



Access Connections for IP-VPNs:

The Business Case for a Switch from Leased Lines to DSL

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Analysis

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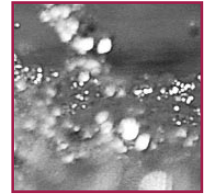
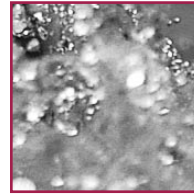
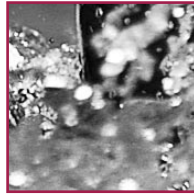
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DSL is Enabling Companies to Upgrade IP-VPN Capacity

There is increasing awareness amongst IT and communications managers that DSL access circuits provide an alternative to leased lines in connecting sites to a corporate IP-VPN and at a much lower cost. With many companies moving to this type of solution, enough evidence is now available to demonstrate the business case for making this switch, taking into account cost but also other critical factors such as available bandwidth, quality of service and security.

At the same time, while significant savings can be made by migrating to a largely DSL-based access solution, in practice, the growing demands on enterprise networks to handle greatly increased volumes of data mean that most companies choose to take advantage of DSL to upgrade network capacity rather than pocketing savings by replacing on a like-for-like basis.

IP-VPNs are the Fastest Growing Area for Corporate Networking

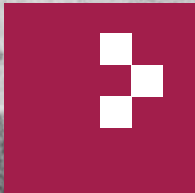
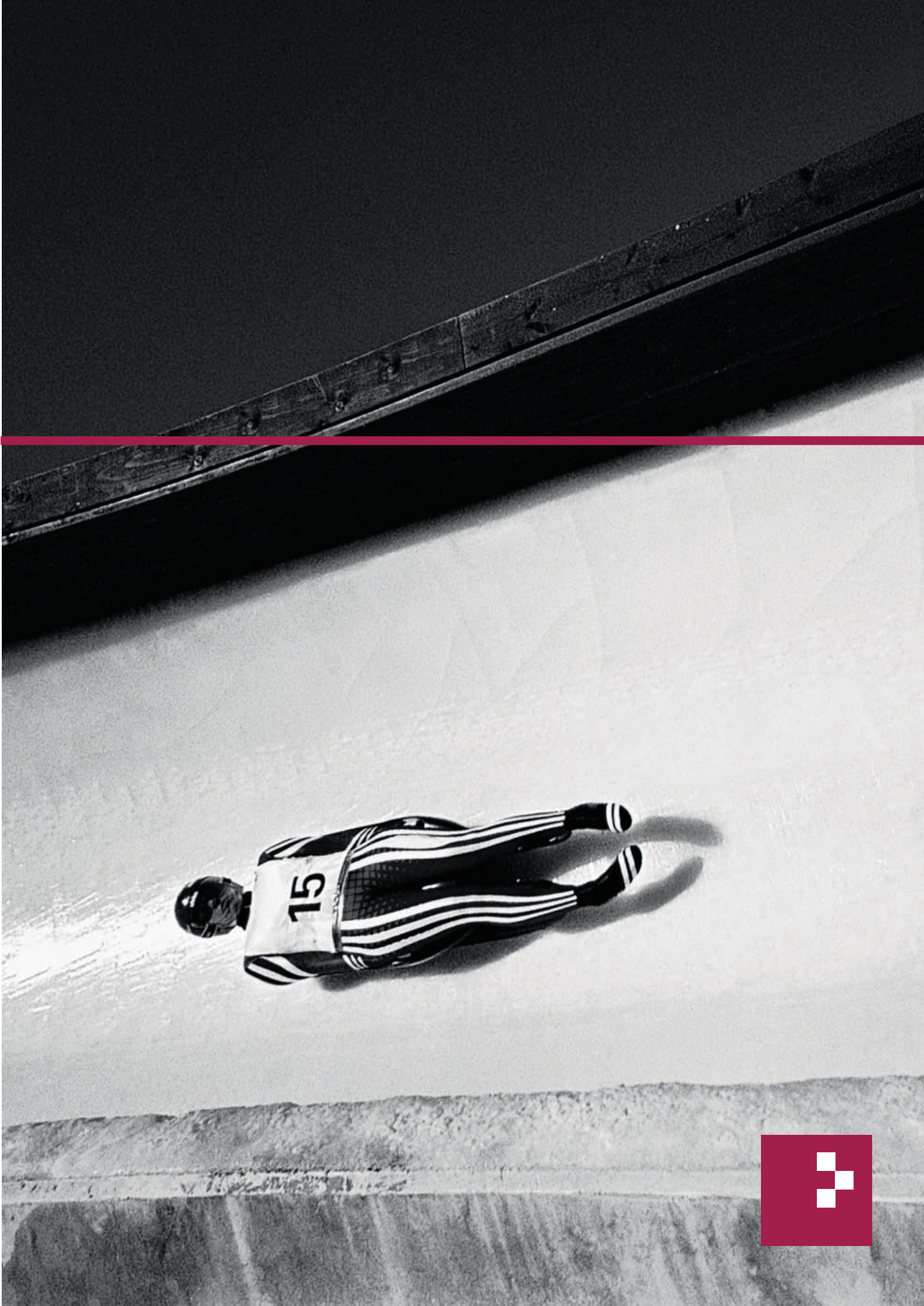
IP-VPNs are fast becoming the data networking solution of choice for most medium-sized and large companies, driven by the need to enable site-to-site communication in a more cost-effective way than running a private network with in-house staff and dedicated point-to-point leased line connections.

