



IS MODULARITY THE FUTURE OF THE DATA CENTER?

Is a pod or container the best option for you?

By Larry Davis

With the economy still seemingly dormant and the speed of technology constantly on the rise, companies in the market to build new or expand existing data centers are in need of cheaper and faster solutions. An emerging trend in data center design is modularity, which provides cost effective, energy efficient data center space with a rapid deployment timeframe. The concept of modularity in a data center may reference both the construction in sections as well as the use of prefabricated, containerized sections. The traditional need to over-build for growth can be eliminated by considering a modular design approach, which meets expanding capacity requirements without the need to construct a large facility on day one.

Is A Modular Data Center Design Right For You?

Before adopting the concept of data center modularity, decision makers should carefully assess both the advantages and disadvantages offered by this approach to data center

construction. A major advantage of modular data center design is the fact that the environment for the hardware can be addressed incrementally, rather than immediately building out the entire data center space. However, if you are planning to grow rapidly, say within 12 months, it may be more cost effective to build to the maximum required IT capacity at the beginning of the project.

Modular data centers are typically designed with standardized infrastructure, enabling operating systems to be used universally and be easily replaced. They also use energy efficient power and cooling components, which can lower the overall operating expense. A truly modular data center is constructed in increments or as a containerized solution. Modularizing a traditional data center build-out is akin to constructing the facility with building blocks. Meanwhile, the containerized approach is “data-center in-a-box,” a prefabricated, fully installed, pretested, and ready for action data center.

All About Pods

One modular approach to data center expansion is the data center pod design. In a pod, the designer engineers a data center capable of supporting the current IT load (e.g., all needed servers, storage, switching and networking infrastructure). The data center itself consists of an IT room and is serviced by a facility supporting infrastructure room (i.e., UPS, cooling, power distribution) adjacent to the IT computer room. Designers then overbuild the supporting infrastructure room by estimating the expected mid-term growth of the IT demand. When ready, construction can be completed on an adjacent room or pod, leveraging the shared facility supporting infrastructure room equipment.



Pod data center solution. Image courtesy of PTS Data Center Solutions

Instead of providing power, space, and cooling for an over-built data center operating at 50 percent IT capacity, a company can divide its data center into pods and build out a pod as needed. For example, a company with a 1,000 square foot IT space requirement today could build a pod (1,000 square feet) with a facility supporting infrastructure room capable of providing service for that 1,000-square-foot of server and storage equipment, plus a future expansion room for adjacent IT pod when needed. Pod designs have a pay-as-you-grow approach toward expansion, reducing initial capital and construction costs while allowing the operational expenditure to grow as need grows. The environment is powered and cooled for only what is in use at inception, lowering the overall operating expense.

All About Containerized Solutions

Rather than designing and building a POD design from scratch when you're preparing to relocate, build or expand your company's facilities, it is also beneficial to consider purchasing a containerized solution. In doing so, capital and operating costs can be lowered. Potential issues with local building construction techniques and codes can also be avoided. Airflow and cooling systems within a module can be engineered beforehand to optimize spatial, performance and efficiency perspectives. The deployment time frame can be cut down from one year or more to a few weeks.

Containerized data centers are ideal for remote locations, companies faced with spatial issues, or locations with inferior building supplies and construction expertise.

They can be used as a temporary solution for disaster recovery, as a solution when data center expansion is required, or for when you just want a pre-designed, energy-efficient environment. Reliability is high because they are constructed in a controlled environment and tested before being deployed. Containerized solutions have the upper hand in terms of mobility with their ability to be placed anywhere, providing multi-location support and redeployment capabilities. In addition, since these prefabricated environments are not considered capital improvements, they provide significant off-balance sheet financial and tax benefits. Furthermore, if the system is leased, the entire data center addition can be treated as an operating expense instead of a capital expense.



Containerized data center solution. Image courtesy of PTS Data Center Solutions

Side-by-Side Comparison

Before deciding on a direction to go, you should compare the advantages and disadvantages of the two modular data center approaches — pod design versus containerized solutions.

