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A Digital Ceiling Is Now a

BUSINESS IMPERATIVE

WHITE PAPER

Prepared by
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ZK Research
A Division of
Kerravala Consulting

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ABOUT THE AUTHOR

Zeus Kerravala is the founder and principal analyst with ZK Research. Kerravala provides tactical advice and strategic guidance to help his clients in both the current business climate and the long term. He delivers research and insight to the following constituents: end-user IT and network managers; vendors of IT hardware, software and services; and members of the financial community looking to invest in the companies that he covers.

INTRODUCTION: INTRODUCING THE DIGITAL CEILING

ZK Research defines digital transformation as the application of innovative technology to build new operating models, processes, software and systems by leveraging the convergence of people, business and things. Digital trends are reshaping the business environment faster than ever before. A digital world is a world where everything is connected, creating a vast “Internet of Things” (IoT). And the IoT can be leveraged to change the way organizations deal with customers, make the workspace more dynamic, and create new processes and market opportunities.

In the digital era, the customer experience will be key to achieving and sustaining market leadership. But improving the customer experience requires attention from business and IT leaders now. Customers are currently switching loyalties on the basis of their experience. In fact, Accenture surveyed approximately 13,000 consumers in 33 different countries and found that 66% have switched providers due to poor customer experiences.

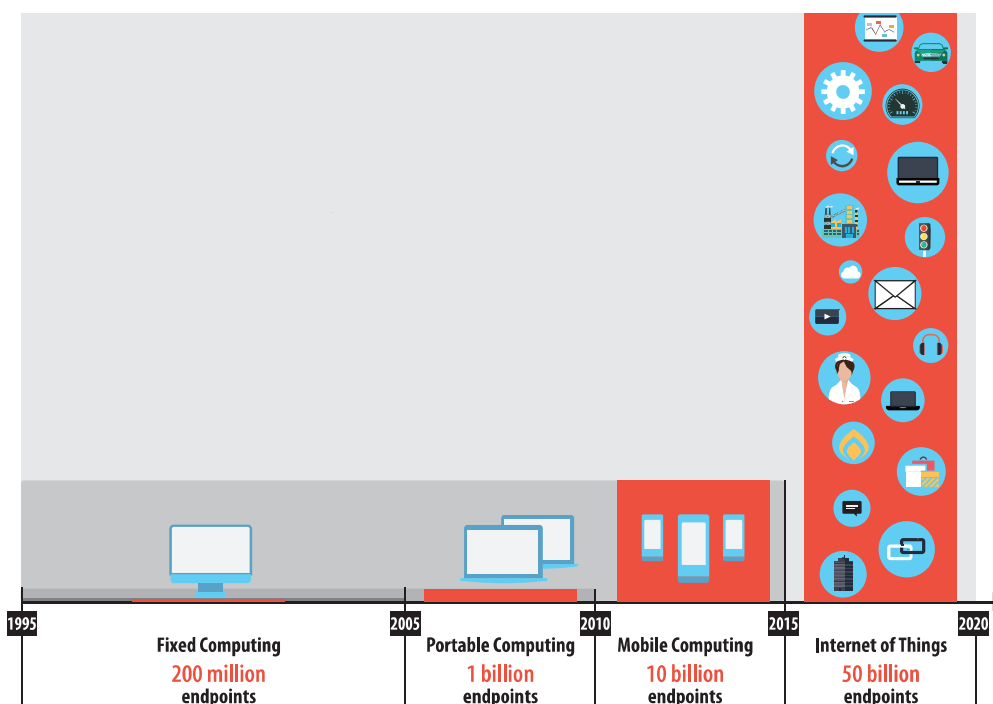
Another key to success in the digital era is ensuring that the level of worker engagement is high. An engaged worker is a highly inspired and motivated employee, is emotionally invested in the company and strives to add value every day. However, a [recent survey from Gallup](#) found that only 13% of workers are actively engaged.

One enabler of the digital world is the rise of the Internet of Things. The industry sits on the precipice of having a massive number of new devices connected. ZK Research predicts that 50 billion devices will be connected by 2020 ([Exhibit 1](#)). These connected devices can transform processes and business models by enabling quicker and more accurate decisions.

Metcalf’s Law states that the value of a network is proportional to the square of the number of nodes that are connected—which means the more devices connected to a common network, the more value it will provide. Today, many systems run on completely separate, parallel networks, including elevators, video surveillance cameras, badge readers, alarms, building control systems and lighting. In such cases, each system has its own individual purpose and performs adequately. However, the lack of integration among these systems leads to inefficiencies. For example, air conditioning (AC) and lighting systems are generally set to turn on and off automatically at specific times of the day. But why should these systems turn on if there is no one in the office? If the AC and lighting systems were on the same network as the card access systems, they could be turned on only when employees are in the office.

