

BTOP Birds of a Feather

Overview

- BTOP Program Overview
- Primary Components
- Maps and Diagrams
- Architecture Review

NTIA BTOP – Round 2

- BTOP is the Broadband Technology Opportunities Program administered by the National Telecommunications and Information Administration (NTIA) in the U.S. Department of Commerce.
 - Funded in 2009 with \$4.7B by the Recovery Act to enhance broadband connectivity to underserved areas and community anchor institutions.
- Partners Internet2, National LambdaRail (NLR), Indiana University, the Northern Tier Network Consortium with industry partners Ciena, Cisco, Infinera and Juniper Networks submitted a Round 2 proposal, titled “**United States Unified Community Anchor Network (U.S. UCAN)**”
- On July 2, 2010, President Obama and Department of Commerce Secretary Locke announced 60+ BTOP Grants were funded including U.S. UCAN
- <http://www.usucan.org>

U.S. UCAN overview

- A nationwide, advanced network infrastructure that - in partnership with regional networks - will enable the connection of America's community anchor institutions - schools, libraries, community colleges, health centers and public safety organizations—to support next-gen applications
- Designed to fill a critical gap linking community anchor institutions together into a national, open network with next-gen capabilities, operated with end-to-end transparency and the highest levels of performance suited to the needs of these institutions.
- Built as a 100 Gbps “middle mile” infrastructure optimized to connect all community anchor institutions across the U.S.

U.S. UCAN overview (con't)

- Expands the community's optical capabilities to increase resiliency and capacity of the Internet2 and NLR networks including the acquisition of nearly 12,000 miles of newly lit fiber
- Expected to cost approximately \$97 million to deploy, of which 64.61% will be funded by BTOP and 35.39% would be funded through cost-matching by Internet2, NLR and its partners
- Provides a jumpstart in directly implementing the FCC National Broadband Plan recommendations to help serve the broadband needs of community anchor institutions that have not been met

