



# BGC

## **Introduction of multifunctional pole platform and solution for smart cities**

2022.9



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- Discussion on Construction and Operation Mode

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- Successful Cases out of China



## Part 1 | Background

- National Policy Orientation
- Discussion on Construction and Operation Mode



# National Policy Orientation



## City management should be as fine as embroidery

### Global Urbanization

With the rapid development of information networks and the increased global mobility of capital and labour, a massive urbanization movement is taking place around the world.

### Urbanization in China

After the reform and opening up, China's urbanization process has only accelerated significantly. How to actively and steadily promote the urbanization process in accordance with the theory of sustainable development is a major issue that China must face in the 21st century.

### Urban problems are getting worse

The blind expansion of urban planning and construction to the periphery, and the relative inadequacy and backwardness of infrastructure construction such as road traffic and public services. The historical and cultural heritage of the city is not well protected. The humanistic problems and crime rate in urban construction are prominent, and urban construction and urban development are in an imbalance and disorderly state.

During the two sessions in 2017, General Secretary Xi proposed **"embroidered management"** when he attended the deliberations of the Shanghai delegation, **"city management should be as fine as embroidery"**, pointing out the new direction of urban management.

The bigger the city, the finer the management must be!



## New infrastructure" was mentioned several times in high-level national meetings"

2018. 12. 19–21

### Central Economic Work Conference

Increase the technological transformation and equipment renewal of the manufacturing industry, **accelerate the pace of 5G commercialization, and strengthen the construction of new infrastructure such as artificial intelligence and industrial Internet of Things.**

2019. 3. 5

### Government work report meeting

**Increase intercity transportation and logistics,** municipal disaster prevention and control, civil and general aviation and other infrastructure investment, and strengthen the construction of a new generation of information infrastructure.

2019. 7. 30

### Central Political Bureau Meeting

Stabilize investment in the manufacturing industry, implement projects to make up for **shortcomings such as the renovation of old urban neighborhoods, urban parking lots, and the construction of urban cold chain logistics facilities,** and accelerate the construction of new infrastructure such as information networks. .

2020. 1. 3

### State Council Executive Meeting

**Vigorously develop advanced manufacturing industries, vigorously develop advanced manufacturing industries, introduce policies to support investment in new infrastructure such as information networks, and promote intelligent and green manufacturing..**

Infrastructure is an important support for economic and social development. We should take overall optimization and system integration as the guide, coordinate the development of stock and incremental, traditional and new infrastructure, and **build a modern infrastructure system that is intensive and efficient, economical and applicable, intelligent and green, safe and reliable.**

**Comprehensive deepening reform committee meeting**

2020. 2. 14

We should increase support for the research and development of reagents, drugs and vaccines, and promote the accelerated development of biomedicine, medical devices, **5G networks and industrial Internet of Things.**

### Central Political Bureau Meeting

2020. 2. 21

We will increase investment in public health services and emergency supplies, and speed up the construction of new infrastructure such as 5G networks and data centers.

### Central Political Bureau Standing Committee Meeting

2020. 3. 4



# Discussion on construction and operation mode

## For the government

1. Stable and secure performance, meeting the basic functions of the smart pole and the requirements of policy specifications
2. Meet the requirements of national policy documents and achieve data management interoperability
3. Meet the people's growing material and cultural needs, and can be constantly upgraded iteratively
4. As far as possible to benefit the old, to help the government in the limited financial resources to complete the task assigned by the higher and generate more revenue
5. To generate as much operating revenue as possible on this basis

## For operation investors

1. A system that can impress government departments to meet their requirements and win by being the technological leader in various system competitions
2. A system that can continuously overlay new technology applications with technological development to generate more application scenarios
3. A system that can be compatible with various systems and different functions to create synergistic management benefits
4. Able to realize big data analysis based on the basic control function to complete the well to realize data connectivity. A system that finally forms a new value to act on the real economy, from IOT to WIC
5. A system that can generate more potential revenue projects than other systems

## Several business models



### Government Procurement Model

The government leads and invests in construction, and the social capital will do the construction, installation, maintenance and platform building, etc.



### Joint Venture Model

The government and social capital, state-owned enterprises, etc. set up a project company. The project company will invest, construct, operate and maintain the project, and the property rights and data operation rights of streetlights are operated independently by the project company.



### Franchise Model

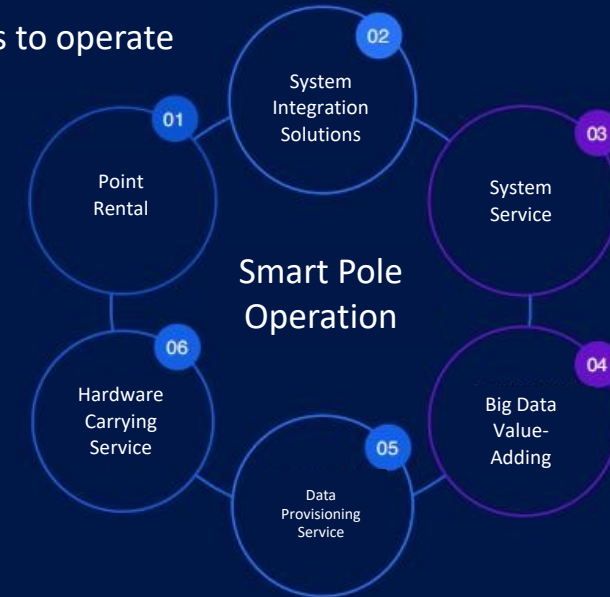
Social capital will do the investment, construction, operation and delivery, and sign with the government concession contract for a certain period of time.



### EMC Energy Management Model

Social capital to do the investment construction, operation, delivery payment, and the savings in The electricity bill will be returned to the social capital.

## A few ways to operate





## Part 2 | Technical Support

- Introduction of Multifunctional Pole
- Platform Introduction
- Deployment Solutions



# Introduction of multifunctional pole

## Smart City Solutions

- Monitor urban environmental conditions
- Air pollution detector
- Temperature and humidity sensors
- Brightness sensors
- Municipal building monitoring
- Noise sensors



Sensors

- Security Surveillance
- Vehicle Surveillance



Video Surveillance

- Special People Monitoring
- Well Cover Monitoring
- Community Security Monitoring
- Municipal Facilities Monitoring



Radio Frequency Identification

- Contact with the monitoring center from the field extensions
- Active contact with the outfield for the monitoring center



Emergency Call

- Electric Vehicles
- Electric Bicycle
- Smartphone

Charging pile



Smart Lighting

- Unique patented design
- Very bright and even light distribution
- Intelligent single light / centralized controller
- Series of lamp body size design options

