DUKE ENERGY CENTER

CASE STUDY

Wells Fargo Corporate Properties redefines development by creating a smart building without compromise—on time and on budget.

INTELLIGENT BUILDINGS℠

Overview

During the development of the Duke Energy Center, Wells Fargo Corporate Properties, the building owner, set out to improve the new building's tenant experience, improve the reliability of the buildings control systems, and reduce long-term system costs. When the Duke Energy Center was already mid-construction, Bob Bertges, Managing Director for Corporate Real Estate, believed there was an opportunity to create a new model for smart building design. The Duke Energy Center was designed to achieve LEED certification and included multiple building control technologies. Wells Fargo led a team that developed a unique solution: integrating the building's sixteen (16) separate and incompatible control system networks into one (1) secure converged network. This novel approach demonstrated the benefits of developing technologies that could be leveraged by control systems across functional groups. The converged network reduced capital costs and operating expenses while increasing reliability and control of the building's systems, ensuring a superior tenant experience and optimal building performance.

Executive Summary

Building profile

- **Location**: Charlotte, North Carolina
- **Building Size**: 1.5 million square feet over 48 stories with below-grade parking
- **Building Type**: Commercial, multi-tenant
- **Owner**: Wells Fargo Corporate Properties
- **Developer**: Childress Klein Properties
- **Certifications**: LEED Platinum Status

Challenge

- Reduce risks of existing building technologies
- Secure the network for the building control systems
- Improve reliability of controls systems, long-term operational efficiency, and ability to adjust technologies over time
- Meet or exceed requirements of existing budget, schedule, and contracts

Solution

- Replace redundant networking systems with a single, interoperable secure converged network
- Allow vendors to focus on their expertise—real estate networking for Cisco and control systems for contractors
- Use control systems integration to optimize building performance while providing tenants exceptional experience

Benefits

- $400,000 reduction in capital costs
- Superior building control and reliability provides excellent tenant experience
- Network interoperability preserves control system performance while improving reliability and reducing maintenance costs
- Secure IP network

1.5M	48	$400K	20-25%
SQ FT	STORIES	CAPITAL SAVINGS	ENERGY REDUCTION

Connecting smart building technologies with traditional construction

The early development of smart building technologies

Smart building technologies that integrate passive technologies, as well as automated building controls, have been gaining popularity since the late 1980s. At that time, open protocols began to replace closed proprietary systems, which in turn standardized system capabilities that allowed vendors to focus on manufacturing products. These open protocols were able to interface with each other and ultimately communicated with the building automation system (BAS), which centralized control of the building systems. Despite these open standards, many of the internal protocols, cabling, and networking infrastructure remained unique to each company, which required vendor-certified installers and technicians to bring their system to a building.

Traditional constructions processes can isolate technologies by function

On the other hand, the commercial real estate (CRE) development industry changed at a slower pace. CRE development is an extremely complex process where innovation in design and engineering comes with a cost premium in addition to increased risk. Additionally, the standard process of identifying vendors and contractors for a project follows the Master Format from the Construction Standards Institute (CSI). This process organizes work specifications into discrete work packages organized by construction requirements and associated activities. Within the 50 divisions offered, CSI splits the Facility Service systems into 10 separate divisions that align to the trades performing the work. This process makes it easy for project managers and contractors to easily define the work packages by trades. However, the process draws lines in the scopes of work that tends to silo technologies within each group. This siloing reduces or eliminates the opportunity to innovate products across categories, limiting building technologies to single functions.

Wells Fargo aims to connect smart building technologies across functions

Curt Radkin, Senior Vice President and Sustainability Strategist for Wells Fargo Corporate Properties Group, was the executive in charge of developing the Duke Energy Center, and he believed combining technologies across functional groups and updating the CSI could improve building technologies. He brought in the expertise of Intelligent Buildings (IB) to develop the strategy and technical standards to successfully bring the 16 disparate control systems networks together. Each control system vendor had already been contracted to install their own networks, so implementing the plan required the approval of every contractor. To convey that this solution was a win-win for both the contractors and Wells Fargo, IB created the business case and value proposition to present to the control systems contractors.

Creating a scalable unified building controls network

Identifying opportunities to simplify control networks

Wells Fargo's team—Childress Klein, property manager and developer, Cisco, a worldwide leader in IT solutions, and IB—worked with the control system contractors to review the current technology, identify a solution to simplify the control networks, and develop an implementation strategy. The team found that controls systems that consumed the most energy, such as HVAC, lighting, and elevators, had all evolved in recent years to have nearly identical networking technologies and components, though the IT infrastructure implementations varied in both design quality and security levels. To meet the project goals the team recommended installing a single converged network that would be shared by every control system. This converged network would ensure network quality, eliminate the redundancies across control systems network, and dramatically increase the cybersecurity posture of the building systems.

The convergence of networking technologies that allowed every control system to leverage one secure converged network was not a fluke. It was the result of the growing influence of the Internet Protocol (IP), broadband internet, and the ubiquity of networks throughout commercial properties. Control companies across industries were aware that enabling internet connectivity and access to buildings' networks would be necessary to stay competitive in the future.

Leveraging network unification to enable stakeholder to focus on their strengths

Despite the inevitability of interfacing with IP networks, control system companies are not IT companies. Controls manufacturers approach this reality in different ways, some take on a growing amount of IT responsibility, while others look to minimize their role in IT by interfacing with outside networks. When presented with IB's value propositions for integrating networks and reviewing the value of Cisco's converged network solution and their IT expertise, all the control system integrators agreed to move forward with the integrated solution. This allowed every company involved to focus their efforts on the core competencies—control systems for building system integrators, and real estate networking for IT integrators and Cisco.

