

EPOC Roadside Assistance

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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.

EPOC supports five main activities

- *Roadside Assistance and Consultation* via a coordinated Operations Center to resolve network performance problems with end-to-end data transfers reactively;
- *Application Deep Dives* to work more closely with application communities to 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;
- Provision of *managed services* via support through the IU GlobalINOC and our Regional Network Partners;
- *Coordinated Training* to ensure effective use of network tools and science support.

ROADSIDE ASSISTANCE AND CONSULTATION- END USER SUPPORT

A key aspect of EPOC is the process pipeline for immediate help, referred to as *Roadside Assistance*. Based on our previous experience with international performance issues, the Roadside Assistance approach helps collaborators when data sharing failures occur, since these almost always involve multiple domains and organizations.

EPOC also offers a consultation service to help engineers and management staff make informed decisions about network services and deployments. These include, but are not limited to, questions related to network upgrades that may include Science DMZ's, data stores, data movement practices, perfSONAR deployments, and other related topics. Consultations may also include reviewing grant proposals and suggesting changes or enhancements.

A Roadside Assistance request can be submitted by email to epoc@iu.edu by anyone who is having difficulties transferring or receiving files from a collaborator at another site. The help request is then triaged within 24 hours, which includes some initial investigation to verify the issues. A Case Manager and Lead Engineer are assigned, and basic tracking infrastructure is set up.

The infrastructure we are using for this process includes not only a formal ticketing instance within the project, but a shareable online folder for each case that is made accessible to all engineers working on the case. This is required because most performance issues involve more than one organization, and most ticket systems are accessible only to the local users. Within this folder is also a *Customer Case Document* that is written in language accessible to the submitter and updated frequently to enable the submitter to always be able to access the current status of their issue.

The *Case Manager* is the primary point of contact for the submitter, and is generally someone who has experience talking with end user scientists or other community members. The Case Manager will update the submitter on a regular basis, through both email and the always-available Customer Case Document, stating what is happening with the issue and what the next steps towards resolution are. The Case Manager also loops in the campus, regional, or national network contacts relevant to the issue.

The *Lead Engineer* is the assigned staff member who will coordinate the technical aspects of the problem. This often includes involving a set of external engineers, organizations, or network operations centers during the investigation. The Lead Engineer tracks these interactions, any opened ticket numbers, and all associated documentation for the case, making sure the data is copied to the shared folder and is made accessible to the full team debugging the problem.

In general, troubleshooting of these cases involves understanding the end-to-end path of the data transfer, the use public test and validation services (such as perfSONAR nodes (<http://perfsonar.net>) and router proxies) to identify potential issues, and coordination with a wide set of engineering help staff along the data transfer path.

Each case will be unique and some of the issues found during an investigation may require more than simple engineering fixes. Training, capital expenditure, network architecture redesign, or policy changes may be required to achieve effective file transfers. If longer term or larger scope issues are identified, the Case Manager will discuss these with the customer and the relevant support staff, and describe possible next steps with help from EPOC. This may include EPOC-led Deep Dives, managed service offerings, or larger scale interactions with other organizations.