

CISCO CONNECTED REAL ESTATE

Responsiveness. Innovation. Agility. Adaptability.

All qualities that organizations need to possess in order to thrive in today's highly competitive global economy. Until recently, however, these qualities have not been readily associated with the real estate that organizations use. That is changing.

This paper explores how Cisco Connected Real Estate is delivering huge financial and operational advantages not only to the construction, real estate and property services industries but also to their customers – such as hotel operators, multiplexed retail outlets, and corporate tenants – in sectors as diverse as hospitality, healthcare, education and retail finance. It is changing the way that real estate is developed, used and managed, and is shifting the basis of the real estate business model from one based solely on space to the provision of service.

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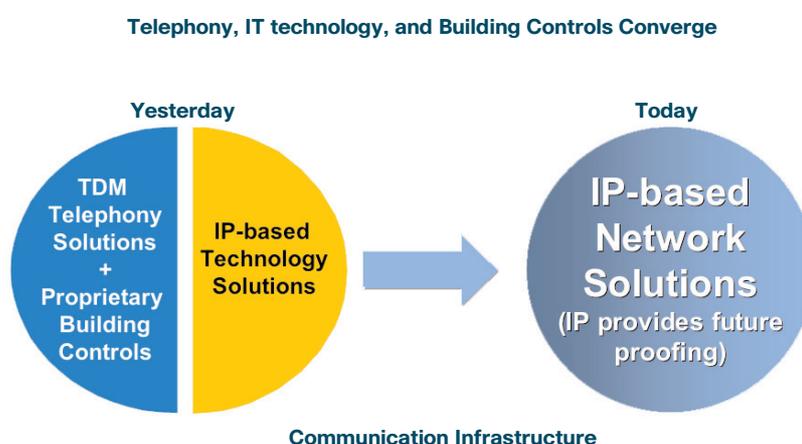


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Responsiveness. Innovation. Agility. Adaptability. All qualities that organizations must possess in order to thrive in today's highly competitive global economy. Until recently, however, these qualities have not been readily associated with the real estate that organizations use. That is changing. The real estate sector is in a state of transformation, driven largely by customers from a broad range of industries, demanding more from their assets.

Figure 1: Building and technology solutions are merging



These demands and needs are converging to create a shift in the way that buildings are both conceived and used. The changing real estate business climate is being driven by:

- Customers searching for ways to achieve visibility, transparency, and control over their entire real-estate portfolio.
- A drive for innovation and sustainable capabilities to reduce capital and operational expenditure.
- Key stakeholders searching for opportunities to optimize value in the real estate lifecycle.
- Industry searching for means to improve competitiveness and differentiation of its offering.
- Saving on energy consumption and achieving environmental sustainability.
- Technology adoption accelerating transformation

Cisco Connected Real Estate drives value by transforming the way real estate stakeholders—for example developers, landlords, tenants, and others—design, build, operate, and use real estate.

- In the workplace, Connected Real Estate simplifies the business of providing real estate and allows landlords and owners to deliver effective work environments that drive workforce productivity. This relates directly to the ability of IP communications and innovative technology to drive higher productivity and greater cost savings.
- In a building, Connected Real Estate enables the delivery of powerful services or

revenue-generating opportunities that drive business growth by combining real estate and IT. This is possible due to IP being installed as the fourth utility over which these services can be delivered, in-house or as managed services.

