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white paper

Choose the Best Data Center
Co-location Outsourcing
Solution for Your e-Business

REAL WORLD EXPERIENCE

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Introduction

When embarking upon a mission to evaluate and choose a data center co-location facility that is right for your company, a healthy dose of paranoia is a virtue. Certainty Solutions' approach is to present our clients with a framework and a methodology by which they can make an informed co-location decision that works for them, with a reasonable understanding of the risks and trade-offs that they will have made.

Each client will place different emphasis on each of the variables that are being considered, so it is impossible to try to rank all of the issues for all clients. In addition, each client may have some unique criteria that are not considered here, but which may be of paramount importance to that specific client. Therefore this document does not pretend to be all encompassing for all clients. It is intended as a valuable tool, checklist, and reference guide for clients that are evaluating whether they should build their own data center or outsource this function to a 3rd party. If a decision to outsource has already been made, this document is further intended to be a valuable tool, checklist, and reference guide to help clients evaluate and choose the best data center solution for their specific needs.

In order to be successful in e-business today, you need to ensure that your Web site delivers the availability, reliability, security and performance that your customers demand. There are many potential problems and risks that can impact the operational viability of your site. Some of these risks are inherent in the make-up of the Internet itself, which may present your end-users with widely variable experiences when visiting your site. There are myriad potential points of failure in the systems, platforms, applications, operating systems, and operating infrastructure that can result in degraded service or even denial of service to your end-users. Slow site performance or unavailable services can negatively affect both customer perception and loyalty, and can have a disastrous effect on corporate valuation and profitability.

The risks are great. Managing and mitigating the risks is becoming ever more complex. However, most e-businesses are focused on managing their business and their core application technologies. They do not have the focus or the skills in-house to provision and manage a system and operating infrastructure that minimizes risk, while maximizing performance, security, reliability, and availability of the site.

Building such infrastructure in-house usually doesn't make economic or business sense. More and more e-businesses recognize the value of working with a partner who can help them to evaluate their existing infrastructure, and who can architect an improved infrastructure that meets the evolving business and technical objectives of the company. The ideal partner can help to

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implement a real world solution that brings together best-of-breed technical solutions, ongoing and proactive production management expertise, and physical data center and Internet connectivity solutions.

The choice of physical data center and Internet connectivity solution should be made within the context of the larger technical and business objectives of the company. Too often the choice of data center provider is taken as a first step towards Internet outsourcing. There are many data center and bandwidth providers, all of whom claim to offer a proven, reliable data center infrastructure with all the redundancy needed to maintain the up-time levels demanded by your end-users. The selection of your company's data center provider is a critical business decision. Service disruption results in lost revenue and potentially lost customers who may not return to a site that delivers long waits or errors. Companies require highly reliable web-hosting solutions that allow them to increase revenue and market share while reducing the cost of sales and operations.

This paper discusses how you can minimize your technical and business risk, maximize your web site investment, and meet a variety of technical and business objectives that are specific to your company, by selecting the appropriate data center provider that can deliver the performance, availability and reliability that your business applications demand.

Site Expectations

There are a host of challenges facing e-businesses. Most e-businesses need to offer a service as reliable as dial tone, which can generate increased client loyalty and increased web "stickiness". Most e-businesses need to manage exponential growth, improve operational efficiency, reduce operational cost, decrease time to market, and increase quality of service, while reducing financial and business risk.

One way to help achieve these goals is to outsource your company's production data center and Internet connectivity. However, it is imperative that you partner with a first-class service provider. You have to deliver up-time as close to 100% as possible. By hosting your site at a best-of-breed data center, and by demanding measurable reports on up-time and availability, you can deliver the performance and availability required, even as you scale your site and add new applications.

By outsourcing to a data center provider with the infrastructure in place to guarantee availability levels, you can remain focused on your core business. No data center service provider can guarantee 100% availability, but most will sign service level agreements that demand network up-time of 99% - 99.999%. It is important to note that even if it were possible to provide Internet connectivity that never had any unscheduled downtime, your application and your site might still experience downtime for any number of problems that may or may not be caused by infrastructure failure.

