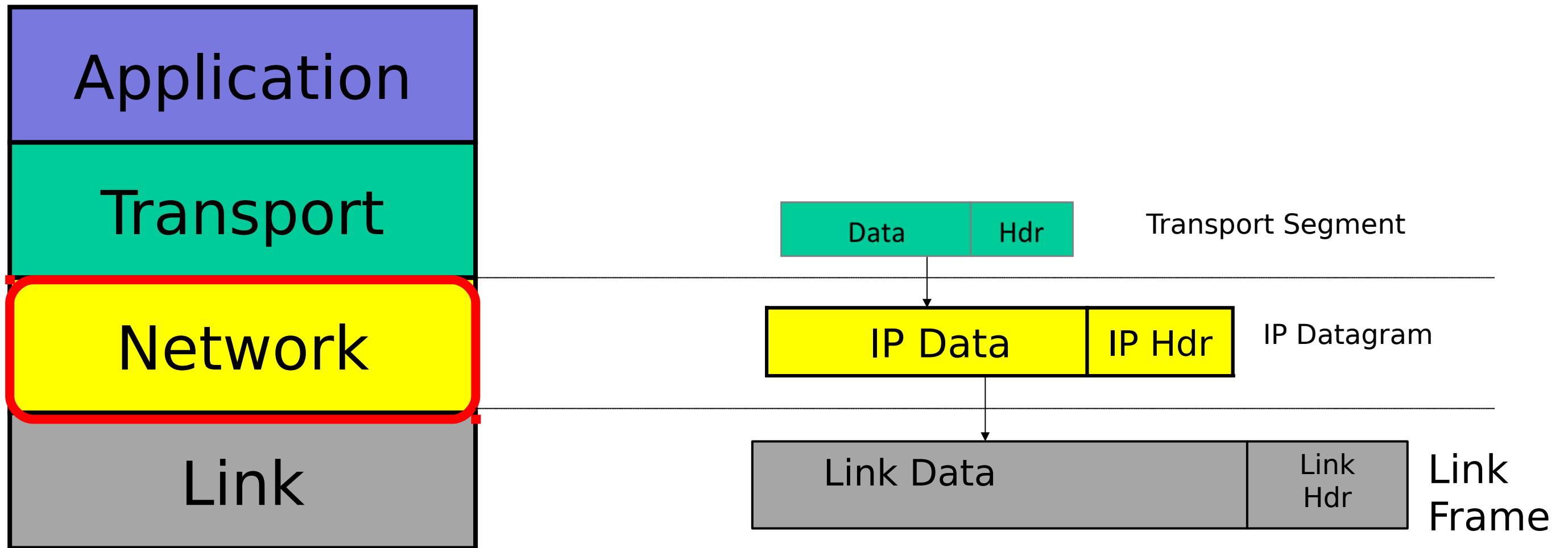# CS144
An Introduction to Computer Networks

What the Internet is

The IP Service

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The Internet Protocol (IP)

Application

Transport

Network

Link

Data | Hdr — Transport Segment

IP Data | IP Hdr — IP Datagram

Link Data | Link Hdr — Link Frame

The IP Service Model

Property	Behavior
Datagram	Individually routed packets.
	Hop-by-hop routing.
Unreliable	Packets might be dropped.
Best effort	...but only if necessary.
Connectionless	No per-flow state. Packets might be mis-sequenced.

Data IP SA IP DA

Router

Link

B

A

C
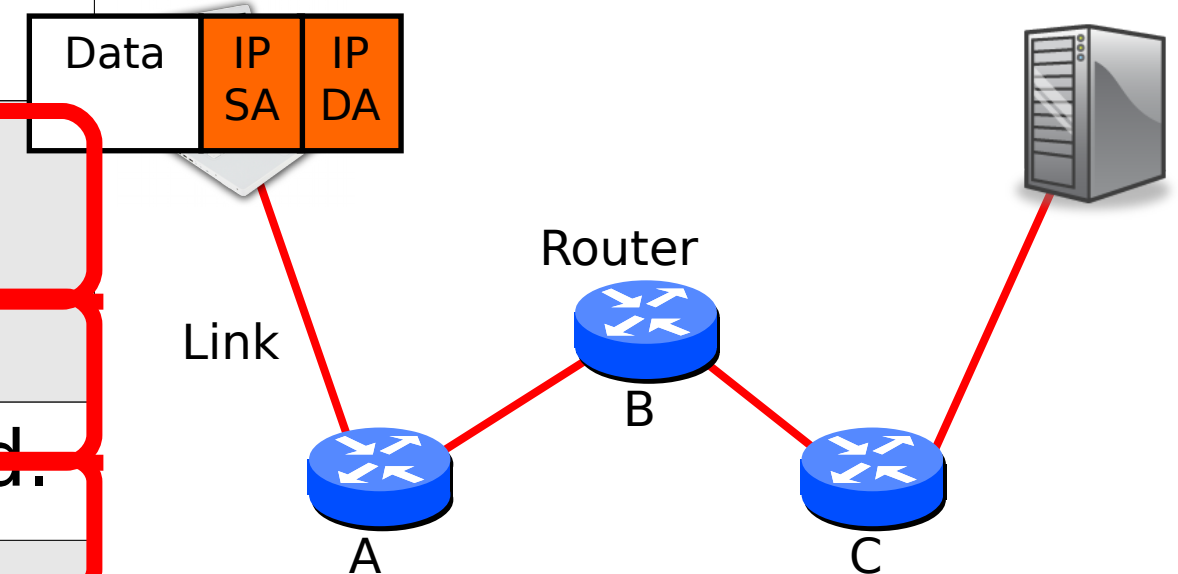
Why is the IP service so simple?

- Simple, dumb, minimal: Faster, more streamlined and lower cost to build and maintain.

- The end-to-end principle: Where possible, implement features in the end hosts.

- Allows a variety of reliable (or unreliable) services to be built on top.

- Works over any link layer: IP makes very few assumptions about the link layer below.

The IP Service Model (Details)

1. Tries to prevent packets looping forever.
2. Will fragment packets if they are too long.
3. Uses a header checksum to reduce chances of delivering datagram to wrong destination.
4. Allows for new versions of IP

   - Currently IPv4 with 32 bit addresses
   - And IPv6 with 128 bit addresses

5. Allows for new options to be added to header.

IPv4 Datagram

Version	Header	Type of Service	Total Packet Length	
Packet ID			Flags	Fragment Offset
Time to Live "TTL"		Protocol ID	Checksum	
Source IP Address				
Destination IP Address				
(OPTIONS)				(PAD)
Data				

Summary

We use IP every time we send and receive datagrams.

IP provides a deliberately simple service:

- Datagram
- Unreliable
- Best-effort
- Connectionless

<The End>