



GETTING SMART ABOUT SMART CITIES

RECOMMENDATIONS FOR
SMART CITY STAKEHOLDERS

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The goals of this research report are:

- To understand the main drivers for transforming a city into a “Smart City”
- To understand the expectations of citizens living in Smart Cities
- To provide a snapshot of different Smart City projects, their drivers, and business models
- To understand the key role of Information and Communication Technologies (ICT) in a Smart City project
- To provide guidelines and recommendations to stakeholders of Smart City projects

UNDERSTANDING THE CHALLENGES AND OPPORTUNITIES OF THE CITIES OF TOMORROW

The world population is moving from rural to urban locations. Urban populations will grow by an estimated 2.3 billion over the next 40 years, and as much as 70 percent of the world's population will live in cities by 2050. In a general context where population is increasing sharply and the global climate is warming, cities consume 75 percent of the world's energy and produce 80 percent of its greenhouse gas emissions. At the same time, the population is ageing: By 2050 the number of people over the age of 60 is expected to triple and will outnumber children under 15 for the first time in history. Many cities around the world are today experiencing the effect of decentralization, where political responsibilities are devolved from central government to city leaders. With this increased responsibility, cities have the power to determine to a degree their own success, and to find their place in the national and international competitive environments. Cities are aware of a pressure to attract economic activity, and this is not just at the regional and national levels, but more and more at the city level. In such context, a “Smart City” should leverage all technological means to ease the life of their citizens, and of companies that may employ them.

This desire to attract new businesses, to stimulate economic development and to boost the local job market is very well illustrated by the city of Chattanooga, Tennessee, and its success in attracting businesses such as Amazon and Volkswagen, in the latter case to build their first and largest factory in the U.S.A. for a total investment of US\$1 billion with the creation of 2000 new jobs. The advanced nature of the city's ICT infrastructure is thought to have been a significant factor in the decisions of both companies.

LOOKING AT THE GLOBAL PICTURE

Of course the urbanization of the worldwide population is not a new story but a major trend which began centuries ago and will continue in the future (see www.unfpa.org). But new challenges appear as the urban population becomes wealthier, keener to travel and more demanding in terms of well-being. Examples include the reduction or control of pollution due to increasing activity, balancing the convenience of individual transport and its consequences on traffic congestion, the need for security while preserving privacy, the need for immediate information on any situation, and so on, all within the landscape of a reduced taxation regime.

Making cities smarter and safer is emerging as a necessity to overcome the saturation threshold due to urban population growth. The unprecedented rate of this urban growth creates an urgency to find smarter ways to manage and identify such challenges. Some cities are blazing a trail in successfully operating in this smarter way, such as Chattanooga in the U.S.A.

Often, Smart City projects are driven by a variety of different verticals, most notably public sector, energy and real estate.

Early evidence from some Smart City projects suggests that city-owned utility companies like EPB Chattanooga in the U.S.A. and EWZ in Switzerland (with support of local authorities), in their race to comply with Smart Metering legislation and to build Smart Grid infrastructure, have been the first to take advantage of ICT infrastructure development.

CITIZEN EXPECTATIONS

In the early stages of Alcatel-Lucent primary market research on the expectations of Smart City citizens we have found that, based on the services they have available today, there is huge optimism and a great expectation that their lives will be enhanced by the services that will become available in the future in sectors such as education, health care, transportation and public safety. So far, using Smart City residents as a resource to develop these services has been overlooked. However, these people should be seen as both the customers of this movement and more importantly as principal partners in its development. Some early results for the Smart City of Chattanooga, Tennessee:

• What they have today

- Everything “faster”: Uploading and downloading photos, videos, movies, games
- Wired household without worry: No more taking turns to use devices as many devices can be online at the same time.
- First adoption by citizens and corporations addresses high bandwidth applications: Medical (radiology), cloud services, marketing services (video), public safety (lighting, flooding, disaster planning)

- **What they want tomorrow**

- New applications for verticals (health care, education, public safety): bringing city and rural citizens together
- Home automation: energy monitoring, safety, working from home, global connectivity to dispersed family
- New connected devices: sniffers, robotics all connected

- **The “spirit” of collaboration beyond the business case**

- Intentional conversations sponsored by service provider (EPB): Understanding customer needs enable the stakeholders to deliver them new services as win-win strategy.
- Players who set aside short-term profit motives gain short-term and long-term relevancy
- Combining multiple ideas/projects saves money: Police, fire, single streetlight becomes multi-purpose device; for example, sensors in the streetlight provide information about traffic and weather conditions and change intensity of the lights depending on the presence of people in the street.

