

AARNet

The Australian Academic and Research Network

Quarterly Report

Second Quarter 1991

AARNet Upgrades

Usage levels of AARNet have continued to climb through the second quarter of 1991. Included in this report is a graph of the weekly total traffic levels across all AARNet links over the period from July 1990 until the end of June 1991, indicating the extent of this growth in usage of the network. These figures show continued rates of growth in usage of the network, with growth rates noted from all States and all member sites. This growth is seen in both the volume of transferred file data and the volume of electronic mail and interactive remote access performed across AARNet links.

National Network Upgrades

One of the consequences of this growth is the requirement to engineer the underlying links within AARNet to have sufficient capacity to meet these usage requirements. Many users of AARNet would have noticed a degree of degradation of the quality of service to and from NSW AARNet sites over March and April of this year. The existing links, capable of transmitting 48Kbps, were saturated during peak hours, with consequent delays in network access being experienced by users. These problems were addressed in late April 1991 with the commissioning of 2Mbps circuits between Sydney and Canberra, and between Canberra and Melbourne. This additional capacity has made a dramatic impact on the quality of access to the network, with peak time transmission times for individual data packets between Sydney and Melbourne dropping from 5 seconds to 0.01 seconds.

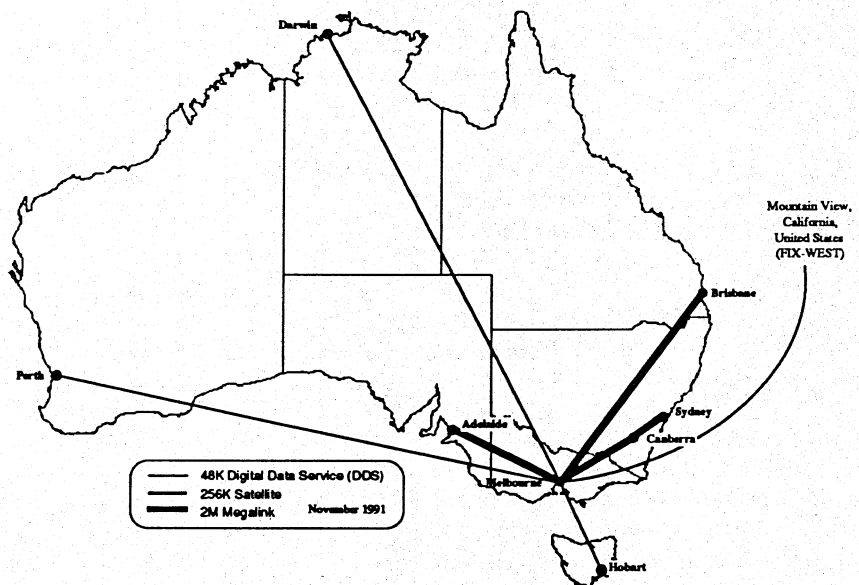
A comparable pattern of increasing levels of load is being recorded on the National Backbone links to Queensland and South Australia, and it is anticipated that both

these 48Kbps circuits will be heavily congested by the end of 1991. Accordingly AARNet has placed orders with Telecom Australia for a 2Mbps circuit from Melbourne to Brisbane, and a second 2Mbps circuit from Melbourne to Adelaide.

These circuits will be installed in late October of this year, allowing for the standard Telecom Australia ordering lead time for these circuits.

each partner paying half-circuit costs to the local international carrier. (The PACCOM program funds a number of international Pacific Internet links, including those to New Zealand, Japan, Korea, and shortly, Hong Kong.)

International traffic levels continue to grow at very high rates. Analysis of this traffic indicates that the overall majority of the traffic is concerned with the transfer of



Map of AARNet National Backbone Network - November 1991

International Link Upgrade

On the 22nd of May 1991 the circuit between AARNet and the US Internet was upgraded in capacity from 128Kbps to 256Kbps. As with the national backbone upgrades, this upgrade has been implemented in response to usage of the facility reaching link saturation levels. As with previous upgrades to this circuit, this circuit is funded through an international agreement between AARNet and the Pacific Communications Program (PACCOM) within the the University of Hawaii, with

file-based information, rather than electronic mail or remote interactive access.

The international circuit remains a satellite circuit at present, with one way packet transmission times of the order of half a second. With the installation of the new fibre optic cable linking Hawaii to New Zealand, and New Zealand to Australia, scheduled to be completed in early 1993, it is anticipated that we will have access to significantly greater transmission capacity at competitive tariffs.

Melbourne Upgrades

The AVCC and CSIRO have announced a joint funding program of upgrades to two links within Melbourne.

