

```

euler_index = int(input("Index:")) - 1
receiver_code = toggleBits(receiver_code,
                            euler_index)

for i in pos_p:
    receiver_code.pop(i)
receiver_code = " ".join(receiver_code)

decoded_list = []
for i in range(0, len(receiver_code), 8):
    decoded_list.append(receiver_code[i:i+8])
decoded_msg = ""
for i in decoded_list:
    decoded_msg = decoded_msg + chr(int(i, 2))

print("Decoded message at receiver side:", decoded_msg)

```

### Output:-

Enter the string: abc

Binary representation: 011000010110011  
                           01101001010110010110001

No. of parity bits:-6

The Hamming code: 010011000001011

(even parity): 000111010100101010  
                           110001100001

Enter position to change

the bit (-base & index)

Date:

Aim: Write a program to implement flow control at data link layer using SLIDING WINDOW PROTOCOL simulate the flow of frames from one node to another.

Program:-

```

import time
import random

class Frame:
    def __init__(self, frame_no, data):
        self.frame_no = frame_no
        self.data = data
        self.acknowledged = False

    def send_frames(frames, window_size):
        print("In... sending frames...")
        for i in range(window_size):
            if i < len(frames) and not frames[i].acknowledged:
                print(f"sent Frame {i+1}, frame_no: {frames[i].frame_no}")
                frames[i].acknowledged = True
        print("Frames sent, waiting for acknowledgments.")

    def receive_frames(frames, window_size):
        print("In ... Received Frames...")
        for i in range(window_size):
            if (i < len(frames)) and not frames[i].acknowledged:
                print(f"Received Frame {i+1}, frame_no: {frames[i].frame_no}")
                frames[i].acknowledged = True

```

```
        "frame-number": frame[i].frame-number,
        "acknowledged": false
    }
}
```

```
else
```

```
    print("Received frame " + str(i) + ",
```

```
frame-number: " + str(frames[i].frame-number) + ",
```

```
frames[i].acknowledged: false
```

```
else
```

```
    print("Received frame " + str(i) + ",
```

```
frame-number: " + str(frames[i].frame-number) + ",
```

```
frames[i].acknowledged: true
    
```

```
window-size = int(input("Enter window
```

```
size:"))
```

```
message = input("Enter the message to send: ")
```

```
base = 0
```

```
while base < len(frames):
    
```

```
send-frame < del(frames):
```

```
send-frames(frames[base:], window-size)
```

```
time.sleep(2)
```

```
del-frames(frames[frame[base]], window-size)
```

```
while base < len(frames) and frames
```

```
base < len(frames) and frames
```

base < len(frames):  
    if  
        print("In Pending unacknowledged frame") time.sleep(1)

time.sleep(1)

print("In Pending unacknowledged frames")

\n")

if name == 'main':

sliding-window-protocol()

Output:

Enter window size: 3

Enter message to send: abcd

sending frame:

Received frame: A [OK]

Received frame: B [OK]

Received frame: C [OK]

Resending unacknowledged

frames next, waiting for

acknowledgment

sending frame:

Receiving frame:-

Received frame: 3d [OK]

sent frame 3:d

All frames sent and acknowledged!

Result:  
*✓ Recd*

thus the above sliding window

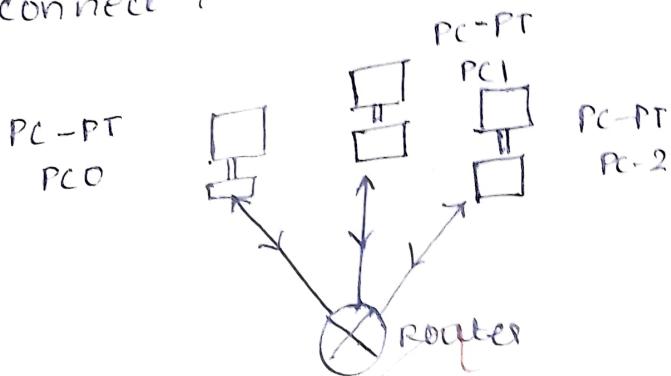
program is executed and verified successfully.

(b) Configuration of wireless LAN using Cisco  
Packet tracer.