UNDERSTANDING THE SMART CITY LANDSCAPE

To better understand the dynamics of Smart City development projects and the opportunities available, the Alcatel-Lucent Market and Consumer Insight team conducted an in-depth, three-part analysis of 52 Smart Cities in H2 of 2011 (Table 1).

The first phase of the study focused on developing an overview of the Smart City landscape based on a review of secondary sources from different stakeholders, such as analysts, universities and governments. The research looked at Smart Cities from two angles. First, it focused on key stakeholders and their contribution to the conceptualization and realization of the ideal. Second, to better understand how the stakeholders influenced development, the research focused on a thorough review of 18 ongoing Smart City projects.

The second phase of the study – in cooperation with the EDHEC Business School of Nice – was designed to supplement the initial observations of Smart Cities provided by third-party sources with an insider’s view of Smart City projects. This insider’s view was built on interviews and discussions with Smart City analysts, key representatives of five of the original 18 Smart Cities studied, and representatives from additional projects in India and Brazil.

Finally, the third phase of the study, which was conducted in association with the Presidio Graduate School (San Francisco, U.S.A.), rounded out the initial findings through a close examination of an additional 25 Smart Cities. Phase 3 was focused on the validation/substantiation of the key conclusions of Phase 2; that is, the types of Smart Cities and motivations. This final analysis enabled the team to develop a more detailed view of Smart City categories and all the factors that influence ICT decisions. The research did not stop there; the MCI team engaged in bringing forward the voice of the citizens in the current research phase.

Table 1. Smart City projects researched

CITIES	
1. Amsterdam (The Netherlands)	27. Malmö (Sweden)
2. Ballarat (Australia)	28. Masdar (UAE)
3. Besançon (France)	29. Moncton (Canada)
4. Birmingham (U.K.)	30. Ottawa (Canada)
5. Bottrop (Germany)	31. Paredes (PlanIT Valley, Portugal)
6. Bristol (U.S.A.)	32. Pedra Branca (Brazil)
7. Cape Town (South Africa)	33. Porto Alegre (Brazil)
8. Chattanooga (U.S.A.)	34. Quebec City (Canada)
9. Cleveland (U.S.A.)	35. Recife (Brazil)
10. Copenhagen (Denmark)	36. Riverside (U.S.A.)
11. Curitiba (Brazil)	37. Rotterdam (The Netherlands)
12. Dakota County (U.S.A.)	38. Shanghai (China)
13. Dongtan (China)	39. Shenyang (China)
14. Dublin (Ireland)	40. Songdo (South Korea)
15. Dublin (U.S.A.)	41. Sopron (Hungary)
16. Eindhoven (The Netherlands)	42. Suwon (South Korea)
17. Gdansk (Poland)	43. Tallinn (Estonia)
18. Gold Coast City (Australia)	44. Taoyuan (Taiwan)
19. Gujarat international financial tech-city (GIFT, India)	45. Tianjin Binhai (China)
20. Ipswich (Australia)	46. Toronto (Canada)
21. Issy-les-Moulineaux (France)	47. Trikala (Greece)
22. Jubail (Saudi Arabia)	48. Trondheim (Norway)
23. Kalundborg (Denmark)	49. Urumqi (China)
24. Lavasa (India)	50. Windsor-Essex (Canada)
25. Lyon (France)	51. Winnipeg (Canada)
26. Malaga (Spain)	52. Wuxi (China)

THE ROLE OF ICT

Chattanooga has recognized that the key enabler of Smart Cities is its ICT “central nervous system,” beginning with a broadband network that is perceived today as commodity to the everyday lives of its citizens. Citizens and businesses are demanding access to ICT services from any location at any time. To support this demand for ubiquitous coverage, the conditions in which they live and work must evolve to comply with the requirements of continuing breakthroughs in the next generation of telecommunications networks. As a result, telecommunication network infrastructures are, in many cases, essential to realize the objectives of the other industries driving the development of a Smart City, and machine-to-machine (M2M) and machine-to-machine-to-human (M2M2H) communications technologies (also known as the Internet of Things*) are basic requirements for an effective and sustainable Smart City.

