"NCSA and Telepresence Collaboration"

Remote Telepresence Talk to
The 2006 NCSA Private Sector Program Annual Meeting
In Honor of John Stevenson's Retirement
Delivered from Calit2@UCSD
La Jolla, CA
June 20, 2006

Dr. Larry Smarr

Director, California Institute for Telecommunications and Information Technology;

Harry E. Gruber Professor,

Dept. of Computer Science and Engineering

Jacobs School of Engineering, UCSD

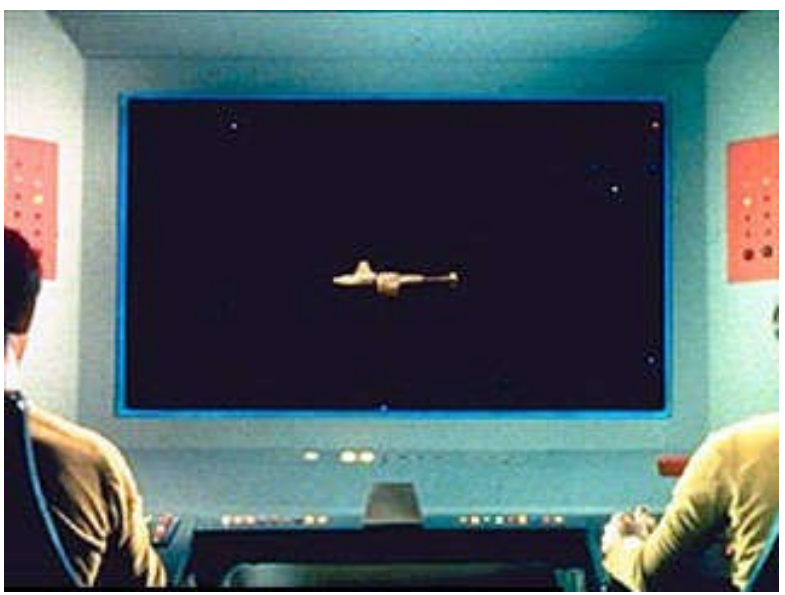




TV and Movie Science Fiction of 40 Years Ago Envisioned Telepresence Displays









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Source: Star Trek 1966-68; Barbarella 1968

it²

PicturePhone Introduced 40 Years Ago—

The Long Road from Product Prototype to Commercial Success



NEW LOOK PICTUREPHONE

Now you can *see* as well as talk The Picturephone has Touch-Tone controls to make calls and control the television screen so you can see the person you're talking to, be seen yourself, or have a darkened screen. Attended service between New York, Washington and Chicago began in 1964.

www.bellsystemmemorial.com/telephones-picturephone.html

An NCSA Simulation of Telepresence

Using Analog Communications to Prototype the Digital Future

"What we have to do is eliminate distance between individuals who want to interact with other people and with other computers in a collaborative fashion. … This is a really a glimpse into that future"
— Larry Smarr, Director, NCSA







"We're using satellite technology…to demo what It might be like to have high-speed fiber-optic links between advanced computers in two different geographic locations." — Al Gore, Senator

OptIPuter NCSA™ **ATT & Sun SIGGRAPH 1989** it²

Alliance 1997: Collaborative Video Production via Tele-Immersion and Virtual Director

Alliance Project Linking CAVE, ImmersaDesk, Power Wall, and Workstation with Shared Internet











