



A TALE OF 3 SMART CITIES

- London, New York and Tokyo.

Essential technologies that are
enabling the Metropolises of Tomorrow



Smart cities

are no longer a dream of tomorrow, but becoming an increasingly popular option for enhancing the sustainability and livability of major metropolitan areas throughout the world. To enable the functionality of the advanced technologies that make up a smart city, a superior level of connectivity is not only advantageous but essential. Mission-critical data centers located in the heart of these smart cities are making this level of connectivity possible with low latency interconnectivity, resilient infrastructure to securely house critical data, and scalable capacity for future growth.

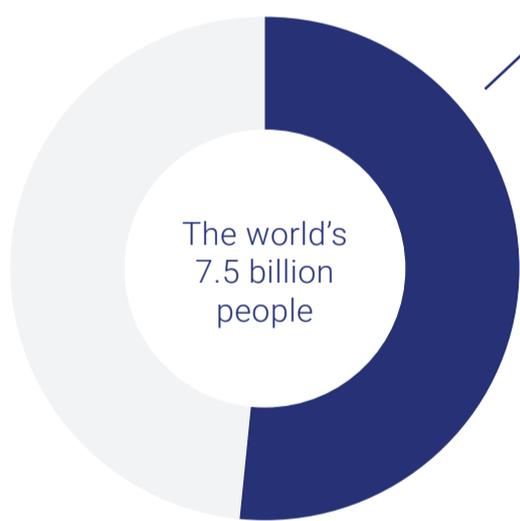
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Introduction: **Defining the Smart City**

With the global population steadily increasing, major cities around the world are experiencing a massive influx of new inhabitants each year. According to the World Health Organization (WHO), 54 percent of the world's 7.5 billion people currently live in urban areas, a number that is expected to grow by two percent every year until 2020.



54%

Live in urban areas

In order to maintain a high quality of life for residents, cities around the world are becoming smarter, incorporating innovative Information and Communications Technology (ICT) and Internet of Things (IoT) devices to manage a variety of city assets such as transportation, government, education, law enforcement and waste management.

These so-called 'smart cities' are changing the way people live on a fundamental level by continuously collecting and analyzing data that is used to improve a city's livability.

Growth, Trends and Forecasts

As a growing number of people congregate within urban areas, it has become increasingly important to make cities greener and more efficient through the utilization of smart technologies. According to a study by research firm Frost and Sullivan, there are eight key factors that define smart cities, including smart governance, smart energy, smart building, smart mobility, smart infrastructure, smart technology, smart healthcare and smart citizen. Based on its research, Frost and Sullivan reports that these eight elements provide a combined market potential of \$1.5 trillion globally.

