DYNES: Application Package

1 Introduction

This NSF-funded project (grant number 0958998) will develop and deploy the **Dynamic Network System (DYNES)**, a nationwide cyber-instrument spanning about 40 US universities and 14 Internet2 connectors. A collaborative team including **Internet2**, **Caltech**, **University of Michigan**, and **Vanderbilt University** will work with regional networks and campuses to support large, long-distance scientific data flows in the LHC, other leading programs in data intensive science (such as LIGO, Virtual Observatory, and other large scale sky surveys), and the broader scientific community.

For the latest announcements concerning DYNES, subscribe to the dynes@internet2.edu mailing list.

- http://lists.internet2.edu/sympa/subscribe/dynes.

To ask questions of the DYNES project team, email dynes-questions@internet2.edu.

- http://lists.internet2.edu/sympa/subscribe/dynes-questions

The purpose of this document is to provide the requirements for submission of a request to participate in the DYNES project. Additional documents are provided for Regional Networks and Campuses who may be interested in participating in the DYNES project. These documents are as follows:

- DYNES: Overview
- DYNES: Regional Network and End-Site Participation Requirements
- DYNES: Criteria for Site Selection
- DYNES: Frequently Asked Questions (FAQ)

This document and all of the above are on the DYNES web site:

- http://www.internet2.edu/dynes

2 DYNES Application Requirements Overview

The DYNES Regional Network and End-Site Participation Requirements document outlines the requirements for participation in the DYNES project. This document will provide the specific requirements for submission of an application to participate in the DYNES project. The criteria for site selection are outlined in the DYNES: Criteria for Site Selection document. In his context, site refers to either a Regional Network or End-Site facility.

3 DYNES Application Requirements and Procedures

Regional network and Campus End-Sites who are interested in participating in the DYNES project are requested to submit an application to Internet2. These applications should follow the format as defined in Section 4 of this document. They may be submitted via email to the following address:

- dynes-questions@internet2.edu

The important dates associated with this submission are as follows:

- Application Submission Deadline: 15 December 2010
- Application Review Period: 15 December 2010 - 15 January 2011
- DYNES Site Selection Decision Notification: 31 January 2011

Those interested in responding to this request are encouraged to contact the DYNES project team with any questions at anytime prior to the application submission deadline. Please forward any request for additional information to:

- Eric Boyd
  Internet2
  dynes-questions@internet2.edu

4 DYNES Participation Application Instructions

To request participation in the DYNES project please submit an application formatted as described in the remainder of this section.

Please refer to the DYNES: Regional Network and End-Site Participation Requirements document for additional information regarding the requirements and architectural considerations for DYNES equipment deployment and participation.

An important component of the DYNES project is a close collaboration between Regional Networks and the associated End-Sites (Campus) facilities. However, it should be noted that each organization is expected to submit a separate application. Each application is expected to demonstrate that interoperability between associated Regional Networks and End-Sites has been discussed and agreed upon. The DYNES Deployment Plan section below defines requirements in this area to demonstrate adequate coordination as part of the application process.

Please note that there are separate sections below (4.3 and 4.4) depending on the type of organization which is submitting this application, Regional Network or End-Site.

4.1 DYNES Participant Organization Info

Provide the following regarding your organization:

Name
Address
Point of Contact for this Application (email / phone)
Type of DYNES Site (Regional Network or End-Site)

4.2 DYNES Statement of Participation

Provide a short summary indicating why your site would like to participate in the DYNES project. This summary should be a maximum of 1,000 words and should include the following information:

- How will your participation in the DYNES project benefit researchers in your area?
- If your organization is a Regional Network, list the End-Sites (Campuses) and associated researchers in your region who you expect will participate in DYNES.
- If your organization is an End-Site, list the researchers and campus IT organization at your site who will participate in DYNES. Also list the Regional Network you will collaborate with as part of DYNES project participation.
- How will your participation in the DYNES project contribute to the larger DYNES project goals? (Please refer to DYNES: Overview and DYNES: Regional Network and End-Site Participation Requirements)
- Please provide any other information you think is relevant to this application.

