

# ESnet Update

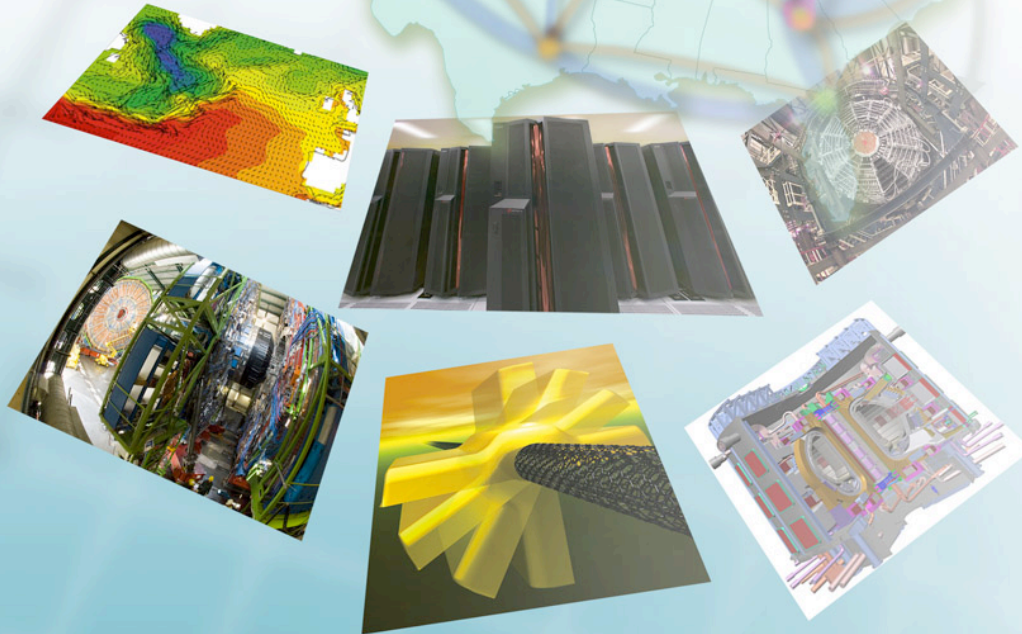
## Summer 2008

### Joint Techs Workshop

*Joe Burrescia*  
*ESnet General Manager*

Energy Sciences Network  
Lawrence Berkeley National Laboratory

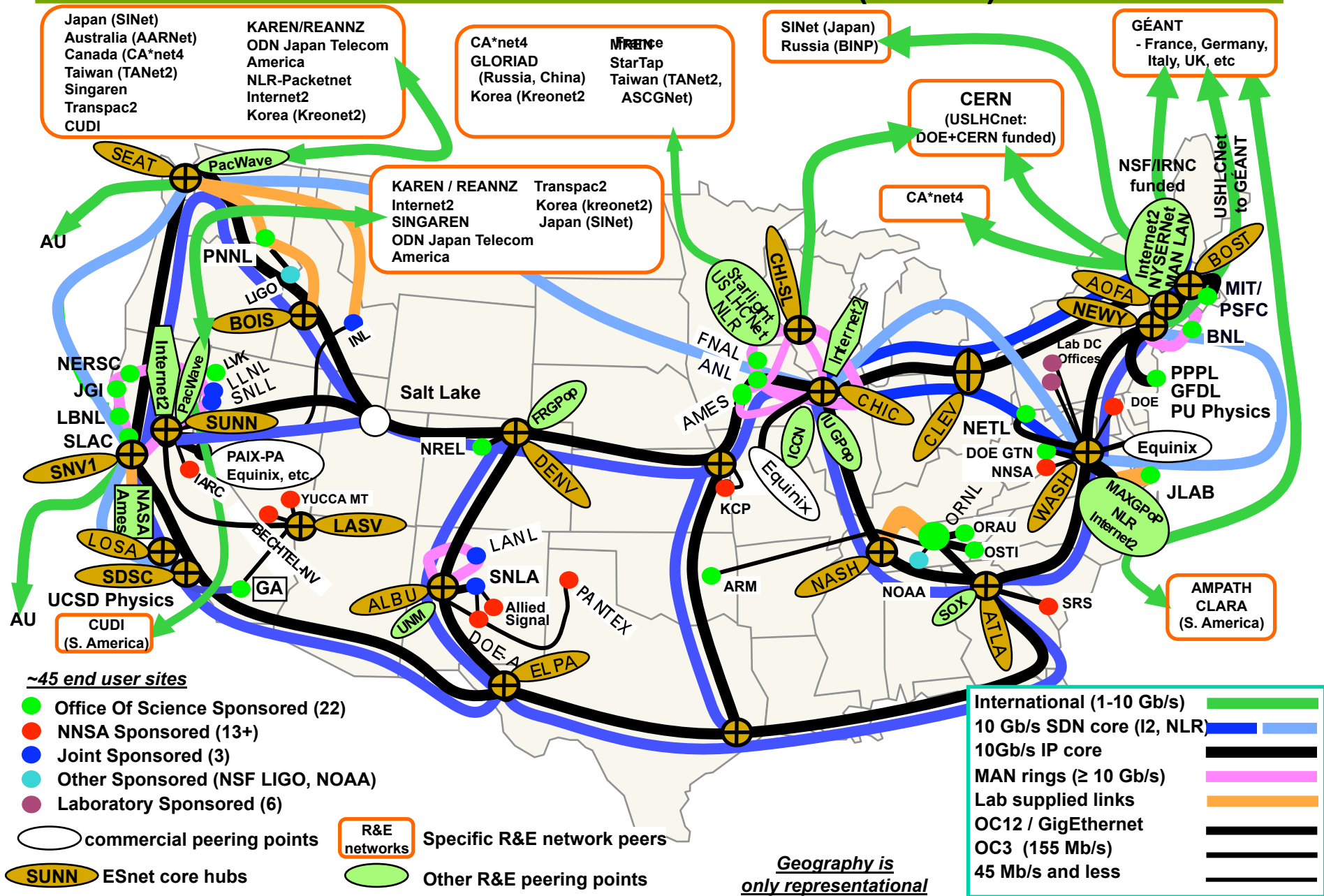
July 22, 2008



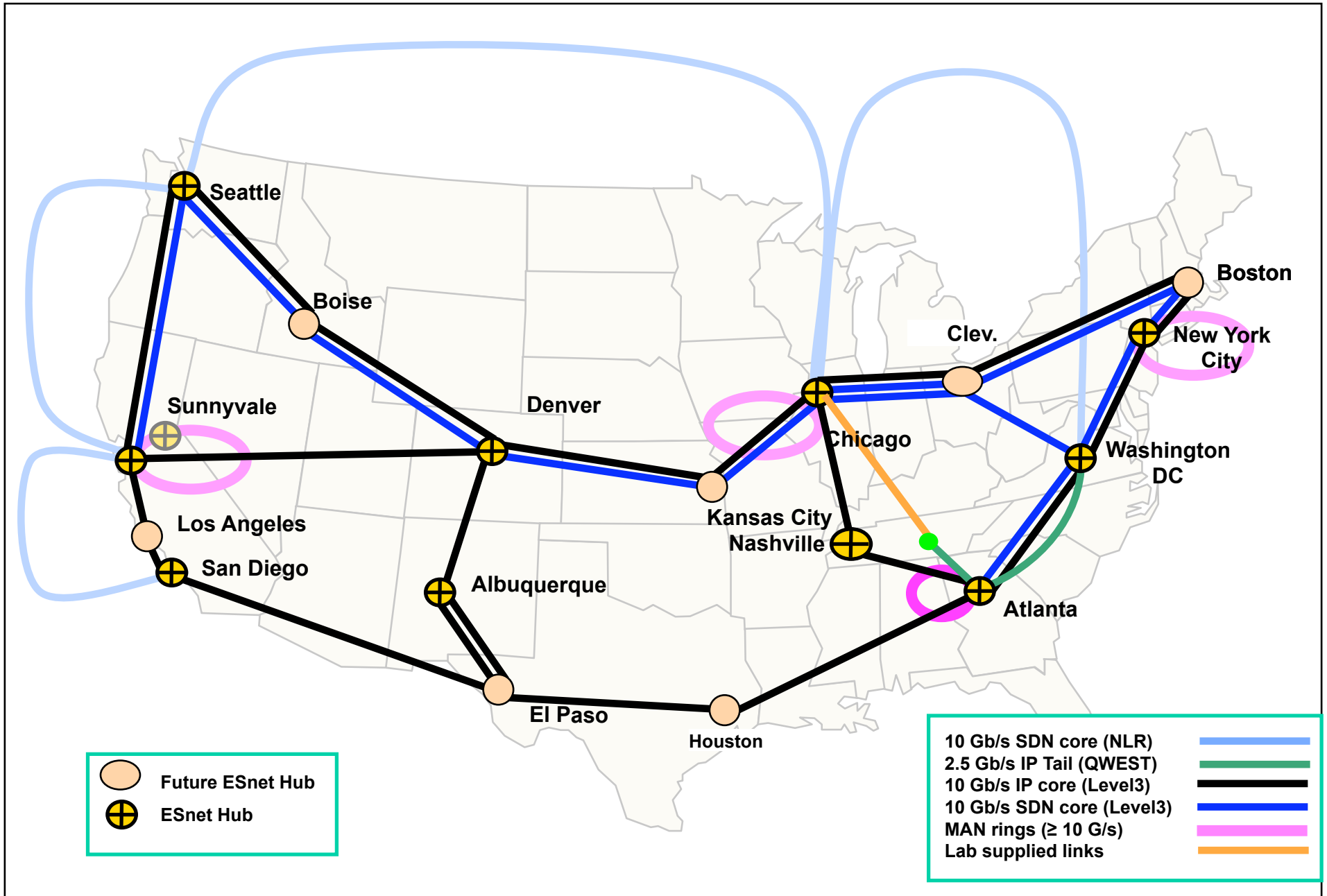
*Networking for the Future of Science*



