

The ICT “Crisis” & What To Do About It

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The ICT “Crisis”

- “Crisis”
- Other Perspectives
- What To Do About It
- Spectrum: A U.S. Case Study



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Caveats

- U.S. Perspective
- Personal Perspective
- ASG Input
- Caveat Emptor



“ICT Crisis”

**Scramble to grab a piece of the
new economy**

**Fueled by easy access to and
high expectations of capital**



We Got Ahead of Ourselves

On Infrastructure & Business Models

Dependence on advertising

Everyone reaching for the same customer

“B2C became B2N”

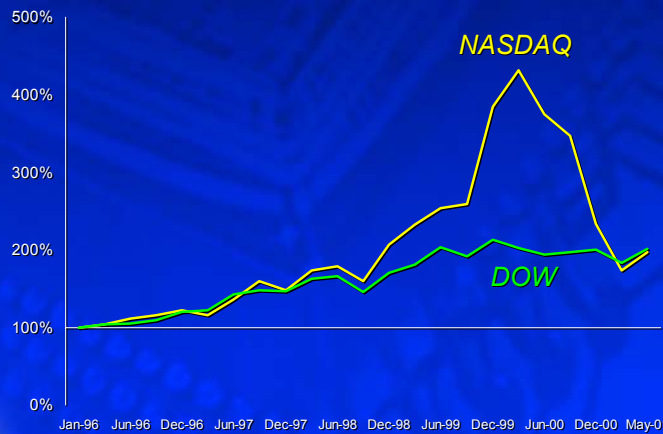
“Perfect Storm”

Y2K

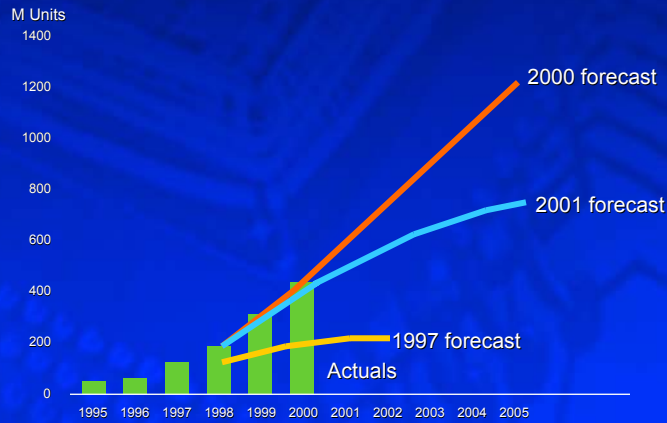
Unbundling = “mom & pop” local telephony?



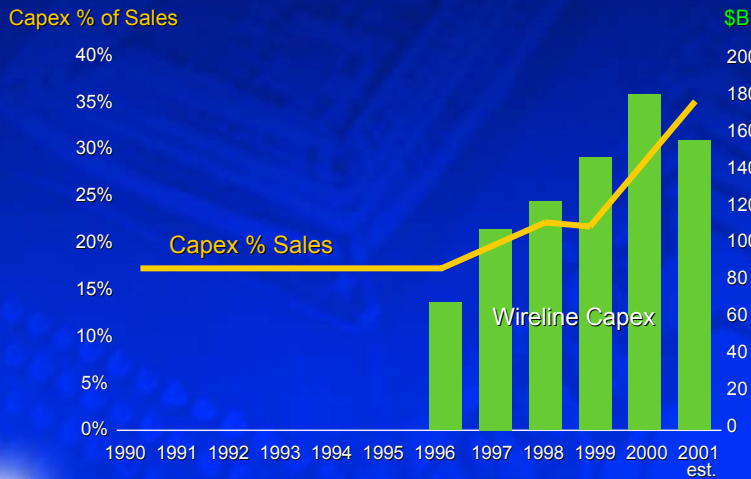
Technology Gamble



Wireless Clients



Telecommunications



“Over 500,000 US tech jobs lost in 2 years”

American Electronics Industry, March 2003



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Other Perspectives on ICT Crisis?

- Historical
- Consumer
- Cyclical
 - Intel



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From Canals to Railroads to Internet Infrastructure



From Canals to Railroads to Internet Infrastructure



Investment



From Canals to Railroads to Internet Infrastructure



Investment Expected Returns



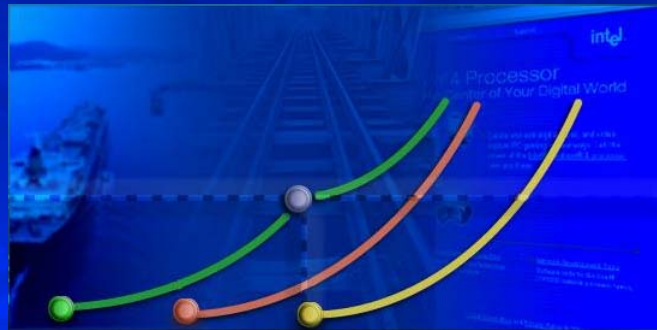
From Canals to Railroads to Internet Infrastructure