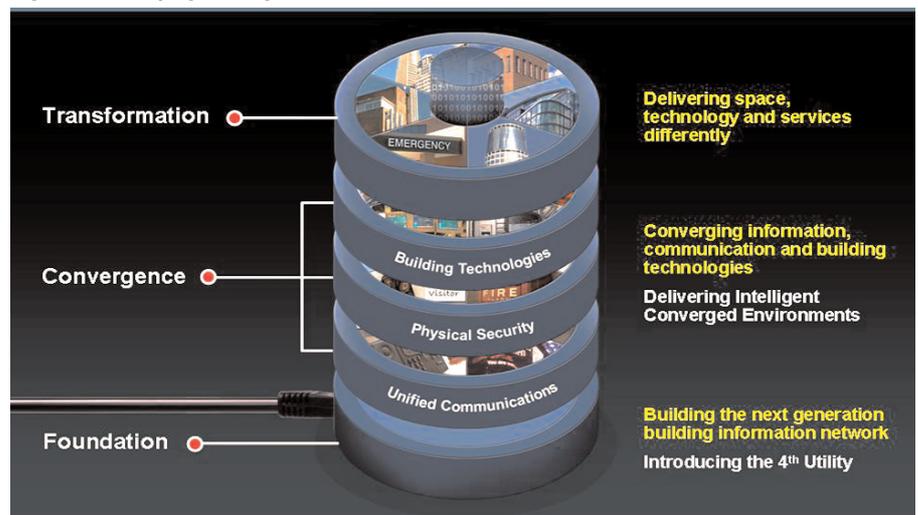
- In most parts of the world, energy is expensive and excessive consumption is becoming socially unacceptable; Connected Real Estate enables energy efficiency through planning, visibility, monitoring, and control.
- Last but not least, Connected Real Estate improves safety and security by transforming how building operators and owners can protect their people and assets.

Cisco Connected Real Estate does all of this by harnessing and integrating the power of IP networks. Connected Real Estate is predicated on the three fundamental principles relating to real estate and network interactions:

- Creating a “building information network” or flexible and scalable network foundation as the facility’s fourth utility
- The convergence and integration of ICT and building systems onto a common IP network, reducing OpEx and CapEx while optimizing building management and operations.
- Transformation of the physical environment; delivering space differently, and introducing new ways of working.

These three principles form the basis of the Connected Real Estate solution. Together, and interacting in different combinations according to the various needs of developers, owners and occupiers, the principles are driving the next wave of transformation in the construction and use of real estate.

Figure 2: Developing building infrastructure



This paper explores those principles in detail and demonstrates how Connected Real Estate is delivering huge financial and operational advantages not only to the construction, real estate and property services industries but also to their customers such as hotel operators, multiplexed retail outlets, and corporate tenants in sectors as diverse as hospitality, healthcare, education and retail finance. It is changing the way that real estate is developed, used and managed, and is shifting the basis of the real estate business model from one based solely on offering space to service provision.

“After four years of market research it was time to renovate our business model. Our strategy was to differentiate this building and all our assets in an already saturated market. One of the methods to achieve this goal was the creation of a unique communications network.”

Roy Gadish, CEO Adgar Investment and Developments

This new approach looks along the entire building lifecycle, from concept, design and construction through to maintenance and operation. The network and the transformational capabilities it delivers is at the heart of this new approach. And to use it successfully means doing things differently, literally from the drawing board.

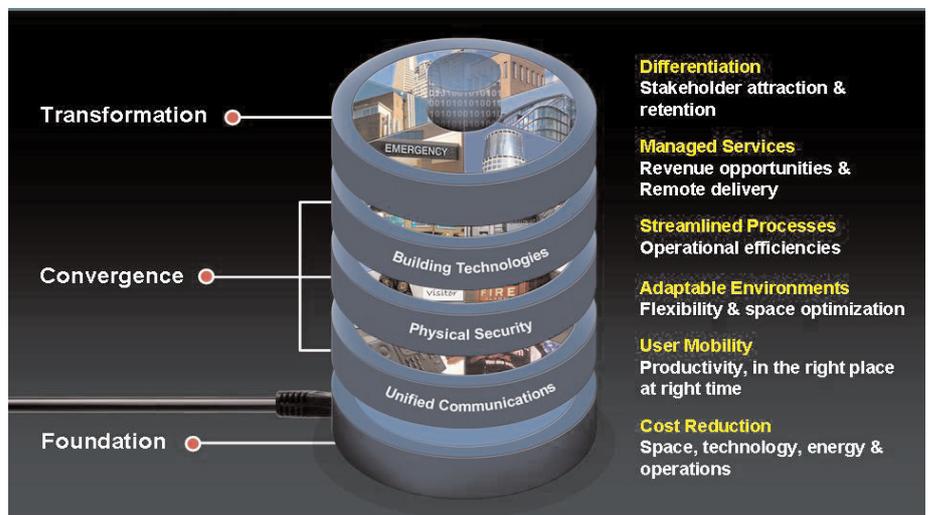
Delivering Building Information Networks: The Network as the Fourth Utility

“After four years of market research it was time to renovate our business model. Our strategy was to differentiate this building and all our assets in an already saturated market. One of the methods to achieve this goal was the creation of a unique communications network that would connect Adgar tower with all our buildings in Canada and Europe. The Cisco Connected Real Estate initiative matched our aims.”

