

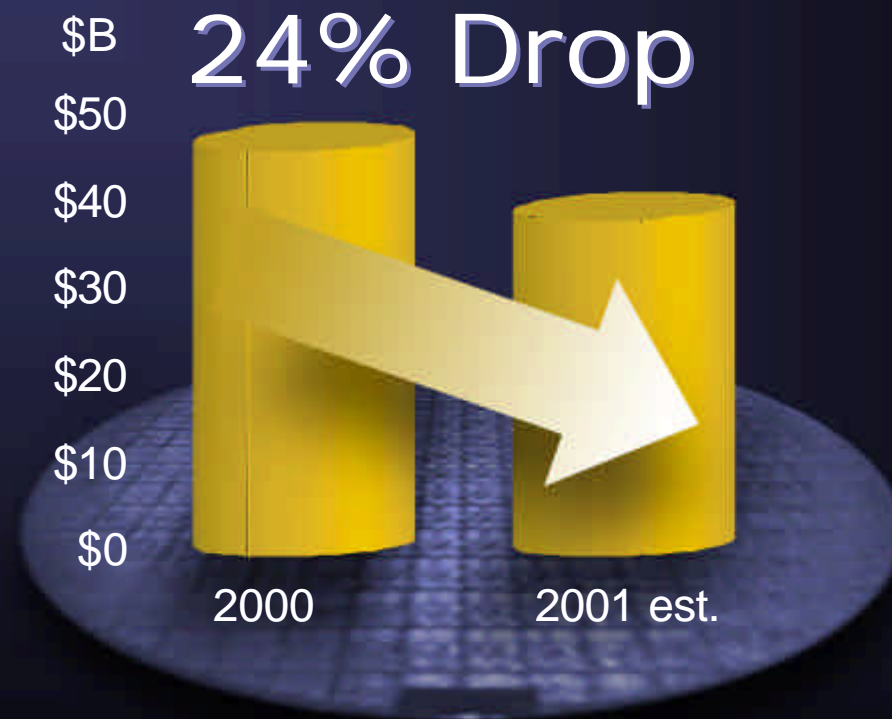
McKinsey&Company

**OLD TRUTHS**  
**NEW INSIGHTS**  
Reinventing Strategic Management

Communications  
Strategy and the  
Nation's New Agenda

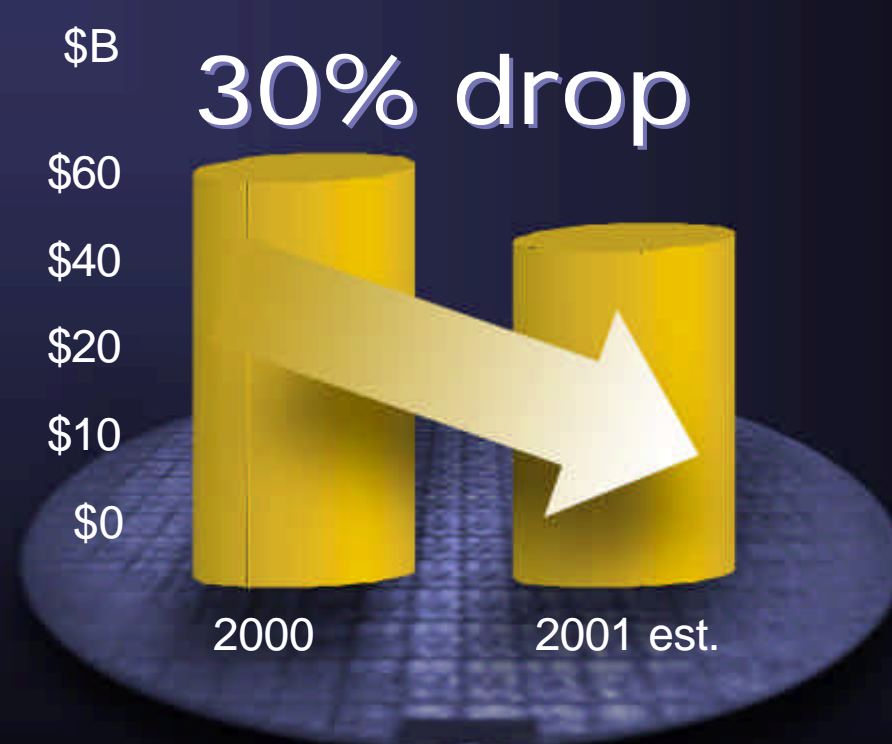
Andrew S. Grove  
Intel Corporation

# Semiconductors into Computing



Source: IDC August, 2001

# Semiconductors into Communications



Source: Gartner October 2001

# Innovation Continues

IBM silicon-germanium  
device cracks  
56 Gbits/second

*ZDNet*  
Oct 19, 2001

Nortel stages demo of  
All-optical switch

*EETimes*  
June 11, 2001

Multi-protocol Label  
Switching Storms  
Supercomm

*EETimes*  
June 4, 2001

Japan to reallocate  
Spectrum for 4G  
Phone services

*Wired News*  
July 4th, 2001

*MEMS chip  
sinks 'microteeth'  
into drug delivery*

*PlanetAnalog*  
Sept 5th, 2001

*Hyperchip Switch  
Supports Petabit Speeds*

*EETimes*  
May 31, 2001

**VoicePump & NEC  
Offer reference design  
For Toll-quality  
low-cost VoDSL,  
VoIP solutions**

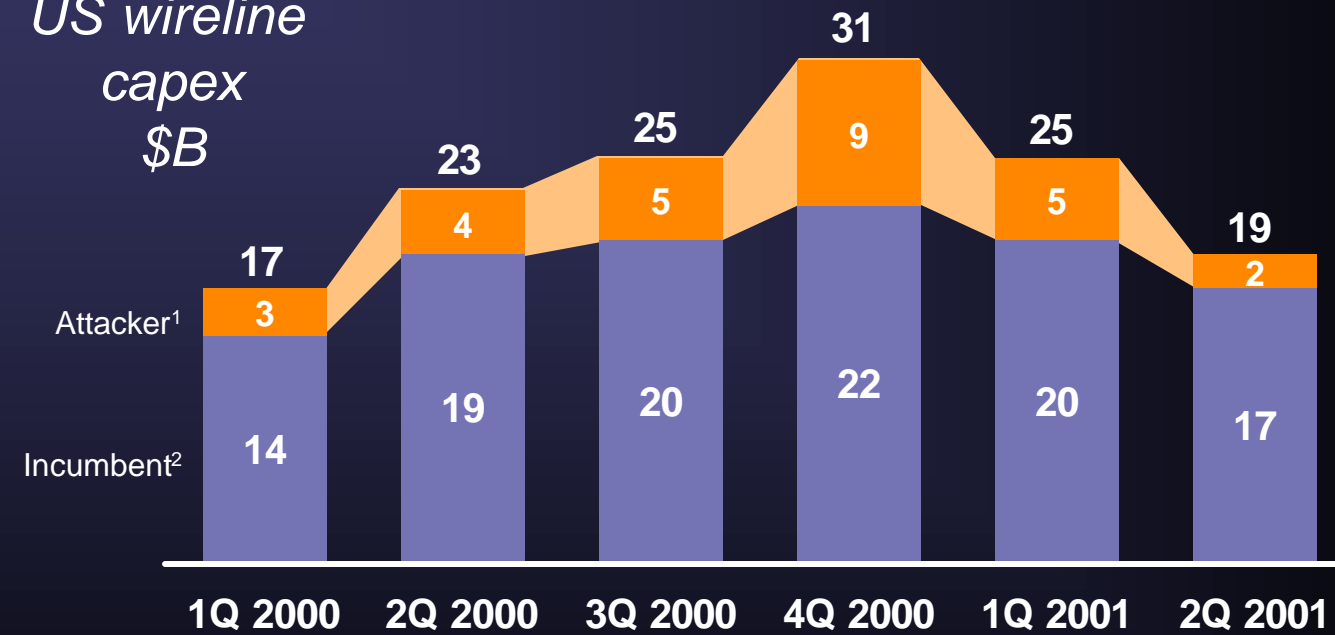
*NEC*  
Oct 1, 2001

Hitachi Announces World's  
Smallest Radio Frequency  
Identification IC

*ZDNet*  
July 5, 2001

# Deployment Slows

US wireline  
capex  
\$B



<sup>1</sup>1360Networks, Genuity, Global Crossing, Level 3, Williams, Broadwing, Adelphia, Allegiance, McLeod USA

<sup>2</sup>Qwest, Verizon, SBC, BellSouth, Broadwing, AT&T, Worldcom Inc., Sprint FON Group

Note: Incumbent capex includes AT&T wireless

Source: Compustat; SEC filings

## Opportunity

*...benefits to the U.S. economy  
of the widespread adoption  
of broadband access is \$400  
billion per year*

Source: Crandall/Jackson study 7/2001 Financial Times

# The US Agenda Has Changed

## Pre Sept 11<sup>th</sup>:

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- Social Security
- Medicare
- Immigration liberalization
- Stem cell funding
- Energy
- Privacy Protection

## Post Sept 11<sup>th</sup>:

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- War on terrorism
- Homeland defense
- Airline security
- Economy

# Potential 10X Change

To our culture & our economy



Inflection point



**Sept 11th**

Communications & Computing Essential

Technology Prevailed

---

## Within Hours....

1.2B instant messages exchanged on AOL

40x volume at Yahoo!News

Yahoo! PC-phone calling up 59%

9M page views at CNN.com

Level3's APAC network traffic up by 50%

Blackberry traffic up 57%

Instant platform for community action

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**Sept 11th**

But.....

