

SIEMENS



DATA CENTERS

Reference Architecture IV

Fault-tolerant design with hybrid automation and split or integrated approach

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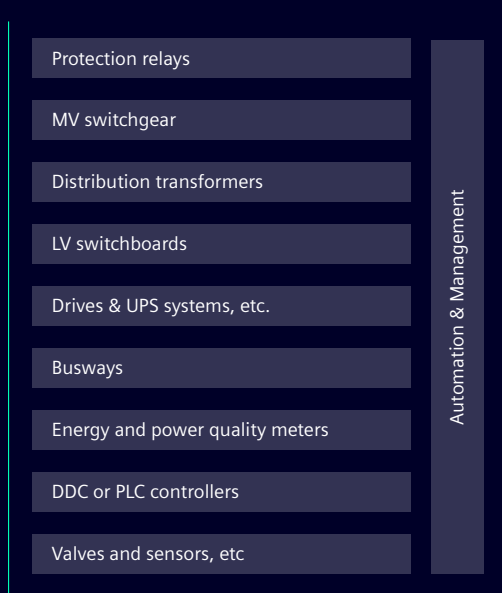
Introduction

A reference architecture is a standardized blueprint that outlines the components, communication protocols, and functional relationships between the different systems and devices in a data center. It provides a unified framework to ensure seamless integration of various components, including those from third-party vendors. Furthermore, a reference architecture facilitates scalability and adaptability as a data center's requirements evolve.

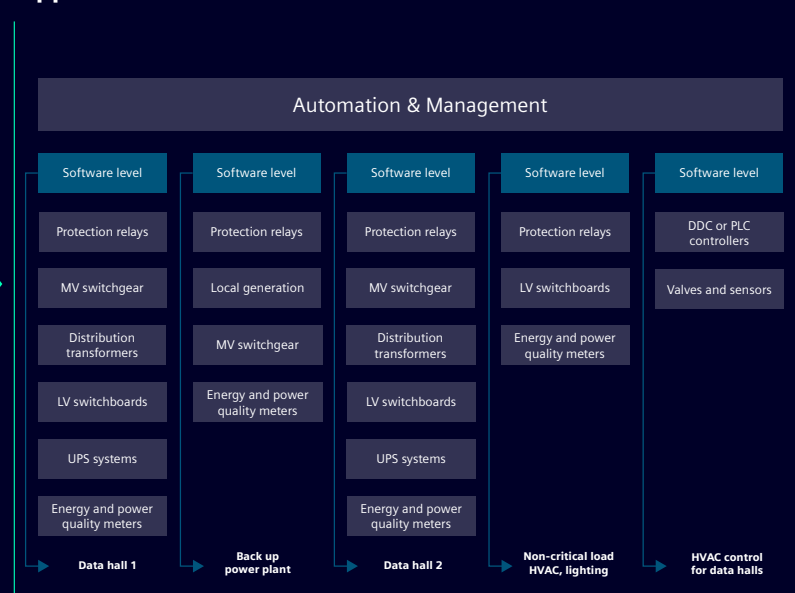
This flyer outlines one possible design, implementation, and operation of a data center's monitoring, control, and management system – commonly referred to as the Building Management System (BMS) and Electrical Power Monitoring System (EPMS). By adopting this solution guideline, you will be in an even better position to enhance cost efficiency, reliability, and scalability.

Reference Architecture Concept

Product-based architecture



Application-based architecture



BMS and EPMS: To separate or to combine?

When it comes to the Building Management System (BMS) and Electrical Power Monitoring System (EPMS), a common approach has been to treat these systems as two separate entities. However, there are good arguments for an integrated BMS–EPMS setup, especially for greenfield data centers.

Data centers rely on two key infrastructure systems for efficient operation: the BMS and EPMS. A BMS specializes in the mechanical aspects, like HVAC, ensuring optimal temperature and airflow. An EPMS concentrates on electrical usage, providing high-fidelity power flow monitoring down to milliseconds. Both are crucial for managing a facility.

