Hewlett Packard Enterprise

Business white paper

Smart cities and the Internet of Things

Municipal transformation with the HPE Universal IoT Platform

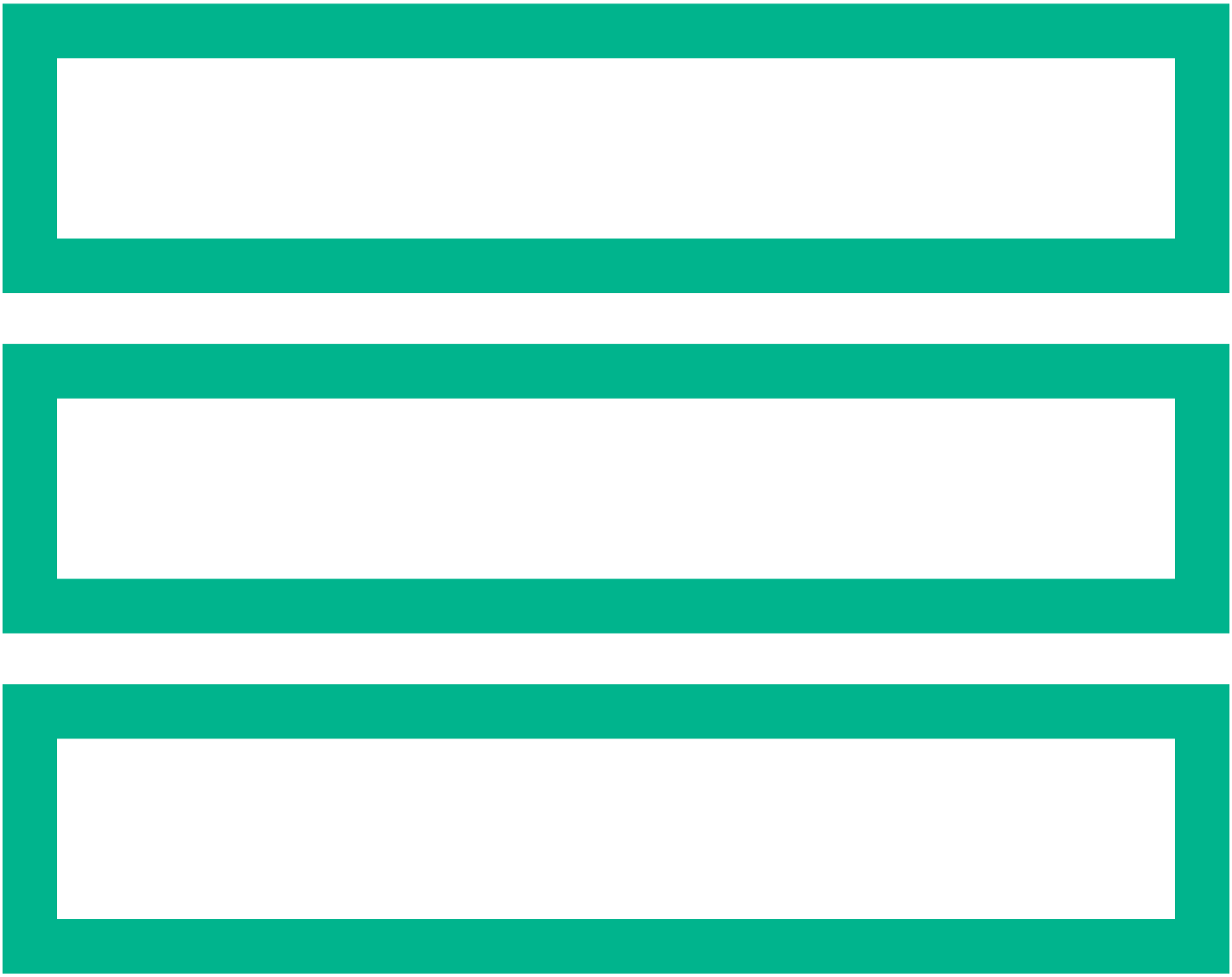

Table of contents

Executive summary

Smart cities are urban areas that use digital technologies in a secure fashion to manage the municipality's assets, enhance sustainable economic development, reduce costs and resource consumption, and support the well-being of its citizens. Smart cities have become a global phenomenon, and municipal leaders around the world are interested in the potential opportunities as they prepare their cities for the future.

Beyond marketing and technology, an effective smart city strategy takes a city's cultural, socioeconomic, environmental, and geographical realities into account and requires collaboration between stakeholders—from policy makers to citizens—with assistance from trusted, experienced information and communication technology (ICT) partners.

Innovation and the proper implementation of new technologies into a smart city strategy requires careful contemplation. ICT partners play a pivotal role in the project's development and implementation, and therefore its ultimate success. Hewlett Packard Enterprise (HPE) helps customers use technology to slash the time it takes to turn ideas into value.

In this white paper, HPE shares its analysis and vision for smart cities founded on its 50-year experience in ICT transformations. We see the Internet of Things (IoT) as a key enabler in the transformation towards smart cities and note how the HPE Universal IoT Platform can support municipalities in that transformation.

