

# Lecture (04)

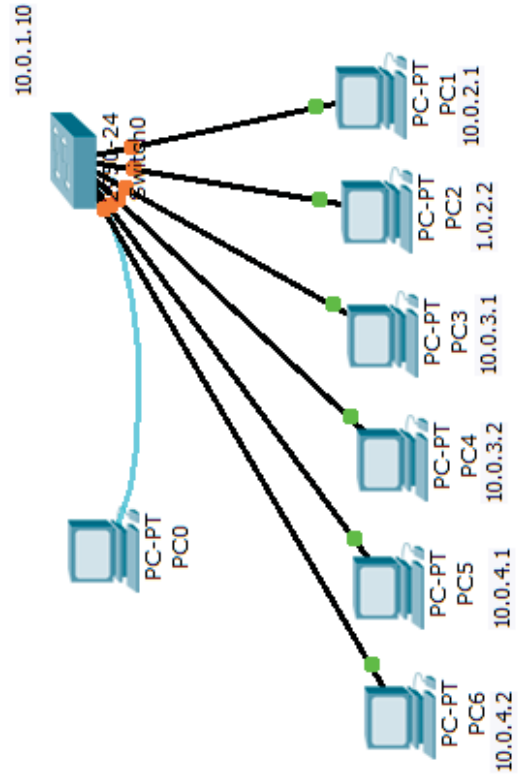
## Using VLANs to segment LANs

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### Topology

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# 4.0

PC1		PC2		PC3		PC4	
item	Configuration	item	Configuration	item	Configuration	item	Configuration
Gateway	auto	Gateway	auto	Gateway	auto	Gateway	auto
DNS	auto	DNS	auto	DNS	auto	DNS	auto
Port status	On	Port status	On	Port status	On	Port status	On
Band width	auto	Band width	auto	Band width	auto	Band width	auto
Duplex	auto	Duplex	auto	Duplex	auto	Duplex	auto
IP	10.0.2.1	IP	10.0.2.2	IP	10.0.3.1	IP	10.0.3.2
Mask	255.255.0.0	Mask	255.255.0.0	Mask	255.255.0.0	Mask	255.255.0.0

PC5		PC6	
item	Configuration	item	Configuration
Gateway	auto	Gateway	auto
DNS	auto	DNS	auto
Port status	On	Port status	On
Band width	auto	Band width	auto
Duplex	auto	Duplex	auto
IP	10.0.4.1	IP	10.0.4.2
Mask	255.255.0.0	Mask	255.255.0.0

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```

enabl
config t
hostname FL00-R01-SW01
banner motd #Hello & Welcome to
Practical Applications on Network! - Lecture
04#
line vty 0 4
password cisco
login
line console 0
password cisco
login
enable password cisco
enable secret cisco01

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

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```

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	BridgNo	Stp	BridgMode	Trans1	Trans2
1 enet	100001	1500	-	-	-	-	0	0
1002 fddi	101002	1500	-	-	-	-	0	0
1003 tr	101003	1500	-	-	-	-	0	0
1004 fddnet	101004	1500	-	-	-	ieee	0	0
1005 trnet	101005	1500	-	-	-	ibm	0	0
Remote SPAN VLANs								
Primary	Secondary	Type	Ports					

V

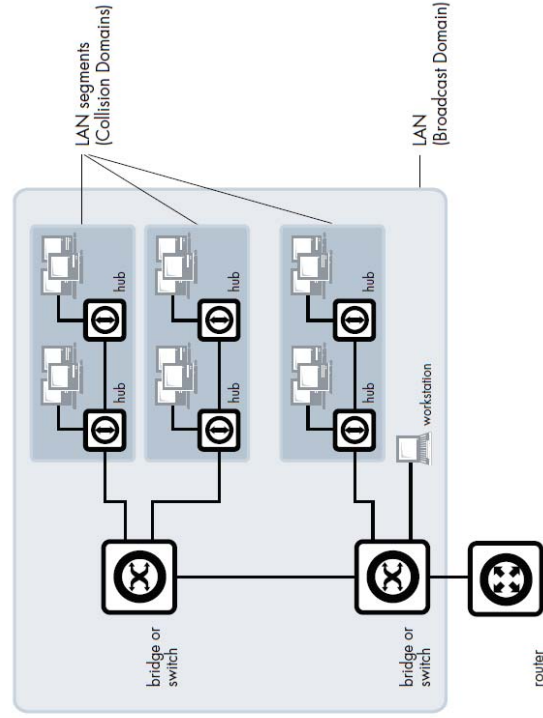
```

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

```

## Domain terminology



```

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

```

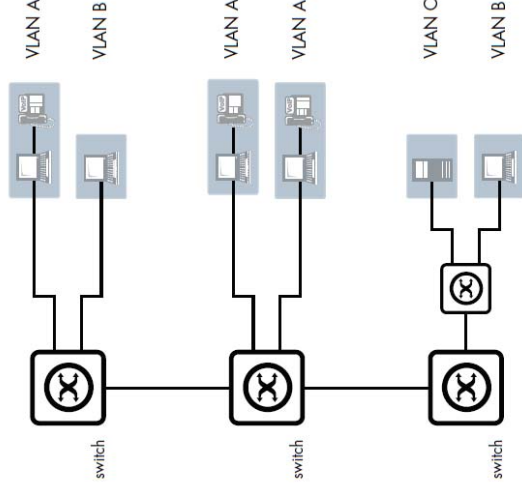
- figure introduces the concept of a **LAN segment**.
- This is also referred to as a **collision domain**, because when a device is trying to send a packet, it can only collide with packets sent by other devices on the same segment.
- each LAN segment consists of all the devices attached to a single 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.

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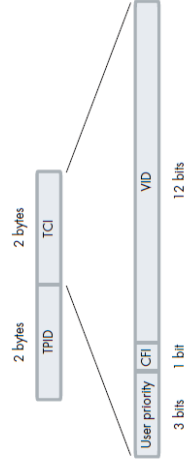


- In modern networks, a “collision domain” mostly consists of a single device attached to an L2 switch port.
- For example, all the devices in the various areas labelled “VLAN A” all belong to a single virtual LAN—i.e. a single broadcast domain.

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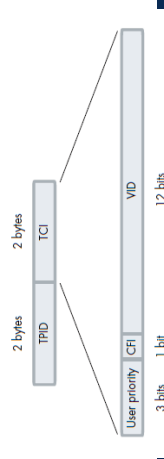
- In effect, this just divides a switch up into a set of independent sub-switches.
- **How VLANS work**
- frame tagging, Simply, 4 bytes are inserted into the header of an Ethernet packet.
- This consists of 2 bytes of Tag Protocol Identifier (TPID) and 2 bytes of Tag Control Information (TCI):



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- **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



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- **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.

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```

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

```

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# 4.1

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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 Management	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	fddnet	101004	1500	-	-	ieee	0	0
1005	trnet	101005	1500	-	-	ibm	0	0

Remote SPAN VLANs

Primary	Secondary Type	Ports
-	-	-

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```

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#

```

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```

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),

```

Y1

Thanks,..  
See you next week (ISA),...

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