

Branch surgeries—connecting your computers



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If you have delayed upgrading to a Windows clinical system such as Premiere or System 6000 because of concerns about how to link a branch surgery, then read on! Running a Windows clinical system across a branch surgery link is no longer prohibitively expensive and a range of viable options exist.

There is no single ideal solution for all practices. The decision over which method to adopt depends on individual geographical and organisational factors and requires careful evaluation.

Centralised Data

Desktop computers have created new challenges and new opportunities for practices with branch surgeries. At the simplest level a practice can have completely independent databases running on servers at each location with no direct linkage.

Most practices, however, have wisely chosen to have a single central database on a clinical server at the main surgery. Branch surgeries are then linked to allow access to this patient information. This allows clinical details to be available throughout the practice. It also means that the practice can function as a single unit in terms of recalls, reporting, etc.

A further model which a small number of practices have been able to adopt is for patient information to be held on a server at a remote location such as the PCG/T. Several practices then use this centrally administered resource to hold and maintain their patient database that is accessed by suitable links—and obviously, to the server in a system such as this, each client computer is conceptually identical whether the surgery is the main surgery or a branch!

Most branch surgeries, however, will still be operating connected to a server held in the main surgery, and it is these that are the subject of the remainder of this article.

Terminal Interface

Connecting branch surgeries is a fairly simple affair when the clinical system is character-based and accessed from dumb terminals such as the Wyse 50.

Peripherals, such as the terminals and printers, are linked by serial lines to an interface board attached to the file server.

Branch surgery links for character-based systems rely on analogue lines running at up to 56 Kbs,¹ either as leased lines or using dial-up connections. Running the link at this speed, however, makes it error-prone, and 14 Kbs is more typical. This requires modems and multiplexors at either end. The serial connection for each terminal or printer at the remote site is channelled via this connection. As the bandwidth required is relatively small the costs are modest.

System 5 is a character-based clinical system that has typically been configured in this way.

Windows Interface

The advent of clinical systems with a Windows interface, such as Premiere and System 6000, has created new problems. On a single site the main infrastructure change is the need for recabling using Category 5 cable and connections via a network hub.

Practices with branch surgeries have a much greater headache, as Windows systems require a much larger amount of data to be communicated to the remote PCs than their terminal equivalents.

The simplest solution, namely to have a direct digital connection of sufficient bandwidth (e.g. Megastream), has been beyond the means of most practices. It was envisaged that the basic costs of leasing digital lines would fall over time. This has not happened, but fortunately a variety of alternative ways to link branch surgeries in an affordable way have materialised.

NHSnet

The advent of NHSnet has produced further impetus to practices wishing to upgrade their branch surgery links. The combined policies of having NHSnet access from every doctor's desktop, but only a single 64Kbs link to the main surgery, has meant that practices have needed to find ways of extending their networks out to the branches. Many practices have upgraded their branch surgery links to extend their digital networks, even if their clinical system does not require digital links.

It is possible to make a case to the Health Authority that the cost of upgrading branch surgery links is a requirement to connect to NHSnet and so should be 100% reimbursed.

Bandwidth

System 6000 and Premiere are demanding applications, requiring approximately 256 Kbs per remote PC. Since not all PCs will be in active use simultaneously, if there are several at a remote site there is a scaling down of bandwidth requirements. Trials have

established the following bandwidth requirements:

Client PCs	Bandwidth required
1	384 Kbs
2	512 Kbs
3-4	768 Kbs
4-6	1 Mbs
6-8	1.5 Mbs
10-12	2 Mbs

Solutions

There is no single ideal method to link a branch surgery. The solution depends on individual circumstance. Factors to take in to consideration include

- Intended usage at branch: clinical system, interface (Windows or character), NHSnet, other applications e.g. appointments or DocMan
- Number of branches
- Number of PCs at each branch
- Opening times (palmtop or dial-up solution may be adequate for a branch location used only occasionally)
- Proximity of branch; Line of sight
- Telephone exchanges
- Costs and reimbursements
- Performance requirements

Kilostream/ISDN

For a small branch with 1 or 2 PCs, if performance is not paramount, it is possible to link using a simple low bandwidth digital link. This is not going to give top performance based on predicted bandwidth requirements.

ISDN is available from BT and, in some areas, from alternative telecommunications companies. The BT leased digital link solution is branded as Kilostream and is available in multiples of 64 Kbs. The typical cost of a 64 Kbs link is £2,500 to £4,600 per year.

ISDN is an abbreviation for Integrated Services Digital Network. This is a dial-up alternative to a leased digital line and may be cheaper for a branch that is used infrequently. ISDN is also available in multiples of 64 Kbs.