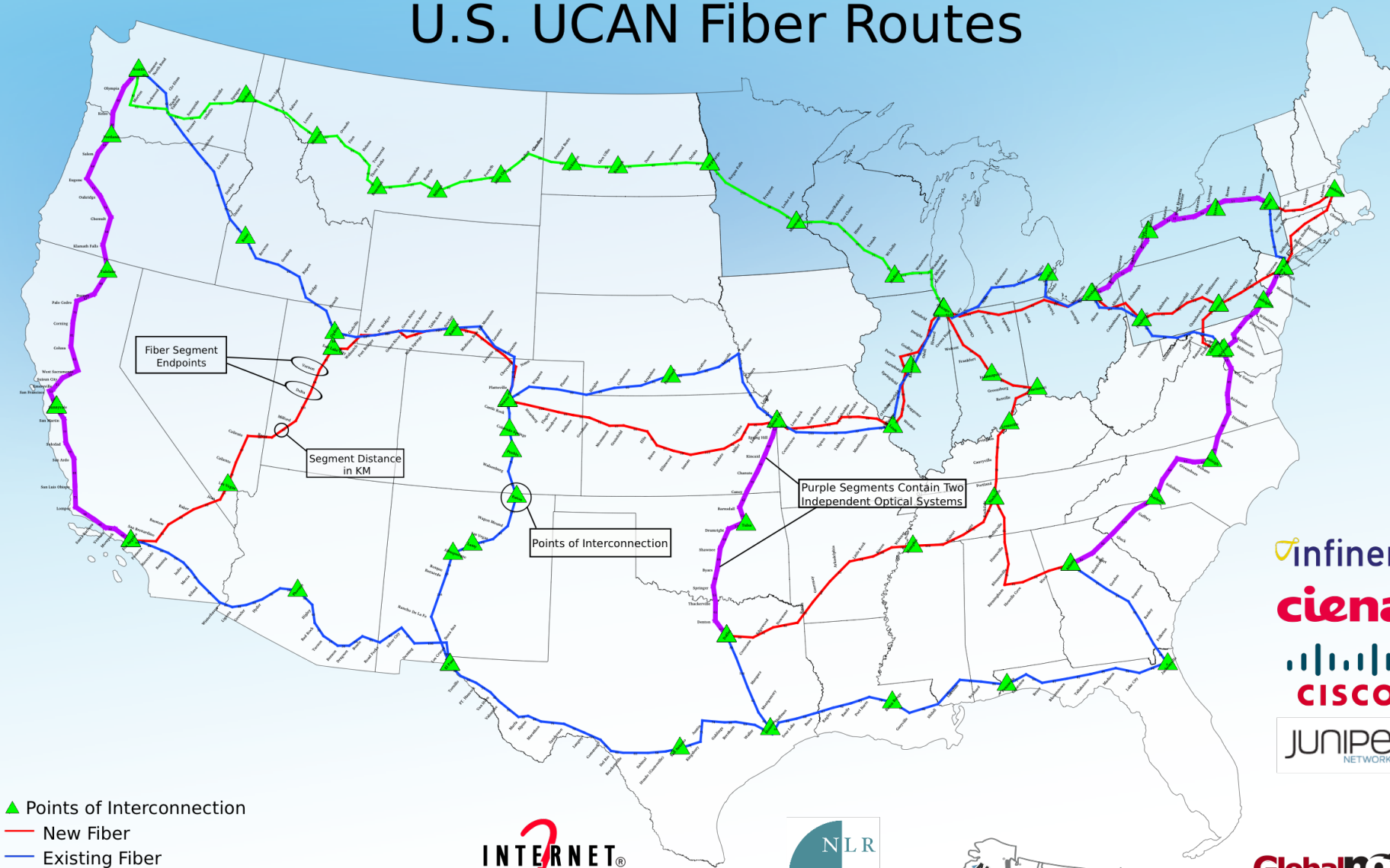
U.S. UCAN benefits

- Investments in a new national scale fiber pair as diverse as possible from other community assets
- Optical equipment with 100 Gbps Ethernet capability to provide enhanced capacity to the entire Internet2 community
- Interconnection to all of the major Internet exchange points to ensure both a robust interconnection with the commodity Internet, as well as the ability to ensure universal access to competitively priced commodity.
- Enhanced connectivity to/from the regional networks
- Enhanced connectivity among regional networks (lambdas for inter-connecting RONS)
- Ultimately striving to ensure regional networks have the nation-wide capacity and features required to meet the needs of all community anchor institutions

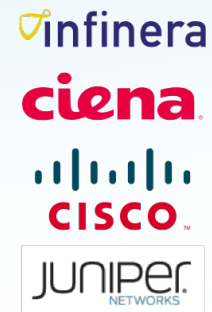
Proposal Primary Components

- Dark Fiber on national footprint
- Optical
 - Optical equipment to light new fiber with 100Gbps-capable equipment
 - Upgrade of NTNC Infinera equipment to be 100G-capable
 - 100G Transponders for existing NLR footprint
- Routers
 - Internet2
 - 100G and 10G routers (MX960s and MX80s) for R&E network
 - 10G routers for TR/CPS
 - Multiservice DPCs for MX960 routers
 - NLR
 - 100G and 10G routers (Cisco-based)

