Internet2 Network Control Plane Strategy

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Internet2

GLIF Meeting
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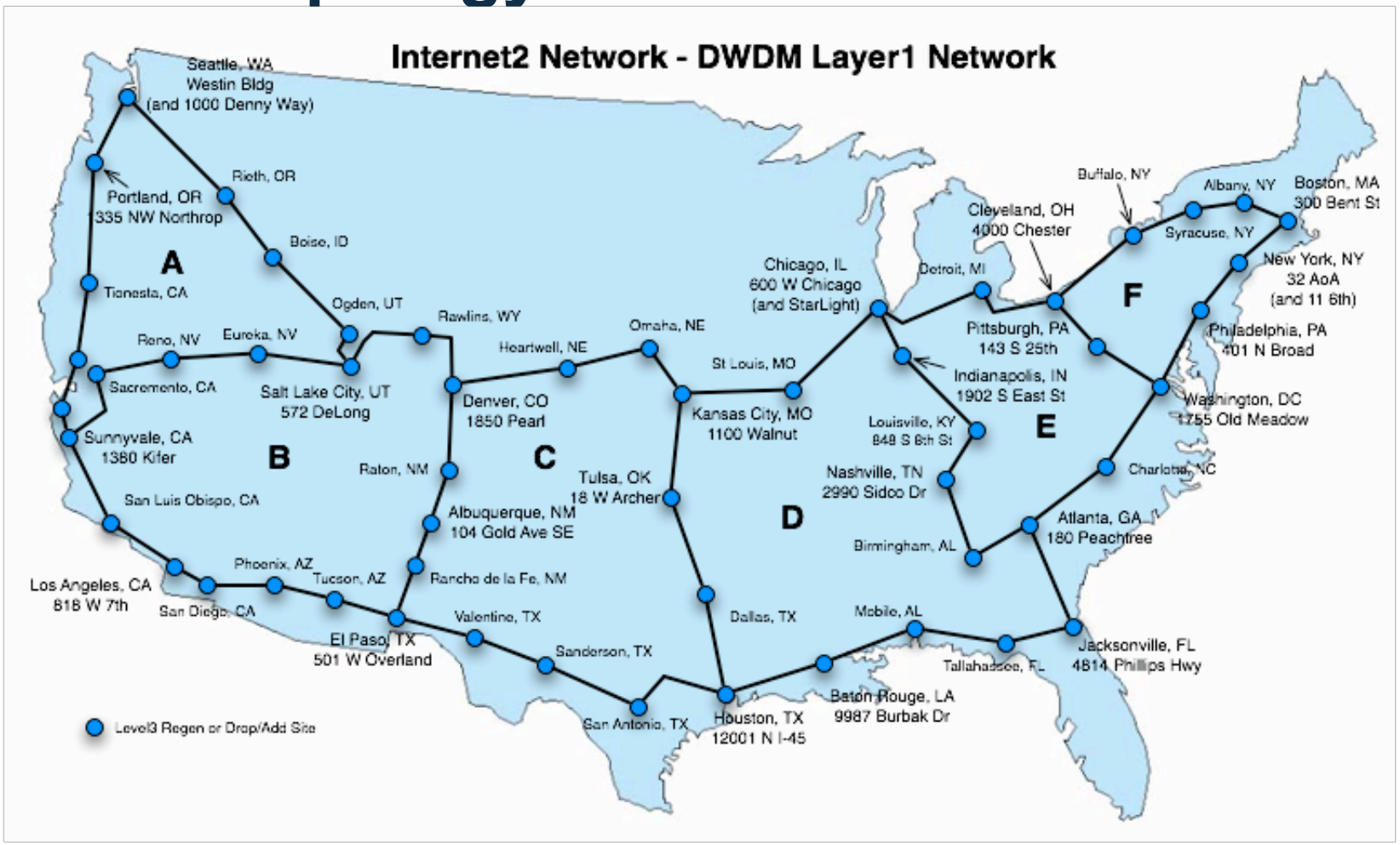
Tokyo, Japan