Both of these solutions require hardware called a Router at either end of the link, connected to a network hub in each location. The PCs, network print servers, etc. are then connected to the hubs.

Megastream

If the bandwidth from Kilostream is insufficient for the number of PCs required, or if higher performance is required, it is possible to extend your network via a high bandwidth Megastream link. A 2 Mbs digital link

¹ There is a glossary at the end of this article.

costs in the region of £7,000 to £9,000 per year. There is also a £2,800 connection charge for each link. A router and hub are required at either end of the link.

This simple but costly solution effectively extends the network from the main site to the branch. It allows connection and configuration of devices as if at the main surgery.

xDSL

This is a solution that runs over standard copper analogue lines. A high-speed link of up to 2 Mbs is achieved by the use of xDSL modems at either end of the link. These enable digital to analogue conversion and an extremely high compression rate so that a large amount of data can be squeezed through a low bandwidth connection.

xDSL modems have hardware known as an Ethernet Bridge built in which effectively extends a TCP/IP network across an existing analogue circuit. Hubs are required at either end.

This solution is almost too good to be true. As it runs over simple analogue lines the rental costs are no greater. There are initial hardware costs for the specialised modems and the only additional recurring costs are for the maintenance of this hardware.

Unfortunately it is not available to everyone. The main limitation is that the two sites to be linked must be on the same BT exchange. The speed of connection that can be achieved is

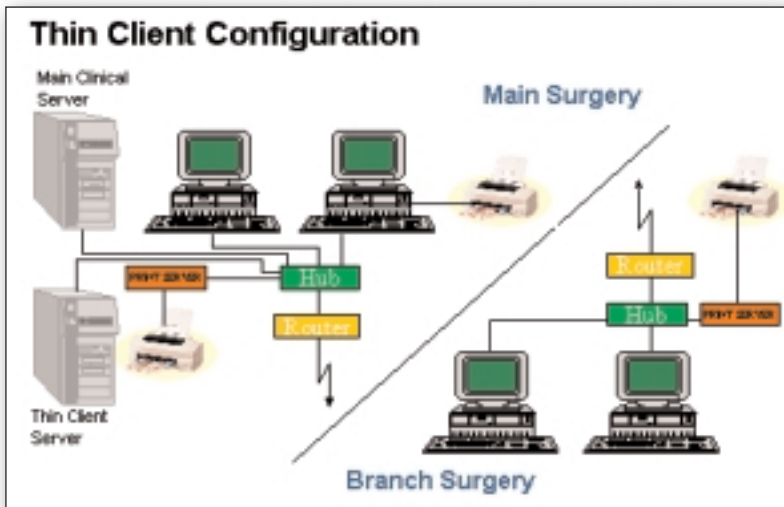


Fig. 1

established by a site audit prior to the installation. Speed is affected by the specification of the existing analogue circuit and the distance of the two sites from the exchange, amongst other factors.

There are 3 modem types available depending on the outcome of the audit performed. These are HS ('High speed'—but in practice the lowest speed option), SDSL (192 Kbs—1.2 Mbs) and HDSL (2 Mbs).

ADSL (or 'broadband') is the best-known version of xDSL. The 'A' stands for 'asynchronous', referring to low bandwidth upload and high bandwidth

download speeds. This is not suitable for running clinical systems, as these have significant data movement in both directions.

Thin Client

This is a cost-effective method of connection for practices running Windows interfaces such as in Premiere, System 6000 or VISUAL Phenix (Fig. 1). It allows acceptable speed over relatively low bandwidth connections.

Generally, a basic 64Kbs link (leased Kilostream or ISDN) is adequate. Additional bandwidth is required if there are 12 or more users at a branch.

A separate server running Windows NT is located at the main surgery. This server must be of high specification both in terms of RAM and processing capacity. For larger practices dual processor servers are an option. A remote access software package is also required. System 6000 practices use Citrix Metaframe and Premiere practices use Windows Terminal Server.

And now the clever bit! The clinical software is loaded on the Thin Client server at the main site rather than on the remote PC. Multiple copies of the software run on the server, one for each of the remote computers that is logged on to the clinical system. At the remote site, apart from changes to the login process, the clinical system performs exactly as if connected directly to the network at the main site.

The branch surgery must be fully cabled in Category 5 or 6 cabling with a network hub. Routers, supplied directly by BT, are required at either end of the digital link.

Running other applications

Other applications, such as appointments or DocMan (or other centralised document management), can be 'published' on the Thin Client server and then accessed from the branch surgery PCs.

If the practice has an NHSnet connection then web browsing can be satisfactorily achieved by accessing Internet Explorer on the Thin Client server. There does appear to be a limitation in that programs cannot be downloaded directly from the Internet on to a branch surgery PC.

