



# DIGITAL REALTY TRUST

## Powering Your Datacenter

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Due to a variety of factors, such as virtualization and enhanced processing power, datacenter growth continues almost unabatedly. Although these advances in technology continue to enable companies to place more servers within a rack and benefit from geometric increases in their processing capability one common thread still underscores every datacenter scenario—the need for power.

A prime example of this increasing need for power within the datacenter is the steep adoption curve for the blade server market that has only become steeper in recent years. In 2002, Gartner Group estimated that there would be 1 million blade servers installed by 2006. <sup>1</sup> In a 2006 presentation, they indicated that this figure was actually passed in 2005 and have now adjusted their forecast to show an annual growth rate of nearly 40 percent, resulting in an installed base of 7.2 million units by 2011. <sup>2</sup>

The by-product of this prodigious rate of growth are power requirements that Gartner estimates to reach 53kW per rack in the same time period. <sup>3</sup> These projections indicate that a number of organizations expect to be supporting high applications loads over the next few years. According to a recent paper by the Green Grid, “more and more datacenters run out of power availability before they run out of floor space... Operations are not properly “tuned” to accommodate the new energy-hungry environment.” <sup>4</sup>

As the need for power continues to escalate within the datacenter world, the search for solutions is growing almost as rapidly. Although there are a number of potential solutions being proposed by vendors of products ranging from chipsets to servers the most effective way to address power issues is during the initial planning process. Understanding the level of power that is required to fuel your datacenter operations up front is the best way to avoid a potential shortage in the future.

## **A Quick Note on Virtualization...Nice Technology but Not a Complete Solution**

Unlike many industry followers, Digital Realty Trust views virtualization not as a competing technology that may slow the growth of demand for new datacenter space and its associated power requirements, but rather as a catalyst for the addition of new applications that will only increase power consumption. This facilitation of applications expansion and by association, power, is due to three specific factors:

- 1) It is best suited for new applications- Due to the expense and expertise required to implement virtualization schemes within existing environments its use will be limited primarily to reducing computing capacity for new applications that will continue to add power consumption requirements to those already in place.
- 2) It works best in support of one application at a time- While it can limit the requirements for new applications (but not eliminate them) it will not reduce the current datacenter power load, but rather incrementally add to the existing level of power usage.

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1 Gartner Group

2 Michael Bell, “The Datacenter Power and Cooling Challenge”, November 2006

3 “Green Grid Guidelines”, The Green Grid

4 “Green Grid Guidelines”, The Green Grid



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- 3) It will help increase the need for storage- The demand for storage continues to increase for a variety of reasons including legal requirements and the on-going expansion of database driven transactional applications. Virtualization's ability to reduce the computing demands for new applications will only increase the need for storage devices (and the power to run them) within the datacenter.

## **Design for Power Efficiency**

In performing your datacenter planning your goal should be to ensure that all of your datacenter components are operating at their peak efficiencies. This may require that you build out larger spaces using an "incremental" methodology. An example of this incremental approach is the POD Architecture™ that we use here at Digital Realty Trust. This structure has arisen from our datacenter construction experiences. The basic building block in this design and construction scheme is a 2 MW generator working in conjunction with a standard transformer and switchboards to support an 8,000 to 12,000 square foot raised floor space with between 100 and 150W per foot in the United States. The resulting benefit of incremental construction methods like the POD Architecture™ is that they allow you to take advantage of "natural breaks" in electrical design to gain peak component efficiency, thereby ensuring that they are using only the power that they require.

## **Use the Correct Terminology to Express Your Power Requirements**

Square footage is the standard unit of measure for real estate but is not adequate for datacenters. A real estate professional uses square footage to describe the entire space, including raised floor and common areas, while his IT counterpart uses the term for the cabinet footprint and an engineer uses the term for the datacenter's gross raised floor area. Different interpretations introduce a variety of hazards, including dramatically overestimating required power capacity.

As an alternative to square footage, Watts/Square Foot might appear to be an appropriate approach to describe datacenter capacity and requirements. However, this measure also falls short. The load profile within a datacenter is typically not homogeneous. While racks of blade servers have substantial power requirements, the other datacenter components that reside in the datacenter do not. Cabling and patch panels, for example, require no power at all, and other components such as your network, telecommunications and spinning disk storage have lower rates of power consumption than high density servers.

Viewing your power requirements in terms of kW of IT load is a fundamental principal of Digital Realty Trust's concept of value engineering. In our concept 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. The measure of kW of IT load provides a



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counter-balance to the tendency to overestimate power needs. By using kW of IT load you establish a level of design flexibility for your datacenter that square footage and Watts/square feet do not provide. By using this unit of measure to determine your requirements you recognize that the demands of high power consuming hardware are offset by other less voracious components. By achieving this balance within your datacenter you build in expansion capability from the standpoints of both footprint and power.

## **Power Oversubscription...Good for Your Provider. Bad for You.**

Analogous to selling more tickets than the seats on an airplane, oversubscription is allocating more power to a building's users than the total amount of power available to the facility. Oversubscription generally works because users typically use far less than the maximum capacity allocated. With telephone circuits, the use of oversubscription is a sound business practice as all assigned users rarely attempt to make a call at the same time. As many datacenter clients have come to find, this is not a sound practice when contracting for power. An organization may contract for a prescribed level of power (150W / sf, for example) with the ability to add capacity up to 200 W / sf. However, if the datacenter provider has substantially oversubscribed, expansion capacity does not exist.

When contracting for power, verify that your potential datacenter provider does not oversubscribe at any level of the components comprising the power architecture (utility, UPS, PDU, circuit). Moreover, narrow your search to vendors who will commit to a fixed amount of kW. It is important to understand the terms of a contracted level of capacity. At Digital Realty Trust, the building's power capacity is allocated based on the contracted need of each tenant. We do not use "growth language", such as the right to add additional circuits at a later date to "guarantee" power delivery.

As an added measure of insurance regarding your contracted power delivery, insist on metered power from your provider. Our clients are able to view a physical metering device within their facilities to provide them with a visual status of their power usage. They are thereby assured that they are only paying for the power that they use and that no other occupant is using their capacity. By insisting on a hard capacity commitment in conjunction with metered power you avoid the unpleasant pitfalls associated with power oversubscription.

## **Summary**

Power will always be the key "currency" within the datacenter. Although there are technical alternatives that can help you reduce your level of power consumption, these solutions tend to be more "micro" in nature. A more effective approach to ensuring that your datacenter uses only the power that it requires, and has supply available as you add new applications is to view your facility from a "macro" perspective. This process requires a systematic approach to planning and designing your facility as well as, understanding exactly how your provider delivers power to your datacenter.



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## **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.