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As Seen In: Mission CRITICAL

THE CASE FOR THE BIG BOX UPS

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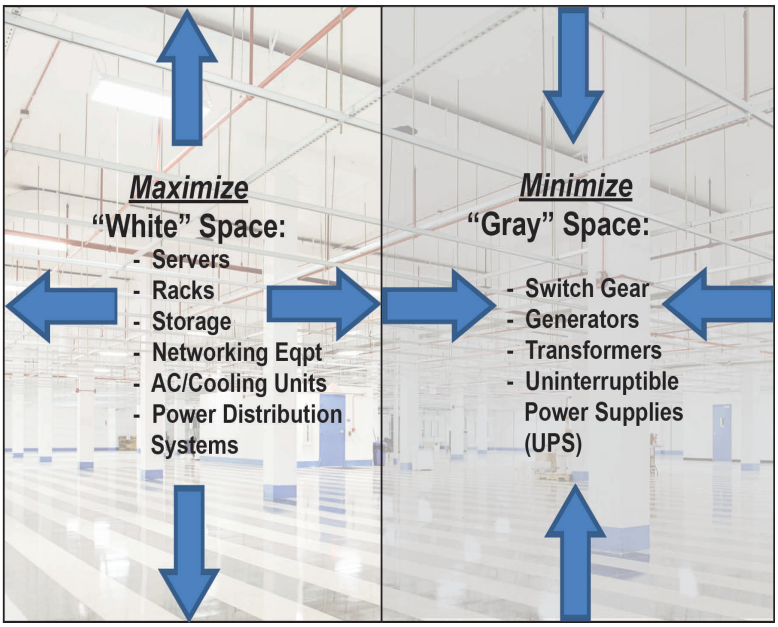
Have you noticed the exceedingly rapid growth in the number and size of data centers around the world recently? Major cloud service providers such as AWS (Amazon Web Service), Microsoft Azure, and Google have all embarked on impressive new data center projects of previously unseen magnitude in the last 12 months.

As Peter Judge, global editor for DatacenterDynamics points out, much of the rampant growth is due in large part to consumer posting on sites such as FaceBook and YouTube, where there are no limits and no charges for posts. As long as there continue to be no fees for these services, why would anyone stop using them? In fact, more social sites such as Pinterest and Instagram have sprung up bursting with visual content, thus continuing the feeding frenzy for cyber storage space. This surging need for data storage has led to a rush to build data centers with sufficient incoming power and infrastructure.

On the business side, stiff competition has arisen among data centers to attract those enterprise companies looking to push an increasing share of their electronic transactions skyward. The pay-as-you-go business model in the cloud arena is an attractive option for internal IT departments faced with the all-too-common mandate to accomplish more with less.
In addition, the flexibility provided in the cloud to update computing needs in the short term is a breath of fresh air for IT directors. With the switch to outsourcing a bulk of a company's data processing to the cloud, many former infrastructure challenges are now gone. In addition, significant capital expenditures are no longer concerns. With these burdens lifted, a company's IT professionals can now focus on their internal business systems and day-to-day operations that are essential for any corporate enterprise.

Given the requirement to handle more data while building their new data centers, owners are faced with the challenge of accommodating larger loads while keeping costs in check. The balance of white space vs. gray space is at the core of their profitability. This can easily be determined in terms of square footage, given the footprint of all equipment in both spaces. White space is the revenue-generating area of a data center. It includes all the IT equipment: servers, racks, storage, networking equipment, air conditioning units, and power distribution systems. Gray space is a data center's insurance policy and includes the back-end equipment such as switch gear, uninterruptible power supplies (UPS), transformers, and back-up generators. Obviously, minimizing the area occupied by the back-end equipment while maximizing white space is a primary goal for data center owners.



As uptime and reliability are undeniably top priorities for any data center, it all comes down to the integrity of the UPS to carry the load. Reliability factors into the cost equation because a more reliable piece of equipment can require less maintenance and, therefore, lower operating costs over its lifetime. Additionally, considering the vast amount of energy required to operate a data center, and with electricity costs on the rise, a higher efficiency UPS can have a significant impact on a data center's bottom line.

POWER REQUIREMENTS ARE ON THE RISE

IHS Markit Ltd, a market research company based in London, studies and analyzes the global energy sector among other market segments. In a report on the North American UPS market published in June 2017, IHS stated that the highest growth rate by power rating is in the over 800 kVA range. This coincides well with the expected rise in power requirements of hyperscale data centers. A closer look at the big box UPS applicable for such centers is therefore warranted.