Introduction

By 2050, 70 percent of the global population will live in urban areas. Fortunately, the digital revolution holds great promise for responding to many of the challenges created by inexorable urbanization. IoT in particular offers far-reaching opportunities to change the trajectory of asset and resource management and usage to help cities become more efficient and sustainable as demands increase.

A key goal of a smart city is to enhance the use of public resources, increasing the quality of services offered to its citizens while reducing operational costs. While this objective cannot be achieved with technology alone, leveraging the deployment of IoT within a city can go a long way to reaching this goal.

Leading to new sources of value creation and capture

Internet of Content (Distribution/Access)
- Email
- Information
- Entertainment

Internet of Service (Participation/Trade)
- E-commerce
- Productivity tools
- Integrated chains

Internet of People (Collaboration/Share)
- Voice and video collaboration
- Social media and docs
- Web logs/boards

Internet of Things (Integration/Control)
- Indexing and tracking
- Control and connectivity
- Autonomous operations

Figure 1: IoT represents the next wave of the Internet

IoT and Big Data are expected to shape the use of technology in urban centers for decades to come. Today, there are nearly 300 million Machine-to-Machine (M2M) SIM cards in use and an ever-increasing number of connected devices using low-power, low-throughput networks. Machina Research believes that the number of M2M connections will grow from 5 billion in 2014 to 27 billion in 2024, a compound annual growth rate (CAGR) of 18 percent.[1]

Gartner estimates a 35.2 percent CAGR of non-consumer IoT devices from 2013 to 2020, reaching an installed base of 25 billion units in 2020.[2] IDC estimates that the installed base of IoT is approximately 9.1 billion devices in 2014, growing to 28.1 billion devices by 2020 with a $7 trillion market value.[3] Goldman Sachs forecasts that about $2 trillion of that market value relates directly to "industrials," which includes building automation, manufacturing, and resources.[4]

[1] Machina Research, **Annual guidance on the size of the M2M market**, June 2015

[2] Forecast: Internet of Things, Endpoints and Associated Services, Worldwide, Gartner, 20 October 2014

[3] IDC: Worldwide and Regional Internet of Things (IoT) 2014–2020 Forecast: A Virtuous Circle of Proven Value and Demand

[4] Goldman Sachs: The Internet of Things: Making sense of the next mega-trend, 3 September 2014

McKinsey Global Institute forecasts that the potential direct economic impact of IoT in cities could approach $1.7 trillion by 2025. Domains such as air and water monitoring, adaptive traffic management, and autonomous vehicles are expected to have the highest potential economic impact as shown here:

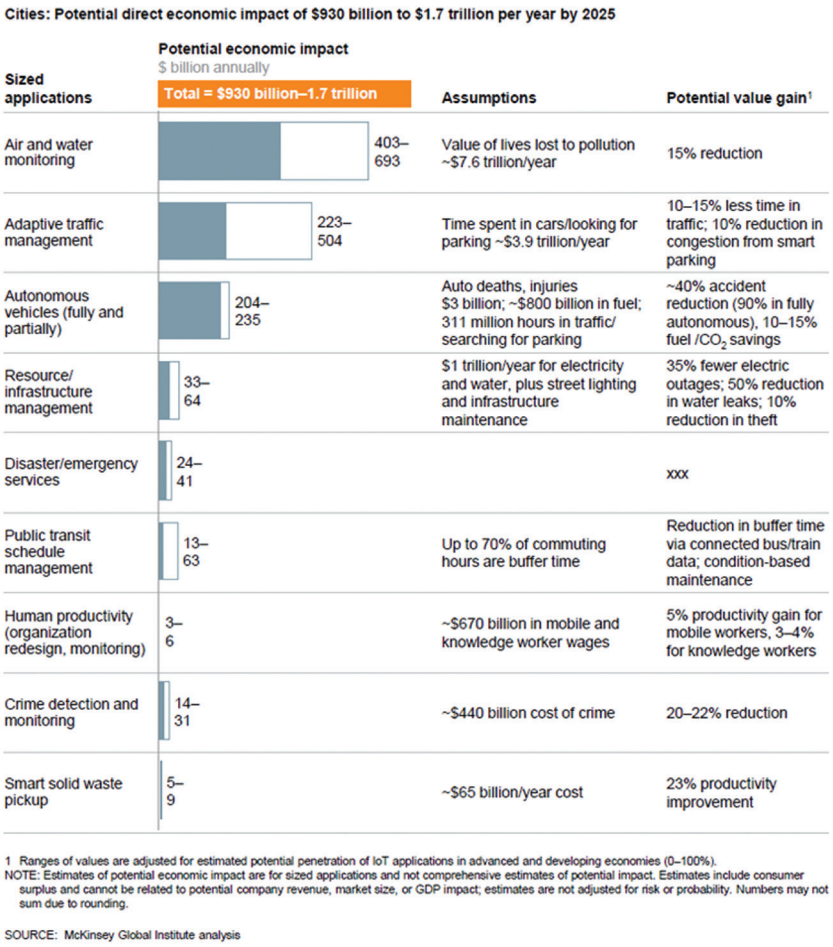

Figure 2: Applications and impact

The evolutionary trajectory, from limited-capability M2M services to the super-capable IoT ecosystem, has opened up new dimensions and opportunities for traditional communications infrastructure providers and industry-specific innovators. Those exploiting the potentials of this technology to introduce new services and business models can achieve outstanding outcomes with existing services and, in many cases, transform their operations to match the needs of a hyper-connected world. This is particularly true within a smart city.

