CS 655
Computer Networks

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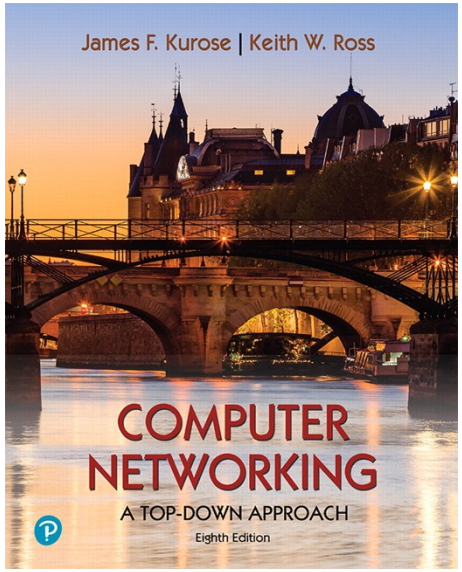
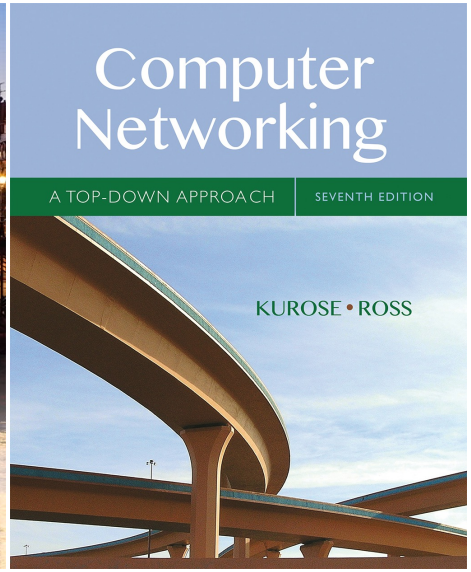
Chapters 4 & 5
Internetworking

