

ESnet Update

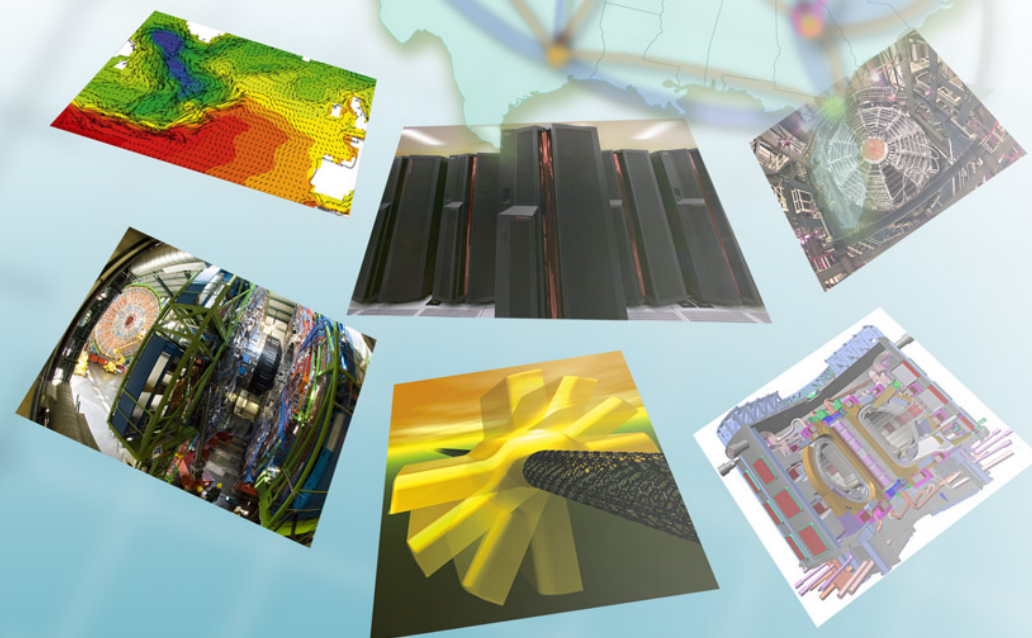
Winter 2008

Joint Techs Workshop

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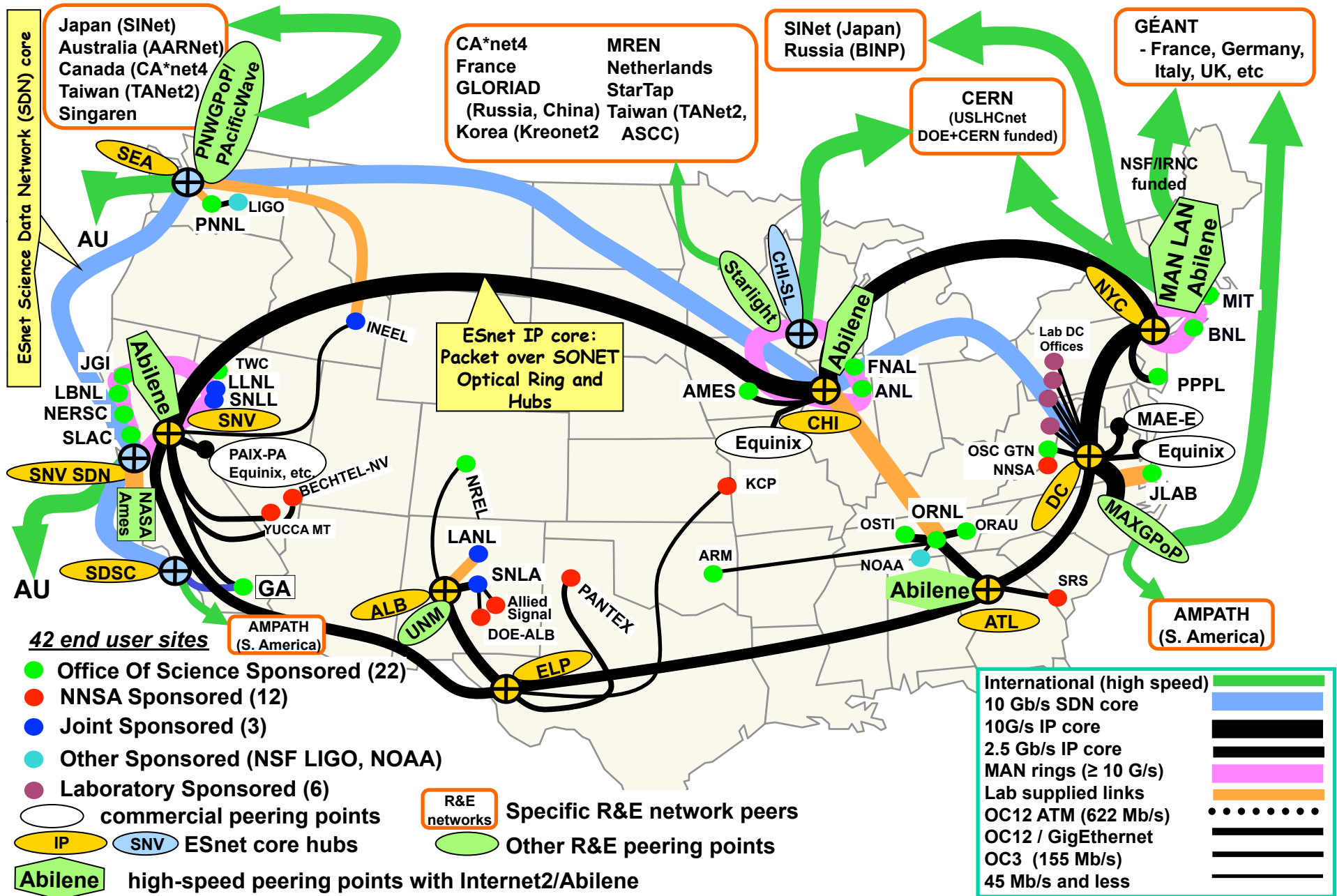
January 21, 2008



