Part II Review

COS 460

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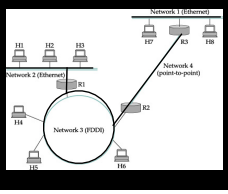
Problem

LAN's are great… but…

We want to **connect** them together



...across the world

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Bridge, Router, Switch

- repeater & hub - physical
- bridge - link
- switch - network
- router - internet
- gateway - application

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Service Model

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- Datagram Delivery
- Packet Format
- Fragmentation and Reassembly

Packet Format

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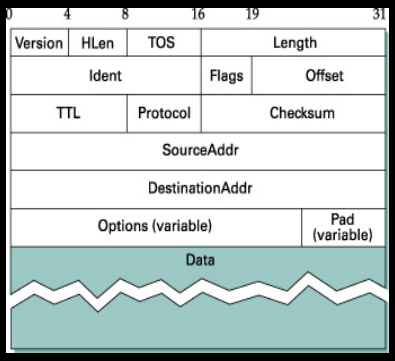

HLen – length in 32-bit words (normal 5 words, 20 bytes)
Length – bytes, max 64k, includes header
TTL – hops

Fragmentation

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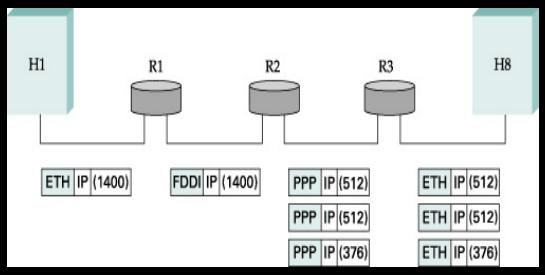

Fragmentation

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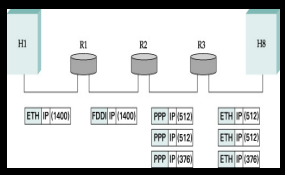

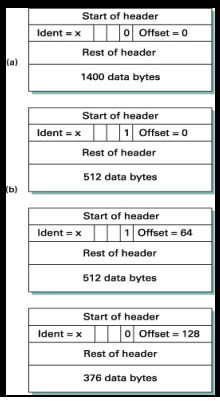

IP Addressing

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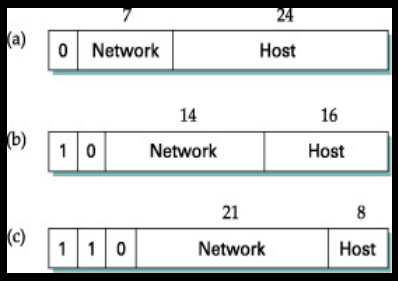

Datagram Forwarding

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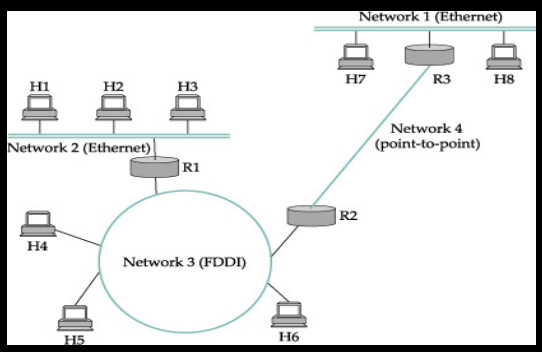

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Address Resolution

1. Do we have the IP-MAC addresses cached?
2. Send out broadcast query
3. Look for response, and fill in cache

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DHCP

1. Broadcast request: DHCPDISCOVER
2. Look for responses: DHCPOFFERs
3. Pick one and DHCPREQUEST
4. Wait for DHCPACK

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ICMP

Remember: Best-effort service

- Diagnostic purposes (ping)
- TTL (hops) reaches 0 at a router
- Host not reachable (network error)
- Network redirection

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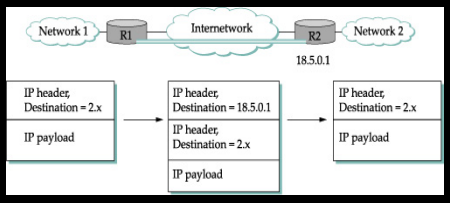
VPN



Wrap an IP datagram in an IP datagram

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Forwarding vs Routing

- ***forwarding*** is taking an input packet and sending it out the appropriate port
- ***routing*** is the process of building forwarding tables.

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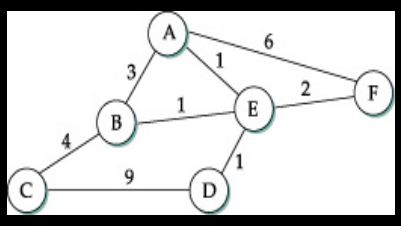
Network Graph



GOAL:
Find the lowest cost path between nodes

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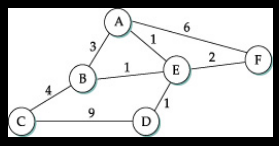
Distance Vector (RIP)

- Table of distance/cost to all nodes
- Distribute to immediate neighbors
- Link Down = ∞
- periodic & triggered



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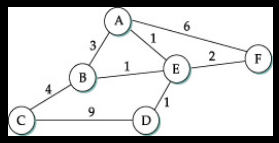
Distance Vector (RIP)

- Complete Map
- Exchange with immediate neighbors



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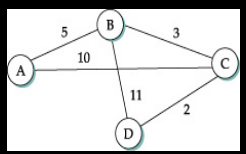
Link State

- Link State Packet (LSP)
  - Distance/Cost of neighbors
  - Flood to all routers



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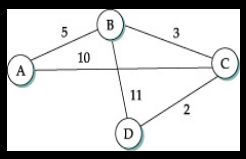

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IPv6