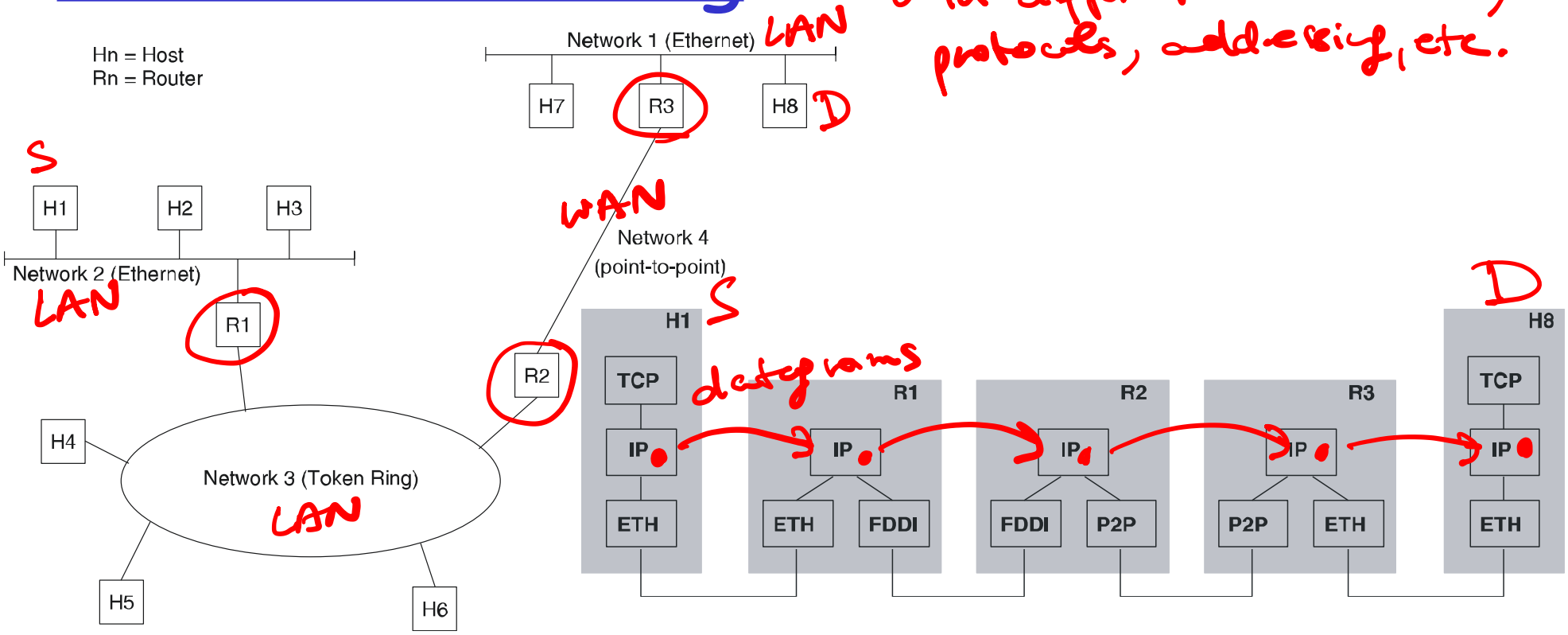




Computer Networking: A Top-Down Approach, 8th edition. Jim Kurose, Keith Ross. Pearson. 7th edition is OK too!

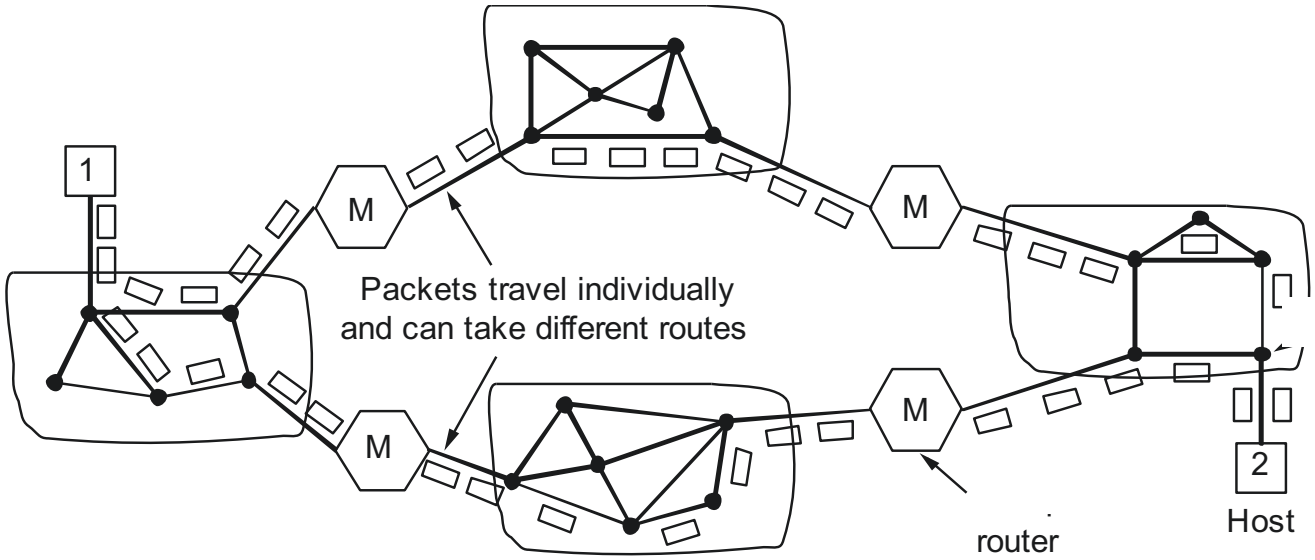
Internetworking

different subnets with different architectures, protocols, addressing, etc.