The research revealed a wide variety of ways in which ICT is used to create Smart City projects (Table 2). However, it is usually applied to improve a mix of public and private services:

- **City administration:** to streamline management and deliver new services in an efficient way
- **Education:** to increase access, improve quality, and reduce costs
- **Health care:** to increase availability, provide more rapid, accurate diagnosis, provide wellness and preventive care, and create more cost efficiencies
- **Public safety:** to use real-time information to anticipate and respond rapidly to emergencies and threats
- **Real estate:** to reduce operating costs, use energy more efficiently, increase value, and improve occupancy rates
- **Transportation:** to reduce traffic congestion while encouraging the use of public transportation by improving the customer experience and making travel more efficient, secure, and safe
- **Utilities:** to manage outages, control costs, and deliver only as much energy or water as is required while reducing waste

Table 2. Examples of main areas in which the Smart City concept has been adopted in selected Smart Cities

AREA OF ADOPTION	EXAMPLE
Telecom network	<ul style="list-style-type: none"> • Broadband development (Chattanooga, Dakota County) • Home automation (Lavasa, Malaga, and Masdar) • Internet access in public libraries (Cape Town) • ICT sector support and ICT training (Cape Town)
Energy	<ul style="list-style-type: none"> • Energy networks, such as smart grids, smart meters, smart buildings (Amsterdam, Chattanooga, Dublin, Malaga, Masdar) • Renewable energy sources in a smart grid (Malaga) • Electric vehicles (Amsterdam, Malaga) • Power quality monitoring (Lavasa) • Energy conservation monitoring (Shenyang)
Transport	<ul style="list-style-type: none"> • City transport systems (Dublin, Lavasa, Shenyang, Trondheim, Dakota County) • Consolidated parking management technology (Lavasa) • Geographic Information System (GIS) (Lavasa)
Business support	<ul style="list-style-type: none"> • Library business corners for starting and running small businesses (Cape Town) • Digital business centers with telephones, faxes, scanners, photocopiers (Cape Town) • Retail (Masdar) • Business incubation center (Suwon) • Climate street (Amsterdam) • Electronic trade office (Suwon)
Intelligent community framework	<ul style="list-style-type: none"> • Guide for planning (Dakota County) • Education (Gdansk) • Recreation (Gdansk, Chattanooga, Dakota County) • Integrated security command center (Lavasa) • Automated messaging/mass Short Message Service (SMS) from a citizen call center (Lavasa) • Consolidated billing (Lavasa) • Residential (Masdar, Trondheim) • City administration center (Suwon)
Public utilities	<ul style="list-style-type: none"> • Water and sewage (Gdansk, Shenyang) • Streets (Gdansk) • Waste management (PlanIT Valley) • Food supply (Shenyang)
Industry sectors	<ul style="list-style-type: none"> • Petrochemical (Jubail)
Eco-sustainability	<ul style="list-style-type: none"> • Integrated environmental measures (Lavasa) • Smart building (PlanIT Valley, Masdar) • Environment management (Shenyang)
Technology development and innovation (academic based)	<ul style="list-style-type: none"> • Technology and innovation centers (Masdar and MIT)

INSIGHTS AT A GLANCE

- Although ICT is a key enabler in the development of a Smart City project, the value propositions of most Smart City initiatives do not position ICT as the key to the project's success.
- Because ICT is an enabler in Smart City projects, the implementation of the necessary layers related to ICT services (for example, communication infrastructure, IT and applications layers) is usually determined by drivers behind the project and those who initiate it.
- Along with the many stakeholders involved in a Smart City development, each project is also motivated by a variety of drivers:
 - Construct or invent a new economic model (the economic driver)
 - Reduce energy consumption (the eco-sustainability driver)
 - Improve the quality of life in a city environment (the social driver)
- The three key drivers are not exclusive of each other and they can all be found playing a role at the inception of a project.
- Despite the many factors that must be taken into consideration, Smart Cities present a viable business opportunity to the ecosystem – for instance, utilities, real estate companies and public sector – active in today's projects.
- To comply with this vision, the Smart Cities mission is offering to city residents, workers and visitors the most current and feasible telecom and non-telecom services and systems. As part of setting up Smart City services, a variety of business models and approaches to provide, supply, operate and manage the Smart City services will be explored.

ICT BUILDING BLOCK REQUIREMENTS

To achieve these objectives, Smart Cities require common open platforms and an underlying ubiquitous ICT infrastructure, which includes high-speed Internet access and wired and wireless networks. They also need an ICT application and service enablement suite, which includes smart media service enablers and citywide open access to sensors and actuators.

