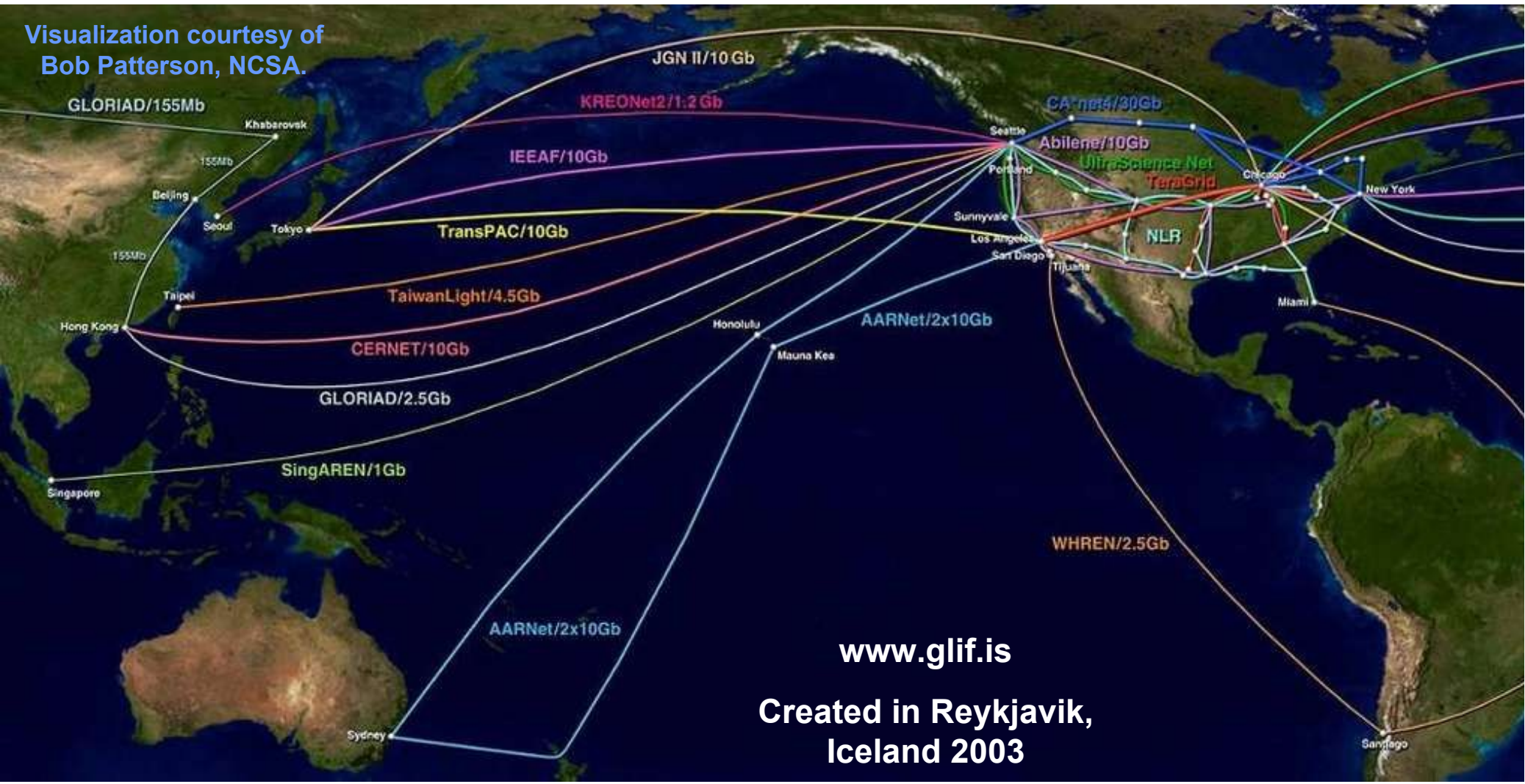
"Ultra-Broadband and Peta-Scale Collaboration Opportunities Between UC and Canada

Summary Talk
Canada - California Strategic Innovation Partnership Summit
ICT/Broadband Internet Session
Vancouver, Canada
June 12, 2006

