



# **Leading New ICT Building a Better Smart City**



# Smart City Facilitates Sustainable Urban Development

With urban pressures increasing year by year, the Smart City concept has been developed as an approach to sustainable urban development. A growing number of governments worldwide are building Smart Cities via an impressive array of leading-edge ICT technologies, such as cloud computing, the Internet of Things (IoT), Big Data, and mobility.

These technologies aggregate, share, and converge city-wide resources to provide real-time, efficient, and intelligent information services.

Smart Cities are reshaping the ways in which public services are provided and managed, transforming how residents travel, work, study, interact, consume products and services, and entertain.



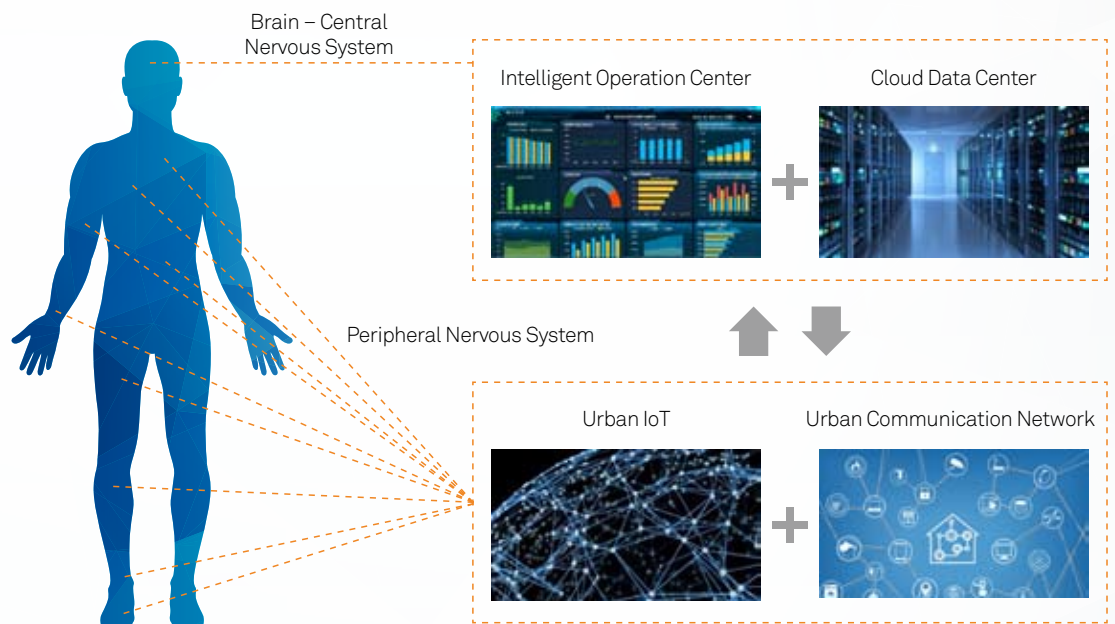


## Strategic Positioning

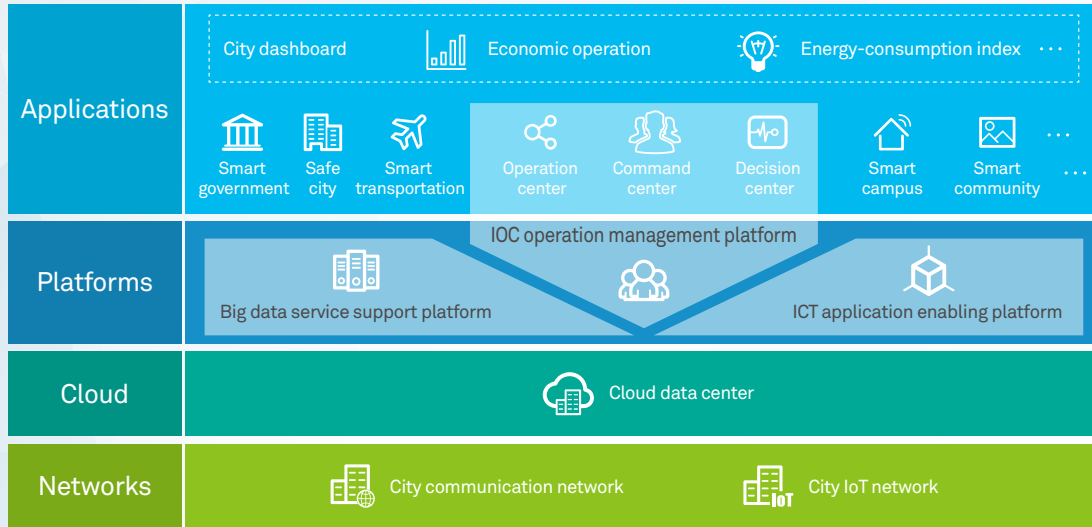
A Smart City is like a living being, with a brain and complex nervous system working together so that it constantly learns and enhances the physical world. Its growth and evolution depend on open platforms where all players collaborate to foster innovation. Integrating ultra-broadband networks, cloud computing, big data and IoT, Huawei is committed to helping cities become context aware, better connected and more intelligent.



