

Cisco Kinetic for Cities

Cisco® Kinetic for Cities is a smart city IoT platform that provides automated, secure data sharing across community infrastructures, solutions, applications, and connected devices. 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.

Product overview

Communities and cities around the world are turning to technology innovations to help them overcome the growing challenges of urbanization. Many have already begun their own digital transformation journeys as they recognize the vast potential and growing number of opportunities made possible by secure network connectivity and the Internet of Things (IoT).

But digital transformation initiatives are so much more than connecting sensors and new devices across your infrastructure. Digital transformation is a way in which cities can use data to create actionable intelligence so they can operate and plan better. How do you reach and engage your residents, and make them more informed, more connected? How can you better manage your transportation, trash and waste services? And how can you use data to not only save money but derive new sources of revenue that can benefit everyone?

To meet the promise of digital transformation initiatives, it is important that data can freely be moved or shared whenever, wherever and whatever format it is needed. But the world of IoT introduces a new big data paradigm with a host of complexities in data management, analysis and governance:

- **Massive volumes** and velocity of intermittent data streams from a variety of legacy and new devices can quickly overwhelm existing IT systems.
- Data is coming from **varied sources** of sensors, connected devices and existing data systems, in different schemas and formats
- **Limited control over data movement** to ensure data quality, discovery, usability and security

To help with these challenges, Cisco Kinetic for Cities provides you with unified monitoring and management of data across your infrastructure, easy extraction and integration of data from multiple sensors and connected devices, and a comprehensive set of APIs that enable third-party partners to offer new and richer services for your residents, visitors and workers.

Platform approach: The model for success

As more and more things are connected, challenges for cities continue to manifest and evolve. Some of these challenges include:

- Breaking down siloed management of networks and data
- Reaching consensus across a wide range of stakeholders in both public and private sector organizations on how to best serve the community
- Addressing increased data vulnerability and security issues while adhering to privacy policies
- Automating the extraction of insights and resulting actions to reduce data overload

To address the growing list of challenges that cities face, the Cisco solutions portfolio offers a specialized approach to help solve problems, meet unique goals, and achieve desired outcomes. Cities around the world are being made smarter and are connected more securely through Cisco Kinetic for Cities, together with its solutions across a number of city use cases. We want to help each and every city leader, urban operator, local business, city resident, and visitor in their respective journeys toward creating vibrant, lively communities.

Cisco, with its industry-leading expertise in secure networking infrastructure, collaborates with a trusted ecosystem of partners to deliver Cisco Kinetic for Cities, which:

- Collects and integrates sensor data from multiple sensors and sensor types
- Makes sense of the aggregated data by constructing a common data model that enables more meaningful analysis
- Exposes APIs through which local and Global Independent Software Vendors (ISVs) and application developers can meet the needs of an urban service marketplace
- The platform includes APIs for the following urban service domains:
 - Parking
 - Lighting
 - Waste Management
 - Environment
 - Safety and Security
 - Urban mobility
 - Crowd
 - Traffic

Cisco has developed a framework to help cities digitize (Figure 1). This approach addresses the needs of cities today and into the future and uses the network as the infrastructure foundation for managed city and business services. It incorporates mobility, security, cloud computing, virtualization, collaboration, and video, and relies on a standards-based, open architecture and cross-functional applications running on a foundational network layer. This framework enables sensors and other city devices to connect through a common wired and wireless network infrastructure. With the platform, the data is aggregated, normalized, and analyzed. Through Representational State Transfer (REST) APIs, app developers, as part of a certified partner ecosystem, can use this data to develop new urban services applications for city agencies, citizens, and businesses.