The common approach has been to keep these systems separate. Some of the main reasons for this strategy:

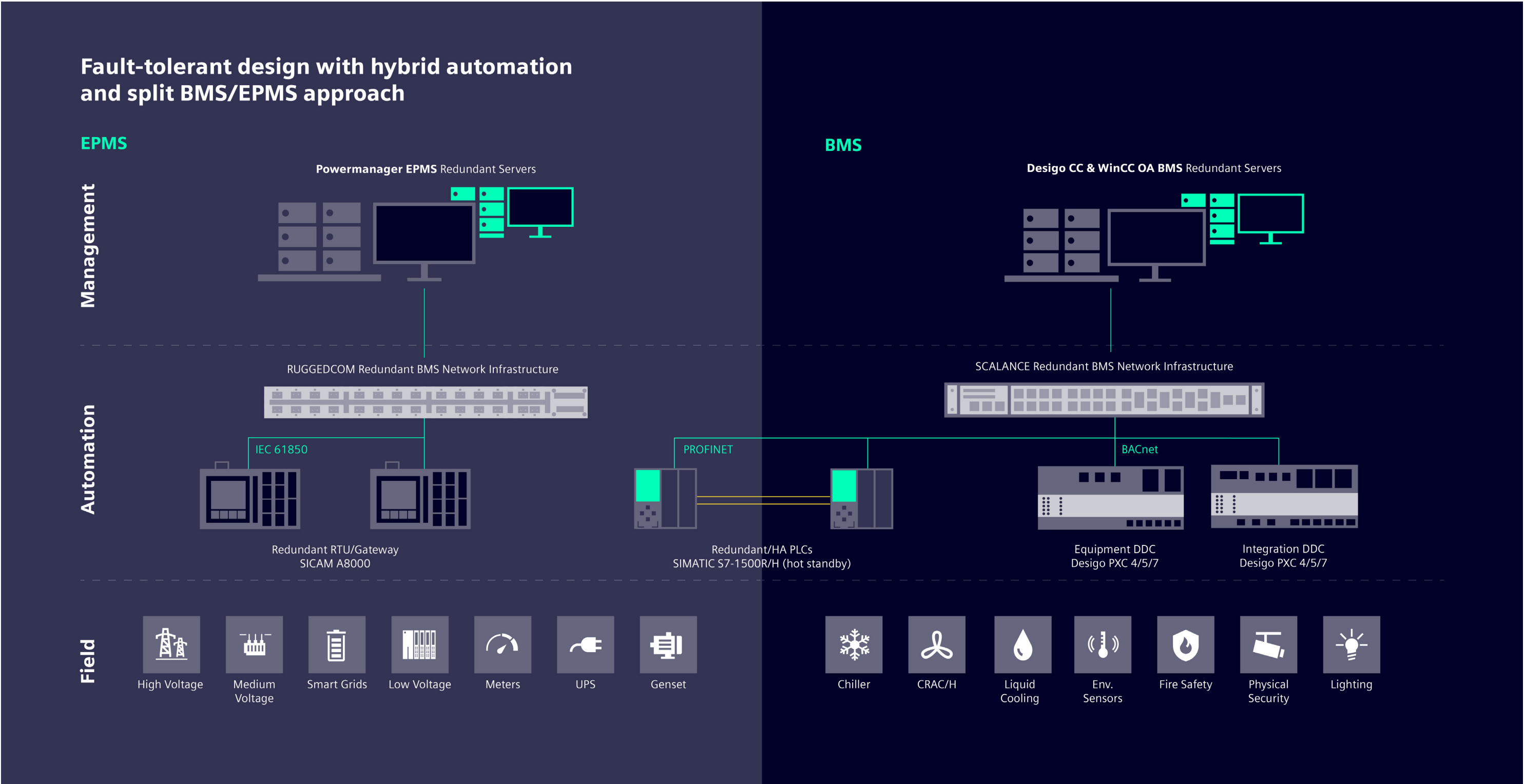
- **Focus and expertise:** Separate systems allow for dedicated functionalities. Such a focus translates into deeper expertise within each system, leading to better performance and troubleshooting.
- **Data acquisition speed:** A data center's power needs are dynamic. EPMS deals with data time stamped to the millisecond to give a real-time picture of electrical events. A BMS works with slower data (minutes or hours) which is sufficient for monitoring environmental conditions. Separate systems optimize data acquisition for each function.

- **Scalability and integration:** Data center needs can evolve. Separate systems allow for independent scaling. You might need a more granular EPMS for a growing white space, while the BMS might remain sufficient. Additionally, integration with other systems like DCIM (Data Center Infrastructure Management) or Digital Twin platforms becomes easier to manage with a two-step approach (BMS and EPMS provide their specific data points), reducing the risk connected to build a larger connector.
- **Cost and complexity:** Running a separate BMS and EPMS system offers a more traditional solution, where implementation and maintenance are simplified as each system caters to a specific domain.