Things to Consider When Choosing a Data Center or Co-location Facility

There are a variety of technical and business issues that should be researched and carefully considered before choosing the right data center co-location provider for your company. You should take a holistic view of the various issues when choosing a facility. Some of these issues are listed below:

General Facilities Evaluation: Many data center vendors claim to offer “n+1” redundancy. It should be noted however that there is no clearly accepted definition of what it means to have “n+1” redundancy. It becomes important to separate the hype versus reality. At a minimum, you should look for primary back-up solutions for all critical components, as well as secondary back-up solutions in case a primary back-up fails. This applies to power, fire suppression, and HVAC systems. The data center provider should have a fully fault tolerant environment. Look for duplication and segregation of all primary components, no single points of failure even for back-equipment, redundant or mirrored site capability, and systems redundancy features.

As with other areas of our industry, some companies market and promote the sale of services that are sometimes undeliverable. The promotion of an “n+1” facility is such a case. The primary problem is the fact that the customer will not be able to test the actual theory of a redundant facility until it's too late. It's a bit like buying life insurance, unfortunately you are unable to test in advance how your policy will work since to be able to do so, you need to be dead.

Based on our independent evaluation of current industry co-location standards, it seems certain that for many facilities which promote themselves as “n+1” fault tolerant data centers, if and when they do experience a real life major disaster, in which their disaster recovery processes as well as the dependency on the redundant infrastructure is called upon, they will have many frustrated and unhappy customers.

So, you may ask, what's the problem with company X's facility? I was sold the concept of “n+1” facilities with redundancy for all major equipment and an up-time of 99.999%. I can't ask for anything better, right? The main problem is how the “n+1” criteria are defined. In most cases it's achieved by taking the major components of a specific system (HVAC, Electrical, Data Transmittal) and adding some duplication for what may be considered the most critical pieces. What is often overlooked is the integrity of the entire system, identifying the weak links and then providing a method of overcoming that specific deficiency. As an example, an HVAC system needs to be up and running 99% of the time in order to keep the temperature of the facility within an acceptable range. Most engineers look at the major components of the HVAC system and add some contingency, therefore the derivation of the “n+1” facility concept. The major problem lies not in what the engineer did, but in what he failed to do. Specifically in areas such as California where

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seismic activity is a real threat, the weakest link within the system may not be a specific unit, but the method of attaching the unit or the installation of all the pipes that move the cooling around.

In this scenario, it is important to understand whether the facility personnel have the ability to correct any of these deficiencies within a 1-2 hour window. If the answer is no, the luxury of having duplication of major systems doesn't mean much. The facility integrity will suffer and you, the customer, will not receive the level of service that you assumed was part of your agreement.

Another scenario to ponder is the coordination of physical and intellectual security with the fire suppression systems during an actual alarm state. Most co-location providers have in their inventory of facility upgrades the installation of very complex fire detection and suppression systems. These systems, although very sophisticated, were in most cases not designed for data centers with cages or cabinets. The limited security provided by the cages or cabinets is jeopardized by the activation of the fire detection system or in other instances the fire suppression is impaired by the security of the cages and cabinets.

Some co-location providers promote a facility with a certain redundancy of DC power, in most cases, 8-9 hours. The assumption here is as follows: if a power failure occurs, the bank of batteries would provide power to the data center for a specific timeframe (assuming 100% capacity and having a generator as a backup). If someone asks a question regarding what will happen if the generator doesn't work, the most used answer is "we would bring a third party generator to the site to supplement what we have". Now, have we all thought about this – assuming that we have a disaster, do you think that the federal, state or even local governments will allow surplus generators to be dispatched to local business when they may be better used for life threatening operations?

These are some of the factors that need to be carefully analyzed as you prepare to install your critical equipment within a co-location facility. If that piece of your business is so crucial to the success of your company, you should spend as much effort as possible analyzing all the aspects of an "n+1" facility, and not depend on the marketing and sales propaganda that is often used as the basis of a decision.

As a customer, you need to make sure that these facilities meet the promotional criteria depicted on the presentations and allegations given by the co-location operator. In order to make an educated decision, you must do your part in analyzing the entire facility. To achieve this, you may need to create a task force encompassing individuals that are knowledgeable in data center facilities design and construction, network architecture, and network security. These individuals should be your auditing team, and you should not accept any co-location data center that will not pass their inspection. In other words, know well in advance where you are putting your company's jewels.

