THE PA SCIENCE DMZ

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PA-DMZ PARTNERSHIP

- Partnership
  - Growing research networking connectivity needs in smaller institutions
  - KeystoneREN/KINBER planning grant
  - Penn State land grant mission and ICDS strategic goals

- New Proposal
  - NSF Program (CC): Campus Cyberinfrastructure
  - New Institutions - New Use cases
  - New capabilities
  - Novel approach
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PA-DMZ PROJECT OVERVIEW

- Frictionless Network (DMZ)
  - Goal - establish the foundation for a statewide Pennsylvania Regional Science DMZ (PA-DMZ) that enables and enhances access for under resourced PA institutions of higher education to cyberinfrastructure-based resources and services in support of science driven research and education applications.
- Grant supports
  - Networking hardware and connectivity
  - Installation and support for 2+ years (organizations to provide support years 3-5)
  - Broader Impacts and Research Enablement
- Grant Link: https://new.nsf.gov/funding/opportunities/campus-cyberinfrastructure-cc

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PA-DMZ PROJECT OVERVIEW

- $1.1M funding - NSF Award #2346589
- 6 partners
- Under-resourced Institution Current-Future State
  - Existing 1-2Gb/s Internet only
  - Adding 10/25Gb/s router, 10Gb/s Internet2, with 10G perfSONAR and 10G DTNs
- 2-year award PLUS 1-year NCE
  - 2024 - Team Formation, Site Visits, Requirements, Design, Procurement
  - 2025 - Install and Operational, Research Enablement
  - 2026 - Expansion and Sustainment Plan

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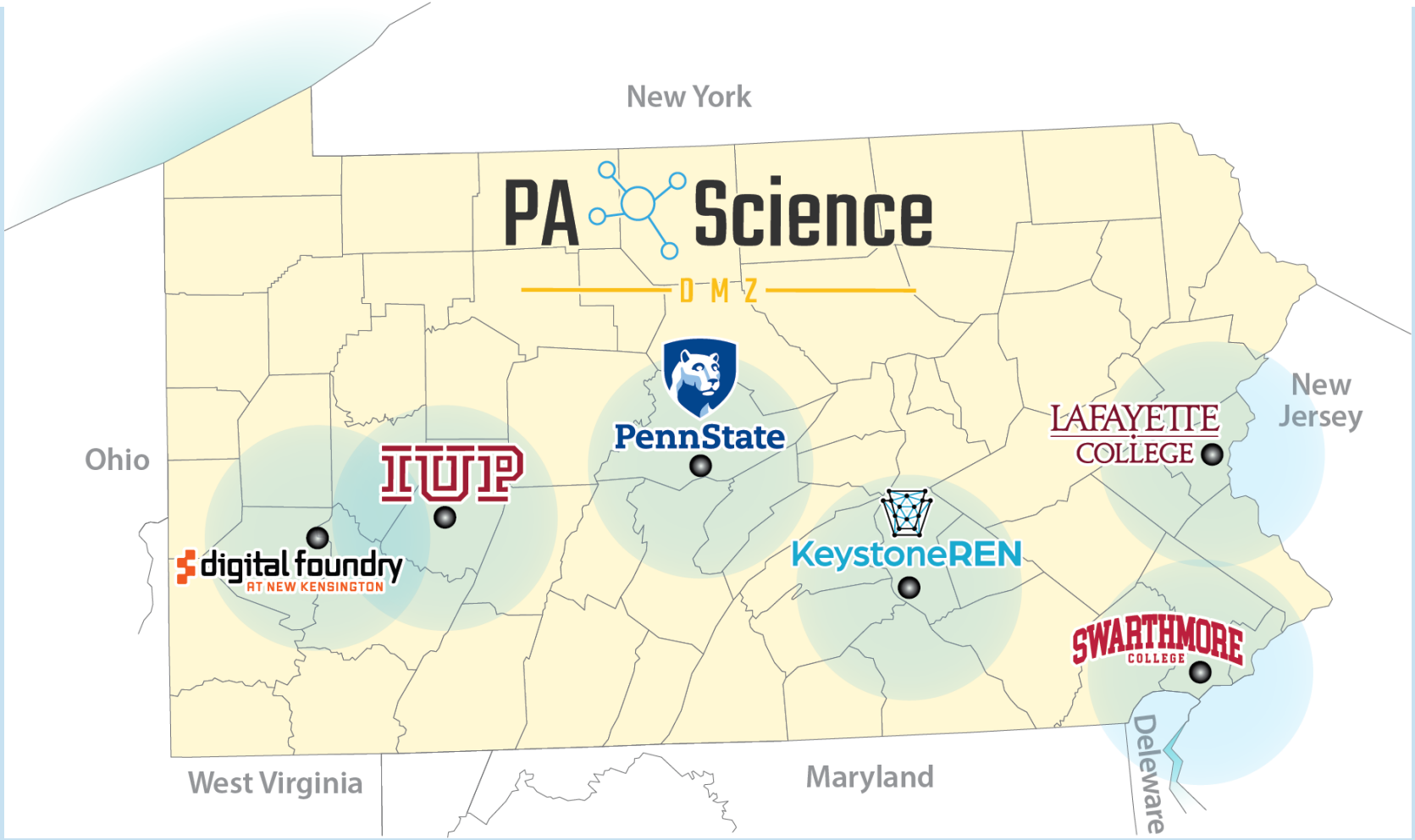
PA-DMZ CURRENT STATE



