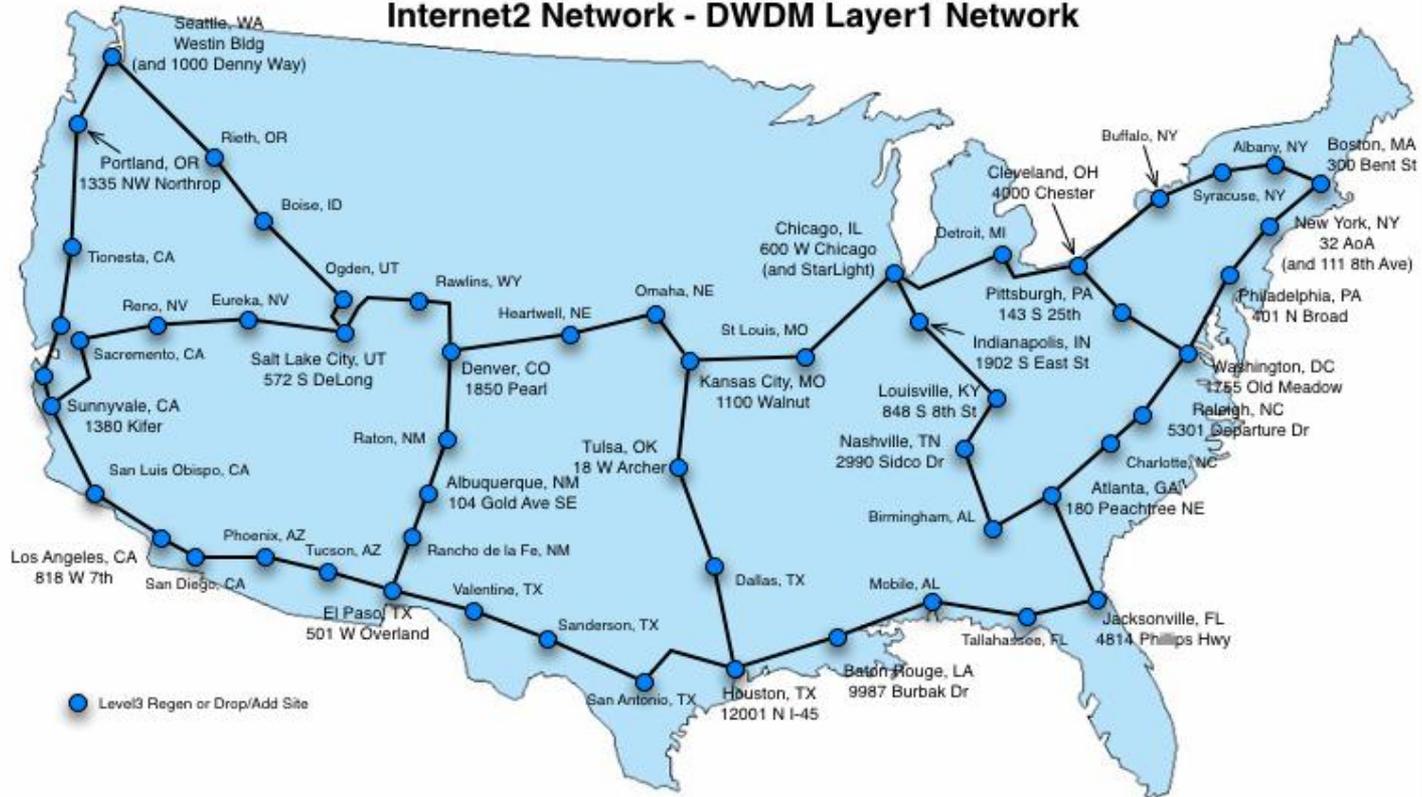