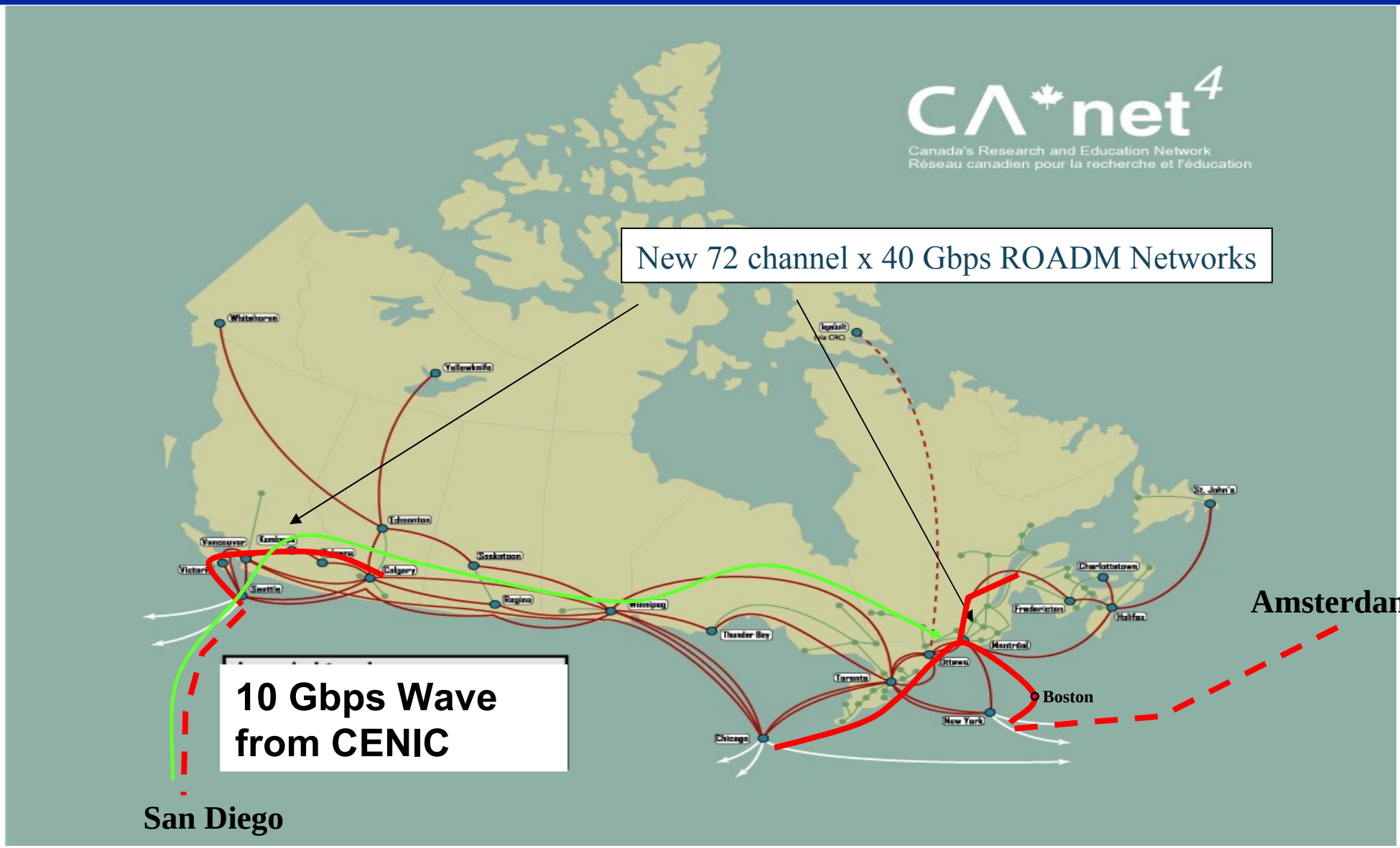
Dr. Larry Smarr
Director, California Institute for Telecommunications and Information Technology;
Harry E. Gruber Professor,
Dept. of Computer Science and Engineering
Jacobs School of Engineering, UCSD

Countries are Aggressively Creating Gigabit Services: Canada Has Been an International Leader



OptIPuter CANARIE cenic Corporation for Education Network Initiatives in California it2

Achieving January's Summit ICT Goal: Bringing CANARIE South to California



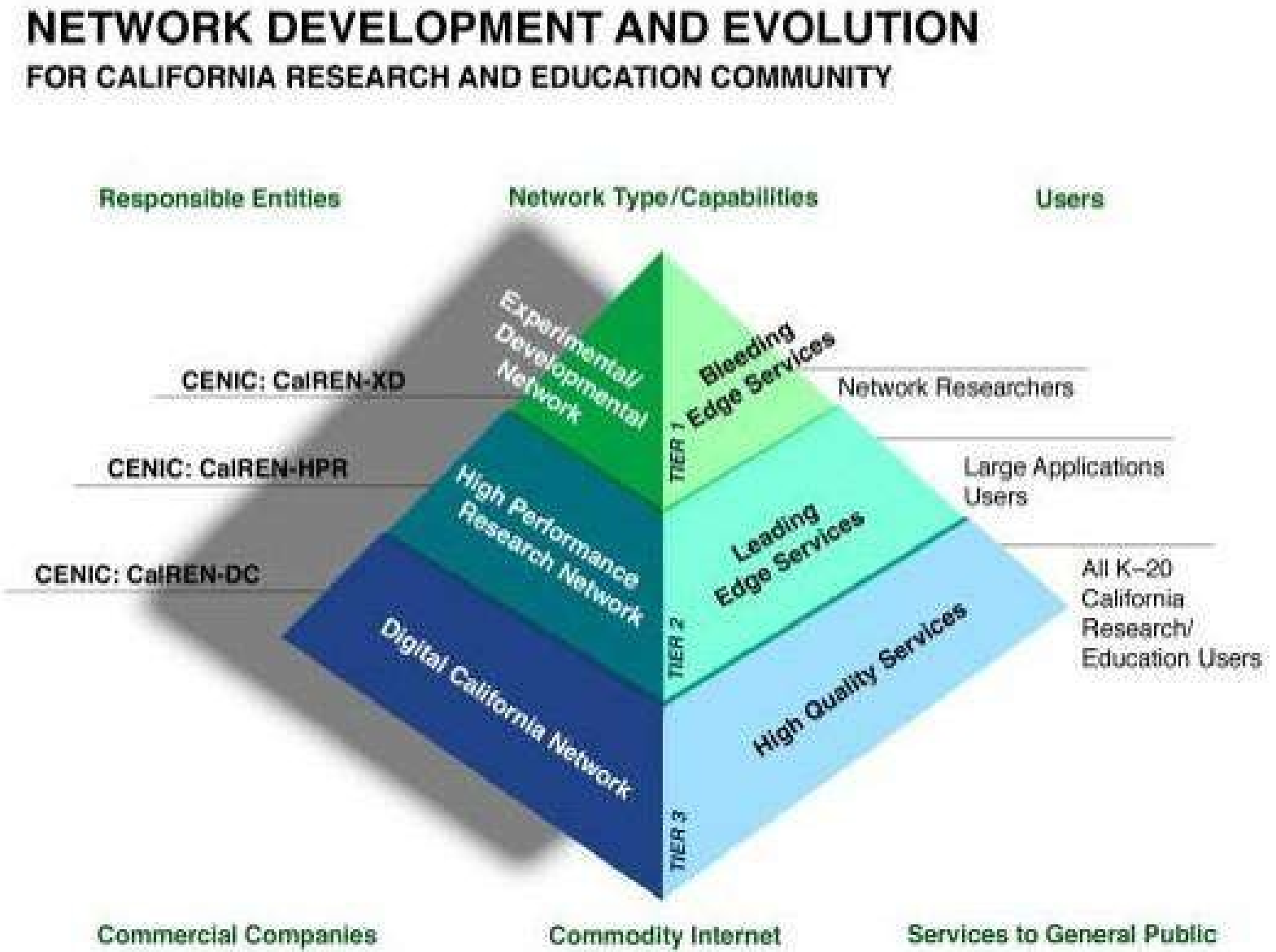
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California Has Three Tiers of Network
The California-Canada Summit is Driving CalREN-XD



