COMPUTER NETWORK PROJECT- DESIGN A COMPUTER NETWORK FOR COLLEGE

1. PROJECT SCOPE:

Design a computer network for a college. There are 50 users in the college. 20 users in the main building, 20 users in the annex campus tech park bldg, and 10 users in annex campus hospital block. Every building has a lobby which is 200 sqft open space, where wireless access to the network is required. Only authorized personal should have access to the wireless network.

The distance between annex campus hospital block and the main building is 300 mtrs. The distance between annex campus Tech Park and the main building is 90 mtrs. The distance between annex campus hospital block and Tech Park is 70 mtrs. A high speed cable internet connection is available in the main building which needs to be shared among the users.

3. NETWORK REQUIREMENT ANALYSIS:

DELL LAPTOPS: 50 NO'S

- For Users (Students and Faculties) to use laptop device for study purpose.

D-LINK 24-PORT SWITCH (DGS-1024A): 1NO'S

- Has many network ports to connect several end host devices
- Enables communication to connected hosts by sending or receiving data.
- This is a 24 port switch

D-LINK N 300 DIR-615 WIRELESS Router: 2 NO'S

- It is a network device which allows devices like laptop, mobile, I-pad to connect and provides wireless network.
- The wireless router has to be connected to a wired router.

TP-LINK TL-R470T ROUTER: 3 NO'S

- Provides connectivity between local area network (LAN)
- Used to send Data over Internet. Data are sent in form of packets.
- Forwards Traffic over network

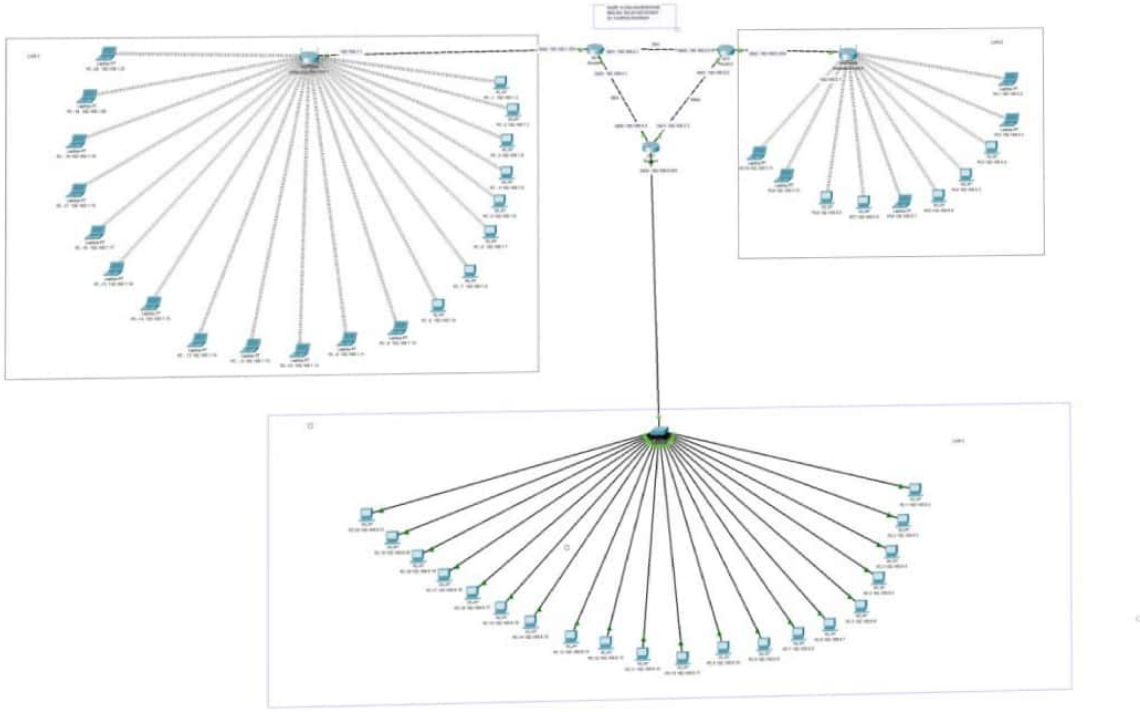
FIBRE OPTIC (MULTI-MODE) CABLE: 300 meters

- To connect devices over large length
- Multi mode is used which is cheap compared to single mode
- Sends light signal over glass
- Fiber optic cable is used to connect on SFP(small form factor pluggable port)

ETHERNET COPPER UDP CABLE: approx 250m

- To connect devices of less than 100 meter length range
- Sends electrical signal over copper wire
- Udp cable are twisted to protect against electromagnetic interference
- Udp cable is used to connect on RJ-45 port (Registered jack)
- Straight through cable to connect unlike device (PC-Switch, Switch-Router)
- Cross over cable to connect like device (Router-Router)

