0.0 at 0-0-00
Local updater ID is 10.1.1.101 on interface Vl1 (
  interface found)
```

The switch in VTP server mode with the highest revision number propagates VLAN information over trunked ports.

Every time VLAN information is modified in the VLAN database the revision number is increased by one.

More in Part 2!

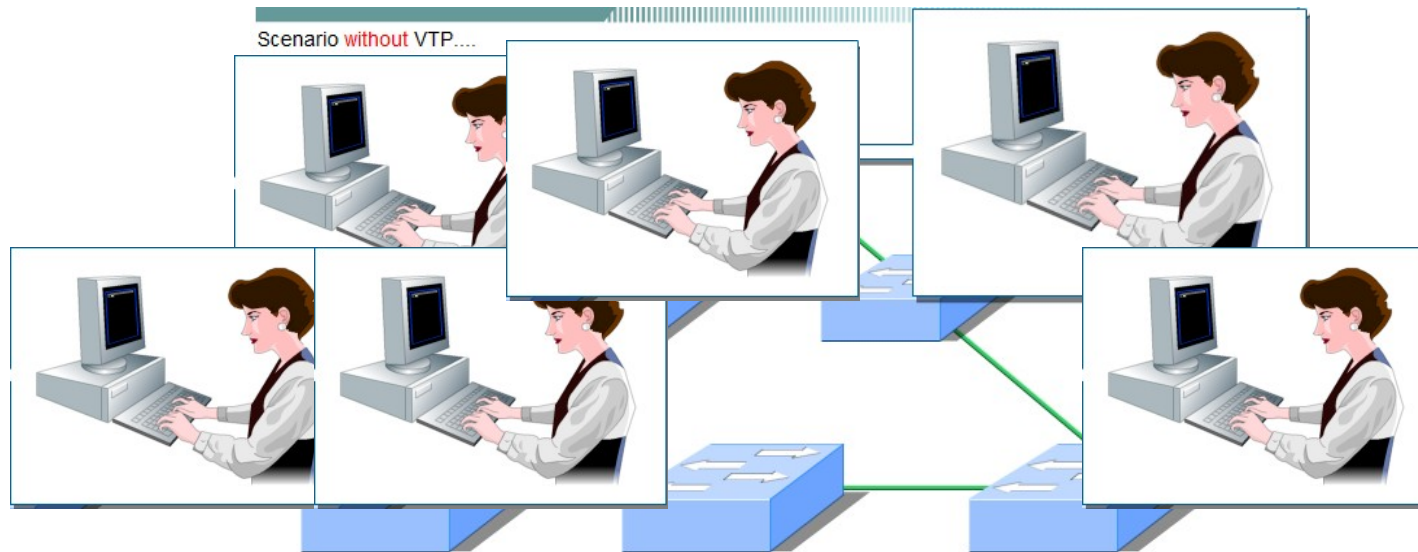
- What is the default VTP version?
 - 2
- What is the starting configuration revision?
 - 0
- What is the default VTP Mode?
 - Server
- What is the default VTP domain name?
 - none (displays as blank)

Do show vtp status on ALS1

```
ALS1# 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                 : 0x7D 0x5A 0xA6 0x0E 0x9A 0x72 0xA0 0x3A
Configuration last modified by 0.0.0.0 at 0-0-00 00:00:00
Local updater ID is 10.1.1.103 on interface Vl1 (lowest numbered VLAN
interface found)#
```

- How many VLANs does a 2960 switch support?

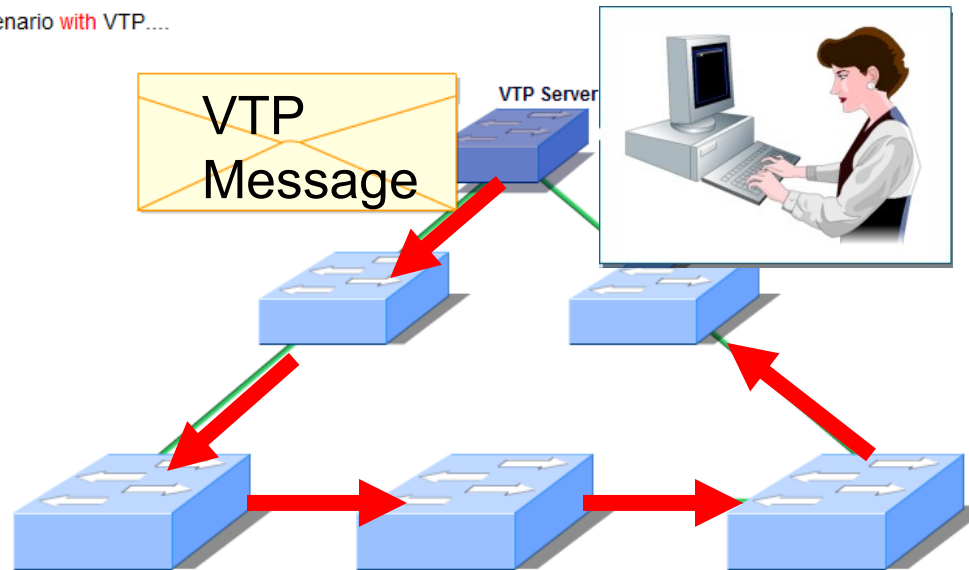
VTP (VLAN Trunking Protocol)



- Configuring VLANs without VTP.

VTP (VLAN Trunking Protocol)

Scenario with VTP....



- **VLAN Trunk Protocol (VTP)** reduces administration in a switched network.
- VLAN information can be configured on as few as one VTP server, which is then distributed to all participating switches throughout the domain.
 - alleviates the need to configure each switch individually
 - Cisco-proprietary

VTP Modes

- **Server**
 - Can create, modify, and delete VLANs
 - Configure VTP version and VTP pruning.
 - Advertise their VLAN configuration to other switches in the same VTP domain
 - VTP advertisements sent/received over trunk links.
 - Default mode.
- **Client**
 - Behave the same way as VTP servers, but you cannot create, change, or delete VLANs on a VTP client.
- **Transparent**
 - Does **not** participate in VTP.
 - Does **not** advertise its VLAN configuration.
 - Does **not** synchronize its VLAN configuration based on received advertisements
 - Does forward VTP advertisements that they receive out their trunk ports in VTP Version 2.
- **Off** (CatOS switches only)
 - Behaves the same as in VTP transparent mode with the exception that VTP advertisements are not forwarded.

VTP – Verifying the VTP Mode

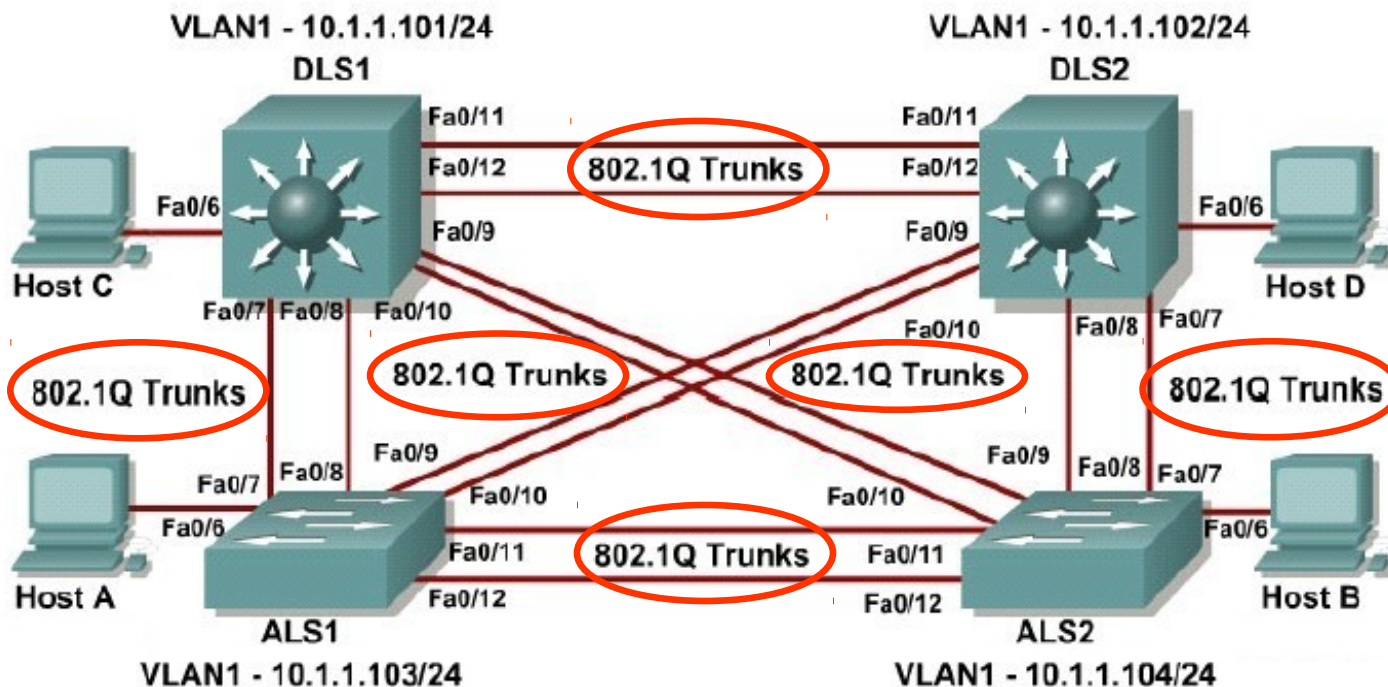
```
DLS1# show vtp status
VTP Version                : 2
Configuration Revision     : 0
Maximum VLANs supported locally : 1005
Number of existing VLANs   : 5
VTP Operating Mode         : Server
VTP Domain Name            :
VTP Pruning Mode           : Disabled
VTP V2 Mode                : Disabled
VTP Traps Generation       : Disabled
MD5 digest                 : 0x57 0xCD 0x40 0x65 0x63 0x59
                           0x47 0xBD
Configuration last modified by 0.0.0.0 at 0-0-00 00:00:00
Local updater ID is 10.1.1.101 on interface V11 (lowest numbered
  VLAN interface found)
DLS1#
```

Configure the VTP domain name on DLS1

```
DLS1(config)# vtp domain SWLAB
```

Changing VTP domain name from NULL to SWLAB

Domain is case sensitive.



- Will the other switches receive the domain name in a VTP update?
 - We will see in a moment.
 - Hint: Switches transmit VTP messages only over trunks (802.1Q or ISL).

Configure DLS1 as a VTP Server and ALS1 as a VTP Client

```
DLS1(config)# vtp mode server  
Device mode already VTP SERVER.
```

```
ALS1(config)# vtp mode client  
Setting device to VTP CLIENT mode.
```

- Configure other two switches
 - Configure DLS2 switch as a VTP Server
 - Configure ALS2 switch as a VTP Clients
- Verify VTP Mode

VTP Server and Clients

Why do these switches not have the VTP domain name configured on DLS1?

```
DLS2(config)# vtp mode server
Device mode already VTP SERVER.
DLS2(config)# end
DLS2# show vtp status
VTP Version                : 2
Configuration Revision     : 0
Maximum VLANs supported locally : 1005
Number of existing VLANs   : 5
VTP Operating Mode         : Server
VTP Domain Name            :
<output omitted>
```

```
DLS1(config)# vtp domain SWLAB
Changing VTP domain name from NULL to SWLAB
```

VLAN information is not propagated until the VTP Domain Name is learned through **trunked ports**.

```
ALS2(config)# vtp mode client
Setting device to VTP CLIENT mode.
ALS2(config)# end
ALS2# show vtp status
VTP Version                : 2
Configuration Revision     : 0
Maximum VLANs supported locally : 255
Number of existing VLANs   : 5
VTP Operating Mode         : Client
VTP Domain Name            :
```

Non-trunking by default

```
ALS1# show interfaces fastethernet 0/6 switchport
Name: Fa0/6
Switchport: Enabled
Administrative Mode: dynamic auto
Operational Mode: static access
Administrative Trunking Encapsulation: dot1q
Operational Trunking Encapsulation: native
Negotiation of Trunking: On
Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 1 (default)
<output omitted>
```



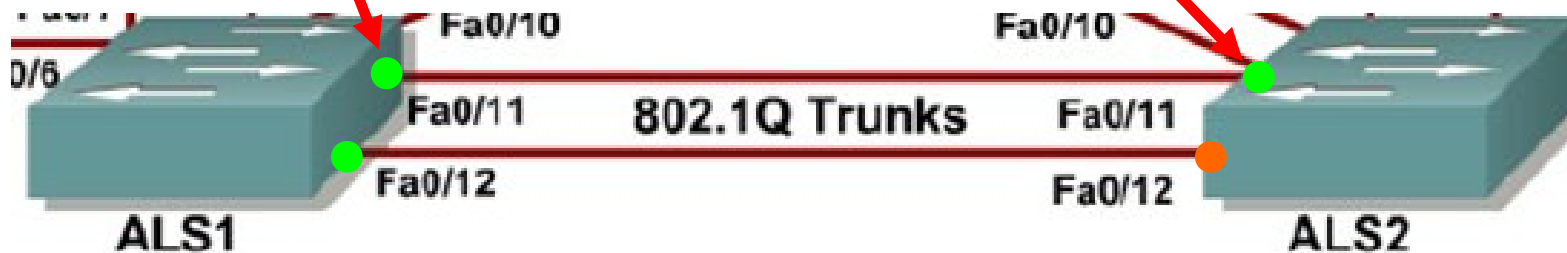
How the port was configured.

How the port is operating.

- Ports on the 2960 and 3560 are set to **dynamic auto** by default.
 - Does not try to negotiate a trunk unless one side is configured with **switchport mode trunk** command.
- This results in the interface being in access mode (non-trunking).
- Older switch platforms may default to **dynamic desirable**, which can lead to accidental (and unexpected) trunk links being formed.
 - Be familiar with the defaults that apply in your organization!

DTP (Dynamic Trunking Protocol) and Switchport Mode Interactions

	Dynamic Auto	Dynamic Desirable	Trunk	Access
Dynamic Auto	Access	Trunk	Trunk	Access
Dynamic Desirable	Trunk	Trunk	Trunk	Access
Trunk	Trunk	Trunk	Trunk	Not recommended
Access	Access	Access	Not recommended	Access



Non-trunking by default

