Lecture (04)
Using VLANs to segment LANs

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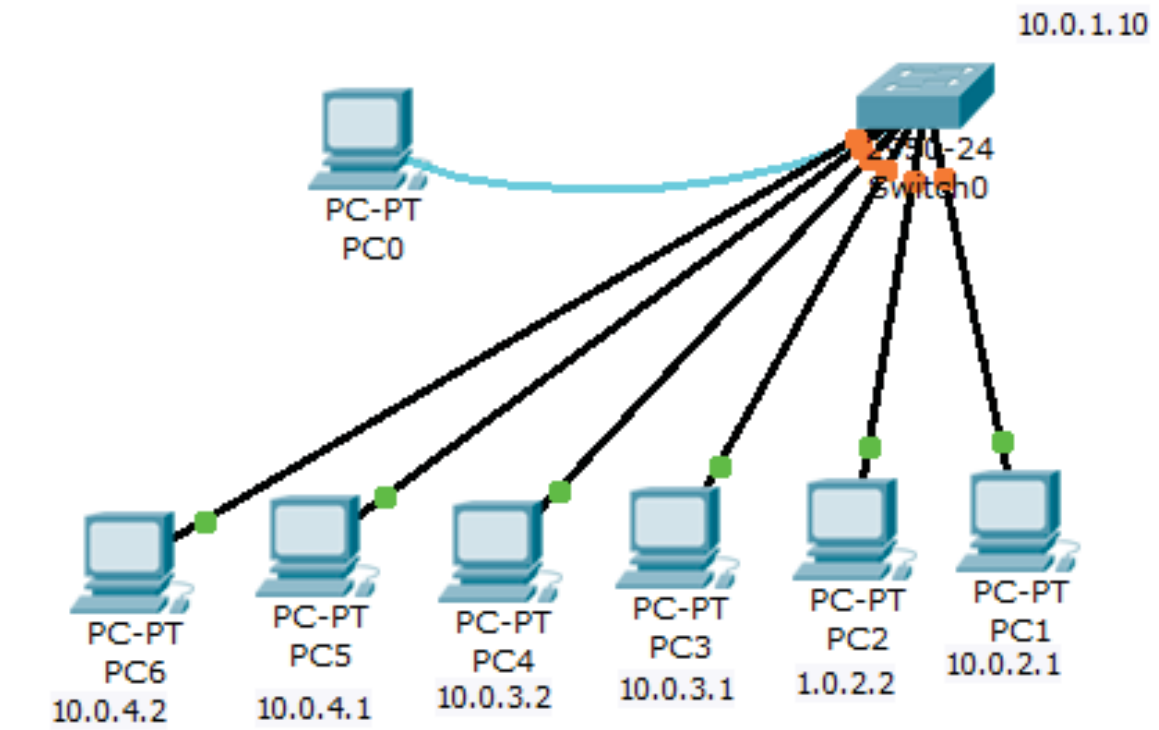
4.0

Topology



PC1

item	Configuration
Gateway	auto
DNS	auto
Port status	On
Band width	auto
Duplex	auto
IP	10.0.2.1
Mask	255.255.0.0

PC2

item	Configuration
Gateway	auto
DNS	auto
Port status	On
Band width	auto
Duplex	auto
IP	10.0.2.2
Mask	255.255.0.0

PC3

item	Configuration
Gateway	auto
DNS	auto
Port status	On
Band width	auto
Duplex	auto
IP	10.0.3.1
Mask	255.255.0.0

PC4

item	auto
Gateway	auto
DNS	auto
Port status	On
Band width	auto
Duplex	auto
IP	10.0.3.2
Mask	255.255.0.0

PC5	item	Configuration
	Gateway	auto
	DNS	auto
	Port status	On
	Band width	auto
	Duplex	auto
	IP	10.0.4.1
	Mask	255.255.0.0

