



BEGINNER TO ADVANCED

A Complete Guide — From Zero to Hero

SYED GHOUS

CYBERSECURITY LEARNER

Learn | Build | Secure

■ Andaaza — Kya Kya Seekhoge?

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02. Network Devices	Router, Switch, Modem...
03. OSI Model — 7 Layers	Networking ki buniyad
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Chapter 01 — Network Kya Hota Hai?

Jab do ya zyada computers ek doosre se jur jaate hain — taa ke woh data ya cheezein share kar sakein — toh usse **Network** kehte hain.

■ Soch lo tumhare ghar mein mobile, laptop, aur TV sab ek WiFi se jure hain — yeh ek Network hai. Isi tarah duniya ke sab computers mile hue hain — usse Internet kehte hain.

■ Network ke Qism (Types)

Naam	Full Form	Range	Misal
LAN	Local Area Network	Ek kamra / building	School lab, ghar
WAN	Wide Area Network	Shehar / mulk / duniya	Internet
MAN	Metropolitan Area Network	Ek pura shehar	City cable network
PAN	Personal Area Network	10 meter tak	Bluetooth earphone

■ Yaad raho: LAN = apna ghar, WAN = poori duniya!

Chapter 02 — Network Devices

Yeh woh machines hain jo network chalati hain:

■ Router

Internet se data leta hai aur tumhare ghar ke devices tak pohanchata hai.

■ *Post office — letters sort karke sahi ghar bhejta hai.*

■ Switch

Ek LAN ke andar devices ko aapas mein connect karta hai. Sirf sahi device ko data bhejta hai.

■ *School ka attendance register — sirf apne section ko data.*

■ Hub

Switch ka purana aur bekar version — data SABKO bhejta hai, chahe unhe zaroorat ho ya nahi.

■ *Loudspeaker — sab sunta hai, chahe koi sunna na chahe.*

■ Modem

ISP (Internet Service Provider) se signal leta hai aur router ko deta hai.

■ *Translator — bahar ki zubaan ko ghar ki zubaan mein badalta hai.*

■ Firewall

Network ko nuqsandeh traffic se bachata hai. Sahi traffic ko andar aane deta hai, buri ko rok deta hai.

■ *Security guard — sirf allowed log andar aane denge.*

■ Access Point

WiFi signal broadcast karta hai taake wireless devices connect ho sakein.

■ *Ghar ka WiFi router — sab usse connect hote hain.*

Chapter 03 — OSI Model — 7 Layers

OSI Model networking ki **buniyad** hai. Isko samajh lo toh sab kuch samajh aata hai. Yeh batata hai ke data ek computer se doosre tak **kaise travel karta hai** — step by step, 7 qadam mein.

■ Soch lo tum ek khat likh rahe ho. Likhna, envelope mein daalna, address likhna, post office le jaana, deliver karna — yahi 7 layers hain!

Layer #	Naam	Kya Karta Hai?	Misal
7 — Top	Application	User ke apps ke liye data	Chrome browser, WhatsApp
6	Presentation	Data ka format / encryption	SSL, JPEG, MP4
5	Session	Connection kholta aur band karta	Login session
4	Transport	Data ki delivery ensure karta	TCP, UDP
3	Network	Sahi rasta dhundta hai	IP address, Router
2	Data Link	Data frames mein todta hai	MAC address, Switch
1 — Bottom	Physical	Actual cables / signals	Ethernet cable, WiFi

■ Yaad Karne ka Trick

■ "All People Seem To Need Data Processing" A=Application, P=Presentation, S=Session, T=Transport, N=Network, D=Data Link, P=Physical

■ Cybersecurity mein yeh model bohot kaam aata hai — har attack kisi na kisi layer par hota hai!

Chapter 04 — IP Address — Har Device Ka Pata

Jaise har ghar ka ek address hota hai, isi tarah internet par har device ka ek **IP Address** hota hai. Iske bina data kisi ko nahi mil sakta.

■ *IP Address = Ghar ka postal address. Bina address ke letter nahi pahunchega!*

■ IPv4 — Pehla Aur Common Type

IPv4, 192.168 aur 10.x.x.x parts hote hain. 192.168 ko 255 ka Data se flag hote hain. Yeh address internet par har device ko identify karta hai.

■ IPv6 — Naya Type (Zyada Addresses)

IPv6, 2008 mein banaya gaya tha. IPv4 addresses khatam ho rahi thi, isliye IPv6 naya type address provide karta hai.

Type	Range	Use
Private IP	192.168.x.x	Ghar / office ka network
Private IP	10.x.x.x	Bari companies ka network
Public IP	ISP deta hai	Internet par tumhara address

■ Commands — Apna IP Kaise Pata Karein?

1. Windows mein ipconfig aur Linux mein ifconfig command use karke apna IP pata kar sakte hain.

Chapter 05 — MAC Address — Hardware Ka ID Card

MAC Address har network card ka **permanent unique ID** hota hai. Yeh factory mein hi likha jata hai aur change nahi hota (normally).

■ *IP Address = ghar ka address (badal sakta hai) MAC Address = CNIC number (permanent, unique)*

IP Address har network card ke liye unique hota hai aur har device ko har network par apna ID mil jata hai.