Wireless Network



- Street light embedded WiFi hotspot
- Street light embedded base station

Information Distribution



- Advertising broadcast
- Current Affairs News
- Real-time weather forecast



Terminal Controller

- Remote control of individual or group lights on, off and dimming
- Single lamp current, voltage, power factor, power, temperature and humidity detection, etc.
- Automatic control of light on/off and dimming and set timer for on/off and dimming according to weather conditions and actual lighting
- Flexible light combination management, precise control of each light

## Smart City System Structure

By connecting all street light nodes in every city corner, it is easy to build a tree network to control and manage. By managing public lighting, connecting various smart city devices, city management network monitoring, electric vehicle charging stations, creating safer cities and improving city management and efficiency. Using standards-based IoT integrated LED street lighting systems, network operators can simply "plug and play" new and crude smart city devices and deploy them to existing networks, such as smart street lighting and smart grid systems. These devices can be used more effectively to integrate and improve the ability to transmit data. Such as smart parking lots, intelligent traffic systems, bike rentals, kiosks, digital signage for electric vehicle charging stations, environmental and lighting sensors, substation monitors, etc. In addition, helping cities and utilities reduce detection and deployment costs, improve citizen service operations and citizen engagement, and create new revenue and opportunities.



4G  
5G  
GPRS

CMS



Cloud box 2.0







# Multifunctional Pole - Smart Gateway



## BGC-GW-G40

### Core Features :

1. Includes full Gigabit fibre optic communication
2. Can carry up to 4 external devices
3. Can be ring networked
4. Compact design
5. Economical design

### Applicable occasions

1. Fewer peripherals, less than 4
2. Strict cost control

Park pole, low configuration



## BGC-GW-G200

### Core Features :

1. With AC/DC power supply
2. Includes full Gigabit fiber optic communication
3. Up to 10 external devices
4. Can be networked in a ring
5. All-in-one design

### Applicable occasions

1. Full-featured gateway
2. Communication and dynamic loop system integration

All kinds of smart poles



## BGC-GW-G200-EU

### Core Features :

1. With AC/DC power supply
2. Includes full Gigabit fiber optic communication
3. Up to 10 external devices
4. Can be networked in a ring
5. Special structure design

### Applicable occasions

1. Full-featured gateway
2. Communication and dynamic loop system integration
3. Strict cross-sectional size requirements

Smart Lamp Post



## BGC-GW-G300

### Core Features :

1. Multi-IO device access
2. Full Gigabit fiber optic communication included
3. Up to 10 external devices
4. Can be ring networked
5. Compact design

### Applicable occasions

1. Multi-IO peripherals
2. Communication and dynamic loop system isolation

All kinds of smart poles



## BGC-GW-G500

### Core Features :

1. NXP 4-core automotive-grade CPU
2. 5G communication, 5GCPE
3. Full Gigabit ring fiber
4. Support 10 Gigabit communication
5. 1.3G ultra-high-speed dual-band WIFI
6. All-in-one design