It could have done more

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# Essential Infrastructure

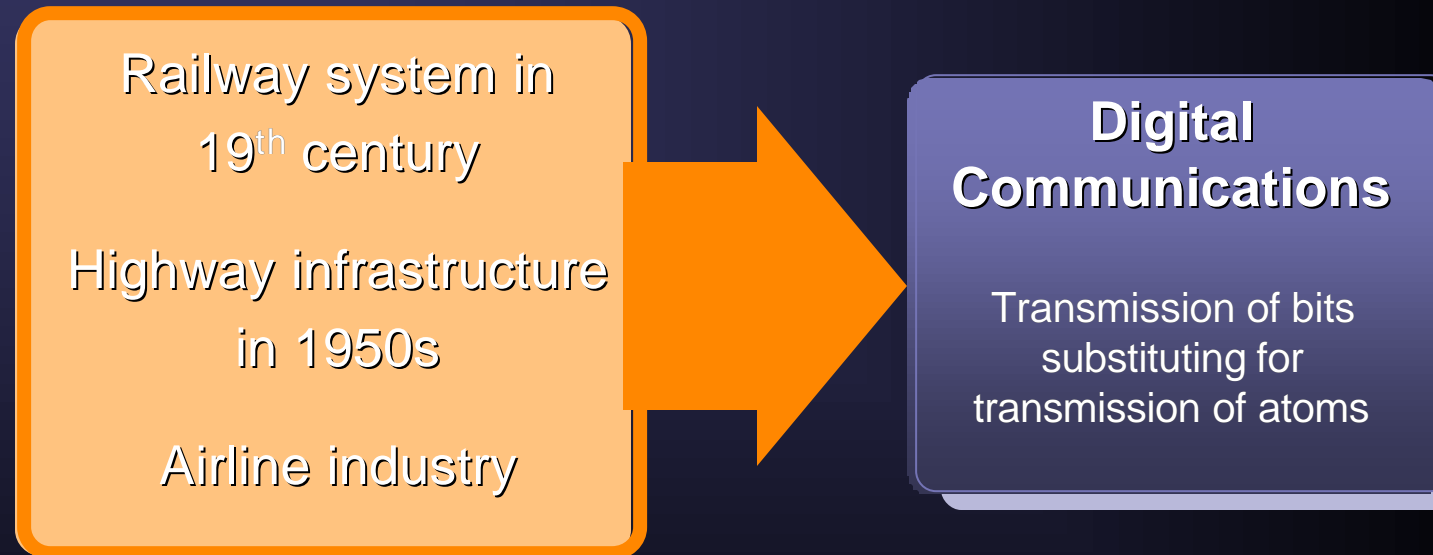
Keeping Society &  
the Economy Connected

