



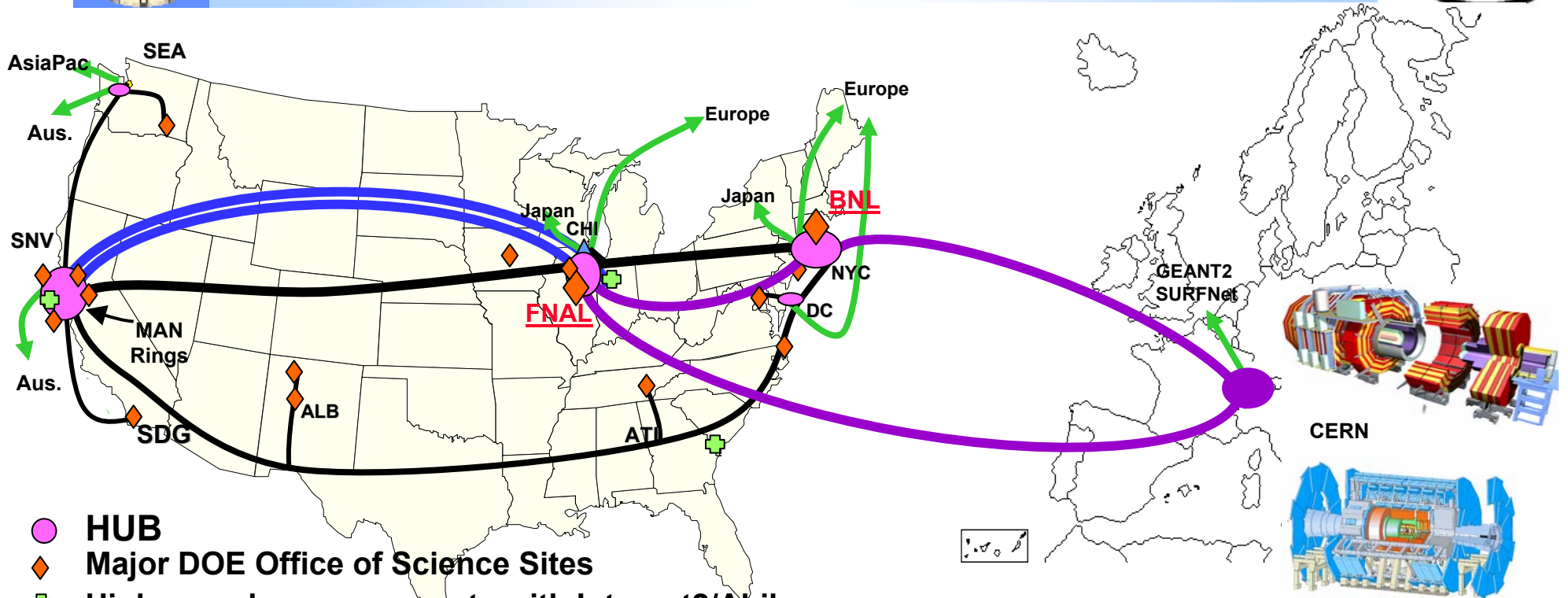
US LHCNet

LHCNet WG
September 12th 2006

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California Institute of Technology