Investment Expected Returns Real Returns



From Canals to Railroads to Internet Infrastructure



Investment Expected Returns Real Returns



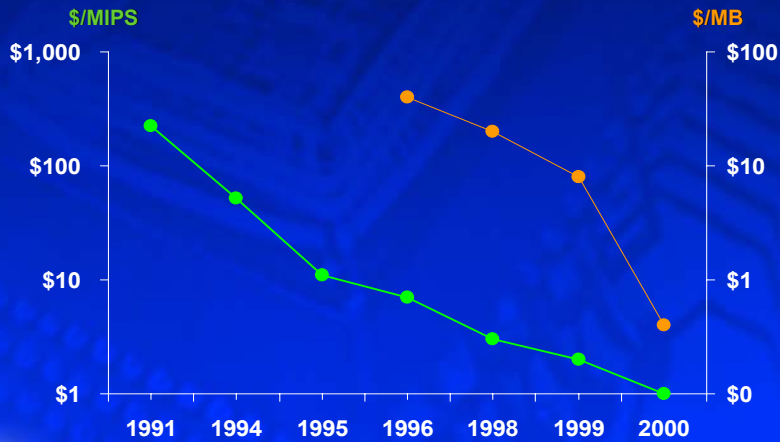
From Canals to Railroads to Internet Infrastructure



Investment Expected Returns Real Returns



Bandwidth Pricing



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Consumer Benefits

- **Railroads**
 - Domestic "Free Trade"
 - Furniture: North Carolina
 - Gas: Texas
 - Autos: Detroit
 - 1920 U.S.--262 Auto Manufacturers
 - State Restrictions—Costs \$15 Billion
- **"Free E-Trade"**
 - 9-16% Books
 - 10-40% Contact Lens
 - 75-80% Wills



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Productivity Effects

- U.S. Labor productivity
 - '73-'95 1.35%
 - '95-'00 2.54%
- ICT Contribution
 - 2/3's due to ICT
 - Production & Use
- Effect
 - Productivity = living standard
 - 2x living standard
 - 1.35% = 53 years
 - 2.54% = 28 years
 - One Generation Ahead!



Cyclical

- Intel 3rd Quarter
 - Revenues
 - 15% over 2nd Quarter
 - \$7.8 b
 - Costs down
 - Profits: more than doubled from last year's 3rd Quarter
 - 4th Quarter expected to be strong
- Other IT Companies are doing well



What to do about it?

- **Get the Fundamentals Right**
 - Free E-Trade
 - Education
 - R&D
 - Taxes
- **Regulation—Do No Harm**
 - Broadband Unbundling
 - Price Regulation
- **A U.S. Spectrum Case Study**

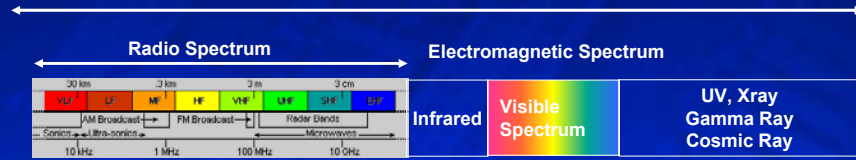


Spectrum Reform in U.S.

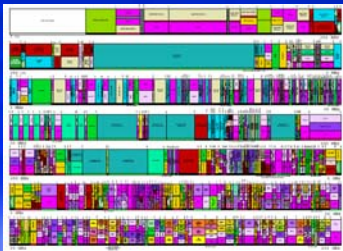
- **Problems**
- **Causes**
- **Recommendations**



Spectrum Scarcity



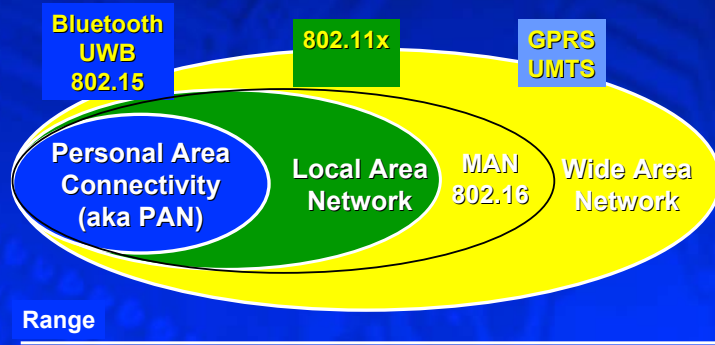
FCC Spectrum Allocations (3KHz – 300GHz)