NCSA™ UIC

sgi

ALLIANCE

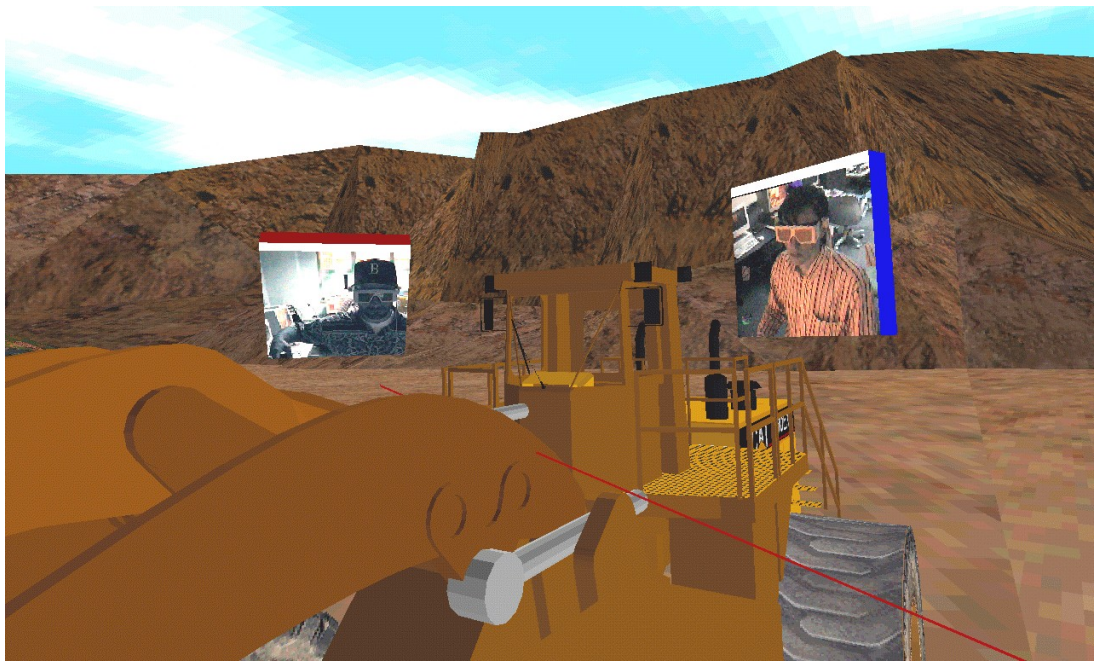
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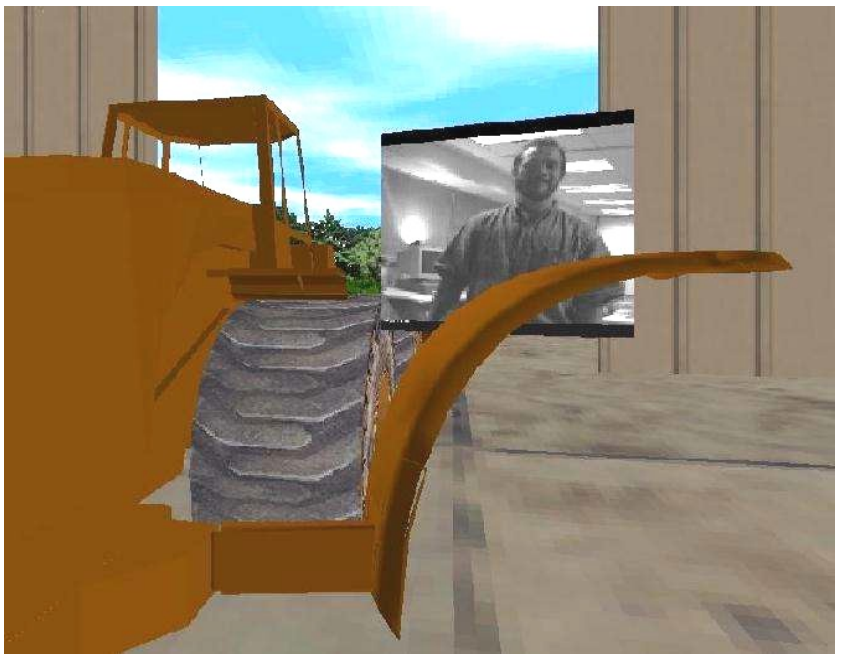
Donna Cox, Robert Patterson, Stuart Levy, NCSA Virtual Director Team
Glenn Wheless, Old Dominion Univ.

