CS144
An Introduction to Computer Networks

What the Internet is
The Internet Control Message Protocol (ICMP) Service Model

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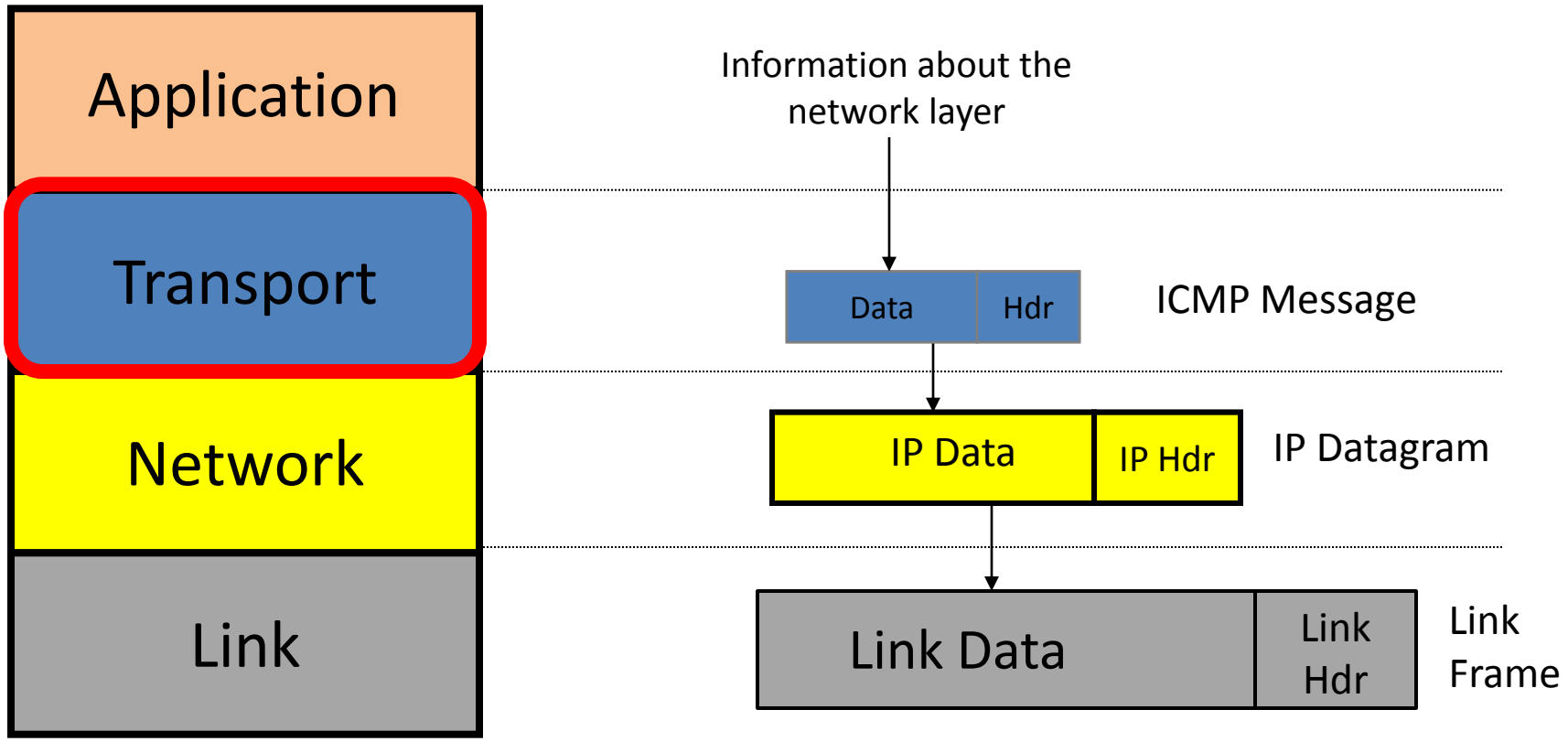
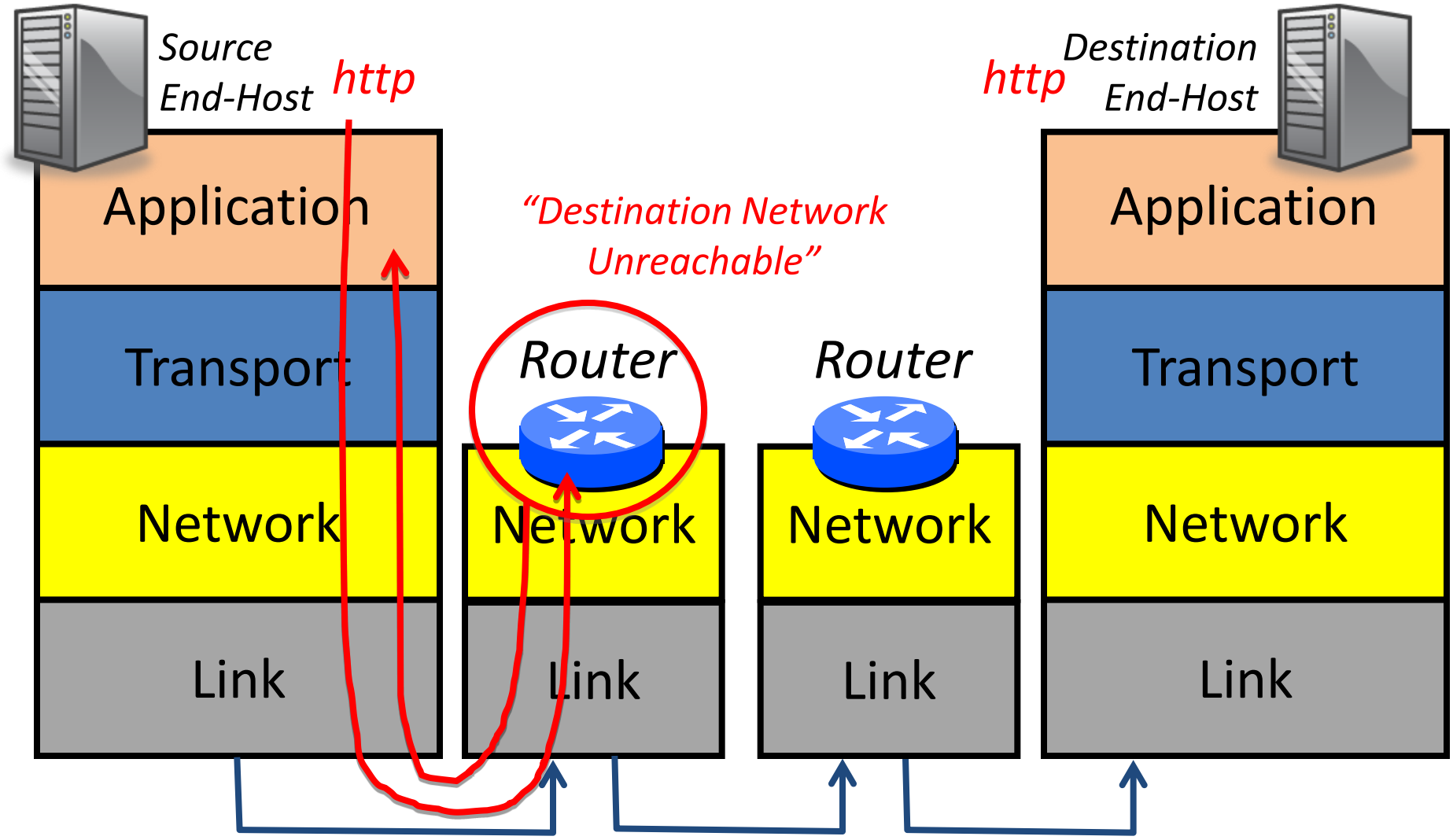
Making the Network Layer Work