Aim: To design a topology with three PC's connected from single wireless routers.

Procedure:  
Configure static IP on PC and wireless router.

- Set SSID to mother network
- Set IP address of router to all PC's
- Secure your network
- Connect your PC by WAP key



Step(1): click on Wireless Router

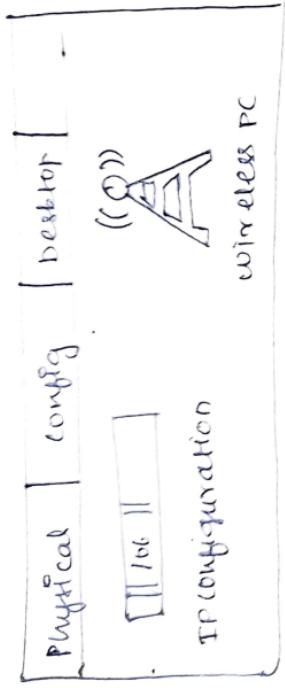
setup wireless security Administration		
management	Router password	admin
Router Access	Re-entered password	admin.

WILSONS BIRDS OF THE  
INDIAN SUBCONTINENT

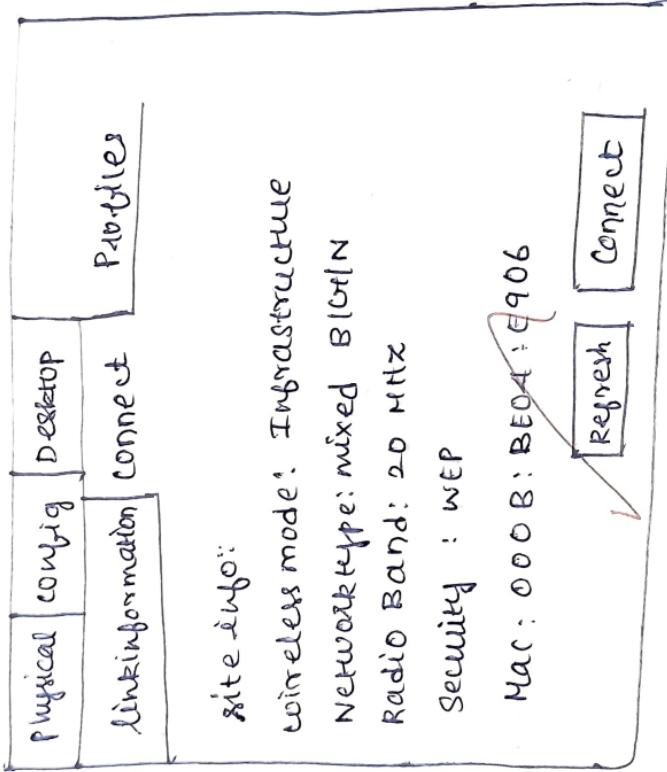
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INDIAN SUBCONTINENT

## click pc wireless



click on connect tab and click on refresh button.

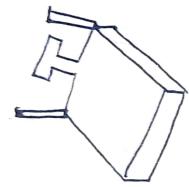


click on connect button to connect to network. It will ask for WAP key

WEP key  
security: WEP  
WEP: 64 bit

Please select the wireless security method to use WEP encryption select G/B/N 1128

WEP key 1: 0123456789



((

))

□

□



signal  
strength



live  
quality

Repeat for all PCs

✓ 2014

Result:

Thus the above exercise is executed  
and verified successfully.

## 1. Voraussetzung

Die Voraussetzung ist die Existenz eines Betriebs.

Der Betrieb ist ein Betrieb, der eine Produktion oder eine Dienstleistung erbringt und dabei einen Betriebserfolg aufweist.

## 2. Betriebserfolg

Der Betriebserfolg ist der Betriebserfolg, der durch die Produktion oder die Dienstleistung erzielt wird. Der Betriebserfolg ist der Betriebserfolg, der durch die Produktion oder die Dienstleistung erzielt wird.

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## 5. Betriebserfolg

Der Betriebserfolg ist der Betriebserfolg, der durch die Produktion oder die Dienstleistung erzielt wird.

