

## Some New Directions for ESNET

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I would like to announce some significant changes in our development and implementation of ESNET. From previous *Buffer* articles, we've made you aware that we were in the process of developing IP (INTERNET Protocol) network routers using DEC microVAX IIs and IIIs. In the course of the development, it became clear to us that these machines would not have enough performance to take us very far into the future, given the appreciable growth in the amount of bandwidth that is now commonly expected to be required for future networking applications—i.e., T1 (1.5 Mbps) immediately, T3 (45 Mbps) in 2-3 years, and gigabit rates in a few years following that. Last fall, we began a planning process that would allow us to gradually incorporate higher-performance commercial routers.

Following the ESNET project review in March, however, we concluded that we must move faster in the direction of higher-speed routers. Accordingly, we have terminated our development of microVAX-based routers and we are planning to implement the next phase of ESNET with commercial routers. This change in direction has also affected our decision on how to implement MFENET II and the topology of ESNET. Barry Howard describes the changes in MFENET II in "*Network Access: Status of MFENET II Terminal/ Printer Server Project*" in this *Buffer*.

Our new plans are to procure commercial "dual-protocol" routers that are capable of switching both IP and DECNET Phase IV traffic

simultaneously at aggregate T1 rates. (You may recall that part of the MFENET II effort is to convert the NSP protocol family currently used by MFENET to operate with IP.) We also expect these routers to be capable of routing ISO datagrams within approximately one year.

We have also simplified the architecture of the network backbone for the next phase of ESNET, while enhancing its interconnectivity. (See map—Figure 1.) We have eliminated the use of time-division multiplexors to reduce delay in the network, as well as to reduce the complexity and to increase the reliability of the backbone. We are now planning to use only full-bandwidth T1 circuits in the backbone interconnecting 19 major OER (Office of Energy Research) centers. The T1 circuits will be provided by two vendors. The NNT (National Network Testbed) circuits are provided under the DARPA/DOE interagency arrangement. In this arrangement, NYSERNET, under contract to DARPA, is subcontracting to NTN (National Telecommunications Network) for a number of cross-country T1 circuits, including two for DOE/OER/ESNET. (If you can understand all the acronyms in this paragraph, you probably need a vacation.) The remaining circuits will be provided by a single commercial vendor, yet to be selected.

Although it is not shown on the map, we are also planning to cross-connect ESNET with both the National Science Foundation's NSFNET backbone, and with NASA's National Science Network backbone.



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This will additionally facilitate ESNET access to and from sites supported by those backbone networks. We have completed a first round of discussions with both of those agencies, and have tentatively agreed upon two common points of initial interconnection.

Currently, we have two major procurements under way. One is for 26 routers (we need a few beyond the 20 required for all the nodes shown on the map), and a second for the non-NNT T1 circuits.

The ESNET Control Center at NMFECC is also coming along well. The physical facilities are nearly complete. Initially, we will be using commercial software supporting SNMP (Simple Network Management Protocol) to monitor the commercial routers. Additional software is being procured or developed to support the other functions of the Control Center.

I am also in the process of adding a new group of five people, tentatively called Network User Services. This group's primary mission will be to provide communications and problem resolution support to ESNET users. I am currently interviewing candidates for the Group Leader position. We will provide additional information on this group once it is established.

Our job now is to procure, install, and make the routers and T1 circuits operational. The schedule for these tasks is largely dependent on vendor's delivery schedules, getting through the normal amount of "red tape" that a procurement of this size requires, and appreciable help and cooperation from personnel at the 19 major sites. However, with a modicum of luck and skill, we expect to begin installation around mid-August and complete around the middle to end of November ... yes, of this year.

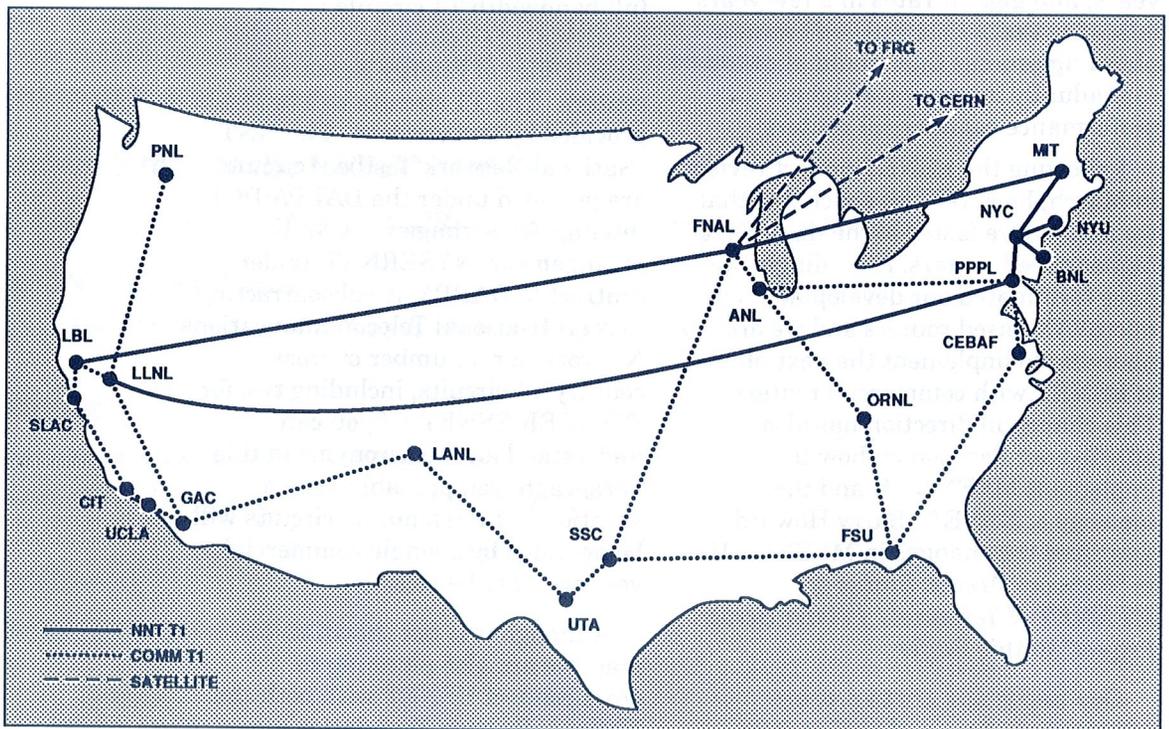


Figure 1. Network backbone for ESNET.