Cisco Kinetic for Cities:

Solutions Overview

June 2018

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The Changing Urban Landscape

Communities around the world are facing unprecedented amounts of change, creating a complex set of evolving challenges. Waves of people are moving to urban areas. Environmental sustainability is a topic that can no longer be avoided. Public safety and security threats are growing. Citizens expect efficient and effective public services. Nefarious cyber actors are continuously developing new ways to penetrate network connected devices. Global leaders must establish or improve standards of living and must address all of these evolving challenges with dwindling resources. These leaders are turning to technology to solve for the pressing challenges of today and prepare for those that will emerge in the future.

Our most recent research looks at key areas that drive cost savings, efficiencies, and revenue generation. It shows that cities have an unprecedented $2.3 trillion opportunity globally through 2024. As important as technology innovation will be to gain higher efficiency and more productivity, benefitting people should be the main driver for pursuing digital transformation. Today, residents, visitors, and employees expect to engage and interact digitally. And when it comes to creating sustainable cities, there's really no greater task than building smarter communities for people to enjoy and flourish.

Unprecedented Global Opportunities

Key drivers:

|Public infrastructure | Citizen services | Economic growth | Environmental sustainability|

Cisco Kinetic for Cities

Cisco® Kinetic for Cities is designed to meet the challenges facing cities and communities around the world. Our comprehensive platform approach can:

- **Accommodate rapid population growth and help alleviate the pains of demographic shifts:** UN projections show the world can expect to add close to 1.5 billion urbanites in the next 15 years, and 3 billion by 2050. Our approach provides efficient operations, services, and tools to support these population changes.

- **Protect the environment and natural resources:** Population growth increases pollution and waste, and depletes vital resources such as water. Our approach helps to protect resources and make processes and outcomes greener for cities and for the entire planet.

- **Enhance information sharing:** Digital solutions collect large amounts of diverse data so you can take necessary action in real time. Our approach enables the sharing of information, coordinates activities, and improves service delivery.

- **Boost economic growth:** City management involves many independent departments, external stakeholders, and technology vendors. Our approach implements a comprehensive, secure data infrastructure that protects investments, supports current and future services, and simplifies management.

- **Drive innovation:** Our approach provides the infrastructure necessary to innovate and grow with an open standards-based platform that seamlessly includes new devices, applications, and services.

- **Improve citizen engagement:** Better connect with residents, visitors, and public servants with social and collaborative tools. Using citywide data, our approach allows for more-informed public service delivery and response to citizen needs.

Cisco Kinetic for Cities Overview

The Cisco Kinetic for Cities is a cloud-based platform that provides automated, secure data sharing across all kinds of devices, sensors, cameras, applications, and more, in an open, standard-based infrastructure. It enables you to easily and cost effectively get the maximum value out of your IoT data to drive new initiatives around increasing safety, managing resources more effectively, delivering new services when and where they are needed, and more. The digital solutions enabled by the platform are connected to a single federated data layer, eliminating redundancy and facilitating greater collaboration within a city.

Addressing the evolving challenges that cities face, Cisco provides the secure data infrastructure to facilitate robust and efficient urban services. Cisco Kinetic for Cities is a cloud-hosted subscription service that delivers an intuitive digital model and set of tools for creating a sustainable smart city framework for any kind of unique priorities, requirements, and budget.

CISCO

Cisco Solution Architecture for Smart Cities

Combined with the Cisco Digital Network Architecture for Cities and Communities (Cisco DNA™), cities can effectively extract, move, and compute data from citywide devices. This platform approach provides modeling for correlated data across different solutions and domains for coordinated city management. For example, a city operator can associate flow density, emissions, lighting, and video data that can simultaneously be used by traffic authorities, parking enforcement agencies, and city planners.

Collaborating with our trusted ecosystem of certified partners, Cisco Kinetic for Cities is the foundation that cities can use to solve problems and more effectively manage across domains, such as:

- Parking
- Lighting
- Waste Management
- Environment
- Safety and Security
- Crowd and Traffic Control
- Video

Note: Cisco provides the holistic solution, including the Kinetic for Cities platform, hardware, and software. Third-party partners contribute sensors, applications, and other devices.

Sensors, Devices, and Applications

The smart cities market is inundated with sensors and applications specialized to solve specific urban challenges. Each city is at a different maturity of adoption of these capabilities. This smart city vendor ecosystem is evolving quickly, and without the secure network infrastructure to connect and support ongoing growth, cities will find themselves with more complex issues than solutions.

Sitting atop Cisco DNA for Cities, our platform approach provides an agnostic position to lower layer communication protocols between sensors and gateways. This provides cities with the ability to choose between various types of sensor vendors to meet both present and future needs.