```
ALS1#show inter fa 0/11 switchport
Name: Fa0/11
Switchport: Enabled
Administrative Mode: dynamic auto
Operational Mode: static access
Administrative Trunking Encapsulation: dot1q
Operational Trunking Encapsulation: native
Negotiation of Trunking: On
Access Mode VLAN: 1 (default)
<output omitted>
```

```
ALS2#show inter fa 0/11 switchport
Name: Fa0/11
Switchport: Enabled
Administrative Mode: dynamic auto
Operational Mode: static access
Administrative Trunking Encapsulation: dot1q
Operational Trunking Encapsulation: native
Negotiation of Trunking: On
Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 1 (default)
<output omitted>
```



- 2960 and 3560 switches do not try to negotiate a trunk unless the other side is configured with `switchport mode trunk` command.

show interfaces without switchport option

```
ALS1# show interfaces fastethernet 0/6
FastEthernet0/6 is up, line protocol is up (connected)
  Hardware is Fast Ethernet, address is 001b.0c98.8106 (bia 001b.0c98.8106)
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, media type is 10/100BaseTX
  input flow-control is off, output flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 00:00:01, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    51 packets input, 9122 bytes, 0 no buffer
  Received 49 broadcasts (0 multicast)
    0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog, 0 multicast, 0 pause input
    0 input packets with dribble condition detected
  489 packets output, 38801 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier, 0 PAUSE output
    0 output buffer failures, 0 output buffers swapped out
ALS1#
```

Without the switchport option this command shows basic interface (non-vlan) information.

Non-trunking by default

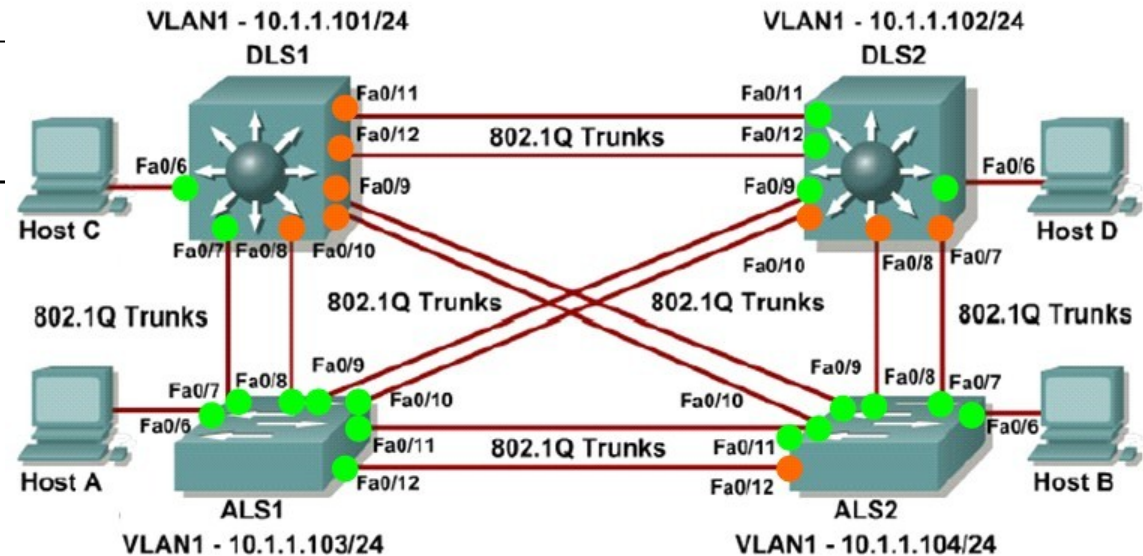
```
ALS1#show vlan
```