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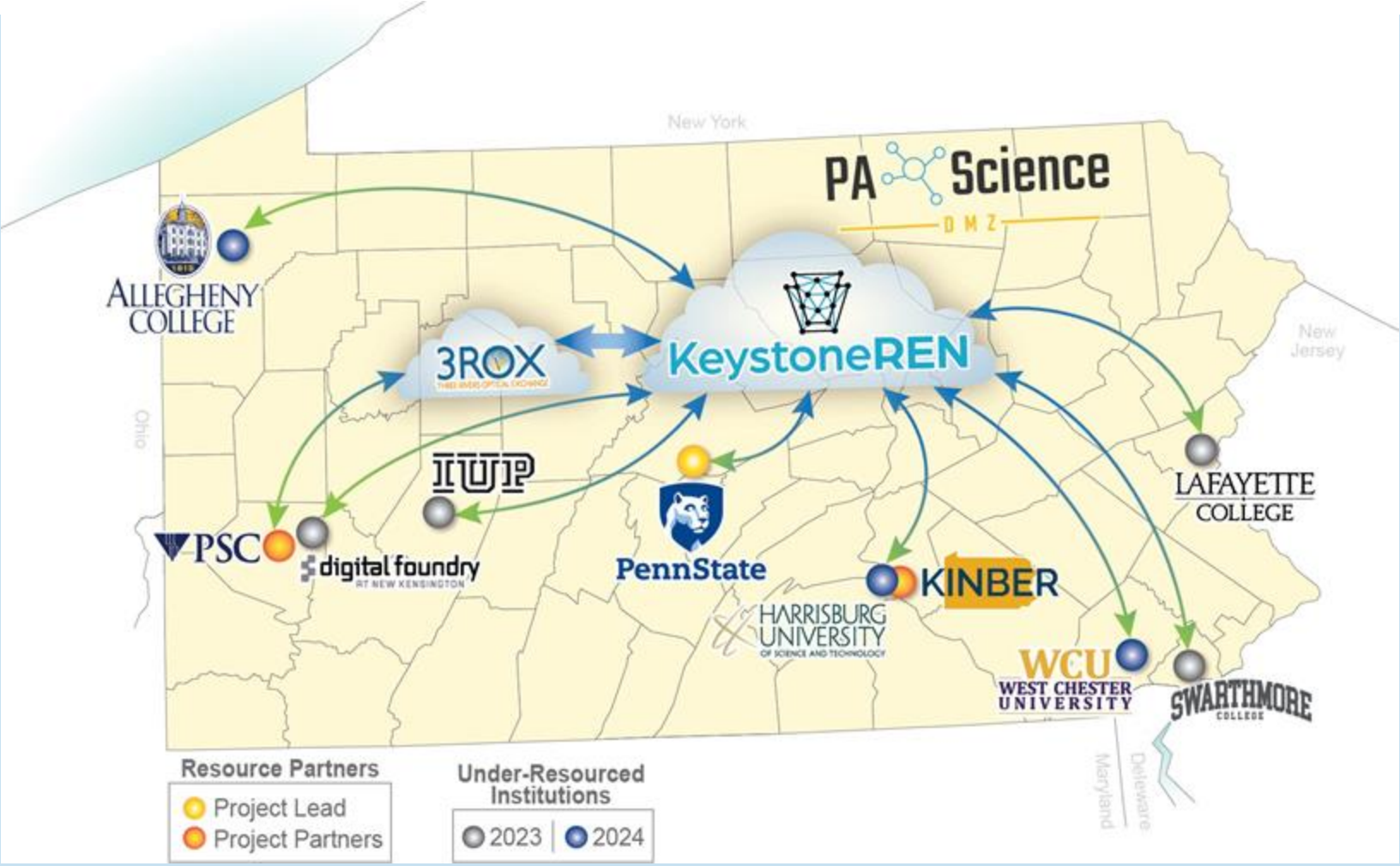
PA-DMZ NEXT STATE