Figure 1. Solution framework

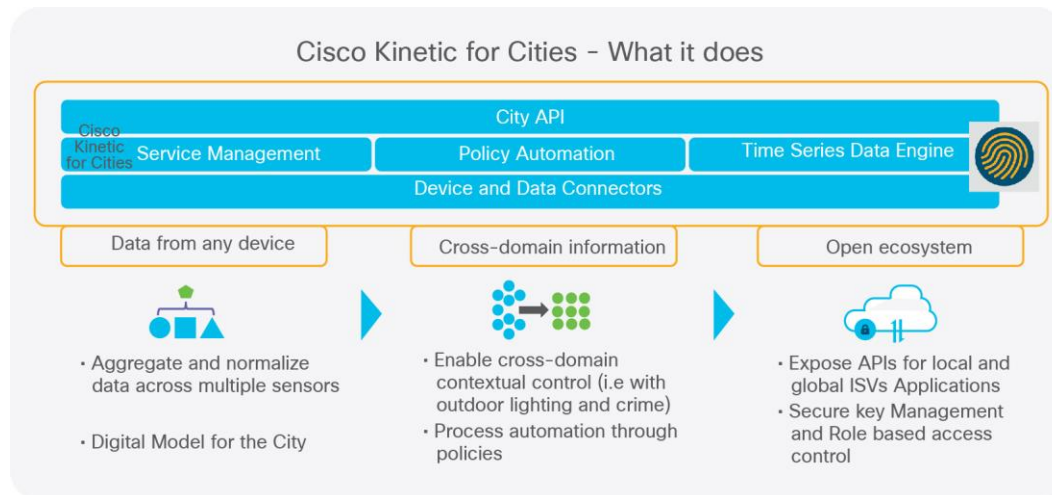


Cisco Kinetic for Cities

The Cisco Kinetic for Cities platform is delivered as a subscription-based service. The platform collects data from city systems and citywide devices, using secure network connectivity—both wired and wireless—to transmit this data to the cloud. The platform's ability to capture data through standardized APIs means that the specific protocols that each sensor uses are irrelevant to the network. The platform also stores the information securely, making it available to other applications and services so they can further analyze, respond, package, and present it.

The integration between all these connected elements is critical to creating a digital infrastructure that is dynamic and responsive. Cisco Kinetic for Cities bridges the disparities between network-connected devices, people, and processes to simplify operations, allow leaders to be more responsive to citizen needs, inspire new revenue sources, and much more (Figure 2).

Figure 2. Cisco Kinetic for Cities: What it does



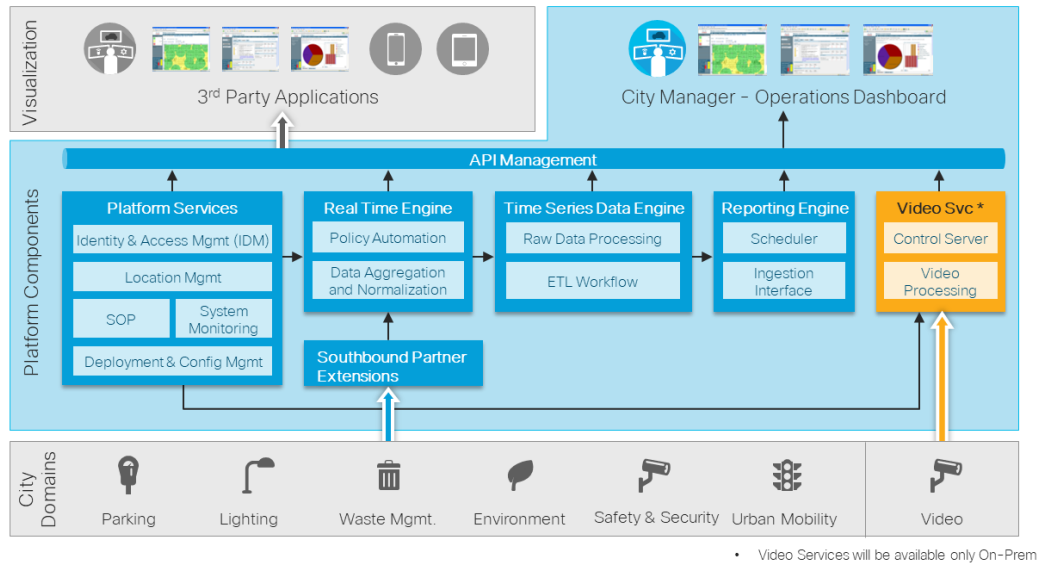
Benefits include:

- Dynamic visibility into your community's digital infrastructure
- Rich, up-to-date information that is easy to share across different departments and organizations to manage incidents quickly and effectively
- Data analytics to increase situational awareness and provide the basis for cost savings and more reliable short-term and long-term planning

Cisco Kinetic for Cities architecture

The open architecture of the platform makes it easy to add solutions to address a wide range of urban service needs. The platform unlocks citywide data, enabling it to be used by devices, applications, and services across domains to trigger alerts or actions based on criteria established by and for your community. This functionality derives from the ability to combine data from many sources, regardless of their individual protocols, and communicate it securely while also tapping into geospatial mapping for many important uses across the city (Figure 3). For example, by combining data from both the parking and lighting domains, you can achieve features such as parking space-specific lighting based on time of day, weather conditions, etc.

Figure 3. Software architecture



Platform technology

Cisco Kinetic for Cities uses platform-centric native libraries, server-side scripting languages, object relational database systems, a distributed file system, and markup languages to support the platform's core and extended functionalities (Table 1).

Table 1. Platform specifications for core components

Real-time engine	<ul style="list-style-type: none"> • Aggregation and abstraction of sensors: Provides aggregation of sensors from a diverse sensor cloud • Normalization of sensor data: Organizes sensor data and assigns attributes based on relations; raw data is removed and passed to the time-series data engine
Time series data engine and reporting engine	<ul style="list-style-type: none"> • Data archive and logging: Stores data feeds from the real-time engine • Analytics: Provides time-shifted or offline analytics on the archived data • Reporting: Delivers reports based on events triggered by real-time engine data and external notifications
Platform Services	<ul style="list-style-type: none"> • Identity and Access Management (IAM): Performs user authentication, authorization, user management and role-based access control • Location Management: Location management services including locating and tracking devices on the map, providing geo-coordinates of specific facilities, roads and city infrastructure assets.
Video Services	<ul style="list-style-type: none"> • Provides real time video streams of camera to operators and is useful in case of any incident or live tracking.

Reference Dashboard

Cisco Kinetic for Cities provides a dashboard web app for urban operators as a reference application. The dashboard web app provides an operational and informational overview of selected city assets represented in a simple graphical form. The visibility into all system functionality aids city operators' decision-making and coordinated citywide response. The dashboard web app provides a single view of urban infrastructure connected through the platform.

Domain-specific language for application developers

Cisco Kinetic for Cities uses an XML-based domain-specific language built for smart city and urban service applications. Its primary benefits are as follows:

- **Ease of development:** Application developers can model sensors and business logic with varying attributes to functionally align as unified APIs “north” of the platform. For example, an in-ground parking sensor, a wireless parking sensor, and a camera-based parking sensor can be unified through a parking API that allows for a unique parking model regardless of the different attributes of sensors provided by different vendors.
- **Cross-domain use cases, possibilities, and revenue channels:** Cross-domain use cases can create entirely new solutions to address community and city challenges while also simplifying and improving existing processes without requiring further infrastructure investments.
- **Fast, efficient application development:** A ground-up systems development lifecycle is not needed, because the domain-specific language does not require compilation and byte-code generation. Therefore, the application development lifecycle is fast and efficient, and its industry applicability is vendor agnostic.
- **Backward compatibility and shorter development work:** The domain-specific language addresses current city requirements and scales to meet new and future challenges with little development work.

Standard Operating Procedure support

A Standard Operating Procedure, or SOP, is a set of step-by-step instructions compiled by a city council to help workers, operators, and agencies carry out complex routine operations without any ambiguity. SOPs aim to achieve efficiency, quality output, and uniformity of performance while reducing miscommunication and failure to comply with industry regulations.