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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

Powered by Rocks ROCKS

evl electronic visualization laboratory

OptIPuter

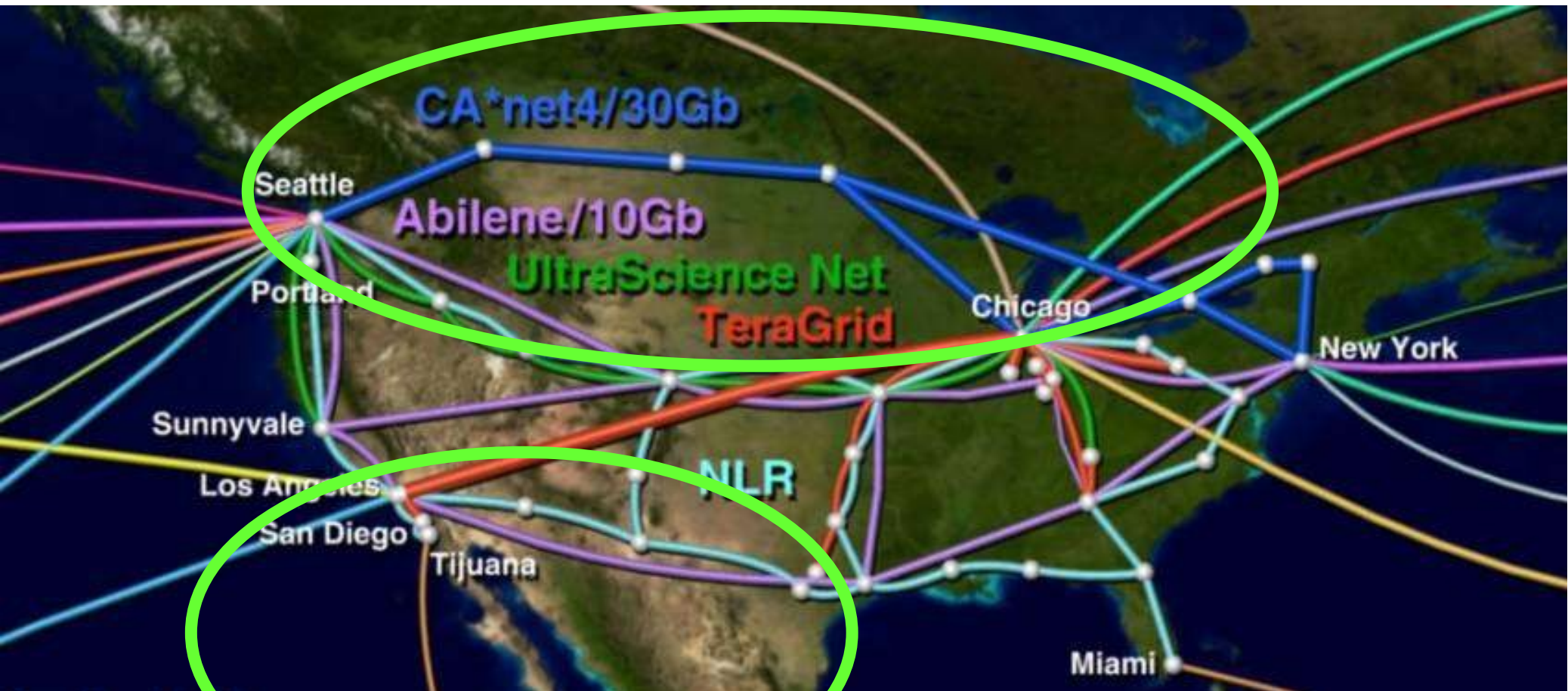
CANARIE

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Creating a North American Superhighway for High Performance Collaboration

Next Step: Connecting Mexico to Canada's CANARIE Using California's CENIC and the U.S. National Lambda Rail