Historically, businesses have been reluctant to interconnect these disparate systems, primarily due to cost. But more and more organizations are starting to understand that doing nothing may be more expensive than changing their systems due to the rising cost of electricity. Consider that commercial buildings use 23% of global electricity today. Juxtapose this with the fact that the price of LED lights has fallen 12% in the past year, and it’s easy to see why more organizations are embracing LED lighting.

The evolution to LED lighting creates an opportunity for organizations to bring all of their parallel networks together. New LED lighting systems are now connected to and powered from

Exhibit 1: The Number of Connected Devices Explodes

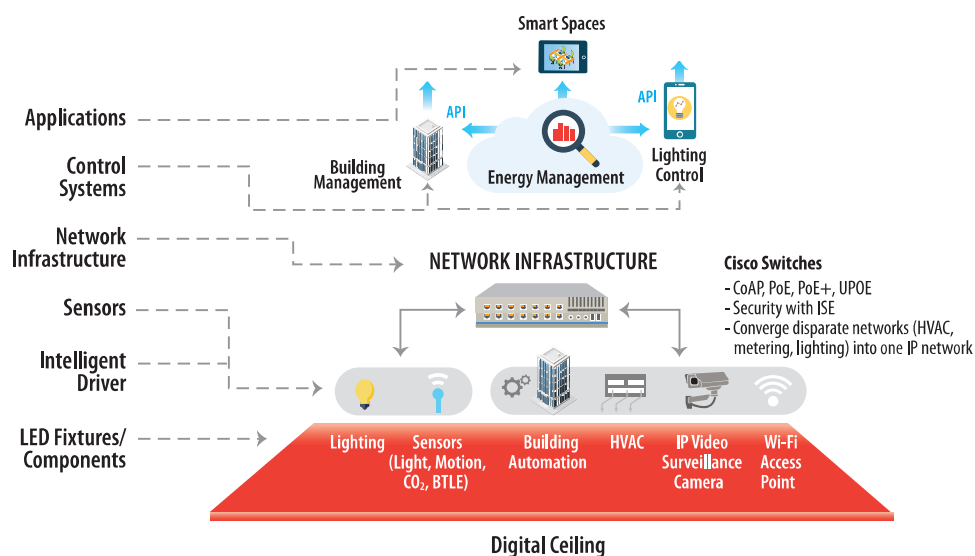
ZK Research, 2016

the corporate data network. The network-powered lighting system can be the centralized hub for a digital ceiling that brings together lighting, building automation and other technologies such as sensors. In fact, the digital ceiling is the easiest, fastest path to a true smart and connected building. The evolution to a digital ceiling will not only make buildings smarter and lower cost, but can also significantly change the way companies interact with customers and workers—two keys to success in the digital world.

SECTION II: CISCO DELIVERS A DIGITAL CEILING

Cisco's Digital Ceiling framework and solution set converges all of a building's disparate networks and services including lighting, HVAC (heating, ventilation and air conditioning), metering, blinds, CCTV (closed-circuit television), security and analytics over a single IP network.

[Exhibit 2](#) shows how Cisco's Digital Ceiling incorporates a variety of components to provide businesses with more holistic control and analytics. The exhibit illustrates IP cameras, HVAC, building automation and other building services such as LED light fixtures connected to a Cisco switch that provides both connectivity and power.

Exhibit 2: Cisco's Digital Ceiling

Cisco and ZK Research, 2016

Cisco's Digital Ceiling is more than just connectivity—it's an architecture that incorporates the following elements in addition to converging multiple building systems:

Digital Ceiling partner community: Cisco's Digital Ceiling ecosystem includes a number of leading vendors across multiple facets of building services segments. See the complete list of partners at www.cisco.com/c/en/us/solutions/digital-ceiling/partner-ecosystem.html. These technology partners provide solutions for lighting, analytics, building automation and more.

Open information exchange: Cisco has created an open model that enables interoperability by establishing a common language for devices and endpoints to communicate over the Constrained Application Protocol (CoAP).

Optimized network infrastructure: Cisco Catalyst switches are the backbone of the Cisco Digital Ceiling. The switches deliver several optimizations including FastBoot, Perpetual Power over Ethernet (PoE), CoAP, PoE+ and Cisco Universal Power Over Ethernet (UPOE). The switches also have software enhancements to integrate with intelligent sensors (e.g., motion, light, temperature, infrared, humidity).

Although many solution providers offer IoT or solutions that fall under the realm of the digital ceiling, Cisco is an ideal partner to get customers going. Cisco is the market leader in networking,

It's critical to understand that a digital ceiling does more than just provide light.

and it already connects the digital world with security, automation and insight. Cisco's differentiators are as follows:

Prevalidated solutions: Tested, validated and integrated solutions combined with a broad partner ecosystem bring critical pieces together, which can reduce deployment risk and speed up the time to value. Cisco's digital solutions are based on actual business use cases and include reference architectures. They have been fully validated and designed for high reliability and security.