The Cisco Kinetic for Cities dashboard allows unlimited SOPs to be created and mapped to different types of incidents so that the mapping preferences are persistent.

- The dashboard GUI provides seamless control over incidents and alerts that happen within the region of focus. It allows the operator to trigger appropriate SOPs for the type and priority of the incidents, enabling the operator to handle incidents efficiently. Cisco Kinetic for Cities supports complex SOP workflows that have:
 - Multiple levels of approvals
 - Multiple departments that need to be contacted by phone, SMS etc.
 - Automated escalation paths of communication
- Alerts can be seen on the dashboard with location information.
- Support for both manual and automated triggering of SOP's based on the incoming alarm's type and severity.
- If no actions or resolutions are provided within a predefined SLA, an SOP can be escalated to the next authority in line for resolution.
- Users can create and edit their own SOP's, cancel an in-progress SOP, add/modify comments against SOP's and also view the historical information on all SOP's. Any errors in SOP execution also would be available to be viewed on the dashboard

Video Wall Support

The Cisco Kinetic for Cities Video solution uses the Cisco Kinetic for Cities platform to aggregate, normalize, and analyze data obtained from disparate sources such as intelligent sensors, video cameras etc. The unified view of the dashboard provides a single pane of glass view for both IOT data and video camera feed to allow the city operators to make critical decisions to help manage situations and respond to emergencies.

Key Features

- Video wall – Grid View for viewing multiple cameras simultaneously
- Easy selection of cameras in grid view
- Grid size selection up to 6*6 based on operator's comfort for viewing multiple cameras
- Geotagged cameras in Map View for easy correlation between the view and its location
- End users to have the ability to configure their choice of auto-rotation time-interval between different video screens

Provider Connectivity Monitoring support

“Provider Connectivity Monitoring” helps to monitor the status of sensor(s) connectivity on the dashboard.

Whenever the connectivity between CKC platform and the sensor (or provider) cloud is down/not operational, the dashboard has the capability to show the status of all the sensors associated with the provider to be “offline” until the connectivity between the CKC platform and the sensor provider cloud is restored. When the connectivity is restored, automatically the status of the sensors is updated to “online”. This helps the city operators to get a much more realistic and accurate status of the sensor connectivity on the reference dashboard.

Whenever the CKC platform is unable to connect to the sensor provider cloud, it raises a “Provider Connectivity Lost” alert that is seen on the dashboard. This allows the city operators to use the dashboard to create and manage Standard Operating Procedures (SOPs) against this alert and be able to take any preventive or corrective actions as they deem fit.

Note: “Provider Connectivity Monitoring” feature is only supported for those southbound providers/extensions where the CKC platform is initiating the connection to the sensor provider cloud. In case the sensor provider cloud is initiating connection to the CKC platform through a callback URL mechanism etc, the “Provider Connectivity Monitoring” feature support is not available.

Security designed to work together

Traditionally, network deployments use a disparate approach and do not follow open security standards. Organizations run applications, servers, and tools on the public cloud with limited security protections. There's an imminent need for a more effective security posture to address the needs of all users.

Our security evolves with each technology. And our trusted network partners can use their own complementary compliance standards, security policies, and governance requirements. Cisco Kinetic for Cities is secure at each layer of the architecture to protect data, reduce complexity, and help IT be more productive. We use an OAuth 2.0 framework and an identity-based key management mechanism that detect and stop threats to protect data across the platform.

The following functionalities and approaches are used to assure the platform's end-to-end security:

- OAuth 2.0 framework:
 - Provides clients "secure delegated access" to server resources on behalf of a resource owner.
 - Allows an authorization server to issue access tokens to third-party clients, with the approval of the resource owner.
- Cloud perimeter security guidelines:
 - Enables secure virtual private clouds.
 - Establish dynamic perimeters around applications, clients, hosts, and shared resources.
- User ID management:
 - Protects users, data, and applications through centralized automated identity management.
 - Provides application management: role-based application access and view.
- Key management mechanism:
 - Enables certified users to access and collaborate on ecosystem partner data in a secure and safe manner.
 - Validates stakeholders using role-based keys and workflows, helping assure security.
 - Allows certified users to leverage data, service, and domain capabilities based on their subscriptions. Appropriate information is available for collaboration.