PC6	item	Configuration
	Gateway	auto
	DNS	auto
	Port status	On
	Band width	auto
	Duplex	auto
	IP	10.0.4.2
	Mask	255.255.0.0


```
enabl
config t
hostname FL00-R01-SW01
banner motd #Hello & Welcome to
Practical Applications on Networl - Lecture
04#

line vty 0 4
password cisco
login

line console 0
password cisco
login

enable password cisco

enable secret cisco1


interface vlan 1
ip address 10.0.1.10 255.255.0.0
no shutdown
```

```
interface range fa0/1-6
speed auto
duplex auto
end

copy running-config startup-config
```

```
FL00-R01-SW01#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol

FastEthernet0/1        unassigned      YES manual up                    up

FastEthernet0/2        unassigned      YES manual up                    up

FastEthernet0/3        unassigned      YES manual up                    up

FastEthernet0/4        unassigned      YES manual up                    up

FastEthernet0/5        unassigned      YES manual up                    up

FastEthernet0/6        unassigned      YES manual up                    up

FastEthernet0/7        unassigned      YES manual down                  down

FastEthernet0/8        unassigned      YES manual down                  down

FastEthernet0/9        unassigned      YES manual down                  down

FastEthernet0/10       unassigned      YES manual down                  down

FastEthernet0/22       unassigned      YES manual down                  down

FastEthernet0/23       unassigned      YES manual down                  down

FastEthernet0/24       unassigned      YES manual down                  down

Vlan1                  10.0.1.10       YES manual up                    up
FL00-R01-SW01#
```



```
FL00-R01-SW01#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
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

Remote SPAN VLANs
------------------------------------------------------------------------------


Primary Secondary Type              Ports
------- --------- ----------------- ------------------------------------------
FL00-R01-SW01#
```

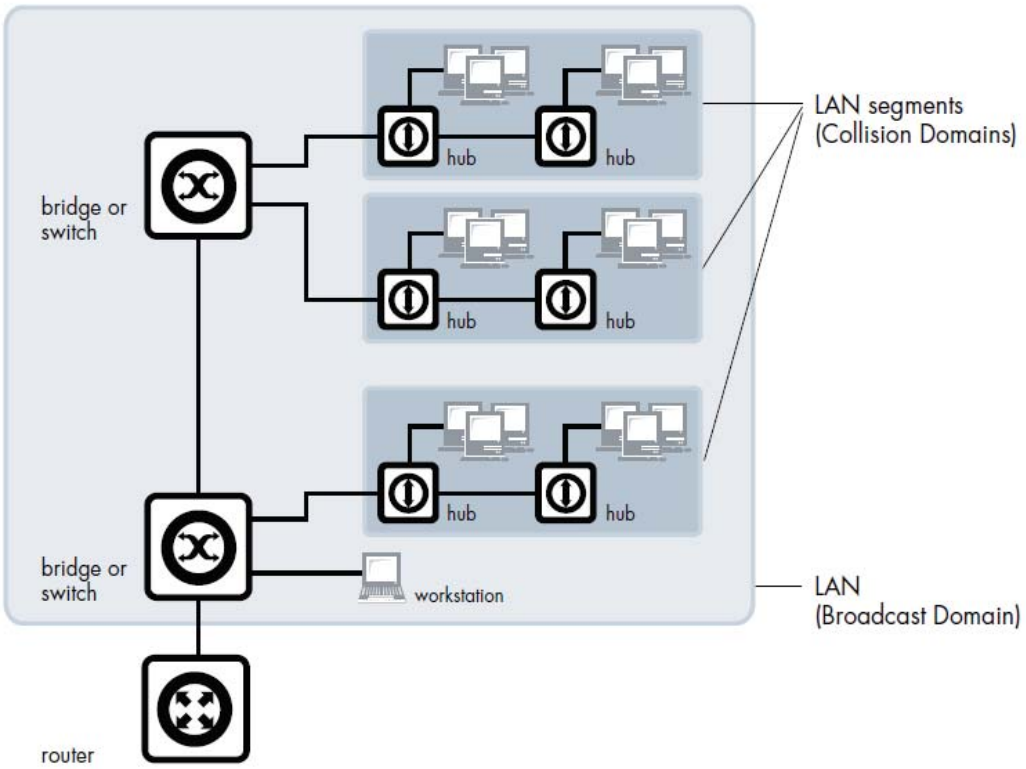
```
PC>ping 10.0.1.10

Pinging 10.0.1.10 with 32 bytes of data:

Request timed out.
Reply from 10.0.1.10: bytes=32 time=5ms TTL=255
Reply from 10.0.1.10: bytes=32 time=3ms TTL=255
Reply from 10.0.1.10: bytes=32 time=3ms TTL=255

Ping statistics for 10.0.1.10:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 5ms, Average = 3ms
```

```
PC>ping 10.0.2.1

Pinging 10.0.2.1 with 32 bytes of data:

Reply from 10.0.2.1: bytes=32 time=1ms TTL=128
Reply from 10.0.2.1: bytes=32 time=0ms TTL=128

Ping statistics for 10.0.2.1:
    Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```



