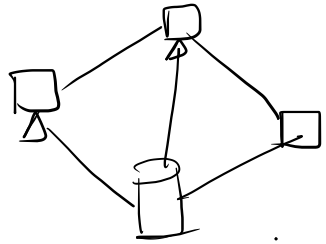
Network Protocols



→ Set of rules for data communication b/w different devices in a network

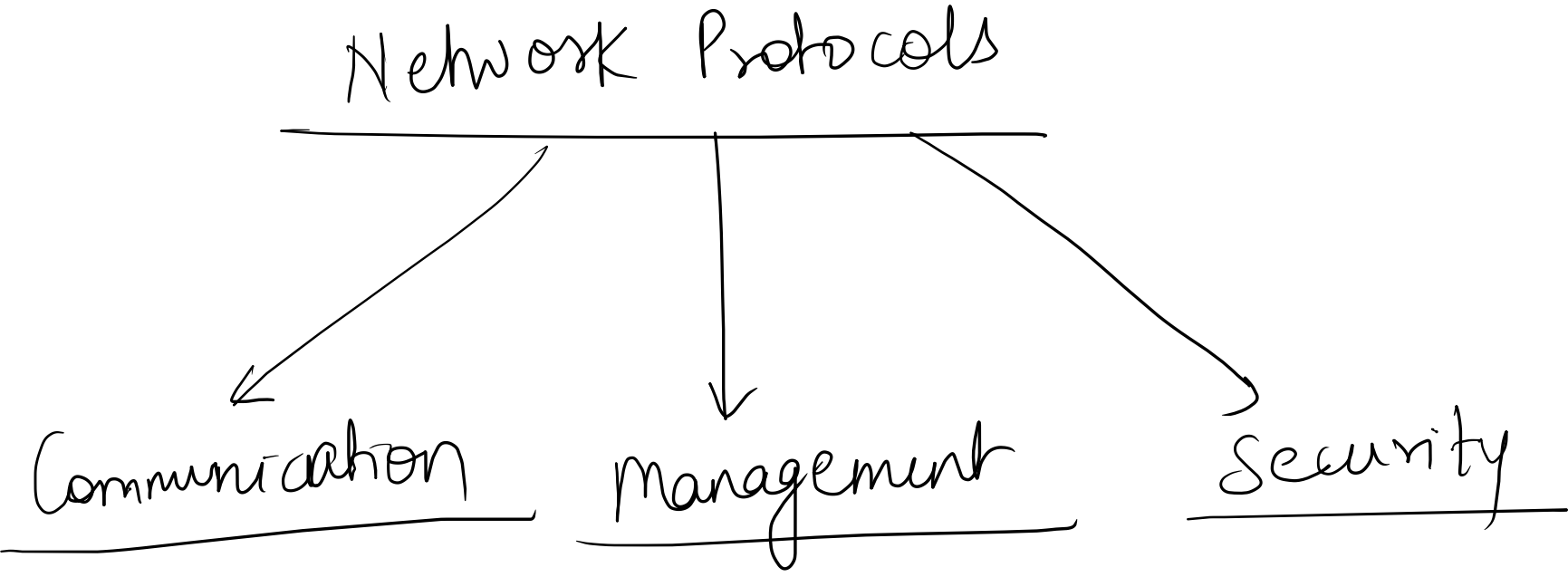
→ Exchange information b/w devices

It determines

1.) what is being communicated?

2.) How it is being communicated?

3.) when it is being communicahon?


Network Protocols
Communication
management
Security

(basic protocol)

① TCP / IP → Internet Protocol (address of destination)

↓

(Transmission control Protocol)

TCP → connection-oriented protocol

reliable

TCP

↳ helps in exchange of messages between diff devices in a network

→ breaks the data into packets and delivers to the destination in correct order

→ reliable

2.) HTTP (Application network protocol)