## Huawei: a Builder of the Nervous System for Smart City



# Huawei Smart City Solution Framework: Converged Architecture to Empower Applications



## One Cloud: Cloud Data Center

Using an open architecture, the secure cloud data center integrates, shares, and capitalizes on all kinds of city information resources, serving as a key part of the foundation on which Smart City solutions are built.

## Two Networks: Urban Communication Network and Urban IoT

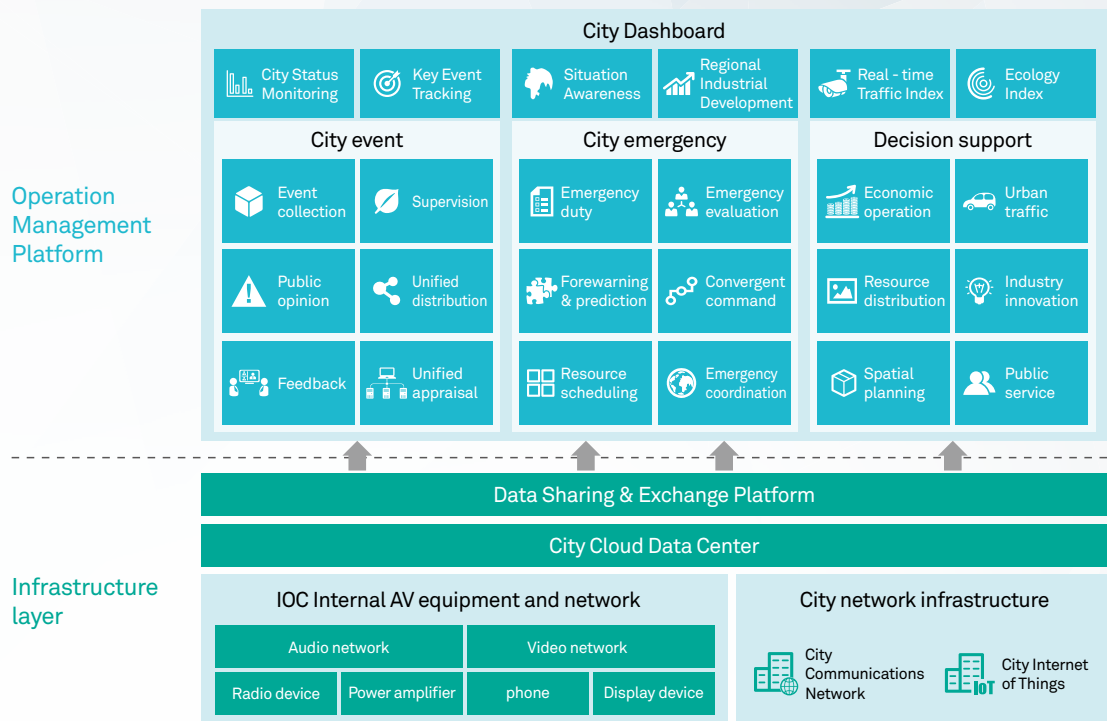
- Huawei combines wired and wireless broadband networks to enable ubiquitous broadband access in a city.
- The IoT provides a way for Smart City solutions to work with physical systems. Huawei provides several types of IoT access gateways and wireless access technologies. These technologies adapt to complex access environments, including high-density, large-volume, and underground scenarios. Huawei is a major contributor to IoT communication standards (NB-IoT/eLTE-IoT) and leads the development of the private application of mobile LTE technology for IoT use (eLTE-IoT). Huawei also provides cloud-based IoT platforms to enable IoT solutions for various purposes.

