

LAN Design for IIIT-H

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2019202002

Objective: To design LAN Network architecture for college.

Assumptions:

1. There are 6-7 buildings in which at a time not more than 200 people are present.
2. There are 5 Hostels where internet connection will be provided through LAN Ports, and a maximum of 300 students reside and a minimum of 100.
3. Since the area of college is reasonably smaller, we don't require any Repeaters.
4. The topology will not be changed quite frequently, thus devices that are to be used will also not be frequently changed/replaced.
5. There will be a separate VLAN for
 - a. Hostels + Research Labs
 - b. Faculty Rooms
 - c. Admin Block
 - d. Fingerprint Sensors
 - e. CCTV Cameras
6. Since devices have provisions for different types of ports, thus we don't require media converters.
7. A provision for redundant links all across the campus if the primary link goes down, or there is a device failure.

Cables Used:

1. Optical Fibre - Spread all across the campus, not inside the buildings.
2. Shielded Twisted Pair Cables(CAT 6/CAT 5e) - Used to connect devices within buildings. These can be used without using any

repeaters for distances upto 5-6km hence will be perfect for installing them in buildings and hostels.

Gateway - It serves as an entry and exit point of the network.

Proxy Server - It acts as an intermediary between the users and the Internet so that the campus can ensure security, administrative control, and caching service.

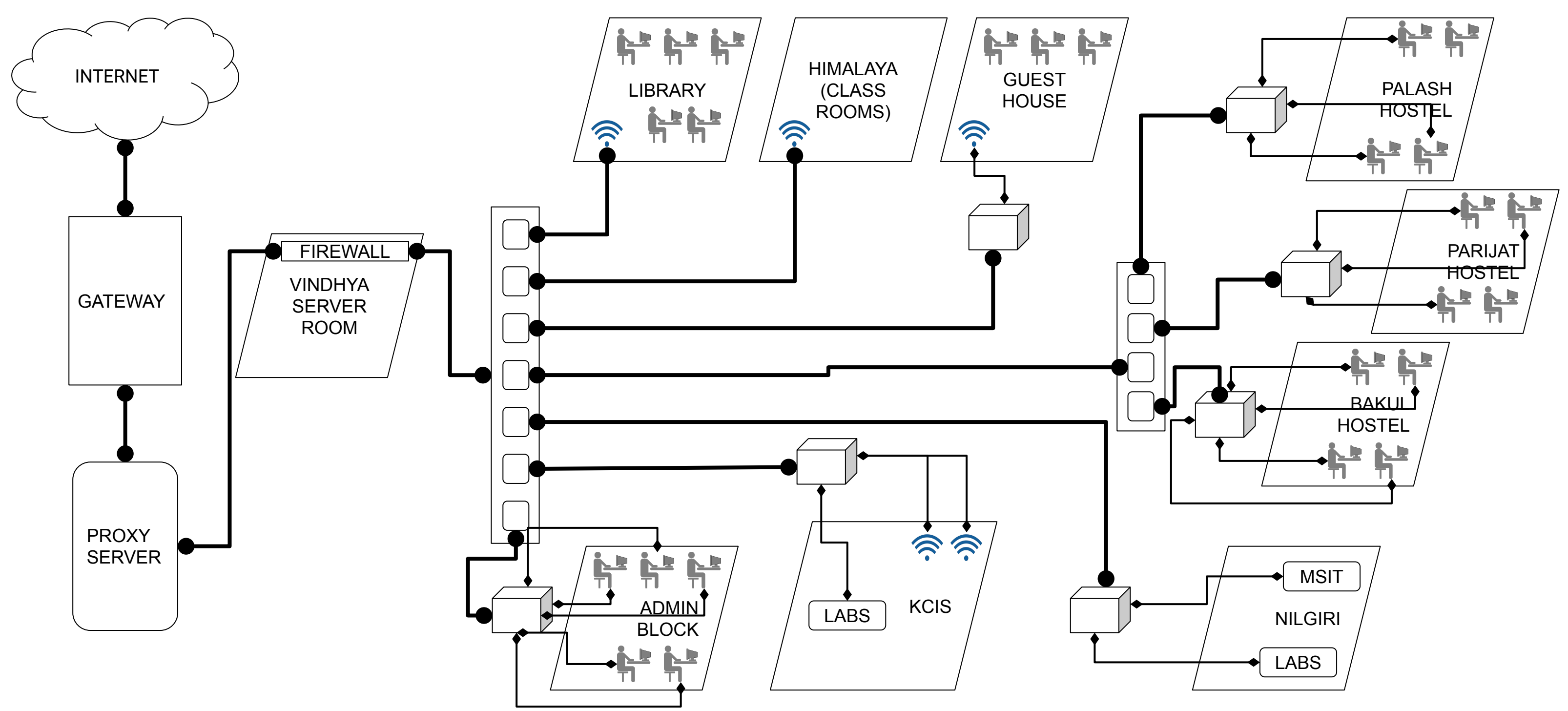
Firewall - It is used to ensure the security of the network.