IoT as a key technology enabler

IoT has the potential to facilitate beneficial decision-making that no stand-alone device could collect and process on its own. Example: merging data from weather, traffic, and environment sensors to predict and manage air quality along major roads and networks. The treasure trove of data coming online for the first time is of limited value however unless the devices generating the data can be managed and the data itself can be verified as trustworthy, analyzed, and monetized into new revenue streams, cost savings, or improvements in user experience. Without all of that, the true value cannot be fully realized.

The explosion of connected objects will not only depend on the appropriation of uses, but also on the management of radio frequency congestion, network capacity, and how public and private networks are interconnected. Across a smart city, different use cases will likely require different types of connectivity. For example, an IP surveillance camera requires the high bandwidth available from cellular, Wi-Fi, or fixed-line connectivity, whereas smart parking sensors require long battery life and therefore a low-power connectivity method such as LoRa (or Narrowband LTE as it becomes available).

IoT is already delivering benefits to cities like Los Angeles[5] and Oslo,[6] which have experienced energy savings of more than 60 percent by moving to smart street lighting. Other cities have seen similar significant savings by deploying smart waste management solutions, reducing CO_2 emissions, and increasing citizen satisfaction through smart parking and traffic management.

In many cases, however, these are only isolated point solutions. To truly exploit the benefits of IoT within a smart city, a holistic approach is required such that the infrastructure deployed is flexible enough to support multiple use cases rather than building multiple silos.

As such, a thorough study of setting up IoT networks and solutions is needed to respond adequately to specific smart city project requirements. Policy makers must fully comprehend and organize the interaction between IoT systems and multiple connectivity networks to accelerate the transformation of data these systems generate into value and services.

The future city represents an extensive melting pot of innovation potential. Several cities are already driving knowledge exchange in schools, universities, and laboratories. Innovation labs are expected to marry technology innovation to services and business models to create more contextualized residential and enterprise benefits.

[5] C40 Cities: **London and Los Angeles Share Knowledge on Outdoor Lighting Retrofit**

[6] KEMP Technologies: **Are you ready for the $1.9 Trillion Internet of Things Economy?**

Connectivity options

Given the requirement for connectivity, many see IoT as an obvious fit for communication service providers (CSPs), such as mobile network operators, although connectivity is a readily available commodity and therefore of low value. In addition, a growing number of IoT use cases are introducing different connectivity requirements in terms of both economics and technical capabilities.

Matching the IoT use case to the appropriate connectivity option is key. With connected cars, for example, mobility and access to high-bandwidth services is critical and therefore ideally suited to a 3G/4G network. In other cases, like smart parking/waste management sensors or smoke detectors that only transmit data when triggered, a low throughput network is a better connectivity option as the costs of a substantially underutilized 3G/4G wireless module are impractical.

Wireless access technologies can be fundamentally categorized along two dimensions—range and throughput—as depicted here:

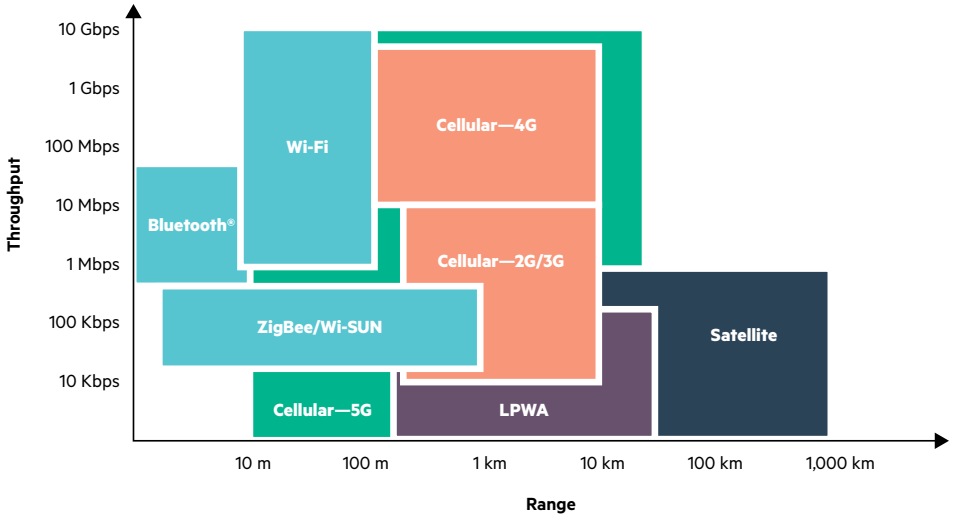

Figure 3: Range/throughput characteristics of wireless access technologies

Choosing the right connectivity option, however, is not as straightforward as checking range and throughput attributes. Many IoT use cases are characterized by a low average revenue per unit (ARPU). Examples include soil quality sensors for agriculture and smart building monitoring where a large number of sensors are typically spread across a large area, which predictably deliver a low ARPU.

