“Internet2 and QUILT Initiatives with Regional Networks”

Panel Presentation:

Larry Smarr (UCSD), Jen Leasure (Quilt),
Mickey Slimp (GPN), Eric Buckhalt (SoX), James Deaton (Internet2)

Sixth National Research Platform Conference (6NRP)

UC San Diego

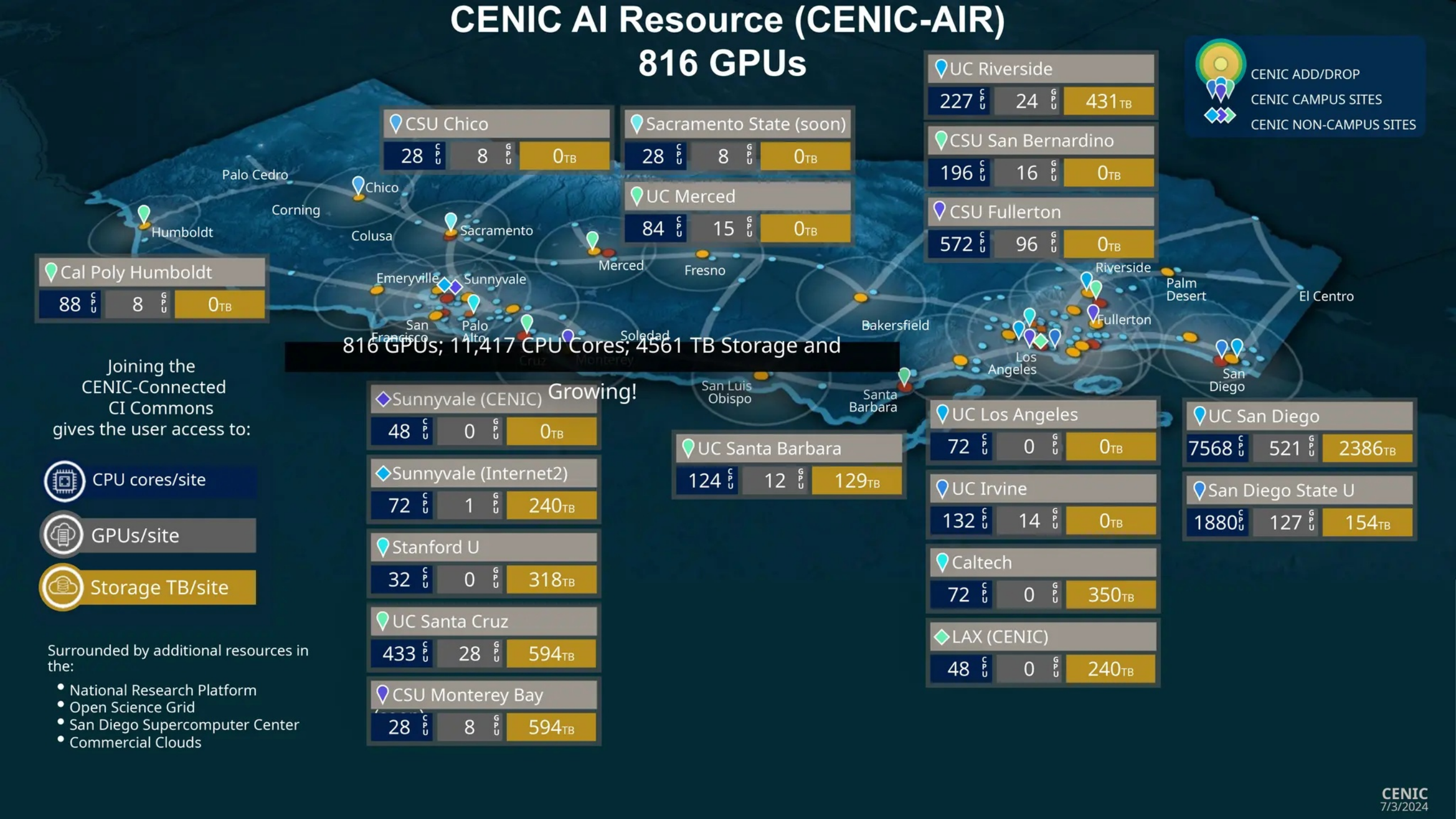
January 29, 2025

NRP NATIONAL RESEARCH PLATFORM

CENICAIR
CENIC ARTIFICIAL INTELLIGENCE RESOURCES

NRP Nautilus

CENIC AI Resource (CENIC-AIR)
816 GPUs



CENIC
7/3/2024

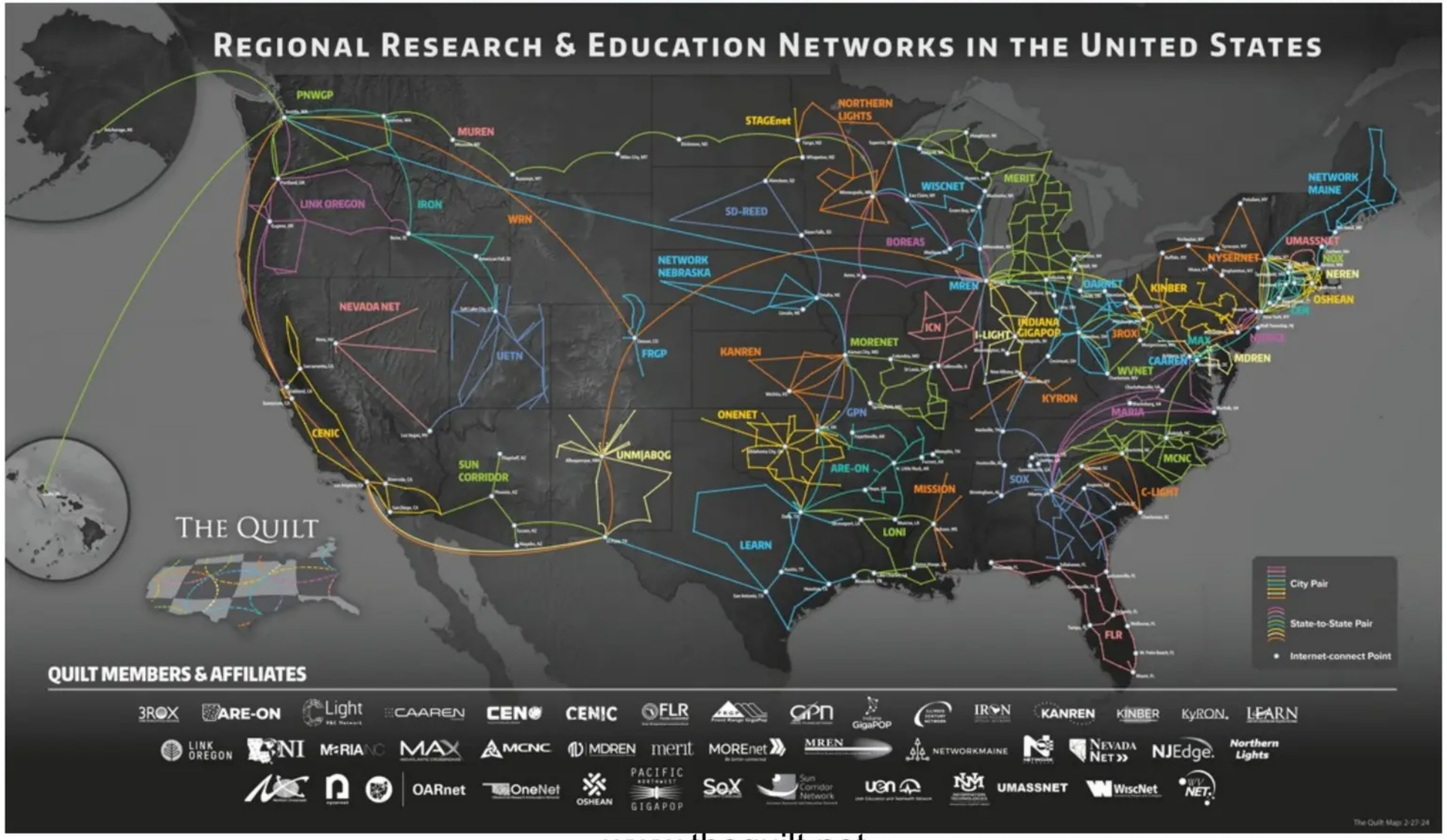
Jen Leasure, President & CEO, The Quilt

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Profiles of Regional R&E Networks as CI Resources

- Advanced networking providers
- Regional aggregators of cyberinfrastructure resources connecting institutions to the national and global R&E fabric
- Trusted technical consultants
- Bridges to other national cyberinfrastructure resources and experts
- Conveners of human networks
- This support is especially important to broadening the reach of NRP and other CI Resources to Smaller Institutions

