科学城(广州)信息科技集团有限公司
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Smart Community Planning and Construction Program Based on Smart Street Light Pole

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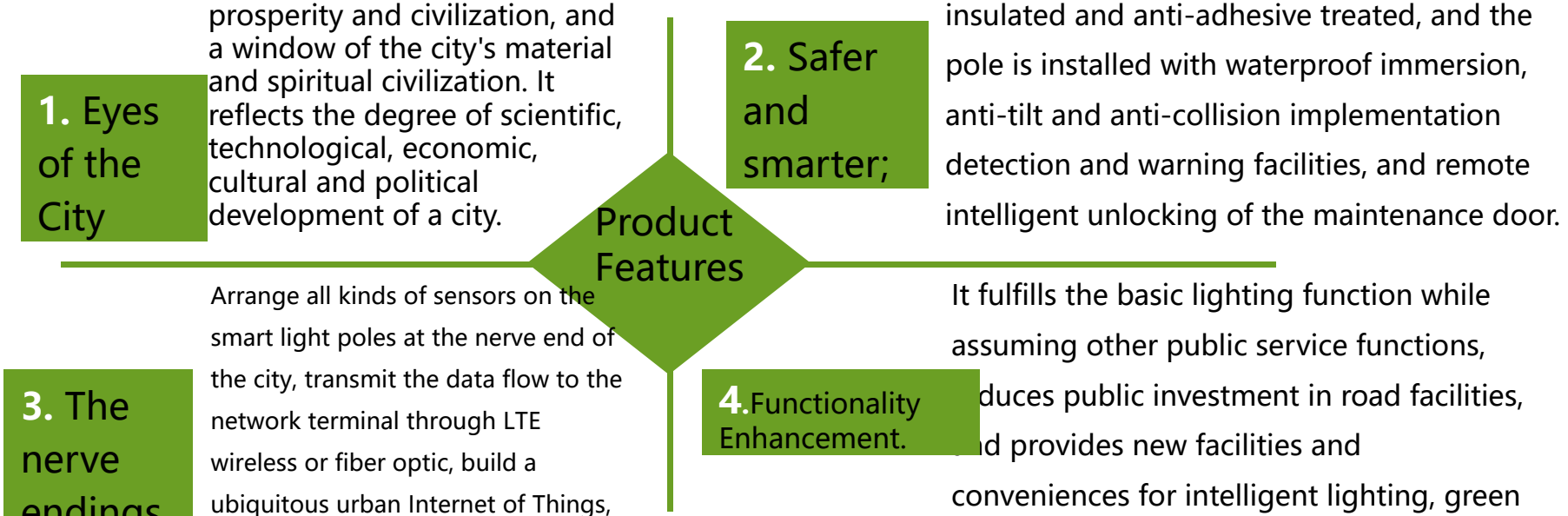
Smart Light Pole Comprehensive Introduction

The birth of the smart city is to reasonably solve the difficulties and pain points encountered in urban management, and the powerful lever to pry the development of the smart city is the smart light pole. The smart light pole is based on the effective integration of the functions of various types of municipal poles and towers, and selectively integrates the intelligent sensing equipment of public security, transportation, urban management, municipal government, communication, environmental protection and other functional departments, such as charging piles, information dissemination screens, HD cameras, emergency alarms, 5G base stations, environmental sensing and so on, on a pole (tower) with high expandability, making the pole (tower) a smart city information collection terminal and a convenient service terminal. Based on the effective integration of the functions of public security, transportation, urban management, municipal government, communication, environmental protection and other functional departments, intelligent sensing devices such as charging piles, information release screens, HD cameras, emergency alarms, 5G base stations, environmental sensing, etc. are integrated on a light pole (tower), which is highly expandable, making the light pole (tower) become a terminal for collecting information and providing convenient services for the people of the smart city.

2.1 Smart Street Light Pole Comprehensive Introduction



2.2 Smart Street Light Pole Design Advantages

Software Advantages

The IOT software management platform developed by our company can realize the docking of nearly 20 kinds of IOT sensing devices, such as charging piles, information dissemination screens, high-definition cameras, emergency alarms, environment sensing, human-vehicle monitoring, pavement sensing, intelligent manhole covers, intelligent parking, intelligent garbage cans, intelligent hydrants, and so on.

Box Advantage

The integrated equipment box has the functions of heat dissipation, waterproof, dustproof, anti-theft, anti-electricity leakage, etc. and network alarm, and can be installed with the central control box, mobile communication main equipment, police equipment, etc.; the inspection door lock is set with locking device (anti-prying, anti-theft, waterproof), and the intelligent ESC door lock is used, and can be operated through the cloud control platform in case of subsequent connection to the network; and the door panel and door frame adopt the swinging-type waterproofing treatment to prevent the entry of water from the outside world.

Rod Advantage

The circumferential welds of pole and base box are welded by national second-grade welding standard, the longitudinal welds of pole are fully fusion welded (the traditional pole factory can only achieve 60% fusion), the inner and outer surfaces of pole are hot-dip galvanized for anticorrosion treatment, and the plastic powder adopts high-quality outdoor pure polyester plastic powder, which is resistant to ultraviolet rays, and adapts to the coastal cities and heavily salted areas;

Construction Advantages

Our company has almost all the top qualifications in the information technology industry, and has rich engineering and construction experience in communication, electricity, electronics, etc. Smart light pole is an integrated communication infrastructure for many kinds of IOT sensing devices, and our company is capable of undertaking this special mission.

2.3 Smart light pole pole structure type

Intelligent light poles can be divided into fixed, rack and slide (see the picture below) from the design of the installation structure of various types of IoT modules, which are suitable for various installation scenarios, and the product modeling can be flexibly designed and produced according to the site surrounding conditions and the actual needs of the owners.

