Network Protocols

IP addendum
or peculiarities and items of interest
What could have been different?

• Addressing
  • larger, variable length
  • automatic derivation
  • central coordination (rent versus own)
• Elimination of certain fields
• Call the TTL a hop count
• Getting rid of the version field?
• Fragmentation strategies
Hop count / TTL

• Is it better to count up or down?
• Does it matter where you start?
• How do you use it as a security knob (kind of)
  • think anti-spoofing and hop limiting
Routing

- Multihoming
- Minimize route table size?
- Performing fast look-ups
- Authenticate routes, paths or prefixes?
- Churn
- Policy routing
- Measurement and monitoring
Privacy

• How do or don't you have it?
• IPX was better in some ways, but less privacy?
• IPv6 can construe hardware based node address
• How do you get source address anonymity?
• How do you prevent source address anonymity?
Service differentiation

• Kind of a holy grail of packet networking
• CoS or QoS?
• Will differentiation hold beyond an AS?
• Within an AS you can often over-provision
  • especially with LAN links
  • then no need for differentiation?
• Recurring cost and complexity trade-offs
IP multicast

'When you see a bunch of engineers standing around congratulating themselves for solving some particularly ugly problem in networking, go up to them, whisper “multicast”, jump back and watch the fun begin.' - purportedly David Clark @ IETF plenary 1991

• Group discovery

• Group security

• Sending packets to a group

• Can you do all this simply without network state?
Some things to be familiar with

- Default-free
- Ships-in-night
- Traffic engineering
- Whois
- NetFlow
- traceroute