1. The Internet Protocol (IP)
   - The creation of IP datagrams.
   - Hop-by-hop delivery from end to end.
2. Routing Tables
   - Algorithms to populate router forwarding tables
3. Internet Control Message Protocol (ICMP)
   - Communicates network layer information between end hosts and routers
   - Reports error conditions
   - Helps us diagnose problems

ICMP runs above the Network Layer



An example


Source
End-Host
http
Application
Transport
Network
Link
"Destination Network
Unreachable"
Router
Network
Link
Router
Network
Link
http
Destination
End-Host
Application
Transport
Network
Link

The ICMP Service Model

Property	Behavior
Reporting Message	Self-contained message reporting error.
Unreliable	Simple datagram service – no retries.

(Some) ICMP Message Types

ICMP Type	ICMP Code	Description
0	0	Echo Reply (used by ping)
3	0	Destination Network Unreachable
3	1	Destination Host Unreachable
3	3	Destination Port Unreachable
8	0	Echo Request (used by ping)
11	0	TTL Expired (used by traceroute)

RFC 792

How “ping” uses ICMP

How “traceroute” uses ICMP

Summary

ICMP provides information about the network layer to end hosts and routers.

It sits above IP and is therefore strictly a transport layer mechanism.

The commonly used tools “ping” and “traceroute” both rely on ICMP.