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Prefabricated and Modular Data Centers Market - A Global and Regional Analysis: Focus on Data Center Types, Configuration, Form Factor, and Region - Analysis and Forecast, 2024-2034

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Abstracts

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This report will be delivered in 7-10 working days.Prefabricated and Modular Data Centers Overview

The prefabricated and modular data centers market was valued at $4,242.9 million in 2024 and is expected to grow at a CAGR of 15.39% and reach $17,761.0 million by 2034. The demand for prefabricated and modular data centers has been growing rapidly, driven by their ability to provide scalable, efficient, and cost-effective digital infrastructure. These solutions streamline deployment timelines while maintaining high reliability and energy efficiency standards, making them ideal for diverse applications, including edge computing and hyperscale operations. With advancements in modular design and factory integration, prefabricated data centers offer enhanced flexibility, allowing organizations to adapt quickly to changing IT demands. Additionally, their compatibility with sustainable practices, such as renewable energy integration and optimized cooling systems, aligns with global initiatives toward reducing carbon footprints, further driving market growth.

Introduction to Prefabricated and Modular Data Centers

Prefabricated and modular data centers are pre-engineered, factory-assembled facilities designed to streamline the deployment and operation of IT infrastructure. These data centers combine key components such as power, cooling, IT racks, and network

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systems into modular units that can be quickly transported and installed on-site. Built with scalability, energy efficiency, and reliability in mind, prefabricated data centers address the growing demand for flexible and cost-effective digital infrastructure. Utilizing advanced technologies such as IoT, AI-driven monitoring, and energy-efficient cooling enables organizations to optimize operational performance, reduce deployment timelines, and support sustainable practices, making them integral to modern IT ecosystems.

Market Introduction

The prefabricated and modular data centers market has been rapidly growing as organizations seek scalable, efficient, and cost-effective solutions to meet the rising demand for digital infrastructure. These modular systems, comprising pre-engineered units for power, cooling, IT, and networking, enable quick deployment and operational flexibility, making them ideal for diverse applications such as edge computing, cloud services, and disaster recovery. With the increasing adoption of IoT, AI, and 5G technologies, the market is expected to expand significantly, driven by the need for faster data processing, reduced environmental impact, and streamlined operational costs. Technological advancements and sustainability goals further drive the global growth trajectory.

Industrial Impact

The industrial impact of the prefabricated and modular data centers market extends across multiple sectors, including cloud computing, telecommunications, and edge computing, while driving innovation in digital infrastructure. The adoption of modular data centers promotes advancements in scalable, energy-efficient, and rapidly deployable IT solutions, promoting industry-wide efficiency and sustainability. This evolution enhances collaboration between technology providers, data center operators, and enterprises, elevating infrastructure standards and pushing the boundaries of technological innovation. Additionally, it creates opportunities in engineering, manufacturing, and data management, supporting the broader digital transformation ecosystem. By enabling faster deployment and resource-efficient operations, these modular solutions align with global sustainability goals and meet the rising demand for scalable digital infrastructure across industries.

The key players operating in the prefabricated and modular data centers market include Schneider Electric, Vertiv Group Corp., Huawei Technologies Co., Ltd., Rittal Pvt. Ltd., Dell Inc., Eaton., Cannon Technologies Ltd, Hewlett Packard Enterprise Development

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LP, Emerson Electric Co., Lightning Investors LLC (Colt Data Centre Services Holdings.), Eltek (Delta Electronics, Inc.), IBM, Cisco Systems, Inc., BladeRoom Group Limited, STULZ GMBH and M.C. Dean, Inc.. These companies have been focusing on strategic partnerships, collaborations, and acquisitions to enhance their product offerings and expand their market presence.

Market Segmentation:

Segmentation 1: by Data Center Types

Centralized Data Center

o Enterprise Data Centers

o Hyperscale Data Centers

o Colocation Data Centers

Edge Data Centers

Edge Data Center Type to Lead the Market (by Application)

Edge data centers have emerged as the leading application segment in the global prefabricated and modular data centers market. This growth has been driven by the increasing demand for low-latency computing and real-time data processing, which are essential for applications such as the Internet of Things (IoT), artificial intelligence (AI), and 5G connectivity.

One significant factor contributing to the rise of edge data centers has been the rapid expansion of 5G networks. As of May 2024, several telecommunications companies in North America, including Verizon and AT&T, have accelerated their deployment of 5G infrastructure. This expansion necessitates the establishment of edge data centers closer to users, enabling faster data transmission and reducing latency. These edge facilities can efficiently handle the high volume of data generated by connected devices, supporting applications that require immediate processing, such as autonomous vehicles and smart city technologies.