8 KEY FACTORS THAT DEFINE SMART CITIES

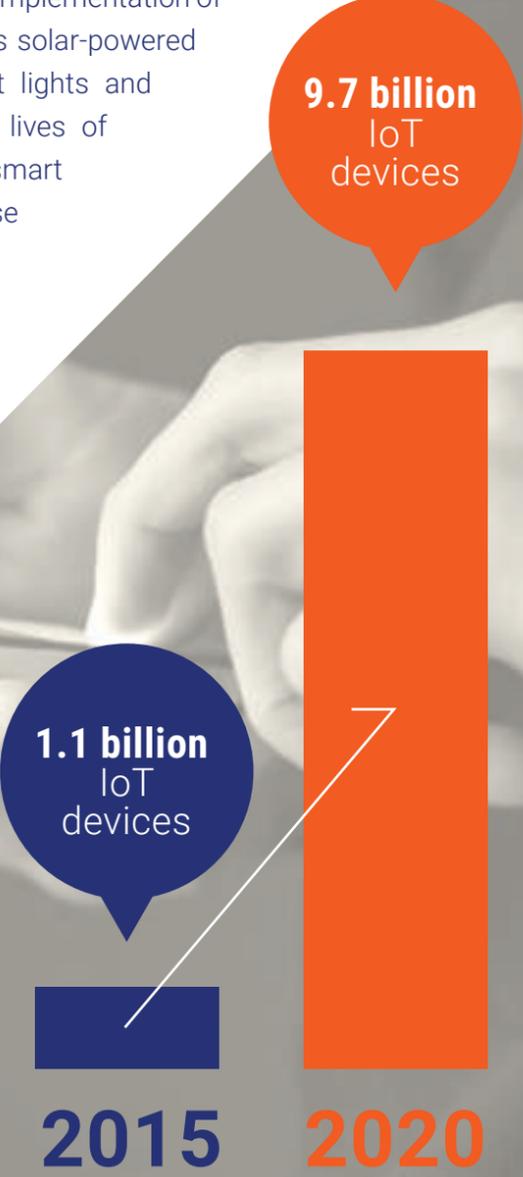


Combined market potential of **\$1.5 trillion** globally

A multitude of sensors and IoT devices are critical to the enablement of smart cities. Gartner predicts that 9.7 billion devices will be used in smart cities by the year 2020, rising from just 1.1 billion in 2015. Gartner also predicts that climate change, resilience and sustainability will be among the chief objectives surrounding smart cities in upcoming years, as major metro areas around the world launch various projects utilizing IoT technology for data collection and resource management.

These diverse projects create an opportunity for the implementation of green technologies throughout smart cities such as solar-powered trash compactors, remotely controlled LED street lights and vehicle emissions sensors. In addition, the daily lives of residents and visitors are also directly impacted by smart technologies, as many gain the opportunity to use emerging applications such as driverless cars, Wi-Fi kiosks, and solar-powered charging stations.

“ climate change, resilience and sustainability will be among the chief objectives surrounding smart cities in upcoming years ”



5G and the Future of IoT

As the growth in mobile data accelerates and more and more demand is seen on the ground for better ways to access content on the move, the future of IoT requires new networking capabilities to support a massive number of connected devices. This requires unprecedented efficiency for both devices and networks. For IoT to successfully evolve, close partnerships across industries and ecosystems are

essential. IoT must have the ability to utilise the power of next generation technologies and 5G is best placed to offer these enhanced features. 5G will be able to support the future application at the core of IoT which demands intensified computational and communications power. 5G networks high speeds (up to 10Gbps) combined with the next generation of low latency radio links, enable mobile devices to become immersive and overarching in their capabilities.

High-bandwidth, low-latency connectivity

Although IoT is not new as a concept or as a service, 5G will provide the technology for the evolution of a more cognitive and more virtual IoT, especially for telecoms and service providers. It will allow much more in the way of direct device-to-device communication, massive machine communication, with ultra-reliable communication as a standard. One thing that is very clear - 5G networks must accommodate many more users and devices whilst delivering more data to each individual user at an instant for IoT to develop and replicate.

5G is on its way to not only becoming reality, but also the standard for next generation data transmission. It will provide the engine to communicate the IoT to multiple devices and machines. 5Gs impact on the IoT will be transformational and will take IoT to a completely new level.

To facilitate constant connectivity, which is the cornerstone of smart city infrastructure, data must be exchanged virtually instantaneously between businesses, organizations and government entities.

To enable IoT technologies and the 5G networks that support them, high-bandwidth, low-latency connectivity inside smart cities is absolutely critical.



INSTANTANEOUSLY EXCHANGE

HIGH-BANDWIDTH



LOW-LATENCY

Leveraging their ability to provide enhanced connectivity, and their substantial experience managing complex networks and mitigating cybersecurity threats, telecom providers, global network operators and mobile businesses are in a prime position to serve the technological requirements of smart cities.