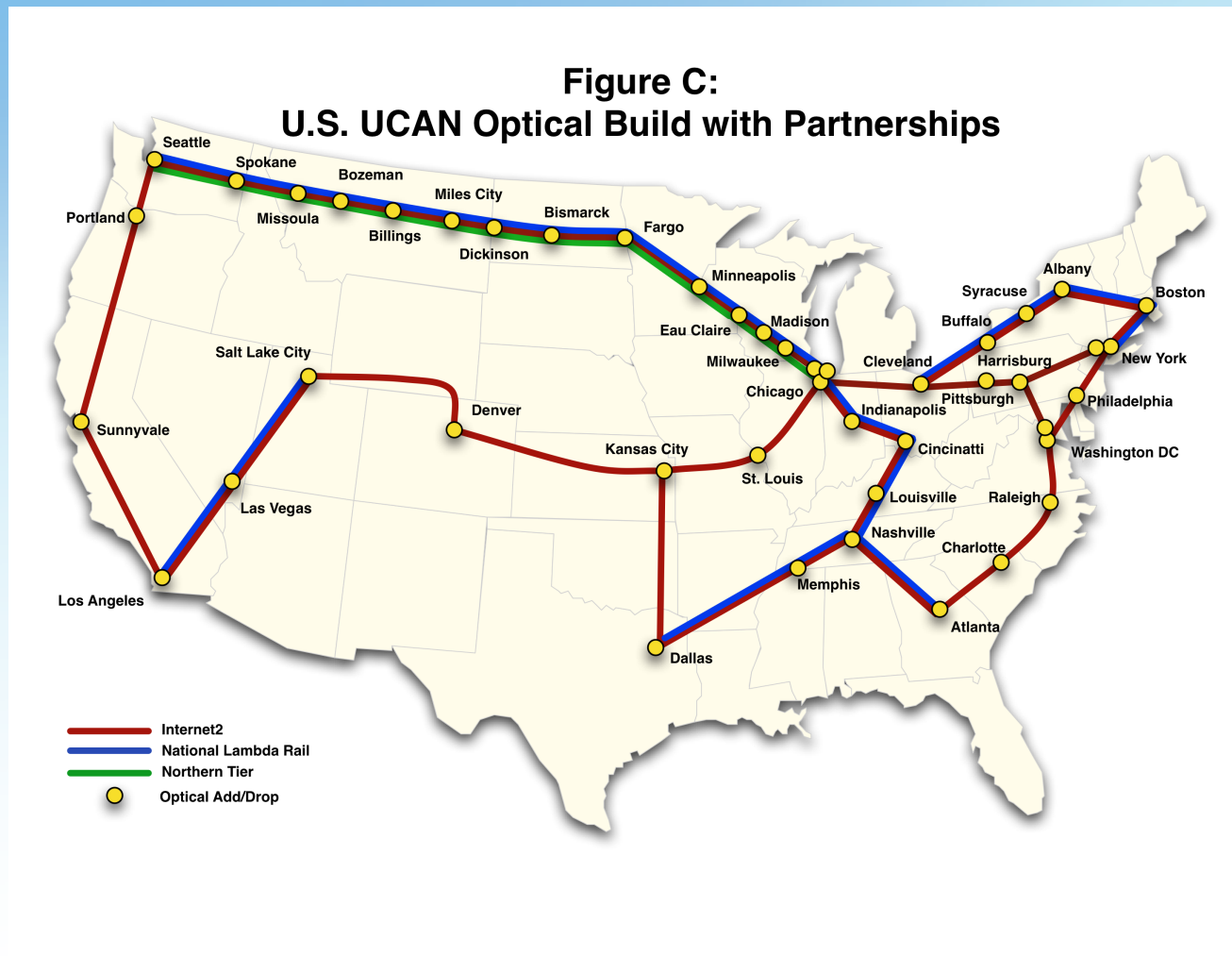
U.S. UCAN Fiber Routes



- ▲ Points of Interconnection
- New Fiber
- Existing Fiber
- New & Existing Fiber (common path)
- New Fiber via Northern Tier Partnership

