A High-Performance Campus-Scale Cyberinfrastructure For Effectively Bridging End-User Laboratories to Data-Intensive Sources

Presentation by Larry Smarr to the NSF Campus Bridging Workshop

April 7, 2010

University Place Conference Center

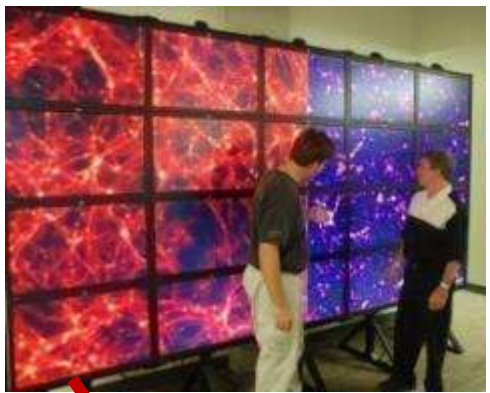
Indianapolis, IN

Philip Papadopoulos, SDSC

Larry Smarr, Calit2

University of California, San Diego

Academic Research "OptIPlatform" Cyberinfrastructure: An End-to-End 10Gbps Lightpath Cloud



End User OptIPortal



Instruments



HD/4k Telepresence



HD/4k Video Cams



10G Lightpaths



National LambdaRail

HPC

TeraGrid

Campus Optical Switch



Data Repositories & Clusters



HD/4k Video Images

SDSC

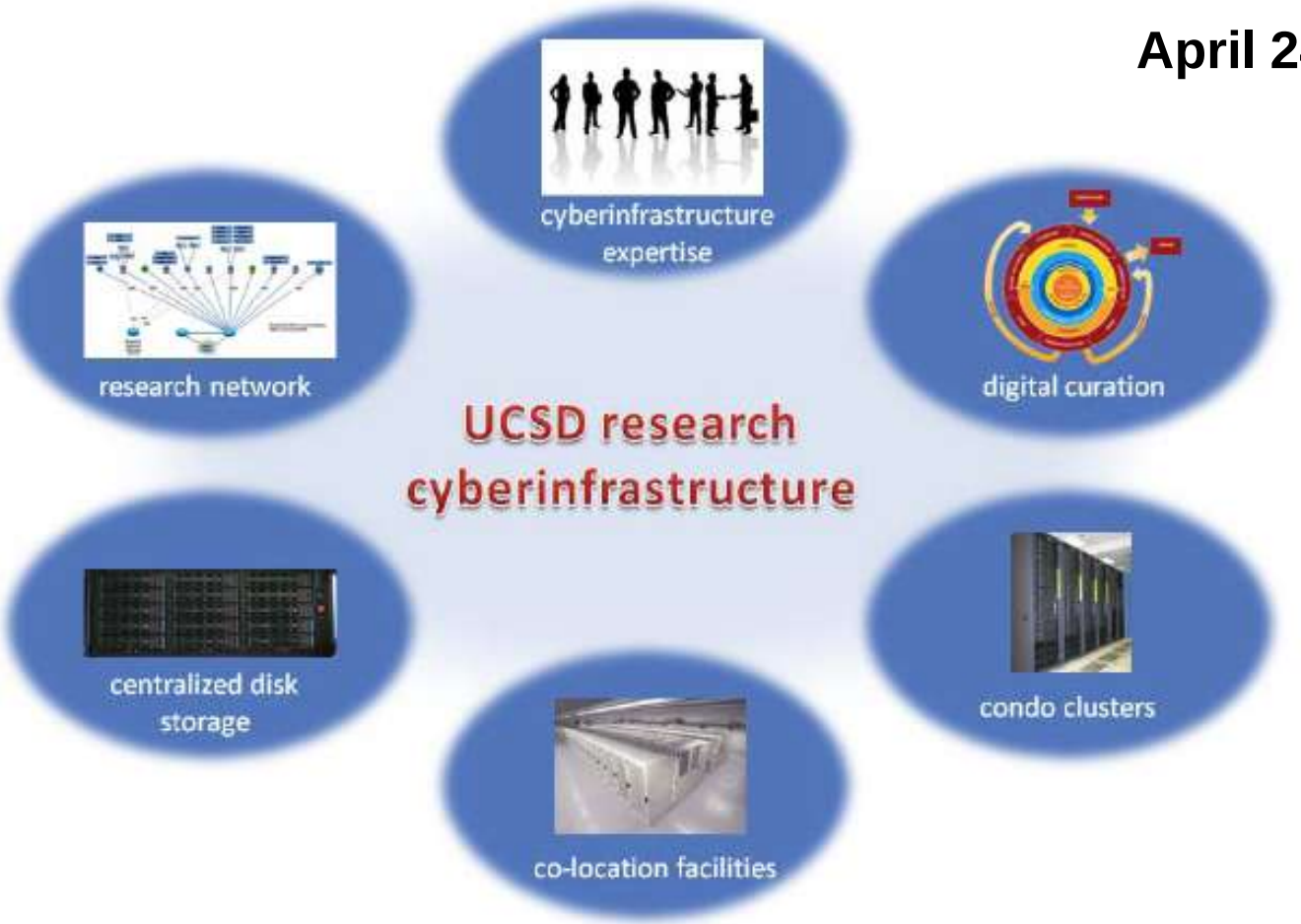
it²

OptIPuter

"Blueprint for the Digital University"--Report of the UCSD Research Cyberinfrastructure Design Team

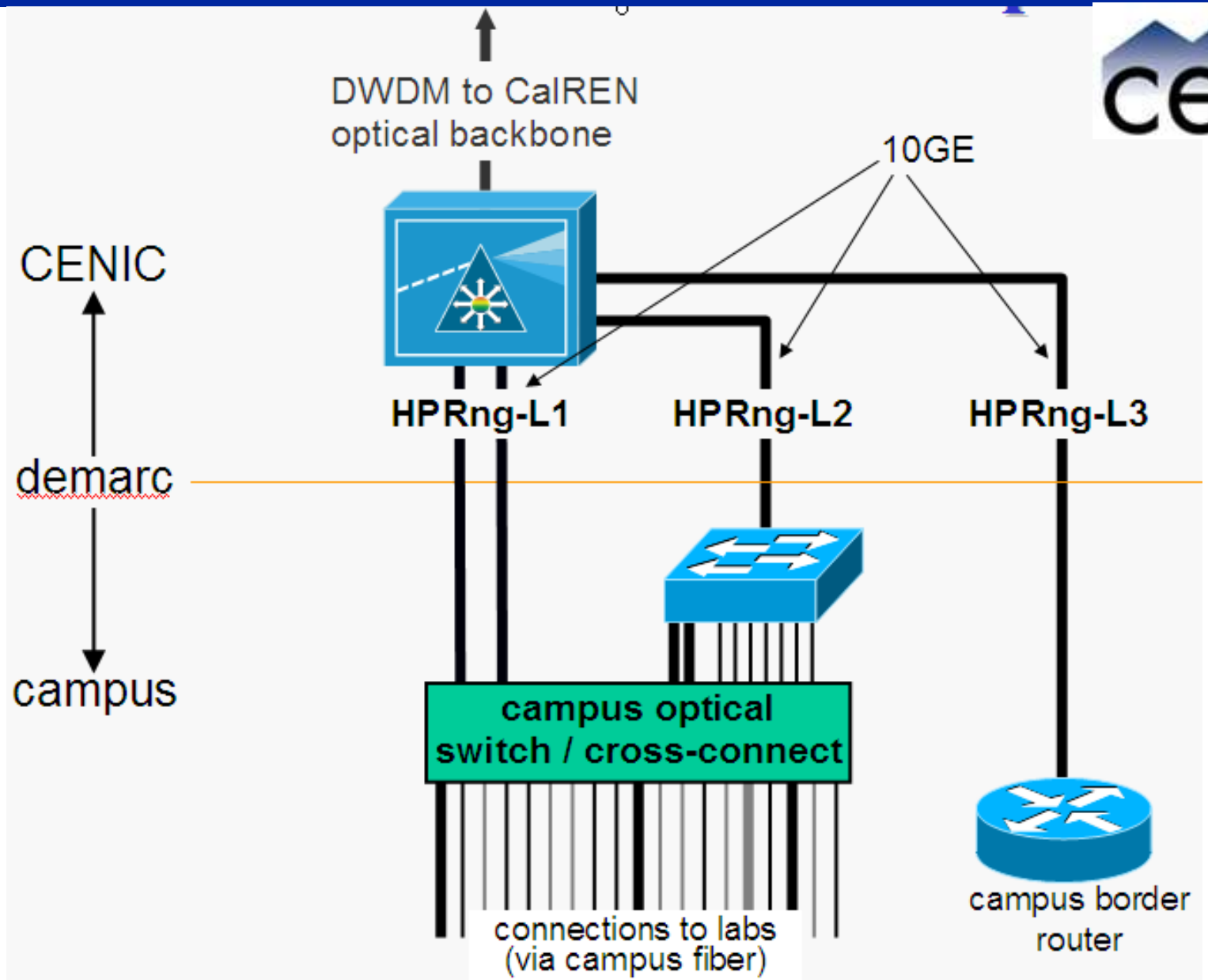
- **Focus on Data *Storage* and Data *Curation***
  - **These Become the Centralized Components**
  - **Other Common Elements "Plug In"**