Roy Gadish, CEO, Adgar Investment and Developments, Tel Aviv, Israel.

Power, water and heating are taken for granted in the construction of a building. To date however, the provision of communications and information networks has been left to tenants. This means that in multioccupancy buildings, a number of parallel networks are likely to be installed on a piecemeal basis, with each tenant responsible for meeting its own requirements.

Figure 3: The Connected Real Estate value foundation



Today, however, the demand for connectivity creates a new business model for landlords and developers. The network becomes part of the fabric of the building, supplied to tenants just as water, light and heating are today. By providing the network infrastructure as part of the building’s platform, developers provide a point of competitive differentiation to attract prospective tenants. This applies to all forms of real estate whether commercial office space, retail developments, hotels or even residential developments. Connected Real Estate provides landlords and owners with the ability to provide services that respond to the needs of their users, shifting the business model from space to service.

Traditional commercial buildings offer landlords limited opportunities for generating additional revenue from their tenants. And generally the only way that they can compete for prospective tenants is through location and lease rates. In short, landlords sell



space. The integration of the network in the fabric of the building, becoming the building information network as the facility's fourth utility, removes those barriers and provides numerous new revenue generation opportunities. Rather than simply selling space, the network allows landlords to move into a business model based on service provision.

As an example, tenants in One America Plaza in San Diego have instant, secure access to communications and data networks providing them with the connectivity that they would otherwise have to acquire themselves. For the building owners, the provision of the network as a utility means that they have a real source of competitive differentiation in the property market, attested to by the occupancy rates of 95percent compared to an 88percent average in the San Diego region. One America Plaza tenants are able to connect their operations to the network almost instantaneously (compared to the average 30-day turnaround when ordering from an ISP) and at far lower cost than sourcing provision independently. One America Plaza has a wireless network, meaning that literally the whole building is connected, allowing tenants the mobility and flexibility of working styles that characterize business today.

It's not simply commercial office space that benefits from the integrated offering of IP networks in the fabric of the building. One of the largest real estate developments in the Arabian Gulf, the \$1.3 billion Greenfield, mixed-use development, Amwaj Island, will provide residential, commercial, and hospitality tenants immediate access to a range of communications and data services through the creation of a single IP infrastructure backbone that will provide connectivity to every home, business and hotel room on the island. This means that Amwaj Island will be able to provide added security and extra services to tenants such as video on demand for apartments and hotels and digital signage in retail and hospitality facilities over a single network, enhancing the revenue potential for landlords and providing enhanced services at lower costs for tenants.

Having an IP network at the heart of a building does more than deliver service to tenants. It enables significant reduction of move-in and retrofit costs and increases the speed at which they can set up their businesses. Such a network:

- Reduces tenant operating costs
- Creates more productive work environments
- Improves flexibility and start-up
- Enhances user/landlord responsiveness
- Enables 24-hour availability using Contact Center
- Provides the ability to optimize building and tenant management (such as track work-order status)

A network that is integrated in the fabric of the building also provides landlords and users with greater control and security of the building's operations. For all building owners integrating communications, security, and building systems into one IP network creates significant financial and operational advantages.

Boston Properties is a real estate investment company (REIT) that owns and operates 120 properties in major centers in the US, covering more than 40 million square feet. Boston Properties uses an integrated network approach to property management that connects all of its buildings systems to a single converged network infrastructure. This approach provides Boston Properties with the ability to monitor systems including ener-

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(Building Automation Systems Worldwide Outlook, Market Analysis and Forecast Through 2009)

gy management, security, ventilation, and access control around the clock from a single control center. The tenants of the buildings in Boston Properties' portfolio also benefit from this integrated approach. The system allows them to make requests for service over the web, greatly enhancing the efficiency with which their requests are handled and allowing Boston Properties to manage its workflow far more effectively. More than 60 percent of all requests from tenants are now received through the dedicated website. The benefits of centralized building management for Boston Properties became even more apparent when they added a new building to their existing portfolio. They achieved a pay-back period for “connecting” this new property into the portfolio of less than five months by adding the building's operation to the centralized management infrastructure.