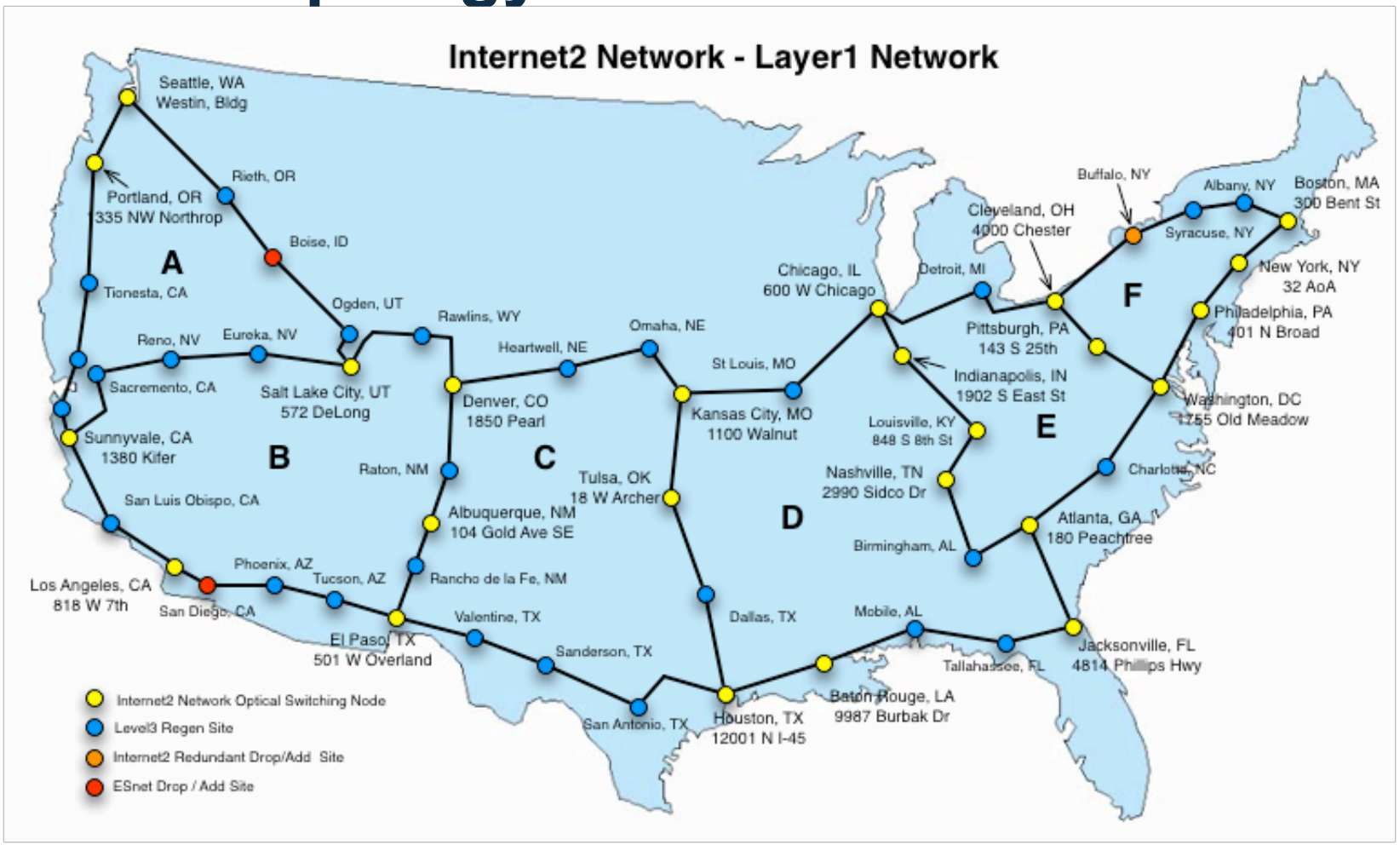
Agenda

- Basic Ideas
- Topology
- Optical nodes
- Control Plane

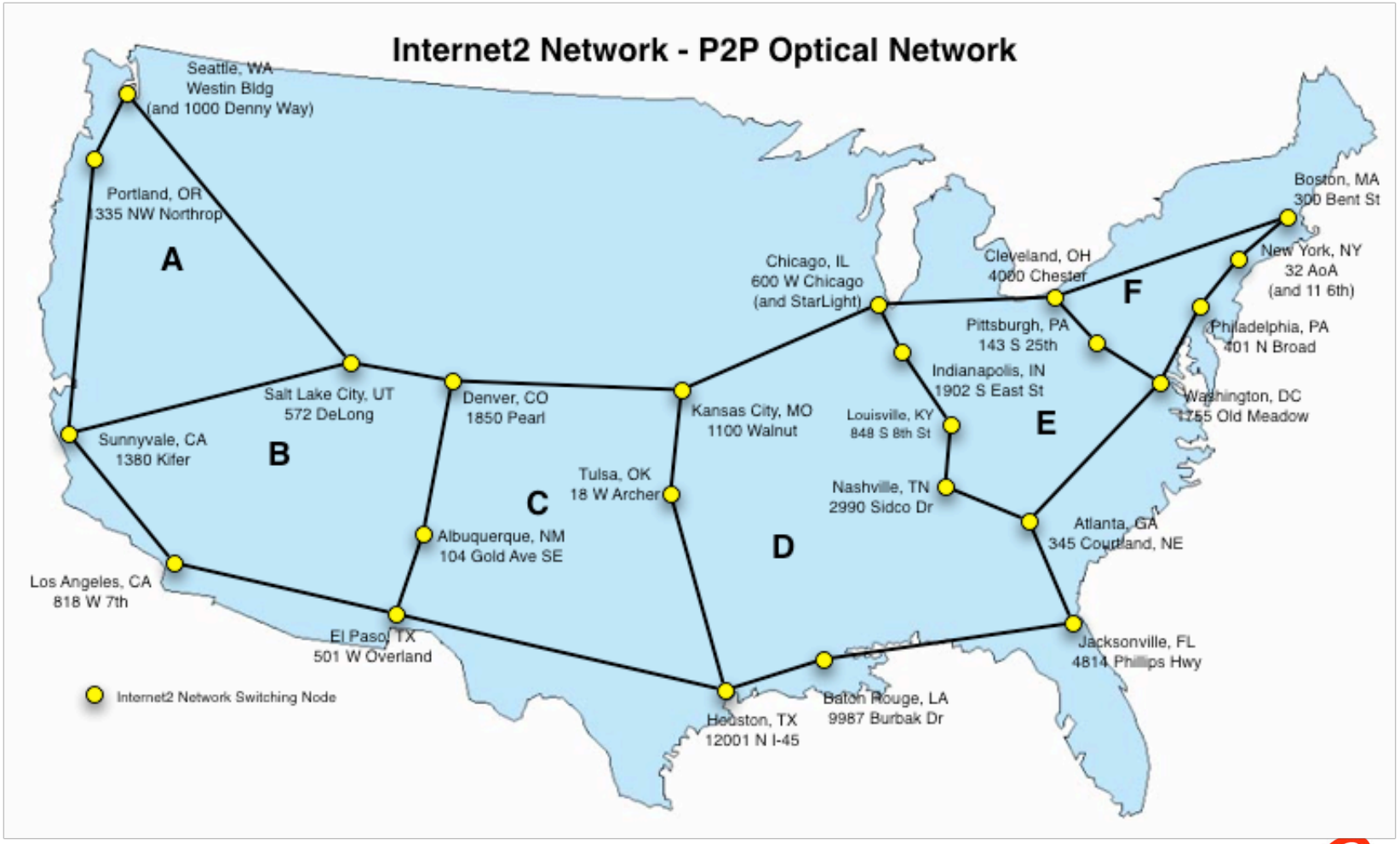
DWDM Topology



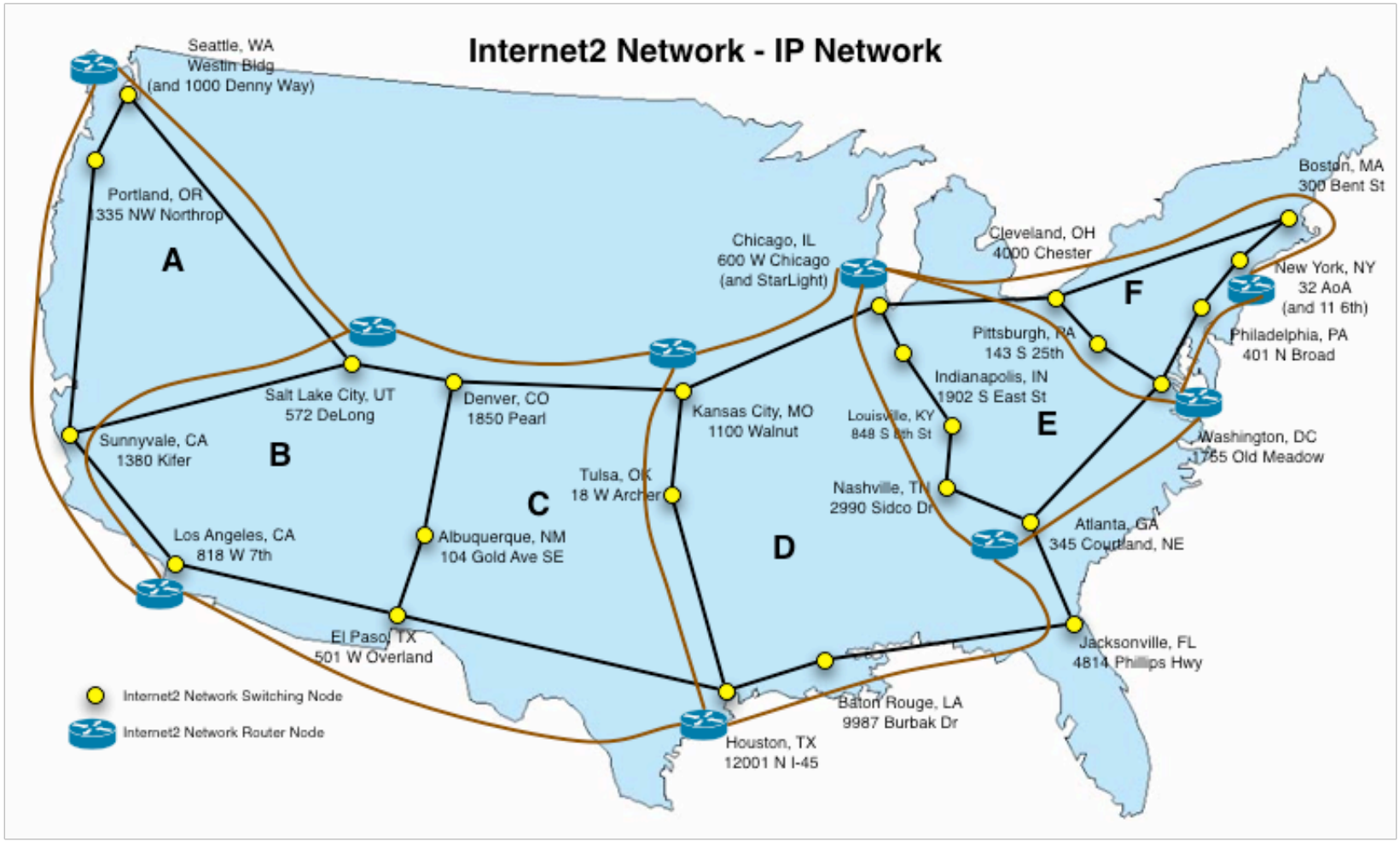
DWDM Topology



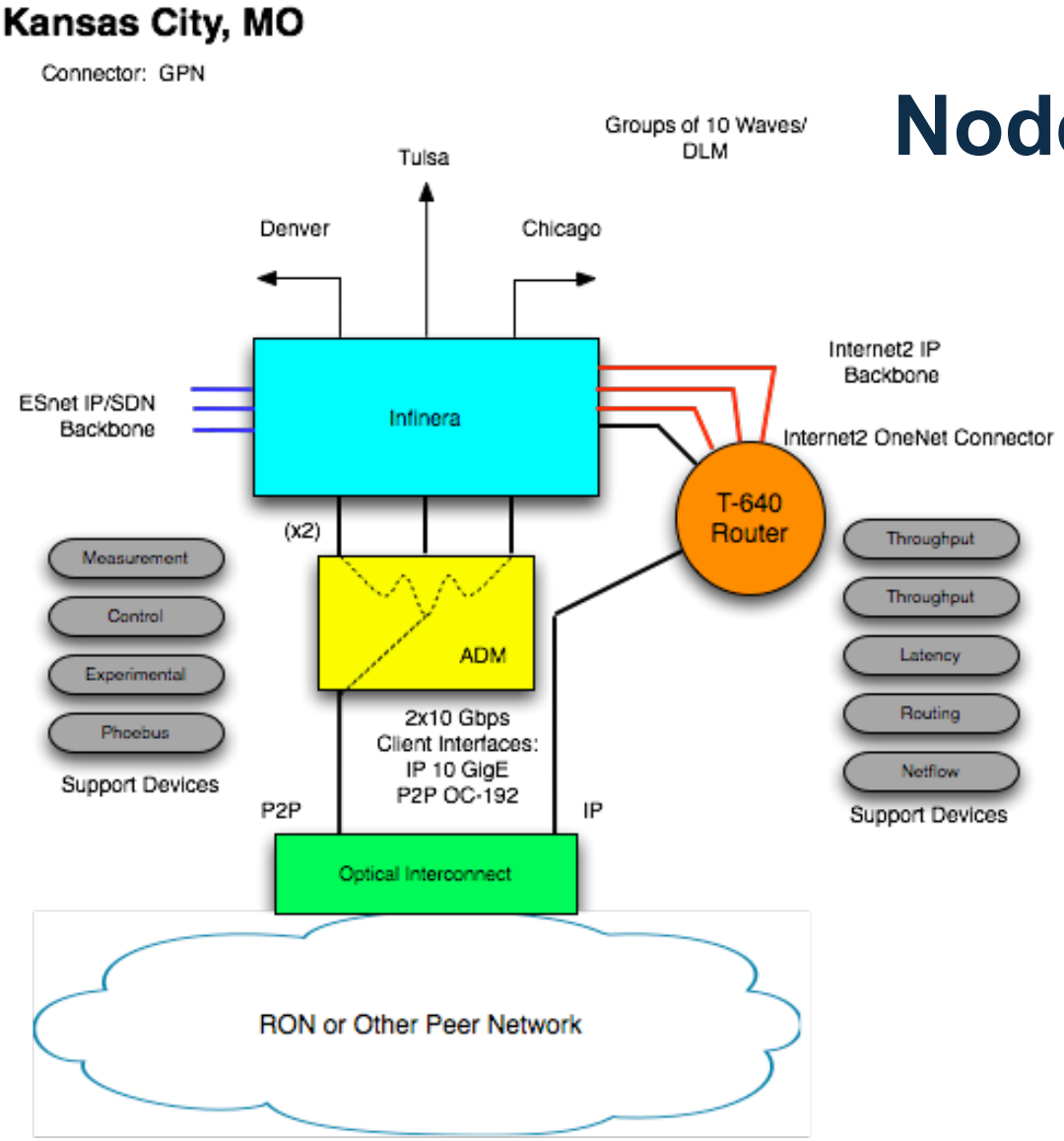
P2P Optical Topology



IP Network

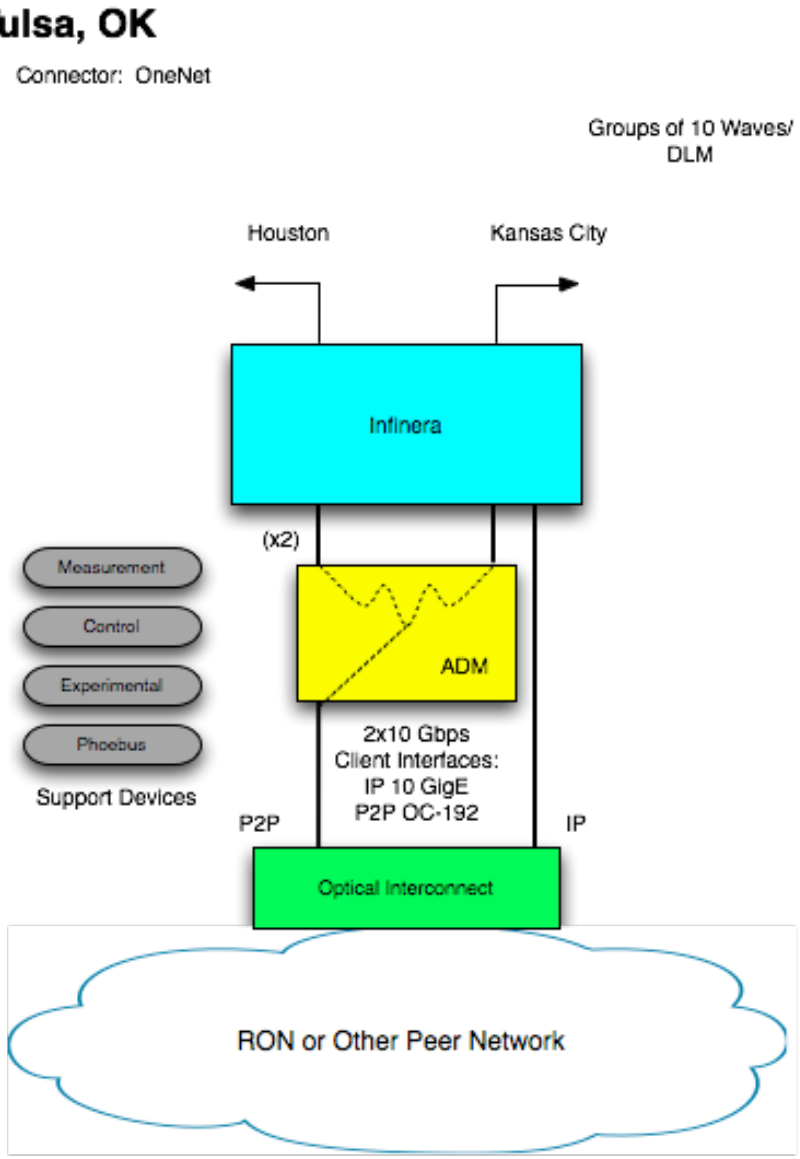

Internet2 Network - IP Network
Seattle, WA
Westin Bldg
(and 1000 Denny Way)
Portland, OR
335 NW Northrop
A
Sunnyvale, CA
1380 Kifer
B
Salt Lake City, UT
572 DeLong
Denver, CO
1850 Pearl
Los Angeles, CA
818 W 7th
Albuquerque, NM
104 Gold Ave SE
C
El Paso, TX
501 W Overland
Tulsa, OK
18 W Archer
Kansas City, MO
1100 Walnut
Houston, TX
12001 N I-45
D
Chicago, IL
600 W Chicago
(and StarLight)
Indianapolis, IN
1902 S East St
