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White Paper

Using ICT to Deliver Benefits to Cities by Enabling Smart+Connected Communities

This white paper will examine the fundamental shift in information and communications technologies that is enabling the deployment of Smart+Connected Communities. In addition, this paper will discuss the strategic information and communications technology investments that businesses and governments are making to transform the manner in which services and products are delivered via Smart+Connected Communities.

Introduction

In the 1970s, enterprise information resources were centralized in a mainframe model and shared primarily by computer specialists and power users within the IT department. The decentralized, client-server model took over in the 1980s, enabling businesses to provide dedicated access to information for many more users, but still within the organization's walls. In the past 10 years, information resources have again become concentrated in server farms, as well as enterprise resource planning (ERP) and customer relationship management (CRM) systems, for simplifying management.

As cities attempt to meet today's challenges, they are finding that the information and communications technologies (ICT) and business models used for the past 10 to 15 years are not able to support the capabilities that are required by an Internet-based world. Consequently, cities are creating and implementing new business and technology models where services such as education, health, and public safety can have more coverage without increasing their budgets. With the introduction of these new models, there are significant opportunities for economic development and urban sustainability across industries and geographic boundaries regardless of size. ICT plays an integral role in these new models and is being used in many ways to capitalize on these opportunities to bring benefits to countries, regions, and cities.

Fundamental Shift in ICT Strategy

Unlike prior decades, ICT tools are now broadly available to a wide variety of users, citizens, and employees, and the advent of cloud computing makes data instantly available to everyone who needs it, wherever they need it, using their chosen devices. At the same time, information, applications, and services must increasingly be shared beyond company walls with external partners, suppliers, and customers. As cities rethink their ICT strategies and service delivery models to deliver information and services that meet the needs of empowered users and borderless enterprises, they are turning to techniques, such as virtualization, that enable them to scale business services quickly, cost-effectively, and with minimal incremental impact to resources. For example, they are adopting Software as a Service (SaaS) offerings to eliminate having to host massive, complex applications that demand costly, specialized expertise to support and optimize. In addition, cities are seeking ways to improve collaboration while maintaining security and compliance.

Hosted Web 2.0 Services

The term Web 2.0 describes a current trend in web technology and design that affirms massive evolutionary changes within information sharing and user collaboration. It has transformed online users from passive browsers of content to active editors and publishers. The term is not intended to imply that a new version of the web is to be introduced, but rather refers to the evolution of creativity and resourcefulness in how software developers and end-users interact within the web. Web 2.0 is often used to describe the latest advancements in collaborative web technologies.

Cloud Computing

One of the key elements that contribute to the rise of Web 2.0 is known as cloud computing. Cloud computing consists of moving raw data to online storage solutions that are accessed simultaneously to successfully accomplish advanced computing services. Cloud computing is the delivery of virtual applications. Cloud computing alleviates prior data restrictions such as boxes, cables, and technicians. It moves data and information storage to larger remote computing and storage solutions. These solutions are most often owned by third-party providers such as data centers. Cloud computing often lessens internal resource and infrastructure needs while proving to be a cost-effective option. These services have also expanded beyond storage use to include web applications, raw computing, and specialized services. The reliability, security, and efficiency of cloud computing encourages new users to share and store their information and data externally rather than within their own internal infrastructure. The applications of this computing model are now expanding rapidly due to its decreasing external connectivity costs and highly regarded reputation.

Mobile Internet

Mobile Internet contributes greatly to the movement toward the Web 2.0 world. Also known as open mobile, mobile Internet refers to the the process of providing Internet access to users with mobile devices that are capable of viewing online content by expanding the methods of accessing the Internet through portable mediums such as mobile phones, laptops, and other digital handheld devices. No longer is the Internet confined to a limited connection through conventional networking of bulky wires and heaps of hardware. With the help of open mobility, today's Web 2.0 revolution enables Internet users to access the Internet from more than just their traditional desktop computer. These devices receive an Internet signal outside the familiar land-line Internet service provision of the past and alternatively retrieve Internet capabilities wirelessly from satellites. Many of the same Internet

services that can be accessed from a personal computer may also be accessed through countless mobile devices, depending on the user's service plan.