With Cisco Kinetic for Cities, you can choose applications, sensors, and devices from third-party providers, based on unique goals and outcomes. Cisco DNA for Cities gives an interface that allows integration to the applications. App developers and sensor providers can then access APIs from our developer network, where we certify the inclusion of these devices and applications in the Cisco Kinetic for Cities ecosystem.

Cisco Digital Network Architecture for Cities and Communities

Cisco DNA uses wired and wireless technology to securely connect devices to the common data and control layer, aggregating this information through network gateways. Our network infrastructure supports past, current, and future additions to the smart city framework. Cisco supports a variety of wired and wireless networks and can translate any communication frequency (such as Low Radio Frequency [LoRa]) to IP.

Cisco DNA provides comprehensive network automation, assurance, and security. From a citizen or an IoT device in the city, through to the network core and the public cloud, Cisco DNA offers industry leading intent-based networking capabilities, including:

- **Assurance:** Predictive insights for better service management.

- **Intelligent WAN (IWAN / SD-WAN):** Enables policy-based automation for the WAN.

- **Security:** Network as sensor and enforcer to proactively mitigate threats.

- **Software-Defined Access (SD-Access):** Enables policy-based automation across the network fabrics.

- **Virtualization:** Quickly scale virtualized network and application services.

Cisco DNA provides the digital backbone for cities and communities to thrive. With secure connectivity, cities can deliver effective public services, share meaningful interactions with constituents, keep people safer and data protected, innovate faster, and unlock unique opportunities for revenue generation. Cisco DNA can help cities and communities to:

- Deliver simple, effective public services

- Facilitate constituent and community data security, anywhere and in real time

- Improve IT processes while reducing overall cost and maintenance burdens

- Personalize public engagement for residents and visitors

- Streamline inter- and intra-agency communications and collaboration across your city's vast ecosystem

- Turn data intro actionable insights for better city management

Cisco Kinetic for Cities – What it Does

Cisco Kinetic for Cities is the foundational platform that extracts data from its sources to compute and move disparate citywide information. This gives leaders unprecedented insights for better city management and money-saving operations that help to be more responsive to citizens, keep people and places safer, inspire new revenue streams, get traffic and transit where they need to go, and create partnerships for continued innovation.

With the ability to share data via open APIs, cities have a wide array of options for various applications, solutions, and services. And as events originate from different devices at different times, the workload can be distributed from the cloud to the edge. As a result, this system scales much better, allowing cities to innovate and grow.

Cisco Kinetic for Cities – What it Does
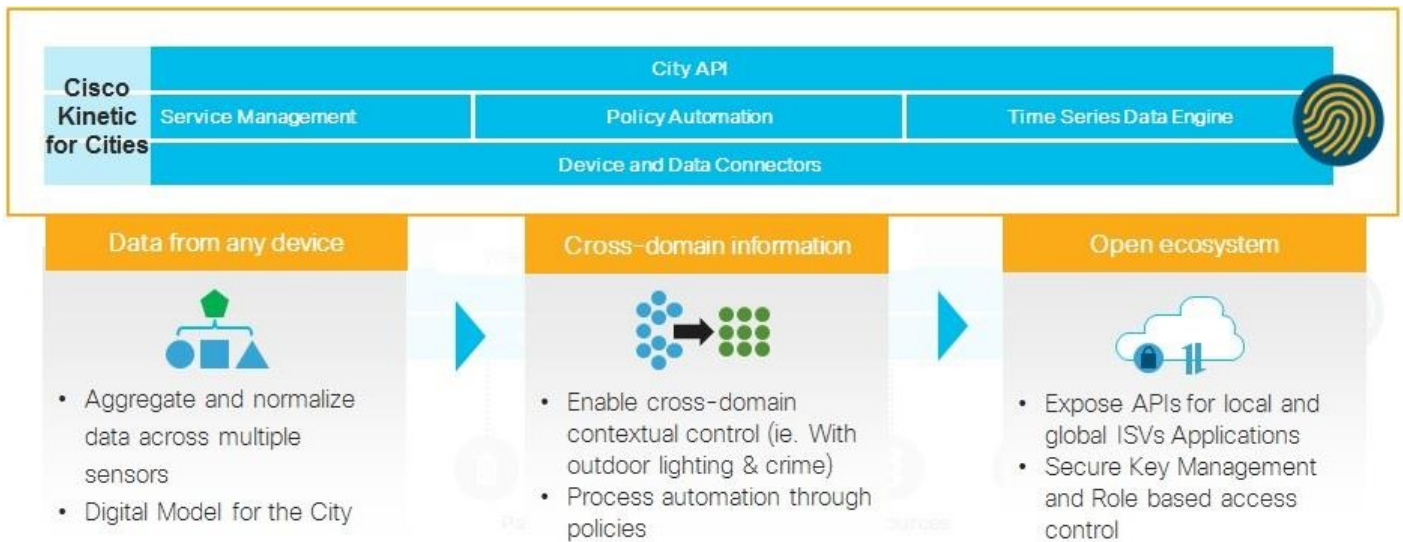
The distributed cloud provides virtualization and adaptability required to connect disparate systems and take the required actions. This approach provides secure, reliable software engines that can handle large amounts of data and actions from different types of sources. Cities can add, extend, improve, or eliminate services and their related networks as needed, allowing for truly sustainable smart city investments.