The Smart Cities ICT infrastructure should comprise of:

- **An all-IP core network**, which creates a converged infrastructure for buildings and ICT systems, and seamlessly integrates wireless and wireline technologies
- **A broadband access network**, which can support the integration of numerous components by **wireless** (LTE), **wireline** (copper, fiber), and other access nodes to make a city "smart" by enabling advanced services and applications, such as telecommunication coordination, urban traffic management, building automation, lighting and energy management, access control and security networks

At first glance, the ICT building block requirements imply that Smart Cities offer a major market opportunity for many players in the ecosystem that can be easily exploited by whether or not they come from the telecommunications verticals and their telecom equipment partners. However, although the opportunity exists, capitalizing on it is not as straightforward as it seems, because it requires an appropriate strategy from the players to benefit from it.

A VARIETY OF PLAYERS AND OBJECTIVES

Although ICT plays a major role in the development of a Smart City project, the value propositions of most Smart City initiatives do not position ICT as critical to the project's value chain. On the contrary, value propositions are typically aligned with the respective drivers for the initiation of each project, while ICT is considered an enabler of the ultimate objective.

In addition, the Alcatel-Lucent analysis revealed a variety of ecosystem players involved in the realization of Smart City projects. These players span many government levels and multiple disciplines, and those from the business world range from small private firms to large multinationals. Interestingly, there is no single definitive way in which all players behave and work together. Roles vary based on the nature of each player's business and the Smart City's goals.

Typically, governments initiate a Smart City project. Sometimes this happens in cooperation with other partners. However, private companies can also initiate development efforts. When this does happen, the initiative still needs government backing (Table 3).

Table 3. Key initiation models for Smart City projects

INITIATOR	EXPLANATION
Government	<p>The government alone takes the initiative with the key objective to rationalize infrastructure (existing or to be deployed). Examples:</p> <ul style="list-style-type: none"> • Masdar city, where a presidential law created a special economic zone • Cape Town, where the local government issued a decree transforming the way local government services are delivered • Suwon city, where the Korean Ministry of Information and Communication, in collaboration with the Ministry of Construction and Transportation, created a task force to cope with issues related to Ubiquitous city (U-city) environments that will be realized mainly in newly created communities
Government with partners	<p>Governments work closely with private companies or other partners to improve existing processes and reach pre-defined targets. Examples:</p> <ul style="list-style-type: none"> • Amsterdam, where the city government (Amsterdam Innovative Motor) in cooperation with an electric grid operator (Liander), started a project to reduce energy consumption and tackle related ecological challenges • Birmingham, where the city council worked with partners from the business, public, and local communities to stimulate economic growth and inward investment • Dublin, where the city government cooperated with an energy agency (Codema) to reduce energy consumption and CO2 emissions
Private companies	<p>Private companies take the initiative, backed by the government, to realize well-defined development projects. Examples:</p> <ul style="list-style-type: none"> • Jubail, where Bechtel started the project to make better use of natural gas resources and to develop related industries with the active support of the government • Lavasa, where the Lavasa Corporation in partnership with Wipro (MyCity Technology, Ltd.) plans, builds and manages ICT services • Malaga, where the Spanish energy company Endesa took the lead managing over 50 partners for a project to reduce energy consumption and CO2 emissions • Songdo city, where Gale International, a U.S. real estate firm, and Posco, a Korean steelmaker, were the main backers of a project to build a new city on a 1500 acre man-made island off the coast of Incheon

Government and top government officials are also usually drivers – key influencers and decision makers – of most Smart City projects. Birmingham, Dublin, Gdansk, and Shenyang offer very good examples of projects where government and government officials play this role.

In some areas, laws and regulations sometimes impose this role on local governments. In these cases, governments often form project or development teams, which include leads from governments, academia, and industries, to direct independent yet coordinated sets of programs.

But governments are not the only ones initiating Smart City projects. In some cases, private companies take the initiative. This is the situation in Lavasa, where a subsidiary of the HGC Group started the development. Songdo Smart City was backed by Gale International, Morgan Stanley and Korean steelmaker Posco, while the Trondheim project was initiated by Bellona in cooperation with Siemens.

MANY COMPLICATED RELATIONSHIPS

In all cities, a variety of relationships have developed between primes, main contractors and subcontractors. However, it is unclear how these relationships are created. The most obvious example of this is in Chattanooga, where the city-owned Electrical Power Board (EPB) became a communications company as well as an electric utility, providing telecommunications services for local businesses using its fiber optic infrastructure. Meanwhile, in Shenyang, Northeastern University is working closely with IBM, and in Songdo architects Kohn Pedersen Fox Associates cooperated with ARUP city planner.