it²

NCSA Industrial Partners Adopted Innovations and Drove Virtual Collaboration

1998





NCSA™

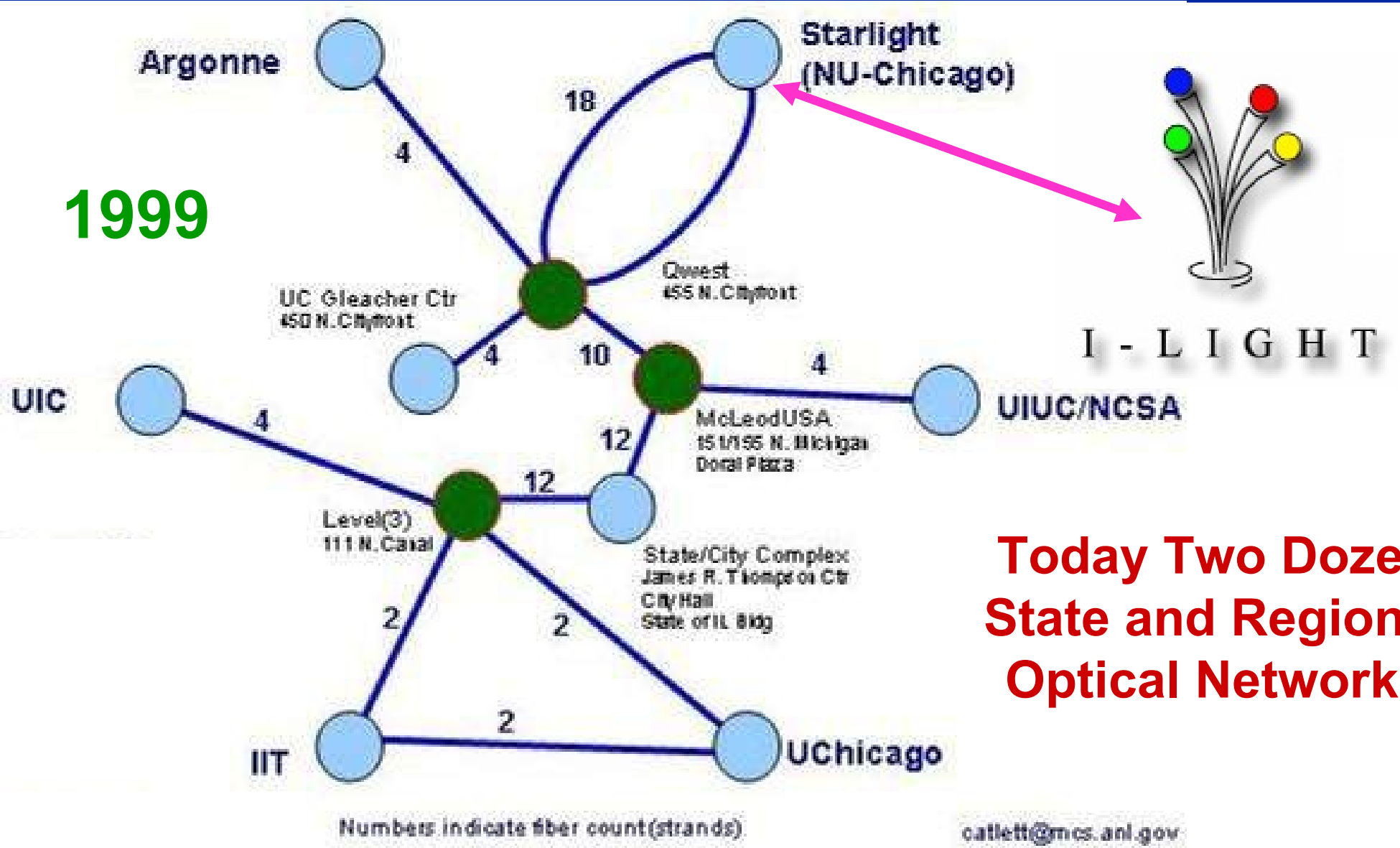
Real Time Linked Virtual Reality and Audio-Video Between NCSA, Peoria, Houston, and Germany

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Caterpillar, NCSA

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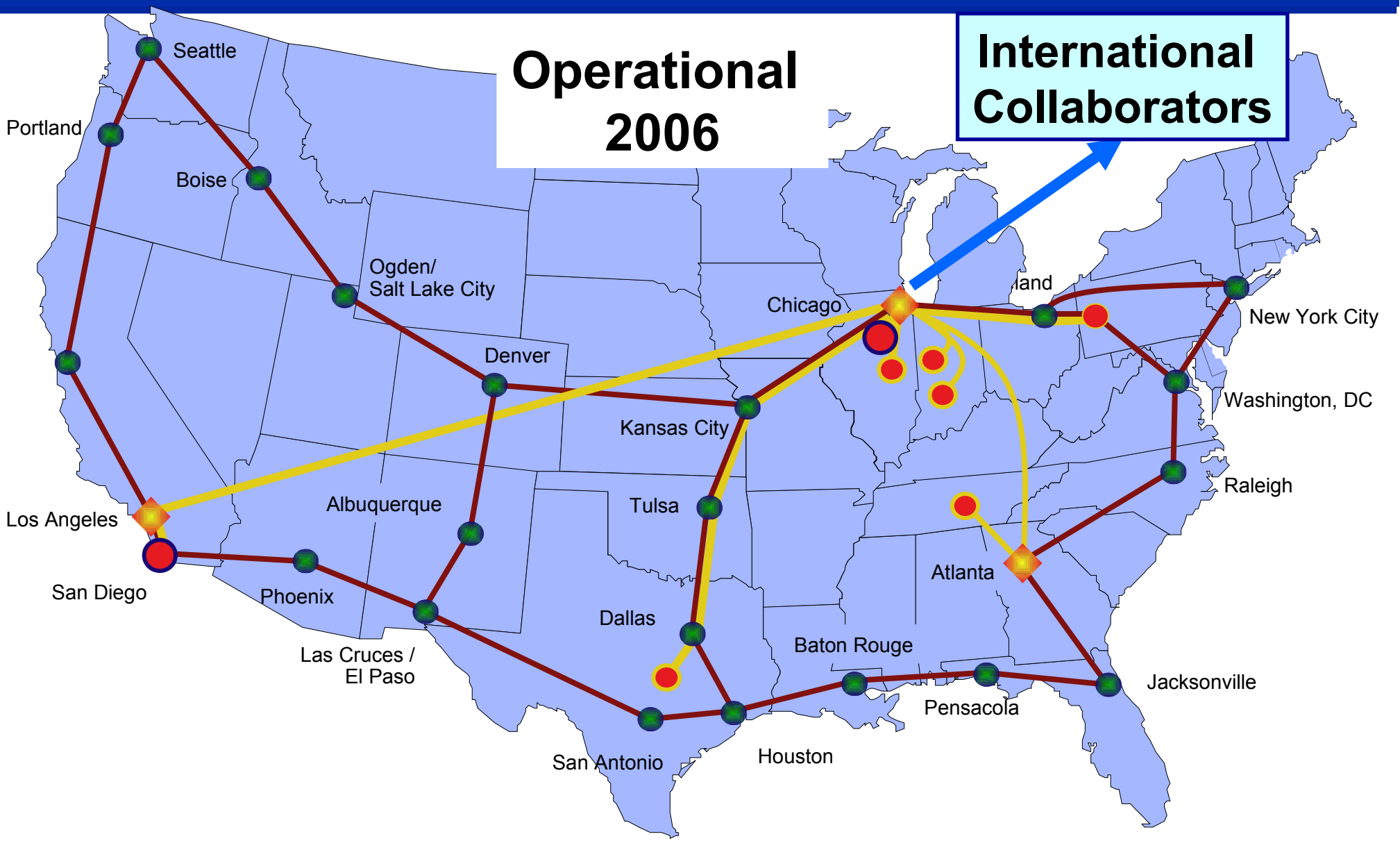
States Began to Acquire Their Own Dark Fiber Networks -- Illinois's I-WIRE and Indiana's I-LIGHT Led the Way