- Service Model:
  - Packet Delivery Model
  - Global Addressing Scheme

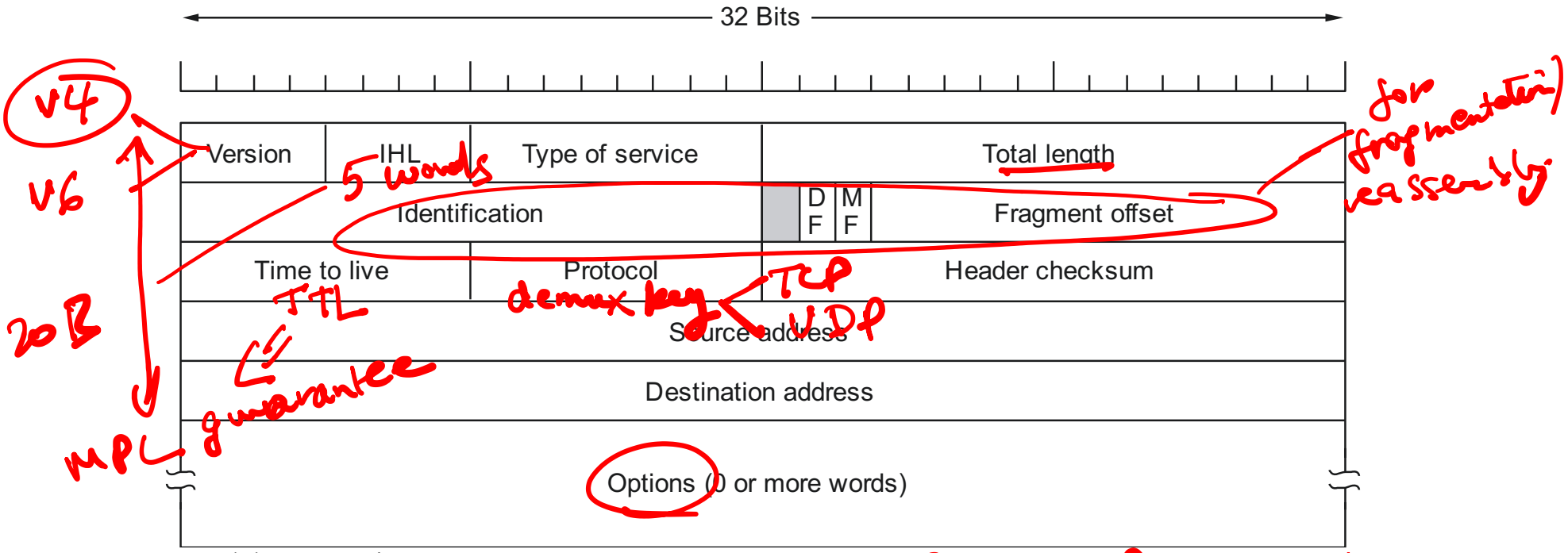
Packet Delivery Model



- Connectionless (datagram-based)
- Best-effort delivery (unreliable service)
  - packets can be lost
  - packets can be delivered out of order
  - duplicate copies of a packet can be delivered
  - packets can be delayed for a long time