Feature	IP Address	MAC Address
Kaam	Network par rasta dhundna	Local network mein pehchaan
Badal sakta hai?	Haan	Normally nahi
Layer	Layer 3 (Network)	Layer 2 (Data Link)
Misal	192.168.1.5	AA:BB:CC:11:22:33

IP Address har network card ke liye unique hota hai.

Chapter 06 — Protocols — Network Ki Zuban

Protocol matlab rules — woh rules jin par computers aapas mein baat karte hain. Agar protocol nahi hoga toh ek computer doosre ko samajh nahi sakta.

■ *Protocol = zuban / language. Jab tum Urdu mein bolte ho, samne wale ko bhi Urdu aani chahiye. Dono same rules follow karein — tab communication hogi!*

Protocol	Port	Kya Karta Hai?
HTTP	80	Websites — normal (secure nahi)
HTTPS	443	Websites — encrypted aur secure
FTP	21	Files transfer karna
SSH	22	Remote Linux access — secure
DNS	53	Domain name ko IP mein badalna
DHCP	67/68	Automatically IP address dena
SMTP	25	Email bhejna
POP3	110	Email lena
RDP	3389	Windows ka remote desktop
Telnet	23	Remote access — INSECURE, use mat karo!

■ **HTTPS wali websites pe hamesha lock icon hoga. HTTP wali pe sensitive information kabhi mat dena!**

Chapter 07 — Ports — Network Ke Darwaze

Ek computer mein **65,535 ports** hote hain. Har service ek specific port par kaam karti hai — jaise ghar mein alag alag rooms hote hain alag kamon ke liye.

■ *Computer = ek bari building IP Address = building ka address Port = building ka specific room number Jab koi aata hai 192.168.1.1:80 — woh port 80 (HTTP) room mein jaata hai.*

Range	Type	Misal
0 – 1023	Well-known ports (system ke liye)	HTTP (80), HTTPS (443), SSH (22)
1024 – 49151	Registered ports	Apps ke liye
49152 – 65535	Dynamic / private ports	Temporary connections

■ *Ports 0-1023 system ke liye hote hain, 1024-49151 apps ke liye hote hain, 49152-65535 temporary connections ke liye hote hain.*

■ **Cybersecurity mein:** agar koi port khula ho jo hona nahi chahiye — woh ek vulnerability ho sakti hai!

Chapter 08 — TCP vs UDP — Do Delivery Systems

Data bhejne ke **do tarike** hain — TCP aur UDP. Dono alag situations mein use hote hain.

Feature	TCP	UDP
Poora Naam	Transmission Control Protocol	User Datagram Protocol
Reliable?	Haan — delivery confirm karta	Nahi — bhej diya, bas
Speed	Thoda slow	Fast
Use Case	HTTP, FTP, Email, SSH	Gaming, Video call, DNS
Analogy	Registered post — sign karke deliver	Normal post — gaya ki nahi pata nahi

■ TCP Ka 3-Way Handshake

Step 1: Client connects to server (main connect karne chanta hoon) Step 2: Client sends a request to server (request bhej deta hoon) Step 3: Server responds to client (reply deta hoon) Connection established, data transfer hoga.

■ TCP handshake aise hai jaise phone call karo: Tum: 'Hello?' | Dusra: 'Haan, haan?' | Tum: 'Theek hai, baat karo!'

■ TCP = important data ke liye (bank transactions, emails) UDP = speed zaroori ho toh (live games, video streaming)

Chapter 09 — DNS — Internet Ka Phone Book

Jab tum 'google.com' likhte ho, computer ko asal mein ek **IP address** chahiye. DNS is domain name ko IP mein badalta hai — bilkul phone book ki tarah.

■ Phone book mein tum 'Ali' dhundho toh uska number milta hai. DNS mein 'google.com' dhundho toh uski IP milti hai: 142.250.180.46

■ DNS Kaam Kaise Karta Hai? (Step by Step)

```
1. Tum type karo: www.google.com 2. Browser check karo: Apni local cache (yaad hai kya?) 3. Nahi mila → Router se puche 4. Router → ISP ka DNS server se puche 5. ISP → Root DNS servers se puche 6. Root → com DNS se puche 7. com → google.com ka DNS se puche 8. Jawab mila: 142.250.180.46 9. Browser connect kare is IP par is Website mil jayegi
```

```
# DNS lookup command: nslookup google.com & Ya phir: dig google.com
```

■ Google ka public DNS: 8.8.8.8 | Cloudflare ka: 1.1.1.1 Yeh free DNS servers hain jo fast aur secure hain.

Chapter 10 — DHCP — Auto IP Dena

Jab tum kisi network se connect hote ho, tumhe IP address ki zaroorat hoti hai. **DHCP** yeh kaam automatically karta hai — khud IP assign karta hai.

