

The Power of Three: Connected Real Estate in Action



A Joint Connected Real Estate White Paper





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1 Executive Summary

The booming real estate industry in the Asia Pacific offers exciting possibilities, as well as unique challenges, for owners and developers of commercial buildings. To stand out among the competition, they will need to take a new approach to developing buildings, and look at a building's entire lifecycle in terms of new and better service availability, leveraging technology to enhance service level, and building operation and maintenance.

IP technology will play an increasingly important role in enabling developers to transform the way they approach commercial building development and management. The winners in the competition to attract new and retain current tenants will be the ones who successfully leverage and harness IP-enabled solutions deployed within flexible and scalable infrastructure that helps reduce capital and operational expenditure, as well as provide new service possibilities.

This white paper highlights the current Asia Pacific real estate market trends that will determine how future commercial buildings will develop. It also describes the major challenges facing commercial building stakeholders today, and describes how the Connected Real Estate framework, built upon a robust single IP network infrastructure, can enable the delivery of more cost-effective building operations and create new business opportunities.

2 Commercial Buildings: A Market Overview

There has never been a better time to be in the Asia Pacific real estate business. Fueled by strong economic sentiments, and the growing sophistication of the regional property markets (evidenced by the growth of the REIT sector), commercial real estate investments are rising. In many Asia Pacific Grade A office markets, real rental and capital values are fast surpassing the record levels reached in 1997, before the Asian financial crisis¹.

According to the BCI Asia Building Starts Forecast for 2008², scheduled starts for building projects in Southeast Asia were up 45% compared to 2007, and up 21% in Greater China. Vietnam appears to have the highest amount of new office buildings projects in South East Asia (a 345% increase in Q208 compared to the same period in 2007), followed by large increases in Singapore and Hong Kong³. The chart below shows the forecast starts in 2008, in terms of total floor space added.

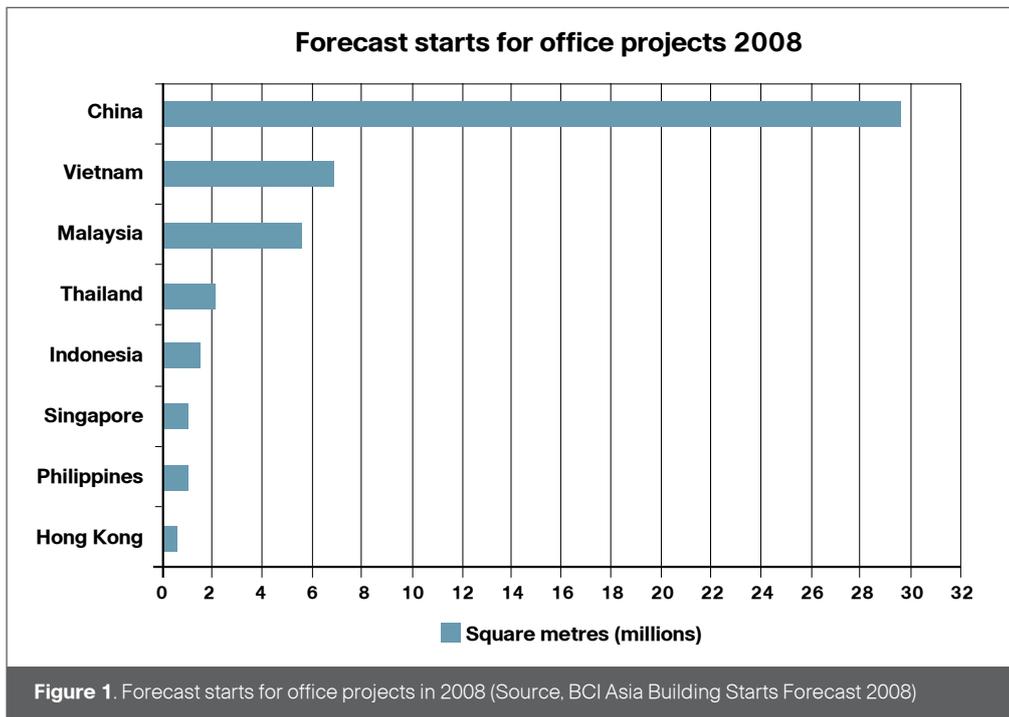
The strong market fundamentals represent a golden opportunity for developers to create next-generation commercial buildings that can meet the soaring demand for office space in this region. Already, several cities are seizing this chance to muscle their way into the public consciousness with attention-grabbing projects. Today, eight of the world's ten tallest skyscrapers are in Asia, including the Taipei 101, and Malaysia's Petronas Twin Towers, and this race to reach the skies is likely to continue unabated⁴.