High capacity static UPSs are a modern solution to the mechanical wear and inefficiency problems of their rotary counterparts, known as DRUPS (diesel rotary UPS). Today's static UPSs offer superior control through increased sampling rates of voltage and current, thereby enabling the control modules to optimize the performance of the insulated gate bipolar transistor (IGBT) power devices, and thus deliver higher efficiencies.

Furthermore, the performance of static UPSs has been enhanced

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in recent years to provide high efficiencies at less than full load levels. This is significant, since it is not uncommon for a data center to be operating under partial loads. The last few years have seen the introduction of static UPSs with advanced capability integral silicon carbide (SiC) semiconductors possessing extremely flat efficiency curves. Such units have specs stating 98.2% efficiency in doubleconversion mode and can achieve 98% efficiency at loads as low as 30%.

A high capacity static UPS is a superior alternative to the space requirements, complex installation, and maintenance demands of utilizing multiple low-capacity static systems strung together in a multi-module configuration. A single large system occupies less floor space than multiple UPSs. Less square footage occupied by the equipment composing the gray space of a data center frees up more room for IT equipment, and therefore, increased customers and profitability for the data center owner.

A single large system also requires less cooling, again freeing up valuable real estate that can be used for more incomegenerating racks and servers. A single UPS with one input and one output has fewer connection points and, therefore, fewer potential points of failure and less opportunities for things to go awry. It also greatly simplifies installation complexity and reduces the electrician hours required to install it. This is particularly relevant today given the current economic boom in the U.S.

When the economy is healthy, there is a wealth of jobs for skilled labor, including electricians. Unfortunately, this plethora of jobs often leads to a shortage of electricians, so anything that can be done to reduce the need for an electrician is worth considering. Time is money, and when electricians are not available to perform the work, the completion date gets pushed out, adding unnecessary cost to the project.

EXPANDABILITY IS A MUST

A common feature in today's high-capacity static UPS models is expandability, meaning that additional modules can be added over time as dictated by an increase in capacity needs. IT equipment procurement professionals can be caught between a rock and a hard place at times, being challenged to stay under budget, yet spec equipment that will last indefinitely. An expandable UPS will thankfully meet both criteria. This means a data center can be built out over time, and also paid for over time. The total capacity utilized on day one in the life of a data center will never be 100%, so it doesn't stand to reason to furnish it with equipment to handle total capacity at the onset. Also, cloud data centers and colos don't fill up instantaneously — it takes some time to match what's offered by the data center with appropriate clientele. Then, over time, as customers, servers, and necessary power capacity increase, additional modules can be added to the UPS to provide sufficient backup capacity.

One final advantage worthy of mentioning concerns redundancy. These new high-capacity UPSs feature built-in redundancy and are typically constructed of several modular sections in parallel. If one of these modules were to fail, internal controls would isolate the damaged module and allow the UPS to continue to operate normally. As an example, let's assume that the required load is one megawatt and a big box UPS consisting of a quantity of four 350 kVA modules (a total of 1,400 kVA) is being used. In this scenario, there is an N+1 redundancy, since 1,050 kVA is all that is really required to sufficiently support the 1 MW load. If one of the four modules were to go down, the UPS would be reduced to N redundancy, but would remain operational.It needs to be noted that not all UPSs are created equal. It would be wise to keep in mind that "you get what you pay for." So buyer, beware. Take time to review all options wisely and keep in mind that the average life span of a UPS is about 15 years. The total cost of ownership (TCO) begins with the initial capital expenditure, but there are ongoing maintenance and operational costs associated over its 15 years, including warranty costs, cooling costs, parts, preventive maintenance, and, of course, the UPS's operating cost in terms of efficiency and corresponding electric bill.

By the very nature of its business, the data center industry is adverse to risk, and a big box UPS goes a long way in reducing a number of risks. Its simpler installation means less chance for mistakes and lower installation cost. Fewer equipment components will lead to fewer potential points of failure, and a lower mean time between failure (MTBF) as an overall system. Redundancy is always desirable in a mission-critical system, and these boxes offer N+1 redundancy inherently. And finally, incorporating a large capacity UPS reduces the overall footprint of gray space in a data center, leading to more available income-generating white space. All of this combined leads to a better bottom line for the data center owner.

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