

Design a redundant network for IOE Pulchowk Campus with four departments (Computer, Civil, Mechanical, and Electrical) with internet department which are around 400m apart from each other. Computer department have 5 labs each lab with 24 computers. Internet department contains server farm with server like DNS, DHCP, Email, FTP and web server and the main internet router will be connected to upstream provider. Propose appropriate equipment (L1, L2 and L3) and physical wires for the network design.

Solution,

Device and Equipments

Wireless AP

Router

Switch

Patch cords

Faceplate

Cat6 Cables

Optical fiber cable

Servers

PCs/Computer

Resource calculation

Computer= 24×5 for labs + 4 for departments=124

Wireless AP = 4 for each department and 5 for labs =9

Faceplate = 125 for computers and servers +9 for WAP =134

Patch cord = 134 as per faceplate

CAT6 Cable

Router to switch= $12 \text{ switch} \times 25\text{m}$ =300

Switch to faceplate = 134×10 =1340

Total = $300+1340$ =1700 (60 additional for backup)

Fiber optic cable

Main Router to switch = $400 \times 6 = 2400 + 100 = 2500$ (100m additional for backup)

Bill of Quantity

S. No.	Devices	Unit	Quantity
1	Computers/PCs	Numbers	124
2	Wireless AP	Numbers	9
3	CAT6 Cables	Meters	1700
4	Faceplate	Numbers	134
5	Patch Cords	Numbers/meters	134(different lengths)
6	Fiber optic cable	Meters	2500
7	Router	Numbers	5
8	Switch	Numbers	12
9	Servers	Numbers	5

Logical Design

192.168.1.0/24

For 5 labs, 3 bits will be required as we have equal number of host (24) in each lab

For lab1

$192.168.1.00000000/27 = 192.168.1.0/27$

30 host can accommodate, so 6 IP will be unused

For lab 2

$192.168.1.00100000/27 = 192.168.1.32/27$

30 host can accommodate, so 6 IP will be unused

For lab 3

$192.168.1.01000000/27 = 192.168.1.64/27$

30 host can accommodate, so 6 IP will be unused

For lab 4

$192.168.1.01100000/27 = 192.168.1.96/27$

30 host can accommodate, so 6 IP will be unused

For lab 5

192.168.1.10000000/27 = 192.168.1.128/27

30 host can accommodate, so 6 IP will be unused

For internet department

5 servers so 3 bit will be host bit

192.168.1.160/29

