**Logo

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*Independent University Bangladesh (IUB)* **Course ID: CSE316L  
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Section: 04  
  
  
Submitted To:  
Instructor:** **Dr. Mst. Najnin  
  
Submitted By:  
Name: Md. Ashikur Rahman  
ID: 1831110  
  
Lab Report 7**

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                                      Submission Date: 23rd August 2021**

**INTER-VLAN ROUTING**

**Objective:**

Your task is to configure the network such that PC-A in VLAN 2 can ping PC-B in VLAN 3 across the switches. In the topology shown in Figure 1 and Figure 2, you can always swap the PCs for routers and use the fast Ethernet interfaces to connect to the switches.

1. Configure Switch A to trunk with Switch B using encapsulation 802.1q
2. Configure PC2 and PC3 to be in the correct VLANs on both switches
3. Configure Router1’s interfaces with two sub-interfaces in the correct VLANs and with correct IP addresses (.1 in respective subnets) and encapsulation with 802.1q.
4. Configure the PCs with respective Gateway addresses (address of the sub-interface on Router1)
5. Ping from all PCs, inter-VLAN Routing or Router in a stick.

Graphical user interface, diagram, application

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Tools and Materials: In a real life Scenario:

Two Workstations with terminal Program (such as putty), two Cisco switches, One Cisco Router, four Straight-through RJ45 cables

For Lab Purpose:

Cisco Packet Tracer Software Instructions:

Step 1: PCs’ IP Configuration:

Graphical user interface, application

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PC2 — 0 X

Physical Config Desktop Custom Interface

IP Configuration DHCP O

IP Address Subnet Mask

X

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IPv6 Configuration

DHCP Auto Config O Static

IPv6 Address / Link Local Address FE80: :202:4AFF: FEA3: EEA1 IPv6 Gateway IPv6 DNS Server

Static

10.0.0.2

255.255.255.0

0.0.0.0

Default Gateway DNS Server

Graphical user interface, text, application

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Step 2: ping PCs

Ping from PC3 to PC1 and PC2: successful

Graphical user interface

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Assign PC2 and PC3 to VLAN2 SW1:

Switch&gt;enable Switch#conf t

Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#int fa0/3

Switch(config-if)#switchport mode access Switch(config-if)#switchport access vlan2

^

% Invalid input detected at &#39;^&#39; marker. Switch(config-if)#switchport access vlan 2

% Access VLAN does not exist. Creating vlan 2 Switch(config-if)#

SW2:

Switch&gt;enable Switch#conf t

Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#int fa 0/2

Switch(config-if)#switchport mode access Switch(config-if)#switchport access vlan 2

% Access VLAN does not exist. Creating vlan 2 Switch(config-if)#

Step 4: Create trunk connection between SW1 and SW2 encapsulation with 802.1q

By default both switches are in VLAN1. Because PC2 and PC3 now in VLAN 2, so we need trunk between the switches, because they carry data of VLAN 2.

There are two types of encapsulation, ISL = CISCO propertoiry

802.1q = Industrial standard SW1:

Switch(config-if)#int fa 0/1 Switch(config-if)#switchport mode trunk

Command rejected: An interface whose trunk encapsulation is &quot;Auto&quot; can not be configured to

&quot;trunk&quot; mode.

Switch(config-if)#switchport trunk encapsulation dot1q Switch(config-if)#switchport mode trunk

Switch(config-if)#

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up SW2:

Switch(config)#int fa 0/1

Switch(config-if)#switchport trunk encapsulation dot1q Switch(config-if)#switchport mode trunk

Switch(config-if)#

Step 5: Again Pinging from PC1, PC2 and PC3. PC1 can’t communicate. PC2 and PC3 should be. Because they are in same VLAN and Have trunk line between switches.

From PC3:

Text

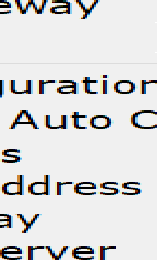
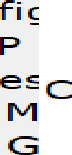
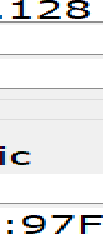
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Everything ok.

Graphical user interface, diagram, application

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Step 1: IP configuration in PCs.



