ECCS-3631
Networks and Data Communications

Module 3-5
VLAN Design Problems

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Practice Problem 1

There are four hosts and two routers in a network. Find below the IP addresses of all devices. The subnet mask of the network is 255.255.240.0. You may use an unlimited number of switches.

a) Draw the network diagram.
b) Label routers' interfaces
c) Label the connecting cables with the correct types
d) Write the default gateway of all hosts.
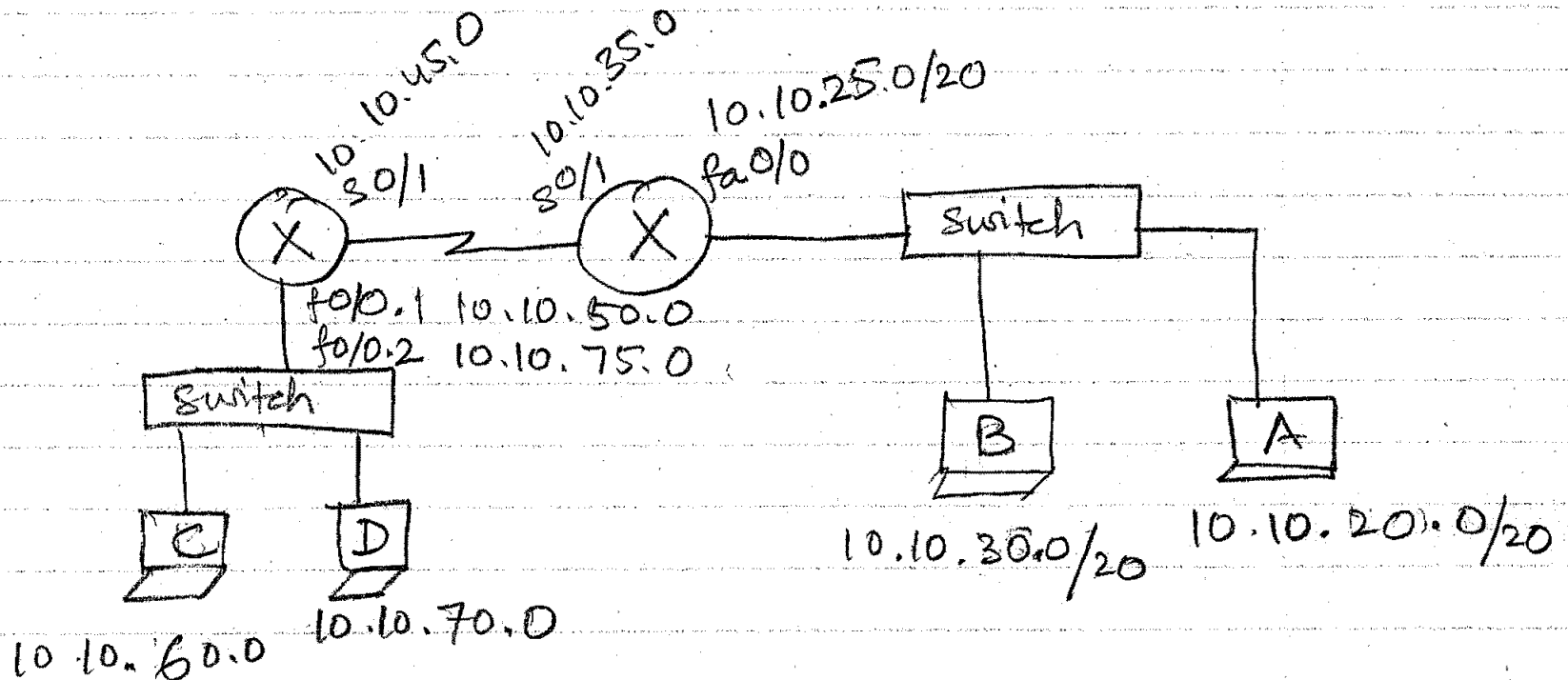e) Write the default gateway of all hosts in the table below.

Host A	10.10.20.0	Default Gateway:
Host B	10.10.30.0	Default Gateway:
Host C	10.10.60.0	Default Gateway:
Host D	10.10.70.0	Default Gateway:
Router 1	fa0/0: 10.10.25.0 fa0/1: 10.10.35.0	
Router 2	fa0/0.1: 10.10.50.0 fa0/0.2: 10.10.75.0 fa0/1: 10.10.45.0	

Solution of Practice Problem 1

Host A	10.10.20.0	Default Gateway:	10.10.25.0
Host B	10.10.30.0	Default Gateway:	10.10.25.0
Host C	10.10.60.0	Default Gateway:	10.10.50.0
Host D	10.10.70.0	Default Gateway:	10.10.75.0
Router 1	fa0/0: 10.10.25.0 fa0/1: 10.10.35.0		
Router 2	fa0/0.1: 10.10.10.50 fa0/0.2: 10.10.10.75 fa0/1: 10.10.10.45.0		

VLAN

Practice Problem 2

There are six hosts and three routers in a network. Find below the IP addresses of all the devices. You may use unlimited number of switches.

