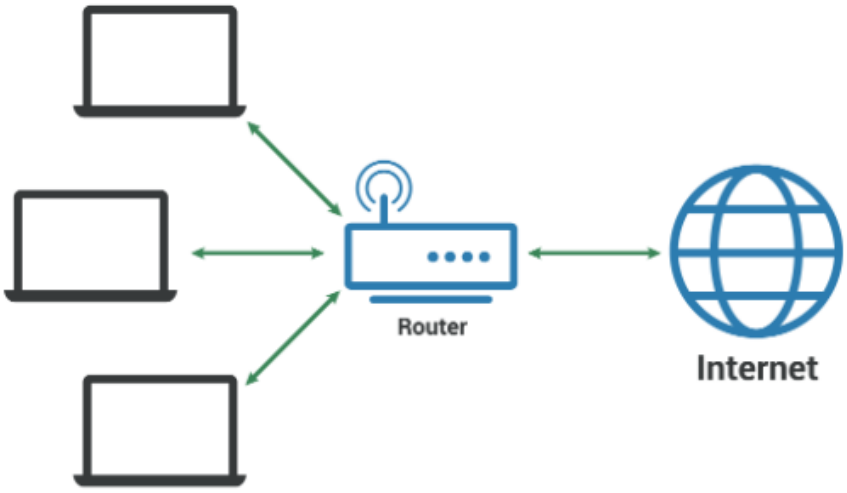
Networking KT-2

LAN

A local area network (LAN) is a collection of devices connected together in one physical location, such as a building, office, or home. A LAN can be small or large, ranging from a home network with one user to an enterprise network with thousands of users and devices in an office or school.
LANs can also be fairly large, although if they take up multiple buildings, it is usually more accurate to classify them as wide area networks (WAN) or metropolitan area networks (MAN).



➢ How do LANs work?

Most LANs connect to the Internet at a central point: a router. Home LANs often use a single router, while LANs in larger spaces may additionally use network switches for more efficient packet delivery.

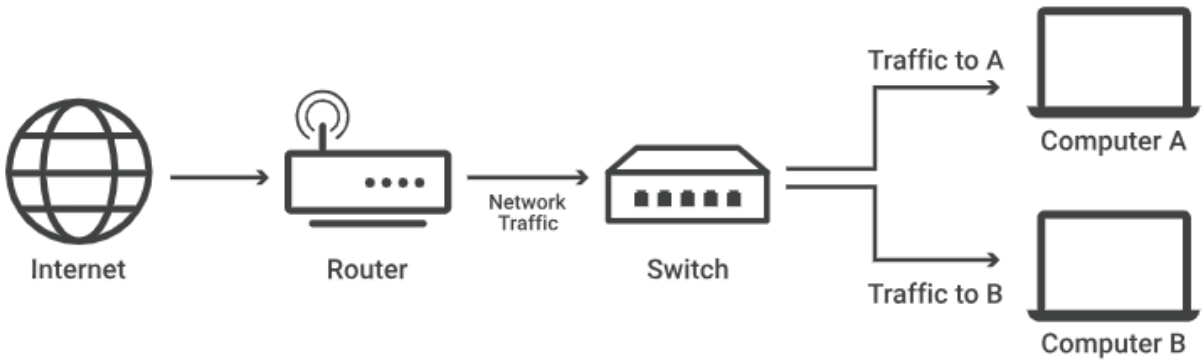
LANs almost always use Ethernet, WiFi, or both in order to connect devices within the network. Ethernet is a protocol for physical network connections that requires the use of Ethernet cables. WiFi is a protocol for connecting to a network via radio waves.

What is a Router?

➔ A router is a device that connects two or more packet-switched networks or subnetworks. It serves two primary functions: managing traffic between these networks by forwarding data packets to their intended IP addresses, and allowing multiple devices to use the same Internet connection.

What is a network switch?

➔ A network switch connects devices within a network (often a local area network, or LAN*) and forwards data packets to and from those devices. Unlike a router, a switch only sends data to the single device it is intended for (which may be another switch, a router, or a user's computer), not to networks of multiple devices.



