SOLUTION BRIEF

current
powered by GE

Turn Existing Street Lightpoles Into Actionable Data Sources and Revenue Streams

AT&T Smart Cities Digital Infrastructure with Current, powered by GE, CityIQ™ turns any street lightpole into an intelligent resource for city services that improve safety and livability.

This solution brief describes how to solve business challenges through investment in innovative technologies.

If you are responsible for...

Business strategy:
You will better understand how a digital infrastructure solution will enable you to successfully meet your business outcomes.

Technology decisions:
You will learn how a digital infrastructure solution works to deliver IT and business value.

Executive Summary

How will cities around the world reconcile exploding urban population growth with flat or contracting city budgets and provide the infrastructure needed to manage congestion, maintain safety and improve livability? According to a UN report, *World Urbanization Prospects*, "The urban population of the world has grown rapidly since 1950, having increased from 751 million to 4.2 billion in 2018. By 2050, 68 percent of the world's population is projected to be urban.[1]

Today, the technology used to improve cities is often funded and implemented on a per-department basis, such as surveillance cameras for law enforcement and storm-tracking devices for weather services. This forces each entity to compete for resources and space. Cities seeking to increase benefits and lower costs are driving the development of integrated solutions.

Digital infrastructure provides a universal intelligent node that can be installed on any street lightpole. Multiple embedded sensors collect and provide security to transmit data, converting ordinary lamp posts into intelligent platforms for a growing variety of solutions. The scalable, future-proof design uses a standards-based, open architecture that hardware and software developers can use for seamless interoperability. Cameras can stream real-time video triggered by events for use by law enforcement and transportation departments. Solutions can detect and pinpoint gunshots, monitor the local environment or assist with finding available parking—opening potential new revenue sources for cities. The benefits for cities and residents are enormous.

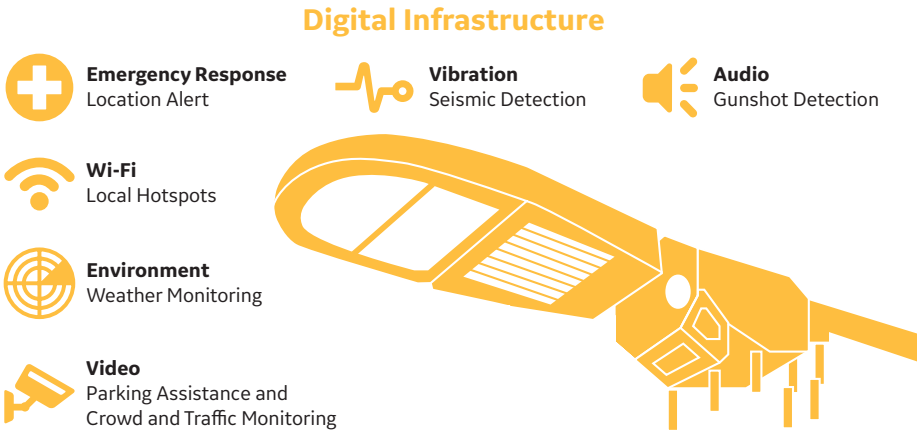

Figure 1. CityIQ™ intelligent nodes fit any street light, enabling existing infrastructure to provide new and expanded capabilities for cities, such as environmental sensors, crime detection tools and traffic monitors.

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Business Challenge: Population Growth Outpaces Budgets

The global population is exploding and is expected to grow from 7.3 billion to 8.5 billion people by 2030. By 2050, it is expected to exceed 9.7 billion.[2] Today, 55 percent of the population live in urban areas, but by 2050 that number is expected to be 68 percent.[3] This presents multiple challenges for cities with limited investment budgets.

Today, cities are implementing several commonly used solutions, such as police surveillance and traffic monitoring. But each solution is designed for a specific application or outcome and uses different technology. The police department may install a camera in a busy public square to prevent criminal activity and improve their ability to respond in emergencies, while the department of transportation may install a different camera in the same area to monitor traffic congestion and parking issues.

Consolidating on a single, horizontal platform that can accommodate various existing and new applications can help cities provide greater services while reducing costs. Cities possess massive investments in existing infrastructure. Leveraging that infrastructure, rather than replacing it, can help cities rapidly implement modern solutions and save money. A horizontal platform that uses already installed street lights can accommodate new applications, open new revenue opportunities, improve civic involvement, and enhance the city's safety and livability.