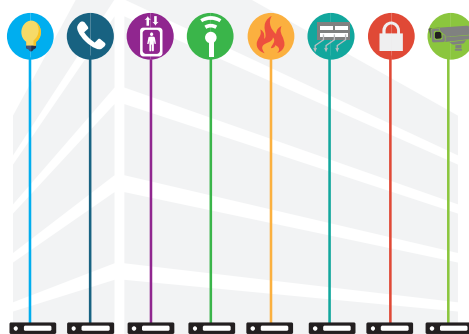
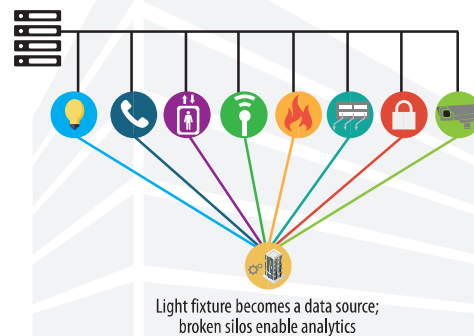
Deliver business-relevant results: Cisco's purpose-built Digital Ceiling solutions enable companies to transform processes and business models as well as improve employee and customer satisfaction. Customers can leverage the pervasive Cisco network that is already in place for investment protection.

Secure solution: Cisco's solutions have integrated threat defense. Digital ceiling endpoints are not inherently secure on their own, so Cisco's embedded security can protect the business from a breach that could cause significant business disruption and brand damage.

It's critical to understand that a digital ceiling does more than just provide light. Organizations need to take an end-to-end, architectural approach to it. The journey to a digital ceiling isn't a single leap; rather it's a three-step process, as outlined below:

Step 1: Converge the building infrastructure. Similar to how VoIP disrupted telecom networks, Cisco's Digital Ceiling framework will disrupt facilities networks ([Exhibit 3](#)). In legacy environments, nothing was connected, meaning devices could not communicate with other devices. Also, the wiring can be complex, as they need to run through conduits in the United States and Canada. With Cisco's Digital Ceiling, everything is connected over the Ethernet network, so there are no electrical conduits to install—which saves significant money on installations. Also, it makes it easy (just a simple software action) to move lights and other endpoints, if needed.

Step 2: Implement smart services with analytics. A network-powered lighting solution can provide data to help organizations analyze customer and employee behavior. For example, businesses can identify which areas are most traffic heavy or where vulnerable spots are. This allows companies to improve floor layouts. Smart services can improve both customer and worker experiences, but this can't be done without gathering data and conducting the necessary analysis. Another example is creating dynamic workspaces for in-office employees. By collecting data and analyzing the information, businesses can understand which workspaces are being underutilized and then modify the space to improve utilization rates.

Exhibit 3: Converging Building Systems Is the First Step to a Digital Ceiling**Separate Building System Networks****Single Converged IP Network for Building and IT Systems**

Cisco and ZK Research, 2016

Step 3: Evolve to a digital workplace. A digital workplace is the convergence of the physical workplace with virtual tools, and it creates better-engaged employees whether they are in the office or working remotely. Attracting, engaging and retaining a quad-generational workforce (i.e., Baby Boomers, Generation X, Millennials and Generation Z) requires a complete re-think of workspaces. Legacy office space is currently used very inefficiently. Workers need to be able to use the tools they want on their own terms. Collecting data from presence sensors and performing analytics can continuously improve the workplace. No matter how much planning is done up front, it's likely that the workplace will need some tweaking after deployment. Organizations should collect data to monitor key metrics such as occupancy and dwell times as well as other factors.

SECTION III: BENEFITS OF A DIGITAL CEILING

Customers that choose to implement a digital ceiling will realize a number of benefits. The most obvious benefit is the cost savings generated by converging all the separate building networks onto a single network. Indeed, there are operational savings as well as savings on cabling and facilities. But as compelling as the cost savings are, they aren't the only benefit. Other benefits include the following:

More efficient use of resources: Daylight harvesting is an energy-management technique that reduces costs by utilizing the ambient light present in a room and then switching off lighting when there is enough ambient light or when the space is not being used. This, combined with the ability to centrally manage lights via the network, can lead to more than a 50% energy savings compared to traditional methods.

Network-powered lighting within the digital ceiling can help create a new employee experience and improve productivity.

Improved worker productivity: In an office building, network-powered lighting within the digital ceiling can help create a new employee experience and improve productivity because the high color-rendering index allows companies to closely approximate natural light. This improves moods, productivity and health, and it gives workers more energy. Network-enabled lights can be programmed to suit individual needs or task requirements using a laptop, a mobile device or even a tablet mounted to the wall.

