A Tool for Supporting Regional Optical Networks

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Underlying hypothesis

- The fundamental nature of regional networking is changing
  - The *GigaPoP* model based on *provisioned, high-capacity services* steadily is being replaced – on the *metro and regional scales*
- A model of *facility-based networking built with owned assets* – Regional Optical Networks *(RONs)* – has emerged
  - Notably, this change *increases* the importance of regional networks in the traditional *three-level hierarchy* of U.S. R&E advanced networking

Leading & Emerging *Regional Optical Networks*

- California (CALREN)
- Colorado (FRGP/BRAN)
- Connecticut (Conn. Education Network)
- Florida (Florida LambdaRail)
- Georgia (Southern Light Rail)
- Indiana (I-LIGHT)
- Illinois (I-WIRE)
- Louisiana (LONI)
- Maryland, D.C. & northern Virginia (MAX)
- Michigan
- Minnesota
- New York + New England region (NEREN)
- North Carolina (NC LambdaRail)
- Ohio (Third Frontier Network)
- Oregon
- Pacific Northwest (Lariat – supported by NIH)
- Rhode Island (OSHEAN)
- SURA Crossroads (southeastern U.S.)
- Tennessee (One Tennessee)
- Texas (LEARN)
- Utah
- Virginia (MATP)
- Wisconsin

