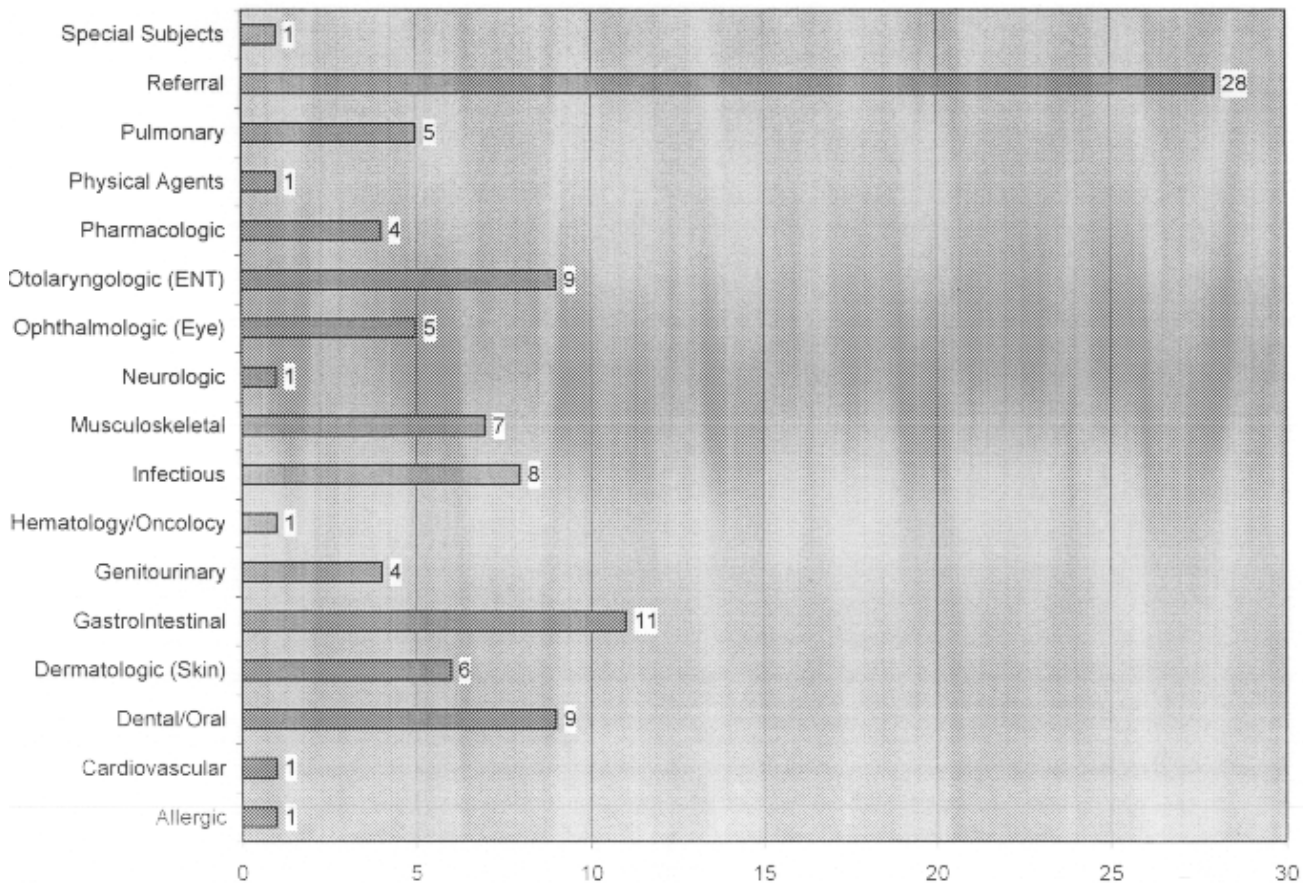


1997 UNOLS Cases by System



Appendix XII

**SeaNet receives National Oceanographic Partnership Program support
by Ellen Kappel
(Joint Oceanographic Institutions)
and Andrew Maffei
(Woods Hole Oceanographic Institution)**

Abstract

The SeaNet partners* are pleased to announce that the 1997 National Oceanographic Partnership Program of the Office of Naval Research recommended for funding the proposal, "SeaNet: Extending the Internet to the Oceanographic Fleet," in amount of \$1.478M. This funding will provide over two years, and will enable the SeaNet partners to create the shore-based and shipboard infrastructure capable of supporting both a high speed (e.g., INMARSAT-B HSD at 64 kbaud) and low speed (e.g., cellular or PCS modem at 4800 baud) access to the Internet from ships at sea. This infrastructure includes building a shore-based operations center; providing updated satellite and cellular communications for a number of UNOLS vessels; developing shipboard communications servers designed specifically for the support of shipboard science and technical support applications; and supporting the integration of emerging (less expensive)

communications technologies in the future. Once this infrastructure is in place and operational, the incremental cost of adding more ships to the SeaNet network should be relatively small. A SeaNet Advisory Panel will provide guidance and advice to SeaNet operations, including recommending ships for SeaNet installation.