## Three Platforms: Big Data Support Platform, ICT Application Enablement Platform, and Intelligent Operation Center (IOC)

- The Big Data Support Platform enables data sharing and exchange, and provides data support for intelligent applications.
- The ICT Application Enablement Platform allows partners to develop intelligent applications easily based on Huawei ICT infrastructure. The platform combines Huawei's application development, Big Data processing, security management, and video processing and analysis capabilities with a variety of third-party capabilities, such as Geographic Information System (GIS), public service systems, and unified identification and Single Sign-On (SSO).
- The Intelligent Operation Center (IOC) platform aggregates a wide range of data to visualize the city running status, enable efficient emergency collaboration across agencies, and facilitate decision-making based on Big Data.



# Intelligent Operation Center



The Intelligent Operation Center, coupled with high-performance data networks, provides an integrated and interconnected city management platform.

## Visualizes the city operation

An operation center dashboard displays a panorama of city situations and monitors key locations in real time. With this platform, city administrators can stay informed of the city operating status.

## Accelerates emergency response

A unified emergency command and scheduling system enables rapid response and cross-agency collaboration.

## Facilitates intelligent decision-making

Based on information from a wide range of data sources, the IOC filters, aggregates, and standardizes data efficiently for comprehensive use and display. This intelligent information handling helps city administrators make effective decisions quickly.

# Ubiquitous Awareness Facilitates Smart Services

A variety of wired and wireless methods implement a network for connecting IoT devices and a general Smart City data network. These methods include eLTE-IoT, NB-IoT, Wi-Fi, 2G/3G/4G cellular technology, and wired IP networks. These networks enable the monitoring of physical systems in the city using IoT technology and provide the information required by smart services.





## 1. IoT-based Smart Utilities: Smart Street Lights

### Challenges



High power consumption:  
One 400W street lamp uses up to  
1,500 degree electricity per year



Short life of light source: Damaged  
street lights affect city's image and  
public safety



Big investment in a single function:  
Low utilization of public resources

### Solutions



### Benefits

- Intelligent light detection and automatic illumination adjustment saves 80% on lighting bills and 90% costs of operation and maintenance.
- Integration of multiple services on the pole improves public resource utilization.
- Features such as LED display and public wireless broadband services promote business model innovation.