## 6. Betriebserfolg

Der Betriebserfolg ist der Betriebserfolg, der durch die Produktion oder die Dienstleistung erzielt wird.

## 7. Betriebserfolg

Der Betriebserfolg ist der Betriebserfolg, der durch die Produktion oder die Dienstleistung erzielt wird.

### Student observations

b) What is SSID of a wireless router?

The SSID (extreme set identifier) of a wireless router is the network name that identifies a WiFi network. It is allowed devices to connect to it.

(d) What is a security key in wireless router?

A security key in a wireless router is a password used to protect a wireless network ensuring that only authorised users can connect. Common types include WEP, WPA, WPA2, Key.

(e) Configure a simple wireless LAN in your LAB using a real access point & write down the configurations in your network.

Configuration:



Access Point setup: Connect the access point to power and network, then access eg.: 192.168.0.1.1

Set SSID: Name your network  
Set configuration:  
Security mode: WPA2-PSK  
Password: Set a key.

save settings: apply the changes and save the access point.

ex: SSID: lab-wifi

security key: Labsequence123

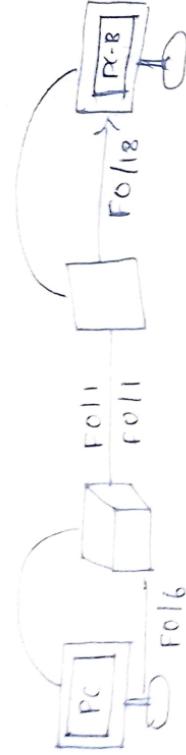
security mode: WPA2 - PSK

IP Range: 192.168.1.100 to 192.168.1.150

channel: 6  
Mode: 802.11 b/g/n.

1 Cisco Packet tracer simulation

Aim:- Stimulate virtual LAN configuration using Cisco Packet tracer simulation



Packet tracer - configure VLANs and tracking physical mode topology.

Device	Interface	IP address	Subnet mask	Default gateway
S1	VLAN-1	192.0.168.10.11	255.255.255.0	N/A
S2	VLAN-2	192.0.168.10.12	255.255.255.0	N/A
PC-A	NIC	192.0.168.10.3	255.255.255.0	192.0.168.10.11
PC-B	NIC	192.0.168.10.4	255.255.255.0	11

**Part-1** Build the network & configure basic device settings

**Step-1** Build the network

**Objectives:** Connect the devices as shown in the topology.

**Steps:** Drag switches & pass to the rack. Drag PC-A and PC-B to the table & power them on.

Connect the devices with copper straight-through cables.

## Step-2 configure the basic switch

- \* use the terminal in each pc to connect into the switch-2 enter privileged exec mode.
- \* set the device name for each switch
- \* set the privileged exec password to class
- \* set the console password & enable login
- \* set the password and enable login.
- \* set the vty password, encrypt plaintext password.
- \* create a banner that warns unauthorised access.

Step(3): Shutdown the unusual interfaces and save the running configuration.

## Step(3): Configure PC hosts

Step(4): ~~Test connectivity by attempting to ping between each of the listed devices class configuration window.~~

PART(2): Create VLANs and assign switch port.

## Step(1) Create VLANs

Obj:- Create VLANs on both switch

Step(2): use the VLAN command on slot 32 to create VLANs operation pairing dot , management and native. use show VLAN brief to verify VLAN creation.

Step(2): Assign VLAN to switch interface assign port to VLANs.

Step(3): Assign IP address from VLAN 1 to management IP addresses from VLAN 10 remove the management IP address from VLAN 1 & configure it

## VLAN DB

- Step-1 Assign VLAN to port assignments, multiple interfaces
- Step-2: Assign VLAN to interface: Command: `int fa 0/1`
- Step-3: Use the no switch port access vlan command to remove VLAN assignment from

10/24

Point 4 Configure on 200-10 trunk interfaces

Point 5

Step-1 Use DTP to initiate trunking

Ques-1: Configure dynamic trunking of ports fa 0/1-4, on interface fa 0/1 to ~~use~~ a trunk between S1 and S2.

Step-2:

Set the trunk mode trunk mode dynamic desirable on fa 0/1. In this case trunking is enabled between S1 and S2.