Today Two Dozen State and Regional Optical Networks

Source: Larry Smarr, Rick Stevens, Tom DeFanti, Charlie Catlett

National LambdaRail (NLR) & TeraGrid Provides Cyberinfrastructure Backbone for Researchers

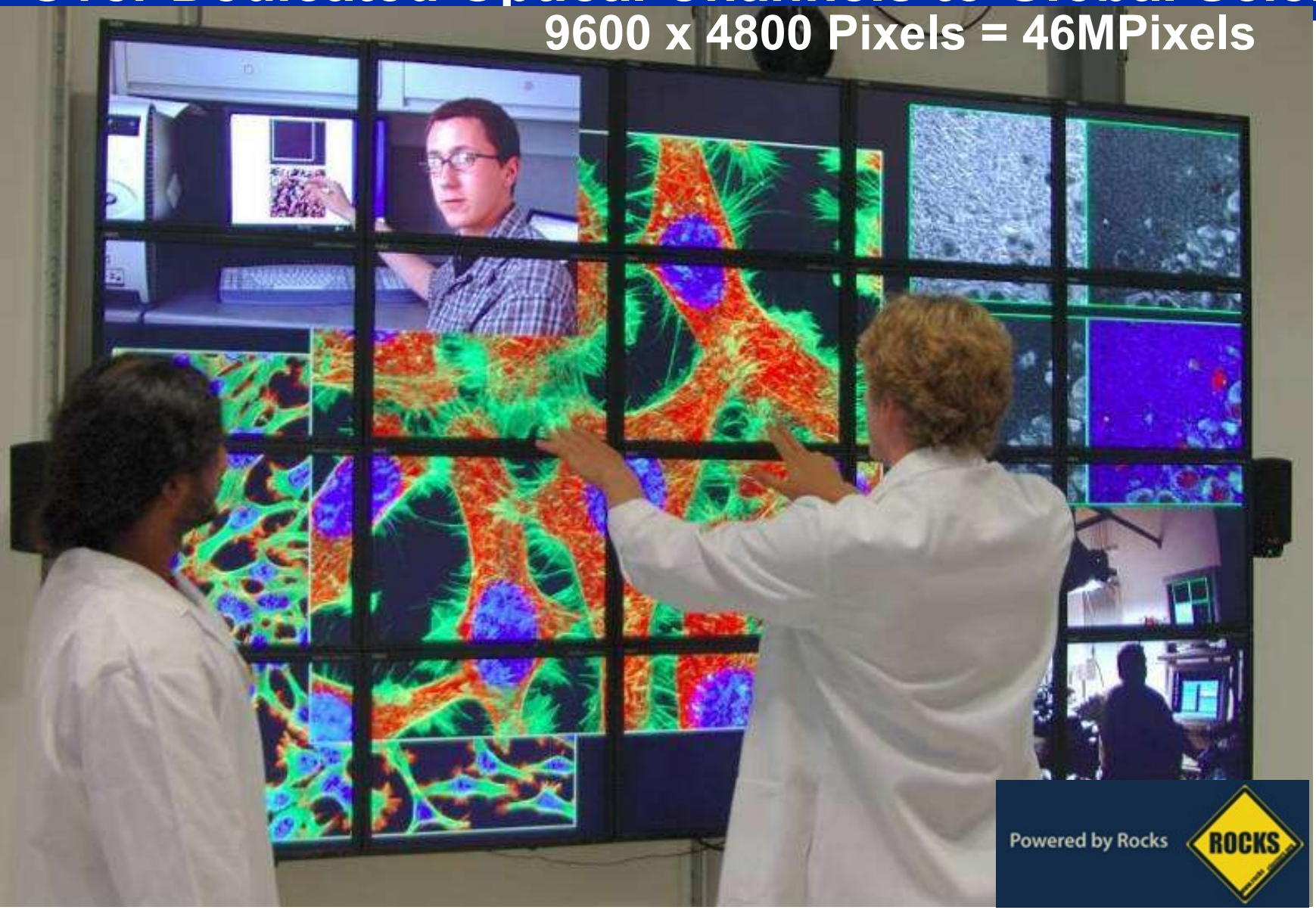


NLR 4 x 10Gb Wavelengths Initially
Capable of 40 x 10Gb Wavelengths at Buildout

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The OptIPuter Project – Creating High Resolution Portals Over Dedicated Optical Channels to Global Science Data