This approach is:

- **Model-driven:** Instead of a traditional API approach, Cisco Kinetic for Cities takes a declarative language approach to model devices.

- **Vendor-agnostic device standard:** Any vendor can integrate into our platform ecosystem irrespective of the communication protocol.

- **Open APIs:** Open APIs are available through Cisco DevNet for app developers and device vendors to contribute unique urban services to our extensive portfolio

Cross-Domain Collaboration

The Cisco Kinetic for Cities framework brings together a set of city-focused digital solutions that can be easily plugged in as needed to help city leaders manage operations and costs. Securely sharing data more effectively allows for improved decision support, operational transparency, and greater citizen engagement. The following illustrates some examples of cross-domain collaboration between these solution offerings.

Offering	Use Case	Result
Parking	A citizen wants to find an available parking space quickly and efficiently.	Citizen App - Cisco Kinetic for Cities APIs provide information on the availability of parking spots in the respective area / lot. The Cisco Kinetic for Cities Platform connects to various kinds of parking solutions/sensors deployed on the street, normalizes the data and provides a uniform view to citizens, regardless of the type of solution deployed. Citizens can know beforehand which parking lot in the area has available parking space and can directly go there. This reduces the additional traffic on the road trying to find parking and is convenient for citizens.
Parking	City council requires a common platform to view and manage the City's parking lots and have reporting capabilities.	The Cisco Kinetic for Cities dashboard provides a consolidated view of the parking lots integrated to the Cisco Kinetic for Cities Platform which may be on different solutions / vendors. Using the Cisco Kinetic for Cities dashboard, the city council can see the current utilization of the parking lots and apply appropriate policies like increased parking fare for different time slots. The city council also can access the Cisco Kinetic for Cities data for deeper analytics on parking usage.
Lighting	City council wants to ensure availability of street lighting to citizens and optimize the energy consumption of street lights at the same time.	The Cisco Kinetic for Cities Platform can integrate to disparate lighting control solutions deployed on the street. The Cisco Kinetic for Cities dashboard can provide a common view for the real-time status

Offering	Use Case	Result
Lighting	Monitor and apply lighting policies from a common platform for disparate kinds of lighting solutions deployed on the street.	of lights on the street and enable detection of faulty lights. This also enables monitoring to determine if the lights are ON when not needed. The Cisco Kinetic for Cities Platform can apply policies to (supported) lights to 'dim' the light intensity when needed, like midnight, and increase intensity if there is presence of citizen/vehicles (motion sensing).
Traffic	Commuters want to know about potential traffic delays and alerts in advance.	The Cisco Kinetic for Cities Platform can work with a variety of Traffic sensors/cameras that can analyze vehicular flow, construction, and accidents to provide detailed actionable information to key stakeholders.
Environment	Citizens want assurance that health and safety issues are reported and handled quickly.	The Cisco Kinetic for Cites Platform can work with environmental sensors that can detect an imminent air quality concern. An alert can then be displayed in the city's command center, or a Cisco spark room could be instantly set-up and key stakeholders alerted.
Safety and Security	Citizens and visitors want to feel confident that they can move safely throughout the city.	In precarious situations, lighting brightens. This provides a safer environment and better camera conditions for video surveillance applications. If a citizen feels threatened, they can send an SOS alert to city command center for immediate action.
Waste Management	Citizens and visitors want to have clean and healthy neighborhoods where solid waste is collected, segregated, and managed in an efficient way Collection agencies want to optimize collection trips to save fuel, time, and money.	Waste bin fill sensors can provide accurate fill levels to collection agencies so that the waste is picked up on time, without any spillage or overflow. The Cisco Kinetic for Cities Dashboard visualizes the waste bins, its current fill levels, inside temperature, and location, and alerts collection managers if there is a potential bin overflow well in advance.

