



BEARbytes

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The potential SMB savings by replacing an existing phone system with an IP-based PBX breaks down into two general areas: Tangible savings, which are clearly measurable, and intangible savings, which are more difficult to quantify but can have a huge impact on overall business.

According to a published study conducted by research firm Dell'Oro Group, IP PBX shipments will reach 28 million lines in 2006, surpassing Time Division Multiplexing (TDM)-based shipments. Analysts believe that IP telephone shipments have entered a period of sustained growth. The IP Telephone market will expand from simply a PBX handset business into emerging IP Centrex and Residential Voice-over-IP (VoIP) markets. Consumer wireless LAN (WLAN) phone introductions in 2005 will stimulate IP Telephone sales to residential VoIP subscribers.

For smaller companies, there are many areas of potential savings to justify the move to IP-PBX phone systems. The focus of this article is on the IP-PBX phone system, but there are clearly benefits for some smaller businesses today that want to move their long distance to VoIP or Internet long-distance calls. The potential SMB savings by replacing an existing phone system with an IP-based PBX breaks down into two general areas: Tangible savings, which are clearly measurable, and intangible savings, which are more difficult to quantify but can have a huge impact on overall business.

Tangible Savings

- **VoIP – Intra-company long-distance:** If companies have more than one location, they can connect the phone systems in each office together over the Internet and eliminate any long-distance charges associated with those calls.
- **Moves, adds, and changes (MACs):** Instead of expensive visits by the phone system provider to make changes, with an IP-PBX system, the customer manages his own MACs.
- **Conference Bridging:** Most IP-PBXs provide for multiparty conference calls (more than three-way calling), which can eliminate the need for any third-party bridging service.

Intangible Savings

- **Voicemail Communications**

Visual Voicemail — With many IP-PBXs, users have the ability to visually see all their voicemail messages on their computer. They no longer have to listen to all the messages sequentially, just get to the important one they

are looking for. They can also annotate the message to avoid listening to the message a second time, hence increasing productivity.

Notification — Users can get immediate notification on their PC, cell phone, pager or Blackberry, not only that they have a new voicemail message, but who the call is from. This results in a less intrusive interruption to the employee while still making them available to customers and fellow employees.

Forwarding — There is now a wide array of voicemail forwarding options allowing the user to annotate (with voice or text) a voicemail and send it on to others as a voicemail or an e-mail sound file.

- **Call Forwarding**

Call forwarding (and follow-me calling) is a standard feature on many of today's IP-PBXs. This powerful tool simply lets the user direct calls going to the office extension to a different location. Particularly useful for sales, marketing and customer service personnel, it gives their customers easy but controlled access to them.

- **Enterprise Instant Messaging**

This allows for employees within the business to quickly

communicate with each other. It works without the interruption of a phone call, yet is more urgent than e-mail. The savings is measured in terms of better internal communications.

- **Computer Telephony Integration**

CTI has historically been considered to be the ability to dial a phone number from a computer application and to get a Caller ID-based “screen pop” with an inbound call. Depending on the customer’s operation, this can offer significant savings. The inbound screen pop can save time per inbound call by eliminating the customer database search.

- **Automatic Call Distribution**

For departmental use and for inbound call centers,

An IP PBX is a private branch exchange (telephone switching system within an enterprise) that switches calls between voice over Internet Protocol (VoIP) or IP users on local lines while allowing all users to share a certain number of external phone lines. The typical IP PBX can also switch calls between a VoIP user and a traditional telephone user, or between two traditional telephone users in the same way that a conventional PBX does.

ACD can be an effective tool. By routing calls to a department or group of operators rather than an individual, businesses can provide quicker service for their customers, and operators spend less time routing and re-routing calls.

- **Interactive Voice Response**

The IVR systems of IP-PBXs carry huge potential savings. From the simplest feature of, say, offering directions to the office to providing their customers with 24x7 access to their account information, the company benefits from better customer service and higher employee productivity.

- **Remote Worker Integration**

With most IP-PBXs, telecommuters as well as road warriors can be completely and transparently integrated into the office phone system. This means that calling their normal extension will ring their phone

at their home office or their soft phone on their PC in their hotel room (if they are logged in). The teleworker and employees in the office can all “see” the status and availability of each other on the presence management screen on their computer. Company managers also have immediate and complete visibility into their employees’ telephone activity.