requires

Ubiquitous Broadband Access

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# Vital Industries



## **The laws of computing**

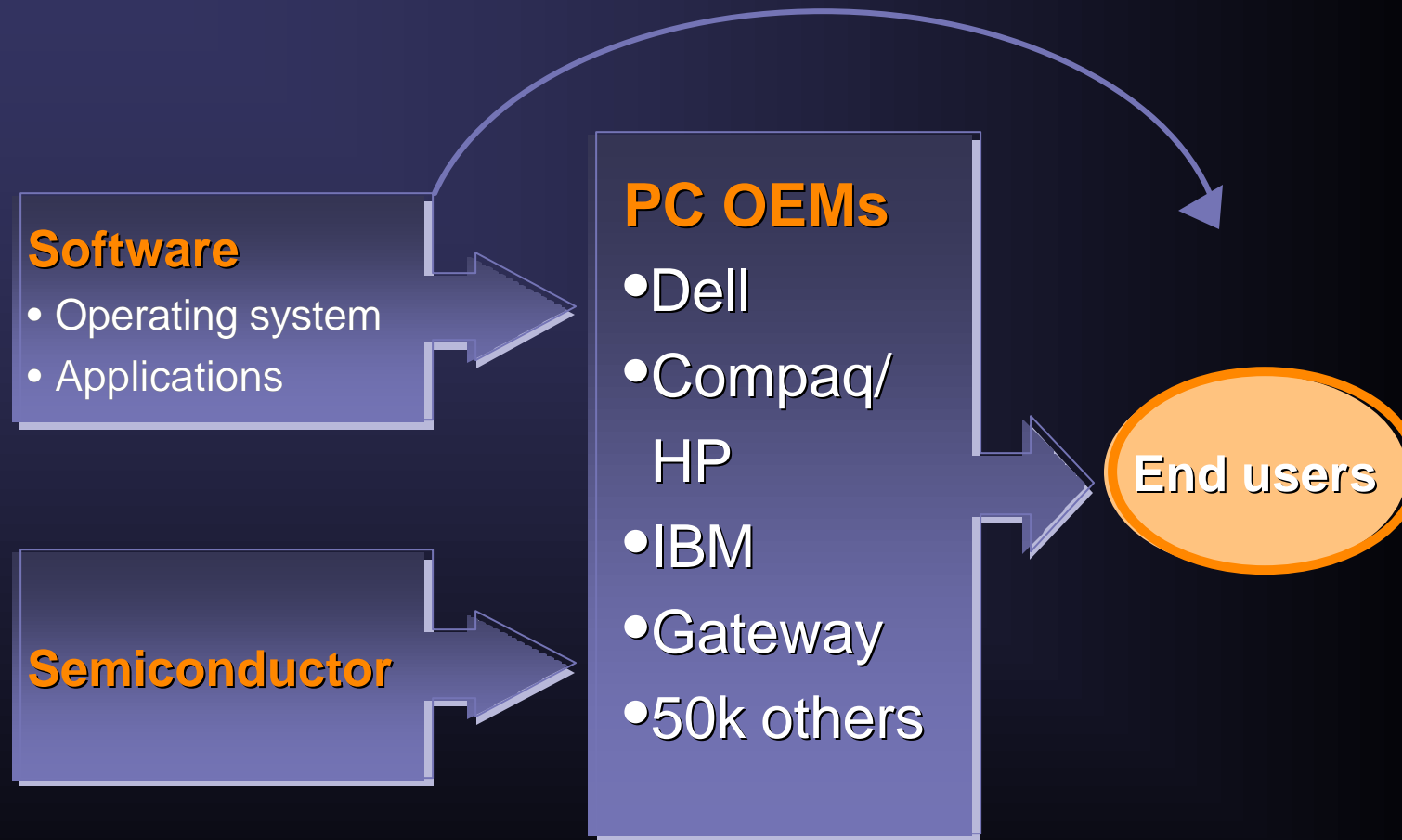
Cost follows price

## **The laws of communications**

Price follows cost

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# PC Value Chain



