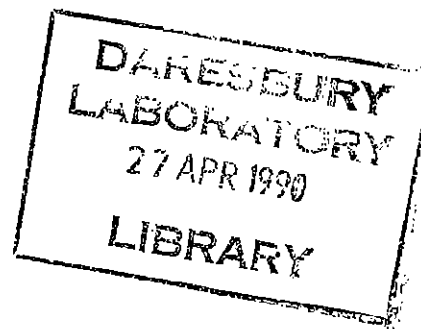# technical memorandum   Daresbury Laboratory

DL/SCI/TM60A

PERSONAL INFORMATION TECHNOLOGY IN THE SRS DIVISIONS

by

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OCTOBER, 1989

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Personal Information Technology
in
The SRS Divisions

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Introduction

The primary tool for personal information processing at Daresbury is now the microcomputer. In the SRFD and SRRD divisions microcomputers are available for scientists and engineers usually on a one-per-person basis or at worst shared between only a few users. Very often the micros are linked to each other and/or to local and remote hosts. The linkages often transcend divisional boundaries. The purpose of this paper is to describe how they are arranged and used and also to outline plans for future development of the facilities.

The Machines

The vast majority of microcomputers in the SR divisions belong to the Apple Macintosh family. There are, however, some IBM-type PC's and a Sun Workstation. The predominant personal arrangement is the Macintosh Plus with 1 MB RAM together with an external 20 MB winchester disk and Imagewriter printer. Recent acquisitions have been Macintosh SE computers with internal 20 MB winchesters and in a number of cases 2 MB or more RAM. It is expected that this will be the pattern for future acquisitions. Also some Macintosh Plus machines have had their RAM increased to 2.5 MB or 4 MB. All Macintosh computers have multi-tasking capability but the 1 MB RAM models obviously suffer from space problems. When 2 MB or more is available this facility comes into its own.

For personal computer usage most scientists and engineers have an Apple Macintosh. Two or three scientists have IBM PC's either for historical reasons or because they use special-purpose applications which are available only for that machine. There are a few IBM PC's used in the laboratory for specialist purposes. There is also a Sun Workstation.

Some clerical staff in the SR divisions use the IBM PS 2/50 for word processing and similar tasks. Others use Macintosh Plus machines for the administrative tasks associated with SRS Users.

Networked Apple Laserwriters provide central printing facilities for many of the computers and there are also some networked plotters available. An IBM Laserwriter is used by one of the clerical staff.

The Networks

The computers are presently arranged into three major networks. A fourth, small network, joins the two Control Room Macintoshes together with their Imagewriter. It is worth noting that the Control Room net has been extended to the Synchrotron Light Monitoring Area where, when required, a Macintosh can perform data taking tasks under remote control via the this net.

All primary networking uses Apple "LocalTalk" which is very cheap and very convenient for Macintoshes. Four IBM PC's have been incorporated into the LocalTalk nets, two into the "Accelerator Physics" net and two into the "SRRD B-Block" net. In each net there is one old-style PC XT/AT and one PS2/50. The connecting hardware is a TOPS Flashcard for the AT/XT installations and Daystar Atalk cards for the PS2's. In both cases the network software is TOPS. TOPS is also used by the Macintoshes to communicate between themselves and between Macintoshes and IBM PC's.

As an example, a block diagram of the Accelerator Physics net is shown in Figure 1. The other two nets are formally similar, but differ in the detailed composition. For historical reasons the Accelerator Physics LocalTalk net incorporates the three Macintosh computers of the Daresbury Technical and Scientific Information Service (TSIS). A useful result of the connection to Ethernet is that TSIS can access their Sun Workstation using this route.

Nearly all the microcomputers are attached to central host computers via the PAD, either individually or via LocalTalk PAD connections. In addition the Accelerator Physics net is bridged to Ethernet via a Kinetics Fastpath. The SRRD E-block net is bridged to Ethernet by the same means. All LocalTalk machines connected to Ethernet can exchange information with each other as if they were connected to the same LocalTalk net since Ethernet is transparent to LocalTalk. The SRRD B-block net will be connected to Ethernet very shortly. Figure 2 shows the relationship of the LocalTalk nets to the main site services on Ethernet.

