Colocation Services. What you need to know and why you need to know it.

Why Choose Colocation?

The same two basic problems plague all businesses that rely on the Internet, Intranets, Extranets, computer systems, call centers or telecommunications:

> • Ensuring enough clean, reliable power is available to keep the computers and communications systems running 24 hours a day, seven days a week
> • Acquiring enough bandwidth to serve the needs of web sites, back offices and other business services.

Moving your servers and related equipment off site to a colocation facility can solve both of these problems. A colocation facility is a building suitable for housing your servers in a safe, secure, environment that has temperature and humidity controls, a source of clean and reliable power, and access to one or more high-bandwidth communications backbone services. Physically, a colocation site can be an entire building that has been designed and built for the purpose, or an older building that has been renovated appropriately.

The power problems in California in the winter of 2001 revealed to the general public for the first time that utilities cannot be counted upon to deliver power reliably. A severe problem with the electricity supply has existed in North America for several years. Today, all companies have come to realize that rolling blackouts lasting several hours, brownouts lasting for days and outright curtailment of power for an indefinite time are possibilities across the country.

As for bandwidth, many companies rapidly outgrow their original Internet access, and must seek additional speed. unfortunately, not every communications supplier may be willing to run a 51.84 Mbps OC-1 leased fiber optic line to your facility, especially if your building is in a second-tier service area, far from any supplier's hub.

In addition to power and bandwidth, several other factors can make colocation attractive to many types of businesses. These include security, environmental controls, fire protection, and availability of managed services.

In this paper, we'll look at all these factors, examine what colocation facilities have to offer, and provide a few guidelines on how to choose a colocation facility that's best for your company.

Who Needs Colocation?

Colocation is a solution for any company that relies upon computers and communications, and cannot afford to be without those services or have them degrade. Such companies include:

> • Companies with E-commerce web sites
> • Application Service Providers (ASPs)
> • Internet based Companies
> • Dot.coms
> • Telecommunications service providers
> • Managed Services Providers

Today, nearly every business has a web site, and many are expanding into business-to-business Ecommerce. If your site becomes successful and starts getting thousands of hits per day, it can rapidly outgrow the capabilities of its web servers. If the servers are located on your company's premises, then you have two basic choices: Expand your capabilities in house, or move the servers to a colocation facility. If the servers are already located off site in a data center or at an ISP, expansion may pose a different problem. If the data center or ISP cannot expand to meet your needs, colocation may be your only option.

ASPs and data centers both require high reliability in computing hardware and high-speed communications bandwidth. Both types of companies frequently have mainframe or midrange computers that offer managed computer services to client companies, and they host client applications such as accounting, finance, banking and document storage.

An Internet Data Center (IDC) is a relatively new form of data center that is set up to offer managed services to large e-commerce firms. An IDC helps large firms manage and protect their data and network operations. In all three cases, colocation offers them the reliable power, environmental controls and security that are vital to a service-oriented operation.

New Internet firms may find it much easier to move into a colocation facility immediately, rather than start an operation in one location and have to move it a few months later when the business grows.

Telecommunications service providers distribute wholesale IP telephony services to resellers, prepaid calling card companies, facility-based telephone companies, wireless companies and many other of the new breed of companies emerging in the telecommunications business. Such wholesalers require absolute reliability from their computers and servers because any equipment downtime is an interruption of their revenue stream.

They also need access to high bandwidth communications because of the large amount of telephone traffic generated. Also important is the need to keep all their servers close together in racks to reduce the amount and length of cable needed, as well as shortening the distance to the telephony switch. A colocation facility, with its environmental controls and insistence on rack-mounted computer equipment, is ideal for a telecom wholesaler.

Heed the Warning Signs

The high cost of downtime is what propels most companies to consider colocation. In some cases, sheer overload may be causing your application to shut down; this is a problem that may require additional servers, more bandwidth or better software. In other cases, your system may be shutting down or failing because of power or environmental problems. If you are suffering service outages of any kind, they are costing you money.

One solution is to work with a company that offers high quality service for your business with 99.999% up time (the legendary "five nines"); these services can cost up to $60,000 per month for high-end High-Availability solutions. Before going that route, it might be wise to "clean up your act" at home: that is, make sure your servers and communications hardware are as reliable as possible.