- **Integration of Calls With Customer Database**

By doing some backend database work, IP-PBX users can now automatically integrate their telephone activity with customers directly into their customer database. By putting this key data element (the phone call) into their customer relationship management system, smaller companies enjoy a huge new area for IP-PBX payback opportunity.

- **Reporting**

With most IP-PBXs, call records are readily available to the company’s management. Management can also observe live calls at any time, including who is on the phone with what customer. They can get their normal reports on a regular basis, but they also now have the capability for quick ad-hoc information.

A great many of the features and savings areas described have never before been available to smaller businesses. Small businesses can benefit from this technology in other ways, including reduced telephone tag, easy use of formerly complex features, increased employee mobility, higher productivity, better information for faster decision making. When added up, there is a powerful return on investment to many smaller companies.





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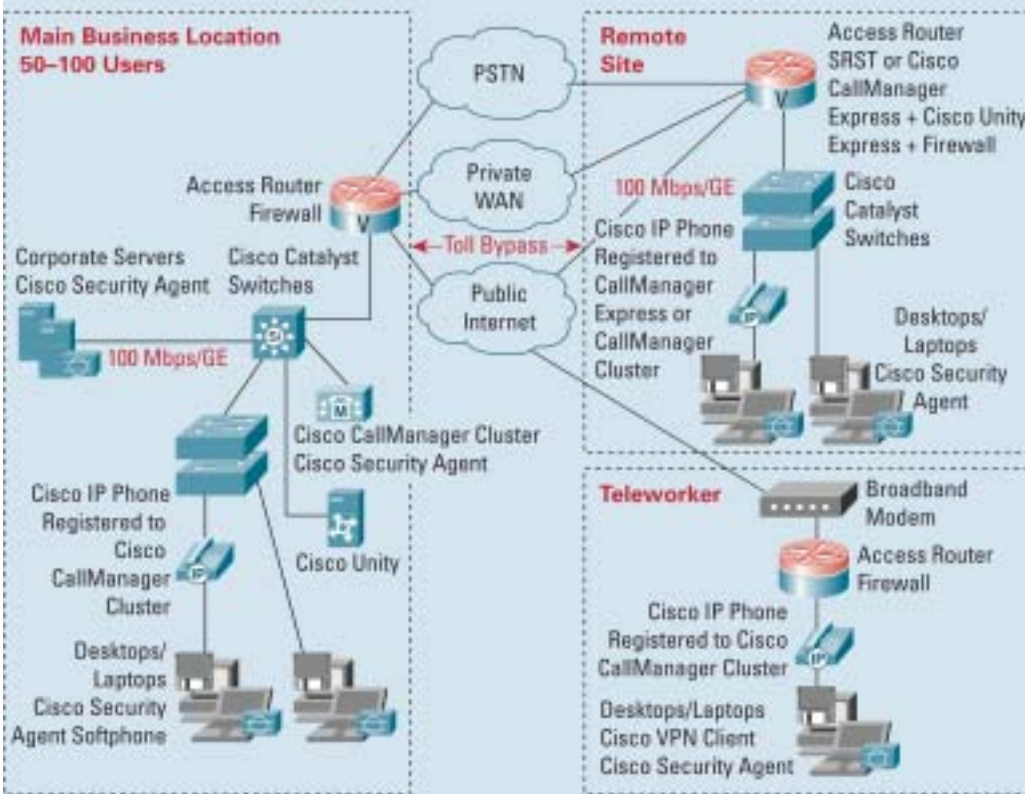


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BEAR Facts - Tech Tips from BEAR Data Systems

IP COMMUNICATIONS SOLUTION BLUEPRINT: 50 TO 100 USER PORTS PER SITE

IP Communications Blueprint



This blueprint provides a network diagram and product table for the main office, remote office and teleworkers of a SMB of size 50-100 user ports per site.

Cisco CallManager Express: For small offices and enterprise branch offices that need converged voice and data communications quickly and efficiently, Cisco CallManager Express enables feature-rich call processing via existing or planned access routing platforms.

