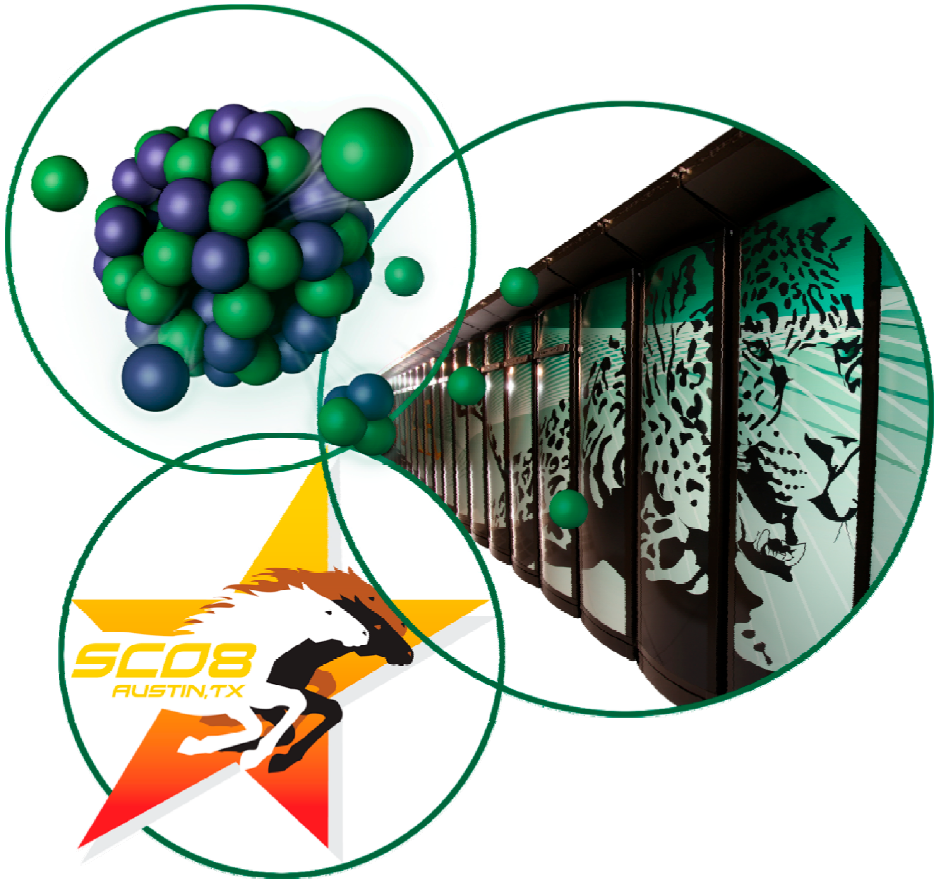
ORNL's FutureNet Infrastructure



