ROSE-HULMAN
INSTITUTE OF TECHNOLOGY

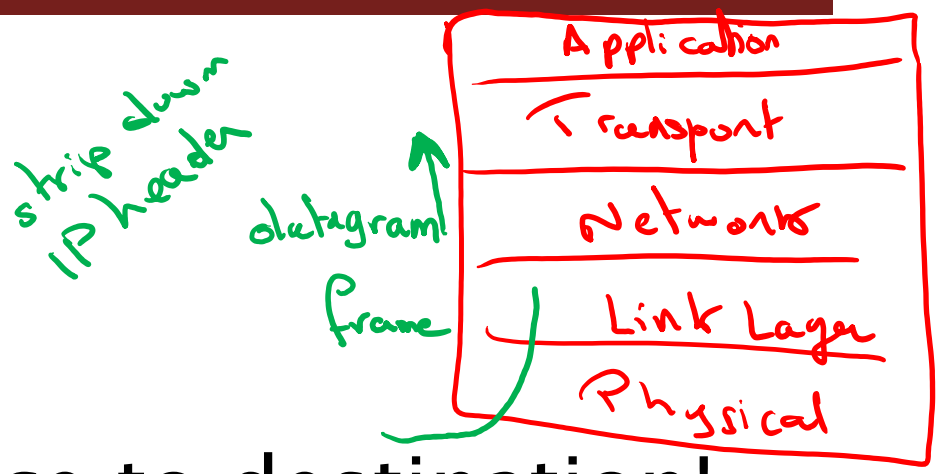
CSSE 490
Network Security

Day 8: Layer 3 Primer

Outline

- The Role of the IP Layer
- The IP Header
- IP Fragmentation
- IP Fragementation Attacks

