

Functional and Operational Priorities for a New Network Architecture

Kevin Fall

Intel Research, Berkeley

kfall@{cs.berkeley.edu,intel.com}

Clean-Slate Internet?

- Some researchers and funding agencies believe the Internet is “broken” somehow
- What does everyone else think?
 - Users
 - Enterprise Managers
 - Network Operators
- Provide some value to all or lots to one
 - If not, purely an academic exercise
 - If so, still maybe not much impact

User Issues

- Too much traffic, too little time
 - SPAM, multiple data sources, search, sync
 - Async comms lets users manage their own time
- Legitimacy
 - Phishing, pharming, fraud, identity theft
 - Privacy (for some people; varies by culture)
- Functionality in more/many environments
 - “always on” not always correct
 - *Note*: no GENI plans for satellites
- What went wrong? Who can fix it?
- I can't read this (Chinese, Hindi,) web page!

Enterprise Issues

- Commercial and non-commercial
 - E.g. military, E911 services, non-profits
- What is happening on my network?
 - Monitoring, intrusion detection (hard)
- Information Assurance
 - Not just “security” of authentication/privacy
 - Reliability, availability (multihoming)
- Configuration
 - Address allocation/assignment
 - Locator/ID overloading – ACLs, policy, renumbering

Operator Issues

- Increasing commoditization motivates premium service offerings (e.g. anti-DoS)
- RoI driven by simple (revenue/cost) ratio
 - Scalability (refresh cycle), deployment, utilization
 - New revenue opportunities
- Concern regarding routing scalability
 - Table size + churn vs router affordability
 - Billions of portable devices
 - Address allocation hierarchy v location independence

Recommendations

- For Users
 - Collaborative filtering / search, anti-spoof
 - Disruption and heterogeneity tolerance [plug RFC4838]
 - Sane internationalization
- For Enterprise managers
 - End host security (TPM?, biodiversity, guards)
 - Data provenance (acceptable PKI?)
 - Diagnostic protocols (ICMPv4?)
 - Effects of locator/ID split proposals

Recommendations (2)

- For Operators
 - Programmable routers w/storage (svc platform)
 - Scalable routing (loc/ID split?)
 - Formal behavior specification (“algebras”, P2, etc)

Concluding Remarks

- Significant issues remain to be solved
 - Sifting through too much data, verifying data provenance, understanding what is happening, configuration, routing scalability vs flatness, formal expression of behavior/policy, handoff and disruption tolerance
- Need sufficient value across stakeholders
- Research/enterprise/user interaction
 - Note activities in IETF right now