Presented by

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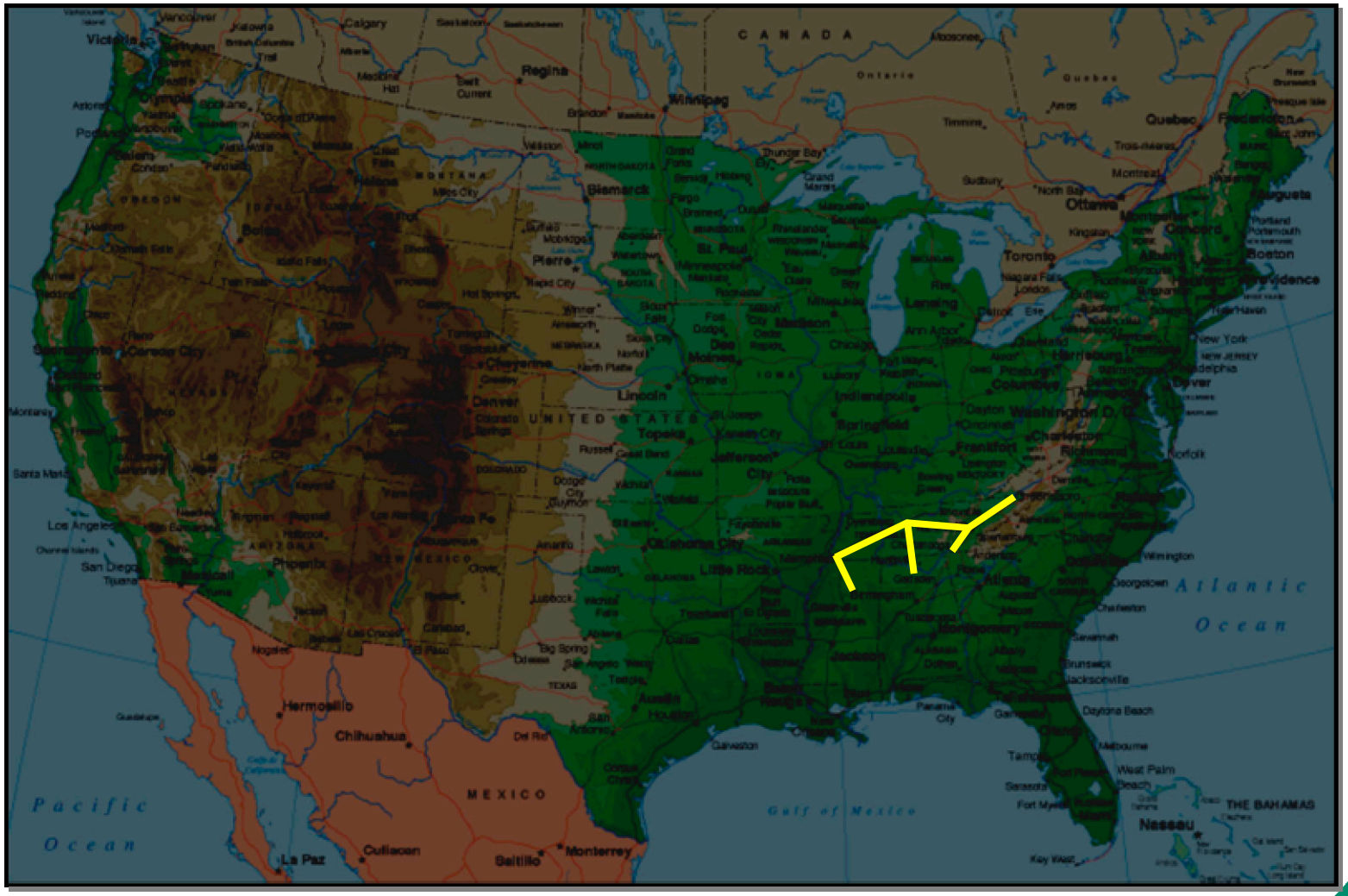