A 2Mbps data service will replace the existing 48Kbps service which services both Monash University and the CSIRO Clayton site. CSIRO Clayton is the Melbourne termination point for the Sydney - Canberra - Melbourne CSIRO internal telephone and data network, and this upgrade will provide enhanced services for data exchange between AARNet members and the CSIRO facilities at Clayton in Melbourne, at Amstie, Canberra and at North Ryde, Sydney.

The second component of this program is the upgrading of the 48Kbps service to the CSIRO Joint Supercomputer Facility to a capacity of 10Mbps. This link will be implemented using a private microwave service and will be project managed by staff of the University of Melbourne. These links are anticipated to be commissioned in the next two months.

The total program will provide improved levels of access to the Cray Supercomputer for both CSIRO and AARNet members.

Affiliate Network Members

In January 1991 AARNet launched the Affiliate Membership program, allowing organisations and bodies outside the AVCC and CSIRO to connect to AARNet. The intent of this Affiliate Membership program is to employ AARNet as common communications network for the purposes of supporting joint collaborative activity in the academic and research domain, and to allow third party organisations to fulfil a service role to higher education institutions and CSIRO.

As one of the major precursors to collaborative activity is effective communications support, it is anticipated that this program will have a significant impact on the research environment in Australia, bringing together higher education, gov-

ernment and commercial research organisations as peer members in a single national communications environment.

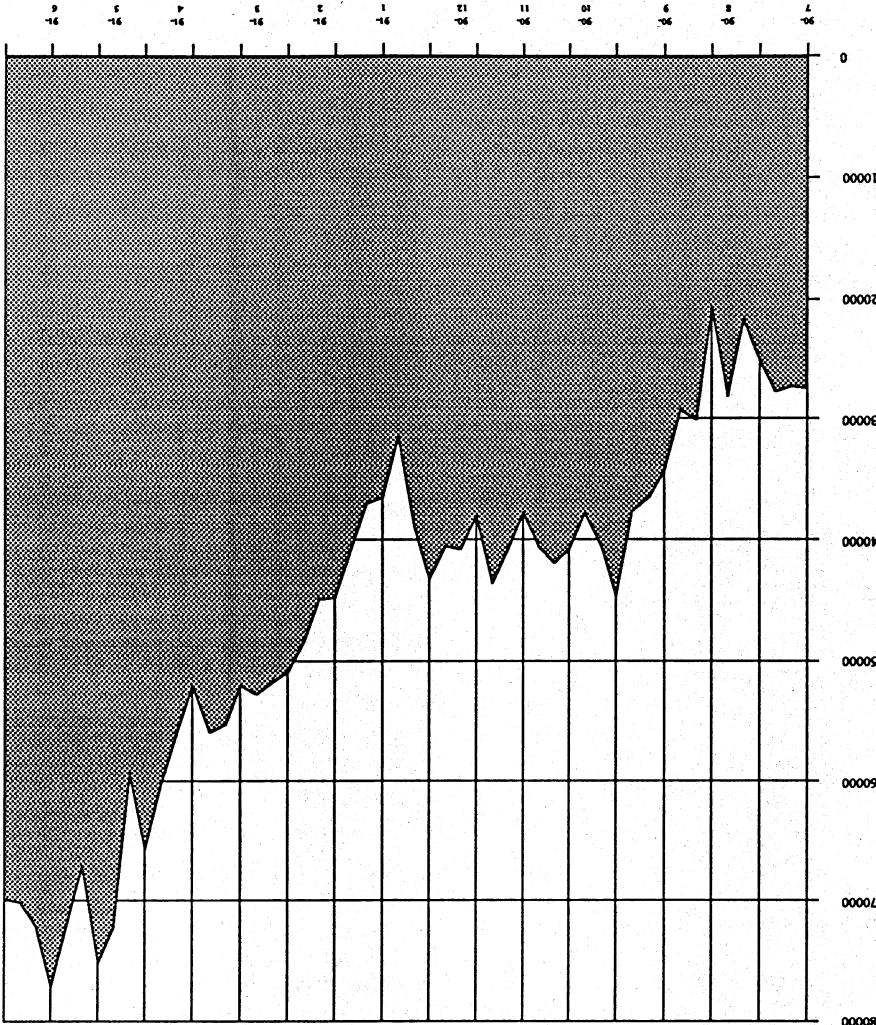
This Affiliate Membership program allows AARNet to extend services to other organisations through either of two mechanisms; as a Network Service Affiliate Member of AARNet, with a direct connection to the network infrastructure of AARNet, or as a Mail Service Affiliate member of AARNet, which allows electronic mail to be delivered across AARNet on behalf of the organisation.