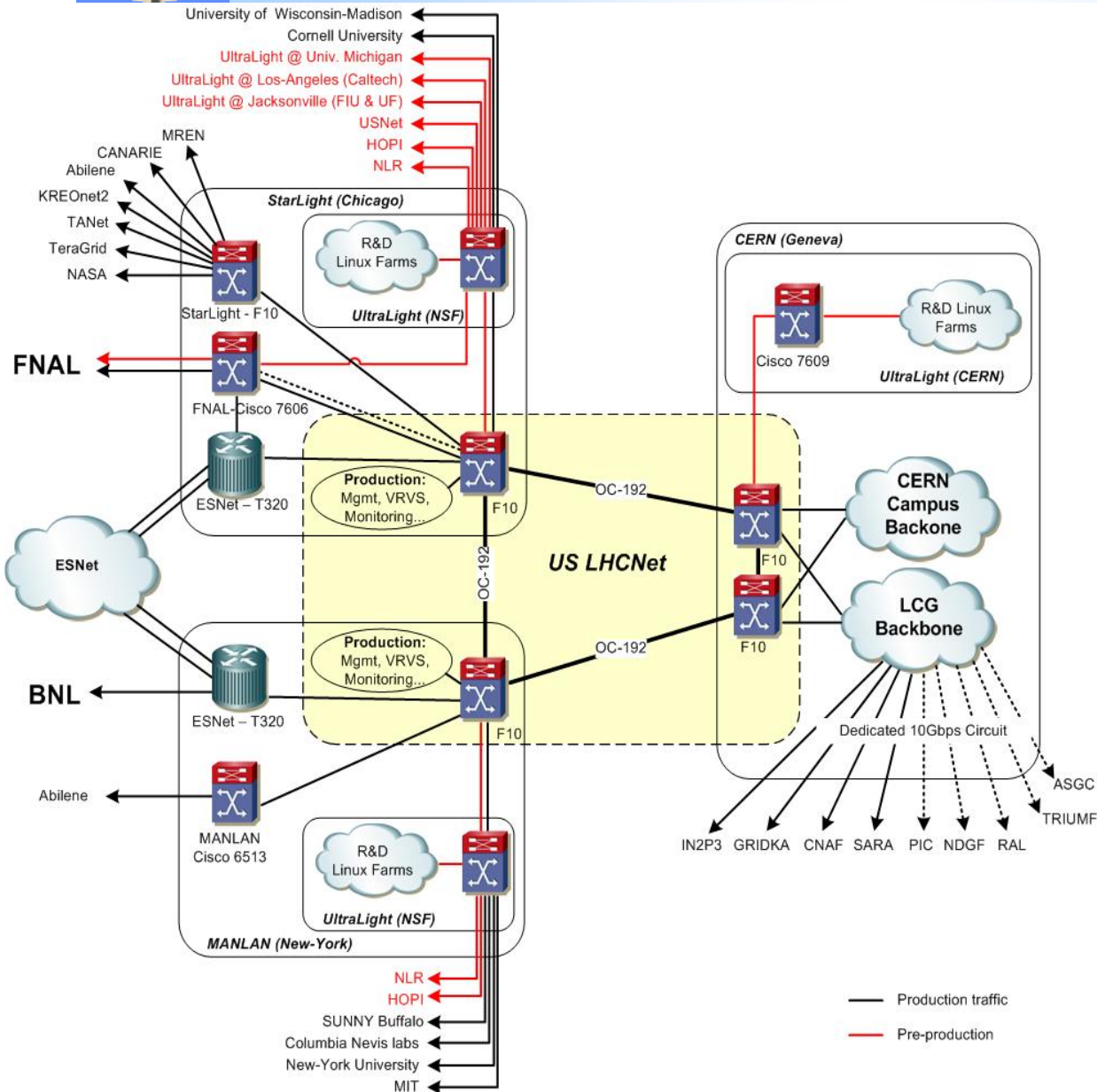
US LHCNet



- ◆ Connections to ESnet Hubs in New-York and Chicago
- ◆ Redundant "light-paths" to BNL and FNAL
- ◆ Redundant 10 Gbps peering with Abilene
- ◆ Access to USNet/HOPI for R&D