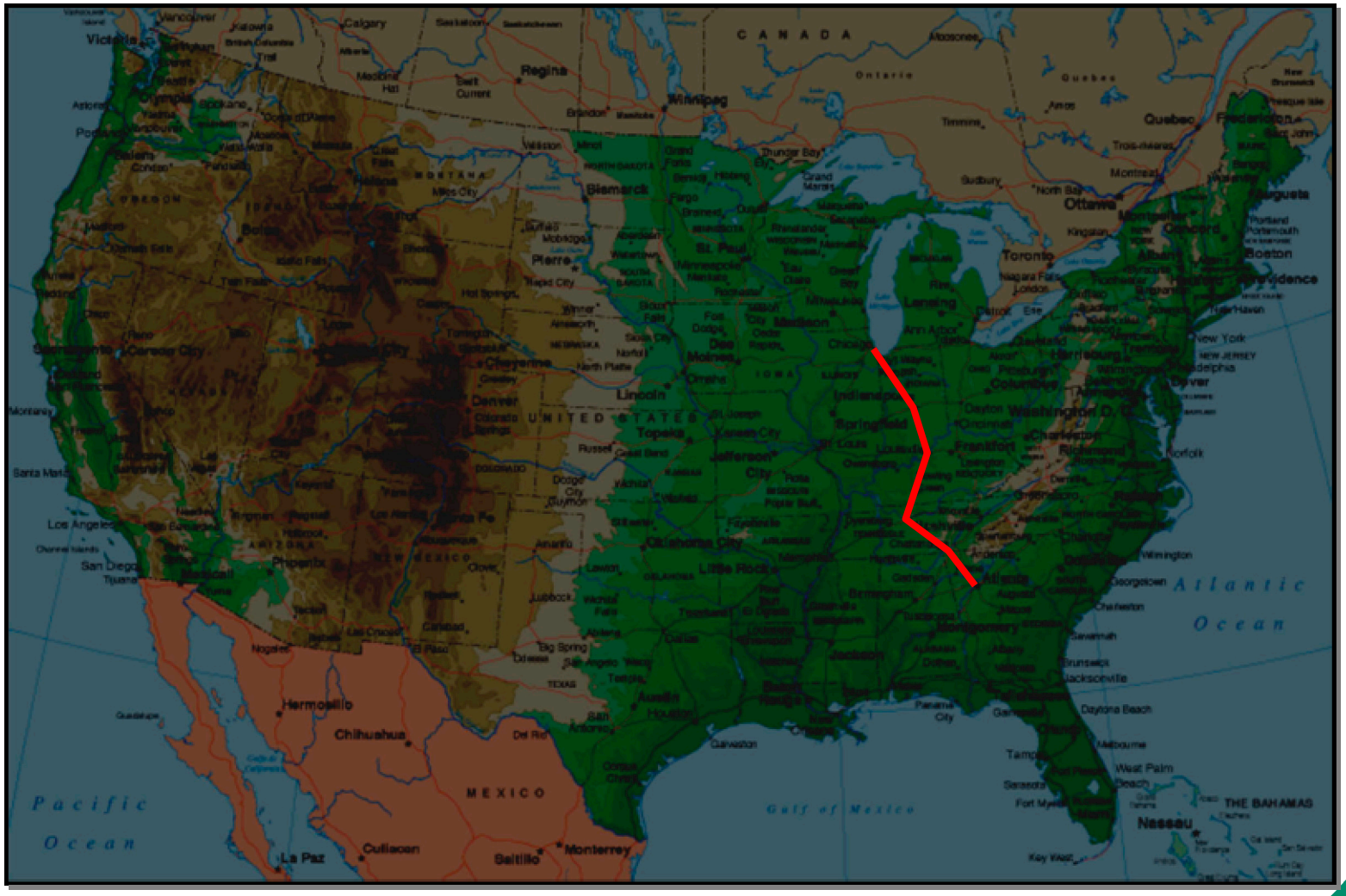
History and context