Louisville, KY
848 S 4th St
Nashville, TN
2990 Sidco Dr
Atlanta, GA
345 Courtland, NE
E
Cleveland, OH
4000 Chester
Pittsburgh, PA
143 S 25th
F
Boston, MA
300 Bent St
New York, NY
32 AoA
(and 11 6th)
Philadelphia, PA
401 N Broad
Washington, DC
1755 Old Meadow
Jacksonville, FL
4814 Phillips Hwy
Baton Rouge, LA
9987 Burbak Dr
Internet2 Network Switching Node
Internet2 Network Router Node

Node Architecture



- Infinera DWDMGear - Static at the start
- Grooming capabilities in ADM to provide sub channels and HOPI types of activities at the start
- Simplified and standardized interface to connectors, exchange points, and other global research and education networks - 2 x 10 Gbps interfaces
- Measurement and control servers will support the node

Node Architecture



- Example of Optical only Node for connected RON or Peer Network

Timeline

- Build-Out:
  - November 15, 2006: NYC - PHL - DC - PIT - CLEV - CHIT
  - March 15, 2007: West to Denver
  - June 15, 2007: West to LA and Seattle
- Transition
  - From Abilene to new Internet2 Network by October 2007
- Control Plane deployment evolves over this time period
  - Would like to be able to implement ASTs across domains by October of 2007
- HOPI Testbed will be transitioned to the new network over the next 2 months

Control Plane

- Nodes
  - Infinera DWDM Equipment - GMPLS control plane
    - Will be static at the beginning
  - Grooming Equipment (e.g. Nortel OME6500 or Ciena Core Director)
    - Will provide dynamic services at the start
