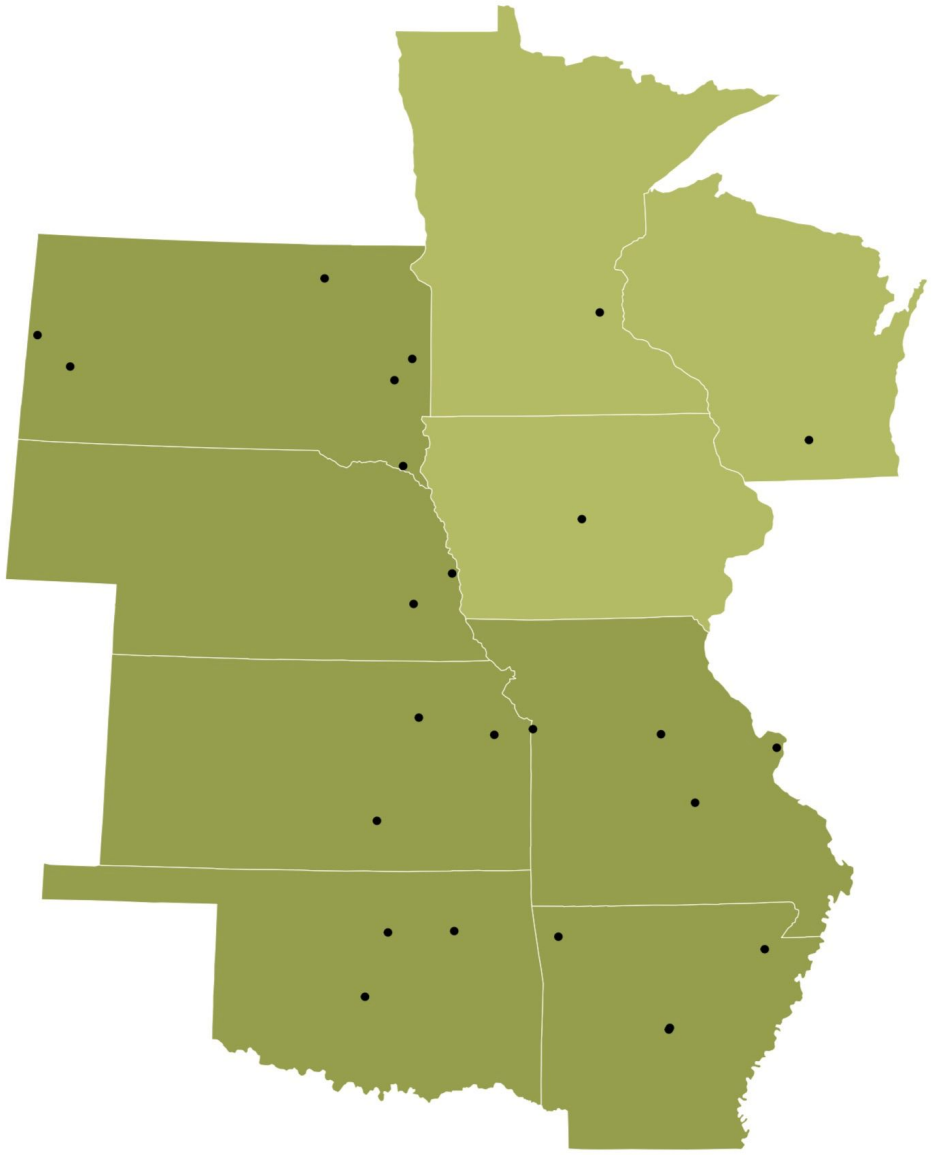
GPN-RP
Efforts in Developing a Regional Research Platform

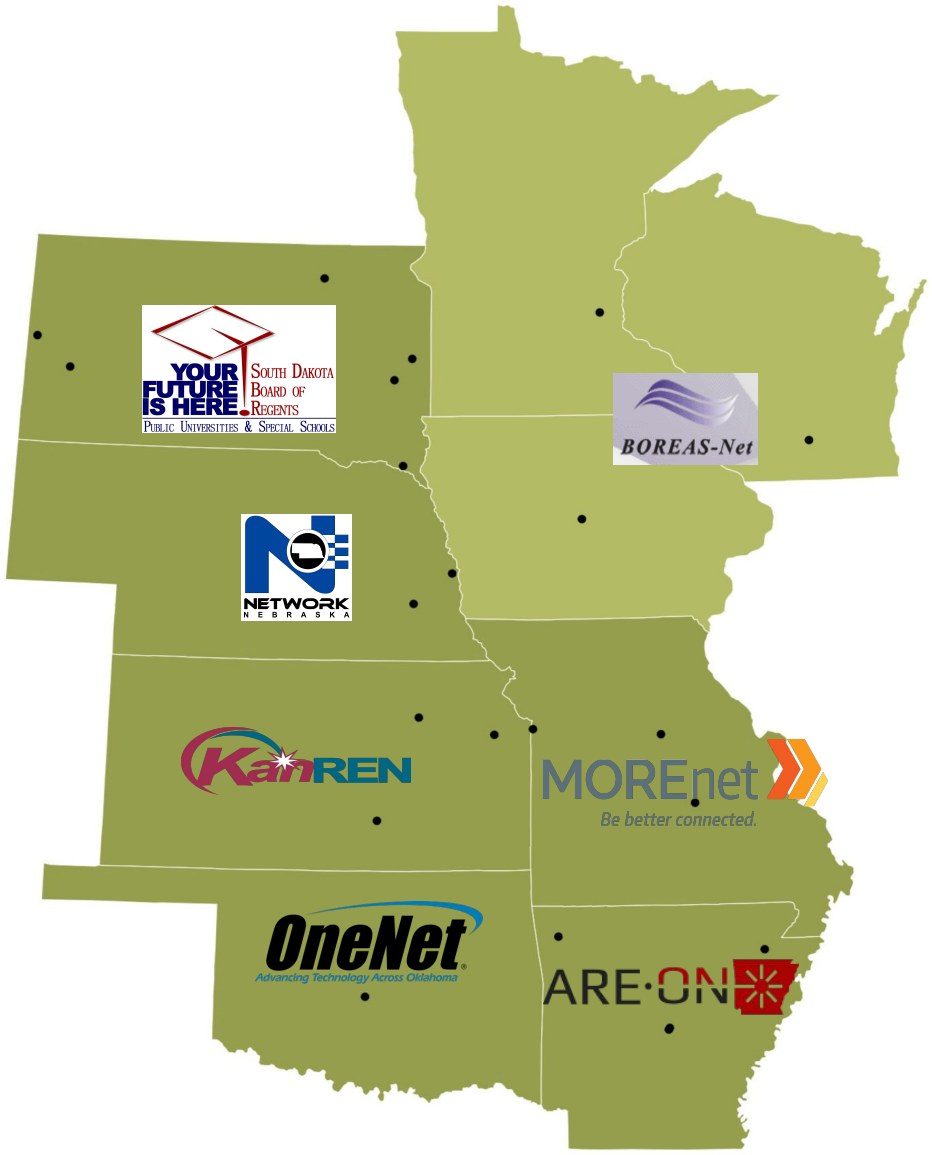
3rd National Research Platform Meeting
Minneapolis, MN
2019

James Deaton
Executive Director
jed@greatplains.net



- The Great Plains Network (GPN) is a non-profit consortium aggregating networks through GigaPoP connections while advocating research on behalf of universities and community innovators across the Midwest and Great Plains who seek collaboration, cyberinfrastructure and support for big data and big ideas, at the speed of the modern Internet.