# ESnet Provides Global High-Speed Internet Connectivity for DOE Facilities and Collaborators (1/2008)



# ESnet 4 Backbone January 2008

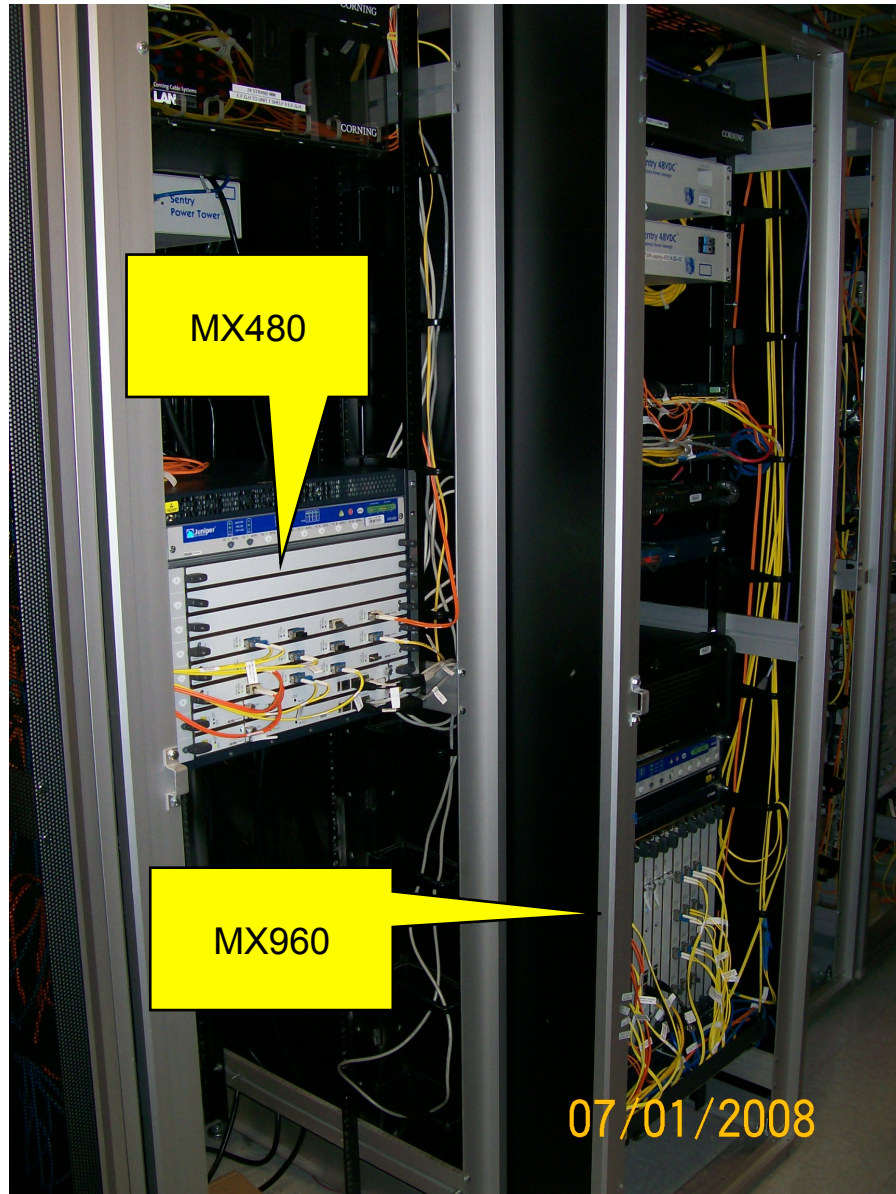


# ESnet SDN Network July 2008

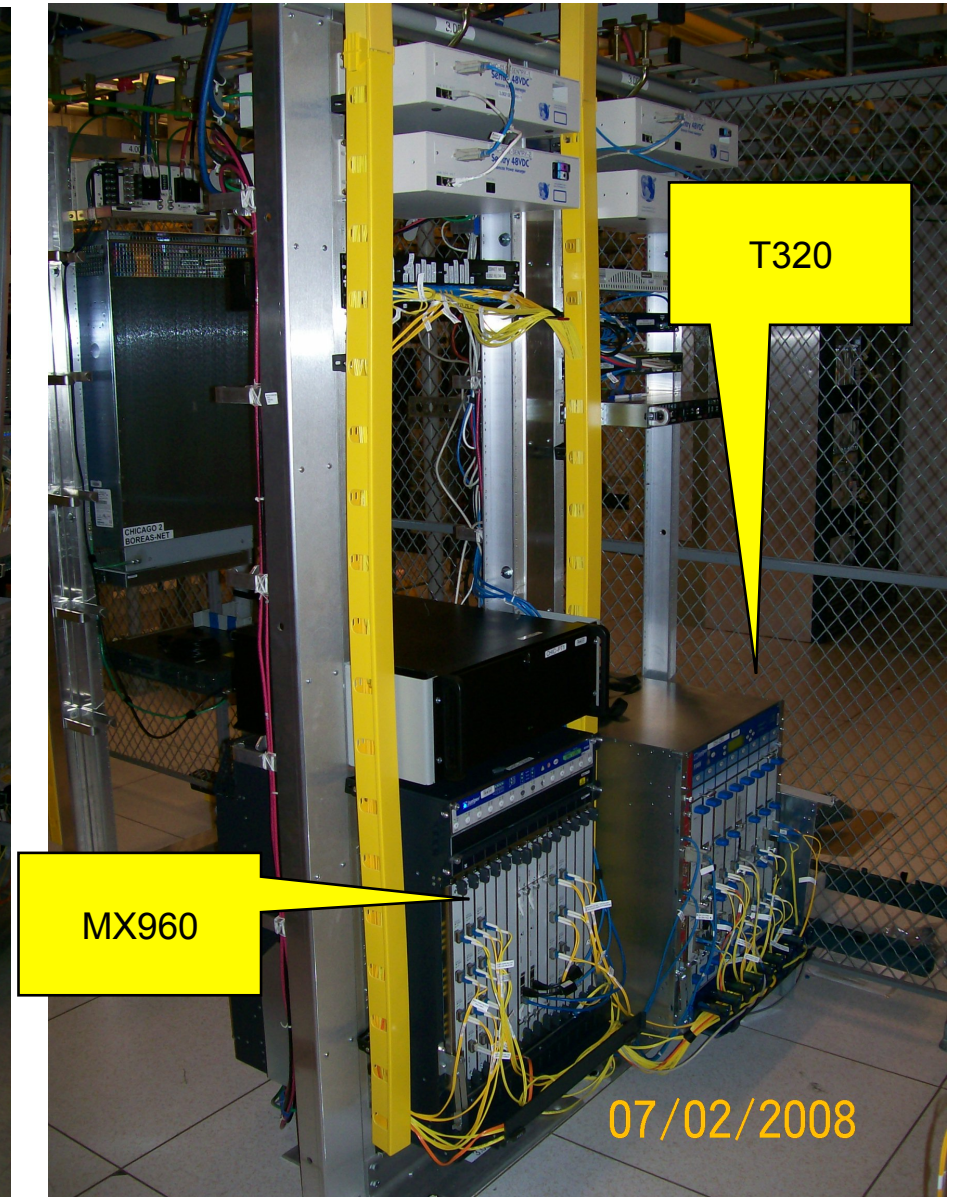


# ESnet4 SDN Chicago Hubs, Complete!

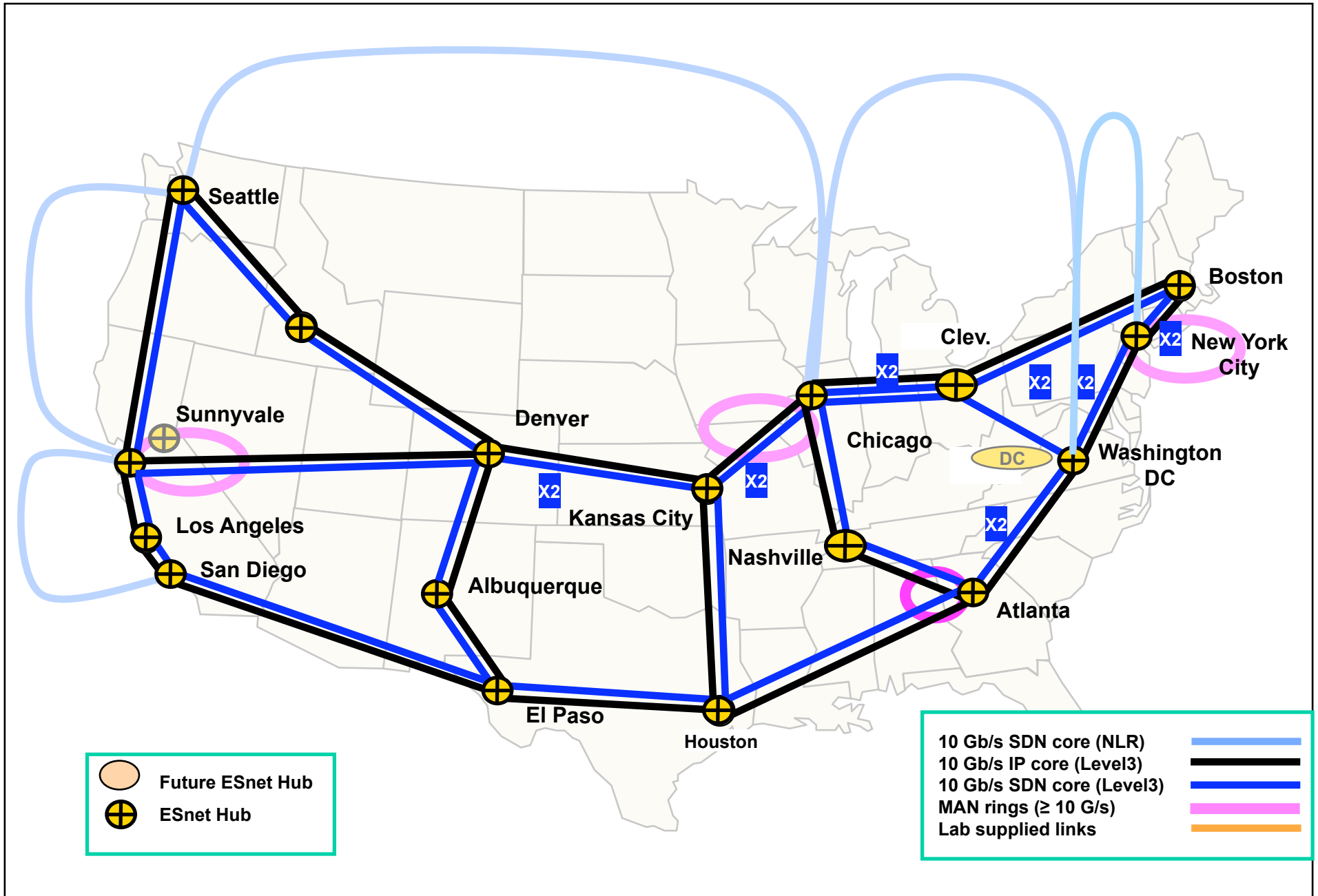
## Starlight



## 600 West Chicago aka "MondoCondo"

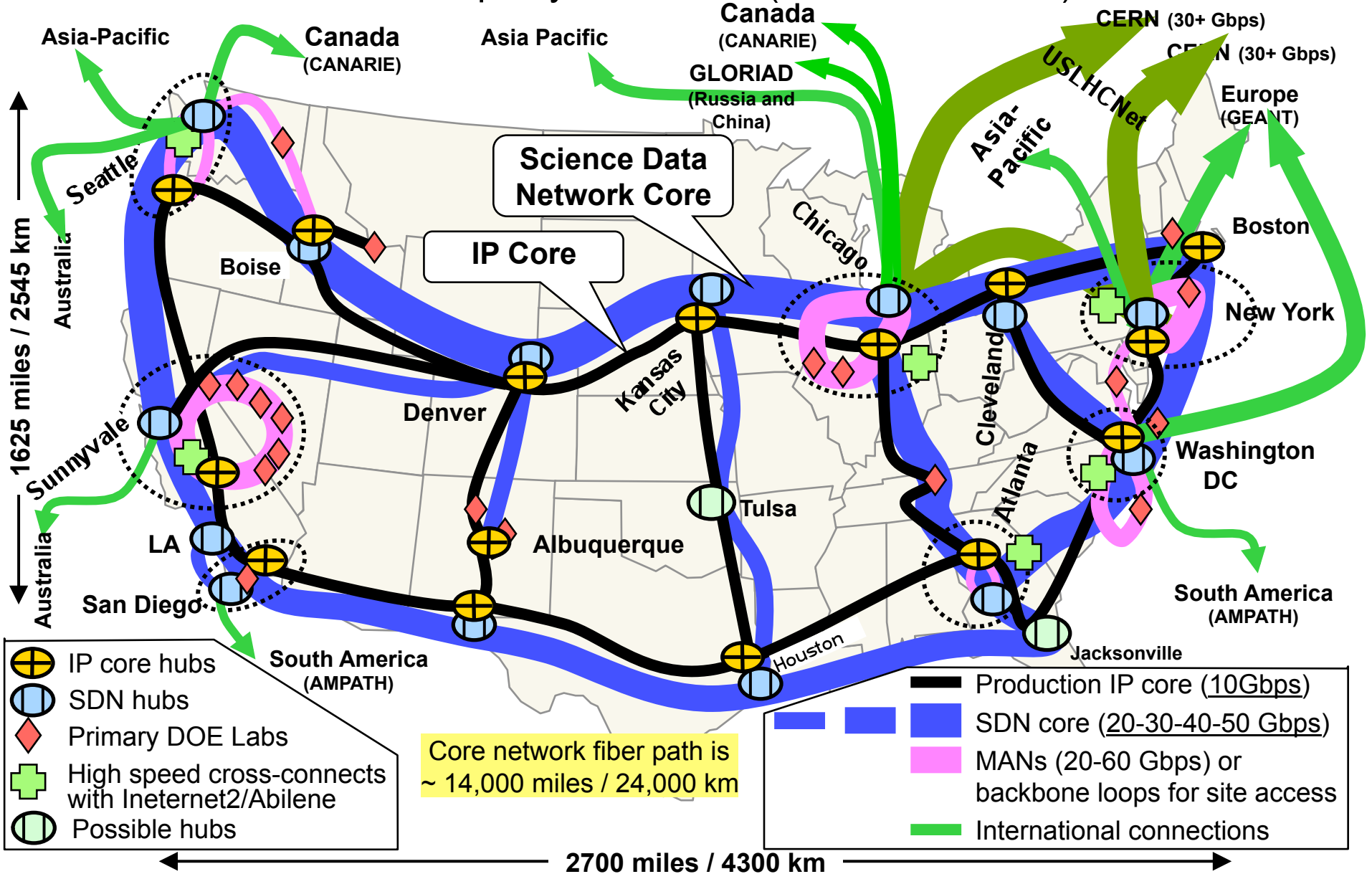