Other use cases present technical challenges such as the need for long battery life due to the difficulties or cost of maintenance. With traffic sensors embedded in the roadway, for example, low-power consumption is a must.

For such use cases, traditional 2G/3G/4G cellular network connectivity and SIM-based devices are not feasible. Mobility offers scant benefit for fixed devices, just as a high-bandwidth cellular network is wasted on a smoke alarm with infrequent traffic and a miniscule amount of data to transmit.

A new type of connectivity option is required to increase efficiency and return on investment (ROI) of such use cases. Examples include Low Throughput Networks (LTNs) such as SIGFOX or LoRa as well as emerging cellular standards, including LTE-M and the new Narrow Band IoT recently introduce by 3GPP, which is in the process of standardization.

The IoT infrastructure deployed by smart cities needs to be able to handle devices and objects connected via any connectivity method. An application enablement platform like the HPE Universal IoT Platform, which is agnostic with regard to connectivity, device, protocol, and use case enables smart cities to manage most of their IoT services via a single platform, therefore reducing total cost to service as well as enabling the "mash up" of use cases and data to provide new and innovative services.

Smart city IoT use cases

Use cases such as smart street lighting where savings can be quickly realized in terms of energy consumption and reduced downtime have become commonplace in many municipalities, as have smart parking, environmental monitoring, and traffic management.

Many cities are now looking to expand the use IoT to improve services like waste management, water management and quality, and energy consumption in public buildings. Additionally, the use of contextual analysis to provide real-time information to citizens and authorities are growing in popularity.

HPE has the capabilities and experience to support these use case and more through a combination of the HPE Universal IoT Platform and other products and services.

Smart water

Make more informed decisions, protect city's water supply and prevent water waste using data from detecting water pressure, temperatures, and leaks

Smart lighting

Save time for maintenance crews and **save fuel costs**—from driving around town to find and replace broken bulbs

Smart traffic

Improve traffic flow using traffic signals, the number of vehicles and pedestrians; inform commuters about the next bus or train in near-real time by using digital signage

Smart parking

Save energy by turning lights on only when a car approaches; provide real-time parking availability info, reduced circulation times to lower environmental impacts (pollution, noise)

Smart building

Improve building electricity usage with motion sensor lights which can dim or shut off when a room is empty; **alert** when there is a leaking pipe using smart meters; **monitor energy use** of an electric meter and alert when it reaches a specific threshold

Smart industry

Enable easier tacking of transport and logistics flows, not only for one industry, but also for multi-industry (e.g., retail, oil, shipping, etc.)

Smart farm

Improve water utilization and irrigation by leveraging weather forecast and farm data, key trends and anomalies, and evapotranspiration index

Smart goods

Provide real-time city event info; leverage GPS locations and combine with the user profiles to find a suitable parking spot while considering the driver's sport interest, event starting time, tickets purchased/seat numbers, etc.

Figure 4: HPE IoT solutions enable smart city use cases

Smart parking

The reasons for smart city investments vary by municipality but often begin with the need to reduce operational costs. For many urban residents, improving mobility is of special interest. Specific goals often include:

- Reduce time and cost of transportation when traveling to and from the workplace
- Avoid traffic jams and incidents while en route
- Have ample parking readily available upon arrival
- Experience less stress and a healthier way of life

Citizen complaints about commute times or parking availability in central business districts can drive investments in real-time traffic information systems and smart parking meters. The car parks sector in Europe and North America is rapidly innovating toward smart systems. In addition to adopting advanced automation solutions and software for the booking and payment of parking, emerging trends include:

- Rapid development of wireless technology (both cellular and LPWA)
- Ability to analyze volumes of data collected from parking and other sensors (such as traffic)
- Short-range communications (NFC) contactless and other payment methods

A recent analysis from Frost & Sullivan indicates that the smart parking market in Europe and North America earned revenues of $7.05 billion in 2014 and estimates this to accelerate up to $43.084 billion in 2025 at a compound annual growth rate (CAGR) of 17.89 percent.

Smart parking applications enable new revenue streams for cities by making it possible for parking to be sold via connected car applications direct to the vehicle, opening up wholesale partner relationships between car manufacturers and rental companies. Another option is the ability to provide sponsored parking services to local businesses: reserve a parking space when you book a restaurant.

Smart lighting

With the rising costs of energy, combined with increased environmental and regulatory pressures toward energy efficiency, many local governments are looking to improve their street lighting operations and infrastructure. Street lighting, an important community service that contributes to citizens' sense of safety and security, consumes as much as 40 percent of an operator's energy consumption. Plus, they're expensive to manage.