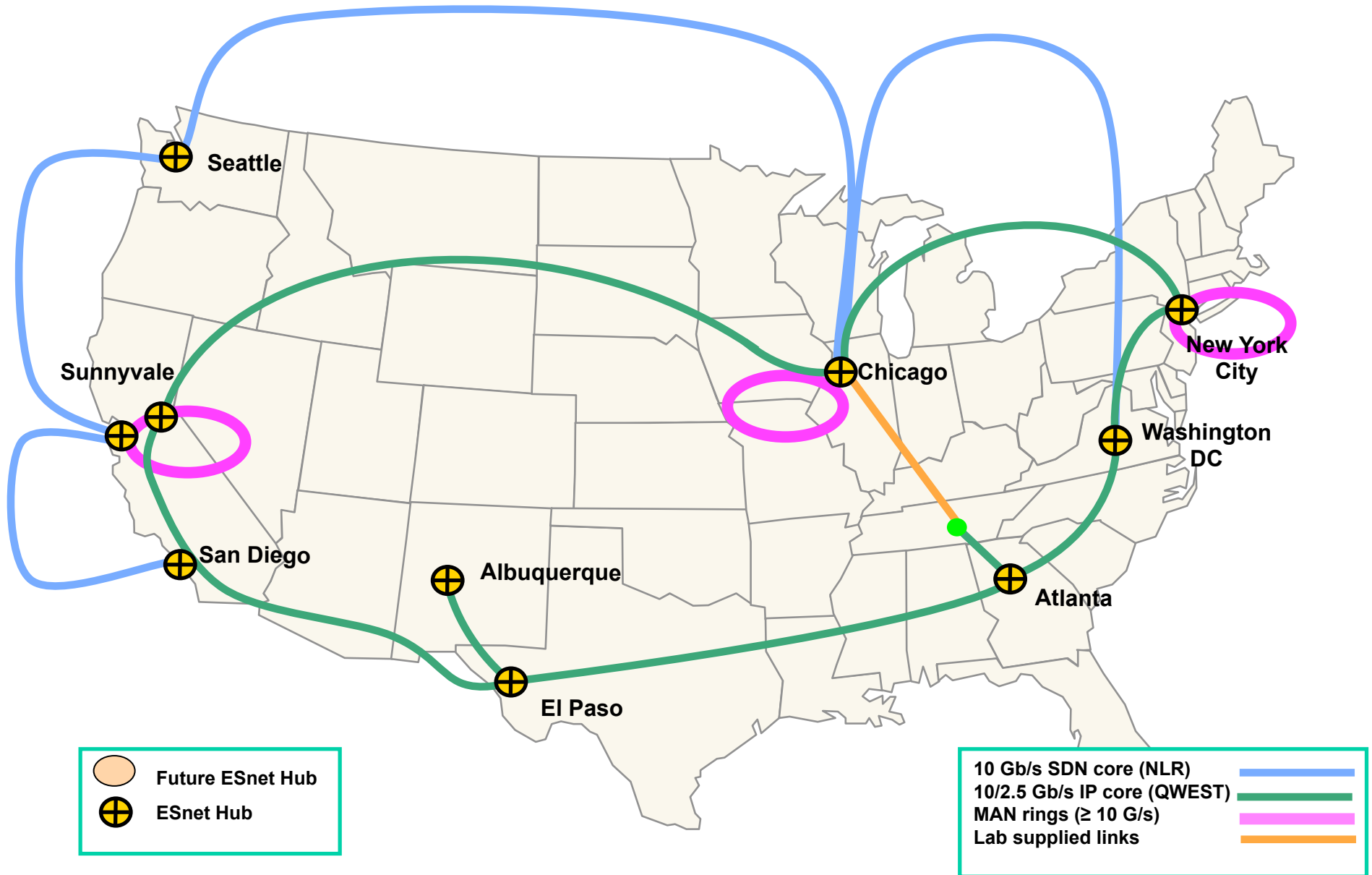
Networking for the Future of Science



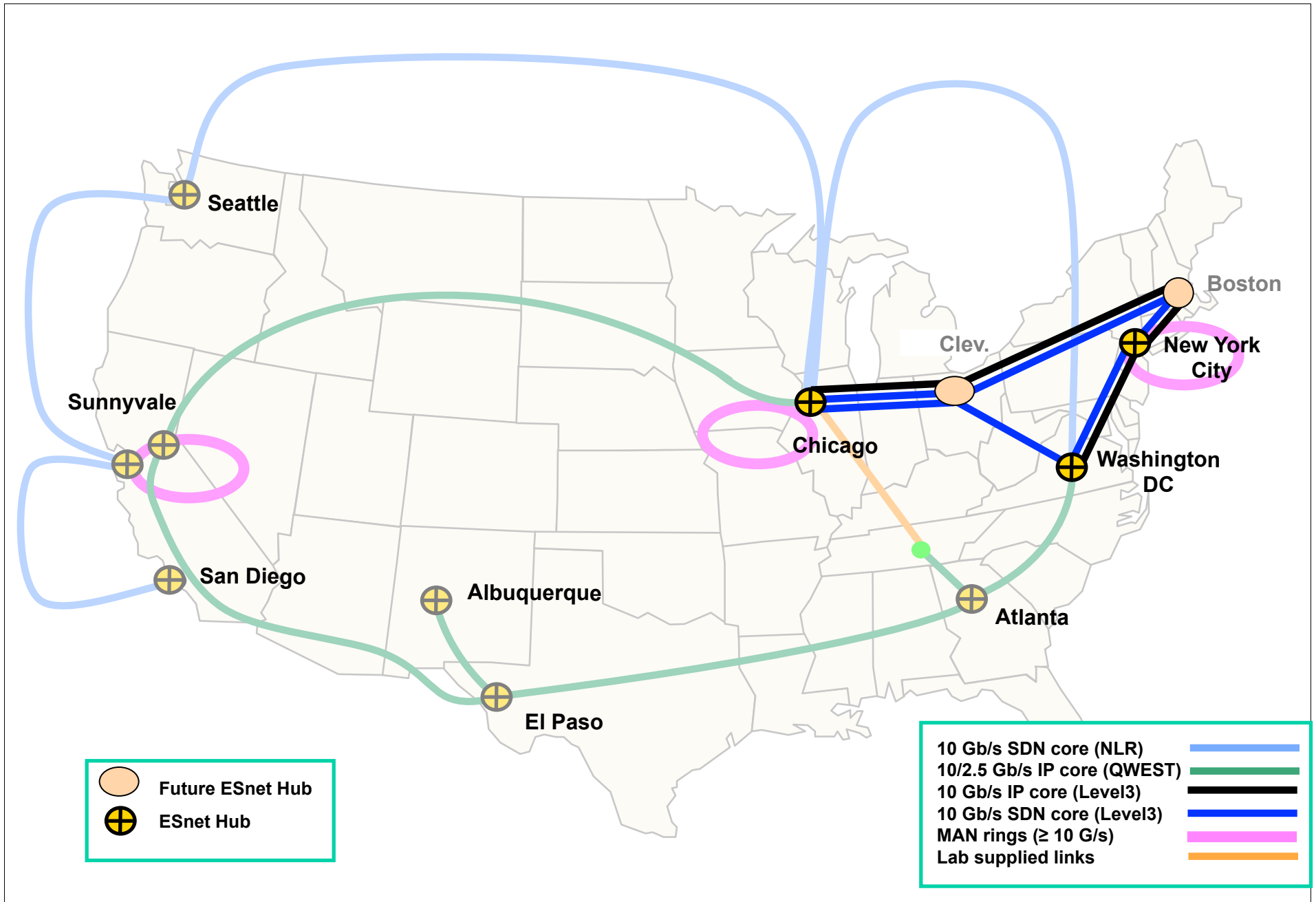
ESnet 3 with Sites and Peers (Early 2007)