Some of the warning signs that environmental factors might be causing problems with your hardware include:

• **Poor power quality**. Losing power completely because of a blackout is always a problem, but it can be handled by an uninterruptible power supply (UPS). Unfortunately, some UPS's do not contain the power conditioning circuitry necessary to deal with poor power quality caused by nearby lightning strikes, voltage transients, and voltage sags and surges. Such power problems are hard on computers and associated electronics, possibly causing immediate hardware failures. Worse, poor power quality is almost like corrosion or rust on an automobile: meaning the damage from low-level transients is cumulative. It causes minor damage that can't be seen until one day it just "eats through" an integrated circuit connection (it actually nibbles away tiny microscopic pieces of silicon over time) and causes the device to fail for no apparent reason. If you are suffering mysterious hardware problems, it may be because of poor power quality.

• **Environmental Variations**. If computers and electronic equipment are kept at a constant temperature and humidity, they last much longer. In the old days, computer rooms were air conditioned to the point of refrigeration in an attempt to keep conditions constant. If your servers are in a location where temperature and humidity vary considerably, you may suffer from component failures. If monitoring reveals wide fluctuations in temperature and humidity, a better heating, ventilating and air conditioning (HVAC) system is needed.

• **ESD**. Electrostatic discharge (ESD, or static electricity) is another insidious form of electrical damage caused by dry conditions and poor grounding. If walking across the floor and touching the server results in a spark between your finger and the rack, you have ESD problems. Like poor power quality, ESD can cause both immediate failures and cumulative damage. Be certain the HVAC system is keeping the humidity above 40%RH, and all work areas are sufficiently grounded to avoid ESD problems.

• **Communication Line Interruptions**. The farther away you are from your hub, the more chance you have of suffering service interruptions caused by everything from a truck running into a utility pole to a lightning strike taking out a junction box. Also, the farther away from the hub, the more "hops" the system has to make when establishing communications; the more hops, the more chance for lost packets and slower service. There isn't much you can do to decrease problems caused by distance except move closer to the hub, or subscribe to multiple carriers with distinct data paths.

In all these cases, one solution to such environmental problems is moving your servers to a colocation site where you will be guaranteed clean reliable power, constant temperature and humidity suitable for electronic devices. You also will be as close as you can get to high-speed communication hubs.

What is Colocation?
Colocation facilities vary widely from a bare-bones "shell and core" building where you have to supply everything, to a fully equipped facility where you just move your servers in and plug them into the power and networking cables. In the fully equipped sites, such as EtherneXt, you rent rack space, cabinets or cage space, and bandwidth.

A typical equipment rack is 19 in. wide and seven feet tall. Some colocation companies start with a minimum charge for one-quarter of a rack. If you rent a cage, you get a small or large room that is enclosed by a wire cage. You can put anything you want in the cage from racks to enclosures and setup your equipment as you see fit.

You gain physical access to your equipment according to the rules set out in your colocation agreement. Most sites allow full visitation with access controls, so you can service the system whenever necessary to change disks and backup tapes, perform scheduled maintenance, etc. Others restrict access, and require that you use in-house people for these services.

Essentially, you move all your servers and associated communications equipment to the colocation site, and install it with the help of technicians and engineers on site who will pull cables, run power and connect you to the backbone of your choice. You may or may not be charged for such installation services, depending on your contract. You start up your system, make sure it's running correctly, and walk away from it, secure in the knowledge that it will be running in an environmentally optimal environment, supplied by clean power and connected to fast networks. In a good colocation facility, Like EtherneXt, you are guaranteed that your equipment will no longer be subject to environmental or power problems.

Who Provides Colocation Services?

Colocation sites are available from a variety of sources:

> • **Do it yourself** – Find a suitable company, building or location and build or convert your own off-site facility *(see sidebar at end of document)*.

> • **Data Neutral, Full-Service, Colocation Providers** – Colocation NSP providers, like EtherneXt, sub-lease colocation only space from carrier-neutral datacenters in order to provide a single source of colocation space, support and connectivity for clients. Clients can choose a private carrier or choose a connectivity solution from the ISP which maintains multiple high-speed internet connections and can personally assist clients in a close relationship. These type of colocation provider's work closely with clients measuring and understanding their needs in order to provide a very customized and personalized package that the client knows will fit their needs and grow as their business grows. Clients looking for the most gain when choosing a colocation provider should look for a provider who will work closely with their business and custom tailor colocation and connectivity solution's to best server the clients needs.