```
VLAN Name
```

```
-----
```

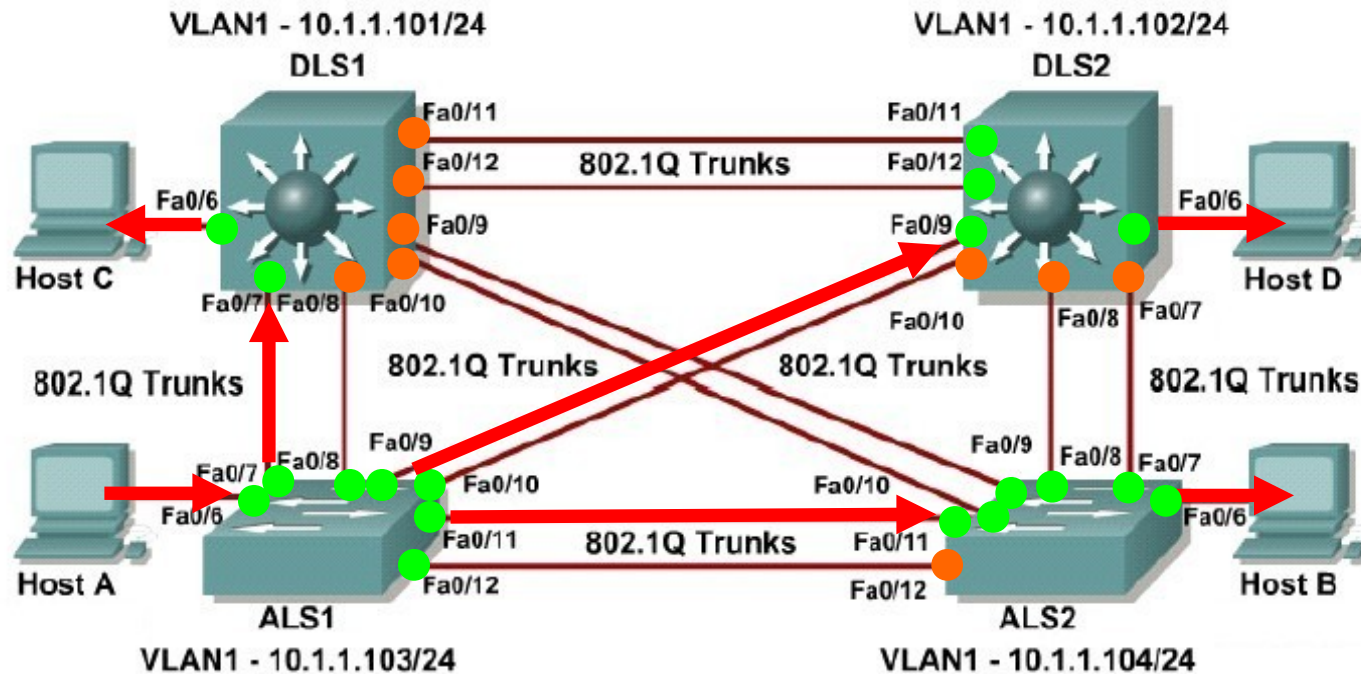
```
1    default
```

```
<output omitted>
```



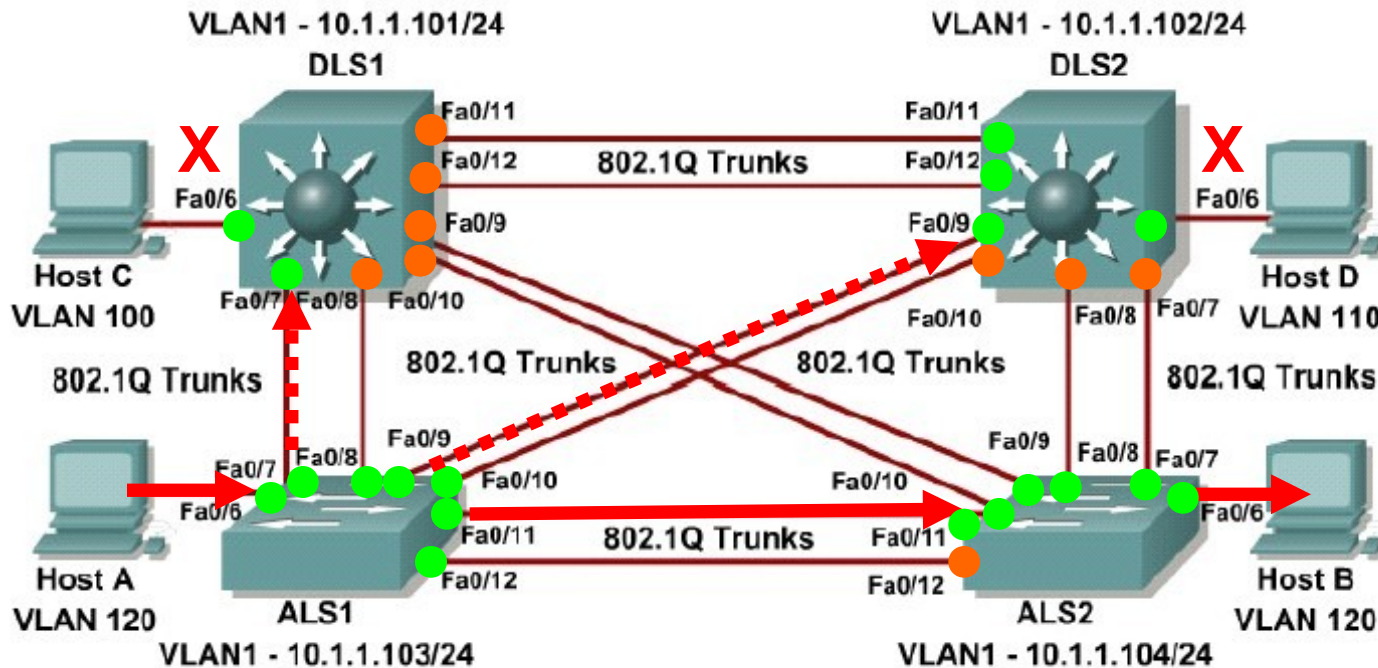
- Even though trunking is not yet configured between the switches, can the hosts ping each other? Try it!
 - Yes, as long as the hosts are configured on the same IP subnet they will be able to ping each other without trunking. (Host A and Host B)
 - Since all ports are on VLAN 1, it's like a switched network with no VLANs.
- So why do we establish VLANs?
 - To segment broadcast domains.
- Why do we need trunks?
 - To carry traffic for multiple VLANs.

Without VLANS what does this mean?



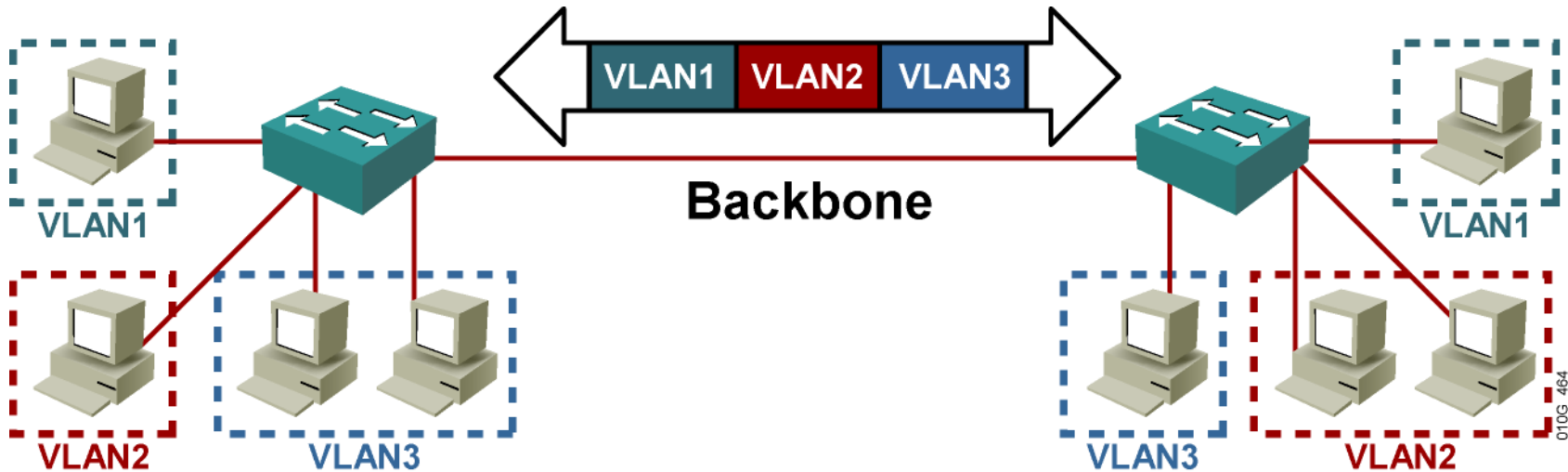
- ARP Request from Host A to Host B. Which hosts will see it?
 - Only Host B is on the same subnet as Host A, but the entire network (all hosts) will receive and must process, the broadcast.
- Why aren't all of the links used?
 - Spanning Tree Protocol is keeping the network loop free.

With VLANS what would happen?



- ARP Request from Host A to Host B. Which hosts will see it?
 - Only Host B is on the same VLAN as Host A, so other hosts will not receive the broadcast.
 - With VTP pruning, broadcasts within that VLAN (dashed lines) could be further isolated.

Trunking



- What is a VLAN trunk?
 - Trunks carry traffic for multiple VLANs across the same physical link.
- What are the two trunking protocols used by Cisco switches?

Comparing ISL and 802.1Q

ISL

Proprietary

Encapsulated

Protocol independent

Encapsulates the old frame in a new frame

ISL (Inter-Switch Link) is no longer actively supported by Cisco, opting instead for 802.1Q.

Note: Not all switches support both protocols.

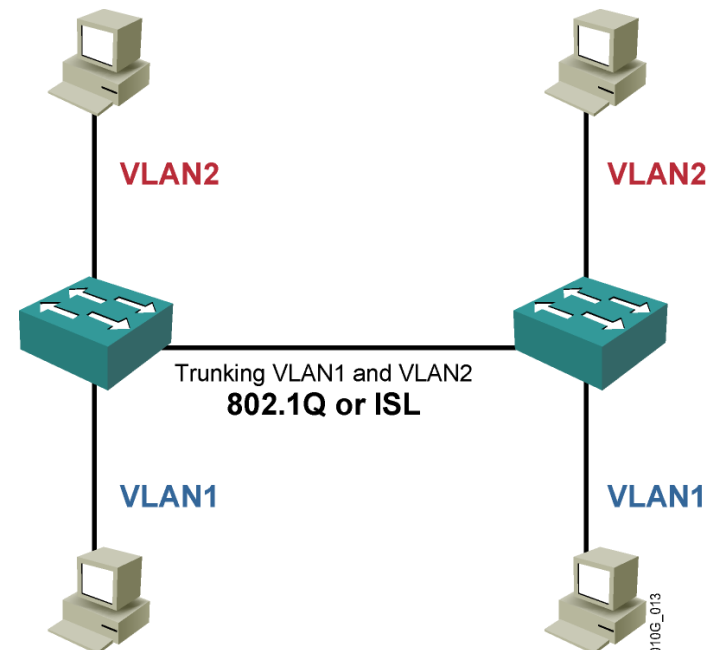
802.1Q

Nonproprietary

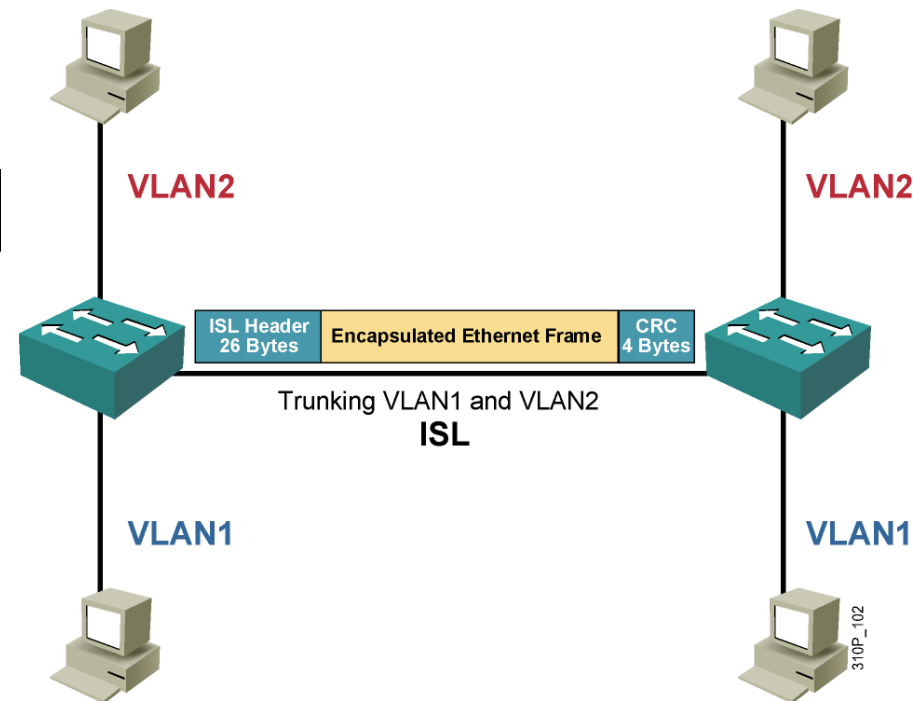
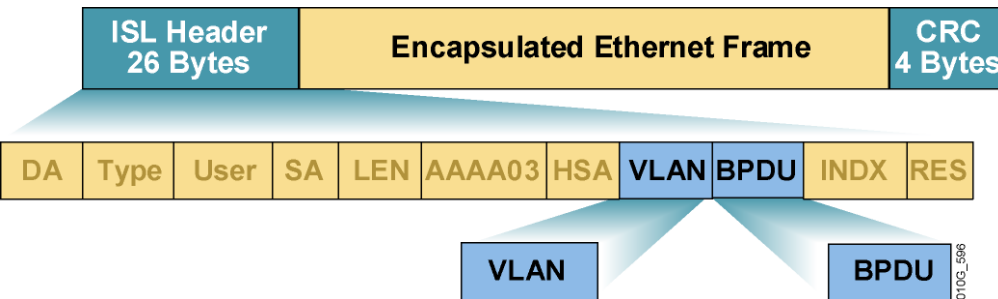
Tagged

Protocol dependent

Adds a frame header field and modifies the original FCS



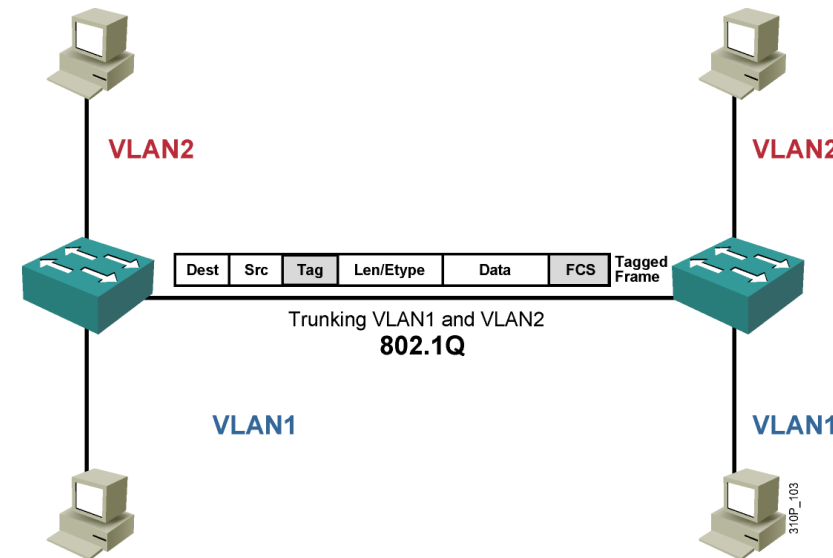
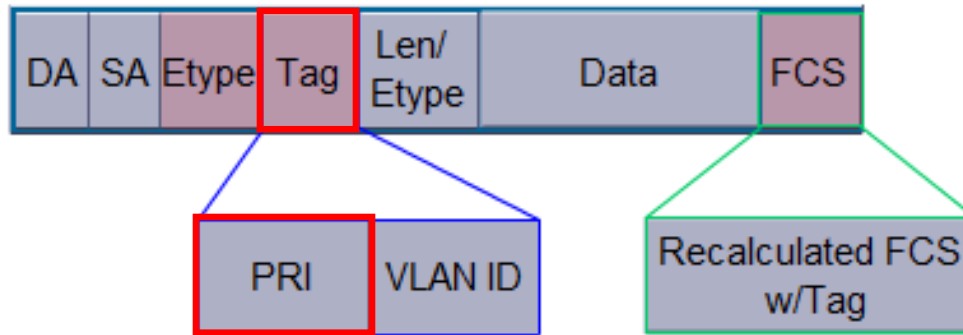
Trunking with ISL



- Is a Cisco proprietary protocol, using a modified SNAP frame
- Uses an encapsulation process (a.k.a. “external tagging”)
- Does not modify the original frame
- Total overhead is 30 bytes

Trunking with 802.1Q

802.1q encapsulated Ethernet Frame



- An IEEE standard
- Inserts a 4-byte tag within the original frame
 - also referred to as “internal tagging”
 - added tag includes a priority field
- Overwrites the original FCS
 - once tagging is stripped, FCS must be recalculated
- Total overhead is 4 bytes
- (We’ll discuss more during Part 2.)

DTP and Switchport Mode Interactions

Note: Table assumes DTP is enabled at both ends.

	Default Dynamic Auto	Dynamic Desirable	Trunk	Access
Default Dynamic Auto	Access	Trunk	Trunk	Access
Dynamic Desirable	Trunk	Trunk	Trunk	Access
Trunk	Trunk	Trunk	Trunk	Not recommended
Access	Access	Access	Not recommended	Access

```
ALS1(config-if)# switchport mode ?
```

```
access    Set trunking mode to ACCESS unconditionally
```

```
dynamic   Set trunking mode to dynamically negotiate access or trunk mode
```

```
trunk     Set trunking mode to TRUNK unconditionally
```

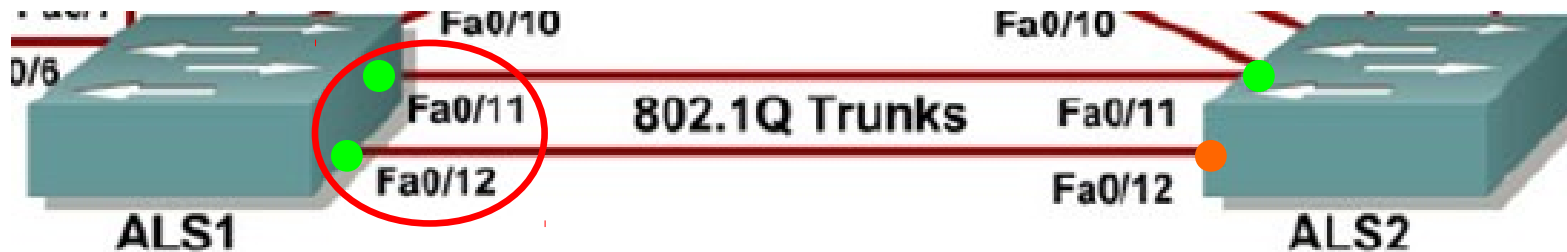
```
ALS1(config-if)# switchport mode dynamic ?
```

```
auto      Set trunking mode dynamic negotiation parameter to AUTO
```

```
desirable Set trunking mode dynamic negotiation parameter to DESIRABLE
```

Configure ALS1 for Trunking

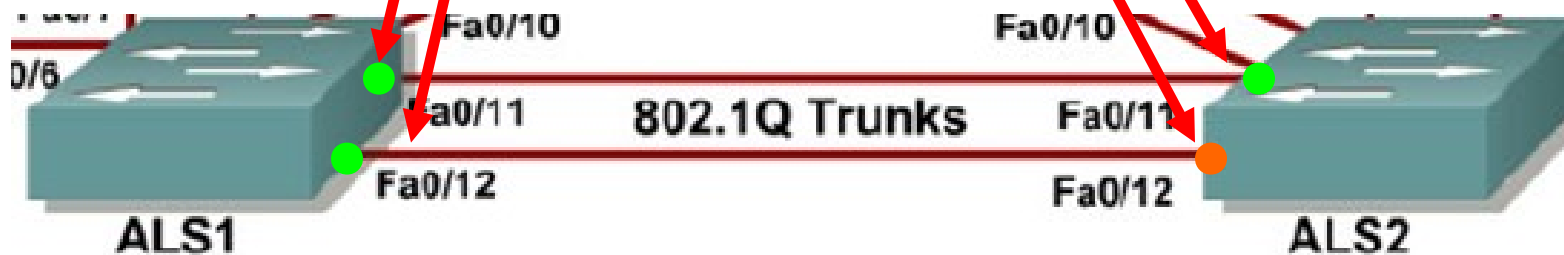
```
ALS1(config)# interface range fastethernet 0/11 - 12
ALS1(config-if-range)# switchport mode trunk
ALS1(config-if-range)#
```



- What will be the impact on these two links?
- Does ALS2 need to be configured as a trunk?

Result?

	<u>Default</u> Dynamic Auto	Dynamic Desirable	Trunk	Access
Dynamic Auto	Access	Trunk	Trunk	Access
Dynamic Desirable	Trunk	Trunk	Trunk	Access
<u>Trunk</u>	Trunk	Trunk	Trunk	Not recommended
Access	Access	Access	Not recommended	Access



```
ALS1(config)# interface range fastethernet 0/11 - 12
ALS1(config-if-range)# switchport mode trunk
```

Trunking! We will verify this on ALS1 in a moment.

Display Trunking Information on ALS1

```
ALS1# show interface trunk
```

Port	Mode	Encapsulation	Status	Native vlan
Fa0/11	on	802.1q	trunking	1
Fa0/12	on	802.1q	trunking	1

```
Port          Vlans allowed on trunk
```

```
Fa0/11        1-1005
```

```
Fa0/12        1-1005
```

```
Port          Vlans allowed and active in management domain
```

```
Fa0/11        1
```

```
Fa0/12        1
```

```
Port          Vlans in spanning tree forwarding state and not pruned
```

```
Fa0/11        1
```

```
Fa0/12        1
```

```
ALS1#
```

ALS1 – Manually Configured Trunk

```
ALS1# show inter fa 0/11 switchport
```

```
Name: Fa0/11
```

```
Switchport: Enabled
```

```
Administrative Mode: trunk
```

```
Operational Mode: trunk
```

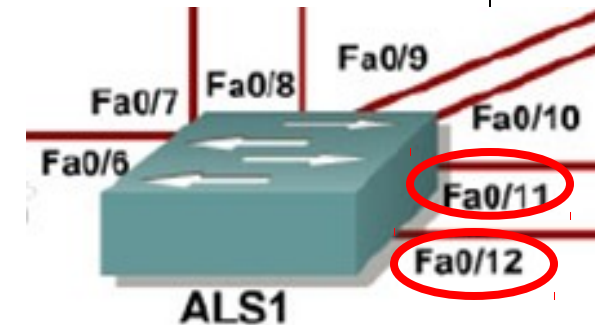
```
Administrative Trunking Encapsulation: dot1q
```