Selected Macintoshes are connected to the MSA system via Avatar protocol converters. It would be perfectly possible to incorporate MSA into the LocalTalk nets, however this has not been implemented for reasons of security.

All the printers on the networks are driven by LocalTalk. To the individual users it appears as if all the printers are connected to their own machine. LocalTalk queuing adequately handles multi-user contention. Problems

have only arisen when one user has loaded special printing media and then the queue allows another user to print on it. This, fortunately, does not happen very often. The networking of printers has made the provision of high quality, high cost printers for desktop computers a viable proposition as the cost per individual user on large networks is reduced to a reasonable level. Each of the major networks has an Apple LaserWriter. The SRRD B-block net also has an ImageWriter LQ for larger size work.

Plotters attached to the networks by Shiva Netserial links are easily accessed by Macintosh drivers. The plotter is simply regarded as another networked printer. Persuading IBM PC plotter drivers to recognise networked plotters is, as yet, an unsolved problem.

Network Software

Many of the hosts at Daresbury are running Pacerlink software which enables fast, flexible file transfer facilities to and from Macintoshes and IBM PCs. The Convex and the Sun Workstations DLSB, DLSF and DLST (the TSIS machine) run Pacerlink and communicate with the personal computers via the PAD or via Ethernet using TCP/IP protocol. The Vax DLVA runs Pacerlink and looks like a LocalTalk node over Ethernet. Pacerlink supports virtual disk facilities via any available mode of communication, but only Ethernet has the speed to allow full utilisation. The microcomputer part of the Pacerlink system provides a useful graphics terminal emulator as well as the file transfer capabilities.

In operation, the Pacerlink system has proved to be very advantageous. In particular the ability to transfer any type of file, text or binary, between machines is often used. The most popular use is to transfer host text files to a Macintosh for off-line editing as, except for minor changes, the Macintosh editors are far superior to those to be found on the mainframes. Also, the provision of a large number of pre-programmed function keys for Unix and VMS systems is quite popular.

Communication between individual microcomputers on the nets is via TOPS, a Sun Microsystems product. TOPS allows any microcomputer to access the data of any other microcomputer, both running TOPS, with appropriate security for private files, and without the need for a dedicated file-server. TOPS for the Macintosh and IBM PC is very cheap and so has been implemented widely. In contrast TOPS for the Sun Workstation is very expensive and so has not been used at all.

TOPS is easy to use. Any user can access data specifically published by any other user as if it were on a device attached to the local machine.

The system is so versatile that, on occasions when one user's hard disc has been away for repair, two machines have used one hard disc so as to maintain a service at both machines. While there obviously is some performance degradation for multi-user discs this has not proved to be a problem in practice.

Communication with MSA is by InTàlk terminal emulator configured as an IBM 3278. No problems have been encountered using this system and data capture for local processing has proved to be quite easy on the Macintosh.

Individual Software

Individual software is, by definition, individual. However there some generally popular packages which can be mentioned here.

All machines have a word processor. On Macintoshes this is usually WriteNow with MacΣqn attached so as to give a full scientific word processor capability including mathematical formulæ and graphics incorporation. IBM PC's use SAMNA and TSIS, of course, use the full range of desk top publishing facilities. Transfer of files to TSIS for professional processing is facilitated by TOPS or Pacerlink and is expected to become more popular in the future.

Much of the scientific or engineering use of the individual computer is to manipulate and display experimental, engineering or computed numerical data into a form suitable for human comprehension. The Excel spreadsheet and the Cricket Graph package are widely used because, apart from their own, impressive, capabilities there is total compatibility between their data storage formats so that each can be utilised to best advantage, quite often by running both simultaneously on the larger capacity Macintosh. Very often communication with a mainframe is maintained at the same time for high-power numeric calculation capability. All Macintosh terminal emulators, and Pacerlink in particular, can directly transfer tabulated data from a mainframe to Excel or Cricket Graph at the stroke of a Mouse.

The Future

With the advent of Ethernet and LocalTalk there seems no reason why all the microcomputers at Daresbury should not have the capability for inter-communication. Certainly in the very near future there will be no free-standing PC's in the SR Divisions. Apart from the advantages of easy data exchange between individuals of like interest, this raises the possibility of providing other services to improve the efficiency of the laboratory. One obvious thing, which could be provided in very short order, is a local

electronic mail service to all PC's on site. With full alerting for unread mail, documentary communication around the site could be speeded up considerably. Even implemented just for the SR divisions it would probably be very useful as the division members are spread over a considerable area.

