

Integrating Layer 1 Switching in Advanced Optical Networks

TF-NGN Friday, January 13, 2006

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Our first TF-NGN meeting

- We're here to listen and learn
- Introduce our company through our customers
- Note a few basic points about what they do
- Look forward to speaking with you afterwards

So What's a Glimmerglass?

- Something that makes Germans smile?

Well yes, but it is also:

- A dynamic,
remotely accessible,
accurate,
and repeatable –
way to view and control physical-layer connections.

Our Customers

- **Manage Physical Fiber**
 - And make regular changes to their fiber configurations
- **Government**
 - The Paranoia Market (Signals Intelligence)
- **Test**
 - Components, Systems, Networks
- **Networks**
 - Control, Manage Resources, Protect, Monitor & Maintain

Test Examples

■ Intel Braunschweig

- You could never buy enough test equipment
- Now sharing it and achieving 90% utilization



■ Cisco

- From: Three staff doing three tests in 12 weeks
- To: One Staff doing 12 tests in 8 weeks.



■ Swisscom

- Testing new services across network replica
- Remote access to lab resources 24/7



Applications in Networking

- Control Plane Development
- Network Resource Management
- Network Protection, Monitoring & Maintenance

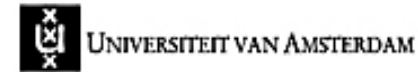
Control Plane Development

- Telecom Italia Labs
- CTTC (Barcelona)
- Trinity College Dublin (CTVR)
- University of Amsterdam
- CERN/Caltech
- Plus numerous examples in US & Japan