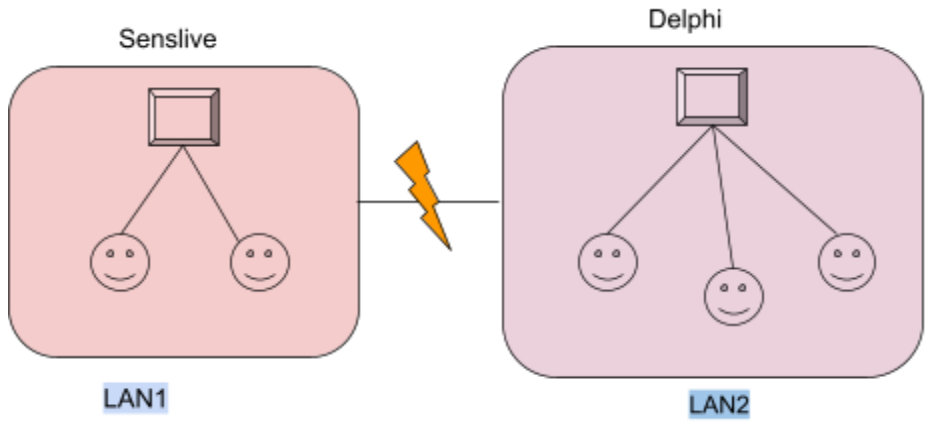
Hierarchy:

1. Internet
2. Router
3. Switch
4. Computers

Router vs Switch

Router	Switches
Share a network connection with multiple devices	Limited features for controlling broadcasts
Delivers data packets in an organized way	Requires inter VLAN routing
Offers a reliable and continuous connection	Multicast data packets requiring complex configuration
Operate at Layer 3 (Network) of the OSI model	Operate at layer two (Data Link Layer) of the OSI model
Maintains IP address in the routing table	Maintains MAC address in a lookup table
Every port has its own broadcast domain	Has only one broadcast domain except VLAN implemented
Can be used for wired and wireless network	Can be used in wired network only

➢ Interconnection between two LANs.

