



DIGITAL REALTY TRUST

Determining the Datacenter You Need

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The need for datacenter space is booming. Due to the convergence of a diversity of factors including: synchronous applications growth, rising regulatory requirements, and enhanced storage demands, a high percentage of existing datacenters can expand no further. The Gartner Group estimates that over 50% of existing datacenters will be obsolete within the next five years. In order to ensure that your search for datacenter space ends with a facility that can support both your current and future requirements it is important to accurately determine your space and power requirements. All this seems like a simple endeavor, however if you are not correctly expressing your requirements you may wind up with a datacenter whose obsolescence begins shortly after your move-in date.

Square Footage—Simple, Yet so Misunderstood

Typically you will find many datacenter professionals use square footage as the standard unit to describe a site at its most basic level. This unit of measure is commonly used in all manner of commercial real estate transactions, and if you were looking for new office space to house the accounting department it would work just fine. Unfortunately, in the realm of the datacenter industry, the definition of square feet is not universal across all involved parties. For example, a real estate professional may use the phrase square footage to describe the entire rentable area within a building. His IT counterpart may view this same terminology as reflecting the space's cabinet footprint, and an engineer may visualize his conception of the term as the datacenter's gross raised floor area. This diversity of interpretation can lead to a variety of issues including the dramatic overestimating of required power capacity leading to the development of a facility that is unable to accommodate future growth because it is literally out of floor space.

Perhaps the most insidious drawback in defining your requirements solely in terms of square footage is that the real estate or "shell" of a datacenter represents only 5-20% of its total cost of ownership. This figure pales in comparison to the site's power delivery infrastructure that contributes over 50% of ownership cost. The key to effectively addressing this inequity is to view your datacenter in terms of small increments rather than as a single contiguous space. At Digital Realty Trust this phenomenon led us to develop our POD Architecture™ that enables us to build out large datacenter spaces in smaller increments to both reduce our costs and enhance our flexibility to respond to shifting customer requirements.

Watts Per Square Foot—It's All in the Math

Although attempting to quantify your power and space requirements by expressing them in terms of Watts/Square Foot might seem like the best method to use (especially compared to square feet), this alternative can be dramatically inaccurate. In fact, many datacenter providers will use this measurement unit to entice customers by presenting them with wildly inflated measures of power capacity that only become apparent when they need to expand. The principle problem with using Watts/Square foot as a measure for datacenter space can be found in how this unit is actually determined.

Calculating Watts/Square Foot is done by using a simple equation in which the total power capacity available for an entire space is divided by a prescribed amount of square footage. For example, assume a power capacity of 2MW which is going to service a 15,000 square foot datacenter. This 2MW figure



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assumes that we have answered a number of underlying questions regarding our power requirements including: does this figure incorporate redundant components, and does it address utility requirements or only the estimated IT load? If we divide 2MW by 15,000 we get an average of 133 W/sf. While this may seem to be a sound method of identifying capacity it is important to note that the operative term in this equation is the word “average”. The problem with this methodology is that I can boost my average capacity by decreasing the amount of my denominator—the available square footage. Thus, if we maintain our same level of power capacity (2MW) but reduce square footage to 10,000 square feet my average rises to 200 W/sf.

Based on the previous example, the major flaw in using W/sf as the measurement unit for defining datacenter capacity quickly becomes apparent—the needs of your datacenter provider and your potential for expansion may not be in synch. While you may be seeking an amount of space that will support your current applications with room to grow to accommodate future requirements, your prospective provider may have unwittingly curtailed your options for future expansion. As indicated earlier, many datacenter providers will base their proposals on quotations for W/sf that bring to mind the phrase “to good to be true”. By using our previous example, it is easy to see how the siren song of a seemingly high-level of capacity can ultimately lead to a short lifespan for a customer’s datacenter “of the future”. Let’s say that the customer did take the 10,000 feet of space with an average of 200 W/sf and would now like to double their footprint to use 20,000 sq. ft. at their same contracted power level. There are two possible responses to this requirement. The first response is that no additional floor space is available as the provider has oversubscribed customers into the space to support their artificially high power delivery claims. In other words, the physical maximum amount of power “promised” to each customer exceeds the total amount available to the entire facility. The second response is directly related to the primary shortcoming of using W/sf as the unit of datacenter measurement as the need to use the requested 20,000 sq. ft. as the denominator reduces the available W/sf from the original 200 to 100!

kW—The True Measure of a Datacenter

Viewing your power requirements in terms of kW of IT load is a fundamental principle of Digital Realty Trust’s concept of value engineering. In our view of value engineering the requirements of the datacenter reflect the unique attributes of the space itself. Adopting this method of determining and expressing your datacenter needs requires you to view your power requirements based on the footprint of all the components that will reside above your raised floor. More succinctly, it provides a counter-balance to the tendency to overestimate your power needs. In this age of expanding high density applications we regularly encounter prospective customers who come to us with needs of 250W/sq ft or more. What we have found to be most common in these situations is that rarely does a datacenter have a homogeneous load profile. While your racks of blade servers may indeed possess substantial power requirements, the other components that will reside in the datacenter with them do not. Cabling and patch panels, for example, require no power at all, and other components such as your network/telco (10-50W/sf) and spinning disk storage (100W/sf) have rates of power consumption considerably below those of your high density servers. Thus, your original 250W/sq ft requirement typically turns out to be considerably lower. By using kW of IT load you have established a level of design flexibility for your datacenter that square footage and Watts/square feet cannot provide. By using this unit of measure to determine your requirements you are able ensure that you have room for future growth through the realization that the demands of high power consuming hardware are offset by other less voracious components. By achieving this balance within your datacenter you have built in expansion capability from the standpoints of both footprint and power.



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Summary

The first, and perhaps most important, step in developing your new datacenter is quantifying your space and power requirements correctly. Only by viewing your needs in terms of kW of IT load can you be assured of accurately determining your requirements. By using this measure you factor in the entirety of your computing and support environment to ensure that your datacenter will support your current and future applications needs.

About Digital Realty Trust

Digital Realty Trust is the largest purchaser, owner, developer and operator of datacenter space in the industry. Since 2004, we have purchased over \$2 billion in datacenter assets and designed and built facilities across North America and Europe. We currently own over 60 properties in 25 markets and manage over one (1) million square feet of datacenter space worldwide. This is why over 50 Fortune 500 firms rely on Digital Realty Trust to provide their datacenter solutions.