4.3 DYNES Deployment Plan - Regional Network

Note: This section is only required if the submitting organization is a Regional Network

The application information requested for this section is based upon the requirements and architectural considerations presented in the DYNES: Regional Network and End-Site Participation Requirements

document. Please refer to that document for additional information. As part of this project the baseline scenario is that the DYNES project will supply each selected Regional Network with the following:

- Ethernet switch, one of the following (Models below are under consideration but not yet final)
  - Dell PC6248 (48 1GE ports, 4 10GE capable ports (Select SFP+, CX4 or optical)
  - Dell PC8024F (24 10GE SFP+ ports, 4 "combo" ports supporting CX4 or optical)
  - Custom variant for sites needing a different alternative
- Inter-domain Controller (IDC) (Dell R610 1U, 1GE connectivity)

In this section, please provide the following:

1) Identify a **DYNES point-of-contact** person for all required DYNES issues.
2) Provide **deployment plan and drawings** for how the DYNES equipment will be placed in the regional network. Each Regional Network can utilize the baseline DYNES provided equipment, or can request other equipment to extend equipment they already have. The cash equivalent value that may be utilized to procure site specific equipment is contained in Section 5 below. The deployment drawings can be based on the diagrams presented in Appendix A of the DYNES: Regional Network and End-Site Participation Requirements document. However, if there are other configurations that will work better for your facility, you are not bound by the examples presented there. If not using the DYNES provided equipment, your drawings and plan should indicate the type of network elements you plan to utilize.
3) Confirm your willingness to **receive** and **deploy** the required DYNES hardware components. This includes taking shipment delivery, unpacking and physical installation into a suitable location. Suitable means having the required power, space, cooling and physical connectivity to the network
4) Confirm your willingness to **configure** the equipment. For "standard" DYNES components this will be very simple and consist of answering a few prompts of an install program: assign IP, define network port topology. The DYNES collaboration intends to make this as simple as possible and will work remotely with each site as needed to get the initial configuration in place. If the Deployment Plan submitted does not utilize the DYNES baseline equipment, describe the plan to configure and maintain the DYNES functionality in the context of the presented architecture.
5) Describe your plan to **enable** DYNES control capabilities into the network infrastructure. This will depend upon the physical topology at each regional network e.g., is the equipment in-line or parallel to the existing network to the regional; is the equipment "standard" for DYNES or custom, etc. Normally the DYNES provided IDC and associated switch are the control point of the dynamic circuit network.
6) Confirm your willingness to provide **local maintenance** where physical access is required. Most support for standard DYNES instrument components will be provided by the DYNES collaboration remotely. Some situations may require a local person to provide support. For example, in case of hardware failures requiring component replacement, we will expect someone at the end-site to accept delivery of parts, do the physical replacement and return the failed component (typically to the manufacturer providing the warranty). Another example requiring local support would be a problem requiring power-cycling equipment where remote power control is not provided.
7) Describe your plan to work in a **collaborative manner with DYNES end-sites** to ensure the regional network and associated end-site designs work well together to enable the DYNES

functions. This should include identification of a **DYNES Regional Team.** This team is expected to include one (or more) individuals from the regional network and from each of the potentially participating end-sites in the associated region. The end-sites identified in this plan should be those in the local regional area who are submitting a separate application for DYNES project participation.

8) Please include a letter of support from every end-site applying to the DYNES project indicating that they have reviewed the regional network implementation plan.

It is not required that the standard DYNES components be utilized to realize the dynamic network capabilities. For instance, rather than receiving the DYNES standard ethernet switch, it may be preferable for a Regional Network to receive some interface cards for an existing network element or other items to be integrated into existing infrastructure. A customized solution will have additional software configuration and deployment considerations. If there are questions regarding a specific or customized DYNES deployment and associated network designs prior to submission of the application, please submit them to the DYNES project team, care of Eric Boyd (dynes-questions@internet2.edu). As part of the application review process we anticipate that additional information may be requested by the site selection panel.

4.4 DYNES Deployment Plan - End-Site

Note: This section is only required if the submitting organization is an End-Site

The application information requested for this section is based upon the requirements and architectural considerations presented in the DYNES: Regional Network and End-Site Participation Requirements document. Please refer to that document for additional information. As part of this project the baseline scenario is that the DYNES project will supply each selected End-Site with the following:

- Ethernet switch, one of the following (Models below are under consideration but not yet final)
    - Dell PC6248 (48 1GE ports, 4 10GE capable ports (Select SFP+, CX4 or optical)
    - Dell PC8024F (24 10GE SFP+ ports, 4 “combo” ports supporting CX4 or optical)
    - Custom variant for sites needing a different alternative
- Inter-domain Controller (IDC) (Dell R610 1U node, 1GE connectivity)
- A Fast Data Transfer (FDT) server. Sites with 10GE throughput capability will have a dual-port Myricom 10GE network interface in the server. One option is Dell R510 which can accommodate Gen2.0 card x8 card along with 12 disks for storage.
- An attached disk array with an LSI or equivalent Serial Attached SCSI (SAS) controller capable of several hundred Mbytes/sec to local storage.

