



A nighttime photograph of a city skyline with several illuminated skyscrapers. In the foreground, there are light trails from moving vehicles on a road, and a street lamp is visible on the left. The sky is dark blue with some light streaks.

Huawei Connected City Lighting Solution



A 3D rendering of three white, rectangular blocks stacked together. The top block is slightly offset to the right, and the bottom two blocks are slightly offset to the left, creating a stepped effect.

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Trends and Challenges



Municipal lighting provides convenience during outdoor activities and also enriches people's lives. The street lamp elsewhere is a key indicator of modern life. However, the immense energy consumption and maintenance costs are a constant burden for city administrators. With the development of IoT and LED, the combination of these technologies accelerates the intelligent reconstruction of municipal lighting. In response to this trend, Huawei has developed the Connected City Lighting Solution. The solution connects lighting devices through RF MESH Network technology and builds the lighting IoT on demand. The solution can be widely applied to various scenarios, such as municipal streets, parks, squares, highways, tunnels, and scenic spots.

Solution

2.1 Solution Overview

Huawei Connected City Lighting Solution is an important part of the Huawei Agile IoT Solution. The solution builds the full-coverage and robust lighting IoT through RF MESH Network. The solution includes smart terminals, Agile IoT Gateways, Agile Controller, and Application systems.

Smart terminal: Smart terminals include lighting controllers and brightness sensors that are installed on the lighting devices. They associate environment detection with street lamp lighting control, implementing on-demand lighting and accurate measurement.

Agile gateway: Huawei Agile IoT Gateway AR502GR-L-D-H connects to smart terminals through the RF MESH Network and sends smart terminal data to the management system through 3G or LTE. The AR502GR-L-D-H uses an industrial-grade design and can work stably in harsh environments.

Agile Controller: The Agile Controller, as a core component of the solution, provides a unified management platform for smart terminals and Agile IoT Gateways, and uniformly processes data sent by the Agile IoT Gateways. It provides standard Restful northbound interfaces for Application systems so that partners can develop differentiated lighting control systems as needed.

Application system: You can check the lighting device status in real time and flexibly set control policies through the lighting control management application system. For example, you can configure the time range, set the sunrise and sunset times, and enable street lamps to turn on when vehicles move, controlling street lamps on-demand.

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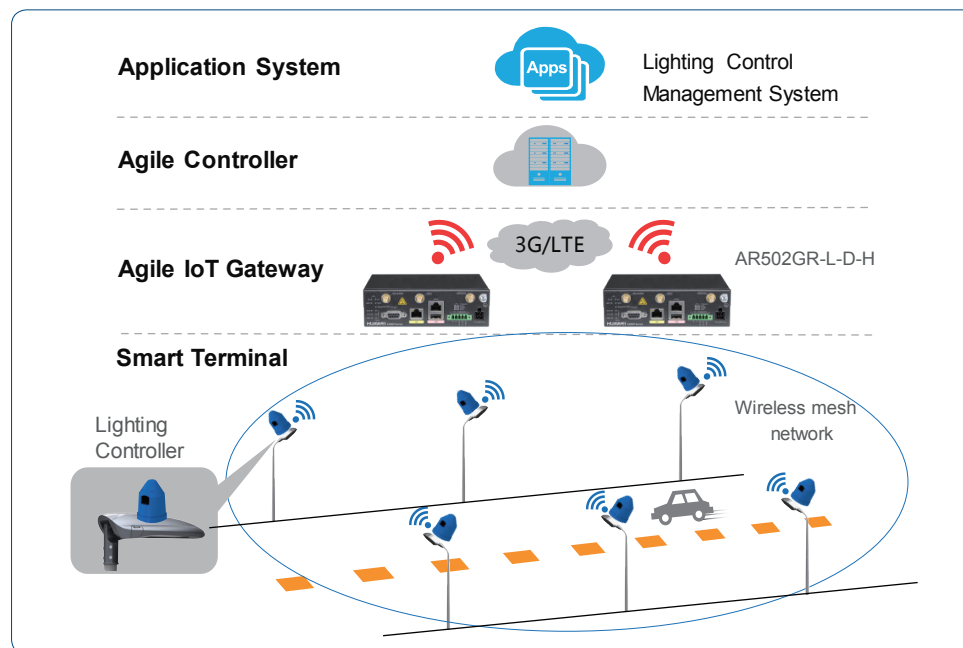