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Network Connectivity: You need to consider your bandwidth requirements, along with redundancy, diversity, latency and routing. The quality of service that your end-users experience depends in part upon the number of Internet “hops” required to reach your site from their Internet Service Providers. It is important to consider the demographic make-up of your current end-users (and of the end-users that you hope to reach), at least in terms of where and how your end-users access the Internet, and compare that against the network connectivity and cross-connects afforded by each co-location vendor. If it seems likely that reaching your end-users will require many hops to and from their ISPs and the data center’s network, then you should consider choosing an alternate provider or provision additional bandwidth from an alternate source.

When evaluating Internet bandwidth at co-location facilities, you should always consider the following issues:

- Consider what is exact physical topology (cabling and equipment) between your equipment and Internet egress.
- Consider which Internet Service Providers (ISPs) are available, i.e. whose bandwidth can you use.
- Consider the physical fiber runs into and out of the building.
- Consider the fiber topology for that major metropolitan area.
- Consider which fiber runs does each ISP use to enter and leave the facility and to connect to the ISPs backbone outside of the metro area.
- Consider what is the ISPs national and international backbone topology.
- Consider what networking monitoring is in place, and what is escalation policy for problems or outages.

Getting exact equipment information (even if it’s a list of what could be used) lets you know the robustness of your connection to the ISPs. You can get specs from the vendors and find out what capabilities and limitations the equipment has. You would still need to find out what your co-location provider will support, but if you know what the equipment can and can’t do, you can be much clearer on contract requirements.

Here are some things you want to know about the equipment that gets data from your equipment to the data center co-location provider:

- Consider if the ports are switched, shared switch, or bridged.
- If a switch, can the switch do VLANs?
- Does the equipment have redundant power supplies?
- Are the cards in the equipment hot-swappable?
- Is there some automatic fail-over between boxes (OSPF, HSRP, etc.)?

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You should also know exactly which Internet Service Providers (ISPs) are providing the Internet access from the data center co-location facility. Some providers offer more direct routes to more places and have larger and higher capacity backbones. Tier 1 providers tend to have more interesting content available via better connectivity than Tier 2 or Tier 3 providers. Some data center co-location ISPs give service level agreements (SLAs), and some don't.

The things you want to know about your co-location bandwidth providers are:

- Can they provide a detailed backbone map that shows topology of routers and links and what is the capacity of the backbone links?
- Can they provide detailed fiber maps showing what routes the fiber traverses?
- Consider with whom and where they peer (exchange routing information), both privately and publicly.
- Consider who are some of the other major customers of the ISP (i.e. whose interesting content or end-users can you get to directly).
- Consider what software/procedures/tools does the network operations center (NOC) use to monitor your links and what is the escalation policy for resolving problems.

The co-location bandwidth providers may consider some of this information proprietary, and you may need to sign non-disclosure agreements (NDAs). Fiber routes and private peering are the information most likely to require NDAs. What you're looking for is:

- If you do have more than one bandwidth provider giving you Internet access, ensure that they don't use the same fiber to enter and leave the building, or to leave the metro area. You are trying to avoid situations where one fiber cut will sever all Internet connectivity.

Network Reliability: Network connections sometimes fail. Most data center vendors provide only a single source of Internet connectivity. Again, you should consider provisioning additional and aggregated bandwidth from alternate source(s). Reliability and reach of the chosen network may vary, so it is important to consider whether the provider is truly "Tier 1" or "Tier 2". It is usually helpful to get some objective, skilled, independent advice on the comparative virtues of the various Tier1 and Tier 2 bandwidth providers.

Network Performance and Scalability: Data center and co-location facilities can be victims of their own success. The aggregated traffic of all of the combined clients in a data center can sometimes leave little "head room" in the event of traffic spikes. The result for your end-users can be degraded site performance or even unavailability of your site due to sudden or unplanned for increases in traffic that might not even be related to activity on your own site.

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Disaster Recovery: The design of the network must prepare for component failures such as router crashes, software failures, etc. The data center provider should offer seamless fail-over to redundant components. Component failure must be immediately corrected, which requires contingency planning that includes hot swappable components, spares, and data back-up.

Network Security: Some data centers offer network security services, such as shared managed firewalls services. The suitability and effectiveness of these services can vary dramatically from client to client.