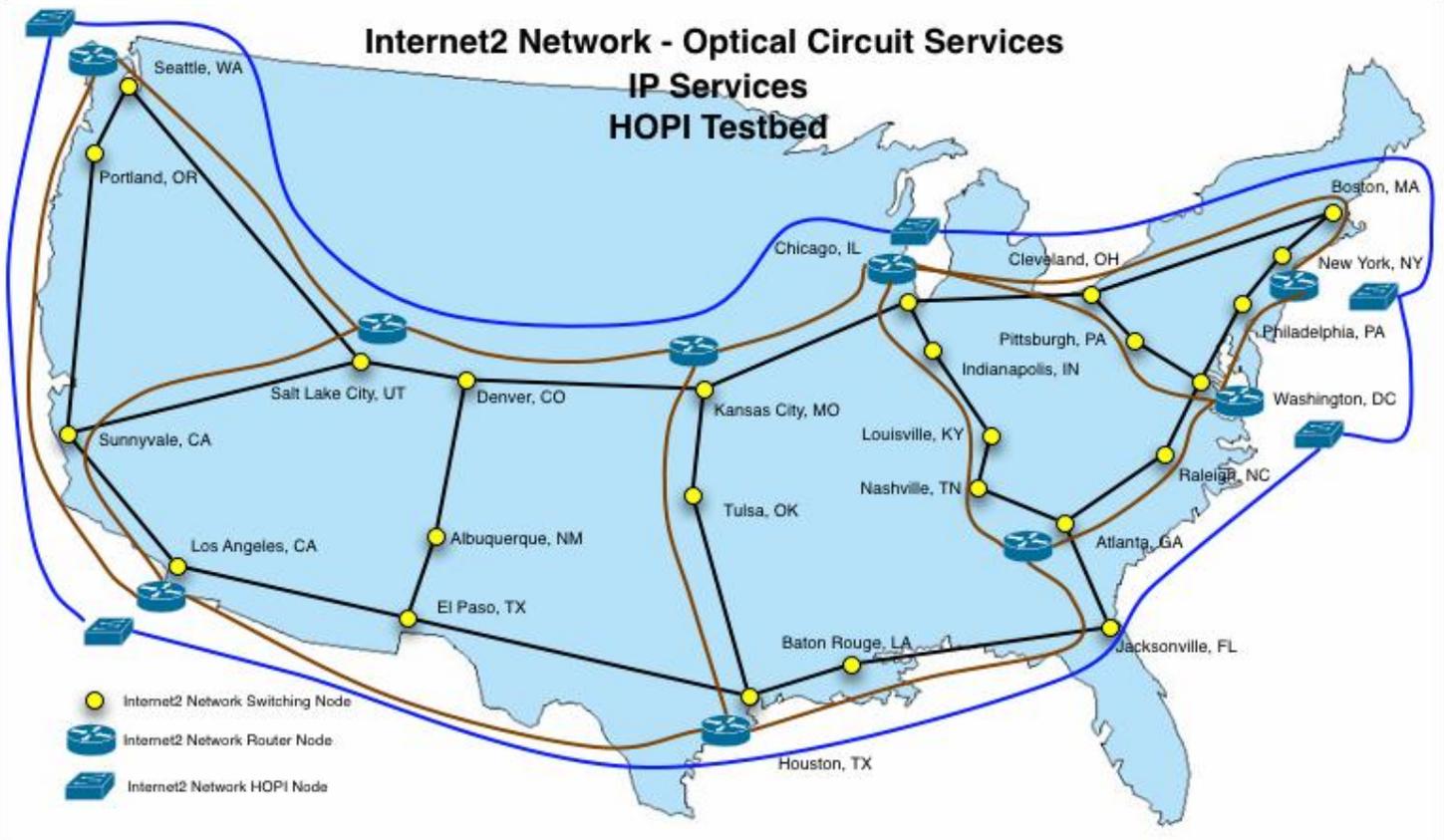
HOPI and Dynamic Circuit Services Update