Cisco CallManager: The software-based call-processing component of the enterprise IP telephony solution, enabled by AVVID (Architecture for Voice, Video and Integrated Data)

Cisco Unity Express: Used in conjunction with CallManager Express, Cisco Unity Express offers integrated voicemail and auto attendant capabilities. Together they provide a simple, consistent, distributed architecture that can be easily replicated for multiple sites.

Cisco Unity: A powerful unified communications solution that provides advanced convergence-based communication services such as voice and unified messaging.

Cisco CallManager Survivable Remote Site Telephony (SRST) branch office: In the rare event of an IP WAN failure, remote sites can take advantage of the SRST feature integrated into Cisco access routers. This provides the IP endpoints at the branch offices with the core call-processing capability for redundancy.

Source: Cisco Systems

Solution Features	For Headquarters	For Remote Sites
Router	Cisco 2851 Integrated Services Router (supports up to 96 IP phones)	Cisco 2851 Integrated Services Router (supports up to 96 IP phones)
Call processing	Cisco CallManager Express (integrated call processing) Cisco CallManager (external Cisco 7815 Media Convergence Server)	Cisco CallManager Express (local integrated call processing) Cisco Call Manager Survivable Remote Site Telephony (SRST) branch office
Call-processing redundancy	Cisco CallManager Express (secondary router required) Cisco CallManager (standby Cisco 7815 Media Convergence Server required)	Cisco CallManager Express (secondary router required) Cisco CallManager SRST branch office
Voice mail	Cisco Unity Express (integrated local voice-mail network module) Cisco Unity (external server)	Cisco Unity (external server) Cisco Unity Express (integrated local voice-mail network module)

Linux Adoption: Part 2

What companies need to look out for while they migrate to Linux

The decision to migrate to Linux comes with its own set of technological quandaries, including understanding Linux's capabilities and shortcomings, the costs of migration, Linux's coexistence with existing systems, and the post-migration support available.

From initially being viewed as the platform of the geek programmers, Linux has now gained so much acceptability that enterprises such as E*Trade, Merrill Lynch and Amazon run their mission critical applications on Linux. Improved stability and operational efficiencies have worked in favor of Linux, proving conclusively that it is now here to stay. The decision to migrate to Linux, however, comes with its own set of technological quandaries, including understanding Linux's capabilities and shortcomings, the costs of migration, Linux's coexistence with existing systems, and the post-migration support available.

Open source licensing issues

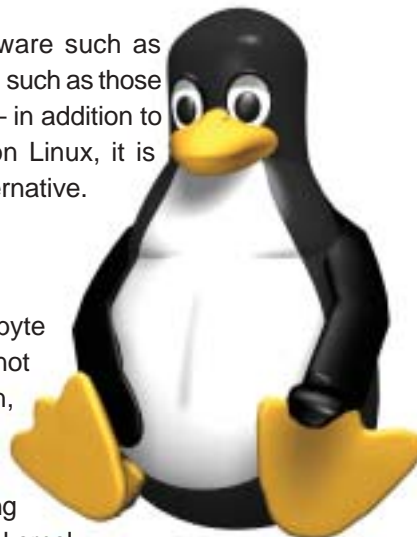
It is of general concern for the developers of proprietary software that incorporating any code written under the General Public License (GPL) into their program will require their program to be licensed under GPL. In addition, there are apprehensions whether applications that interface with or are run on GPL software may fall under the GPL. Companies should carefully go through the licensing terms and conditions before using the OSS. Software like Linux and gcc is distributed under L-GPL or Lesser-GPL, and they allow users to develop their programs using gcc or Linux or run them on Linux without forcing them to be open-sourced.

Third-party software availability on Linux

Another issue is the availability of third-party software such as application servers or databases. While most software, such as those from IBM, BEA Weblogic, SAP, Oracle and Sybase – in addition to Apache, Sendmail and Openssh – are available on Linux, it is important to check for availability or switch to an alternative.

Support for multi-terabyte database and memory larger than 4GB

IBM and Oracle offer products for running multi-terabyte databases setup on Linux clusters. However, with not much industry acceptance, this is an area of concern, and companies prefer to retain their database environment on their proprietary UNIX setup while applications are migrated to Linux. With kernel 2.4 being partially responsible for this limitation, it is expected that kernel



Will Linux distribution be compatible with existing security policies?