### Applicable occasions

1. Mainly 5G scenario
2. High edge computing power requirements

High configuration smart pole, 5G smart pole



# Multifunctional pole style reference - municipal roads



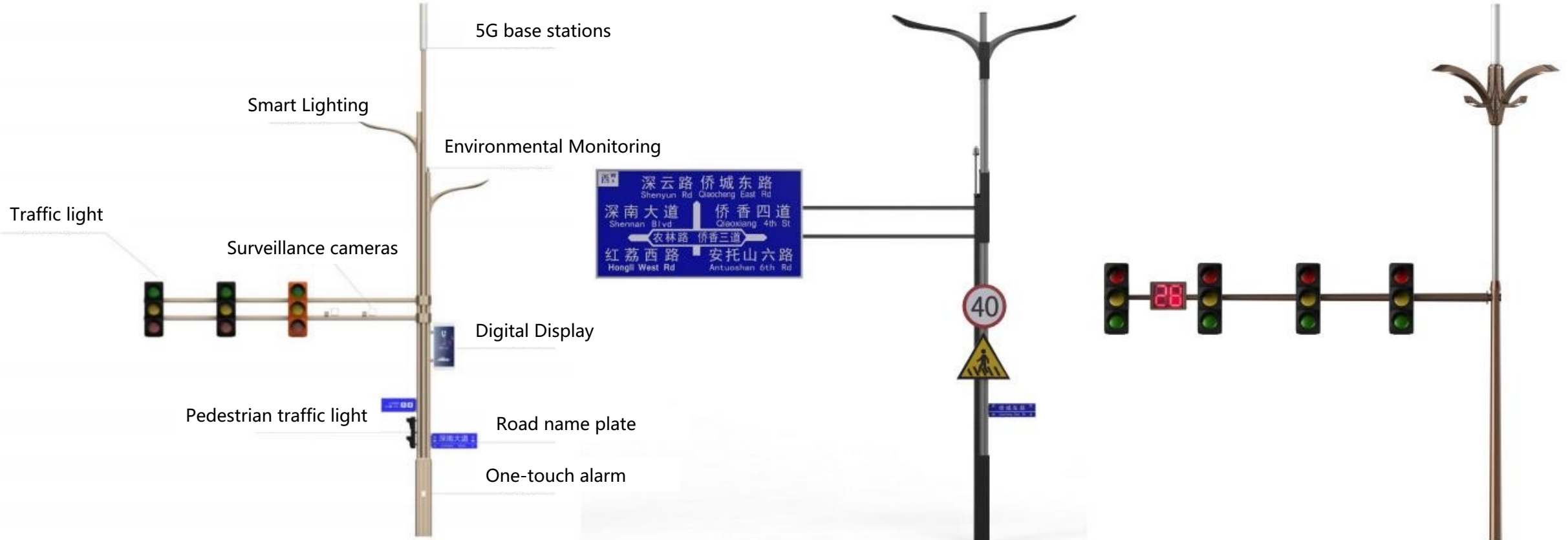


# Multifunctional pole style reference - park smart pole





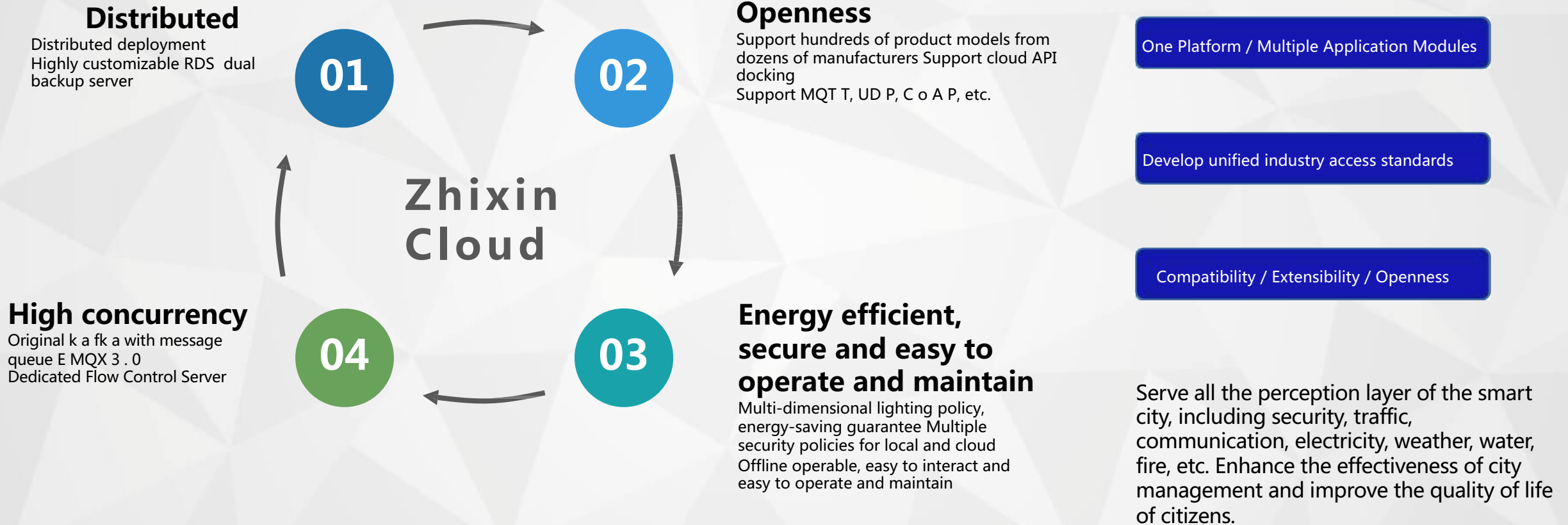
# Multi-functional pole style reference - Traffic Pole





# Platform Introduction - Core Advantages

Deeply changing the way urban lighting is managed





# Platform Introduction - Platform Architecture

Infrastructure  
Operation  
Platform

Energy Management  
Platform

Emergency Alert  
Platform

Data Centre

City



New Urbanization



Featured Town



Smart Microcity

Road  
&  
Park



Road



Industrial Park



Living Community



Park



Campus



Cargo Terminal

Terminal  
Equipment



Smart Cloud Box



WIFI coverage



Cloud Circuit  
Breaker



Manhole cover  
sensors



Street light  
controller



One-touch  
alarm



Sound  
Column



Smart Lighting



Camera



Weather  
Stations



Web gateway



5G Micro Base  
Station



LED Screen



Charging  
Piles



# Platform Introduction-Functional Module

## 1 Street light operation and maintenance

- Street light creation, editing, deletion
- Street light switch, brightness, policy control
- Street light alarm, maintenance
- Street light grouping, circuit control
- GIS management of street lights

## 4 Visualization of the large screen display

- Visualization Interactive Large Screen
- Dynamic Perception Screen

## 2 Supplier Operations Performance Management

- Management of light-up rate, online rate, failure rate, etc. for different suppliers
- Different suppliers' warranty period management
- Power efficiency management of different suppliers
- Horizontal comparison between suppliers, assessment

## 5 Fault Push

- Off-line failure, LED driver failure, LED light board failure
- Light pole tilt
- Cable theft prevention
- Over-voltage fault
- Alarm history

## 3 Data Center Planning

- Cloud Platform Construction Recommendations
- Local Data Center Construction Recommendations

## 6 Dispatch Repair

- Work Order System
- SMS push, email push
- Customized maintenance time
- Automatic order dispatching



# Platform Introduction-Strategy Management

You can set multi-time strategy and adjust brightness automatically according to your needs

## Strategy Management

Add a Strategy

### Cross Chinese New Year Strategy



2018/02/12-2018/03/11  
6点-8点 亮度30% 8点-9点 亮度40%



2018/03/12-2018/04/11  
6点-8点 亮度30% 8点-9点 亮度40%

### Explosion-proof strategy



2018/07/12-2018/08/11  
6点-8点 亮度30% 8点-9点 亮度40%



2018/06/12-2018/07/11  
6点-8点 亮度30% 8点-9点 亮度40%

### Savings Strategy



2018/02/12-2018/03/11  
6点-8点 亮度30% 8点-9点 亮度40%



2018/08/12-2018/09/11  
6点-8点 亮度30% 8点-9点 亮度40%

### Early Morning Strategy



2018/09/12-2018/10/11  
6点-8点 亮度30% 8点-9点 亮度40%



2018/03/12-2018/04/11  
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### Cross Chinese New Year Strategy



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# Platform Introduction-app/Mini program

## Asset Overview

- Total Equipment
- Electricity consumption curve
- Power Saving Curve
- Number of alarms
- Number of lights on
- Number of power distribution boxes

Provide IOS, Android, Mini program and other terminal access methods

## GIS Management

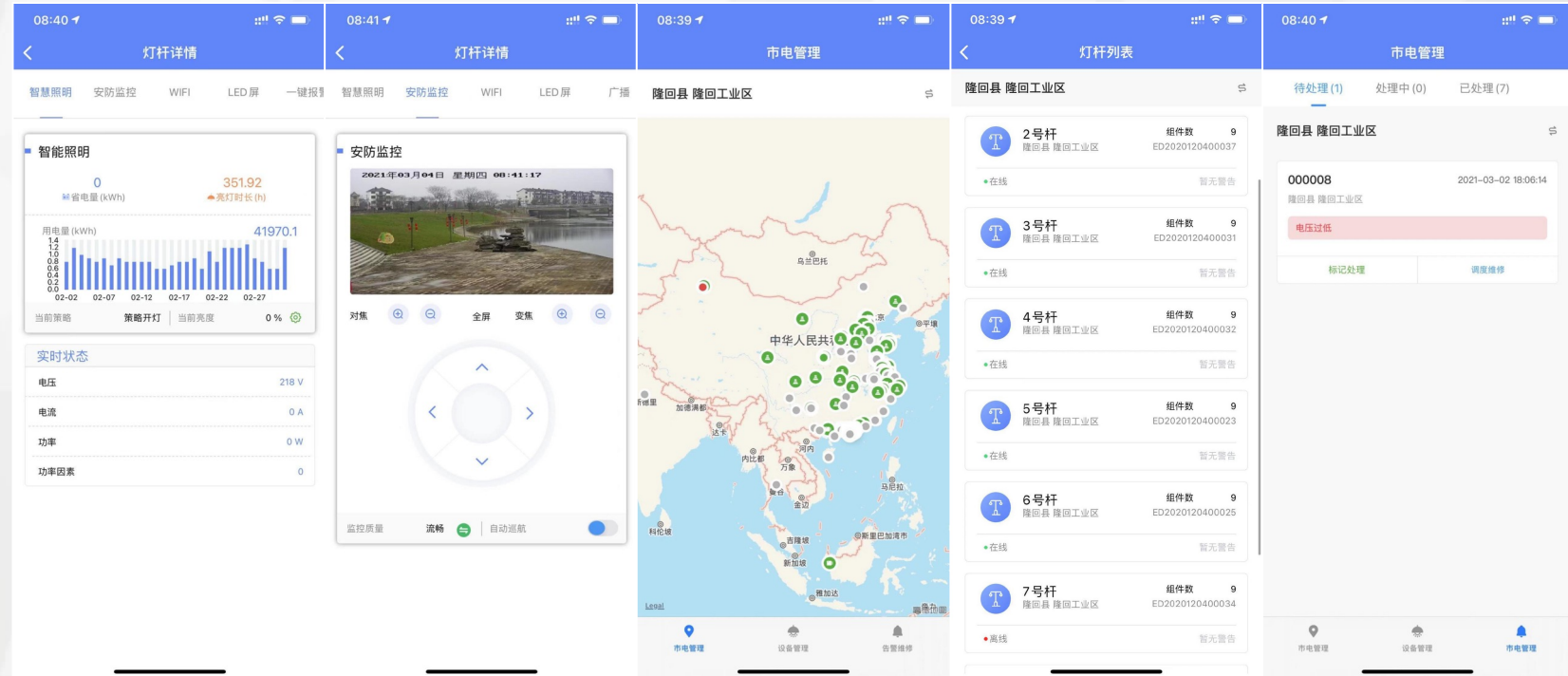
- Map Management
- Map Alert
- Map Operations
- Location Editing
- Map micro-interaction

