MobilityFirst: Economic Models & Policy

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MobilityFirst: WP5.. Economics

Design Principles

- Regulability: compatible with public policies, social governance

e.g., NN, Mobile/Fixed convergence, Competition, Privacy, ...

- Commercializability: economically viable

e.g., Incentives, Compatibility with legacy and LTE, ...

Role for economist

- #1: Technology-aware business models and policy. Inject M1st Design principles into public policy debates.

- #2: Policy/Economics-aware technical design. Inject policy/econ considerations into the technical architecture.

e.g., M1st and Mobility

Key Features

-Distributed/decentralized control/management.

-Flexible/adaptive/scalable.

-End-user control.

-Context-aware (geolocation).

-Wireless

-DTN (in-network storage)

-       Naming & Address separation. GUID: fast-flat address routing.

Challenges & Opportunities

-Incentives, e.g. to route/forward, participate in GUID arch

-Coordination failures (instead of efficiency losses)

-Governance models (e.g., Identity mgmt ecosystem)

-Ad hoc, mesh ➔ equipment not operator bus models ➔ competition

-Cross-layer design issues (e.g., RF)

-Privacy threats

-Contract metrics (SLAs) and enforcement

First year research papers...

Chapin, J. and W. Lehr (2011) "Mobile Broadband Growth, Spectrum Scarcity, and Sustainable Competition," 39th Research Conference on Communications, Information and Internet Policy (www.tprcweb.com), Alexandria, VA, September 2011. (pdf) (slides)

  -- Spectrum scarcity/Mobile BB evolution ➜ 'small cell' architectures
  -- Implies shared infrastructure & spectrum
  -- Heterogeneous networks ➜ Network mobility key for interoperability, openness, innovation

Lehr, W., S. Bauer, M. Heikkinen, and D. Clark (2011) "Assessing broadband reliability: Measurement and policy challenges," 39th Research Conference on Communications, Information and Internet Policy (www.tprcweb.com), Alexandria, VA, September 201 (pdf) (slides)

  -- Measurement and metrics challenges of assessing reliability
  -- What is the value of mobility? Implications of DTN?

Clark, D., W. Lehr, and S. Bauer (2011) "Interconnection in the Internet: the policy challenge," 39th Research Conference on Communications, Information and Internet Policy (www.tprcweb.com), Alexandria, VA, September 2011. (pdf) (slides)

-- Traffic-growth ➜ Usage-related costs ➜ Need to route traffic *and $$$s*
-- Mobile Interconnection: *who manages/controls/pays?*

Current Projects underway....

M1st and Network Neutrality

  -- Understanding how M1st changes landscape

Mobility and the Internet

  -- Assessing performance of mobile BB

  -- Reliability, security considerations

M1st and Wireless Integration

  -- M1st and LTE integration

  -- Spectrum sharing and cross-layer issues

e.g., M1st and Privacy....

Privacy ⇔ Security ⇔ Customizability ⇔ Interoperability

- More context-relevant information, better service
- More anonymity, harder authentication ($/traffic flows) and Security
- More overhead, higher cost, reduced interoperability
- What is PII? Easy to de-anonymize. Preventing DPI not enough.
- Source/dest addresses, context-awareness (e.g. geolocation)

Solutions

- Privacy ➜ spoofing ➜ libel/porn/disconnected incentives
- TOR ➜ wasted resources (not "green"), opaque provisioning
- M1st ➜ GUID separates name/address, but does **not** protect anonymity

(One) economist's perspective ➜ Privacy is dead...

- Don't try to control who knows what... assume anyone can learn anything
- Liability, transparency in data mgmt practices, contract law
- Minimize harm from misuse... reduce asymmetric information

e.g., M1st and Network Neutrality

What is NN really about?

- (a) protecting against monopoly control of "bottleneck" facility
- (b) preserving "generative Internet" (Zittrain), openness (Lessig)
- (c) keeping door open to viral (edge-based) innovation

How do FIAs like M1st change the game?

- "Revenge of the Edge" : source-based routing, multihoming, and end-user control provides mechanisms for responding to non-neutral treatment (but this creates other problems....)

- Many more knobs to turn to cause mischief: who controls?
    * Identity management: name servers/address separation
    * DTN and in-network storage
    * Multihop, end-to-end SLAs: reliability/security
    * RF spectrum: multi-layer design, spectrum mgmt
    * Metric challenges: auditing performance in mobile networks

Additional Slides and Backup

FIA Proposal Plan for WP5...

(1) Case Studies

- Mobile data for 4G cellular

- Novel radio networks & Internet integration; Spectrum sharing.

- SLAs in a mobile future

(2) Roadmapping M1st Deployment

- Institutional

- Game theoretic econ models for distributed network control.

(3) Socio-economic considerations in prototype/testing

- Empirical analyses of stakeholder and user responses