- In 2003 ORNL had a problem—poor connectivity
  - ESnet connection only OC-12
  - Qwest commercial OC-192 was costing $400,000/year
- Three simultaneous network research awards
  - UltraScience Net (DOE circuit-switched research net)
  - CHEETAH (NSF circuit-switched research)
  - ETF (NSF extension of TeraGrid)
- Pooled funds to build capacity rather than lease it

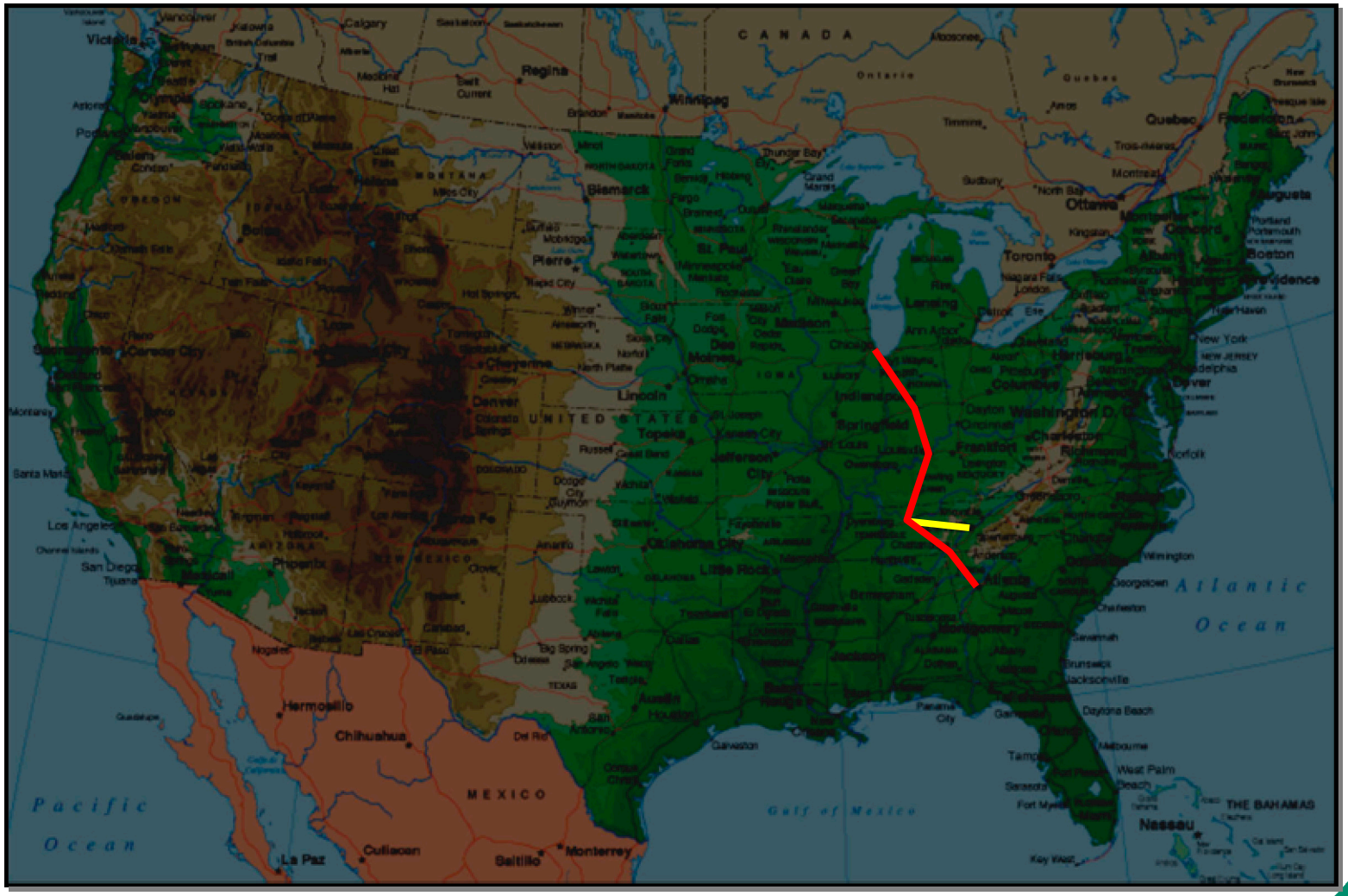
Bought options for 20-year IRUs on Tennessee Valley Authority fiber



