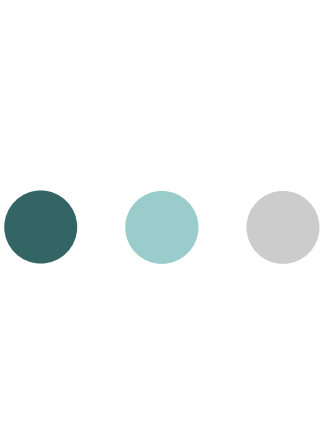

CS519: Computer Networks

Lecture 3, Part 2: Feb 16, 2004

IP Forwarding Table

Best-match rules revisited

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- Select matching FIB entry with longest prefix
- If multiple matching FIB entries have the same prefix size, then any may be used
  - Even simultaneously---path splitting for load balancing
  - But try to maintain source affinity (i.e. send different flows along different paths, but don't split a given flow)

Paths to multi-homed site X

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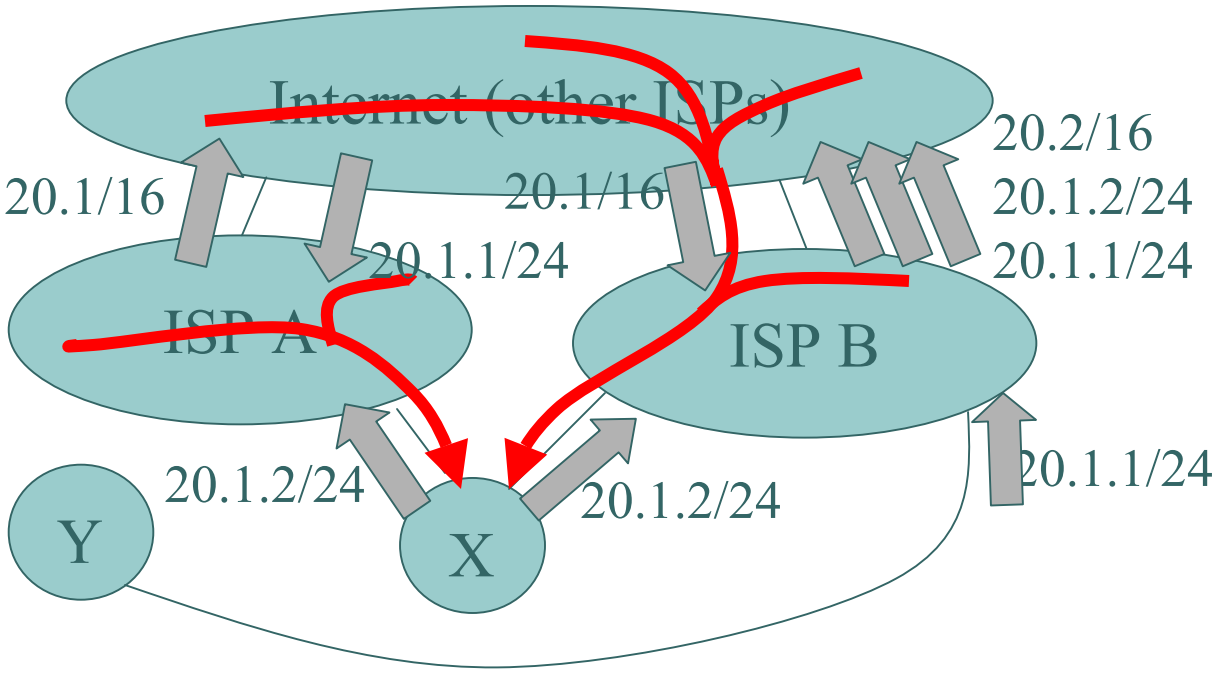