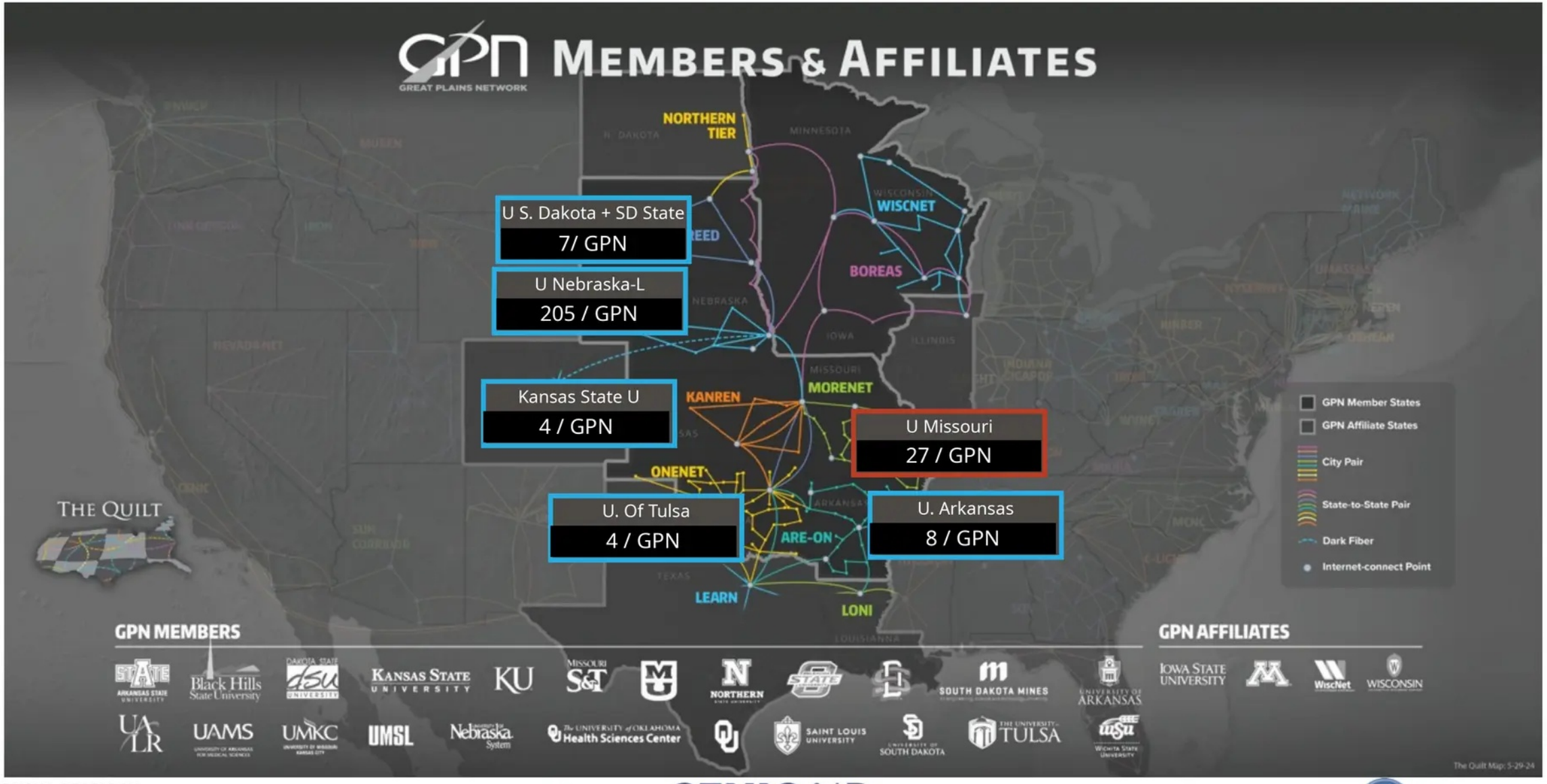
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Great Plains Network AI Resource (GPN AIR)
255 GPUs