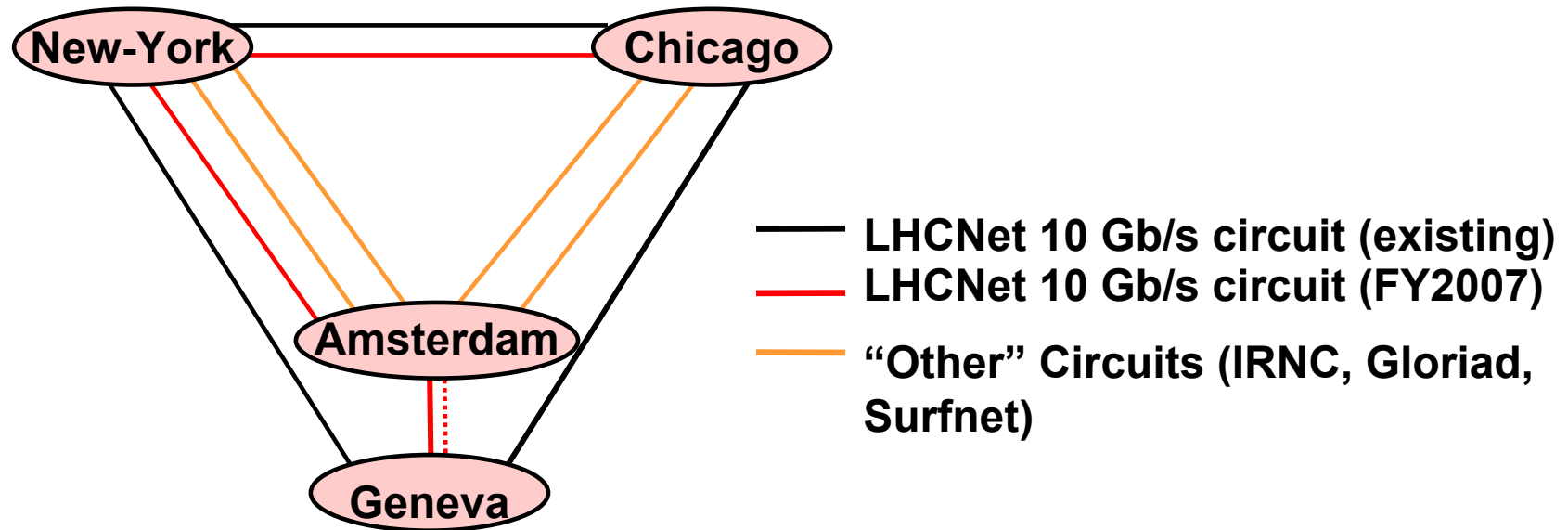
LHCNet configuration (July 2006)



- ◆ Co-operated by Caltech and CERN engineering teams
- ◆ Force10 platforms, 10GE WANPHY
- ◆ New PoP in NY since Sept. 2005
- ◆ 10 Gbps path to BNL since April 2006
- ◆ Connection to US Universities via UltraLight (NSF & university funded) backbone



