

White Paper

ADLINK IoT Gateway Lights Up Smart City

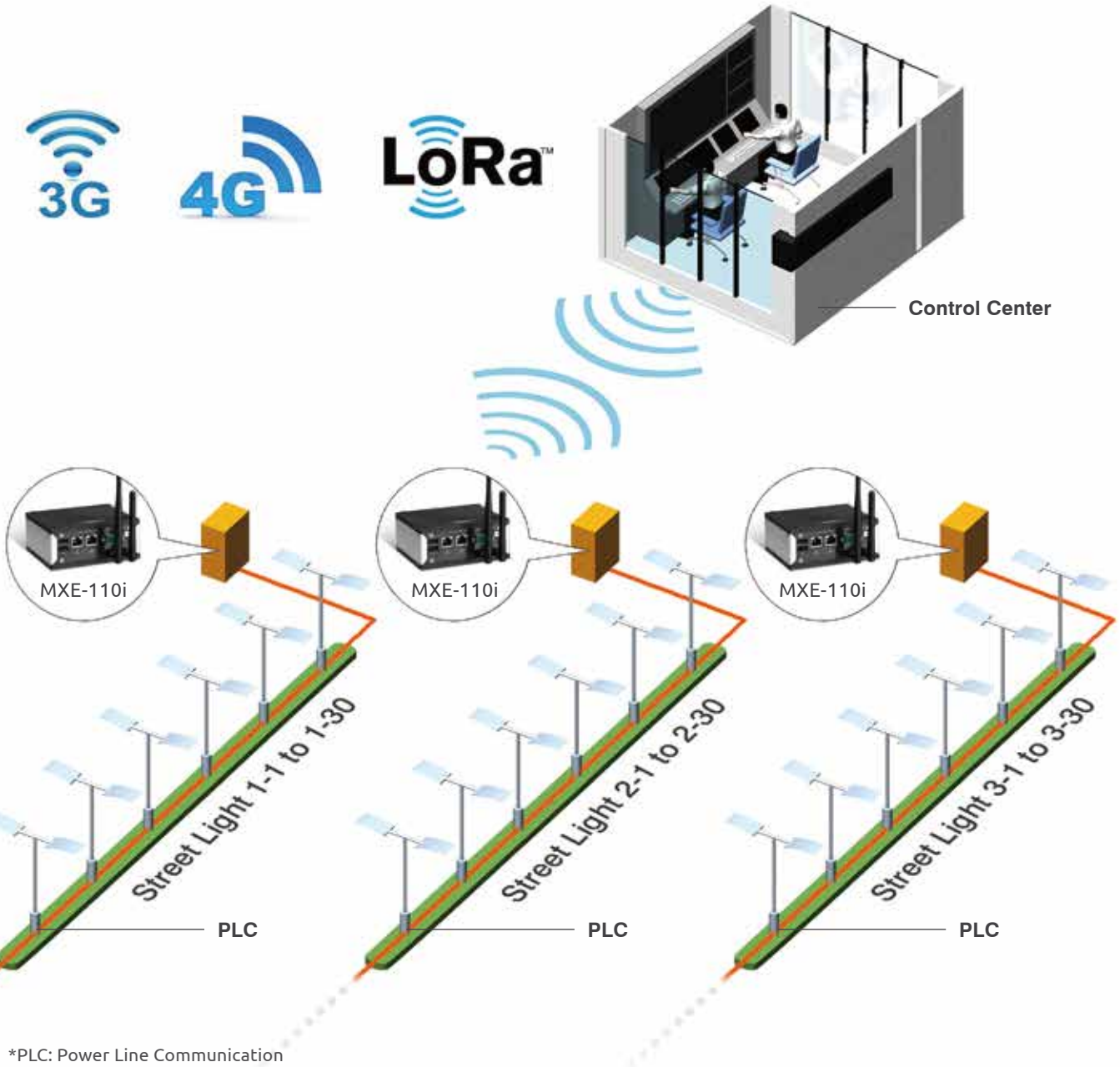
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Application