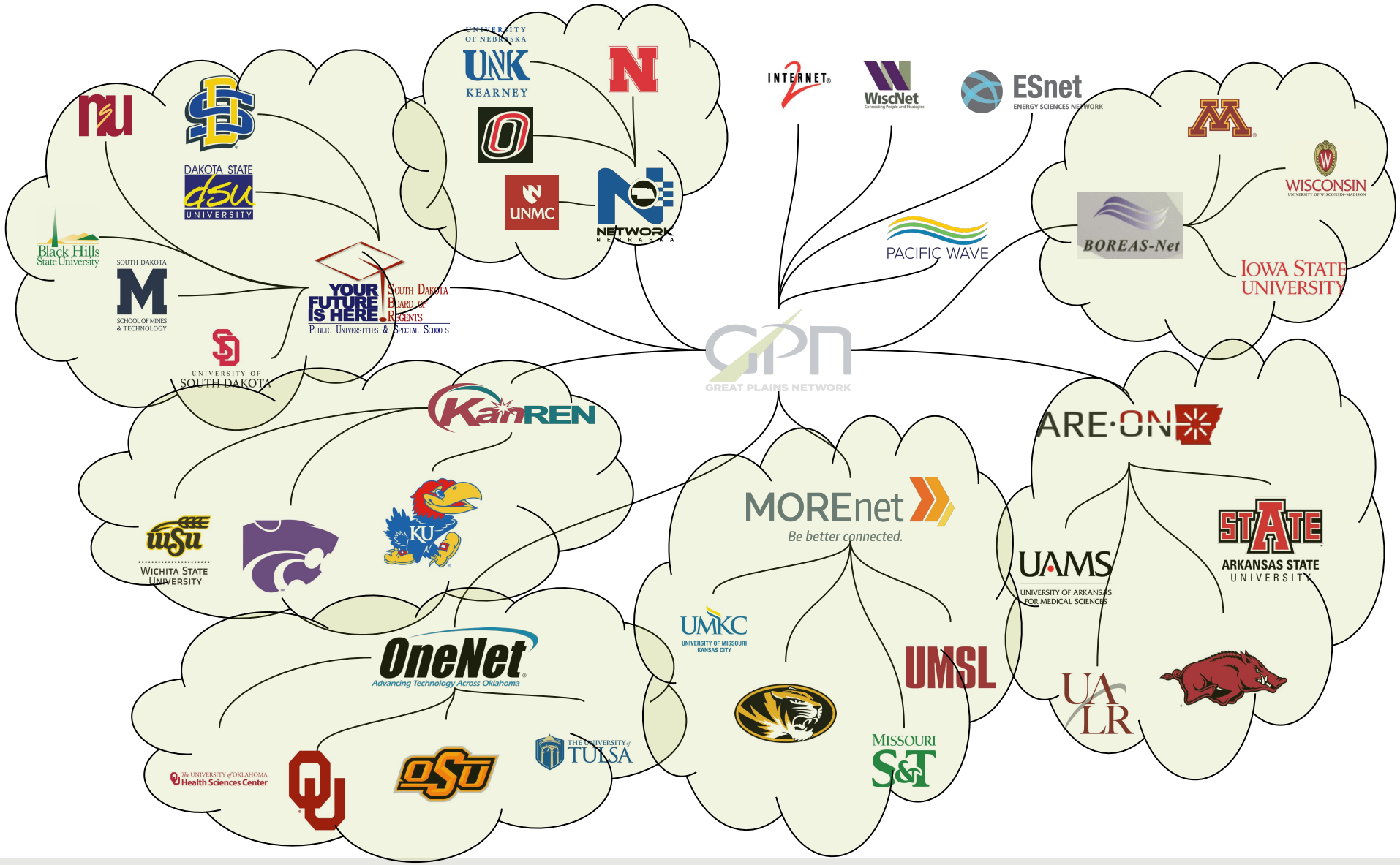
- Over two dozen universities
  - Across 9 states
    - More than 20 years of collaborating in research and education networking



Connected via 6 state networks and a RON

- ARE-ON
- KanREN
- MOREnet
- Network Nebraska
- OneNet
- SD-REED

- BOREAS


UNIVERSITY OF NEBRASKA
UNK
KEARNEY
UNMC
NETWORK NEBRASKA
INTERNET2
WiscNet
ESnet
ENERGY SCIENCES NETWORK
DAKOTA STATE
UNIVERSITY
Black Hills State University
SOUTH DAKOTA SCHOOL OF MINES & TECHNOLOGY
YOUR FUTURE IS HERE
SOUTH DAKOTA BOARD OF REGENTS
PUBLIC UNIVERSITIES & SPECIAL SCHOOLS
UNIVERSITY OF SOUTH DAKOTA
PACIFIC WAVE
BOREAS-Net
WISCONSIN
UNIVERSITY OF WISCONSIN-MADISON
IOWA STATE UNIVERSITY
GREAT PLAINS NETWORK
KanREN
WICHITA STATE UNIVERSITY
KU
MOREnet
Be better connected.
ARE·ON
UAMS
UNIVERSITY OF ARKANSAS FOR MEDICAL SCIENCES
STATE
ARKANSAS STATE UNIVERSITY
UMKC
UNIVERSITY OF MISSOURI KANSAS CITY
UMSL
UALR
OneNet
Advancing Technology Across Oklahoma
The University of Oklahoma Health Sciences Center
THE UNIVERSITY of TULSA
MISSOURI S&T

History of CI Sharing and Facilitation in the Region

http://www.oneocii.okepscor.org/

ACI-REF Virtual Residency

SHOW ME CI .org/

GPN Cyberinfrastructure Program Committee (CIP)