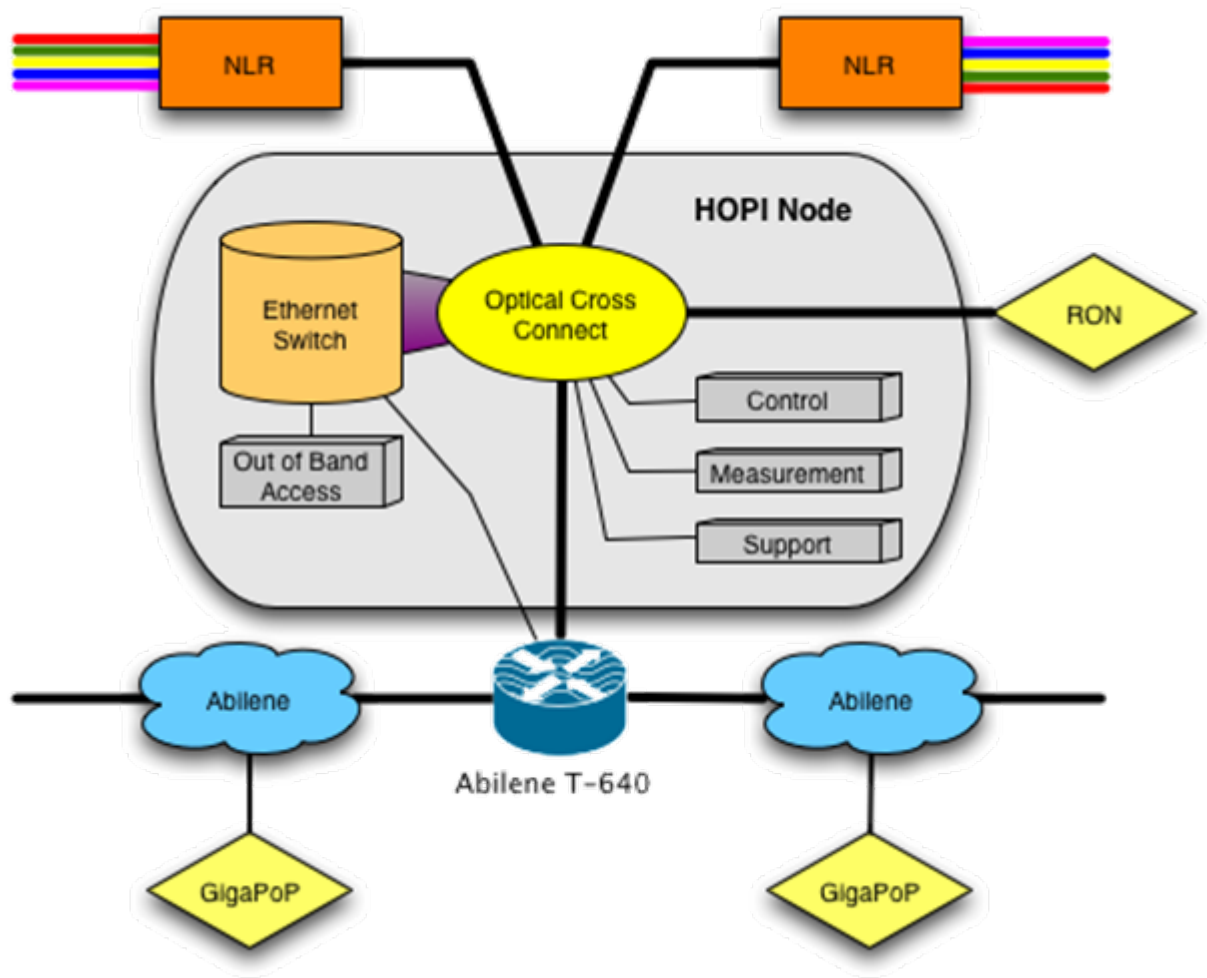


Network Resource Management

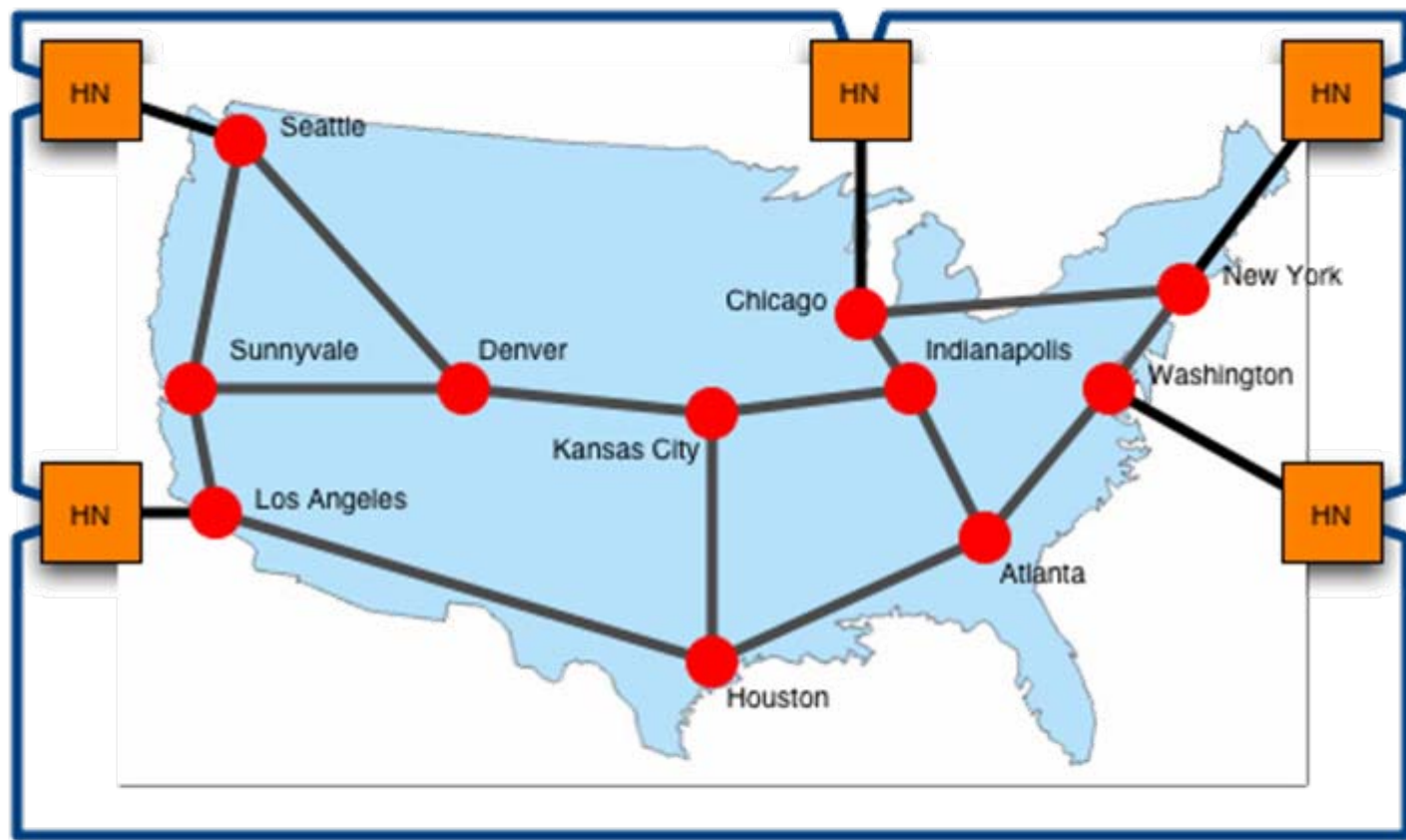
- University of Amsterdam
- Optiputer at UCSD and UIC
www.optiputer.net/news/glimmerglass.php
- Internet2's HOPI project