> • **Dedicated Colocation Provider**. Many colocation facilities offer only a single bandwidth service and are, therefore the client's only source for network connectivity. In some cases, their carriers are only an independent network (that is, not one of the major network service suppliers) and the colocation service is owned by the facility owner. In these cases, your colocation provider is providing network services while also providing colocation services. Most times, you will find that one strength overrides the other, therefore providing sub-par services overall to the client which can detriment overall customer satisfaction, reliability and business quality.

> • **Carrier-Neutral Colocation Providers**. This type of facility offers you complete power, security, environmental controls and access to at least two or more wideband services (hence the "neutral" designation). The facility may be host to one or more ISPs, data centers, ASPs and other services.

Today, colocation facilities are mostly located in or near large cities – the so-called "NFL cities" – such as Miami, Chicago, Dallas, Los Angeles, New York and San Francisco. This is because that's where most potential customers are located, and where the colocation companies were able to get easy access to high-bandwidth suppliers. Remote, big-city colocation is not a problem for most companies, who can easily access all necessary services from remote sites anywhere in the country. Remote colocation may pose a problem for companies who feel the need to be physically close to their servers for any of several reasons, including maintenance, confidence, or the need to be in complete control.

Colocation facilities are expanding rapidly into smaller cities because realtors and colocation firms have snapped up most of the excellent sites in larger areas. We suspect that the new colocation sites will go where ISPs are concentrated or where backbone hubs are available. According to *Boardwatch Magazine's Directory of Internet Service Providers,* there are more than 7,000 ISPs in the world and more than 40 backbone suppliers. The Directory also lists ISP facilities all over the world, indexed by area code. Look up ISPs in your area, and then check to see if they offer colocation services. To 0btain a copy of the directory, go to www.boardwatch.com.

Choosing a Colocation Provider

Assuming that you are able to choose among more than one colocation provider in your area, here are a few parameters to evaluate.

> • **Backbone Connection**. Check to see what connections the ISP maintains and how he maintains them. Carriers with multiple connections should be running BGP4 in order to maintain redundancy and resiliency in their network. Also ask about duplicate equipment so that any one failure will not compromise the entire network.

> • **Power Supply**. Make sure the facility has enough power to meet your current and future requirements. What is the maximum amount of power that can be delivered to each rack? Remember that a high-density rack may require more than 200 W/sq ft. If you are forced to spread your servers over more racks, this will be more expensive. Can the facility supply enough power for all its colocation customers? What about future requirements?

> • **Power Quality**. Inspect the equipment used to clean up line power. Look for large power conditioners and surge suppressors on the incoming power lines. You may want to further protect your equipment with local surge suppressors and conditioners, especially if you will be sharing power circuits with motor-driven equipment, such as large printers, fans or HVAC systems. Transients and spikes can be generated within a facility, too.

> • **Backup Power**. Make sure the facility has UPSes for short-term backup via batteries, plus a backup power source, such as a diesel generator, in case of long-duration brownouts or blackouts. Check to make sure the backup power can keep the entire facility running. If it cannot, determine under what conditions your system will be shut down because of insufficient power.

- **Environmental Controls**. The HVAC system should be capable of dealing with all the heat generated by mainframes and rack systems. If you are allowed to tour the facility, take a handheld digital thermometer with you and make spot checks of the temperatures, especially in the area where your rack will be located. Make sure temperatures remain constant throughout. Determine the ambient temperatures required by the manufacturer of your servers and other equipment and use that as your standard.

- **ESD Protection**. The two most important ways to prevent ESD are keeping the humidity above 40%RH and providing good grounds for the racks, chassis, conduits and building. In some cases, everything may be securely grounded to the building's steel structure, but the structure itself may not be grounded properly. You can test the humidity and ground easily with proper instrumentation.

- **Necessities**. A colocation facility should have proper security, fire suppression systems, protection from natural disasters such as earthquakes and flooding.