THE CARPENTRIES

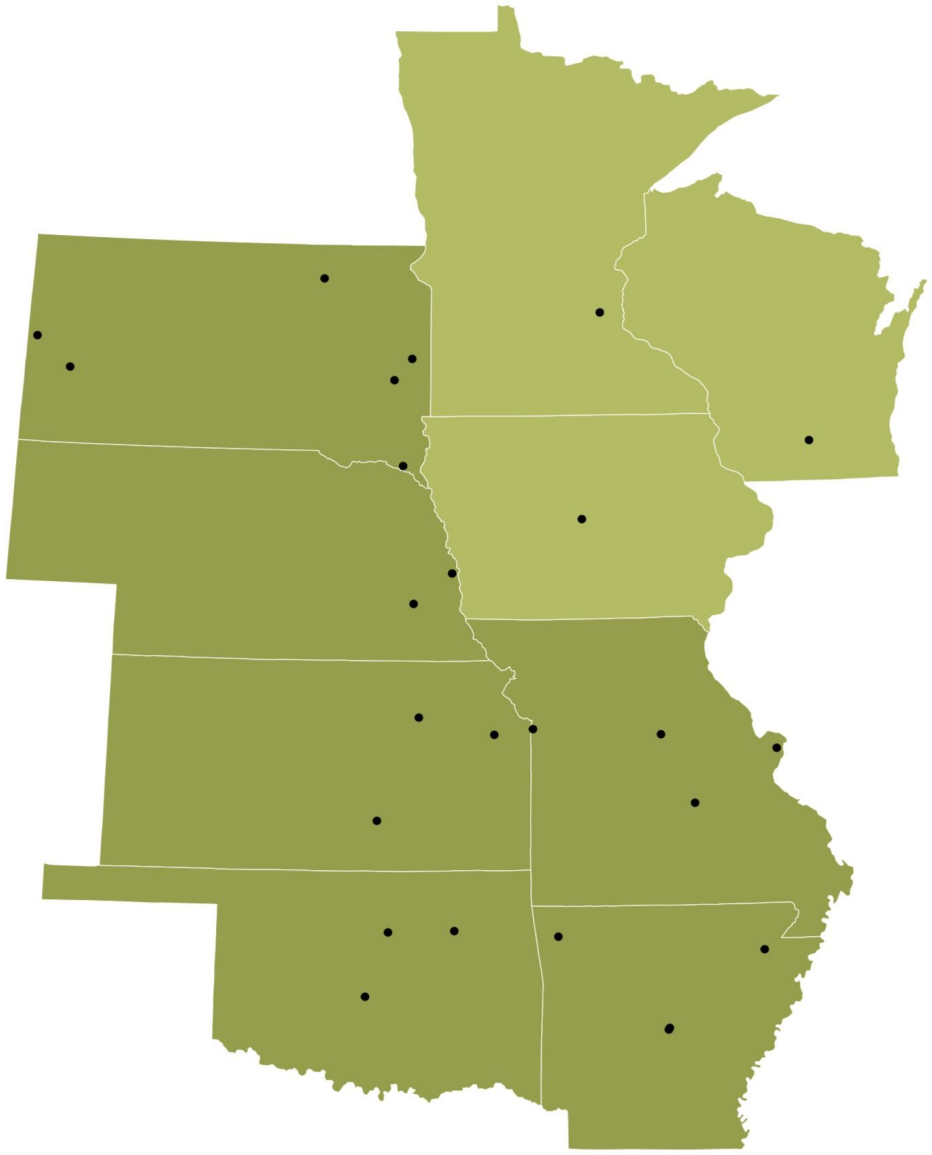
ENCITE:

Enhancing Cyberinfrastructure by Training and Engagement

https://www.greatplains.net/archives/presentations/

Universities in the Region Directly Impacted by CC* Grants

Black Hills State University
Cameron University
East Central Oklahoma University
Fort Hays State University
Kansas State University
Langston University
Northeastern State University
Oklahoma State University
Oral Roberts University
Rogers State University
South Dakota School of Mines and Technology
South Dakota State University
Southwestern Oklahoma State University
University of Arkansas
University of Arkansas at Pine Bluff
University of Central Oklahoma
University of Kansas
University of Missouri-Columbia
University of Missouri-Kansas City
University of Nebraska-Lincoln
University of Oklahoma Norman Campus
University of South Dakota Main Campus
University of Tulsa



GPN Executive Council:

- The GPN will fund one FIONA node per state. This support is contingent upon a statement from the Cyberinfrastructure Program Committee providing details on how the single node is standardized and will be allocated in each state and how it will impact participation with each of the member institutions within the state.

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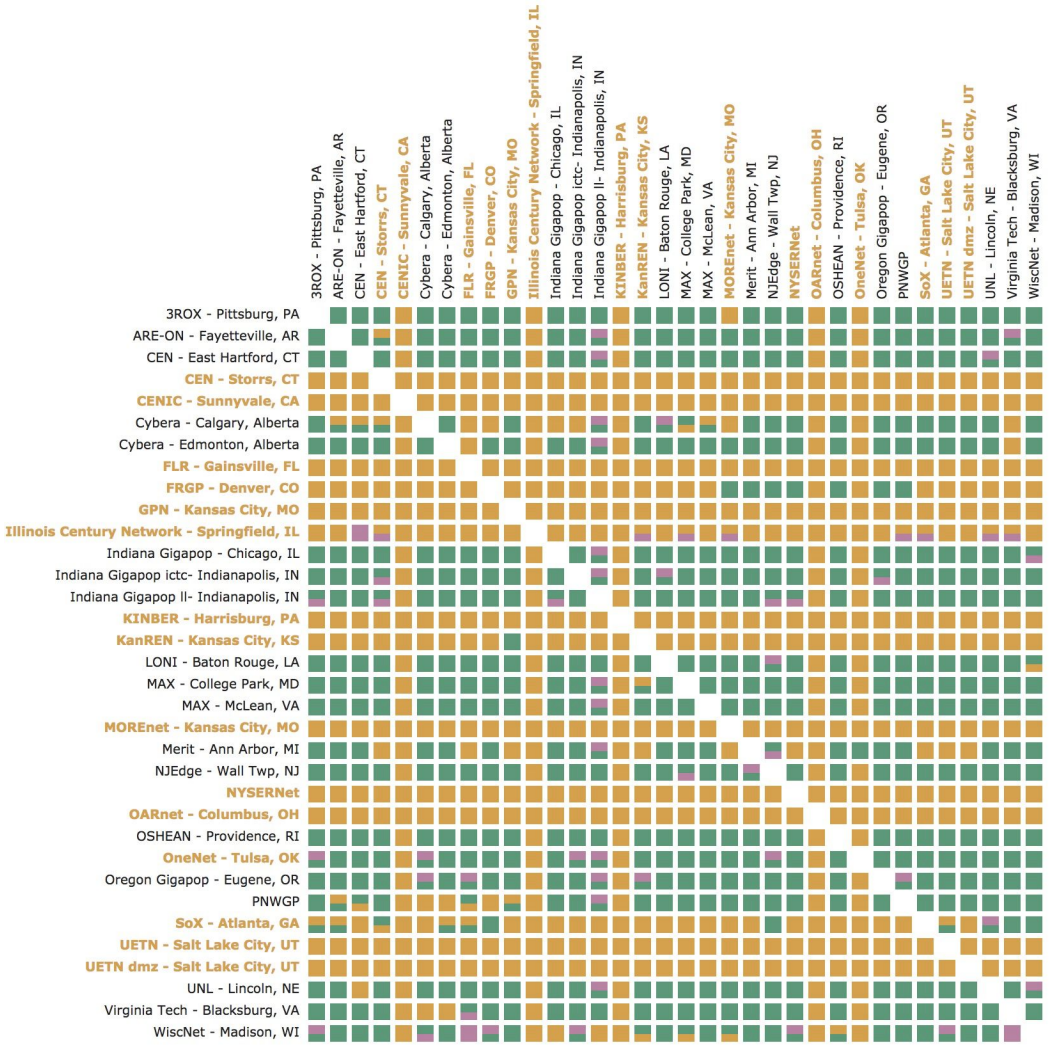
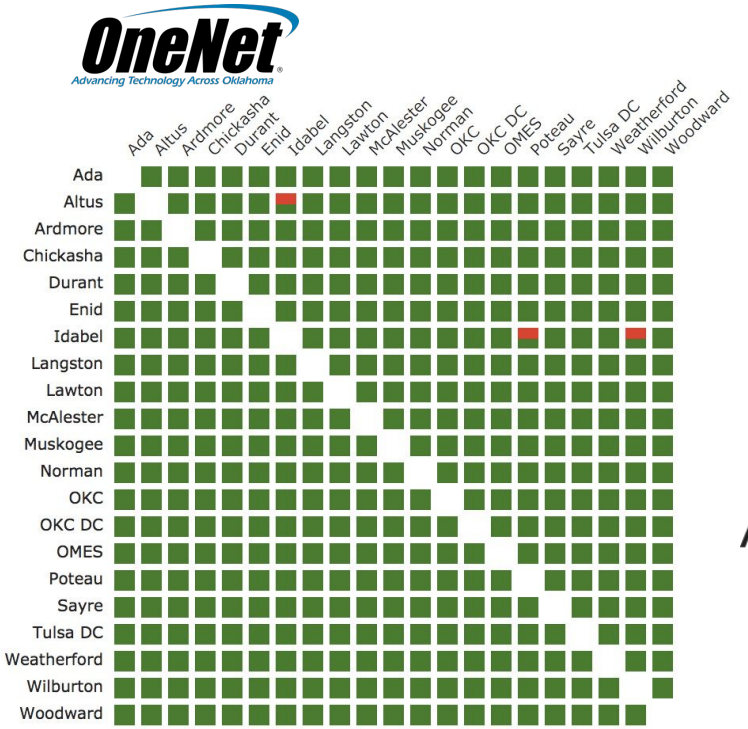
Plus 8 more!