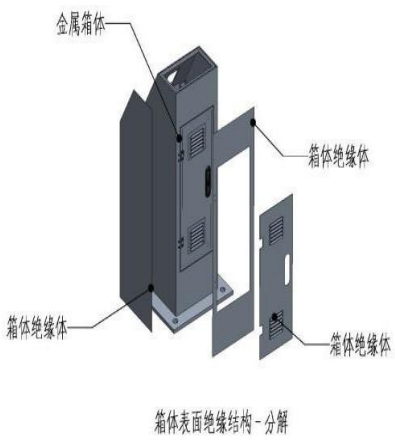
飞檐
智慧灯杆外型设计

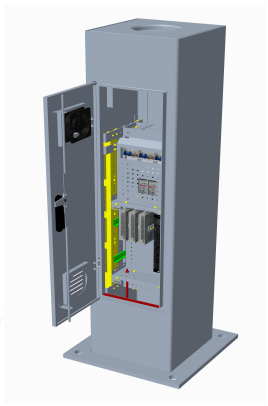
此设计来源于古代建筑屋檐演变而来，辅以镂空窗花边做装饰。摄像头支架为直角，同样辅以窗花边装饰，支架中间可隐藏广播，拉长后可隐藏安放交通设备。大屏边框做形象化设计。整个灯杆呈现出简约中国风，适用于中式街道。

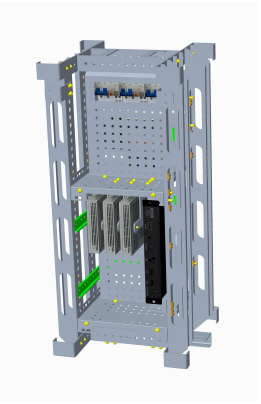
高度：8m-10m-12m
材质：铝合金
颜色：深灰色

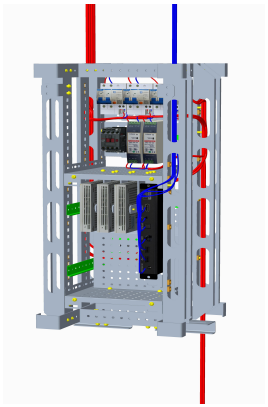
2.4 Smart light pole box structure design

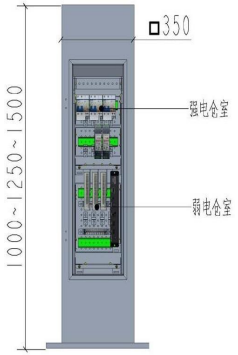
Design principle: multiple boxes are combined and used in separate compartments, strong and weak power are routed separately, strong power is routed in the top compartment and weak power is routed in the bottom compartment; the box has a built-in heat dissipation treatment device and the surface is insulated. Waterproof: the cabin is installed with first and second level waterproof immersion alarms, and the door plate and door frame adopt swinging waterproof treatment to prevent the entry of water from the outside world; Dustproof: dustproof grade IP54; leakage-proof design: by wrapping the flame retardant insulating material as an insulating layer in the outer layer of the metal shell of the equipment box, it achieves the purpose of leakage-proof to ensure the safety of the personnel passing by; anti-theft design: the service door adopts intelligent door lock, which is operated remotely by opening and closing the door through APP or cloud-controlled system. Anti-theft design: the service door adopts intelligent door lock, which can be opened and closed remotely via APP or remote, and the cloud control platform carries out real-time status monitoring of the door lock and tracking of the door opening and closing logs.











2.5 Smart Street Lighting Pole System Architecture

Other applications

API interface

Smart City Cloud Control Platform

System software based on BS architecture, server can be built in the control center or the cloud, based on intelligent street light, intelligent street light control system, set monitoring, informatic dissemination, Internet of Things information in one.

Database

The background communication program, which is responsible for the communication with the hardware; at the same time, it is open to the application system through the API interface to realize the docking of business and data.

server

Local IoT gateway

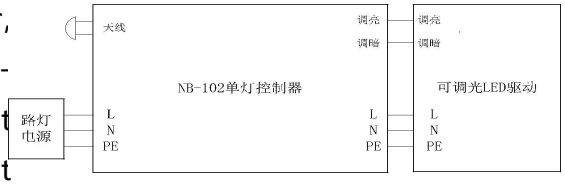
Realize local control of LED display, LED street light, sensor, RFID equipment. Support the development of wireless communication protocols, can be seamlessly integrated with environmental monitoring, parking sensors, intelligent garbage cans and other third-party equipment, and intelligent transportation, environmental monitoring, urban governance all-round linkage, to help the development of smart cities.

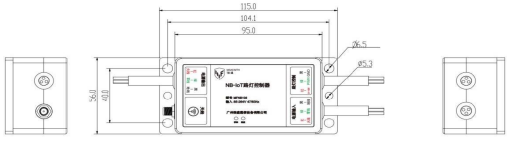
Routing Switch All-in-One

smart terminal

2.6 Smart Street Light Pole NB-IoT Single Lamp Controller

From the perspective of energy saving and practicality, the company has organized a professional team to develop NB-102 based on the Internet of Things protocol NB- IoT, which has three dimming modes: SCR dimming, PWM and analog voltage (0-10V). Advantages: remote single-lamp control, switching, brightness adjustment, self-test, automatic alarm function; current, voltage, power, power factor, temperature detection and other functions; over-current protection, lamp condition detection, default light on and other functions; simple and convenient installation, can respond to the instructions sent by the center in a few seconds; suitable for LED lamps, high-pressure sodium lamps, metal halide lamps and other lamps, such as switching and dimming use.





2.7 Smart Street Light Pole IoT Gateway

1. Scope of application: WAN connectivity and LAN interconnection;
2. Characteristics: Switch, protocol stack and other functions can be integrated to realize system equipment docking, information collection, information input, information output, centralized control, remote management and linkage applications;
3. Accessible devices: with device management function. Can access video surveillance, one-key call, network sound column, LED advertising screen, intelligent WIFI, micro-weather, environmental monitoring, intelligent door locks and so on.

specifications	instructions	remark
Model	MF10-GW-01	
	Button	Supports RESET button (Restore Factory Settings)
	Ethernet port	1XWAN10/100MbpsAdaptive Ethernet ports; 4XLAN10/100MbpsAdaptive Ethernet ports
	COM口	1Gang RS485/1 gang RS232
	USB口	2 gang USB
Power Supply	Scope of power supply	12V DC
Other	Size（mm）	245*85*40
	working temperature	-20--+70℃
	Storage temperature	-40--+80℃

2.8 Intelligent light pole synthesized IoT management platform

Intelligent management of lighting, video monitoring, information broadcasting and other functional modules on smart light poles, intelligent operation and maintenance management, work order management and so on.