Data sovereignty

Your city or community owns all data produced by the Cisco Kinetic for Cities platform. The owner of the device, who in turn grants Cisco a license to provide our services, owns the data. Because the platform shares information, our partners must complete a certification process before they are qualified to use it.

Cisco Kinetic for Cities securely stores all data, and increased capacity is available as needed. We comply with regulations on data storage and management for the respective location of the data center.

Features and benefits

Cisco Kinetic for Cities delivers:

- More coordinated and effective incident response across different city agencies and organizations
- A pay-as-you-grow model; pay only for services consumed
- Federated, consistent data across an extensible platform, available to multiple stakeholders
- Rapid, reliable and flexible deployment using vendors through a Cisco certified partner ecosystem, paired with unmatched Cisco expertise
- Greater trust and security with Cisco security standards
- Improved monetization that inspires new revenue opportunities through application development, data analytics and modeling, and optimized asset use
- Better public engagement and responsiveness to citizen needs
- Innovative partnerships for continued growth and success
- Better understanding of how resources are used to generate cost savings and enable greater efficiency

Licensing

Cisco Kinetic for Cities offers a cloud-hosted deployment model. The platform will be deployed on a cloud owned by a Cisco certified cloud partner and will be hosted and managed by Cisco Ops team.

The Cisco Kinetic for Cities platform has three subscription categories. Customers may choose the one that best meets their needs:

- TaaS- Things as a service—This is the base offer, providing data from sensors from a single vendor within one domain
- DaaS—Domain as a service—This is normalized sensor data across multiple vendors being exposed through the platform as an API for a single domain
- BaaS—Business API as a service—This is normalized data across domains helping to enable contextual relationships to be formed between two or more domains

TaaS	DaaS	BaaS
Base offer providing data from sensors from a single vendor in a single domain.	Normalized data from different vendors from a single domain offered as a service.	Enabling contextual correlations between domains.
		Event in a single domain can trigger action in another domain. For instance: Drive lighting policies from parking data provided from a multitude of different sensor types.

Kinetic for Cities solution approach

Cisco offers the following solutions for city digitization.

Cisco Connected Communities Infrastructure for Cities

Every smart city begins with its network. Cisco's Connected Communities Infrastructure is a validated network design that creates a multiservice network specifically architected for smart cities and roadways. Using this validated approach, Cities can select the technology that is right for them without having to worry about being locked into solutions or technologies.

Cisco Kinetic for Cities Lighting

The Cisco Kinetic for Cities Lighting solution transforms LED light fixtures into sensor-equipped smart devices that are capable of capturing and transmitting data in near real time. This capability provides unprecedented actionable insight and helps to enable an array of applications and services for cities, citizens, and businesses.

Cisco Kinetic for Cities Parking

The Cisco Kinetic for Cities Parking solution provides intelligent parking services that address a city's parking issues through technology, such as public Wi-Fi networks, video cameras, video analytics, and sensor-enabled parking management. The solution provides citizens with real-time information about available parking and allows them to book spaces in advance using mobile applications. This results in less traffic congestion and a more effective partnership between cities, citizens, local businesses, and parking enforcement agencies.

Cisco Kinetic for Cities Urban Mobility

The Cisco Kinetics for Cities Urban Mobility solution provides real-time, configurable vehicle counts and vehicle classification while producing a wide range of traffic density information. Vehicle direction, classification, and lane placement are all captured and seamlessly brought to the Cisco Kinetic for Cities dashboard. This results in shorter daily commutes for citizens, less traffic in general, and thus improving the quality of life for the citizens in the city.