HOPi Node



HOPi Testbed

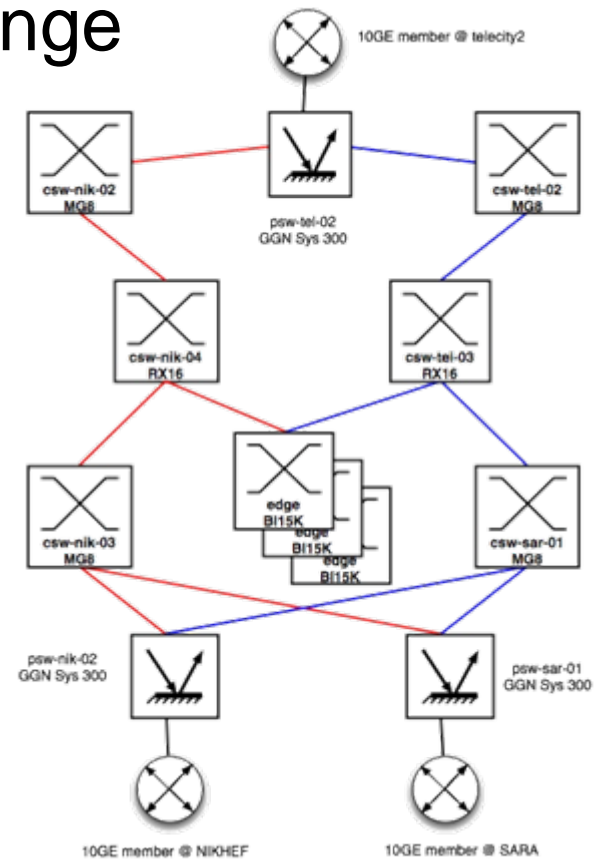
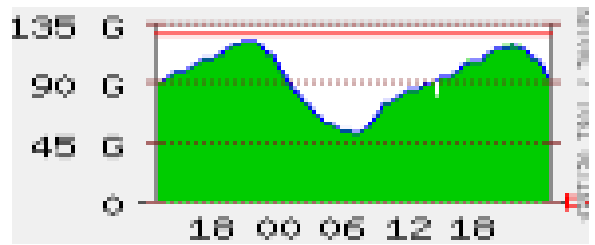


 HOPi Node
  Abilene Node
  OC-192c
  10 GgE

Network Protection

■ The Amsterdam Internet Exchange

- 237 customers, 382 ports
- 127gbps peak traffic
- growing 10% per month
- Monitoring & Maintenance



Direct Benefits Experienced

- **Scalability, Management, Protection**
 - Dynamic reconfiguration of links
 - Sharing of expensive interfaces between multiple users and applications
- **Optical Cut Through Paths**
 - Low Latency, deterministic performance vs L3 routing
 - Reduced Costs vs. L3
 - Independent Application-Specific Network
- **Combine L2 Networks over Distance**
 - Huge Data Flows for short periods
 - Temporary flattened private networks

A Dynamic L3/L2/L1 Network is Better

■ Dynamic L3/L2 fixed L1

- Slow Service Delivery
- Long Contracts
- Inflexible Protection Schemes
- Overprovisioning
- Human Intervention
- Lost Opportunity

■ Dynamic L3/L2/L1

- On Demand Provisioning
- Usage-based Pricing
- Dynamic Protection
- Automated Delivery of Value-added Services
- Intelligent Capacity Utilization

Wrapping it Up.

- How do we integrate and control these benefits?
 - It's programmable
- We have seen some individual examples...
- We're here to learn: e.g. Previous Sessions

- Questions?