Platform features:

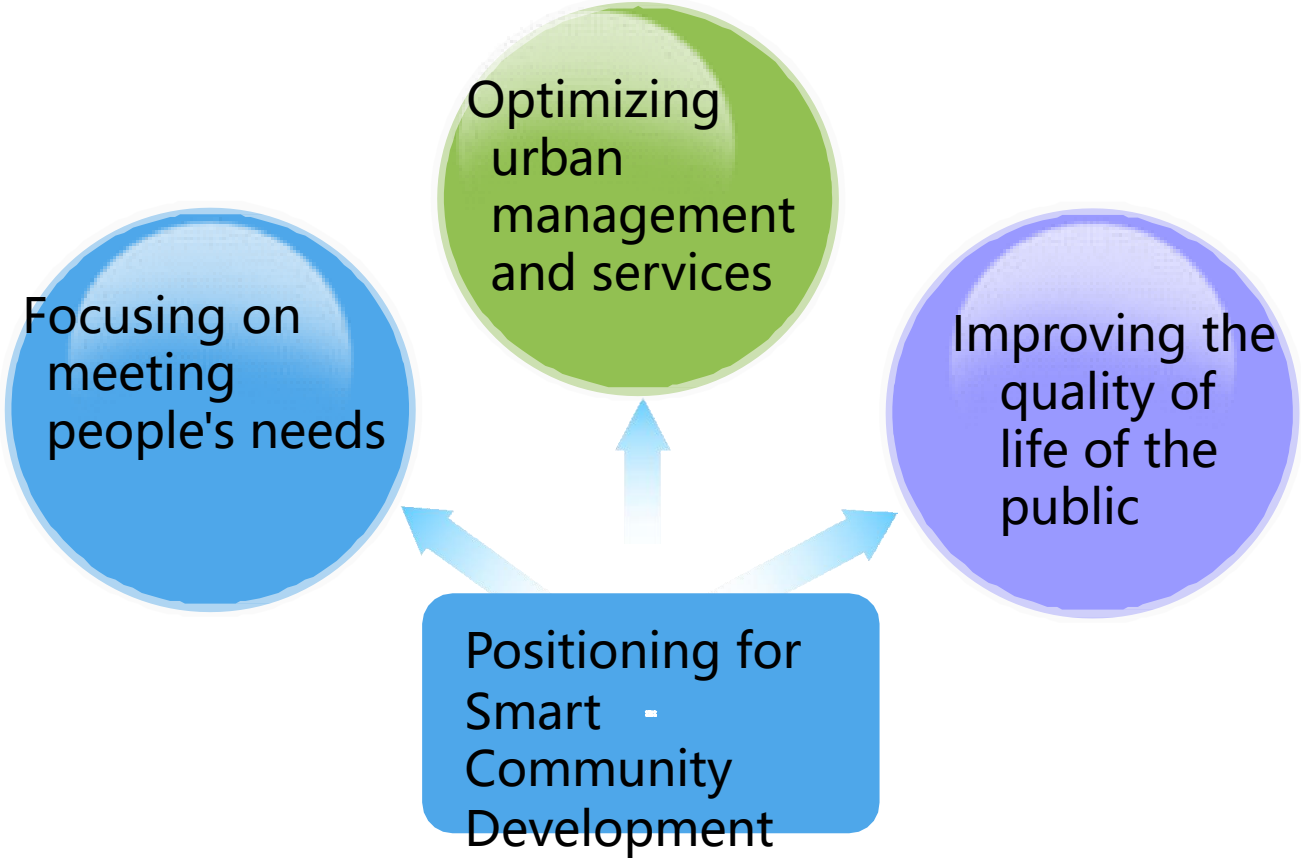
1. GIS-based equipment location display and search;
2. online monitoring of equipment status;
3.multi-protocol access, a variety of remote control methods;
4.historical data management;
5. automatic alarm reminder.

1. Intelligent management of existing facilities information and operation status, such as lighting equipment specifications, running time, maintenance times, electricity consumption and other information. 2. Effectively solve the time cost and labor cost in the operation and maintenance process;
2. effectively solve the time cost and labor cost in the operation and maintenance process, with automatic alarm function of fault networking and precise positioning of the fault point, through the system information can be accurately understood to the fault module.
3. Intelligent dispatch of work orders can be carried out according to the pre-set management process, and the response time and processing opinions of each link can be recorded;
4. the notification mode is flexible and diverse, suitable for office space, construction sites, shopping malls and other areas, at any time and any place to implement the understanding of the relevant facilities operating conditions and troubleshooting.
5. Not only can it intelligently manage the equipment on the integrated pole, but also realize the management of urban infrastructure around the integrated pole through the video linkage function.

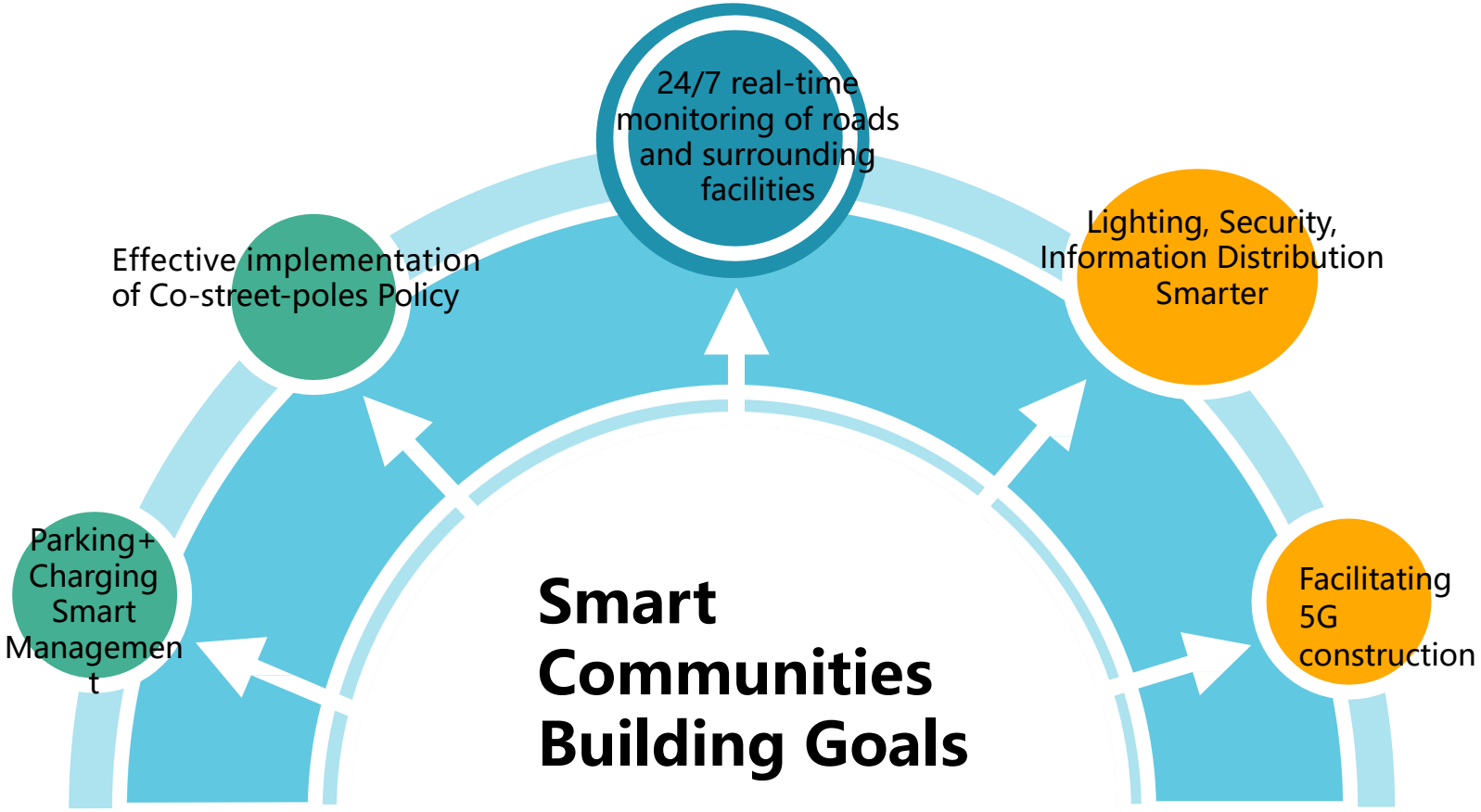
Overview of smart communities based on smart street light poles