In this section, please provide the following:

1) Identify a **DYNES point-of-contact** person for all required DYNES issues.
2) Provide **deployment plan and drawings** for how the DYNES equipment will be placed in the End-Site facility. Each End-Site can utilize the baseline DYNES provided equipment, or can request other equipment to extend equipment they already have. The cash equivalent value that may be utilized to procure site specific equipment is contained in Section 5 below. The deployment drawings can be based on the diagrams presented in Appendix A of the DYNES: Regional Network and End-Site Participation Requirements document. However, if there are

other configurations that will work better for your facility, you are not bound by the examples presented there. If not using the DYNES provided equipment, your drawings and plan should indicate the type of network elements you plan to utilize.

3) Confirm your willingness to **receive** and **deploy** the required DYNES hardware components. This includes taking shipment delivery, unpacking and physical installation into a suitable location. Suitable means having the required power, space, cooling and physical connectivity to the network

4) Confirm your willingness to **configure** the equipment. For "standard" DYNES components this will be very simple and consist of answering a few prompts of an install program: assign IP, define network port topology. The DYNES collaboration intends to make this as simple as possible and will work remotely with each site as needed to get the initial configuration in place. If the Deployment Plan submitted does not utilize the DYNES baseline equipment, describe the plan to configure and maintain the DYNES functionality in the context of the presented architecture.

5) Describe your plan to **enable** DYNES control capabilities into the network infrastructure. This will depend upon the physical topology at each regional network e.g., is the equipment in-line or parallel to the existing network to the regional; is the equipment "standard" for DYNES or custom, etc. Normally the DYNES provided IDC and associated switch are the control point of the dynamic circuit network.

6) Confirm your willingness to provide **local maintenance** where physical access is required. Most support for standard DYNES instrument components will be provided by the DYNES collaboration remotely. Some situations may require a local person to provide support. For example, in case of hardware failures requiring component replacement, we will expect someone at the end-site to accept delivery of parts, do the physical replacement and return the failed component (typically to the manufacturer providing the warranty). Another example requiring local support would be a problem requiring power-cycling equipment where remote power control is not provided.

7) Describe your plan to work in a **collaborative manner with DYNES Regional Networks** to ensure the regional network and associated end-site designs work well together to enable the DYNES functions. This should include identification of a **DYNES Regional Team.** This team is expected to include one (or more) individuals from the End-Site which is submitting this application and the associated regional network. The regional network identified in this plan should be the local regional network which is submitting a separate application for DYNES project participation.
8) Please include a letter of support from the regional network you expect to connect through indicating that they have reviewed your proposed end-site network implementation plan.
9) Please include a letter of support from your campus IT organization indicating that they have reviewed and support your proposed end-site implementation plan and that they have reviewed the proposed regional network implementation plan.

It is not required that the standard DYNES components be utilized to realize the dynamic network capabilities. For instance, rather than receiving the DYNES standard ethernet switch, it may be preferable for an End-Site to receive some interface cards for an existing network element or other items to be integrated into existing infrastructure. A customized solution will have additional software configuration and deployment considerations. If there are questions regarding a specific or customized DYNES deployment and associated network designs prior to submission of the application, please submit them to the DYNES project team, care of Eric Boyd (dynes-questions@internet2.edu). As part of the application review process we anticipate that additional information may be requested by the site selection panel.

5 DYNES Budget Overview

The exact budget details and plan will be determined after review of the participation applications. The general plan is to provide the DYNES baseline equipment to the Regional Networks and End-Sites as described above in the other DYNES project documents. In addition, it is acceptable if a site would prefer to utilize an equivalent amount of funds to purchase equipment which may extend their current infrastructure capabilities in lieu of receiving the DYNES baseline equipment. This equivalent fund value will also be determined after review of applications, but is expected to be in the $18K range for 10 GE connected end-sites, $15K for 1 GE connected end-sites, and around $26K for regionals. These numbers are based upon DYNES budget planning which assumed 40 end-sites distributed 45% 10GE end-sites, 55% 1GE end-sites and 14 regionals.

If your application includes a request for equipment other then the DYNES standard equipment, please identify model numbers and provide cost estimates.