NCMIR NATIONAL CENTER for MICROSCOPY and IMAGING RESEARCH at San Diego, an NIH supported resource center

NSF

OptIPortal– Termination Device for the OptIPuter Global Backplane

evl electronic visualization laboratory

OptIPuter

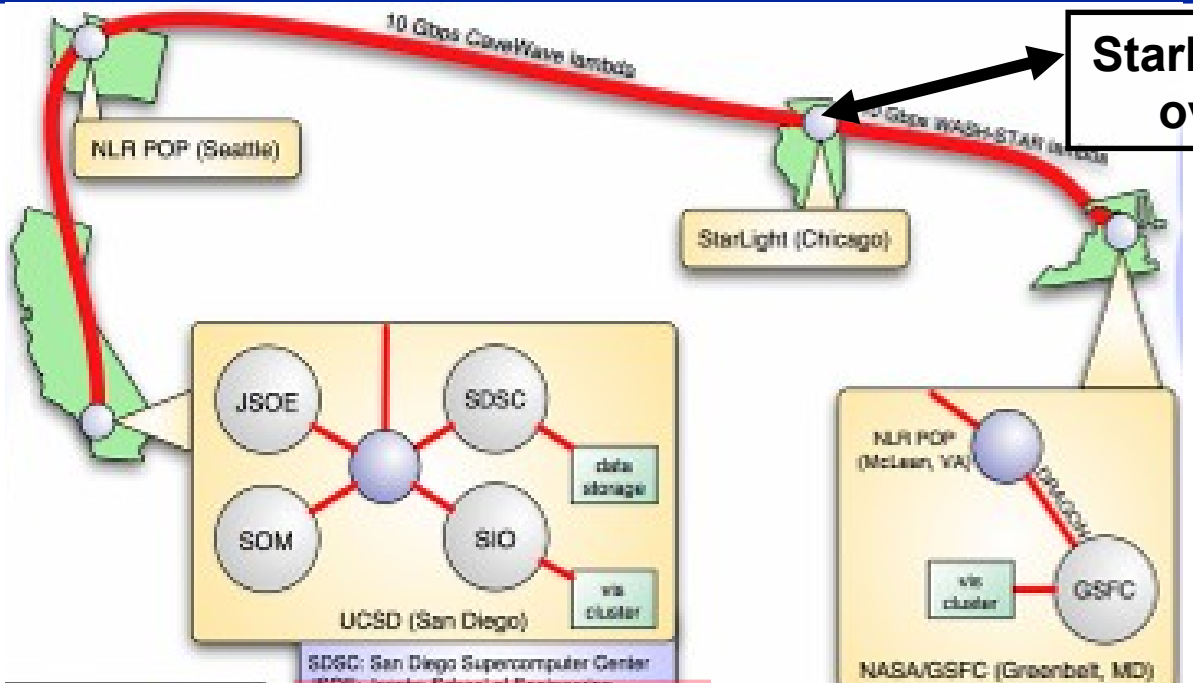
OptIPuter Scalable Adaptive Graphics Environment Enables Integration of HD Streams into Tiled Displays

it2

Combining Telepresence with Remote Interactive Data Analysis

Live Demonstration of 21st Century National-Scale Team Science

August 2005



10 Gigabit/sec Dedicated Optical Lightpath



OptIPuter Visualized Data

HDTV Over Lambda



OptIPuter

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NCSA's Interactive Remote Data and Visualization Services

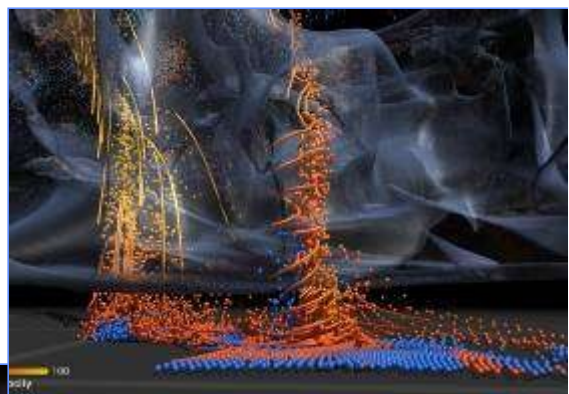


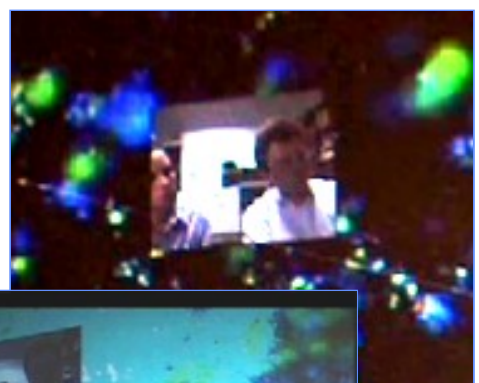
- Multiple Scalable Displays
- Hardware Pixel Streaming
- Distributed Collaboration

