# Campus Infrastructure:

**CHAPTER 5: NETWORK DESIGN**

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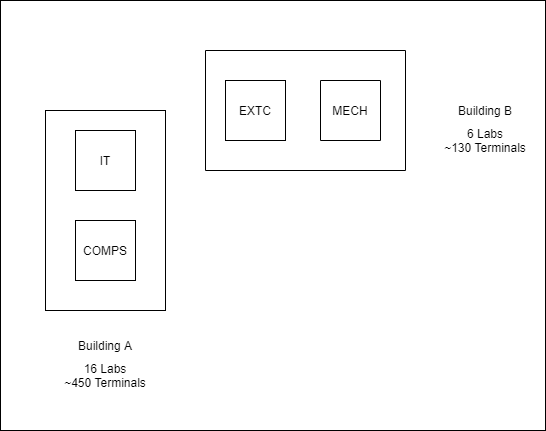
# Roll No.: 66

**Batch:** B

* 2 Buildings- Building A and Building B
  + Building A consists of FE, IT and COMPS Department
  + Building B consists of EXTC and MECH Department
* FE Department has only 1 Lab.
* IT Department has 7 Labs.
* COMPS Department has 8 Labs.
* EXTC and MECH Department have 3 Labs each.
* Building A and B – Ground + 3 Floors
* LAN Infrastructure is implemented.
* Campus Server is located in Building A, First Floor. From there, we can connect totwo multilayer switches, one for each building.
* Each Floor will have a multilayer switch for the Switch Devices present in Lab
* Star Topology is implemented for connection from Switch to Multilayer Switch in each floor.
* Each Lab has around 25-30 PC’s. So, min 32 ports per lab. For these PC’s or Terminal, one Switch of 32 Ports / 2 Switch of 16 or 24 Ports is enough will be present in each lab.

# Access Layer Design:

* Building A has around 450 Terminals (around 29 Switches of 16 Ports each)
* Building B has 130 Terminals(around 9 Switches of 16 Ports each)
* Stackable switches