```
PC>ping 10.0.3.1

Pinging 10.0.3.1 with 32 bytes of data:

Reply from 10.0.3.1: bytes=32 time=17ms TTL=128
Reply from 10.0.3.1: bytes=32 time=8ms TTL=128

Ping statistics for 10.0.3.1:
    Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 8ms, Maximum = 17ms, Average = 12ms

Control-C
^C
PC>ping 10.0.4.1

Pinging 10.0.4.1 with 32 bytes of data:

Reply from 10.0.4.1: bytes=32 time=15ms TTL=128
Reply from 10.0.4.1: bytes=32 time=7ms TTL=128

Ping statistics for 10.0.4.1:
    Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 7ms, Maximum = 15ms, Average = 11ms

Control-C
```

Domain terminology

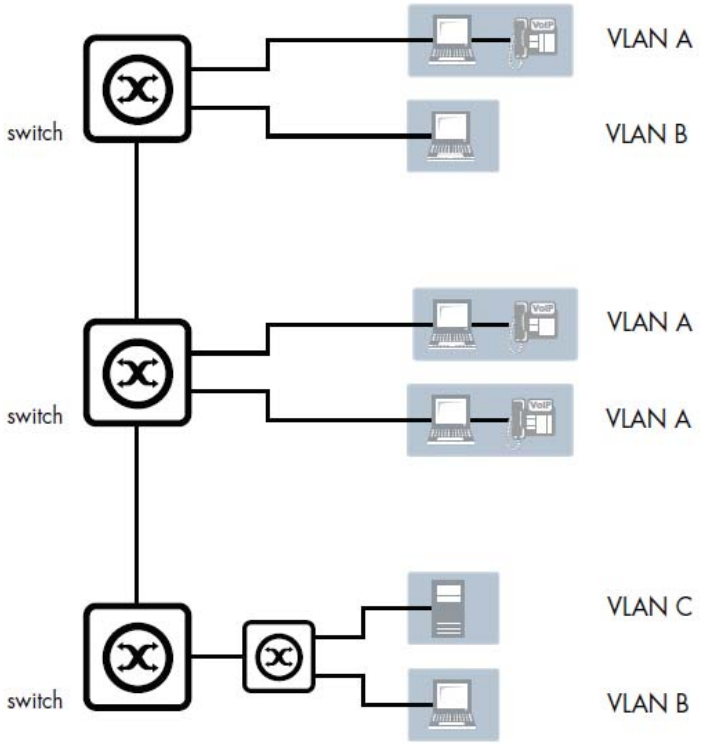


- figure introduces the concept of a **LAN segment**.
- This is also referred to as a **collision domain**, because when a device is trying to send a packet, it can only collide with packets sent by other devices on the same segment.
- each LAN segment consists of all the devices attached to a single switch port—the switch stops packets from different ports from colliding with each other.
- The LAN itself is referred to as a **broadcast domain**, because if any device within the LAN sends out a broadcast packet, it will be transmitted to all devices in that LAN, but not to devices beyond the LAN.

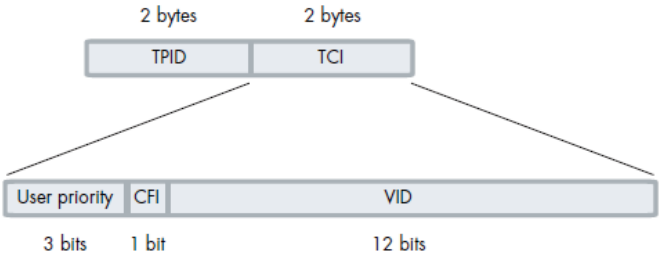
Vlans

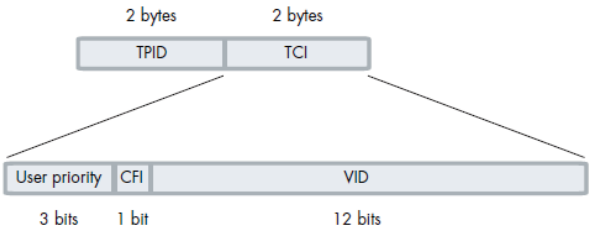
- switch vendors started implementing methods for defining “virtual LANs”—sets of switch ports, usually distributed across multiple switches, that somehow interacted as though they were in a single isolated LAN.
- This way, workstations could be separated off into separate LANs without being physically divided up by routers.
- At about the same time, hubs became less popular and have been largely replaced by L2 switches.
- This has made the whole concept of a collision domain somewhat historical.

- In modern networks, a “**collision domain**” mostly consists of a single device attached to an L2 switch port.
- For example, all the devices in the various areas labelled “VLAN A” all belong to a single virtual LAN—i.e. a single broadcast domain.



- In effect, this just divides a switch up into a set of independent sub-switches.
- **How VLANS work**
- frame tagging, Simply, 4 bytes are inserted into the header of an Ethernet packet.
- This consists of 2 bytes of Tag Protocol Identifier (TPID) and 2 bytes of Tag Control Information (TCI):





- **TPID** is the tag protocol identifier, which indicates that a tag header is following
- User priority is a 3-bit field that allows priority information to be encoded in the frame. Eight levels of priority are allowed.
- The CFI is a 1-bit indicator that is always set to zero for Ethernet switches.
- CFI is used for compatibility between Ethernet and Token Ring networks.
- the VID field contains the identifier of the VLAN

- **There are only two simple rules:**
- If a port is a tagged member of a VLAN, then any packets sent out that port by that VLAN must have a tag inserted into the header.
- If a tagged packet arrives in at a port, **and** the port is a tagged member of the VLAN corresponding to the VID in the packet's tag, then the packet is associated with that VLAN.

4.1

