How Does Mobility Fit Into the Internet Layering Scheme?

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Protocol Layering

- Keeps individual protocols simple
  - Different, complementary goals for each layer
  - Ease of implementation, deployment, upgrades
  - Solutions can be isolated to a single layer
    - Host Addressing, Routing, Fragmentation – L3
    - Data Ordering, Reliability, Port Multiplexing – L4

However ...
Not All Layer Roles are Well-Defined

- Many things can (and are) done in multiple places
  - Retransmission-based reliability:
    Done in both TCP and some physical links
    - Potentially causes problems for TCP
  - Security: could use TLS, IPsec, WEP, all, none
    - Computationally expensive to repeat at multiple layers

Original Stack Design

- In the early days, some features were either explicitly not included (security) or had not been thought of yet (mobility)
- It's not surprising that they didn't end up as tightly integrated into the layering scheme as things like routing, fragmentation, ordering, addressing of hosts/services, etc

Fundamental Restriction

- The layering interface is by no means verbose
- We give and take buffers between layers, with minimal status codes
  - There is no concept of fine-grained notifications between layers
    - Hello link-layer, this is real-time audio, please don't worry too much about reliability for my packets, I can not tolerate the delay or reordering

Host Mobility

- We can do this just about everywhere
  - And have multiple proposals for each layer and even in between layers
- Can layers cooperate to make it easier?
  - Mobile IP over Mobile ad-hoc protocols
  - Mobile SCTP over Mobile IP
  - Mobile aware TCP over Mobile IP
    - Allow TCP to re-estimate state for new paths

Competition to the Death, or Peaceful Coexistence?

- We have some host mobility schemes that can operate largely independent of each other
  - Mobile IP, HIP, Mobile SCTP, session layers, application layers
  - How many standards will Microsoft implement?
  - How many will my wristwatch be able to simultaneously support?
  - How many will providers deploy? support?

What is the Optimal / Optimum Solution?

- What is best for users?
  - Cheapest, easiest, wide-scale deployable, transparent, secure, etc
- Is there room for multiple host mobility architectures within a single mobile Internet?
- Should we rethink the layering interfaces?
  - Not just for mobility

Panelists

- We'll hear some opinions from:
  - Will Ivancic
  - Pekka Nikander
  - David Maltz