■ *Hotel mein check in karo — receptionist tumhe khud room number de deti hai. Tum nahi dhundhte! DHCP bhi aise IP 'room number' deta hai.*

■ DHCP Ka Process

Step 1 (DISCOVER): Device: "Koi baat hai? IP chahiye!" Step 2 (OFFER): DHCP: "Jo yeh IP: 192.168.1.105!" Step 3 (REQUEST): Device: "Shukriya, main yeh leta hoon!" Step 4 (ACK): DHCP: "Theek hai, yeh IP ab tera hai!" Seth mein milta hai! — Gateway (router): 192.168.1.1, DNS server: 8.8.8.8, Server: 255.255.255.0

■ **Ghar mein router hi DHCP server hota hai — wahi IP deta hai!**

Chapter 11 — Subnetting — Network Ko Hisson Mein Todna

Subnetting ka matlab hai ek bade network ko chhote hisson mein todna. Isse manage karna asaan hota hai aur security bhi behtar hoti hai.

■ Ek bari building ko floors mein divide karo. Har floor ka apna group hai — sab ek doosre se alag, but same building mein.

■ Subnetting ka matlab hai ek bade network ko chhote hisson mein todna. Isse manage karna asaan hota hai aur security bhi behtar hoti hai.

CIDR	Subnet Mask	Kitne Devices?
/24	255.255.255.0	254
/25	255.255.255.128	126
/16	255.255.0.0	65,534
/8	255.0.0.0	16,777,214

■ Yeh topic thoda mushkil lagta hai — practice karo Cisco Packet Tracer mein!

Chapter 12 — Network Security — Attacks Aur Bachao

Jab network hota hai, toh kuch log use galat kamon ke liye use karte hain. Inhe **attackers** kehte hain. Neeche common attacks aur unse bachne ke tarike hain.

Attack	Kya Hota Hai?	Bachne Ka Tarika
MITM (Man-in-the-Middle)	Attacker beech mein aa jaata hai aur data sun ta hai	HTTPS use karo, VPN lagao
DoS / DDoS	Server ko itni requests bhejo ke woh crash ho jaye	Firewall, rate limiting
ARP Spoofing	Fake MAC address bhej ke traffic divert karo	Dynamic ARP inspection
Port Scanning	Attacker open ports dhundta hai	Firewall, unnecessary ports band karo
Phishing	Fake email ya website se password churana	2FA, awareness training

■ Har attack ko samajhna zaroori hai — defender wahi hoga jo attacker ki soch samjhe!

Chapter 13 — Zaroori Commands — Hands-On Practice

Yeh commands roz kaam aati hain. Inhe yaad karo aur practice karo!

ping

Check karo: koi host alive hai?

```
ping google.com ping 192.168.1.1
```

tracert / traceroute

Data ka rasta trace karo

```
tracert google.com # Linux tracert google.com # Windows
```

nslookup / dig

DNS lookup karo

```
nslookup google.com dig google.com
```

ifconfig / ip a

Apni network info dekho

```
ifconfig # Ubuntu 19.4 # macOS Linux
```

netstat / ss

Open ports aur connections dekho

```
netstat -tln # windows ss -tln # linux
```

arp -a

ARP table dekho (MAC to IP)

```
arp -a
```

nmap

Port scanner (sirf lab mein use karo!)

```
nmap -vv 192.168.1.1 nmap -p 80,443 google.com
```

■ Nmap sirf apne lab ya authorized systems par use karo. Doosron par use karna illegal hai!

Chapter 14 — Network Topologies — Shapes of Networks

Topology matlab **network ki shape** — devices kaise aapas mein jure hain.

Topology	Kya Hai?	Faida	Nuqsan
Star	Sab ek central switch se jure	Manage karna asaan	Switch band = sab band
Bus	Ek cable par sab jure	Simple aur sasta	Ek break = sab band
Ring	Circle mein jure	Equal access	Slow, mushkil
Mesh	Sab ek doosre se jure	Redundant, reliable	Mehenga
Hybrid	Do ya zyada mix	Flexible	Complex

■ Ghar mein Star topology use hoti hai (router = center). Internet khud ek Mesh topology hai!

Chapter 15 — Aage Ka Safar — Learning Roadmap

Networking seekhne ke baad, yeh topics seeko — ek ek karke:

Level	Topics	Platform
Beginner	OSI, IP, MAC, DNS, DHCP, TCP/UDP	TryHackMe — Pre-Security
Intermediate	Subnetting, VLANs, Routing, VPN, Firewalls	Cisco Packet Tracer
Advanced	Wireshark, Nmap, Network attacks, IDS/IPS	HackTheBox, TryHackMe
Pro	Packet analysis, SOC, Network forensics, Pentest	OSCP, CEH Certification

■ Practice Tasks — Abhi Karo!

TryHackMe, HackTheBox, Cisco Packet Tracer, Wireshark, Nmap, IDS/IPS, OSCP, CEH Certification, SOC, Network forensics, Pentest, Linux + networking wargames

Platform	Kya Milega?
TryHackMe	Guided rooms, beginner friendly
HackTheBox	Advanced challenges
Cisco Packet Tracer	Network simulator — free!
PicoCTF	CTF challenges — free
OverTheWire	Linux + networking wargames

Networking samajhna Cybersecurity ki neev hai. Jab tak yeh mazboot nahi, hacking tools ka fayda nahi.

— Syed Ghous