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USE CASE SUMMARY

- Current - 10 Initial Use Cases
  - Biology
  - Chemistry
  - Math and Computer Science
  - Psychology
  - Visual Neuroscience
- Others include:
  - CyberSecurity, Linguistics, Smart Manufacturing

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SCIENCE DRIVER IMPACT

PRE:

Establish a Baseline by gathering existing data transfer bottleneck or limitations

IMPLEMENTATION:

Measure Total Science Data Transferred

POST:

How has Science Improved both quantitatively and qualitatively?

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MATH & COMP. SCI. USE CASE

Science Driver Description and Needs

- AI machine learning - training large learning models for classification or prediction.
- 10 TB data sets stored in an old electronics factory - not well-connected to the campus
- Fast connect back to HPC and storage

Key Data/Computational Challenges

- High speed campus bandwidth but access ports in offices/classrooms limited to 1Gig.
- RAID backup option for large datasets, more remote compute options - cloud based storage and remote compute options.

Projected Value

- Data sets will be securely shared outside of IUP to support remote access by IUP students for research and remote training activities with other colleges and local businesses

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BIOLOGY USE CASE

Science Driver Description and Needs

- Images from a confocal microscope located on campus.
- Using portable hard drives to move data -- Slow and Error Prone
- Generating hundreds of images of 100GB each
- Archive such images automatically after a set time.

Key Data/Computational Challenges

- Use Globus client on that system to watch a directory and move files automatically to HPC for analysis.

Projected Value

- Capture machines and internet sources; currently going to student laptops, etc. but project provides ability to centralize on the HPC

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CHEMISTRY USE CASE

Science Driver Description and Needs

- Multiple TB of CryoEM data stored on a servers at other institutions
- Transfer to local campus is always failing.
- Project continues to scale making problem worse.