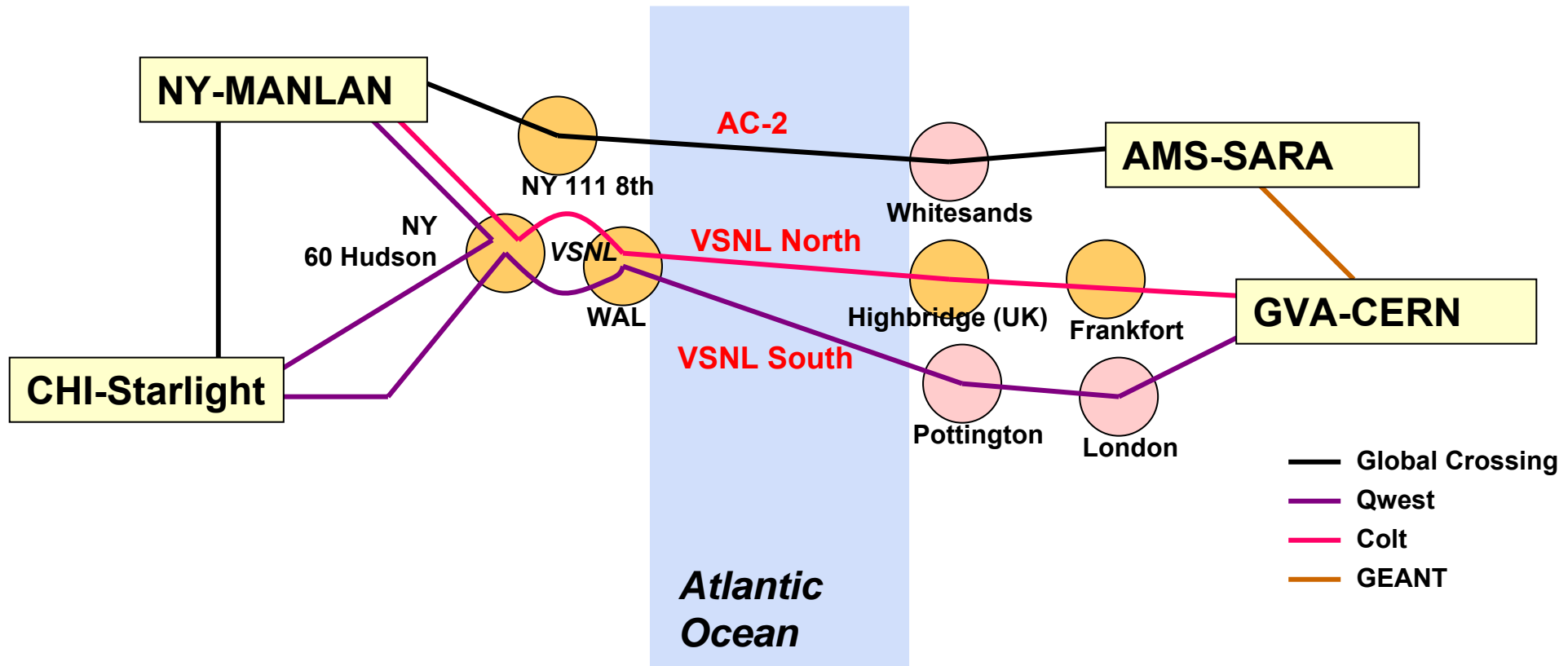
Future backbone topology



- ◆ **GVA-CHI-NY triangle**
- ◆ **New PoP in Amsterdam**
 - ❑ **GEANT2 circuit between GVA and AMS**
 - ❑ **Access to other transatlantic circuits ➔ backup paths and additional capacity**
 - ❑ **Connection to Netherlight, GLIF (T1-T1 traffic and R&D)**