# ESnet 4 Backbone December, 2008



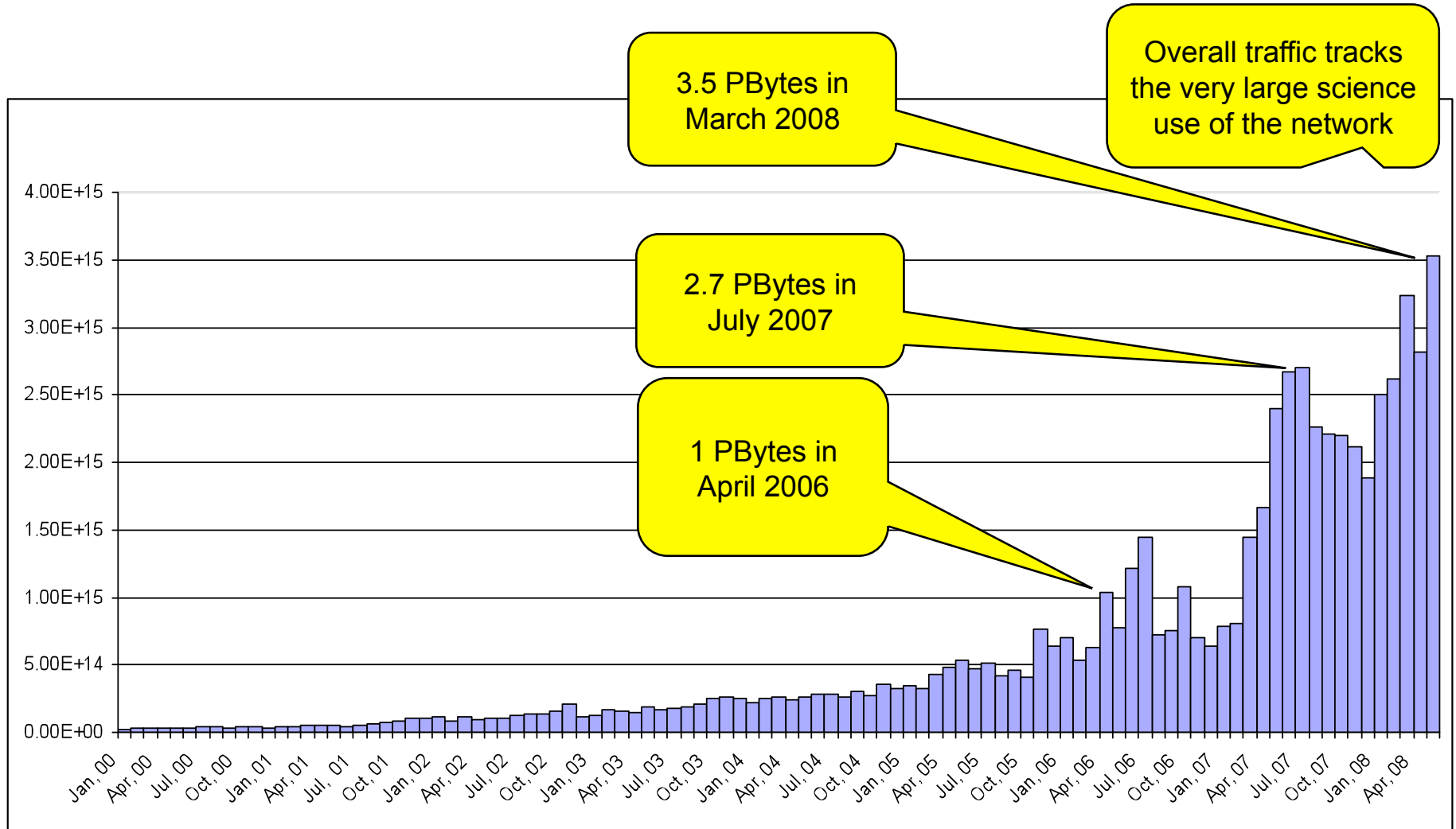
# ESnet4

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



- ESnet4 SDN installation to date:
  - 10 10Gb/s backbone segments in production
  - 32 new MX series switches received
    - 4 installed so far...
    - ATLA, NASH, DENV & PNWG shipped this week
  - Enhanced hubs
    - Sunn
      - 17 total connections moved including 12 10G connections