## Questions:-

D can S1 ping S2, yes if trunking is configured is trunk mode configured S1 can ping S2.

(Q2) Can PC-A ping PC-B?

Yes If VLANS are properly configured, if trunking is enabled, PC-A can ping PC-B.

(Step-2) Use the command switch port mode trunk to enable trunking on fa 0/1 on both switches.

Final testing:

After completing all path test all correctness to ensure that the VLAN configuration and trunking are properly functioning.

Reflection Question:

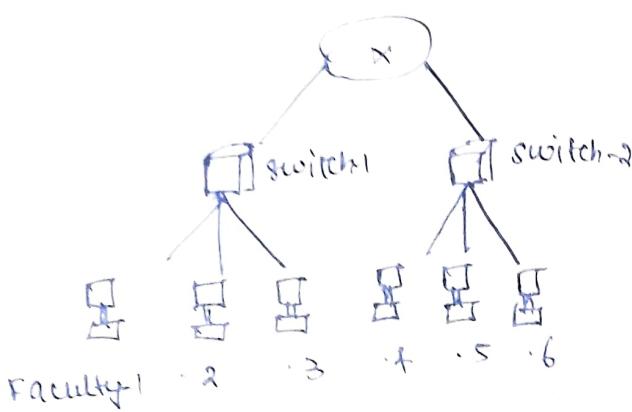
(2) What is needed to allow hosts on VLAN 10 to communicate to hosts on VLAN 99?

We need a 3 layer device such as a router or a 3 layer switch with inter-VLAN routing configurations.

(2) What are the primary benefits that can receive through effective use of VLANs?

- Improved network segmentation
- Enhanced security by isolating traffic
- Reduced broadcast traffic
- Better network management & security, by isolating traffic.

(3) Can draw & label the VLAN for co-faculty in Robotics department sitting in.



(B) Show the IP configuration for each device

Faculty - 1 192.168.10.1/24

Faculty - 2 192.168.10.2/24

Faculty - 3 192.168.10.3/24

Faculty - 4 192.168.10.4/24

Faculty - 5 192.168.10.5/24

Faculty - 6 192.168.10.6/24

Faculty - 7 192.168.10.7/24

Faculty - 8 192.168.10.8/24

(C) Write the commands for VLAN configuration on switch.

switch(config) # VLAN 10

switch(config-vlan) # name Robotics-VLAN

switch(config-vlan) # exit

switch(config) # interface range fast 1/1-10

switch(config-if-range) # switch port mode

switch(config-if-range) access

switch(config) # exit

switch(config) # interface fa0/24

switch(config-if) # switch port mode

switch(config-if) # exit trunk

Result:

?

## CISCO PACKET TRACER

## SIMULATOR

Aim: Implementation of Subnetting in CISCO PACKET TRACER simulator

classless IP subnetting is a technique that allows for more efficient use of IP addresses by allowing for subnet masks that are not just the default masks for each IP class. This means that we can divide the IP address space into smaller subnets which can be useful when we have limited no. of IP addresses but need to create multiple networks.