¹ "Asia Pacific Property Digest – Second Quarter 2007" – Jones Lang LaSalle

² "Building Starts Forecast 2008" - Building and Construction Interchange Asia

³ "Building Starts Forecast 2008 - Second Quarter 2008" - Building and Construction Interchange Asia

⁴ "Official World's 200 Tallest High-rise Buildings" – Emporis Standards Committee



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Figure 1. Forecast starts for office projects in 2008 (Source, BCI Asia Building Starts Forecast 2008)

As the increasing affluence of regional economies spur cities to embark on even more sophisticated building development for commercial, retail and residential sectors, developers will need to address how innovative solutions to building development projects can provide maximum benefits to today’s building stakeholders in the wake of the availability of new building technologies and services. IP technology is set to play a major role in the development of these modern commercial buildings, with advances in IP connectivity now making it possible for real estate developers to build truly connected commercial buildings.

Challenges for Stakeholders

With the growing number of high grade office spaces available, potential tenants are truly spoilt for choice. The onus is therefore on real estate developers to create commercial buildings that stand out from the competition. A number of key challenges face these stakeholders, who will find it increasingly difficult to differentiate their projects from other developments. These include:

- Enhancing the tenant’s experience** – Stakeholders recognize that the latest communications and collaboration tools and interactive media solutions can create a personalized experience for tenants and improve the brand and rental premiums of the building, in both old and new developments. Connected buildings will be able to gather, store and share vast amounts of information that will greatly improve the occupant experience, such as personalized, configurable environmental settings (e.g. in meeting rooms), as well as tracking capabilities (such as finding a colleague based the location of his/her wireless notebook).

- Centralized Control & Monitoring** – In the past, the approach to creating a building infrastructure was a modular one, with several disparate systems managing different aspects of building operations. This in turn means that several groups of operations staff, facilities and resources would be required. For developers that manage multiple sites, this provides a less-than-satisfactory return on a building owner's investments in these building management systems. Connected buildings will be able to report usage amounts and even detect breakdowns for lighting, air-conditioning, and communications, and even allow administrators to remotely change settings as needed.
- Finding new revenue streams** – The current business model for most commercial buildings rely on rental as their main revenue stream. Given the high operating costs of many high grade office spaces, there is a need to find new products and services that can be provided to tenants at a fee, generating additional income for building owners. Connected buildings could deliver world-class voice, data, and video services seamlessly and instantaneously (from day-one of the tenant move-in) over the network, thus adding to pure space rental revenues and increasing tenant loyalty by reducing churn.
- Safety, Security and Remote Monitoring** – Security is one of the top concerns of building owners today. Buildings are often equipped with systems such as video surveillance, access control, and even biometrics. However, the biggest challenge facing developers is the lack of integration between these systems, limiting the ability to quickly and effectively respond to security threats. Connected buildings can not only give security managers the tools to quickly combine, analyze, and distribute data from this diversity of security technologies - so that they can take the appropriate action in case of emergencies - but also share information across external first responder and municipal security systems, effectively creating intelligent and holistic security policies.
- Managing energy consumption** – Buildings are the world's largest consumer of electricity, with the American Institute of Architects (AIA) National Government Advocacy Team pointing out that buildings are the "largest source of both greenhouse gas emissions and energy consumption... around the world"⁵. Recognizing this, the 2030 Challenge exhorts the global architecture and construction industry to commit to constructing carbon-neutral buildings by 2030⁶. Real estate will thus need to optimize a building's energy demand and consumption patterns through the application of smarter building management and automation solutions and more energy efficient building and IT systems.

The network as the platform in a connected building will allow for not just proactive energy management and constant measurement and verification (an important criteria for achieving green building certification), but also provide the ability to collate data for carbon footprinting. Certification programs, such as the US Green Building Council's LEED and the Singapore Building and Construction Authority's Green Mark, will take into account a building's carbon footprint when verifying a building's energy efficiency. In a recent Colliers 2007 study on office tenants, 90% of respondents believe "it is important for landlords or developers to 'green' their portfolios"⁷. Getting such an accreditation helps to increase the marketability of the property, creating an impetus for greater corporate responsibility in going green, for developers as well as tenants.