Likewise, it is not clear how the relationships between the main contractors are created and what determines the level of engagement among these players. It is also not clear how relationships are established between subcontractors. In addition, there is no evidence to suggest whether or not contractual agreements are created to guide and monitor engagement, as well as manage and minimize competitive behavior among ecosystem partners and subcontractors. And it is unclear how the relationships between the many suppliers involved in a typical project are created and maintained.

A VARIETY OF DRIVERS

Along with the many stakeholders involved in a Smart City development, each project is also driven by a variety of factors. The Alcatel-Lucent analysis revealed three major motivating thoughts behind a Smart City project:

- **Construct or invent a new economic model (the economic driver):** This was clearly the case in Masdar, where the driving idea was to change the oil-based business model of Abu Dhabi Emirates to one based on renewable and alternative energy sources.
- **Reduce energy consumption (the eco-sustainability driver):** The best example of this is the Amsterdam Smart City project, where reducing energy consumption and more efficient energy usage were the key motivations for the project.
- **Improve the quality of life in a city environment (the social driver):** This is best exemplified by the Suwon Smart City project where the initial goal was to improve the lives and education of citizens, and improve government services.

These three drivers are not mutually exclusive. They are all major reasons behind the establishment of Smart Cities, and they can all be found playing a role in the initiation of a project. They do not exclude that in a specific Smart City context another driver may be present, but considered less important. In fact, the Alcatel-Lucent analysis revealed aspects of different drivers in each Smart City project.

However, what is different is how each city rates the importance of each driver in the initiation of the project. For example, Figure 1 provides a visual picture of how the “Invent a new economic model” and “Improve citizen’s quality of life” scored in seven of the Smart City projects analyzed.

CATEGORIZING SMART CITY OPPORTUNITIES FOR TELECOMMUNICATIONS SERVICE PROVIDERS

Despite the many factors that must be taken into consideration, Smart Cities present a viable business opportunity for telecommunications service providers. But given the broad range of Smart City projects being initiated across the globe and that the market is still in the early stages of development, telecommunications service providers run the risk of over-committing resources without any clear payback. Therefore, a successful engagement model is one that is carefully tied to a Smart City strategy. And that strategy must be based on a clear understanding of the ICT opportunities in each Smart City.

To that end, every Smart City has characteristics that make it easy to categorize it as a specific type of project.

Depending on the maturity and complexity of the project, some opportunities will be a more natural fit in the early stages for telecommunications service providers, while others will need greater cooperation and partnership with other players in the Smart City ecosystem:

- IT box projects are the best fit with a telecommunications service provider’s product and service offerings
- Dream box projects can only be pursued in cooperation or partnership with the key companies in the industry that are driving the project
- Black box projects can only be successfully approached if and when invited to participate
- Fragmented box projects require a case-by-case evaluation and even a project-by-project evaluation within each Smart City, to better understand the covered functional areas and develop an appropriate strategy – go it alone or enter into a partnership.

Figure 1. Scoring of two key drivers in seven Smart Cities



Table 4. Categories of Smart Cities based on stakeholder vision and objectives

CATEGORY	EXPLANATION
IT box	This type of Smart City is characterized by the fact that an IT company initiates the Smart City project and manages it, with the focus, of course, on IT excellence. Moreover, the business model is based on private companies providing funding for the project.
Dream box	Dream box projects present themselves as turnkey Smart Cities in which many dimensions are covered in a very ambitious and wide-ranging plan created at the very beginning of the project. The business model for this type of initiative involves a public-private partnership, which is crucial for funding, with an important contribution provided by governments or government agencies.
Fragmented box	In this type of Smart City there are many projects defined, which cover various aspects of the Smart City, but these projects are treated as independent and separate, with little or no integration or link to a global Smart City plan.
Black box	A black box Smart City project is usually led and managed by a government or government-affiliated agencies. A closed ecosystem exists that only includes "invited" companies, which are, in most cases, government-affiliated companies. It is very difficult to get a clear view of what happens inside this ecosystem. Moreover, it is very difficult for private companies to enter.

POSITIONING FOR MARKET SUCCESS

In talking to Smart City stakeholders, Alcatel-Lucent recognized that there are a number of key areas of their business model where they need the involvement of private partners to better assess the ICT infrastructure and to identify the options for partnership.