Due to multiple distributions of Linux, a need is felt for a common security evaluation framework that can be used to assess the security level conformance of a particular distribution. This has been achieved by Common Criteria (CC) for security evaluation. The Common Criteria (CC) is an inter-nationally recognized ISO standard (ISO/IEC 15408) used by the US government and other organizations to assess security and assurance of technology products by using common set of rigorous standards. Both RedHat 3 and Suse SLES 8 have achieved Controlled Access Protection Profile compliance under the Common Criteria for Information Security Evaluation (CC), commonly referred to as CAPP/EAL3+. The CC can be applied to hardware also. Both RedHat and SuSE have well-defined plans for achieving next higher level of security certification - CAPP/EAL4+. Achieving these kinds of certification levels is a testament of security that helps users in adopting Linux for mission-critical applications with increased confidence levels.

2.6 will improve scalability, threading and I/O capabilities. Also, the availability of 64-bit versions of Oracle and UDB will enable DBMS workloads in excess of four processors on Linux.

Enterprise applications are very demanding, and to meet growing requirements, the applications need to transcend the 4GB memory limit. This memory limit is constrained not by the operating system but the underlying processor. The operating system needs to be ready to use the features provided by the 64-bit processor. In this regard, Linux has made a head start, with versions being available for both native 64-bit and 32-bit. Sixty four-bit Linux versions are available, along with the 64-bit

A major chunk of revenue of companies like RedHat and SuSE comes from support. The price-performance advantage of Linux is well understood by vendors, so more and more companies are joining the bandwagon.

database software from IBM and Oracle. With the availability of Linux on the 64-bit platform, the maximum physical memory that can be addressed zooms up to 1 petabyte.

Linux thread performance

One complaint against Linux is that Linux-Threads library implementing POSIX threads are slow in performance and not scalable. For most threading implementation, this has been sufficient. However, demanding applications require better threading performance. The open-source community has redesigned the threading library, resulting in NPTL or the Native POSIX Thread Library for Linux, which has enabled the thread startup cost to be reduced significantly and memory allocation to be optimized. NPTL also addresses the challenge of binary compatibility with earlier Linux-Threads implementation, as well as that of software scalability.

Which one to choose, and why?

The chief concern among IT decision makers is that there are close to 200 Linux distributions, and that the OS thus might fragment into multiple commercial flavors, as UNIX did. There is one open-source effort on, the Linux Standard Base project – LSB. This project has come up with specifications which, when followed by the various Linux distributors, will allow a user to develop an application on any Linux to run it on any other Linux distribution.

Execution Challenges

The co-existence of Linux systems with other existing systems in any enterprise is very important. Till Linux migration is complete, systems have to co-exist and provide seamless access to applications and data. This is simplified by the fact that Linux follows all the UNIX standards, which enables it to seamlessly integrate into the existing system. Even within a Windows network, a Linux system can easily serve as a file server using the SAMBA protocol. Sometimes the heterogeneous environment includes Linux coexisting with UNIX/RISC based systems as well as Mainframes. By using the cross-platform compilation and iBCS modules, the co-existence of UNIX and Linux can be easily achieved.

Support Challenges

One major concern about Linux and open-source software in general is the availability of support. Companies like IBM, HP, Oracle, RedHat, SuSE, and Linux Care have clearly defined support offerings for open-source software. In fact, a major chunk of revenue of companies like RedHat and SuSE comes from support. The price-performance advantage of Linux is well understood by vendors, so more and more companies are joining the bandwagon. META Group expects Novell and RedHat to invest in service capabilities in a layered approach similar to that of Microsoft Windows.

The Linux Standard Base project (LSB) has come up with specifications which, when followed by the various Linux distributors, will allow a user to develop an application on any Linux to run it on any other Linux distribution.

Summary

The greatest challenges to adopting Linux are not presented by the capabilities of the operating system itself, but rather by organizations' ability to integrate it into their existing IT infrastructure and manage it as an integral part of the enterprise. With ever increasing ISV and OEM support for Linux and the emergence, conformance and acceptance of standards for quality and security, Linux will always be on the radars of CEOs, CIOs and CTOs to achieve higher productivity levels and efficiency at lower costs.