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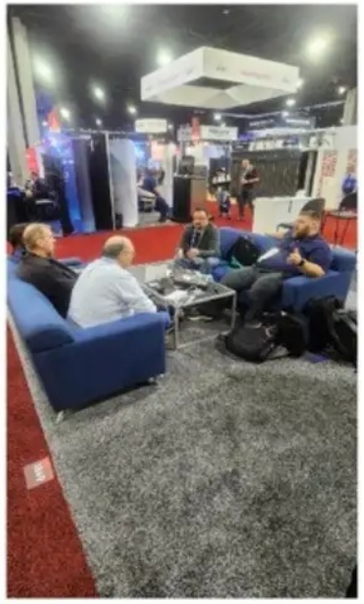
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GP-Engine: Revolutionizing High-Performance Computing in the Great Plains

GP-Engine: Revolutionizing High-Performance Computing in the Great Plains







The **G**reat **P**lains **E**xtended **N**etwork of **G**PUs for **I**nteractive **E**xperimenters (**GP-ENGINE**) project, in collaboration with the Great Plains Network (GPN) and funded by the National Science Foundation (award #OAC-2322218), enhances research computing (HPC) capabilities throughout the Midwest. New supercomputing nodes placed at 10 universities within the Great Plains increase both local and national resources by sharing spare capacity through the National Research Platform and the OSG (formerly called the Open Science Grid).

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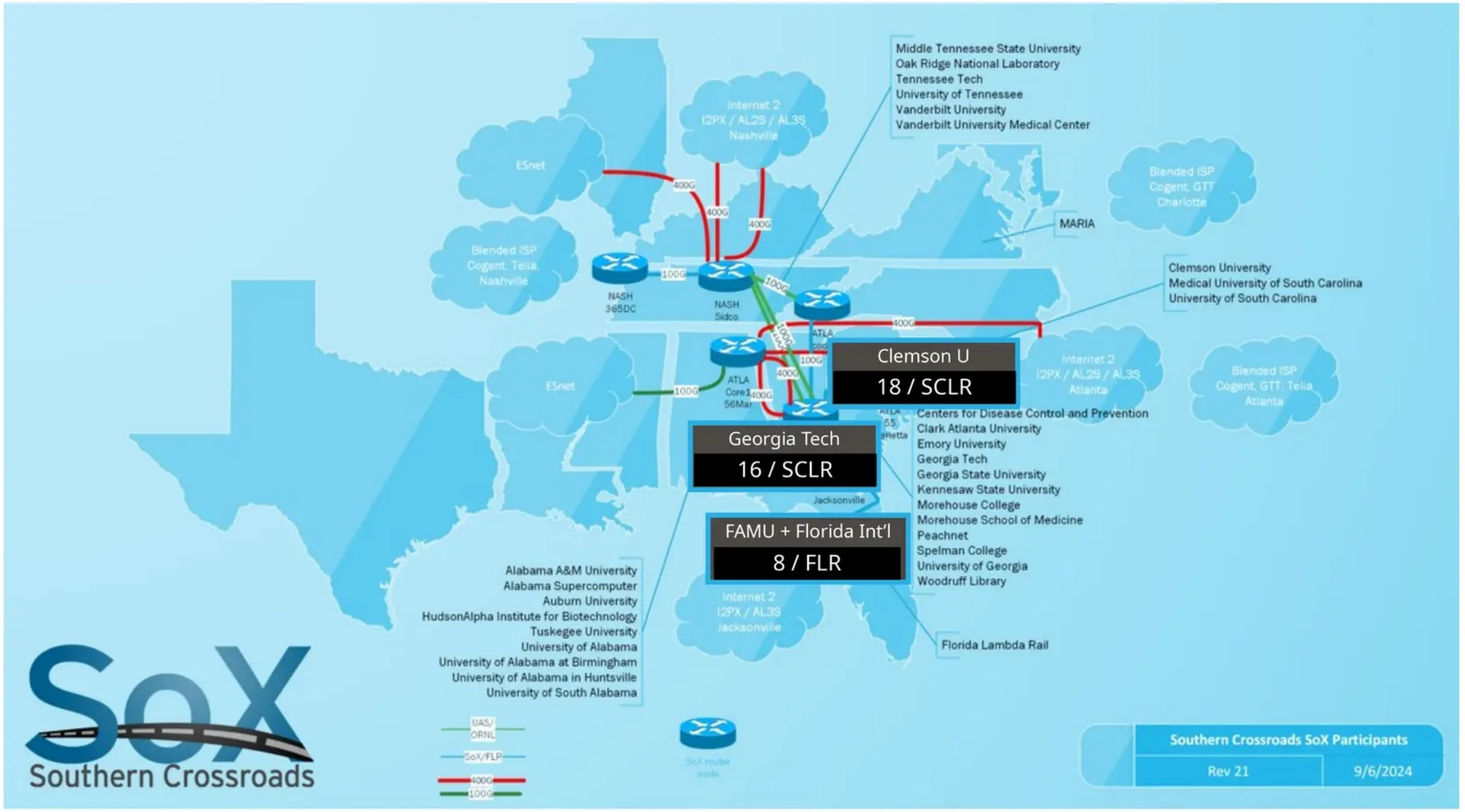
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Regional Network Example: Georgia Tech / Southern Crossroads (SoX)