Paths to Site X after X-B link failure

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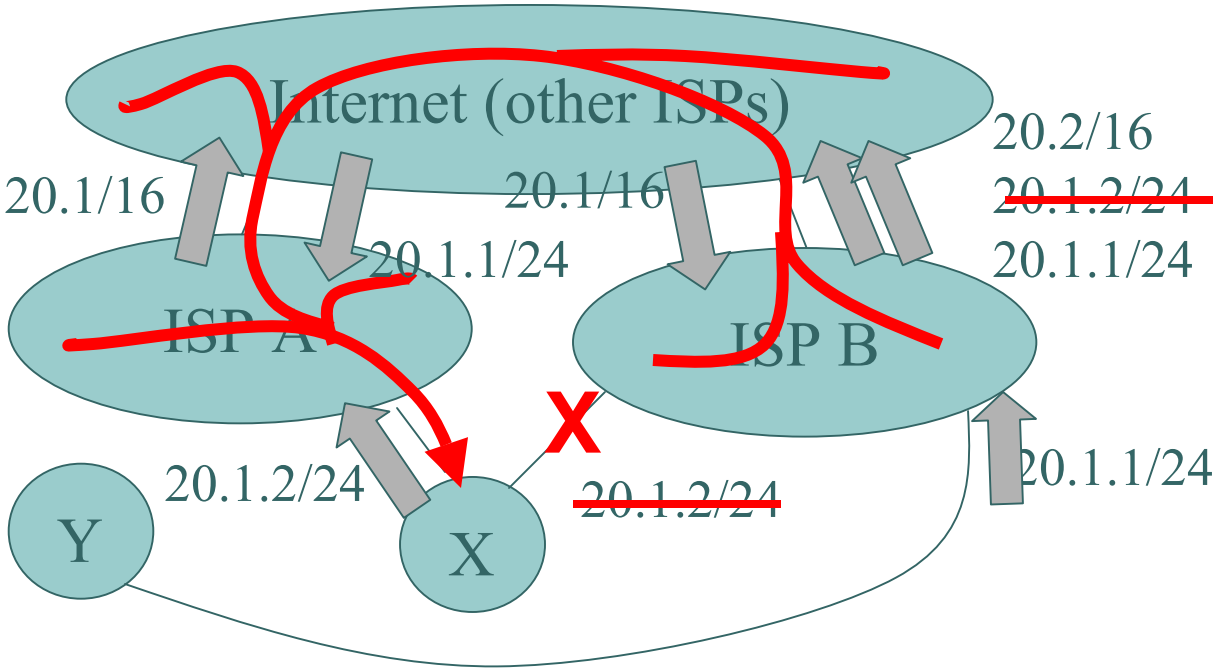

Better load balance (without increasing FIB size)

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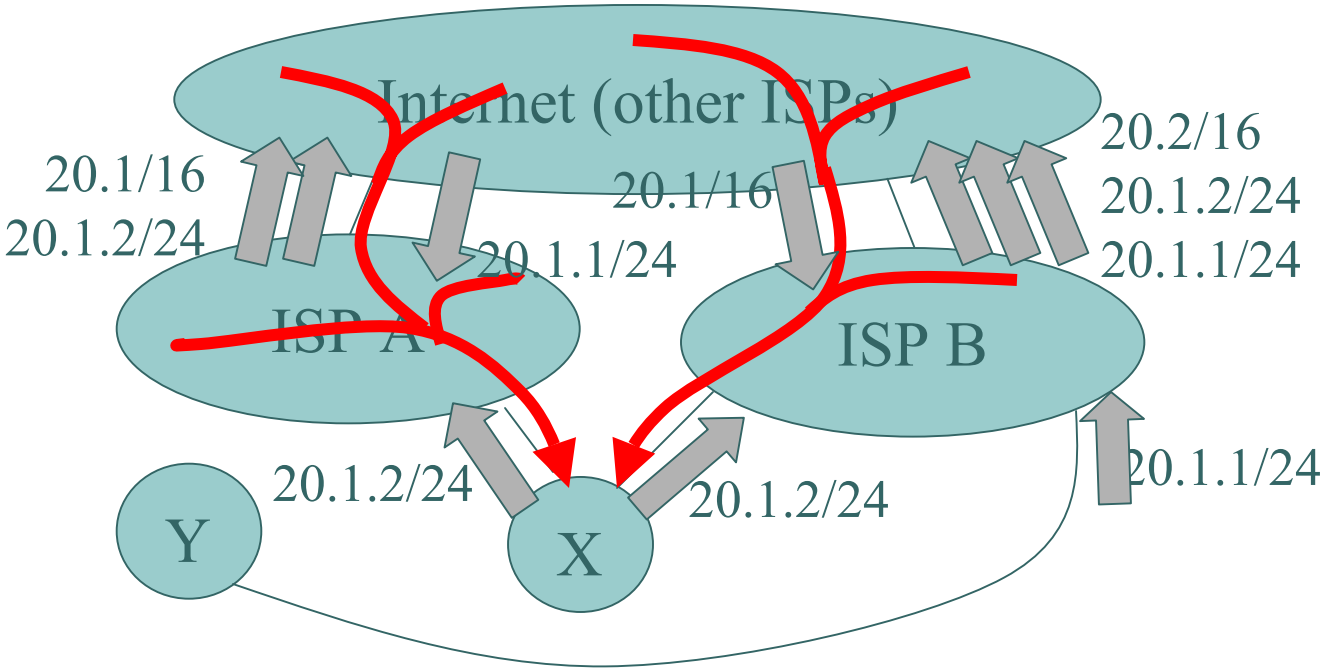