Cisco Kinetic for Cities Solutions

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Cisco Kinetic for Cities Parking	Cisco Kinetic for Cities Safety and Security	Cisco Kinetic for Cities Urban Mobility	Cisco Kinetic for Cities Lighting	Cisco Kinetic for Cities Environment	Cisco Kinetic for Cities Waste

COMMON DATA LAYER: Cisco Kinetic for Cities

SHARED INFRASTRUCTURE: Digital Network Architecture for Cities

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Cisco Kinetic for Cities Starter Solutions

Cisco Kinetic for Cities starter solutions support the following use cases:

Starter Solution	Supported Use Cases (fixed)
Safety and Security	• Object Detection • Intrusion Detection • Perimeter Protection • Face Recognition
Environment	• Sensor-based Air Quality • Software-based Air Quality
Waste Management	• Waste bin level detection • Inside waste bin temperature • Waste bin sensor battery level
Lighting	• Real time monitoring and control • Scheduling
Parking	• Parking occupancy and availability • Utilization reports and analytics
Urban Mobility	• (Crowd) Location analytics • (Traffic) Vehicle count • (Traffic) Vehicle classification • (Traffic) Direction • (Traffic) Size

Cisco Kinetic for Cities Lighting

Cisco Kinetic for Cities Lighting helps cities and communities create a lighting system utilizing multiple LED deployments from multiple vendors controlled by the Cisco Kinetic for Cities Node. It is a converged network and a software platform that enables unified multiple vendor policy and dynamic lighting controls. This network is connected to the smart cities' infrastructure and can benefit and support other smart cities solutions.

The light sensory network (LSN) transforms LED light fixtures into sensor-equipped, smart devices that are capable of capturing and transmitting data in near real time for uses such as:

- Airports

- City and community streets

- Mass transit stations

- Medical facilities

- Military bases

- Parking structures

- Sports venues

- University campuses

Cisco Kinetic forCities Parking

Cisco Kinetic for Cities Parking gives you the ability to optimize existing parking for current and future populations. It offers intelligent parking services through technology such as public Wi -Fi networks, video cameras, video analytics, and sensor-enabled parking management. It also provides citizens with real-time information about available parking and allows them to book spaces in advance using mobile applications. The result is less traffic congestion and a more effective partnership between cities, citizens, local businesses, and parking enforcement agencies.

The Cisco Kinetic for Cities Parking solution is useful in cases such as:

- Resident and visitor applications

- Law enforcement applications

- Parking guidance applications capabilities from local providers to turn a profit (ex. directing game-day drivers to open spots at a local sports store while providing a coupon for a team jersey)

- City planning based on data of use, capacity, location, and more

Cisco Kinetic for Cities UrbanMobility

More than 25% of traffic congestion is non-recurrent, according to the Federal Highway Administration. Instead, it is caused by traffic incidents. As a result, detecting incidents early and responding to them effectively makes for safer roads, less congestion, and smoother traffic flow. The Cisco Kinetic for Cities Urban Mobility solution combines IP cameras, sensors, applications, and Cisco DNA for Cities and Communities infrastructure to provide visibility of live traffic conditions for traffic management authorities and crowd management in real time. This solution provides insight into urban traffic and people patterns so that authorities can make better decisions and long-term plans.

The Urban Mobility solution also offers a Crowd component that provides Cisco Meraki API location analytics that

gather visitor device information, an analysis of visitor counts, and an analysis of dwell times. This provides cities with:

- An application that contains a holistic city-wide view across all of the Cisco Kinetic for Cities solutions

- Data analytics driven through outdoor Wi-Fi and BLE beacons to detect all devices within a given area

- Real-time and historic citizen movement information

Cisco Meraki's APIs also support a wide range of future growth and expansion within the Cisco Kinetic for Cities platform. The solution offers a global partner ecosystem, long-term trusted customer relationships, and an intelligent communications infrastructure.

Cisco Kinetic forCities Safety and Security

As cities continue to grow in number, size, and complexity, their infrastructure and services come under increasing stress. Keeping cities safe is critical; safe cities attract the investments, businesses, and skilled labor necessary for economic growth and development. The Cisco Kinetic for Cities Safety and Security solution helps protect cities against crime, terrorism, and civil unrest. It helps law enforcement monitor public areas, analyze patterns, and track incidents and suspects, enabling quicker response. By combining information from video surveillance cameras, citizen reports, and other sensors, the solution provides a richer view of urban safety. The Cisco Kinetic for Cities Safety and Security solution offers the following features:

- Automated incident and emergency alerts

- Automated incident detection and recognition systems

- Correctional facilities management

- Crime trend analysis and reporting

- Intelligent surveillance using Video Analytics

- Mission-critical response and delivery by integrating resources across law enforcement and emergency response agencies

- Real-time surveillance camera integration

- Situational awareness and incident planning

Cisco Kinetic for Cities Environment

With Cisco Kinetic for Cities Environment, city agencies can receive notification of poor weather conditions or poor air quality, among other conditions. In response, the city can quickly change lighting levels or traffic signals, roadway routes or emergency dispatches, or city service responses.