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⁵ 'SUSTAINABILITY 2030 Toolkit, an Introduction to Green Building' – American Institute of Architects

⁶ 'The 2030 Challenge' – architecture 2030

⁷ Colliers International 2007 Canadian Office Tenant Survey Results

3 Connected Real Estate Framework for Commercial Buildings

The building of the future will be intertwined with Internet technologies from its inception, transforming the process of design, construction, operation, and usage. Such connectivity will improve the occupant experience, maximize building performance, preserve existing investments, and conserve the increasingly scarce resources required to build and operate a property. For building owners looking for a comprehensive solution to meet the challenges outlined in the previous chapter in this highly competitive real estate industry, Internet technologies is seen as the next logical step.

In this marriage of construction and Internet technologies, developers can benefit from a roadmap such as the Connected Real Estate framework, which enables convergence and integration of existing assets and services on a single IP network infrastructure within

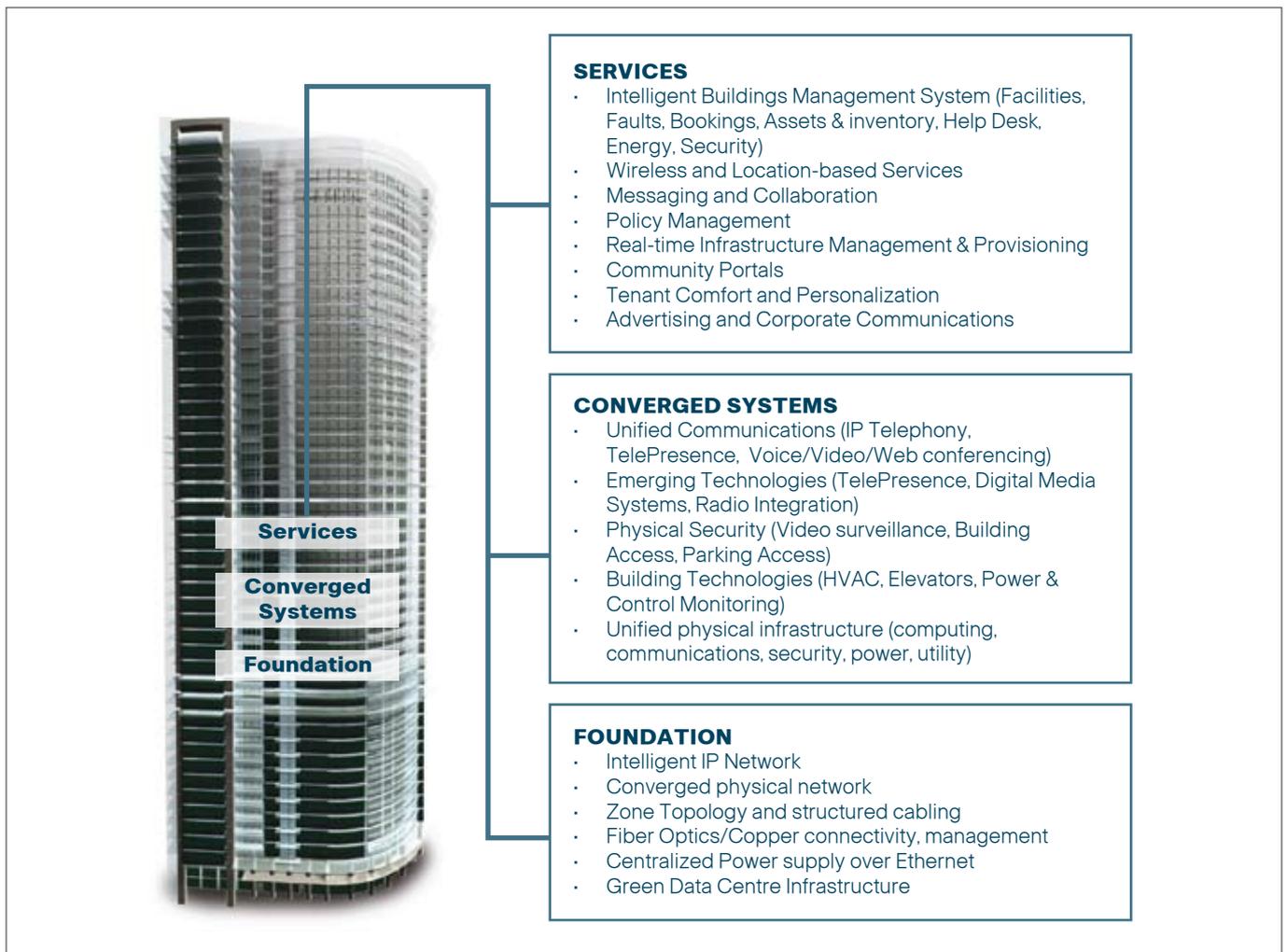


Figure 2. A new business model for building stakeholders – made possible by partners delivering the Connected Real Estate framework.

the building fabric. The Connected Real Estate framework allows all building real estate requirements to be integrated holistically and consistently throughout various sub-system layers.

The Connected Real Estate Framework calls for the centralized control of a building's disparate, proprietary systems and networks. Indeed, this framework could also apply to multi-site developments as well. With the Connected Real Estate Framework - and the interoperability standards that accompany it - the IP network connects everything merits control using one wire, one protocol, one data framework and one application interface.

An Integrated Partnership for the Connected Experience

Cisco, CNA Group and Panduit have established a strategic partnership to develop and implement the Connected Real Estate solution in the Asia Pacific. Each partner offers its complementary core expertise in the areas of IP-infrastructure design & switching, system integration, and unified physical infrastructure solutions for connected building deployment. Each partner's best-of-breed solutions are seamlessly integrated to deliver the Connected Real Estate framework to commercial building stakeholders.

Cisco, CNA Group and Panduit have established a strategic partnership to develop and implement the Connected Real Estate solution in the Asia Pacific

Cisco	<ul style="list-style-type: none"> ▪ Conceptualizes, models, designs and implement the Connected Real Estate framework to deliver high level of service-oriented network architecture for revenue generating services - the core fabric of single IP-connectivity infrastructure ▪ Provides the network switching distribution and unified communication solution within the building to meet different building needs ▪ Innovates with emerging technologies such as TelePresence, Digital Media System, IP Video Surveillance, Radio Services Integration and green product initiatives