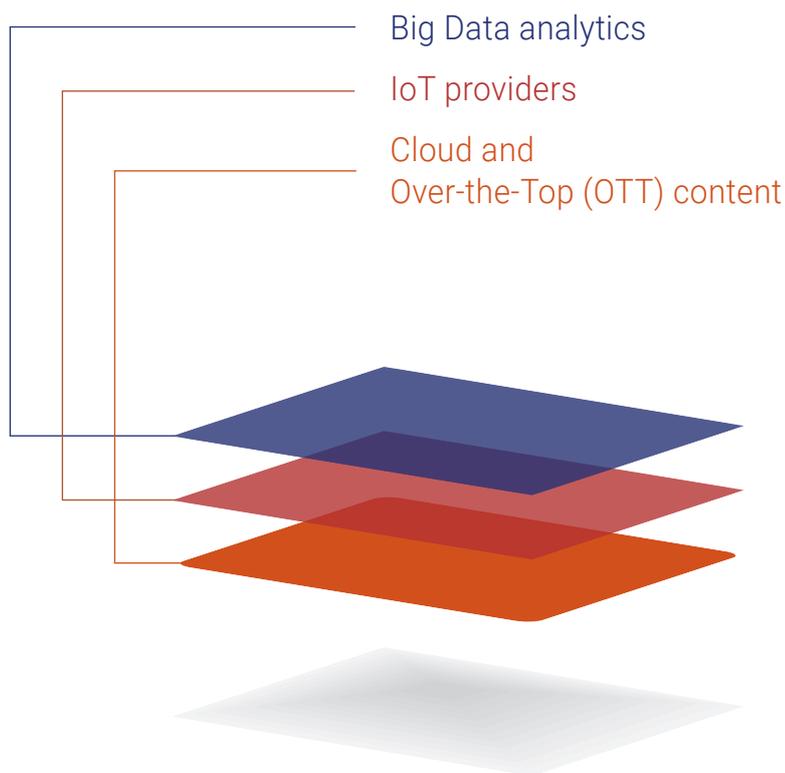
Without superior connectivity, it will be physically impossible to process the high volumes of data necessary to create a network of communicating devices. This need presents the opportunity for telco providers to become involved in the next generation of technology and communications.

A Multi-Layer Ecosystem

Smart city enablement lies within the integration of a new multi-layer telecommunications ecosystem built to support enhanced connectivity. Making up the first layer of this ecosystem, telecommunications companies, Internet Service Providers (ISPs) and Managed Services Providers (MSPs) were among the first wave of data center adoption in the 1990s. During this time, providers found that colocating in close proximity to one another significantly reduced the costs associated with peering. In addition the lower latency resulted in increased performance, enabling

a competitive advantage over rivals.

Over the last two decades, market growth has resulted in the emergence of a large number of highly-connected data centers. This dense network connectivity enabled the next major wave of market disruption via the Cloud and Over-the-Top (OTT) content, followed by IoT providers and Big Data analytics, making up the second and third layer of the telecommunications ecosystem. In many cases this interconnectivity is facilitated by leading Internet Exchanges such as NYIIX, LINX and JPIX.



These three layers interact to form the necessary backbone to enable the emergence of smart cities. Enterprises looking to claim their stake early on are adopting colocation with direct connectivity to key partners for faster and more efficient design and deployment of new technologies and offerings.

How Telcos Can Position Themselves to be Ready for Smart Cities

As we look to the future, it is evident that Telcos will be at the heart of the Smart City. High capacity, highly available networks will provide the level of connectivity that will be needed to facilitate constant communication between devices such as smart healthcare, smart payments, smart utilities and smart transport. All IoT and city devices must be connected through home and public broadband, optical fibre and network data.



The Smart City is not a distant concept; Telcos need to start acting now. In 2012 Virgin Media was awarded the contract to install Wi-Fi at stations on the London Underground in time for the Olympics, and it is now available at more than 260 stations. Whilst metro passengers in Paris, New York, Berlin, Seoul and Tokyo have enjoyed Wi-Fi services for several years, Jason DaPonte, Innovation Manager at Transport for London (TfL), is further advancing this by prioritizing Wi-Fi connectivity across the entire underground network.

The BBC reports that TfL and London Mayor Sadiq Khan will invite telecoms firms to bid to build the infrastructure to provide underground 4G Wi-Fi coverage imminently.

Another example of how TfL is engaging Telcos and Smart Cities is the roll out of their IoT network. DaPonte says “we are in the process of connecting as many of our trains and buses and tracks and ventilation systems and ticketing systems to get as much data out of those as possible to see what insights we can get”. There are already more than 30,000 sensors on every train on the underground delivering 2GB of sensor data per week. The aim of collecting this data is to get “a much deeper level of experience understanding of customers and the ability to improve their journeys both from a hard engineering point of view but also from a personal point of view.”