Key Data/Computational Challenges

- Need to transfer to local servers to process data on CryoSPARC
- Need local storage for results and raw data

Projected Value

- Enables projects and research to scale enabling larger grant submissions and collaborations

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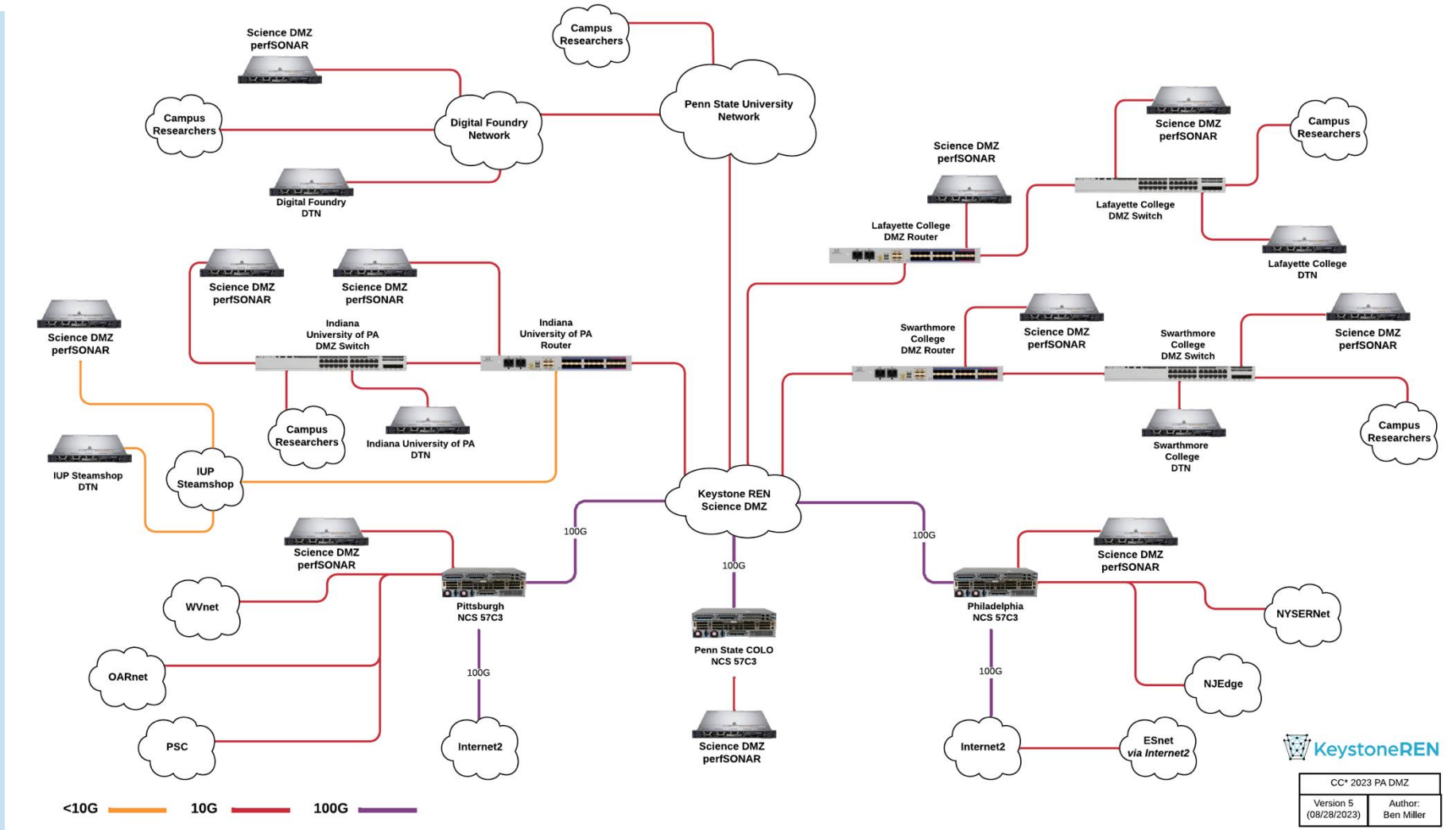
NETWORK DIAGRAM