CNA Group	<ul style="list-style-type: none"> ▪ Designs, develops and implements building application solutions ▪ Integrates these applications over the IP-network, delivering unified software platform for open connectivity and interoperability among multi-vendor systems and sub-systems ▪ Intelligent Building Management Systems provides portfolio wide operations and control as well as robust business rules leveraging on both building and IT systems
Panduit	<ul style="list-style-type: none"> ▪ Provides a unified physical infrastructure for lower cost of building ownership whilst delivering intelligent building services ▪ Scalable architecture and design of physical infrastructure and provision of converged physical network linking devices, end-users and services, providing the arterial transmission conduits of the fourth utility framework ▪ Green energy-efficient data center infrastructure solutions which provide reliable and secure environment with real time physical layer manageability, essential to the hosting of mission critical network and systems that run building operations applications and services

Figure 3. The role of the three partners in the Connected Real Estate framework.

In addition, innovative unified physical infrastructure solutions provided by Panduit allow the deployment of new zone structured cabling, power over Ethernet and data center infrastructure systems with ease, flexibility and scalability for future growth. This plays an important role to ensure the Connected Real Estate framework stays relevant throughout a building's lifecycle. Commercial building developers can look forward to lower capital and operating costs due to the reduced physical infrastructure requirements and energy cost savings.

Finally, Cisco and CNA also provide a suite of solutions for revenue-generating services. Applications to track after hours usage, automate billing and new services such as wireless connectivity, digital media services delivery and unified communications present a myriad of possibilities for building owners and developers to truly differentiate their projects.

4 Considerations for a Connected Commercial Building

The Connected Real Estate development methodology begins with defining and architecting the appropriate Connected Real Estate framework for a particular building. This is followed by the next phase involving the implementation of the switching distribution and unified physical connection system, and subsequently the last phase involving system and sub-system integration. A building lifecycle comprises several main phases depicted below:

- **Conceptualize** - The phase in which a building is scoped and financed; conceptualization consumes about two per cent of the total costs of the building lifecycle.
- **Design** - During the design phase, architects and engineers plan the detailed layout and the structure 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 20 per cent of the total costs of the building lifecycle.
- **Maintain and Operate** – This phase represents the time during which the building is used, typically 25 to 30 years in today's fast-moving environment. It accounts for 75 per cent of the total costs of the building's lifecycle.
- **Retrofitting** – This phase occurs when various elements of the building's infrastructure need to be upgraded to cope with new demands, deliver new services, or to renew or improve the operational efficiency of outdated assets.