“
There are already 3000 sensors on every train on the underground delivering 2GB of sensor data every week

In order to become more involved in the development and enablement of smart cities, telcos must position themselves in highly-connected data centers located within the city limits for fast, secure and resilient connectivity at all times. By colocating network infrastructure within these data centers, companies can innovate faster and launch new offerings virtually instantly with direct and immediate access to connectivity resources.



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As smart cities grow both in number and complexity, the technologies they employ are putting a major strain on the supply of colocation and Cloud resources. Today's telecom providers should never underestimate the sheer amount of data traffic that will be generated by a fully-developed smart city. Furthermore outages at hospitals have hit headlines, with operations cancelled or postponed, and the occasional outages in some of the major cloud providers' operations also cause major disruptions to a variety of their corporate customers.

As a result, it is critical for those involved in the development of smart cities to identify secure, resilient and scalable data center infrastructures that will ensure networks are future-proofed.



FUTURE-PROOFED NETWORKS



Smart City Enablement by Telehouse

Telehouse provides highly-connected colocation facilities within multiple smart cities around the world, including New York, London and Tokyo.

By collocating within one or more of these global facilities, companies have the opportunity to introduce innovative technologies and services to advance smart city development and the proliferation of IoT with direct, low-latency connectivity to end users.



SMART CITY

NEW YORK

LONDON

TOKYO



LONDON



Boasting a combined worth of £56 billion, London serves as the largest tech market in all of Europe with 40,000 digital businesses and 300,000 employees in its technology sector alone^{1*}.

The report commissioned by the Department of Business Innovation and Skills in October 2013 indicates the UK government's interest in being a world leader in the area of Smart Cities. The UK has been the most prolific user of the Horizon 2020 fund established by the European Commission to run pilots for smart cities. Whether this trend continues post-Brexit, given the funding that had been made available through Europe, remains to be seen but it could be an area which actually comes to greater prominence as a result.

As the largest city in Europe, London is leveraging smart technology to solve real-world problems such as rapid population growth, and to maintain its global business competitiveness while ensuring livability. Similarly to Urban Tech NYC, London hosts 'Future Cities Catapult' and groups like Cognicity, both of which have a focus on supporting smart cities start-ups/SMEs, plus more than 60 tech incubators & accelerators in the capital.

TELEHOUSE NORTH TWO
is expanding to help facilitate telco Smart City Infrastructures at the Edge



TELEHOUSE NORTH TWO
Docklands, London



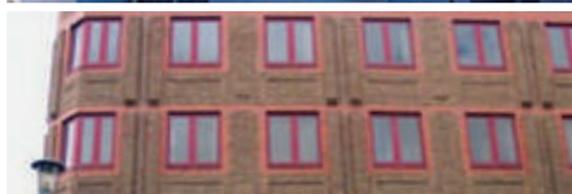
TELEHOUSE NORTH
Docklands, London



TELEHOUSE EAST
Docklands, London



TELEHOUSE WEST
Docklands, London



TELEHOUSE METRO
London



The Mayor's Smart London Plan, published in December 2013, outlined the ways in which smart technology will be utilized throughout the city to improve the lives of citizens and visitors through three overarching work-streams: Engaging and empowering Londoners and their businesses with smart technology; enabling growth for London's infrastructure, environment and transportation systems by harnessing data and digital technology; and working with businesses to help leverage opportunities for further growth and innovation.

“ The Mayor of London, Sadiq Khan said:
“As Mayor of this great city – the best city in the world – it fills me with pride to see our tech sector thriving. New technologies are having an enormous impact on our way of life - reshaping our societies, our economies and our culture.
 My ambition now is to harness the new technologies that are being pioneered right here to transform London into the world's leading smart city.
 The potential for cutting-edge technology to tackle a host of social, economic and environmental challenges is immeasurable. From air pollution and climate change to housing and transport, new technologies and data science will be at the heart of the long-term solutions to urban challenges.”



Reinforcing Mayor Bill de Blasio’s promise to help the city of New York maintain its position as a technologically and economically advanced city, the Mayor’s Office of Tech and Innovation has been hard at work creating one of the most innovative and tech-friendly cities in the world through its Smart and Equitable City initiative. As a result of this initiative, New York was announced as the Best Smart City of 2016 at the Smart City Expo World Congress in Barcelona.