## 2. IoT based Smart Utilities: Smart Waste Management

### Challenges



Irregular garbage collection harms the environment

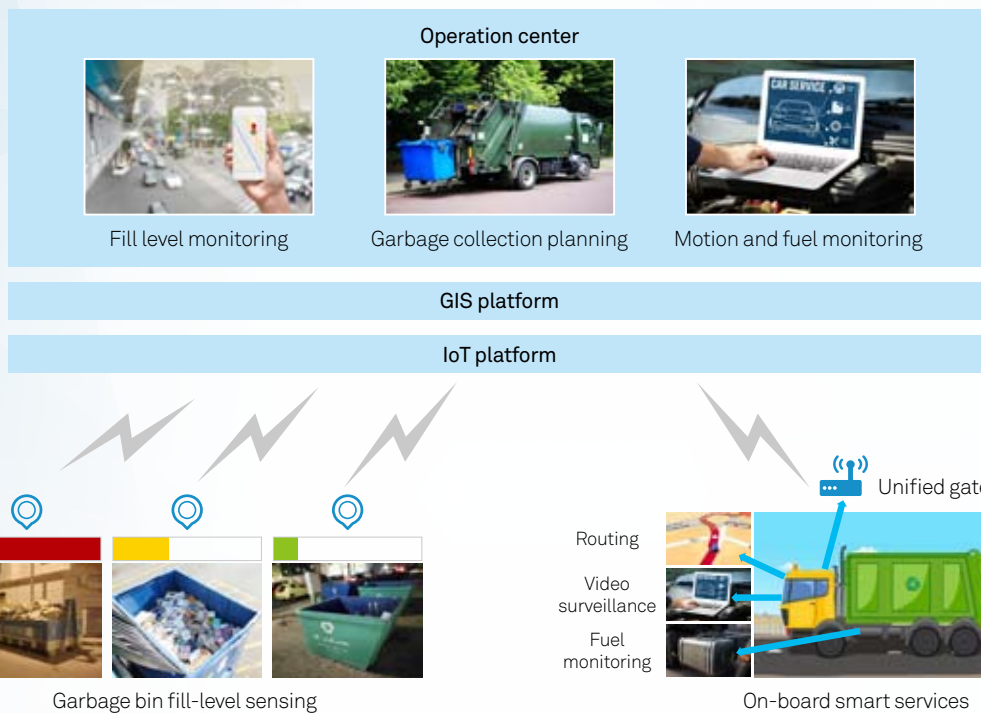


Unknown fill levels of garbage bins reduce efficiency of collection



Uncontrolled fuel utilization increases operating expenses

### Solutions

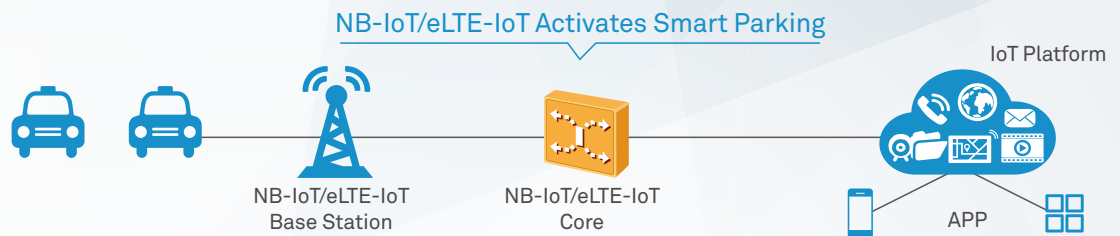


### Benefits

- Real-time sensing of garbage bin fill level and information upload.
- Times of improvement of collection efficiency by optimizing garbage truck routes.
- Enables qualitative management, regulates daily operations and prevents fuel loss.



### 3. IoT based Smart Utilities: Smart Parking



#### Traditional parking challenges:

1. 30% of the traffic congestion in urban areas is caused by drivers circling to find a parking space.
2. No guide direction for an available parking space and finding one is time/fuel consuming special in crowded areas/malls.
3. Managing and maintaining parking areas is expensive, and have low efficiency
4. Paid parking is difficult to monitor.
5. No unified network with standards and no remote O&M systems. High power consumption and low battery life in all old systems.

#### Huawei Smart Parking benefits:

1. Provides parking information in real time.
2. Provides an end-to-end intelligent parking scheme.
3. Includes a smartphone App that shows available spaces, provides navigation and directions, and allows payment by phone.
4. Simplifies policy enforcement.
5. Simplifies troubleshooting with one network for the whole city.
6. NB-IoT/eLTE-IoT allows lower power consumption, and higher lifetime for sensors than any traditional systems, due to using a Narrow band & power saving techniques.