Cisco Kinetic for Cities Environment

With the Cisco Kinetic for Cities Environment solution, cities can improve existing early warning systems by deploying sensors to collect real-time environmental data to detect incidents as they develop. The moment a parameter crosses a threshold, automated notifications create inputs for a predictive model that estimates the spread and effects of the incident. Field response teams are connected to emergency management teams who are getting data from monitoring departments and sensors. All stakeholders are enabled to drive real-time action, with workflows and data flowing through a single platform.

Cisco Kinetic for Cities Safety and Security

The Cisco Kinetic for Cities Safety and Security solution uses the platform to aggregate, normalize, and analyze data obtained from disparate sources, such as intelligent sensors, video cameras, and social media. The analyzed data provides useful insights that aid in planning and making critical decisions to help manage crime and respond to emergencies, thereby making the city a safer place for its citizens.

Cisco Kinetic for Cities Waste Management

With the Cisco Kinetic for Cities Waste Management solution, cities can improve existing waste collection and bin monitoring systems by deploying sensors to collect bin fill level data. Waste pickup can be optimized by knowing bin fill levels and when bins are likely to reach capacity, reducing operational expenditures. The Cisco Kinetic for Cities Waste Management solution accurately monitors bin fill levels and creates insightful reports that enable waste collection managers to dynamically manage the waste collection cycles.

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.

Support

Cisco Kinetic for Cities solutions are fully enabled by Cisco Solution Support.

For more information about this, please refer to the link at

https://www.cisco.com/c/dam/en_us/about/doing_business/legal/docs/cisco-software-and-solution-support-service.pdf

Cisco's responsibilities entail the following:

- Cisco Technical Assistance Center (TAC) access 24 hours per day, 7 days per week to assist by telephone, fax, electronic mail or the internet with Solution and/or Application Software use, configuration and troubleshooting issues. Cisco will respond within one (1) hour for all calls received during Standard Business Hours and for Severity 1 and 2 calls received outside Standard Business Hours. For Severity 3 and 4 calls received outside Standard Business Hours, Cisco will respond no later than the next Business Day.
- Access to Cisco.com for information on the Solution or the Application Software being supported. This system provides Customer with helpful technical and general information on Cisco Products and solutions as well as access to Cisco's on-line Software Center libraries, which may include Open Source software. Please note that access restrictions identified by Cisco from time to time may apply.
- Technical issue management for issues encountered with the Solution
- In the event Cisco determine escalation to a Solution Technology Partner for Third Party Product support is necessary, Cisco will work with the Customer and the applicable Solution Technology Partner to open a case for the Customer in the Solution Technology Partner's case management system, provided the customer has a valid support contract of the Third Party Vendor Product.

Why Cisco

Cisco Kinetic for Cities unlocks and optimizes your IoT data in real-time, enforcing policies for ownership, privacy, security and governance as data moves from the edge to the cloud and across your infrastructure. You benefit from:

- **Reduced costs:** Low-risk, fast start implementation to protect against expensive implementation and upgrade costs.
- **Simplicity and effectiveness:** Extensible and interoperable combinations of sensors, applications, devices, solutions, and public services allow for scale and flexibility as your technology requirements evolve.
- **Innovation and growth:** Easy access to data and increased data management capability allows you to extend technology ecosystem to developers, businesses, and academics to help you solve city challenges and evolve technology for unprecedented opportunities.
- **A bright present and future:** Standards-based open architecture allows for the integration of devices currently on the market, as well as those that will result from future innovation.

Cisco Capital

Financing to Help You Achieve Your Objectives

Cisco Capital can help you acquire the technology you need to achieve your objectives and stay competitive. We can help you reduce CapEx. Accelerate your growth. Optimize your investment dollars and ROI. Cisco Capital financing gives you flexibility in acquiring hardware, software, services, and complementary third-party equipment. And there's just one predictable payment. Cisco Capital is available in more than 100 countries. [Learn more.](#)



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