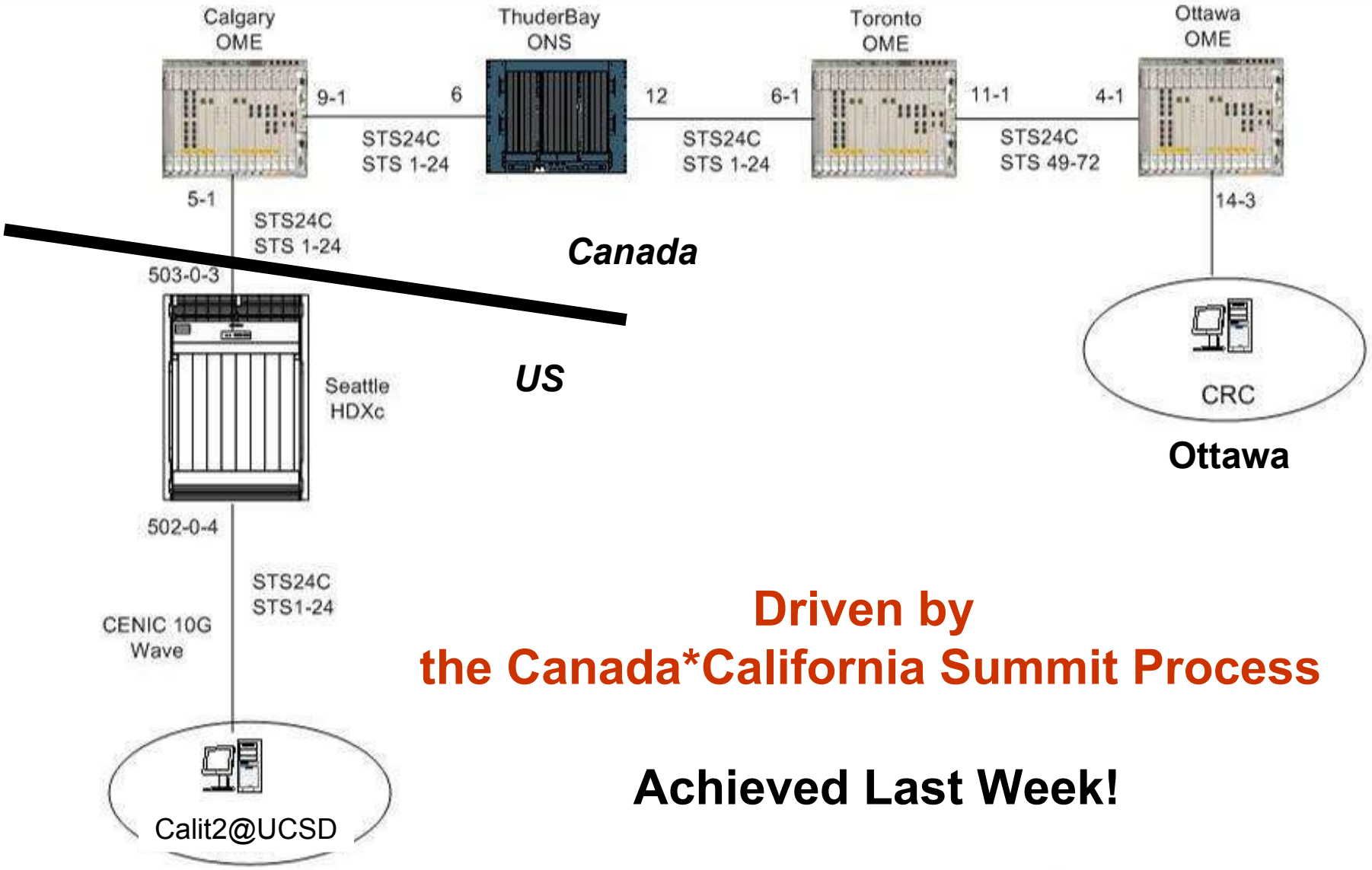
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Driving the "Golden Spike" to Connect California and Canada Via Dedicated Gigabit Network



Driven by the Canada*California Summit Process

Achieved Last Week!

CANARIE

CalIT2-CRC demo

Thomas Tam | 1.0

Communications Research Centre Canada is Joining the OptIPuter Project

Ottawa, Canada

Foundations for the Future

- Primary federal government laboratory for R&D in advanced telecommunications
- Agency of Industry Canada (IC)
- 200 research staff

Key Broadband Facilities

- Broadband Applications and Demonstration Laboratory (BADLAB)
- Optical Networking Laboratory (ONL)

- **Establishing an OptIPuter Node at CRC will Enable the BADLAB™ to Develop Collaborative Visualization Environments Using Lightpath Services across CAnet 4 to Calit2**
- **Architecture Application: Participatory Design Studio in Collaboration with Carleton University's Immersive Multimedia Studio (CIMS)**

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Next: San Diego Interactive Imaging of High Resolution Brain Slices Generated at McGill University



