Berg Insight™

KORE

When cities get smart, life gets easier

Introduction

Cities are today pushed to utilise public assets and infrastructure more efficiently to accommodate growing urban populations and address challenges related to energy consumption, environmental degradation and public safety. Limited public funding must be balanced across areas such as energy, transportation, security, infrastructure, water and waste management, public information, and environmental monitoring. The growing number of IoT solutions deployed in these areas has given rise to the term 'smart cities' – a concept that refers to the utilisation of data from a myriad of sensors and devices to manage city assets, resources, and services across multiple city verticals. Five smart city applications that hold potential to show significant growth in the coming years are smart street lighting, smart parking, smart mobility services, digital signage and smart waste management.

Solution vendors focus on interoperability to break down smart city silos

The concept of smart city platforms has emerged from the idea of integrating data streams from all smart city verticals to allow for coordinated management and analysis through a single interface. Historically, cities have made siloed investments into various smart city verticals, each with its own networks and software systems. This has resulted in post-deployment integrations that have seen varying degrees of success due to frequent interoperability issues. The emphasis on interoperability has nevertheless increased in recent years, with companies active within specific smart city verticals adding functionality for additional smart city solutions to their core offerings.

Why smart street lighting is the most widely adopted smart-city application

Street lighting is a critical part of cities' infrastructure, which historically has accounted for as much as 40 percent of cities' total electricity usage – translating into a massive opportunity for cost reduction. By replacing old light bulbs with new LED lamps, cities can save up to 50 percent of electricity usage. An additional cost reduction of around 30 percent can be achieved if lighting schedules are optimised and remotely controlled by a smart solution.

Smart street lighting solutions are designed to optimise the amount of lighting according to actual needs, in contrast to conventional street lighting where lighting schemes are unresponsive to changes in demand by being static or non-existent. In recent years, smart street lighting infrastructure has moreover emerged as a promising platform for the management of a variety of other smart city devices.

Beyond energy savings, smart street lighting networks provide a platform for other smart city devices due to its ubiquitous nature across urban areas. Sensors and devices can leverage the communications capabilities and power supply of the smart street lighting infrastructure, while the street lighting pole itself offers a protected environment suitable for various applications including Wi-Fi hotspots, surveillance cameras, gunshot detection sensors, public address systems, real-time information displays, EV charging stations, as well as sensors for weather, pollution, waste management, parking, and noise monitoring. Additionally, they can support extended cellular network coverage in dense urban areas by hosting small base stations.

At the end of 2023, the global installed base (excluding China) of individually controlled smart street lights reached 23 million. Cities, municipalities and utilities are becoming increasingly aware of energy costs and environmental issues related to street lighting as well as its potential as a smart-city enabler. With an addressable market of over 350 million street lights across the world and its potential of trimming a major share of cities electrical usage, the market is expected to grow in conjunction with LED retrofits and an increasing need for energy optimisation. Growing at a compound annual growth rate (CAGR) of 22 percent, the global installed base is expected to reach 63 million in 2028.

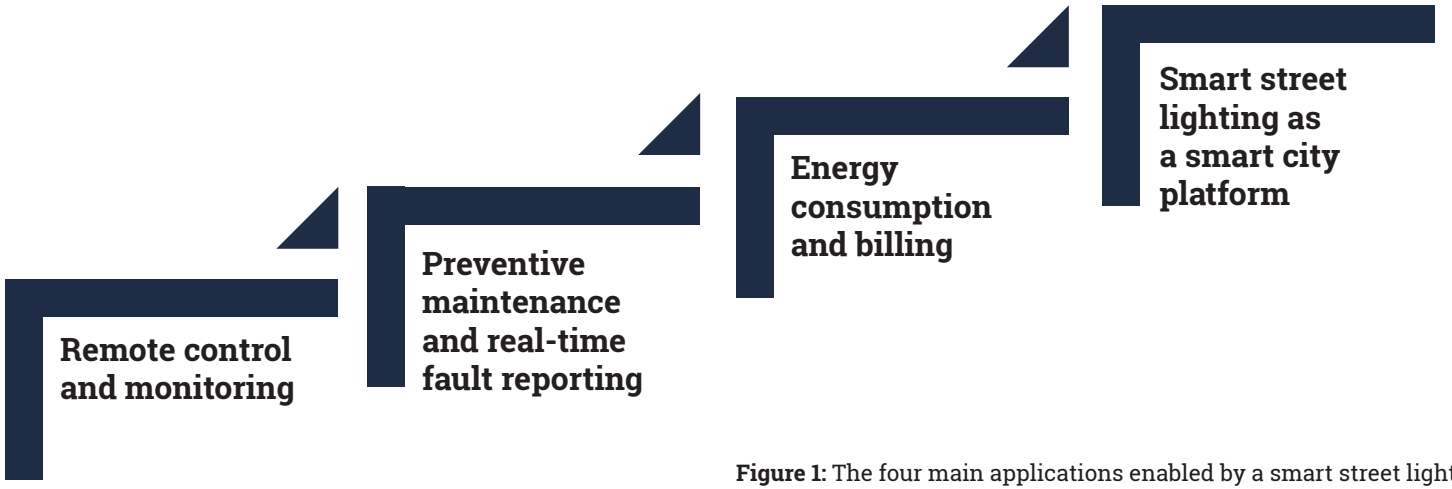

Figure 1: The four main applications enabled by a smart street lighting control system