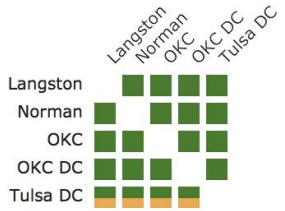
Following the PRP Communication Strategy

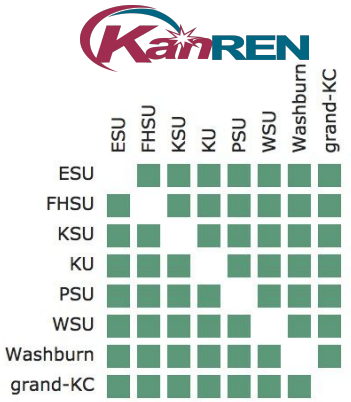
Hollywood Squares of Zoom
And active channels of Rocket.Chat (Slack in our case)

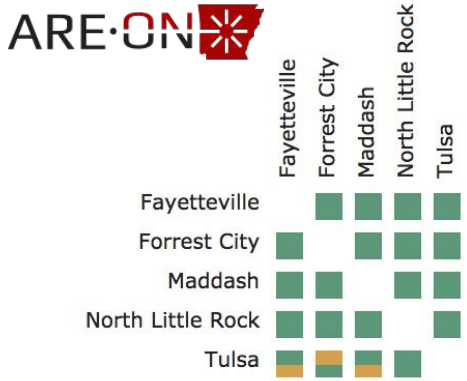
Participants include:
Campus Champions, Campus Enterprise & Research IT Teams, State Network Architects, Research Computing Teams


3ROX - Pittsburg, PA
ARE-ON - Fayetteville, AR
CEN - East Hartford, CT
CEN - Storrs, CT
CENIC - Sunnyvale, CA
Cybera - Calgary, Alberta
Cybera - Edmonton, Alberta
FLR - Gainsville, FL
FRGP - Denver, CO
GPN - Kansas City, MO
Illinois Century Network - Springfield, IL
Indiana Gigapop - Chicago, IL
Indiana Gigapop ictc- Indianapolis, IN
Indiana Gigapop II- Indianapolis, IN
KINBER - Harrisburg, PA
KanREN - Kansas City, KS
LONI - Baton Rouge, LA
MAX - College Park, MD
MAX - McLean, VA
MOREnet - Kansas City, MO
Merit - Ann Arbor, MI
NJEdge - Wall Twp, NJ
NYSERNet
OARnet - Columbus, OH
OSHEAN - Providence, RI
OneNet - Tulsa, OK
Oregon Gigapop - Eugene, OR
PNWGP
SoX - Atlanta, GA
UETN - Salt Lake City, UT
UETN dmz - Salt Lake City, UT
UNL - Lincoln, NE
Virginia Tech - Blacksburg, VA
WiscNet - Madison, WI

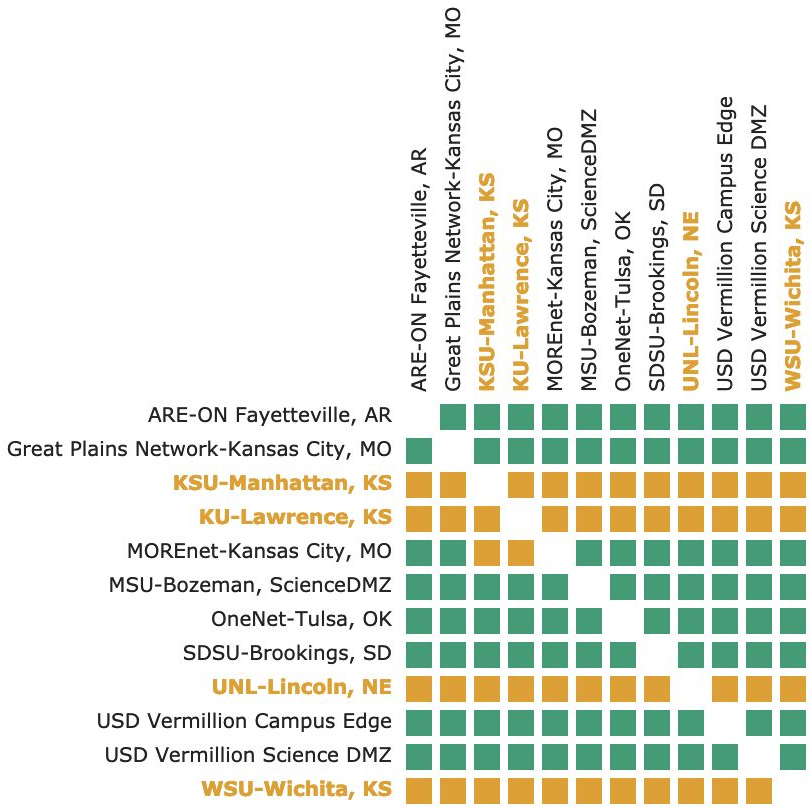

OneNet
Advancing Technology Across Oklahoma
Ada
Altus
Ardmore
Chickasha
Durant
Enid
Idabel
Langston
Lawton
McAlester
Muskogee
Norman
OKC
OKC DC
OMES
Poteau
Sayre
Tulsa DC
Weatherford
Wilburton
Woodward