      - 6509 Removed
      - MX960 added
    - Starlight
      - 32 total connections moved including 23 10G connections
      - T320 & 6509 removed
      - MX960&480 added
    - CHIC (600 W Chicago)
      - 13 total connections moved including 12 10G connections
      - 7609 removed
      - MX960 added

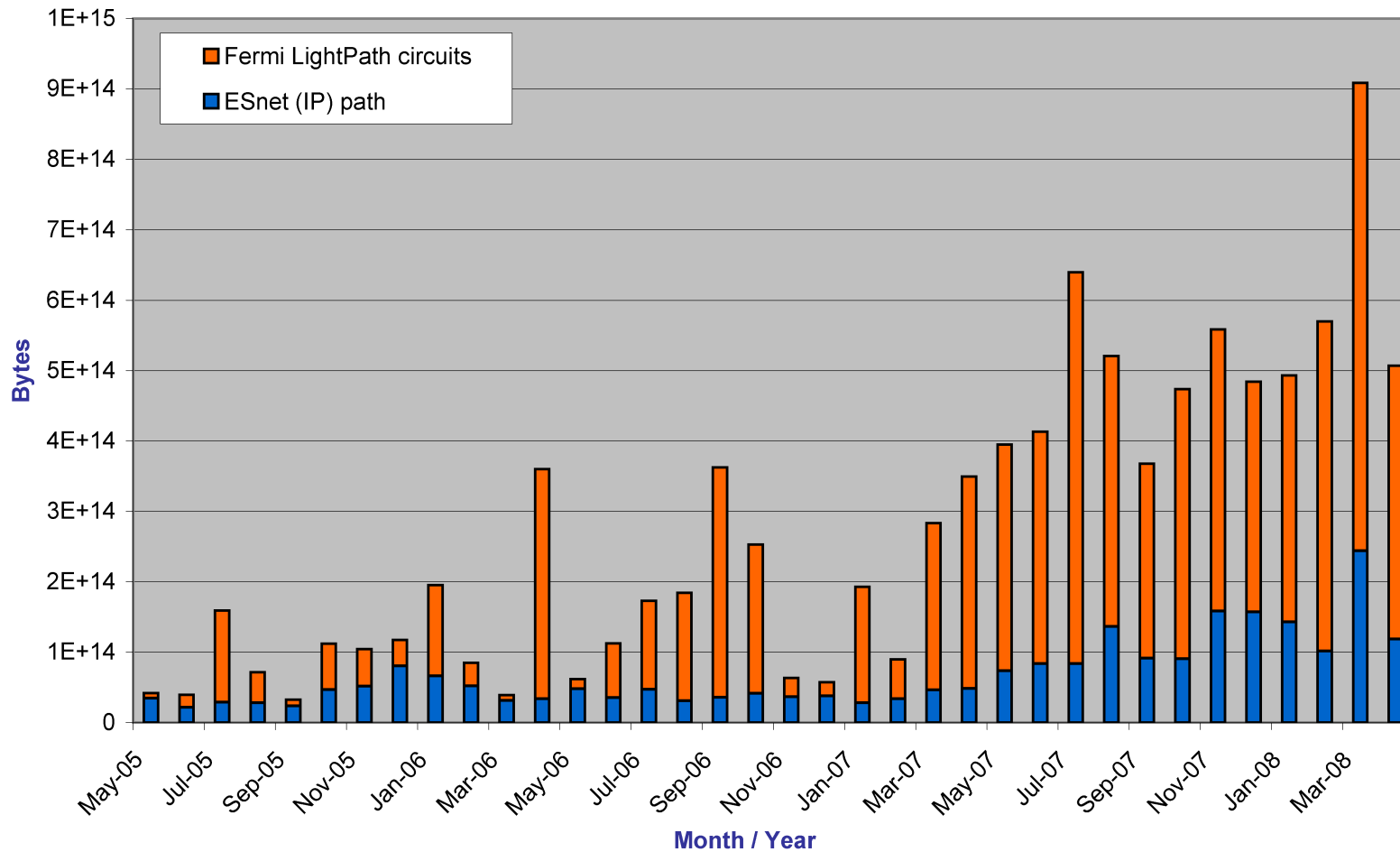
# ESnet Traffic Continues to Exceed 2.5 PetaBytes/Month



