

The Technical and Political Evolution of the Internet -- A Personal Perspective

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A bit of my background

- Bell Labs, RAND, SDS, UC Irvine, Udel, Upenn (Emeritus) , CMU
- Honors: Fellow ACM and IEEE; SIGCOMM Award, Scott Prize, Postel Award
- Served 4 Years on Presidential Advisory Board on Information Technology
- Chief Technologist FCC
- Co-Founder of CSNET, NSFNet, NREN
- Member of the Markle Foundation Task Force on National Security
- Past Member of the NRC CSTB (8 years) and NSF CSAB (8 years)
- Numerous Consulting inc IBM,HP, NTT Docomo, IPA (Japan), NSA, Intel ...

The merging of computing and communications will drive the future.

- we went from computers without networks -> computers with networks -> networks with computers ->
- the cloud inverts
 - the total network is the real action
 - the computers are no longer the motivating item as in the early days
- no longer can we develop computers without paying attention to the networks
- no longer can we develop networks without wondering if our computer architectures are OK

What are the main policy issues of the future and how will that impact the data world:

- Spectrum , spectrum, spectrum
 - SDR and open range
- Competition -- or the lack thereof
 - Increasing consolidation
- The Net - what to do or not do

Where are we?

- Should the Internet be regulated?
- Is there a problem that must be fixed **now**
- Should the wire line and wireless be put in one basket
- Have market forces failed

Spectrum

- PCS – 94 act
- Unlicensed spectrum – 802.11
- Last mile issues
- Software defined radios
- Finally what is the future structure -- the ranchers or the farmers?

Politics 101

- USA
 - The reality of inside the international beltway!
 - Will the internet escape regulation?
 - Security and privacy may be the wedge
 - The legacy businesses -- will they “give up”
 - Wire line??
- Governance
 - A nightmare

What should we do -- technically

- stop thinking of networks and computers as two separate things
- start realizing that soon the network will start on the processor chip
 - go via a fiber to a processor switch on the way to memory, or to the external world
- security, robustness, performance will be the keys to success
- modular distributable software must be produced.
 - time to do it not just write about it
- re-examine the University/Industrial relationship in research

The Real Next Generation -- Optical Networks

- implications
 - protocols IP?
 - processor architecture
 - software systems
- will it be a fully distributed system (the cloud) -- back to the past