From: IN%"G.Huston@aarnet.edu.au" 15-APR-1991 08:49:36.43
To: aarnet-adv-board@aarnet.edu.au
CC: ccdirectors-oznz@aarnet.edu.au, aarnet-contacts@aarnet.edu.au
Subj: AARNet Report - First Quarter 1991

Australian Academic and Research Network

First Quarter 1991 Report

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This report covers the period from November 1990 through to March 1991, highlighting the activities and programs undertaken by the Australian Academic and Research Network (AARNet). This period has been one of consolidation of the rapid developments over 1990 in this area, with major efforts being directed towards the Affiliate Membership program, the continued development of user services and the upgrading of the network management infrastructure.

New AARNet Members

AARNet would like to welcome a number of new members into the network. Following a decision taken in November 1990 to extend AARNet connections to all 1991 institutional members of the Australian Vice-Chancellors' Committee, links to the Phillip Institute of Technology, the Swinburne Institute of Technology, Victoria College and Bond University were commissioned in March 1991. AARNet staff visited all four of these connecting institutions to assist the technical support staff with the physical installation of AARNet, and to discuss how AARNet services are to be integrated into the overall institutional information technology environment.

The order for a link to the Ballarat University College is with Telecom Australia, and we anticipate a full connection to this institution in May 1991. Discussions with the Australian Catholic University are in progress, and some form of connection to AARNet is anticipated shortly. This will complete the connection of all institutional members of the AVCC to the network.

The connectivity of AARNet within CSIRO has also expanded in the period. AARNet now connects some 32 CSIRO sites across the country, with interconnection points to AARNet located in Brisbane, Sydney, Canberra, Melbourne, Hobart, Adelaide and Perth. Within Melbourne the CSIRO Joint Supercomputer Facility, a Cray Supercomputer, is also online, and is used as a computational resource by CSIRO researchers across AARNet.

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 the higher education institutions and CSIRO.

As one of the major precursors to collaborative activity is effective communications support structures, it is anticipated that this program will have a significant impact on the research environment in Australia, bringing together higher education, government 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 either have connected to AARNet in recent weeks, or are anticipated to connect very shortly;

Circulate Section Leaders.

The Defence Science and Technology Organisation (DSTO);
The Anglo Australian Observatory;
The Bureau of Meteorology;
Telecom Research Laboratories;
Broken Hill Proprietary,Research Laboratories; and,
Pyramid Technology Corporation

In addition there are some 30 further organisations who are now Mail Service Affiliate Members of AARNet. The majority of these organisations are members of the ACSnet network.

Usage Levels of AARNet

Usage levels of AARNet have continued to climb through the first quarter of 1991. Attached to 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 March 1991. It should be noted that weekly traffic levels have increased by some 50% over the first 3 months of 1991.

This very high rate of traffic growth indicates the success of AARNet in servicing a very real demand from the academic and research sector. Recent snapshots of usage of AARNet during a normal working day indicate there are in excess of 1,000 simultaneous users of the network at any single point in time.

As well as recording total traffic levels within AARNet, a breakdown of usage across network applications has been recorded since the start of 1991. These figures refer only to traffic between AARNet and the rest of the global Internet, and as a consequence are more heavily weighted in favour of file transfer traffic over interactive access than would be the case if equivalent measurements were taken on a domestic link. The total traffic levels across the link from AARNet to the global academic and research Internet are also somewhat impressive - in the month of March 1991 some 17 Gigabytes of data were transferred into AARNet from the overseas networks, and some 8.5 Gigabytes were transferred out from AARNet. Much of this traffic is associated with the transfer of programs and data, however electronic mail accounted for a total of 2.56 Gigabytes for the month (or an average of 82 Megabyte per day for the month). The figures for the application breakdown for March 1991 are also attached to this report.

The most striking aspect of these application-based figures is the high levels of traffic associated with file transfer applications - one of the more critical objectives for AARNet over the forthcoming year is to engineer an effective means of caching large quantities of file transfer material within Australia, with the ultimate objective of reducing some of the load levels on the international link.

Upgrades to AARNet Links

In response to the high levels of growth in load, AARNet has commenced a program of upgrading the capacity of the most loaded links within the network. The intent of this program is to ensure that link capacity remains t a level appropriate to the patterns of actual usage.

One of the two most heavily loaded links is the single link connecting AARNet to the overseas academic and research networks. Currently this link is supported on a dedicated 128Kbps satellite service connecting the AARNet National Hub in Melbourne with the US Inter-agency Internet Exchange, located at Mountain View, California. Orders from both AARNet and from our US counterparts have been placed with the international carriers to upgrade he capacity of this circuit to 256Kbps.

