

National optical networking initiatives and the Northern Tier

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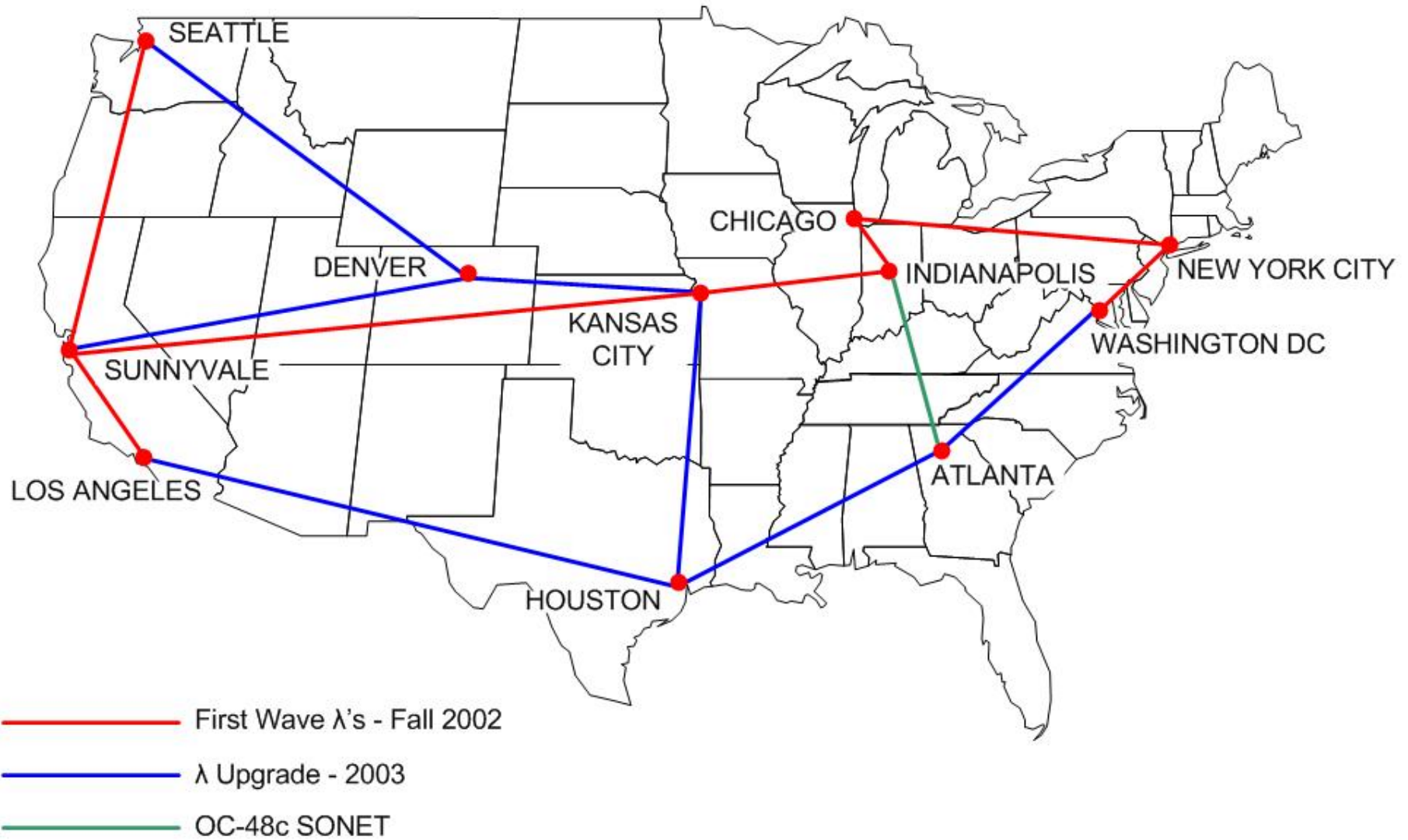
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Northern Tier Optical Networking Meeting

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ABILENE NETWORK 10-Gbps OPTICAL UPGRADE - 2002-2003



Emerging requirements may not met by a high-performance, yet best-effort IP network

- DWDM: 10-Gbps channels now; 40-Gbps soon
- Computational science grids
 - Applications with deterministic network requirements
- Infrastructure for basic and applied networking research

Moment of unprecedented contrarian economics

- Distressed fiber assets available on national scale
 - ‘once in a lifetime’ opportunity
- Optronics industry severely impacted by carrier bust

However, optical networking alone does not solve the end-to-end performance problem

- Host configuration (Web100)
- Local networking capability (DAST, Internet2 E2EPI)

Fundamental shift for high end uses and applications?