As well as transforming the way that buildings are managed, the network also allows landlords to create services that respond to tenants' needs. For example, in a retail development digital signage can be provided that carries promotional material for a particular store, and content can be tailored to fit the precise requirements of each retailer. Landlords are able to provide instant access to a range of communications services - such as connectivity, Internet access, and IP telephony. The landlord, in effect, becomes a service provider responding to the needs of its customers as they develop over time and opening new sources of revenue in addition to rent.

Convergence and Integration: IT and Building Systems on a Common IP network

“The move towards increasing enterprise integration enhances the need for advanced BAS solutions. Companies across all vertical building markets are striving to increase integration across the entire enterprise to improve information management and optimize the strategic decision-making process. As BAS increasingly adopt IT standards, they are increasingly converging with traditional IT infrastructures. Adoption of IT standards in the BAS industry, and the inherent cost savings regarding BAS integration, is causing many building owners to rethink the value proposition of integrated BAS”

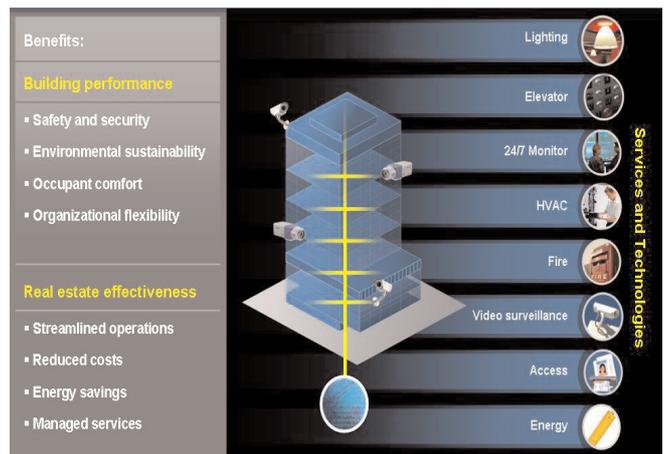
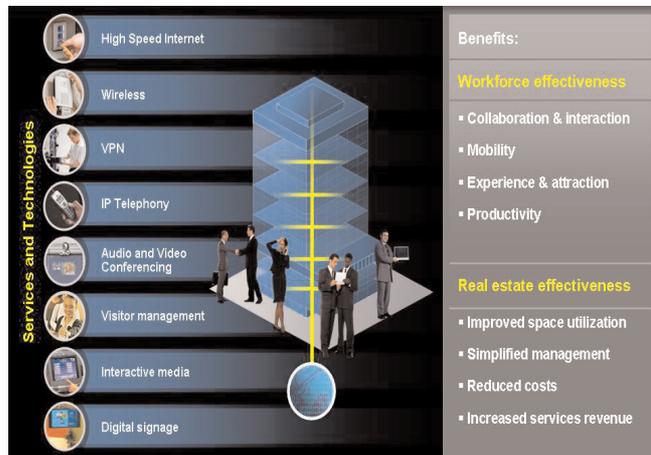
(Building Automation Systems Worldwide Outlook, Market Analysis and Forecast Through 2009)

A key element of the business case for the Cisco Connected Real Estate framework is based upon the convergence of information technology and communication systems, security, and building systems onto a single IP network. This next wave of convergence creates opportunities for key stakeholders in the building value chain.