- Participating with multiple nodes in the Southeast
- Clemson University is also participating
- Presentations from Dr. Alex Feltus and Dr. Larry Smarr to SoX community
- FIONA nodes purchased as DTNs or perfSONAR test points are in process of redeploying as Nautilus nodes
- Goal is to enable research within our community and looking to assist faculty unfamiliar with the platform
- SoX is looking to collaborate on toolkits, demos, training we can share, invite, host, etc. for our community to help take advantage of the NRP
- SoX offers connectivity and space for those interested in hosting nodes
- Recent upgrade to 400G connectivity to ESnet and Internet2 – includes ESnet BW Challenge

Southern Crossroads AI Resource (SoX AIR)
42 GPUs



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RENs and Campus Partners with Nautilus Nodes Connected to NRP – Jan 2025

- Albuquerque GigaPoP
- AMPATH
- AREON
- CENIC
- C-Light
- Edge
- MGHPCC - Edge, OSHEAN, CENIC, NYSERNet
- Florida LambaRail
- FRGP
- GPN
- KanREN
- Merit
- MOREnet
- MREN
- Network Nebraska
- Northern Lights
- Northern Crossroads
- NYSERNet
- OARnet
- OneNet
- PNWGP
- SD-REED
- Southern Crossroads
- Sun Corridor
- University of Hawaii
- UIUC

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CENIC AIR as a Blueprint for Other RENs

- **Quilt Focus this year on potential to leverage CENIC AIR as a model for other RENs**
- **Panel at upcoming Quilt member meeting next week with CENIC and its community member stakeholders to share CENIC AIR with regional network community**
- **Potential for a future REN-focused CENIC AIR workshop to share additional details about the model**

Network Infrastructure Topology | April 2024

INTERNET2

This map represents all 50 states and five major territories of the U.S. The Internet2 network infrastructure extends across the contiguous U.S. and, through a global fabric of research and education networks and exchange points, interconnects with locations in Alaska, Hawaii, Guam, Puerto Rico, and 100+ countries worldwide.

- I2PX/RPI/Cloud Connect Peering Site
- I2PX/RPI Peering Site
- AL1S/AL2S/AL3S Add-Drop Site
- AL1S Add-Drop Site
- AL1S Regeneration Site
- Fiber Infrastructure
- Infrastructure Sharing
- Leased Capacity