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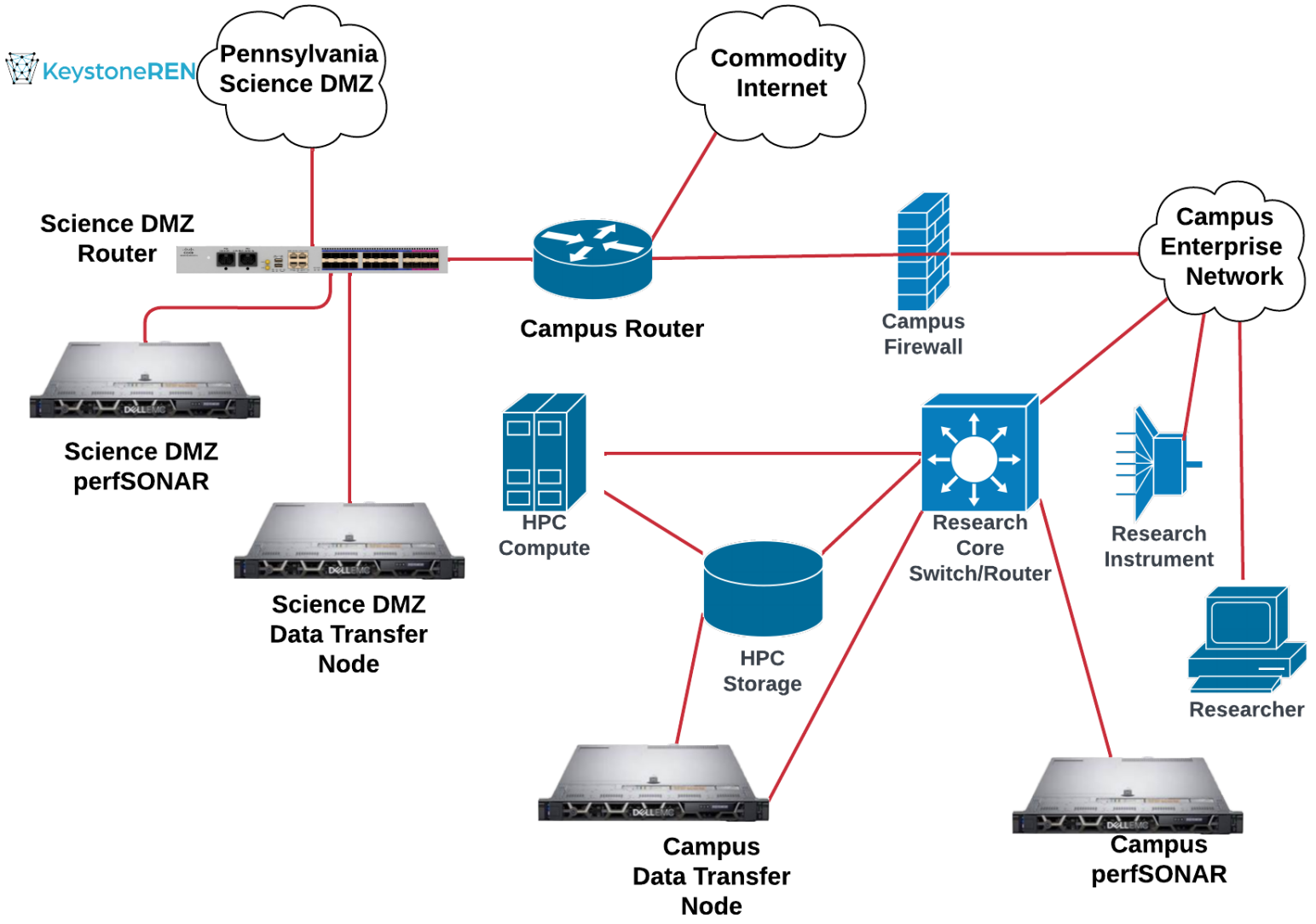

PA-DMZ TECHNICAL OVERVIEW

- CyberSecurity
- perfSONAR testing IPv4 and IPv6
- Data Transfer Node testing
  - Data Transfer Scorecard
- Globus Transfers

