Computer Networks Assignment -02

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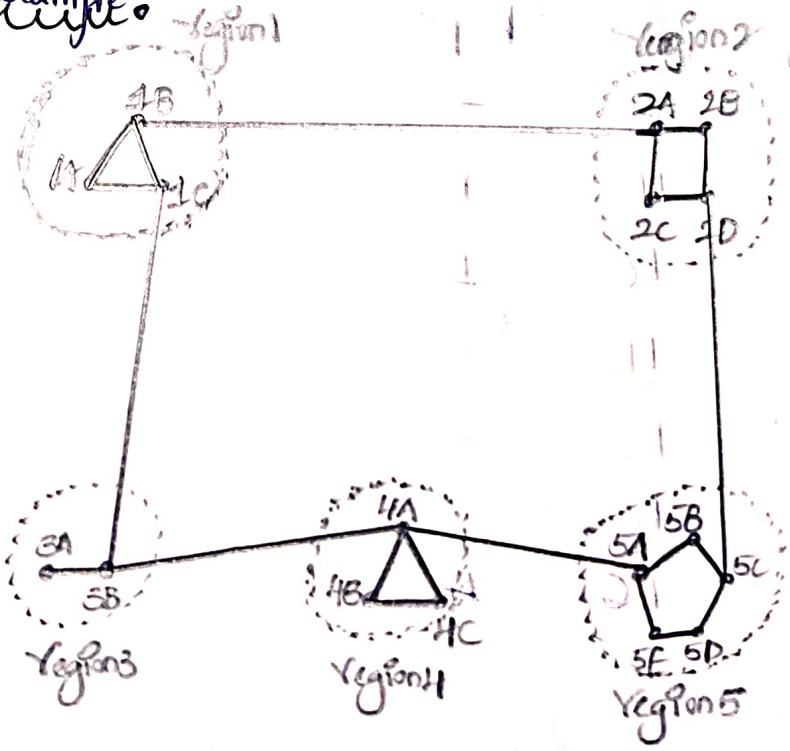
1Q) Illustrate the working of hierarchical routing algorithm with suitable example.

Hierarchical Routing: routers classified into Groups called regions

- Each router has information about the routers in its region and it has no information about routers in other region.
- So routers save one record in their table for every other region.
- For huge Networks a two level hierarchy may be insufficient.
- Hence it may be necessary to Group the regions into Clusters the clusters into Zones the zones into Groups and so on.

Example:



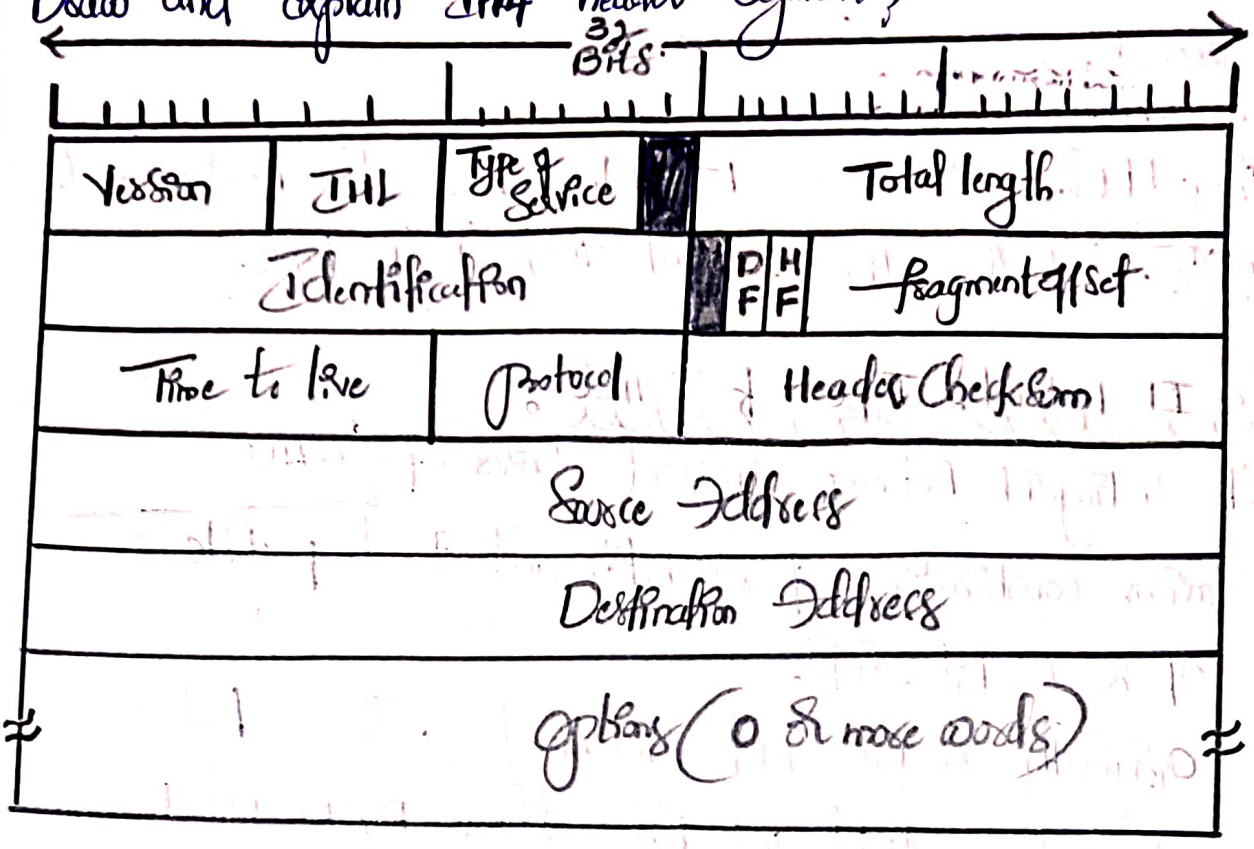
full routing Table:

Destination	Line	hops
1A	-	-
1B	1B	1
1C	1C	1
2A	1B	2
2B	1B	3
2C	1B	3
2D	1B	4
3A	1C	3
3B	1C	2
4A	1C	3
4B	1C	4
4C	1C	4
5A	1C	4
5B	1C	5
5C	1B	5
5D	1C	6
5E	1C	5

The routing is done hierarchically then:

Destination	Line	hops
1A	-	-
1B	1B	1
1C	1C	1
2	1B	2
3	1C	2
4	1C	3
5	1C	4

2) Draw and explain IPV4 header Segment?



IPV4 Header: Version field:

- It keep track of which Version of protocol the datagram Belong to.
- By including the Version in each datagram it Becomes possible to have the Transition Between Versions take years with some machines running the old Versions and others the new one.

IPV4 Header: IHL:

- Since the header length is not constant, a field in the header IHL is provided to tell how long the header is in 32 bit words.
- It is 4-Bit field.

- The Minimum Value is 5 which Means No options are present.
- The Maximum Value is 15 Which limits the header to 60 Bytes and thus the Optional field to 40 Bytes.

The IP Protocol: Type of Service:

- It distinguish Between different Classes of Service.
- Various Combinations of reliability and Speed possible.
- It is 6-Bit field.
- Originally 6-Bit field Contained a three bit Precedence field and Three flags D, T, and R.
- Precedence field was priority from 0 to 7.
- Three flag bits allow host to Specify What it is Most cared Delay, Throughput, Reliability.

IP Protocol: Total length:

- The TOTAL length indicates everything in the datagram both header and data.
  Maximum length is 65535 bytes.
- At present this upper limit is tolerable But with future gigabit Networks larger datagrams may be Needed.

38) Draw and explain the Working of Simple Mail Transfer protocol (SMTP)?

SMTP: protocol used for Sending emails, it operates primarily at Client Server Model Communicates with email Server to deliver Messages.

Working:

Client Initiation:
User Send Email Via Their Email Client (Gmail etc).
They Connect to SMTP Server.

SMTP HandShake: Client establishes Connection with SMTP Server using TCP port 25. SMTP responds with "220 ok" Message Signaling ready to accept mail.

Sender's Email information:
Client Sends HELO or EHLO followed by IP Address / DomainName to Identify itself to Server. Server responds "250 ok" Message.

Sender Recipent Information:
Client Send Senders email address using MAIL FROM Command.
Server responds "250 ok" Message.
Client Sends Recipent Email RCPT TO
Server responds "250 ok" Message to Acknowledge Recipent.

Message Data:

Client Sends DATA Command to indicate ready to Send Message body.