Street lighting is more than just a public security measure. It also plays a pivotal role in a city's financial burden and energy consumption. It is estimated that conventional street lights, utilizing less than efficient lighting technology combined with limited management, can seriously compromise a municipality's energy expenditures, as well as contributing to Greenhouse Gas (GHG) emissions. In light of environmental and financial concerns, many cities are adopting state-of-the-art IoT-enabled technologies to implement intelligent control and management over street lighting, pursuing agendas of a greener, smarter city and healthier municipal finances.

Some cities have initiated smart street lighting, in a bid to reduce both electrical consumption and carbon footprint. The program can include replacing traditional mercury and sodium lamps with more power-efficient LED lights and deploying remote monitoring and management, based on Power Line Communications (PLC).



*PLC: Power Line Communication

Each ADLINK MXE-110i controls around 20 to 30 street lights, and communicates with the control center wirelessly via 3G, 4G, or Lora.

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Power Line Communications (PLC) utilizes existing power lines to street lights to transmit data between the street lights and IoT gateways, establishing two-way communications by means of which the Street Light Management System can issue control commands to specific street lights, and collect operational data and sensor data therefrom.

A PLC-based smart light solution enables street light administrators to control remotely control on/off status of the street lights based on either pre-determined schedules or manually. Further, by collecting operational data of the lights preventive maintenance can be implemented to repair or replace lamps as needed, eliminating the need to dispatch crews for onsite tasking. Moreover, installed sensors allow dimming control of specific street lights according to environmental changes.

It is estimated that, by using more efficient lamps and implementing smart management control, power expenditures can be reduced by 50-80% and CO_2 emissions by up to 40%.



With ADLINK's IoT Gateway, Smart City Street Light solution becomes more environmental friendly.

Advantages and Benefits

Reduced infrastructure requirement

Utilizing existing electrical grid to communicate removes the need for dedicated communication network, saving time and budget.

Reliable communication

Power line-based communication circumvents many of the interference problems associated with wireless RF communication, from buildings, trees, and other obstructions, as well as conflicts with similar frequencies and unauthorized access.

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Energy conservation

On/off control of individual street lights based on automatic lighting schedules allows flexible remote control and management, supporting power saving strategies. With the aid of environmental sensors, dimming of specific lights can also be automatically adjusted in real time according to onsite environmental conditions.

Reduced carbon footprint

More efficient street lighting technologies and intelligent management can decrease actual energy used by street lights, with greenhouse gas emissions lessened accordingly.

Streamlined management and maintenance

Remote monitoring and GPS implementation allow centralized administration to monitor status of each individual light, dispatching maintenance personnel only as needed. Physical onsite inspection is not required to identify faulty or burnt-out units, representing considerable savings of manpower and expense. Implementation of big data analysis for long-term data acquisition, expiry of individual lamps can be predicted and preventive maintenance employed.



