Advice to Link & Subnet Designers

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Document Overview

- Authors observe significant two-way “disconnect” between subnet/link designers and the Internet protocol community
- Intended to give basic advice to the designers of links and subnetworks intended to carry IP
- Also intended to get Internet people to think about what they really want/need
Internet Architecture Overview

• End-to-end principle
• Minimal functionality needed to carry IP
• Subnet errors of comission (I.e., gratuitous complexity) more common than errors of omission
• Some subnet hooks still needed to support multicast & QOS
MTUs & Fragmentation

• IPv4 fragmentation is best avoided (and IPv6 router fragmentation doesn’t exist) so subnets should support a “reasonable” MTU
Connection-oriented Subnets

- Often used but add considerable complexity for state management; difficult to pick good idle timeouts
- PPP generally usable except at very high speeds, where subnet should provide hardware framing
Bandwidth-on-Demand (Falk)

- Similar to connection-oriented subnets, more general case
- Similar problems in predicting demand, avoiding idle channels
Reliability & Error Control

• Internet end-to-end emphasis
• Link/subnet error control still important for performance
• Ongoing discussion on allowable subnet error rate; 1 packet/RTT too high
• Better approach may be “as low as possible subject to TBD delay limit”
  – delay can be both ARQ & FEC
Bandwidth Asymmetry

- Already experienced on cable modems
  - Motorola CyberSURFR: 27 Mb/s down, 768kb/s up (35:1) far more asymmetric than “A”DSL
- Some asymmetry easily tolerated
- Problems occur with TCP ack congestion
  - larger packets
  - ack filtering
Multicasting (Touch)

• Efficient multicasting needs link layer support, particularly on broadcast media
Sections to be written

• QoS, Fairness vs performance, congestion signalling
• Delay characteristics
• Buffering, flow & congestion control
• Compression
  – best done at higher layers
More Sections to be written

• Mobility
  – best done at higher layers
  – subnet mobility OK over limited geographic areas,
    I.e., as long as cost & delay isn’t too high

• Broadcasting & Discovery

• Routing

• Security