With three-quarters of the total expense of a building occurring during the Maintain and Operate phase, decisions taken in the design and construct phases can have far reaching financial and operational effects. Therefore, during those initial phases, key stakeholders should carefully consider a building's underlying network. Decisions made during the early stages can effectively create the levers that reduce ongoing operations costs over the lifecycle of the buildings, as well as improve the opportunity to create revenue streams in the appropriate markets.

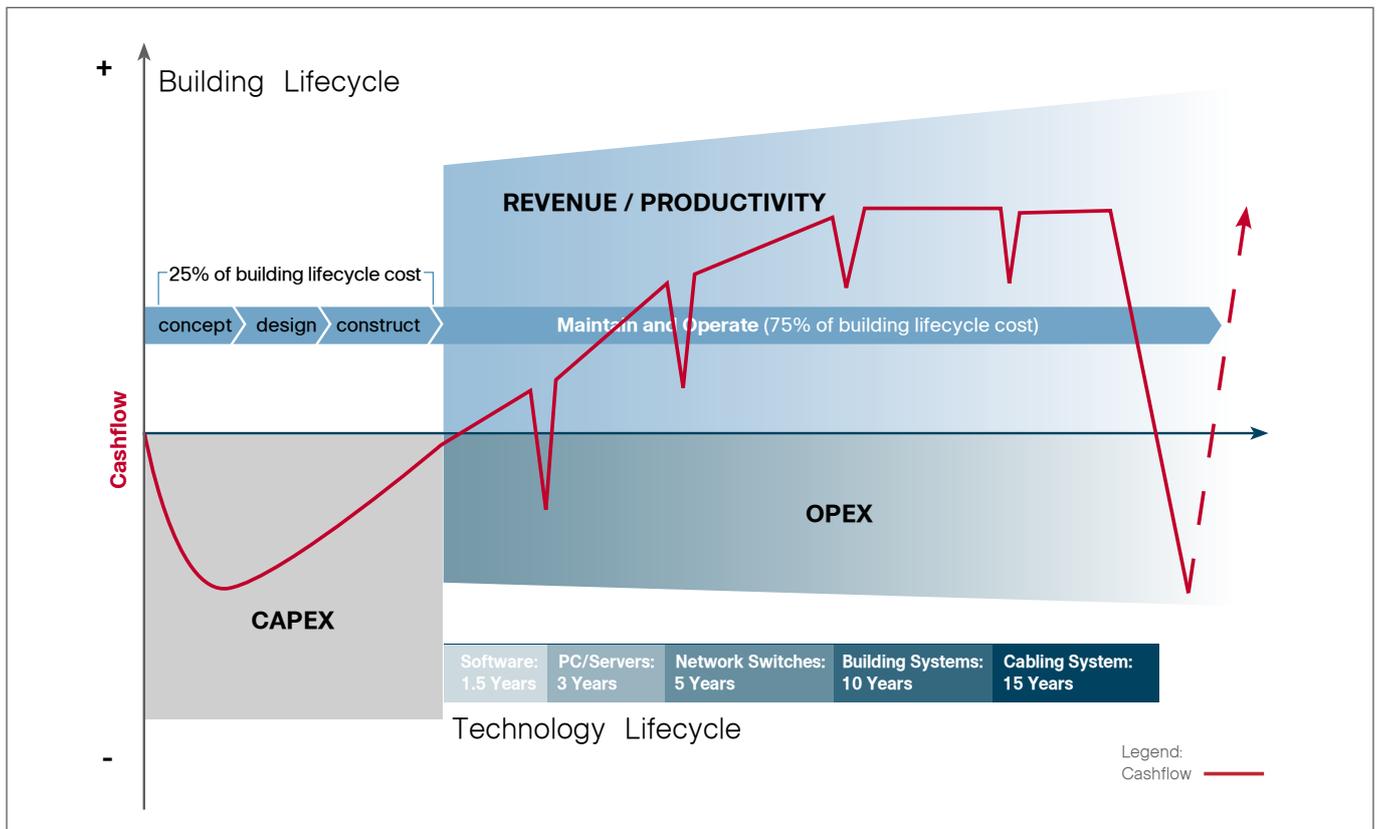


Figure 4. Understanding building lifecycle and technology lifecycle costs and its impact on cashflow.