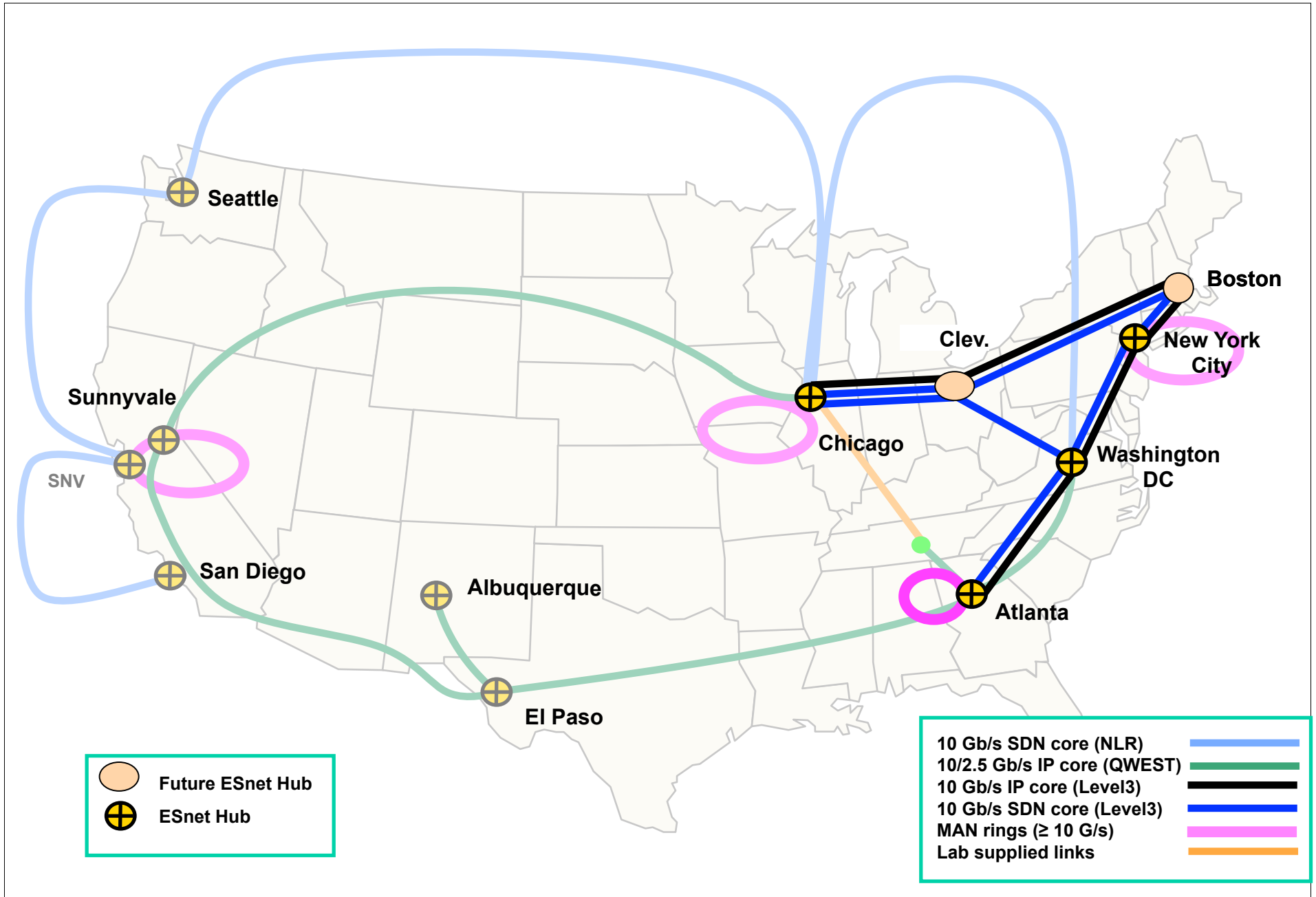
ESnet 3 Backbone as of January 1, 2007



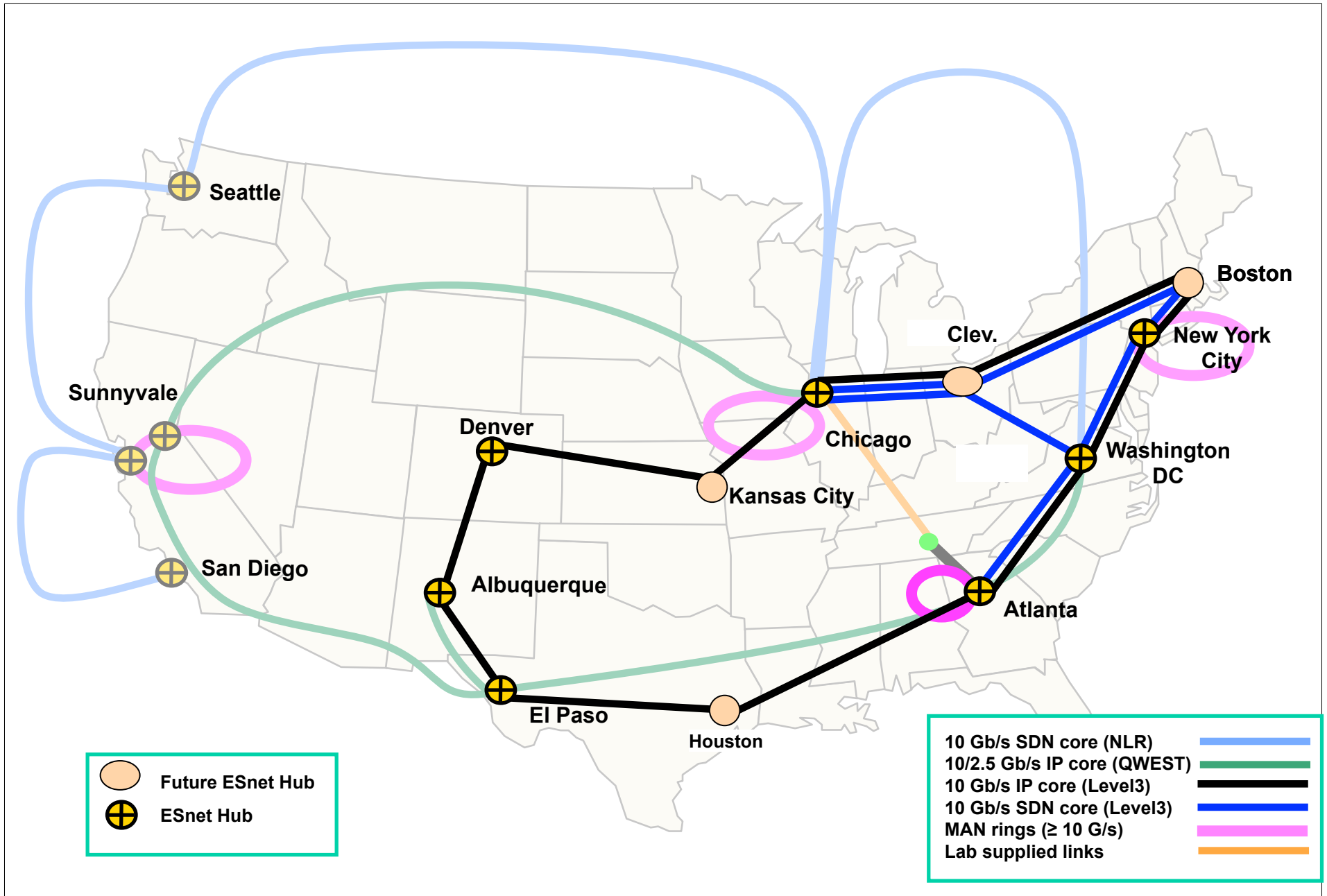
ESnet 4 Backbone as of April 15, 2007



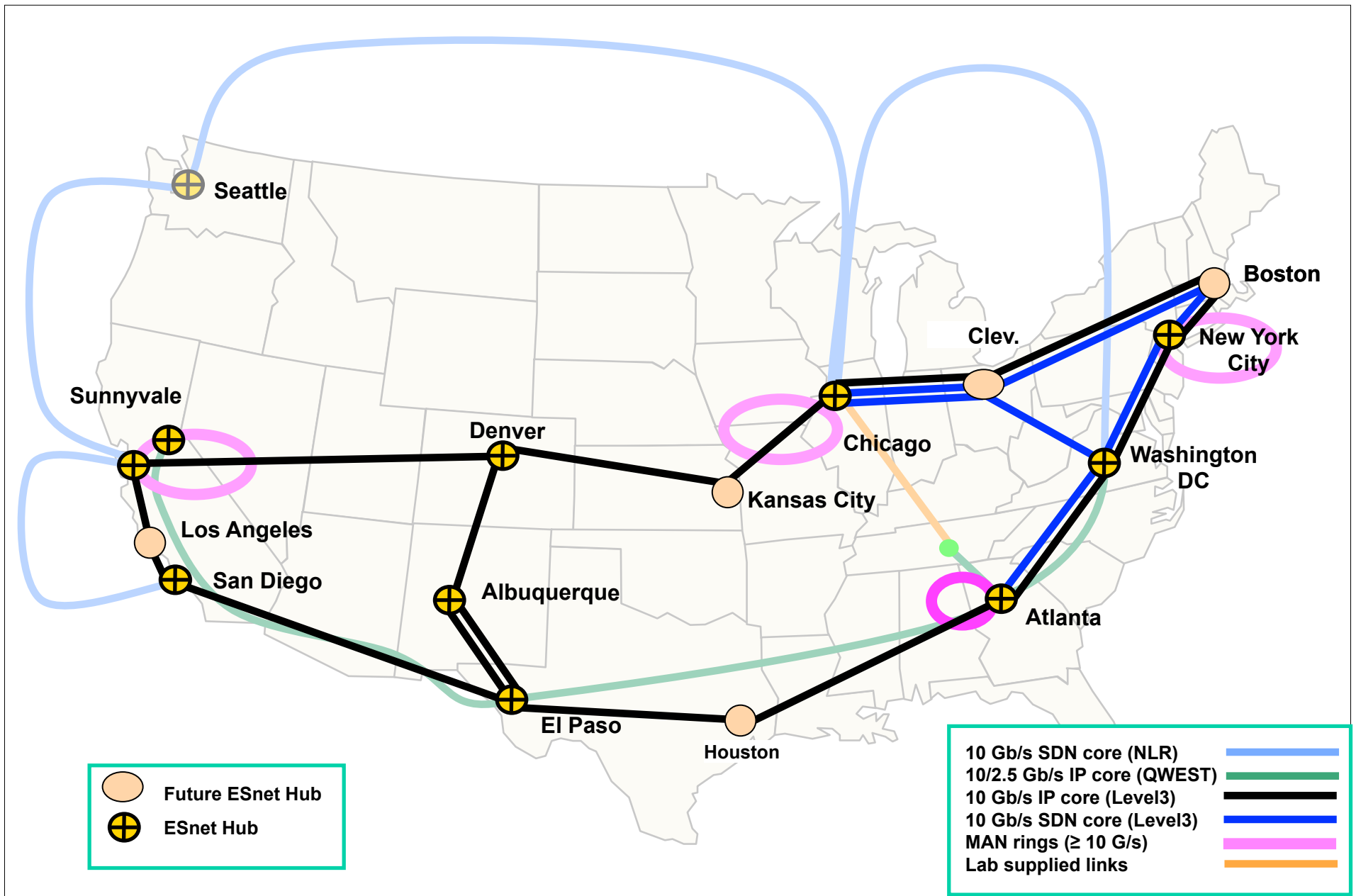
