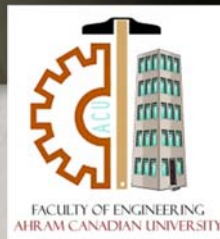




Lecture (03) VLANs



By:

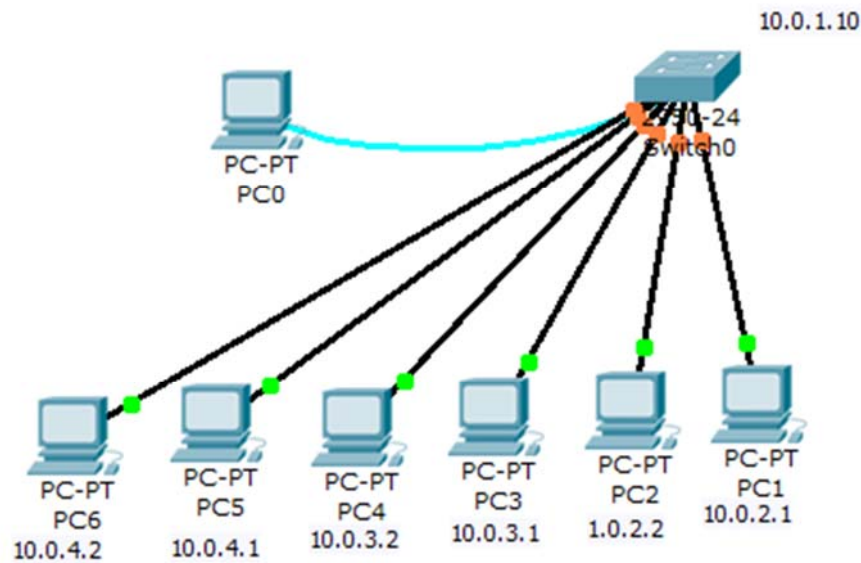
Dr. Ahmed ElShafee

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Networks II

4.0

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Topology



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

PC5	item	Configuration	PC6	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

```

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 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
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:

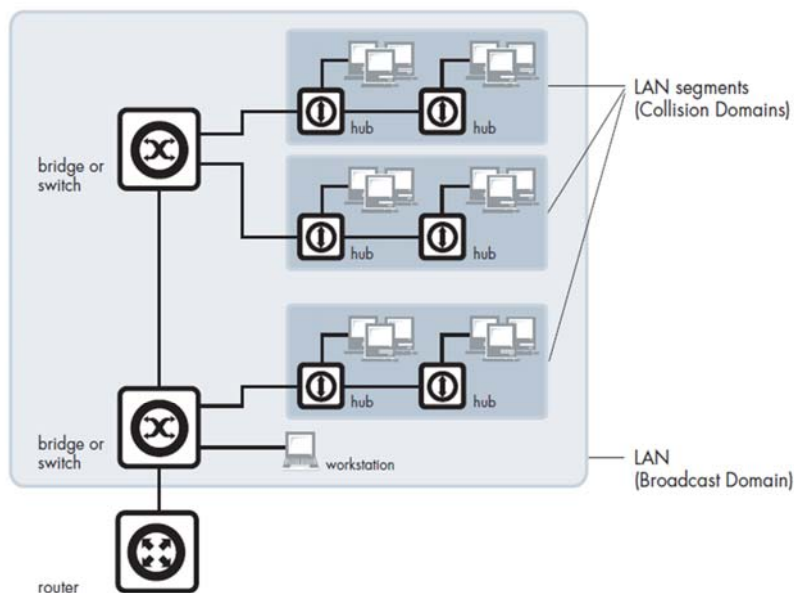
Reply from 10.0.4.1: bytes=32 time=15ms TTL=128
Reply from 10.0.4.1: bytes=32 time=7ms TTL=128

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.

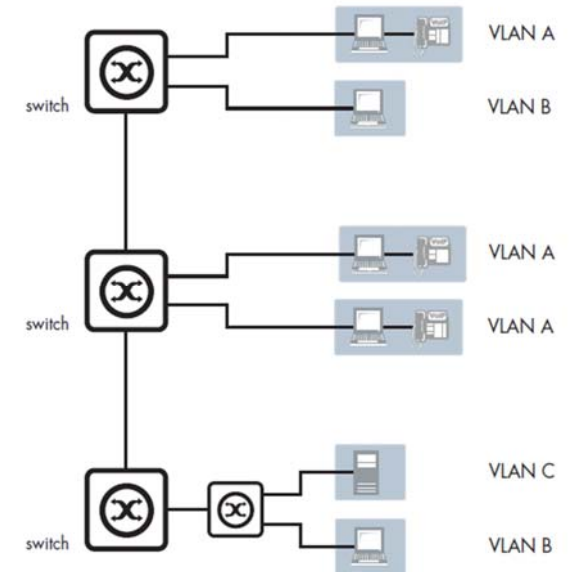
Vlans

- 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.

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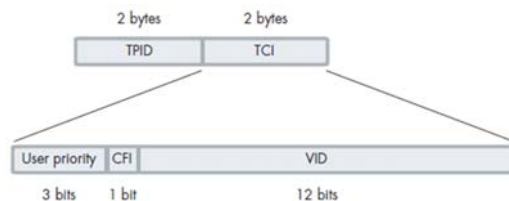
- In modern networks, a “collision domain” mostly consists of a single device attached to an L2 switch.