Digital Infrastructure Creates Thriving Cities

Many cities suffer from traffic congestion and parking problems, and rising populations will only make those problems worse. San Diego, California, recently upgraded its existing street lights with Current's energy-efficient Evolve™ LED luminaires and intelligent nodes to help address these problems. Data collected from the intelligent nodes opens extraordinary opportunities to improve the city experience. For example, software developers can use actionable data from the Internet of Things (IoT) platform to build smartphone applications that both guide drivers to available parking and also let them pay.

The availability of apps since 2008 has grossed nearly USD $40 billion for developers.[4] There are presently 21 million software developers worldwide, and the number is rising.[5] They have already proven what can be done with a smartphone when accumulated data is made available. Cities will be the next beneficiaries of the app economy. The possibilities are endless.

With data collected from the intelligent nodes, a network of solution providers is partnering with cities to develop and install applications that integrate with the IoT platform, including these use cases:

- **Citizen safety.** Law enforcement can respond faster and more effectively with situational intelligence, and automatic gunshot detection and location, using data collected by intelligent nodes in real time.
- **Transportation optimization.** Real-time traffic information reduces congestion and improves modeling for vehicle, pedestrian and bike movement. Monitoring on-street parking helps drivers find available spaces faster and improves incremental parking revenue while decreasing congestion.
- **Environmental monitoring.** Environment can be monitored on a hyperlocal level, detecting temperature, humidity, pressure, and vibration. Coupled with alerting technology, information can be delivered to people in the area through smartphones or with speakers installed on the street lightpole.
- **Citizen.** Vast amount of real-time and historical data are made available via APIs. Endless use cases can be developed by the community, for the community.

Today's city infrastructure can help deliver the data for tomorrow's applications.

Solution Value: Actionable Data Transforms Cities

AT&T Smart Cities* digital infrastructure with Current, powered by GE, is built on Intel* technology and provides a universal intelligent node that can be installed on any street lightpole. The unique intelligent node embedded with many sensors is extensible through over-the-air updates that allow analytics, provide connection to neighboring devices, and perform multisensor fusion over a security-enabled cloud connection. Intelligent nodes on street lightpoles can instantly see, hear, and feel using cameras, microphones and environmental sensors that collect temperature, pressure, humidity, vibration, gunshot, traffic, parking, and pedestrian data. Intel technology provides advanced processing and edge analytics vital to this process. Digital infrastructure lays the foundation for a horizontal platform that all city departments can connect to and use. Instead of individual departments installing and managing hardware for their own specific purposes, they can now use the data collected by intelligent street lightpoles. Police can stream video on demand for situational awareness, while transportation can use the aggregated and analyzed metadata to monitor and plan traffic control (see Figure 2).

Digital infrastructure with Current's CityIQ IoT platform, powered by AWS, makes actionable sensor data available through open and security-enabled APIs for real-time intelligence. This allows citizens, the developer community, entrepreneurs and other organizations with niche expertise to transform that data into applications that deliver new city services, optimize operations and improve citizens' quality of life.

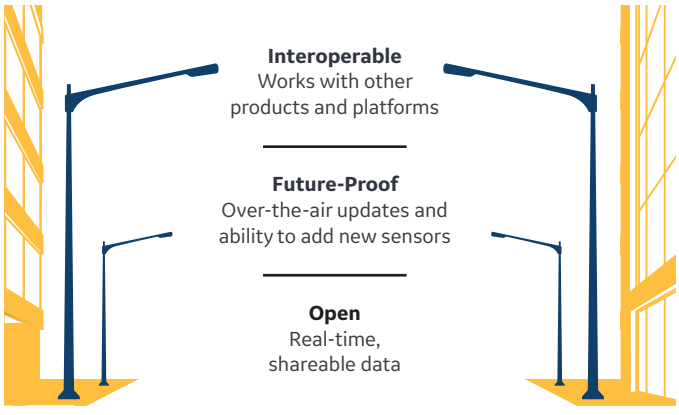

Figure 2. Actionable data, such as the number of vehicles, their size, direction and speed, is collected with intelligent nodes and made available to solution developers through open APIs.