As individual microcomputers are ever gaining more RAM and computational speed, one would expect that the lesser data processing tasks, once reserved for mainframes, will soon be carried out locally, reserving the more powerful central machines for the major tasks. New spreadsheets such as WingZ, utilising maths coprocessors, now have what would have been regarded only two or three years ago as major data processing capability and can display the results in many forms, such as contour or surface plots, for easy human consumption. Similarly, analytic packages such as Mathematica are putting very powerful algebraic and numerical calculation capabilities onto the desk top. With the advent of Apple System 7 later this year, virtual memory will be implemented for the Macintosh, improving multi-tasking and making possible large-scale computation. Again the importance of being able to disseminate the results in machine-readable form so that other workers can process the information for their own purposes cannot be too highly stressed.

All in all, one would expect the closely-knit network of powerful computers to make a major contribution to the efficiency of research in and the administration of the SR divisions.
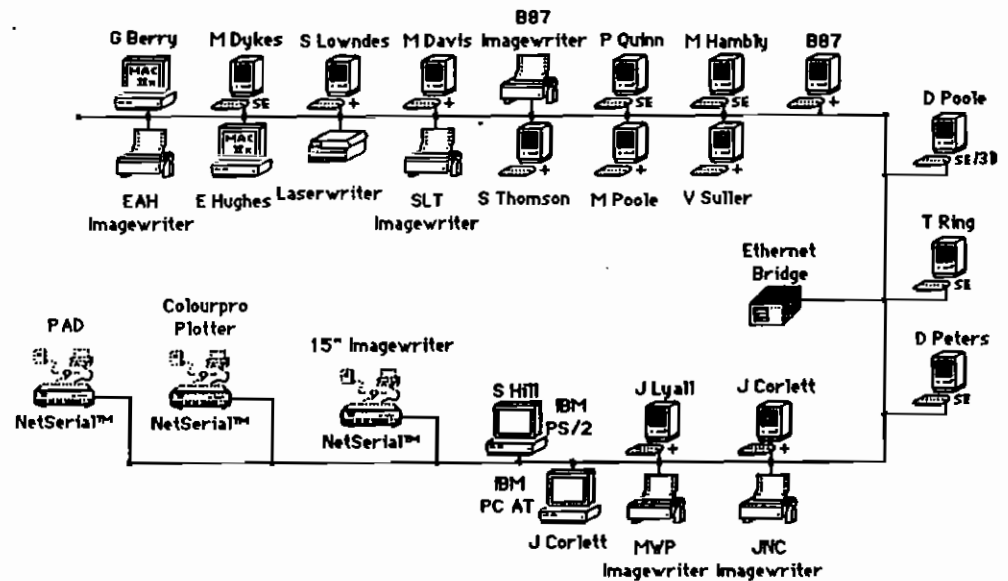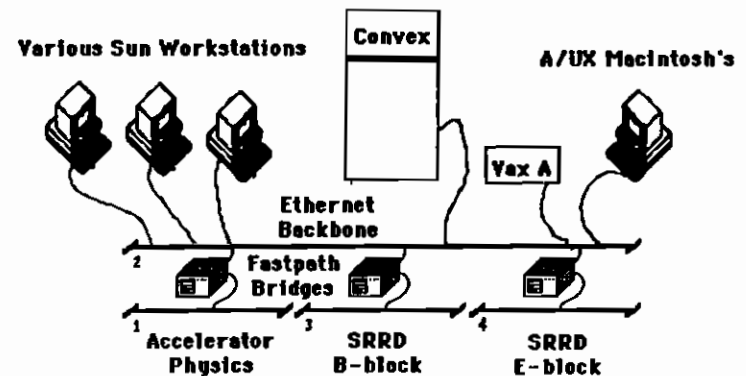
Figure 1 The Accelerator Physics Network

Figure 2 Relationship of LocalTalk Nets to Main DL Services

MR J.C.C.SHARP   [S 1]
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