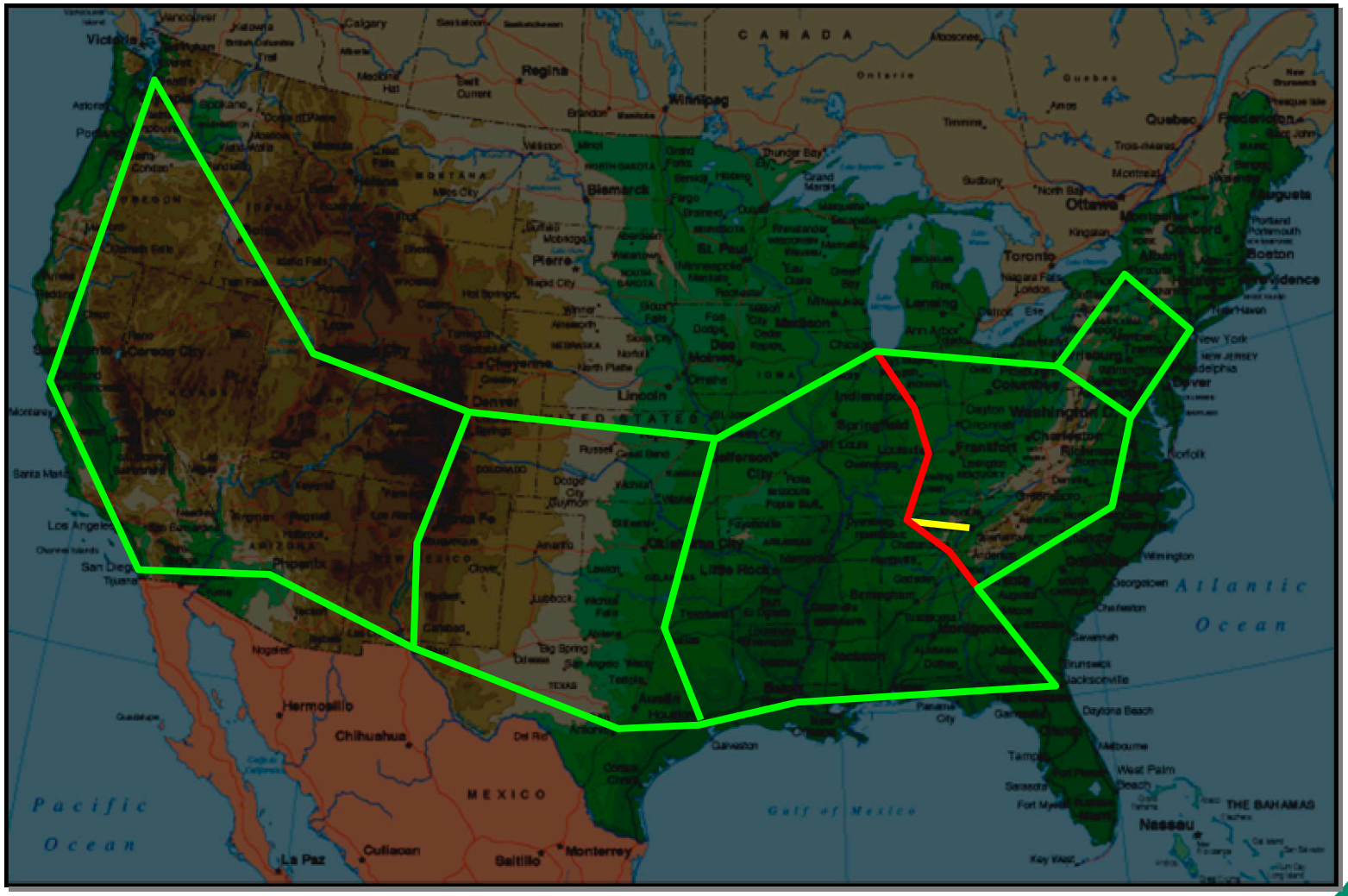
Bought a 20-year IRU with Qwest



Initially lit Atlanta–Chicago and Nashville–Oak Ridge



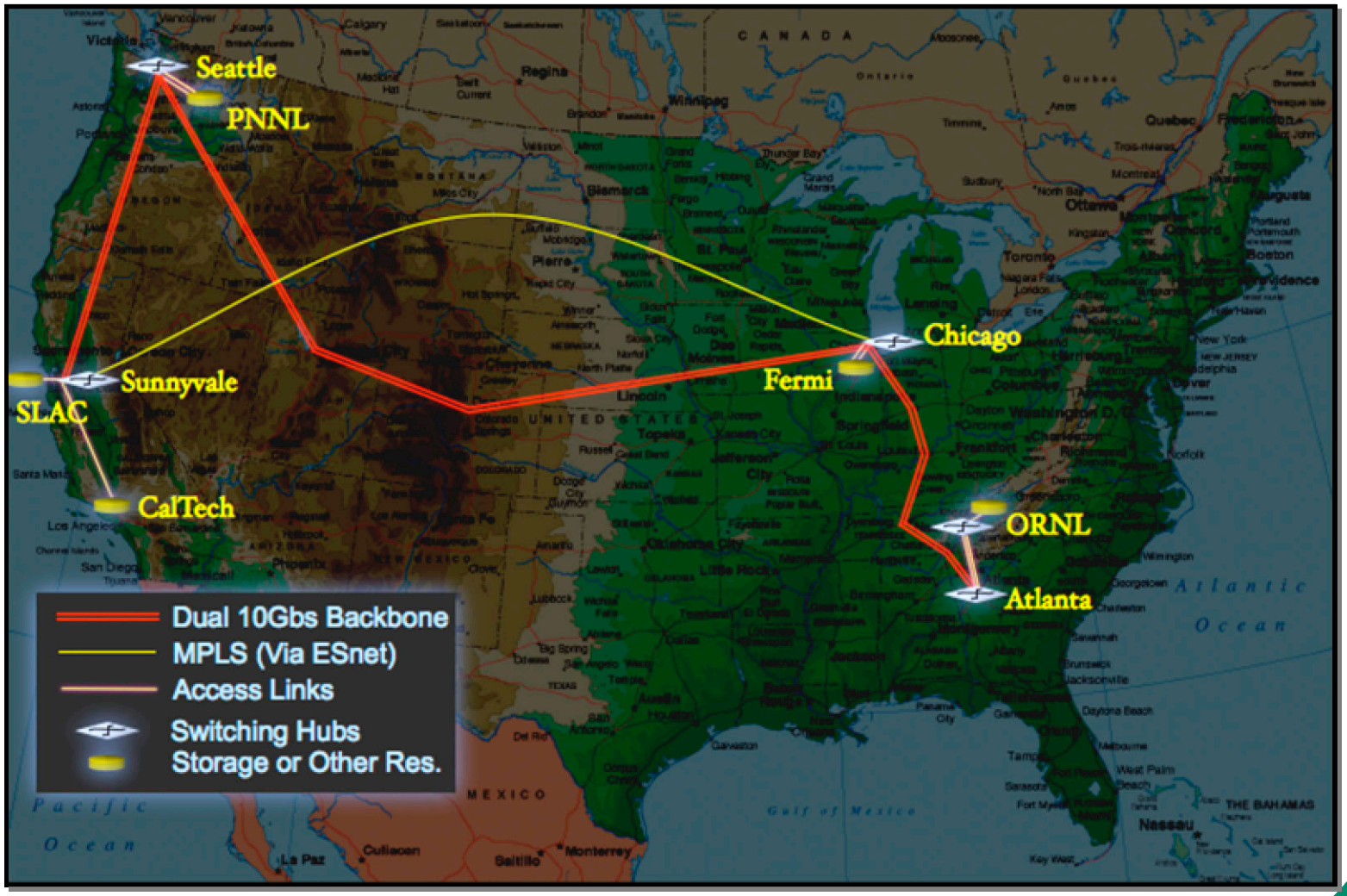
Arranged an asset trade with National LambdaRail for membership rights



Infrastructure—not a network

- On it we've built and added to three research networks and DOE's operational network, ESnet
  - DOE's UltraScience Net (circuit switching with secure control and robust reservations)
  - NSF's CHEETAH and Internet2's HOPI (which was built to help study interdomain issues; no longer operating)
  - ORNL's connection to TeraGrid
- Options to connect to EVERYTHING worth connecting to