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Furthermore, major industry players recognize the advantages of prefabricated solutions for edge data centers. In September 2023, Schneider Electric announced a $3 billion multi-year agreement with Compass Datacenters to expand their partnership and manufacture prefabricated modular data center solutions. This agreement is aimed at delivering finished goods more quickly and at a lower cost, addressing the skyrocketing demand for data center solutions driven by the burgeoning AI market. Schneider Electric has already manufactured and delivered about 150 modular data center solutions to Compass, showcasing its commitment to efficient and scalable edge data center solutions.

Segmentation 2: by Configuration

Power Module (Fully Fabricated)

Power Skid (Semi-Fabricated)

Power Module (Fully Fabricated) Segment to Lead the Market (by Configuration)

The power module, or fully fabricated data center, is the dominant segment in the global prefabricated and modular data centers market. This segment has gained traction due to its ability to provide ready-to-use solutions that streamline deployment and reduce construction time. For example, in November 2022, Huawei launched its FusionModule2000 6.0, a modular data center solution designed to enhance energy efficiency and simplify operations. This solution features a quick deployment period, reducing setup time from 30 days to just 7 days, making it an attractive option for businesses.

These power modules support energy efficiency and facilitate quick setups, making them a preferred choice for businesses looking to optimize their IT infrastructure. The combination of rising data needs and the efficiency of power modules positions this segment for continued growth in the market.

Segmentation 3: by Form Factor

Containerized Data Center (ISO)

All-in-One Modular Data Center

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Skid-Mounted Data Center

Individual Module

Containerized Data Center (ISO) Segment to Lead the Market (by Form Factor)

Containerized data centers are the dominant segment in the global prefabricated and modular data centers market by form factor. This segment's popularity stems from its flexibility, rapid deployment capabilities, and cost-effectiveness. Containerized data centers can be easily transported and installed at various locations, making them ideal for businesses that require quick solutions to meet their data needs.

For instance, in March 2023, Microsoft announced the expansion of its containerized data center offerings to support its cloud services, demonstrating the growing demand for modular solutions in the tech industry. These real-time instances illustrate how containerized data centers are becoming integral to modern IT infrastructure, solidifying their position as the leading form factor in the global prefabricated and modular data centers market.

Segmentation 4: by Region

North America: U.S., Canada, and Mexico

Europe: Germany, France, U.K., Netherlands, Spain, Italy, and Rest-of-Europe

Asia-Pacific: China, Japan, Australia, India, Singapore, and Rest-of-Asia-Pacific

Rest-of-the-World: South America, the Middle East and Africa

North America is the leading region in the global prefabricated and modular data centers market due to a rising need for AI-ready infrastructure, quick deployment options, and advanced technologies. The region has a strong tech industry that focuses on innovation, particularly in AI, creating a high demand for data center capacity that surpasses supply. For instance, Vertiv Group Corp. launched the MegaMod CoolChip in July 2024, a prefabricated modular solution that can be set up up to 50% faster than traditional methods, speeding up the availability of important AI digital infrastructure.

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Additionally, the growth of edge data centers in the U.S. greatly impacts the prefabricated and modular data centers market. As businesses look to improve speed and support the increasing need for real-time data processing, edge data centers are becoming crucial. This shift toward decentralized computing means data processing occurs closer to users. The demand for quick, efficient, and flexible solutions in edge computing has been boosting the adoption of prefabricated and modular data centers.

As companies focus on streamlined processes and single-source accountability, North America is expected to emerge as a key hub for these solutions, ready to meet the evolving needs of AI computing and digital infrastructure. This combination of rapid deployment, scalability, sustainability, and innovation positions North America as a leader in the prefabricated and modular data centers market.

Recent Developments in the Prefabricated and Modular Data Centers Market

In July 2024, Vertiv Group Corp. launched MegaMod CoolChip, a high-density prefabricated modular data center solution designed to accelerate AI compute deployments. Featuring advanced liquid cooling, direct-to-chip cooling for high-power CPUs and GPUs, and integrated power protection, it reduces deployment time by up to 50%. The solution is scalable, offering configurations for retrofits or standalone data centers, and supports sustainability goals with improved PUE and lower carbon footprints.