ESnet traffic historically has increased 10x every 47 months

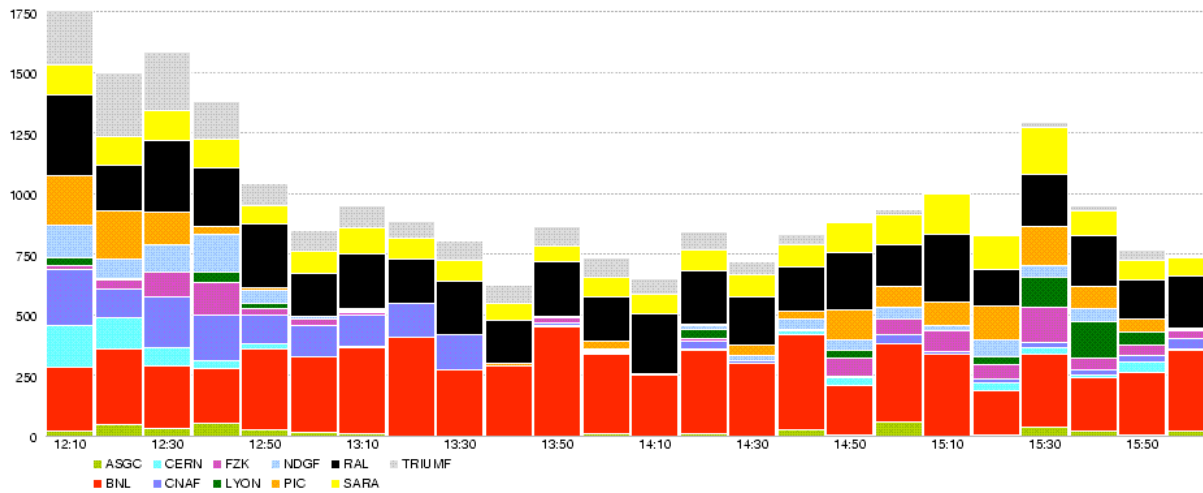


# FNAL Inbound Traffic

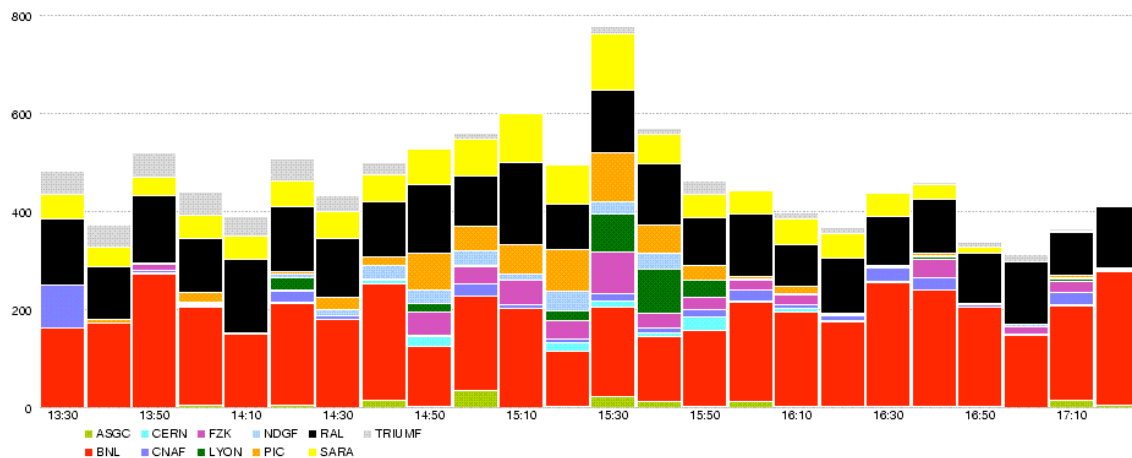


Slide Courtesy of Phil DeMar

# ATLAS Tier 0 Data Export Dashboard (July/21/2008)



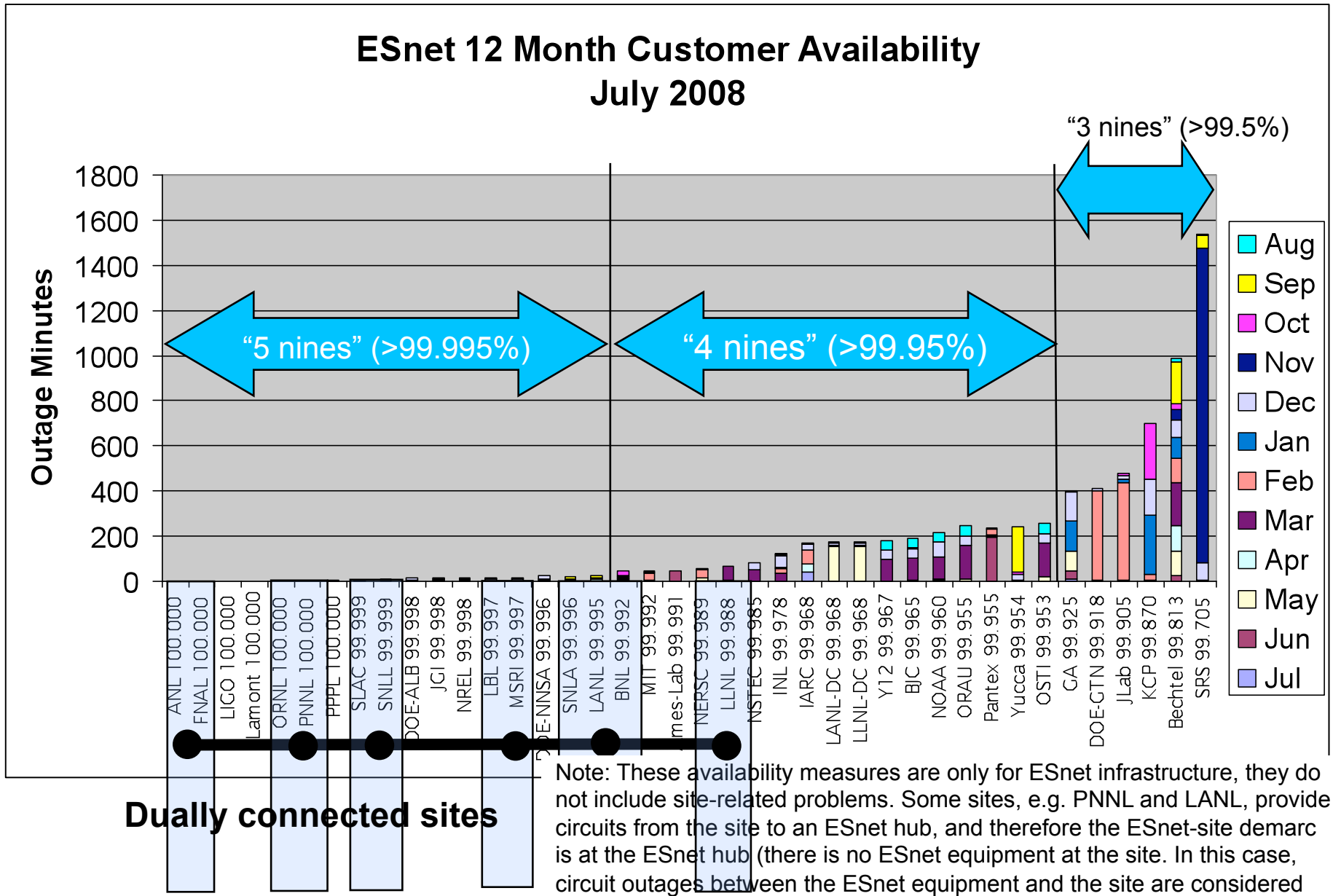
\*Actual ATLAS production data transfer: BNL throughput 200-500MByte. It is the fastest Tier 1 site.



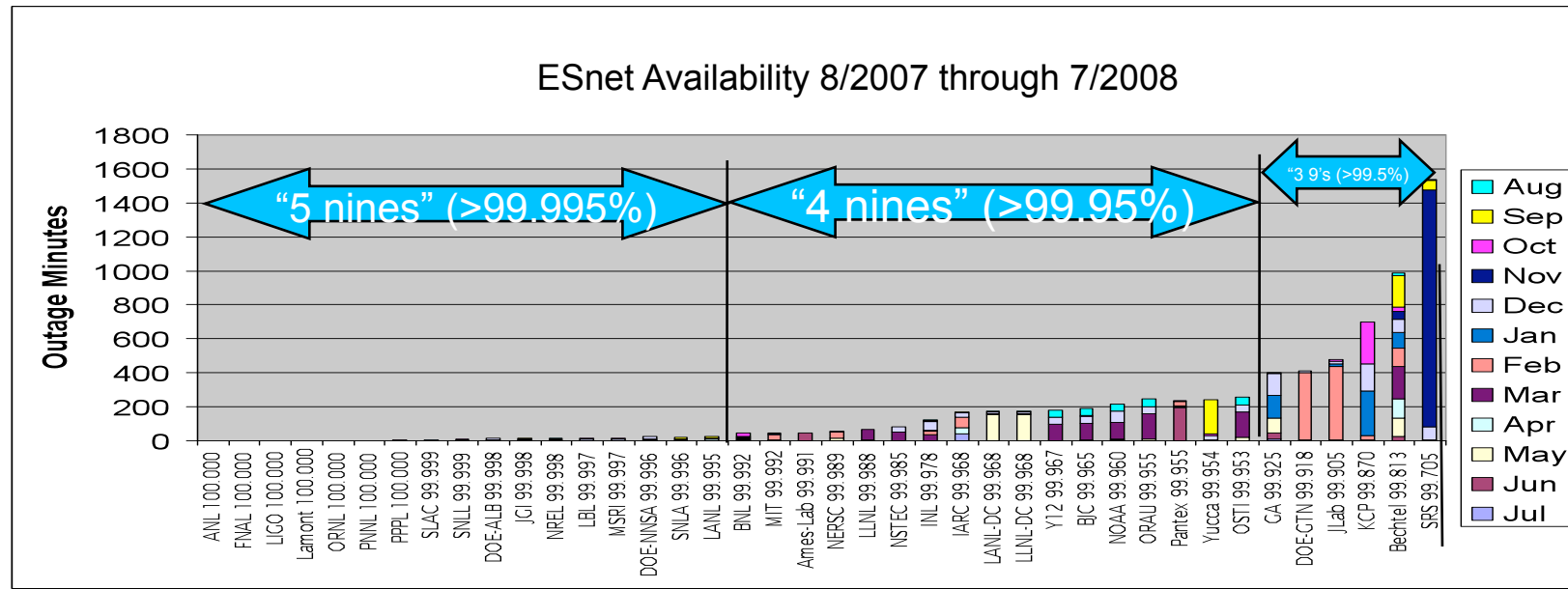
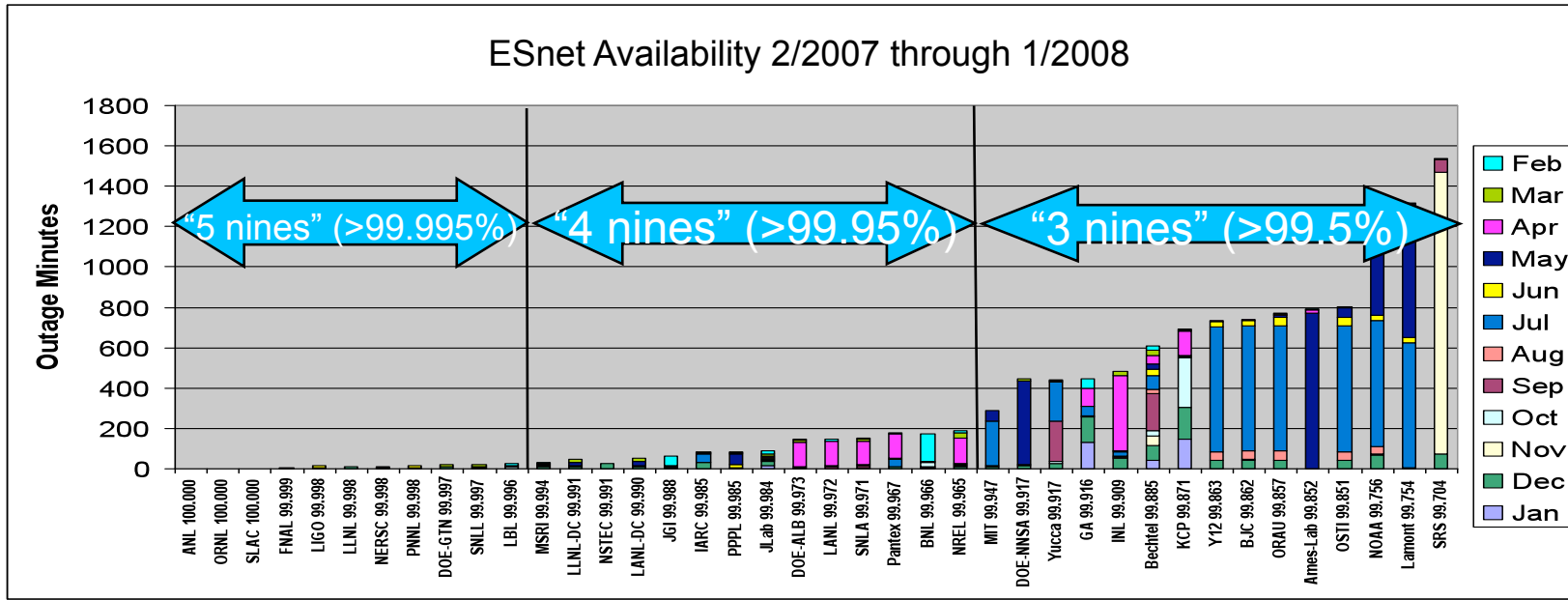
\*Actual ATLAS production data transfer: BNL received 200-300MByte every 10 minutes. BNL has much more stable data transfer rate than any other ATLAS Tier 1 site.