### Creating a network topology:

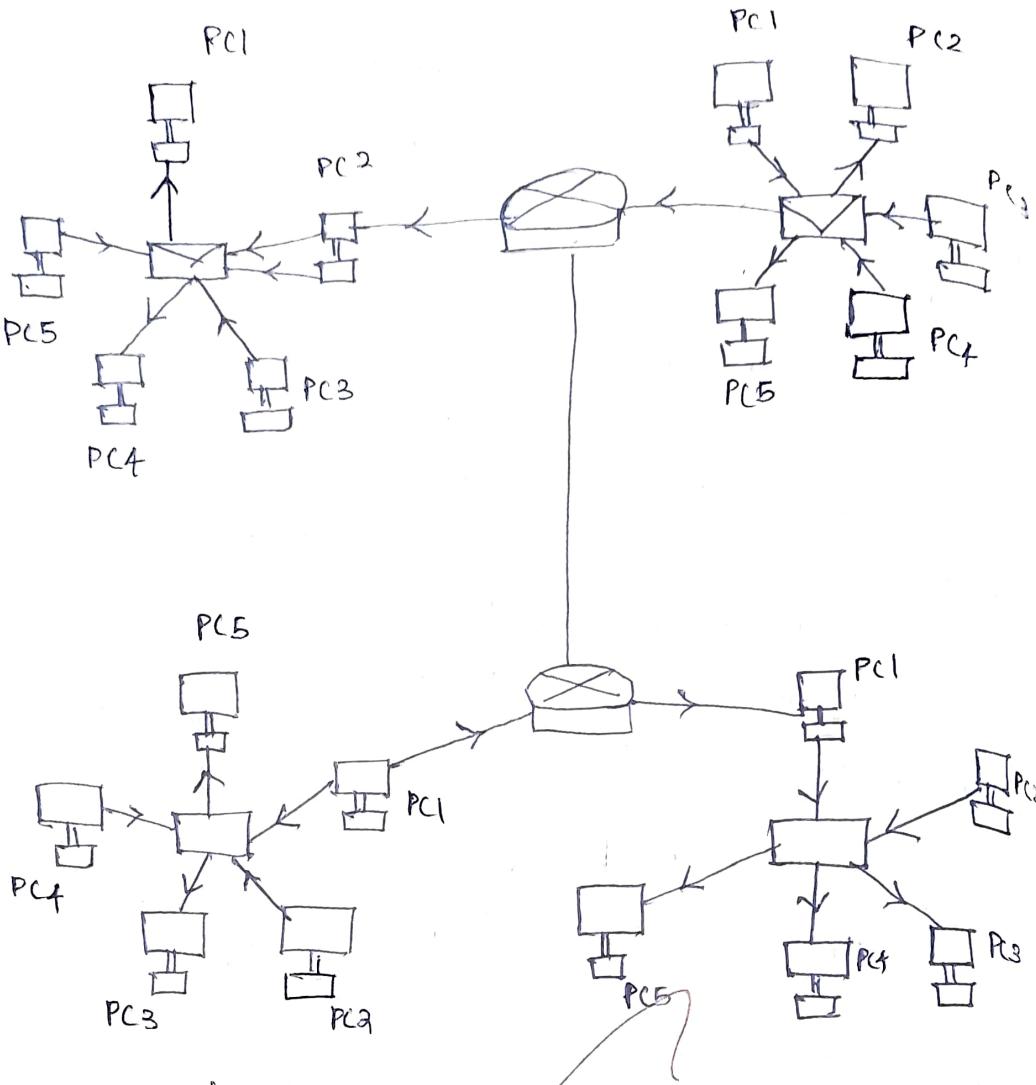
The first step in implementing classless IP subnetting is to create a network topology in packet tracer. To create a network topology in packet tracer select the "New" button in the top left corner. Then select "Network" & "Generic".

### Adding the devices:

Once we have created our network topology, we can add device to it. Here we will be adding routers, switches, pc. To add a device, select the device from the bottom left corner and drag it onto the network topology.

### Subnetting:

To subnet the network address of 192.168.10/24 to provide enough space for at least 5 addresses for end devices, the switch and the router, we can use a /27 subnet mask. This will give us 8 subnets with 30 host addresses each.



The input addressing for the network shown in the topology can be as follows.