Hyper-text transfer protocol

→ works on client-server model

→ web data sharing

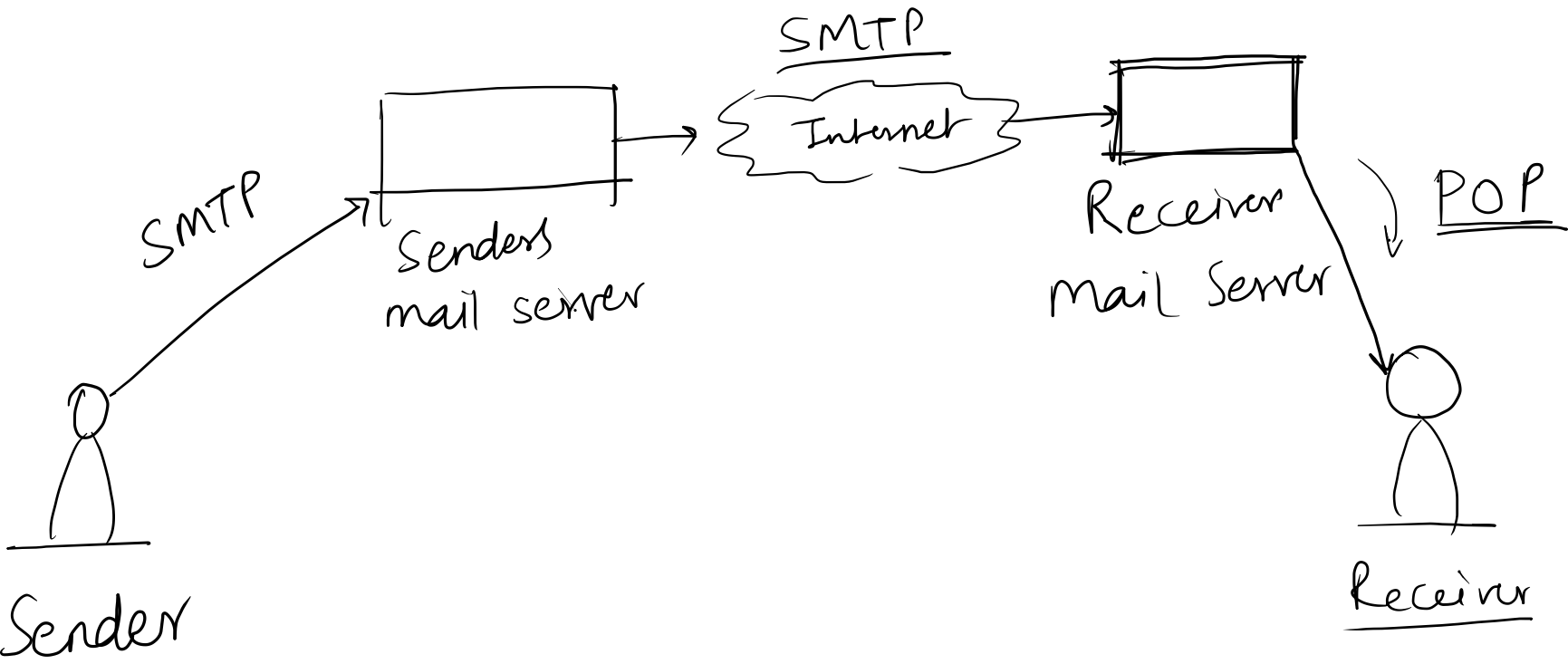
→ transfers hypertext

③ SMTP (push protocol)

(Simple mail Transfer Protocol)

→ Used to send mails

→ transfer mail for one user to another


SMTP
SMTP
Internet
Sender's
mail server
Receiver
mail Server
POP
Sender
Receiver

4) POP (post office protocol)

↳ message access protocol

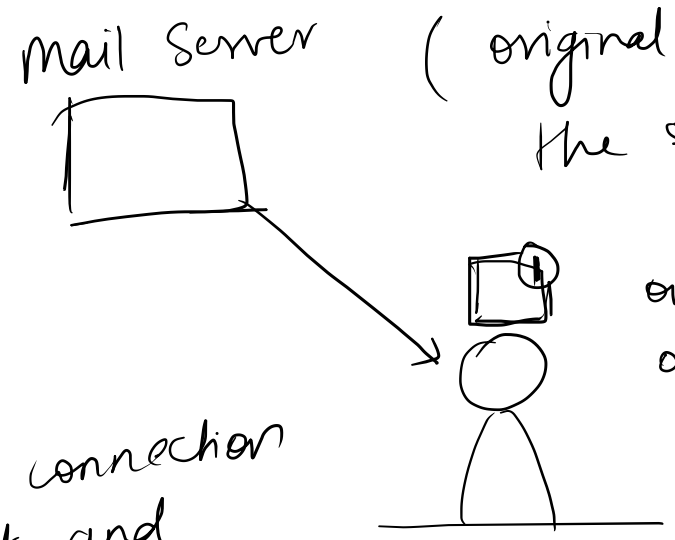
↳ Used for retrieving emails from server.

