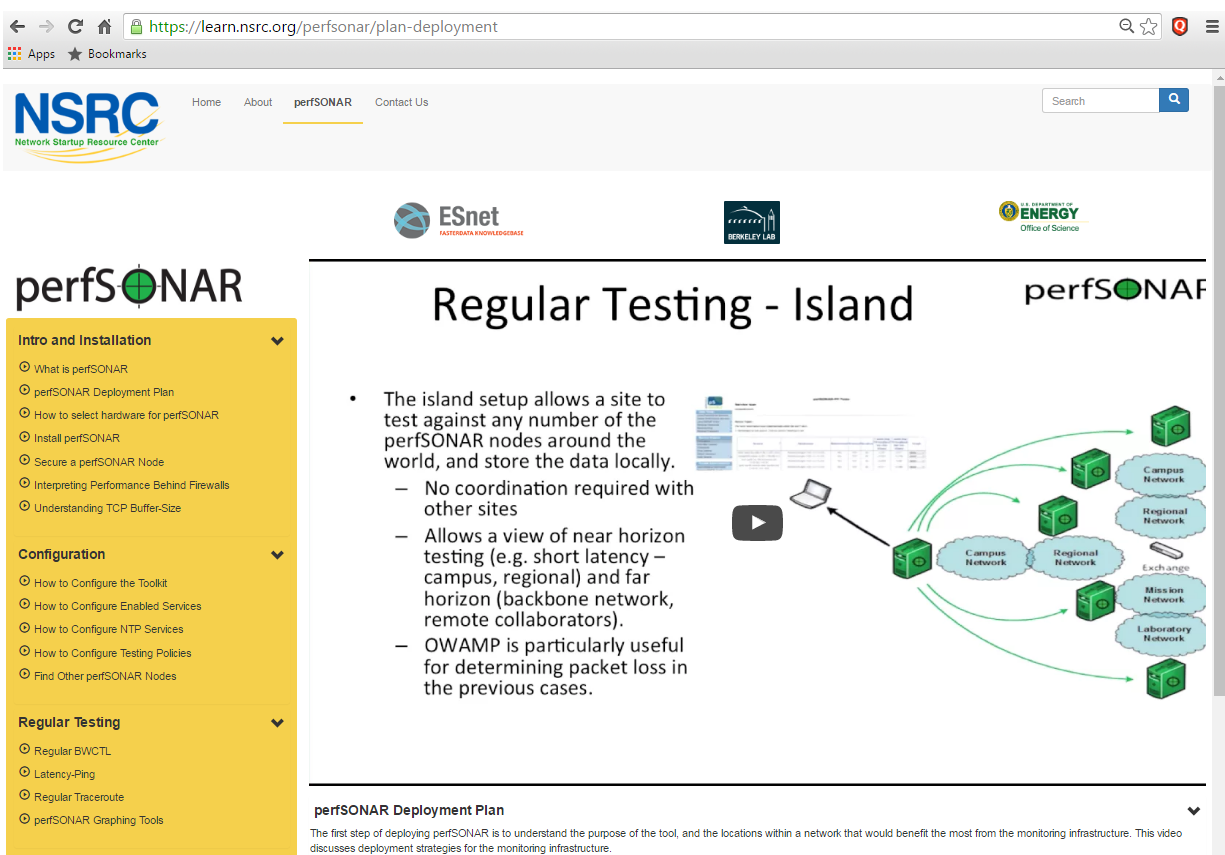


New training videos leverage ESnet's expertise to improve network performance around the world

July 18 2016



perfsONAR

- Intro and Installation
 - What is perfsONAR
 - perfsONAR Deployment Plan
 - How to select hardware for perfsONAR
 - Install perfsONAR
 - Secure a perfsONAR Node
 - Interpreting Performance Behind Firewalls
 - Understanding TCP Buffer-Size
- Configuration
 - How to Configure the Toolkit
 - How to Configure Enabled Services
 - How to Configure NTP Services
 - How to Configure Testing Policies
 - Find Other perfsONAR Nodes
- Regular Testing
 - Regular BWCTL
 - Latency-Ping
 - Regular Traceroute
 - perfsONAR Graphing Tools

Regular Testing - Island

- The island setup allows a site to test against any number of the perfsONAR nodes around the world, and store the data locally.
 - No coordination required with other sites
 - Allows a view of near horizon testing (e.g. short latency – campus, regional) and far horizon (backbone network, remote collaborators).
 - OWAMP is particularly useful for determining packet loss in the previous cases.

perfsONAR Deployment Plan

The first step of deploying perfsONAR is to understand the purpose of the tool, and the locations within a network that would benefit the most from the monitoring infrastructure. This video discusses deployment strategies for the monitoring infrastructure.

A screenshot from the training video on deploying perfsONAR. Credit: Jon Bashor, Berkeley Lab

The Department of Energy's Energy Sciences Network, or ESnet, and the Network Startup Resource Center (NSRC) at the University of Oregon are teaming up to create an extensive video training library to help organizations improve the performance of their networks by deploying the perfSONAR network measurement tools and the Science DMZ network architecture.

One of the first institutions to benefit from the project will be the University of Guam. NSRC staff are flying to the U.S. territory in the Pacific on July 25 to help the university improve its campus [network](#) and set up a high-speed link to the University of Hawaii. Prior to the weeklong workshop and perfSONAR installation, NSRC staff will have the six campus network engineers familiarize themselves with the toolkit via the [video library](#).

