Smart Cities

## Opportunities for Service Providers

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Smart cities will use technology to transform urban environments. Cities are leveraging internet pervasiveness, data analytics, and networked devices to improve cities' economic, environmental and social trajectories. This viewpoint examines the trajectory of smart cities, describes their significance to service providers and recommends ways in which service providers can drive growth in smart cities.

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The Growing Challenge

In 1900, around 15 cities in the world had populations of one million people or more. Today, the number of cities meeting this mark has grown to 450. Cities currently host 50% of the world's population and by 2050, this percentage will grow to 66%, or seven billion people. The trend toward more populous cities has been accompanied by a trend toward greater urban density.

Cities have always faced economic and social pressures. However, today's spiking urban populations are overwhelming many traditional solutions. Simply building more housing will not solve poverty and inequality. Simply hiring more teachers will not solve the problems of education. Moreover, uncontrolled use of natural resources is severely harming our environment. Cities need to find better ways to support future urban growth.
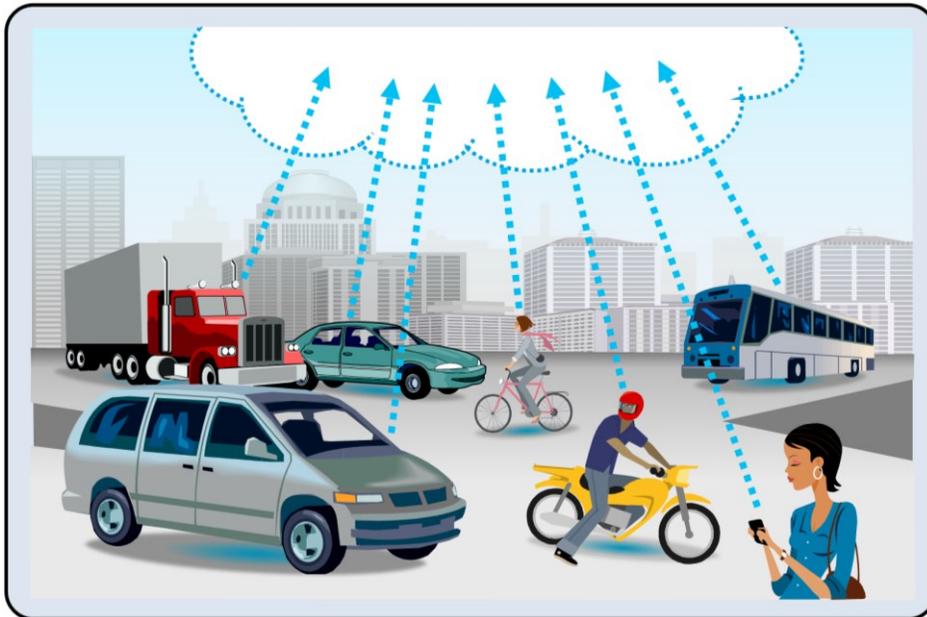
The Building Blocks of Smart Cities

Pervasive internet connectivity, data analytics and networked devices can support healthier economic, social and environmental urban growth. Cities are epicenters of technology adoption. Over half of all mobile traffic is already in cities and is expected to grow to 60% within two years. Cities can leverage this momentum to strengthen communication among citizens and cities, predict patterns to inform urban planning, incentivize and orchestrate new behaviors and even automate physical infrastructure such as vehicles and transportation systems. Network technologies will transform how cities operate.

Today, 40% of the world's population has access to the internet, which can provide a foundation for new forms of information sharing. Cities can use the internet to disseminate information, to engage citizens and to manage city functions. For example, cities can create platforms (e.g., web-based and mobile) that create opportunities for cities and citizens to interact, build relationships and share. These platforms can be used to enhance the sharing economy, expand citizen participation in debating or voting on issues and streamline the management of city functions.

Pervasive Internet Connectivity – Applications		
	One-Way Communication	**Two-Way Communication**
Description	• Direct, real time communication between municipal government and citizens	• Platforms for collaboration, network building, and sharing between and among cities, citizens and businesses (i.e., web-based, mobile apps and social networking)
Example Applications	• Mobile device-based emergency notifications / evacuation management • Reminders for activities such as elections, trash collection or city events • Information for visitors to a city	• Platforms for citizens or municipalities to network around common interests • Platforms for sharing cars, housing, work spaces or social spaces • Platforms for citizens to provide input, debate issues or vote • Online management of city functions such as permitting and public works
Benefit	• Improved public safety • Participation in city activities • Coordinated city services • Waste reduction	• Improved social fabric and citizen engagement • Economic growth • Environmental efficiency • Greater municipal accountability • Reductions in labor cost • Increased economic productivity

Snapshot		
	Where:	New York City
	When:	Construction beginning 2015
	Who:	CityBridge, a partnership of advertising, technology, telecom companies
	What:	Payphone modernization
	Benefit:	• Units provide gigabit WiFi, directions, cell charging, and voice calls • Private sector funded and expected to bring in substantial ad revenue

Image credit: CityBridge

Data can lead to valuable insights about the behaviors and patterns of individuals and groups. Our ability to use data to track, store, analyze, and draw conclusions is stronger than ever and could be used to support the development of smart cities. Data, such as movement patterns, buying behavior, and resource consumption (e.g., use of public spaces and transportation) contains valuable insights that can be used to support the development of smart cities (e.g., new facilities and roads). In addition, findings from the analysis of behavioral patterns can be used to incent behavioral changes in urban behavior and orchestrate resource use (e.g., collection and analysis of transportation data to inform development of a seamless multimodal transportation app). Additionally, cities could leverage data to monitor and charge for use of urban infrastructure (e.g., metering and charging for use of roads). Efforts by governments to increase the availability of open data could support further progress in this area.