Development Status

In 1995, the National Science Foundation funded the SeaNet collaborative effort by WHOI, LDEO, and JOI to develop a prototype communications system to demonstrate a cost effective use of INMARSAT-B High Speed Data for Internet connectivity between shore and a ship. The system was first installed and tested on the R/V Thompson as part of a JGOFS cruise. This same communications system has been successfully redeployed the Ocean Drilling Program research vessel, JOIDES Resolution, and is in active use by the LDEO Borehole Research Group to transfer large wireline logging data sets. The latest testing over the NERA High Speed Data (IISD) link has shown an increase in transfer rates of close to ten times those of typical INMARSAT-A transfers using modern voice modems. While the cost of the INMARSAT-B link is twice that of the INMARSAT-A link, there is still substantial cost savings because of the efficiency of the B-link.

What will SeaNet provide and who pays?

Now that funding is in place for the next phase of SeaNet development, we will be moving the SeaNet Communications Node (SCN) from a prototype configuration to a production configuration including appropriate documentation, support, and testing. In addition we will be redesigning the new system in order to take advantage of what we have learned from the prototype. In this realm we are considering (1) moving the SCN from a SPARC-5/Solaris platform to a PC/Linux platform, (2) using a MAGNAPhone INMARSAT-B system instead of the NERA INMARSAT-B system to take advantage of a new shared-channel feature that would further improve cost effectiveness of the system, (3) making the new system much smaller and more compact, (4) incorporating new communication link technologies under development at the NAVY NRAD facility, and (4) redesigning the structure of existing software modules (though we are happy with much of the original design).

NOPP funding will provide for five production versions of the SCN to be built and deployed in the first year. Most of these will be installed on large research vessels with guidance from the SeaNet Advisory Panel (see later discussion). One, or possibly two, of these units will be available for temporary installation on ships and platforms of opportunity in support of science driven requirements. SeaNet will provide reduced rate and subsidized INMARSAT pricing (up to 50% subsidy on \$9.50/minute rate) in order to encourage investigators to begin to experiment with the use of shipboard Internet capabilities as part of their experiments.

The design and implementation of an enhanced INMARSAT B/HSD Ship Earth Station will be done by MAGNAPhone in close coordination with the other SeaNet partners. The hardware, packaging and installation aspects of the shipboard equipment will be lead by Dale Chayes of LDEO. Andrew Maffei of WHOI will take the lead in the software effort. It is expected that the first production units might be available for installation six months from the award date, which is expected in July 1997.

The SeaNet collaboratory will provide comprehensive technical support for installing the initial SCNs working in close coordination with the vessel operator and/or the science program. The vessel operator or science program will be expected to cover some of the costs associated with their specific installations. At a minimum, this will include: crane and possibly welding costs associated with the installation; INMARSAT B commissioning costs; and the travel expenses of a SeaNet engineer who will participate in the installation, do the on-board configuration and testing, and provide hands-on training of the operators.

SeaNet will handle radio licenses and billing accounts for all of the SCN communications channels. Usage charges will be billed against authorized access codes based upon prearranged accounts.

The Network Operations Center at Omnet, Inc. will provide full time (7 day by 24 hour) monitoring of the performance of the remote SCNs and will be the first level point of contact for remote sites. A SeaNet engineer will be on call to provide backup support for resolving technical and operational problems.

Software in the SCN will maintain a running estimate of usage and cost incurred per authorized user account. Usage updates will be distributed to the NOC, the SeaNet accounting office, and the on-board science party.

Another aspect of the SeaNet collaboratory is technology monitoring. Rex Buddenberg at the Naval Postgraduate School (NPS) has been watching the leading edge technologies that will be more effective in supporting an Internet at sea. In his graduate course titled Internet at Sea, at NPS Buddenberg directly addresses the technological, infrastructure and managerial problems of a SeaNet. Class projects and follow-on theses by NPS students explore various facets of extending the Internet to sea and unifying several heretofore stovepipe communications systems, both inside the Department of Defense and in the commercial world. Buddenberg has recently been working with the Navy Research and Development (NRAD) laboratory which is, itself, deploying an Internet-at-Sea capability for Navy vessels based on the use of Navy satellites (and expensive shipboard components).