ESnet 4 Backbone as of May 15, 2007



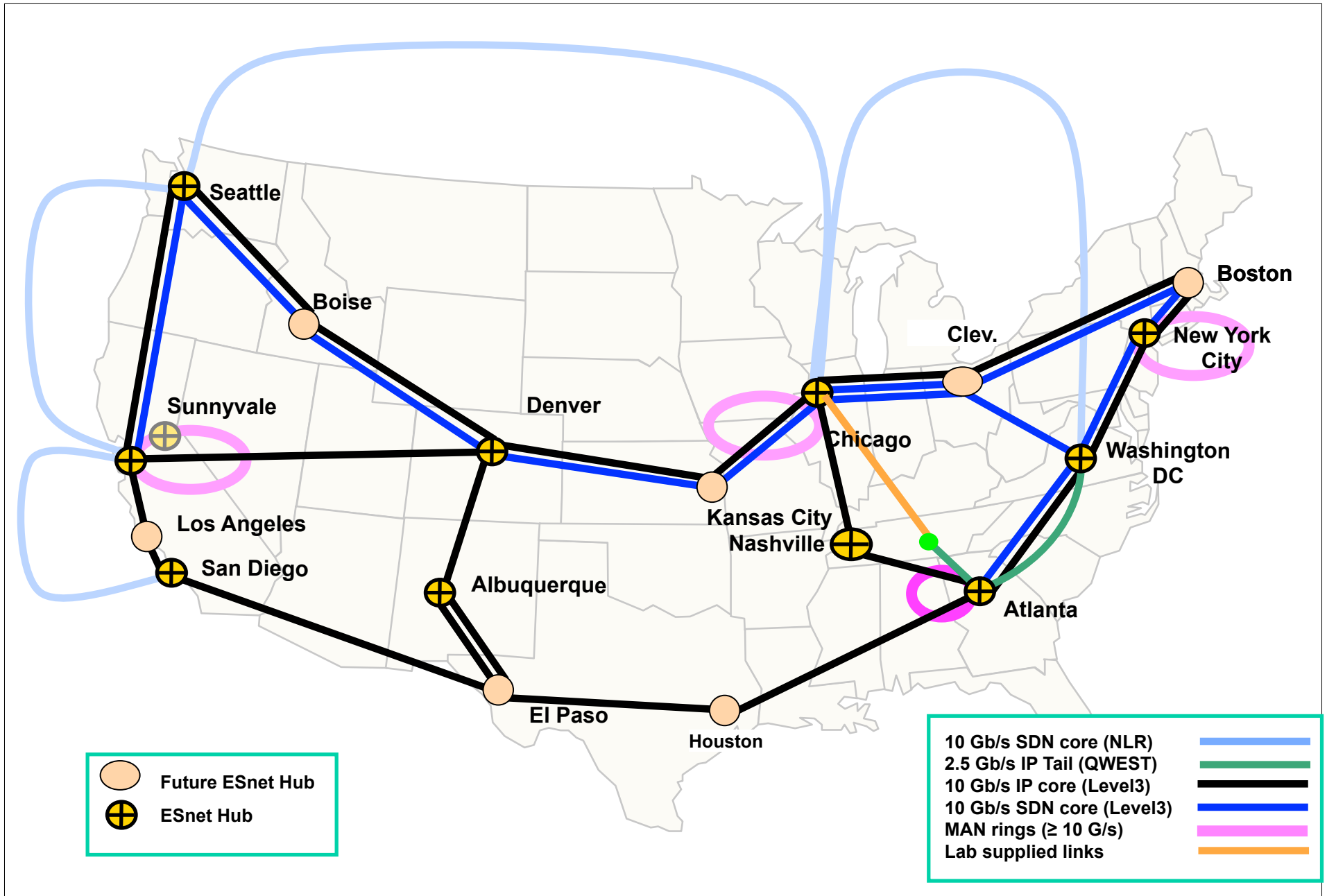
ESnet 4 Backbone as of June 20, 2007



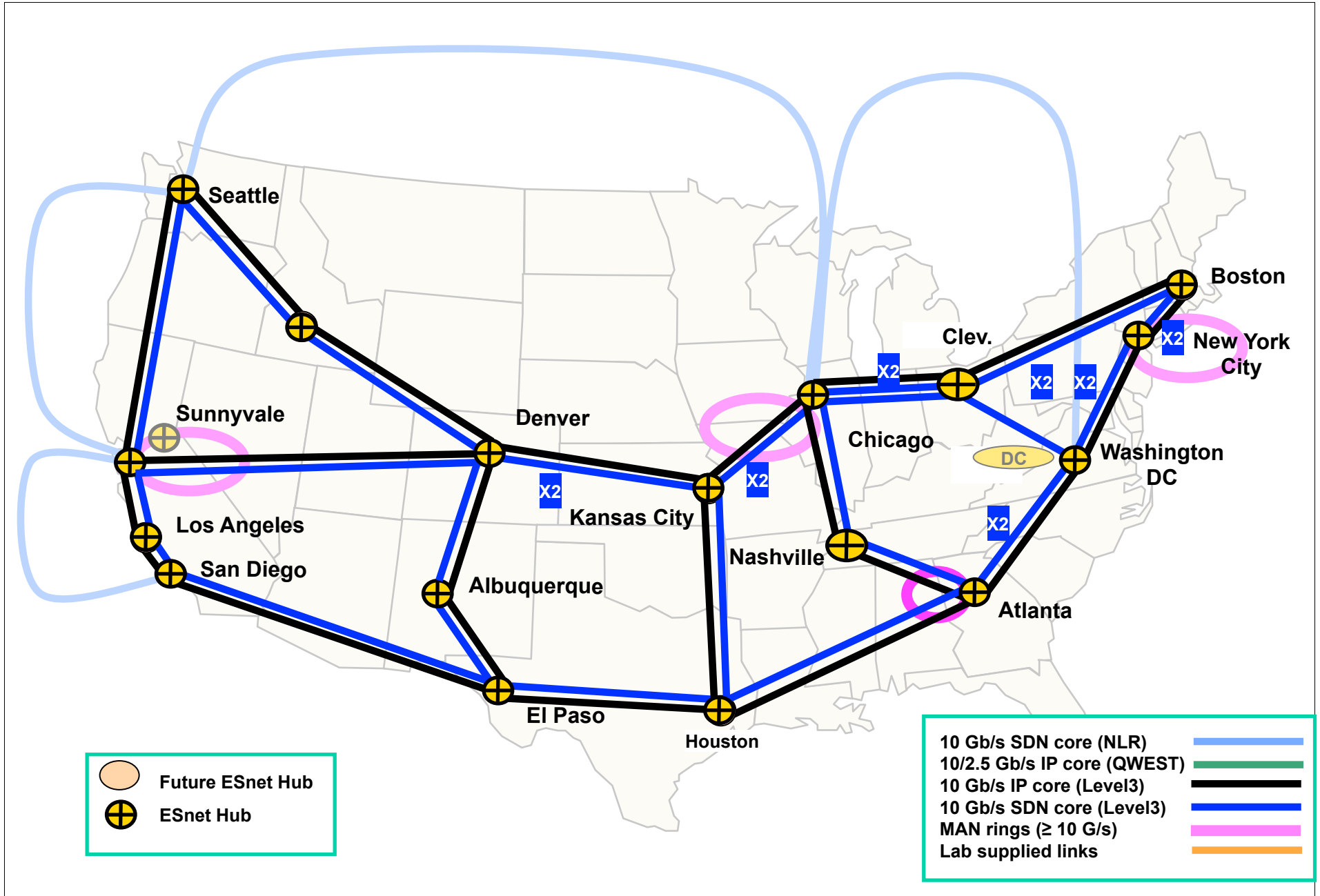
ESnet 4 Backbone August 1, 2007 (Last JT meeting at FNAL)