"We'll have them view the videos before we arrive and then provide direct network assistance with the installation," said Hervey Allen, NSRC's program manager. "We're really excited to see if people can watch the videos, then install and run perfSONAR, or, if they are using it for basic tests, they can understand the data and what it means. The whole idea is to help them use the tool better."

ESnet is one of the original developers of [the perfSONAR toolkit](#), which has provided the research and education (R&E) networking community with tools for end-to-end monitoring and troubleshooting of multi-domain network performance. Other current partners in the perfSONAR project are Internet2, Indiana University and GÉANT, the pan-European research network. The perfSONAR collaboration over the past 11 years has also included Fermilab, SLAC, Georgia Tech, the University of Delaware, the ATLAS Great Lakes Tier 2 team at the University of Michigan and RNP in Brazil.

Created in 1986, ESnet is a DOE Office of Science User Facility

managed by the Department of Energy's Lawrence Berkeley National Laboratory, operating a 100 gigabits-per-second backbone network linking more than 40 DOE research sites, including the entire national laboratory system, its supercomputing facilities and its major scientific instruments.

"We've developed a good working relationship with NSRC over the past several years, and we started talking about this video project in early 2015 as a way to efficiently transfer ESnet's expertise to anyone interested in network performance, from DOE scientists to other research organizations," said ESnet's Eli Dart, who developed the Science DMZ architecture and will appear in a series of related training videos. "They do a lot of good work in all corners of the world, helping research organizations in emerging economies around the world get up to speed fast and help them bootstrap the development of science networks where it was not possible before."

Funded by the U.S. National Science Foundation (NSF), the NSRC works directly with the local network engineers and operators who develop and maintain the Internet infrastructure in their respective countries and regions by providing technical information, engineering assistance, training, donations of networking books, equipment and other resources. The end goal in this work is to make it easier for local scientists, engineers and educators to collaborate via the Internet with their international colleagues by helping to connect communities.

"These days, the whole world goes to YouTube when they want to learn something," said ESnet's Brian Tierney, who appears in the perfSONAR videos along with Jason Zurawski.. "Hopefully both the NSRC and the DOE community will find these videos a useful way to get started and then follow up with more in-depth information as needed."

Although perfSONAR was developed and is used mainly by large, high-

speed R&E networks, it's also a valuable tool in fledgling networks in developing nations where network bandwidth is expensive and perfSONAR can help local researchers make the most effective use of that investment.

Global successes

NSRC Director Steve Huter ticked off a list of countries where the organization has helped build networks and train engineers, often using donated equipment and documentation: the NREN of Senegal, a regional research and education meeting hosted by the NREN in the Philippines that brought together 19 Asian nations earlier this year, the research and education communities of Zambia, Ecuador, Uganda and the Central Asian republics of the former Soviet Union, plus many others.

"One of the great success stories is KENET, the Kenya Education Network, which is the national R&E network," Allen said. "Like many countries, Kenya first connected to the Internet via the national telco with low speed at a high cost; with the establishment of KENET and robust relationships between academia, government, industry and infrastructure providers, they are now are a leader in showing Africa how to build an efficient and affordable network."

More convenient packaging

"The idea from ESnet and NSRC to do these training videos makes sense - this is knowledge dissemination in the 21st century, in this case from subject matter experts on an important measurement element of R&E networking," said Kevin Thompson, program manager in the National Science Foundation's Division of Advanced Cyber Infrastructure, which funds the NSRC. "And this approach makes the content available to everyone."

Jason Zurawski, ESnet's perfSONAR evangelist, has presented tutorials at dozens of workshops, often in segments lasting 20 minutes or longer. But increasingly, he's noticed that people want to know quickly how to do something, "not look through some giant manual."

So ESnet was thinking about how to create quick, two- to five-minute lessons for various aspects of perfSONAR, Zurawski said, "like how to test this metric and what's this data mean? We'd worked with NSRC staff over the years, so it seemed like a good idea to link together."

Zurawski said it was a challenge for him and ESnet's Brian Tierney to boil their usual talks down to five minutes or less - their first dry run was 20 minutes.

"So we tried to rewrite it into two-minute chunks to create very succinct videos that allow you to jump right to the topic you're interested in," Zurawski said.

There are now 29 videos in the perSONAR library, including a high-level introduction to configuring, metrics and measurement.

"It was an interesting experience, and you have to think a lot differently about how you're going to present the material than if you're giving a live talk," Zurawski said. "We're all excited to get the information out there and to help organizations of all sizes feel confident in getting their feet wet with the technology."

Up next: Science DMZ

With the perfSONAR videos wrapped up, the team will now focus on the library of 12 Science DMZ videos, of which a few are already available. The Science DMZ architecture provides a secure, dedicated network connection for moving massive research datasets that may

otherwise be slowed to a trickle by typical network designs. Dart, who will appear in the videos, recognizes that developing nations may not have the need or resources to deploy full-scale Science DMZs.

"The nice thing is that this is all modular and can be deployed incrementally, so institutions don't have to jump in with both feet all at once," he said. "They can start small, and as they are successful, extend to other projects."

ESnet has positioned itself as a custodian of technical information that can be tapped by the broader community, Dart added. "Helping the community use this information is an important part of what we do," he said. "We see real value in helping the community be more effective in their use of networks."

Huter agreed and cited even greater benefits.

"We're working to connect new countries, new networks and new people to the global research and education network fabric, extending the benefits of high-end science and eliminating obstacles to research collaboration with the U.S., Europe and within regions as well," he said. "We're crossing international boundaries and scientific domains as we build both physical network and human connectivity."

Provided by University of Oregon

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