4. NETWORK DIAGRAM



5. NETWORK AND SYSTEM INTEGRATION METHODOLOGY

Network topology used to connect PC/Laptop to switch or router is **Star Topology**

Network and System Integration

There exists total of **three LAN's:**
LAN 1 (Tech Park)
LAN 2 (Hosp Block)
LAN 3 (Main Bldg)

LAN 1(Tech Park):

Components /Devices used in LAN 1(Tech Park):
End Host (PC/Laptop): 20
Wireless Router (**WR1**)**:** 1
Router (**R1**): 1
Cross over UTP cable: 1 (to connect **wireless router to router**)

- In LAN1 (Tech Park) the Wireless router (WR1) is connected to Router (R1) using **Cross over UTP cable** so that the packets can be forwarded over other LAN'S or over Internet.

- The PC's and Laptop's IP address are configured manually and then they are connected to wireless router (WR1) for active Internet connection.

LAN 2 (Hosp Block):

Components /Devices used in LAN 2(Hosp Block):
End Host (PC/Laptop): 10
Wireless Router (**WR2**)**:** 1
Router (**R2**): 1
Cross over UTP cable: 1 (to connect **wireless router to router**)

- In LAN2 (Hosp Block) the Wireless router (WR2) is connected to Router (R2) using **Cross over UTP cable** so that the packets can be forwarded over other LAN'S or over Internet.

- The PC's and Laptop's IP address are configured manually and then they are connected to wireless router (WR2) for active Internet connection.

LAN 3 (Main Bldg):

Components /Devices used in LAN 3(Main Bldg):
End Host (PC/Laptop): 20
Switch (**SW1):** 1
Router (**R3**): 1
Straight through UTP cable: 21 (to connect **switch** to **router** and **PC's** to **switch**)

- In LAN3 (Main Bldg) the switch (SW1) is connected to Router (R3) using **Straight though UTP cable** so that the packets can be forwarded over other LAN'S or over Internet.

- The PC's and Laptop's IP address are configured manually and then they are connected to switch (SW1).

All Routers' are interconnected with each other so that packets can be forwarded to other LAN's i.e. Router (R1) ---> Router (R2), Router (R2) ---> Router (R3), Router (R3) ---> Router (R1)

R1 → R2 and R1 → R3 are connected by Cross Over UTP cable (length is less than 100 meters)

R2 → R3 are connected by Fiber Optic cable Multimode (length is over 300m and cross over cable's max cable length is 100m)

6. IP NETWORK DESIGN GUIDELINES: ASSIGN IP ADDRESS, CLASS C ADDRE SS, SUBNETTING

IP version 4 (IPv4) is used to assign IP address

Class C address is used.

In total there are 6 networks:

192.168.1.0- LAN 1 (Tech Park)

192.168.2.0- WAN 1 (R1 ----> R2)

192.168.3.0- WAN 2 (R2 ----> R3)

192.168.4.0- WAN 3 (R1 ----> R3)

192.168.5.0- LAN 2 (Hosp Block)

192.168.6.0- LAN 3 (Main Bldg)

LAN 1 (Tech Park) IP ADDRESSING:

Network Address: 192.168.1.0

Subnet Mask: 255.255.255.0

Router (R1, G0/0): 192.168.1.254

Wireless Router (WR1)

- IP: 192.168.1.1
- Subnet Mask: 255.255.255.0
- Default gateway: 192.168.1.254

PC/LAPTOP: PC 1 TO PC 20

- IP: 192.168.1.2 – 192.168.1.21
- Subnet Mask: 255.255.255.0
- Default gateway: 192.168.1.254

LAN 2 (Hosp Block) IP ADDRESSING:

Network Address: 192.168.5.0

Subnet Mask: 255.255.255.0

Router (R2, G0/2): 192.168.5.254

Wireless Router (WR2)

- IP: 192.168.5.1
- Subnet Mask: 255.255.255.0
- Default gateway: 192.168.5.254

PC/LAPTOP: PC 1 TO PC 10

- IP: 192.168.5.2 – 192.168.5.11
- Subnet Mask: 255.255.255.0
- Default gateway: 192.168.5.254

LAN 3 (Main Bldg) IP ADDRESSING:

Network Address: 192.168.6.0

Subnet Mask: 255.255.255.0

Router (R3, G0/2): 192.168.6.254

PC/LAPTOP: PC 1 TO PC 20

- IP: 192.168.6.2 – 192.168.6.21
- Subnet Mask: 255.255.255.0
- Default gateway: 192.168.6.254

WAN 1 (R1 ---> R2)

Network Address: 192.168.2.0

Subnet Mask: 255.255.255.0

R1 (G0/1): 192.168.2.1

R2 (G0/0): 192.168.2.2

WAN 2 (R2 ---> R3)