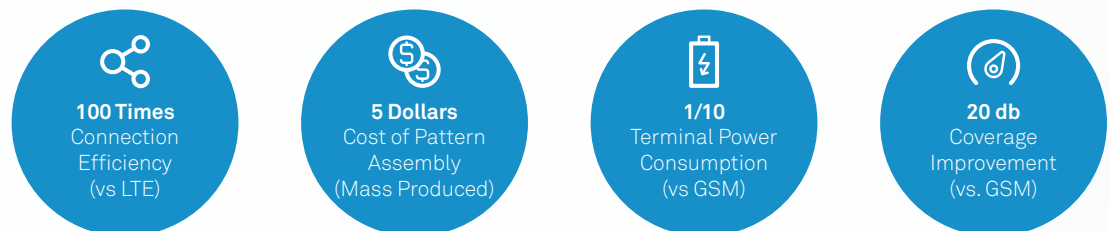
In this service, sensors under the pavement of parking spaces communicate with a parking server through the cellular network to get parking information.

Huawei provides the LTE cellular network, chips for sensors, and IoT platform, while partners provide the smartphone App and sensors.

#### Huawei's Cellular IoT Solution

Huawei's NB-IoT/eLTE-IoT overcomes the above defects, with all the advantages like:

1. Wide area ubiquitous coverage.
2. Fast upgrade of existing network.
3. Low-power consumption guaranteeing 5 years or more battery life, high coupling, low cost terminal.
4. Plug and play, high reliability and high carrier-class network security.
5. Unified business platform management win-win-win for Parking service provider, carrier operator and device providers.
6. Initial network investment may be quite substantial and superimposed costs are very little.
7. NB-IoT/eLTE-IoT Huawei's smart parking solution perfectly matches LPWA market requirements, enabling smart way to park for end user using Smartphone APP, and enables operators to operate traditional businesses by virtue of ultra-low-cost (\$ 5 ) modules and super connectivity also opens up more industry opportunities.



## 4. IoT based Smart Utilities: Smart Metering

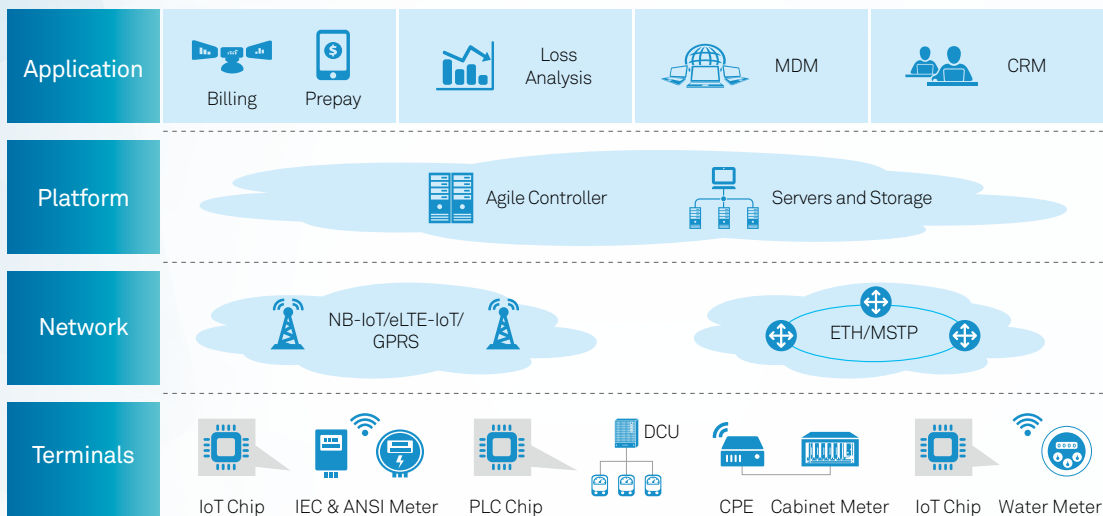
### Challenges



Metering, charging, user management, and resource loss have been major concerns of relevant companies. due to the lack of effective communication measures, employees had to go to households to collect meter data once a month. Problems including inaccurate metering, ineffective resource theft prevention, long charging period, and inaccurate line loss calculation often occurred.