April 24, 2009



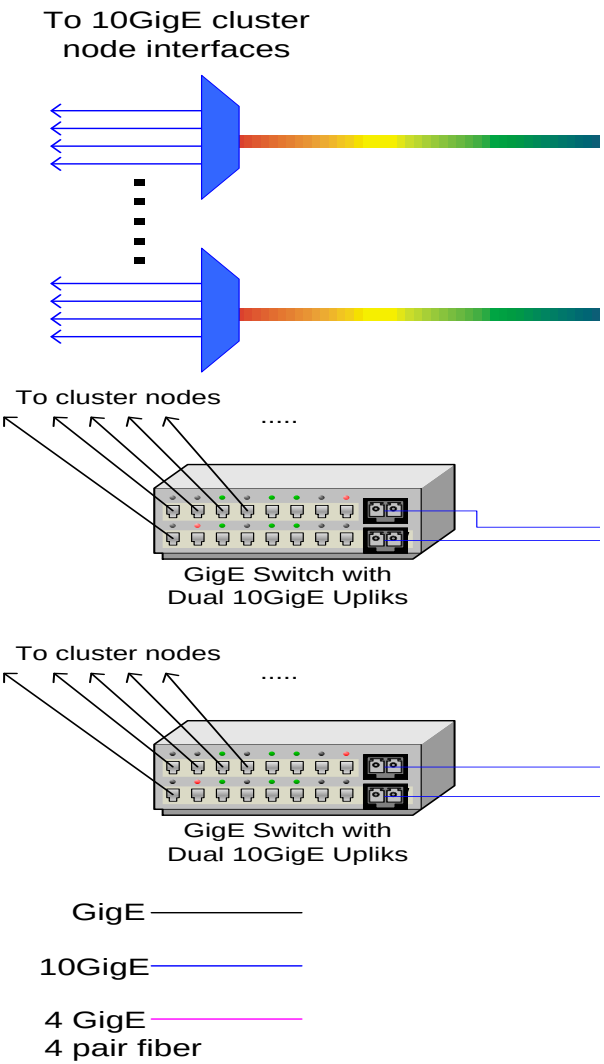
research.ucsd.edu/documents/rcidt/RCIDTReportFinal2009.pdf

Campus Bridging Preparations Needed to Accept CENIC CalREN Handoff to Campus



Source: Jim Dolgonas, CENIC

Current UCSD Prototype Optical Core: Bridging End-Users to CENIC L1, L2, L3 Services



Enpoints:

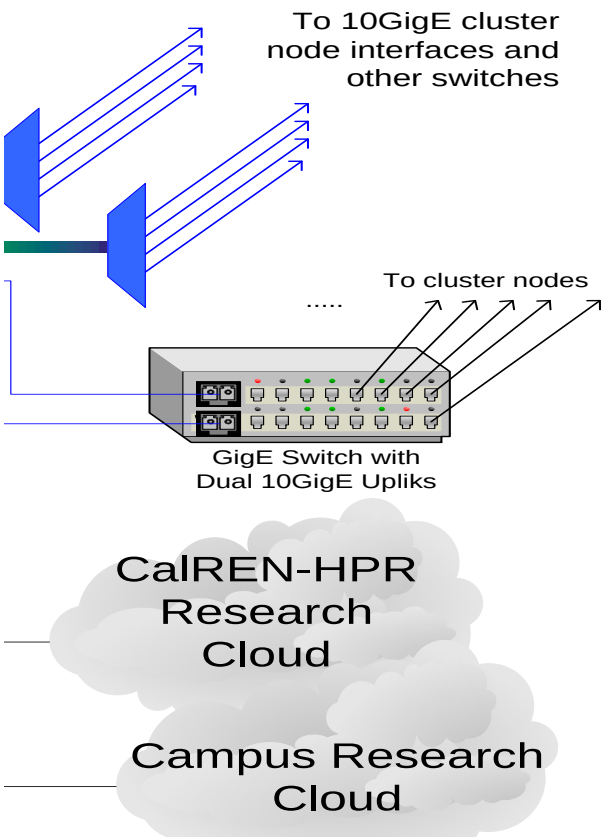
>= 60 endpoints at 10 GigE

>= 32 Packet switched

>= 32 Switched wavelengths

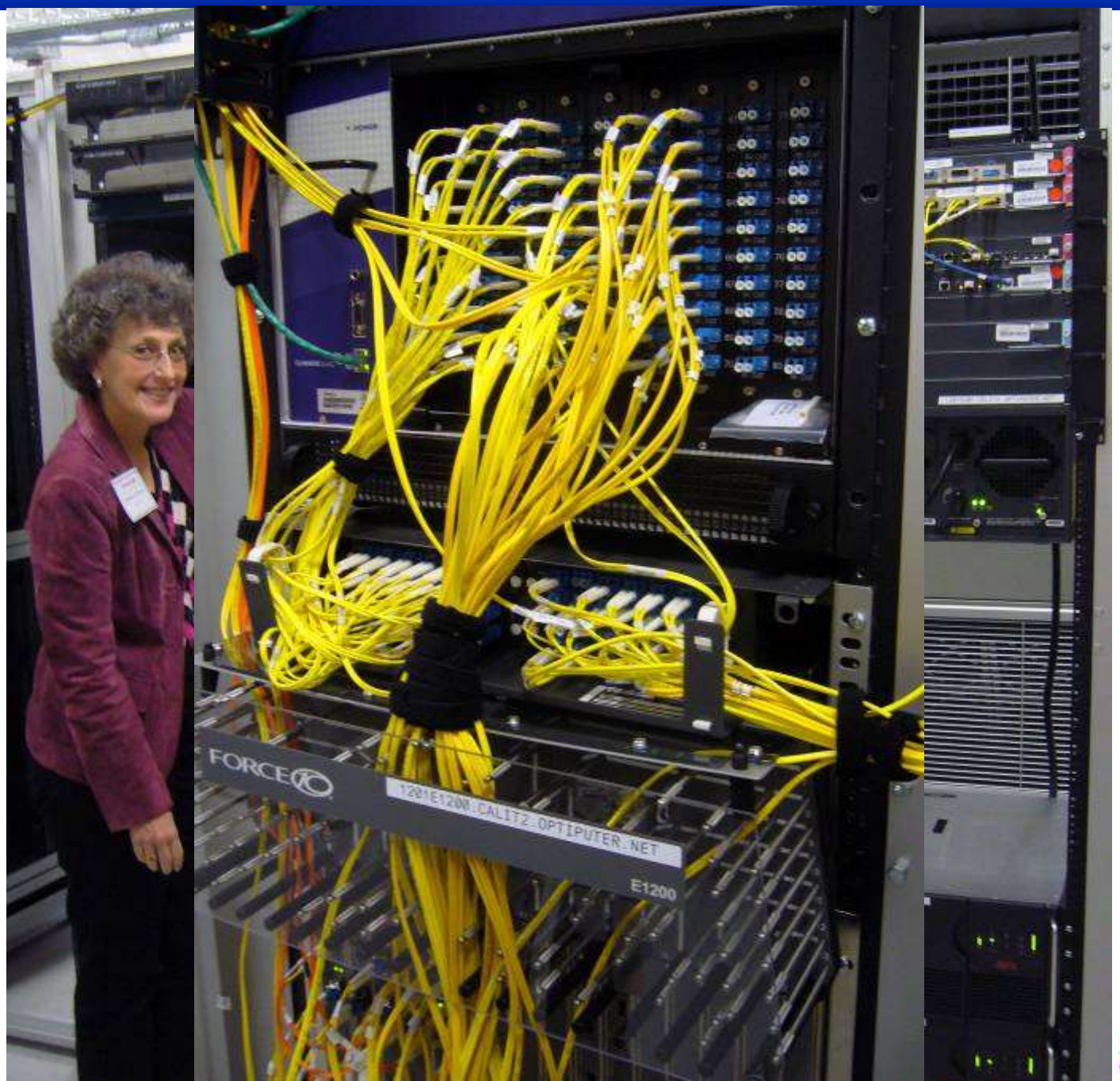
>= 300 Connected endpoints

Approximately 0.5 TBit/s Arrive at the "Optical" Center of Campus. Switching is a Hybrid of: Packet, Lambda, Circuit -- OOO and Packet Switches