## Alarm Repair

- Alarm List
- Maintenance Scheduling
- Work Order Preview

## Equipment Operation

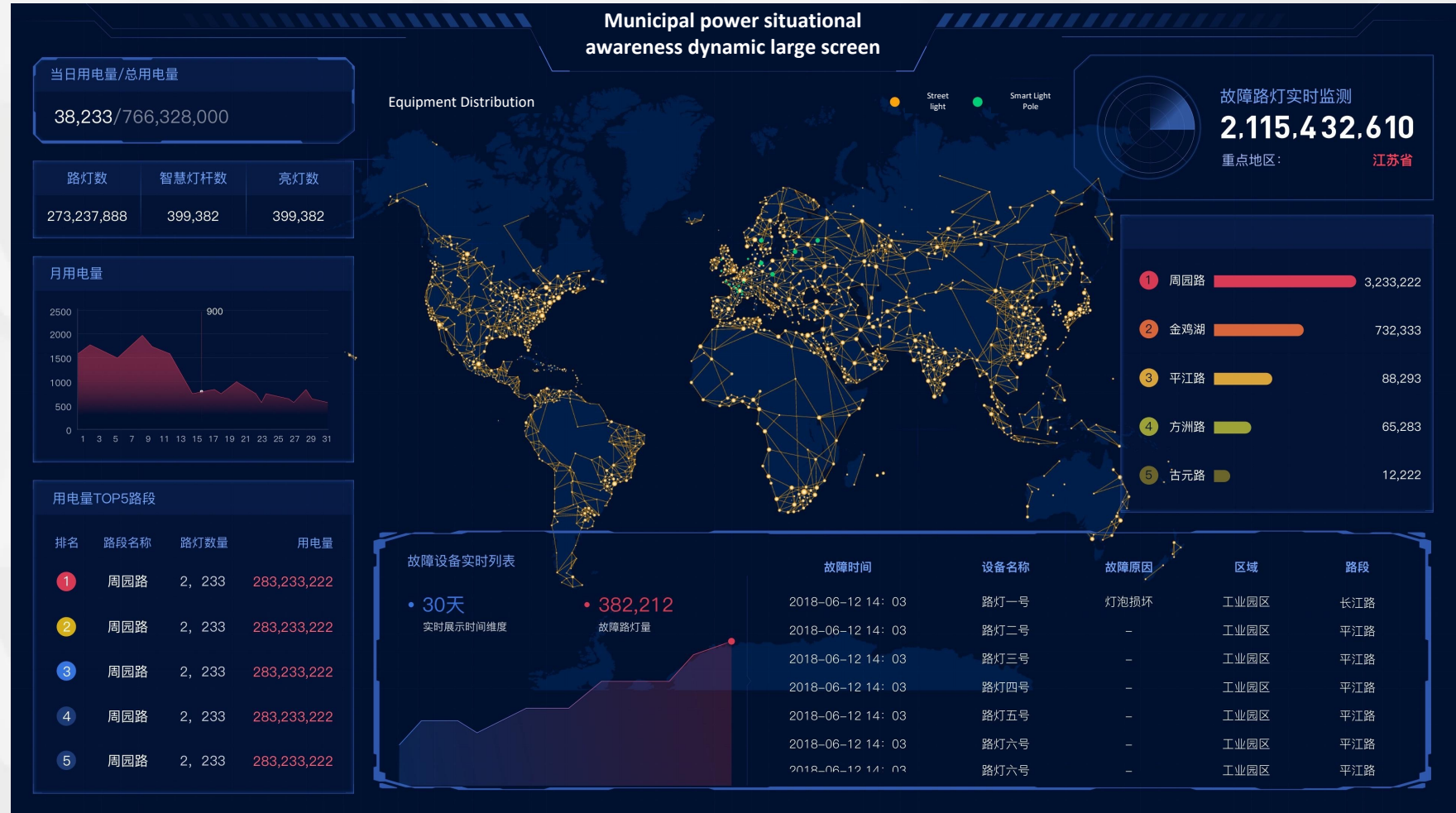
- Device List
- Intelligent Lighting Management
- Conventional Multifunctional Pole Management





# Platform Introduction-Visualization of large screen

- Total power consumption, power saving visualization design
- Number of street lights, number of faults visualization design
- Visualization design and data display of road segment efficiency
- Full-size map visualization design
- Fault list dynamic scanning design
- Repair work order statistics visualization design





# Platform Introduction-Visualization of large screen

The module contains

- Dynamic distribution of street light illumination
- Fault dynamic distribution
- Energy consumption statistics
- Operation log
- Component statistics
- Try Fault
- Light pole GIS distribution