Therefore the Smart City approach includes five key portfolio elements which are:

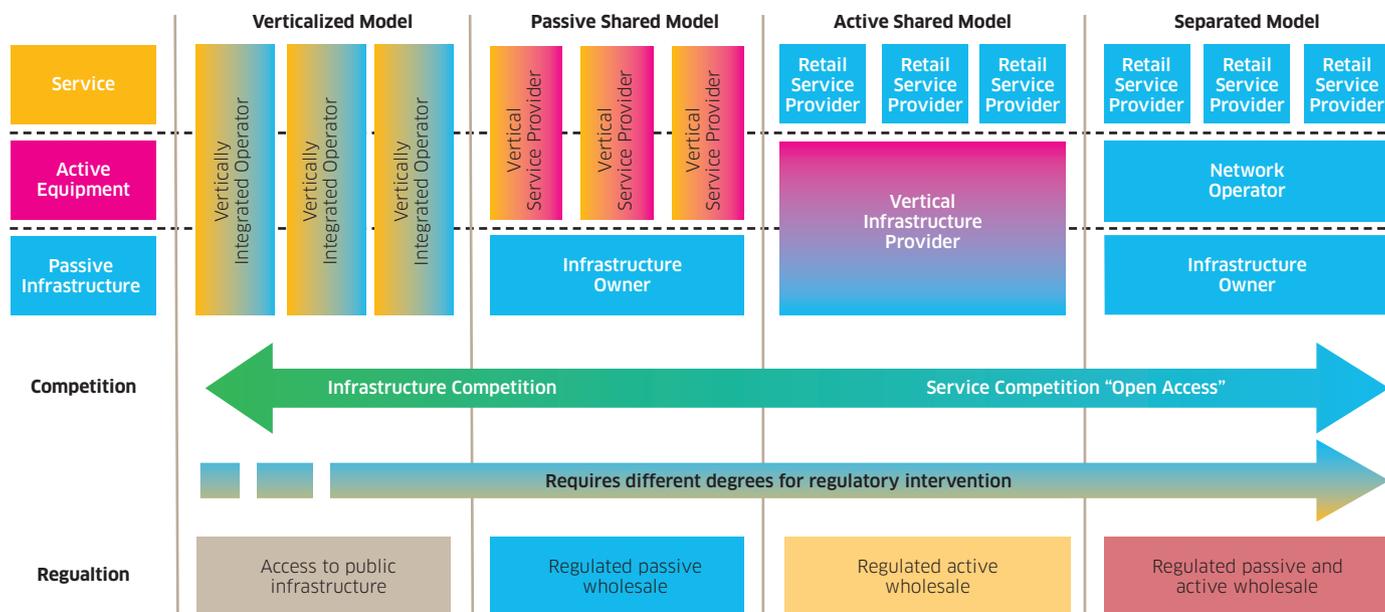
- **Financing model:** Allowing Smart City stakeholders to manage business case funding and defer payments over longer periods. The partner must have the credibility in facilitating development finance with trade partners, facilitating export credit agency insurance/financing, and experience of forming vehicles to manage execution risk for larger programs.
- **Integration services:** Allowing customers to validate their business model in addition to reviewing opportunities to expose further services on their future infrastructure.
- **Operational model:** The complexity of launching new services and collaborating with other networks is managed through operational assurance services.

- **Broadband network:** Based on intelligent network infrastructure such as broadband, so that connected and sustainable cities can be planned. However, before these Smart Cities can be built, trans-sector policies and strategies need to be developed.
- **Security:** Security is critical for Smart City assets. At the Smart City inception, the infrastructure needs to be designed taking into account all security aspects of the physical and logical infrastructure.

To ensure the right level of financing is available through each stage of the development process, Smart Cities must choose an effective business model. In the past, urban development was viewed as a form of public works handled by national, regional, or other government agencies. In Smart Cities, development is increasingly being undertaken as an investment, particularly in emerging markets. As a result, Smart Cities are being constructed and operated as commercial enterprises. This has created a need for more efficient urban development and city management, especially in the early planning stages.

Based on the openness of the commercial enterprise, and the ICT infrastructure construction and service deployment required, a Smart City may have one of four possible business models as shown in Figure 2.

Figure 2. Possible business and engagement models



- **Verticalized Model** means that one operator controls all three layers of the network, and consequently, if a second operator also wishes to offer broadband and telephony services in the same area, it will have to build its own infrastructure, operate it and market it directly to the end users. **This is a clear form of infrastructure competition.**
- **Passive Shared Model** leverages a single passive infrastructure, which is built and maintained by one infrastructure owner. The active and services layers are owned by a different organization. A second service provider may share the same passive infrastructure with the first service provider, but will still have to invest in active network equipment and operations as well as the services and customer-facing activities.
- **Active Shared Model** means that a single organization owns the passive and active infrastructure and operates the active network. This vertical infrastructure owner wholesales broadband access to the various retail service providers who will then compete against each other for customers.
- **Separated Model** partitions the ownership of the different layers. Each layer is owned by a different player, with the infrastructure owner generating income by providing passive infrastructure access to one or more network operators, who in turn wholesale broadband access to retail service providers.