Video 2.0

As Web 2.0 has changed the Internet, Video 2.0 is changing the way we think of video. Video 2.0 describes the current trend in video technology that affirms massive evolutionary changes in how we view and retrieve visual information. The term is not intended to imply that a new version of video is to be introduced, but rather refers to the evolution of how consumers retrieve video content. Today, consumers are using mobile phones as televisions, PCs as telephones, and televisions as interactive gaming stations with a host of entertainment options. Because of the variety of content available on the Internet, consumers are now accustomed to choosing the content that they want, when they want it. The discovery of new tools and resources to help businesses meet these evolving demands from today's consumers is a newer door in technology development. Internet service providers (ISPs), telecommunications service providers (TSPs), cellular phone service providers, and cable service providers are all becoming a commodity of the past as the unified experience service provider is surfacing.

The Intelligent Network as a Transformation Platform

Today, chief information officers (CIOs) around the globe find themselves with a demanding list of priorities, and because the network is inextricably linked with today's global ICT trends, the only delivery platform that can support today's ICT and business goals and requirements is an intelligent network. In addition to ensuring that today's business systems operate effectively, CIOs are expected to identify and enact strategies that will turn these trends into competitive advantages. CIOs must successfully address escalating user expectations, enable openness and spontaneity while ensuring compliance and security, scale operations globally, and deliver highly available ICT services for just-in-time information needs, wherever services are needed. Finally, they must meet all of these demands while meeting environmental sustainability goals of reducing energy and resource costs. These combined demands place a tremendous burden on their ICT organization to support new business models for driving revenue and growth while maintaining reliability, security, and scalability. If successful, the ICT organization can empower the business to successfully navigate the shift from delivering pure functionality to delivering superior customer experiences

In today's open business world, devices, operating systems, and applications must work together within and between departments and consumers. Only intelligent networks provide an enterprise platform that enables everything in the enterprise to work better together, transforming business processes and presenting the capabilities that users need in a unified fashion. Cisco first transformed critical business processes by using ICT-based transaction services such as customer self-service portals, employee intranets, and virtual manufacturing models to accelerate its own back-office processes and to free employees for other tasks. Just as this network-based approach successfully fueled business productivity in the past decade, the intelligent network will also transform businesses' ability to meet the challenges of the next decade by delivering:

- Real-time information around the world, beyond traditional enterprise borders, and empowering users
- Rich collaboration capabilities that increase productivity and create a personalized user experience anytime, anywhere, and on any device
- Virtualized resources that meet sustainability goals without compromising performance and reliability
- A comprehensive integration of business and technology architectures

While cities may want all of these capabilities and ICT departments must deliver them, they must also find ways to deliver services within growing cost and resource constraints. In addition, while ICT departments can rely on the

network as a delivery platform and use the intelligent network as the core platform, they can significantly reduce the amount of management required for service delivery. An intelligent network can deliver this freedom and flexibility. For example, core network services, such as routing and quality of service (QoS), call control, file management, presence, and policy management can be on-premises, integrated elements of the network that function like dial tone. An ICT department can deploy these services and let them operate. Additionally, new applications or capabilities that change frequently can be deployed as SaaS, where the provider manages them and the ICT department is free to focus on strategy.