It is anticipated that this upgraded circuit will be commissioned in May 1991.

Of the national backbone network links, the link connecting Sydney and Melbourne has now reached full saturation levels, ands is currently the most loaded link within AARNet. The consequence of such saturation is high levels of delay for traffic across this link during weekdays (delays of between 2 - 5 seconds per packet are typical during such periods of load). An order has been placed with Telecom Australia in December 1990 for a 2Mbps Megalink Service circuit connecting Melbourne, Canberra and Sydney to address this traffic load. The latest advice from Telecom indicates that the high capacity link will be available in late April 1991. When this link is implemented all users of AARNet should then see an immediate improvement

in responsiveness and throughput for connections to and from the ACT and NSW. This upgrade is a net increase in total capacity by a factor of 20 over the existing 48Kbps services for this sector of AARNet.

It is also noted that traffic levels on the national links to Queensland, South Australia and Western Australia are also increasing, and daytime peaks are approaching 80% link capacity. As a consequence of this continued growth in usage, upgrades to these links over the existing 48Kbps capacity will be necessary within the next 12 months. At this point AARNet is evaluating the possibilities offered by Telecom Australia's ISDN service, with reference to its suitability within this application.

Additonally AARNet is closely monitoring all tail links within AARNet, and is at this stage exploring mechanisms to allow cost effective upgrades of capacity as required on these circuits.

The AARNet Resource Guide

One of the major requirements by 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.

Over the last four months all AARNet members were requested to contribute entries to the AARNet Resource Guide. This resource guide has now been published on AARNet, and is available for collection by any AARNet user. The guide is stored in an area allowing access by the anonymous FTP application from the system aarnet.edu.au in the directory /pub/resource-guide. Plain text versions of this document are stored in this archive. A PC HyperRez version of the AARNet Resource Guide will be available shortly.

A comparable resource guide is published in the United States for the US Internet. Due to the size of this document it has been suggested to the AARNet site contacts that each site on AARNet maintain a single copy in an accessible area on one of the local hosts. Similar documents are available for the UK JANET academic network. It is recommended that users should contact their local users services group with network queries in the first instance.

AARNet Protocols - X.25

One of the major aspects of the engineering of AARNet is the use of multi-protocol routers as the basic building block of the network. This allows AARNet to support a number of network protocols simultaneously, creating the appearance of a number of distinct protocol-specific networks coexisting within a single network structure.

At present AARNet supports a TCP/IP protocol network both nationally and internationally, and a national DECnet (Phase IV) network. Interest has been expressed in some form of interface from AARNet into the public switched X.25 networks (Telecom Australia's Austpac service).

Initial work has been performed by the University of Queensland in this area. Trials between the University of Queensland and the University College of Southern Queensland have successfully switched X.25 protocols across the AARNet equipment.

Additionally a survey of site's requirements for X.25 has resulted in the initial conclusion that the most desirable form of X.25 support for interactive access from AARNet to remote databases and information systems. Work is underway to explore the most feasible way of supporting such a telnet / PAD access gateway within AARNet to allow cost effective means of access to national and international X.25 services from AARNet.

AARNet Projects

All AVCC member institutions and CSIRO were contacted by the AVCC secretariat in March 1991 regarding a call for proposals for AARNet-funded

projects. The background to this call for projects is that there is included in the overall 1991 budget for AARNet a sum of $150,000 to provide funding for educational, promotional and developmental projects relating to AARNet. Proposals are now being sought from AARNet members (within both higher educational institutions and CSIRO), with a deadline for initial responses of 15 April 1991.

Following evaluation of submissions by the AARNet Advisory Board, it is anticipated that the successful projects will be made known in the second quarter of 1991, and a description of these projects will be included in the Second Quarter AARNet Report.

This is the second year of this project funding program. The following projects were selected in November 1990 for funding under this scheme, and are underway at present.

A Pilot OSI National Directory Service
Queensland University, Monash University, The University of Adelaide, Sydney University, CSIRO

Preparation and Publication of AARNet User Documentation
Queensland University of Technology

Email to Fax Gateway Project
Sydney University

TCP/IP Sendfile/Fetchfile Application specification
South Australian AARNet Regional Advisory Board

AAP Wire Service Interface to AARNet - Feasibility Investigation
University of Tasmania

For further information on these projects, and the entire program, please contact AARNet at the address below.