Cities Increase Revenue Opportunities

CityIQ intelligent nodes are installed on existing street lightpoles or when cities upgrade to LED. The potential benefits of this open digital infrastructure include:

- **Cost avoidance.** Current lays the foundational digital components on street lighting infrastructure. Cities can use a horizontal digital infrastructure and cross-department operational budgets to meet individual department goals, eliminate costly redundancies and accelerate new service offerings. By implementing smart street lights and migrating to LED, cities like Los Angeles have reduced their energy bills by 60 percent due to the ability to brighten and dim the lamps as needed.[6]
- **Increased revenue.** With Intel's vast developer community and powerful processing capabilities, thousands of pretested and validated solutions are available and continue to emerge. Cities can decide how to engage users of their data and define the revenue opportunities that data generates. The advanced parking features enabled by Current also improve the parking experience for citizens and increase the revenue generated by cities. San Francisco, for example, increased revenues by about USD $1.9 million by introducing similar smart parking functionality. Digital signage and Wi-Fi hotspots can also become new sources of revenue due to connectivity or ad management.[7]
- **Economic development.** With the success of apps, over 1.4 million jobs have been created for app developers, software engineers and entrepreneurs, as well as non-IT supporting jobs.[8] The smart city apps of the future will likely be developed by students, entrepreneurs, startups and mature businesses alike, using real-time actionable data, making job creation and civic engagement an important part of the future.

Citizens Enjoy Safer, More Livable Cities

With a broad range of applications that use local data, citizens can enjoy the following potential benefits:

- **Improved safety.** Data collected from intelligent nodes on street lightpoles is the first line of defense in improving safety at the hyperlocal level. Applications can help identify and correct traffic hazards, detect gunshots or alert people in the area to dangerous weather conditions, making city living more predictable.

Tailored Solutions for Specific Needs

Whether the customer is a city, a utility provider or other institution, digital infrastructure offers a flexible solution that can be tailored to meet unique needs. An urban downtown, for example, may want enhanced parking solutions and optimized traffic, while other areas of the city may not require such robust applications.

Additionally, the GE LightGrid™ outdoor wireless lighting control system provides several benefits:

- **Energy savings** with scheduled brightness control and sensors that ensure the right luminosity in each location.
- **Cost savings** with controlled metering on each pole.
- **Lower maintenance costs** with outage alerts and end-of-life warnings.

Many GE lighting systems can be connected to the same platform, providing a unified dashboard for actionable insights and better control.

- **Faster response.** From emergency medical responders to snow plows, access to real-time, actionable information can translate to a faster, more-efficient response.
- **Convenience.** Real-time traffic optimization, parking locators and other applications that use data collected from intelligent nodes make city living more enjoyable and convenient for its citizens.

All data collected from the intelligent nodes belongs to the city, allowing each city to define its own possibilities.

Solution Architecture: Digital Infrastructure, Future-Proof Cities

The intelligent nodes can be installed on any street lightpole, minimizing the need for new infrastructure. The open, vendor-agnostic design provides the vast developer network with data for existing and new applications. When connected to the AWS cloud data center, it provides an end-to-end, standards-based solution for OEM interoperability (see Figure 3).

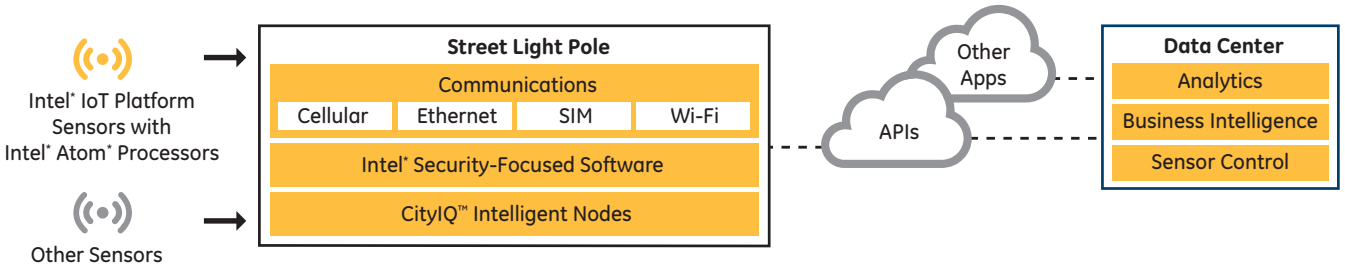

Figure 3. Built with security-focused, scalable Intel technology and Intel architecture, digital infrastructure delivers a powerful solution for cities that protects data, software and hardware while delivering exceptional value.

