<div align="center">

SeaNet Progress Report
July 1999

</div>

The SeaNet Collaboratory: Ellen Kappel, Andy Maffei, Steve Lerner, Cindy Sellars, Dale Chayes, Richard Perry, Bob Heinmiller, Susan Kubany, Kevin Kimball, Rex Buddenberg.

The SeaNet/NOPP-ONR grant expires on August 1, 1999. The SeaNet collaboratory is pleased to provide the following progress report, which includes a summary of what we proposed to ONR and a corresponding status report for each item.

Proposal: Build and deploy five SeaNet Communications Nodes (SCNs) on UNOLS vessels, with updated satellite and cellular communications. A SeaNet Advisory Panel would provide guidance as to which ships would be the first to receive these units.

Status: SCN hardware and software have been installed on five ships, as recommended by a SeaNet Advisory Panel, after review of proposals from eight institutions. The current status of each ship is as follows:

> **ATLANTIS** - A pre-production version of the SCN, embodying most of the features of the "production" units was integrated with the Atlantis' existing Nera Saturn Bm satellite communications unit. Lerner, Maffei, Perry, and Sellars installed the SCN during a late August/early September 1998 port call in San Diego, California. The "production" model was installed in Manzanillo, Mexico by Koczynski (filling in for Perry) and Lerner during April 1999. The SeaNet system is currently being used primarily for Cmail, an electronic mail system designed by WHOI's shipboard services group. It is also being used for transferring large files on occasion.
>
> **EWING** - A SeaNet pre-installation survey was performed on 15 December 1998 while EWING was in dry dock in Norfolk, VA. Locations for the satellite dome and the SCN were determined. The Nera Saturn B marine satellite communications node was purchased and commissioned at LDEO on 14 January 1999. The SeaNet unit was installed during the week of 25 January 1999 while EWING was in dry dock in Norfolk, VA. Because this was the first "production" installation, Lerner, Maffei, and Perry, assisted by Joe Stennet, EWING's science officer, all participated in the installation effort.
>
> We had a one-month test of the system in February 1999 while Maffei sailed on EWING. The system works well but we had a difficult time accommodating the existing email system because of shipboard network problems and need for additional changes to SeaNet software to make transfers more "timely." We are working closely with EWING technical support staff to do this ASAP. Their email system is a "batchuucp" system developed at the University of Hawaii. During February we supported a Deborah Smith/Chris Fox cruise with some "quick" web browsing and program/data file transfers.
>
> **SEWARD JOHNSON** - HBOI purchased and commissioned the Nera Saturn Bm marine satellite communications node in December 1998. Perry performed the hardware installation in May while JOHNSON was in homeport at Fort Pierce, FL,. Software integration was performed by Maffei June 4-6, 1999. Modifications are currently being made to accommodate the Microsoft Exchange email system so that it will work with SeaNet.
>
> **MELVILLE** - A SeaNet pre-installation survey was performed on September 3, 1998 while MELVILLE was in homeport in San Diego. Locations for the satellite dome and the SCN were determined. The Nera Saturn Bm marine satellite communications node was purchased and commissioned in conjunction with the SeaNet installation on 24 April 1999 while MELVILLE was in Honolulu, HI. Lerner and Perry performed the installation. Use of the

SeaNet system has so far been minimal. We will be talking to the Scripps group again soon to determine if they need help using the system or are interested in trying to get their email system to work over the INMARSAT-B system.

PELICAN - A SeaNet pre-installation survey was performed on 14 December 1998 while PELICAN was docked in Cocodrie, Louisiana. Locations for the satellite dome and the SCN were determined. The Nera Saturn Bm marine satellite communications node was purchased and commissioned at LDEO in early March. Maffei and Perry performed the SeaNet installation during the week of 22 March 1999. The system on PELICAN has been used to transfer images regularly. They are also interested in exploring video applications and we have been talking to vendors about video technology that could be incorporated into SeaNet.

NOTES: Although original plans did not intend to support shipboard operators' current email systems we found that by retrofitting SeaNet software to accommodate some of the existing system we got increased use of the Inmarsat-B systems because of the better cost/byte. For this reason more effort has been put into supporting existing email systems than we had originally expected.

The SeaNet collaboratory has developed web-based software installed on the Linux operating system. All operations are provided by a shipboard browser. The system provides a new "datapipe" technology designed to automatically collect, compress, and transfer files that sit in directories on a shipboard LAN and transfer them to directories destination directories on the shore-side Internet. Datapipes can also be configured from shore to the ships. An "Interactive IP" mode connects the shipboard LAN directly to the Internet. Accounting, B-HSD, link management, special support for existing support of shipboard email systems and several other functions are also provided.