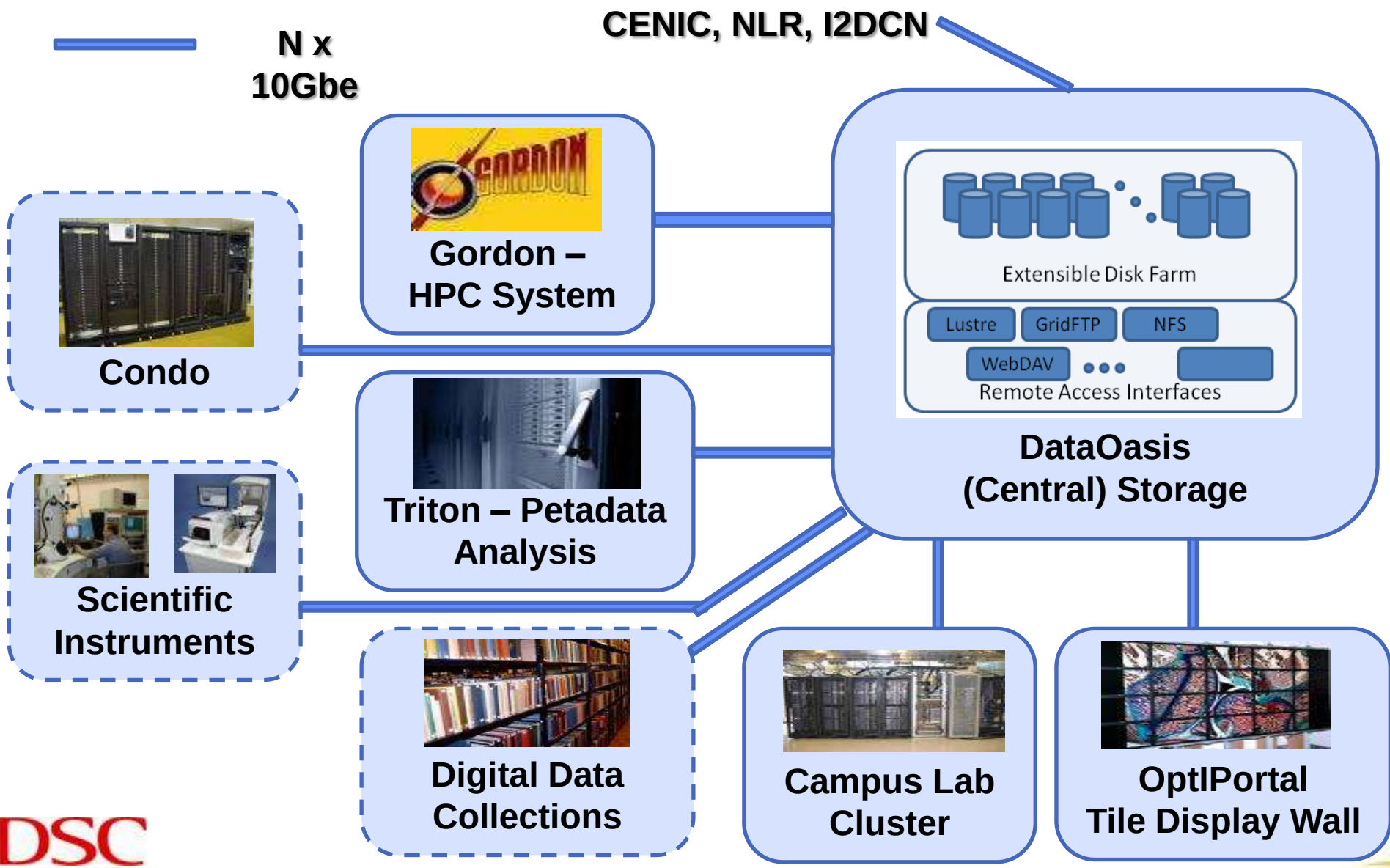
Source: Phil Papadopoulos, SDSC/Calit2 (Quartzite PI, OptIPuter co-PI) Quartzite Network MRI #CNS-0421555; OptIPuter #ANI-0225642