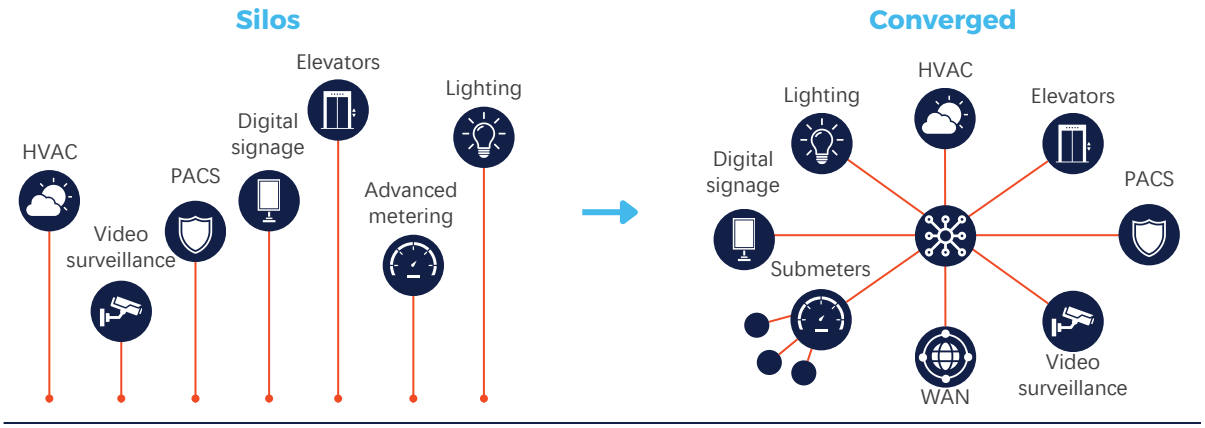

Figure 1: Traditional Control Systems Siloed Networks vs. Single Converged Network

Implementing a scalable, interoperable control network

Cisco and an IT integrator designed a neutral, secure, and scalable converged network that would allow every control system to securely connect to it without compromising performance, warranties, or profits. Cisco partnered with Tridium, whose Jace middleware products facilitate communication across the various control system protocols. With this solution, vendors simply had to connect with an ethernet cable, which had already been adopted by many major control systems. Cisco's converged network leveraged standard protocols, allowing it to support multiple systems within various control systems from different vendors simultaneously. The transition to one robust converged network reduced the risks of network failure, excessive maintenance expenses, and operational costs that could result from 16 distinct, incompatible, and potentially inadequately designed networks.

Achieving new efficiencies in developing smart buildings

Impacts on capital costs

Wells Fargo's forward thinking and leadership immediately impacted both the project's capital costs and the ongoing operational performance and maintenance needs. The standardization of the network configurations on every floor made installation more efficient by reducing labor costs. Overall, this change that potentially could have upended the project budget had a small financial impact, even though the project was well into the construction phase when implemented.

The project impact was bounded by the overall costs of the targeted building systems controls networks, which in total represented less than 0.5% of the project cost. However, with the large scale of the Duke Energy Center, reducing the 16 unique networks to a single secure converged network saved the project over $400,000. These savings included providing deducts to control vendors for the contracted network installations that were no longer necessary.

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Impacts on reliability and future needs

Additionally, Cisco's expertise in designing networking solutions significantly reduced the complexity of the network and increased the overall reliability of the building systems. Removing the siloed and proprietary network designs of the various control systems in favor of accepted standards and open protocols would reduce ongoing service costs. Wells Fargo no longer needed to adhere to service contracts from each vendor, which generally require a technician certified by the vendor to service their system. It has also reduced future costs by ensuring that any additions or adjustments to the systems will only need to connect to the converged network for building connectivity, and by providing vendors a more efficient method to service and update systems through secure remote access.

Redefining the approach to smart buildings to achieve data-driven buildings

The integration of the control systems into one network created the opportunity to continuously monitor and optimize the buildings' systems. Property managers and the required vendors can securely access the systems remotely to view performance and make any necessary changes to ensure each tenant's experience is exceptional. It also allows for granular data gathering to identify strategies that could improve building performance in the future. For example, Wells Fargo and Childress Klein Properties conducted a study of the impact of reducing the maximum brightness of lighting and other control changes, yielding a 20-25% energy reduction associated with lighting.

Wells Fargo's leadership in advocating for a single converged network for building control systems demonstrated a critical step toward achieving smart building performance with improved reliability and lower lifetime cost. From the outset, many buildings do not achieve their designed performance level, and the control systems ability to optimize can also decline over time. This causes a building's operational and maintenance expenses to rise over the years as systems experience wear and tear or maintenance is deferred. In contrast, the integration of the control systems demonstrated in the Duke Energy Center creates the opportunity to easily optimize building performance and integrate additional systems over time. This includes integration with systems outside of the building, such as the electrical grid, and the benefits of big data analytics in building system management. This could result in real-time demand response interactions with electrical utilities or ongoing testing of control systems to continually optimize building operations as systems physically change over time. This redefinition of smart building technologies could continue to drive down capital and ongoing operational costs while delivering a superior tenant experience and reduced energy footprint to commercial buildings.

About Intelligent Buildings

Intelligent Buildings is a team of CRE technology specialists, founded in 2004 with a mission to simplify the complex technology challenges within commercial real estate buildings. We focus on three core services: assessing your building technology to give you greater understanding and visibility of your capabilities, providing strategic advice to empower you to make smart decisions, and supporting your buildings connectivity with our 24/7 IntelliNet managed services. Our proactive approach to building technology empowers you to create an elite experience, deliver better performance outcomes, and increase your bottom line—so you can have power over your portfolio.

Building technology advisory, assessment, and managed services at scale.

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