The Role of ICT in Smart+Connected Communities

A couple of decades ago, the development and expansion of the Internet were hampered by disparate networks unable to interoperate with one another. Cisco's multiprotocol router solved this problem by translating across networks, paving the way for the development of today's all-encompassing Internet. Urbanization poses a similar challenge. Today, hundreds of different systems and protocols across an urban center are not interoperable. The convergence of all kinds of data across a unified IP network will make it possible to develop a wide range of new services and to deliver these services to anyone, anywhere, and at anytime. When these systems are converged onto a single, open-systems-based intelligent network, significant opportunities for productivity, growth, and innovation can be unleashed. It is this combination of services and delivery that defines Smart+Connected Communities (S+CC). An S+CC unites information-sharing and collaboration tools, creating a services delivery platform to address the challenges from massive urbanization around the world. ICT will be central in building S+CC, managing existing communities, and delivering services to citizens.

The organization of an S+CC and the way business is conducted depend on ICT. There are several trends affecting the business decisions and implementation strategies related to S+CC. The dramatic increase in the use of ICT has helped increase the competitiveness of cities that harness its power. To capitalize on these opportunities, business decision makers will need to recognize the dominant trends occurring today and understand their implications for transforming ICT architectures and critical business processes, such as collaboration and innovation. As a result, ICT will change the way people interact and how communities work and interrelate with other communities.

ICT is enabling integration, speed and innovation in ways that are transforming and redefining communities. Additionally, the increase in the use of the ICT can enhance the productivity of an S+CC by:

- Collapsing timeframes
- Changing relationships
- Enabling collaboration
- Shortening time to market
- Creating economies of scale

Cities incorporate ICT into their business strategies, enabling employees to become more productive and efficient at completing job tasks. Furthermore, employees are able to focus on more valuable and higher-skilled activities, as administrative tasks that they traditionally do can now be done by ICT-enabled applications. Having more highly skilled employees improves a community's competitiveness in the marketplace. Consequently, as cities sustain economic growth, everyone's standard of living increases in that city.

Meeting the Requirements of an S+CC

Specific business requirements affect specific functional areas of an S+CC, while competitive, technology, and human resource trends have implications throughout an S+CC. Examined as a whole, however, they align around three main areas: the empowered user, a demand for real-time information, and the borderless community.

The Empowered User

Individuals and cities now take advantage of the Internet's pervasiveness to not only purchase products and services, but to inform their purchasing decisions. Individuals, whether they are a customer, citizen, patient, student, voter, or employee, are using advanced technologies to innovate within their workplaces and communities. They are rapidly adopting Web 2.0 technologies, such as social networking, peer-to-peer collaboration, blogs, wikis, and multimedia content for mobile devices. An S+CC needs to deliver new tools and capabilities that meet the expectations of the empowered users while simultaneously coping with the associated technology complexity, support, security, and compliance issues.

Online communities wield tremendous influence over perceptions of products and the companies that offer them, and these communities transcend geographies and social backgrounds. As a result, product offerings based solely on functionality are no longer adequate. Customers increasingly demand a personalized experience with a product or service. They want to deal with companies who actively listen, openly change, and respond to customer feedback. Increasingly, an S+CC will need to be able to identify those attributes that create a unique experience with their products or services, deliver the experience consistently, and evolve their citizens' experiences to continuously differentiate themselves from competitors.

Real-Time Information

An S+CC needs to recognize the importance of using real-time information to increase productivity, agility, and competitiveness. However, increased business velocity does not simply mean the ability to respond faster. It means improving how an S+CC uses data that is continuously generated by systems. Moreover, it also means gaining an ability to understand what the data means, with context. It means deciding which actions to take, based on the data, and automating execution. Being able to use real-time information, such as customer transaction data, to shape a marketing campaign on the fly, or to combat competition, can enable an S+CC to adapt its tactics and capture better market advantages.

The Borderless Community

Customer and supplier interactions increasingly occur across an enterprise that is distributed, operates 24x7, requires a global talent pool, and conducts business from venues outside of traditional office buildings. New business models are being enabled, such as virtual companies and partner ecosystems built on Web 2.0 technologies that accelerate business processes and streamline product development and delivery. Effective collaboration across a borderless S+CC model will embrace new sources of global expertise and unlock the next wave of productivity. The S+CC that can openly and securely enable collaboration beyond borders will improve its creativity and velocity.