### Smart Metering Solution

#### Solution Architecture



#### Key Features

##### 1. Flexible Deployment

Various communication modes: NB-IoT/eLTE-IoT/ PLC in different meter reading scenarios

##### 2. Innovative Technology

NB-IoT/eLTE-IoT has low consumption, long-range coverage and more connections. World-leading broadband PLC at the application layer provides the rate larger than 2Mbit/s

##### 3. Open Architecture

Huawei open solution architecture integrates value-added services and improves operation efficiency

#### Benefits

##### 1. Reduce Operation Cost

Automatic data reading and remote control will avoid manual wrong operation and reduce labor cost and operation cost

##### 2. Monitor Abnormal Loss

Detect, analyze, and identify attempts or actions for resource theft by E2E solution

##### 3. Improve Customer Satisfaction

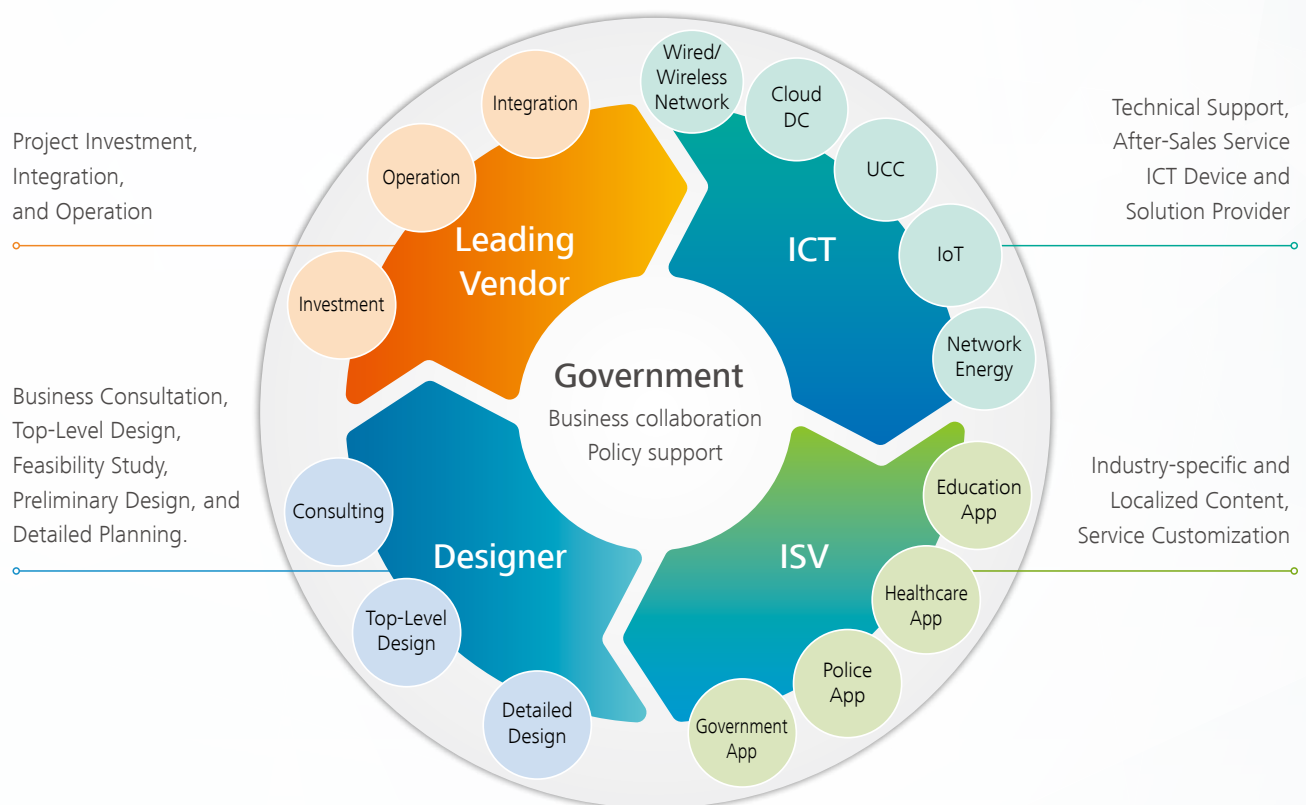
Multiple remainder fee ways (SMS, Email, telephone, smart phone APP) and forms of payment (website, mobile phone, bank, scratch card, POS, remote recharge), user-friendly, greatly improving customer satisfaction