Functions and Properties



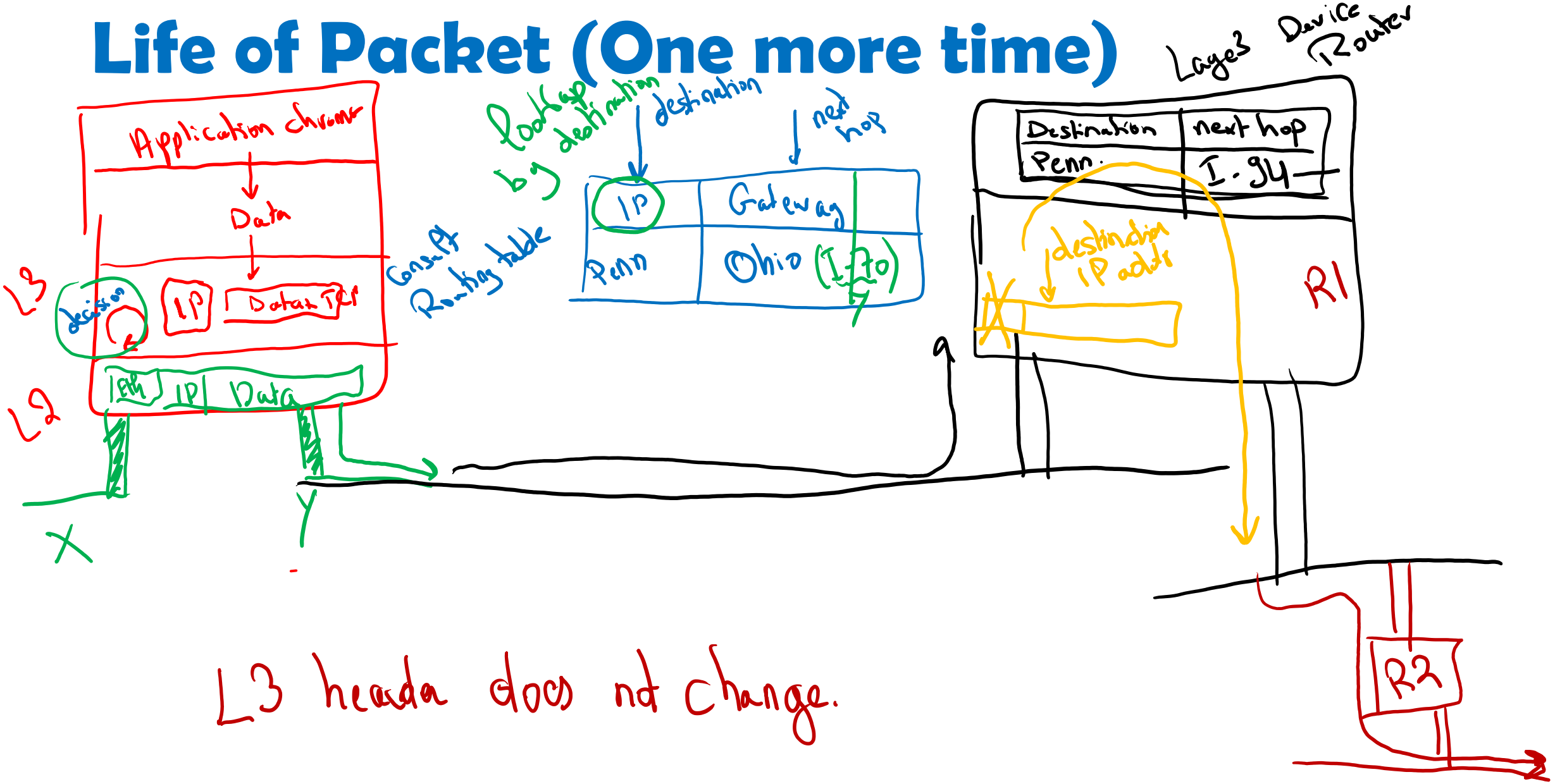
Basic Functions

- Routing: Get packet from source to destination!
- Pass packets to transport layer
- Provide error detection and diagnostic

Properties

- Best-effort transmission ≠ reliability

Life of Packet (One more time)



L3 header does not change.