Data Analytics – Applications			
	Urban Planning	**Citizen Orchestration**	**Metering and Charging**
Description	• Use of location data to inform urban development and resource allocation	• Use of location data to inform citizens of resource usage	• Monitoring and charging for actual use of urban infrastructure
Example Applications	• Identify patterns of and changes in use of public resources (roads and public spaces) and transportation infrastructure to inform planning • Identify patterns in crime to support police in planning resource allocation	• Collect and analyze data to identify trends, use findings to optimize resource allocation, and share with citizens to support better informed use decisions • Incorporating time, price, parking and walking distance, with option to pay for a trip in one seamless transaction	• Variable road pricing based on time of day, demand for use, type of vehicle, etc.
Benefit	• Improved access for people, particularly equal access • Optimized cost allocation reducing cost and creating economic growth	• Optimized use of resources, reducing traffic and environmental strain	• Incentive for behavior shifts leading to reduction in rush hour traffic, use of certain routes, and use of high emission vehicles

Snapshot		Where: Paris, France When: Today Who: Paris-based company Snips What: Transit passenger load prediction Benefit: • Analyzes real-time rider submissions, boarding trends, demographics, weather, other transport options and special events • Informs rider trip planning and transit deployment

The breadth of types of networked devices – and applications for them – are expanding rapidly. Companies are developing innovative applications for connected devices in homes, work places, and sources of energy. We can automate technologies and orchestrate the ways in which they behave together (e.g., vehicle to vehicle (V2V), vehicle to infrastructure (V2I) and machine to machine (M2M) connections). We can also use network connections to enhance our ability to participate in activities and collaborate from remote locations (e.g., movement enabled telepresence technologies). This can be used to optimize the delivery of resources and the movement of people for environmental, economic and social benefit.

Networked Devices – Applications		
	Device Automation and Orchestration	**Virtual Presence and Productivity**
Description	• Technologies that make machines more productive	• Technologies that make people more productive
Example Applications	• Network connections within and among vehicles (V2V) and transportation infrastructure (V2I) enabling orchestration of entire transportation environment (e.g., autonomous cars) • Network connections within technologies that deliver utilities and other resources (e.g., M2M, smart home technologies)	• Incorporation of touch and movement into telepresence technologies (e.g., video chat with controllable movement)
Benefit	• Enhanced safety of transportation • Increased ability to be productive while traveling through the city • Reduced emissions • Reduced use of energy	• Decreased need for travel, increasing productivity and reducing environmental impact

Where:	Austin, TX
When:	Today and In Development
Who:	Siemens
What:	Smart Intersections
Benefit:	• Alters traffic light timing based on approaching smartphones or emergencies
	• When nearing red traffic signal, connected cars automatically power down and recharge via regenerative braking

Image credit: electronicsbus.com

Snapshot

Opportunities for Service Providers

Building smart cities depends on a variety of stakeholders. Network service providers, in particular, can lead the charge. While governments, particularly local governments, are needed to build consensus and coordinate, they lack the resources and expertise to do it alone. The private sector is needed to provide capital, innovation and implementation support. Network service providers can contribute in areas in which other participants in urban development efforts often fall short. To compete effectively, they should proactively identify opportunities that complement their organizational capabilities and goals. Below are service provider capabilities, as well as examples of how these capabilities can generate revenue while fostering smart city development.

Service Provider Capabilities for Smart Cities	
Capability	**Description**
Means for investment	Public / private partnership is necessary to achieve Smart Cities
Ability to drive adoption	Network operators have strong capabilities in marketing, education, and training
Technological expertise	Cities lack network operators' deep technology expertise
Ability to scale	Network operators bring successful innovations across geographies
Trusted consumer data management	Leading privacy advocates are calling on network operators to play this role
Access to valuable customer data	Existing billing relationships and persistent interaction with customers and devices
Data capabilities	The ability to access, collect and process data in real time
Scale and impact as an industry	The potential to collectively influence the legal and regulatory landscape

Service Provider Opportunities for Smart Cities	
Application	**Examples**
Education services and support tools	• Cloud-based collaboration • Dedicated television channel and webcam enabling simple communication for English language learners, elderly and low-income demographics
Government collaboration tools	• Centralized e-government platform • Electronic voting capabilities
Connections across data systems	• Aggregation of multimodal transportation system data
Sharing (P2P) ecosystem infrastructure	• Platform for building space sharing • Management of vehicle access for car sharing

Cartesian estimates that smart cities are a $7.5 billion per year opportunity for technology providers. Private sector participants are recognizing this opportunity and developing strategies to leverage their capabilities to create more technically advanced cities. Developing a focused smart city strategy can help network service providers identify missing assets or capabilities and determine how to bridge gaps through internal investment, partnership or acquisition.

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