```
Operational Trunking Encapsulation: dot1q
```

```
Negotiation of Trunking: On
```

```
Access Mode VLAN: 1 (default)
```

```
<output omitted>
```



- Why is the administrative mode “trunk”?
 - Because we configured the port(s) as trunking:

```
ALS1(config)# interface range fastethernet 0/11 - 12
```

```
ALS1(config-if-range)# switchport mode trunk
```

ALS2 – Default Dynamic Auto

```
ALS2# show inter fa 0/11 switchport
```

```
Name: Fa0/11
```

```
Switchport: Enabled
```

```
Administrative Mode: dynamic auto
```

```
Operational Mode: trunk
```

```
Administrative Trunking Encapsulation: dot1q
```

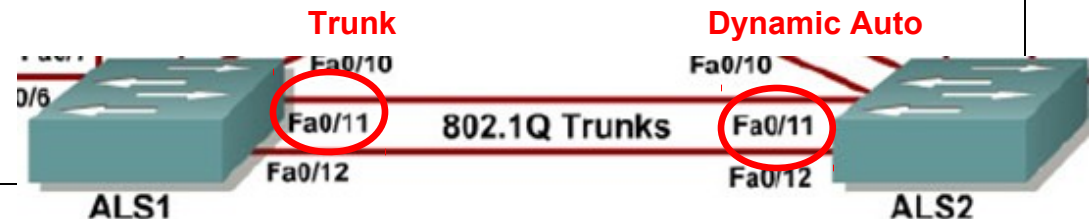
```
Operational Trunking Encapsulation: dot1q
```

```
Negotiation of Trunking: On
```

```
Access Mode VLAN: 1 (default)
```

```
Trunking Native Mode VLAN: 1 (default)
```

	Dynamic Auto
Dynamic Auto	Access
Dynamic Desirable	Trunk
Trunk	Trunk
Access	Access



What is the DTP setting on ALS2? (This did not change.)

Is this also the default on a 3560 switch? **Yes**

Notice it is now trunking because the other end is set to trunk.

ALS2 – Default Dynamic Auto

```
ALS2#show interfaces trunk
```

Port	Mode	Encapsulation	Status	Native vlan
Fa0/11	auto	802.1q	trunking	1
Fa0/12	auto	802.1q	trunking	1

Port	Vlans allowed on trunk
Fa0/11	1-1005
Fa0/12	1-1005

Port	Vlans allowed and active in management domain
Fa0/11	1
Fa0/12	1

Port	Vlans in spanning tree forwarding state and not pruned
Fa0/11	1
Fa0/12	none



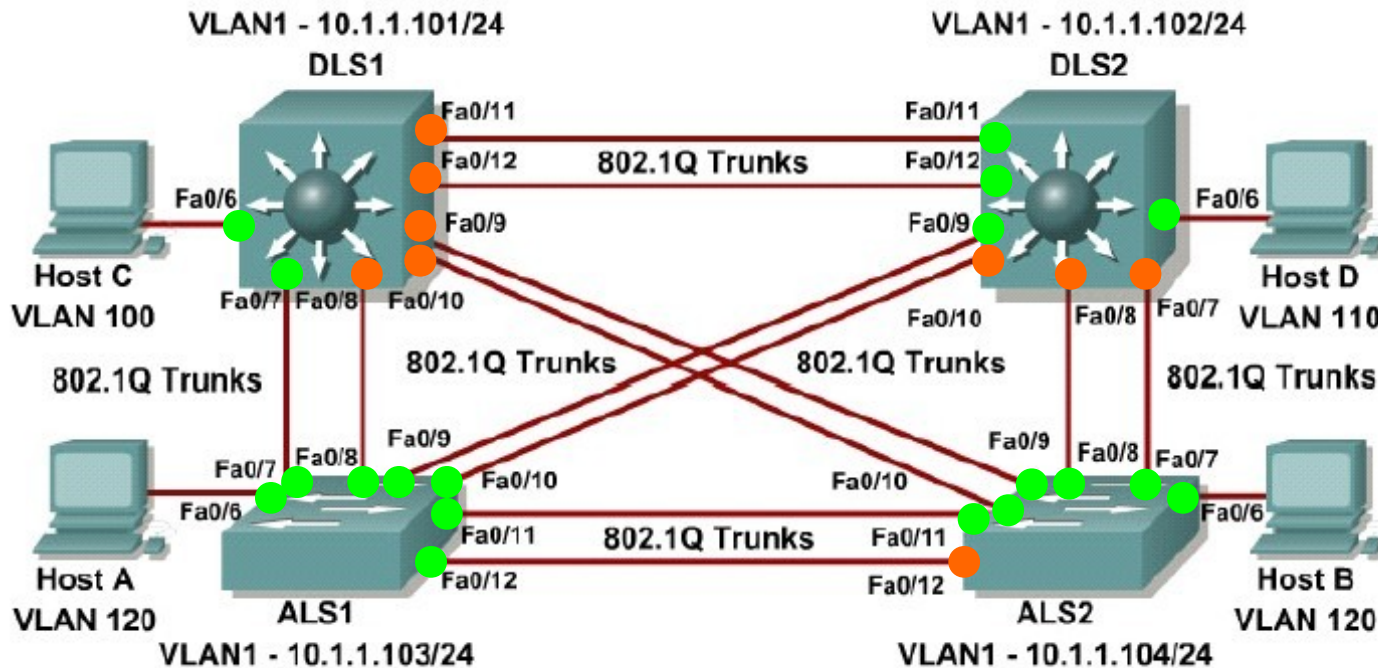
- Verifying trunks on ALS2

Switches that support both ISL and 802.1Q

```
Switch(config)# interface range fastethernet 0/1 - 4
Switch(config-if-range)# switchport mode trunk
Command rejected: An interface whose trunk encapsulation is "Auto"
can not be configured to "trunk" mode.
Switch(config-if-range)# switchport trunk encapsulation dot1q
Switch(config-if-range)# switchport mode trunk
```

- For switches that support both trunking protocols (e.g. the C35xx series), what happens when we use the **switchport mode trunk** command without specifying the encapsulation?
 - The switchport trunk encapsulation (802.1Q or ISL) must be configured before configuring trunk mode.

Configure the rest of the trunk links



- What about the VTP domain names on DLS1 and DLS2?
 - No other trunk links configured so DLS1 and DLS2 still have no VTP domain name.
- Trunking only configured between ALS1 and ALS2.
- Configure the rest of the trunk links as shown in the topology.
- Note that Packet Tracer only supports 802.1Q trunks, not ISL.

ALS1 (config) # inter range fa 0/7 - 10	<i>Fa 0/11 – 12 previously configured "trunk"</i>
ALS1 (config-if-range) # switchport mode trunk	
ALS2 (config) # inter range fa 0/7 - 10	<i>Fa 0/11 – 12 defaults to "dynamic desirable"</i>
ALS2 (config-if-range) # switchport mode trunk	
DLS1 (config) # inter range fa 0/7 - 12	
DLS1 (config-if-range) # switchport mode trunk	
Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode.	

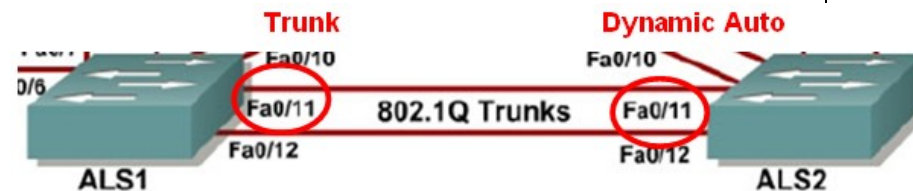
- Note: Configures trunking manually on the remaining links: **switchport mode trunk**
- Only one end of the link needs to be configured manually, if the other end is configured **dynamic auto**.
- Now verify trunking on all switches:
 - **show interfaces fa 0/7 <thru 0/12> switchport**
 - **show interfaces trunk**

DLS1 (config-if-range) # switchport trunk encapsulation dot1q
DLS1 (config-if-range) # switchport mode trunk
DLS2 (config) # inter range fa 0/7 - 12
DLS2 (config-if-range) # switchport trunk encapsulation dot1q
DLS2 (config-if-range) # switchport mode trunk

Two ends: Trunk Mode and Dynamic Auto

```
ALS1# show interface fa 0/11 switchport
Name: Fa0/11
Switchport: Enabled
Administrative Mode: trunk
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)
```

```
ALS2# show interfaces fa 0/11 switchport
Name: Fa0/11
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)
<output omitted>
```



- How can you tell if an interface is trunking, due to **dynamic auto** instead of manually configured as **trunk**?

Two ends: Trunk Mode and Dynamic Auto

```
ALS1# show interface trunk
```

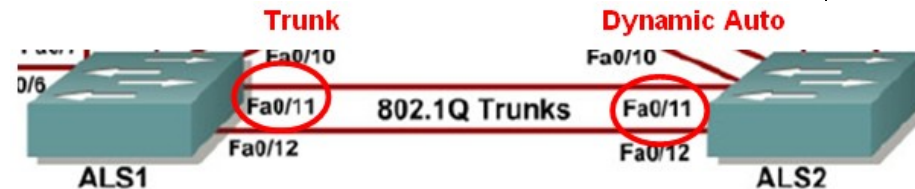
Port	Mode	Encapsulation	Status	Native vlan
Fa0/7	on	802.1q	trunking	1
Fa0/8	on	802.1q	trunking	1
Fa0/9	on	802.1q	trunking	1
Fa0/10	on	802.1q	trunking	1
Fa0/11	on	802.1q	trunking	1
Fa0/12	on	802.1q	trunking	1

<output omitted>

```
ALS2# show interface trunk
```

Port	Mode	Encapsulation	Status	Native vlan
Fa0/7	on	802.1q	trunking	1
Fa0/8	on	802.1q	trunking	1
Fa0/9	on	802.1q	trunking	1
Fa0/10	on	802.1q	trunking	1
Fa0/11	auto	802.1q	trunking	1
Fa0/12	auto	802.1q	trunking	1

<output omitted>



- How can you tell if an interface is trunking, due to **dynamic auto** instead of manually configured as **trunk**?

VTP Update

```
DLS1(config)# vtp domain SWLAB
```

Previously configured

```
Changing VTP domain name from NULL to SWLAB
```

```
ALS2# 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 : SWLAB
VTP Pruning Mode : Disabled
VTP V2 Mode : Disabled
VTP Traps Generation : Disabled
MD5 digest : 0x57 0xCD 0x40 0x65 0x47 0xBD
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)
ALS2#
```

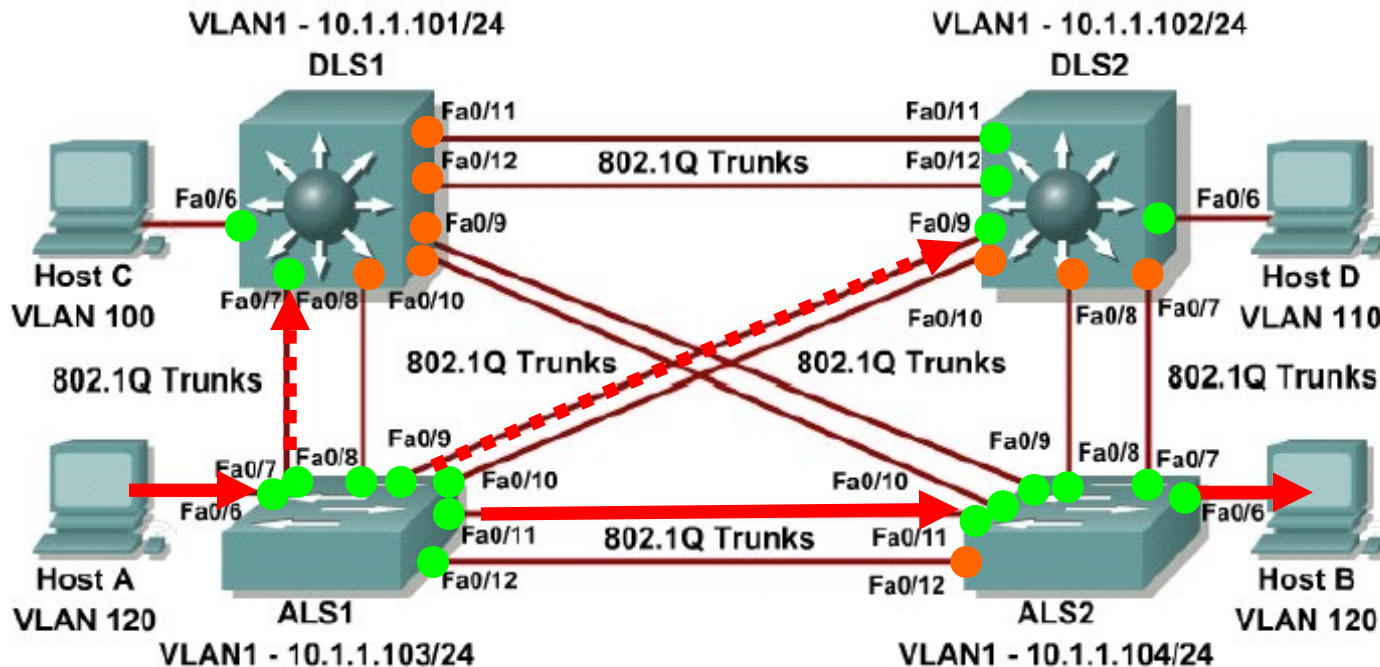
- We now have trunk links between VTP servers and clients.
- What does this mean for ALS2 and getting a VTP domain name?
- ALS2 receives the VTP update from ALS1 who received a VTP update from DLS1, thereby updating its VTP Domain Name.

VTP Updates Received