There are 7407 Slices at 20 µm
Each Image has 8513 x 12,472 pixels

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

Source: Mark Ellisman, UCSD, Calit2

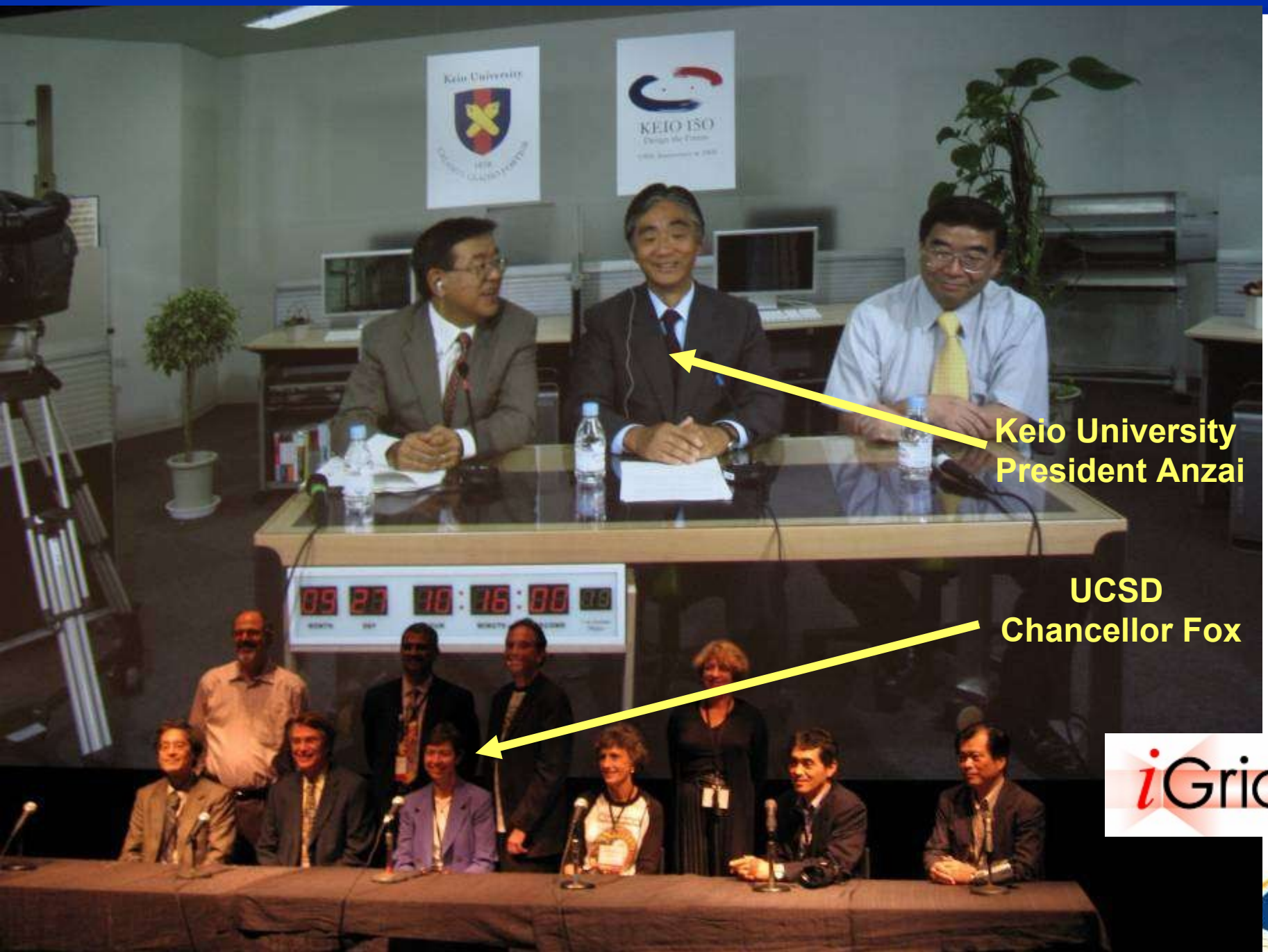
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CineGrid™ -- an OptIPuter Application Supporting "Extreme" Digital Media



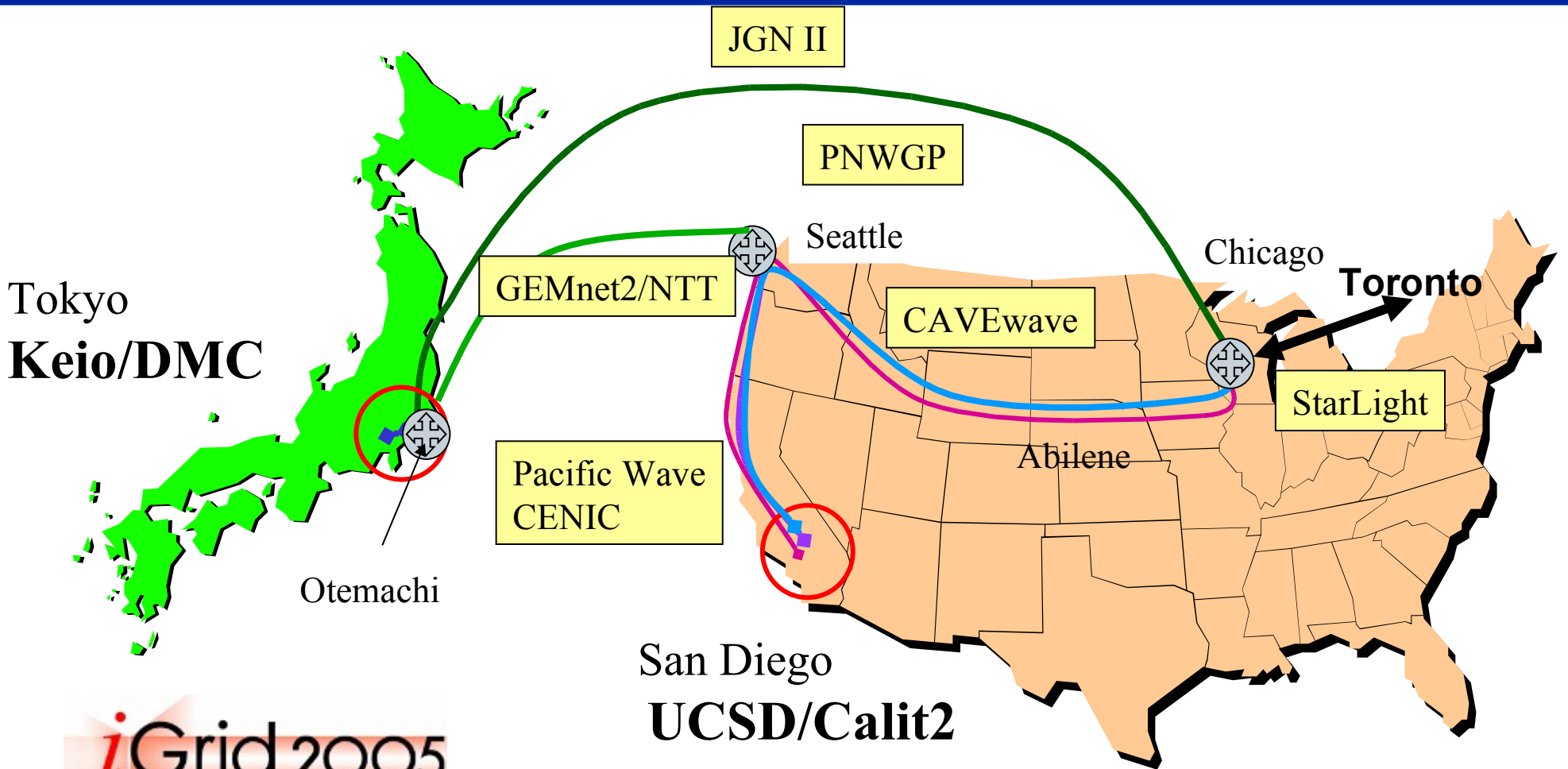
Lays Technical Basis for Global Digital Cinema