Benefits of a Connected Building

The inclusion of a Connected Real Estate IP network in the building design process, and its installation as early as possible in the construction process, provides immediate gains for building owners.

The Cisco 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 Panduit unified physical network infrastructure reduces the requirement for multiple closed proprietary networks and the associated costs of installing them. With proper planning of the infrastructure (zone structured cabling and datacenter) during the design stage, developers can reap cost savings of around 60% to 90%.

⁸ "Smart Buildings - A Handbook for the Design and Operation of Building Technology Systems", Jim Sinopoli, 2006
 "DOE Buildings Energy Data Book", 2004.
 "IFMA Benchmarks VI Report", 2004
 "Intelligent Buildings Roadmap Document", CABA, 2007
 National Institute of Standards and Technology, 2004

By installing networks early, building owners can extract value from the network over a longer period of time, increasing overall return on investment. Various sources⁸ cite numerous cost advantages for building developers and owners should they adopt smart building technology systems. These include:

CAPEX savings:

- 56% less capital costs associated with management hardware and software, network upgrades, web services, and devices.
- 32% savings in operational costs linked to service contracts, additions, remodeling, and software upgrades.
- 24% reduction of the Net Present Value of the life cycle costs of an integrated system.
- Reduction in Project Management, Installation and Training costs to oversee just one physical connection system deployment – savings of around 35% in manpower costs.
- Reduction in costs due to removal of duplicate networks. The use of a building wide network infrastructure removes the need for separate networks for HVAC control, security, energy meters, lighting control and IP CCTV

OPEX savings:

- Energy Savings of around 10-12% by networking HVAC, Lighting and Building Management Systems (BMS) for enterprise energy management
- Operational savings of 10% due to lowered maintenance costs of managing a converged network, centralized facilities management of building systems and optimized staffing for building management operations
- Savings in reduced costs in making additions and remodeling – 20% savings due to having unified structured cabling and data center infrastructure in place
- Service Contracts – OPEX savings of 15% in service contracts due to using open versus proprietary systems
- Employee productivity improvement of 1-2% due to a safe, secured and comfortable working environment. Improving occupant productivity even a few minutes a day provides for a dramatic return to the tenant
- Intelligent Buildings afford a premium of at least 4% for rental rate over market rates
- Intelligent Buildings afford occupancy improvement of at least 4%

5 Connected Real Estate in Action

An Integrated Test-bed for Connected Building Concepts

In November 2007, Cisco, CNA Group and Panduit announced the official launch of CNA Group's Digital Land, Asia's first-ever connected building "experience center" in Qingdao, China. This center, along with Panduit's Customer Briefing Centre (CBC) in Shanghai and Cisco's Customer Solutions Centre (CSC) also in Shanghai, forms the tri-partite test-bed for concepts and ideas that have the commercial potential for connected buildings of the future.

- **Cisco Customer Solutions Centre (CSC)**

The CSC is an integrated solution development and customer experience center. Situated in Caohejing Hitech Park in Shanghai, it is the first of its kind in Cisco, and will provide a development environment to encourage solutioning and innovation in real estate technology.

- **Panduit Customer Briefing Centre (CBC)**

The Panduit CBC in Shanghai is a solutions collaboration center where Panduit technologies, innovation and solutions as well as integrated solutions developed with key partners, including Cisco and CNA, are brought to life and action.

- **CNA Group Digital Land**

Digital Land aims to offer facility owners a foretaste of how intelligent building systems and technologies will transform the built environment of the future. Located in Qingdao, China, it is a meeting place for property developers, architects, consultants, design engineers, property managers, world-renowned technology innovators and other building system-related experts, and will allow facility owners to visualize and experience the latest IP-connected building systems and technologies that can transform their facilities to world-class standards.

The Cisco, Panduit and CNA test-bed will demonstrate how the Connected Real Estate framework will be used to integrate secure, scalable and interoperable systems throughout the enterprise.