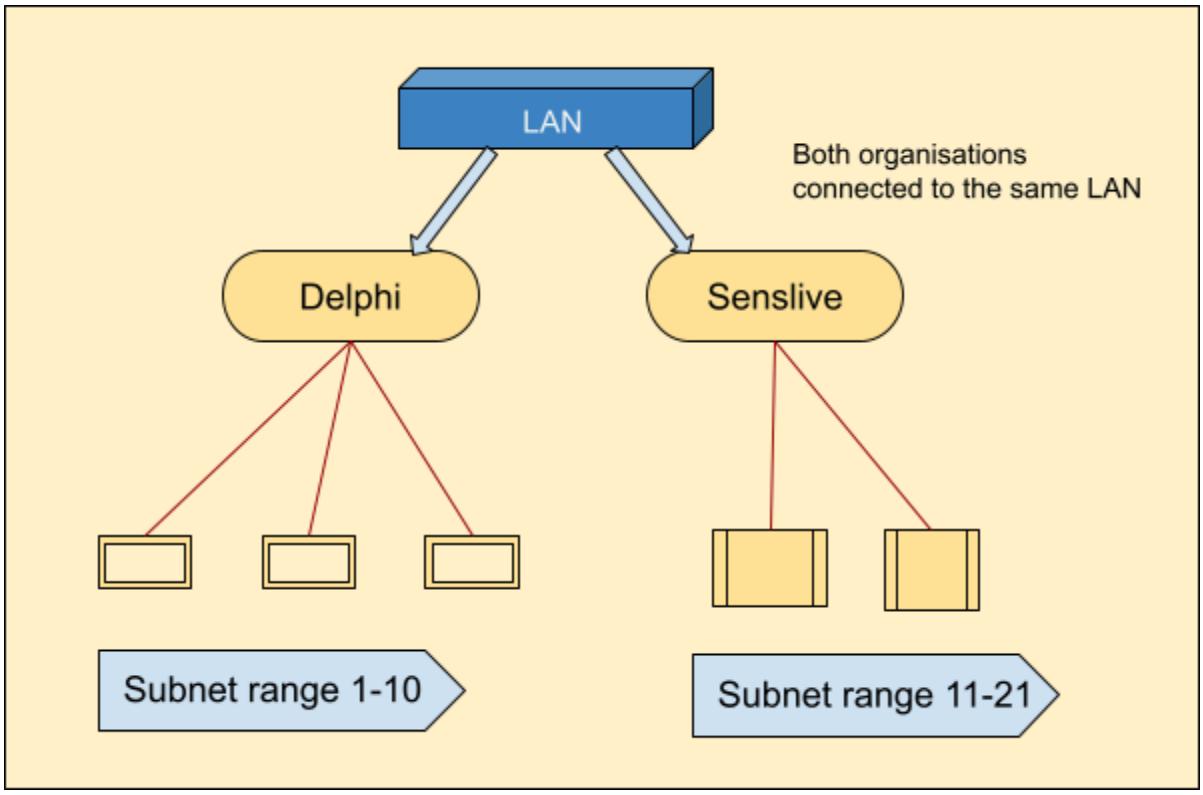


Senslive and Delphi Cannot establish a connection with each other as they have their separate LANs.

Only devices under same LAN can establish connection

➢ What is a virtual LAN?

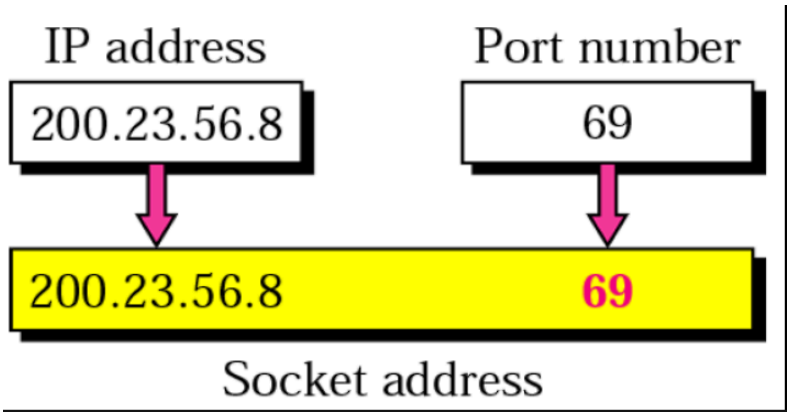
Virtual LANs, or VLANs, are a way of splitting up traffic on the same physical network into two networks. Imagine setting up two separate LANs, each with their own router and Internet connection, in the same room. VLANs are like that, but they are divided virtually using software instead of physically using hardware — only one router with one Internet connection is necessary.



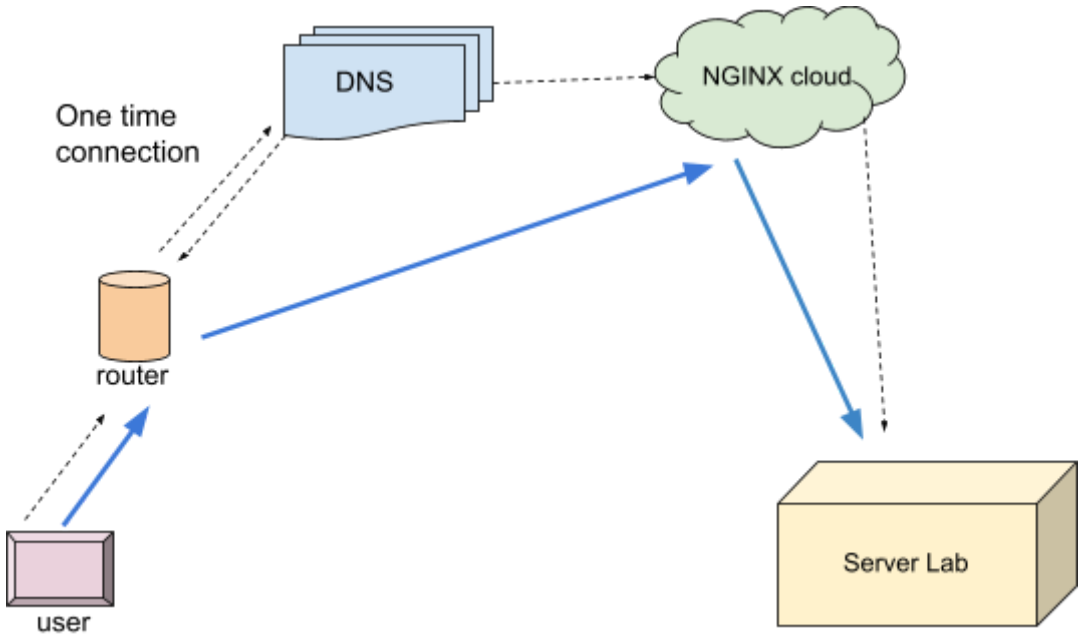
- PORT AND IPs

Analogy: IP is the hotel (device) address. Ports are room numbers for different services on that device. Enables data to reach the right service within a network.

