



**The Colocation
Data Center**

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Executive Summary

Colocation facilities are purpose-built buildings, intended to protect mission critical IT equipment.

Colocation providers allow their customers to focus on their business while their IT equipment is taken care of. Improving availability and operational efficiencies can be realized by letting the colocation provider worry about the many facets of building, operating and maintaining a complex data center facility.



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Colocation

A colocation center is where multiple customers locate network, server and storage equipment which have the ability to interconnect a variety of telecommunications as well as multiple network service providers in one location with a minimum of cost and complexity.

A classification system developed by the Uptime Institute allows for an easy and fair comparison of one site to another. It also defines redundancy, uptime availability and an overall level of protection IT equipment is given. The tier classifications provide an objective basis for comparing the functionality, capacities and relative cost for a particular site infrastructure design topology. Each industry has unique uptime requirements and many times this will drive the need to house their IT equipment in a certain tier level of facility.

Figure 1. Uptime Institute™ Tier Classifications

	Tier 1 Basic Site Infrastructure	Tier 2 Redundant Capacity Components	Tier 3 Concurrently Maintainable	Tier 4 Fault Tolerant
Building Type	Tenant	Tenant	Stand-alone	Stand-alone
Staffing	None	1 Shift	1+ Shifts	24 by Forever
Representative Site Availability	99.67%	99.75%	99.98%	99.99%
Typical kW per Cabinet	<1kW	1-2 kW	>3 kW	>4 kW
UPS Redundancy	N	N+1	N+1	2N
Generator	No generator, or optional	Generator	N+1 Generator	2N Generator System
Interface with Building Management System	No	No	Yes	Yes

Why Colocation?

When looking at colocation there are many things to consider. The typical business value derived from placing IT infrastructure with a colocation provider is that it allows the business to retain focus on what they do rather than worry about:

- Facility construction and maintenance costs
- Keeping pace with changing power and cooling technologies
- Maintaining operational efficiencies of the data center infrastructure
- Security of the facility
- Disaster avoidance protection for the facility
- 24 x 7 x 365 staffing of the data center
- Ability to quickly scale or add space to accommodate changing demand
- Depreciation of the data center facility

Colocation facilities are purpose-built buildings, intended to protect mission critical IT equipment; period. In a 2008 colocation Industry Trends Report by Hosting.com the factors cited as most influential for selecting colocation were:

- 67% - Improve Availability/Reliability
- 49% - Improve Operational Efficiency/Performance
- 45% - Reduce/Eliminate Costs
- 39% - Scalability (Exponential Growth)
- 36% - Risk Mitigation
- 19% - Compliancy / Regulatory Requirements

Source: 2008 Hosting.com Colocation Trends Report

Return on Investment

Almost seventy percent of the respondents to the Hosting.com report expected a return on their colocation investment; of those

- 24% expected a return within six months
- 40% percent within twelve months
- 29% within two years

Without the overhead of building and maintaining a data center, businesses are able to achieve a return on their investment quicker.

One way that colocation providers are able to provide overall cost value is in the price per kilowatt hour. Colocation facilities draw a lot of power and are usually able to achieve a discounted price from the utility provider. Power costs can vary depending on which region of the country the colocation provider is located. With power being a primary factor in the cost of colocation, less expensive power will equate to a large cost savings over time. In November 2008 the average cost for power, per kilowatt hour, across the nation for commercial and industrial was \$0.1013 and \$0.0706 respectively. In the Midwest current cost of power is around \$0.055 per kilowatt hour which is a significant cut in costs.

“At a Minimum, data centers cost 3 to 5 times the cost of a regular office building”.

Richard Sawyer
EYP Mission Critical Facilities
Spring Data Center World 2008

The Cost of Down Time

Natural disaster recovery is not only difficult but sometimes impossible to achieve if not properly prepared. Knowing the type of threats that a specific colocation data center may face is essential in proper planning. Tornadoes, floods, earth quakes, hurricanes and terrorism threats all contribute to a risk of down time.

