VERTIV™

How all-in-one data centers simplify and speed edge deployments.

Vertiv™ SmartRow™ 2 enables operators to standardize and scale quickly.

Vertiv White Paper

As enterprise business growth accelerates, computing is increasingly being placed at the edge. Edge computing offers sizeable advantages for latency-sensitive and high-security workloads. Organizations can process and distribute workloads near or where the data is created, with or without network connectivity, which reduces latency and processing costs while improving data security and privacy.

Edge deployments conventionally use non-traditional spaces that vary widely in size and scope, so IT teams upgrade each space individually with solutions uniquely designed for each room or site. As a result, roughly 50% of the overall deployment time is spent on designing, planning, and managing one-off deployments. This lack of standardization causes operational complexity, slows deployment speed, and makes future upgrades more difficult and costly.

Edge deployments' inconsistencies can also make it inefficient and expensive to manage remotely and service infrastructure across locations.

All-in-one data centers are the logical solution to the problem of deploying new edge sites, providing integrated cooling, power, management, and security. Pre-engineered row-based data centers like Vertiv™ SmartRow™ 2 offer building blocks of capacity that operators can deploy quickly, meeting business requirements while streamlining critical operational processes. Instead of taking eight to 12 months to plan, design, and deploy an edge data center, owners and operators can leverage these solutions to add capacity when and where needed, installing them in days.

Edge computing and AI are a winning combination to spur business growth

Nearly all

98% Of executives say AI foundation models will feature prominently in their organizations' strategies over the next three to five years.[1]

Gaining exponential advantage at the edge

An Accenture survey found that the most advanced adopters of edge computing were:

x4 Four times more innovative.

x9 Nine times more efficient.

x7 Nearly seven times more cost-effective than lagging peers.[2]

Driving to standardization

While edge deployments are highly variable today, data center operators need standardized solutions to speed deployment – and scale.

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[1]Leading with edge: How to reinvent with data and AI, report, Accenture, 2023, https://www.accenture.com/us-en/insights/cloud/edge-computing

[2]Accenture, ibid.

Building edge sites in an era of speed and scale?

Historically, it has been challenging to install edge sites quickly, as they are typically remote, and requirements vary from site to site. To design and deploy edge sites, there are multiple processes to navigate, such as:

- **Kicking off projects:** The business will identify a new capability that requires more computing capacity. The IT team then decides which workloads will achieve the desired outputs – and what new IT hardware is needed to support them.

- **Selecting the site:** Next, the IT and/or data center teams will select the site, determine the floor space needed, and the white space required for power, cooling, and future growth. They'll also verify security and fire suppression requirements, consult with zoning and legal experts, and conduct site and feasibility surveys.

- **Planning and designing the solution:** The joint team may work with architects and specifying engineers to identify the scope of building and system upgrades. They'll create designs for equipment and cabling layouts, including white space for power and cooling. The joint team will then conduct a feasibility study to ensure the designs achieve business, technical, and cost goals, converting them into specifications.

- **Selecting new equipment:** Next, it's time to finalize plans and designs for new equipment and convert them into bid specifications. The joint team will submit specifications to their preferred vendors, evaluate competitive bids, make final selections, and submit purchase orders.

- **Navigating permitting:** The joint team will secure construction permits, blueprints, engineering drawings, zoning and local government approvals, and environmental impact studies. This phase can vary in length and intensity, depending on where the site is located.

For example, edge sites near residential areas typically face higher regulatory requirements and scrutiny.

- **Preparing the site:** With all the approvals, the joint team can prepare the site. They will work with local experts to make building enhancements to support new IT hardware and other supporting infrastructure. This process includes conducting engineering reviews of the site, making electrical and security upgrades, and implementing new network cabling.

- **Installing equipment:** The third-party service provider or system integrator will deploy the new power supply, cooling capacity, uninterruptible power supply (UPS) battery backup, rack enclosures, and IT hardware. If integrated onsite, this process takes significantly longer than if a pre-engineered, pre-integrated solution is delivered for deployment.