Slide Courtesy of Dantong Yu

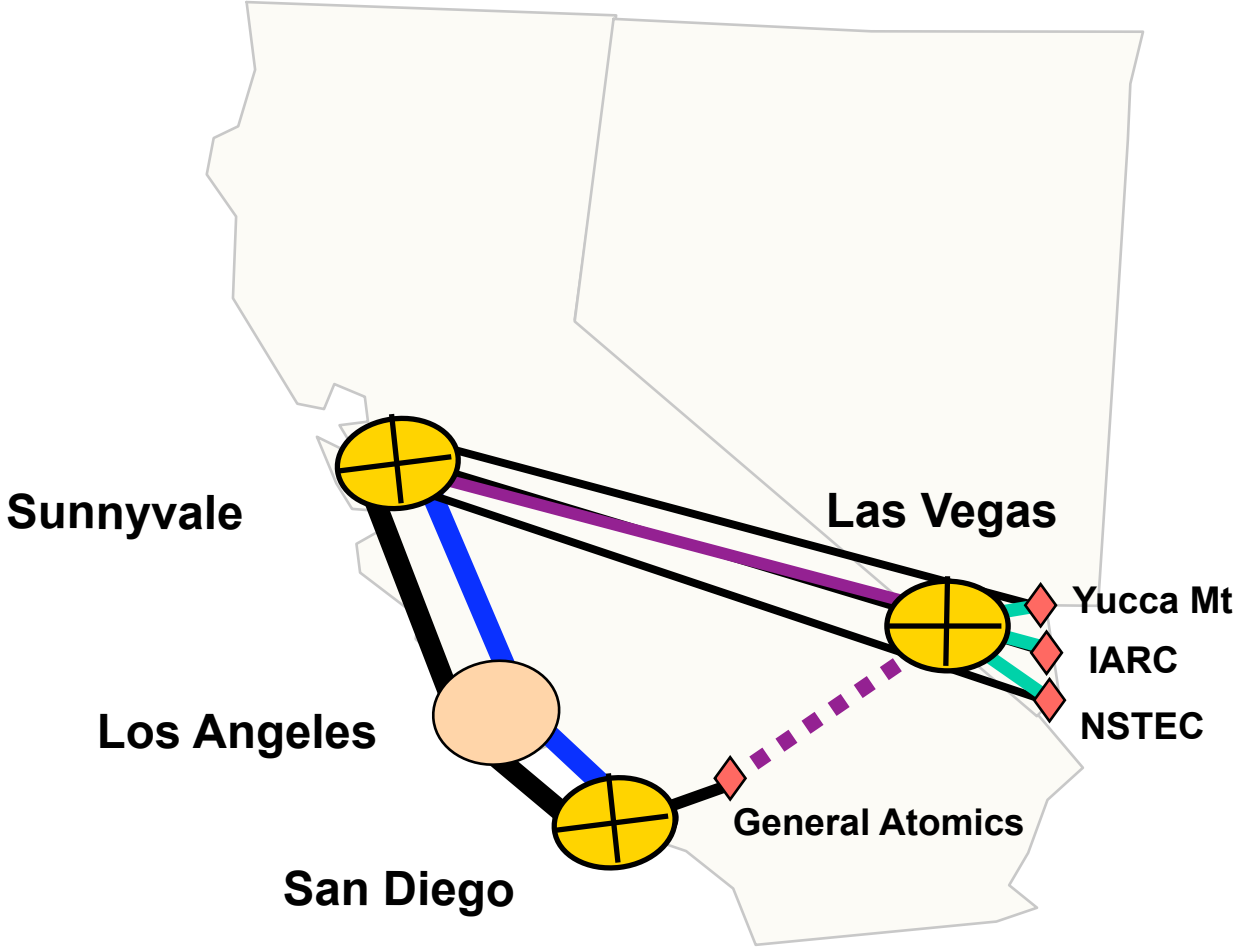
# ESnet's Availability Continues to Increase