Smart parking solutions help eliminate the hidden costs of parking

The never-ending circling of blocks, the stress of finding a spot and the inevitable fines for overstaying make the urban parking dilemma a shared experience worldwide. Before the development of wireless sensor technology, parking guidance solutions guided drivers to or within parking facilities with available parking spaces. Today, parking solutions have become more advanced and are able to guide drivers in real time to available parking spaces anywhere in a city, while also facilitating the introduction of an array of new parking enforcement, payment and curbside management capabilities. These systems not only alleviate congestion but also help cities significantly enhance the overall efficiency of their transportation networks.

Broadly defined there are two separate parking detection application areas with their own characteristics – indoor and outdoor parking occupancy detection. Outdoor parking occupation detection is the more complicated of the two due to the lack of power supply and harsh conditions. The dominant sensor types are in-ground and surface-mount sensors, collectively referred to as ground parking sensors. Excluding China, there were over 1.3 million of these sensors installed worldwide by 2023.

The global market is still in an early stage and is expected to be boosted in the coming years as cities move from pilots to city-wide deployments. The build out of EV-charging infrastructure acts as a major driver for the market, as the ability to secure availability and capture violations at EV-charging spots becomes more important. Technology and pricing have also gotten to a point where even mid-size cities can effectively deploy parking sensors to manage their parking operations.

Europe is currently positioned as the leading region, where adoption has benefitted from a positive attitude among local authorities towards solutions that improve environmental performance. Urbiotica, Fleximodo and Smart City System are currently among the leading players in the region. In North America, adoption has lagged Europe but is now on the rise. Leading vendors in the region include Frogparking, CivicSmart, PNI, Nwave Technologies, eleven-x and Fybr. In other parts of the world, large-scale rollouts are increasingly taking place in regions such as the Middle East and Southeast Asia. In Malaysia, the state of Penang has for example recently deployed close to 36,000 sensors as part of the country's first IoT enabled smart parking project.

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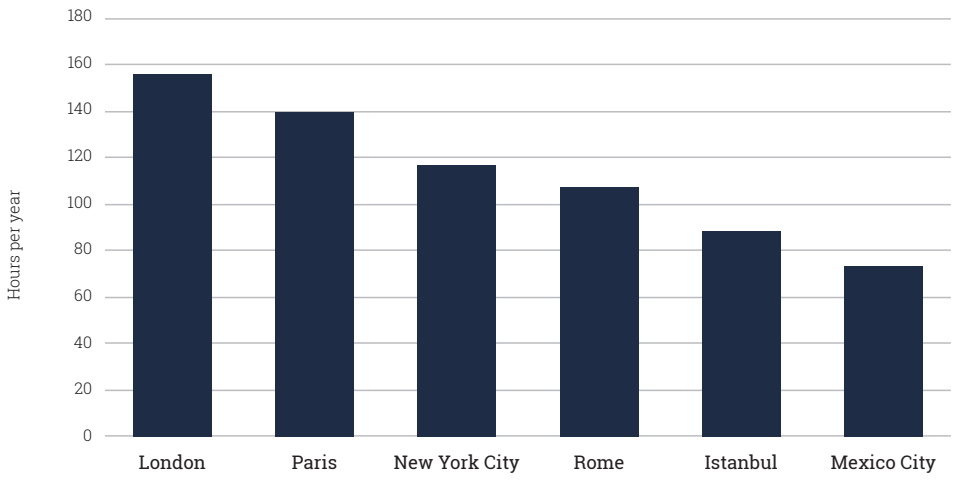

Figure 2: Time lost in traffic congestion per driver

Mobility services lead the development towards the sharing economy

As cities and governments have taken action to alleviate urban congestion through measures such as traffic reduction policies and congestion charges, there has been a significant rise in alternative mobility services. These services are part of a paradigm shift that is driven by the sharing economy, which is transforming the attitudes of urban dwellers and businesses towards ownership and consumption. The automotive and personal mobility sectors have been at the forefront of this shift and have adapted to the sharing economy with services that aim to maximise efficiency and provide flexible transportation options.