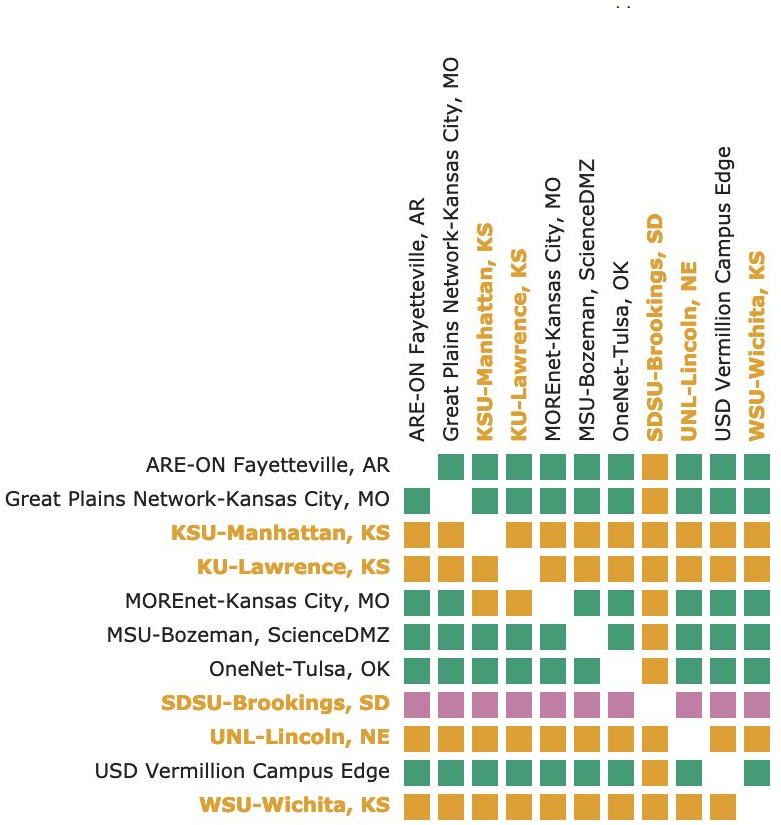

Langston
Norman
OKC
OKC DC
Tulsa DC


KanREN
ESU
FHSU
KSU
KU
PSU
WSU
Washburn
grand-KC


ARE·ON
Fayetteville
Forrest City
Maddash
North Little Rock
Tulsa

GPN-RP perfSONAR Dashboard





NSF Campus Cyberinfrastructure PI and
Cybersecurity Innovation for Cyberinfrastructure PI Workshop
September 23 – 25, 2019 | Minneapolis, MN

Quad Chart for: *The Great Plains Regional CyberTeam*

Challenge:

Supporting computational and data-intensive research at under-resourced institutions in rural states is challenging.

Rural states have:

- Sparse populations
- Fewer trained CI staff
- Smaller research output
- Less participation in national CI community.

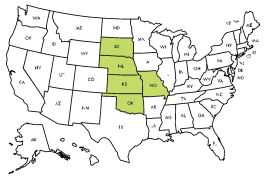
Broader Impact:

- Drives CI development and adoption in EPSCoR States
- Enables advancements on campuses currently underserved by advanced CI
- Develops and disseminates CI best practices for an effective CyberTeam

GREAT PLAINS NETWORK

UNIVERSITY OF SOUTH DAKOTA

KANSAS STATE UNIVERSITY



Approach:

- Bring CI expertise directly to rural campuses.
- Cross-institutional distributed support team with 4 key foci:
  - **Networking**
  - **System Administration**
  - **Security**
  - **Researcher Training and Outreach**
- Leverages existing collaboration model of regional networks
- Pairs regional mentors with mentees and students
- Onsite campus engagement focused on enabling specific science workflows

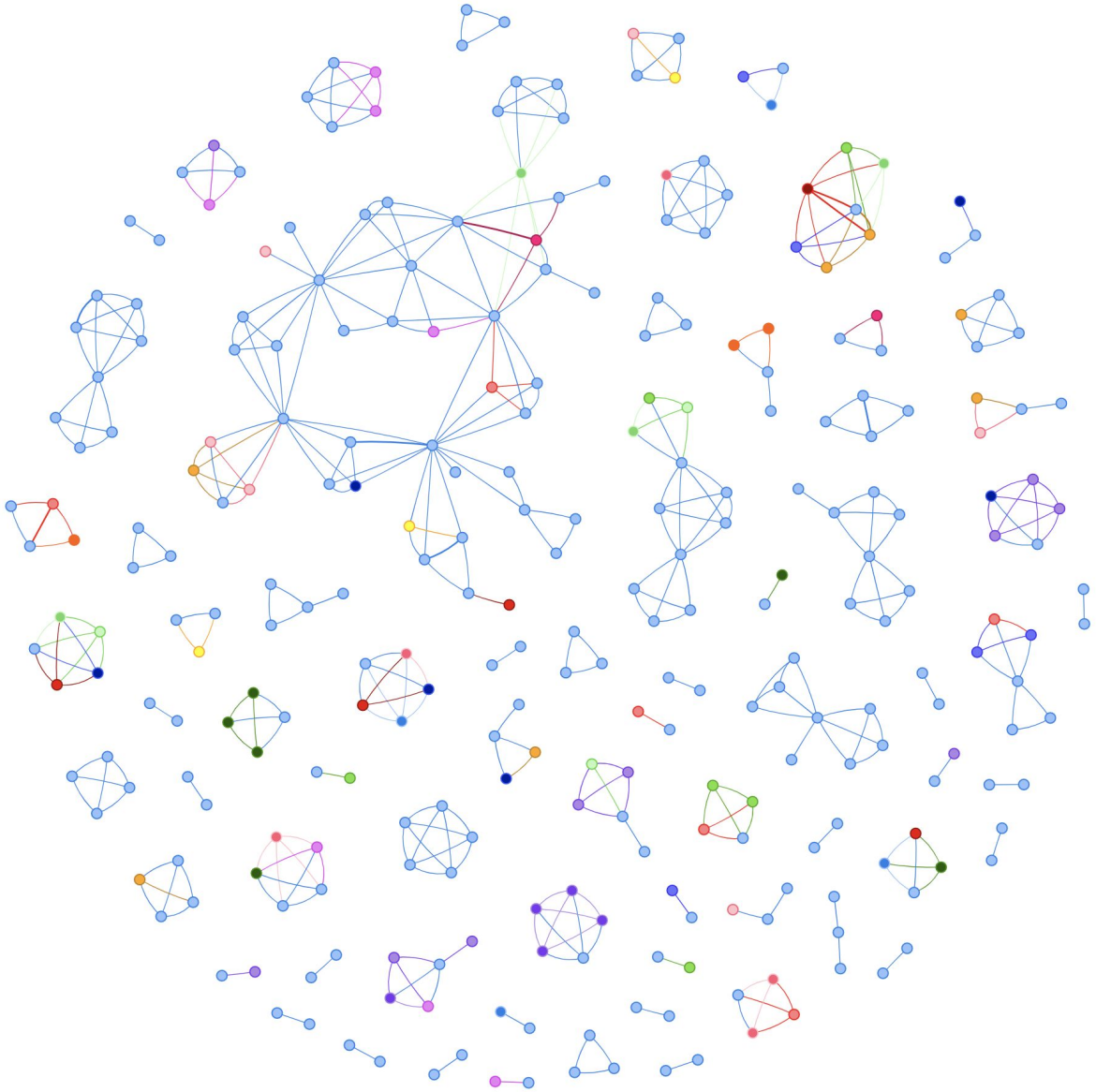
Participation in the PRP's "Nautilus Hypercluster"

PRP's "Nautilus Hypercluster" provides a platform where members of our community - whether they are researchers, research computing or research network operators can explore ideas atop of an infrastructure designed to be as akin to the major cloud providers to ultimately provide a mechanism to scale into (and out of) any of the major cloud providers.

With its caveats (of which we **often** discuss) it's providing a path to rapidly innovate upon possibilities with minimal friction for those that are becoming familiar with industry-leading container orchestration systems.