Figure 1 Connected City Lighting Solution Architecture

2.2 Solution Highlights

- 1. Full-coverage and robust wireless mesh network:** Mesh network technology provides self-networking and self-healing. Smart terminals are plug-and-play and automatically connect to the mesh network, without extra configurations or cabling. This technology helps you rapidly build a full-coverage and robust lighting mesh network.
- 2. Intelligent control and on-demand lighting:** The solution can adjust the illumination and control switches through a variety of methods such as using the management system and mobile terminals. The solution supports user-defined control policies, scheduled control, and control triggered by changes to environmental factors such as illumination and traffic.
- 3. Accurate metering and visualized energy consumption:** The solution can remotely collect data on the current, voltage, power, and electricity consumption of lighting devices, and generate energy consumption reports. The solution can query historical data of lighting devices and can also collect various indicators, such as the lighting frequency of lighting devices within a region or street.
- 4. Offline operation and reliable regulation:** When the uplink 3G or LTE network or the downlink RF MESH Network fails, Agile IoT Gateway and smart terminals can still work properly based on the preconfigured control plan, ensuring maximum network reliability.
- 5. Alarm report and intelligent management:** The solution reports alarms for lighting faults, and power supply exceptions, in real time. The solution monitors the lighting device health in real time and generates alarms. The alarms are sent through the control center or mobile terminals and emails.



2.3 Solution Component

Key Component	Product	Description
Application system	Lighting control management system	Provides lighting control policies and plan management, device installation management, statistics reports, alarm management, power consumption management, and device monitoring.
Agile Controller	Agile Controller	Is the unified management platform of smart terminals and agile gateways.
Agile IoT Gateway	AR502GR-L-D-H	Supports LTE, 3G, and RF Mesh Network, and connects to various smart terminals.
Smart terminal	Lighting controller FJSD201	Supports the RF Mesh network, measurement of the voltage, current, power, power factor, and power energy, and dynamic regulation of lighting devices.

2.3.1 Agile Gateway: AR502GR-L-D-H



- Fixed interfaces: 1*RS485, 1*RS232, 6*DI/DO, 1*GE (10/100/1000 M RJ45)
- LTE (dual SIM cards)
- RF Mesh Network
- Dimensions (H x W x D): 150 mm x 100 mm x 44 mm
- Power supply: 8 V DC to 36 V DC
- Operating temperature: -25°C to +70°C

2.3.2 Smart Terminal: Lighting Controller FJSD201



- Voltage: 100 V AC to 265 V AC
- Communication mode: RF Mesh network
- Lighting regulation signal output: 0 V DC to 10 V DC
- Operating temperature: -40°C to +65°C
- Power consumption: less than 1.5 W
- Encryption mode: AES-128
- Compliance with ANSI C136.41-2013
- Measurement of voltage, current, power, power factor, and power energy

Customer Value

► Intelligent control & Accurate Metering, reducing power consumption by over 40%



- Fine-grained plan and scenario control to every lighting device, reducing secondary energy consumption by over 40%
- Accurate metering for power consumption, preventing unnecessary electrical leaks and electrical theft to reduce loss

► Zero wired, plug & play, reducing TCO by over 90%



- Plug-and-play, Compliance with ANSI C136.41-2013, 0 configuration, Rapid establishment of the wireless mesh network, 0 wired.
- Alarm report, as well as control, diagnosis, and fast fault location

► Openness, flexibly integrating value-added services



- Seamless integration with third-party smart terminals, platforms, and applications, quickly integrating value-added applications
- Reduction of public lighting energy consumption, building a low-carbon city
- Reduction of accidents caused by lighting device faults, building a safe city









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