# The Value Chain

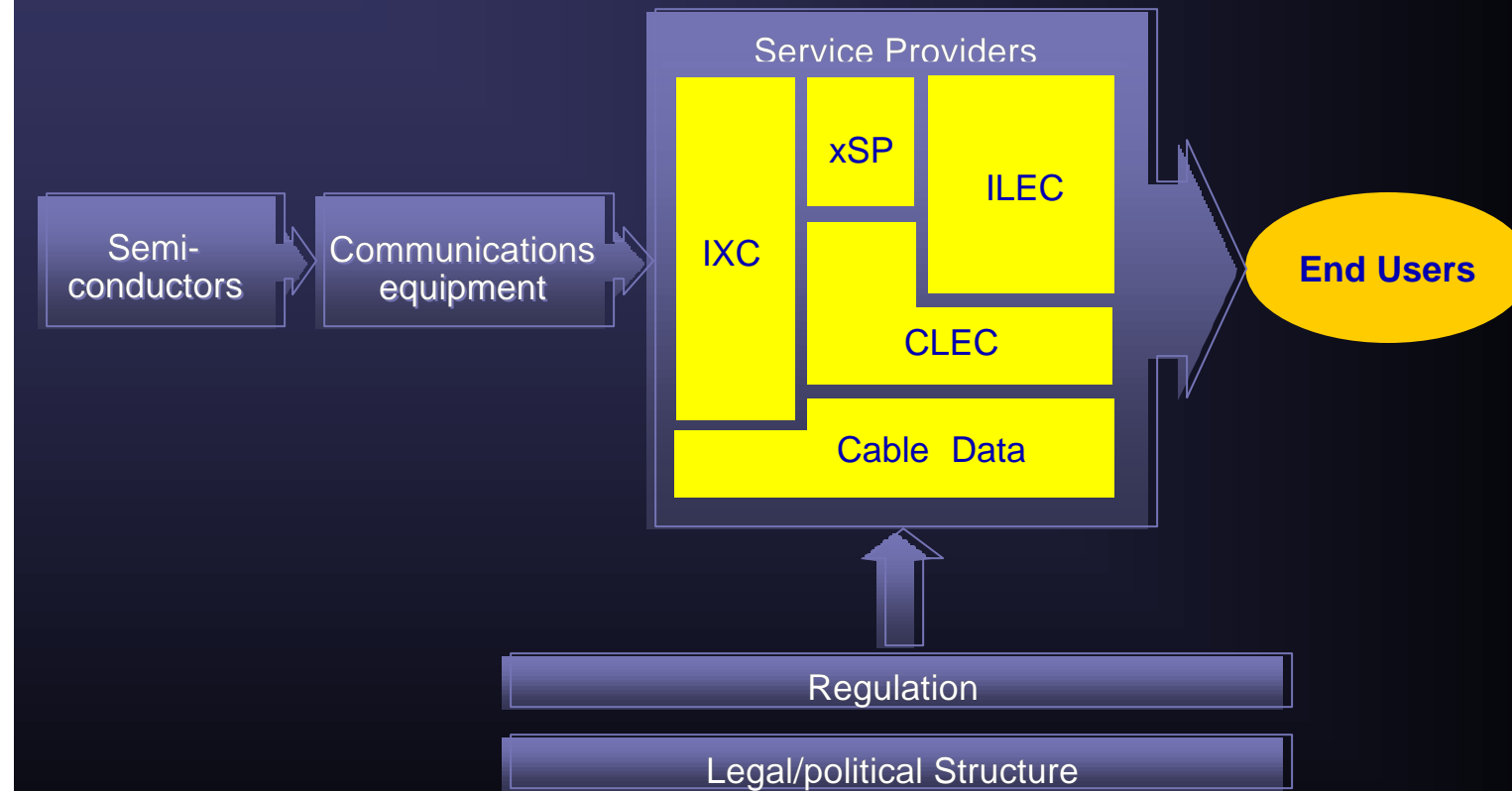
## Computing

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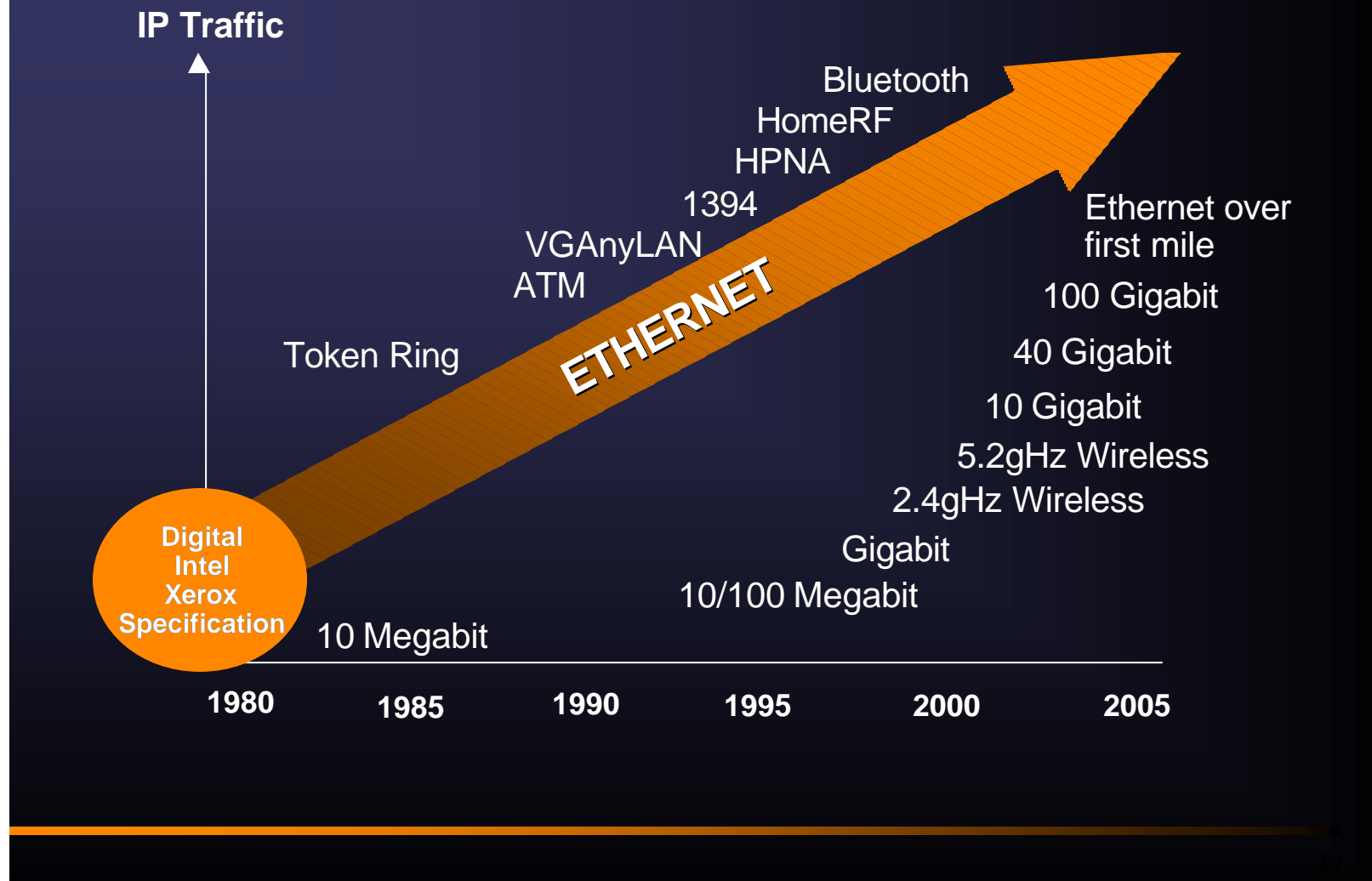
- Competitive technology development
  - Common standards
  - Incentives push technology
  - Consumers pull technology
- Rapid innovation and deployment