(a) Draw the network diagram,   (b)Label the ports of routers

(c) Label the correct type of cables, (d) Write the default gateway of all the hosts.

Host A	10.10.10.10/28	Default Gateway:
Host B	10.10.10.40/28	Default Gateway:
Host C	10.10.10.75/28	Default Gateway:
Host D	10.10.10.50/28	Default Gateway:
Host E	10.10.10.20/28	Default Gateway:
Host F	10.10.10.90/28	Default Gateway:
Router 1	fa0/0: 10.10.10.110/28 fa0/1.4: 10.10.10.45/28 fa0/1.5: 10.10.10.60/28 s0/1: 10.10.10.140/28	
Router 2	fa0/0: 10.10.10.70/28 fa0/1: 10.10.10.85/28 s0/1: 10.10.10.115/28 s0/2: 10.10.10.130/28	
Router 3	fa0/0: 10.10.10.100/28 fa0/1.2: 10.10.10.14/28 fa0/1.3: 10.10.10.30/28 s0/1: 10.10.10.125/28	

Solution of Practice Problem 2

There are six hosts and three routers in a network. Find below the IP addresses of all the devices. You may use unlimited number of switches.

/28   255.255.255.240   0000   0
                                   16
                                   32
                                   48

(a) Draw the network diagram
(b) Label the ports of routers
(c) Label the correct type of cables.
(d) Write the default gateway of all the hosts.

Host A	10.10.10.10/28	Default Gateway:	10.10.10.14
Host B	10.10.10.40/28	Default Gateway:	.45
Host C	10.10.10.75/28	Default Gateway:	.70
Host D	10.10.10.50/28	Default Gateway:	.60
Host E	10.10.10.20/28	Default Gateway:	.30
Host F	10.10.10.90/28	Default Gateway:	.85
Router 1	fa0/0: 10.10.10.110/28 fa0/1.4: 10.10.10.45/28 fa0/1.5: 10.10.10.60/28 s0/1: 10.10.10.140/28		
Router 2	fa0/0: 10.10.10.70/28 fa0/1: 10.10.10.85/28 s0/1: 10.10.10.115/28 s0/2: 10.10.10.130/28		
Router 3	fa0/0: 10.10.10.100/28 fa0/1.2: 10.10.10.14/28 fa0/1.3: 10.10.10.30/28 s0/1: 10.10.10.125/28		

Solution of Practice Problem 2
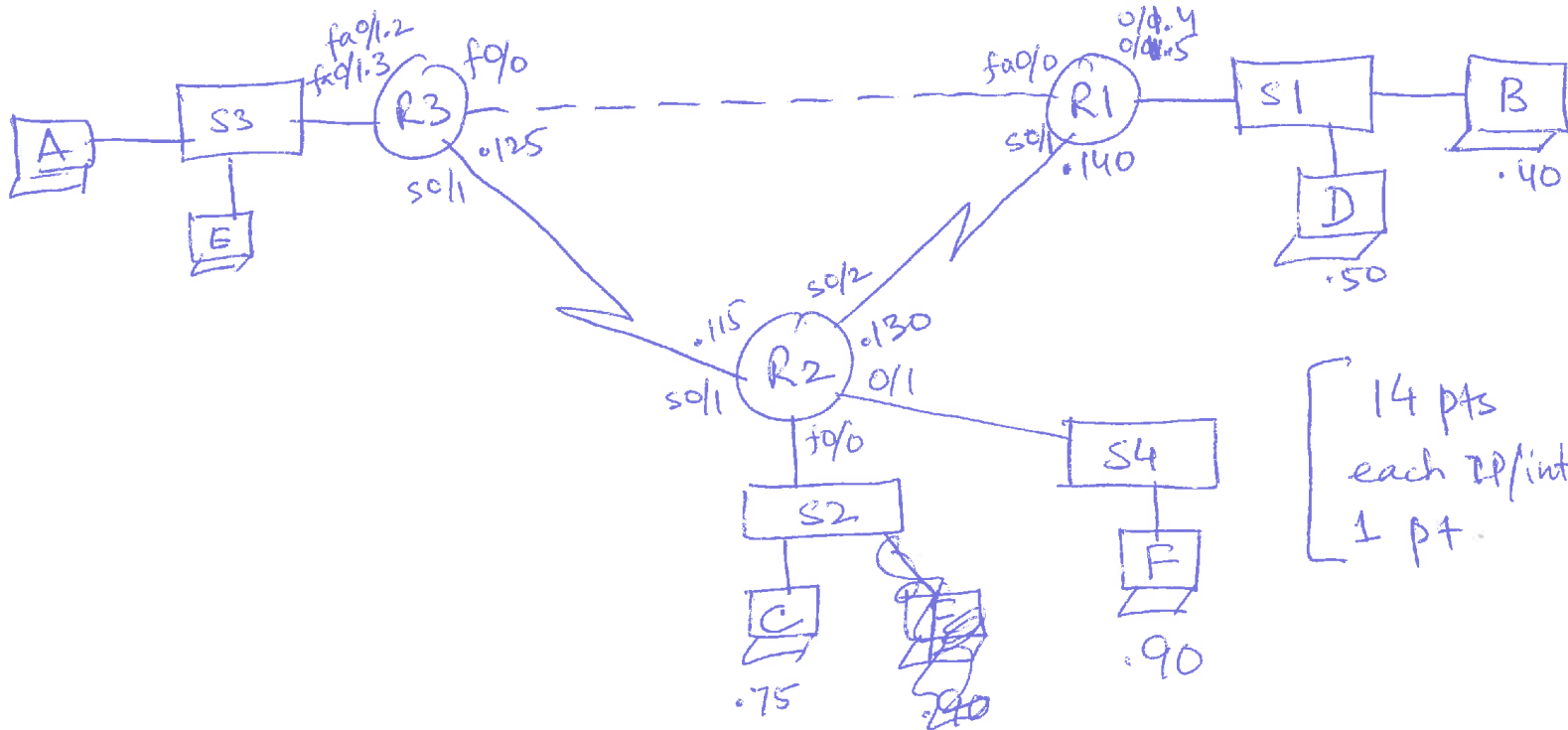
Practice Problem 3