    - Using DRAGON high level services
  - At router nodes, Juniper Routers - GMPLS implementation
- Integration of control planes
- Partnership between Infinera, Juniper, and Internet2

DWDM Equipment

- Infinera GMPLS testing and setup
  - Configuration of waves across system by hand
  - Interfacing with other networks
  - Interfacing between T-640s and Infinera gear using UNI
  - Will remain static at the start, to be added to the dynamic services as integration proceeds

Grooming Equipment

- Final decision on vendor soon
  - Details of dynamic service will depend on the equipment chosen
- Connection to several waves at the start
- SONET on the backbone
- Must support GFP, VCAT, and LCAS
- Integration of DRAGON software will depend on equipment. Two possible directions:
  - Strong dependence on DRAGON software
  - Strong dependence on vendor software

Control Plane

- Control Plane Activities - DRAGON software. How will these be integrated? Still an open question.
  - CSA - Client System Agent - Uni for applications
  - VLSR - Virtual Label Switched Router
  - NARB - Network Access Resource Broker
  - ASTs - Application Specific Topologies. Successful demonstrations of these at Internet2 member meeting
- Specific types of services
  - Immediate reservation - who will use this? Bandwidths?
  - Advanced reservation - will network utilization be good?
- Need to incorporate - would be good if we ccould share code
  - AAA
  - Security
  - Scheduling

Contact Information

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