While other outsourced managed network services, for example those based on Frame Relay, are generally more cost-effective than a private solution, IP-based VPNs offer companies even greater benefits. With IP becoming the default networking protocol for most applications, IP-VPNs allow companies to integrate local and wide area networks, deliver centrally hosted or outsourced applications to any type and size of site and securely connect workers at home or out of the office.

IP-VPNs are now being used to rationalise communications infrastructure while also adding to the range of ways in which information can be exchanged:

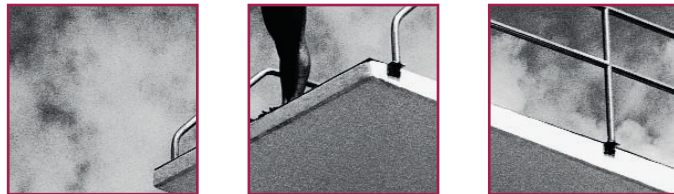
- ✦ **VoIP** - companies can combine their voice and data services on a single IP-VPN, offering significant savings. While not all companies are moving directly to this solution, a rapidly increasing proportion see IP-VPNs as a first step on the road to network infrastructure rationalisation in the future
- ✦ **Critical Data Applications** - businesses today use a variety of internal data applications, which are critical to their business performance. These applications vary significantly in terms of their bandwidth requirements. However, many of these applications will rely on the performance of the network and its capability to prioritise applications e.g. CRM, ERP, EPOS, Supply Chain Management etc.
- ✦ **Conferencing** - the use of enhanced voice and videoconferencing is finally beginning to grow. IP networks enable IT managers to have access to a much richer set of applications but these again need sufficient network capacity and quality of service to function effectively

These developments demand a resilient, scalable and cost-effective IP-VPN solution in order to accommodate the growth in traffic volumes and to ensure that the specific quality of service requirements for different applications are met. Decisions on the choice of access solution are critical in this respect.



	Leased lines	Standard ADSL	Standard SHDSL	ADSL with MPLS	SHDSL with MPLS
Type of Connection	Dedicated private line	Shared DSL network Asymmetrical access	Shared SDSL network Symmetrical access	Shared DSL network Asymmetrical access MPLS protocol for security and traffic prioritisation	Symmetrical DSL access MPLS protocol for security and traffic prioritisation
Speeds	A wide range to cover all needs	Speed dependent on capability of local exchange Up to 2Mbps	Speed dependant on capability of local exchange Up to 2Mbps	Up to 8Mbps download speeds Upload typically limited to 256kbps	Up to 2Mbps in both download and upload directions
Coverage	>99% population coverage	Approaching >95% population	Available in most urban locations	Available in most urban locations	Available in larger urban locations
Advantages	Very secure and reliable Well understood and widely trusted Access speeds guaranteed	Low price Widely available Wide range of possible service providers	Lower price than leased lines Range of possible providers	Low Price SLA available Offers same security for access and core network Prioritises traffic to offer different levels of service (requires sufficient minimum ADSL capacity)	Low Price SLA available Offers same security for access and core network Prioritises traffic to offer different levels of service
Disadvantages	Relatively expensive Limited number of suppliers	No level of service guarantee - service on a 'best efforts' basis only Requires IPsec security or similar to be secure	Service levels available dependant on providers ability to provide own infrastructure Requires IPsec security or similar to be secure	Limited number of suppliers Various Contended services Less established than leased lines	Limited number of suppliers Less established than leased lines

Table 1: Key characteristics of leased line and DSL connections [Source: Analysys Research, 2004]



Alternative Access Solution

While companies moving to an IP-VPN previously had to rely largely on leased lines to connect sites to the IP-VPN core network, they now have the option to make use of a variety of DSL technologies. Moreover, the use of multi-protocol label switching (MPLS) in the core IP network means that customers can be offered different classes of service to suit different applications. MPLS is a way of prioritising data packages, with applications requiring a high class of service, such as voice, given priority over applications that require a lower class of service, such as email.