- **Testing new systems:** Finally, it's time to test all systems onsite to validate their design. It is critical to validate that servers and software are working as expected and that all cooling and power systems provide the expected capacity.

- **Closing out the project:** After testing and validating all systems, the team will seek and receive acceptance from key stakeholders and close out the project.

Designing and deploying Edge sites is traditionally a complex, custom approach. Vertiv has conducted extensive market research to quantify the average time it takes from start to finish following the abovementioned traditional process.

Planning — Site Selection 8 - 12 Weeks | Design 6 - 8 Weeks | Equipment Selection 4 - 6 Weeks | Permitting 4 - 6 Weeks | Site Prep 8 - 12 Weeks

Implementation — Installation 4 - 8 Weeks | Testing 2 - 4 Weeks

⚠ **Months of work and 50% of the cost** for a new Edge deployment are spent planning and designing a one-off solution.

📅 **Average time to deployment:** 8 – 12 Months.

Figure 1. The average timeline for designing and deploying a new Edge site in the traditional process.

Here are additional challenges operators experience with slow and cumbersome edge deployment projects:

- **Converting non-traditional spaces:** Edge applications are often deployed in spaces not designed to support rows of IT racks. Spaces might have no dedicated cooling, require expensive electrical upgrades, and lack physical security controls to prevent unauthorized access. In addition, these environments may be co-located with industrial operations where dust and dirt can damage IT hardware. As a result, these rooms will need dedicated cooling for IT equipment and to be isolated with a vapor barrier to avoid condensation.

Edge sites can include:

- Bank branches

- Electrical rooms such as those in hospitals

- Manufacturing plant floors where heavy equipment operates daily

- Retail storerooms

- Telecommunications cell towers

- University laboratories, and more.

Due to these considerations, operators need a solution that will span industry use cases and diverse spaces and address operational constraints.

Deploying edge data centers in non-traditional spaces

Common issues

Electrical upgrades

Power required in the space for the IT requires electrical upgrades to support the increased power capacity.

Excess heat

IT equipment and power infrastructure generate heat in a space that wasn't designed to handle it.

Poor environment

Spaces are often poorly maintained and less than optimal for IT equipment.

Security

Unauthorized access is common when non-traditional spaces are not properly updated for security.

Example environments

Retail stores

Distribution centers

5G Cell towers

Hospitals

Manufacturing

University labs

Figure 2. Common issues deploying Edge data centers in non-traditional spaces.

- **Moving from one-off solutions to standardized solutions:** Edge deployments are typically treated as one-offs because of their variability. Instead of spending up to a year deploying just one site, data center operators want to move faster.

  Pre-engineered systems accelerate deployment speeds by providing repeatable processes, eliminating planning and design work, and offering faster installation at a lower cost. An all-in-one data center can be deployed in just a few days on-site, enabling operators to meet business requirements and capture new growth opportunities as they emerge.

- **Deploying an environmentally sound and financially sustainable solution:** Data centers have come under regulatory and activist scrutiny due to the power their operations consume and the carbon emissions produced. Data centers and transmission networks consume around 1-1.5% of the world's electricity, producing 1% of its greenhouse gas emissions.[3]
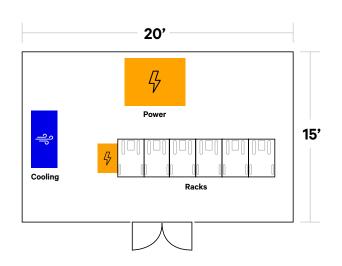
  Custom solutions expose companies to scope and budget creep due to the need to source different experts, install a wide array of equipment, and manage cross-dependent processes.

When enterprises deploy all-in-one data centers, they deploy only the capacity they need and gain access to the latest system advances, such as highly efficient cooling. As a result, there's no need to power and cool idle IT equipment or pay more for inefficient cooling systems.