In February 2024, NTT DATA and Schneider Electric announced their partnership to co-innovate solutions for edge computing, integrating Edge, Private 5G, IoT, and Modular Data Centers. This collaboration aims to address the increasing demand for AI applications at the edge by delivering high-performance, scalable infrastructure. The companies have also deployed a private 5G-enabled EcoStruxure Data Center at Marienpark Berlin, a 30-hectare innovation park.

In November 2023, Vertiv Group Corp, a global provider of critical digital infrastructure and continuity solutions, launched the Vertiv SmartMod Max CW, a modular data center designed to meet the increasing need for swift compute deployment. This flexible and scalable system can handle IT loads of up to 200kW and features chilled water cooling, promoting energy efficiency and minimizing environmental impact.

In September 2022, Vertiv Group Corp launched prefabricated modular data

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centers in India, providing flexible, scalable solutions for deploying IT assets quickly and efficiently. These modular data centers incorporate Vertiv Group Corp's critical power and thermal management technologies, including uninterruptible power supply (UPS), thermal management units, and monitoring systems. Designed for ease of deployment and scalability, these solutions aim to meet the growing demand for data centers in India, driven by the government's infrastructure status for data centers and the rise of hybrid work culture.

Demand - Drivers, Limitations, and Opportunities

Market Drivers: Increased IT and 5G-Driven Infrastructure Demand

The prefabricated and modular data centers market has been experiencing significant growth, driven by the surging demand for IT infrastructure and the rapid expansion of 5G networks. With the expansion of data-intensive applications, such as IoT, AI, and cloud services, businesses require flexible and scalable solutions to support their IT infrastructure needs. The deployment of 5G networks further accelerates this demand by enabling faster data transmission, lower latency, and enhanced connectivity. Prefabricated and modular data centers offer a cost-effective and efficient approach to meet these growing demands, allowing organizations to adapt to the dynamic requirements of modern technology ecosystems quickly.

Additionally, companies have been increasingly focusing on developing innovative solutions to meet the rising demand for AI-driven technologies and scalable infrastructure. For instance, in October 2024, Cisco Systems, Inc. unveiled new plug-and-play AI solutions, including the Cisco UCS C885A M8 AI servers and AI PODs, to simplify AI adoption for enterprises. With only 14% of enterprises currently AI-ready, the company's offerings address a critical market need, streamlining deployment and reducing complexity. These advancements align with the growing demand for scalable AI infrastructure, supporting transformative applications such as generative AI.

Market Challenges: Seamless Integration with Existing Infrastructure

One of the key challenges in the growth of the prefabricated and modular data centers market is ensuring seamless integration with existing infrastructure. Many enterprises operate legacy systems with distinct configurations, protocols, and architectures, making aligning modular solutions without extensive customization difficult. This

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mismatch can result in extended deployment times and added costs, reducing the overall appeal of modular data centers. Additionally, concerns around compatibility and disruptions to operational workflows further exacerbate the reluctance of businesses to adopt these solutions at scale.

Additionally, organizations face significant hurdles in adapting modular data centers to legacy IT systems. For example, industries reliant on older equipment and proprietary systems often struggle to incorporate new modular solutions without costly overhauls or upgrades. Moreover, enterprises operating in heavily regulated sectors, such as healthcare or finance, face stringent compliance requirements that further complicate the integration process. These factors collectively affect the rapid adoption of prefabricated and modular data centers, particularly in regions where traditional infrastructure remains dominant.

Market Opportunities: Opportunities for Solution Providers to Collaborate with Hyperscale Cloud Providers

The growing partnership opportunities between solution providers and hyperscale cloud providers have been driving significant opportunities in the prefabricated and modular data centers market. As hyperscale cloud providers expand their global footprint to meet rising data demands, they increasingly seek scalable, efficient, and quick-to-deploy data center solutions. This collaboration allows solution providers to utilize the cloud providers' vast networks while delivering value-added services that enhance deployment efficiency and operational reliability.

For instance, in January 2024, EQT Infrastructure announced a partnership with EdgeConneX to develop high-powered, purpose-built data centers tailored for global hyperscale customers. This collaboration aims to meet increasing demands for cloud, AI, and critical digital infrastructure by expanding into new markets worldwide. Supported by EQT Infrastructure's industry expertise, EdgeConneX has tripled its capacity and expanded across Asia, Latin America, and Europe since 2020. The initiative plans to deliver hundreds of megawatts of data center capacity to support the growing digital economies and hyperscale customer requirements, reinforcing its role as a leading global provider of sustainable data center solutions.

How can this report add value to an organization?