Server responds with "354 Start mail input; end with <CRLF><CRLF>". Signaling Body of Msg will follow.

Email Content:

Email Client Sends the content of email to SMTP Server

Ending the Communication:

Once The entire Message has been Sent The Client ends with . & New line.

- Server responds "250 ok" Message received & queued for delivery.

Mail Delivery:

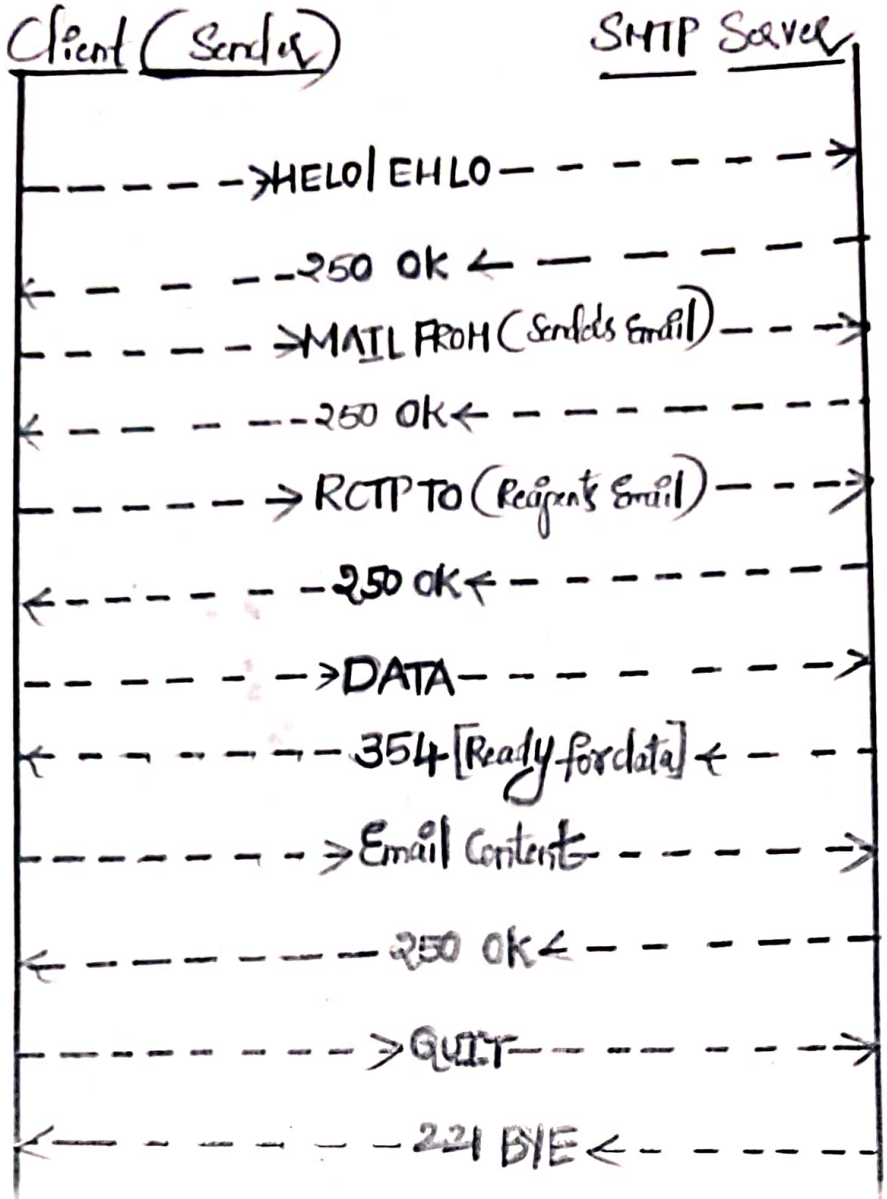
SMTP directly Send mail to recipient's SMTP Server or relays to Another Mail Server.

Source forward Msg to Another Server Server repeat Same process to ensure Message reaches to recipient.

Closing the Connection:

Client Sends the QUIT to Close the Connection.

Server responds "221 Bye". Connection Terminated.


Client (Sender)
SMTP Server
HELO/EHLO
250 OK
MAIL FROM (Sender's Email)
250 OK
RCTP TO (Recipient's Email)
250 OK
DATA
354 [Ready for data]
Email Content
250 OK
QUIT
221 BYE