Sony
NTT
SGI

iGrid 2005

it²

CineGrid™ International
Real-Time Streaming 4K Digital Cinema



iGrid 2005

September 2005

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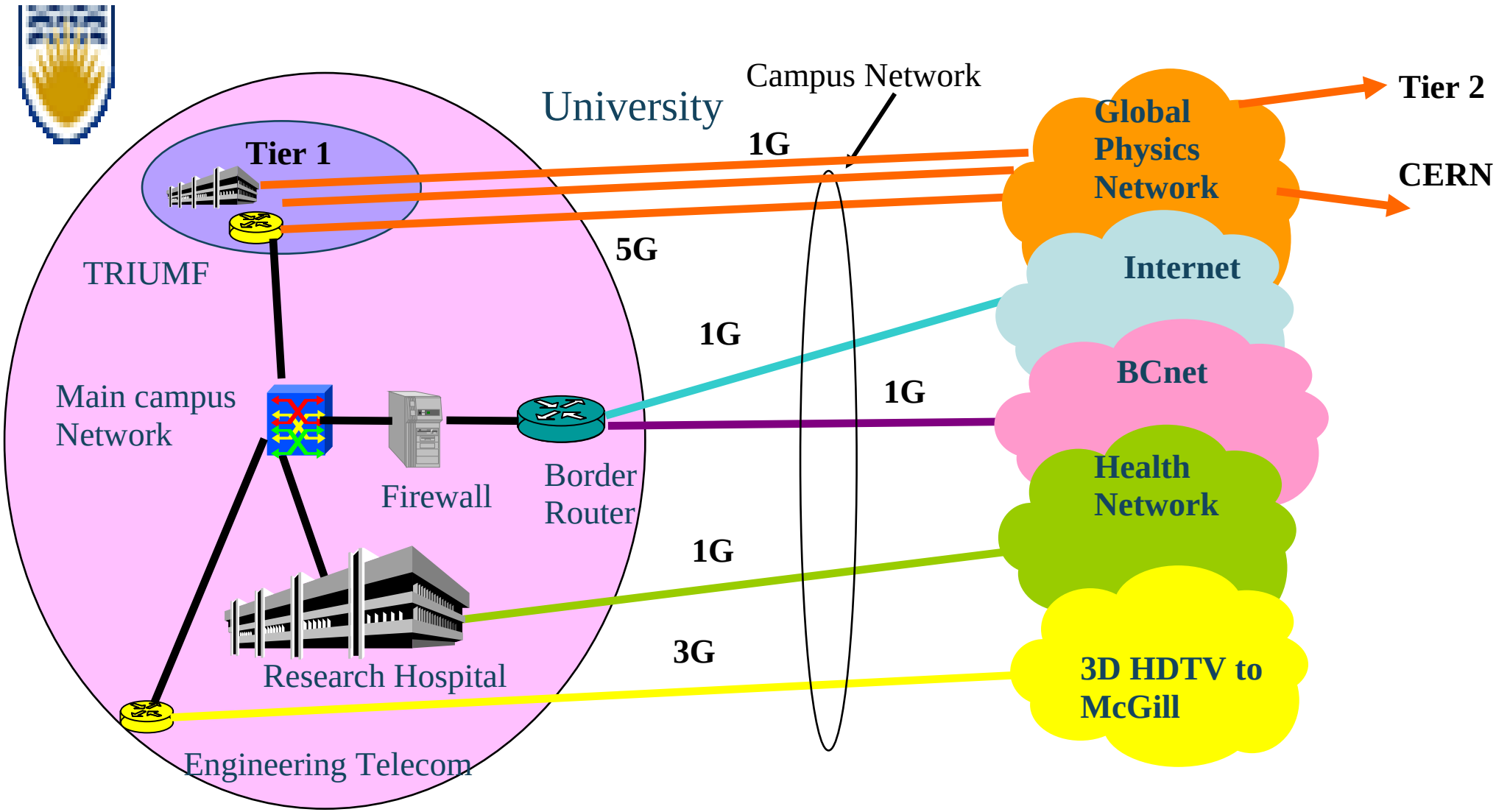
Ryerson University's Rogers Communications Centre Linking to CA*net4 and CineGrid – Fall 2006

- **In the Heart of Toronto - Canada's Largest Media Centre**
  - **Creating Digital Cinema/Visualization Lab**
  - **School of Image Arts and School of Radio and Television Arts**
    - **1300 Undergraduate Students**



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Establishing Wide-Area Optical Networks Drives Campus Infrastructure Innovation: e.g. U British Columbia