Product/Innovation Strategy: The product segment provides insights into the diverse applications of prefabricated and modular data centers based on data center types

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(centralized data centers, including enterprise, hyperscale, and colocation data centers, and edge data centers), configuration (power module - fully fabricated and power skid - semi-fabricated), and form factor (containerized data centers, all-in-one modular data centers, skid-mounted data centers, and individual modules). Continuous technological innovations, growing investments in digital infrastructure, and rising demand for cloud and edge computing have been driving the adoption of these modular solutions. Consequently, the prefabricated and modular data centers market represents a high-growth and high-revenue business model with substantial opportunities for industry players.

Growth/Marketing Strategy: The prefabricated and modular data centers market has been growing at a rapid pace. The market offers enormous opportunities for existing and emerging market players. Some of the strategies covered in this segment are mergers and acquisitions, product launches, partnerships and collaborations, business expansions, and investments. The strategies preferred by companies to maintain and strengthen their market position primarily include product development.

Competitive Strategy: The key players in the prefabricated and modular data centers market analyzed and profiled in the study include professionals with expertise in the automobile and automotive domains. Additionally, a comprehensive competitive landscape such as partnerships, agreements, and collaborations are expected to aid the reader in understanding the untapped revenue pockets in the market.

Research Methodology

Factors for Data Prediction and Modelling

The base currency considered for the market analysis is US$. Currencies other than the US$ have been converted to the US$ for all statistical calculations, considering the average conversion rate for that particular year.

The currency conversion rate was taken from the historical exchange rate on the Oanda website.

Nearly all the recent developments from January 2021 to January 2025 have been considered in this research study.

The information rendered in the report is a result of in-depth primary interviews, surveys, and secondary analysis.

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Where relevant information was not available, proxy indicators and extrapolation were employed.

Any economic downturn in the future has not been taken into consideration for the market estimation and forecast.

Technologies currently used are expected to persist through the forecast with no major technological breakthroughs.

Market Estimation and Forecast

This research study involves the usage of extensive secondary sources, such as certified publications, articles from recognized authors, white papers, annual reports of companies, directories, and major databases to collect useful and effective information for an extensive, technical, market-oriented, and commercial study of the prefabricated and modular data centers market.

The market engineering process involves the calculation of the market statistics, market size estimation, market forecast, market crackdown, and data triangulation (the methodology for such quantitative data processes is explained in further sections). The primary research study has been undertaken to gather information and validate the market numbers for segmentation types and industry trends of the key players in the market.

Primary Research

The primary sources involve industry experts from the prefabricated and modular data centers market and various stakeholders in the ecosystem. Respondents such as CEOs, vice presidents, marketing directors, and technology and innovation directors have been interviewed to obtain and verify both qualitative and quantitative aspects of this research study.

The key data points taken from primary sources include:

validation and triangulation of all the numbers and graphs

validation of reports segmentation and key qualitative findings

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- understanding the competitive landscape
- validation of the numbers of various markets for market type
- percentage split of individual markets for geographical analysis

Secondary Research

This research study of the prefabricated and modular data centers market involves the usage of extensive secondary research, directories, company websites, and annual reports. It also makes use of databases, such as Hoovers, Bloomberg, Businessweek, and Factiva, to collect useful and effective information for an extensive, technical, market-oriented, and commercial study of the global market. In addition to the aforementioned data sources, the study has been undertaken with the help of other data sources and websites, such as IRENA and IEA.

Secondary research was done in order to obtain crucial information about the industry's value chain, revenue models, the market's monetary chain, the total pool of key players, and the current and potential use cases and applications.

The key data points taken from secondary research include:

- segmentations and percentage shares
- data for market value
- key industry trends of the top players of the market
- qualitative insights into various aspects of the market, key trends, and emerging areas of innovation
- quantitative data for mathematical and statistical calculations

Key Market Players and Competition Synopsis

The companies that are profiled in the prefabricated and modular data centers market

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have been selected based on inputs gathered from primary experts who have analyzed company coverage, product portfolio, and market penetration.

Some of the prominent names in this market are:

Schneider Electric

Vertiv Group Corp.

Huawei Technologies Co., Ltd.

Rittal Pvt. Ltd.

Dell Inc.

Eaton

Cannon Technologies Ltd

Hewlett Packard Enterprise Development LP

Emerson Electric Co.

Colt Data Centre Services Holdings.

Eltek (Delta Electronics, Inc.)

IBM

Cisco Systems, Inc.

BladeRoom Group Limited

STULZ GMBH

M.C. Dean, Inc.

Companies not part of the aforementioned pool have been well represented across

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different sections of the report (wherever applicable).

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