Instead of working with cellular technology, SeaNet has had an opportunity to work closely with AMSC to develop high-speed data transfers for coastal ships. This is currently a work-in-progress.

*****

Proposal: Provide an accounting and billing system that ensures that participating institutions, researchers, and ships understand the cost implications for their ship-based communications, and also pay their fair share of the infrastructure costs.

Status: We are currently working with the vessel operators, providing custom billing and invoicing. As we develop a better agreement on the best format and on what information is needed by the operators, we will evolve a standard invoice. The system will provide enough information to the vessel operator for internal institutional billing on an individual or project basis, if desired. We also plan to provide the ability to generate month-to-date and date/period traffic/cost figures on request.

The goal is to provide to the vessel operators (and to projects, groups, and individuals who wish to be billed separately) enough information to meet their own needs for internal re-billing, traffic analysis, interim account status, and budgeting.

*****

Proposal: Provide a secure system so that hackers can't find a way to use our expensive satellite connection. The system would also prevent users to transfer very large, but unwanted files over the satellite connection, thus saving money.

Status: The SeaNet nodes are located within a private IP address space. This protects them to a certain extent. TCP wrappers are employed on both the shipboard and shorebased machines.

*****

Proposal: Provide help-desk services so that immediate and accurate answers to SeaNet questions are provided.

Status: A Network Information Center (NIC) is being developed at Omnet. Anyone with SeaNet questions can send an e-mail to SeaNet.Service@seanet.int or call Omnet at 540-885-5800.

We have also provided ship operators with home telephone numbers of key SeaNet staff for use in urgent situations.

<center>*****</center>

Proposal: Build a frame-relay network in cooperation with MCI. This network would be used to interconnect identified key communications facilities.

Status: Because of MCI's merger with WorldCom shortly after the SeaNet grant was funded, this collaboration never panned out despite several face-to-face meetings with MCI. In the event, we designed a different network infrastructure which fit SeaNet as well as the preferred mode of operations for the satellite carriers much better. SeaNet calls are routed from the satellite ground stations to Omnet via public network ISDN lines. Because of the way the ground station switches and billing software are configured, this interfaces well with the carriers' existing way of doing business. It has, however, had a great impact on our efforts, as Omnet has had to take on more of the tasks involved in being an ISP than we had originally expected.

Plans are being made to co-locate the primary SeaNet NIC server to obtain higher bandwidth and better power backup.

<center>*****</center>

Proposal: Provide e-mail filtering and web-page caching.

Status: Work on the Web page caching system is still underway. The next release of the SeaNet Communication Node (SCN) software will have the web-mirror functions incorporated in them.

We are designing a web-page-by-mail service. We have surveyed existing services and decided to develop our own, and a specification is in preparation.

The development of user-definable filters for e-mail from shore to ship accounts has been completed. These filters are intended to allow a SeaNet e-mail user to determine his own priorities for what mail will be forwarded on to the ship (and for which he will pay). Options include sending to ship, return to sender, trash, and archive for later retrieval.

Integration of CMail, an e-mail package developed and used at WHOI, into the SeaNet system is underway. CMail has hooks for the addition of the filter package and associated administrative functions.

<center>*****</center>

Proposal: A shore-based SeaNet reference laboratory would be built at the Naval Postgraduate School to provide a reference model for trouble-shooting SeaNet shipboard software and hardware.

Status: Development of a test lab at NPS proved more difficult than originally thought because of the logistics involved in software and hardware development and R&D efforts. In addition, Rex Buddenberg had additional and unforeseen responsibilities given to him at NPS, which did not allow for as much time on the SeaNet project as originally planned. To compensate for this, WHOI has set up and maintained the SeaNet test lab, and Omnet has taken on much of the responsibility for AMSC testing originally planned for NPS. NPS still contributes to the SeaNet effort in graduate theses related to SeaNet developments and provides the valuable "crystal ball" input to communications technologies.

Future

The SeaNet collaboratory has submitted a proposal to NSF to continue SeaNet support through the end of

the year. A decision on this is pending. SeaNet is also developing a proposal to NSF for support for three years beginning January 2000. This proposal would provide the UNOLS fleet with additional SeaNet units, enhanced software, and continued technical support. SeaNet has had numerous inquiries from the private sector, and is hoping to develop at least one prospect in the near future to set the stage for wider access to our system.

SeaNet is also working out the best way to add ships to the SeaNet network that have purchased the necessary hardware independent of the SeaNet group. We understand that this is a very real possibility and an excellent opportunity to extend services to more ships.

Expansion of service to more vessels will provide the needed critical mass to support the SeaNet infrastructure.