How Cisco IT Provided an Integrated, Intelligent Office Experience at Its Bangalore Campus

Cisco's Smart+Connected Communities (S+CC) solutions combine networking technologies with building systems and infrastructure to increase productivity, improve energy and building process efficiencies, and lower operations cost.

Background

Modern workplaces are powered by a multitude of building systems and applications. Managing these systems and applications to ensure operational efficiency while retaining a seamless office experience is a priority for the various stakeholders involved in operating and maintaining the workplaces at Cisco.

In a typical workplace infrastructure, facilities and technologies that are provided as a matter of course can broadly be divided into two categories: IT systems and applications, and core building systems. Not only do these two groups operate in largely isolated silos but each individual component within the groups is not connected. In other words, all the individual components operate as independent systems without any centralization.

The Cisco S+CC solution breaks down these silos, integrating building systems with IT systems and applications onto one IP network. Cisco is proving the cost savings, energy and building process efficiencies, and productivity gains of the S+CC solution at its campus in Bangalore, India. Cisco IT and the Workplace Resources group (facilities management) have worked together to develop a reusable, scalable solution that can be replicated at Cisco campuses globally. Cisco is in the process of deploying this solution at other locations worldwide.

Challenge

In enterprise campuses, there are traditionally two distinct groups of systems and devices that are used for running and maintaining the office infrastructure:

- Building systems such as heating, ventilation, and air conditioning (HVAC), security and safety, facilities, resources, operations, and maintenance systems
- IT systems and applications such as wired and wireless networks, IP telephony, digital signage, data center, collaboration technologies, video solutions, and more

These two groups usually function in silos with little or no information sharing regarding resources, personnel, or objectives, which results in cost and process inefficiencies. Even though many of the systems and devices that go into infrastructure building and management today are IP enabled, or can be IP enabled, they continue to operate in silos. For example, the lighting, access control, and HVAC systems in the same building might all have IP installations but are more often than not installed and operated independently.

Specifically, with the S+CC solution Cisco wanted to:

- Break down the dependency on siloed IT and facilities groups and integrate IT applications and building

subsystems for a fully functional facility

Cisco IT and the Workplace Resources group were using separate interfaces, applications, and controls within a single building. A facilities manager would use one application to control the lighting system in a building and another application to control HVAC, for example. Because of the multiple, different building systems and applications being used, facilities management was not consistent from building to building. In addition, many of the building subsystems were not IP enabled and required onsite management, and therefore onsite personnel, to maintain. Both Cisco IT and the Workplace Resources group needed to work together to develop a converged solution that would result in a fully functional facility.

- Provide employees with a comfortable building environment that is easy to control

When employees wanted to adjust the environment in a meeting room, for example, they had to use different controllers specific to the condition they wanted to regulate (e.g., air conditioning, lighting). With S+CC, employees can immediately control the room environment themselves using a Cisco IP phone or even a mobile device.

- Reduce energy costs, the biggest building management expense globally

Because the S+CC solution enables integration between building systems and meeting room scheduling, energy consumption can be controlled. For example, lights and air conditioning are not activated in rooms when no meetings are scheduled but are automatically programmed to be turned on minutes before a meeting is scheduled to begin. Another example of energy consumption savings: visitor signage is activated only during business hours. Energy data trending and analysis allows facilities managers to spot anomalies that will help in identifying areas for reducing energy use.

The Quest for a Standard, Scalable Solution

Before the S+CC implementation in Bangalore, Cisco had tried similar implementations at other campus buildings globally. Each of these deployments required a unique configuration according to the building subsystems. The IT process to get each of the implementations approved required a complete review of the solution architecture, specific network design, and security access control setup, as well as involvement by several teams over a few months. Likewise, support for each of the implementations had to be tailored.

Cisco needed a standard architecture and design for its S+CC solution, with standardized support, that would scale to other buildings at Cisco campuses worldwide.

Solution

For the S+CC solution at the Bangalore campus, Cisco IT provided last-mile connectivity to many applications and programs that were originally not connected to the building network, constructing a central technology backbone that integrates building automation functions and optimizes power management. The intelligent, flexible building design at Bangalore was enabled by seamlessly integrating:

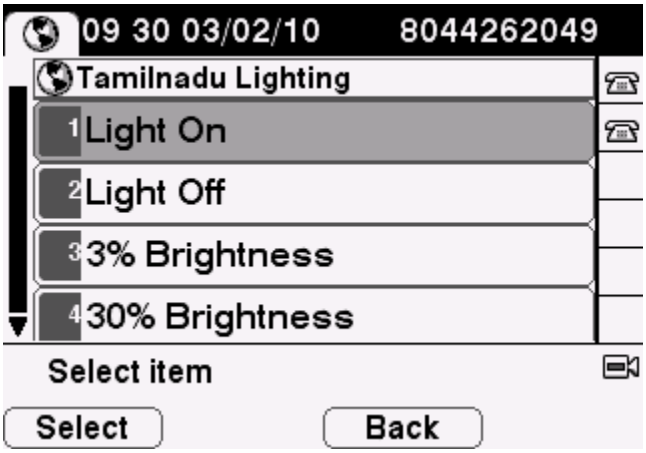
- Third-party providers and their applications
- Cisco products
- End-user applications

Community+Connect and Community+Exchange

The Cisco S+CC solution addresses two primary areas, which Cisco calls Community+Connect for enhancing the end-user experience and Community+Exchange for assisting those who manage the building, campus, or community.

Community+Connect helps employees leverage the S+CC solution for a safer, healthier, more sustainable work environment. All end-user touchpoints are connected seamlessly to the relevant systems within the building rather than through a circuitous, manned system. For example, a user request for a conference room can automatically trigger the HVAC in that room to switch on 15 minutes before the meeting is scheduled to begin. Employees can control these and other conditions in the conference room via the LED display on Cisco IP phones (see Figure 1).

Figure 1. Controlling Meeting Room Lights on a Cisco Unified IP Phone 7961



In addition to the ability for users to control meeting room conditions themselves, they can also make facilities requests via the Cisco IP phone, such as additional refreshments delivered to the room. IP phones can also be used to facilitate immediate resolution of an issue with the Workplace Resources group. Employees do not have to wait for a problem in the meeting room, such as an equipment malfunction, to be resolved. The traditional method of opening a case with Workplace Resources via a separate online process and awaiting a response is bypassed.

What's more, visitor signage outside of the conference rooms informs employees of useful stats such as room availability, nearby meeting rooms and their locations, and internal and external temperatures. Employees can also use the Cisco IP phone to select from a menu of messages to be displayed outside a conference room; these messages alert users of a known scheduling conflict or other matter pertaining to the availability or function of the room.

Community+Exchange is akin to a network operations center (NOC) that resides at the infrastructure backend. It enables the network to be a highly secure, resilient service delivery platform, and helps facilities managers operate the campus in a more cost-, energy-, and time-efficient manner. Measuring ambient lighting and temperature in different parts of the building to moderate the cooling and brightness in a designated conference room is one example of how cost and resource optimization is achieved. Recognizing a power cut and limiting supply to non-essential resources such as corridors, fountains, and unused portions of the building is an example

of how real-time demand and supply is managed.

This integrated building management system also allows facilities managers to operate one or more facilities remotely without having to retrofit or lock in any single underlying building system.

A Unified IP Platform

Cisco's S+CC solution interconnects several diverse applications on a unified, fully redundant IP platform. This Cisco Service Delivery Platform (SDP) consists of a device and infrastructure layer that enables Cisco and non-Cisco devices to interact with one another once connected over IP, a services layer that provides end users with an easy-to-use, intuitive interface of service offerings, and a middleware or platform layer that connects all the different smart and non-smart devices (Cisco and third-party applications) to the network in a standardized, open way.

Middleware synchronizes the applications at the backend and responds to requests coming in from users and also acts proactively when needed.

With a unified IP platform in place, there is no limit to the services an organization can offer as part of the S+CC solution. Table 1 provides examples of the S+CC service offerings at Cisco's Bangalore campus.

Table 1. S+CC Service Offerings at the Cisco Bangalore Campus

Office Resource Management	**Integrates building management systems such as HVAC and lighting control with IT applications such as calendaring on a single IP network. This approach provides facilities managers with increased visibility into meeting room usage and optimal utilization of resources. Meeting rooms are kept in energy save mode when not in use, and users can control the room environment via an IP phone or mobile device.**
GreenAware	**Uses S+CC technologies to gather, analyze, and display real-time building energy use (utility and resource consumption), as well as anecdotal information regarding global and local sustainability efforts. The service is deployed on Cisco's Digital Media System, enabling the display of targeted messages to specific locations.**
Emergency Notification (Safety and Security)	**Allows security and facility administrators to monitor all physical aspects of the building from multiple locations (centralized or remote). The service enables immediate display of emergency information, such as evacuation plans and severe weather alerts, using digital signage and IP phone displays as the media for notification.**
Digital Signage Applications	**Uses digital signage to deliver information (e.g., building directory, way finding, events, and welcome messages) and art and entertainment news to building occupants and visitors.**
Connected Maintenance	**Focuses on planning, raising, and executing maintenance work requests against all types of building assets to either prevent issues from occurring or resolve issues as they arise. The service includes preventive, corrective, and manual/complaint-based maintenance as well as automated defect notification and rectification.**

Cisco Network Building Mediator

A key component of the S+CC solution is the Cisco Network Building Mediator, a Linux-based processer that provides the intelligence for all of the building systems to communicate, enabling real-time energy and data monitoring and reporting for the varied subsystems and devices within a building.