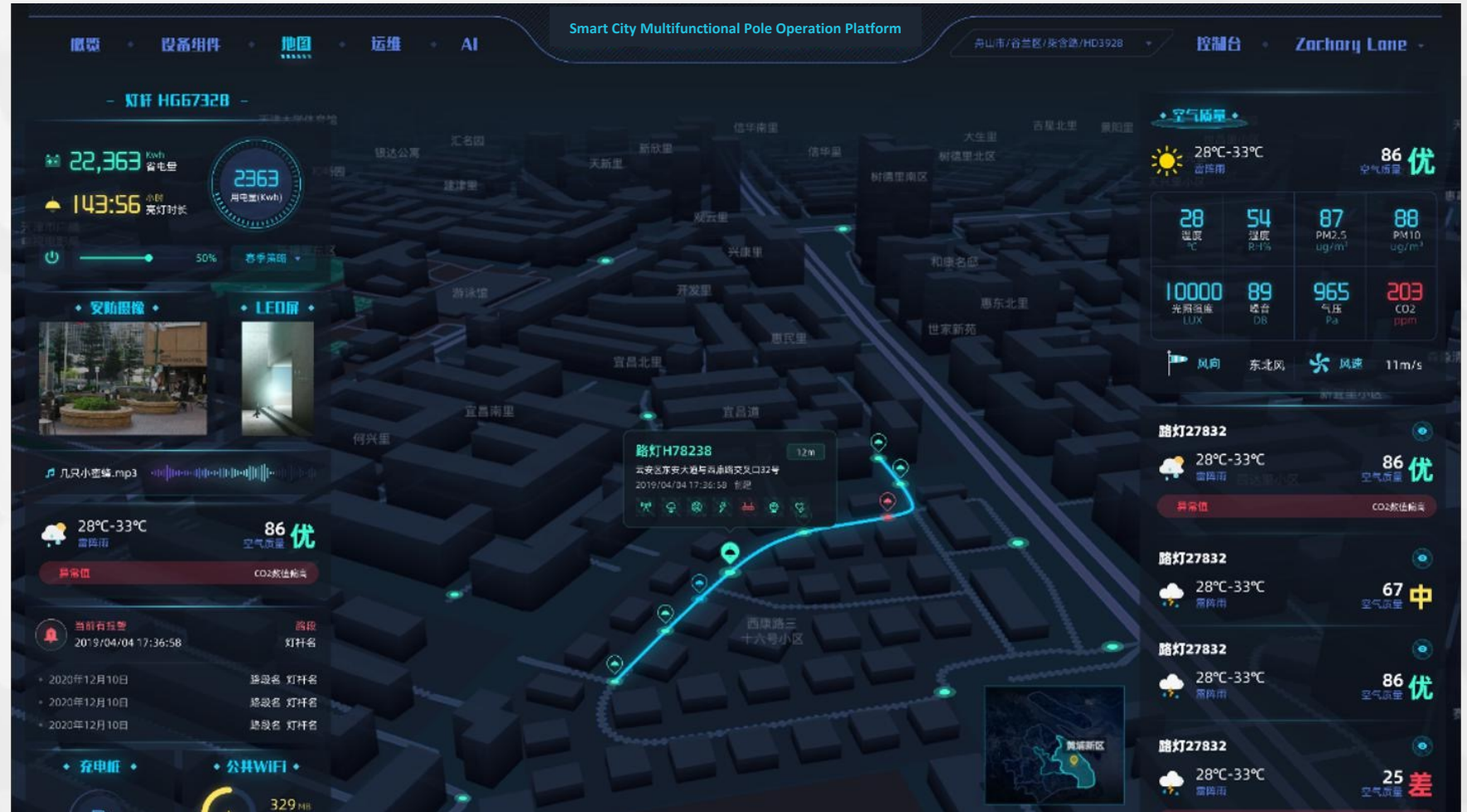




# Platform Introduction-Visualization Big Screen, GIS Map

This module contains

- GIS positioning and display
- Full-pole operation of light poles
- Component partition browsing
- Component group browsing
- Closed-loop operation of components and poles
- 3D High Fidelity Map
- Pole location editing





# Visualization of large screen, operation and maintenance

This module contains

- Real-time operating account number display
- User activity curve
- Operation bar chart
- Light pole operation and maintenance log
- Full lifecycle monitoring of work orders
- Maintenance status pie chart
- Fault Distribution Pie Chart
- Basic Fault Log