Smart community based on smart light poles means that in the process of urban development, in the fields of urban infrastructure, resource environment, social livelihood, economy and industry, and municipal governance, light poles are fully utilized as a carrier to intelligently sense, analyze, integrate, and respond to the activities related to urban residents' life and work, enterprises' operation and development, and government administration and management, by means of the Internet of Things (IoT), cloud computing, artificial intelligence, and big data analysis, so as to provide a more beautiful living and working environment for citizens, create a more favorable business development environment for enterprises, and build a more efficient urban operation and management environment for the government. Through the Internet of Things, cloud computing, artificial intelligence, big data analysis and other technological means, it can intelligently sense, analyze, integrate and respond to the activities related to the living and working of urban residents, the operation and development of enterprises and the administrative management of the government, so as to provide the public with a more beautiful living and working environment, the enterprises with a more favorable business development environment, and the government with a more efficient operation and management environment, thus realizing the effects of safety, convenience, high efficiency and greenness.

3.1 Smart Community Development Positioning Based on Smart Light Poles



3.2 Smart Community Building Goals Based on Smart Street Light Poles



Information technology hardware system planning and construction program

In view of the future development trend of the smart community, we will rely on a series of latest high-tech and new technologies such as cloud computing, Internet of Things, big data, fifth-generation mobile communication technology, etc., and carry all kinds of informationized infrastructures on the smart light poles, such as smart lighting, mobile communication, WIFI, traffic monitoring, public security management, public infrastructure monitoring, traffic guidance, and human-vehicle monitoring, etc., so that we can build up a smart network, smart management, smart business, smart supervision, smart warning and other functions for the town. Intelligent network, intelligent management, intelligent business, intelligent supervision, intelligent warning and other functions are built for the town. In the system design, full consideration is given to the advancement, rationality, expandability and compatibility of the overall intelligent system, so that the entire intelligent level of the smart town can be constantly enriched and improved with the development and progress of technology.

4.1 Smart Community Informatization Hardware Subsystem Based on Smart Light Pole

Sorting of key subsystems based on smart light poles

1. Smart Street Lighting Subsystem
2. Video Surveillance Subsystem
3. Information Intelligent Release System
4. Smart Parking Subsystem
5. SOS call subsystem
6. People and traffic flow monitoring subsystem
7. Real-time road monitoring subsystem
8. Smart WIFI subsystem

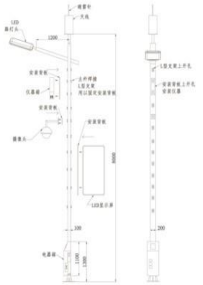
4.2 Smart Light Pole Function Display and Construction Program

The planning and construction of smart communities are divided into two parts: renovation of existing facilities and new construction. Light poles, as the most widely distributed and densely populated public infrastructure facilities, are also built according to the combination of renovation and new construction modes, and the renovation project needs to comprehensively consider whether the original light poles are safe under stress.

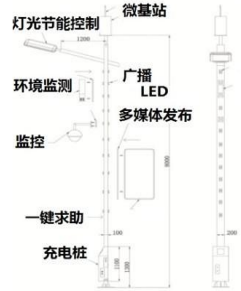
1. Newly Constructed Smart Street Lighting Pole Product Program

2.Non-smart Street Lighting Pole Retrofit Program

普通路灯灯杆



智慧灯杆功能模块

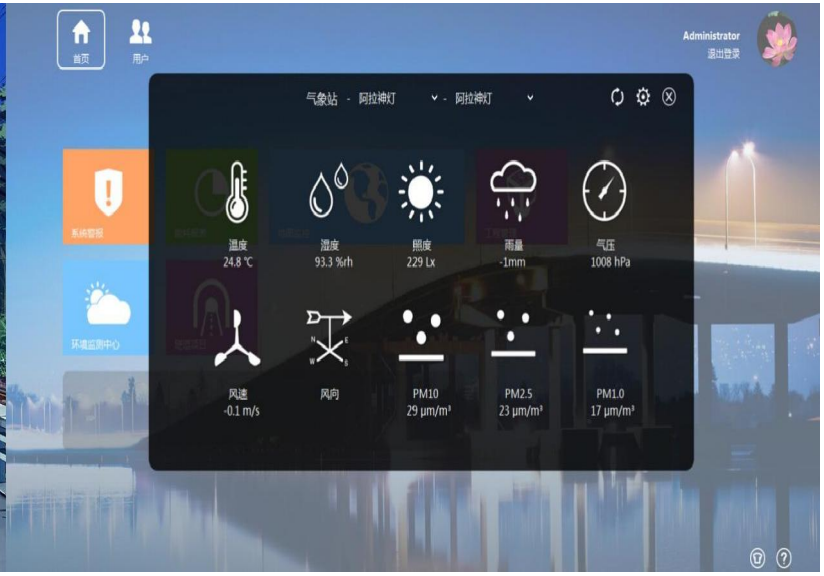


智慧路灯杆改造方式

4.3 Smart Street Light Subsystem

Intelligent street light is based on NB-IoT street light controller, which realizes precise control and maintenance of single light and flexible setting of street light on/off/brightness according to seasonal, weather and scene changes, saving power consumption by 10-20%; after using NB-IOT intelligent street light program, the street light operator doesn't need to manually inspect the street light, and can remotely detect and locate the faults, and carry out lifecycle management combined with the running history of the street light to reduce operation and maintenance costs by up to 50%. NB-IOT intelligent street light utilizes carrier network, street light is plug-and-play, and the data will be transmitted to the street light management cloud platform through the "one-hop" method. Due to the use of authorized spectrum, it saves the maintenance cost in the later stage and has strong anti-interference ability.