In short, a separate **BMS and EPMS makes sense in established data centers** with well-defined needs and distinct operational procedures for mechanical plants and power distribution systems.



Reference architecture schematic



Integrated **from the beginning**

With increasing demand for seamless integration, a hybrid design with an integrated BMS and EPMS is the answer.

There are compelling reasons why customers are adopting an integrated BMS–EPMS for their data centers:

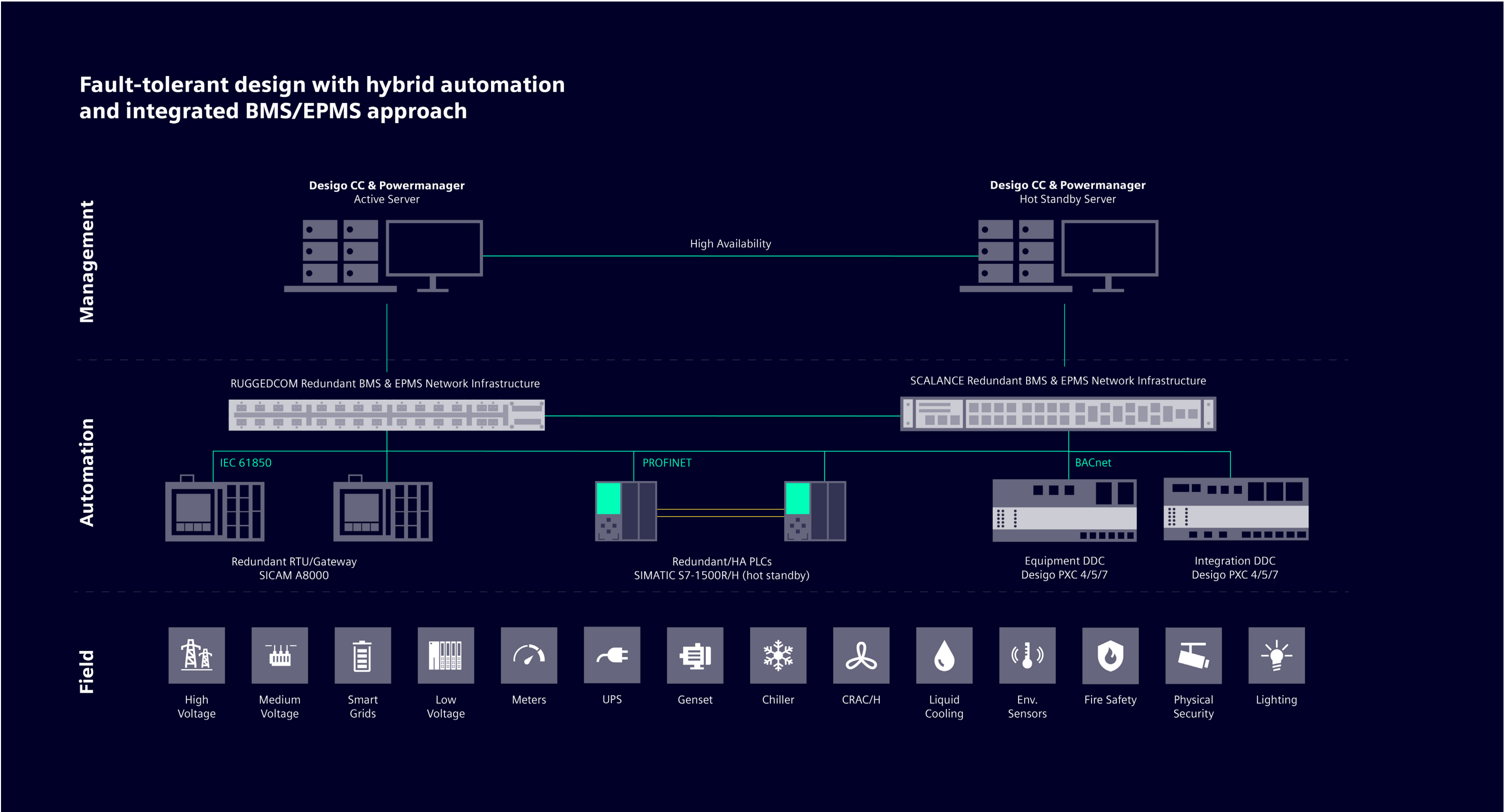
- **Optimized monitoring and reporting:** This option simplifies monitoring and reporting, avoiding the need for Data Center Management Software (DCIM). Facility managers can see how power consumption impacts cooling needs and vice versa, allowing for proactive adjustments to optimize efficiency.
- **Streamlined operations:** Integration eliminates the need to switch between separate systems for different aspects of the data center, minimizing errors caused by referencing inconsistent data from separate sources. The integration reduces training requirements, leads to faster resolution times, and simplifies troubleshooting for any issues.
- **Enhanced analytics and reporting:** An integrated system allows for more comprehensive data analysis. Correlations between power usage and temperature fluctuations become readily apparent, facilitating the identification of areas for further optimization. Generating reports becomes a streamlined process.