Network Address: 192.168.3.0

Subnet Mask: 255.255.255.0

R2 (G0/1): 192.168.3.2

R3 (G0/1): 192.168.3.3

WAN 3 (R1 ---> R3)

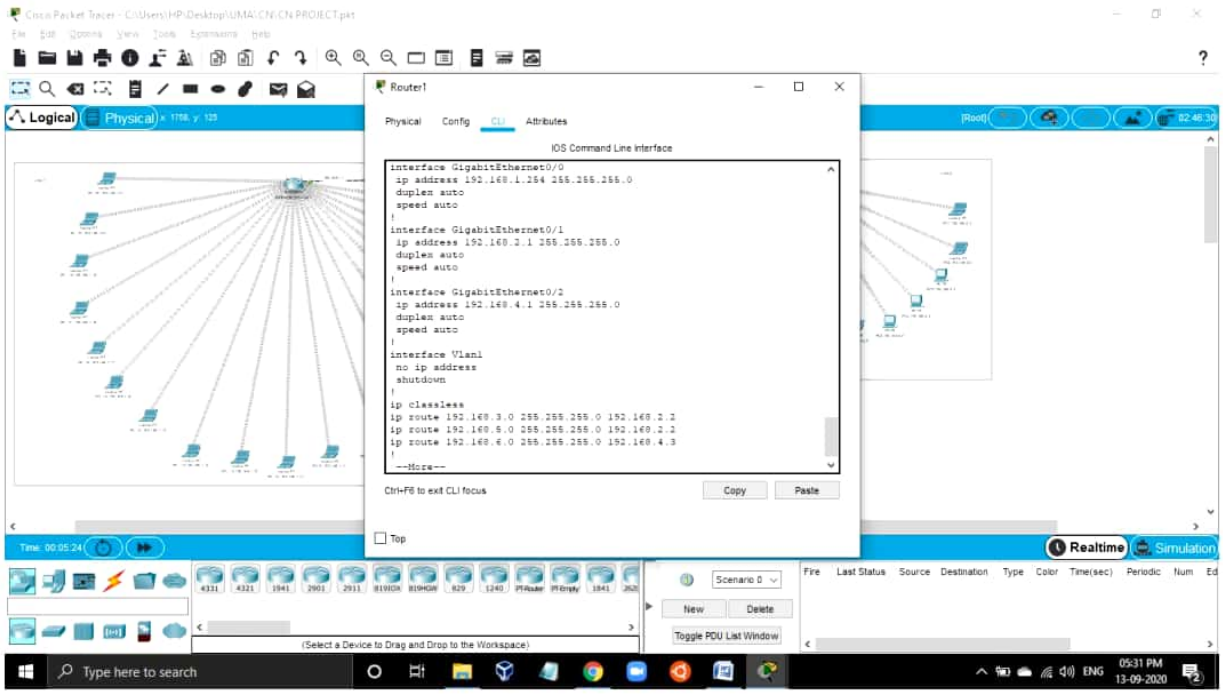
Network Address: 192.168.4.0

Subnet Mask: 255.255.255.0

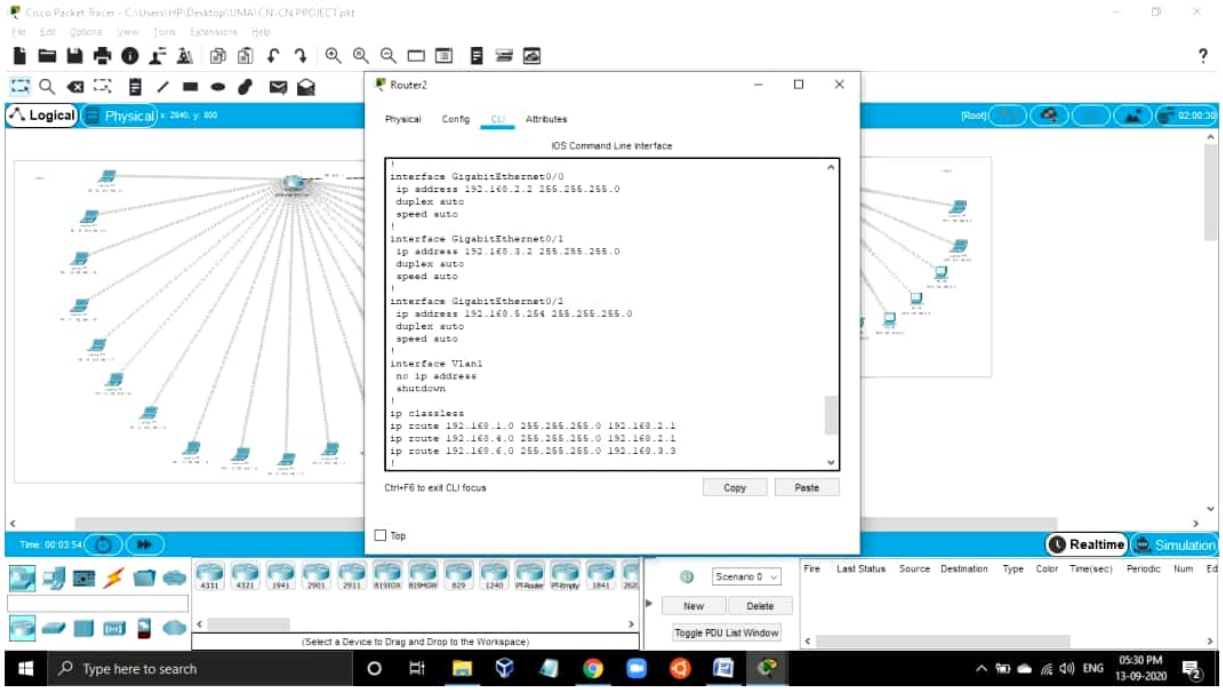
R1 (G0/2): 192.168.4.1

R3 (G0/0): 192.168.4.3

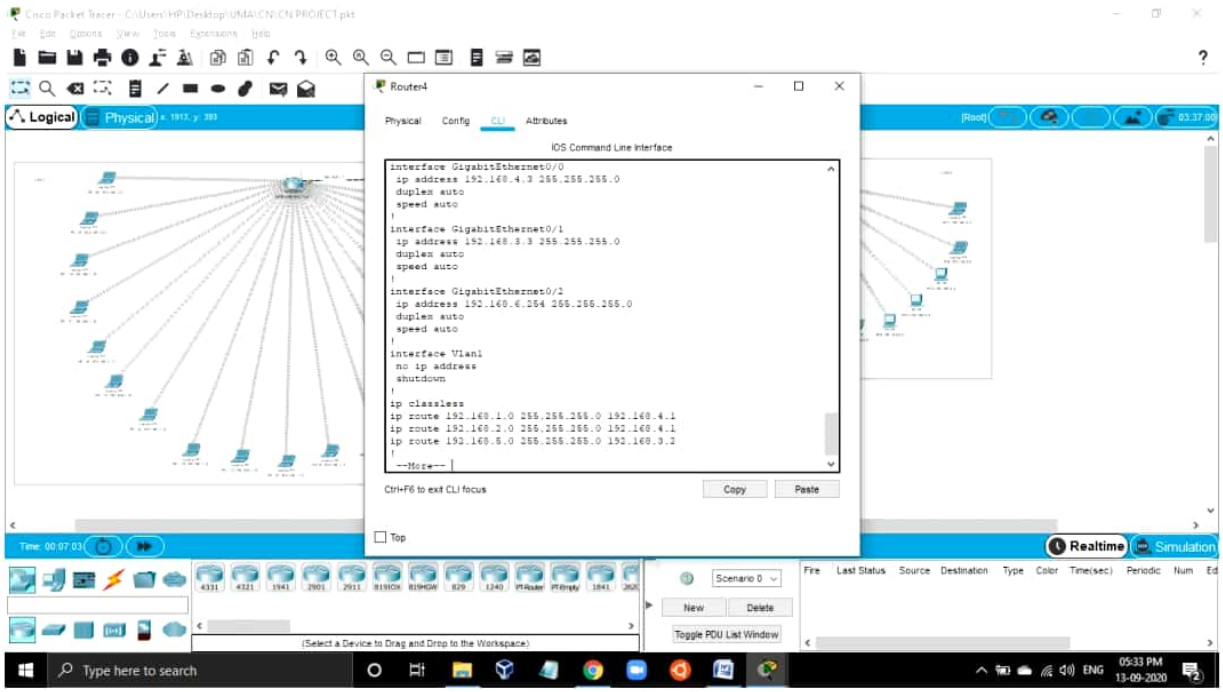
R1# show running-config (COMMAND- to view current configured file)



R2# show running-config (COMMAND- to view current configured file)



R3# show running-config (COMMAND- to view current configured file)



7. FEATURES AND SERVICES

All PC and Laptops have to install

- WINDOWS 10 OS
- Anti-Virus Software
- Ubuntu Linux

8. BILL OF MATERIAL

DEVICE	QTY	COST
Dell PC (inc CPU,mouse,keyboard)	33	23,000 *33 = 3,91,000
Dell laptop	17	36,000 *17 = 6,12,000
TP-LINK TL-R470T Router	3	2,800 *3 = 8,400
D-LINK N 300 DIR-615 Wireless Router	2	1,299 *2 = 2,598
D-LINK 24-PORT Switch	1	3,215
Fiber optic cable	1	20,000
UTP cable	23	3,000
Total	80	10,40,213 (approx 10L)