Packet switching (IPv4/v6 routed cloud)

- +: E2E reachability
- +: advanced services (v6, multicast)
- +: measurement visibility
- +: network management
- -: shared, best effort service
- -: WAN/LAN bandwidth balance

Circuit switching (Optical circuits; IP/Eth frames)

- +: dedicated capacity for specific purposes (e.g., TeraGrid)
- +: customized network focus (experimental vs operational)
- +: lack of contention for bandwidth
- +: CyberInfrastructure view
- -: inefficient - resource utilization and manpower
- -: abandons tremendous scaling power of IP networks



Optical network project differentiation

	<i>Distance scale (km)</i>	<i>Examples</i>	<i>Equipment</i>
Metro	< 60	UWash USC/ISI(LA), MAX(DC/Md/Va)	Dark fiber & end terminals
State/ Regional	< 500	I-WIRE (IL), I-LIGHT (IN), CENIC ONI	Add OO amplifiers
Extended Regional/ National	> 500	TeraGrid NG Abilene, Light Rail	Add OEO regenerators & O&M \$'s

Two national initiatives and a supporting project

- USA Waves
- National Light Rail
- Fiberco

Common factors

- National fiber footprint represents a strategic asset for HEC
- All leverage the much lower *incremental* cost of λ 's in an existing DWDM system

Differentiating factors

- Scope
- Buy vs. build focus
- Production vs. research capabilities
- Participation cost

UCAID and national optical initiatives

Last October, UCAID board authorized an investment of up to \$10M over 5 years to a national optical network facility project

- Drawn from current and anticipated Abilene Network reserves
- Contingent on
 - Viable national program
 - Scalable governance and financial models
 - Critical mass financially
- Potential for the facility to serve as transport platform for 3rd generation 'Abilene' IP backbone
 - 2005-2006 time frame
 - Driving interest in 40-Gbps transport
- Subsequent board action to authorize acquisition of national fiber
 - Both through CENIC and separate UCAID Lol

UCAID alone has examined >10 **national** facilities based networking options in 2 years

- Goal is to leverage incremental cost advantage of DWDM systems

$$\text{Cost}(\lambda_N) / \text{Cost}(\lambda_1) \sim O(10\%)$$

- Case for 'build' becomes stronger when system has >10 λ 's

Pressing need for **state/regional** optical networks

- Joint Techs and Member Meetings sessions
- IP/Optical technical working group

UCAID has been active participant in both

- National Lambda Rail (NLR)
- SURA NBC & USA Waves

CENIC – on behalf of NLR – negotiated a significant fiber acquisition and operations partnership with Level(3)

- Ability to purchase fiber at pricing at least through 2003

Can we create a lightweight vehicle for holding and redistributing fiber assets for both national and regional initiatives?

- emulate success of Quilt Commodity Internet project

Achieving this alone represents a quickly attainable milestone with immediate benefits to the community while work on creating a national optical networking capability proceeds in parallel

Outcome of NLR governance discussions

- Collaboration of CENIC, P/NW, Virginia Tech, and UCAID

Create a lightweight LLC – ‘Fiberco’

- solely to serve as a *holding company* for fiber assets
- Limited scope mitigates tax and other concerns that are the usual motivations for 501(c)(3) tax exempt status

Fiberco will acquire, hold, and distribute these assets for the benefit of its equity participants

- will operate on cost-recovery basis
- nationally leveraged tool for regional fiber acquisition

Fiberco will not be an operating entity

- will not light fiber or otherwise offer services

Can either hold or assign fiber for non-profits

Operating costs will include

- Minimal business operation cost & insurance (D&O)
- Share of significant fiber repairs above covered events
- Any unexpected property and other tax liabilities

Costs will *not* include

- Fiber O&M, equipment co-location & power

Annual capital calls to cover expenses

LLC has been incorporated in Delaware as *National Research & Education Fiber Company*

- Name reserved
- A supporting project

Status

- Documentation
 - Introductory slides and white paper
- Draft LLC term sheet in circulation
- Executing agreement with Level 3 for national fiber access
- Investigating metro fiber options

For more information...

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