Most buildings and campuses today are constructed with multiple proprietary networks to run systems such as heating, ventilation and air conditioning (HVAC), security and access controls, lighting, and fire and safety as well as separate voice, video, and data telecommunications networks. As a result we see buildings that are complex to operate, with high installation, integration and ongoing maintenance costs, and sub-optimal automation functionality. Typically these generate constraints and inefficiencies such as:

- High CapEx for design, engineering, and installation
- Building performance not optimized, limited functionality
- Expensive maintenance (OpEx)
- High integration cost when linking different devices
- Reduced management capabilities - limited reporting and monitoring options (isolated views)

Figure 4: Moving from multiple to a single IP network for communications and building systems



- Less flexibility with closed systems, proprietary networks, custom processes, vendor dependency

The Cisco Connected Real Estate solution unites the disparate—and often proprietary—networks and systems over a single IP network that allows all communication, security, and building systems to be monitored and managed centrally.

This so-called “building and IT convergence” creates new opportunities to reduce a building’s total cost of ownership (TCO), enhance the building’s performance, and deliver new building services to tenants.

The Connected Real Estate approach applies not simply to the network within one building. Cisco Connected Real Estate allows identical levels of oversight and control to be exercised across a geographically dispersed portfolio of facilities, or unrelated remote properties when offering building management as a managed service. The same network architecture that is used to allow an organization to communicate and share information is also used to distribute information about activity within a building over the Internet to any point on the network where it is needed. Security, for example, can be monitored and controlled across a broad campus or group of buildings from a single, central point. Furthermore, security personnel in a firm do not need to be worried about laying in



their infrastructure since their cameras will be using IP. It is also easier and more cost-effective to add, replace and move IP cameras between locations.

A study commissioned by the Converged Buildings Technology Group (CBTG), a consortium of building system manufacturers including Tour Andover Controls, Molex Premises Networks and ADT Fire & Security, set out to measure the advantages of converged systems against those built on the traditional, separate model. By creating a model of an eight-storey office building suitable for 1,500 people, they were able to measure the capital and operating expenditure levels that both approaches would generate. The study found that the converged approach generated CapEx savings of 24 percent in the construction phase and reduced operating expenses (OpEx) by 30 percent over the economic life of the building.

Creating centralized capabilities for building management has a direct impact on the ongoing costs of building operation and maintenance. Centralization introduces economies of scale by which fewer staff can monitor and control far more properties in one or more real estate portfolios. For specific services, such as energy management, an intelligent network can provide constant visibility and monitoring of temperature and energy consumption and ensure that the system is adjusted to suit the demand. Because the system is constantly monitored, reaction times to unexpected developments such as energy surges and loss of power are significantly improved. In addition, centralized building management for energy issues eases the increasing regulatory pressure to comply with stringent environmental standards. An intelligent networked approach ensures that the risks of non-compliance can be managed effectively with a preventative rather than reactive approach.

Real estate assets spread across a wide geographical area benefit from this integrated approach, and in much the same way, existing campuses of many buildings in one physical location can also derive considerable operational and financial benefits from adopting this novel approach to building control.

Pharmaceutical company Pfizer operates 4 million square feet of R&D and manufacturing facilities on its site in the UK. More than 70 buildings are in active use and were operating with multiple building systems that created inconsistent and unwieldy control. Pfizer decided to link its building control network to its corporate IT, and the business now has consistent control from over 70,000 data points over one IP network and the Internet. Pfizer has achieved considerable savings on annual energy costs (5 percent or Euro 8.6 million) as well as a 15 percent reduction in annual maintenance costs. Business continuity in mission critical facilities has been enhanced with facilities subject to far less downtime, and overall control of all real estate has been considerably enhanced.

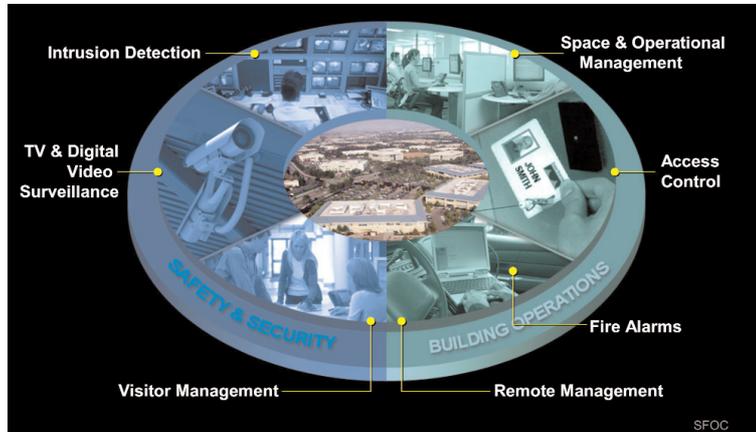
Converging Safety, Security and IT

The convergence of IT networks and buildings systems has a significant impact on the ability to create safer environments for building owners, operators, and users.