Custom Imaterface

Graphical user interface, text, application

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Graphical user interface, text, application

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Graphical user interface, text, application

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Step 2: Pinging from PCs

From PC1: only reply from PC3. Other PCs are in another subnet.

Graphical user interface, text

Description automatically generated

From PC2:

Step 2: VLAN Configuration in switches SW1:

Switch&gt;enable Switch#config t

Switch(config)#int fa0/1 ;[for PC1 interface] Switch(config-if)#switch mode access Switch(config-if)#switchport access VLAN 13

% Access VLAN does not exist. Creating vlan 13 Switch(config-if)#

Switch(config-if)#int fa 0/2 ;[for PC2]

Switch(config-if)#switchport mode access Switch(config-if)#switchport access vlan 24

% Access VLAN does not exist. Creating vlan 24 Switch(config-if)#

SW2:

Switch&gt;enable Switch#config t

Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#int fa 0/1 ;[for PC3]

Switch(config-if)#switchport mode access

Switch(config-if)#switchport access vlan 13

% Access VLAN does not exist. Creating vlan 13 Switch(config-if)#int fa 0/2 ;[for PC4] Switch(config-if)#switchport mode access Switch(config-if)#switchport access vlan 24

% Access VLAN does not exist. Creating vlan 24 Switch(config-if)#

Step 3: both switches are now by default in VLAN 1. We configure a trunk line, then traffic of VLAN13 and VLAN 24 can travel from SW1 to SW2.

Even though PC1 and PC3 are now in same VLAN13, no traffic flow in between, because SW1 and SW2 in VLAN1.

Pinging from PC1 to PC3:

Text

Description automatically generated

Trunk command:

SW1:

Switch(config)#interface fa 0/3 Switch(config-if)#switchport mode trunk Switch(config-if)#

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up SW2:

Switch(config)#int fa 0/3

Switch(config-if)#switchport mode trunk Switch(config-if)#

Here, we don’t need encapsulation in switches.

Step 4: inter VLAN connectivity through Router, using encapsulation 802.1q

Due to trunk configuration, PCs within same vlan can communicate with each other.

From PC1:

Text

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From PC2:

Text

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PC1 to PC2: Communication between two VLAN doesn’t work.

Solution: Router in a stick. Configure IP address in different sub-interfaces. Only Single connection between R1 and SW1. With sub interface we create two connections using single connection, configuring Ip addresses on those will be default gateway for PCs. Route Configuration:

Router&gt;enable

Router#config t

Enter configuration commands, one per line. End with CNTL/Z. Router(config)#int fa0/0

Router(config-if)#no shutdown Router(config-if)#

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up Router(config-if)#int fa 0/0.13

Router(config-subif)#

%LINK-5-CHANGED: Interface FastEthernet0/0.13, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.13, changed state to up Router(config-subif)#ip address 10.0.0.1 255.255.255.128

% Configuring IP routing on a LAN subinterface is only allowed if that subinterface is already configured as part of an IEEE 802.10, IEEE 802.1Q, or ISL vLAN. [ip address not configured here, we need encapsulation first] 13 for 1 st VLAN. Subnet mask .128 is equivalent of /25

Router(config-subif)#encapsulation dot1q 13

Router(config-subif)#ip address 10.0.0.1 255.255.255.128 Router(config-subif)#

Router(config-subif)#int fa 0/0.24 Router(config-subif)#

%LINK-5-CHANGED: Interface FastEthernet0/0.24, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.24, changed state to up Router(config-subif)#encapsulation dot1q 24

Router(config-subif)#ip address 10.0.0.129 255.255.255.128 Router(config-subif)#

Router(config-subif)#

[24 for 2 nd VLAN, .129 – default gateway for PC2 and PC4]

We need to configure SW1 – R1 interface as trunk, what is fa 0/4 in SW1. Otherwise, no VLAN could communicate.

Switch(config)#int fa 0/4

Switch(config-if)#switchport mode trunk Switch(config-if)#

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to up Now all PCs should communicate each other, even though they are in different VLAN. From PC1 to PC2 and PC4:

Text

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PC1 – PC3: all are ok now

Graphical user interface, text

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PC2 to PC4 and PC1:

Graphical user interface, text

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