Router R1:-

Switch S1:-

Fast

$PC1 : 192 \cdot 168 \cdot 1 \cdot 011$

Ethernet 0/1

$PC2 : 192 \cdot 168 \cdot 1 \cdot 012$

$192 \cdot 168 \cdot 1 \cdot 0/27$

$PC3 : 192 \cdot 168 \cdot 1 \cdot 013$

$PC4 : 192 \cdot 168 \cdot 1 \cdot 014$

$PC5 : 192 \cdot 168 \cdot 1 \cdot 015$

Fast

Ethernet 0/2

$PC1 : 192 \cdot 168 \cdot 2 \cdot 011$

$192 \cdot 168 \cdot 2 \cdot 0/27$

$PC2 : 192 \cdot 168 \cdot 2 \cdot 012$

$PC3 : 192 \cdot 168 \cdot 2 \cdot 013$

$PC4 : 192 \cdot 168 \cdot 2 \cdot 014$

$PC5 : 192 \cdot 168 \cdot 2 \cdot 015$

Router R2

Switch S2

Fast ethernet 0/1  
192.168.3.0/29

PC1: 192.168.3.11  
PC2: 192.168.3.12  
PC3: 192.168.3.13  
PC4: 192.168.3.14  
PC5: 192.168.3.15

Fast  
ethernet 0/2  
192.168.4.0/27

PC1: 192.168.4.11  
PC2: 192.168.4.12  
PC3: 192.168.4.13  
PC4: 192.168.4.14  
PC5: 192.168.4.15

### configuring the services:-

#### Router configuration

Access the CLI :- Right click on the router and select "CLI" to open the command-line-interface.

configure interfaces  
Enter enables & configures terminal to begin configuration mode.

#### Fast-Ethernet 0/0:-

Enter interface Ethernet 0/0  
set IP: ip address & IP address & subnet mask  
Active: no shutdown  
exit interface configuration: exit

#### Fast Ethernet 0/1:-

\* Repeat the above steps - connecting the interface to one of the PCs

#### Configure Gigabit Ethernet:-

use interface GigabitEthernet 0/0. Set IP and subnet, activate with no shutdown & exit.

#### Switch configuration

→ Enter enable & configure terminal  
→ Enter interface FastEthernet 0/1. Then switch port mode access & exit

Repeat for Fast Ethernet 0/2 for connecting to the second PC.

## PC configuration:

Must be in the same subnet as the router's Fast Ethernet 0/1 interface  
→ set to the IP of the router interface connected to the PCs.  
→ enter DNS details as needed

## Testing the network:

- A successful ping indicates proper PC-to-PC communication
- This ensures correct connectivity with PC's

~~Result: Thus the above connection is CISCO packet tracer was executed successfully.~~

## student observation:

Explain about your understanding of subnetting  
Subnetting is the process of dividing a large network into smaller, manageable sub networks. Each subnet operates with its own IP address range helping to organize & manage network traffic.

(a) What is the advantage of implementing subnetting within a network?

- efficient management
- improved network performance
- enhanced security

(b) Find out whether subnetting is implemented in your college.

college subnetting

subnet1 (Admin) - 192.168.1.0/24  
subnet2 (Library) - 192.168.2.0/24  
subnet3 (Labs) - 192.168.3.0/24

## Internetworking with

Router

In Cisco packet tracer.

Aim: To create a simple network with a router connecting two PCs using a copper straight-through cable then testing connectivity by sending a PING from PC0 to PC1.

Steps:-

## (1) Router configuration:-

- Open CH enter privileged mode (enable)
- enter global configuration (config +)
- Configure fast ethernet 0/0:-

Set IP: 192.168.10.1      255.255.255.0

Bring interface up (no shutdown)

- Configure Fast Ethernet 0/1:-

Set IP: 192.168.20.1      255.255.255.0

Bring interface up (no shutdown)

PC Configuration:-

PC0:- IP address - 192.168.10.2

subnet mask - 255.255.255.0

default gateway - 192.168.10.1

PC1:- IP address - 192.168.20.2

subnet mask - 255.255.255.0

default gateway - 192.168.20.1

Cable connections:-

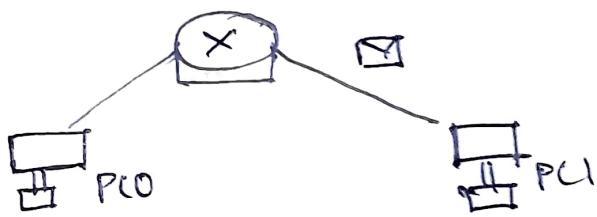
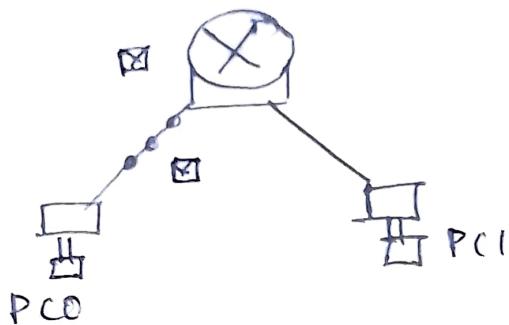
→ connect PC0 (Fast Ethernet 0) to router 1 (Fast Ethernet 0/0)

→ connect PC1 (Fast Ethernet 0) to router 1 (Fast Ethernet 0/1).