Physical Power: Consider whether the data center provisions sufficient power to each rack of your equipment. Many data centers offer only 15Amp or 20Amp of power per rack as standard. That often proves to be inadequate for an entire rack of equipment. This can result in additional costs, as extra semi-full racks need to be provisioned simply to meet the power requirements of the systems. In addition to considerations of adequate power, you should also consider what protection you are offered from potential power failures. Expect that each vital component is equipped with multiple power supplies. Power should be conditioned by UPS systems and should be backed up by multiple diesel generators. It is important to consider how often the back-up generators are tested, and how long they can run without re-fuelling.

Reliability of Systems and Equipment: Consider if there are any single points of failure. If there are spares available on-site. Consider whether the facility offers disaster recovery options and planning. Does it require access to the facility, drive time, spares and trained staff available on-site that can respond.

Physical Security: It is important to consider how physically secure the data center is, both from intentional acts of vandalism or terrorism, as well as from accidental damage caused by other visitors to the data center. Things to consider include whether the co-location provider publishes and lives up to a set of policies and procedures. Clients should consider whether a closed cage, a locked cabinet, or an open rack meets their needs. This usually depends upon the type of facility and whether the facility provides only escorted access. Access to the facility will typically require sign-in and authentication. Some facilities have taken to offering biometric security measures. These can be effective, but only if the facility adheres closely to their published policies and procedures.

Ease of Access to the Site: Sometimes as part of a security effort, and sometimes as a result of under staffing, entering your chosen co-location data center facility can be difficult and time consuming. It is important to ensure that you can gain ready access in the event of a system failure or site outage. Having available trained staff whom can respond and gain access in an emergency, as well as proximity to your headquarters may be important factors.

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Confidentiality: This may or may not be important to a client. Some clients prefer to remain anonymous within a data center, perhaps to minimize the risk of potential hacker or terrorist attack, or to minimize investor concerns regarding the choice of cheapest provider. Regardless of the reason, if you have concerns about confidentiality, you should check to ensure that the provider does not publicize or advertise the relationship unless you agree.

Costs: Of course, cost is a key consideration. There are many obvious costs as well as some potentially hidden costs. Things to consider, at a minimum, include Bandwidth Costs, Facilities Costs, Set-up Costs, Operational Costs, and Maintenance Costs.

Timing: Availability of appropriate space *within acceptable lead times* is certainly a key consideration.

Expansion Capabilities: You should consider whether the data center could meet your expansion needs when necessary. Consider if it can provide adjacent racks in the primary facility, and whether it can provide additional facilities in alternative geographies, both nationally and internationally.

Monitoring: Once your site is located within a data center, you want to be certain that your application, your systems, and your Internet connectivity are all operating at optimal efficiency. Most data center vendors offer basic network monitoring. This simply tells you whether the facility connection to the Internet is still functioning. Consider whether there is any more extensive monitoring available, to track the health and performance of your entire site, not just the network connection. Consider what monitoring tools are being deployed, and whether they are extensible and/or customizable.

Reporting: You should consider what kind of information you want and need. Consider how available the information is, and in what format.

Special Equipment Needs: Consider ramps and doorways, and whether all of your equipment can easily be brought into the facility.

Support Services Available: Some facilities will offer a very basic “remote hands” support service (e.g. tape swaps, restarts). The type and level of support provided can dramatically affect the reliability and performance of your site. Consider what basic services are included with the standard package, as well as any premium support services available, either from the co-location provider or from a partner. Consider whether the services are available 24x7, what are the response times. Will these services suffice in the event of an emergency, or will you need to maintain a separate staff of systems administrators to respond to emergencies and provide proactive site maintenance.

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Other Subjective Variables: There may be several subjective and client specific variables that can have an influence on your choice of data center provider. For example;

- Perceived customer care
- Perceived marketability
- Perceived relevance for investment community
- Cooperative marketing opportunities
- Available storage for spares
- Staging area for configuration
- Quality and appearance of the NOC

About Certainty Solutions, Inc.

Certainty Solutions is the leading integrated managed services provider (IMSP) for companies with sophisticated Internet businesses. The company provides customers with both pre-packaged and customized site architecture solutions, standard and a-la-carte managed services offerings, implementation services and hosting/bandwidth solutions.

For more information about this topic, or to speak to a Certainty Solutions representative, please call 650.569.4600 or email info@certaintysolutions.com

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