Find below the IP addresses of all the hosts. Design the network to connect all the hosts using least number of switches and/or routers as well as least number of cables.

a) Draw the network diagram.
b) Label all the interfaces.
c) Label the type of devices and the type of cables.
d) Write the default gateway of all the hosts.
e) Describe your design and explain how it uses the least number of network devices.

Host A	10.10.10.10/27	Default Gateway:
Host B	10.10.10.30/27	Default Gateway:
Host C	10.10.10.40/27	Default Gateway:
Host D	10.10.10.50/27	Default Gateway:
Host E	10.10.10.60/27	Default Gateway:
Host F	10.10.10.70/27	Default Gateway:
Host G	10.10.10.90/27	Default Gateway:
Host H	10.10.10.100/27	Default Gateway:
Host I	10.10.10.120/27	Default Gateway:
Host J	10.10.10.125/27	Default Gateway:

Solution of Practice Problem 3

Subnet Mask /27 $\Rightarrow$ 255.255.255.224

Subnet 0: 10.10.10.0 $\rightarrow$ 31

Subnet 1: 10.10.10 32 $\rightarrow$ 63

Subnet 2: 10.10.10.64 $\rightarrow$ 95

Subnet 3: 10.10.10.96 $\rightarrow$ 127

Total 4 subnets.

The question requires least number of switches and/or Routers, which is possible when VLAN is implemented. Thus, all subnets can be connected to only one switch with VLAN. Subnets can not communicate without Router, Thus one Router will be connected to the switch.

Solution of Practice Problem 3
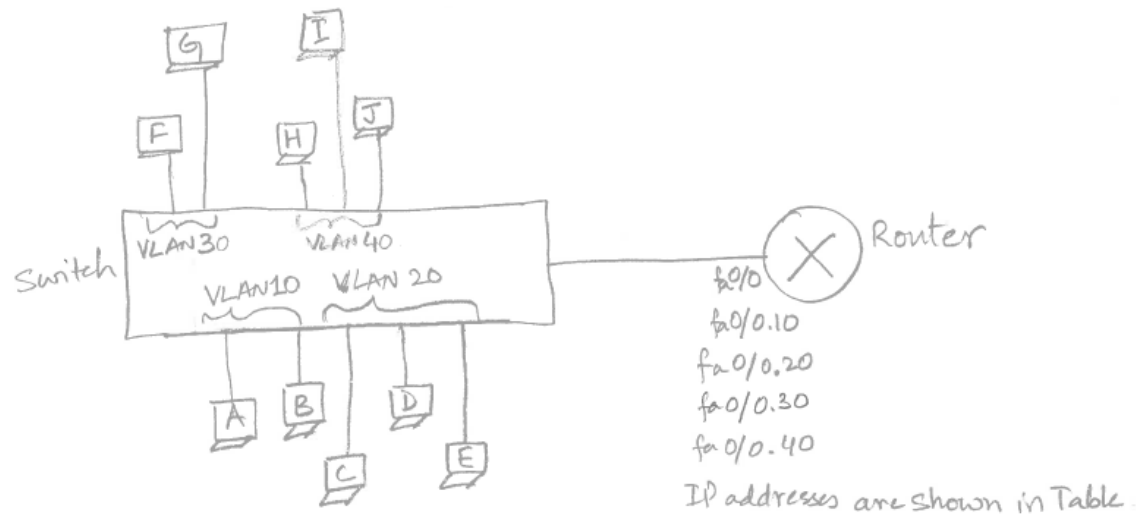
Cable : Twisted-Pair straight-Through

Design Description :

- Used VLANs
- Assigned VLAN to each subnet
- connected all Hosts to respective VLANs on 1 switch.
- only one Router is required to Link all Hosts (VLANs)
- only 1 switch is required.
- Used trunking, thus only cable is required from Switch to Router.