AARNet would like to welcome the following new Network Service Affiliate Members who have connected to AARNet in the period covered by this report:

- The Commonwealth Department of Transport and Communications
- Great Barrier Reef Marine Park Authority
- Miden Pacific
- IPS Radio and Space Services
- Computer Education Centre
- Australian Electoral Commission
- Australian Bureau of Agricultural and Resource Economics
- Australian Nuclear Science and Technology Organisation
- Sugar Research Institute
- Geelong and District Water Board

The total number of Network Service Affiliate member organisations now are now Mail Service Affiliate Members of AARNet.

AARNet - Weekly Traffic Volumes



AARNet Projects

As in 1990, funding has been made available by AARNet to fund various groups in undertaking developmental activities related to the use of AARNet. Following a call for proposals earlier this year, the first set of 1991 programs to be funded can now be announced. These projects are:

- the provision of an **information and archive file server** on AARNet, a joint program undertaken by members of The University of Wollongong, The University of Tasmania, Sydney University, The University of Adelaide and Deakin University;
- the implementation of a **stratum 1 time reference** on AARNet, undertaken by CSIRO DMS; and
- the implementation of a **connection to the Antarctic Division and cross connection to the Australian Antarctic Base**, undertaken by the University of Tasmania.

It is anticipated that further projects will be selected in a second announcement later this year.

It is also noted that there has been significant progress within the AARNet **X.500 Directory Services Pilot Project** (a project funded from the 1990 AARNet projects program). This project is a distributed project, involving the University of Queensland, Monash University, the University of Sydney, the University of Adelaide and CSIRO Division of Information Technology. The project has now purchased four DECstations, with support from Digital Equipment Corporation Australia, and is using these systems as platforms for the QUIPU X.500 Directory Servers in Brisbane, Adelaide, Melbourne and Sydney. In addition the project is now part of the international X.500 directory service, supporting distributed directory links to servers in the European COSINE project and the US Internet X.500 pilot projects.

Network Information Services

One of the major requirements of users is a knowledge of the resources which are available over the networks. Typical queries generally include how to get in touch with a particular institution or research group within an institution, or how to access a particular database or request an account on a specialized computing facility, or to access a library catalogue. To address such queries a number of overseas national academic and research networks have undertaken to support a Network Resource Guide - a directory of resources connected to the network, and also support complementary on-line information services.

In 1990 all institutional members of AARNet were requested to provide relevant information to be assembled into an AARNet directory of network resources. The assembled set of responses has been published electronically as the AARNet Resource Guide, available for collection across AARNet (the files are held for collection via *anonymous ftp* on the system *aarnet.edu.au*. It is intended to com-

bine the information contained in this resource guide with the AARNet User Guide (currently being prepared by Queensland University of Technology as a funded AARNet project) and publish this as a booklet for widespread distribution. All network members are encouraged to check on the information contained within the resource guide and provide updates as appropriate. AARNet staff will be contacting each member site in the near future to ensure that the information provided in the guide is up to date.

Additionally there are a number of useful information sources available over AARNet. These include both published directories and online resources.

For example, those systems which support the *finger* application can retrieve online information from servers at the University of Sydney - a good starting point is the command *finger help@directory.su.oz.au* (see below). Similarly, information relating to what programs and data are available on the Internet via *anonymous ftp* is available by using *telnet* to the host *sol.deakin.oz.au*, with a login username of *archie*. An initial command of *help* is a good starting

Finger help@directory.su.oz.au.

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**** This is an experimental service offered free of charge by ****
**** The University Computing Service, University of Sydney. ****
**** Please mail support@ucc.su.OZ.AU if you have any queries. ****
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Finger offers these additional services:

- Access to a database facility

Usage: *finger <key>%<database>@dir.su.OZ.AU*

<key> is usually a regular expression and *<database>* can be:

<i>aarnet</i>	- resources available on AARNet
<i>buildings</i>	- buildings and their codes at Sydney Uni
<i>ftp</i>	- anonymous ftp files available on AARNet
<i>internet</i>	- resources available on the Internet
<i>library</i>	- library access available via AARNet
<i>newsgroups</i>	- find NetNews newsgroups
<i>phone</i>	- The Sydney Uni Phone Book
<i>postcodes</i>	- Australian Postcodes
<i>shop</i>	- prices at the UCS shop

- Usage:

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finger help@dir.su.OZ.AU      - this help
finger help%<database>@dir.su.OZ.AU
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point for this service. For US resources in particular the *whois* service can also be a useful tool.) It is intended to collate a directory of information directories and services over the next quarter, and include information about national and international information services in the forthcoming AARNet handbook.