It is possible to access a practice Intranet by choosing this as the default home page of the web browser.

Outlook can be set up on PCs at the branch surgery to allow full e-mail facilities.

Positive points:

- **Low recurring costs** as low bandwidth requirement.
- **Older PCs can be used satisfactorily**, as most processing takes place on the Thin Client server. It is also possible to run PCs at the main site from the Thin Client server in order to reduce hardware overheads.
- **Software updates** are easy to install as installation is only required on the Thin Client server rather than multiple remote PCs.
- **This solution is especially attractive for a practice that has several branches.** The savings on line costs are multiplied by the number of branches, but only one Thin Client server and one Citrix Licence pack (costed according to number of users) is required.

Negative points:

- **High initial cost** as requires additional server. Citrix Metaframe is a surprisingly costly software product.
- **Software responds a little more slowly** than at main site.
- **Graphics refresh speeds are slow.** This is especially a problem if displaying images such as scanned documents, either as attachments to notes within System 6000 or from within a programme such as

DocMan. When scrolling down a scanned document the screen tends to appear to 'jump' rather than scroll smoothly. Buying additional bandwidth would minimise this problem but would increase recurring costs.

- **Configuration of printers is trickier** than at the main site but once it has been set up correctly, scripts, labels and documents can be produced without problem. As with other digital link solutions it isn't possible to use the link to carry serial connections to remote sites which means that printing must either be via PC attached printers or print servers.

Radio Links

This method of linkage held much promise for a limited number of sites. For this to be successful, proximity and line of sight are required. The rule of thumb is that practices should be within 5km of each other. The speed of the connection achieved is dependant on distance. After initial set-up the recurring costs are minimal.

Installation is subject to a site survey. Unfortunately very few practices have met the criteria for a successful installation. Although there have been installations I am not aware of any practices currently linking their branches in this way.

pcAnywhere (SecureIT 1000)

In theory it is possible to dial in to the main surgery using a simple (analogue) modem connection and remote access software such as pcAnywhere. The slow speed of access, lack of reliability and other restrictions such as the inability to print prescriptions make this of limited value as a branch surgery solution.

NHSnet acceptable use policy forbids unprotected IP connections via modem to the practice network to occur at the same time as the NHSnet connection is up. SecureIT 1000 is a software and hardware solution available from Torex that allows secure remote access via a ConnX server in a way that is acceptable to NHSnet policy.

Palmtop

Torex has developed the palmtop solution mainly with home visits in mind, but there is no reason why a handheld PC shouldn't be used for occasional sessions held in a small branch surgery.

Palmtop uses the Windows CE

operating system running on an HP Jornada 690/720. Amazingly, the entire patient database, clinical codes and drug database can be downloaded onto this compact device and carried around! After a clinical session any new data is uploaded and added to the database on the main practice server.

What may be the best solution for your practice?

Practice	Solution
Single user/ infrequent sessions	Palmtop or possibly ISDN
Proximity and line of sight	Radio links
Same exchange	xDSL
Single branch (xSDL not available)	Megastream Thin Client
Multiple branches	Thin Client

Glossary

Modem = Modulator-demodulator (enables a computer to transmit data over telephone lines)

Multiplexor Hardware to merge data from several serial connections for transmission

Bandwidth Amount of data/second that can be transmitted down a connection

Kilostream BT brand name for 64Kbs leased digital line

Megastream BT brand name for 2 Mbs leased digital line

ISDN Integrated Services Digital Network (dial up digital link)

TCP/IP Transmission Control Protocol/Internet Protocol (the suite of communications protocols used to connect hosts on the Internet)

Kbs Kilobits/second

Mbs Megabits/second

xDSL Digital Subscriber Line

This description can only be a guide: practices thinking of expanding their clinical system to connect to a branch surgery will need to obtain expert advice from Torex Health on the issues affecting their particular practice situation, either by contacting their practice's Business Consultant, or alternatively the Sales Office.
(Diagram kindly supplied by Torex Health)

Unix—locked out?
The Unix command to unlock all accounts is `comeback` typed at the Unix # prompt.

Premiere—list of medication
To produce a list of prescriptions without issuing any, go into the repeat prescription screen, make sure that nothing is ticked, click the Print button and then select 'Print all repeats' from the drop-down list.

System 5—editing templates for cancer referrals
The latest Anthem Upgrade (v1.19) gives access to Urgent Cancer Referral Letters. They are in the directory `R:\anthem\templates` and have a `.tpl` file type. They can be opened in a standard Windows word processor for editing of the text. Don't alter any of the data import fields (which are underlined), and make sure to save with the same `.tpl` file type.