- **Neighbors**. Look at the list of tenants in the colocation facility. You may find ASPs, ISPs, data centers, or other companies that can help your business. If you are in the same colocation facility as an ASP, for example, you may be able to connect via a high speed Gb Ethernet network connection. In fact, in some cases it may pay you to seek out the colocation site of an ASP or ISP with whom you do a great deal of business, and move in there to increase your access speed and reliability. For example, some web-hosting companies in colocation centers offer service-level agreements (SLA's) that guarantee 99.999% up time.

- **Managed Services**. The facility or ISP provider offers skilled staff to assist you in the installation and maintenance of your equipment. This staff is also able to rapidly respond to any equipment or network problems.

How Much Does it Cost?

In general, you will pay for two major items: space and bandwidth. Space is almost always determined as rack size and quantity, and is available in as little as 1/4, 1/2 and full rack increments. Private cabinet or cage space in a colocation facility is usually determined by the level of service the colocation facility provides.

The rack "real estate" charge varies considerably all over the country, depending on demand and other factors. For example, one company has colocation facilities in four different Florida cities. Monthly charges for a full rack vary from $500 to $900 per month, depending on location and accessibility to network facility carriers.

Bandwidth charges vary as well. A T-1 line, for example, varies in cost from $400 to $1,100 per month, depending on the supplier and carrier loop charges. A good rule of thumb for estimating purposes is about $200 per Meg (Mbps). Charges are generally $150-$200/Mbit at lower commit speeds and even lower at higher commitment rates.

Depending on the colocation agreement, you may also have to pay for power, installation, one-time services, recurring services, and so on. All sites are different.

A random sampling of prices in *Boardwatch Magazine's Directory of Internet Service Providers, 16th Edition 2004,* shows the following ranges:

- **Average installation time**:
    24 hour to 45 business days.

- **Setup charges**:
    From $200 for a simple rack to $2,000 for a 10 x 10 foot cage.

- **Monthly space charges**:
    1/4 rack: $250 to $500
    1/2 rack: $300 to $700
    Full rack or private cabinet: $500 to $1000
    10' x 10' cage: $2,000 - $5,000

- **Monthly Bandwidth charges**:
    1-5Mbit : $100 - $200
    6-10Mbit: $80 - $150
    10Mbit+: $60 - $100

As with all business-related activities, everything is subject to negotiation, and prices may vary across the country. As Alan Fishel, telecommunications partner in Washington, DC, law firm of Arent Fox Kintner Plotkin and Kahn, PLLC, points out, you should examine the colocation agreement very carefully. The agreement should specify the amount and location of the space to be licensed and unambiguously specify what services the colocation site will provide, such as power, connectivity, cross-connects,
remote monitoring and so on

Building Your our Own Facility

There are many reasons for wanting to build your own facility off site. If you have a large amount of computer hardware, cannot find a colocation site nearby, or want to maintain complete control over your operation, then perhaps you should consider a separate colocation site away from your main headquarters building. You want a physical location that has the following attributes:

> • **Close to Fiber**. The site should be close enough to backbone and wideband suppliers that would be willing to run fiber optic cable to your building from their hub. You'll need to find at least two such suppliers to ensure your future options. This is called "finding the fiber."

> • **More Power**. Your site must be able to obtain the necessary power from the local utility. Computer equipment consumes a massive amount of electrical power. A utility is not always able to supply the power you need. A local power grid is designed for traditional industries that take about 10 W/sq ft. A colocation building can easily take 200 W/sq ft or more. A colocation facility with 20,000 sq ft of space for computer hardware can require upward of 4 MW of power, roughly equivalent to the power needs of a small town. In the early days of colocation, companies found the fiber first; today, you may want to look for a good power source first.

> • **Backup Power**. The location should be able to accommodate an on-site backup power generator, such as a diesel-powered unit. Zoning may prevent you from installing backup power systems. You will need such a system because battery backups typically last only a short time, especially with the power needs of modern systems. The situation in California demonstrated that power outages can last for hours, if not days, and it probably will get worse before it gets better.

After you find a physical location, the next consideration is whether to build or renovate an existing building. The average cost to build and fit out a suitable facility is about $500 per square foot, and you may need about 20,000 sq ft. Renovation costs are probably somewhat less because you don't have to erect a structure. You may still have to do extensive remodeling to the floors and ceilings to increase floor loading, allow room for raised floors, increase building security, improve the HVAC system to accommodate the computers, and rewire everything for the increased power requirements.