- Scientific-Info Visualization
- AMR Volume Visualization
- Glyph and Feature Vis
- Visualization Services

NCSA Altix Data and Vis Server



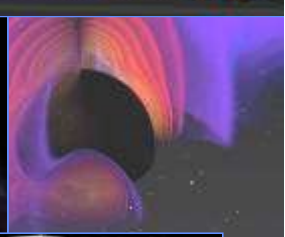


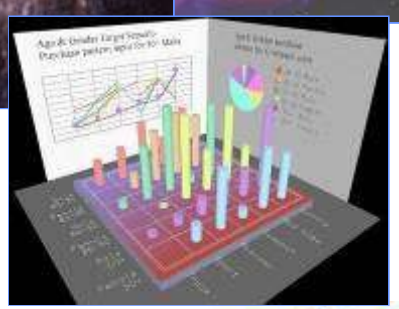












Linking to OptIPuter

- Data Mining for Areas of Interest
- Analysis and Feature Extraction
- Data Mining Services

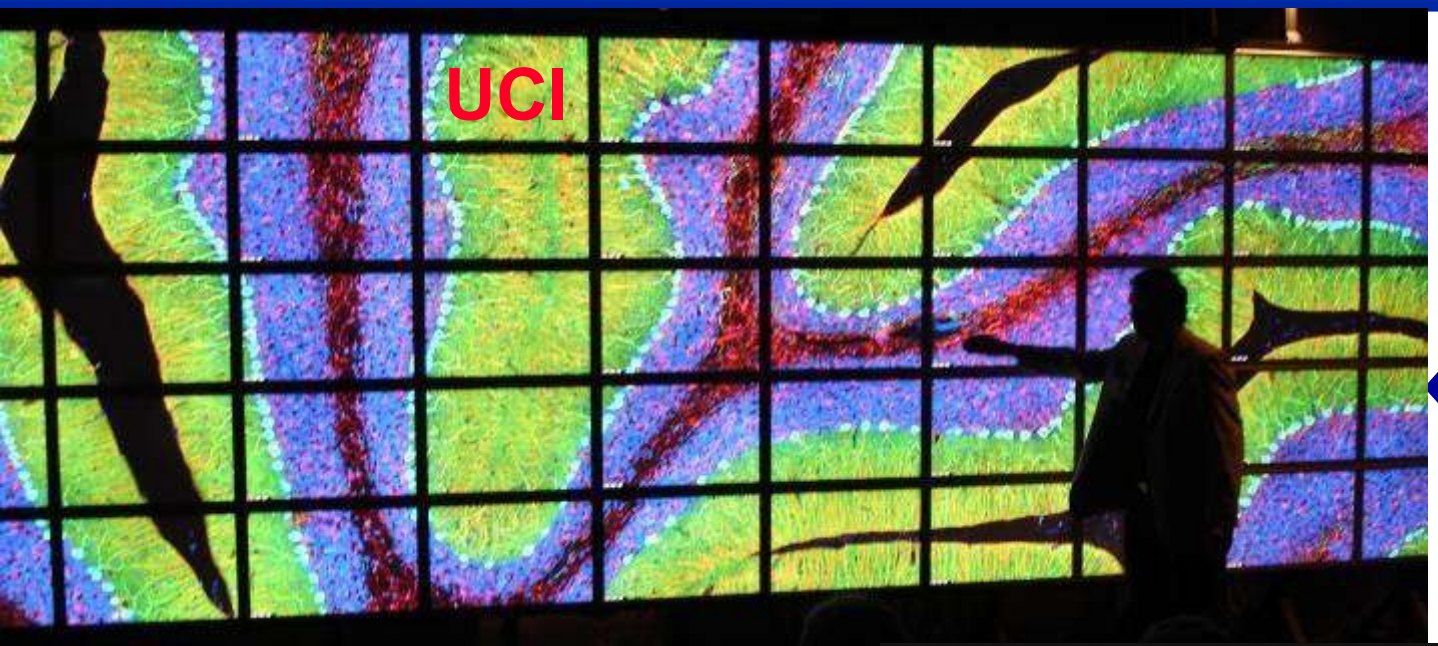
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National Laboratory for Advanced Data Research