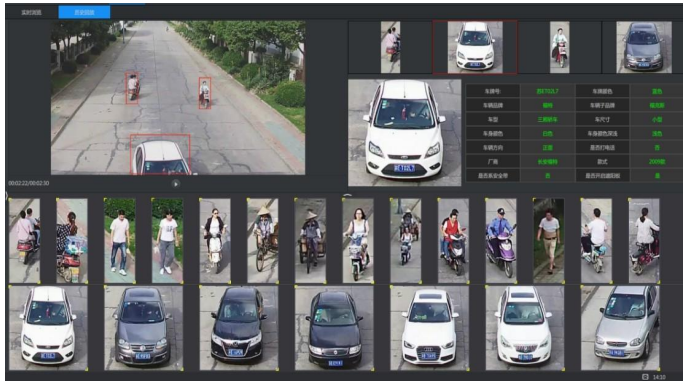
Installation rendering of smart street lights

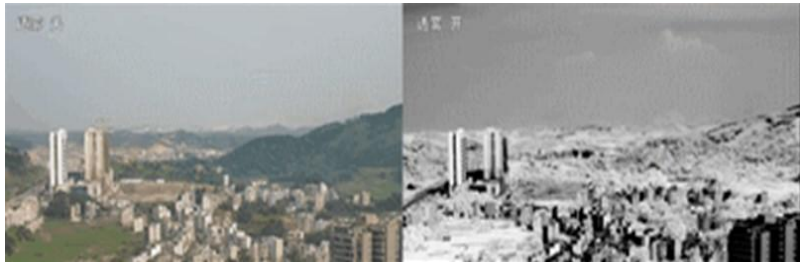


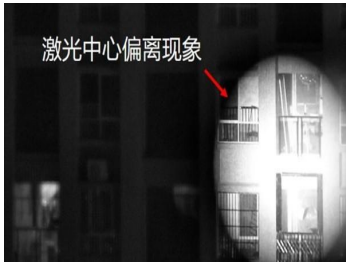
Smart Street Light System Platform Display

4.4 Video Surveillance Subsystem

The video surveillance system includes monitoring of special personnel and vehicles, overall monitoring of the environment in special areas, and can be widely used in law and order, transportation, criminal investigation and other fields, and some of the equipment according to the actual needs of the front-end data sorting and analysis, AI artificial intelligence and other functions.







4.5 Information Intelligent Release Subsystem

Multimedia advertising screen

By deploying information bulletin boards on smart towers and using the on-site network to interface with the platform, the management department can remotely send programs to the information bulletin boards from the backend information dissemination application, such as public welfare advertisements, real-time meteorological conditions, and pedestrian flows. This further enhances the management efficiency of information dissemination and reduces management costs.

Information broadcasts

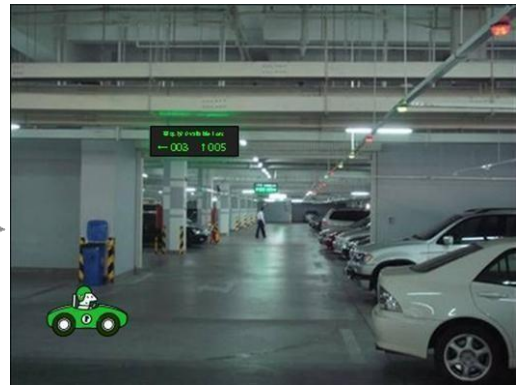
Automatic/manual playback of background music, paging broadcast, business broadcast; in case of emergency, the system forcibly switches the broadcasting right to emergency broadcasting for remote command, and emergency broadcasting has the highest priority control level.

4.6 Smart Parking Subsystem

Intelligent community parking management system is divided into on-street parking management and parking lot parking management, which can adopt the combination of infrared geomagnetic sensor and AI camera, and through the IOT management platform of intelligent light pole to accurately record real-time parking status of vehicles and the time of entering and exiting the parking lot (space), so as to realize the unmanned intelligent management.

Automatic License Plate Recognition (ALPR)

Intelligent parking space guidance



Area of application	Solution	Customer value
§ Indoor parking lot; § Outdoor parking § lot; Roadside parking lot.	§ Based on infrared geomagnetic induction, license plate recognition and intelligent analysis technology, it realizes non-stop card swiping (code scanning) access and automatic license plate recognition.	§ Realization of automatic passage without stopping, increasing the efficiency of passage and improving the user experience. § Realize automatic comparison of images of vehicles entering and exiting, automatic analysis of license plates, electronic billing, and protection of vehicle safety.

4.7 Emergency call subsystem

Intelligent dynamic integrated alarm and help equipment can realize the monitoring center external broadcast and outdoor extension call monitoring center. External broadcasting can realize the release of emergency information, notices, government affairs, news and other information, and the outdoor extension call monitoring center can realize the first aid call. When citizens encounter emergencies and need help, press the one-key emergency button, the security command center platform of the smart community area will instantly pop up which location alarm information, which can achieve rapid response, networking assistance, and nearby police, which can greatly improve the efficiency of dealing with emergencies.

The terminals are made of high-strength metal casing with explosion-proof design, which is not only strong and durable, but also prevents vandalism.

The host adopts a high-definition camera with automatic white balance, automatic night-light compensation, etc., and a built-in - 75dB high-sensitivity microphone, which can truly reflect the sound and image effects of the scene.

The emergency help mainframe can also output control signals to link the original monitoring system.

4.8 Traffic flow dynamic monitoring subsystem

Foresight to win the future

Issue Background

With the rapid development of economic level, all kinds of motor vehicles on the road are increasing, which brings great pressure on urban traffic.

Issues Analysis

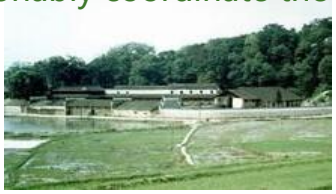
Conventional traffic signals are timed, and the main disadvantage of such control is that when the traffic volume varies greatly, it may lead to traffic congestion due to unreasonable releases.