Automated environmental changes: By connecting building systems, sensors can be placed in conference rooms to detect when more people enter a room. The sensors can then alert the HVAC system to pipe in more cool air from the network-connected variable air valve, ensuring everyone remains comfortable.

Improved user/customer experience: A digital ceiling can easily be shifted to meet changing needs and to set certain moods. For example, the intensity of the lights can be increased to draw attention to a specific item, or color can be used to highlight a featured item in a store. Lighting or light beacons can even be used as a guide by having color indicators embedded into the digital ceiling, or having individuals log in via a tablet or smartphone and be directed by the lights to a specific area.

SECTION IV: CASE STUDIES

RBC WaterPark Place III, Toronto

RBC WaterPark Place III has a goal to be the most modern workplace in Toronto. The challenge was building an innovative, energy-efficient workspace that could be a showcase for the connected workplace and the Internet of Things. Another goal was to receive Toronto's first Enterprise Leadership in Energy and Environmental Design (LEED) Platinum certification.

WaterPark Place deployed Cisco's Digital Ceiling solution with network-powered lighting connected to Cisco Catalyst switches, sensor-based access to workspaces and analytics with fixture-level visibility. The implementation spanned four floors, 1,400 PoE-powered lights connected to 140 Cisco Catalyst 3560 CX switches and approximately 300 (2,200 throughout the whole building) PoE-connected variable air volume (VAV) controllers. Other network features include climate control, security, elevators and blinds.

The evolution to a digital ceiling had some significant benefits, including the following:

- ▶ Converged five networks—HVAC, metering, lighting, CCTV and access—into one
- ▶ Lowered CapEx by 10% and OpEx by \$600,000
- ▶ Reduced energy costs by 50% by replacing fluorescent lights with LEDs

*The digital era
is here, and
businesses need
to use technology
to create new
experiences and
processes.*

Launch Fishers, Indiana

Launch Fishers is a 52,000-square-foot building located in the Northeast Commerce Park area of the town of Fishers. Members can use a variety of co-working office spaces ranging from couches to treadmill desks, a coffee shop and a wide variety of meeting rooms and rentable conference rooms. Launch Fishers wanted to create a dynamic, energizing environment that would attract entrepreneurs, drive innovation and foster creative thinking. Part of creating an environment like this is having the best amenities such as occupancy sensors, advanced LED lighting and high-speed data communications infrastructure.

To help achieve these goals, Launch Fishers partnered with Platformatics, a local company that specializes in intelligent PoE lighting solutions. The Platformatics LED lighting systems were installed in the ceilings and powered using Cisco Catalyst 3850 PoE switches. Using PoE saved significant money, as it was no longer necessary to pull individual power and data cables, and the technology obviated the need for an electrical contractor. Also, the Catalyst switches enabled Launch Fishers to use the network to protect against security threats. Also, the lighting system will soon include a battery backup at the LED troffers as well as a security-lighting system for emergency situations in the building.

SECTION V: CONCLUSION AND RECOMMENDATIONS

The digital era is here, and businesses need to use technology to create new experiences and processes. One of the most impactful areas to start with is shifting to a digital ceiling. Cisco's Digital Ceiling framework and solution set converges all of a building's distinct networks onto a single IP network, which brings operational efficiency and can significantly lower the total cost of ownership. More importantly, a digital ceiling is a foundational component of creating new digital customer and workforce experiences.

In the digital era, the ability to create new experiences that delight customers will be one of the factors that determine the market leaders. Also, digital technology can be used to energize the workforce, which will lead to more productive, engaged employees. A digital ceiling deployment enables both. Consequently, ZK Research believes that a digital ceiling is now a business imperative and should be at or near the top of every business and IT leader's priority list. To help companies get started, ZK Research makes the following recommendations:

Ensure the collaboration of IT, facilities, HR and business leaders to deploy a digital ceiling.

No one group can own the shift to a digital ceiling. There are building issues, employee concerns, IT considerations and customer implications. It's imperative that all of a company's leaders work together throughout the deployment to understand how it will impact both workers and customers. If done right, it can significantly improve the top and bottom line of the organization.

Select a vendor that can offer a complete solution. Many suppliers can address elements of a digital ceiling. However, having to cobble together all the components can lead to long deployment

times as a result of having to tweak and tune the solution. A better approach is to choose a solution provider that can deliver the full ecosystem—from the network to lighting to control systems and other aspects. Based on extensive research, ZK Research believes Cisco is unique in its capabilities to do this today.

Gather data and analyze the results for optimization. The journey to a digital organization is not over once the solution is deployed. Companies should gather as much data as they can to optimize the deployment, including location information, dwell time and utilization rates. Also, as the environment changes as a result of adding new space or more employees, adjustments will need to be made. The best way to make modifications is by having the data and analysis to provide the insight to make informed decisions quickly.

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