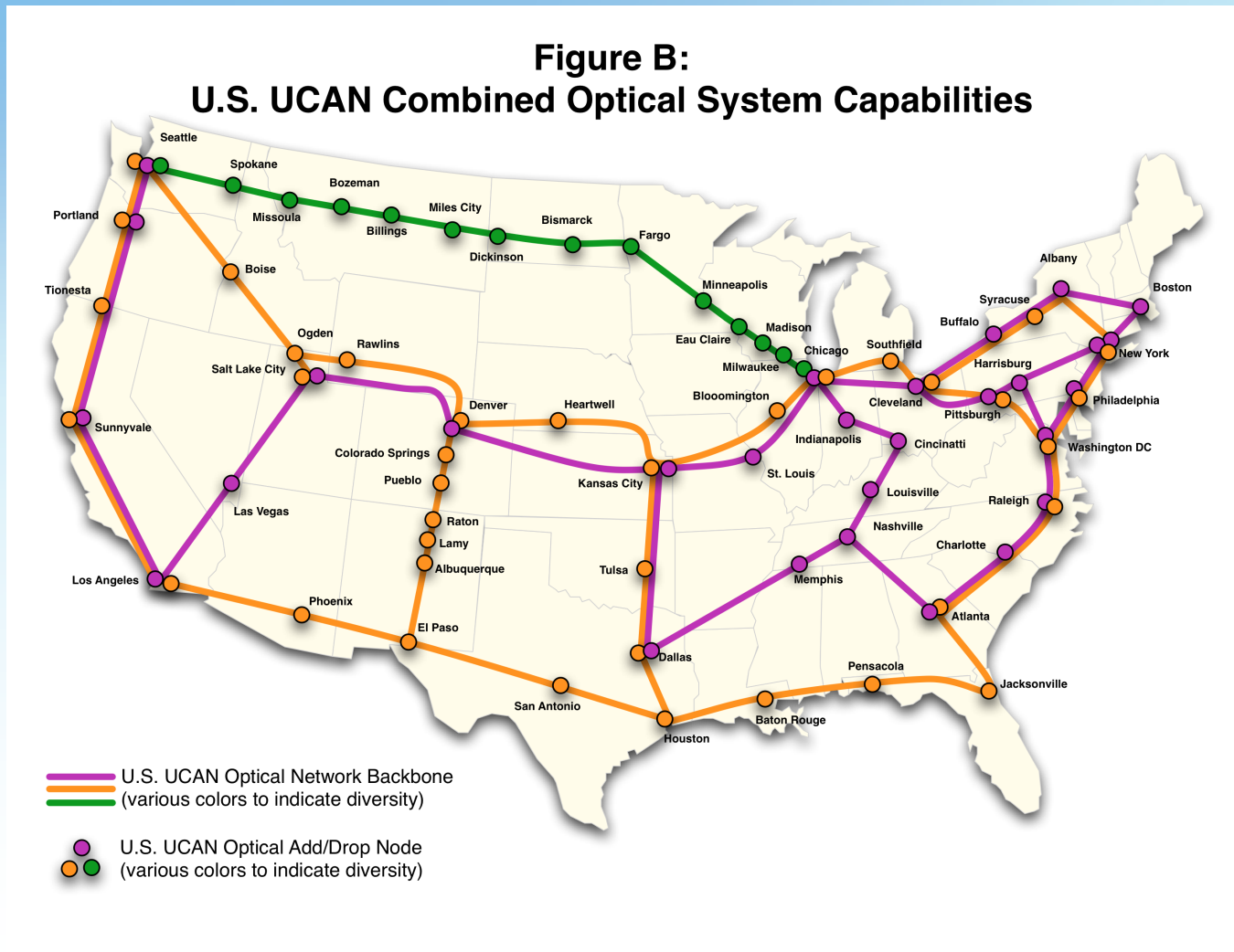


New Network Builds in Proposal



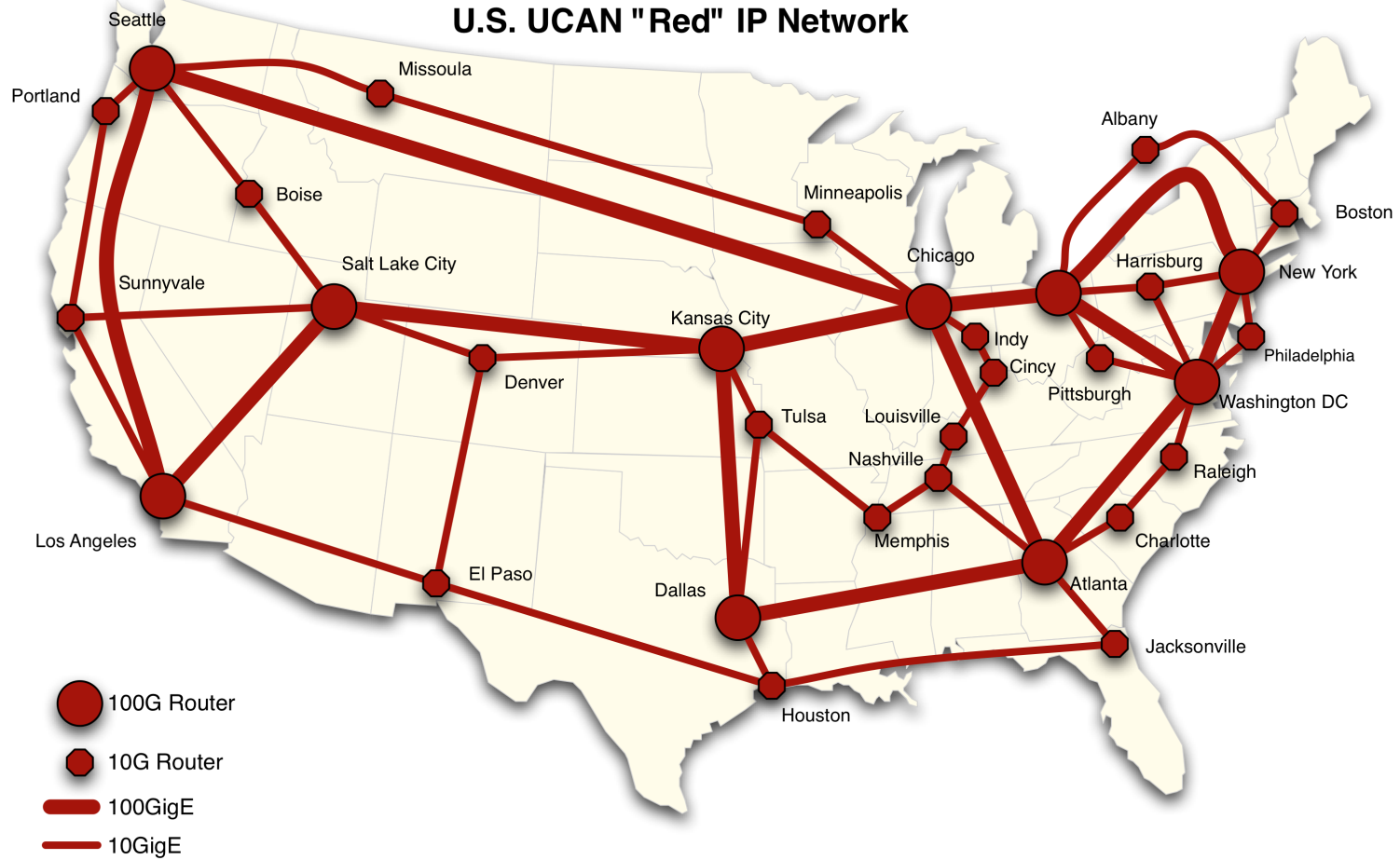
Combined US UCAN System Capability

**Figure B:
U.S. UCAN Combined Optical System Capabilities**



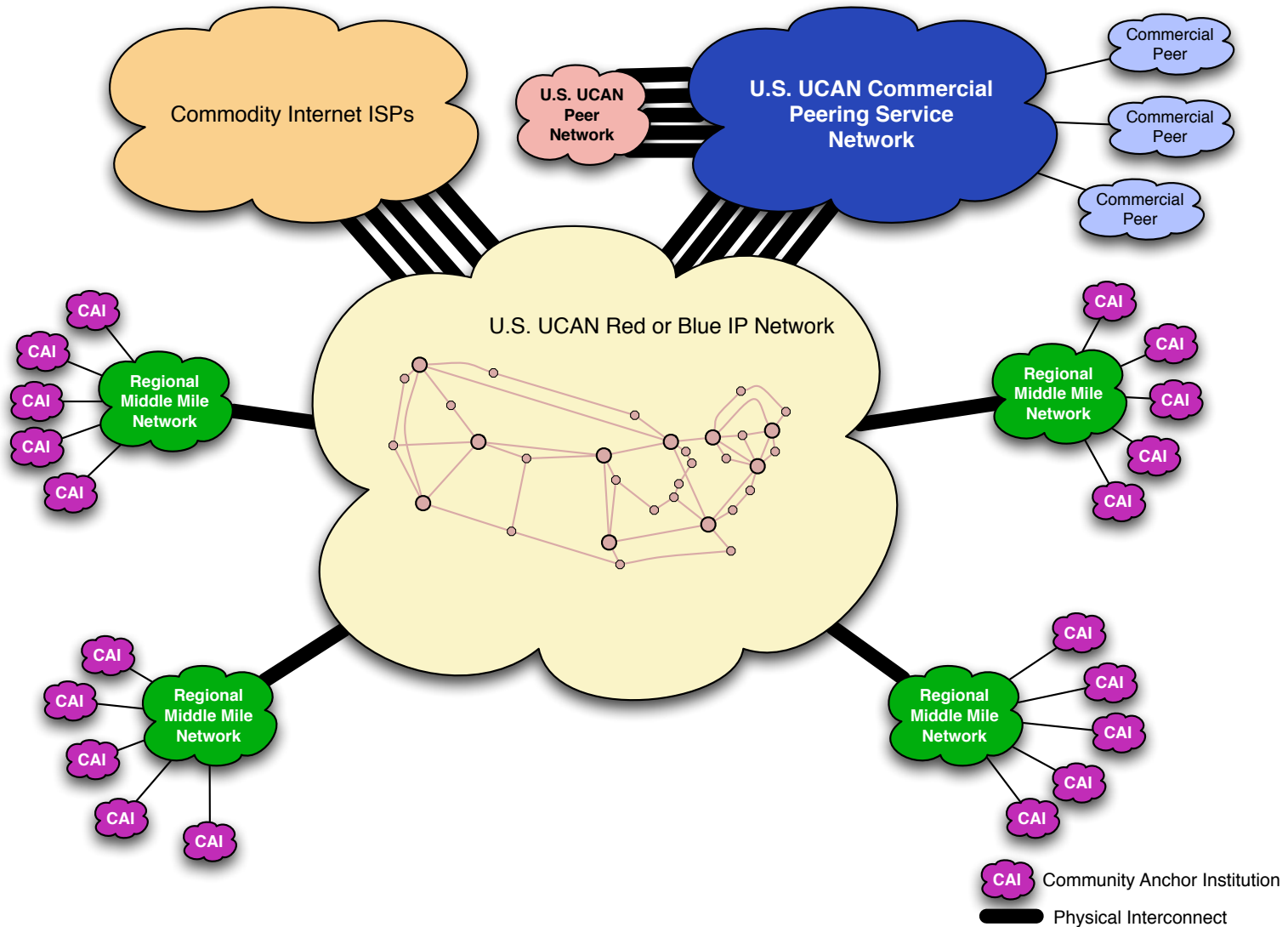
Upgraded Internet2 IP Backbone

**Figure D:
U.S. UCAN "Red" IP Network**



U.S. UCAN Logical Topology with Regionals

Figure H: U.S. UCAN Peer Network Access



Open Questions

- What's the timeframe to implement?
 - We expect to begin implementation later this year, though planning is already underway
 - Need to see the contract
- How locked down is the engineering design?
 - Unclear how much we can deviate from “POI” locations in the proposal; awaiting contract with NTIA
 - Optical equipment selected for some routes:
 - NTNC portion – Infinera
 - NEWY-WASH – Ciena
 - NEWY-CLEV & CHIC-ATLA – Cisco
 - Internet2 routers to be Juniper based, but may be able to change models

Open Questions

- How will 10G and 100G layers interoperate?
- What services will be supported at which locations?
 - MPLS service? ION? CPS? What else?
- What colo facilities will be used?
 - Level(3) along the Level(3) path; have a little bit of room to choose different POPs along some of the footprint, but subject to POI lockdown with NTIA
 - Some carrier neutral facilities when Allied fiber meets Level(3) fiber
 - Need to hear from the community on desirables

Further Resources

- Two web resources:
 - <http://www.usucan.org>
 - <http://www.internet2.edu/government/opportunities.html>