Datagram Format

IPv4 address 32 bits
2^{32} addresses

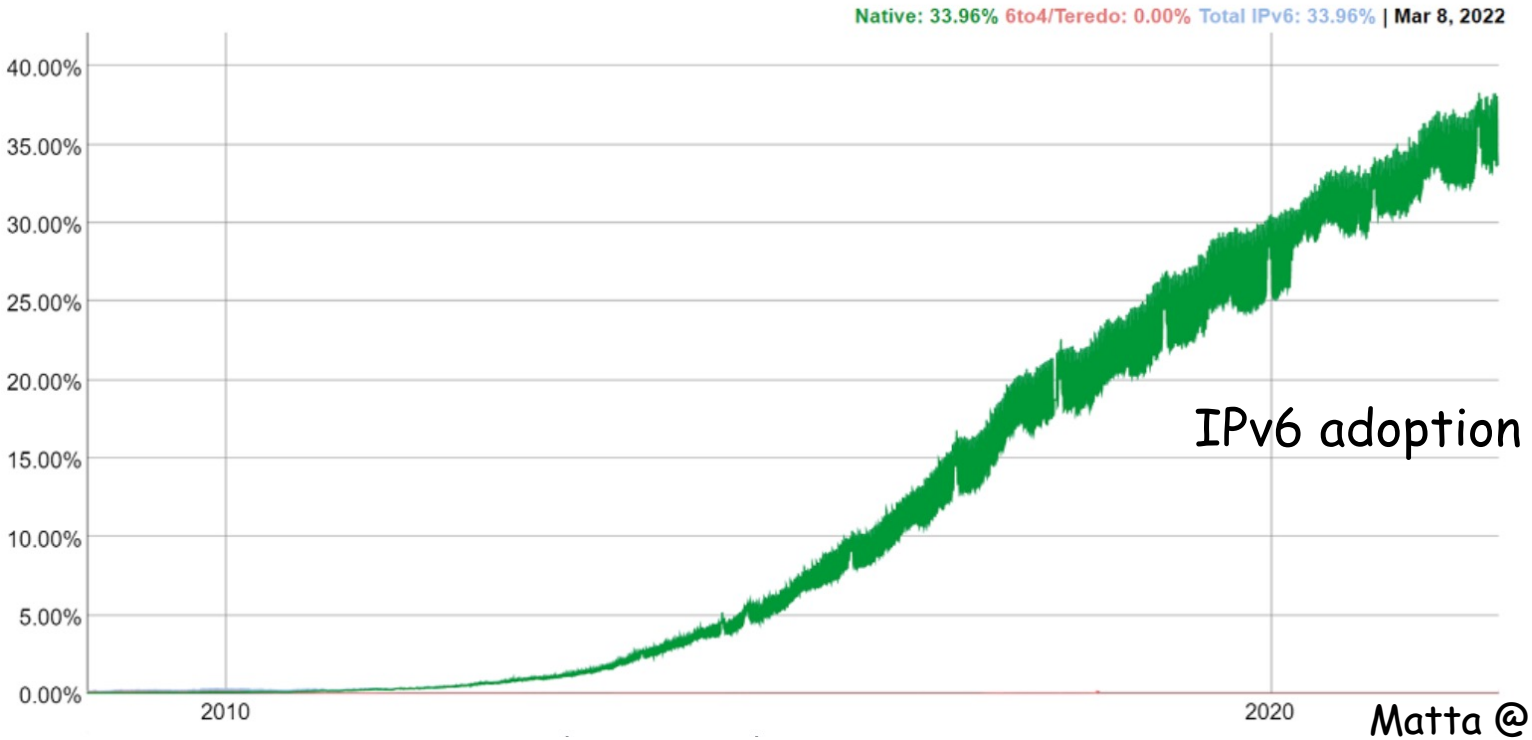


- Version (4): currently 4, new version is 6
- Hlen (4): number of 32-bit words in header
- TOS (8): type of service (not widely used)
- Length (16): number of bytes in this datagram
- Ident (16): used by fragmentation to identify fragments belonging to same original IP packet (datagram)
- Flags/Offset (16): used by fragmentation to identify where this fragment belongs in original datagram
- TTL (8): number of hops this datagram has traveled, used to detect datagram loops
- Protocol (8): demux key (TCP=6, UDP=17)
- Checksum (16): of the header only
- DestAddr & SrcAddr (32), Options: source route, record route, ...

IPv6 deployment

IPv6 128 bits address
2^{128} addresses

- IPv6 standardized around 1998
- In 2008, IPv6 still accounted for less than 1% of Internet traffic
- Since 2011, IPv6 has been increasingly implemented in Operating Systems, mandated by governments and cellular providers for new network devices, ….



IPv6 adoption by Google users