Social Network Analysis of Awards

- Reviewing data from NSF and NIH currently
- Text analysis to increase focus on projects with potential greater amounts of data movement
- Color of dots represent the state of the PI or co-PI's institution
- Lines represent common NSF awards between PIs, thickness represents number of awards between PIs
- As familiarity with the graphs grow, can visually identify interesting inter-institutional and/or interstate collaborations facilitating engagement opportunities



NSF PI Connections

Number of years: 5 (1 2 3 4 5 6 7 8 9 10)

State: Missouri

.EDU site: missouri.edu, umkc.edu, mst.edu, umsystem.edu, umsl.edu

Choose one:
- interstate
- inter-institution
- all

Download

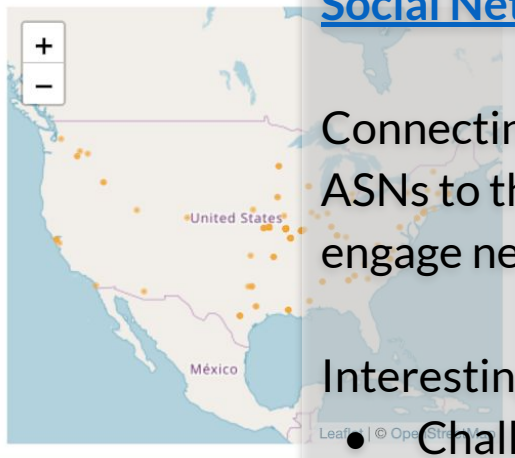
Dashboard

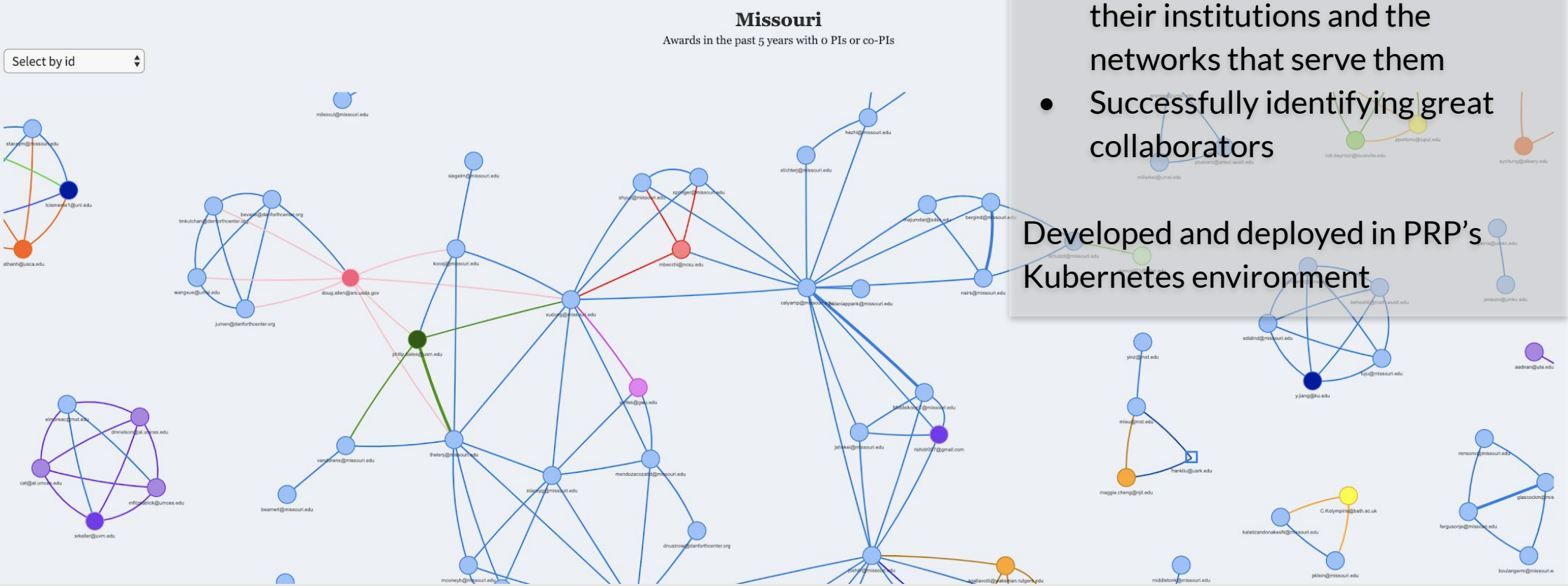
Raw data

Column visibility | Copy | Print | Download | Search:

link	award_id	title
Info	1339156	Polyploidy and Plasticity in the Crop Brassicas
Info	1351274	CAREER:Multi-Scale Meniscus Thin-Film Evaporation Enhancement using Hierarchical Tri-Porous Media
Info	1354609	Probing the Role of Glia in Neuronal Function and Behavior in Drosophila
Info	1355151	Collaborative Research:RCN:UrBioNet: A global network of urban biodiversity research and practice

Showing 1 to 4 of 227 entries





Social Network Analysis of Awards

Connecting network data such as ASNs to the institutions to help engage networkers

Interesting discoveries:
- Challenges of mapping co-PIs to their institutions and the networks that serve them
- Successfully identifying great collaborators

Developed and deployed in PRP's Kubernetes environment

ARTEMIS

self-managed BGP hijacking detection

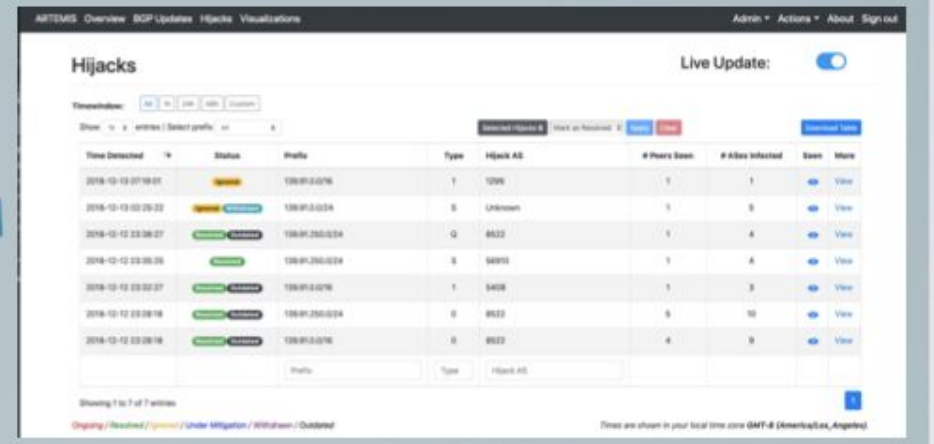
https://github.com/FORTH-ICS-INSPIRE/artemis

RIPE NCC
RIPE NETWORK COORDINATION CENTRE

ROUTE VIEWS 6447

BGP STREAM

ARTEMIS



Sermpezis et al. , "ARTEMIS: Neutralizing BGP Hijacking within a Minute"
IEEE/ACM Transactions on Networking 2018

Foundation for Research and Technology-Hellas
University of Crete,
FORTH INSTITUTE OF COMPUTER SCIENCE

caida
Center for Applied Internet Data Analysis
University of California San Diego

kubernetes

PRP PACIFIC RESEARCH PLATFORM

NSF OAC-1848641 — Sep 2018 - Aug 2019
Experimental Deployment of the ARTEMIS BGP Hijacking Detection Prototype in Research and Educational Networks