Comparing DSL and Leased Lines

For business users, running business critical applications, standard ADSL does not come with guarantees of service and as a result it is not considered as a replacement for leased lines in our calculations.

For DSL solutions with MPLS the actual quality of the service will depend on the contention ratio, the ratio in which bandwidth is shared between users. The lower the contention ratio, the fewer DSL lines share the network. Providers of DSL solutions with MPLS should be able to offer guaranteed levels of bandwidth matching those offered by leased lines. Quality of Service and fault resolution times, both critical in weighing up the selection of a new access solution, are dependent on the service provider. Again though, providers of DSL access solutions claim to offer service level guarantees equivalent to those for leased lines. Fundamentally, this means that the key difference between the two solutions is price.

For both solutions, the level of service coming from the IP core network depends on how widely available MPLS has been implemented. For service level agreements to be implemented, the access solution, whether DSL or leased line needs to be connected to an MPLS compatible network. It is possible therefore that a leased line or DSL solution does not connect to the MPLS solution and the associated service levels cannot be guaranteed.



The Relative Cost of DSL-Based Solutions can be Modelled for Different Sizes of Network

Based on current service offerings, it is possible to illustrate the cost of a DSL-based solution relative to using leased lines by modelling two typical network configurations:

- ❖ a small network of 20 sites
- ❖ a medium-sized network of 70 sites

	Size of Network	
	Small network	Medium sized network
Total no. of sites	20	70
No. of sites with 256Kbps guaranteed minimum bandwidth	18	63
No. of sites with 1Mbps guaranteed minimum bandwidth	2	5
No. of 34Mbps sites	0	2

Table 2: Assumed configuration of two networks modelled [Source: Analysys Research, 2004]

The one-off and annual costs per access line are shown in Table 3. All prices include the annual access circuit charge, customer premises equipment (CPE), annual management fees and an ISDN line to provide backup. Depending on the provider, these costs may be broken down differently (for example, annual management fees may not be quoted per line but as an overall charge). All charges related to operating the IP-VPN across the core MPLS network have been excluded as these are assumed to be the same for the DSL-based solution as for leased lines.

Type of Line	Minimum bandwidth	Installation cost (GBP)	Annual rental	Annual rental
			for 20 site network (GBP)	for 70 site network (GBP)
ADSL*	128Kbps	1500	2200	2000
SDSL	1Mbps	1500	4000	3600
Leased line	256Kbps	**N/A	6600	6000
Leased line	1Mbps	**N/A	10,000	9000
Leased line	***34Mbps	15,000	N/A	15,000

Table 3: Assumed configuration of two access networks modelled [Source: Analysys Research, 2004]

* Assumes 5:1 contention ratio and a minimum bandwidth of 256Kbps

** Leased lines are used for the existing network so no installation fees are applicable

*** No DSL alternative can provide 34Mbps, so a new leased line connection will be needed when moving to a new contract

As well as the annual cost per line, we have assessed the total cost of switching to reflect the installation and project management costs (covering initiation, meetings, planning, due diligence and implementation) that will be incurred in moving from a leased line contract. We have assumed that one-off project management costs amount to GBP8 000 for the smaller network and GBP35 000 for the larger network.

A DSL-Based Access Solution can Deliver Savings of More Than 50%

As Figure 1 shows, in its first year, the costs of the DSL-based solutions are between 26% and 38% lower than for leased lines (the difference being greatest for the smaller network), even when the installation and project management costs in migrating to the new contract are taken into account. In subsequent years, the cost difference is even more dramatic, with both the DSL networks delivering savings of over 60% compared with the existing contracts.