Legacy High Pressure Sodium (HPS) lights and their supporting infrastructure are particularly inefficient and often operate for up to 12 hours a day at full intensity. Even using ambient light sensors to switch individual streetlights on and off, the energy costs of providing this service are high. In addition, lack of monitoring or recording energy consumption within individual lights, operators often pay based on using a few metered lights multiplied by the number of lights within their infrastructure, regardless of actual use. Outages in street lighting have an impact on public safety and public services liability. With HPS, streetlights often having a short life span—around five years, so it's not uncommon for operators to replace approximately 20 percent of these lights each year. This leads to unpredictable services and maintenance costs.

To address these issues, many operators are moving to new, energy-efficient LED-based streetlights which enable lower energy use coupled with providing IP connectivity and IoT sensors into the lighting infrastructure to provide remote management and monitoring.

Smart street lighting requires new, smart/connected luminaries and power units (ballasts) to be fitted. In collaboration with our partners, the HPE Universal IoT Platform is capable of managing a smart lighting solution that leverages both HPS lights and new LED-based lights.

Using traditional HPS lights in a managed environment reduces the investment required to implement the new infrastructure, as much of the existing light can be reused. By using newer, more efficient power units, managing the lights, and improving their use, means adding significant savings to the operator. Given the benefits and relatively low cost of deployment by reusing the existing infrastructure, the ROI for such an upgrade generally takes less than three years.

HPE IoT solutions enable smart services

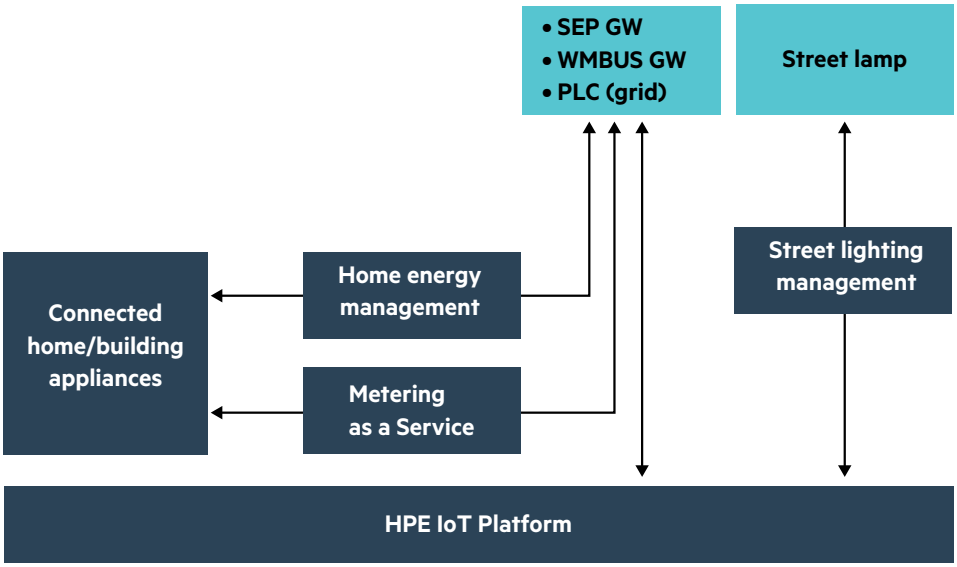

Figure 5: Managing streetlights; offering connectivity to smart city services

In addition, providing IP connectivity to streetlights opens up a large number of opportunities to operators to use that connectivity for additional smart services as shown above. Examples include:

- Using streetlights as access points for a Wi-Fi or small-cell mesh to provide Internet access
- Enabling sensors to manage traffic or parking, such as traffic light controls or smart parking services
- Providing access points or concentrators for home automation services or smart metering connectivity

Smart waste management

Waste management is a major issue in urban areas in terms of environmental management, cost, and citizen satisfaction. In many cases where waste collection happens on a fixed route at predetermined times, some bins are only partly filled while others are overflowing and should have been emptied earlier.

By installing sensors and connectivity in waste bins to monitor the level of the rubbish inside, collection routes can be improved so that the bins are emptied when they need to be, even if that means some bins are emptied twice a day and others only every few days. This delivers cost savings, reduces CO_2 emissions from the collection trucks, and increases citizen satisfaction as waste bins are no longer overflowing.

Smart waste management solutions powered by HPE Universal IoT platform and the HPE analytics portfolio can provide real-time insights and monitor the sensor data coming from waste bins. An HPE study over two years of bin-filling and collection behavior for a waste bin in France, for example, has provided insights and identified waste collection/scheduling patterns that illuminate strategies to improve efficiency.

Smart fleet management

The fleet management industry is going through a significant transformation due to IoT empowered by cellular communications technologies. Fleet management addresses several challenges specific to expense control of fuel and maintenance, driver and passenger safety, and delivering good customer service. More reliable connections and seamless coverage across wide geographical areas and remote locations provides new IoT opportunities to improve fleet performance and customer satisfaction. Fleet management solutions can be employed by smart cities to manage their fleet vehicles more efficiently as well as analyze the causes of traffic congestion through data captured by those vehicles.

HPE has broadened its fleet management understanding and solution capabilities through real-world driving research. A recent collaborative study with Ford,[7] for example, advanced a common vision around bringing together data, mobility, and analytics to explore new ways to deliver better customer experiences, new revenue streams, and lower fuel and maintenance costs in the automotive industry.