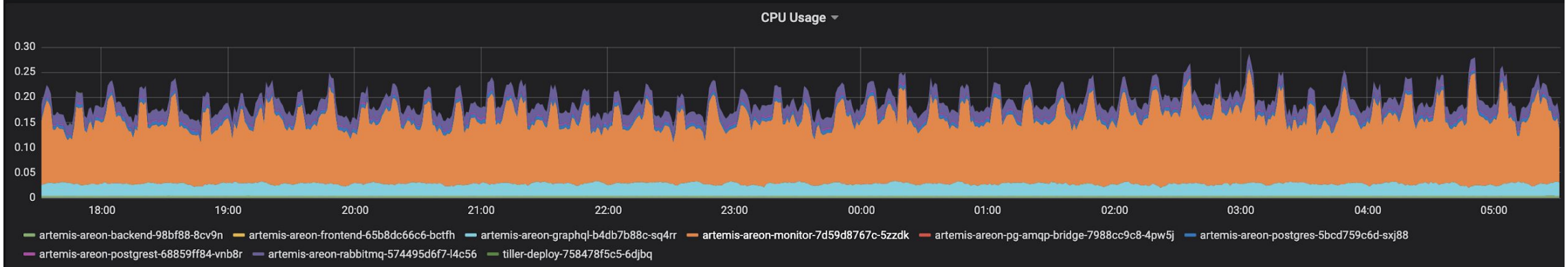
GPN GREAT PLAINS NETWORK
www.greatplains.net

INTERNET2

merit
NETWORK. SECURITY. COMMUNITY.

datasource prometheus namespace artemis-areon

CPU Usage

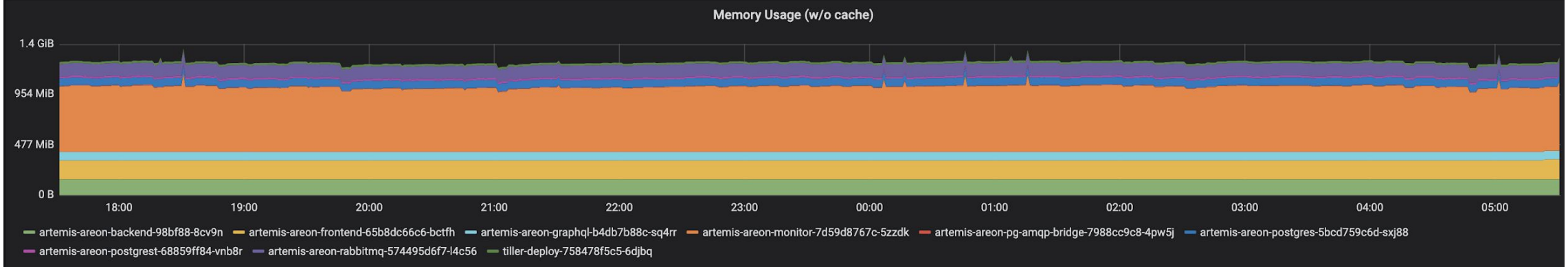


CPU Quota

CPU Quota

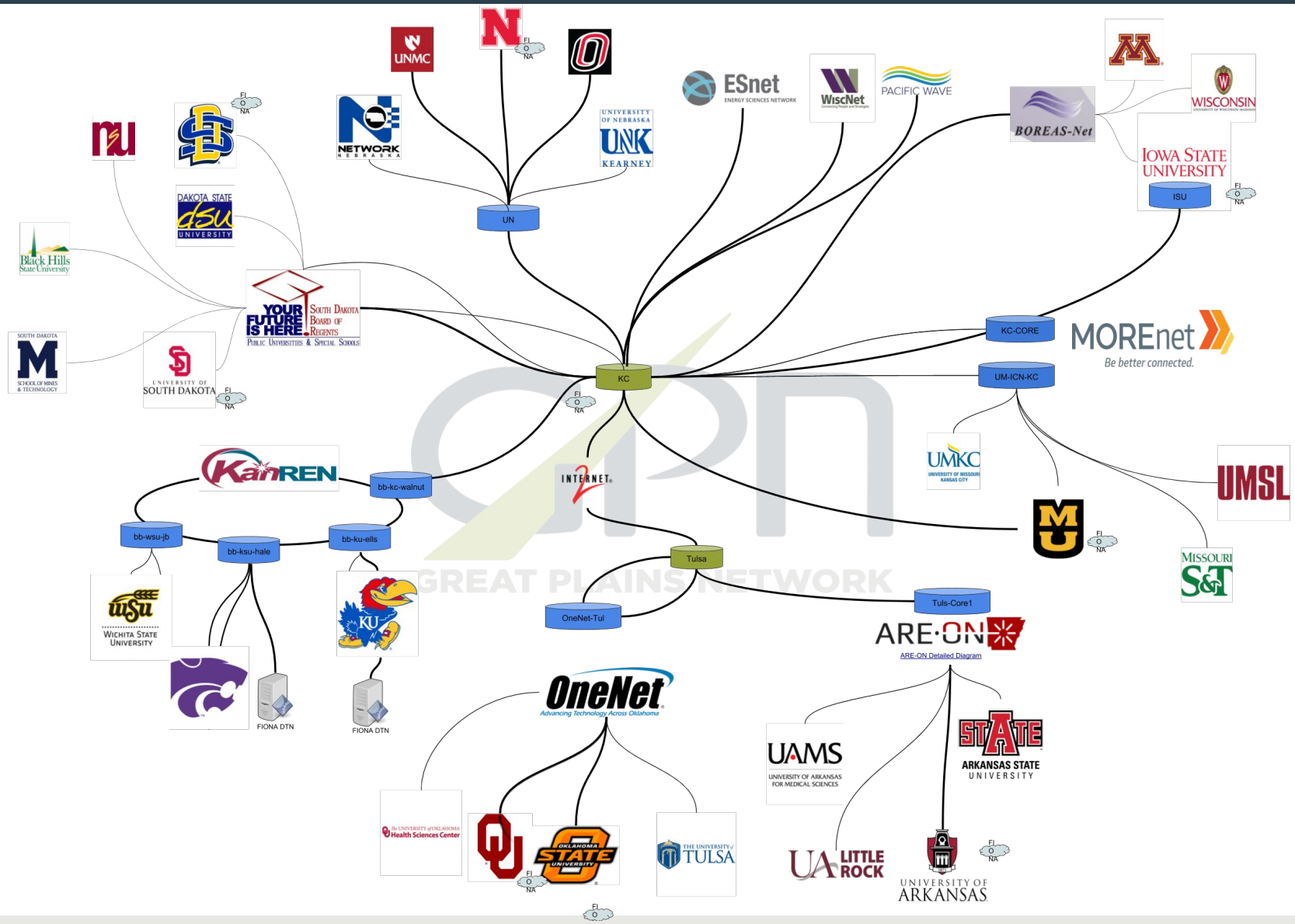
Pod	CPU Usage
artemis-areon-rabbitmq-574495d6f7-l4c56	0.02
artemis-areon-postgres-5bcd759c6d-sxj88	0.01
artemis-areon-pg-amqp-bridge-7988cc9c8-4pw5j	0.00
artemis-areon-graphql-b4db7b88c-sq4rr	0.03
artemis-areon-frontend-65b8dc66c6-bctfh	0.00
artemis-areon-backend-98bf88-8cv9n	0.00