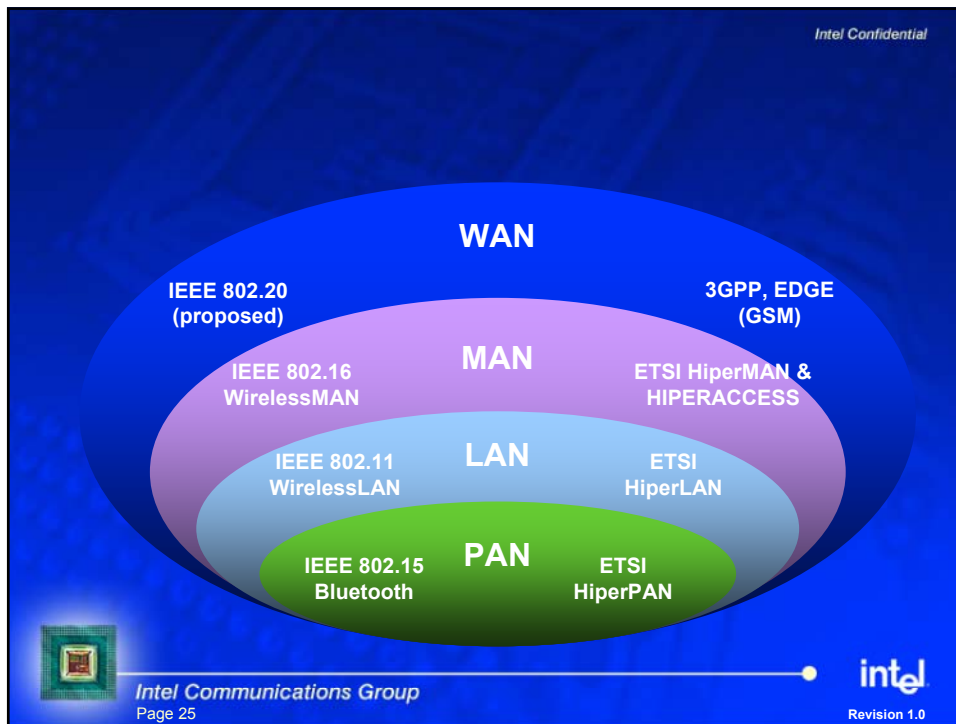


...And it's all spoken for (spectrum is a scarce resource)!



And It's Getting Scarcer





Problems

- **Artificial spectrum scarcity**
 - Auctions reveal price disparities
 - Disparities suggest artificial scarcity
- **Need more “flexibly” licensed and unlicensed spectrum**
 - >80% of 300 to 3000 MHz is “command & control”
 - 155 MHz in Cellular, PCS & SMR
 - 83.5 MHz at 2.4 GHz

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Causes

- **Government Rigidities**
 - Lack of good information & incentives
 - Litigious, cumbersome process
 - Powerful interests prefer status quo
 - Stymie competition
 - Keep process politicized
- **Rigidities lock in less valuable**
 - Uses
 - Technologies
- **“White Beards” Have Become More Costly**



Recommendation 1

Support license spectrum reforms

- **Remove use restrictions**
- **Define outputs (emissions at boundaries)**
- **Assign spectrum (“Swiss cheese”) exhaustively**
- **Facilitate simultaneous exchange**
 - Voluntary
 - Reveals “opportunity cost”
 - Simultaneity
 - Reduces transaction costs and holdout problems
 - Facilitates aggregation and relocation



MMDS/ITFS Rulemaking

- **2.5-2.7 GHz**
 - Underutilized
 - > Cellular & PCS
 - Interleaved band plan
 - 1-way video
 - 2-way data precluded
 - ITFS site licensing
- **Reform**
 - Coalition plan
 - Deinterleaving
 - Market by market transition
 - Improvements
 - Facilitate aggregation
 - Eligibility
 - Certainty



Recommendation 2

Support more commons spectrum

- Moore's Law Meets Marconi's Transmitter
 - Radio Free Intel
 - Spectrum Becomes Less Scarce
- **Non-interfering easements**
 - Underlays, e.g., UWB
 - Overlays, e.g., agile radios



Use of Vacant “white-space” Spectrum Intel Confidential

- Unlicensed Devices in TV bands (FCC 02-380)
 - Radical reform
 - Great propagation characteristics
 - 75 Companies filed comments
- Intel Recommendation
 - Spectrum sampling to learn your current environment
 - Use various control mechanisms (TPC, DFS, Location, etc.) to adjust radio operating parameters to mitigate interference
 - Demonstrate cognitive system < 1st H '04



Summary Intel Confidential

- **ICT “Crisis”**
- **Place in context**
- **Do no harm**
- **Continue reforms, e.g., Spectrum**
 - Incremental
 - “And/both” not “either/or”
- **Remember productivity**