```
enbale
config t
vlan 2
name Finance

vlan 3
name HR

vlan 4
name Administration

interface fa0/1
switchport mode access
switchport access vlan 2

interface fa0/2
switchport mode access
switchport access vlan 2

interface fa0/3
switchport mode access
switchport access vlan 3

interface fa0/4
switchport mode access
switchport access vlan 3

interface fa0/5
switchport mode access
switchport access vlan 4

interface fa0/6
switchport mode access
switchport access vlan 4

end

copy running-config startup-config
```



```
FL00-R01-SW01#show vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    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
2    Finance                           active    Fa0/1, Fa0/2
3    HR                                active    Fa0/3, Fa0/4
4    Administration                    active    Fa0/5, Fa0/6
10   Managment                         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
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
1    enet  100001     1500  -      -      -        -    -        0      0
2    enet  100002     1500  -      -      -        -    -        0      0
3    enet  100003     1500  -      -      -        -    -        0      0
4    enet  100004     1500  -      -      -        -    -        0      0
10   enet  100010     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

Remote SPAN VLANs
------------------------------------------------------------------------------


Primary Secondary Type              Ports
------- --------- ----------------- ------------------------------------------
```

```
FL00-R01-SW01#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol

FastEthernet0/1        unassigned      YES manual up                    up

FastEthernet0/2        unassigned      YES manual up                    up

FastEthernet0/3        unassigned      YES manual up                    up

FastEthernet0/4        unassigned      YES manual up                    up

FastEthernet0/5        unassigned      YES manual up                    up

FastEthernet0/6        unassigned      YES manual up                    up

FastEthernet0/7        unassigned      YES manual down                  down

FastEthernet0/8        unassigned      YES manual down                  down

FastEthernet0/9        unassigned      YES manual down                  down

FastEthernet0/22       unassigned      YES manual down                  down

FastEthernet0/23       unassigned      YES manual down                  down

FastEthernet0/24       unassigned      YES manual down                  down

Vlan1                  10.0.1.10       YES manual up                    down
FL00-R01-SW01#
```



```
PC>ping 10.0.2.2

Pinging 10.0.2.2 with 32 bytes of data:

Reply from 10.0.2.2: bytes=32 time=18ms TTL=128
Reply from 10.0.2.2: bytes=32 time=8ms TTL=128

Ping statistics for 10.0.2.2:
    Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 8ms, Maximum = 18ms, Average = 13ms

Control-C
^C
PC>ping 10.0.3.1

Pinging 10.0.3.1 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.0.3.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

PC>ping 10.0.4.1

Pinging 10.0.4.1 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.0.4.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

PC>
```

Thanks,..

See you next week (ISA),…