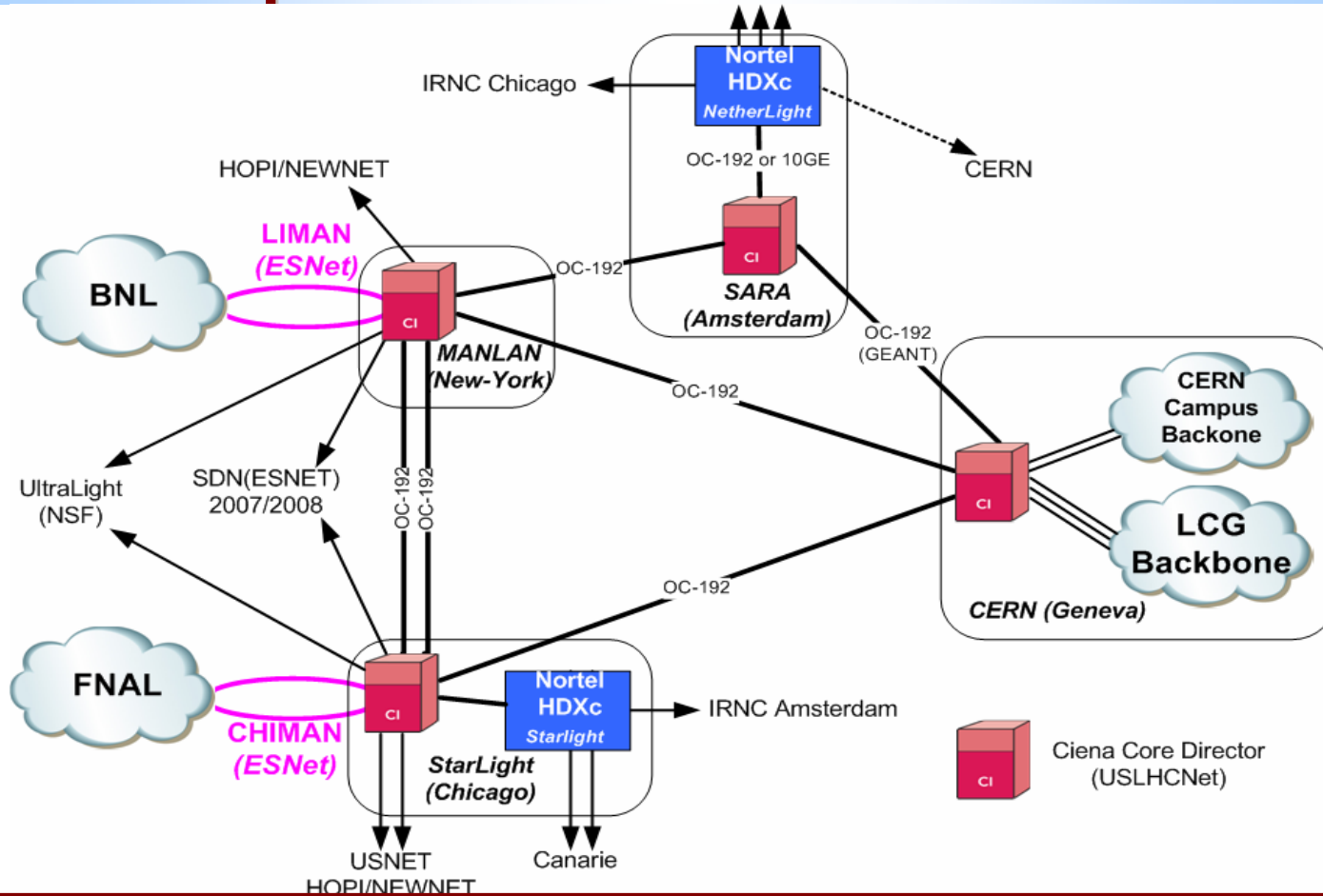
Multiple Fiber Paths: Reliability Through Diversity



- ◆ Unprotected circuits (lower cost)
- ◆ Service availability from provider's offers:
 - ◆ Colt Target Service Availability is 99.5%
 - ◆ Global Crossing guarantees Wave Availability at 98%