# ESnet's Availability Continues to Increase



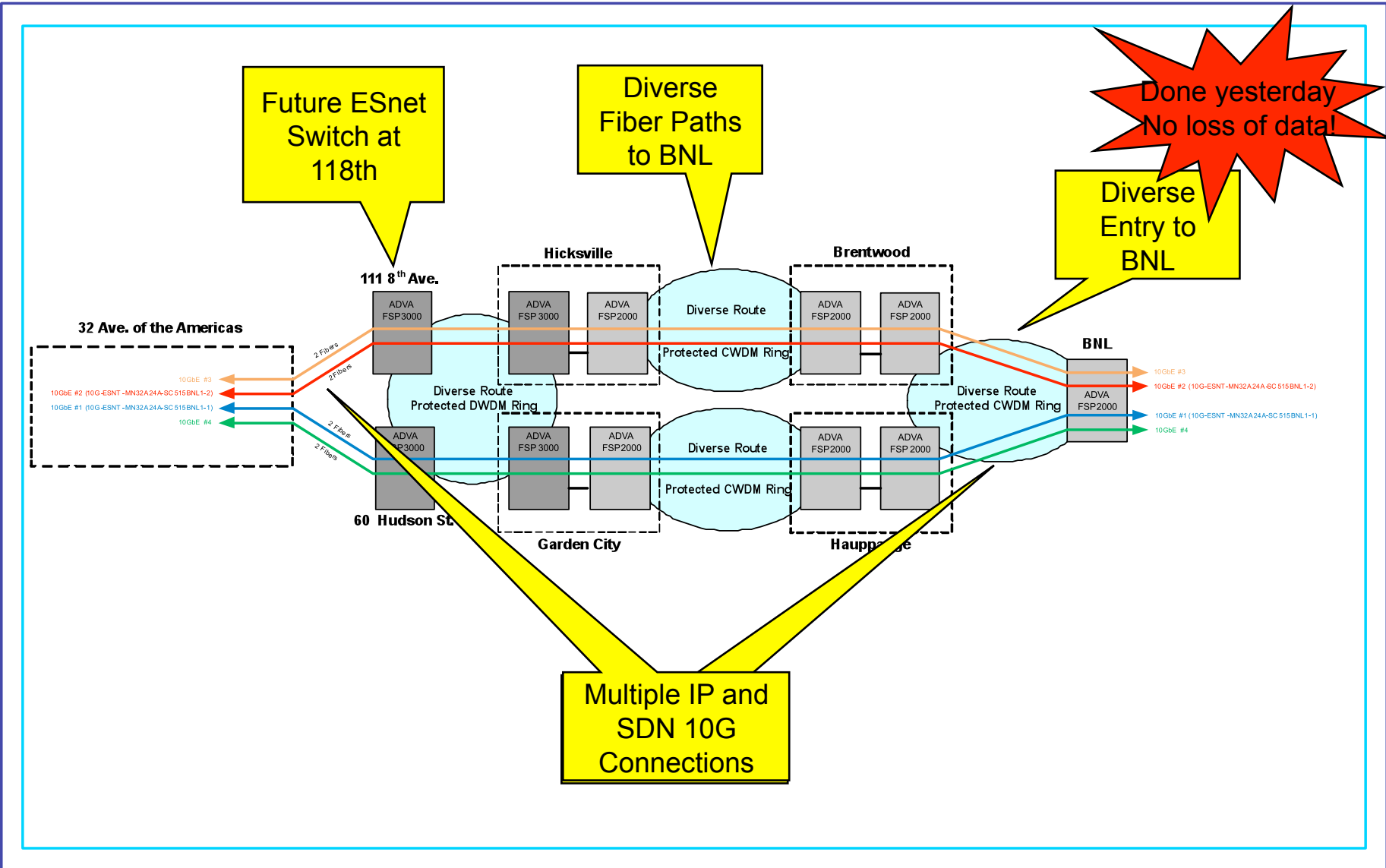
# New Las Vegas Hub



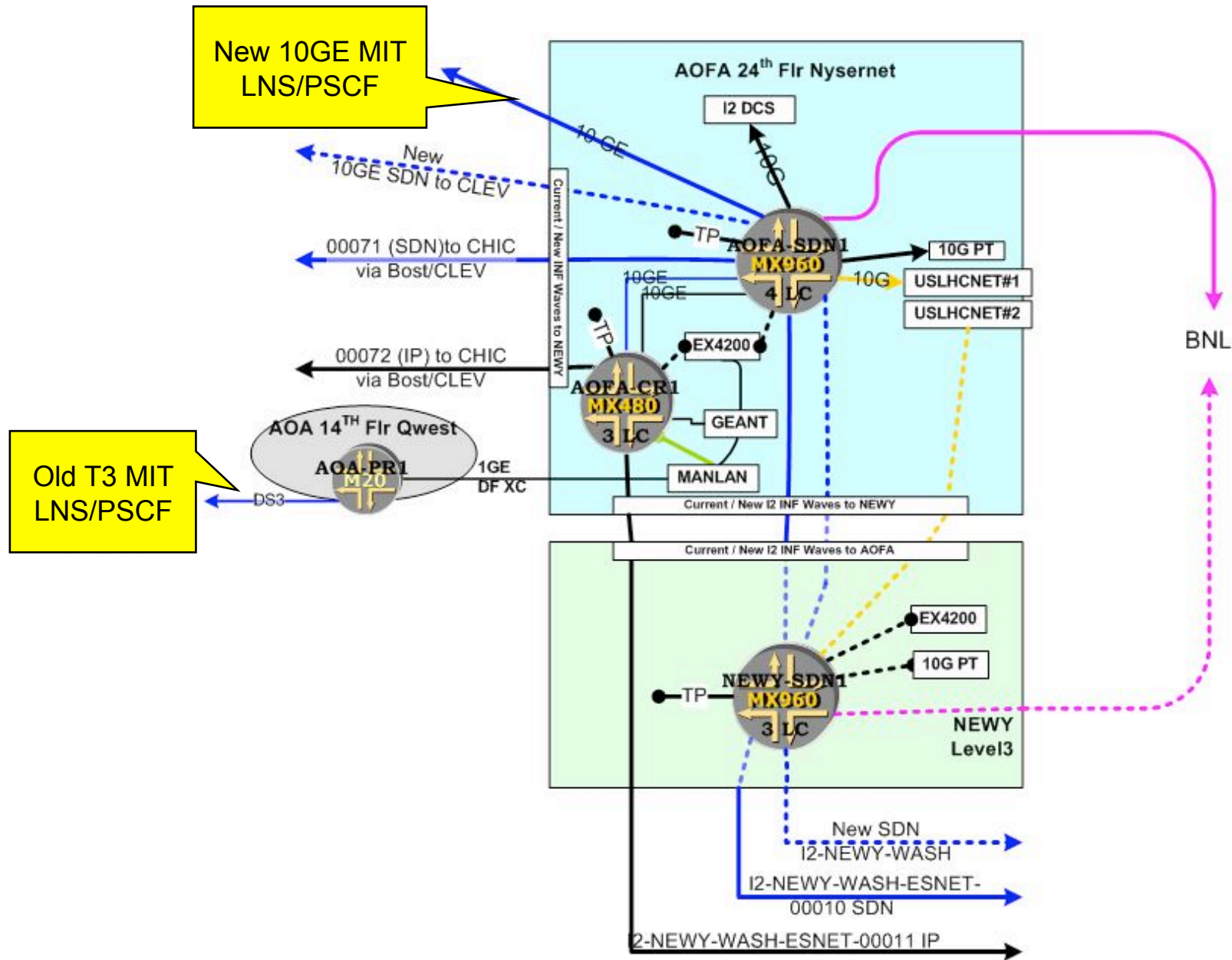
	Future ESnet Hub
	ESnet Hub

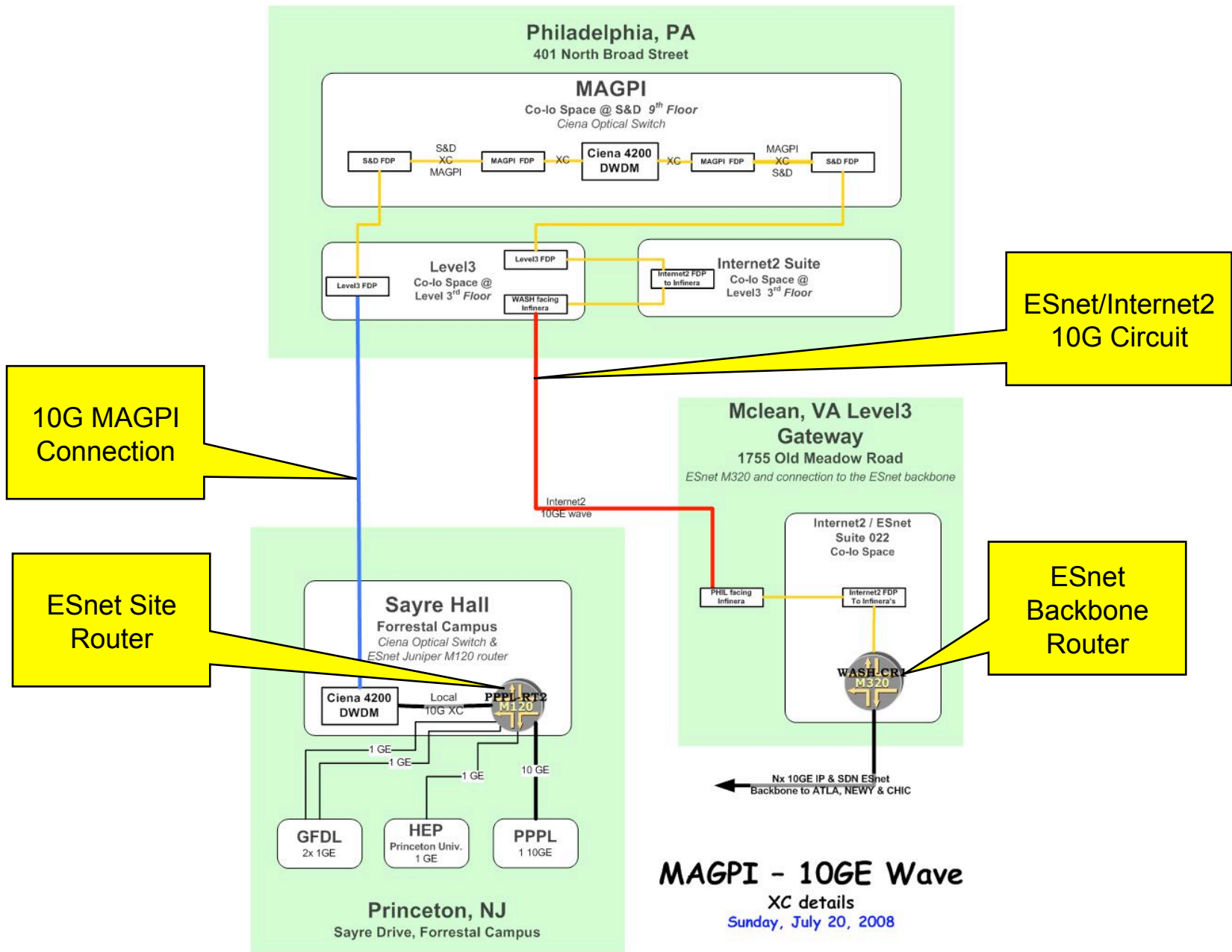
10 Gb/s IP core (Level3)	
10 Gb/s SDN core (Level3)	
GE	
OC 12	
OC 12/GE (Future)	
DS3	