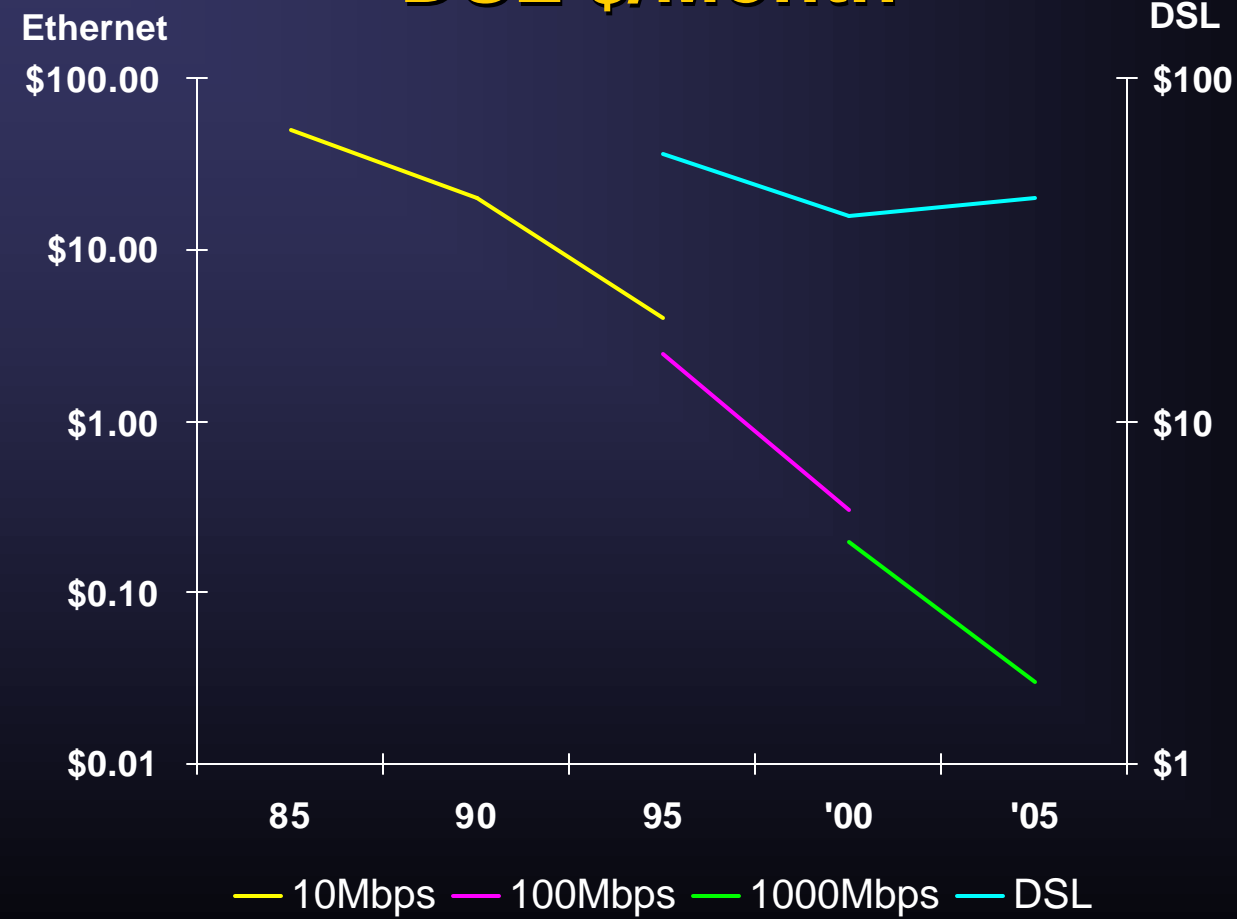
# Communications Value Chain



# Ethernet Evolution



# Ethernet \$/Mb DSL \$/Month



Source: Intel Corporation

# The Value Chain

## Communications

- Diverse standards
- Incentives protect legacy businesses
- Carriers slow to pull new technology
- Innovation, but slow deployment

## Computing

- Common standards
- Incentives push technology
- Consumers pull technology
- Rapid innovation & deployment

# Shift in Communications Value Chain

## Old

- Diverse standards
- Incentives protect legacy businesses
- Carriers slow to pull new technology
- Innovation, but slow deployment

## New

- Standards emerging
- Incentives shifting toward profit focus
- Cost focus increasing
- Rapid innovation, focus on modularity

## The real challenge

DSL ORDER NUMBER: N1467003  
Order Cancellation Date: 10/21/01

Dear Customer,

It is our understanding that you can only have DSL if you dig a trench so new cable can be laid.

Please contact us at 877/722-3755 by the date above and tell us of your positive intention to do this. If we do not have confirmation your DSL order will be canceled.

Thank You

© 2001 Verizon Wireless. All rights reserved. DSL service available in select areas only. See website for details.