An SDSC/NCSA Data Collaboration

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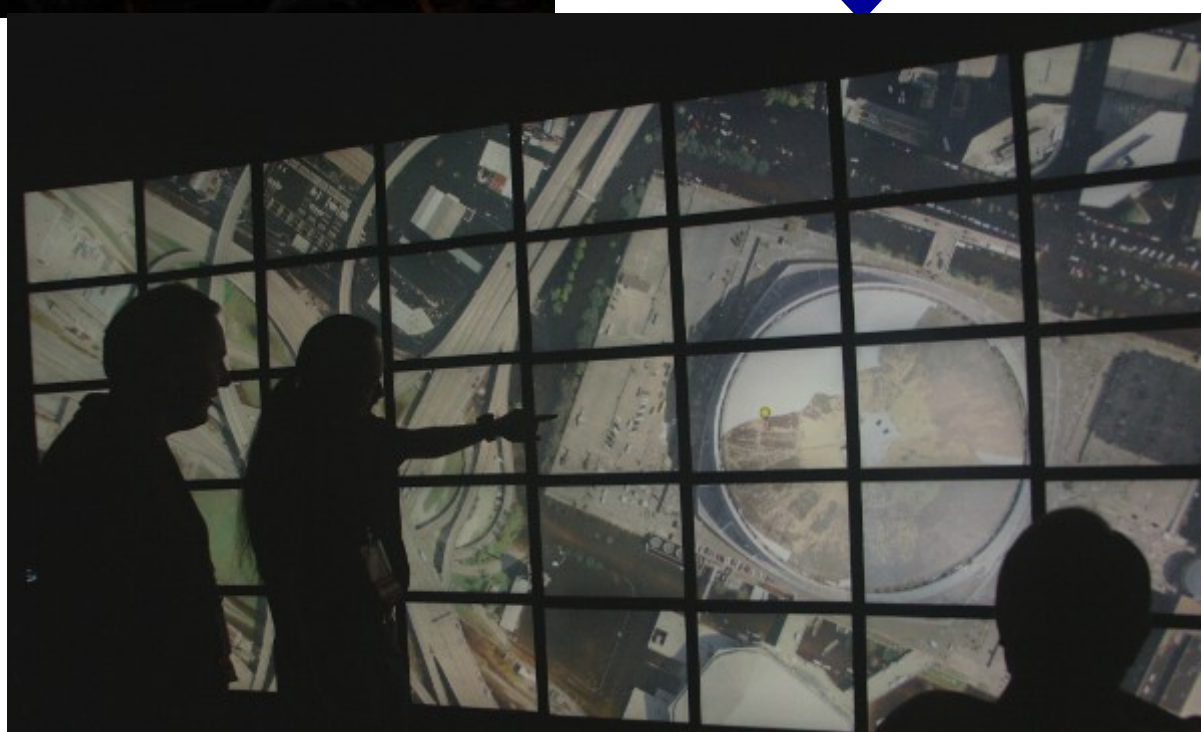
The OptIPuter Enabled Collaboratory: Remote Researchers Jointly Exploring Data



Next: Couple to NCSA 31M-Pixel Projector Wall

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First: OptIPuter will Connect The Calit2@UCI 200M-Pixel Wall to the 100M-Pixel Display at Calit2@UCSD With Shared Fast Deep Storage



100M-Pixel Walls are Just the Start -- Preparing for a Future of Gigapixel Wall Paper

- **Dalsa Semiconductor**
  - 4 X 4-Inch Charge-Coupled Device,
  - Configured as 10,560 X 10,560 Pixels
  - World's Highest-Resolution Image Sensor



