Disrupting the Disruption: The revenge of end to end

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The Internet changed everything?

- The old-line telephone companies are in pain right now.
  - Not just the Internet's fault…
- The Internet is not the end-point of the revolution.
  - Give IT 50 years to see where it ends up.
- A cycle of innovation is repeating itself.
  - Now the ISPs are the "old-line".

Is the Internet done?

- Ubiquitous mobile computing
  - But who provides the infrastructure?
- Location-aware computing.
  - But who owns the knowledge of my location?
- Embedded processing—computerizing everything.
  - But who will hook all these devices together?
- Networked digitized consumer devices
  - But who will set the standards?
- The networked automobile
  - But (again) who provides the infrastructure
  - Who provides the standards?

What shapes the present?

- Economic downturn
  - Especially IT, and especially Internet
- Backlash from incumbent industry sectors
  - Telephone, music, radio, micro-payments…
- Telcos are the surviving ISPs.
  - They own facilities and deep pockets
  - They may still think like telcos.

Central thesis

- ISPs, to make money, would like to control the market and the services.
  - Telcos especially think this way.
- Remember the end to end arguments.
- ISPs are now in the middle.
- Innovation is happening at the edge.

Losing their grip

- ISPs don’t “own” the network.
  - Car, residence, enterprise, body,
- Wireless owners did not corner the spectrum.
- Long haul fiber is cheap.
  - The double whammy of bankruptcy.
- ISPs don’t control standards for devices.
- Municipalities are doing broadband.

The battle for the future

- Edge vs. center
  - Wireless infra: WiFi vs. 3G?
  - My location: edge node or telco?
  - Sensor network: sensor operator?
  - Consumer standards: device manf?
- There is a natural vigor to edge solutions.

The next big thing

- Collaborative edge activities.
  - Napster and peer-to-peer sharing.
  - SETI@home and collaborative computing (e.g. code-breaking).
  - Grid networking.
  - Collaborative filtering (content preferences, spam detection)
  - Overlay networks.
  - Multi-hop ad hoc radio.
  - Mutual backup across the network.
  - Residential co-op and municipal networks.

False comfort for the center

- These things will not scale.
  - They don’t need to, and they do.
- Self-interest will kill them.
  - A dose of economics will cure them.
  - When costs are low, self-sacrifice is nothing.
- They will not be trustworthy.
  - We are learning how to model trust.
- They will not be robust.
  - Small ≠crummy. Who do you trust?

Can the center thrive?

- Why should the center invest in improvements?
  - Increased revenues? Not likely.
  - Competitive pressures? Limited.
- Example question:
  - Will residential broadband get faster?
- How little middle is necessary?
  - A question for developing countries?
  - A question for times of emergency.
  - A disruptive question.

Bottom line

- Focus on the positive--edge power.
  - Collaboration is win-win, creates new value.
  - We know more about building these systems.
- Engineer economic systems
  - We did this without knowing it with Internet.
  - Usage, edge-driven infrastructure
- Be realistic about policy.
- Remember the role of research.
  - Open research can make a market.

An MIT agenda

- Tell the story. Alert the players. Emphasize the key points.
- Demonstrate the story. Excite people by building collaborative applications.
- Dispel the myths and negative advertising.
- Analyze the outcome. Is there a roadmap to this future?
- Remove the technical barriers. We can pick the future we like and invent it.
- Remove the policy barriers. Recognize the pressure of the incumbents to block it.