## Orchestrating a New Ecosystem to Build Smart Cities

A Smart City requires top-level design, integration, operations, service applications, and new ICT infrastructure — much more than a single vendor can supply. Building Smart Cities requires seamless collaboration of players across all domains.



## Aggregating Resources and Serving Customers



Following a Platform + Ecosystem strategy, Huawei has launched the Global OpenLab Program to facilitate joint innovation in an open ecosystem.

Huawei operates OpenLabs in five cities: Suzhou, China; Munich, Germany; Mexico City, Mexico; Singapore; and Dubai, UAE. Each OpenLab provides verification, ISV support, innovation, and experience centers. These facilities bring together the strengths of global expertise with local services to implement the best solutions and services for a wide range of enterprise customers.

In 2017, Huawei will build seven new OpenLabs, including facilities in London, UK; Paris, France; Moscow, Russia; and Johannesburg, South Africa. By the end of 2019, Huawei plans to have 20 OpenLabs around the world.





Through the open platforms and ecosystems, Huawei jointly develops end-to-end holistic Smart City solutions with more than 400 industry-leading solution partners across the globe. And with the support of more than 2,300 channel service partners, Huawei offers access to mature project operation processes, implementation expertise, and delivery systems.



400+  
Solution Partners



## Open Lab



2,300+  
Channel Service Partners



eSDK

## Building Smart City partner resource pools via open cooperation



## Global Footprint: Serving 100+ Cities Across 40+ Countries



Huawei's Smart City solutions have been deployed in more than 100 cities across 40 countries.

### Smart Longgang: Building a Converged Smart City



- More efficient emergency response: Unified command and dispatching for emergencies, enhancing resource coordination efficiency by 60%.
- Improved public security: The number of public-order and criminal cases reduced by 28.79% YOY.
- Big Data-driven energy conservation: Power consumption of 60% of industry campuses is controlled with intelligent electrical equipments.
- Enhanced government service efficiency: The cross-agency approval efficiency improved by 50%.

### DSOA In Dubai: 7.2 Million Square Meters of Smart Living



The Dubai Silicon Oasis Authority offers a Smart City environment:

- Smart streetlights reduced maintenance costs by 42% and energy costs by 35%.
- Streetlight poles incorporate a number of advanced features, such as digital signage, Wi-Fi, CCTV, and environmental monitoring.
- Sewage water treatment reduced operating costs by 70%.
- Smart waste bins reduced operating costs by 65%.





### Henan Telemedicine: Quality Medical Care for Faraway Patients



- As the world's largest telemedicine network, this system covers hospitals in 18 cities and 130+ counties, including more than 1,000 primary care institutions.
- Each year, approximately 120,000 patients are treated through tele-consultation, and 320 tele-education sessions reach 400,000 people.
- 81.2% of patients are treated locally, reducing the referral rate by 21% and improving telemedicine satisfaction to 97%.
- The system extends medical services to other countries, including the USA, Russia, Uganda, and Italy.

### Amsterdam ArenA: High-Tech Stadium



- High-density Wi-Fi network implements 100% coverage for ArenA stadium and supports 100% concurrent online users.
- SDN-based centralized control of policies guarantees service quality of key applications.
- The system increases attendance and brings additional revenue to the stadium owners.
- The network also helps with stadium management by enabling remote control of facilities.







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