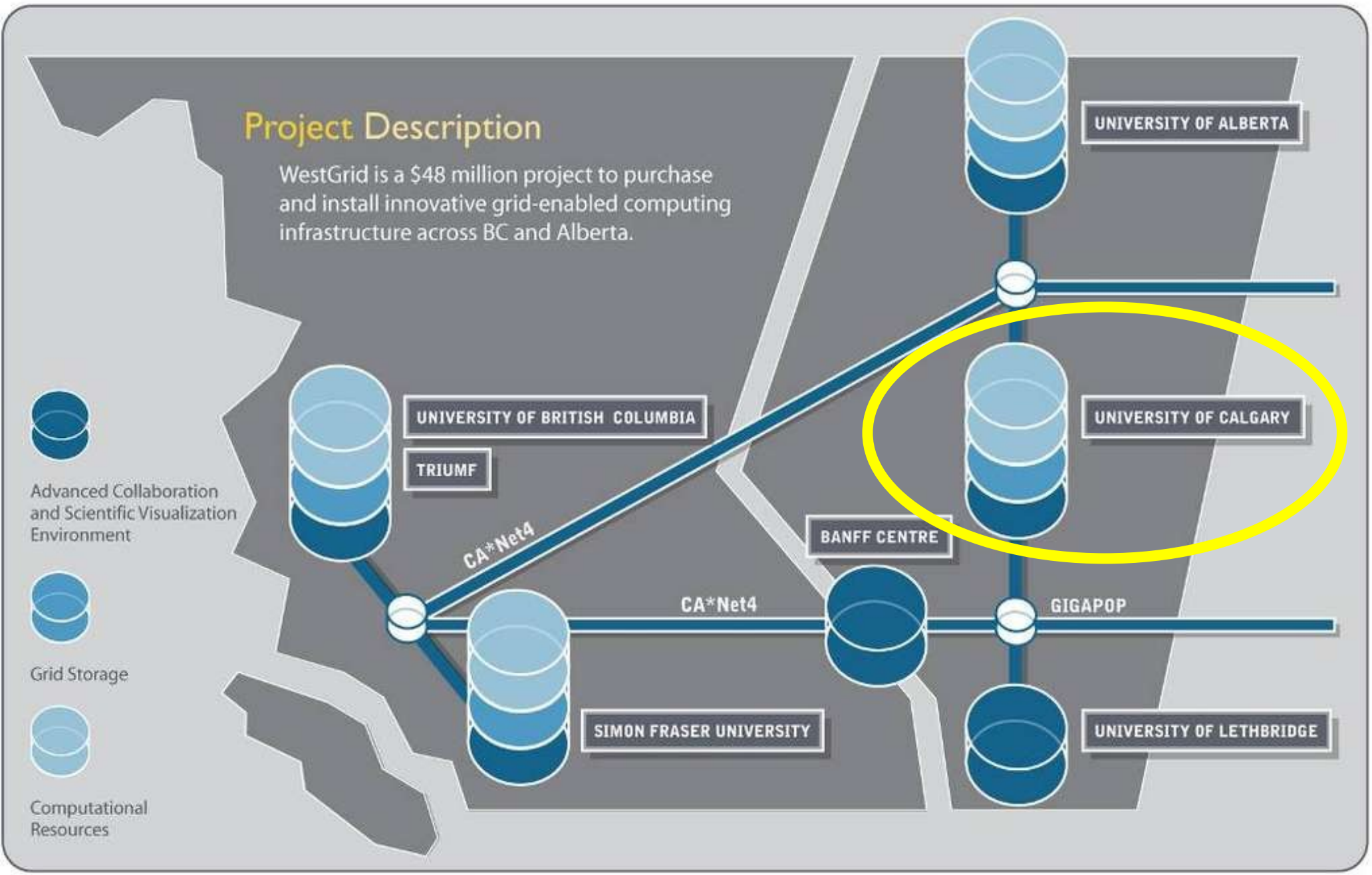


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WestGrid

Western Canada Research Grid

www.westgrid.ca



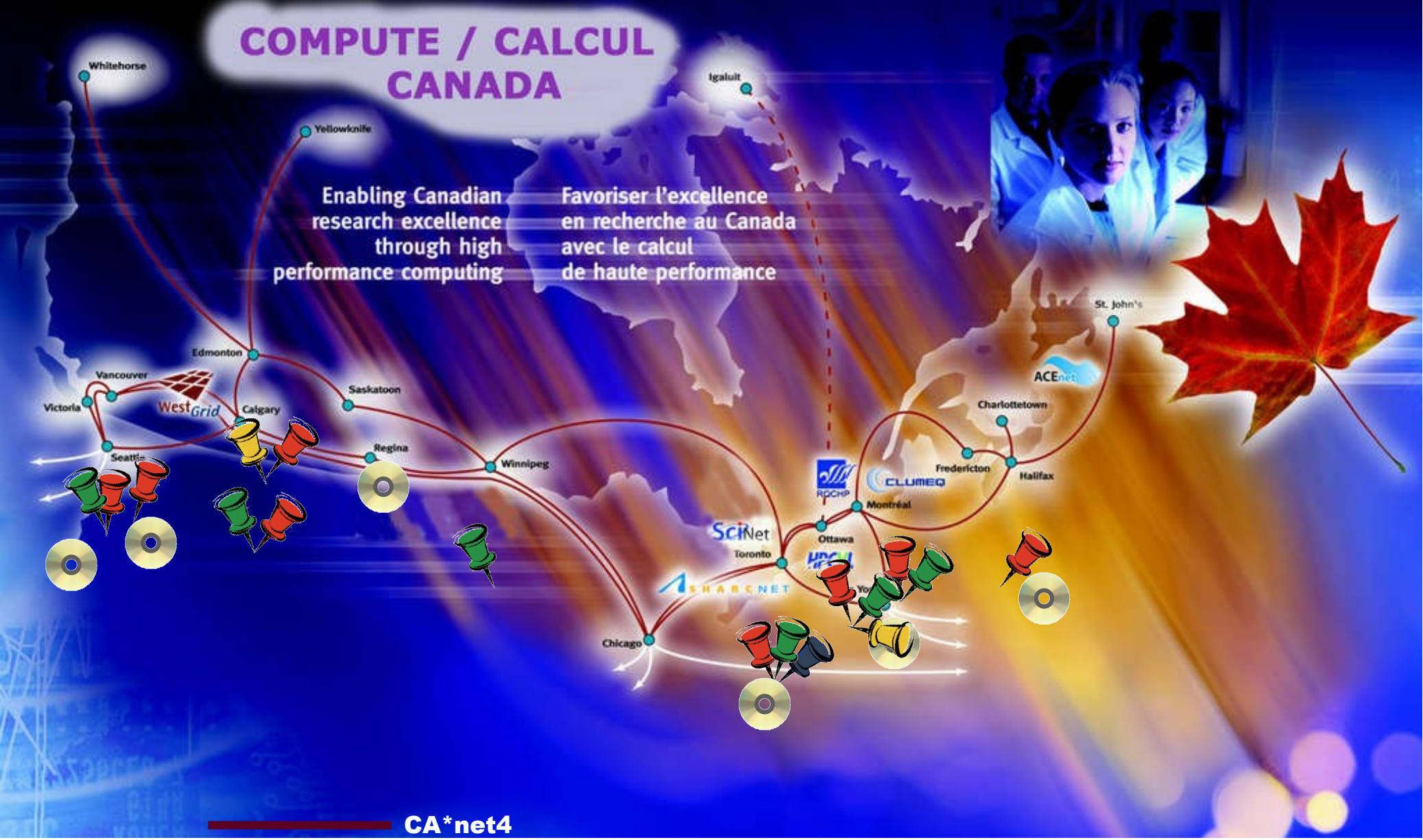
University of Calgary
HP Labs Data Centre