And on a lighter note .... AARNet Merchandising

Previous AARNet reports noted that, as a fact of life of the 90's this network could not truly be considered a success until it branched out into the area of mass merchandising. To this end initial efforts in marketing of the Official AARNet T-Shirt at the Networkshop 90 were a resounding success.

However, to preserve the investment made by our select and obviously discerning clientele, and indeed to allow this investment to appreciate in value, AARNet will print no more of this inaugural TShirt, thereby promoting those sold to date into the realm of a serious networking addict's collectors item. While commerce students may applaud this decision as an astute marketing strategy, this decision has left us with a problem - the creative talents of the AARNet staff in the area of TShirt design are now totally exhausted! Any suggestions as to how we can devise a solution to this extremely critical merchandising problem are welcome.

For More Information

AARNet would be please to provide additional information relating to any of the items mentioned in this report. For further information please contact:

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Attachment A - AARNet Usage Graphs

[The formatted version of this report plotted the following table. This table is the total traffic passed over AARNet lines each week, measured in units of Megabytes

Date	Total Traffic
7/90	27,439
	27,351

	27,707
	25,153
	21,713
8/90	28,109
	20,706
	30,045
	29,369
9/90	34,317
	36,463
	37,651
	44,655
	40,402
10/90	37,745
	40,748
	41,980
	40,486
11/90	37,732
	40,866
	43,690
	38,048
12/90	40,775
	40,500
	43,310
	38,884
	31,414
1/91	36,508
	36,975
	40,856
	44,842
2/91	44,912
	48,423
	50,925
	51,744
3/91	52,783
	52,040
	55,280
	55,943
	51,945
4/91	55,934]

The figure above graphs the total traffic entering and leaving all AARNet routers on a weekly basis, measures in units of Megabytes. This graph should be interpreted as indicating the relative traffic levels on a week by week comparative basis rather than attempting to infer absolute data volumes, as individual data packets may be multiply counted across multiple hops within AARNet.

[The formatted version of this report also included application-based traffic presented as 4 pie graphs. The figures used for these graphs were as in the table below:

Packets In	JAN	FEB	MAR
FTP	31.52%	35.10%	39.20%
MAIL	12.19%	12.00%	12.00%
DNS	16.42%	14.00%	15.00%
NEWS	6.82%	8.20%	7.20%
TELNET	10.21%	12.30%	10.10%
other	22.85%	18.40%	16.50%
total packets	5.48E+07	5.40E+07	7.30E+07

Packets Out	JAN	FEB	MAR
FTP	24.55%	23.20%	34.50%
MAIL	11.14%	8.70%	12.00%
DNS	20.78%	36.00%	16.00%
NEWS	6.94%	6.50%	7.60%
TELNET	13.93%	12.20%	12.30%
other	22.66%	13.40%	17.60%
total packets	5.90E+07	7.20E+07	7.20E+07

Bytes In	JAN	FEB	MAR
FTP	60.54%	63.20%	67.20%
MAIL	12.09%	9.70%	9.10%
DNS	9.32%	6.60%	6.10%
NEWS	4.65%	6.40%	5.80%
TELNET	3.28%	4.40%	3.00%
other	10.13%	9.70%	8.80%

total bytes	1.31E+10	1.20E+09	1.70E+10

Bytes Out	JAN	FEB	MAR
FTP	36.84%	36.60%	50.00%
MAIL	15.49%	9.30%	14.00%
DNS	14.44%	28.00%	10.00%
NEWS	13.57%	12.00%	10.00%
TELNET	6.24%	7.70%	5.40%
other	13.42%	6.40%	10.60%
total bytes	6.56E+09	7.60E+09	8.50E+09

]

The above pie graphs indicate the relative usage of the major network application groups within AARNet. The measurement point is the local Ethernet at the AARNet National Hub. Due to the configuration of equipment at the hub, the traffic being measured in these figures is traffic between AARNet and all other overseas networks.

The applications noted in the above graphs are:

FTP	File Transfer Protocol - used to transfer software and data between computing systems
MAIL	Traffic associated with Electronic Mail
DNS	Distributed Name Service - the Internet directory services
NEWS	Traffic associated with the transfer of USENET NEWS
TELNET	Remote interactive access traffic
other	Other applications

Packet sizes vary with the application being used: File transfer applications tend to use larger packets than, for example, remote interactive access sessions. The packet distributions are more indicative of the work profile of the user population of AARNet, while the byte distributions indicate the breakdown of actual network traffic load.

The Australian Academic and Research Network

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