↳ read emails offline

↳ requires internet only for fetching emails from server.

no backup on server

5.) IMAP (Internet Message access protocol)

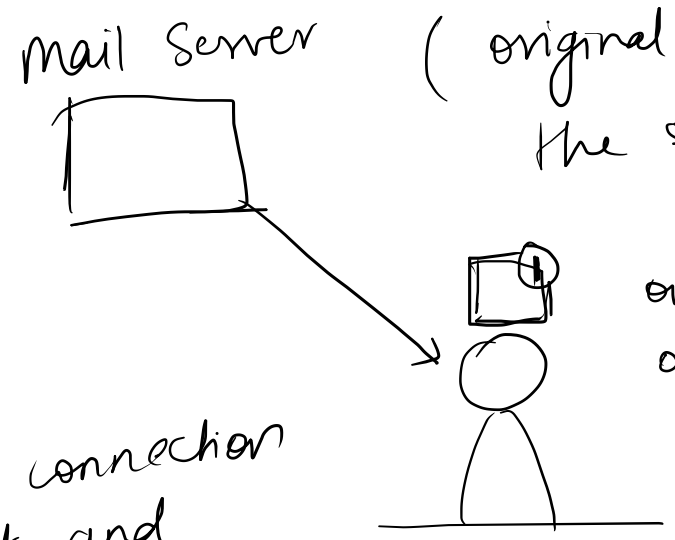


(original stays securely on the server itself)

only renders a copy of the message

(1) Establish a connection between client and mail server. (TCP/IP)

5.) IMAP (Internet Message access protocol)



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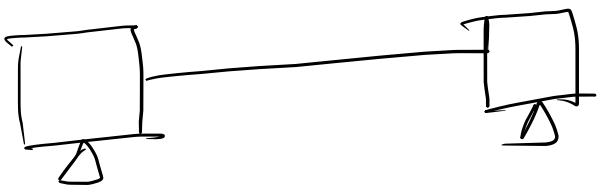
(1) Establish a connection between client and mail server. (TCP/IP)

6.) PPP (point to point)

→ used for transferring data between two directly connected devices.



7.) FTP (file transfer protocol)

↳ Used for transferring file from server to client or vice-versa

→ Uses TCP/IP to establish connection

→ protocol to enable data transfer

8.) UDP (User datagram protocol)

→ It is conechionless protocol.

→ Not reliable

→ when we want faster transmission and reliability not required

→ Real-time services

live telecasting, broadcasting, radio

→ does not retransmit data, in case loss of packets.

Port Numbers

↳ a way to identify specific process

* Standarized ports are assigned
* Reserved for certain protocol and their function

192.168.1.67 : 80

↓ IP address

↓ Port Number

Protocols	Port No.
FTP	21
SMTP	25
PPP	110
IMAP	143
HTTP	80
HTTPS	443

Latency & Throughput

→ we need speed for our service

→ metric to measure network performance

→ identify performance issues

① Latency

* The time taken for a packet to be transferred across a network.

→ can be measured one-way / round trip

→ how long it takes for packets to reach the destination

Network latency

↳ measure of delay

→ If latency is high, it takes longer to transfer the packets to destination

→ slow services

What causes network latency?

→ State of routers

→ distance between network devices

How to improve

→ better path

→ caching

Throughput

↳ The quantity of data being sent & received within a unit of time

→ number of packets processed within a specific period of time.

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What causes poor network throughput?

→ poor hardware performance

→ Congestion in network (too many requests)

→ high latency n poor throughput

How to improve?

→ Improve the bandwidth.

→ Improve the latency.

Latency → milliseconds (ms)

Throughput → bits per second (Mbps)
gigabits per second (Gbps)

Availability

→ percentage of time the service is available

→ uptime

Availability

10 hrs → 9 hrs uptime

→ 1 hr downtime

$\frac{9}{10} \times 100 \sim 90\%$

$$\text{Availability} = \frac{\text{uptime}}{\text{uptime} + \text{downtime}} \left(\times 100\right)$$

Availability → generally measured in 9s

90% one nine

99% two nines

99.9% three nines

99.99% four nines