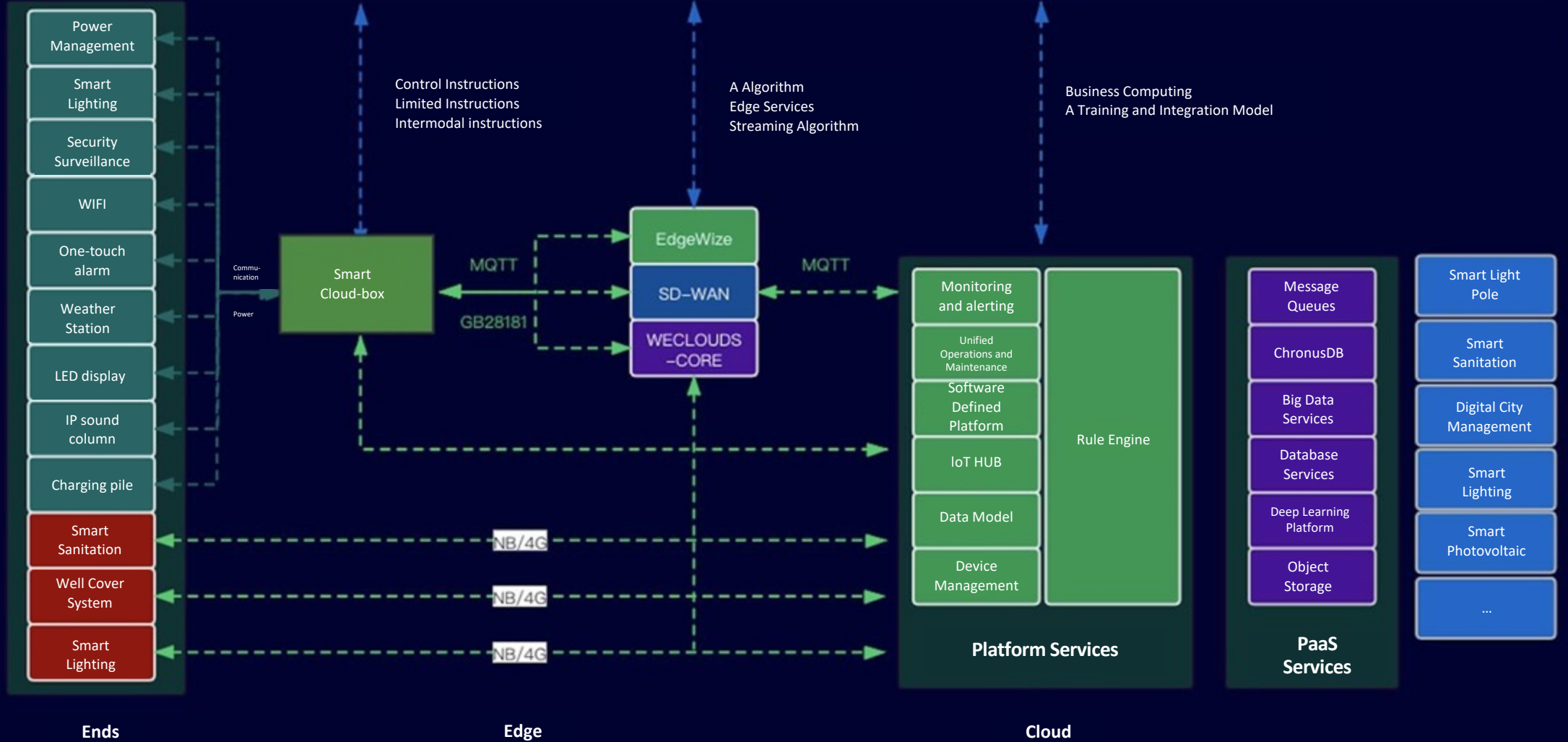






# Platform Introduction - Platform Architecture

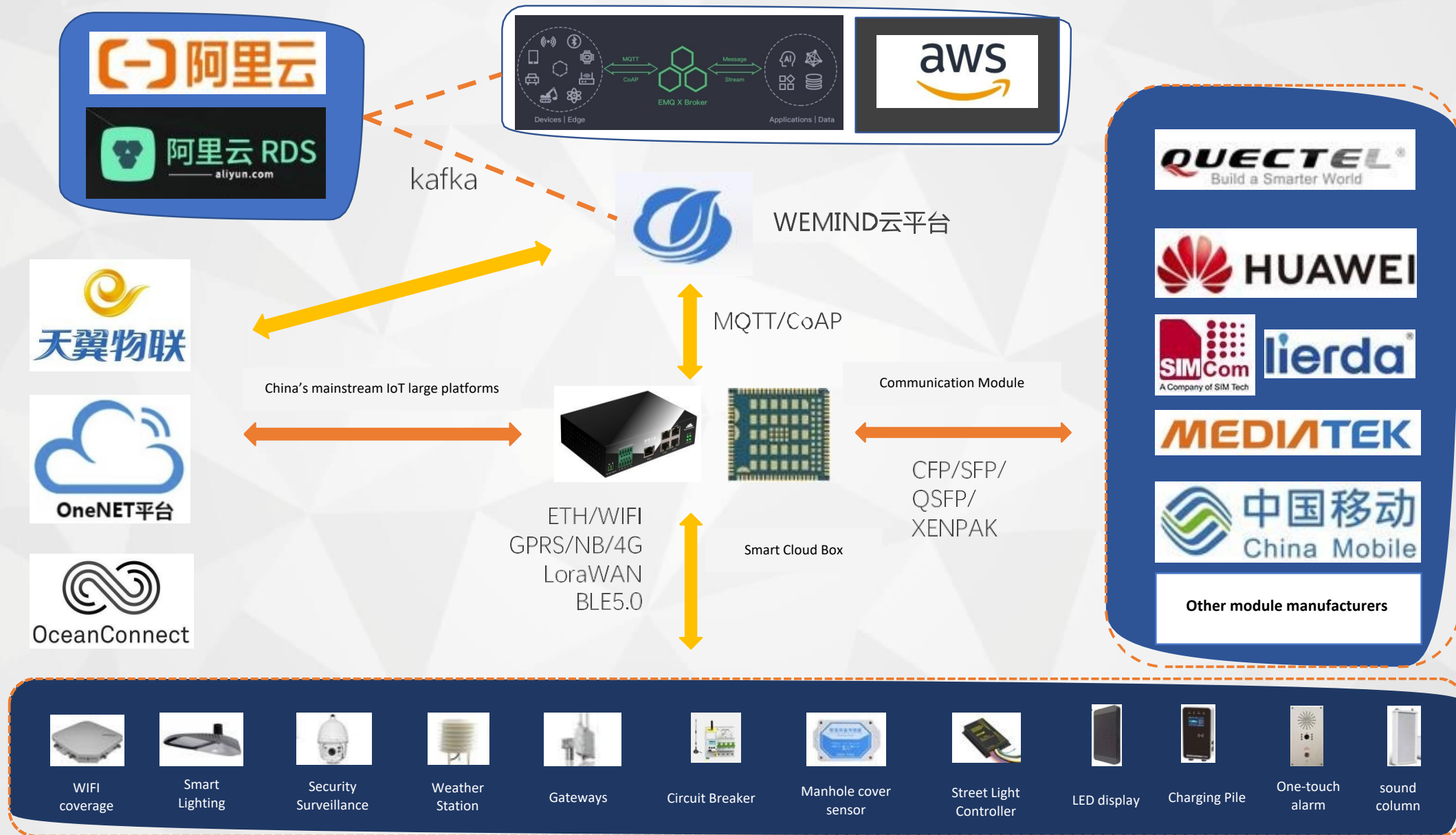
CLLOUDS multifunctional pole platform (edge application, AI algorithm, device management, authentication authority) WEB ends, mobile ends, WeChat mini program