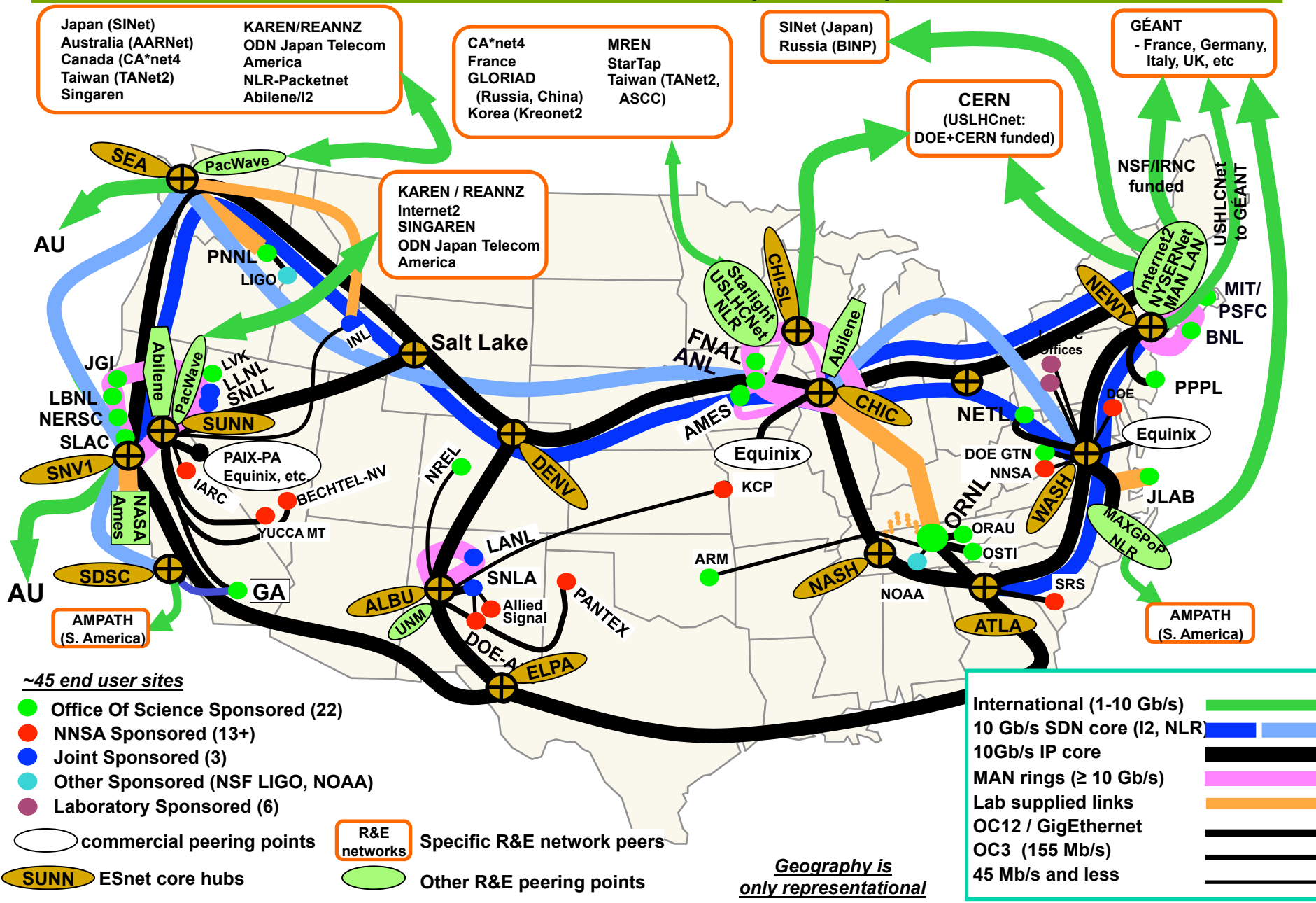
ESnet 4 Backbone December 2007



ESnet 4 Backbone December, 2008

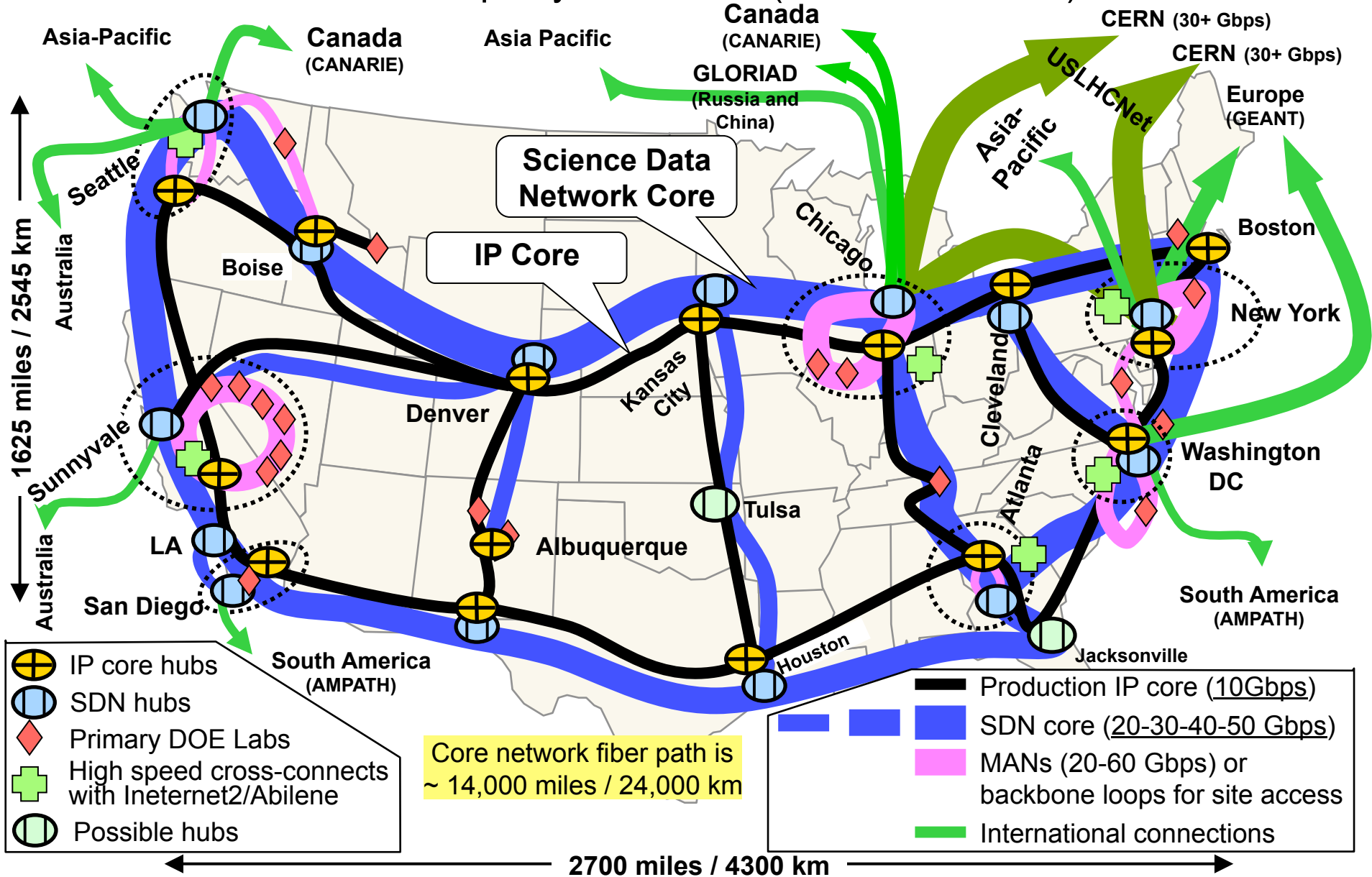


ESnet Provides Global High-Speed Internet Connectivity for DOE Facilities and Collaborators (12/2007)