Fleet management encompasses use cases that include:

- **Route enhancement:** Dynamically communicate task assignments based on vehicle location and inventory levels to reduce the number of vehicles and delivery time windows
- **Workforce management:** Wirelessly track worker location in real time, enabling drivers to remotely clock in and out and allowing companies to track the time to complete tasks
- **Driver behavior management:** Provides instant feedback to drivers to reduce driver errors and achieve better gas mileage. Feedback includes the creation of detailed plans to advise drivers on how to avoid unsafe driving behaviors like speeding, fast cornering, and hard breaking
- **Geo-fencing:** Tracks that a vehicle stays within a defined geographic area, otherwise sending an alert if boundaries are crossed
- **Telematics:** Provides data such as fuel consumption rates, tire pressure, mileage, speed, and braking style to enable fleet managers to fine-tune their operations
- **Diagnostics:** Helps identify maintenance requirements and updates drivers on a variety of performance metrics to avoid roadside breakdowns, reduce costly repairs, enhance safety, and improve vehicle efficiency
- **Smart surveillance:** Enables real-time monitoring to promote safety by utilizing wireless video streams
- **Operations management:** Increases vehicle and delivery efficiency

Smart energy management

Smart energy management can facilitate substantial energy savings for consumers and enterprises alike. From connected thermostats in the home, such as NEST or Hive, to sophisticated systems that manage heating, ventilation, and air conditioning (HVAC) for office complexes and shopping malls, IoT is already making a substantial impact on reducing energy costs.

In public buildings, balancing HVAC demands with outside weather conditions together with occupancy/throughput of people is a complex issue. The right IoT sensors combined with world-class analytics and data management, however, renders this challenge easily managed to produce lower costs, align with ISO 50001 requirements, and deliver a better overall experience for users of the building.

[7] **Ford, Hewlett Packard (now Hewlett Packard Enterprise) using Coffee Stops, Big Data to Better Manage Fleets and Personalize Employee Drives**

HPE smart city value proposition

By engaging with HPE, you get a global, proven technology solutions provider that offers IT infrastructure and global services, and user devices. We invent, engineer, and deliver technology solutions that drive business value, create social value, and improve customers' lives.

The HPE value proposition as a smart city partner accelerates innovation, accelerates transformation, and accelerates next:

Accelerating innovation
Innovation can occur anywhere and take on many forms. At the city level, innovation must permeate the entire organization from local government policies to its daily operation. Simplification in itself can be a source of innovation. Accelerating innovation means developing technologies that drive the ability to act.

A global digital environment with enhanced interfacing of each individual brick (cloud, networks, servers, sensors, data storage, software, and applications) provides the necessary fluidity for accelerating innovation. HPE technology is interoperable, modular, flexible, and open.

Setting up a successful global digital environment for smart cities requires an ecosystem of complementary expertise, founded on human values and qualities. At HPE, we have built a powerful and strong network of 5,000 partners using HPE products.

Accelerating transformation
Cities have to consider four priorities in their transformation into smart cities: transferring to a hybrid infrastructure, protecting digital assets, empowering a data-driven organization, and the increased mobility and engagement of their citizens. Before proposing any technology solutions, HPE collaborates with city leadership to explore available and feasible options for this major transformation.

At HPE, we know how to develop strong relationships, where human values, collaboration, openness, and the ability to provide concrete and city-specific solutions are key, resulting in an accelerated transformation.

Accelerating next
HPE understand city leaders' concerns on smart city transformation and are committed to accompanying them in making it a success. Although challenges are global and often similar, we realize that every city is unique and not served by a one-size-fits-all approach. Wherever a city may be in its journey to smartness, we can provide the technology and solutions to make it succeed.

Our tested horizontal approach can break open vertical projects, transforming them into transverse and interoperable strategies, multiplying the capacity for governance and actions in a flexible, global, and shared architecture, making HPE the ideal long-term transformation partner for smart city leaders.

HPE Universal IoT Platform

For smart cities to become IoT operators and fully realize its value, a horizontal platform is needed. Such a platform must be able to easily onboard new use cases defined by application and device type from any industry and manage the entire ecosystem from the time the application is on-boarded until it's removed. In addition, the platform must support scalability and lifecycle when devices become distributed by millions over periods that could exceed ten years.

HPE Universal IoT Platform is built from the ground up to be data-centric—as data and its monetization is the essence of the IoT business model—and is engineered to support millions of connections with heterogonous devices.

With HPE Universal IoT platform, HPE delivers end-to-end functionalities and creates the technical and economic conditions for offering energy management applications to consumers, industries, and cities on a single cost-effective, standard-compliant, scalable, and vendor-agnostic multi-tenant platform. This is achieved by federating and streamlining different smart environments with multiple gateways and protocols, energy-related sensors, and applications.

