

## Computers in psychiatry

### 3. Introduction to electronic telecommunication

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Electronic telecommunication (networking) is a complex, and growing field in computer technology. It allows the user to link up with a more powerful machine such as a mainframe, exchange information through a Bulletin Board Service (BBS), access a remote database (on-line service), or send electronic mail (E-mail). This basic guide explains the main concepts, and how to get started.

#### *History*

The origin of using signals to carry messages across large distances is uncertain. Ancient civilisations employed various methods: West Africans used drums, Egyptians – mirrors, and North American Indians – smoke. In 1588, beacons were used in England to warn of the invasion by the Spanish Armada. Modern telecommunications began with the telegraph. It used Morse code (Samuel Morse 1791–1872): messages were transmitted by way of short and long clicks (dits and dahs). The first computers used punched cards, only communicated with themselves, and executed information in batches (batch processing). By the 1960s, electronic telecommunication was essential because many users shared (time sharing) on a central (mainframe) computer, and its external devices (peripherals) such as printers. They were connected to the mainframe via terminals (a monitor and keyboard). The proliferation of microcomputers (micros) in the 1980s made greater demands on telecommunication: individual users now needed to share information both locally (local area networks or LANs) and with the outside world (wide area networks-WANs).

#### *Codes*

Computers store information as binary digits or bits (1s and 0s). Every letter, number, or character, has a specific code or sequence of binary digits. Thus, one computer receiving information from another has to understand the code, and translate it back into the original data. The American Standard Code for

Information Interchange (ASCII), a seven bit code (e.g. 1100101) which provides a maximum of 128 characters, is the most widely used on micros.

#### *WANs*

Computers need modems to transfer information along telephone lines. While telephone lines transmit as a continuous (analogue) stream; computers use digital signals (on/off pulses). Modems convert digital to analogue signals, and vice versa. Transmission protocols have been described earlier (Johnson & Wells, 1992).

There are two methods of transmission: asynchronous or synchronous. Asynchronous transmission, via a standard modem (RS 232 serial interface), is by far the more common. Each character is sent individually, and one after the other. To co-ordinate the sending and receiving devices, extra signals (start and stop bits) are used to identify the beginning and end of each character. Parity is used to confirm error free transmission. It is achieved by adding an extra digit (0 or 1) at the end of the data to make the number of 1 bits odd or even. Errors are detected by a mismatch between the parity stipulated and that of the data received. Alternatively, “no parity” can be specified. Thus, to send information to an on-line service its parameters must be stipulated: for example, a setting of 701 represents seven bits, odd parity, and one stop bit. When you enrol on an on-line medical database such as Colleague (telephone: 0800 289512), you will receive the transmission protocols, passwords and communication software to access the system.

E-mail facilities routed through the Joint Academic Network (JANET) are an increasingly popular way of sending articles and communicating with researchers overseas.

For rapid speed telecommunication the sending and receiving devices (i.e high-speed modems) are synchronised, and batches of data are transmitted simultaneously. Flags, similar to start and stop bits, are used to demarcate the limits of each batch of data. Synchronous transmission is used mainly for

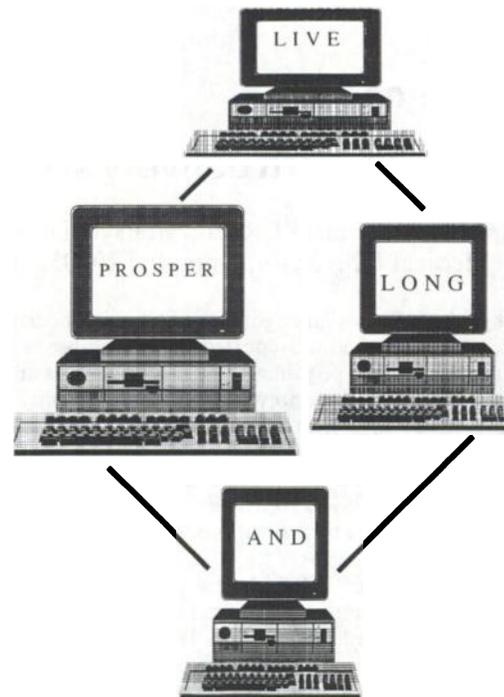
communication between micros and mainframes. An additional feature of most high-speed modems is full duplex transmission: information can be sent and received simultaneously; in contrast, half duplex communication, the movement of data in one direction at a time, is typical of standard modems.

### Local area networks: LANs

Almost half of the business computers in Britain are connected to a LAN. It allows many users to share the computing resources available such as a database, software, or a printer. The hardware consists of the server, and its workstations. The server is the main computer. Users are connected to the server by workstations (nodes). A workstation can be a keyboard and monitor, or a microcomputer with an adaptor (network interface card) plugged into one of its expansion ports. With either set-up, the server and its workstations are linked by cables. The server may utilise one of the following operating systems: Disk Operating System (DOS), Operating System 2 (OS/2), or UNIX. It, however, also requires Network Operating Software (NOS) to organise access to the system's resources. Novell controls almost two-thirds of the world market, and has recently introduced Netware Lite, a package which offers peer to peer networking. This allows all the microcomputers on a network to act as file servers, and to share each other's peripherals. In other words, the purchase of an expensive high performance computer to act as a server becomes unnecessary; it is the logical choice for departments who already have several computers and peripherals. Other examples of NOS include Banyan's Vines, and Microsoft's LAN manager.

LANs can be of great benefit to mental health services. Core members of multidisciplinary teams often work at hospitals or departments on different sites, and increasingly, from small units in the local community. Networks allow for the centralisation of a patient database. Information entered at nodes can be inserted directly into the patient's records, and access to sensitive information can be restricted to users with the appropriate security code.

In summary, electronic telecommunication can improve greatly the efficiency with which we manage patients, educate ourselves, and communicate with colleagues both locally and abroad.



Using LANs to communicate.

### Acknowledgement

I would like to thank Dr L. T. Wells for comments on an earlier draft of this paper.

### Reference and further reading

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