Record CCD Image Sensor has 111 Million Pixels

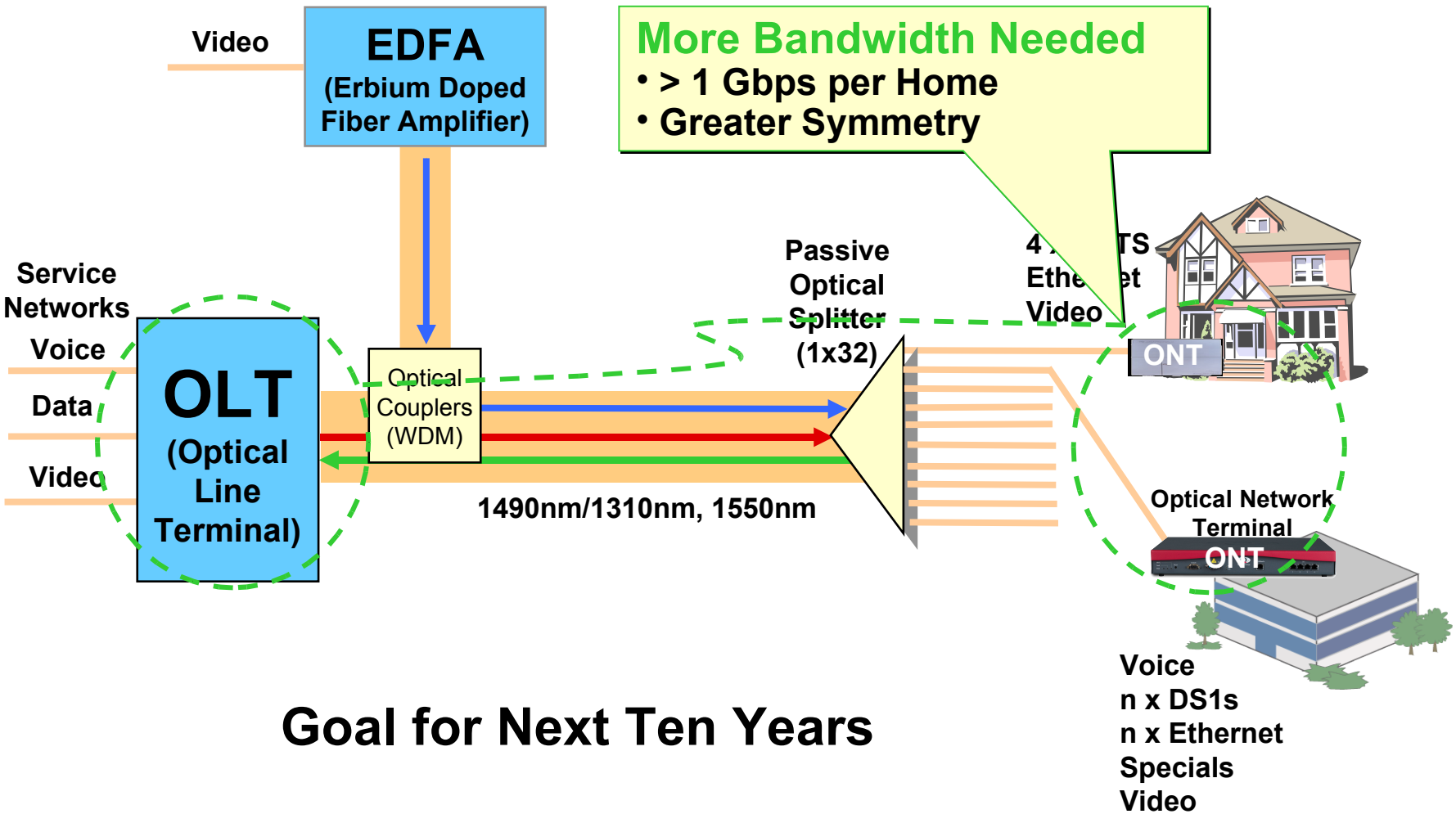
EETIMES ONLINE
Global news for the creators of technology

June 19, 2006

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Verizon Fiber to the Premise: Bringing Gigabit/s to the Home



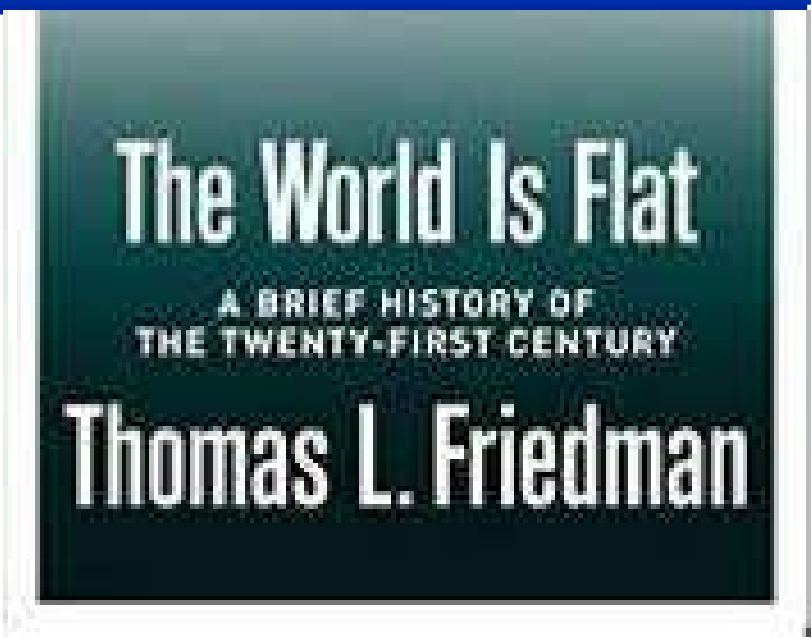
Goal for Next Ten Years

Source: Stuart Elby
VP – Network Architecture, Verizon Technology Org

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Ten Years Old Technologies--the Shared Internet & the Web--Have Made the World "Flat"

- But Today's Innovations
  - Dedicated Fiber Paths
  - Streaming HD TV
  - Large Display Systems
  - Massive Computing and Storage



- Are Reducing the World to a "Single Point"
  - How Will Industry, Universities, and Our Society Reorganize Themselves?

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