The past decade has seen a surge in the adoption of shared micromobility services such as bikesharing and scootersharing. At the end of 2023, the global fleet of such vehicles reached an estimated 27 million vehicles. Examples of companies that operate bikesharing schemes include Meituan Bike, Hellobike, DiDi, Nextbike and JCDecaux, while notable scootersharing operators include Vogo, Marti Technologies, Cooltra, Bird, Tier Mobility, Lime and Voi Technology.

Together with other shared mobility programmes such as carsharing, micromobility services makes mobility in urban areas available to a broader audience while at the same time allowing cities to reduce environmental impact. The use of these vehicles is particularly well suited as a supplement to other modes of transport, including walking and public transportation. However, the greatest benefit is perhaps the ability to replace shorter car trips with more sustainable alternatives which can play a key role in reducing traffic congestion.

Besides making it easy and convenient for users to locate, unlock and pay for vehicles, reliable connectivity is essential for shared mobility services for a number of reasons. It provides valuable data for cities to improve traffic management and infrastructure planning, while at the same time enabling real-time monitoring for efficient fleet management and optimised vehicle distribution for operators.

Digital signage drives economic activity in cities

Digital signage is already a mainstay in most cities around the world and is commonly used to display wayfinding directories, bus and train schedules, city service information and emergency notifications in real time. However, the use of connected digital signage displays also constitute a hugely valuable tool to drive customer engagement and boost local business revenues in a smart city.

In the signage industry, there is currently one word that is on everyone's lips – retail media. The concept refers to the digital advertising space, retail data assets and in-store opportunities that a retailer owns, which is made available to brands for the execution of advertising campaigns. It is estimated that retail media in the US alone will be a US$ 100 billion industry by 2026. A related concept is programmatic advertising, which refers to the use of automated buying and selling of digital advertising through dedicated platforms.

The use of programmatic advertising is today widely used in outdoor digital signage settings, but its use in retail environments now grows rapidly. As an example, Walmart currently operates a retail media network that consists of more than 170,000 displays. The major premise of retail media is that retailers hold huge amounts of data on the behaviour of their customers via anything from loyalty and discount cards to email IDs. Combined with the use of other smart city technologies, digital signage displays are uniquely positioned as a bridge between the physical and the digital space to accumulate and deliver information to and about customers. This opportunity is further bolstered by the depreciation of third-party cookies which has made online advertising less effective.

Today, most major digital signage software vendors offer solutions tailored for retail media. The market is served by a variety of actors including integrators, display screen and media player vendors as well as content management software providers. Leading players in the latter category include companies such as STRATACACHE, Uniguest, Navori and Vertiseit.

Reliable connectivity is not only critical for in-store retail media networks, but for all digital signage projects to ensure continuous content delivery and updates. However, it can be challenging to achieve when relying on only one network in a country. The leading managed services provider Pixel Inspiration has digital signage projects across a diverse range of retail environments and partnered with KORE to address this issue. Using KORE's eSIM and connectivity management platform, Pixel Inspiration can switch between networks to ensure optimal connectivity which has greatly reduced the need for extensive signal checks and on-site visits.

How digital solutions help cities reduce the impacts of uncontrolled waste and save costs of services

Waste collection operations are often highly inefficient as collection points often are either far from full or overflowing at the time they get serviced. The adoption of IoT technologies within the waste management industry has however opened up entirely new possibilities for public and private waste management operators to drastically improve the performance of waste collection services. The basic components of a smart waste collection system are connected fill-level sensors and smart waste management software, which enable optimisation of collection services by leveraging the real-time data generated by the hardware.

While waste management systems have historically been a largely overlooked investment area among cities, smart waste sensor solutions are increasingly seen as an integral part of future smart cities. Municipal and city-wide deployments of smart waste management solutions have grown significantly in the past few years with cities such as Edinburgh in Scotland and Madrid in Spain deploying over 10,000 waste sensors across urban areas. At the same time, private companies are to a growing extent using smart waste management solutions to measure, manage and track generated waste and emissions.

Europe is the largest market for smart waste sensor solutions. At the end of 2023, more than 560,000 sensors and smart bins were deployed across the region. Markets such as Benelux, France, the UK, Spain and the Nordics have seen a particularly positive market development during recent years. Leading European vendors of smart waste sensor solutions include REEN, Sensoneo, Waste Vision and SmartEnds.

Boasting over 470,000 fill-level sensors, the North American market has primarily been driven by the private sector which now accounts for the majority of deployments. The vertical integration of smart waste sensors among managed service providers and waste brokers, such as RoadRunner, RTS and Waste Harmonics, has had a large influence on the overall adoption and the trend is expected to continue to spur growth of smart waste sensor technologies in the region. Leading vendors of smart waste management solutions in North America also include Enevo and BigBelly.