```
DLS1# show vtp status
VTP Version                : 2
Configuration Revision     : 0
Maximum VLANs supported locally : 1005
Number of existing VLANs   : 5
VTP Operating Mode        : Server
VTP Domain Name           : SWLAB
VTP Pruning Mode          : Disabled
VTP V2 Mode               : Disabled
VTP Traps Generation      : Disabled
MD5 digest                : 0x57 0xCD 0x40 0x65 0x63
                           0x59 0x47 0xBD
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)
DLS1#
```

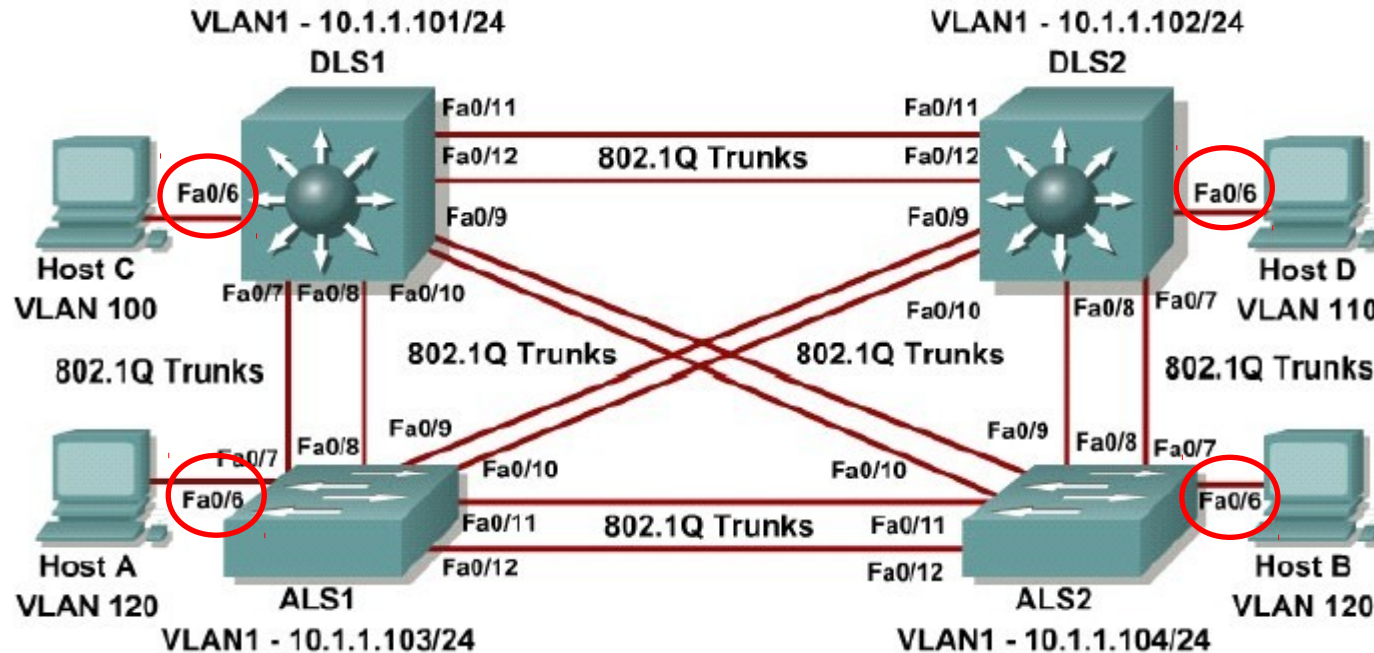
- VTP update sends domain name over trunk links.

What does this mean?



- We have configured trunking but all of our access ports (hosts) are on VLAN 1.
- We still need to configure the access ports for separate VLANs.
 - Currently, broadcasts are propagating through the entire network.
- How would VLANs affect the ARP broadcast?
 - Host C and Host D would not receive the ARP Request.
 - If VTP pruning is enabled with no VLAN 120's on DLS1, DLS1 would not receive the ARP Request either (and similarly for DLS2).

Access Ports

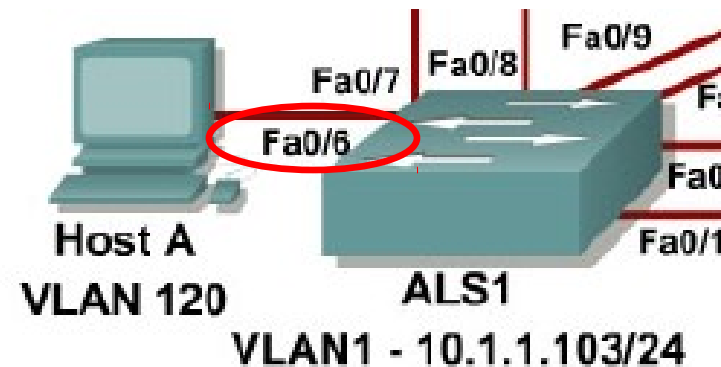


Configure the VLAN on the access port for ALS1

```
ALS1(config)# inter fa 0/6
ALS1(config-if)# switchport mode ?
    access    Set trunking mode to ACCESS unconditionally
    dynamic   Set trunking mode to dynamically negotiate access or
              trunk mode
    trunk     Set trunking mode to TRUNK unconditionally

ALS1(config-if)# switchport mode access
```

- With a single host attached will we ever need trunking on this port?
 - No, so we configure it for access mode, permanent non-trunking. (We will discuss Voice VLANs later.)
- Configure access ports on the other three switches (DLS1, DLS2, ALS2).



Configuring Access Ports

```
ALS2(config)# inter fa 0/6
```

```
ALS2(config-if)# switchport mode access
```

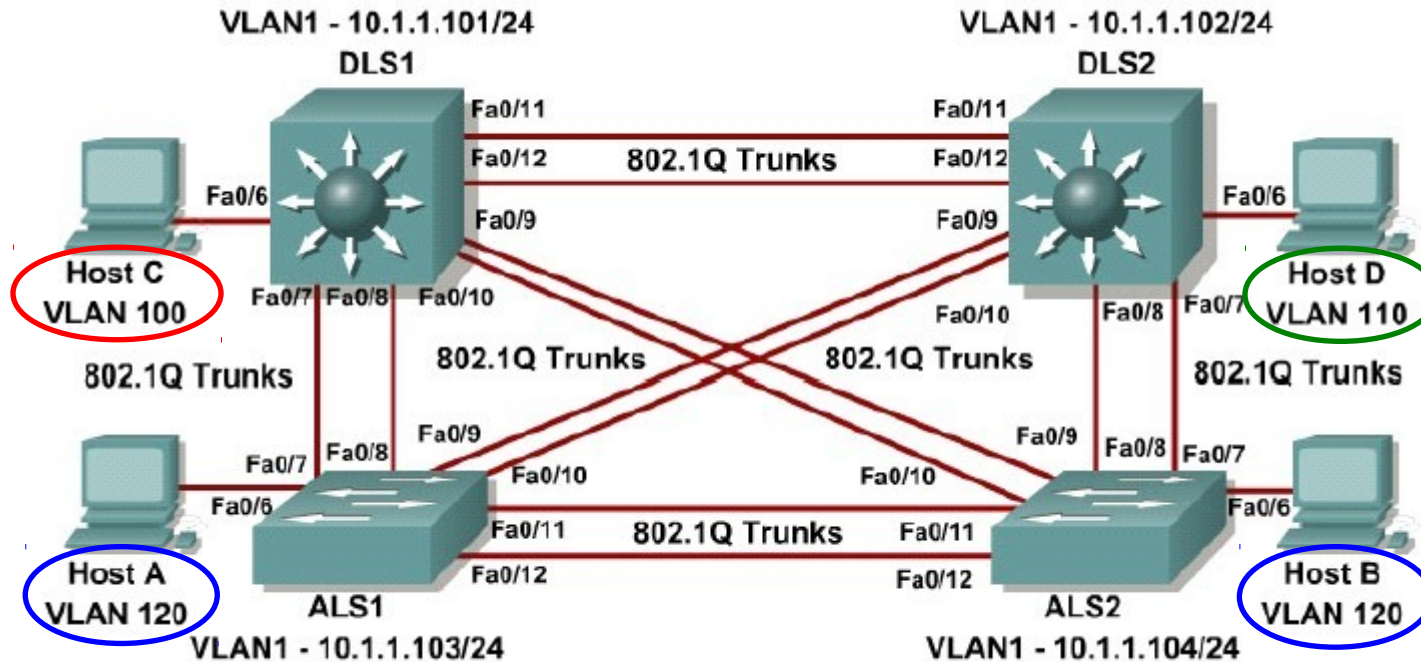
	Default Dynamic Auto	Dynamic Desirable	Trunk	Access
Default Dynamic Auto	Access	Trunk	Trunk	Access
Dynamic Desirable	Trunk	Trunk	Trunk	Access
Trunk	Trunk	Trunk	Trunk	Not recommended
Access	Access	Access	Not recommended	Access

- This command is important, it will not allow trunking to occur even if the link partner tries to negotiate it.

Example

```
ALS1# show interfaces fa 0/6 switchport
Name: Fa0/6
Switchport: Enabled
Administrative Mode: static access
Operational Mode: static access
Administrative Trunking Encapsulation: dot1q
Operational Trunking Encapsulation: native
Negotiation of Trunking: Off
Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 1 (default)
<output omitted>
```

Creating VLANs



Create the VLAN for the Access Port on DLS1

```
DLS1(config)# int fa 0/6
```

```
DLS1(config-if)# switchport mode access
```

Previously configured

```
DLS1(config-if)# switchport access vlan 100
```

```
% Access VLAN does not exist. Creating vlan 100
```

```
DLS1(config-if)#
```

```
DLS1# show int fa 0/6 switchport
```

```
Name: Fa0/6
```

```
Switchport: Enabled
```

```
Administrative Mode: static access
```

```
Operational Mode: static access
```

```
Administrative Trunking Encapsulation: negotiate
```

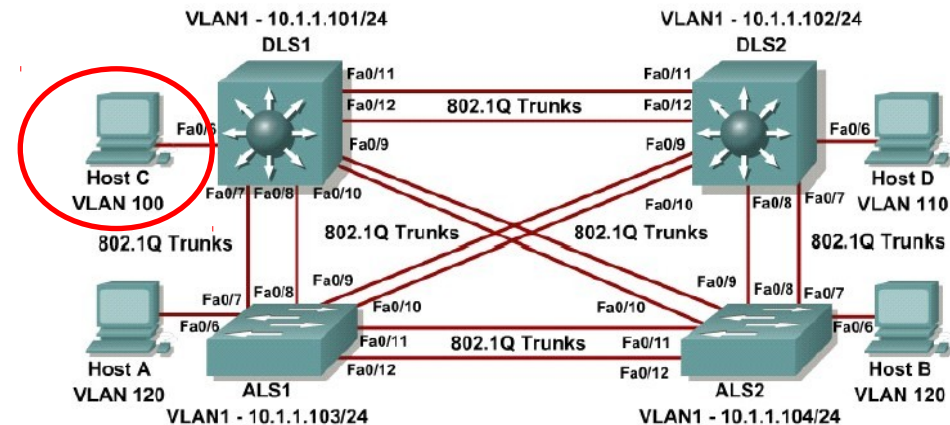
```
Operational Trunking Encapsulation: native
```

```
Negotiation of Trunking: Off
```

```
Access Mode VLAN: 100 (VLAN0100)
```

```
Trunking Native Mode VLAN: 1 (default)
```

```
<output omitted>
```



- All ports are automatically assigned to the default VLAN 1.
- The switch will automatically create a VLAN that does not yet exist.

Why the switchport mode access command?

```
DLS1(config)# inter fa 0/1
DLS1(config-if)# switchport access vlan 55
% Access VLAN does not exist. Creating vlan 55
DLS1(config-if)# end
```

```
DLS1# show vlan
```

VLAN Name	Status	Ports
1 default	active	Fa0/2, Fa0/3, Fa0/4, Fa0/5 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
55 VLAN0055	active	Fa0/1
100 VLAN0100	active	Fa0/6
110 VLAN0110	active	

```
DLS1# show inter fa 0/1 switchport
```

```
Name: Fa0/1
```

```
Switchport: Enabled
```

```
Administrative Mode: dynamic auto
```

```
Operational Mode: down
```

```
Administrative Trunking Encapsulation: negotiate
```

```
Negotiation of Trunking: On
```

```
Access Mode VLAN: 55 (VLAN0055)
```

No switchport mode access command configured on fa 0/1

- Both the **switchport mode access** command and **switchport access vlan n** should be used for non-VLAN 1 ports.
- Want trunk negotiation to be **“Off”**.
- Unexpected results may occur, otherwise.

Removing VLAN 55

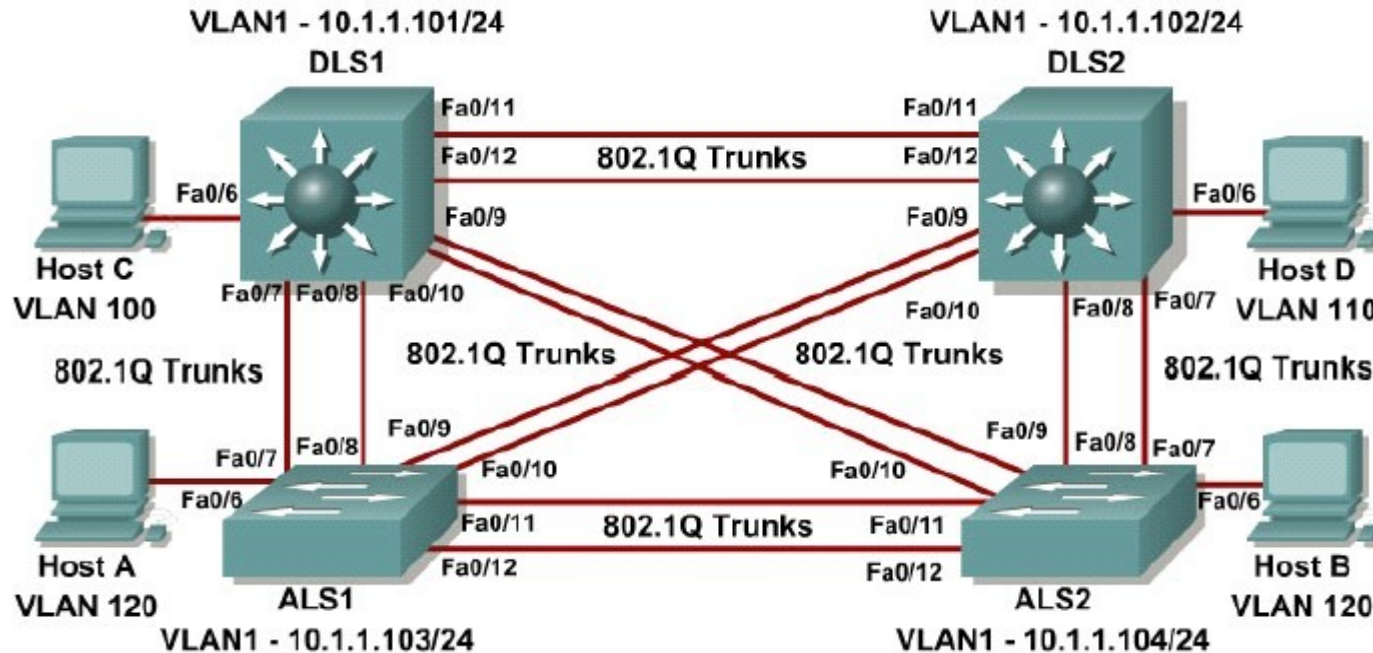
```
DLS1(config)# inter fa 0/1
DLS1(config-if)# no switchport access vlan 55
DLS1(config-if)# exit
```