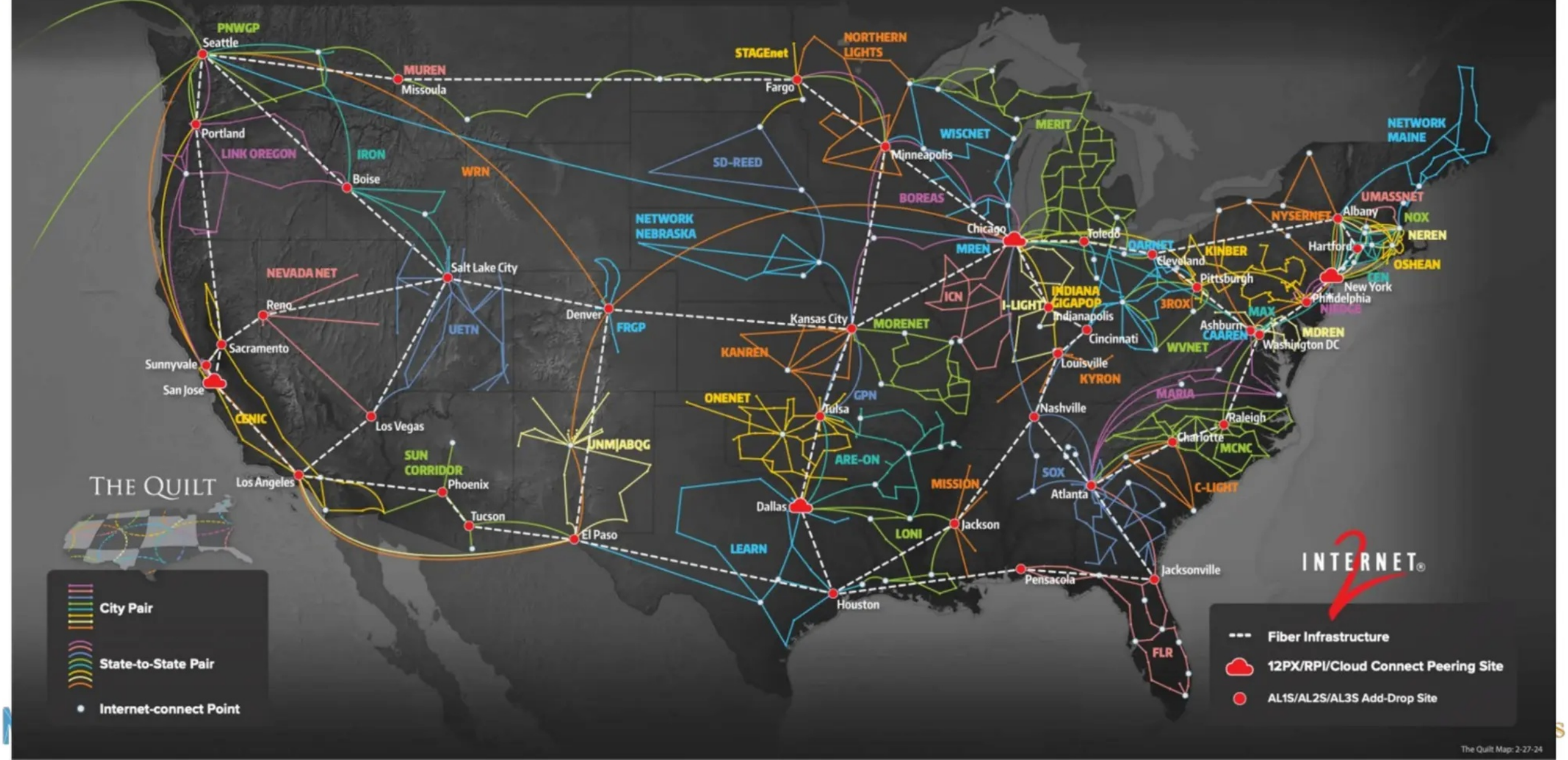


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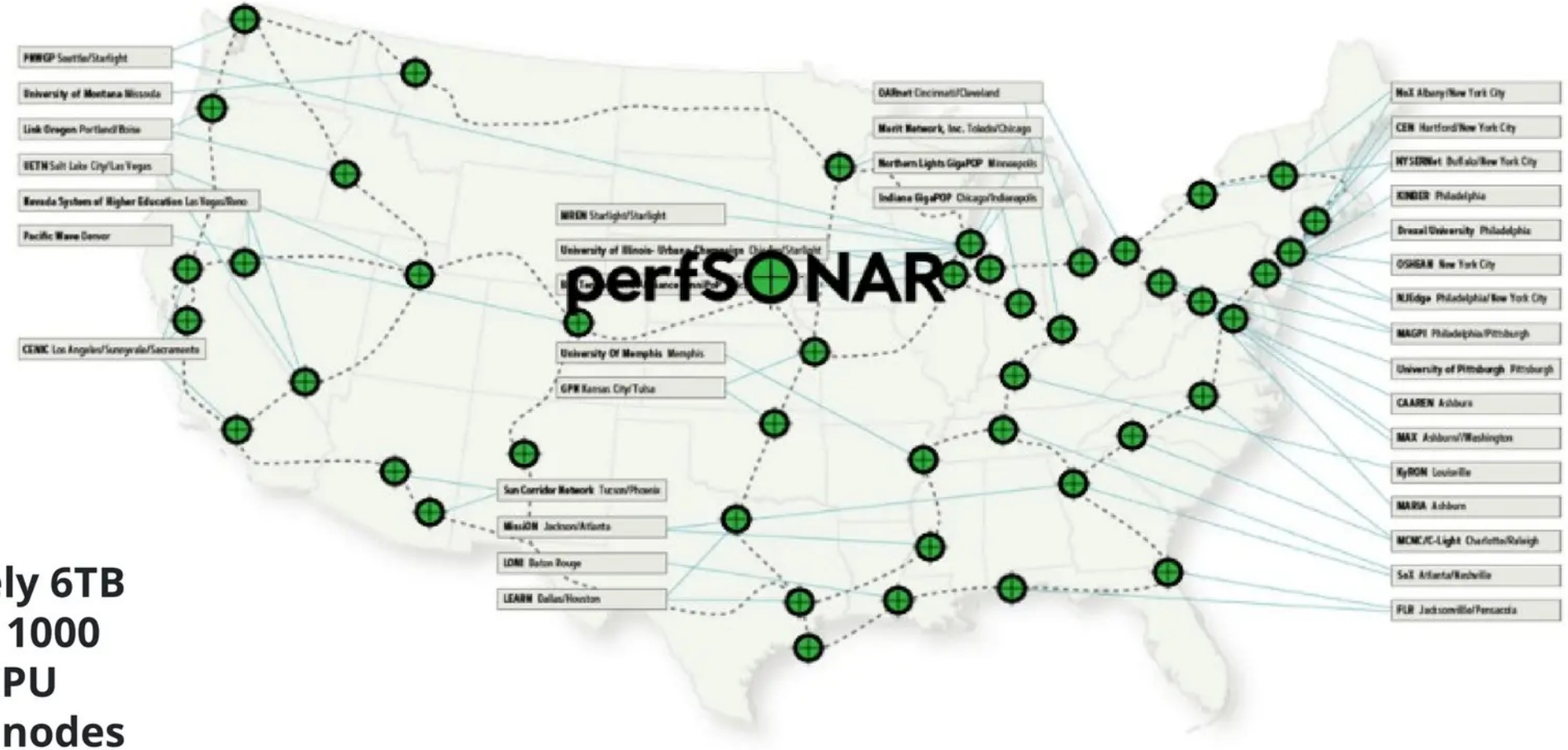
Internet2 & Regional Research & Education Networks (REN) in the United States



Benefits to RENs of Contributing to NRP via the CENIC AIR Blueprint

- Provides a low barrier method to increase infrastructure for research and education efforts – minimally impactful to REN staff
- Provides a mechanism for RENs to promote the identity and education efforts of institutions of all sizes
- Proven models to follow for seeking NSF funding through a variety of Campus Cyberinfrastructure (CC*) opportunities
- Based on Nautilus practices, provides network vantage points to help assure network performance from campus Science DMZs and opportunities to contribute to network research data

Internet2's 40+ Performance Assurance Service Nodes are being added to NRP and will be running Ark, RIPE Atlas and perfSONAR



Approximately 6TB of RAM and 1000 cores of CPU across these nodes

Currently these nodes are only running perfSONAR

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	ARK	RIPE Atlas	perfSONAR
Description	A globally distributed measurement platform that operates measurement campaigns, curates results into an Internet topology data kit, and supports vetted access to programmable environment	A globally distributed measurement platform that operates several measurement campaigns and supports broad execution of limited set of measurements	Network measurement toolkit that provides federated coverage of network paths, interface to schedule measurements, store, visualize data
Type of Measurements	ping, traceroute, DNS, HTTP, UDP probes, packet capture, IP address alias resolution (tightly coordinated)	Built-in: RTT to first 2 hops, ping/traceroute/SSL queries to routing table, DNS queries to root servers. User-defined: ping, traceroute, DNS, TLS and NTP query to any destination	Throughput (TCP and UDP), round-trip time, one-way delay, one-way packet loss, network path
User-Defined Scheduled Measurements	Yes	System of credits based on participation	Yes
On-demand Measurements	Yes	System of credits based on participation	Yes
Incoming Measurements	Yes; site-programmable	No	Yes; site-programmable
Target Control	Yes; site-programmable	Any non-local destination	Yes; site-programmable
Type of Distribution	Hardware or software	Hardware device or software package	Software
Data Storage	Central	Central	Local or central; many archive types
Storage Architecture	Data stored in various documented topology related datasets	Data stored in service provider infrastructure + Google BigQuery	Data stored in user infrastructure
Access to Archive Measurements	Central web interface	Central web interface	Local or central web interface
Source of Funding	US Government Research Funding	RIPE Members (ISPs)	US Government Research Funding