Paths to Site Y

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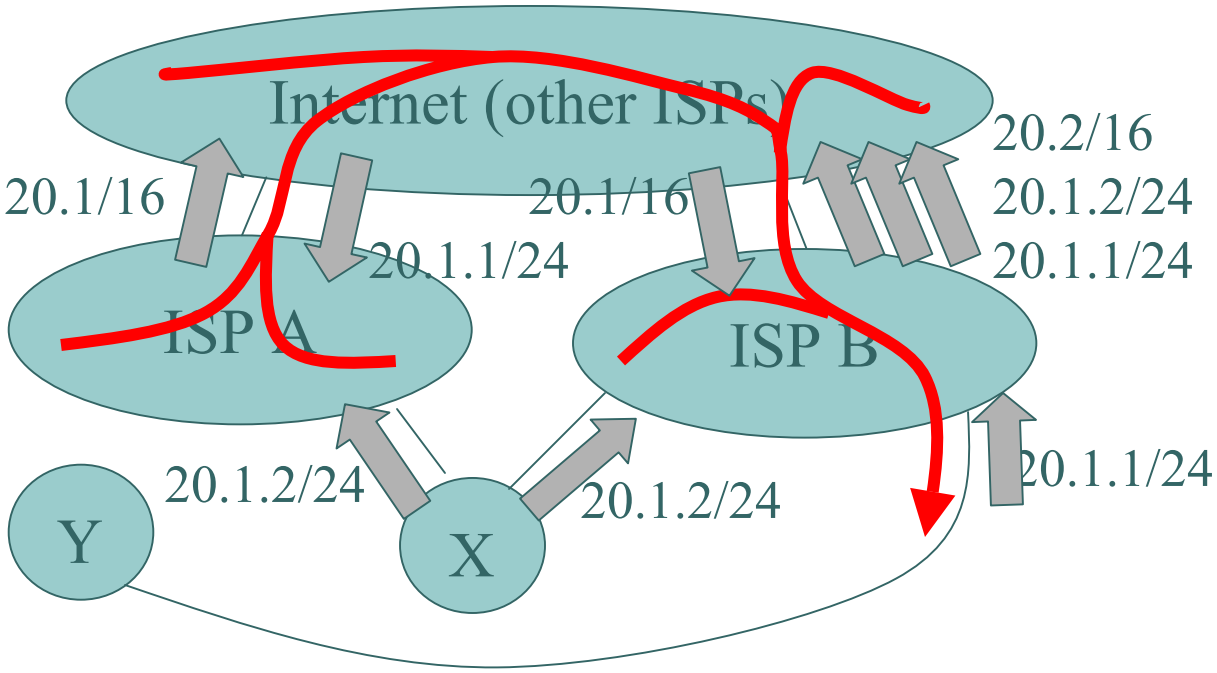