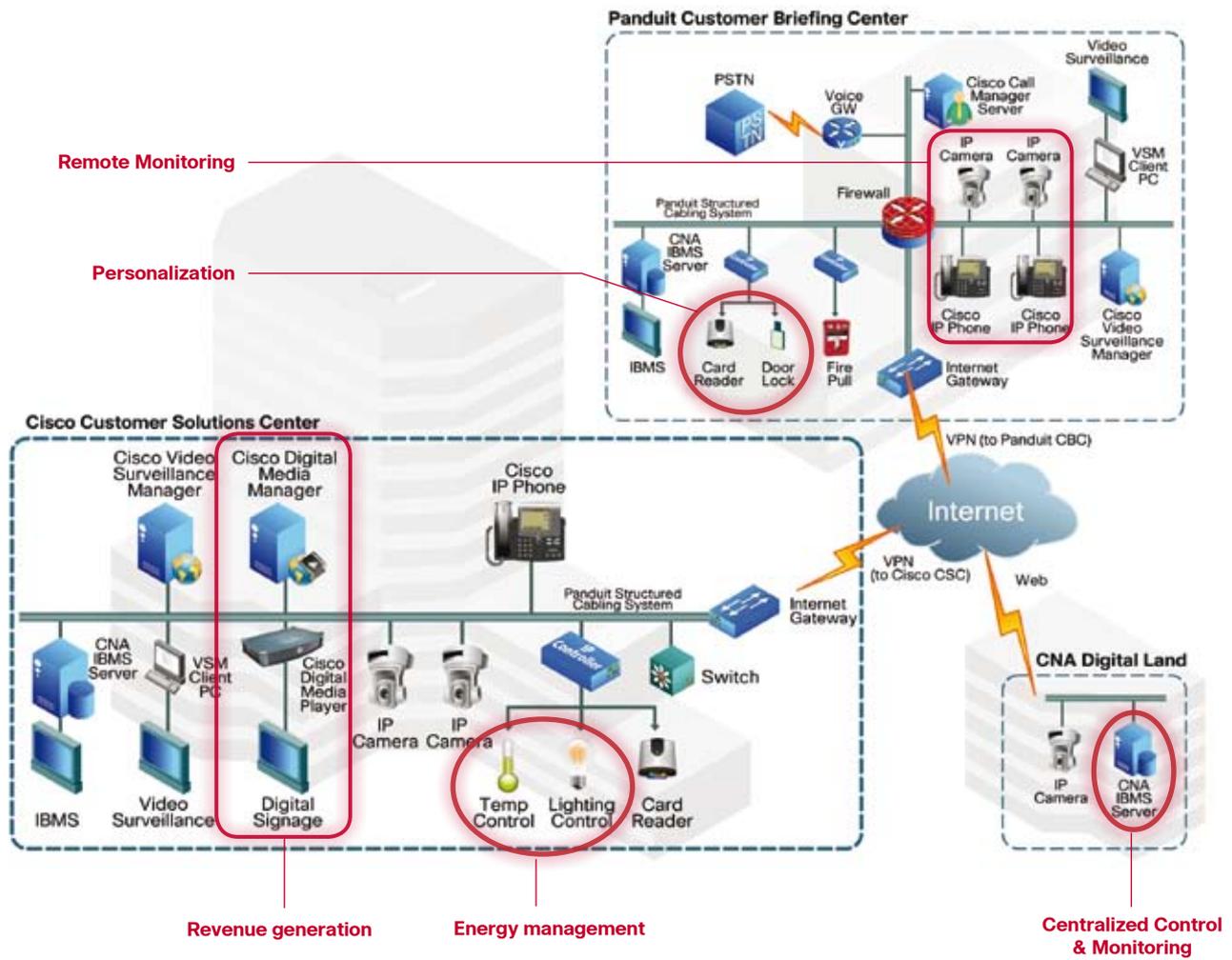


Figure 5. An Integrated Test-bed for Connected Building Concepts.

This test-bed will demonstrate concepts such as; how the Connected Real Estate framework will be used to integrate secure, scalable and interoperable systems throughout the enterprise - including diverse mechanical, electrical, security and climate control systems. It will also demonstrate how unified physical infrastructure solutions further enable building convergence by extending the reach of the IP-based network to all devices within an enterprise including physical security systems such as video surveillance, building access and fire detection. Finally, it will present scenarios that show how building technologies can be used to reduce energy consumption by intelligent control of building systems like lighting, air conditioning, and elevators.

