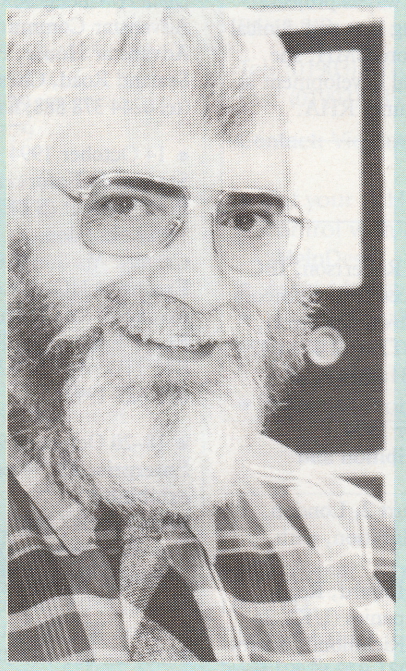
Well connected

Ken Dearden describes how the technical transformation of North Western RHA's network mirrored its difficult organisational transition from regional computer centre to successful trading agency



Ken Dearden, PDC's technical services manager.

As recently as 1989 the computer network of the North Western Regional Health Authority (NWRHA) was, on the authority's own admission, incapable of meeting the increasing demand for IT services. Today, any new device can be plugged into the network at any point and have instant access to the corporate systems. This achievement received official recognition last year when the authority was described as having the best computer network in the NHS.

At the start of this year NWRHA was the second largest of the 14 regional health authorities in England, serving 4 m people. Its territory ran from Stockport to Lancaster, encompassing some of the North West's most densely populated towns and cities, including Manchester, Blackburn, Blackpool and Preston. Since 1990 the authority's old in-house computing department, based in Prestwich, has been trading as an independent agency called Professional Datacare. In April 1994, its responsibilities increased further following the merger of North Western and Mersey Regional Health Authorities to form the new Northwest Regional Health Authority.

Back in the 1970s the computer centre at the NWRHA began to experiment with on-line access to early transaction processing systems. Much of this early data communications was achieved using dial-up modems. Performance was slow, the lines were noisy and unreliable, and it soon became apparent that this was impractical. The next step was to use a combination of leased lines and, where sites had more than one terminal, point-to-point statistical multiplexers.

Much of the early multiplexing was achieved using statistical multiplexers from Micom Borer. These were mostly very reliable, efficient and inexpensive. They did the job very well but were eventually outperformed by a DCX multiplexer from Case — one of the authority's first IT purchases. As time went on this proved to be the most versatile and reliable range of such devices on the market, migrating easily and effortlessly into the local area networking environment of today.

Communication breakdown

By 1985 it had become clear that users wanted more than on-line access in large numbers — they also wanted control of the processors. Under pressure from users, the region embarked on two major projects in the form of a patient administration system (PAS) and a district-based integrated personnel system (IPS). Unfortunately, no one thought to involve the computer centre at the outset of this initiative. Consequently there was a lack of co-ordination over data communications within and between NHS premises, with the inevitable result that the IPS was installed using Micom Borer equipment and the PAS using Case DCX equipment.

The computer centre was brought in to cast light upon the darkness and secured management control while the projects were still in their early stages. It was possible to extract the data communications element of funding from each of the two schemes and to create a small networking project in its own right. Thus a Case DCX network was born which provided access to both local IPS and PAS systems and to central supplies services.

As time went on users were offered more and more on-line facilities and the network began to grow. There was no structure to this growth because networking was, once again, conceived to be part of different application projects rather than an entity in its own right. This philosophy was to change in 1989 when three projects led to the pooling of finances to build and maintain what has since been described by independent consultants as the best work in the NHS.

Developing the network

The projects concerned the introduction of three strategic developments on the network. The first was to enhance terminal connectivity to the already successful PAS. The other two involved introducing on-line access to two new central application services — a general ledger application from Computer Associates called Masterpiece, and a supplies application to enhance the existing supplies stock system. Funding of over £2 m was secured for a redesign of the data communications network. As things turned out, this figure proved to be barely adequate to meet the ambitious objectives set by the computer centre itself.

In short, the objectives were to:

- protect the existing investment in Case DCX;

- base networking within organisations on local area network technology;
- conform to international standards;
- provide a network such that one terminal or PC could access any host computer application; and
- provide electronic file transfer across the network to dispense with magnetic tapes,

While the Case DCX network had been very efficient at handling the communications between asynchronous terminals and host computers, there was no possibility that it would be capable of interfacing to the local area network protocols used by the ICL mainframe.

Consultants Price Waterhouse (PW) were commissioned to undertake a study and provide recommendations as to how modern networking should be approached and what equipment should be used.

The report considered a number of options. One of them, an X.25 network, was discounted on performance grounds, which, on reflection, was one of the wiser decisions taken at the time. The course recommended was to implement a router-based network using the Case 6000 series products, developed and manufactured to OSI standards by Scanet in Denmark.

