Leased Lines and Private Networks

What they are and what they can do

Leased lines[1], sometimes also known as private circuits or private wires, give the user permanent (or semi-permanent) connections between two end-points, for example between a local bank branch and the head office. The major difference between these and other uses of the access network is that no per-call switching is involved once the line reaches the Local Exchange.

Users pay a fixed monthly or annual charge irrespective of how much (or how little) they use the connection. The actual charge will depend on the capacity and the distance between the points connected by the line.

Leased lines were originally all analogue, as was the rest of the network. They are now largely digital, in line with the core network. Leased lines vary greatly in their capacity, from a basic, permanently-wired phone connection between two points to a 155 Mbit/s[2] permanent digital connection.

Analogue leased lines now generally only used for a simple 2-wire or 4-wire permanent connection between two points. Digital leased lines can offer bandwidths from, typically, 2.4 kbit/s upwards and match the hierarchy of the telecommunications networks transmission systems at the higher bandwidths (e.g. 2, 8, 34 and 140 Mbit/s). The higher bandwidth leased lines use dedicated fibres, co-axial cables or microwave links in the access network.

Leased lines are attractive to companies that have a lot of traffic between fixed points. They can, for example, be used to connect the PABXs[3] at two sites so that calls between the sites bypass the public network and hence avoid call charges. Because they can provide much higher bandwidth than the public network, leased lines are also useful for connecting a company's computer systems and Local Area Networks together.

Larger companies often rent a number of leased lines between their various sites and use them to build 'private networks' for carrying all the company's internal voice and data communications. Private networks offer guaranteed communications capacity within a company, together with predictable communications costs. The cost is usually, but not necessarily, less than using the public network. The costs of leased lines depend strongly on where you are based - the price of a 30km leased line in one country can be more than twice that in another. In addition, competition between network operators seems to be driving the prices for public network services down more rapidly than it is doing for leased lines.

Key messages for SMEs

- If you have a lot of communication between your sites, then leased lines or a private network are worth considering.
- Look carefully at how the cost of a leased line or private network compares with that of sending the calls over the public network.
- Leased lines can offer much higher bandwidths than the public network, e.g. for interconnecting computers and LANs.
- Network operators are now offering lower-cost services that offer most of the benefits of leased lines but handle the actual traffic on the public network
- POTS or ISDN connections should always be used as back-up, to cope with unexpected demand or the failure of an individual link.

A private network also has to be managed and maintained. Very large companies can afford to have a department of telecoms and IT people who do nothing else, but SMEs need to buy in this service from their network supplier.

Leased lines and private networks are an important market for network operators. For example, about 6% of BT's income comes from leased lines (i.e. about €1900M per annum). The market is competitive – indeed most countries opened leased lines and private networks up to competition well ahead of their telephone service. However, from the operator's point of view, leased lines make relatively inefficient

---

1 Leased lines are sometimes marketed under product names – such as BT's "Kilostream" and "Megastream".

2 For comparison, this is about 2500 times the speed of an ISDN line.

3 A PABX (Private Automatic Branch Exchange) is the small internal telephone exchange used by most companies for routing internal telephone calls around an office or factory, and connecting its external calls to the public network.

use of the network and it is difficult to drive the costs of these 'custom-built' services down as rapidly as it is possible to drive down the costs of the public network.

For this reason, network operators have developed services that offer customers most of the benefits of leased lines and private networks but do not permanently allocate network resources to individual customers.

One of the first was Centrex, which is marketed under a variety of names (for example FeatureLine in the UK). It offers customers a 'virtual' PABX, which routes their internal telephone calls through the local telephone exchange but charges a flat monthly fee per line, rather than charging for each call. The cost is similar to that of renting or buying a PABX, but the customers do not have to find space for the equipment, nor do they have to maintain it. In addition, customers do not have to upgrade the PABX regularly to take advantage of new features, such as caller identity or voicemail. Many network operators provide Centrex services but they are becoming less popular. A modern PABX for a small business is no bigger than a personal computer and can be upgraded just as easily.

More recent services, aimed at the private network market, include Virtual Private Networks (VPN) and Managed Network Services (MNS). These extend the Centrex concept to the entire public network, offering businesses something that looks like a private network but actually carries their traffic more cheaply on the public network. The network operator also manages and maintains the Virtual Private Network. A further benefit of Managed Network Services is that customers can ask for additional capacity as and when they need it. These products were initially aimed at large businesses but may now also be useful to medium sized companies or virtual enterprises that are spread out over a number of sites.

Advantages and Disadvantages

Leased lines provide an "always-on" connection between the two end-points. The flat rate charge means that users know their communications costs in advance, irrespective of how much (or how little) they use the connection. Leased lines can also provide much more bandwidth than POTS or ISDN connections.

Companies can also rent a number of leased lines between their various sites and use them to build 'private networks' for carrying all of the company's internal voice and data communications.

The major disadvantage of leased lines and private networks is their inflexibility. They can only provide communications between specific places although, if used for interconnecting PABXs or LANs, they obviously connect all the users of those PABXs or LANs.

Virtual Private Networks (VPN) and Managed Network Services (MNS) offer businesses something that looks like a private network but actually carries their traffic more cheaply on the public network. Although initially aimed at large businesses these may now also be useful to medium sized companies or virtual enterprises that are spread out over a number of sites.

What to buy

Leased lines may be cost-effective if you have a lot of communications traffic between two or more sites, especially if this traffic includes bandwidth-hungry applications, such as video or bulk file transfer. However, you should carefully compare the cost with your existing communications bills.

A private network is also worth considering, if you have a lot of sites and lots of communications traffic between them.

Newer services, such as Virtual Private Networks (VPN) and Managed Network Services (MNS) are beginning to offer competition to leased lines and private networks. They will be of particular interest to 'Virtual Enterprises' or 'Dynamic Networked Organisations', which bring together groups of companies and individuals, maybe for a short time, to address a specific business opportunity.

POTS or ISDN connections should always be used as back-up for leased lines or private networks, to cope with unexpected demand or the failure of an individual link.

Questions to ask suppliers

You will obviously want to ask about prices and capacity in order to compare the leased line or VPN solution with your existing telecommunications costs. Other questions to ask include:

- What is the minimum rental period?
- Do you offer quantity discounts?
- How does the reliability of this service compare with the public network?
- What level of maintenance is offered as part of the contract and can a higher level be purchased as an optional extra?

For VPN and Managed Network Services, you will also want to know:

- What reports can you provide about the usage of my network?
- How quickly can you provide changes to the network and what notice do you require?
- Is there a permanently staffed helpdesk?