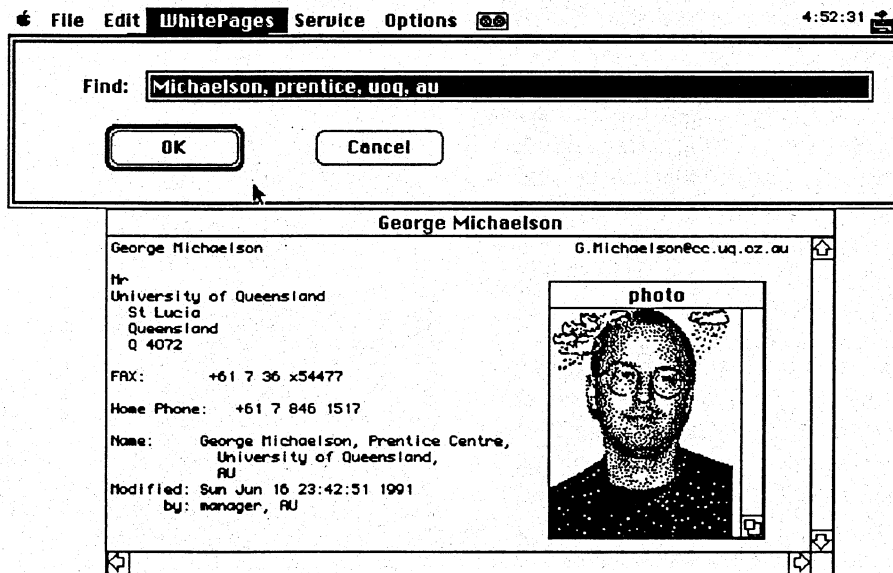
mote interactive services) facilities onto AARNet. While the technical aspects of such a service are now well understood, the interface does require the provision of a mechanism to allow incremental charge back to AARNet clients of such a service. This aspect is still under active investigation by AARNet.

AARNet representatives have attended the previous two meetings of the CCIIRN, and have participated in this body's efforts in ensuring that the issues relating to the quality of the global network services and end user connectivity are not neglected as the network continues to grow.

To assist this policy body in achieving these objectives a network engineering group, the Intercontinental Engineering and Planning Group (IEPG) was established in November 1990. This group has an engineering membership drawn from the European, American and Pacific network communities, and is intended to fulfil a role of engineering the continued growth of the global research network.

AARNet is pleased to announce that the AARNet Network Technical Manager, Geoff Huston, has been appointed as chair of this group, and in addition to his activity in supporting AARNet is now working on issues concerning Pacific regional networking and the wider global issues.

On a similar note a new international body, the Internet Society, is being formed to promote the use of the Internet for research and scholarly communication and collaboration, to provide a focus for development and evolution of Internet technology and to provide a means to advance the sharing of open scholarship in all countries. You can request further details on the Internet Society by e-mailing to isoc@nri.reston.va.us.



An Example of an available Network Information Service -
A Screen Snapshot of a Macintosh-based X.500 Directory Services Query Agent

AARNet Protocols - X.25

As indicated in the previous AARNet Quarterly report, the Queensland universities are undertaking a pilot project to implement an X.25 transport protocol within AARNet. This entails the configuration of the AARNet cisco routers to act as an X.25 packet switch, and configuration of an X.25 switch, located within the University of Queensland, to act as the packet switching interface between the AARNet sites and Telecom's Auspac public X.25 service.

This service is currently provided to the University College of Southern Queensland, and will shortly be extended to the University College of Central Queensland and the James Cook University of Northern Queensland.

Additionally AARNet is currently investigating the provision of X.29 PAD (re-

Global Research Networking Groups

As well as providing services to the national academic and research sector AARNet is a component of the global matrix of research networks. This network of connectivity is the world's largest electronic community, with a total population variously estimated at between 2 and 6 million users.

With such a large, and rapidly growing, network the need for effective coordination of the various national, continental and intercontinental programs has become paramount, and to address such issues a body known as the Coordinating Council for Intercontinental Research Networks (CCIIRN) was formed in 1987. While this body concentrated on trans-Atlantic issues in the first years, the Pacific has now reached a stage of development where it too is now represented in the CCIIRN.

AARNet is a network service operated by the Australian Vice-Chancellors' Committee to provide communications services to the Australian academic and research community.

For more information on the items in this report, or on any other aspect of AARNet, please contact:

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