

EPOC Overview

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ABOUT EPOC

Over the last decade, the scientific community has experienced an unprecedented shift in the way research is performed and how discoveries are made. Highly sophisticated experimental instruments are creating massive datasets for diverse scientific communities and hold the potential for new insights that will have long-lasting impacts on society. However, scientists cannot make effective use of this data if they are unable to move, store, and analyze it. The Engagement and Performance Operations Center was established in 2018 as a collaborative focal point for operational expertise and analysis and is jointly led by Indiana University (IU) and the Energy Sciences Network (ESnet). EPOC provides researchers with a holistic set of tools and services needed to debug performance issues and enable reliable and robust data transfers. By considering the full end-to-end data movement pipeline, EPOC is uniquely able to support collaborative science, allowing researchers to make the most effective use of shared data, computing, and storage resources to accelerate the discovery process.

MAIN PROJECT ACTIVITIES

Supporting the process of scientific innovation must be done in a systematic fashion. It is not feasible to address a single component without understanding how it interacts or works with others. Network infrastructure forms a "circulatory system" for science and links the facilities that produce, process, store, and serve research products and address issues of data mobility across the entire system.

EPOC supports six main activities:

- **Roadside Assistance and Consultations** via a coordinated Operations Center to resolve network performance problems with end-to-end data transfers;
- **Application Deep Dives** to work more closely with application communities and understand full workflows for diverse research teams in order to evaluate bottlenecks and potential capacity issues;
- **Network Analysis enabled by the NetSage** monitoring suite to proactively discover and resolve performance issues;
- **Data Transfer Testing/ Data Mobility Exhibition** to check transfer times against known good end points;
- **Provision of managed services** via support through the IU GlobalNOC and our Network Partners;
- **Coordinated Training** to ensure effective use of network tools and science support.

A COMMUNITY FOR COMMUNITY SUPPORT

EPOC will not only deliver appropriate end-to-end user support and engineering solutions but aims to become a central community hub ready to provide personal expertise and assistance on an ongoing basis. Through our targeted partnerships, this Center has the potential to benefit nearly all of US science, research, and education on a far broader scale than any one organization can accomplish alone.

Many researchers at larger educational institutions, or part of large-scale collaborations, already have access to significant in-house resources, so we focus on small or medium-sized institutions and collaborations that may lack the financial and human resource capacity for more advanced services. By working with the regional networks to develop, teach, and make available additional instructive material to these institutions, we will not only increase the abilities of the teams we are in direct contact with but we will also provide a broad set of materials made freely available to the general public.

Our current Regional Partners include:

- **Front Range GigaPop (FRGP)**, the regional collaboration of networks that cover the western states, including Colorado, Wyoming, Arizona, Idaho, Utah, and New Mexico.
- **iLight**, the regional network for Indiana.
- **The Great Plains Network (GPN)**, the regional network that serves North Dakota, South Dakota, Nebraska, Iowa, Minnesota, Kansas, Missouri, Oklahoma, and Arkansas.
- **The Keystone Initiative for Network Based Education and Research (KINBER)**, the regional network for Pennsylvania.
- **The Lonestar Education and Research Network (LEARN)**, the regional network for Texas.
- **NOAA N-Wave**, the Enterprise network for the US National Oceanic and Atmospheric Administration
- **The Ohio Academic Resources Network (OARnet)**, the regional network for Ohio.
- **Pacific Northwest GigaPop (PNWGP)** provides access to next generation internet services and technologies throughout the Pacific Rim, but in the US primarily in California, Oregon, and Washington State.
- **Southern Crossroads (SoX)**, the regional network for much of the southeastern part of the US, including parts of Alabama, Georgia, South Carolina, and Tennessee
- **Sun Corridor Network (SCN)**, the regional network for the state of Arizona
- **The Texas Advanced Computing Center (TACC)**, at the University of Texas at Austin, United States, is an advanced computing research center

We have also identified a set of Infrastructure Partners who themselves provide services to end user scientists to expand the set of services available to the community, including:

- **The Campus Research Computing Consortium (CaRC)**, a consortium of over 30 campuses that facilitate access to cyberinfrastructure;
- **The NSF Cybersecurity Center of Excellence (CCOE)**, which supports cybersecurity for NSF funded projects;
- **Internet2**, which supports solving common technology challenges for their over 200 educational, research and community members;

- **The Quilt**, which provides a central organization for networks to share the best practices to support end user science;
- **The Science Gateway Community Institute (SGCI)**, which provides best practice recommendations and support for scientists building and using data portals; and
- **The Extreme Science and Engineering Discovery Environment (XSEDE)**, which supports a single virtual system and expertise through the Campus Champions.

In addition, our Science Community partners, each of which comprises a collaboration of scientists, allow us to scale our reach to entire community groups. These partners include:

- **The Earth Science Information Partners (ESIP)**, a consortium of over 180 members that provides a forum for the Earth science data and technology community;
- **The University of Hawai'i System Astronomy Community**, which supports 15 facilities with hundreds of researchers and experiments every year;
- **The Midwest Big Data Hub (MBDH)**, which supports the use of data for a variety of applications and end users across twelve states; and

The Engagement and Performance Operations Center has the potential to be transformational to science and education by providing not only a depth understanding to achieve better data transfers but also the human expertise needed to make the most of research collaborations.