- For example, all the devices in the various areas labelled “VLAN A” all belong to a single virtual LAN—i.e. a single broadcast domain.



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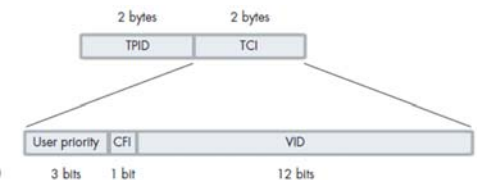
- In effect, this just divides a switch up into a set of independent sub-switches.
- **How VLANS work**
- frame tagging, Simply, 4 bytes are inserted into the header of an Ethernet packet.
- This consists of 2 bytes of Tag Protocol Identifier (TPID) and 2 bytes of Tag Control Information (TCI):



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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.

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 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 fdnet 101004    1500  -       -       -       -       ieec  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#

```

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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),

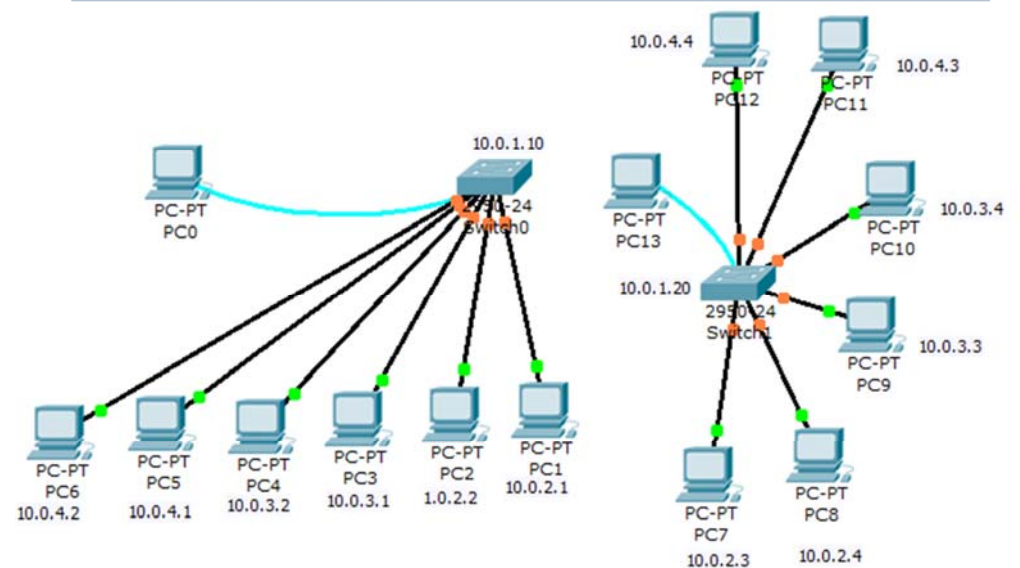
PC>ping 10.0.4.1
Pinging 10.0.4.1 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