Rick Summerhill
Director, Network Research, Architecture, and Technologies

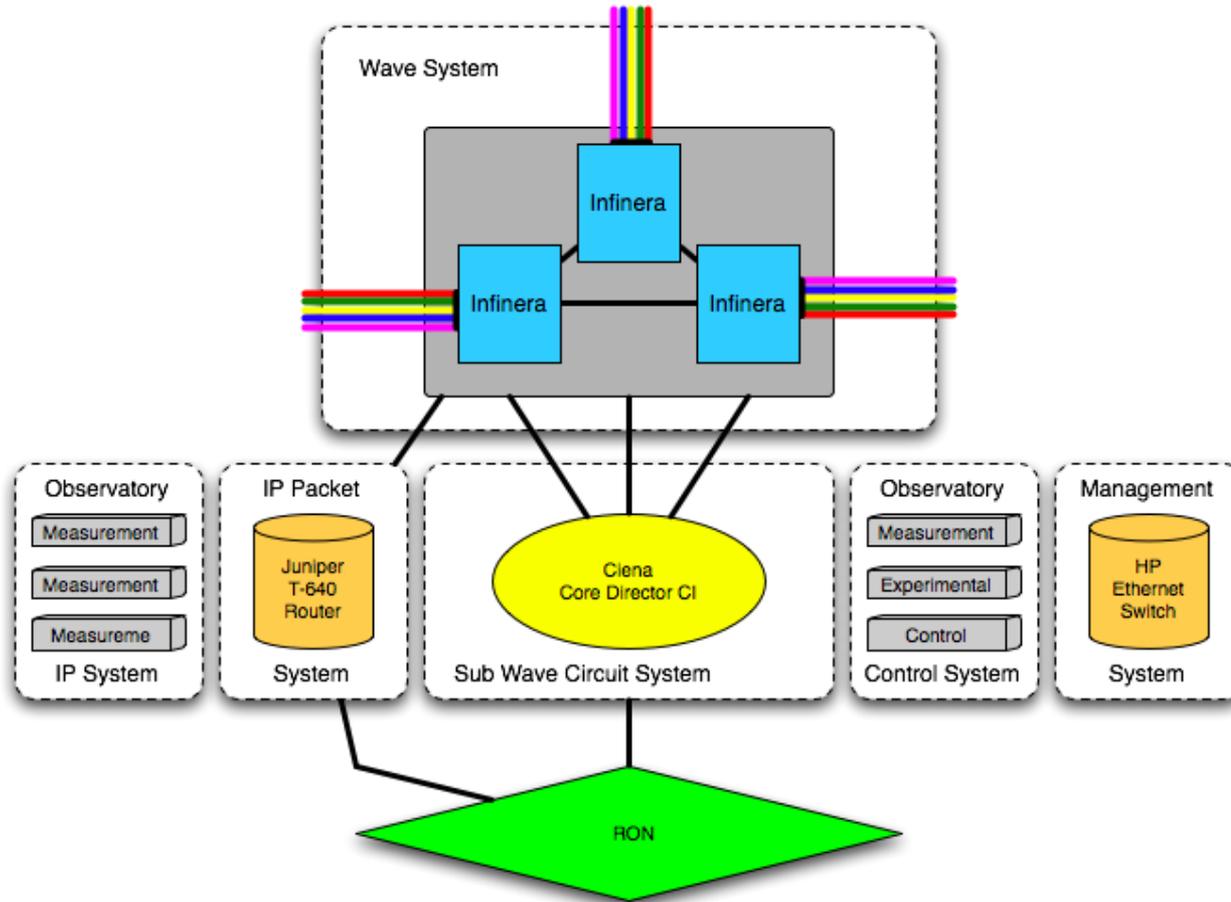
Jet Meeting
May 15, 2007

Internet2 Network - DWDM Layer1 Network

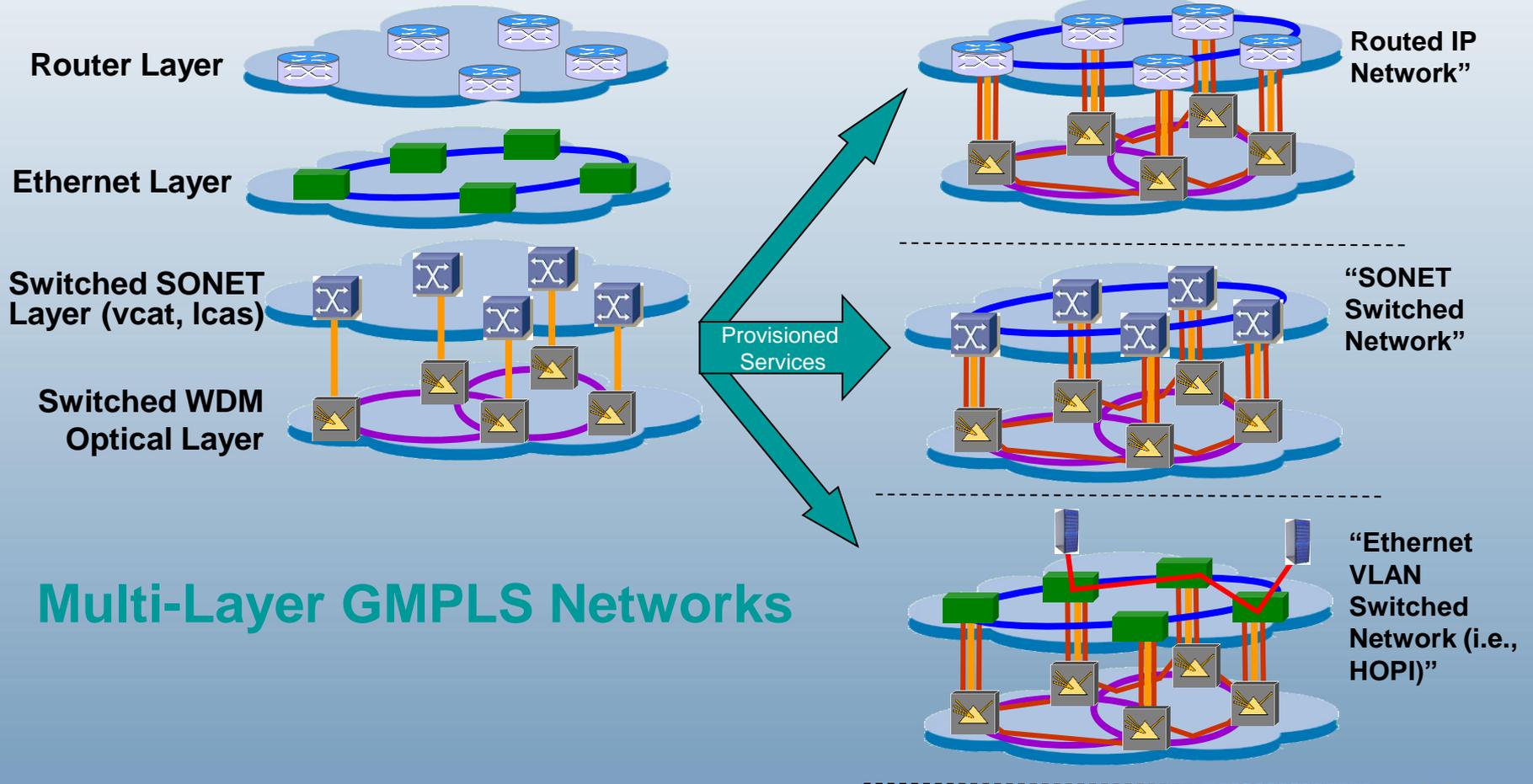




Nodes



Internet2 Network: Infrastructure with Multiple Services



Multi-Layer GMPLS Networks

Dynamic Circuit Services

- Current infrastructure and deployment
 - The HOPI testbed - uses a single wave on the wave platform
 - Is a breakable platform for experimentation
 - VLAN based, modeling a circuit infrastructure
 - Uses Force10 switches
 - A single wave connected to the Ciena platform
 - Working toward a persistent set of services to support real applications
 - Separation of development services from production services
- Eventually would like a unified control plane to control all aspects of the network

Dynamic Circuit Services Development

- Current Development involves two main areas: Intra-domain and Inter-domain capabilities
- Intra-domain work
 - HOPI - has been working for a long time
 - The Ciena Network - now working
 - Have a small Ciena testbed between Bloomington and Indianapolis
- Inter-domain work
 - Collaborations with other networks
 - Following and participating in various standards bodies