- **Reduced costs:** The initial investment for an integrated system can be lower than the sum of the two, according to a Siemens study. Integration can reduce hardware and software licensing costs. Additionally, streamlined operations and improved efficiency can lead to further OPEX reductions.
- **Simplified maintenance:** A single system requires less maintenance effort compared to managing two separate ones. This translates into lower staffing needs and potentially less downtime for maintenance activities.

In summary, an **integrated BMS–EPMS is the option of choice for greenfield data centers**, or for facilities aiming to optimize efficiency and streamline operations.



Reference architecture schematic



Siemens offerings that support this reference architecture:



Desigo CC

Siemens’ integrated building management system for high performing buildings has the power to increase comfort, efficiency, resiliency, and safety; acting as the technology backbone to leverage the full potential of your smart building infrastructure.



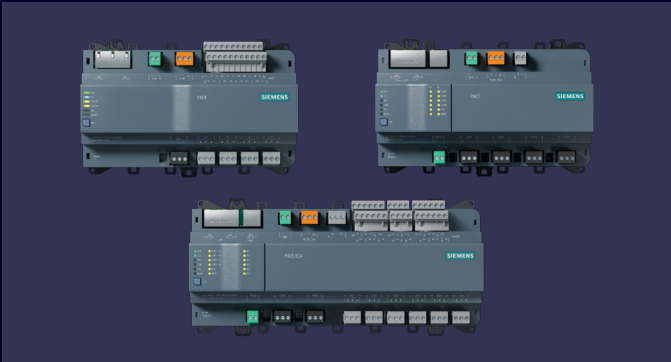
SENTRON Powermanager

This software lets you monitor energy consumption in buildings and plants, keep an eye on the condition of their low-voltage power distribution and on the power quality, and generate reports for operational power management according to ISO 50001.



SCALANCE

These network components form the basis for communication networks in industrial automation. They meet all requirements for highly efficient industrial networks and bus systems, whether for switching, routing, security applications, remote access or industrial wireless LAN.



Desigo PXC

Our Direct Digital Controller (DDC) provide optimal control for high-performing automation of all facility operations, based on four key pillars: scalable, smart, simple, secured. The cost-effective solution minimizes deployment time and operational overhead while maximizing reliability, performance, and long-term value across the data center lifecycle.



SIMATIC S7-1500 R/H PLC

These redundant industrial PLCs use redundant communication to the connected I/O units. The components offer a standard system feature of down to 50 millisecond switchover time.



SICAM A8000

These modular and scalable automation and remote terminal units range for telecontrol and automation applications in all areas of energy supply. It's suitable for rough ambient conditions thanks to mechanically stable modules and an extended temperature range from -40 to +70 °C.



RUGGEDCOM RSG900 series

These managed gigabit compact switches are tested and certified to withstand extreme environments, featuring High-availability Seamless Redundancy (HSR) and Parallel Redundancy Protocol (PRP). Their RedBox functionality enables simultaneous operation across HSR, PRP, or RSTP networks, ensuring continuous, secure, and reliable performance even during power failures. They are suitable for temperatures from -40°C to + 85°C and meet industry standards such as IEC 61850-3, IEEE 1613, and IEC Ex.

Let's talk!

Fill in this contact form to start a conversation with our data center experts.



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Discover the Siemens data center offering and use cases that align with the strategic business goals.



Visit use case page

Discover more information and offerings for increased uptime with redundant automation design!



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