IP Header

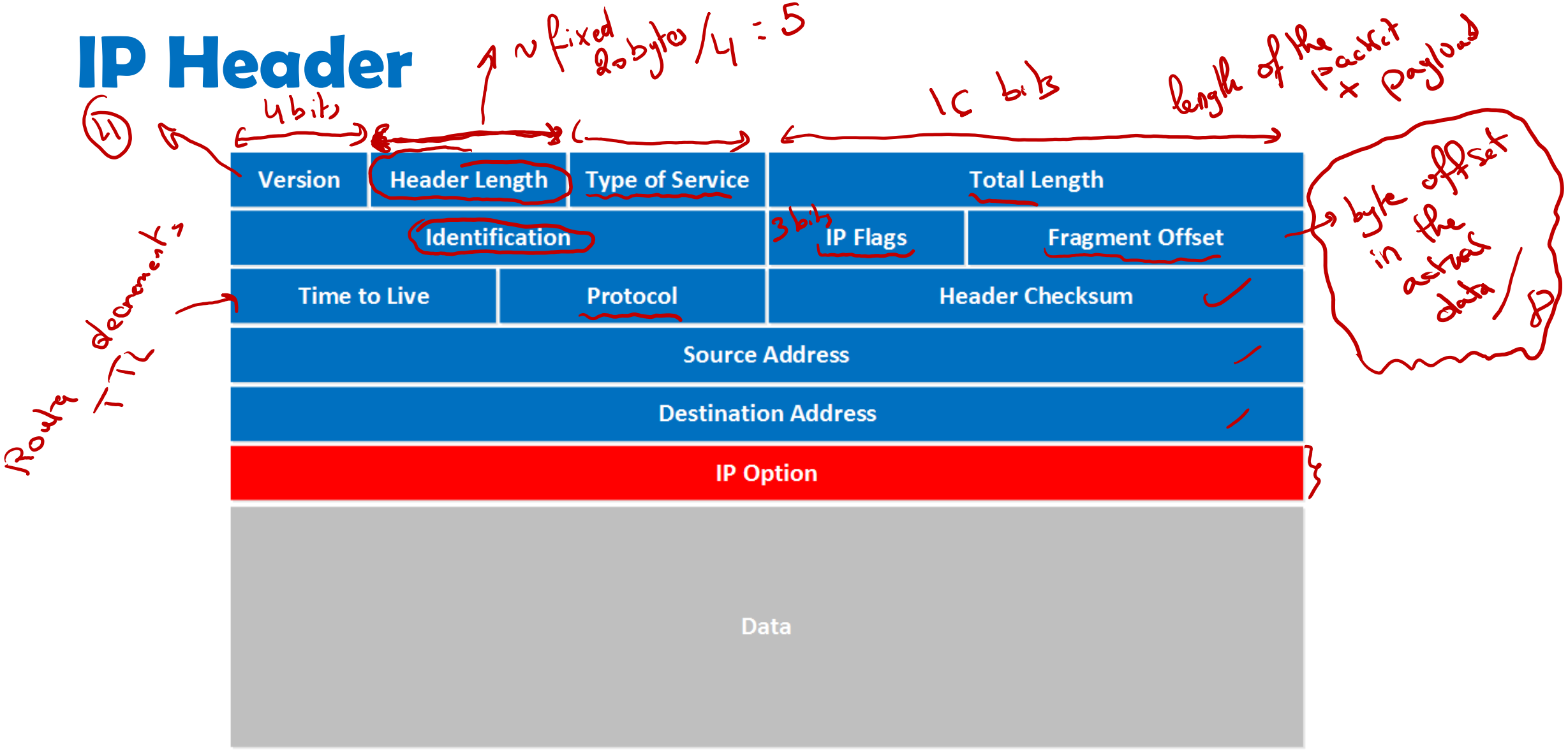
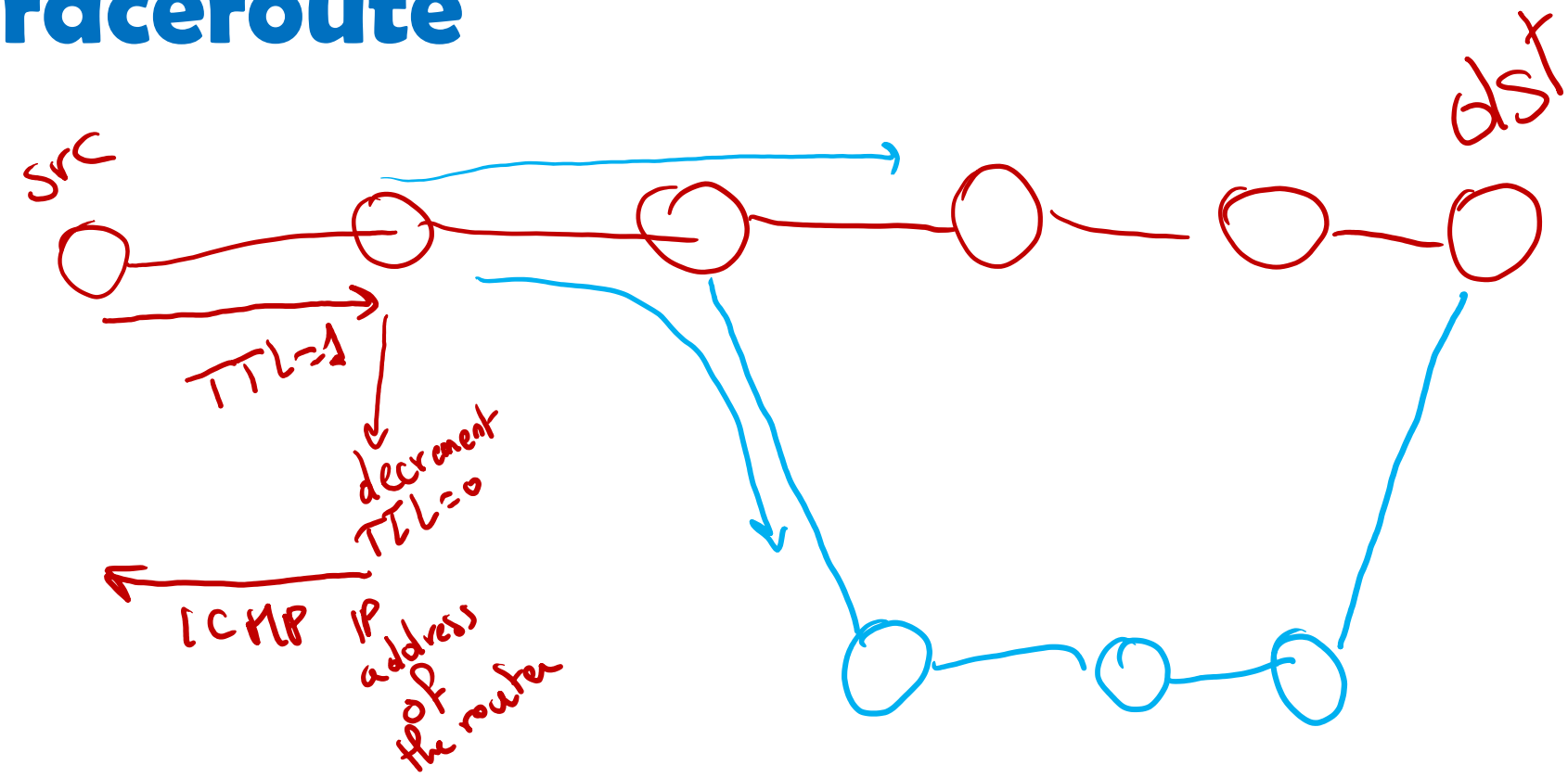