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Addressing the Remote Office Data Protection Challenge

The research for remote office and mobile work data is alarming. Over 30% of a corporation's critical data resides in remote offices or with mobile workers. The amount of valuable data is growing at an annual rate of 50% to 100%. Organizations that want to protect this data face significant challenges with existing solutions.

- Protecting laptops, typically over slow network connections, results in backups taking too long and renders the laptops unusable while the backup is running. As a result, remote workers will turn off backups, leaving the laptop data unprotected.
- The cost of deploying independent backup installations at each remote office and the staff necessary to manage backups at each site lead to a high overall cost for protecting this data.

- Tape-based backup solutions, due to the nature of tape technology, results in failed backups and restores, leaving organizations subject to failed regulatory compliance.
- Organizations typically do not have adequate network bandwidth between remote offices and the datacenter to centralize data protection and the cost of additional network bandwidth to enable centralized backups is prohibitive.

Avamar has redesigned the entire backup and restore process and developed the first complete disk-based solution without the limitations of tape, through our line of Axion™ products. Axion delivers a centralized data protection solution for remote offices that eliminates manual intervention by local staff and reduces the cost of protecting remote office data.

Axion can be flexibly deployed and scaled to protect diverse remote environments from individual desktops or laptops for remote workers, a remote office with a few servers and desktops, or a global environment with data distributed across many remote offices geographically located around the world.

With Axion, companies can fully protect all their remote data at a lower and more controllable cost than traditional backup and restore solutions. This ability to effectively do remote backups is nothing less than imperative for organizations with valuable data.

To learn more, register for our June 21st webcast "Move the Data, Not the Media: How organizations are solving the remote office data protection challenge" at <http://www.avamar.com>.



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Utility computing in data centers

The convergence of server and storage virtualization will enable utility computing in tomorrow's data centers

Data centers today demand high investments in hardware and software but end up with low server utilization, high administration costs, poor uptime and delayed deployment of new applications. Typically including an assortment of application servers, database servers, transaction processing servers, web hosting servers and file / print servers, data centers are an administrative nightmare. In addition, they consume more power and space and are often underutilized.

Estimates of IT hardware utilization range from 8 to 30 per cent, which means that the vast majority of computing power in today's data center sits idle most of the time. Innovation is stifled because too much time is spent just keeping the data center up and running. In a recent survey of IT managers, it was found that 75 per cent of IT budgets are dedicated to support legacy systems, and only 20 per cent to new initiatives, making the data center a cost center and not a benefit center. The data center is looked at by

management as a big financial sinkhole, instead of being part of what makes the company competitive.

The Promise of Utility Computing

The silos in today's data centers are the major reasons for the problems. That must be broken down, and companies need to adopt holistic approaches that can lead to synergy, innovation and competitive advantage. That is the promise of utility computing.

One way to look at utility computing is to see it as part of a continuum. The road looks like this: First came dedicated

Virtualization:

"A virtualized pool of self-managing IT resources that can be dynamically provisioned via policy-based tools that ensure these resources are easily and continually reallocated in a way that addresses the organization's changing business and service needs. These resources can be located anywhere and managed by anyone (the organization's IT staff or a third-party service provider), and their usage can be tracked and billed down to the level of an individual user or group."

servers, followed by server consolidation, which is the phase many companies are in today. In this phase, the number of servers is reduced through the use of partitioning. This makes managing data centers easier and less expensive. But applications still live on traditional dedicated servers with fixed storage and network connections.

The next big step, which some forward-looking companies are already taking, is server and storage virtualization, in which pools of computing, storage and network resources are created in the data center. This pushes the bar even higher in the data center by exponentially increasing utilization while lowering TCO. Beyond server virtualization

is grid computing, which uses idle resources on servers and desktop devices to tackle computer-intensive applications. The premise of grid computing is that the workload of a single, heavy-duty application can be divided up and assigned to multiple devices.

Finally there's full-blown utility computing, in which computing resources can be ordered, used and billed just like electricity. Another way to approach this idea of utility computing, is to realize that it requires three primary layers of enabling technology:

1. Virtualized infrastructure, which means virtualized servers, storage and networks, plus dynamic provisioning.
2. Policy-based resource management tools, including fault, performance and operations management.
3. Policy-based service-level management tools, which encompass business-based and, eventually, ROI-based management.