Pod Design Approach vs. Containerized Data Center Solutions

Feature	Pod Design	Containerized Solution
Flexibility	<ul style="list-style-type: none"> Pods can be built to suit Flexible in size and configuration Higher density hot/cold aisle configuration possible 	<ul style="list-style-type: none"> Equipment must fit in a pre-fabricated container Limited density for cold/hot aisle configuration due to size constraints
On Site Customization	<ul style="list-style-type: none"> During design and construction, pods can be tweaked and modified to fit changes in requirements 	<ul style="list-style-type: none"> Configuration cannot be changed after installation Container must be replaced with a new configuration
Serviceability	<ul style="list-style-type: none"> Maintenance space can be designed as needed for comfortable service access 	<ul style="list-style-type: none"> Uncomfortable, limited space if technician needs to spend long hours replacing hardware
Energy Efficiency	<ul style="list-style-type: none"> With proper design, the Power Usage Effectiveness (PUE) can be strong but cannot beat the efficiency of a containerized solution 	<ul style="list-style-type: none"> Manufacturers spend significant design dollars to improve energy efficiencies or PUE
Common Applications	<ul style="list-style-type: none"> Permanent solution Additional capacity to existing facility Repurposing a building Green space design 	<ul style="list-style-type: none"> Military Oil rigs Temporary needs Remote sites
Compliance	<ul style="list-style-type: none"> Must be built to local building codes 	<ul style="list-style-type: none"> Must be ISO compliant container Not ASHRAE compliant
Time to Deploy	<ul style="list-style-type: none"> Initial space can take at least six months to complete due to permitting and typical construction timelines Subsequent PODs added can be deployed more rapidly 	<ul style="list-style-type: none"> With limited modifications to standard manufacturer design, containerized solutions can be deployed in as little as four weeks

Source: "The Optimum Data Center: How Modular Data Centers Transcend Containers," *Saheila Saheil, NxGen Modular, www.nxgenmodular.com; December 2011.*

Experienced data center design firms have gravitated to building data centers using the pod design approach. They have awareness of the best practices in designing supporting facility infrastructure shared across pods, how large pods should be for optimal energy efficiency, and the costs and timelines associated with completing a project effectively. There are a number of manufacturers providing these data center solutions such as:

- BladeRoom Modular Data Center Systems
- C-Cube Modular Technology
- Elliptical Mobile Solutions Micro-Modular Data Centers
- Emerson Network Power Smart Solutions
- Firelock Fire Proof Modular Vaults
- Hewlett Packard EcoPOD

IO Anywhere: Are Others Migrating To A Modular Approach?

Modular data center design is an ongoing topic for debate in today's data center consortiums. Chief operating officers, chief information officers, facilities managers, and IT staff openly debate the value of a modular data center design.

Uptime Institute Survey Questions & Results

Which of the following are you considering as part of any data center expansion strategies for the future? (Pick all that apply)

- Traditional brick-and-mortar, custom builds **52%**
- Traditional brick-and-mortar, supplemented with pre-fabricated systems or components (e.g. power and cooling "blocks") **41%**
- Data center made entirely out of pre-fabricated systems or components, with little or no traditional brick-and-mortar construction **19%**
- Data-center-in-a-container (IT, power, and cooling in a box) **21%**
- Whole third-party data center providers **27%**

What do you see as the biggest drawbacks to containerized or pre-fabricated modular data centers? (Select two)

- Not adaptable/inflexible to my requirements **35%**
- Price – They are currently too expensive **33%**
- Quality/Longevity – They won't stand the test of time **32%**
- The technology is too new/unproven in the market **30%**
- Vendor lock-in **27%**
- Market selection – Too few vendors/choices **15%**
- Purchasing increments – Components/blocks sizes not aligned to needs **12%**
- Other financial issues (leasing, depreciation) **11%**

Source: Uptime Institute Survey, Matt Stansberry, 2012, Uptime Institute LLC. All Rights Reserved.

In reality, there are many reasons to deploy modular designs in their entirety or as part of an overall data center relocation, migration or expansion. The decision criteria can be technological, financial, strategic or business related. It is imperative for decision makers to weigh all options before driving forward since bad decisions can be costly to the enterprise. ■

Larry Davis is a vice president and director of marketing for PTS Data Center Solutions Inc., based in Franklin Lakes, N.J. PTS specializes in the business strategy, planning, designing, engineering, constructing, commissioning, implementing, maintaining, and managing of data center and computer room environments from both the facility and IT perspectives. For more information, contact PTS at 866-787-3271 or visit www.PTSdcs.com.