HPE Universal IoT Platform makes it easy for cities, enterprises, and CSPs to onboard new use cases and rapidly achieve successful outcomes that include:

- Reduced complexity through pre-integrated modules for data acquisition, validation, and analysis
- Reduced risk due to compliance with the oneM2M standard
- Faster time-to-value through as-a-Service (aaS) hosted models
- Lower total cost of ownership (TCO) by reducing capital expenses, providing scalability, and offering outstanding pricing based on HPE's global scale, cost efficiencies, outstanding components, and deep vertical expertise

The platform supports use cases defined by application and device type from any industry, manages the entire ecosystem from launch through end of life, and supports scalability to millions of distributed devices.

Critical for a smart city where the range of connected objects and connectivity options is large and diverse, HPE Universal IoT Platform enables the connection and exchange of information between heterogeneous IoT devices (standard and proprietary communication) and applications. It also dramatically simplifies the integration of diverse devices with different communication protocols by transforming the ingested data into the oneM2M data model.

The platform can be deployed, for example, to integrate with the Aruba Networks WLAN solution to manage mobile devices and the data they produce within the range of that network, as well as integrating devices connected by other Wi-Fi or mobile networks, including LTE 4G, and low throughput/low-power networks such as LoRa.

On top of this ubiquitous connectivity, HPE Universal IoT Platform provides federation for device and service management, data acquisition, and data exposure to applications. This enables platform customers (including public utilities, municipalities, home automation, and automotive among others) to realize tremendous benefits from the consolidation of data that had been previously unobtainable, driving new value in the process.

HPE IoT reference architecture

The HPE IoT reference architecture at the heart of the HPE Universal IoT Platform incorporates our own carrier-grade connectivity and applications, custom IP, cloud-based "as-a-Service" distribution, and value-added functions (e.g., Big Data analytics, portals, and services).

The HPE IoT reference architecture is aligned with the oneM2M standard and is designed to be agnostic towards industry, vertical, use case, connectivity, and protocol.

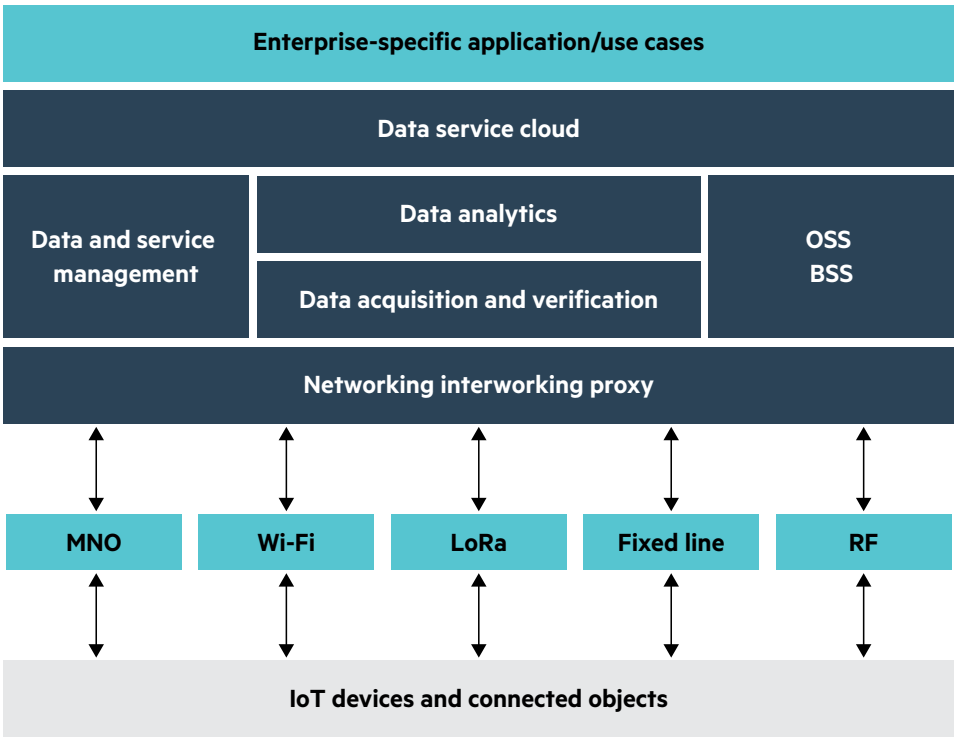

Figure 6: HPE Universal IoT Platform layered architecture

HPE enables service providers and enterprises to build for and capture new value from the proliferation of connected devices. Given its carrier-grade Telco applications heritage, the solution is highly scalable and versatile. Components of the platform are already deployed to manage data from millions of electricity meters in Tokyo, for example, as well as being used by over 170 Telco enterprises globally to manage data acquisition and verification from their networks and applications. It's modular and can be deployed as such, where only the required core modules can be purchased as licenses or as-a-Service with an option to add advanced modules as required.

Alignment with the oneM2M standard and data model means there are already hundreds of use cases covering more than a dozen key verticals that are natively supported by HPE Universal IoT Platform. The platform provides agnostic support for smart ecosystems, and can be deployed on premises or in any cloud environment for a comprehensive as-a-Service model.