Image source: https://networklessons.com/cisco/ccna-routing-switching-icnd1-100-105/ipv4-packet-header

TTL and Traceroute

- No guarantee of same path traversal
- Not all routers send ICMP



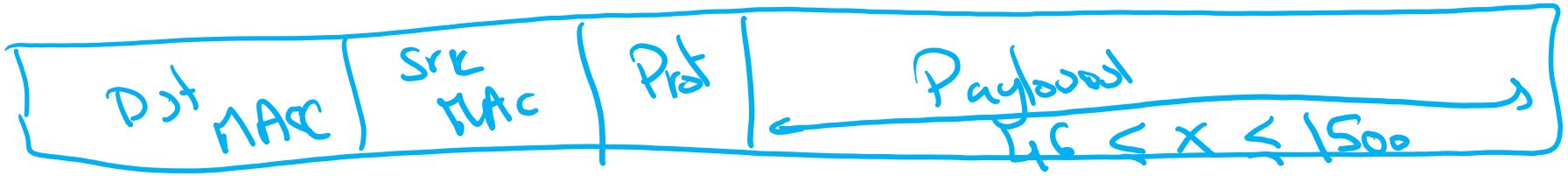
TTL Demo

- Set the `TTL` field in `ping` using

```
ping -t 1 8.8.8.8
```

Fragmentation: Why?

Recall from Ethernet Frames discussion

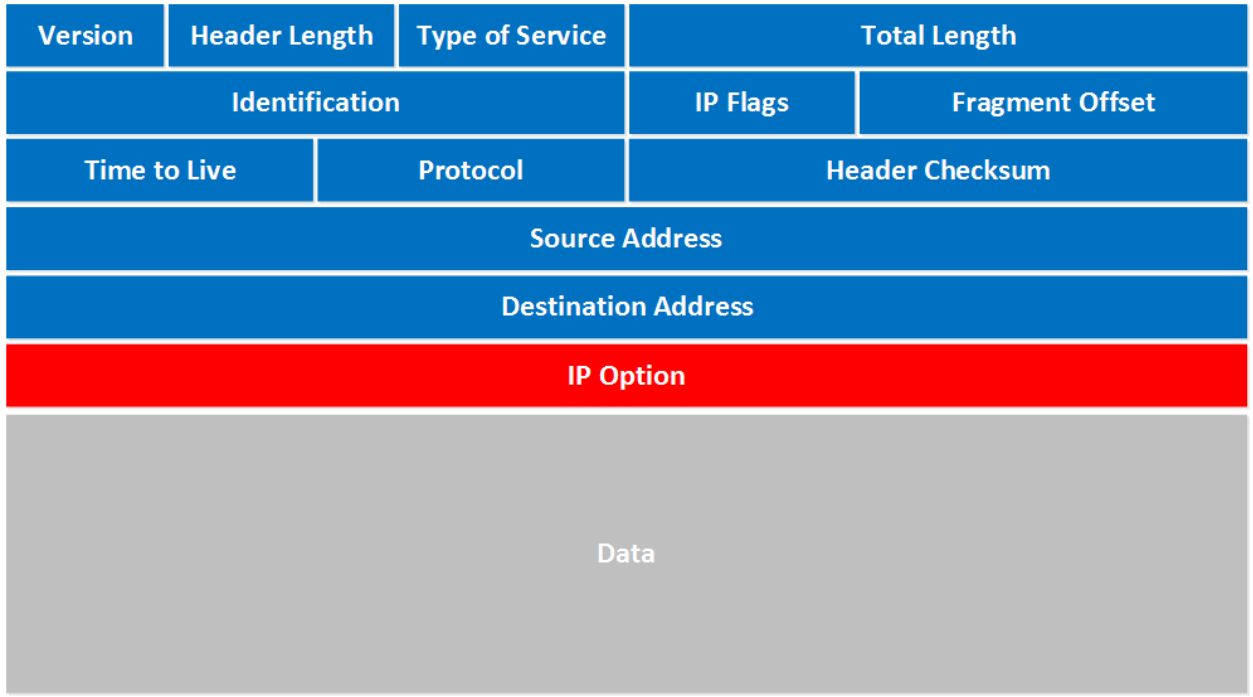


- Maximum Transmission Unit (MTU)

- $46 \leq MTU \leq 1500$ bytes

IP Fragmentation

Fragmentation Offsets



Fragmentation Demo

Attacks on IP Fragments?

- Think-Pair-Share!