Solutions

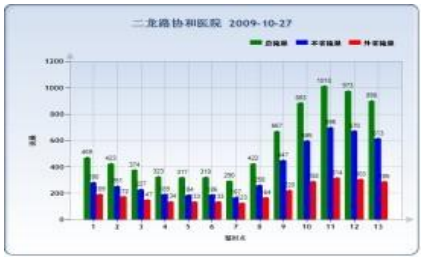
In each lane of the far side and near side of the buried pressure sensors to detect traffic flow, the detection zone distance is set to 100m, with long-term traffic statistics and the system combined with the input of a fixed value of time, change the current implementation of the signal cycle

4.9 Dynamic monitoring of passenger flow in plazas and commercial areas

Since light poles are widely, densely and uniformly distributed, passenger flow dynamic monitoring equipment mounted on light poles can effectively monitor and analyze the characteristics of passenger flow in real time, which can help the management of the smart community to reasonably coordinate the distribution of relevant public resources and construction improvement plan.

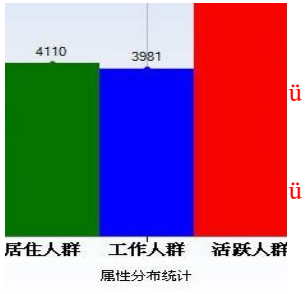


- ü Distribution of clientele, shown in segments;
- ü Visitor behavior analysis, e.g., frequency, length of stay
- ü Based on the data analysis, the next step of the smart community construction plan will be deployed, thus enhancing economic benefits.

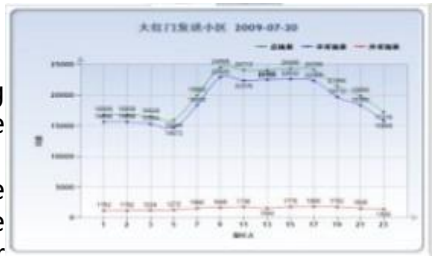


Daily monitoring of changes in pedestrian flow in plazas and commercial districts, with quantitative charts automatically generated.

Mobilizing staff in a timely manner to evacuate visitors in case of overcrowding and emergencies in the Plaza



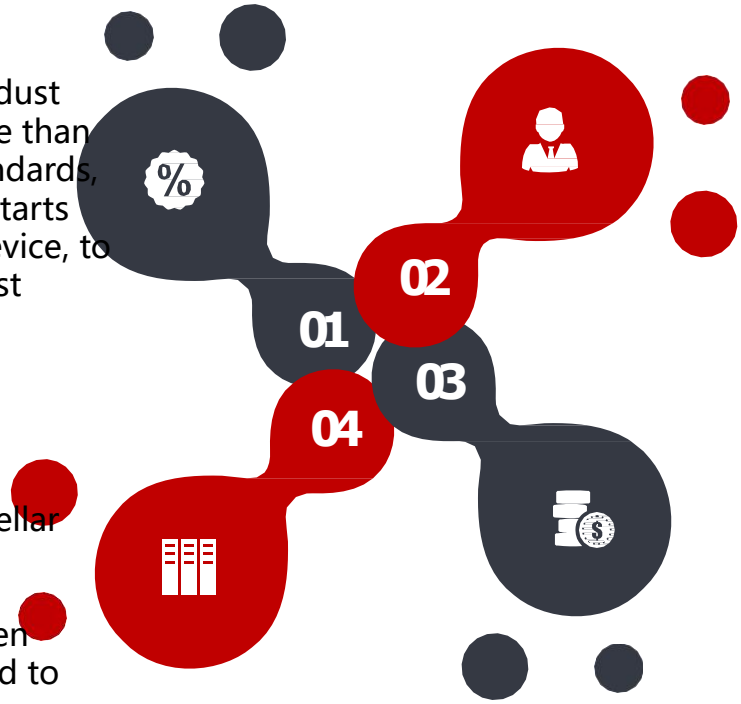
- ü Segmentation of visitors: working people, residential people, active people
- ü Analyze the characteristics of the active population and further target the attractions to enhance their attractiveness.



- ü Accumulate and analyze historical data easily and quickly
- ü More accurate data and easier quantification to support decision-making for the sustainability of the tourism industry

4.10 Real-time road monitoring subsystem

Dust monitoring
Through the road surface dust real-time monitoring, more than the corresponding set standards, the system automatically starts the water mist spraying device, to achieve the purpose of dust reduction, air purification.

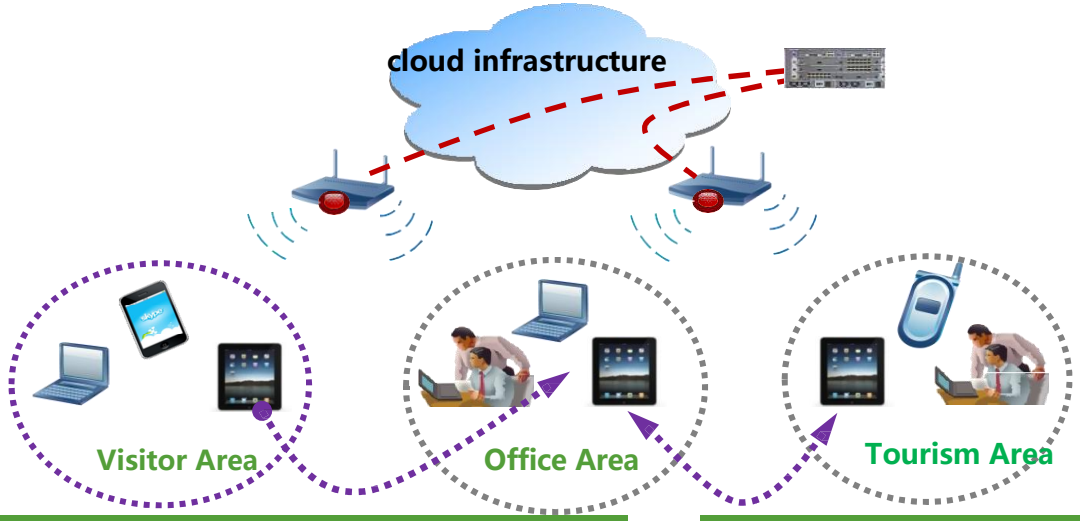


Cellar cover monitoring
As the public infrastructure that occupies the largest number of cellar covers on the road, they are not effectively monitored for a long period of time and are often stolen or displaced, which can easily lead to traffic construction and even cause personal injuries.

Waterlogging monitoring
As the light poles are mostly installed at the roadside, which is a waterlogged area, the lack of effective real-time monitoring of the existing waterlogged areas leads to frequent traffic accidents due to waterlogging on rainy days, and people's properties are not effectively safeguarded.

Ice detection
Since most of the light poles are installed on the roadside, which is an area prone to waterlogging and icing, there is a lack of effective real-time monitoring, resulting in frequent traffic accidents due to waterlogging on rainy days and a lack of effective protection of people's property.