```
DLS1(config)# no vlan 55
DLS1(config)# end
```

```
DLS1# show vlan
```

VLAN Name	Status	Ports
1 default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, 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
100 VLAN0100	active	Fa0/6
110 VLAN0110	active	

Create VLANs for the Access Ports



- VLANs 100, 110 and 120 must be created on the appropriate switches.
- With fa0/6 configured on DLS1, we next configure the host access port on **DLS2** with the proper VLAN and verify with: `show vlan`

Creating the VLAN for the Access Port on DLS2

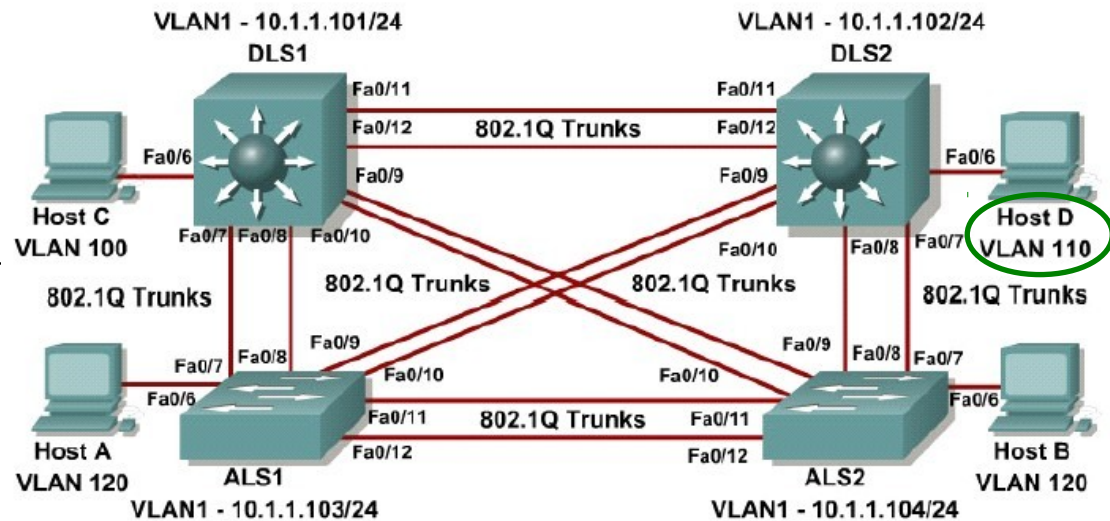
```
DLS2(config)# inter fa 0/6
DLS2(config-if)# switchport access vlan 110
% Access VLAN does not exist. Creating vlan 110
DLS2(config-if)# exit
```

```
DLS2# show vlan
```

```
VLAN Name
```

```
-----
1    default
```

```
100  VLAN0100          active
110  VLAN0110          active   Fa0/6
1002 fddi-default      act/unsup
1003 token-ring-default act/unsup
1004 fddinet-default   act/unsup
1005 trnet-default     act/unsup
```



- Notice that there are two new VLANS and that interface Fa 0/6 is active in VLAN 110.

Looking at the number of VLANs

```
ALS1# show vlan
```

VLAN Name	Status	Ports
1 default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, Fa0/6, Fa0/13, Fa0/14 Fa0/15, Fa0/16, Fa0/17, Fa0/18 Fa0/19, Fa0/20, Fa0/21, Fa0/22 Fa0/23, Fa0/24, Gig0/1, Gig0/2

100 VLAN0100	active
110 VLAN0110	active

1002 fddi-default	active
1003 token-ring-default	active
1004 fddinet-default	active
1005 trnet-default	active

<output omitted>

Four other default VLANs

```
ALS1# show vtp status
```

VTP Version	: 2
Configuration Revision	: 6
Maximum VLANs supported locally	: 255
Number of existing VLANs	: 7
VTP Operating Mode	: Client
VTP Domain Name	: SWLAB
VTP Pruning Mode	: Disabled

<output omitted>

Why 7 VLANs and not 3?
We only configured two
plus VLAN 1.

Good Bye to “vlan database”

```
DLS1# vlan database
```

```
% Warning: It is recommended to configure VLAN from config mode,  
as VLAN database mode is being deprecated. Please consult user  
documentation for configuring VTP/VLAN in config mode.
```

```
DLS1(vlan) # exit
```

```
APPLY completed.
```

```
Exiting....
```

```
DLS1#
```

- Note: vlan database is no longer recommended by Cisco.
- One less exception to remember!

Another way to create VLANs...

```

ALS1(config)# vlan 120
VTP VLAN configuration not allowed when device is in CLIENT mode.
ALS1(config)#
ALS1(config)# inter fa 0/6
ALS1(config-if)# switchport access vlan 120

```

VLANs cannot be created
at a VTP Client.

```
ALS1# show vlan
```

VLAN Name	Status	Ports
1 default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, Fa0/13, Fa0/14, Fa0/15 Fa0/16, Fa0/17, Fa0/18, Fa0/19 Fa0/20, Fa0/21, Fa0/22, Fa0/23 Fa0/24, Gig0/1, Gig0/2
100 VLAN0100	active	
110 VLAN0110	active	
1002 fddi-default	active	
1003 token-ring-default	active	
1004 fddinet-default	active	
1005 trnet-default	active	

What if the interface is
assigned that VLAN?

No VLAN 120 (yet)

- Use Global Configuration mode.
- Let's try it again on a VTP server...

Another way to create VLANs...VTP Server

```
DLS1(config)# vlan 120
DLS1(config-vlan)# end
```

No VTP error message.

```
DLS1# show vlan
```

VLAN	Name	Status	Ports
1	default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, 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
100	VLAN0100	active	Fa0/6
110	VLAN0110	active	
120	VLAN0120	active	
1002	fddi-default	act/unsup	
1003	token-ring-default	act/unsup	
1004	fddinet-default	act/unsup	
1005	trnet-default	act/unsup	

<output omitted>

- VLAN 120 has been successfully created.
- Let's see what happened back at ALS1...

Back to ALS1...

```
ALS1# show vlan
```

VLAN	Name	Status	Ports
1	default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, Fa0/13, Fa0/14, Fa0/15 Fa0/16, Fa0/17, Fa0/18, Fa0/19 Fa0/20, Fa0/21, Fa0/22, Fa0/23 Fa0/24, Gig0/1, Gig0/2
100	VLAN0100	active	
110	VLAN0110	active	
120	VLAN0120	active	Fa0/6
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

```
ALS1(config)# inter fa 0/6  
ALS1(config-if)# switchport access vlan 120
```

- ALS1 now has VLAN 120 via VTP.
- Fa 0/6 now active on VLAN 120 – previous commands ...
 - didn't create the VLAN, but associated f0/6 to inactive VLAN 120

Configure ALS2

```
ALS2(config)# inter fa 0/6
ALS2(config-if)# switchport access vlan 120
ALS2(config-if)# end
%SYS-5-CONFIG_I: Configured from console by console
ALS2# show vlan
```

VLAN Name	Status	Ports
1 default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, Fa0/13, Fa0/14, Fa0/15 Fa0/16, Fa0/17, Fa0/18, Fa0/19 Fa0/20, Fa0/21, Fa0/22, Fa0/23 Fa0/24, Gig0/1, Gig0/2
100 VLAN0100	active	
110 VLAN0110	active	
120 VLAN0120	active	Fa0/6

<output omitted>

Name the VLANs on the VTP Server DLS1

```
DLS1(config)# vlan 100
DLS1(config-vlan)# name Server-Farm1
DLS1(config-vlan)# exit
DLS1(config)# vlan 110
DLS1(config-vlan)# name Server-Farm2
DLS1(config-vlan)# exit
DLS1(config)# vlan 120
DLS1(config-vlan)# name Net-Eng
DLS1(config-vlan)# end
```

```
DLS1# show vlan brief
```

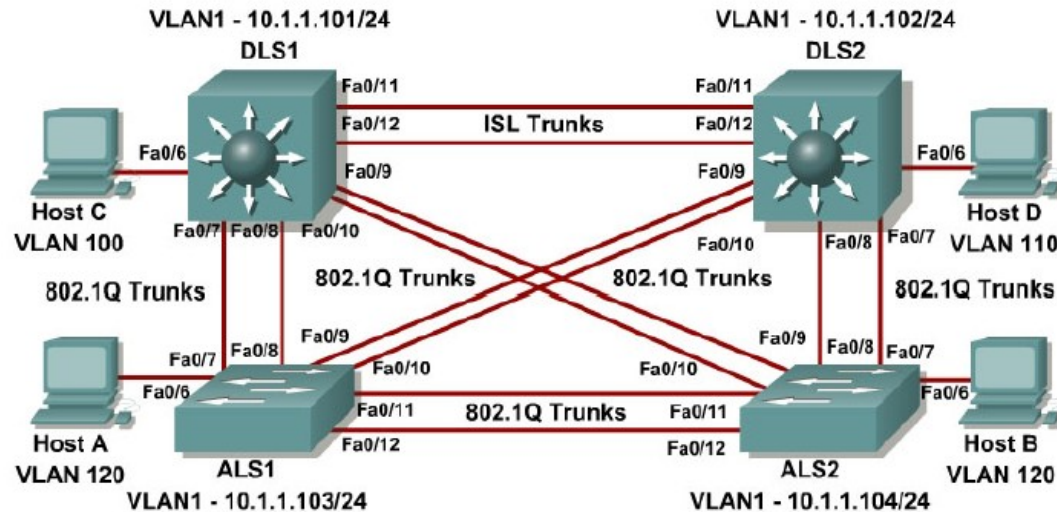
VLAN	Name	Status	Ports
1	default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, Fa0/13, Fa0/14, Fa0/15 Fa0/16, Fa0/17, Fa0/18, Fa0/19 Fa0/20, Fa0/21, Fa0/22, Fa0/23 Fa0/24, Gi0/1, Gi0/2
100	Server-Farm1	active	Fa0/6
110	Server-Farm2	active	
120	Net-Eng	active	

VTP will update other switches

```
ALS1# show vlan
```

VLAN	Name	Status	Ports
1	default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, 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
100	Server-Farm1	active	
110	Server-Farm2	active	
120	Net-Eng	active	Fa0/6
1002	fddi-default	act/unsup	
1003	token-ring-default	act/unsup	
1004	fddinet-default	act/unsup	
1005	trnet-default	act/unsup	active

Verification



- Verify configurations:
 - `show vlan [brief]`
 - `show vtp status`
 - `show interfaces interface switchport`
 - `show interfaces trunk`
 - `show running-config`

ALS1

VTP information not shown in **running config**. Use **show vtp status** and **show vlan**.