## Deployment Challenges

100M HH

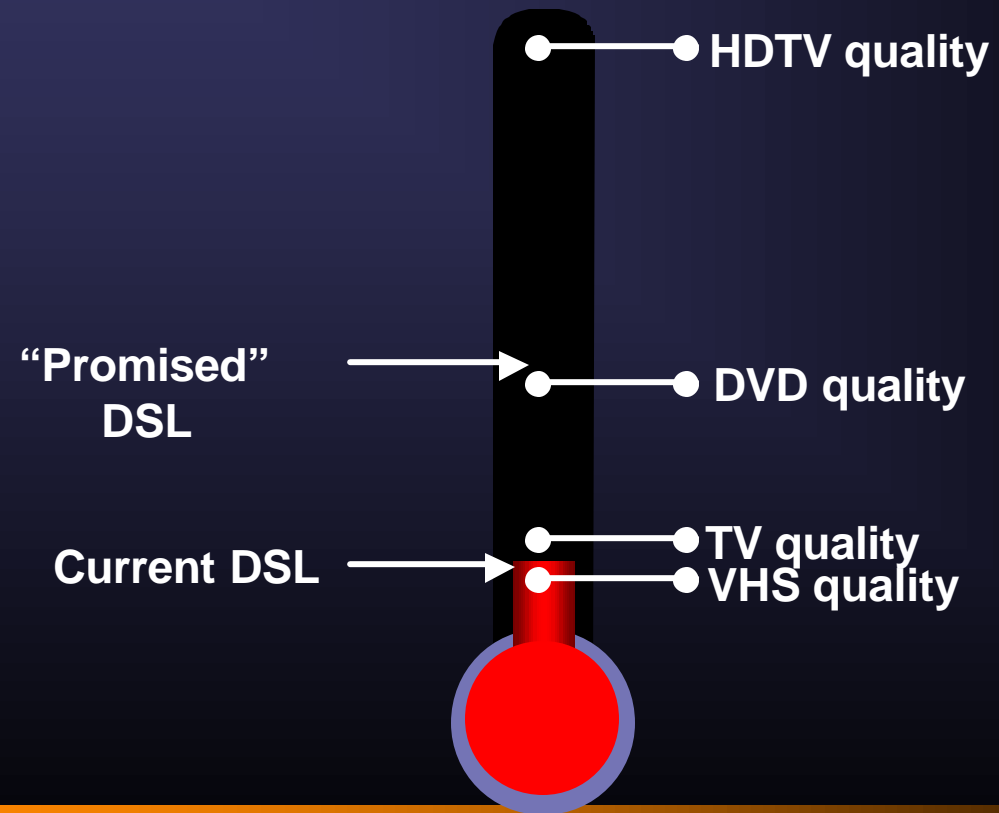
~\$200B to deploy today

~\$2000/HH average

~150 kbps

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# Broadband meter





## **Acceleration Alternatives**

Reduce regulatory uncertainty on telco investments

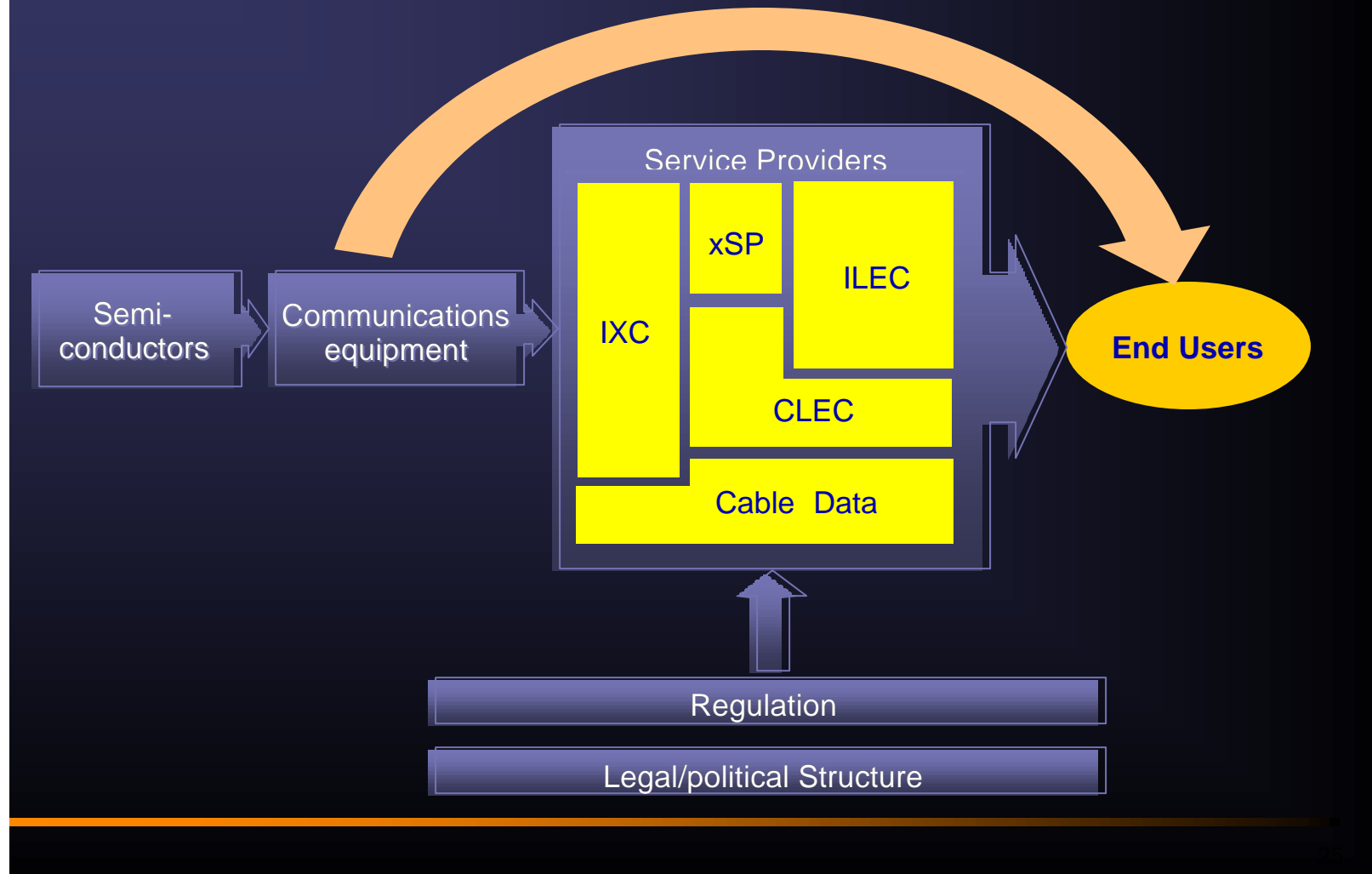
Share in the heavy cost of build-out

Invest in disruptive technologies

---

# Communications Value Chain

*Disruptive Technology*



# Fund a technology horserace

Goal: a 10x Solution

~\$20B to deploy

\$200/HH

10 mbps

\$10B Government funded race

Focus on the first mile to the consumer

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# Developer challenge

Government funded development

IP license is the reward

Rapid innovation

Competitive solution, common standards

Scalable, easily deployed by multiple manufacturers/distributors

Purchased and installed by consumers

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# Alternative Technologies

Free space optics

Hybrid fixed point wireless

Space Platform communications

Portable satellite video phone

UWB transmission

10Gb Ethernet over Fiber

Passive Optical Networks

Low Earth Orbiting Satellites

Hz in lightly populated areas

Satellite Downstream / Wireless Upstream

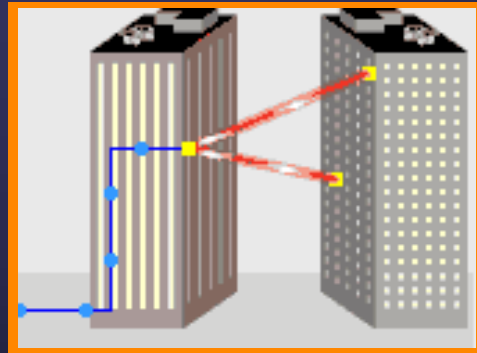
Short Reach/Coded Fiber

Creative Spectrum allocation

Push copper to new levels