Interoperability of devices and networks ensures that critical real-time data can be acted upon. Video surveillance, access control and asset management over the IP network can be used to drive more sophisticated and comprehensive physical security strategies.

Cisco Connected Real Estate provides a secure platform for consistent, real-time communication of emergency status and instructions through data, voice and video formats to

Figure 5: Convergence of Safety, Security and IT



multiple devices including PCs, IP telephones, and even information display and public address systems. This allows rapid communication of emergency information to tenants, visitors, and employees. For example, IP telephony applications allow security personnel rapidly to inform building occupants of security breaches that may require building evacuation.

Cisco Connected Real Estate enables state-of-the-art access control to buildings and car parks using a variety of recognition technologies. This not only allows close control of people and physical assets (such as workforce, car parking, equipment) but also lets building owners regulate access to buildings or areas, for example excluding personnel who are listed as on holiday or on sick leave (and may have been victims of identity theft).

IP-enabled closed circuit television (CCTV) has been proven to reduce vandalism and other forms of lawlessness. One example comes from the UK, where the local education authority in Newport, Wales installed IP-enabled CCTV to monitor school premises that were suffering from a high incidence of vandalism. By using CCTV installed over an IP network, the education authority has been able drastically to reduce the incidence of vandalism and reports considerable savings of both cash and teachers' time. The end result is a safer, happier and more productive school environment in which teachers can focus on teaching, rather than dealing with the aftermath of vandalism. The flexibility of an IP network enables clear images to be monitored at any distance and instant action to be initiated. Digital storage of IP CCTV enables archived images to be instantly recalled without laboriously searching through videotapes.

Cisco Systems has implemented a worldwide security system that uses its IP network to provide video surveillance, security monitoring and access control in all of its 388 sites around the world. Each site is centrally monitored from one location in either the UK, United States, or Australia. Not only does CCTV over IP create an instantaneous reaction time so that facilities can be monitored in real time, but also other elements of the building operations (such as temperature control and leak detection) are visible on the network so that a potentially damaging change in the physical environment of a sensitive area can be spotted and controlled before long-term damage is done. Cisco saves on the physical presence required to control security without diminishing the level of security available to all of its sites around the world. The return on investment that Cisco generates from this integrated approach is \$10 million (Euro 8 million) each year.

“The great agent of change which makes new ways of working inevitable is, of course, information technology, the power, reliability, and robustness of which are already evident in their impact not only on work processes within the office but on every train, in every airport lounge, at every street corner, in every classroom, library and café. Office work, no longer confined to office buildings, is everywhere.”

Frank Duffy, Reinventing the Workplace

Transforming How We Use Our Environment: Delivering Space Differently, Integrating Space, Technology, and Services

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Frank Duffy, Reinventing the Workplace

The nature of work is changing. Knowledge workers are mobile. They collaborate. They are no longer desk-bound by the processes they execute but are brought together by the projects they develop. This fundamental shift has not been widely reflected in the way that the space these workers occupy is designed and arranged. For many organizations today, much of the space they maintain is largely underutilized. An increasingly mobile workforce may mean that many of a building’s intended occupants are absent for much of the time. Dedicated offices and cubicle spaces are empty, and spaces for meetings or other forms of interaction lie dormant. Yet, all these assets have to be maintained as if they were being occupied to maximum capacity. Improving the efficiency of the design and use of physical spaces will limit the need for space and result in cost reduction (rent and operations), while enhancing the productivity of the workforce.