Making New York a global benchmark for smart technology, this initiative rests on four pillars of innovation. Among these, LinkNYC, which replaces the city’s payphones with Wi-Fi kiosks to expand connectivity among citizens and visitors; Marketplace.nyc, a digital platform to help government institutions identify smart city solutions; Urban Tech NYC, an accelerator program to

NEW YORK

help entrepreneurs create smart technologies and solutions; and a comprehensive set of guidelines for the deployment of smart technologies and practices.

Simon Sylvester-Chaudhuri, Managing Partner and Chief Innovation Officer at Global Futures Group stated, “New York’s progressive policies, unparalleled diversity, appetite for innovation and entrepreneurial spirit make it an attractive gateway for new technologies from across the globe. I have worked all over the world, and in no place have I seen people as hungry as they are here. New York is truly unique and serves as a prime location for smart city innovation and development.”



NEW YORK awarded The Best Smart City of 2016

at the Smart City Expo World Congress in Barcelona

LinkNYC

Marketplace.nyc

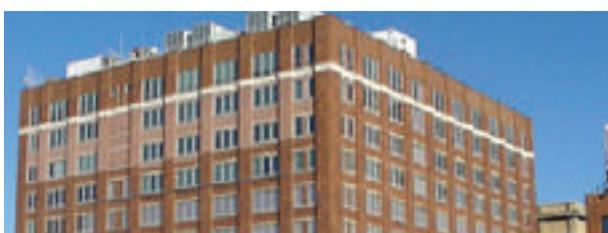
URBAN
TECH
NYC



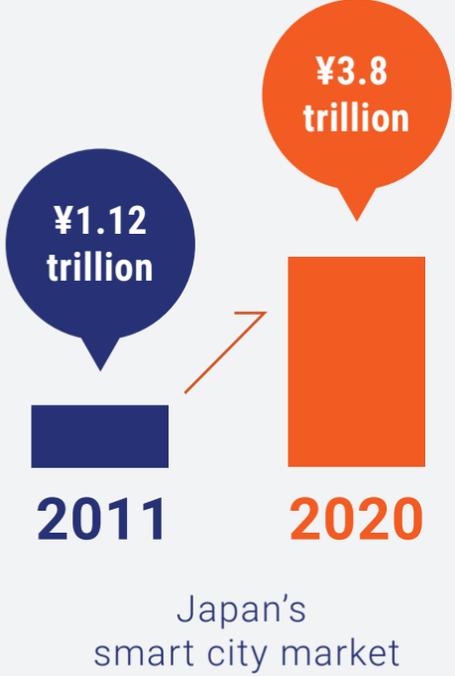
SMART CITY



TELEHOUSE TELEPORT
Staten Island, NY



TELEHOUSE CHELSEA
85 10th Avenue, NY



Japan's smart city market

Japan's smart city market, which stood around ¥1.12 trillion in 2011, is expected to increase to ¥3.8 by 2020 thanks to significant subsidies from the Ministry of Economy, Trade and Industry (METI).

TOKYO

In Tokyo, smart technology solutions such as automation of energy supply and production of highly-connected vehicles are being utilized to help solve regional issues in the pursuit of enhanced sustainability and livability throughout the city.

In addition, as Tokyo prepares to host the 2020 Olympics, urban development has greatly accelerated making sustainability a key consideration.

Organizing the Olympic games provides Tokyo with an opportunity to make additional smart upgrades throughout the city, including enhanced energy efficiency within buildings, sustainable construction and renewable energy production.



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ABOUT TELEHOUSE

Telehouse is the pioneering data center colocation provider established in 1989. It is an owner operator of global data centers, connectivity and managed ICT solutions to over 3000 corporations around the world. Telehouse is the data center subsidiary of Japanese corporation KDDI, a leading Japanese mobile and fixed-line telecommunications and ICT solution provider with 104 offices in 28 countries around the world and a Global Fortune company.



CONTACTS

UNITED STATES

E: marketing@telehouse.com
T: +1 844 518 0026 (Toll Free)

UNITED KINGDOM

E: webenquiries@uk.telehouse.net
T: +44 (0) 207 512 0550

JAPAN

E: inquiry@telehouseglobal.com
W: www.telehouse.com

1. <http://technation.techcityuk.com>
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