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## Free-Space Optics



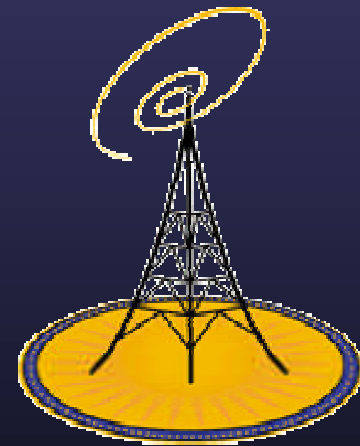
- Pulsed laser light connects buildings for very high speed communications
- Emergency back-up to quickly restore disrupted communications
- Innovators: Terabeam, Winstar, LightPointe

## Portable Satellite Broadcasting



- Portable satellite videophone using 64/128 kbps Inmarsat or ISDN link
- War correspondence, extreme or isolated environments
- Weighs 20 pounds, lunchbox sized, \$8,000 cost

## Fixed Wireless Broadband



- Wireless first mile from fiber-connected base station
- Licensed (e.g., MMDS, UHF) and unlicensed spectrum technologies
- Areas of innovation: mesh architecture, smart antennas, and self-install CPE



# Space Platform Communications



- High-flying aircraft platform circling major population centers
- Connected to ground gateway stations and operation centers
- Roof-mounted satellite dish transceivers for customers
- Low latency, good line of sight coverage

## Summary

Digital communication is essential infrastructure

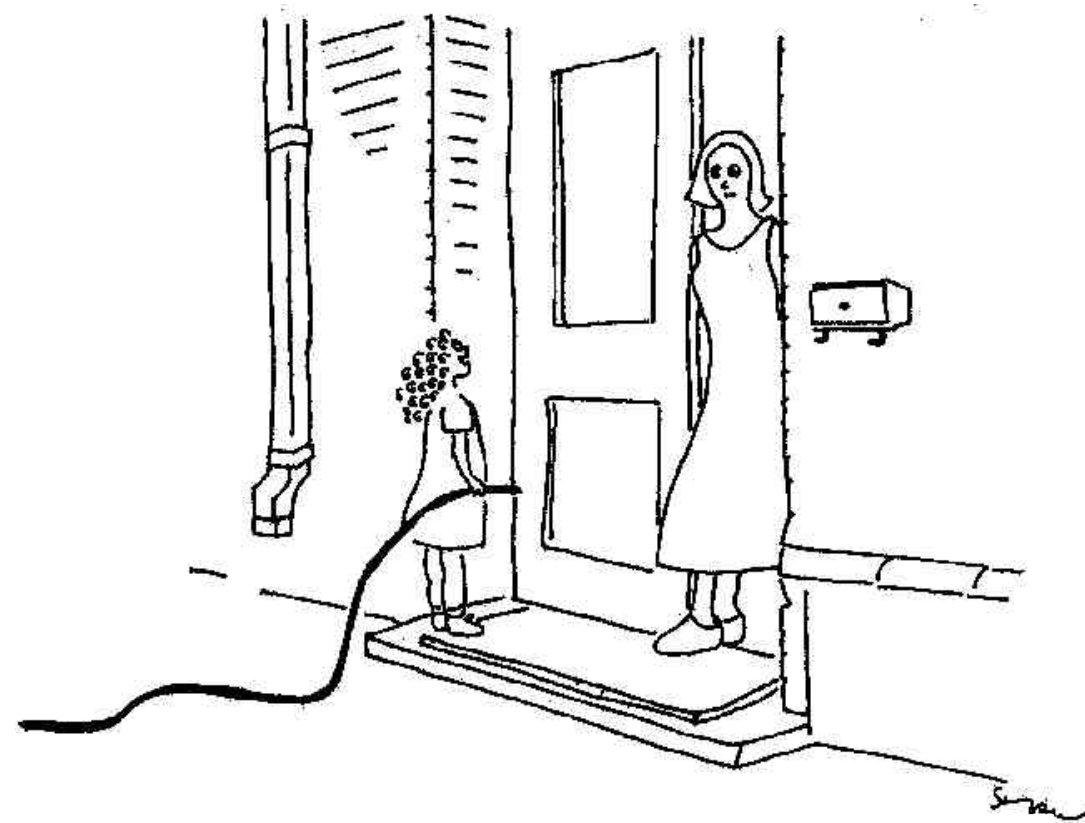
Utility is limited by first mile bottleneck

9/11 reinforces need to accelerate

Viable alternatives exist

Perfect place for disruptive technologies

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*“Look, Mom! A broadband digital subscriber line followed me home. Can we keep it?”*