Intra-Domain work

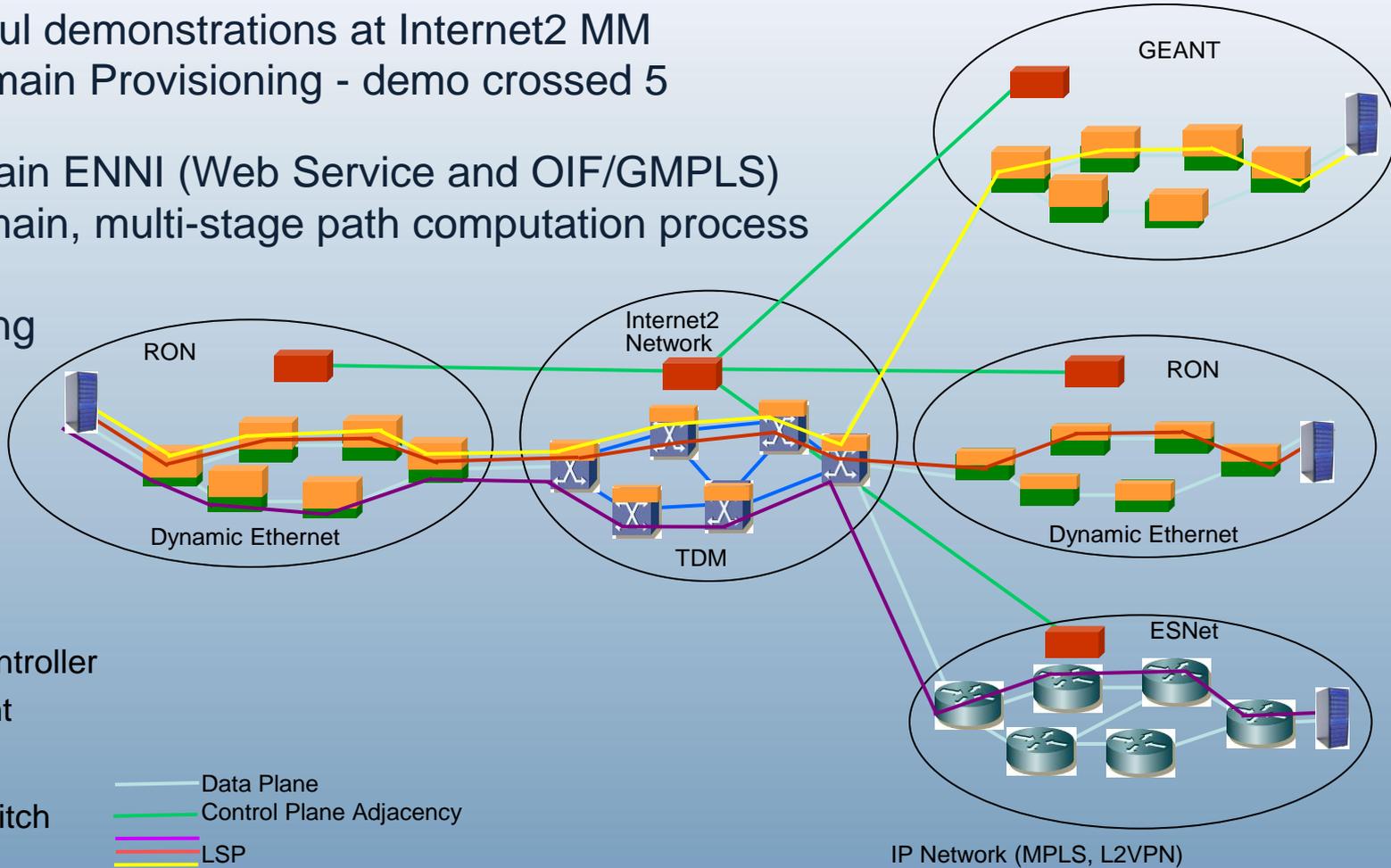
- Challenges
 - Multi-vendor environment
 - Multi-layer environment
- Uses DRAGON GMPLS control plane for both HOPI and the Ciena network
- HOPI has been in place for several years, and functions as a test-bed
- Ciena Implementation should support a large number of platforms, eventually
 - Evolving to a UNI-2.0 interface at this time
 - It is currently using the TL-1 interface
 - Software platform should be extensible and vendor independent
 - Lot of support from Ciena on all aspects of this project

Inter-Domain Development

- Collaborations with many different group
- For example, the DICE group - Dante (GEANT2), Internet2, CANARIE, and ESnet
 - Working closely with ESnet on interfacing OSCARS and HOPI - involves AAA work, using OSCARS interface
- Reporting back progress to the GLIF and other organizations
 - For example, Phosphorus, in coordination with the SURFnet and University of Amsterdam participants
 - Meetings with Terapaths
- Coordinating with OGF on various schema - topology, path computation, signaling, ASTs

Multi-Domain Control Plane

- Successful demonstrations at Internet2 MM
- Multi-Domain Provisioning - demo crossed 5 domains
- Interdomain ENNI (Web Service and OIF/GMPLS)
- Multi-domain, multi-stage path computation process
- AAA
- Scheduling



IP Network (MPLS, L2VPN)

Development Team

- Tom Lehman, Jerry Sobieski leading the efforts
 - Xi Yang
 - Chris Tracy
 - Jarda Fildr
 - Fiona Leung
- Make software available to the community
- Supporting workshops to aid further deployment
 - Next workshop at NASA Ames - May 30-31, 2007

Development Time-Line

- By the time the Internet2 network deployment is complete,
 - Have a working DRAGON based intra-domain capability on the Ciena network
 - Implementation that can be deployed on campuses and regional networks
 - Have basic inter-domain capabilities that can communicate topology, path computation, and signalling information
- By the end of the year, have initial stages of AAA and scheduling built into the implementation