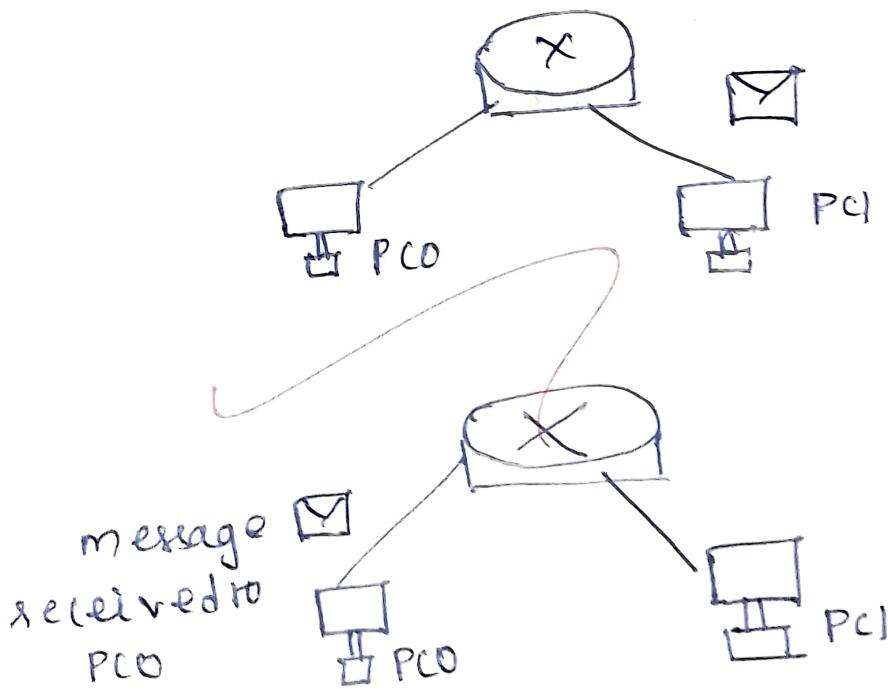
Testing connectivity:

send a PDU from PCO to PCI to view  
verified functionality

sending a PDU from PCO to PCI



Acknowledgment from PCI to PCO



Result :

Ex No: 10/2  
Date No: 07/07/2014

INTERWORK USING  
WIRELESS ROUTER, DHCP  
SERVER, CLOUD.

Aim: To design and configure an inter-network using wireless router, DHCP server & internet cloud

Step 1: Launch packet tracer

Build the topology

→ Add devices: In packet tracer, select 8 Place each network devices in the work space according to the topology diagram.

\* Rename device

\* Connected device with cables

→ PC to wireless Router

→ wireless Router to cable modem

→ cable modem to internet cloud

→ cloud to cisco.com server

Configure the network devices:

Step(1): Configure the wireless router

Setup wireless network:-

• Open the wireless router configuration

• In the Wireless tab, go to wireless settings

change the network name to "Home network".

Setup Internet connection:-

→ In the Setup tab ensure DHCP server is enabled.

→ Set the DNS server IP address to 208.07.220.220.

Step(2): Configure the laptop

Install wireless module :-

Insert the wireless WPC 300N module

and turn the laptop back on

connect to wireless network. In the desktop tab, under PC wireless settings, under connect select 'Home network' from the list of networks in connect.

Step(3): Configure the PC

(i) Enable DHCP

(ii) Verify IP address

(iii) Waited prompt on the PC run ipconfig /all open command prompt on the PC received an IP address in the to confirm the PC received an IP address in the 192.168.0.X range.

### Physical Config Desktop Programming Attributes

IP configuration	Interface	IP address	Subnet mask	Default gateway	DNS server
DHCP	Fast Ethernet 0	192.168.0.101	255.255.255.0	192.168.0.1	208.67.220.220
	DHCP request				
	Successful				

Step(4): Configure the internet cloud

① Install network modules

Insert the wireless WPC 300N

and turn the laptop back on.