```
ALS1#show run
!
version 12.2
!
hostname ALS1
!
no ip domain-lookup
!
interface FastEthernet0/1
. . .
!
interface FastEthernet0/5
!
interface FastEthernet0/6
  switchport access vlan 120
  switchport mode access
!
interface FastEthernet0/7
  switchport mode trunk
!
interface FastEthernet0/8
  switchport mode trunk
!
```

```
interface FastEthernet0/9
  switchport mode trunk
!
interface FastEthernet0/10
  switchport mode trunk
!
interface FastEthernet0/11
  switchport mode trunk
!
interface FastEthernet0/12
  switchport mode trunk
!
interface FastEthernet0/13
. . .
interface GigabitEthernet0/2
!
interface Vlan1
  ip address 10.1.1.103 255.255.255.0
!
line con 0
  exec-timeout 0 0
  logging synchronous
line vty 0 4
  no login
```

ALS2

```
ALS2#show run
version 12.2
!
hostname ALS2
!
no ip domain-lookup
!
interface FastEthernet0/1
!
. . .
interface FastEthernet0/5
!
interface FastEthernet0/6
  switchport access vlan 120
  switchport mode access
!
interface FastEthernet0/7
  switchport mode trunk
!
interface FastEthernet0/8
  switchport mode trunk
!
```

```
interface FastEthernet0/9
  switchport mode trunk
!
interface FastEthernet0/10
  switchport mode trunk
!
interface FastEthernet0/11
!
interface FastEthernet0/12
!
. . .
!
interface GigabitEthernet0/2
!
interface Vlan1
  ip address 10.1.1.104 255.255.255.0
!
line con 0
  exec-timeout 0 0
  logging synchronous
line vty 0 4
  no login
```

DLS1

```
DLS1#show run
version 12.2
!
hostname DLS1
!
no ip domain-lookup
!
interface FastEthernet0/1
!
. . .
interface FastEthernet0/5
!
interface FastEthernet0/6
  switchport access vlan 100
  switchport mode access
!
interface FastEthernet0/7
  switchport trunk encapsulation dot1q
  switchport mode trunk
!
interface FastEthernet0/8
  switchport trunk encapsulation dot1q
  switchport mode trunk
!
```

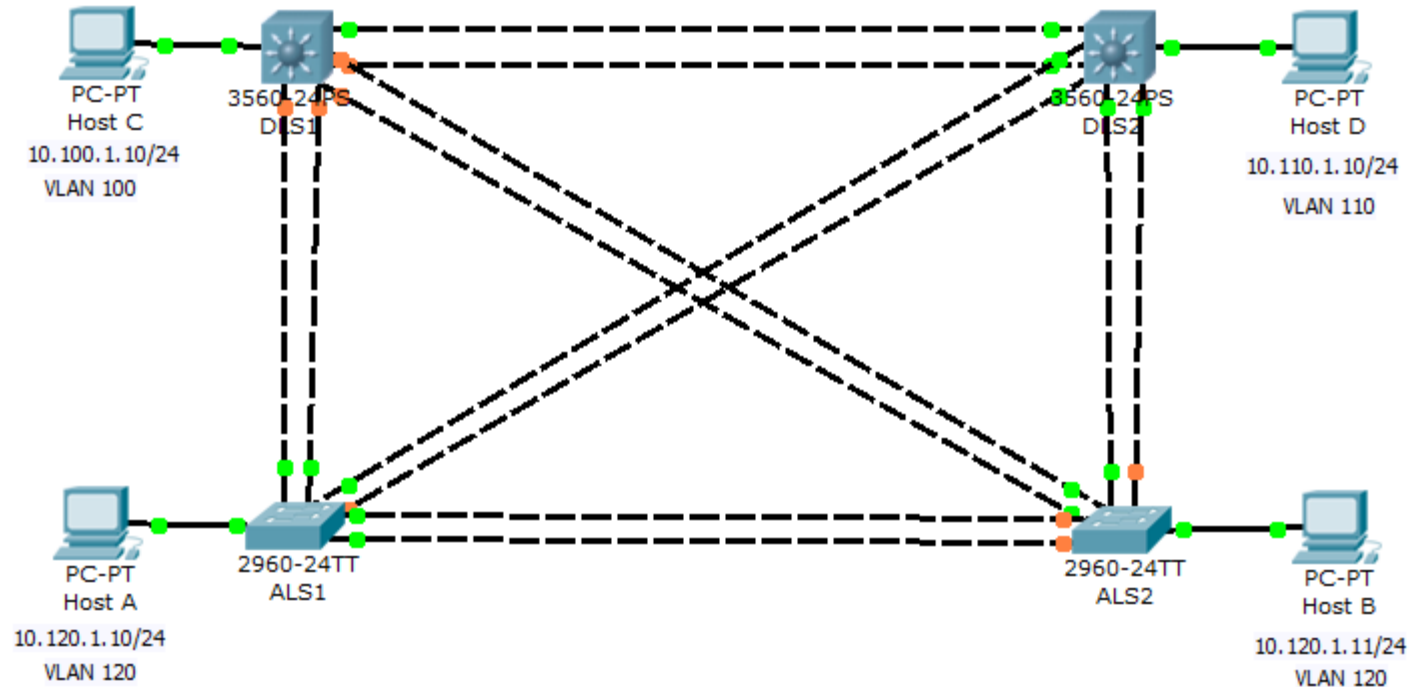
```
interface FastEthernet0/9
  switchport trunk encapsulation dot1q
  switchport mode trunk
!
interface FastEthernet0/10
  switchport trunk encapsulation dot1q
  switchport mode trunk
!
interface FastEthernet0/11
  switchport trunk encapsulation dot1q
  switchport mode trunk
!
interface FastEthernet0/12
  switchport trunk encapsulation dot1q
  switchport mode trunk
!
interface FastEthernet0/13
!
. . .
interface GigabitEthernet0/2
!
interface Vlan1
  ip address 10.1.1.101 255.255.255.0
!
line con 0
  exec-timeout 0 0
  logging synchronous
line vty 0 4
  no login
```

DLS2

```
DLS2#show run
version 12.2
!
hostname DLS2
!
no ip domain-lookup
!
interface FastEthernet0/1
!
. . .
interface FastEthernet0/5
!
interface FastEthernet0/6
  switchport access vlan 110
  switchport mode access
!
interface FastEthernet0/7
  switchport trunk encapsulation dot1q
  switchport mode trunk
!
interface FastEthernet0/8
  switchport trunk encapsulation dot1q
  switchport mode trunk
!
```

```
interface FastEthernet0/9
  switchport trunk encapsulation dot1q
  switchport mode trunk
!
interface FastEthernet0/10
  switchport trunk encapsulation dot1q
  switchport mode trunk
!
interface FastEthernet0/11
  switchport trunk encapsulation dot1q
  switchport mode trunk
!
interface FastEthernet0/12
  switchport trunk encapsulation dot1q
  switchport mode trunk
!
interface FastEthernet0/13
!
. . .
interface GigabitEthernet0/2
!
interface Vlan1
  ip address 10.1.1.102 255.255.255.0
!
line con 0
  exec-timeout 0 0
  logging synchronous
line vty 0 4
no login
```

What we have done:



- Configured 802.1Q Trunking links between switches
- Configured DLS1 and DLS2 as VTP Servers (default)
- Configured ALS1 and ALS2 as VTP Clients
- Configured VTP domain name
- Configured VLANs for host ports

VTP Authentication: Add a password and change the domain name on DLS1

```
DLS1(config)# vtp password cisco
Setting device VLAN database password to cisco
DLS1(config)# vtp domain Algonquin
Changing VTP domain name from SWLAB to Algonquin
DLS1(config)# end

DLS1# show vtp stat
VTP Version                : 2
Configuration Revision     : 0
Maximum VLANs supported locally : 1005
Number of existing VLANs   : 8
VTP Operating Mode         : Server
VTP Domain Name            : Algonquin
VTP Pruning Mode           : Disabled
VTP V2 Mode                 : Disabled
VTP Traps Generation       : Disabled
MD5 digest                  : 0xCC 0xEE 0xCE 0x23 0x7D 0x6A 0x35 0x6B
Configuration last modified by 0.0.0.0 at 3-1-93 00:10:08
Local updater ID is 0.0.0.0 (no valid interface found)

DLS1#
00:18:15: %DTP-5-DOMAINMISMATCH: Unable to perform trunk negotiation on port
Fa0/11 because of VTP domain mismatch.
```

Verify any changes on DLS2...

```
DLS2# show vtp status
```

```
VTP Version : 2
Configuration Revision : 22
Maximum VLANs supported locally : 1005
Number of existing VLANs : 8
VTP Operating Mode : Server
VTP Domain Name : SWLAB
VTP Pruning Mode : Disabled
VTP V2 Mode : Disabled
VTP Traps Generation : Disabled
MD5 digest : 0x7D 0xA0 0x5E 0xB9 0xDE 0xC1 0x7F 0x8E
Configuration last modified by 0.0.0.0 at 3-1-93 00:00:00
Local updater ID is 10.1.1.102 on interface Vl1 (lowest numbered VLAN
interface found)
DLS2#
```

Did DLS2 update its
domain name from
DLS1? **No**

**Why? Domain name and
passwords do not
match with DLS1**

Verify no changes on ALS1...

```
ALS1# show vtp status
VTP Version                : 2
Configuration Revision     : 22
Maximum VLANs supported locally : 255
Number of existing VLANs   : 8
VTP Operating Mode         : Client
VTP Domain Name            : SWLAB
VTP Pruning Mode           : Disabled
VTP V2 Mode                : Disabled
VTP Traps Generation       : Disabled
MD5 digest                 : 0x7D 0xA0 0x5E 0xB9 0xDE 0xC1 0x7F 0x8E
Configuration last modified by 0.0.0.0 at 3-1-93 00:00:00
ALS1#
```

Add a VLAN on DLS1... (VTP authenticated switch)

```
DLS1(config)# vlan 300
DLS1(config-vlan)# name Guest
DLS1(config-vlan)# end
```

```
DLS1# show vlan
```

VLAN	Name	Status	Ports
1	default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, Fa0/13, Fa0/14, Fa0/15 Fa0/16, Fa0/17, Fa0/18, Fa0/19 Fa0/20, Fa0/21, Fa0/22, Fa0/23 Fa0/24, Gig0/1, Gig0/2
100	Server-Farm1	active	Fa0/6
110	Server-Farm2	active	
120	Net-Eng	active	
300	Guest	active	

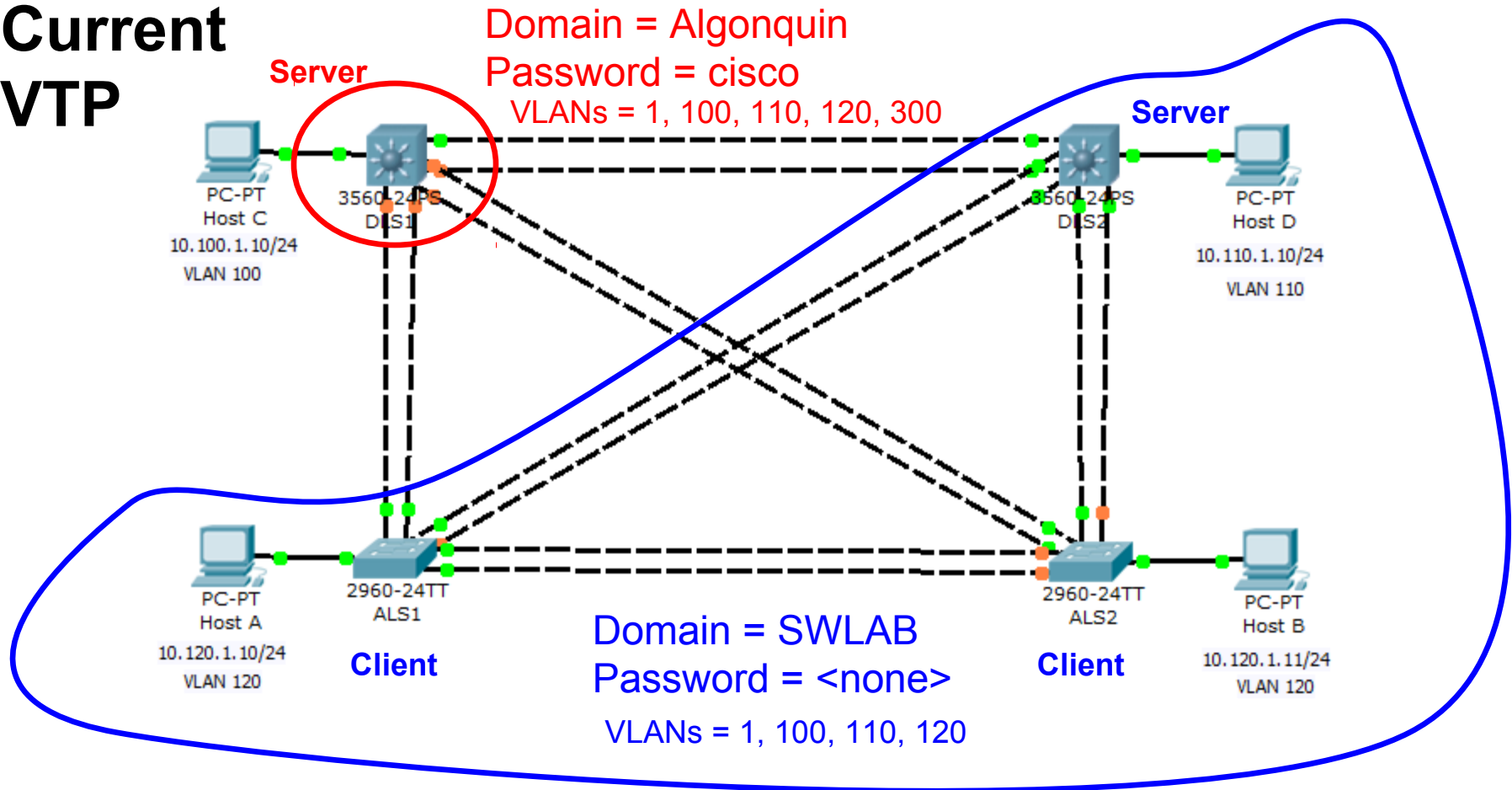
Will this change be reflected on DLS2?