IP Address (Hotel): Unique identifier for a device on a network.
Like a hotel's address, it helps data find its way to the correct destination.
Ports (Room Numbers): Differentiate services on a device. Incoming data directed to specific ports, like guests finding rooms.
Examples: Port 80 for web, 443 for secure web, 25 for email.

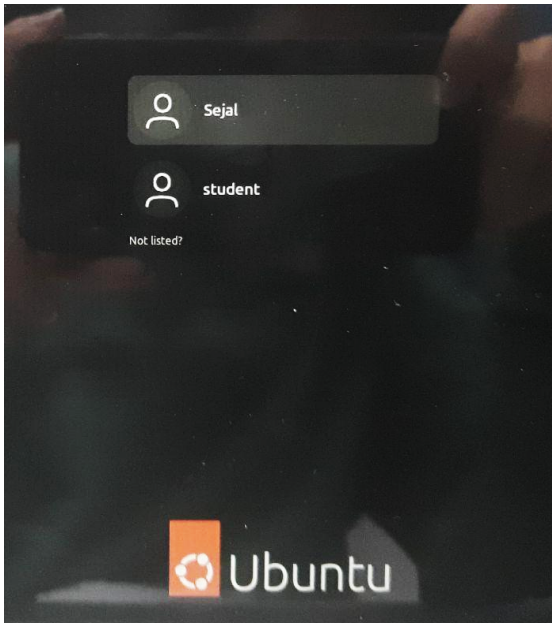


- DNS and NGINX



- Username
- user@computername/IP address
  Ex: root@cloud.delphianalytics.ai

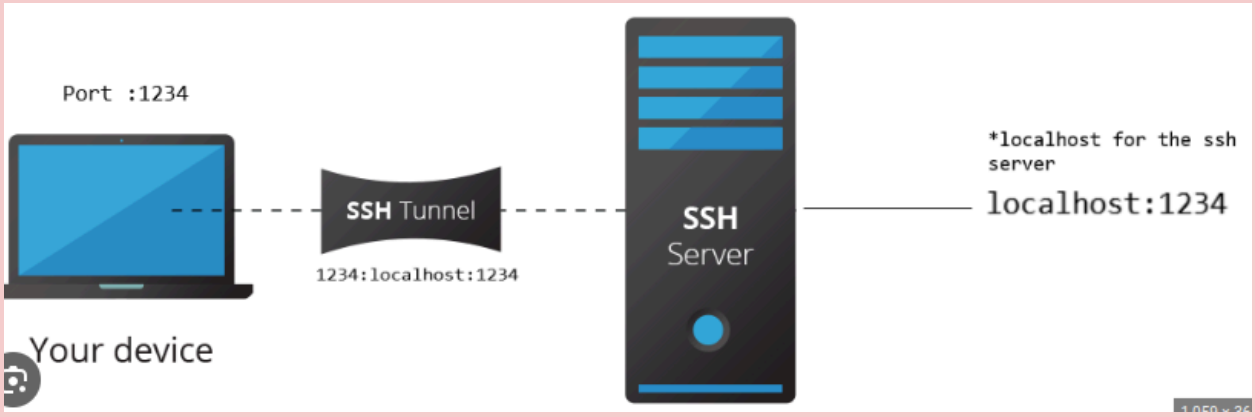
A system may have numerous usernames and respective passwords. Each will have their own separate files and work.
Ex. My system has two usernames: Sejal and Student



- SSH

The Secure Shell (SSH) protocol is a method for securely sending commands to a computer over an unsecured network. SSH uses cryptography to authenticate and encrypt connections between devices.

SSH karna means kisi dusre/remote laptop ke shell ko access karna.



➢ Authentication under SSH

➔ Password

➔ Public and Private key

- SCP

Basic usage

The basic usage of `scp` is as follows:

```
scp file host:path
```

This copies the file to the remote host. The destination `path` is optional, but can be a directory on the server, or even a file name if copying a single file. It is possible to specify multiple files; the last one is the destination.

EX: `scp a.txt root@cloud.delphianalytics.ai: home/sejal`