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

```

٢٢

Topology



5.0 Build two switches having same VLANS

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PC7	item	Configuration	PC8	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	10.0.2.3		IP	10.0.2.4
	Mask	255.255.0.0		Mask	255.255.0.0

PC9	item	Configuration	PC10	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	10.0.3.3		IP	10.0.3.4
	Mask	255.255.0.0		Mask	255.255.0.0

PC11	item	Configuration	PC12	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	10.0.4.3		IP	10.0.4.4
	Mask	255.255.0.0		Mask	255.255.0.0

```
[siwtch0]
*****
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

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

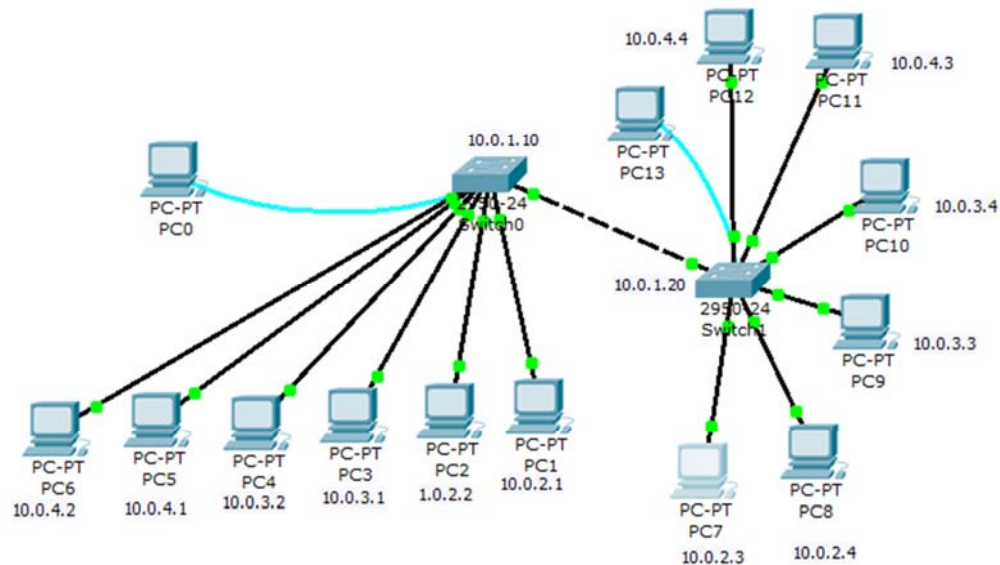
interface fa0/6
switchport mode access
switchport access vlan 4

end

copy running-config startup-config
```

5.1 Connecting switches

Topography



```
FL00-R01-SW01#ping 10.0.1.20
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.1.20, timeout is 2 seconds:
..!!!
Success rate is 60 percent (3/5), round-trip min/avg/max = 4/4/4 ms

FL00-R01-SW01#ping 10.0.0.20
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.0.20, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

FL00-R01-SW01#ping 10.0.1.20
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.1.20, timeout is 2 seconds:
..!!!
Success rate is 60 percent (3/5), round-trip min/avg/max = 4/4/4 ms

FL00-R01-SW01#ping 10.0.20.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.20.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

FL00-R01-SW01#ping 10.0.30.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.30.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
```

```
FL00-R01-SW01#ping 10.0.30.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.30.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

FL00-R01-SW01#ping 10.0.40.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.40.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
```



```

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
Reply from 10.0.2.2: bytes=32 time=8ms TTL=128
Reply from 10.0.2.2: bytes=32 time=9ms TTL=128