- **Project Focus Areas**
  - Dynamically create secure, grid-enabled virtual clusters
  - Run apps for University IT divisions, extended community of researchers, and partners from oil and gas industry
- **Future Directions**
  - Use high speed links for resource sharing between Canada and California
    - Extend secure virtual environments across lightpath networks
  - Develop models for highly reconfigurable computing
  - Collaborate globally with other external HP data centres

GRID RESEARCH CENTRE

hp invent

UNIVERSITY OF CALGARY



Canada's National Platform for HPC

The NSF High Performance Computing Initiatives

- **Track 3**
  - Small dedicated compute clusters as part of a funded project
- **Track 2**
  - Medium sized machines made available as part of the Teragrid through the national allocation process (~ few hundred Teraflops)
  - $30M with one or two awards every year for the next four years
  - Stress on general science applications and architectural diversity
- **Track 1**
  - A revolutionary leap for NSF announced in June 2006
  - Single award of $200M over four years to develop a *sustained* petaflop machine
    - Estimated ~ 1 Million Processors
  - In production in 2010-2011 time frame - development starting in 2007
    - Full proposals due Feb 2007
  - Can be focused on a smaller set of national challenge applications

… What's next?

- Given:
  - A national HPC platform in Canada
  - TeraGrid and maybe "PetaGrid" in California
  - An ultra fast network
- Why not …
  - *"CAL-CAN COMPUTE" - a project to harness the combined computing power of California and Canada for specific challenges - such as computational chemistry, particle physics, etc*

Smart Infrastructure:
"Infrastructure Enabling Infrastructure"

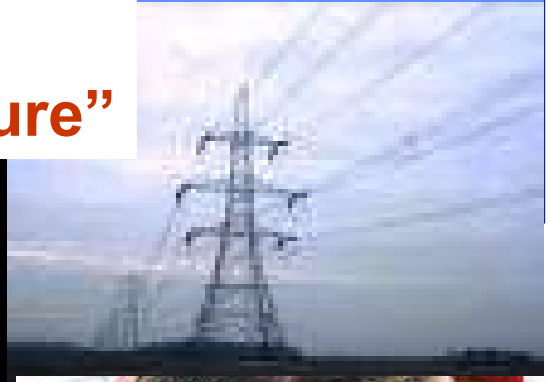






Transportation





Critical Infrastructure



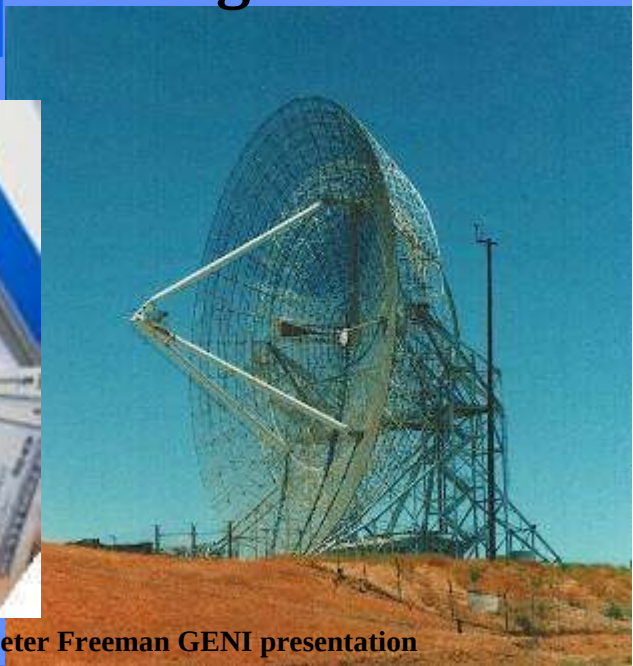
Internet Not Ready for Its Future Roles



Telecommunications
Banking & Finance







Adapted from Peter Freeman GENI presentation