The first major obstacle was that BT could not physically supply 64 kbit/sec Kilostream circuits to some of the sites.

The second major obstacle was that much of the equipment was new. Being first does have its drawbacks; a great deal of time went into resolving quirks and bugs in software and firmware. Nevertheless, a functional network which met the objectives finally became fully operational about a year after the original deadline. It was then the problems really started.

A question of protocol

At the time, the OSI standard for terminal access had not been fully ratified. Even today, given a stable VT specification, there are very few implementations of the protocol, even in its basic form. Since the situation was, and still is, unlikely to improve without legislation backed by the DTI in respect of trading and manufacturing licences, there were only two alternatives. Either we adopted an OSI transport stack up to and including layer 4, using proprietary protocols above this, or we went for the option of TCP/IP protocols

Having followed the government guidelines on procurement and purchased a router network based on OSI, we could not, at that time, route TCP/IP traffic. The Case OSI protocol stack used asynchronous VT 220 terminal emulation over OSI transport between the products, a technique since adopted by many other suppliers. Protocol conversion gateways were used to translate this protocol to the DEC and ICL proprietary host protocols. The existing DCX devices were migrated into the LAN environment by adding an interface card with TCP/IP protocols.

This resulted in an 'asynchronous echoplex' set-up, where asynchronous OSI packets were passed from the PC over the router network to the OSLAN gateway at the computer centre, and then echoed back to the PC before the character appeared on the screen. This was not a particularly efficient solution and for most PC users this method of communicating with the mainframe — via emulator, PC LAN card and gateway — proved just too slow.

Although the OSLAN gateway was specified as handling up to 32 concurrent sessions, it became noticeably slower as the workload increased. It was also prone to randomly disconnect at anything over 25 sessions. These problems, coupled with a roll-out to provide connectivity for 300 PC users, furnishing visions of stack upon stack of OSLAN gateways, led to the search for a better method of PC-to-ICL/VME connectivity.

It was then we came across network communication specialists Network Designers Limited (NDL). The company's HQ-lan product — a mixture of hardware boards and software — allows access to ICL host systems (among others) from one terminal. HQ-lan has the look and feel of a modern system with new facilities but it still has the old system behind it. So the investment was relatively low. An arrangement was reached to license 300 copies of HQ-lan under DOS for ICL VME access over the Case OSI transport stack on the Case LAN card.

Shaky start

Success did not come straight away — there were some major shocks and surprises which for a time threatened to undermine the whole networking project. The documentation on the OSI interface to the LAN card was poor and although ICL's facilities and documentation for the OSI capabilities of the mainframe were good, they seemed to have omitted to test them. As one ICL employee remarked: "We have not got another customer who does what you do, the way you do it."

At length we arrived at the network we have today. The network, which has over 60 nodes, many of which are large local area networks themselves, is expanding rapidly into new customers' premises. There are countless PCs and terminals, hundreds of file servers, and over a 100 hosts on the network. OSI FTAM is operational between different host environments. The routers now route OSI and TCP/IP, and these are shortly to be joined by IPX. There are external links to suppliers for support and to other external network services suppliers.

One such link is to the University of Manchester, which will soon be providing access to university library services, as well as to JANET (the Joint Academic Network) and to the international network known as the internet. There are external gateways to X.25 and ISDN2, providing access to BACS and, coming soon, Racal Healthlink and, possibly, the Prescriptions Pricing Authority. Network products from Satelcom, Spider and 3Com interwork directly with host processors and either supplement or are employed as alternatives to Case (now Cray Communications) equipment.

The network is presently undergoing its second major upgrade in three years as preparations are made for the implementation of a network management system.

In terms of PC terminal emulation, NDL's TCT product works for all installations. TCT gateway/emulation software connects Windows workstations with host mainframes. A particularly useful feature of this emulation is its ability to save on bandwidth and dramatically boost performance, delivering up to 2 Mbits/sec over a 64-bit Kilostream link.

Connected to the future

Professional Datacare has regular meetings with NDL to keep pace with emerging developments, and has an opportunity to suggest strategies such as the possibility of migrating block-mode protocols to other Unix hosts.

Looking to the future, the network is ideally suited to the implementation of the NHS X.400 electronic messaging service, for which the Northwest Region will act as a pilot. A gateway can easily be provided to the NHS spine network when this becomes available.

So, on reflection, all the risks, the heartache and the sleepless nights have paid dividends. The network is a success and Professional Datacare has made the transition from a computer centre servicing users to a trading agency which recovers its costs by providing quality services to paying customers. This success is attributable to first and foremost to the staff, without whose support and dedication it would not have been possible. The success is also attributable to our strategic suppliers, ICL, Cray Communications Ltd (formerly Case), NDL and BT. ■

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