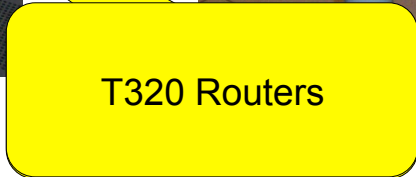
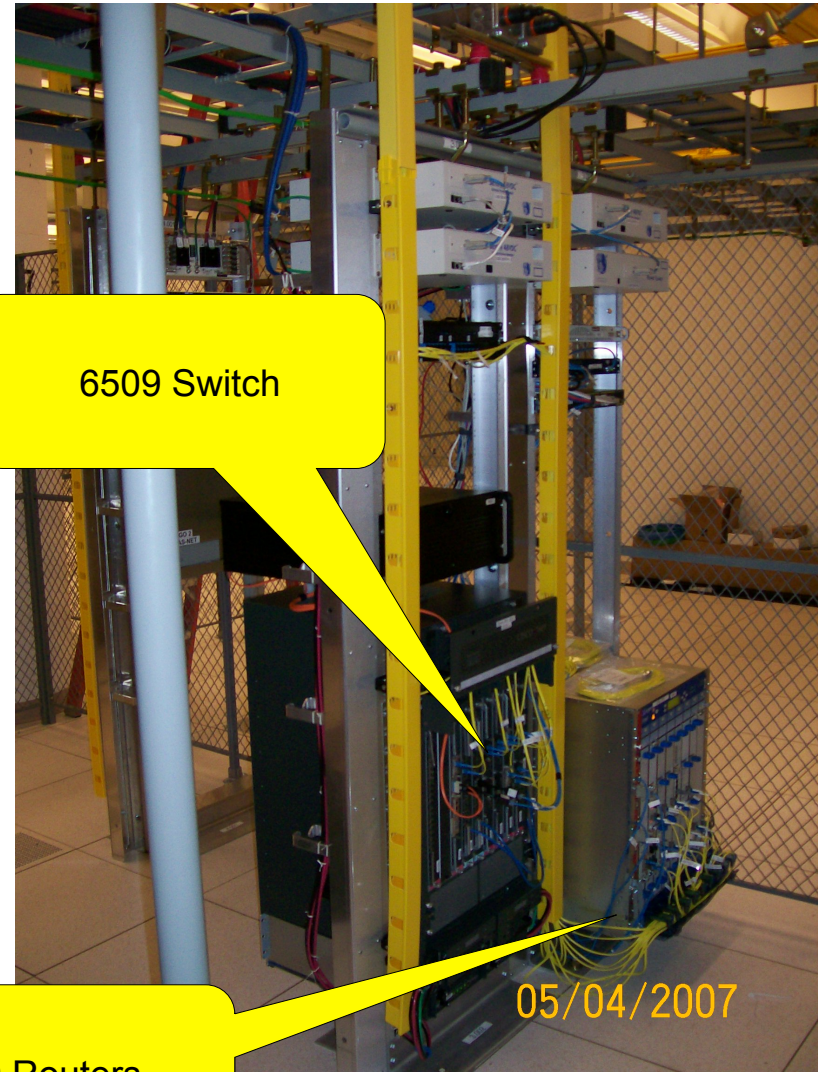
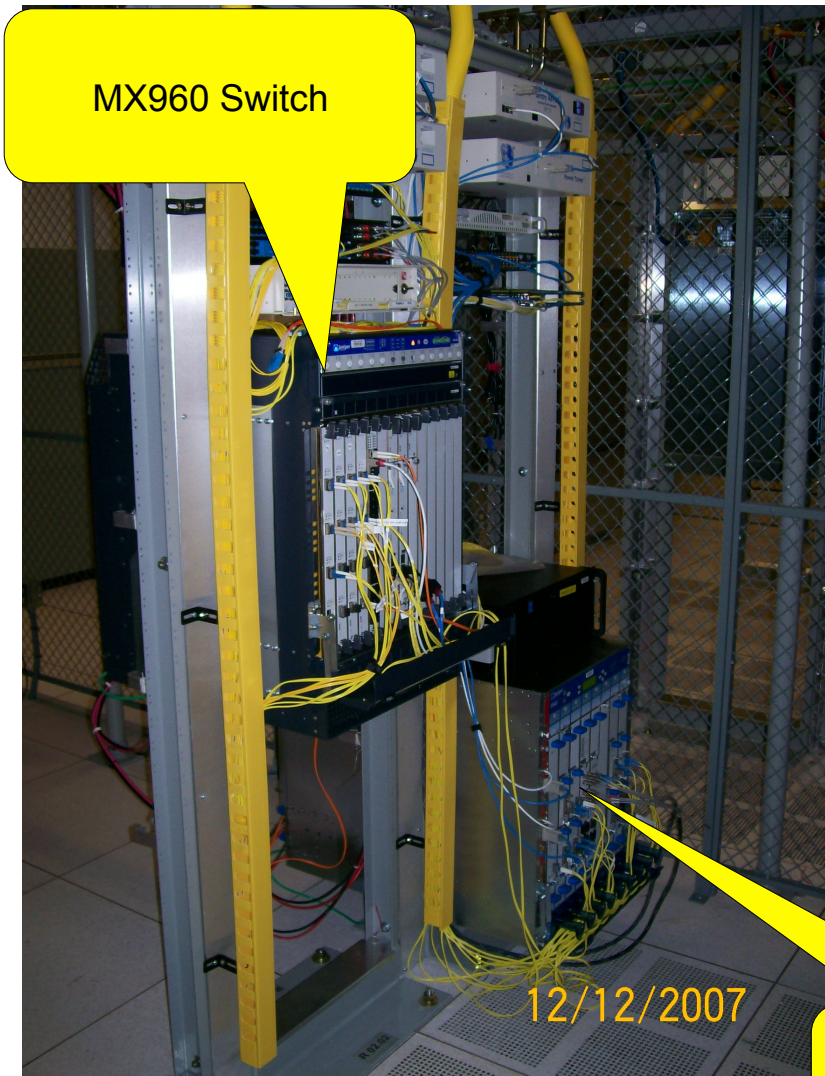


ESnet4

Core networks 50-60 Gbps by 2009-2010 (10Gb/s circuits),
500-600 Gbps by 2011-2012 (100 Gb/s circuits)