In the future, the business models that will govern investment and revenue distribution in a Smart City will be determined by:

- The competitive positioning of telecommunications service providers with the broadest service offerings for transformational change and smart grid enablement. Partnerships in operational, communications and consumer technology are critical to the success of a Smart City strategy.
- The state of the information utility business model and its evolution over the next 10 years, which will open the door to new service market entrants with retail and financial services platforms and consumer marketing expertise.
- Collaborative initiatives by providers with industry associations, regulatory bodies and universities, which facilitate long-term success through sustained engagements with policymakers, standards bodies, industry consortia, and energy utility customers (co development) to address consumer concerns and enable R&D.

The existence of different business models has opened up the broadband market to organizations other than traditional telecommunication service providers, including utility companies, housing associations and local authorities and governments. Figure 3 and Figure 4 give examples of the value chain and revenue streams helping Smart City stakeholders to decide which business model to apply to each specific case taking into consideration country regulations.

Figure 3. Value chain and revenue stream of the Passive and Active Sharing Business Model

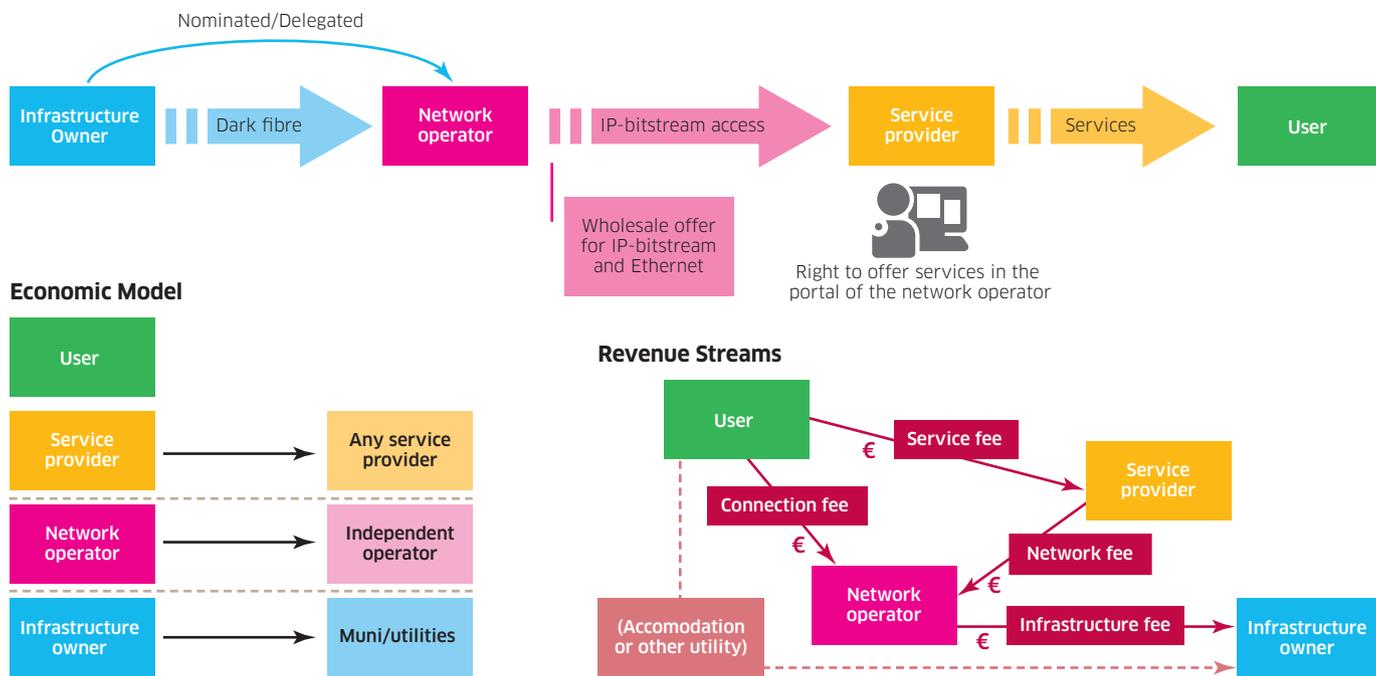


Figure 4. Value chain and revenue stream of the Full Separation Business Model

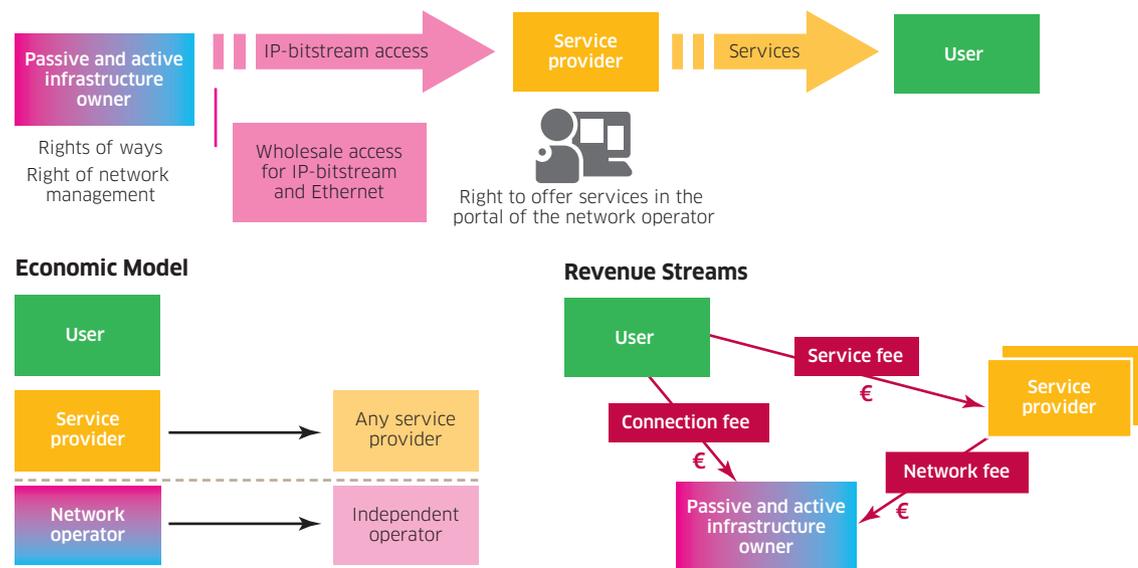


Table 5. Business model opportunities and challenges

BUSINESS MODELS	PROS	CONS
Verticalized Model	Control total value chain and cash flow profile	Complex operation and high execution risk Subscribers have a limited choice of service providers.
Passive Shared Model	Simple operations About 50% of the revenue potential	Lack of direct control over the revenue stream and marketing to the end user Citizens have a limited choice of service providers.
Active Shared Model	Capture extra margin for low incremental investment	Small operators may struggle due to lack of commercial and operational standards for wholesale. Citizens have an unlimited choice of service providers.
