

# GpENI

## Great Plains Environment for Network Innovation

James P.G. Sterbenz\*

Joseph B. Evans, Rick McMullen, KU

Deep Medhi, Baek-Young Choi, Jim Schonemann, UMKC

Greg Monaco, GPN

Byrav Ramamurthy, Dale Finkelson, UNL

Caterina Scoglio, Don Gruenbacher, KSU

Jeff Verrant, Jim Archuleta, Ciena

Cort Buffington, KanREN



\*Department of Electrical Engineering & Computer Science  
Information Technology & Telecommunications Research Center

The University of Kansas

*jpgs@ittc.ku.edu*

*www.gpeni.net*

# GpENI Overview



- GpENI [dʒɛ'pi ni]  
Great Plains Environment for Network Innovation
- Regional network part of Cluster B in GENI Spiral 1
  - exploiting new fiber infrastructure in KS, MO, and NE

# GpENI

## Participants: Universities

- KU: The University of Kansas
  - James P.G. Sterbenz (lead PI),  
Joseph B Evans (co-I), Rick McMullen (co-I),  
Ronqing Hui, Gary Minden
- KSU: Kansas State University
  - Caterina Scoglio (PI), Don Gruenbacher (co-PI),  
Tricha Anjali
- UMKC: University of Missouri – Kansas City
  - Deep Medhi (PI), Baek-Young Choi (co-I)  
Cory Beard, Khosrow Sohraby, Jim Schonemann
- UNL: University of Nebraska – Lincoln
  - Byrav Ramamurthy (PI), Dale Finkelson

# GpENI

## Participants: Research Networks

- GPN: Great Plains Network (consortium)
  - Greg Monaco (PI)
- KanREN: Kansas Research and Education Network
  - Cort Buffington (PI)
- MOREnet: Missouri Research and Education Network
  - Hank Niederhelm

# GpENI

## Participants: Industry

- Ciena
  - Jeff Verrant (PI), Jim Archuleta (co-I)
- Qwest

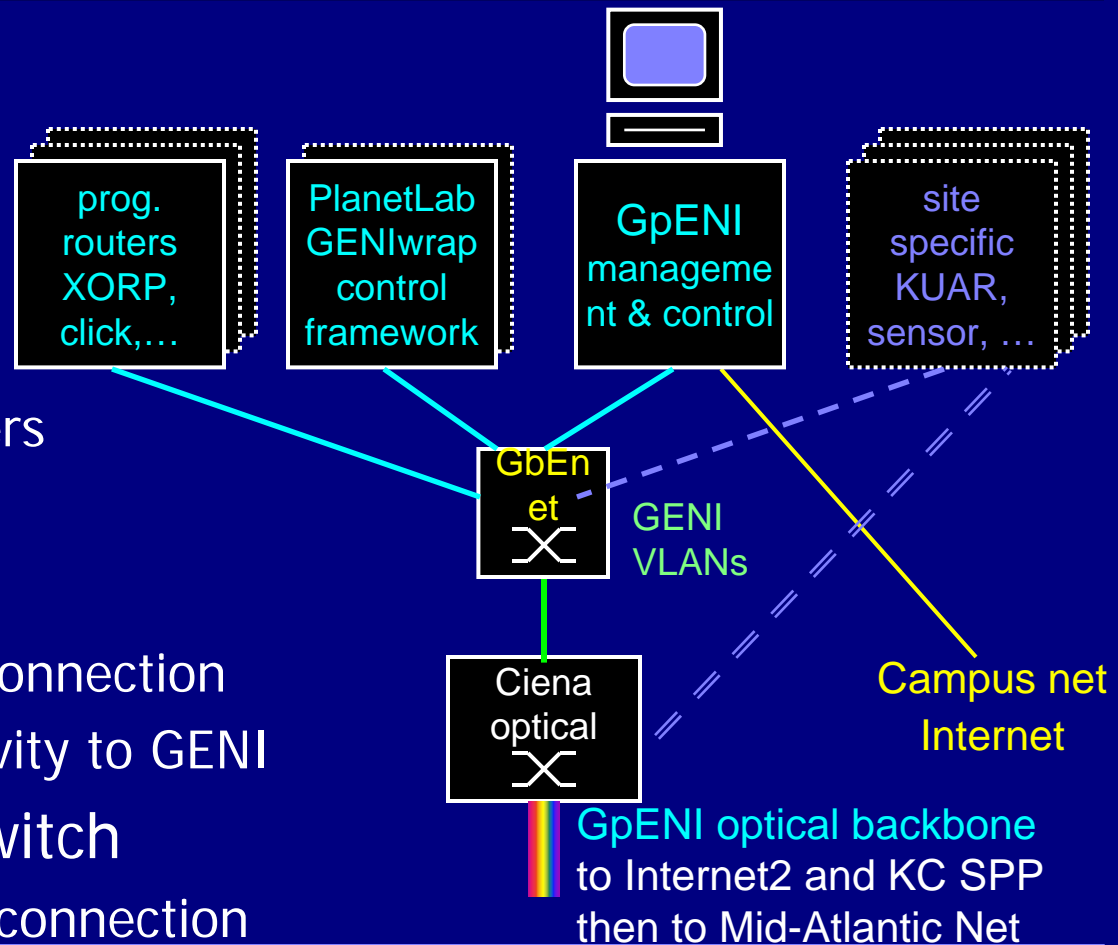
# GpENI

## Participants: Proposed Expansion

- Domestic
  - 6 universities in three additional states
- International
  - 9 European universities
  - 2 Indian universities
  - 1 Korean university
  - 2 European research institutes
  - 2 Asian research institutes
- Research networks
  - collaboration with European research networks