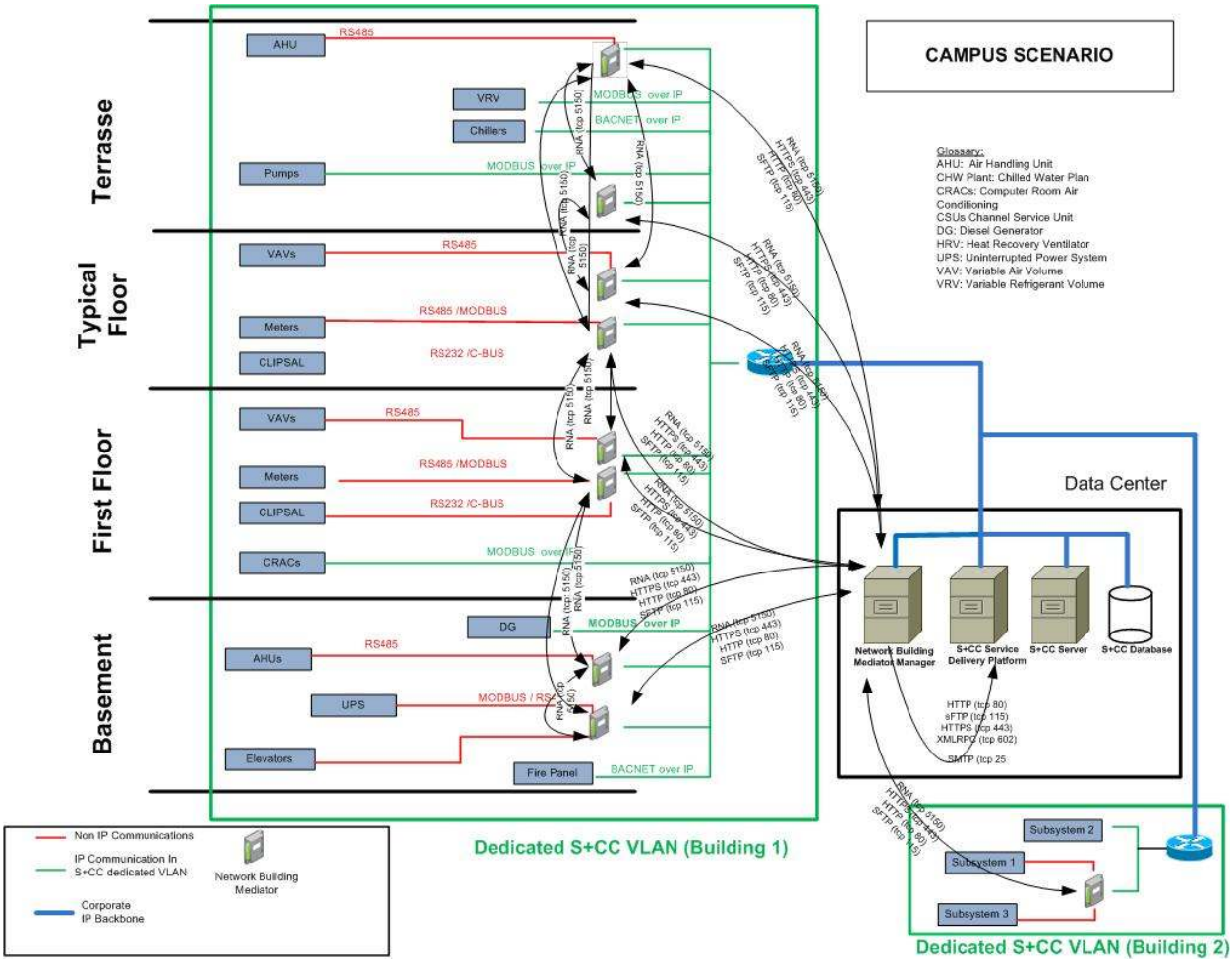
With the Cisco Network Building Mediator all of the building subsystems, even those not natively IP capable, can be remotely managed over the IP network. So a user at the Cisco campus in San Jose, California, can control the temperature in a conference room at the Bangalore campus, for instance.

“All the building subsystems can be put in a separate network VLAN [virtual LAN], and all communications with the subsystems are done via the Building Mediator," says Nicolas Coulet, technical program manager for Workplace Resources/IT at Cisco. "The Mediator is a go-between communications channel for building systems and applications in the data center. This is a very secured architecture that can be replicated globally."