```
DLS2# show vlan
```

VLAN	Name	Status	Ports
1	default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, Fa0/13, Fa0/14, Fa0/15 Fa0/16, Fa0/17, Fa0/18, Fa0/19 Fa0/20, Fa0/21, Fa0/22, Fa0/23 Fa0/24, Gig0/1, Gig0/2
100	Server-Farm-1	active	
110	Server-Farm-2	active	Fa0/6
120	Net-Eng	active	
1002	fddi-default	active	

- No VLAN 300
- Same on ALS1 and ALS2.

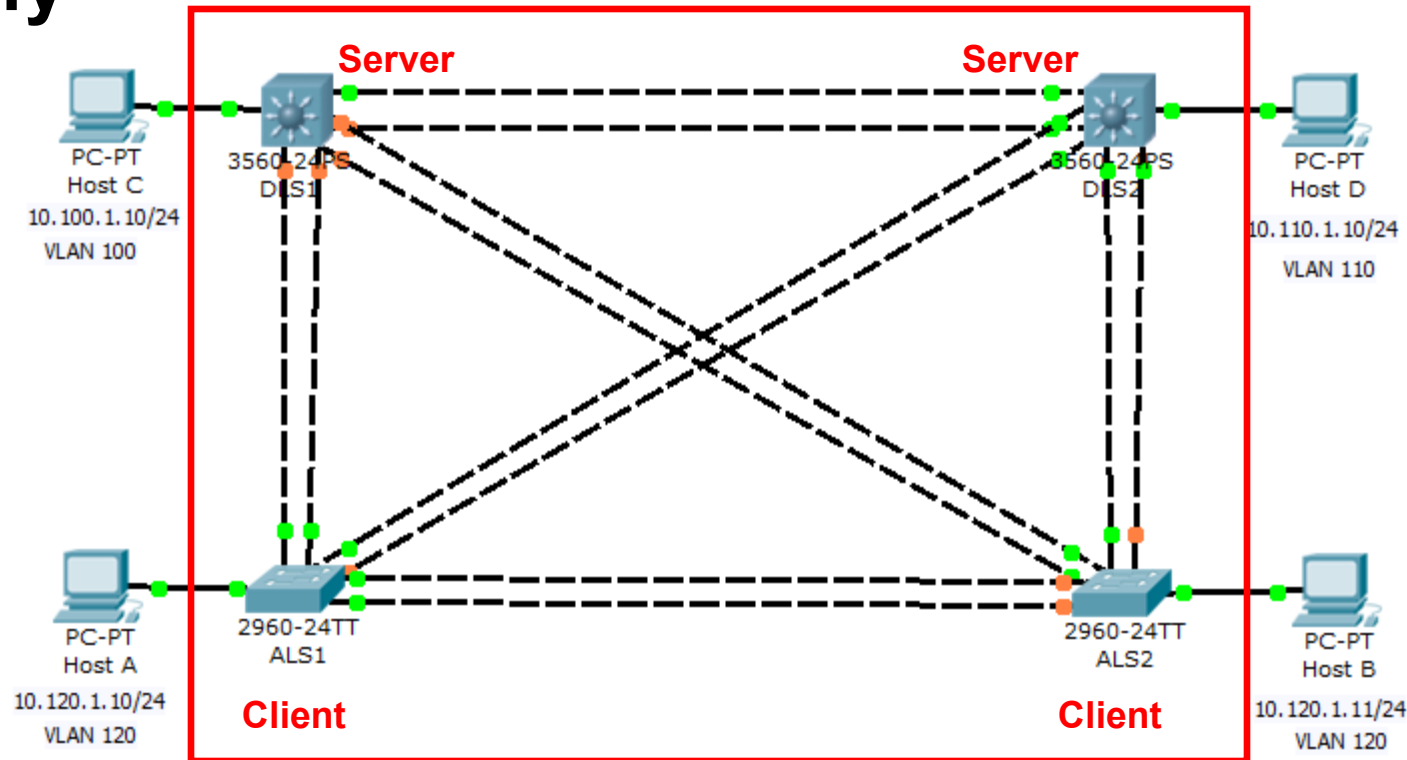
Current VTP



- VTP domain name and password must be the same for switches to be part of the same VTP domain.

Modify VTP

Domain = Algonquin
Password = cisco



- VTP domain name and password must be the same for switches to be

Modify DLS2, ALS1 and ALS2 to authenticate with DLS1...

```
DLS2(config)# vtp domain Algonquin
Changing VTP domain name from SWLAB to Algonquin
DLS2(config)# vtp password cisco
Setting device VLAN database password to cisco
DLS2(config)#
```

```
ALS1(config)# vtp domain Algonquin
Changing VTP domain name from SWLAB to Algonquin
ALS1(config)# vtp password cisco
Setting device VLAN database password to cisco
ALS1(config)#
```

```
ALS2(config)# vtp domain Algonquin
Changing VTP domain name from SWLAB to Algonquin
ALS2(config)# vtp password cisco
Setting device VLAN database password to cisco
ALS2(config)#
```

- Modify DLS2, ALS1, ALS2
 - Domain and Password are case-sensitive
- Verify with
 - show vtp status
 - show vlan

Verify on DLS2...

```
DLS2# show vtp status
VTP Version                : 2
Configuration Revision     : 2
Maximum VLANs supported locally : 1005
Number of existing VLANs   : 9
VTP Operating Mode         : Server
VTP Domain Name            : Algonquin
VTP Pruning Mode           : Disabled
VTP V2 Mode                : Disabled
VTP Traps Generation       : Disabled
MD5 digest                 : 0xAB 0x0C 0xEB 0xDE 0x6A 0x89 0x0C 0xAD
Configuration last modified by 10.1.1.101 at 3-1-93 00:17:55
Local updater ID is 10.1.1.102 on interface Vl1 (lowest numbered VLAN interface found)
```

```
DLS2# show vlan
```

VLAN Name	Status	Ports
1 default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, Fa0/13, Fa0/14, Fa0/15 Fa0/16, Fa0/17, Fa0/18, Fa0/19 Fa0/20, Fa0/21, Fa0/22, Fa0/23 Fa0/24, Gig0/1, Gig0/2
100 Server-Farm-1	active	
110 Server-Farm-2	active	Fa0/6
120 Net-Eng	active	
300 Guest	active	

Verify on ALS1...

```
ALS1# show vtp status
```

```
VTP Version : 2
Configuration Revision : 2
Maximum VLANs supported locally : 255
Number of existing VLANs : 9
VTP Operating Mode : Client
VTP Domain Name : Algonquin
VTP Pruning Mode : Disabled
VTP V2 Mode : Disabled
VTP Traps Generation : Disabled
MD5 digest : 0xAB 0x0C 0xEB 0xDE 0x6A 0x89 0x0C 0xAD
Configuration last modified by 10.1.1.101 at 3-1-93 00:17:55
```

```
ALS1# show vlan
```

VLAN Name	Status	Ports
1 default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, Fa0/13, Fa0/14, Fa0/15 Fa0/16, Fa0/17, Fa0/18, Fa0/19 Fa0/20, Fa0/21, Fa0/22, Fa0/23 Fa0/24, Gig1/1, Gig1/2
100 Server-Farm-1	active	
110 Server-Farm-2	active	
120 Net-Eng	active	Fa0/6
300 Guest	active	

Verify on ALS2...

```
ALS2# show vtp status
```

```
VTP Version : 2
Configuration Revision : 2
Maximum VLANs supported locally : 255
Number of existing VLANs : 9
VTP Operating Mode : Client
VTP Domain Name : Algonquin
VTP Pruning Mode : Disabled
VTP V2 Mode : Disabled
VTP Traps Generation : Disabled
MD5 digest : 0xAB 0x0C 0xEB 0xDE 0x6A 0x89 0x0C 0xAD
Configuration last modified by 10.1.1.101 at 3-1-93 00:17:55
```

```
ALS2# show vlan
```

VLAN Name	Status	Ports
1 default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, Fa0/13, Fa0/14, Fa0/15 Fa0/16, Fa0/17, Fa0/18, Fa0/19 Fa0/20, Fa0/21, Fa0/22, Fa0/23 Fa0/24, Gig1/1, Gig1/2
100 Server-Farm-1	active	
110 Server-Farm-2	active	
120 Net-Eng	active	Fa0/6
300 Guest	active	

Use of VTP in a Network

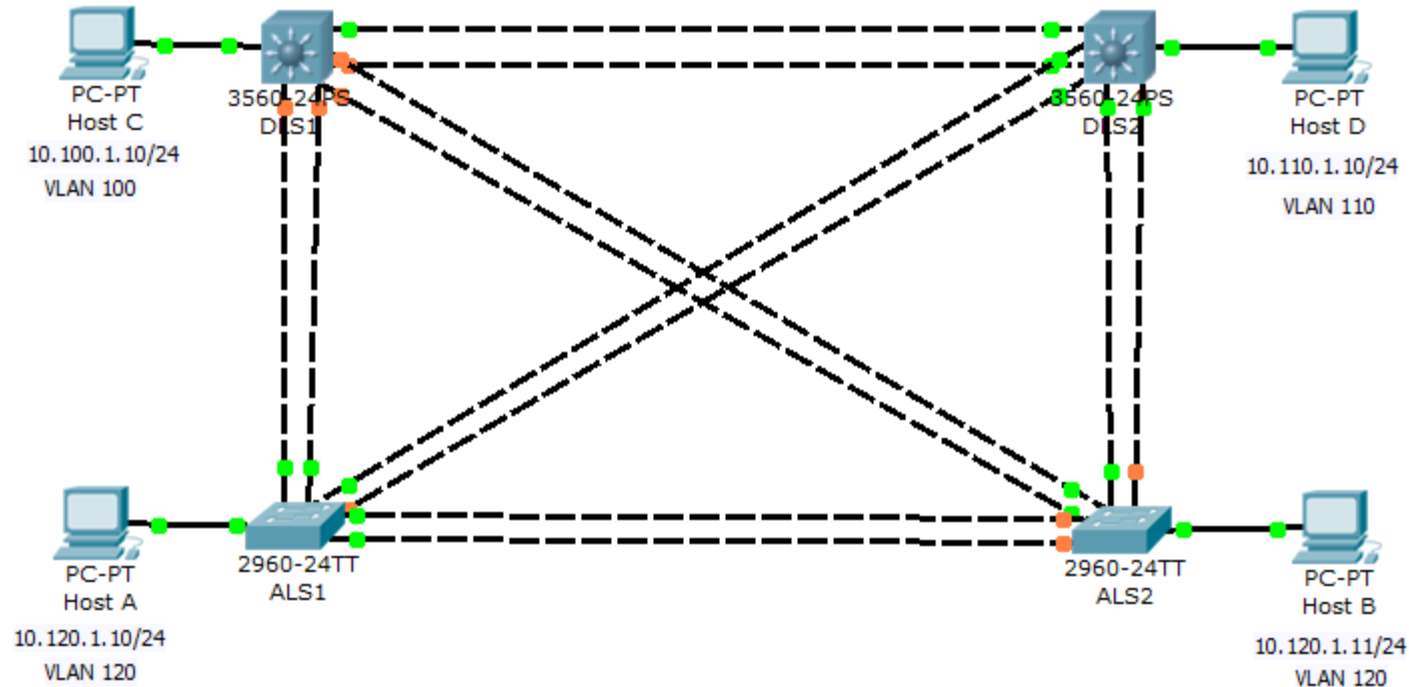
- By default, all switches are configured to be VTP servers.
- Fine for small-scale networks.
 - Size of the VLAN information is small and is easily stored in all switches (in NVRAM).
- In a large network:
 - Size of NVRAM is minimal.
 - Should choose a few well-equipped switches and keep them as VTP servers.
 - Chosen to provide a degree of redundancy
 - All other devices that participate in VTP can be configured as clients.

Use of VTP in a Network

- A VTP server without a VTP domain name cannot send or receive VLAN information using VTP.
- Client will learn domain from server if it does not have one.
 - **But once a client has a domain it must be changed manually on the client if changed on the server.**
- Dynamic Trunking Protocol (DTP) includes the VTP domain name in a DTP packet.
 - Therefore, if you have two ends of a link that belong to different VTP domains, the trunk does not come up if you use DTP.
 - In this special case, you must configure the trunk mode as **on** or **nonegotiate**, on both sides, in order to allow the trunk to come up without DTP negotiation agreement. (Even so, this is not recommended.)
 - If previously trunking, then trunking will continue.



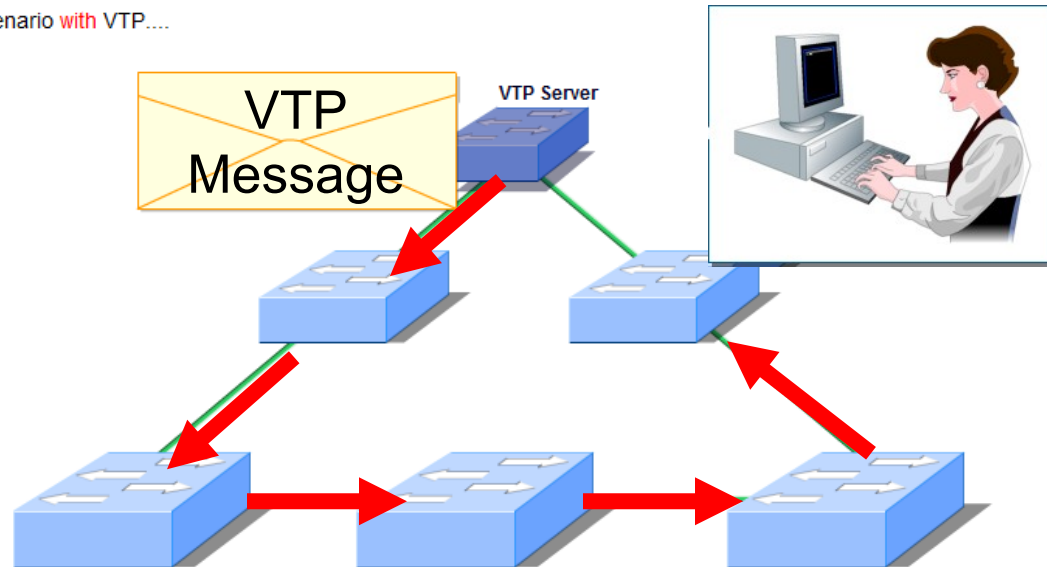
Coming in Part 2:



- VTP pruning, authentication and troubleshooting
- Native VLAN
- Private VLANs
- Inter-VLAN routing
- VLAN security
- VLAN load balancing (MSTP)

VTP Flash Animations from Cisco

Scenario **with** VTP....



- http://www.cisco.com/warp/public/473/vtp_flash/
 - Introduction
 - VTP Domains and Modes
 - Two Common VTP Problems