# GpENI Node Cluster

- GpENI cluster
- 5–10 PCs
  - GpENI mgt.
  - L4: PlanetLab
  - L3: prog. routers
  - site-specific
- GbE switch
  - arbitrary interconnection
  - VLAN connectivity to GENI
- Ciena optical switch
  - L1 GpENI interconnection



# GpENI

## Initial Capabilities and Technology Roadmap

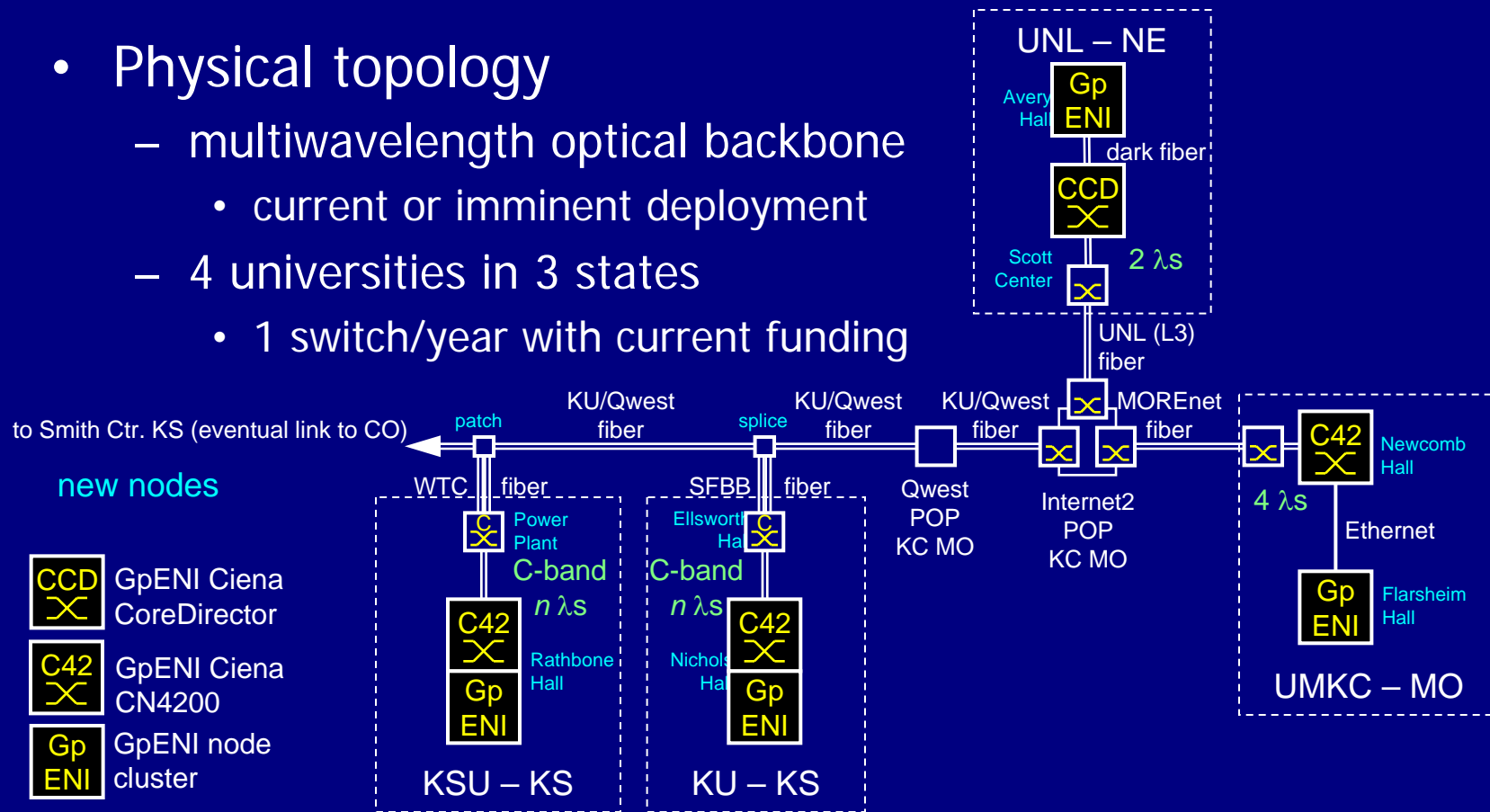
- Programmability at all layers
- Quickly available to the community
  - private PlanetLab experiments as soon as connected
  - GUSH tools when available
- Development and integration of layers
  - GpENI experiments → PlanetLab → VINI, XORP, Click → Ciena
- Spiral development toward new integrated platforms
  - processor(s) to deploy evolving platforms
  - open access to research and experimentation community
  - scalable per cluster and number of clusters
    - others invited to install and run GpENI L3–7 clusters



# GpENI

## Physical Topology and Network Infrastructure

- Physical topology
  - multiwavelength optical backbone
    - current or imminent deployment
  - 4 universities in 3 states
    - 1 switch/year with current funding



# GpENI Deployment

## Current Status

- Fiber mostly deployed
  - tunnels temporarily bridging some segments
- First Ciena optical switch operational at UNL
  - second switch may be installed at KU this year
- Node clusters operational and interconnected
  - need to sort out many network engineering issues:
    - DNS: \*. <institution>.gpeni.net
    - IP: 198.248.240/24 from KanREN
- Initial integration with Planetlab control framework
  - integration with DRAGON optical control framework underway
  - integratoin with VINI, XORP, and Click beginning

# End of Foils