Because of the standard architecture and design of the S+CC solution, support is also scalable.

Additionally, Cisco IT uses the Cisco Network Building Mediator Manager to centrally manage the building systems over the IP network. Network Building Mediator Manager can connect, monitor, aggregate, and manage a distributed network of Mediators (see Figure 2).

Figure 2. Cisco S+CC Solution at the Bangalore Campus



Cisco IT and Workplace Resources Collaborate

Critical to the deployment's success was the close partnership between Cisco IT and the Workplace Resources group. The planning phase included an integrated project plan that aligned different activities within both groups. The timing of commissioning and rollout were done in sync.

As the S+CC deployment uses IP as a backbone, the IP network must be available in the building before the building systems are commissioned. "This dependency needs to be planned so the IP network can be used for communication, thereby reducing the proprietary and siloed cabling for each subsystem," says Giri Govindarajulu, senior manager, IT, Cisco.

The S+CC design included the following:

- Identification of the right functionalities in the subsystems
- Communication protocols to be used between the subsystems
- Wiring and cabling plans
- Node path and devices hierarchy
- Location and mapping to the location services (for easier identification and configuration during deployment)
- Services to be made available
- Peripheral devices that will be deployed

Results

To date Cisco's S+CC solution implemented at the Bangalore campus has delivered an initial operational savings estimated to be more than US$150,000 annually.

Among the other benefits realized:

- **Time savings**. More than 700 hours saved annually in routine daily maintenance tours. Maintenance calls are now conducted on an as-needed basis and automated to provide real-time updates and alerts. A two-hour routine maintenance check undertaken at the beginning of each day is no longer required, nor are quarterly repair and replenishment checks. The S+CC solution alerts the network of potential requirements, and maintenance teams are called in only if required.
- **Economies of scale with very little capital expenditure (CapEx) investments**. HVAC systems now run intelligently, which means that they are operational only when required. Community+Exchange assesses the need to have lights, ventilation, and network connections switched on in various parts of the building. CapEx spends are also reduced as the addition of an integrating layer to the existing network infrastructure ensures that setup costs do not escalate when new systems and devices are added.
- **Reduced energy consumption**. By integrating building systems with meeting room scheduling, energy consumption can be controlled.

"Energy efficiency is an important outcome of the S+CC implementation," says Nitya Ramakrishnan, manager, Workplace Resources Solution Design, Cisco. "Savings will be apparent as the building ages and continuous commissioning keeps the building's energy consumption in check."

Continuous commissioning allows facilities managers to monitor, trend, and make changes to the systems uninterrupted, which not only lowers operating expenses and increases the lifespan of equipment but also yields fewer issues and outages because a problem can be corrected before it has a chance to impact operations.

- **Building process efficiencies**. The Community+Connect component helps to ensure that routine processes are more efficient, predictable, and people-independent. Users can book conference rooms with real-time information at hand, including room availability by floor, schedules, available facilities, etc. Community+Exchange ensures that all devices and facilities requested in the conference room, such as air conditioning, Internet access, sign boards) are pre-set and ready to use.
- **Resource optimization**. Cisco's S+CC solution enables the utilization of various value-added services over the network, thereby minimizing human intervention for routine facilities requirements and, more importantly, during emergencies. In a security emergency, for example, the S+CC solution alerts potentially impacted employees, feeds users and infrastructure managers a continuous flow of information about the situation through smartphone integration (the network directs the data directly to users' cell phones). Emergency doors can be activated remotely, and employees can be directed to available exit routes and safe areas using digital signage systems available on every floor.

Lessons Learned

Cisco IT and the Workplace Resources group offer the following suggestions to other enterprises and organizations interested in deploying the S+CC solution:

- Establish a partnership between IT and facilities, and collaborate to develop an integrated design and implementation plan
- Work with Information Security to identify a secure architecture with no system vulnerabilities
- Ensure that the network is available in a slightly earlier timeframe than traditional build-outs usually require. The IP network must be available before the building systems are commissioned.
- Include multiple communications, IT, and building devices in the testing. For example, Cisco's testing included IP phones, wireless devices, and other products in addition to the lighting, air conditioning, and other building systems.
- Devise a clear support plan that factors in all of the IT, facilities, and business unit stakeholders involved in the deployment, not only for the implementation but also for later support of the solution as required

Next Steps

With the successful S+CC implementation in Bangalore, other buildings on the Bangalore campus and Cisco locations in Dubai are being retrofitted to the S+CC architecture. Cisco has also begun scaling the solution to campuses outside the region.

For More Information

To read additional Cisco IT case studies on a variety of business solutions, visit Cisco on Cisco: Inside Cisco IT www.cisco.com/go/ciscoit

Note

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