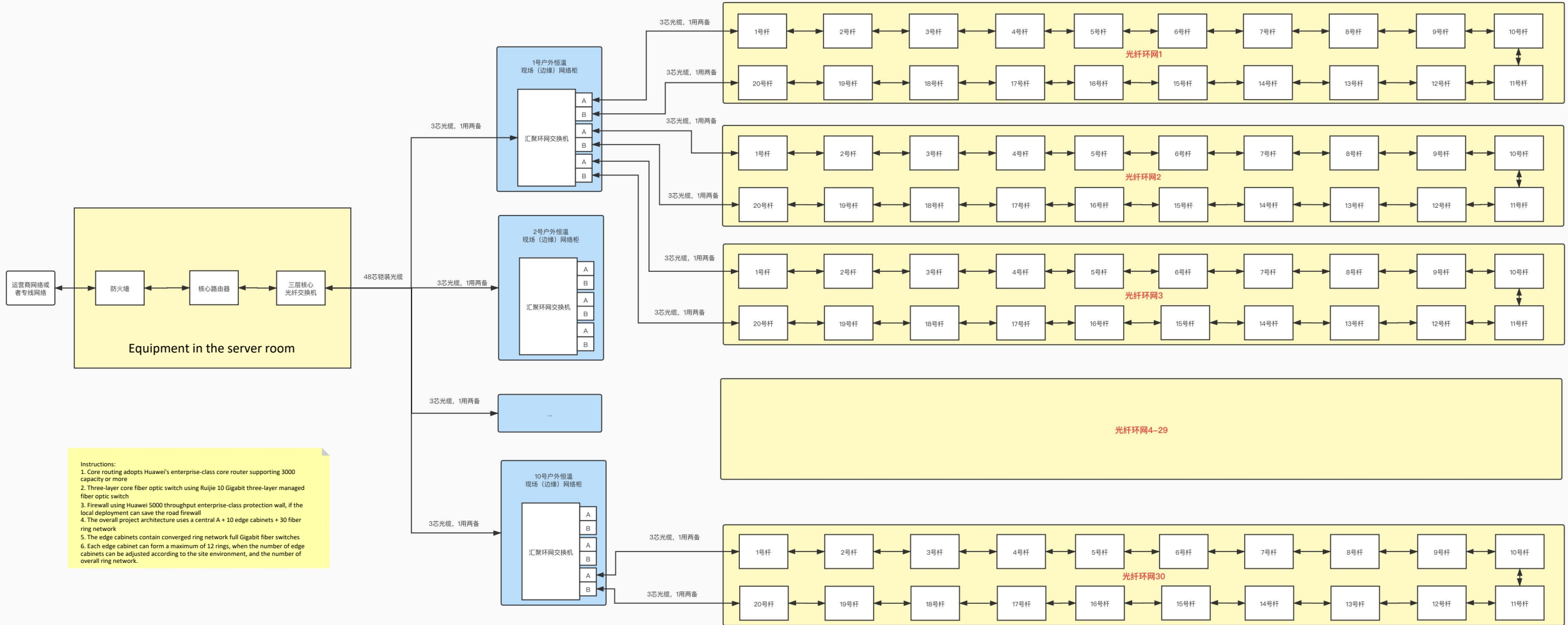


# Platform Introduction - Data Flow





# Network topology example



Instructions:

1. Core routing adopts Huawei's enterprise-class core router supporting 3000 capacity or more
2. Three-layer core fiber optic switch using Ruijie 10 Gigabit three-layer managed fiber optic switch
3. Firewall using Huawei 5000 throughput enterprise-class protection wall, if the local deployment can save the road firewall
4. The overall project architecture uses a central A + 10 edge cabinets + 30 fiber ring network
5. The edge cabinets contain converged ring network full Gigabit fiber switches
6. Each edge cabinet can form a maximum of 12 rings, when the number of edge cabinets can be adjusted according to the site environment, and the number of overall ring network.



## 01

### **Cloud Platform Planning**

ALI Cloud Hosting

ECS: 8 cores 16G memory 1T hard disk  
RDS: 4 cores 8G memory 1T hard disk  
Database: MySQL5.0+

Message Queue: EMQX+kafka

## 02

### **Self-built data center, local deployment**

4U Server Hosting

4U Database Server

Data center core router  
Data center UPS

Data Center Air Conditioning  
Data Center Racks, etc. Firewalls



# Construction Plan - Smart Lighting

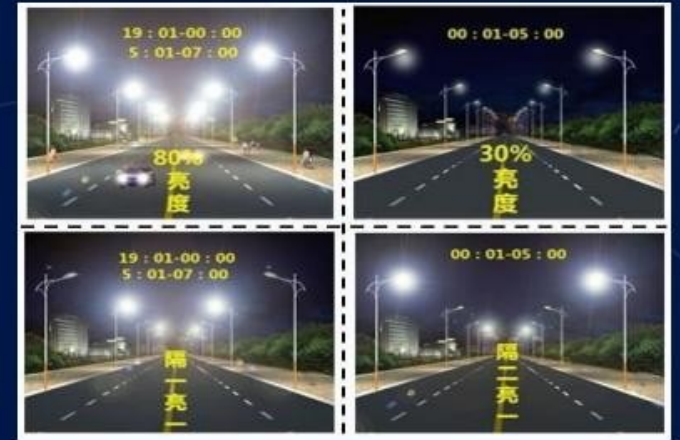
The smart light pole is equipped with Rongguan IOT **single light controller**, with dimmable LED lamps and lanterns, by setting the smart lighting strategy, can achieve **energy saving 40%-60%**.

1 Intelligent light on, light off, dimming

2 Smart Lighting Strategy

3 Energy consumption analysis  
real-time alarms

4 Smart operation and maintenance



## Energy consumption status monitoring

Refined energy consumption monitoring, monitoring energy consumption by day, month and year  
Total power monitoring, so that the power consumption can be traced



## Real-time fault alarm

The light is damaged and cannot be illuminated  
Street light current and voltage abnormal  
Communication link abnormal can not collect information



# Construction Case - Vehicle-Road Collaboration

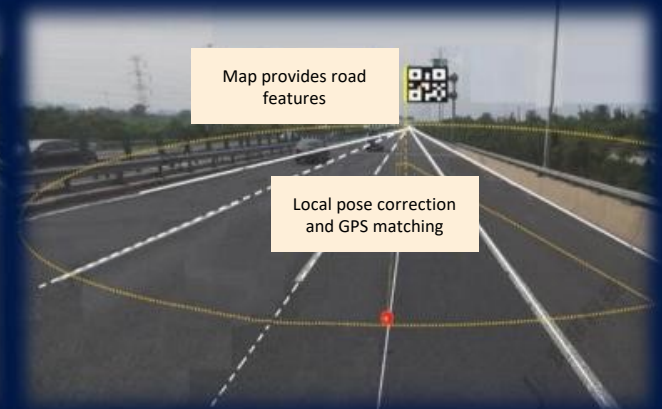
The smart light pole is equipped with intelligent facilities such as **RSU**, **high-definition camera**, **millimetre wave radar** and other road-side units for vehicle-road cooperation, as well as **5G communication**, **edge computing** and **artificial intelligence technologies** to provide a **smart road** for smart cars and meet the strict requirements of automatic driving in terms of **high-speed transmission**, **high reliability** and **low latency**, so as to realize real vehicle-road cooperation and automatic driving.



- ✓ Intersection condition view
- ✓ Intersection traffic collection
- ✓ Special event detection
- ✓ Control optimization strategy



- ✓ Ultra-visible range awareness
- ✓ Lane level path planning



- ✓ Road data fusion awareness
- ✓ Rapid collision warning



# Construction Plan - Scene Recognition

Smart light pole equipped with high-definition infrared cameras, real-time monitoring of road conditions; accurate diagnosis of road abnormalities, including road hazards, facility damage, traffic events (congestion, vehicle illegal parking, etc.), real-time traffic violations monitoring and security monitoring, for law enforcement, handling cases to provide evidence based on the timely elimination of security risks.



Road  
Monitoring



Traffic Accidents



Ground collapse



Traffic flow



Waterlogged  
Roads



Cracked road  
surface



Illegal vehicles



Damaged  
markings



Damaged signage



Suspects



# Construction Project - Bus Stops

Smart bus stop: Integrating intelligent lighting, video monitoring, voice broadcasting, one-key help, 5G base station, wireless WIFI, environmental weather monitoring, cell phone charging, LED display, vending machine and other functions to realize the overall control of the bus stop and give passengers a comfortable, convenient and safe waiting environment.



## Clear and accurate vehicle information

Through the cloud operation of the information collection and management platform mounted on the smart light poles along the route, the data such as bus arrival, bus route, road congestion, surrounding businesses and toilets, temperature, PM2.5, etc. can be accurately displayed in real time on the LED release screen at the bus stop platform, supporting touch direct inquiry.