Transforming the Workplace

Cisco’s converged network for voice, video and data is enabling transformation of the workplace by helping organizations create flexible real estate portfolios, and supporting new workplace designs – at the same time improving organization-wide productivity, collaboration and mobility. A converged network:

- Improves employee mobility and remote working
- Delivers flexible and efficient workspace
- Enables new working practices and better collaboration
- Improves space optimization and use
- Reduces real estate costs

Robust, scalable and secure networks for voice, video and data improve employee productivity. Unified communications, wireless access and VPNs create flexible work environments, employee mobility and remote working initiatives. A converged network allows secure synchronous and asynchronous collaboration, email, voice mail, conference calls, video conferencing, knowledge management initiatives, intranets and instant messaging. This enables new working practices while reducing overall real estate requirements through, for example, hot-desking and VPN-based remote working.

IT and real estate executives can take advantage of a fully converged intelligent information network to create virtual workspaces that provide more flexible and efficient work environments. This converged intelligent information network provides wireless work areas that connect people to important corporate assets and building amenities to provide greater mobility, productivity and communication capabilities. This allows owners to achieve greater operational gains from the much more flexible and efficient use of their existing space and to use the network to derive more from their assets.



Cisco Connected Workplace in Action

Cisco Systems has put these principles into action with the redevelopment of office space at its headquarters in San Jose and around the world (Bangkok, Taipei, Charlotte, New York, and growing). Cisco's employees, like many in other organizations work differently than they did even as recently as a few years ago. An increasingly global workforce and customer base makes it more likely that employees need to work at nontraditional hours, leaving their offices vacant at other times. More complex business and technology issues increase the need for collaboration with team members in the same building or at various sites worldwide. Employees are often away from their desks, in meetings or workgroup discussions. Even Cisco employees who work on site are likely to be mobile within the building.

The Cisco Connected Workplace approach is built on the use of space rather than its allocation in accordance with headcount. The design of the offices reflects the way that people work, ie collaborative and mobile both within and beyond the building and different types of space have been created that reflect the work modes that an individual employee may cycle through in the course of a working day. These range from quiet spaces for working alone, to areas designed for collaborative and more social ways of working. And critically, employees are supported at all times with access to data and communications through an IP network that provides various forms of connectivity. In Cisco's Building 14 Proof of Concept at headquarters, the result is that a space which under traditional configuration would have accommodated 88 workers, is now used by 200. Every aspect of space usage has been investigated and the approach modified to take account of needs as they develop. As employees have responded to the flexibility, so the workplace has evolved. For example, wireless access points have been installed in greater numbers in areas of the building where people tend to congregate, ensuring that no single access point is overloaded and thereby impairing employees' productivity.

The success of the Connected Workplace solution comes in two forms: reduced costs and improved employee satisfaction and productivity across a range of indicators. The costs of cabling and IT infrastructure have both been halved compared to a traditional office, as has spending on furniture. The savings generated by having more people productively using space more effectively means that rent and construction costs are also cut considerably (by 37 percent and 42 percent respectively). A more cost-effective solution is accompanied by higher levels of employee satisfaction with the new arrangements. Nearly 80 percent of employees say that they prefer the new environment, citing factors such as the greatly increased ease of finding a meeting space. Nearly two-thirds say that they enjoy coming to work more. In short, the connected workplace offers better and more productive use resources at lower cost; a proposition that few organizations can afford to ignore.

One example of an organization that has put this approach to building usage to work is Hillingdon Borough Council in the UK. There, the housing department identified that some 70 percent of its staff could work remotely provided that they had the necessary levels of connectivity eliminating the need to maintain the same level of office space. Staff now have access to the information, services and applications they need whenever, and wherever they are – whether working from home or on the road. The council has saved more than Euro 4.3 million in annual office costs.

Another example is the UK's largest telecommunications service providers, British



Telecom (BT). It has recognized the significant savings and productivity improvements available from rethinking the space it uses. Today, about 9,500 BT staff are contractually employed to work primarily from home and more than 63,000 others are able to work independently from any location at any time. BT now saves some Euro 6.5 million annually on property costs, absenteeism has fallen by 63 percent and staff retention has increased dramatically

Cisco Connected Real Estate and the Need to Do Things Differently

New thinking about the use of the network in the deployment of real estate assets creates a wide range of exciting possibilities for the development of both the business models for the property value chain and the way that owners, operators and the building users will be able to use the buildings they inhabit.