Not all the pieces required for complete utility computing are ready today, particularly when it comes to the policy-based service-level management tools. But one piece that definitely is ready and that customers are benefiting from today is convergence of server and storage virtualization.

Virtualization - the first step

Virtualization is not a new concept in the server or storage markets. Companies are already benefiting from the ability to create distinct server and storage resource pools, masking the physical components from users and applications. But integrated server and storage virtualization holds the key to true management convergence. In the server market, virtualization surfaced initially for use with mainframes. In this environment, virtualization tools assisted in workload management and improved utilization.

In the late 1990s, virtualization tools emerged for Unix and Windows servers. These let multiple virtual operating systems run on one physical machine but be logically independent with consistent hardware profiles. Sometimes referred to as server resource management, this involves partition managers, virtual machines, virtual partitions and logical partitions. Such tools have grown in importance as a means to improve server utilization rates as well as to better align and manage application performance on different server platforms, ranging from blade servers to large symmetrical multi-processing systems.

In storage, the earliest use of virtualization emerged in the early 1990s with the first RAID subsystems, combining that

technology with aggregation. By the late 90s came storage virtualization appliances, aimed at improving management and utilization. Since then, storage virtualization has evolved from a stand-alone technology to a feature of storage infrastructure management tools. This means it resides on host servers, on storage arrays or on intelligent switches in the storage network.

Storage virtualization also has enabled higher-level management functions. Data management tools can better handle snapshots, replication, capacity on demand and policy-based decisions. Volume management, also considered a form of virtualization, has become a mandatory part of most data centers with storage networks and large storage arrays. In the coming years, it will increasingly be a feature of entry-level storage arrays that target IP storage and entry-level storage networks.

As companies roll out data center architectures, these two islands need to blend. Convergence, required to further simplify and improve data center efficiencies, will be quite possible with the array of new and emerging technologies. These include data center service management and automation tools, blade servers, utility and grid computing, storage-area networks (SAN), grid storage, information life-cycle management (ILM), policy-based management tools and the all-important virtualization.

Having an integrated server and storage virtualization strategy could realize the concept of autonomic computing. This includes allowing servers and storage infrastructure that will self-heal, dynamically change as requirements increase or decrease, and provide transparent migration of applications to servers and storage systems.



Hotspot Security: Escaping the Breach



The usage of Wi-fi public access hotspots is on the rise, and a corresponding increase can be seen in nefarious activities. This is especially higher in airline hubs and wireless trade shows, where important business is often transacted over the wireless network. Typical forms of security breach include denial-of-service (DoS) or rerouting the user to a different network, the hacker's, after a DoS.

As information traded over business networks is vital, corporate users employ a virtual private

network (VPN) that captures and encrypts all incoming and outgoing data. Along with firewalls and anti-virus programs, a VPN-equipped laptop can be virtually impregnable.

While VPNs have previously been the domain of enterprises, VPNs are now publicly available for individual travelers at a reasonably low monthly fee.

Simple steps to a secure wireless network

1. Change the default network SSID (network name) on your wireless router / access point. If it's possible to turn off broadcasting the name of the SSID, do so. This way, only users knowing your company SSID ahead of time can connect to your network. For smaller networks, you can also restrict access only to "known" network card addresses (low level MAC addresses). Many wireless access points and / or wireless routers let you lock out non-registered network cards from the network, preventing outsiders from accessing your network connection.
2. You should also turn on some form of encryption on wireless traffic, such as Wireless Encryption Protocols (WEP). Activating rotating encryption keys for WEP encryption at regular intervals (say monthly) or implementing a "dead" wireless network can keep this type of encryption most secure.

A "dead" wireless network assigns network addresses to individual systems, but does not connect to the internal network infrastructure. Users must then use the company VPN to access the internal network, keeping each user connection protected with unique and secure encryption keys.
3. Finally, develop a security policy that combines both wired and wireless security to leverage management and cost advantages. For example, integrate a single user ID and password requirement for your employees whether they access the network through your wired or wireless infrastructure. The addition of hardware-based security features, such as embedded security, compliments the 802.1x standard by providing extra data encryption and authentication protection.