Built on Intel technology and Intel architecture, digital infrastructure delivers the following:

- **Greater security.** Intel's security-focused technology helps to protect information at the hardware level, allowing cities to open APIs to approved developers while protecting them from malicious attacks.
- **Higher performance.** Intel Atom* processors support higher-res multimedia and high frames-per-second streaming, and Intel Solid State Drives use low power consumption and demonstrate efficiency.

> **"Fostering innovation and improving infrastructure are important to enhancing the lives of all San Diegans. This new technology will give the city and developers the opportunity to make our neighborhoods safer and smarter."**
>
> — San Diego Mayor Kevin L. Faulconer

Conclusion

Confronted with a population boom in the coming years, cities must improve livability while decreasing costs. Technology today is often implemented by different agencies, such as duplicate surveillance cameras by police and transportation departments. These silos compound other issues—competing resources, proprietary technology and outdated infrastructure—increasing the burden on city budgets.

By implementing AT&T Smart Cities digital infrastructure with Current, powered by GE, cities not only save money, but can also create new revenue streams, as well as improve the safety and convenience of residents and visitors. The universal intelligent nodes are installed on existing street lights, providing a platform to embed sensors that can collect and securely transmit data. Scalable and future-proof, CityIQ runs on a standards-based, open architecture that fosters hardware and software development as well as seamless interoperability. With cameras that stream real-time video triggered by events for law enforcement and transportation departments; sensors that detect and locate gunshots, monitor the environment or assist drivers to find parking; and applications that have yet to be invented, the benefits improve city life for all, no matter how many people call it home.

Find the solution that is right for your organization.
Contact your Current representative, or visit currentbyge.com/cities.

About Current, powered by GE

Current is the digital engine for intelligent environments. A first-of-its-kind startup, built within the walls of GE, Current blends advanced LED technology with networked sensors and software to make commercial buildings, retail stores, industrial facilities and cities more energy efficient and productive. Backed by a broad ecosystem of technology partners, Current is helping businesses and cities unlock hidden value and realize the potential of their environments.

To build thriving cities, Current partners with city leaders to turn their ubiquitous lighting network into a digital infrastructure. Imagine the possibilities for cities on Current's open, interoperable Internet of Things (IoT) platform, from reducing traffic congestion, increasing pedestrian safety, and driving new economic development and job creation, to reducing gun violence and providing citywide Wi-Fi connections. With the ever-expanding ecosystem partners and the innovative developer community, thousands of applications deliver desired outcomes for cities.

Learn More

You may also find the following resources useful:

- Intelligent Cities News and Ideas
- Redefining the Future with CityIQ™ Developer Platform
- CityIQ Innovation Apps Center

Solutions Proven by Your Peers

Intel Solutions Architects are technology experts who work with the world's largest and most successful companies to design business solutions that solve pressing business challenges. These solutions are based on real-world experience gathered from customers who have successfully tested, piloted and/or deployed these solutions in specific business use cases. Solutions architects and technology experts for this solution brief are listed on the front cover.

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[1] United Nations Department of Economic and Social Affairs, World Urbanization Prospects, 2018 Revision, esa.un.org/unpd/wup/publications/Files/WUP2018-KeyFacts.pdf
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[3] United Nations Department of Economic and Social Affairs, World Urbanization Prospects, 2018 Revision, esa.un.org/unpd/wup/publications/Files/WUP2018-KeyFacts.pdf
[4] Apple Press Info, Record-Breaking Holiday Season for the App Store, January 2016, apple.com/pr/library/2016/01/06Record-Breaking-Holiday-Season-for-the-App-Store.html
[5] Evans Data Corp., Global Developer Population and Demographic Study 2016 v2, October 2016, evansdata.com/reports/viewRelease.php?reportID=9
[6] Green Biz, 3 ways IoT is already making cities smarter, June 2016, greenbiz.com/article/3-ways-iot-already-making-cities-smarter
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