## High quality wireless network experience

The construction of 5G and wireless WIFI network fully covers the station and the surrounding environment, providing passengers with a high-quality wireless network environment, passengers can watch videos and play games through 5G or WIFI wireless network while waiting for the bus, enhancing the waiting experience.



## Safety and security, prevention and control of epidemics

Equipped with infrared high-definition cameras, one-key help and voice broadcasting and other intelligent facilities, real-time monitoring of passenger body temperature and timely alerting and reporting of abnormal body temperature; when an emergency occurs, it can quickly alert and monitor the dynamic situation of the accident in real time.



## Convenient charging environment

The bus platform is equipped with a cell phone charging module, so passengers with dead cell phones can quickly charge them at the station, which is convenient and practical.



## Vending Service

24-hour unmanned vending machines provide snacks, beverages, newspapers and magazines, mascots of tourist attractions, etc. for the public.



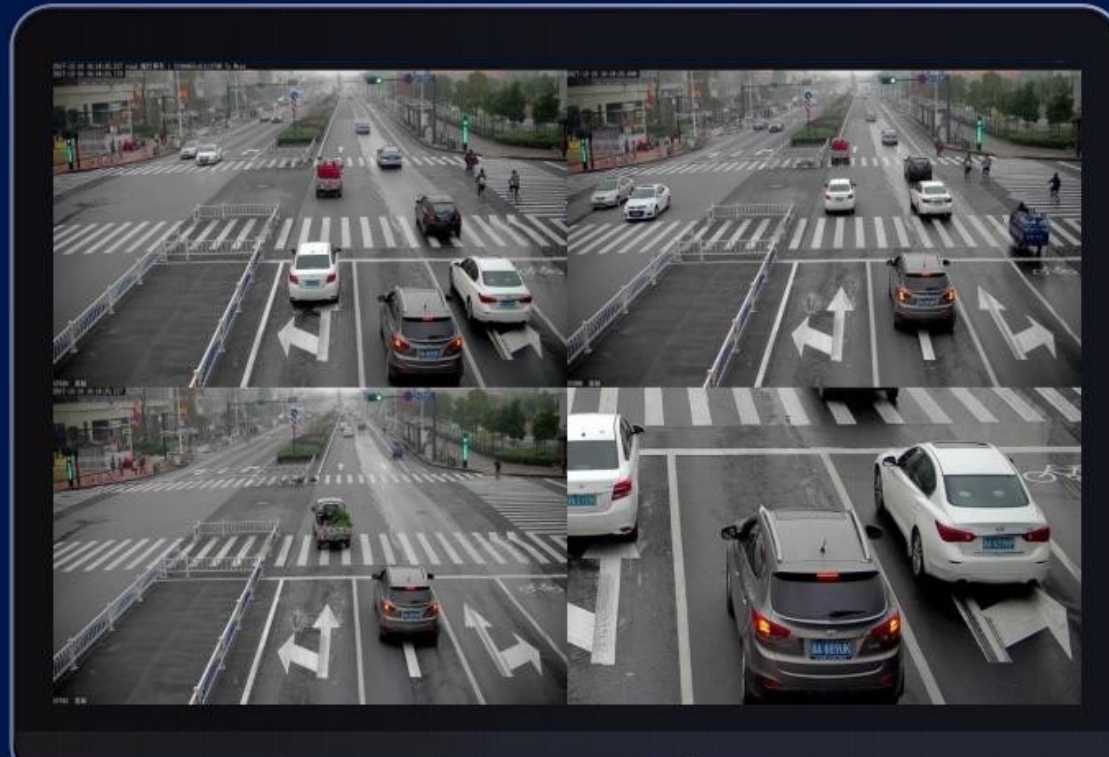
# Construction Case - Traffic Event Detection

1 All-area, 24 hours real-time traffic event detection on roads

2 Improve the efficiency of traffic violation enforcement

3 Improve road safety

- Catching red light running
- Not following the lane
- Against traffic capture
- Illegal U-turn
- Cross line capture
- Lane change capture
- Green Light Parking



- Running red lights
- Occupy the lane
- Cross line capture
- Not following the guide
- Changing lanes in the solid line
- Failure to yield to pedestrians
- Against traffic capture
- Motor vehicles occupying non-motorized lanes
- Illegal reversing
- Illegal parking
- Illegal U-turn
- Other Traffic Violations





## Create a complete technical protection system

A complete open ecosystem with platform, application, hardware and data



### Big Data Platform for IoT

High reliability, high concurrency, high security services high openness, compatibility, scalability big data analysis, data value mining  
Perfect standard system



### Smart Street Light Pole

Various IoT devices on board and applications  
Automatic sensing and powerful edge computing  
Pole shape design and quality



### Smart Hardware

Full data collection, full state awareness  
Guarantee the 24H line with power  
Guarantee system power safety  
Intelligent monitoring and management of lighting



## Part 3 | Market Cases

- Successful Cases in China
- Successful Cases out of China



# Guangxi Liuzhou smart street light project / 2019 the largest IOT street light project in China



## Liuzhou Citywide New Rural Project

The project is divided into three years, 170,000 + streetlights and smart city construction



## Central government enterprise endorsement

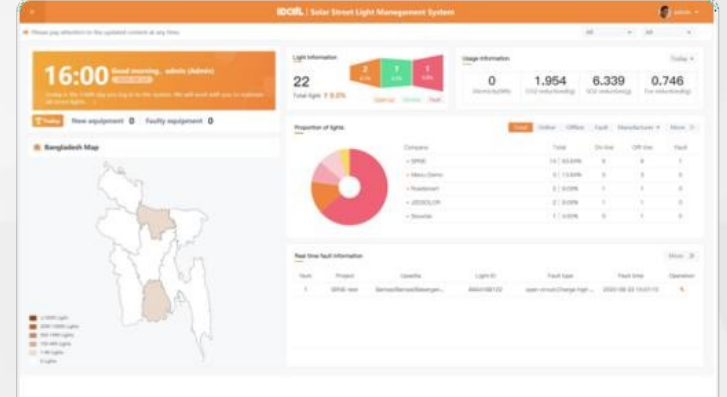
China Telecom wins the bid and China Tower Group operates



Smart City Infrastructure Management Platform



Municipal Lighting Management Platform



Solar Street Light System



Smart Cloud Management Platform



Hotel and public lighting management system



Education Lighting Management System



Wenzhou multi-pole project (198 lights)



Xiongan Project



Dongguan Humen Project



Southwest wisdom pole project (more than 500 lights)



Midea Industrial Park Project



Chongqing Yunyang project (more than 2,000 lights)



Foshan Project



Ningxia State Grid Project (hundreds of lights)



Guangzhou Xintang NB Street Light Project



Xiongan Project



Shaoyang 4A scenic area solar project



Yunnan Qujing NBiot Street Lights



Guangzhou Project



Fuzhou NB high and low pole street light project



Utah, US Project



Texas Solar Project



Hebei Baoding

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