Ping statistics for 10.0.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 8ms, Maximum = 18ms, Average = 10ms

Pinging 10.0.2.3 with 32 bytes of data:

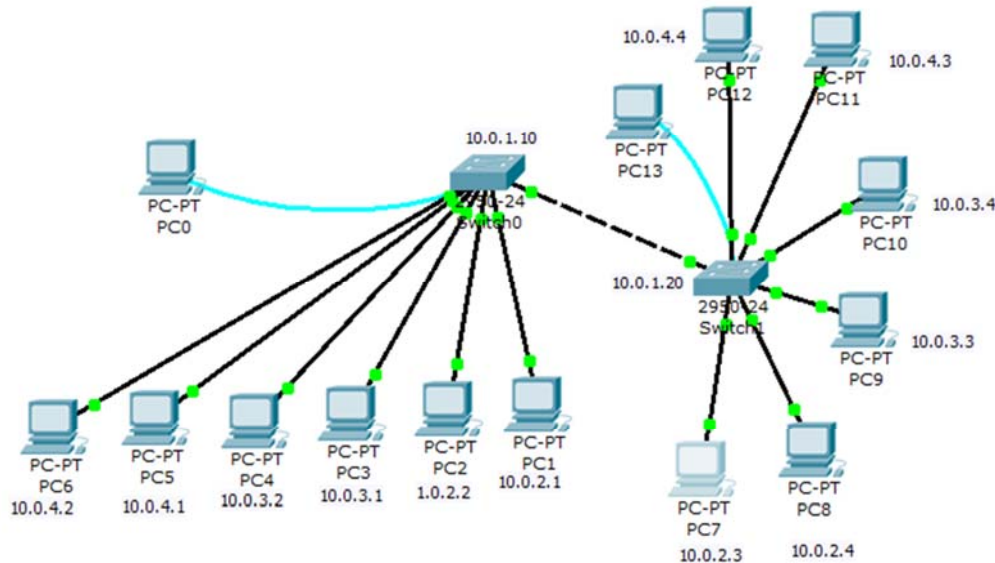
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.0.2.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

```

5.2 Trunk mode

Topography



<pre> [FL00-R01-SW01] enable config t interface fa0/24 switchport mode trunk speed auto duplex auto end copy running-config startup-config reload </pre>	<pre> [FL00-R02-SW01] enable config t interface fa0/24 switchport mode trunk speed auto duplex auto end copy running-config startup-config Reload </pre>
--	--

```

FL00-R01-SW01#ping 10.0.1.20

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.1.20, timeout is 2 seconds:
..!!!
Success rate is 60 percent (3/5), round-trip min/avg/max = 4/4/4 ms

FL00-R01-SW01#

FL00-R01-SW01#ping 10.0.2.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.2.1, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

FL00-R01-SW01#ping 10.0.2.3

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.2.3, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

```

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The screenshot shows a PC window titled 'PC1' with tabs for 'Physical', 'Config', 'Desktop', and 'Software/Services'. A 'Command Prompt' window is open, displaying the following output:

```

Packet Tracer PC Command Line 1.0
PC>ping 10.0.2.3

Pinging 10.0.2.3 with 32 bytes of data:

Reply from 10.0.2.3: bytes=32 time=25ms TTL=128
Reply from 10.0.2.3: bytes=32 time=14ms TTL=128
Reply from 10.0.2.3: bytes=32 time=10ms TTL=128
Reply from 10.0.2.3: bytes=32 time=11ms TTL=128

Ping statistics for 10.0.2.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 10ms, Maximum = 25ms, Average = 15ms

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=20ms TTL=128
Reply from 10.0.2.2: bytes=32 time=6ms TTL=128
Reply from 10.0.2.2: bytes=32 time=4ms TTL=128
Reply from 10.0.2.2: bytes=32 time=10ms TTL=128

Ping statistics for 10.0.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 20ms, Average = 10ms

PC>

```

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Networks II