Strategic ICT Investments

ICT departments will have the responsibility for helping an S+CC achieve its goals. In order to do so, they will need to find ways to make their own tasks easier. ICT departments should focus on five strategic areas of ICT investment that will help achieve their goals: video collaboration, unified IP communications, IT as a service (ITaaS), data center solutions, and mobility.

Video Collaboration

Video delivers unmatched immediacy and richness to collaboration, enabling people to meet, discuss, and make decisions in real time. An S+CC can deliver video applications from the same intelligent network infrastructure that connects all of its locations and simultaneously personalize application delivery to meet its specific objectives. For example, high-quality, lifelike video conferencing such as virtual presence supports a borderless approach to business by creating virtual in-person experiences between people, businesses, and events. Virtual presence meetings deliver the same visual context and richness of a face-to-face meeting, resulting in reduced travel, increased employee productivity, and enhanced job satisfaction while eliminating the delay and difficulty associated with traveling long distances to gain consensus and reach decisions.

Unified Communications

Unified communications allows people to efficiently access data on demand, support effective team interaction around the world, and manage interactions in real-time. IP phones and messaging operate on a single, intelligent infrastructure that bridges the on-premises and on-demand worlds. Enterprises will increasingly require a unified communications approach to cost-effectively improve collaboration within their companies and extend it globally to customers and partners with high quality and reliability.

IT as a Service

Software as service (SaaS) solutions have become widely accepted by small and medium-sized enterprises because they are highly cost-effective, can be rapidly implemented and adopted, and do not require a high initial investment. Extending the concept even further to include ICT operations, many large enterprises are adopting IT as a Service (ITaaS) to more easily manage the issues associated with globalization and cost-effectively meet the needs of empowered users. ITaaS offers much potential to help an S+CC achieve business goals more cost-effectively, without the high commitment typically associated with delivering these kinds of services themselves.

Data Center Solutions

Virtualization technologies are helping many businesses to dramatically improve storage utilization, service delivery, resource efficiency, and space utilization. Virtualization solutions are enabling simplified, end-to-end coordinated provisioning of physical and virtualized server, storage, and network-based resources while helping data center managers monitor and control energy use far more precisely than was previously possible. Similar virtualization approaches will help an S+CC meet future computing and storage demands as well as budget and green demands. Other data center technologies, such as QoS, WAN optimization, performance routing, integrated security capabilities, and extensible application architectures, enable ICT departments to more easily deploy and manage global business services while actually enhancing their performance and reliability. The enterprise data center holds tremendous potential for an S+CC transformation that further enables successful collaboration, globalization, and virtualization strategies.

Mobility

Mobility solutions more effectively meet the needs of empowered users by enabling them to instantly connect with global resources, collaborate from wherever they are working, and use the devices that they find most productive. Mobility is a key component for all the different services to be provided to citizens and for scaling the S+CC infrastructure. This will ensure that services are delivered seamlessly, whether you are on a wired or wireless network. Mobility solutions enable employees to work from almost anywhere and enjoy a high-quality communication experience with whatever device they are using. Mobility solutions can help an S+CC improve collaboration, employee productivity, and customer satisfaction by reducing the time and fuel use associated with daily commuting.

Conclusion

The new information economy demands the promotion of digital inclusion. Thus, ICT will be essential in the transformation of cities to S+CC. Using the network as a delivery platform will play a critical role for businesses and governments to successfully meet the demands of S+CC. Although cities may want to build out these capabilities to deliver services in an innovative manner, ICT departments must deploy the infrastructure to meet their requirements and need to deliver services while managing cost and resource constraints. By leveraging the freedom and flexibility that an intelligent network can provide, ICT departments can significantly reduce the amount of management required for service delivery. ICT departments can strategically invest in an intelligent network that can support new applications or capabilities that meet the needs of an S+CC.

About the Authors

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