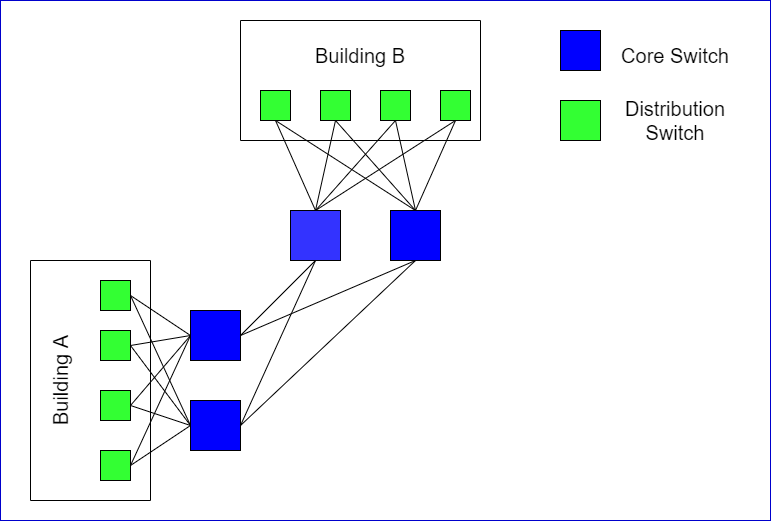


# Distribution Layer Design:

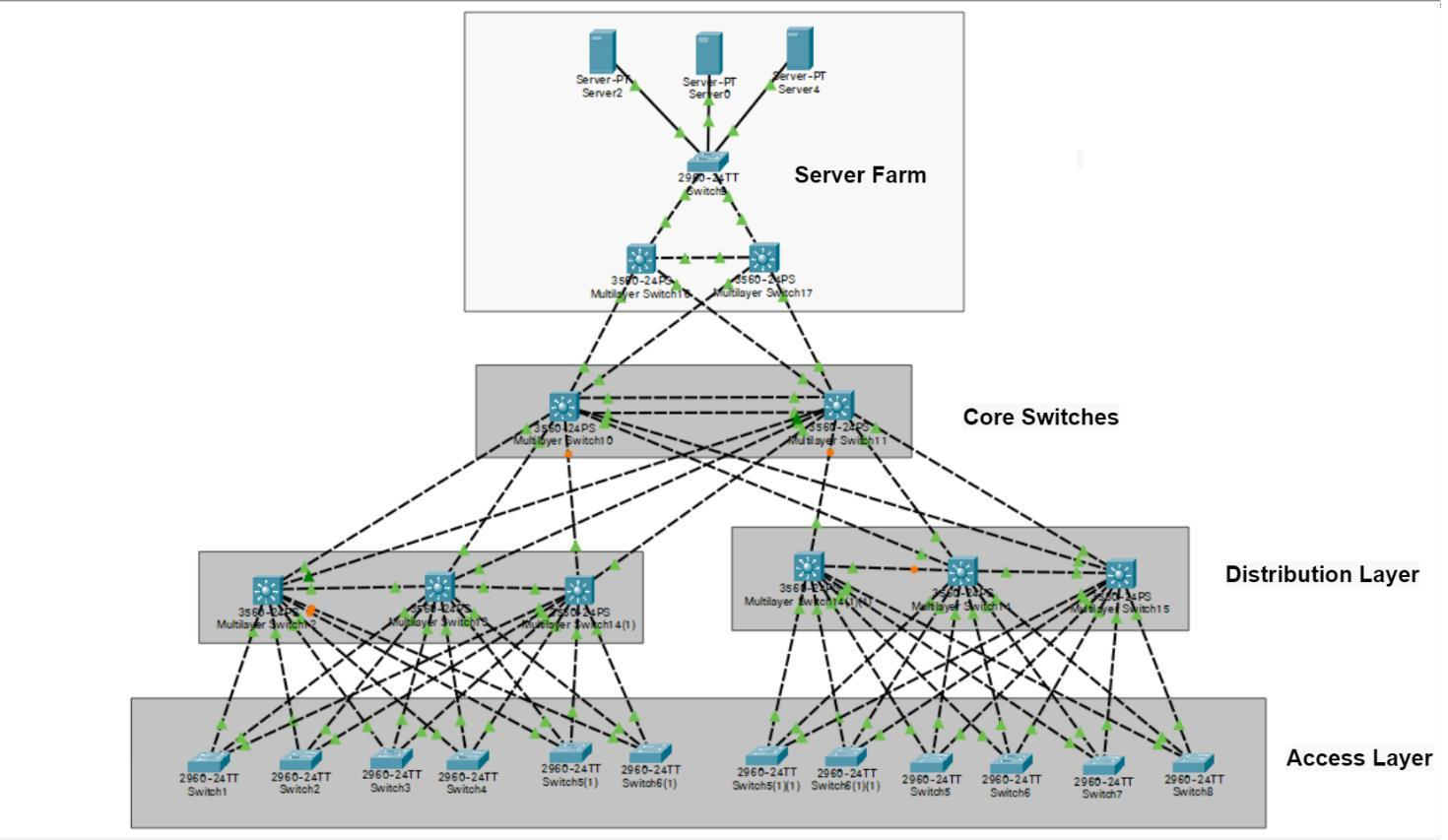
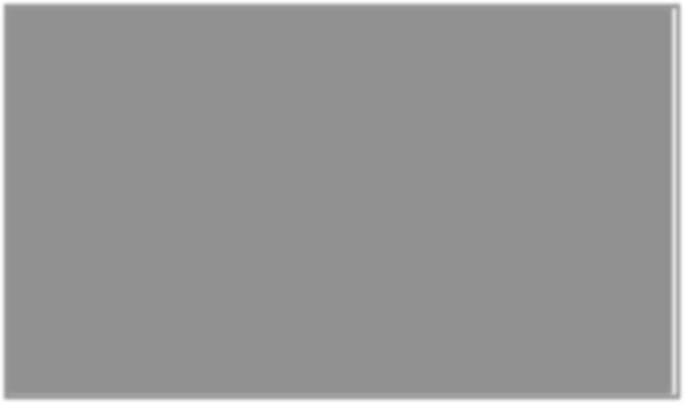
* Each Floor will have a multilayer switch, which will be connected to the core layer switches.
* We can implement 2 switches at device level redundancy or we can setup infra to access multilayer switches from one floor above or below.
* Each Distribution Switch will be handling lab switch devices, to which the lab terminals are connected.
* Link Level Redundancy is required between access and distribution layer