Next Generation LHCNet: Add Optical Circuit-Oriented Services



Based on CIENA “Core Director” Optical Multiplexers

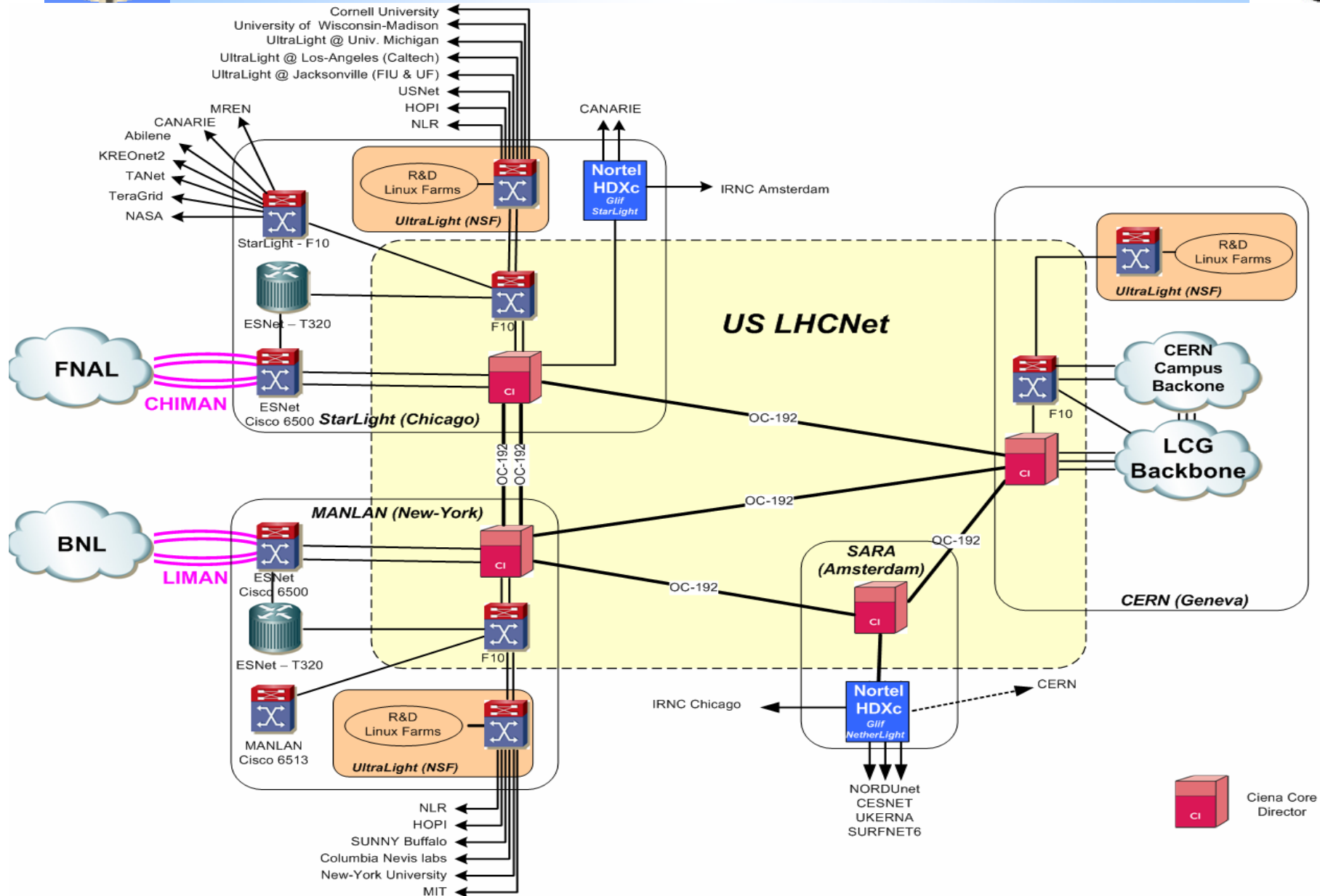
- ❑ Robust fallback, at the optical layer
- ❑ Circuit-oriented services: Guaranteed Bandwidth Ethernet Private Line (EPL)
- ❑ Sophisticated standards-based software: **VCAT/LCAS**.