HPE equips service providers and enterprises with end-to-end mobile device remote management, including device discovery, configuration, and software management. HPE Universal IoT Platform also enables customers to remotely manage millions of IoT devices for smart applications on the same multi-tenant platform.

Additionally, HPE Universal IoT Platform is device vendor-independent and connectivity-agnostic. The solution operates at a low TCO with high scalability and flexibility when combining the built-in Network Interworking Proxy and alignment with oneM2M standards. HPE embeds security directly into the foundation of the platform, enabling end-to-end protection throughout the data lifecycle.

Create new service offerings with accelerated time-to-value

With the HPE IoT reference architecture, we enable multiple business applications with multiple data streams—including contextual data (think weather, traffic, time of day, and other variables)—on the same platform. The combination of the **HPE Universal IoT Platform**, HPE's **Communications Media Solutions (CMS)** business unit specializing in providing services to the CSP market, and HPE's **Public Sector Industry Vertical** with its vast and diverse experience delivering mission-critical solutions to cities and governments around the world, creates a compelling proposition that can help you accelerate time to value for a smart city.

HPE core components are constantly operational, which provides a reliable and scalable platform. We also have a common way to manage devices through one set of APIs. We own the HPE Universal IoT platform IP and other solution components that help us accelerate time to market for our customers. With no dependency on third parties to deliver results, HPE uniquely provides an unsurpassed end-to-end experience that enables you to monetize and collect more of the value derived from the massive volume of data created by connected devices.

In addition, HPE helps:

- Accelerate time-to-market by enabling quick and early "cloudification" of network to get to cost and agility/automation points
- Utilize outstanding components for operations in an aaS model
- Quickly launch new capabilities: HPE owns the IP for most of the solution, saving both time and money compared to carriers that must rely on vendors for application-specific capabilities
- Achieve future enhancements by leveraging world-class research from Hewlett Packard Labs in areas such as QoE solutions and protocol advancements

The end game with IoT is to reliably monetize the vast treasure troves of IoT-generated data to deliver value to enterprise applications, whether by enabling new revenue streams, reducing costs, or improving customer experience. This is especially true with the smart city concept.

The complex and fragmented ecosystem that exists within IoT requires an infrastructure that interconnects the various components of the end-to-end solution—from device through application—to sit on top of ubiquitous securely managed connectivity, enable identification, development, and roll out industry-specific use cases (like smart cities) that deliver this value.

Working with HPE to enable not just the smart city of today, but also the smart city and services of the future, presents municipalities and governments with an excellent opportunity to accelerate time to value and deliver new, innovative, and interactive services to their customers through IoT.

HPE CMS developed the HPE Universal IoT Platform specifically to address long-term IoT requirements. At its core, this platform adapts HPE's own carrier-grade Telco software—widely used in the communications industry—by adding specific intellectual property to deal with unique IoT requirements. The platform also leverages HPE offerings such as cloud, Big Data, and analytics applications, which include Virtual Private Cloud and Vertica.

The HPE Universal IoT Platform enables connection and information exchange between heterogeneous IoT devices—standards and proprietary communication—and IoT applications. In doing so, it decreases dependency on legacy silo solutions. It also dramatically simplifies integrating diverse devices with different device communication protocols.

For example, HPE Universal IoT Platform can be deployed to integrate with the HPE Aruba Networks WLAN solution to manage mobile devices and the data they produce within the range of that network and integrating devices connected by other Wi-Fi, fixed or mobile networks. These include GPRS (2G and 3G), LTE 4G, and LoRa.

On top of this ubiquitous connectivity, the HPE IoT solution provides federation for device and service management, data acquisition, and exposure to applications. Using our platform, public utilities, home automation, insurance, healthcare, regulators, municipalities, and numerous others can realize tremendous benefits from consolidating data that had been previously unobtainable.

Conclusion

HPE Universal IoT Platform makes it possible to build for and capture new value from the proliferation of connected devices and benefit from:

- New revenue streams when launching new service offerings for consumers, industries, and municipalities
- Faster time-to-value with accelerated deployment from HPE partners' devices and applications for selected vertical offerings
- Lower TCO to introduce new services with limited investment
- Flexibility of HPE options, including cloud-based offerings
- Mitigated risk

By embracing new HPE IoT capabilities, services, and solutions, IoT operators—CSPs and enterprises alike—can deliver a standardized end-to-end platform, create new services in the industries of their B2B/B2C/B2B2C customers, and derive new value from data.

About the authors

Chris Meering has been part of the HPE CMS IoT Worldwide Practice since its inception. He is responsible for "Go To Market" activities and working across industry verticals within HPE. Chris also has over 25 years of operational, consulting, and business development experience in the telecommunications sector.

Paolo Balella is a worldwide business consultant with HPE CMS and has played a key role in the rapid growth of HPE's IoT business. With more than 19 years of experience in communications and media, air traffic management, and defense systems, Paolo supports C-level executives define strategy and roadmaps focused on the digital economy, digital ecosystems, and smart services.

Learn more at
hpe.com/CSP/IoT

Sign up for updates

★ Rate this document

4AA6-5129ENW, April 2016

Hewlett Packard
Enterprise