For-Hire VPNs

HotSpotVPN.com offers a VPN-for-Hire solution with a monthly or yearly package. It uses PPTP (Point-to-Point Tunneling Protocol) service for VPNs and is compatible with all operating systems that support a PPTP client. Its advantage is that it assigns passwords and does not allow one to choose one's own, overcoming the PPTP client's weakness of being easily hacked if passwords are composed of dictionary words. HotSpotVPN's OpenVPN-based SSL option is priced based on encryption level. Its SSL offers Blowfish encryption (128 bits), AES-192 (192 bits) and AES-256 (256 bits). The last of those standards is considered government-grade and is required for financial and medical security.

Also available are WiTopia's low-fee personalVPN, which uses SSL to handle transport for traffic passing over a network. personalVPN relies on OpenVPN, an open-source SSL VPN system, for the client side of the transaction. This will ultimately allow the company to support virtually all platforms and not just Windows XP. personalVPN works on the principle of tunneled encryption. Many forms of encryption are available for the tunnel, and SSL transactions can also be tunneled through port 443, the secure Web port, when a VPN connection is not be allowed.

Cooling Data Centers



reaching all parts of the room.

Proper installation of cooling systems and blanking plates will ensure that hot air from one side of a rack tower doesn't circulate to the cooler inlet side. Avoiding hotspots, which occur in densely packed spaces, is important, since the cooling, otherwise sufficient, may not be enough for the hot-rack area. Distributing hot racks around the center can spread

the cooling evenly. Having proper airflow management, with cold aisles and hot aisles between racks, is necessary.

Protecting your investment

It would be a waste of investment to throw away the savings gained from consolidation through either inadequate cooling, which shortens equipment life, or inefficient use of costly conditioned air. Implementation of these cooling best practices will keep the data center in good health and preserve cost savings.

Data centers and servers generate tremendous heat and require cooling. With consolidation being the new trend for more efficient use of power, space and infrastructure, hardware can generate almost 10 kilowatts of heat. To function smoothly, therefore, they need efficient cooling systems. This not only implies high investment in cooling systems but also proper maintenance and floor space management to keep down the impact of the heat generated.

The Cooling Checklist

Servers and racks should be situated such that the cooling system and device inlets have

a clear path, for back-and-forth movement of air. The cool air must reach all parts of the room and exhaust air must be able to escape back into the air-conditioning system.

The capacity of the air-conditioning system should correspond to the heat generated – that is, at least 1W of cooling for every 1W of heat generated.

The temperatures at key monitoring points should be correct. One way of checking this is to see if the air returning to the a/c unit is cooler than the average air temperature.

Installing temperature and humidity sensors in aisles between racks, as well as on the top, middle and bottom of each rack, is essential to ensure that air is flowing the right way and the temperature is correct.

Dust can get into and block vents and slats, making cooling ineffective. Ensure that floors and cables are clean. Untidy cables arrangements can restrict airflow, so tying them into a bunch is a good idea. Underfloor cabling can cause similar problems. Removing redundant cables and running them overhead rather than underfoot is recommended. The temperature of the floor tiles can also indicate if cool air is

Sacramento, here we come!

BEAR Data Systems is proud to announce the opening of its new branch office on April 2, 2005, in Roseville, CA, to cover the greater Sacramento Valley and Northern Nevada. Our Sacramento customers can now call upon the services of two account managers, one sales support staff and several engineering resources.

Each of our sales personnel has over 10 years of experience in technical solutions and system integration sales in the local Sacramento area. Jonas Jones covers the Central Valley from Stockton to Fresno. Jonas can be contacted at (415)828-4954. Jeff Rogers covers Sacramento and the Northern Valley as well as Northern Nevada. Jeff can be contacted at (530)655-6300.

Our primary products and services include solutions from IBM, Cisco, EMC / Legato, Computer Associates, StorageTek, and Oracle. Our professional services include storage assessments, storage consolidations, and both SAN and NAS implementations. Our engineering team handles network infrastructure, network security, and Voice over IP. We also work with IBM on server consolidation and VMware on server virtualization projects.

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