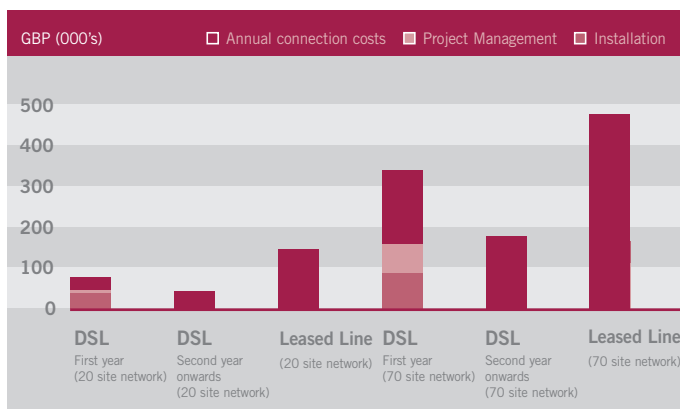


Figure 1: Yearly costs of new DSL and existing Leased Line solutions [Source: Analysys Research, 2004]

Over a typical three year contract, the DSL-based solutions are about half the cost of the leased line contracts (Figure 2).

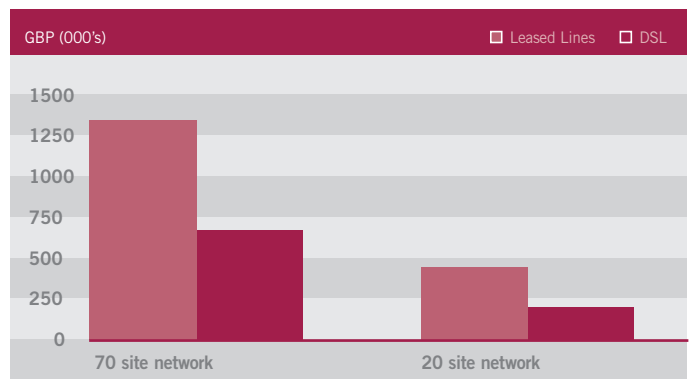


Figure 2: Total costs of DSL and Leased Line solutions over three year contract [Source: Analysys Research, 2004]

In the 20 site network, this level of saving amounts to some GBP235 000, with the 70 site network seeing a cost reduction of over GBP677 000. For both networks, the payback time for the switch to a DSL network is less than a year.

The figures above do not include any termination charges for ending a contract prematurely. Clearly, such termination costs can have a big impact on overall cost savings and need to be clearly understood in undertaking any cost-benefit analysis.

Interest in DSL-based IP-VPNs is Growing Across all Sectors

Recent contract announcements suggest that DSL-based IP-VPNs are proving increasingly popular with companies across all industry sectors. For many, switching to a DSL-based network enables a significant upgrade in network capability as the same level of spend as for a leased line access network can be used to secure much higher levels of bandwidth. Table 4 lists a number of companies that have recently switched to IP-VPNs based on MPLS and DSL access and their motivations in making this change.

Customers Need to Examine Closely What Service Providers Can Offer

Customers considering switching from using leased lines to a DSL-based IP-VPN should assess the capabilities of their service provider in a number of areas:

- ❖ Is the DSL offered over the supplier's own unbundled local loop so that an end-to-end quality of service can be offered to match leased line performance?
- ❖ How quickly can sites be provisioned – does the supplier have the resources to migrate to the new solution quickly?
- ❖ Will it be necessary to operate two access solutions simultaneously before the DSL solution is fully up-and-running – how much will this add to the cost of switching?
- ❖ How significant are the project management charges – are significant overhead costs charged in addition to the annual costs of connection?
- ❖ How financially stable is the service provider – is there any risk in their being able to deliver over the lifetime of a three year contract?
- ❖ How will the termination costs for existing contracts affect the business case for a switch at this point in time – can the supplier do anything to mitigate these?
- ❖ What are the termination costs for the new DSL-based solution – do they offer flexibility for future changes?



Company	Sector	Provider	Network	Reason for switch
Arla Foods	Foods	BT	100 sites in the UK, further sites in Europe	Necessary step before integrating an international enterprise resource planning (ERP) solution
Avenance	Catering	Easynet	600 sites	Replacing previous patchwork network solution, reduced costs, less administrative time
Calor	Gas supplier	Easynet	70 sites	Replacing their legacy network
Lend Lease	Real estate	Vanco	350 sites	Enhanced network capability combined with cost savings
Newcastle Building Society	Finance	BT	49 sites	Increased flexibility and faster company-wide access to central applications and resources
Norske Skog	Paper manufacturer	Equant	39 sites	Cost savings plus greater flexibility in adding future sites
Select Education	Recruitment	Easynet	90 sites	Cost savings and greater bandwidth than previous leased lines. Enables possibility of moving to VoIP

Table 4: Examples of companies that have migrated to a DSL-based IP-VPN [Source: Analysys Research, 2004]

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