# BNL Access Diverse Topology (In Progress)



# New 10G MIT LNS & PSFC Connection



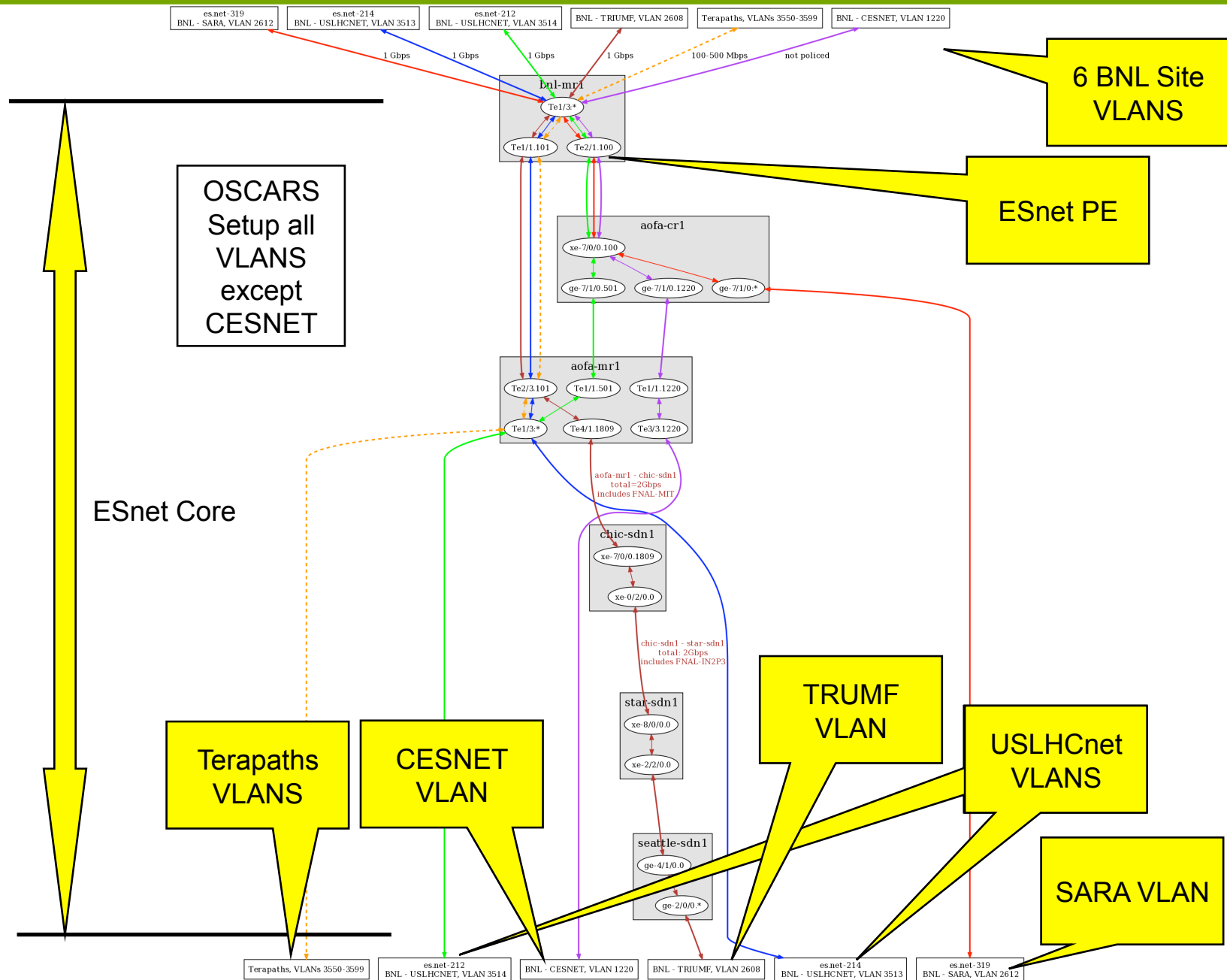


# OSCARS Status Update

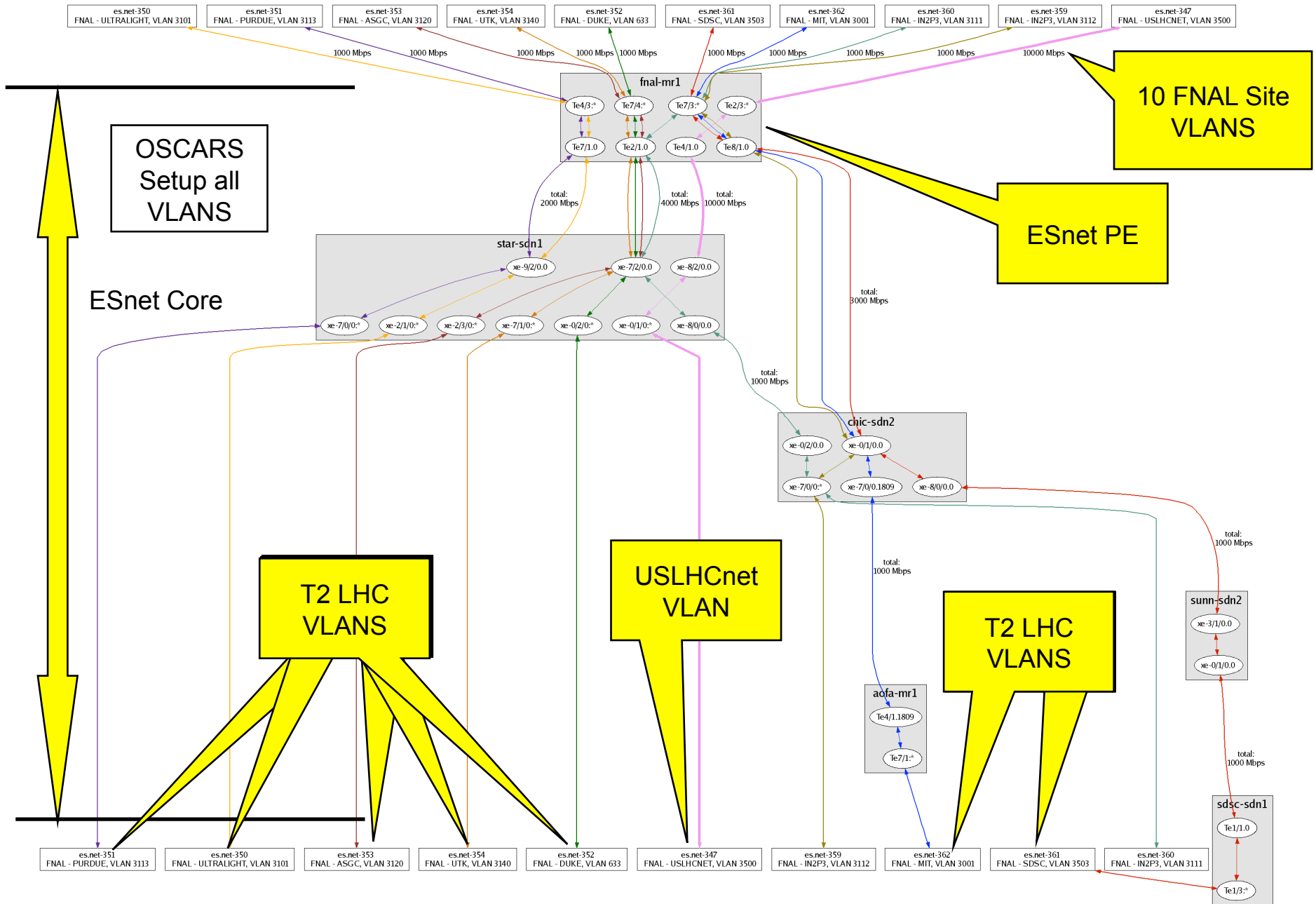
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- ESnet Centric Deployment
  - Prototype layer 3 (IP) guaranteed bandwidth virtual circuit service deployed in ESnet (1Q05)
  - Prototype layer 2 (Ethernet VLAN) virtual circuit service deployed in ESnet (3Q07)
  - Support soft reservations (2Q08)
  - Automatic graph generation of VCs (2Q08)
  - Support site administrator role (2Q08)
- Inter-Domain Collaborative Efforts
  - Terapaths
    - Inter-domain interoperability for layer 3 virtual circuits demonstrated (3Q06)
    - Inter-domain interoperability for layer 2 virtual circuits demonstrated at SC07 (4Q07)
  - LambdaStation
    - Inter-domain interoperability for layer 2 virtual circuits demonstrated at SC07 (4Q07)
  - I2 DCN/DRAGON
    - Inter-domain exchange of control messages demonstrated (1Q07)
    - Integration of OSCARS and DRAGON has been successful (1Q07)
  - GEANT2 AutoBAHN
    - Inter-domain reservation demonstrated at SC07 (4Q07)
  - 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)
  - Nortel
    - Topology exchange demonstrated successfully 3Q07
    - Inter-domain interoperability for layer 2 virtual circuits demonstrated at SC07 (4Q07)
  - UVA
    - Demonstrated token based authorization concept with OSCARS at SC07 (4Q07)
  - OGF NML-WG
    - Actively working to combine work from NMWG and NDL
    - Documents and UML diagram for base concepts have been drafted (2Q08)
  - GLIF GNI-API WG
    - In process of designing common API and reference middleware implementation

# External Circuit Topology at BNL



# External Circuit Topology at FNAL



- 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 will be enabled soon.
  - 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 pilot for the Tier 1/ Tier 2 community is ready for deployment.
  - A proposal from DANTE to deploy a perfSONAR based network measurement **service** across the LHCOPN at all Tier1 sites is still being evaluated by the Tier 1 centers

End