The affects of down time are felt immediately in the form of loss of access to vital systems and information and may have a residual effect resulting in negative customer confidence and ultimately loss of revenue. Colocating in a facility that is strictly regulated and provides a greater amount of protection can greatly reduce and possibly eliminate the risk of downtime.

The cost of downtime varies by industry, ranging from \$6,450,000 for Brokerage Operations on down.

A colocation providers' mission is to ensure customers from all industries enjoy the availability provided by their reliable, redundant and protected facility.

As the aforementioned Hosting.com report showed, most rely on a colocation provider in order to improve availability and reliability. Providing improved availability and reliability incurs costs that most are not willing or able to accommodate on their own.

Industry	Hourly Down Time Cost
Brokerage Operations	\$6,450,000
Energy	\$2,817,846
Telecommunications	\$2,066,245
Manufacturing	\$1,610,654
Financial Institutions	\$1,495,134
Information Technology	\$1,344,461
Insurance	\$1,202,444
Banking	\$966,802
Healthcare	\$636,030

Elements Of a Data Center

There are many components of a data center that must be carefully designed, engineered and maintained. Colocation companies are in the business of protecting mission critical equipment by efficiently operating the facility and environment.

Power is the number one factor in operating a data center. Power consumption and requirements in servers, storage and network equipment is growing at an alarming pace. In order to accommodate greater power and server densities a data center must keep up with demand and maintain complex electrical infrastructures. Maintaining generators, large UPS systems, and increasing utility rates are all front and center on the data center manager's dashboard.

Greater power requirements and increased density equate to a greater amount of cooling needed in the data center. Cooling technologies are evolving in order to match the increase in

rack density. Cooling requirements can be driven by a desired Uptime Tier level, the equipment density and heat output, and room design. Many new technologies such as 'free cooling' allow greater and greener cooling efficiencies.

Fire Suppression and Security are crucial components of protecting the data center. Fire detection and suppression equipment are complex systems that operate inside the data center facility to protect IT equipment. They also provide proper warnings and integration with local fire departments. There are many angles to tackle securing IT equipment and the data center infrastructure. Physical security, digital security, data center location and social engineering are all important pieces. Physical security comes in the form of proximity cards, biometric scanning devices, multi-factor authentication and many others. Security staff, training and process documentation is also critical. Digital security is practiced by firewalls, intrusion protection systems, and well maintained and audited back end systems. Social engineering is often overlooked at a data center, but can sometimes be the easiest way to get around every other method of security just listed. Social engineering is the act of manipulating people into performing actions or divulging confidential information.

Site Selection

The site a colocation data center is built on has a number of selection criteria that include, but are not limited to:

- Proximity to airports
- Proximity to chemical plants
- Price of power
- Local government incentives
- Fiber and Telecommunication provider access.

Site selection consultants Boyd Company, Inc. publish annual studies that show the least expensive cities to operate a data center based on annual operating costs.

Physical Structure

The data center facility itself should be a fortress meant to withstand a multitude of threats. Natural and un-natural disasters should be accounted for and protected against when dealing with these elements. In a post September 11th world, the location of a data center in relation to potential terrorist targets must also be considered. There are a number of protection technologies and methods to employ when dealing with disasters. Facility walls can be built to withstand certain levels of hurricanes and tornados. Facilities can be built to tolerate certain magnitudes of earth quakes. All of these factors play a big role in the ultimate protection of mission critical data.

Conclusion

Wrapped around all of the components that make up a data center are services. Even a lights-out data center must be properly maintained and operated via the three P's: People, Process, and Policy. Each of these is equally important to the overall orchestration of running a data center.

In the end it all comes down to the two favorite acronyms in business: TCO and ROI. Data centers and the facility requirements needed to protect and extend the life of mission critical equipment are long term planning exercises and can either be capital or operational expenditures. Deciding which one is the best fit depends on requirements, risk aversion and a long term strategy of protecting mission critical equipment.

**What is it going to cost, and
what am I going to get out of
it?**