Calit2 Sunlight Optical Exchange Contains Quartzite 3-Level Switch



10:45 am Feb. 21, 2008

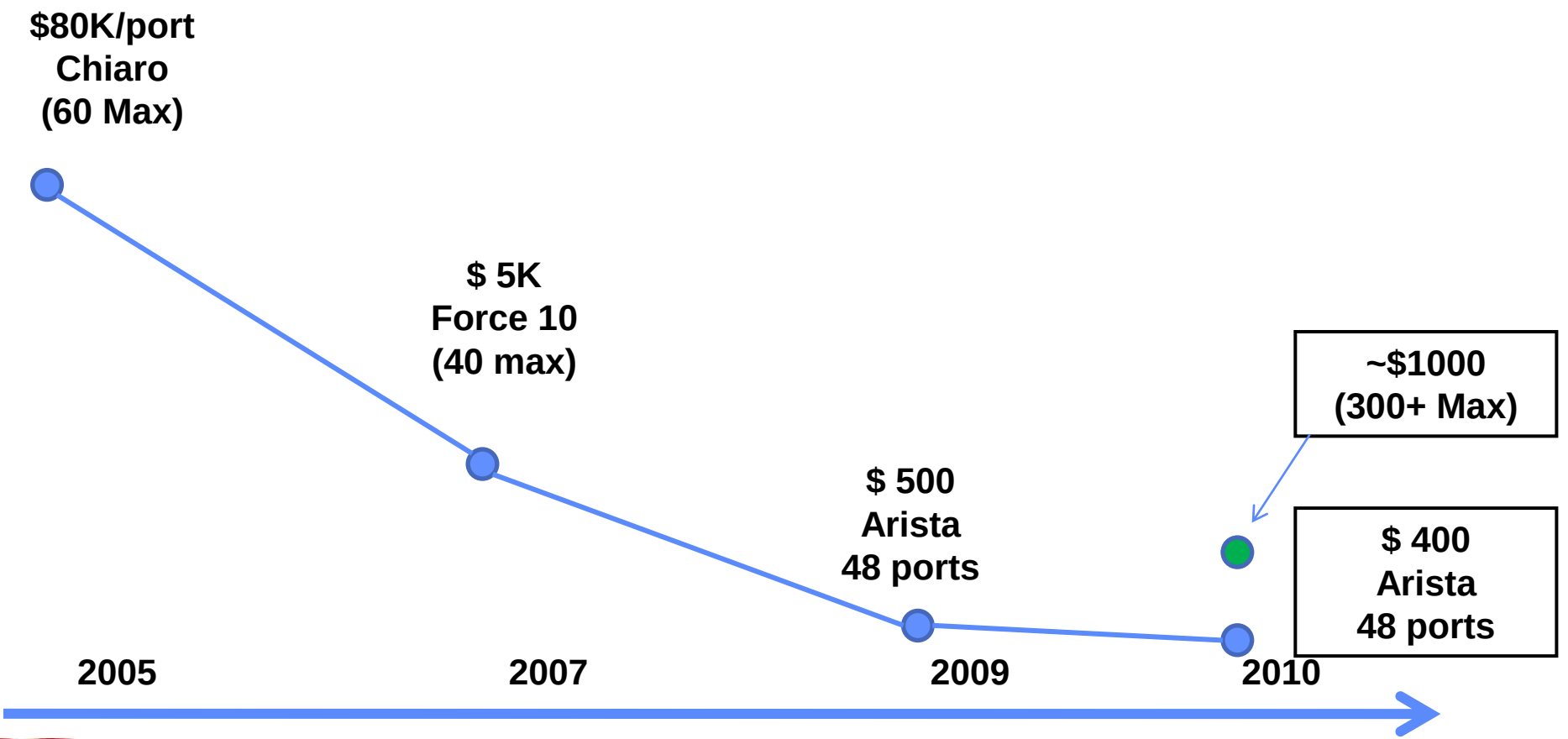
UCSD Campus Investment in Fiber and Networks Enables High Performance Campus Bridging CI



Source: Philip Papadopoulos, SDSC, UCSD

Rapid Evolution of 10GbE Port Prices Makes Campus-Scale 10Gbps CI Affordable

- **Port Pricing is Falling**
- **Density is Rising – Dramatically**
- **Cost of 10GbE Approaching Cluster HPC Interconnects**



Source: Philip Papadopoulos, SDSC, UCSD