- **Sourcing local talent:** Finding architects, engineers, and system integrators; validating their respective technical knowledge and capabilities; and scheduling and sequencing contributors is time-consuming and difficult. Centralized IT teams lack the local knowledge they need to streamline this process.
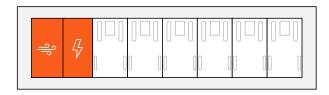
  With pre-engineered, pre-tested solutions, operators can confidently determine when new capacity will be rolled out and predict how systems will operate in the field. In addition, it's easier for small teams to monitor, manage, troubleshoot, and upgrade Edge sites with these solutions because they use standardized components and provide centralized remote monitoring and management capabilities.

Smart solutions offer a better approach to edge deployments

Custom room build

All-in-One data center

- Physical Security included
- Sealed & Contained Racks

1. Sealed System with power and cooling
2. No construction costs
3. Faster install (days vs months)
4. Lower operating costs
5. Higher efficiency cooling

Figure 3. Standardizing Edge deployments for speed and scale

[3] "Data Centres and Data Transmission Networks," webpage, last updated July 11, 2023, International Energy Agency, https://www.iea.org/energy-system/buildings/data-centres-and-data-transmission-networks

Introducing Vertiv™ SmartRow™ 2 to simplify edge deployments

Vertiv™ SmartRow™ 2 is an IT-ready data center solution for edge sites that operators can leverage to streamline global deployments, reducing operational complexity and overall time to market. Pre-engineered and ready to deploy, power and cooling can be added to the SmartRow 2 architecture and provide:

- Secure rack enclosures

- Airflow management with precision cooling, power management, emergency backup ventilation

- Temperature and humidity sensors

- Intelligent lighting

- Centralized management and monitoring

Flexible system configurations

Scalable design architecture allows the solution to be tailored to your needs while remaining room neutral so that you can place the system virtually anywhere.

- IRC: In-Row Cooling
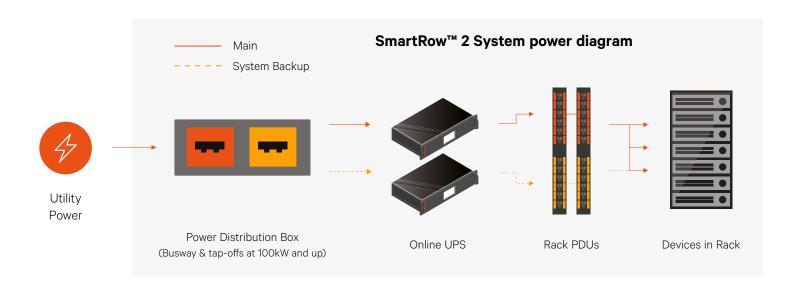
- PMC: Power Management Cabinet

IRC   PMC   IT Rack   Vertiv™ SmartRow™ 2 (1+3)   Fully Enclosed Hot Aisle & Cold Aisle Containment

Management Appliance

HMI & Web Interface

SmartRow™ 2 System power diagram

Main
System Backup

Utility Power

Power Distribution Box
(Busway & tap-offs at 100kW and up)

Online UPS

Rack PDUs

Devices in Rack

When deployed at scale, Vertiv™ SmartRow™ 2 offers the following advantages:

- **Gain a repeatable solution:** SmartRow™ 2 provides a standardized, repeatable solution that can be used to deploy new capacity at speed across use cases and spaces, freeing up IT and data center teams to focus on other strategic work.

- **Decrease operational complexity:** SmartRow 2 eliminates the need to hire teams with different trades to construct data centers and install equipment onsite. In addition, Vertiv can service all equipment. With single-point accountability for design, installation, and servicing, operators can significantly reduce operational risks and avoid delays due to contractor unavailability.

- **Deploy 80% faster:** By using SmartRow 2, data center operators can significantly shrink deployment times while bringing predictability, consistency, and quality to new installations.

- **Decrease carbon emissions:** SmartRow 2 provides intelligent systems, including containment and in-row cooling, that reduce carbon emissions by up to 20%, helping companies progress toward achieving their sustainability goals faster.