4.11 Smart WIFI system



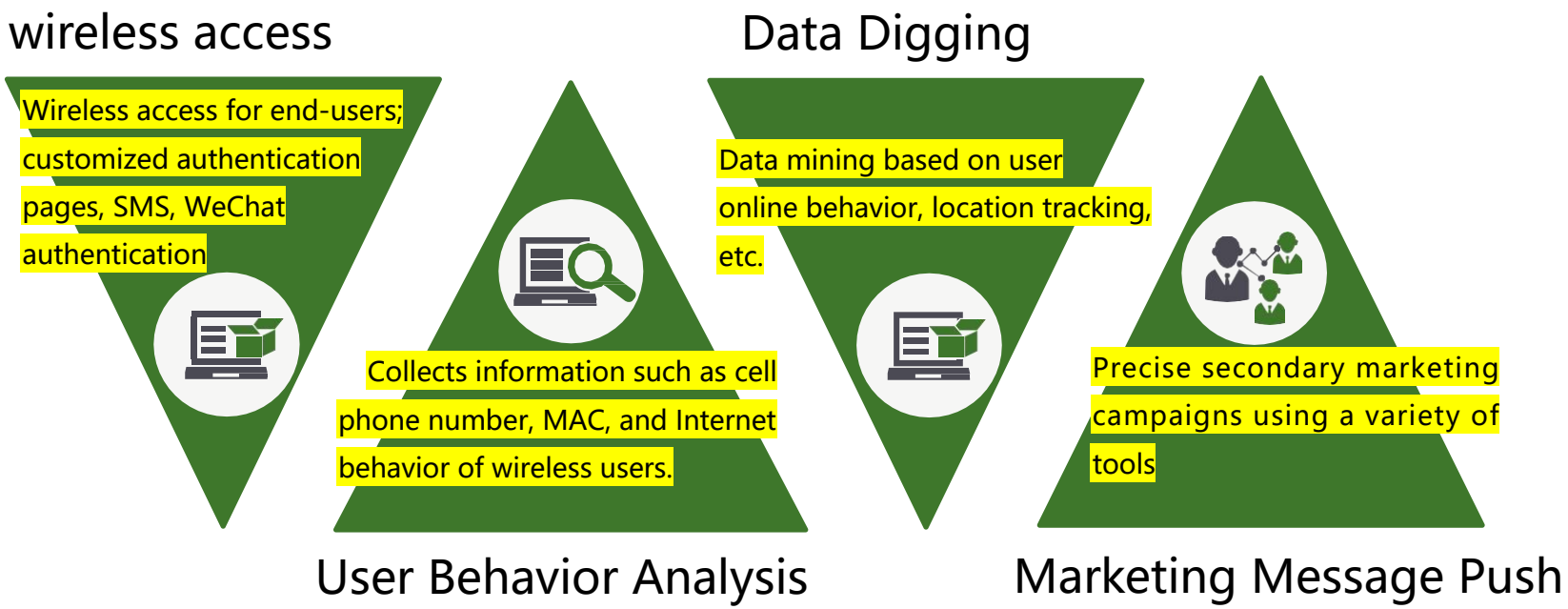
Fine-grained user control

l. One authentication, multiple access, free roaming of internal employees
l . Supports policy control of users or user groups, and bi-directionally guarantees users' upstream and downstream access bandwidth.
l . Secure access control for visiting customers

pervasive access

l . Wi-Fi coverage, free access for users
l . A large number of terminals can be freely identified, realizing mobile office in the park.

4.11 Smart WIFI system



Intelligent Community Informatization Platform Construction

The construction of smart community should be built on intelligent information infrastructure, and the information construction of smart community should fully utilize the Internet of Things (IoT) technology to connect every smart device in the town as a physical node with full access to the network, realizing the interconnection of everything in the featured town, forming a brand-new network operation support environment, and upgrading the level of intelligence of the town. Through the construction of intelligent community informationization platform, government managers are able to understand the key indexes of each link of operation and management of the town in a timely and comprehensive manner; improve the response speed of management, emergency and service by means of intelligent analysis and prediction; gradually realize the transformation from passive management to active response; and improve the management of the town by highly efficient cross-departmental intelligent collaboration.

5.1 Smart Community Panorama Based on Smart Light Pole Network Networking Platform

Intelligent manhole cover
Adopting the current advanced NB-IOT wireless communication technology combined with electronic map to show the status of manhole cover and alarm content.

Intelligent Pipe Networks
Installation of various types of sensors in suitable locations according to specific monitoring needs

Intelligent Security
Cameras with face recognition technology for the security of small towns

Intelligent hydrant
Supports the design of fire hydrant anti-collision, anti-theft, valve control, etc.