A Tail of Two ESnet4 Hubs



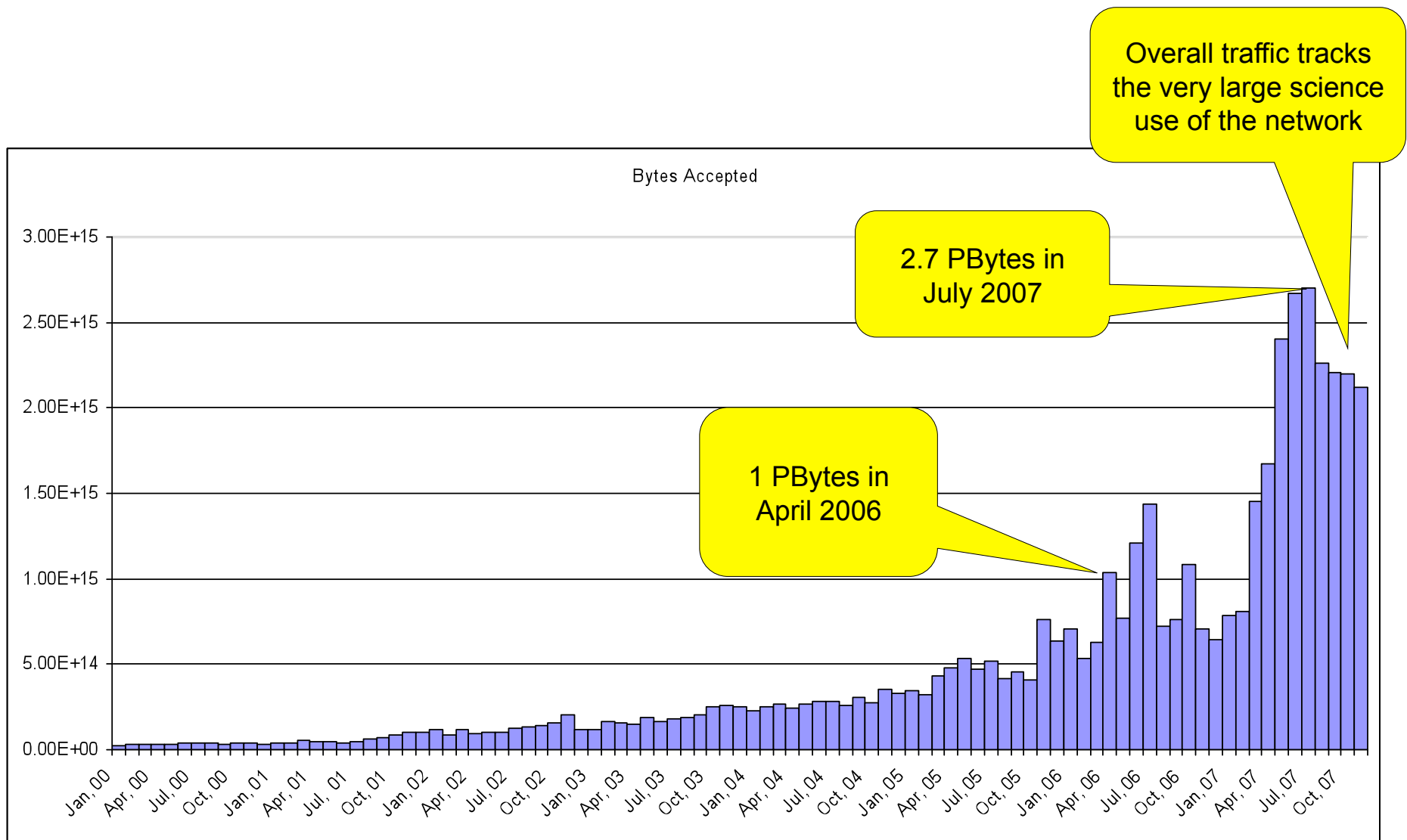
Sunnyvale Ca Hub

Chicago Hub

ESnet's SDN backbone is implemented with Layer2 switches; Cisco 6509s and Juniper MX960s each present their own unique challenges.

- ESnet4 installation to date:
 - 32 new 10Gb/s backbone circuits
 - Over 3 times the number from last JT meeting
 - 20,284 10Gb/s backbone Route Miles
 - More than doubled from last JT meeting
 - 10 new hubs
 - Since last meeting
 - Seattle
 - Sunnyvale
 - Nashville
 - 7 new routers 4 new switches
 - Chicago MAN now connected to Level3 POP
 - 2 x 10GE to ANL
 - 2 x 10GE to FNAL
 - 3 x 10GE to Starlight

ESnet Traffic Continues to Exceed 2 PetaBytes/Month

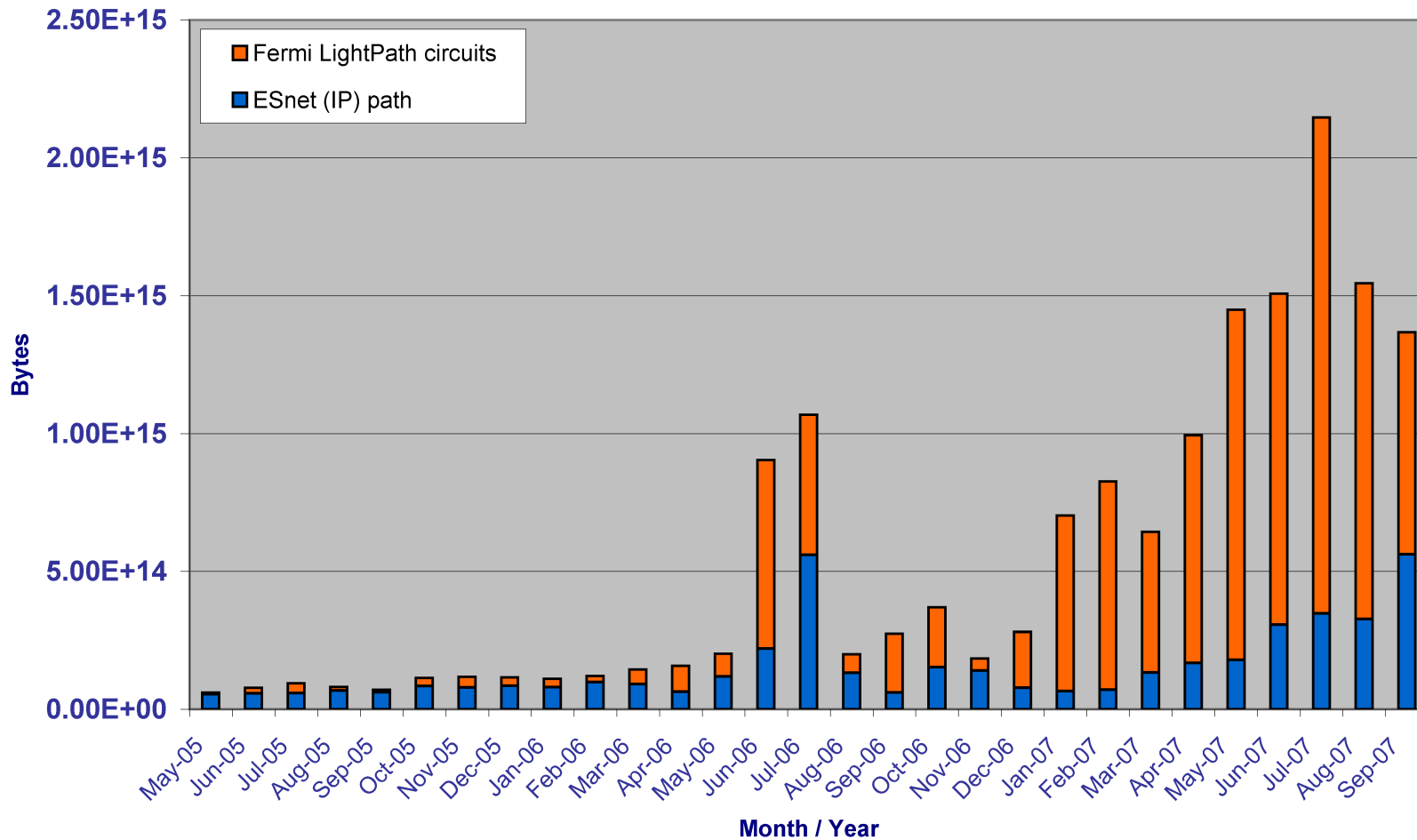


ESnet traffic historically has increased 10x every 47 months

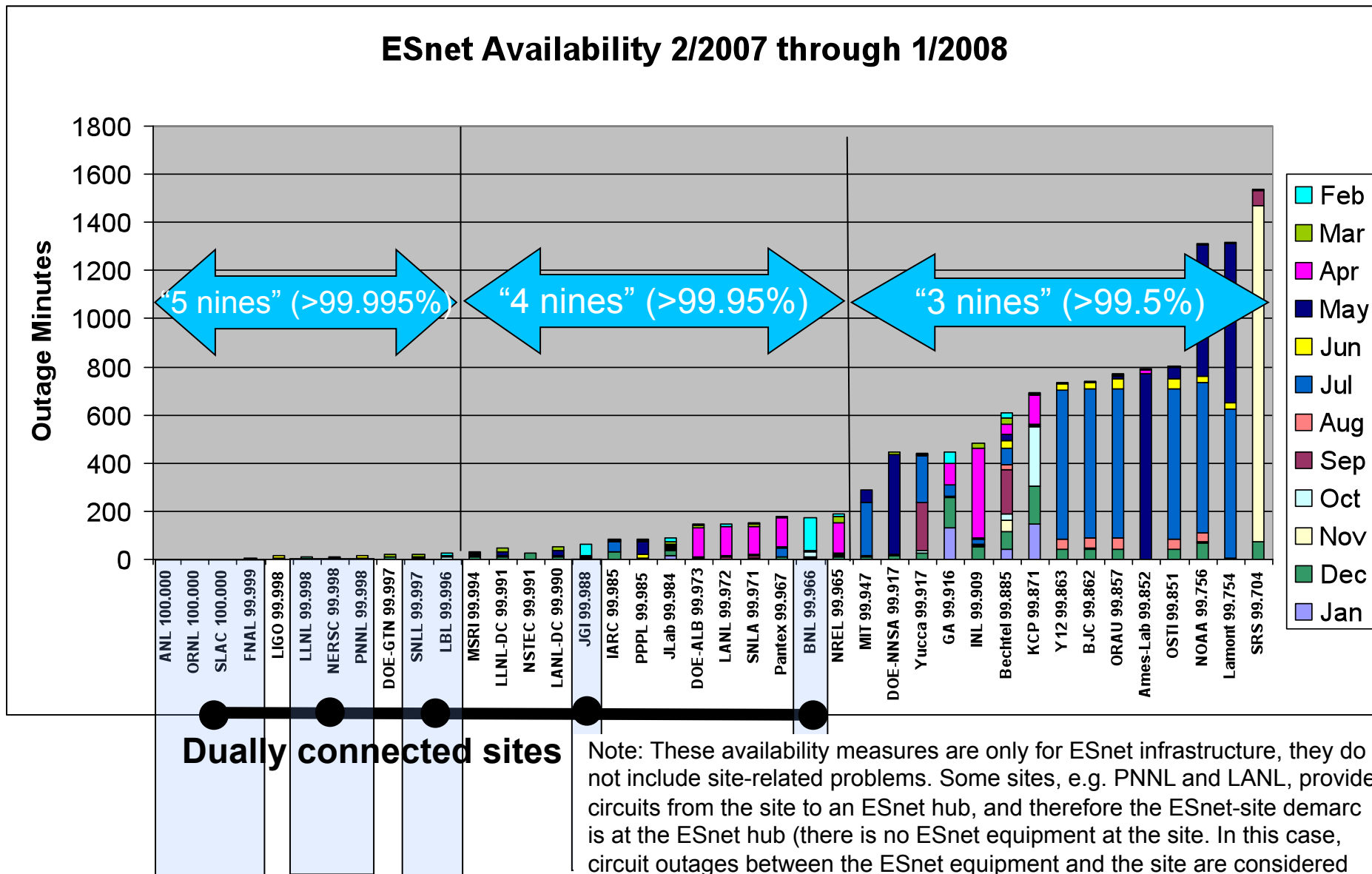
**When A Few Large Data Sources/Sinks Dominate Traffic
it is Not Surprising that Overall Network Usage Follows the
Patterns of the Very Large Users - This Trend Will Reverse in the Next
Few Weeks as the Next Round of LHC Data Challenges Kicks Off**