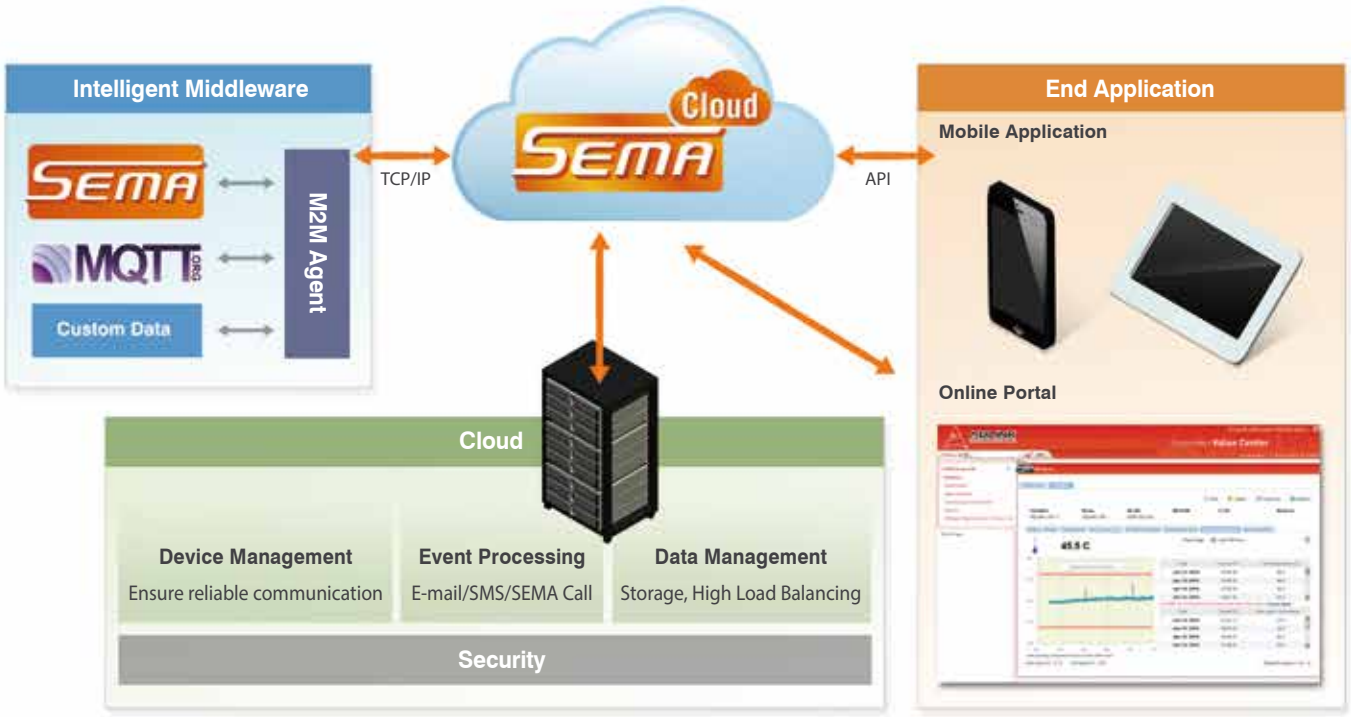
ADLINK MXE-110i IoT Gateway is a smart choice to the smart city light solution.

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ADLINK's solution

ADLINK has helped realize these projects with its Matrix MXE-110i IoT gateway, serving as a smart master controller deployed in the field enabling PLC and IoT communications.

With the implementation of ADLINK"s proprietary SEMA Cloud solution and integration of Wind River® Intelligent Device Platform XT and McAfee Embedded Control, the MXE-110i maximizes manageability and security critical for IoT-based operations.



SEMA Cloud offers remote manageability and enhances system reliability.

The MXE-110i further integrates PLC transceiver functionality to receive commands from cloud admin (smart light management center), modulating signal packets into a frequency length suitable for AC power-based transmission, and forwarding the commands to specific street lights via power lines.

Each street light carries a PLC transceiver, by which commands are received from the gateway via power line, and onsite operational data returned to the gateway and management center.

In this case, multiple MXE-110i gateways are deployed in the field, in roadside installations, each controlling around 20 to 30 street lights in the vicinity.

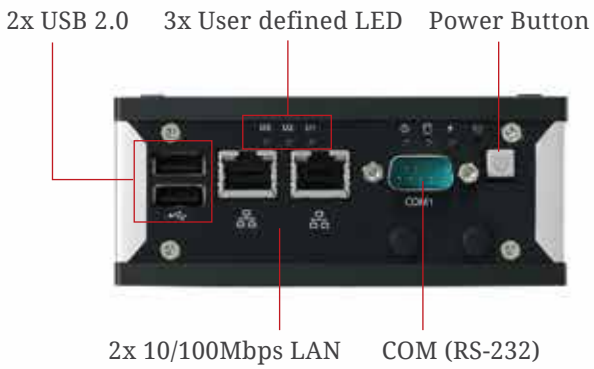
In addition to PLC communications, the MXE-110i can receive and transmit data via other methods, including Zigbee, LoRa, Modbus TCP, 3G, WiFi, and others. Communications among gateways and servers are accomplished using 3G and Ethernet.