Information Release

- Includes visual and auditory information dissemination, intelligent management

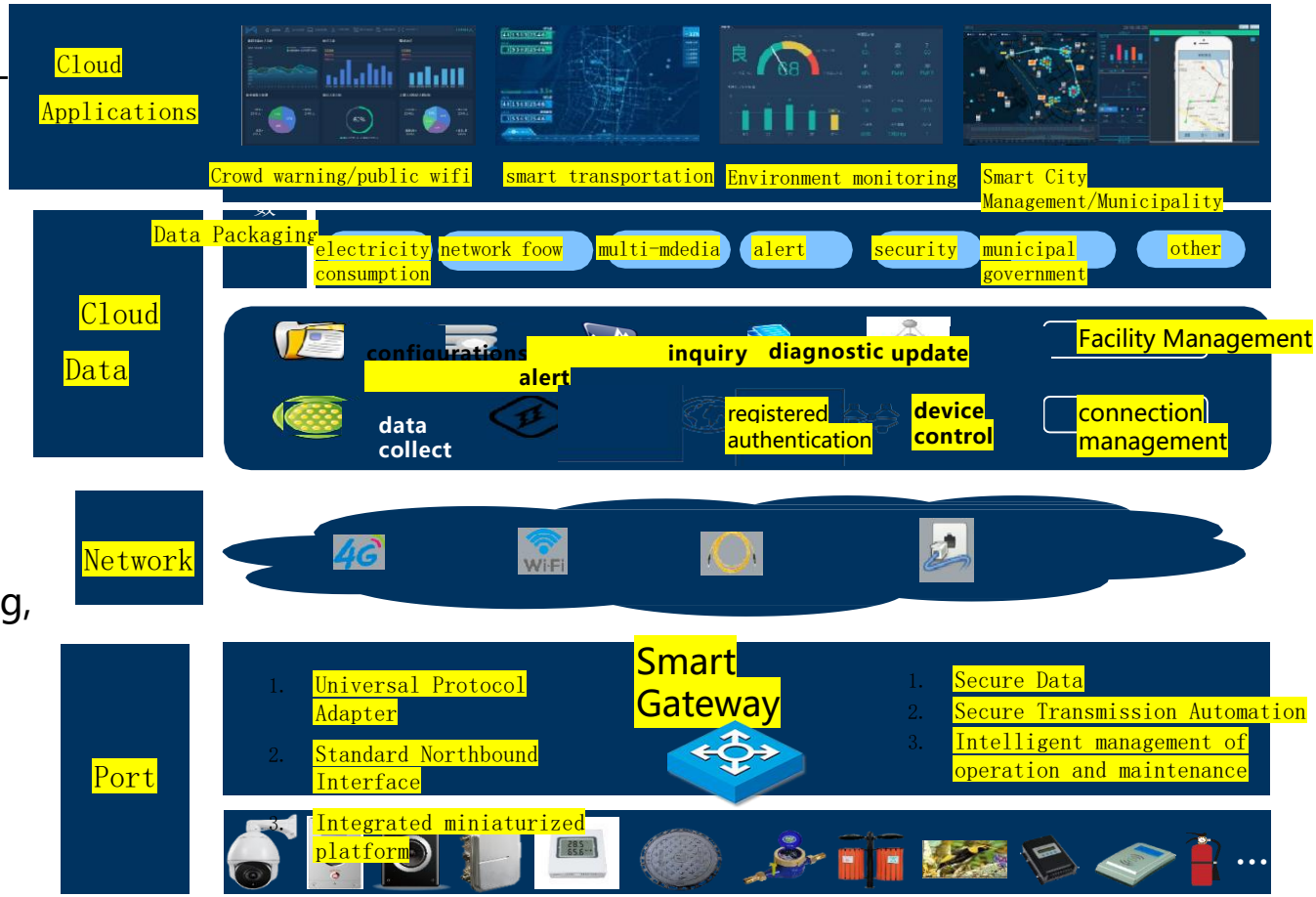
Green Energy Saving
Building energy consumption collection and analysis of energy collection modeling analysis of computer rooms

Smart Parking
Parking Space Reservation, Smart Identification Quick Pay, Payment Binding

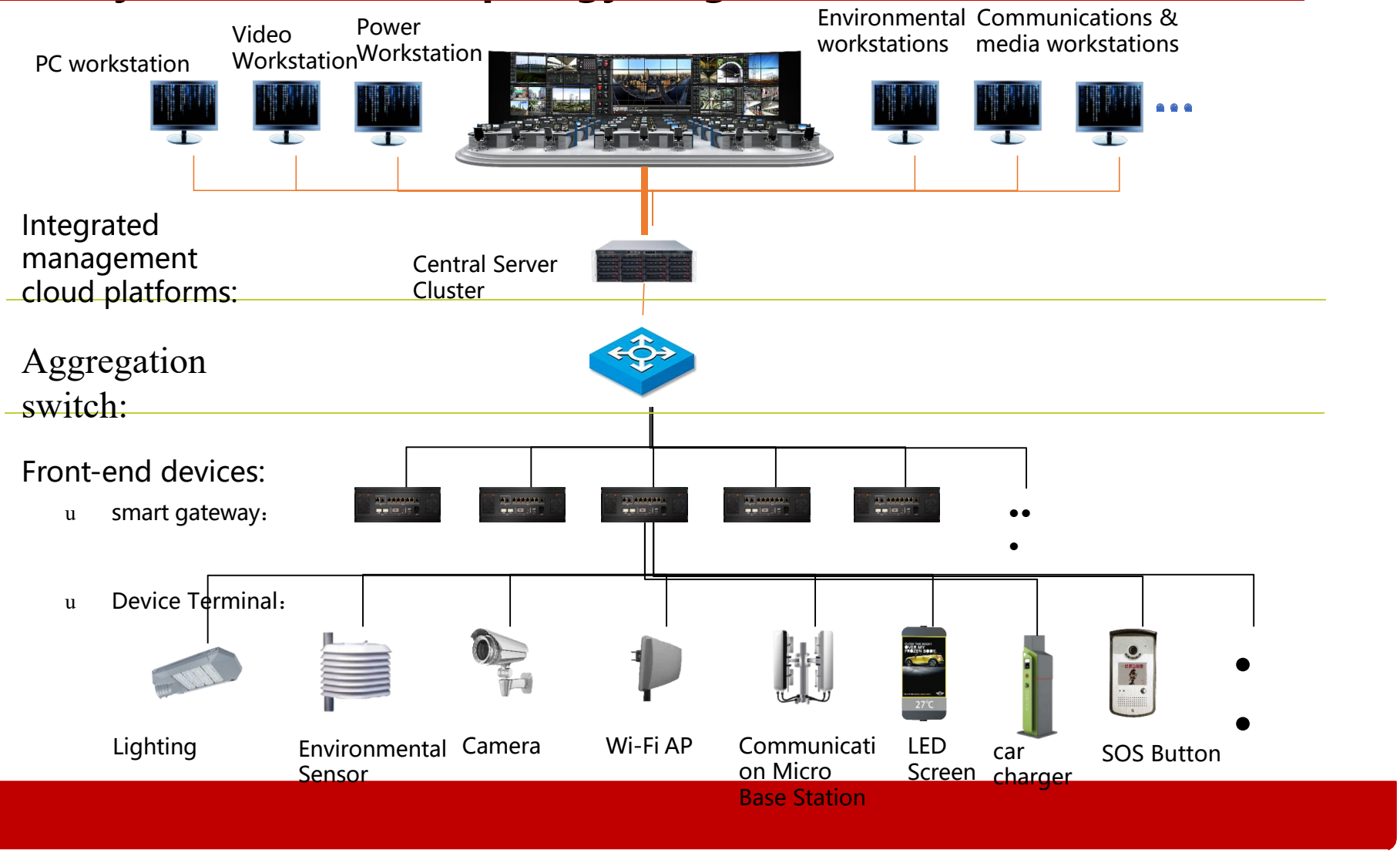
Green Energy Saving
Building energy consumption collection and analysis of energy collection modeling analysis of computer rooms

5.2 Intelligent light pole IoT management platform building program

Adopting the overall framework of "cloud-network-terminal", using light poles as the physical carrier, equipped with intelligent lighting, video surveillance, traffic management, environmental monitoring, emergency assistance, wireless network, public broadcasting, advertising, charging piles and other equipment, so as to make a good layout of basic data for the construction of the Smart City.



5.3 System network topology diagram



Thanks!