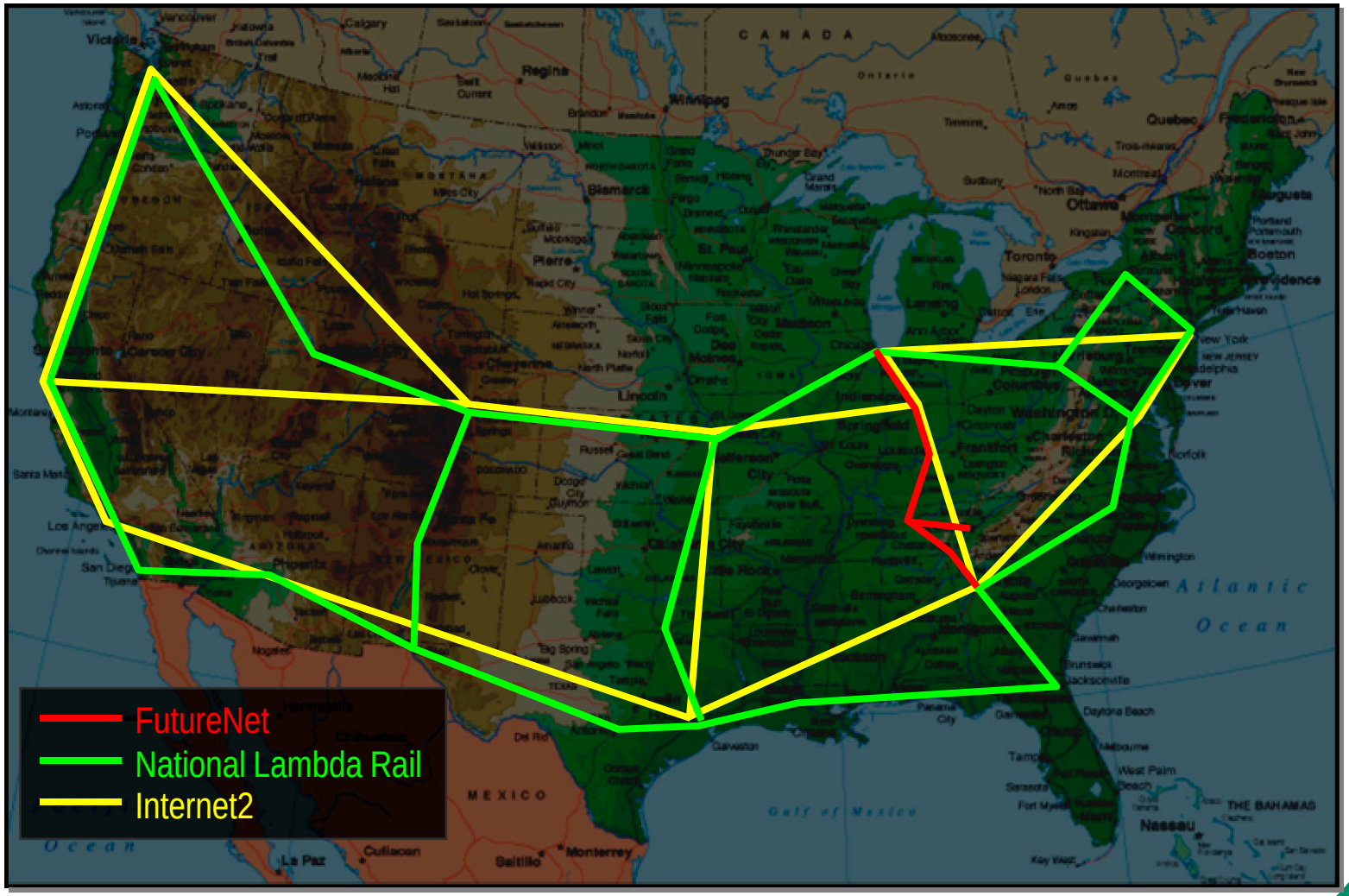
UltraScience Net: Fully meshed, circuit-switched, dedicated-wave research



Shameless plug for research

- Research is what you do when you don't know what the answer is…
  - UltraScience Net (USN) was built to demonstrate and model a high-performance, circuit-switched network (which it did—and ESnet's Science Data Net is modeled on it)
  - However, the greatest long-term benefit turns out to be the fact that USN can operate as a "trombone"
  - That is, it can instantly change its overall length from less than 1 mile to more than 8000 miles
- This is allowing us to study optimizing distributed-resource networks such as will be needed for the Earth Systems Grid and the next generation of facility-support networks

But of course, the real goal has been connectivity



So, how are we really doing it?

- DWDM transport gear from Ciena
- Latest (third generation) with 25 GHz lambda spacing
- C-band tunable transponders
- CoreDirector switches for lambda and sub-lambda switching
- Support for GFP mapping, LCAS, VCAT

But the project isn't finished

- **Lighting Tennessee Valley Authority fiber to Memphis, TN, and Starkville, MS**
  - **Pick up University of Memphis and Mississippi State**
- **Adding an extension to Cincinnati to connect AVATEC**
- **Providing NASA with a lambda through Nashville to Atlanta**
- **Providing University of Alabama a lambda through Nashville to Atlanta**

Contact

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