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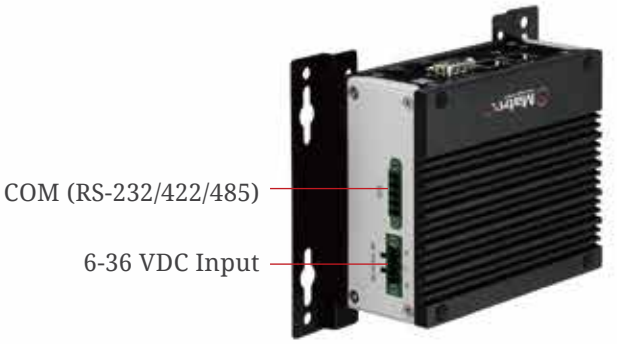
The ADLINK MXE-110i, powered by an Intel® Quark™ SoC X1021 and incorporating Intel® IoT Gateway technology, empowers solutions that provide leading performance and security for intelligence at the edge, enabling near real- time analysis and tighter, more efficient process control while reducing data transmission costs. The MXE-110i also incorporates ADLINK's own proven technologies, including mini-compact 120 mm (W) x 100 mm (D) x 55 mm (H) size and extreme rugged construction, ideal for outdoor deployment. Though small in size, the MXE-110i delivers rich and versatile communication I/O capabilities, including two High-Speed LAN ports, two COM ports, three USB 2.0 hosts, SDI/O, and dual mini PCIe slots, as well as a USIM socket supporting connection to WiFi, BT and 3G. Practically any communications requirement can met flexibly in any IoT deployment.

Low power consumption in a fanless and compact system, the MXE-110i conserves both space and energy expenditure, in an extremely rugged package. Withstanding operating vibration up to 5Grms, shock up to 100 G and operating temperatures of -20°C to 70°C (optional), ADLINK's MXE-110i assures 24/7 operations in the harshest outdoor deployment conditions.

MXE-110i: Front



MXE-110i: Side



MXE-110i delivers rich and versatile communication I/O capabilities.

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About ADLINK

ADLINK Technology is enabling the Internet of Things (IoT) with innovative embedded computing solutions for edge devices, intelligent gateways and cloud services. ADLINK's products are application-ready for industrial automation, communications, medical, defense, transportation, and infotainment industries. Our product range includes motherboards, blades, chassis, modules, and systems based on industry standard form factors, as well as an extensive line of test & measurement products and smart touch computers, displays and handhelds that support the global transition to always connected systems. Many products are Extreme Rugged™, supporting extended temperature ranges, shock and vibration.

ADLINK is a Premier Member of the Intel® Internet of Things Solutions Alliance and is active in several standards organizations, including PCI Industrial Computer Manufacturers Group (PICMG), PXI Systems Alliance (PXISA), and Standardization Group for Embedded Technologies (SGeT).

ADLINK is a global company with headquarters in Taiwan and manufacturing in Taiwan and China; R&D and integration in Taiwan, China, the US, and Germany; and an extensive network of worldwide sales and support offices. ADLINK is ISO-9001, ISO-14001, ISO-13485 and TL9000 certified and is publicly traded on the TAIEX Taiwan Stock Exchange (stock code: 6166).

About the Intel® Internet of Things Solutions Alliance

ADLINK is a Premier member of the Intel® Internet of Things Solutions Alliance. From modular components to market-ready systems, Intel and the 400+ global member companies of the Intel® Internet of Things Solutions Alliance provide scalable, interoperable solutions that accelerate deployment of intelligent devices and end-to-end analytics. Learn more at: intel.com/iotsolutionsalliance

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