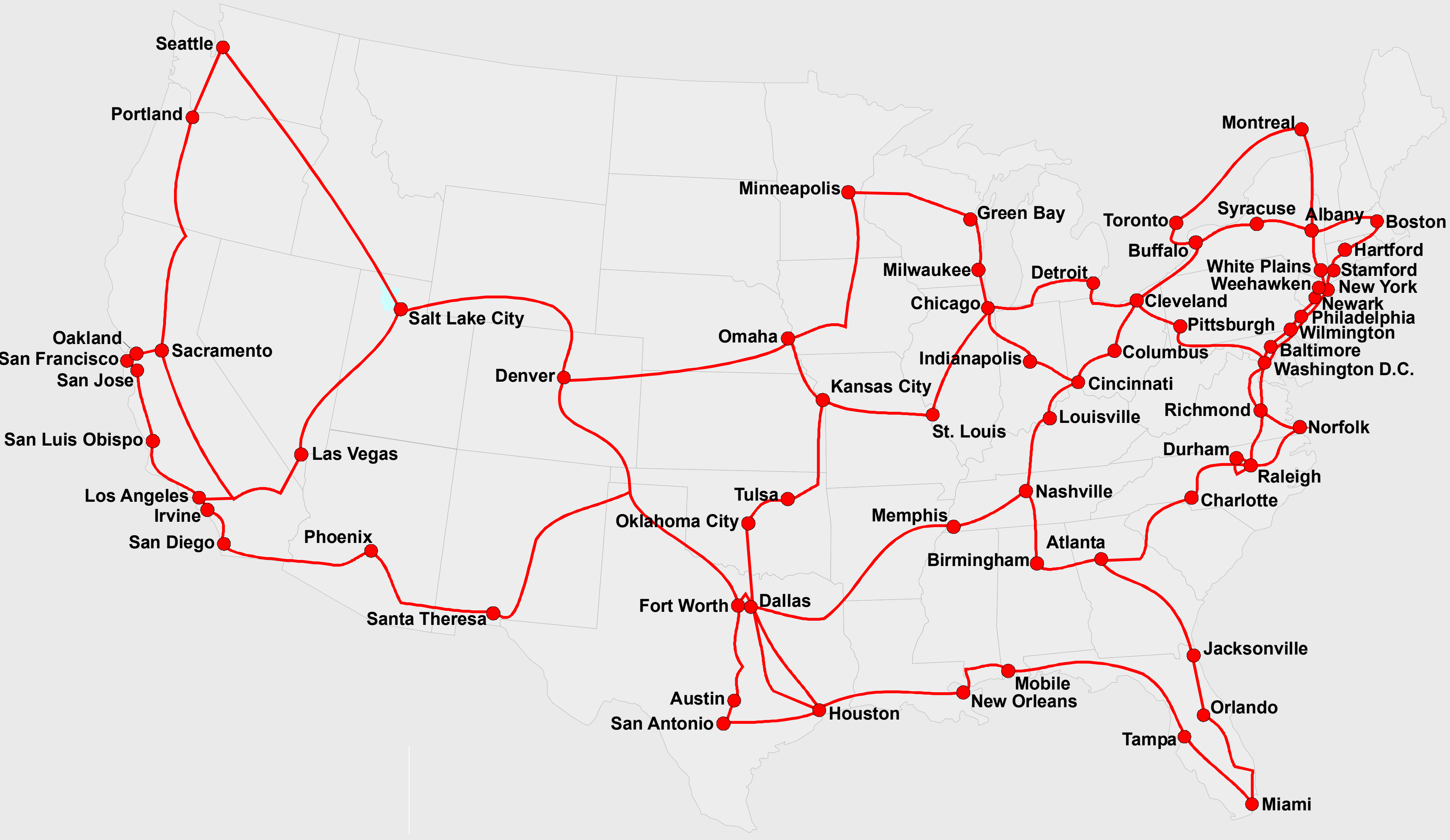
FiberCo

- Dark fiber holding company
  - Operates on behalf of U.S. higher education and affiliates – the Internet2 membership
  - Assignment vehicle for regionals and NLR
  - **Fundamentally, a dark fiber *market maker* for R&E**
- Project designed to *support* optical initiatives
  - Regional (RONs)
  - National (NLR)
- Not an operational entity
  - Will not light any of its fiber
  - Thus, does not compete with NLR in the λ space
- Idea was spin-off from NLR governance discussions
  - Internet2 took responsibility for LLC formation
  - Nat'l R&E Fiber Co. incorporated in Delaware
  - First acquisition of dark fiber through Level 3
    - 2,600 route miles – 3/2003

Why start with Level 3 fiber?

- National-scale IRU and O&M pricing available on major inter-city segments through **March, 2006** (or fiber exhaust)
- Overall wholesale approach taken by L3
  - Open fiber interconnection policy
  - Co-location space availability
  - No AUP/CoU restrictions
- Impact of fiber plant design on total cost of system ownership (over 5 years)
  - Hut spacings & footprint placement
  - Homogeneous fiber type on original plant
- Ease of direct interconnection with NLR

Available fiber topology



How is the fiber distributed?

- FiberCo assigns both the fiber IRU asset and recurring O&M agreements through an assignment agreement
  - 3-way among FiberCo, Level 3 & assignee
  - Assignee has option to waive preferred provider relationship for future fiber acquisition
  - Transaction fee (1/yr) charged to recover costs
- Ongoing bilateral relationship directly between Level 3 and assignee
- Assignees become responsible for any recurring IRU tax liabilities and potential exemptions

Summary of FiberCo activity

May 2003 – April 2004

- 2 RFI responses
- 4 RFP responses
- 4 direct deals

FiberCo assignment progress (route mileage)

	Level 3	Genuity	Total
Completed assignments			
Indiana U	241	-	241
Assignments in progress			
NLR, Inc.	1,705	-	1,705
Florida FLR	900	592	1,492
U Wyoming	178	-	178
Michigan	963	-	963
Internet2	321	-	321
TOTAL	4,308	592	4,900

Gauging community-wide progress

- Aggregate dark fiber assets held by U.S. R&E optical initiatives (segment-miles)
  - CENIC (for CalREN & NLR) 6,200
  - FiberCo (via Level 3 for NLR & RONs) 4,900
  - SURA (via AT&T) 6,000(+2,000 research)
  - OARnet 1,500
  - ORNL (via Qwest) 900
  - Other projects (IN,IL,MI,OR, …) 1,500+
- ***Total (conservative estimate) 21,000+***

- Pending procurements
  - LEARN(TX) & NEREN (New Eng+NY) 1,700+

Key Lessons Learned

- Fiber IRU cost is O(10%) of 5-year total cost of system ownership (TCO)
  - Fiber plant design (topology, hut spacing) and recurring costs have greater impact on 5-year TCO
- Dark fiber fundamentally is real estate
  - Community procurement/RFx sophistication growing
  - Procurement is time consuming (6-9 months)
  - Must consider property and other taxes on city and state levels
- No single carrier has all routes
  - WilTel and AT&T/SURA now very engaged; some activity with Qwest (ORNL)
  - Best long-term relationship is with the underlying plant owner

Lessons learned – II

- Metro fiber is still problematic (surprisingly)
  - Working on metro fiber and starter kit enhancement
- FiberCo has the advantage of pre-negotiated IRU and O&M contracts
- Potential for building combined deals
  - Leverage of adding λ's and/or commodity IP bandwidth to inter-city and metro fiber

Extension beyond original Level 3 footprint

- FiberCo has preferred provider relationship with Level 3
- Genuity (Qwest footprint) routes are being assigned in FL and were bid in TX
- Good working relationship with WilTel
- One of our two NEREN RFP responses proposed WilTel fiber in NY State
- Ongoing discussions with Qwest
- At the same time, we recognize that SURA's AT&T fiber assets will be significant factor in RON development

An observation…

- We have been at a truly unique moment in a time in the telecom/IP economy
- The bad news (from a contrarian viewpoint) is that things seem to be picking up…
- Building a RON is hard work and takes time and FTEs
- If you haven't started acquiring fiber for your RON yet, don't assume the luxury of infinite time… and current prices and availability

Starting a RON … a primer

1. Convene enthusiastic, visionary partners in region
2. Develop governance & capital approaches and preliminary business plan
3. Learn routes and procure dark fiber
   Select and procure optronics kit
   Refine business plan (i.e., λ pricing model)
   Learn how to operate and maintain the system
4. Install and commission plant

For more information…

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