Separated Model	Operations are split among the different layers. Clear split of responsibilities Each layer captures extra margin for low incremental investment.	Must be technically credible yet flexible. Small operators may struggle due to lack of commercial and operational standards for wholesale. Citizens have an unlimited choice of service providers.

Deciding which operational or engagement model to follow is fundamental, as it will determine the associated business and the financial model. This decision is also dependent on local regulations, the competitive environment, and the organization's core business activities and competencies. Each type of business model has its own opportunities and challenges, which are summarized in Table 5.

A strategy built on the potential available business will drive Smart City development efforts by mitigating risks. It will change the role of who will provide the city services from that of facilitators of other industry objectives, to that of strategic partners of the key industries and governments involved.

By applying the learning of what drives the creation of a Smart City, the differences between today's Smart Cities, the influence of stakeholders, and alternative business models, telecommunications service providers are better equipped to define their strategies to match their unique capabilities, thus increasing the potential of business success.

MARKET KNOWLEDGE SHARPENS YOUR BUSINESS EDGE

Market and Consumer Insight (MCI) investigates links between consumer behavior, market and technological trends to help Alcatel-Lucent and its clients, Smart City stakeholders, make more informed and impactful business decisions.

MCI experts dig deeper and reach farther to provide information that helps the various players of the ecosystem – for instance utilities, real estate companies and public sector – formulate new thinking, including:

- Global and regional, urban and rural, insights
- Research on consumer, market and technological trends

For more information related to planning, strategizing and executing proficiently to position for success in the Smart Cities market, please contact the Alcatel-Lucent Market and Consumer Insight team at mcinsight@alcatel-lucent.com

* <http://www.alcatel-lucent.com/new-thinking/market-growth/internet-of-things.html>