Paths “to” Site Y after Y-B link failure

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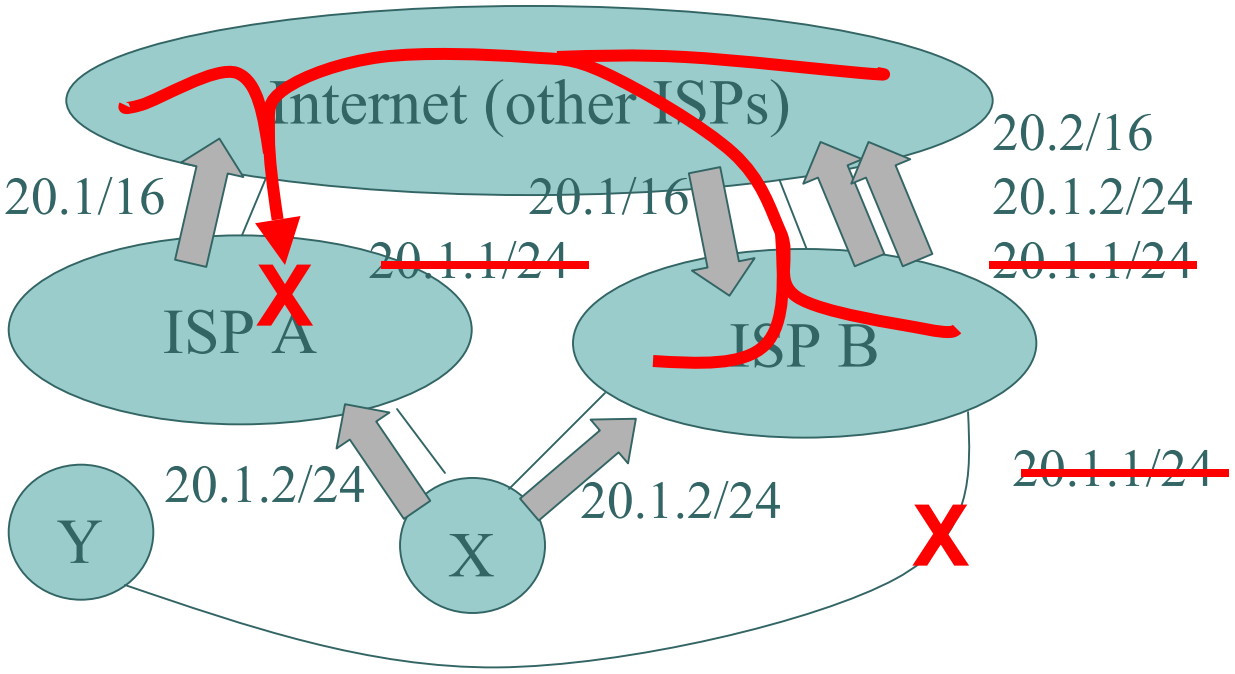

Implementing the forwarding table

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- First-match style ok for small forwarding tables
  - Scales poorly with the number of entries
- Hash structures work for flat addresses, but not hierarchical (masked) addresses
  - “Bridged Ethernets”
- High-end routers implement forwarding table in hardware
  - CAM-based (Content Addressable Memory)
- Otherwise, some kind of tree-like data structure is typically used
  - We’ll look at this later in the course

Other types of forwarding

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- What we looked at so far is *hop-by-hop* forwarding with *hierarchical addresses*
- Hop-by-hop means that every switch in the path makes an “independent” forwarding decision
- But we can also have *source routing*
  - The entire path is listed in the packet
  - IP has a (never used) option for this

Hop-by-hop versus source routing

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- Source routing is (kindof) what you do when you print out directions from mapquest
  - I.e., you carry you path with you
- Hop-by-hop routing is often (kindof) how you find your way around Wal-Mart
  - “where is kids clothing?”, “where are socks?”

Hop-by-hop versus source routing

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- Hop-by-hop is what is used in the Internet
  - Though many people have proposed source routing
- With the exception of routing through a switch fabric within a router
  - But we'll look at router/switch architecture later