NETWORKING BASICS FROM SCRATCH

What is Networking?

Networking is how **computers communicate** with each other to **share data** like files, emails, websites, and messages — either over a cable or wirelessly.

Imagine you're sending a parcel — networking is the **postal system** that delivers it.

What are the Types of Networks?

Type	Description	Example
LAN (Local Area Network)	Small, local network	Home, office
WAN (Wide Area Network)	Large network over long distances	Internet
WLAN	Wireless LAN	Wi-Fi in your home
MAN	City-wide network	College campus Wi-Fi

Important Network Devices

Device	Purpose
Router	Connects different networks (like your home to the Internet)
Switch	Connects computers inside a LAN
Hub	Basic version of a switch (old tech)
Modem	Converts internet signal from ISP to usable form

IP Addressing (Simple Terms)

IP (Internet Protocol) address is a **unique number** that identifies a device on a network — like your phone number.

Example: `192.168.1.10`

Type	Use
IPv4	Common (e.g., `192.168.0.1`)
IPv6	Newer (e.g., `2001:0db8:85a3::8a2e:0370:7334`)

Important Networking Commands in Linux

Command	Purpose	Example
`ip a` or `ifconfig`	Show IP address	`ip a`
`ping`	Test connectivity	`ping google.com`
`traceroute`	Show path packets take	`traceroute google.com`
`netstat -tuln`	Show open ports	`netstat -tuln`
`nslookup`	Resolve DNS	`nslookup yahoo.com`
`hostname -I`	Show local IP	`hostname -I`

DNS – Domain Name System

DNS is like a **phonebook** for the internet. It turns **website names** into **IP addresses**.

Example:

```
Netflix.com → 142.250.182.206
```

Command:

```
bash
nslookup Netflix.com
```

Ports and Protocols

◆ What are Ports?

Ports are like **doors** into your computer. Each service has a number.

Service	Port
HTTP	80
HTTPS	443
SSH	22
FTP	21
DNS	53

TCP vs UDP

Feature	TCP	UDP
Full Form	Transmission Control Protocol	User Datagram Protocol
Connection?	Yes (reliable)	No (faster but no confirmation)
Use Cases	Web, Email	Streaming, Online Games

Firewall (Basic Idea)

A **firewall** blocks or allows network traffic based on rules.

Linux command to check firewall:

```
bash
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sudo ufw status
```

To allow/block ports:

```
bash
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sudo ufw allow 22     # Allow SSH
sudo ufw deny 80      # Block HTTP
```

Public vs Private IP

Type	Scope	Example
Private IP	Local network only	192.168.x.x
Public IP	Visible on Internet	13.201.88.120

Use to check:

```
bash
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curl ifconfig.me        # Get public IP
hostname -I             # Get local IP
```

Bonus: Common Tools You Should Learn

- **Wireshark** – For analyzing network traffic
- **tcpdump** – Command-line packet capture
- **Nmap** – Network scanner
- **Netcat (nc)** – Test network connections