FNAL Outbound Traffic

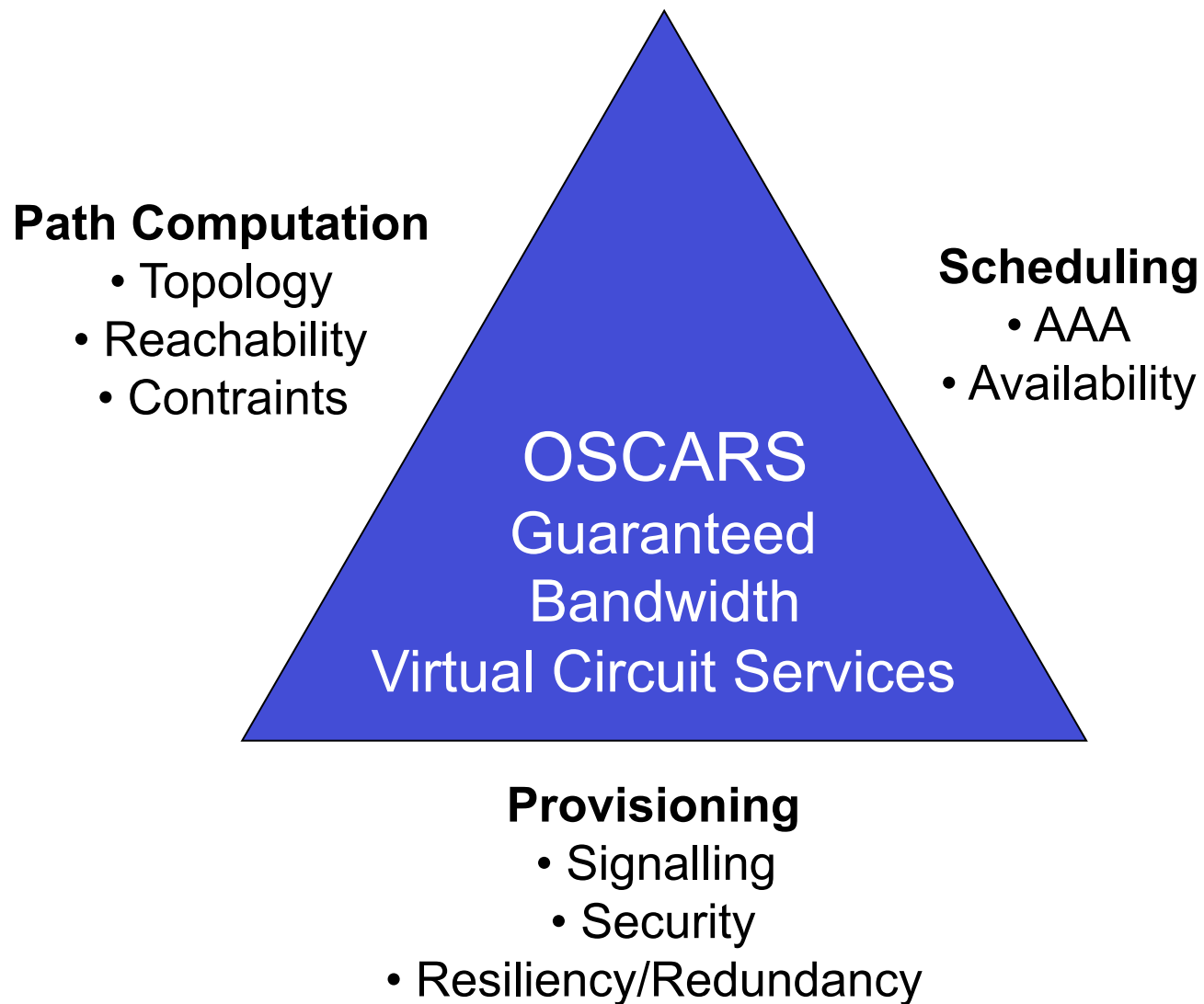


ESnet Continues to be Highly Reliable; Even During the Transition



OSCARS Overview

On-demand Secure Circuits and Advance Reservation System



OSCARS Status Update

- ESnet Centric Deployment
 - Prototype layer 3 (IP) guaranteed bandwidth virtual circuit service deployed in ESnet (1Q05)
 - Prototype layer 2 (Ethernet VLAN) virtual circuit service deployed in ESnet (3Q07)
- Inter-Domain Collaborative Efforts
 - Terapaths (BNL)
 - Inter-domain interoperability for layer 3 virtual circuits demonstrated (3Q06)
 - Inter-domain interoperability for layer 2 virtual circuits demonstrated at SC07 (4Q07)
 - LambdaStation (FNAL)
 - Inter-domain interoperability for layer 2 virtual circuits demonstrated at SC07 (4Q07)
 - HOPI/DRAGON
 - Inter-domain exchange of control messages demonstrated (1Q07)
 - Integration of OSCARS and DRAGON has been successful (1Q07)
 - DICE
 - First draft of topology exchange schema has been formalized (in collaboration with NMWG) (2Q07), interoperability test demonstrated 3Q07
 - Initial implementation of reservation and signaling messages demonstrated at SC07 (4Q07)
 - UVA
 - Integration of Token based authorization in OSCARS under testing
 - Nortel
 - Topology exchange demonstrated successfully 3Q07
 - Inter-domain interoperability for layer 2 virtual circuits demonstrated at SC07 (4Q07)

- ESnet
 - About 1/3 of the 10GE bandwidth test platforms & 1/2 of the latency test platforms for ESnet 4 have been deployed.
 - 10GE test systems are being used extensively for acceptance testing and debugging
 - Structured & ad-hoc external testing capabilities have not been enabled yet.
 - Clocking issues at a couple POPS are not resolved.
 - Work is progressing on revamping the ESnet statistics collection, management & publication systems
 - ESxSNMP & TSDB & PerfSONAR Measurement Archive (MA)
 - PerfSONAR TS & OSCARS Topology DB
 - NetInfo being restructured to be PerfSONAR based
- LHC and PerfSONAR
 - PerfSONAR based network measurement solutions for the Tier 1/Tier 2 community are nearing completion.
 - A proposal from DANTE to deploy a perfSONAR based network measurement **service** across the LHCOPN at all Tier1 sites is being evaluated by the Tier 1 centers

End