Additional Slides

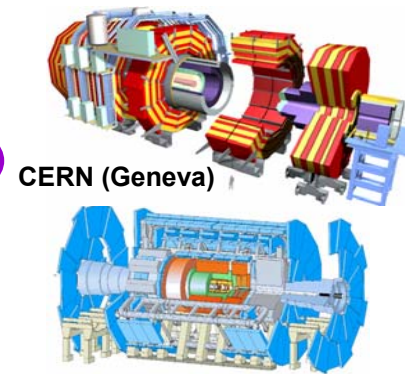
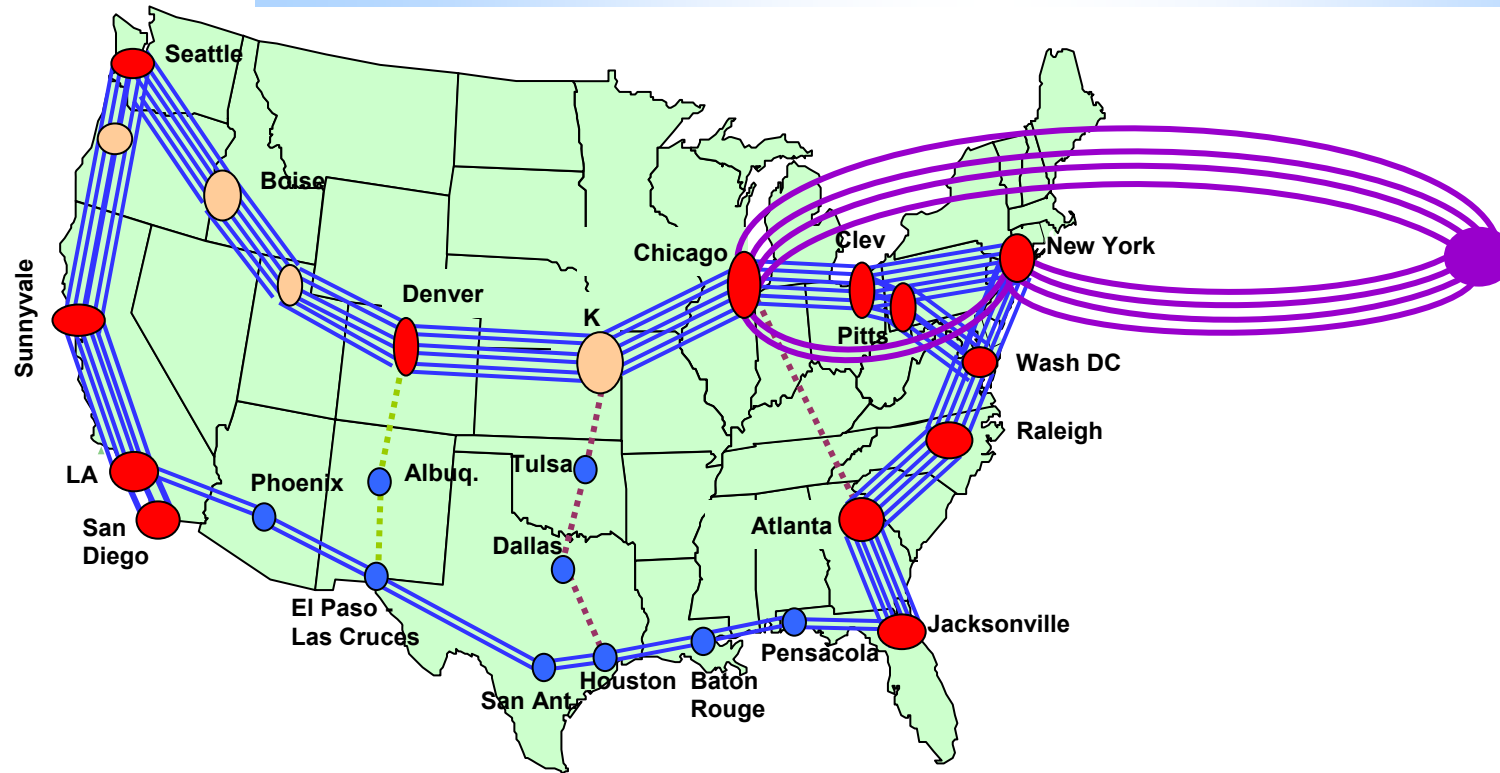






LHCNet configuration (2007)





LHCNet connection to Proposed ESnet Lambda Infrastructure Based on National Lambda Rail: FY09/FY10



-  NLR regeneration / OADM sites
-  NLR wavegear sites
-  ESnet via NLR (10 Gbps waves)
-  LHCNet (10 Gbps waves)

◆ LHCNet: To ~80 Gbps by 2009-10
 ◆ Routing + Dynamic managed circuit provisioning



UltraLight