The Cisco Kinetic for Cities Environment solution is useful in cases such as:

- Air permit dispersion analysis

- Air pollution monitoring

- Environmental policy monitoring and alert

- Greenhouse gas emission monitoring

- Pollution fining

- Pollution-based adaptation re traffic, parking, crowd, weather conditions

- Toxic gas leaks

- Visibility of connected environmental sensors and devices

Cisco Kinetic for Cities Waste Management

With Cisco Kinetic for Cities Waste Management, city agencies can deploy sensors to monitor waste bin levels throughout the city. Alerts can be configured so that the city can quickly dispatch trucks to empty waste bins before they become overfilled, unsightly, or unsafe. This enables cities to maintain a healthier and more aesthetically pleasing environment. In addition, cities realize costs savings as trucks are dispatched only when necessary. Specifically, the Waste Management solution supports the following use cases:

- Waste bin level detection

- Waste bin inside temperature

- Waste bin sensor battery level

Cisco Kinetic for Cities Video

Cisco Kinetic for Cities Video solution integrates with multiple VSM providers and enables operators to bring in different camera feeds from these providers into one single dashboard for a consolidated view. This includes GIS enabled Map View which displays both camera icons and IoT data. Operators can easily locate and stream from any specific camera located at a specific location.

Cisco Kinetic for Cities Benefits

The following describes how Cisco Kinetic for Cities can help you achieve desired objectives.

Desired Business Outcome	Description
Improve quality of life	Cisco Kinetic for Cities and its solutions enable efficient, strong innovation ecosystems that attract startups, venture capitalists, and other creative resources. Our approach can help your city: • **Attract** and retain talent in competitive labor market by making the city more attractive to live in • **Increase** foreign direct investment, create high-value jobs • **Boost** social mobility • **Build** your city's profile as a desirable world-class location for multinational businesses
Enhance investments	Local governments face a gap between their citizens' expectations and what their budgets can realistically accommodate. Cisco Kinetic for Cities and its solutions can help you decide where to invest, where to cut back, and how to optimize your offerings. Using the network as a platform helps: • **Reduce costs** arising from duplication of infrastructure and services spend • **Encourage new models** through public and private stakeholders • **Create revenue** from new value-added services and increase use of existing services • **Build** a federated, centralized management system to avoid difficult integrations of digitization domains in the future
Increase revenues	Monitoring environmental data and tracking city activities improves city planning, now and into the future. We help you get the most out of your assets to: • **Maximize use** while reducing TCO of existing city infrastructure, such as: – Increase city revenue with efficient parking enforcement • Reduce municipality bills with optimal city wide lighting • **Engage network access points** for multiple solutions and public Wi-Fi access • **Improve services** provided by diverse partners through cross-domain sharing of information
Sustainable growth	Develop at your own pace. Our pay-as-you-grow approach allows you to purchase other Cisco Kinetic for Cities solutions and other technologies as you require them. With this model, you have the option to start small, quickly understanding tangible benefits. You can rest easy, knowing your investment It will never require major upgrades to accommodate growth and innovation. Our data plan allows multiple applications such as: • Data from one type of sensor from a city domain delivered directly as a service (such as in-ground parking sensors)

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	• Information aggregated from multiple types of sensors in the same domain delivered as a service (such as in-ground and video-based parking sensors) Data from different sensor types and sources across different domains used to develop correlations and analysis (such as in-ground and video based parking sensors and lighting sensors)
Develop partnerships	Cities compete with one another—for resources, talent, funding, and external partners. Our open integration platform lets you choose companies to include in your solution. They become members of your advisory boards, vested in maintaining your competitiveness. These partnerships help you: • Manage transitions more easily • Earn tremendous goodwill by considering the needs of your vital partners Create new businesses and opportunities for added services

Why Cisco?

For nearly a decade, Cisco and its partners have been committed to transforming cities and communities around the world. Cisco has developed Cisco Kinetic for Cities to address city challenges head-on. Our framework addresses urban environments' digital technology needs, while also preserving the uniqueness that draws people to want to live and work in each city. We are more committed than ever to securely connect everything to create smarter cities and communities for people to truly thrive.

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