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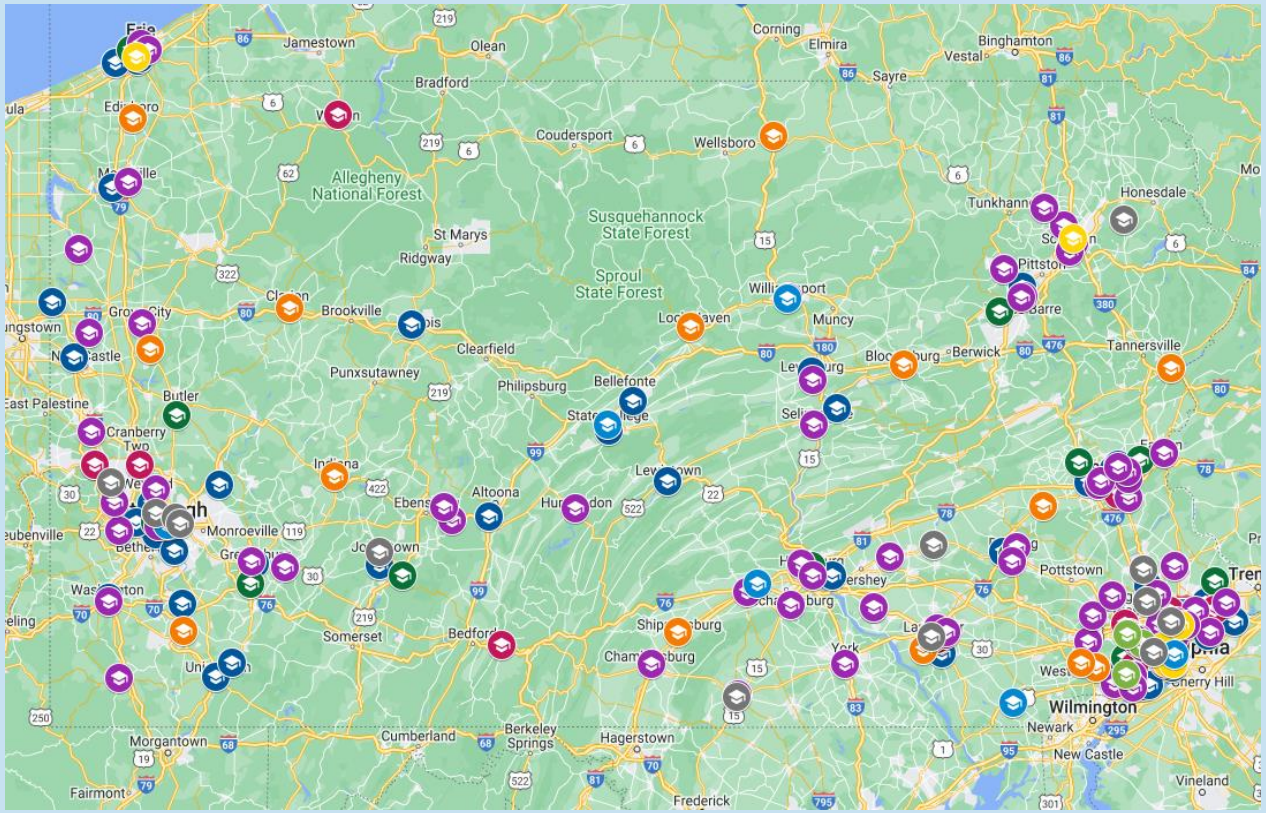
PA-DMZ PROJECT EXPANSION

- PA has received over 20 CC* awards as of Jan 2024
- Most of the higher ed institutions are under-resourced
- Chance to make a change
  - Conference Presentations
  - CyberAccelerate Workshops – over 80 attendees
  - CyberAccelerate Roadshow
  - IT Training
  - >30 additional institutions contacted



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THANK YOU

Questions

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