# Campus Core Design:

* Device level redundancy is required between distribution and core layer
* 4 High-Capacity Ports (with upto 12Gbps link speeds) for connecting Server Farm to Core Layer with port specification



# Network Infrastructure Design:



**Access Layer Hardware:**

|  |  |  |  |
| --- | --- | --- | --- |
| Location | Switch / Router Model | Number of Port Required | Cost of Switch + Add-On (if applicable) |
| Building A | Cisco 2960 Series WS- C2960-48TT-L V04 1U | 450 (29  Switches) | Total cost = 5,900 \*29  = 171100 |
| Building B | Cisco 2960 Series WS- C2960-48TT-L V04 1U | 130 (9 Switches) | Total cost= 5,900 \*9  =53100 |

**Distribution Layer Hardware:**

|  |  |  |
| --- | --- | --- |
| Location | Switch / Router Model | Cost of Switch +Add-On (if applicable) |
| Building A | S3150- 8T2FP, 8-  Port Gigabit,2 1Gb SFP  Uplinks | For one INR 11807 Total cost= 4 \*11807  = 47228 |
| Building B | S3150- 8T2FP, 8-  Port Gigabit,2 1Gb SFP  Uplinks | For one INR 11807 Total cost= 3 \*11807  = 35421 |

**Core Layer Hardware:**

|  |  |  |
| --- | --- | --- |
| Location | Switch / RouterModel | Cost of Switch + Add-On (if applicable) |
| Building A | Catalyst 9500  40-G 12- and 24-port switches speed 100/40-Gbps | For one INR 1,82,28,24  Total cost= 2 \*1,82,28,24  = 3,64,56,48 |
| Building B | Catalyst 9500  40-G 12- and  24-port switches speed 100/40 Gbps | For one INR  1,82,28,24  Total cost= 2 \*1,82,28,24  = 3,64,56,48 |

**SERVICE IMPLEMENTATION:**

* CAT6 Cables must be used for linking between access layer and distribution layer.
* Configuration of DHCP to give each terminal of the network an IP Address to connect to the internet.
* We can also configure a VPN on a DNS for monitoring and logging purposes, and also to manage traffic, and restrict access to unwanted websites.
* We need to also implement Intrusion Detection and Prevention Systems, to prevent against attacks like DoS Attack, IP Spoofing etc.
* We will have to implement Routing Protocols such as RIP or EIGRP, between Distribution Layer and Core Layer, so that there is a faster deterministic convergence for distribution layer between redundant links. Triangle Redundancy must be implemented for faster convergence.

# IP Address Allocation Scheme:

|  |  |
| --- | --- |
| Location | IP Address Range / Mask |
| Building A, 1st floor | 172.16.0.0 – 172.16.0.63 / 255.255.255.192 |
| Building A, 2nd floor | 172.16.1.1 - 172.16.1.254/ 255.255.255.0 |
| Building A, 3rd floor | 172.16.1.128- 172.16.0.190 /255.255.255.192 |
| Building B, 1st floor | 172.16.2.1 - 172.16.2.30/ 255.255.255.224 |
| Building B, 2nd floor | 172.16.2.30 – 172.16.2.127 / 255.255.255.192 |
| Building B, 3rd floor | 172.16.2.128- 172.16.2.190 /255.255.255.192 |
| Server Farm | 192.168.1.0 – 192.168.1.255 / 255.255.255.0 |

**Conclusion:**

By performing this experiment, I was able to design an Enterprise Campus Network, and I understood what all hardware is required, and how such a network infrastructure is created.