Memory Usage



Greater Transparency of the Paths

- Research and education data traverse state networks, regional networks and national networks
- All these networks collect metrics regarding their network
- We all have a set of common goals
- What can we share to make the understanding of the full path friction-free



netsage

Bandwidth Dashboard

Last 7 days Refresh every 1d

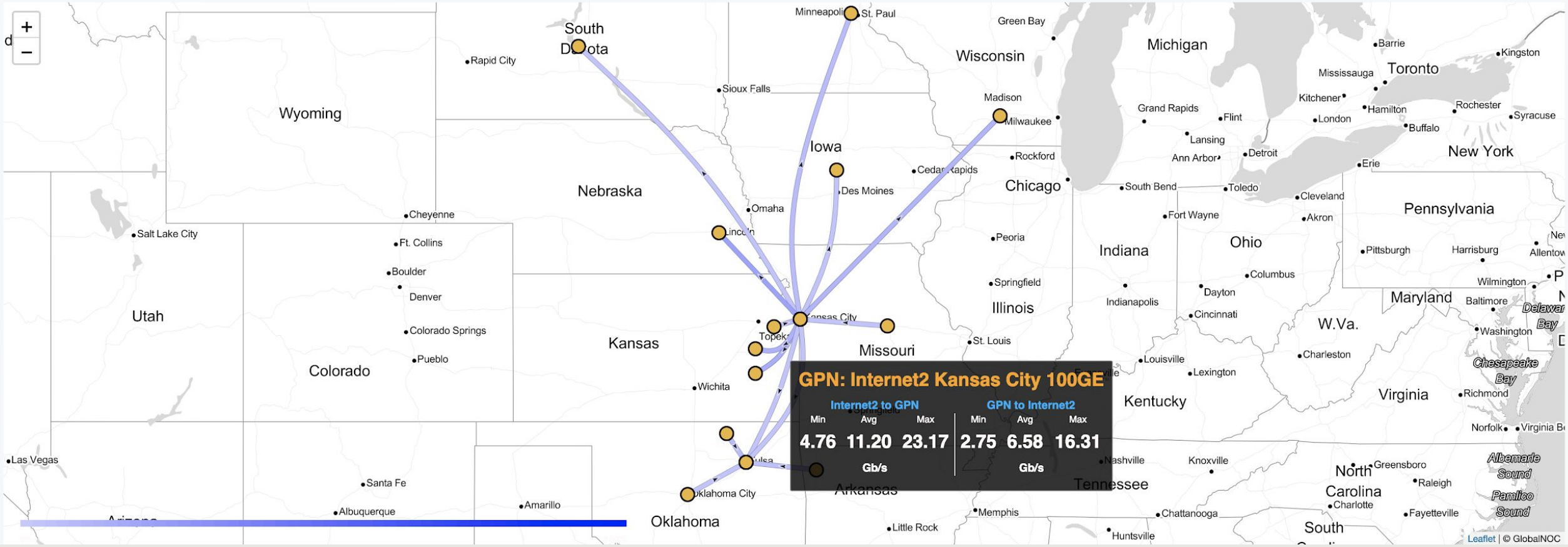
Links All

Other Dashboards

Single Link Max
66.81 Gbps

Average Across All Links
4.04 Gbps

Total Transferred
1.214 PB

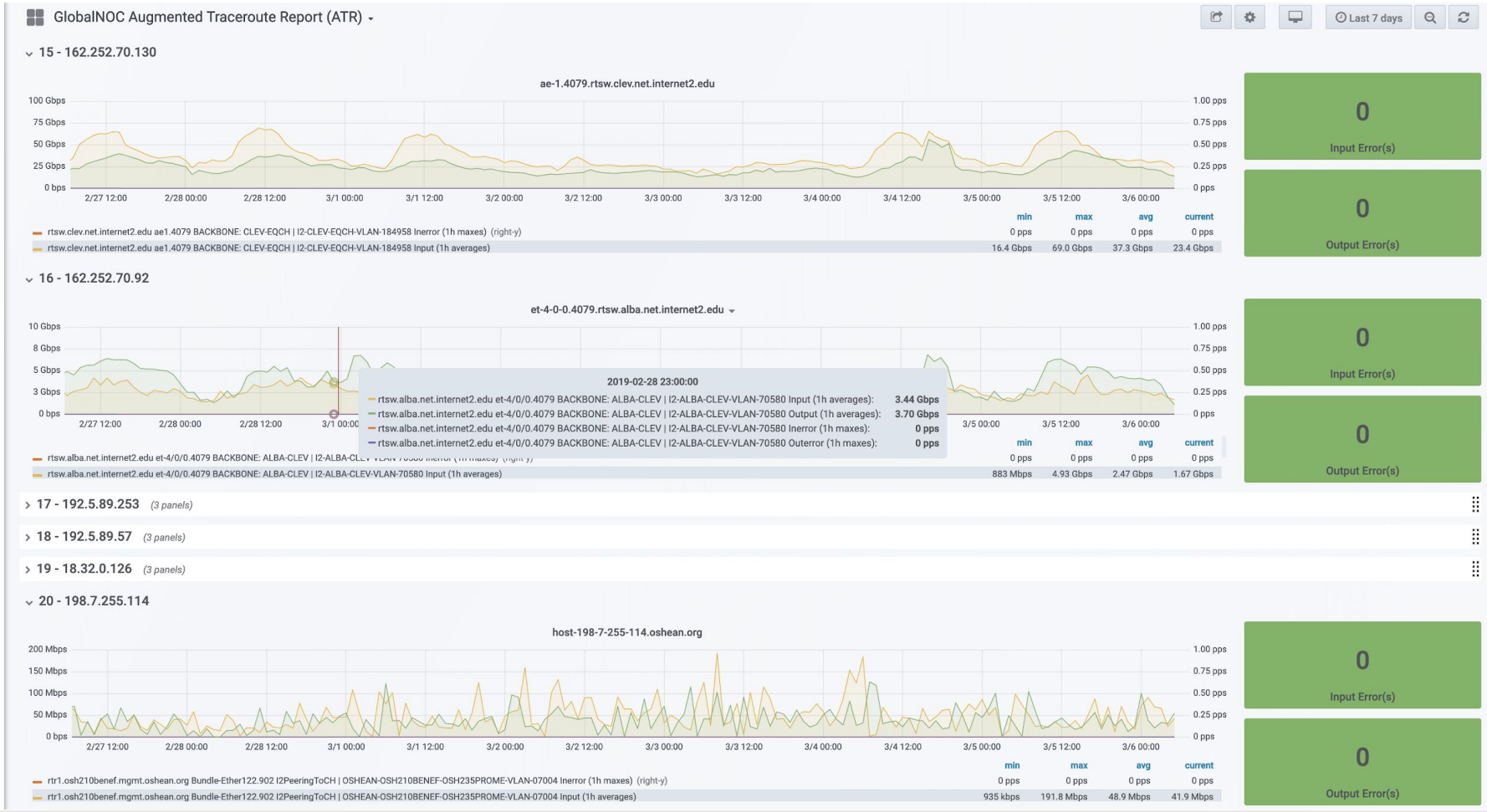


GlobalNOC Augmented Traceroute Report

Encouraged GlobalNOC Project

- **Numerous networks already work with GlobalNOC**
- **Simplify sharing of metrics collected**
- **Simplify visualizing the metrics along the paths**

KINBER
CEN
OSHEAN
OneNet
GPN
MCNC
NWAVE
Internet2, MANLAN, WIX
CAAREN
AREON
SOX
I-light
Indiana Gigapop
BTAA
Indiana University + its regional campuses
TransPAC
NEAAR



Recent and Upcoming Activity

- OSG with Kubernetes Workshop at GPN Annual Meeting
- Complete turn-up of GPN FIONA nodes across the campuses and adding new DTNs from recent CC* awards
- Leverage the RP interactions across the GPN members in identifying new applications and drivers for the FIONA nodes
- Facilitate Great Plains Cyber Team engagements
- Continue collaboration with EPOC and TNRP
- Exploring new opportunities working with FABRIC
- Very excited to continue to grow with Trusted CI renewal!