- **Reduce costs:** Vertiv can provide detailed business cases with return on investment (ROI) calculations, enabling operators to compare the capital expense (CapEx) and operational expense (OpEx) savings they gain by deploying Vertiv™ SmartRow™ 2 instead of designing and building an Edge solution.

  Deploying SmartRow 2 can create savings ranging from hundreds of thousands to tens of millions of dollars, depending on the scale of the deployment. If deployed globally, savings will grow exponentially.

  For example, an enterprise that chooses SmartRow 2 instead of creating Edge computing rooms at five sites could save nearly $700,000 in CapEx investments and reap almost $40,000 in OpEx savings due to greater energy efficiency and reduced system maintenance.

  Operators save 20% in energy costs on average as Vertiv SmartRow 2 provides full airflow containment, maximizing return air temperature. Intelligent in-row cooling significantly reduces energy consumption when compared to traditional room builds.

Vertiv™ SmartRow™ 2 overview

Complete row solution designed for micro and edge data centers.

Centralized management & monitoring

Data and reporting for entire system consolidated into a single platform.

9-inch touchscreen panel

User-friendly display for easy access to system status.

Power management cabinet

Pre-integrated switchboard with surge protection and cabling/whips.

UPS battery backup

Online double-conversion UPS with unity output power factor ensures high efficiency and clean power is fed to critical IT equipment.

Racks and full containment

Sealed EIA310 19-inch rack systems increase cooling efficiency and reduce energy consumption.

Precision cooling

In-row cooling with intelligent capacity modulation to minimize energy consumption.

Environmental sensors

Monitor & report critical environmental information and alarm notifications.

Smart door locks

Rack level security with access logs recorded. Supports local and/or remote authorization.

Emergency Ventilation

Activates automatically in the event of overheating or cooling unit failure.

Power protection

Thermal management

Monitoring & management

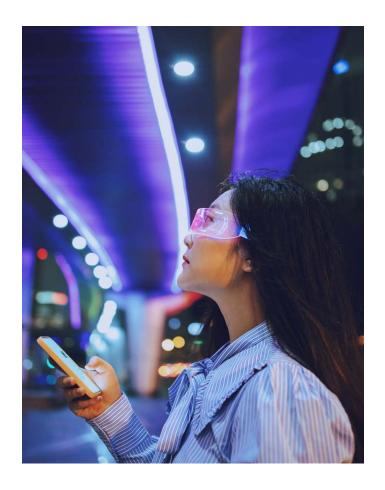When deployed across multiple sites, Vertiv™ SmartRow™ 2 can deliver significant CapEx and OpEx savings.

Big-Box retailer pivots fast with Vertiv™ SmartRow™

During the pandemic, a global retailer sought to overhaul its digital customer experience rapidly. Deploying the required IT infrastructure across the company's distribution center network would have taken seven to 10 months per location, time the retailer didn't have if it wanted to capitalize on fast-growing customer demand for the goods it sold.

Instead, the retailer deployed Vertiv™ SmartRow™ solutions, reducing the deployment time to fewer than five days. With the new technology deployed when and where needed, the company was able to launch a new world-class digital customer experience, including mobile shopping, inventory management, and curbside pickup, driving significant new revenues. In addition, the retailer saved an average of $300,000 per deployment while gaining a scalable solution that could be harnessed to enable future growth.

Delivering the future with Vertiv™ SmartRow™ 2

Data center operators want to make faster progress with digital transformation and AI programs while capturing the benefits of Edge computing, including lower-cost computing, local processing, better security, and data sovereignty.

As a result, they need a repeatable power, cooling, and management solution at the Edge that can be deployed in non-traditional spaces, simplifies processes, and reduces costs. In addition, operators seek to maximize compute uptime and reduce energy consumption and carbon emissions.

When data center owners and operators select Vertiv™ SmartRow™ 2, they gain a standardized and scalable solution that simplifies and accelerates global deployments. They can protect mission-critical operations with integrated power, cooling, and redundancy systems and centralized management capabilities, delivering the real-time services customers covet.

Learn more about Vertiv™ SmartRow™ 2

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