Switches:

1. Layer 3 Switch - It is used for routing within the campus. Since it mostly uses Layer 2 information to route the packets so it is faster than a router. The state of the network and connected devices doesn't change frequently within the campus, thus routing can be done using layer 2 information and thus Layer 3 Switch is a better option than a router, and is also cheaper.
2. Layer 2 Switch - These are used within the buildings to switch packets between multiple connected devices.

Wifi Access Point - Used in some buildings to provide wireless access to the internet.

ISP - NKN 10Gbps.



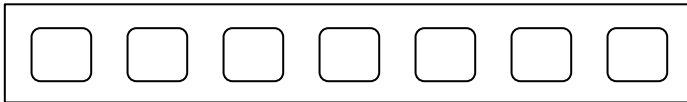
LEGEND



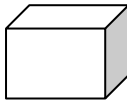
CAT 6/CAT 5e Cable
(Shielded)



Optical Fibre



Layer 3 Switch



Layer 2 Switch



User/Terminal Node



Access Point

IP ADDRESSING SCHEMA

The Internet Protocol Address (or IP Address) is a unique address that computing devices such as personal computers, tablets, and smartphones use to identify itself and communicate with other devices in the IP network. Any device connected to the IP network must have a unique IP address within the network.

These are of two types:

1. Public IP
2. Private IP

Public IP - Public IPs are IP addresses that a home/business router receives from the Internet Service Provider(ISP). In my case, the Proxy Server uses the Public IP to access any website which is not in it's cache. Thus, every device connected to the IIIT network will have the same Public IP.

Private IP - A private IP address is an IP address that's reserved for internal use behind a router or other Network Address Translation (NAT) device, apart from the public.

IANA has the following ranges reserved as Private IPs:

1. 10.0.0.0 to 10.255.255.255
2. 172.16.0.0 to 172.31.255.255
3. 192.168.0.0 to 192.168.255.255

This means, every device connected with IIIT Network would have a private IP assigned to it, but they all will have the same Public IP.

In IIIT-H, we use the 1st class of private IPs, i.e. 10.0.0.0 to 10.255.255.255.

Private IP Allocation:

1. Palash Hostel - 10.1.x.x
2. Parijat Hostel - 10.2.x.x
3. Bakul Hostel - 10.3.x.x
4. Nilgiri Building - 10.4.x.x
5. Himalaya Block - 10.5.x.x
6. KCIS - 10.6.x.x
7. Admin Block - 10.7.x.x

Parijat Hostel:

Floor	IP Address Range	Broadcast Address
Ground Floor	10.2.0.1 to 10.2.1.254	10.2.1.255
1st Floor	10.2.2.1 to 10.2.3.254	10.2.3.255
2nd Floor	10.2.4.1 to 10.2.5.254	10.2.5.255

Bakul Hostel:

Floor	IP Address Range	Broadcast Address
Ground Floor	10.3.0.1 to 10.3.1.254	10.3.1.255
1st Floor	10.3.2.1 to 10.3.3.254	10.3.3.255
2nd Floor	10.3.4.1 to 10.3.5.254	10.3.5.255
3rd Floor	10.3.6.1 to 10.3.7.254	10.3.7.255
4th Floor	10.3.8.1 to 10.3.9.254	10.3.9.255

Nilgiri Building:

Assumption - Approximately 300 systems are there on each floor, considering labs in MSIT, Placement Office and Teaching labs. So assigning ~1022 private IPs

Floor	IP Address Range	Broadcast Address
Ground Floor	10.4.0.1 to 10.4.3.254	10.4.3.255
1st Floor	10.4.4.1 to 10.4.7.254	10.4.7.255

2nd Floor	10.4.8.1 to 10.4.11.254	10.4.11.255
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Himalaya Block(Classrooms):

Assumption - 7 classes per floor and 1 system connected to Ethernet in each class. So assigning ~14 IP addresses per floor.

Floor	IP Address Range	Broadcast Address
Ground Floor	10.5.0.1 to 10.5.0.14	10.5.0.15
1st Floor	10.5.0.17 to 10.5.0.30	10.5.0.31
2nd Floor	10.5.0.33 to 10.5.0.46	10.5.0.47
3rd Floor	10.5.0.49 to 10.5.0.62	10.5.7.63

KCIS:

Assumption - Labs are from 1st floor, and each floor has ~510 IP Addresses.

Floor	IP Address Range	Broadcast Address
1st Floor	10.6.0.1 to 10.6.1.254	10.6.1.255
2nd Floor	10.6.2.1 to 10.6.3.254	10.5.3.255
3rd Floor	10.6.4.1 to 10.6.5.254	10.5.5.255

Admin Block:

Type	IP Address Range	Broadcast Address
Admin	10.7.0.1 to 10.7.0.127	10.7.0.128
Accounts	10.7.0.129 to 10.7.0.254	10.7.0.255