But for these new models to become reality the design of the IT network will require a new place in the elaborate property development process. Though the design and consequences of water, electricity and gas infrastructures (the first three utilities of a building) are included in the very early stages of a property's conception, network and communications needs are rarely given the same early attention. The network needs to become an upfront consideration from the planning stages and drawing board onwards.

Understanding the Building Lifecycle

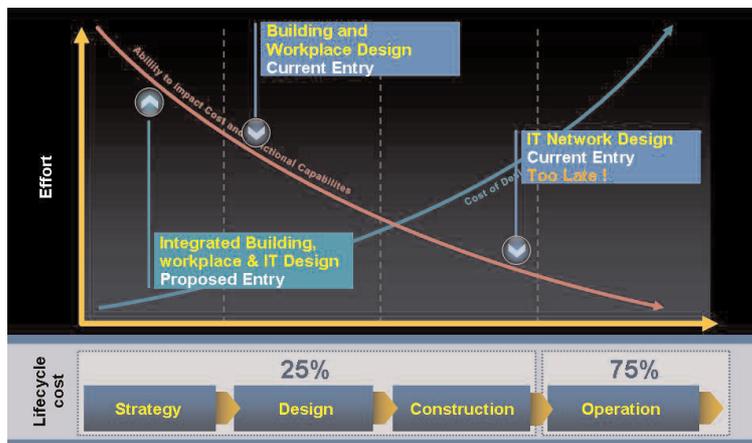
A building lifecycle comprises four phases: conceptualize, design, construct, maintain and operate

- **Conceptualize:** The phase in which the building is scoped and financed, conceptualization, consumes about 2 percent of the total costs of the building lifecycle and marks the beginning and end of each building lifecycle.
- **Design:** During the design phase, architects and engineers plan the detailed layout, structure, and execution of the building.
- **Construct:** In the construct phase the building is erected to its design specifications. Together, the design and construct phases account for some 23 percent of the total costs of the building lifecycle.
- **Maintain and Operate:** The maintenance and operation phase represents the time during which the building is used, typically 25 to 30 years in today's fast-moving environment—marked by its economic of functional life. It accounts for 75 percent or more of the total costs of the building lifecycle.

With more than three-quarters of the total expense of a building arising during the maintain and operate period, rather than as initial capital expenditure, decisions taken in the design and construct phases can have far-reaching financial and operational effects. Therefore during those phases key stakeholders should carefully consider a building's network; especially because the Connected Real Estate framework will positively affect the functional use and design of the building and thus support the transformation of space and businesses. Decisions made during the early stages can effectively create the infrastructure that reduces ongoing operations costs over the lifecycle of the building, and improves the opportunity to create revenue streams in the appropriate markets.

The inclusion of an IP network in the building design process, and its installation as

Figure 6: Understanding building lifecycle costs



early as possible in the construction process, provides immediate gains for building owners. The single IP network reduces capital costs during the construction process, because infrastructure can be laid more easily (rather than being retrofitted with consequent cost and disruption) and the single open standards cabling infrastructure reduces the requirement for multiple closed proprietary networks and the associated costs of installing them. Secondly, by installing networks early, building owners can extract value from the network over a longer period of time, increasing overall return on investment.

Cisco Connected Real Estate also helps lower operating expenses over the building’s lifecycle. An open standards based building infrastructure encourages a centralized (and/or remote) approach to monitoring, maintenance and control of the building environment.

Higher levels of connectivity between building systems provides an array of benefits through access to and sharing of real time data including:

- Optimized remote control, monitoring and reporting of building systems including centralized management of a distributed property portfolio.
- Intelligent heating and lighting and cooling systems that reduce costs through increased energy efficiency.
- Improved staff productivity (maintenance, facilities and security personnel) and enhanced health and safety compliance.
- Improved asset management and tracking together with automated work scheduling, billing and help desks linked to existing enterprise resource planning (ERP) systems.

The Cisco Connected Real Estate IP framework features embedded technologies that guarantee quality of service and high levels of security and resilience further reducing maintenance and repair costs. Furthermore, all components of the network are built entirely on open standards. Hardware, software, and services are designed using roadmaps that anticipate and support constantly changing business requirements.



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