Possible concepts being showcased are numbered in the diagram:

- 1. Personalization.** As a person enters a room using their access card, the lights and temperature are automatically adjusted to predefined levels. The in-room IP phone is activated using that user's profile, and digital signage in the room will display relevant information for that user.
- 2. Centralized Control & Monitoring.** Visitor images can be captured and displayed on IP phones for security personnel to grant entry. Fire alarms can be integrated with CCTV cameras and IP Phones to display the fire location, and digital signage can display evacuation information.
- 3. Remote Monitoring.** Building systems such as CCTV, Access Control, IP Phones, Lighting, HVAC can also be administered remotely at a Central Operations Centre.
- 4. Revenue generation.** Unified networks can deliver personalized advertising via digital signage, weather and transport information via IP phones, as well as subscription based Internet and email access to tenants on a turnkey basis.
- 5. Energy management.** Lights and air-conditioning in meeting rooms can be linked to centralized monitoring systems that automatically switch them off when the occupants leave the room. Tenants can use the self-service features of the IP phone to get after hours services or as an intercom to the facilities center.
- 6. Security.** Anomalous behavior can be flagged to a centralized monitoring station, such as repeated uses of incorrect access cards. Based on access level, staff members can be given limited access to off-limits zones. Wireless technology can also be used to monitor the movement of tracked assets, such as projectors.

Indeed, this integrated test-bed of connected real estate concepts in action is a concerted effort to showcase proven and easily deployable solutions for building stakeholders. Cisco, CNA and Panduit remain steadfastly resolute to continuously innovate with these solution centers, with the ultimate aim of creating business value.

6 Conclusion

The Connected Real Estate framework is based on a holistic and systematic development approach of building connected services, where technologies are leveraged to minimize foundational infrastructure, networks and systems, and implementation for present development and future expansion needs. The overall objective is to provide a highly adaptable IP-connectivity network that can support robust platform operability that delivers the high service level performance of the different building services. The integration of property, facilities and business services onto a single network will ultimately lead to effective building management - lowering operational costs - and new revenue streams, as owners take on the role of provider of business services.

To transform this framework into reality, the strategic tripartite partnership - Cisco, CNA Group and Panduit - will be the impetus for the Connected Real Estate framework for commercial buildings in Asia Pacific. With strategic relationships with real estate customers and industry groups, Cisco, CNA and Panduit are well positioned to help commercial buildings in Asia Pacific become truly connected.

As demonstrated with the creation of their integrated test-bed in China, Cisco, CNA and Panduit are actively developing innovative solutions that will lead to greater tenant retention, satisfaction, and higher rental yields as tenants become more willing to pay a premium for the empowered workspace. Their combined experience in implementing proven solutions is an important factor for developers to consider as they make the move to create connected buildings.

About Cisco Systems

Cisco Systems, Inc. is the worldwide leader in networking for the Internet. Today, networks are an essential part of business, education, government, healthcare, transportation and home communications, and Cisco Internet Protocol based (IP) networking solutions are the foundation of these networks. Cisco hardware, software, and service offerings are used to create internet solutions that allow individuals, companies, and countries to increase productivity, improve customer satisfaction and strengthen competitive advantage. The Cisco name has become synonymous with the Internet, as well as with the productivity improvements that Internet business solutions provide. At Cisco, our vision is to change the way people work, live, play and learn.

About CNA Group Ltd

For more than 15 years, CNA Group has played a key role in delivering vital integrated solutions converging facilities, business and IT systems to commercial buildings, airports and industrial plants around the Asian region. CNA provides an extensive array of services and solutions to automate, control and manage virtually every facility in the building environment. CNA's systems collect and integrate information from multiple points within a building or across a network of buildings, to optimize the performance of critical facilities like air-conditioning, lighting, intrusion detection, access control, energy monitoring, voice, data and video communication systems. CNA solutions are built, integrated optimized on the Connected Real Estate foundation, which results in lower initial costs and operational efficiencies that benefit building stakeholders.

About Panduit Corporation

Panduit is a global manufacturer committed to innovation and excellence. We have continually lived up to that commitment with the help of superior people, leading edge technology & equipment and future-oriented management. Today, Panduit is recognized as a leading manufacturer of high-quality products for wiring and communications applications. We are also known for innovative products that offer maximum reliability at the lowest total installed cost. This reputation gives us a powerful advantage in today's competitive worldwide marketplace.



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