After the first year, we plan to begin to expand the number of ships that are part of SeaNet. New communications link options (Big-LEOS, HF Radio, Navy systems) will be integrated into the SeaNet infrastructure as our research and testing proves them to be both reliable and cost-effective. During Year 2 we also plan to start moving SeaNet towards being a self-supporting venture. Subsidies will decrease as (we hope) prices become more competitive at the same time.

SeaNet Advisory Panel

It is important that those people who plan to use SeaNet have input into its design and future direction. To facilitate wide community involvement in SeaNet, JOI is forming a SeaNet Advisory Panel (SAP). The panel will:

- Review and recommend SeaNet unit installations on oceanographic research vessels and coordinate usage;
- Recommend areas of further development of SeaNet;
- Ensure coordination among scientists, ship operators, funding agencies, and SeaNet; and
- Establish guidelines for evaluating requests for SeaNet equipment and services for science projects.

JOI will invite approximately eight people to join the SAP, and plans to draw membership from the oceanographic support community, including UNOLS RVTEC and RVOC, NAVOCEANO, Coast Guard, NSF/CISE (Networking), and sea-going scientists. We also envision liaisons to this panel being drawn from federal agencies with interest in SeaNet, and SeaNet's commercial partners, as appropriate. The SAP will meet once a year, conducting most of its deliberations via collaboration software and e-mail with occasional teleconferences if necessary. The first SAP meeting will be in October or November 1997. Anyone interested in serving on this panel should contact Ellen Kappel (202-232-3900 ext. 216 or ekappel@brook.edu).

Let's Get Started: A Workshop

One task of the now-funded SeaNet project is to help improve shipboard electronic mail. As a first step in that effort, the SeaNet Collaborative plans to hold a shipboard electronic mail workshop on September 29 and 30 in Washington, D.C. We plan to invite individuals who have been closely involved in the development and operations of the variety of shipboard e-mail systems used in the research fleet as well as technical representatives of other organizations with similar needs.

The goal of the workshop is three-fold. First we will document details about the variety of existing shipboard e-mail systems in use in the fleet. Second, we plan to generate the first draft of a specification that represents the workshop participants' rough consensus about features needed for a shipboard e-mail system that are different than shore-based systems. A third goal is to form a closer working relationship among the technical personnel supporting the shipboard e-mail systems to learn from one another about common problems such as INMARSAT-A communications and billing for usage. A group visit to the COMSAT engineering labs is also in the works.

Travel support for this workshop is available to most participants through JOI's "SeaNet Lite" grant from

NSF. Anyone interested in attending should send Ellen Kappel an email summarizing your background and interests. Only one technical person from any institution may be fully supported. Partial support may be provided to others, depending on availability of funds. It will be assumed that all attendees will have a technical understanding of shipboard and other e-mail systems.

In conclusion....

First and foremost, SeaNet is a community project. The SeaNet partners look forward to working with you on all phases of this effort. As a start, initial communications regarding SeaNet should be directed to Ellen Kappel at JOI (202-232-3900 ext 216 or ekappel@brook.edu).

Finally, we are also pleased to announce that the U.S. Patent and Trademark Office has granted the SeaNet trademark to JOI. We are now official.

*SeaNet Partners and project roles Joint Oceanographic Institutions (Dr. Ellen Kappel, PI):

Liaison/coordination with federal agencies and scientific community, and SeaNet Advisory Panel.

Woods Hole Oceanographic Institution (Mr. Andrew Maffei, PI): Project coordination; Shipboard Communications Node (SCN) software development.

Lamont-Doherty Earth Observatory (Mr. Dale Chayes, PI): INMARSAT-B procurement; Shipboard systems installation and testing.

Omnet Inc (Mr. Robert Heinmiller and Ms. Susan Kubany, PIs): SeaNet operations center; Billing; Value-added services.

Naval Postgraduate School (Mr. Rex Buddenberg, PI): Shipboard implementation laboratory; Emerging technology planning; NRAD and Navy liaison.

Other partners donating services or expertise to this project, but who are not receiving any NOPP funds include:

COMSAT: providing greatly reduced rates, engineering support and, potentially, enhanced services.

MAGNAPhone: providing 20% hardware discount, engineering support, and key input into their product design.

MCI: free circuits and Internet Service.

NCCOSC (Navy) Research and Development Division (NRaD): technology transfer through NPS.

Appendix XIII

Available from the UNOLS Office

Appendix XIV

Available from the UNOLS Office

Appendix XV

IRELAND CONSULTING SERVICES, INC.

58 Northbriar Drive

North Kingstown, Rhode Island 02852

Marine Operations and Safety

Captain George F. Ireland

(401) 885-2822 Regulatory Highlights

(401) 885-3678

Fax (401) 885-2822

(Call First)