MOXA®
Reliable Networks ▲ Sincere Service

Application Note

Remote Access Made Secure and Easy

with industrial LTE cellular gateways

Best-fit Applications

- ☑ Intelligent transportation systems
- ☑ Power substation applications
- ☑ Water and waste treatment applications
- ☑ Pipeline monitoring
- ☑ Offshore oil & gas operations
- ☑ Bus and train surveillance

OnCell
G3150A-LTE Series

OnCell
G3470A-LTE Series

OnCell
3120-LTE-1 Series

www.moxa.com

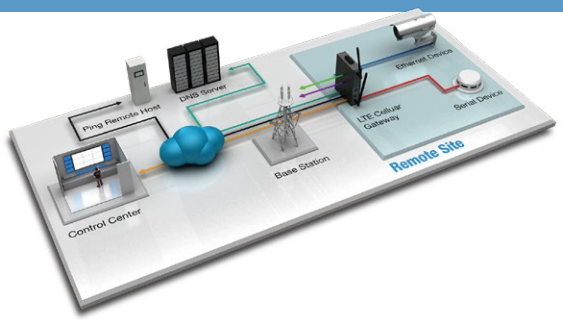
Application Note

LTE Cellular Links for Easy and Secure Remote Access

Long-range and wide-area applications are no longer restricted by distance and speed constraints. Network devices built using the LTE standard can support the high bandwidth and speed needed for large-scale long-distance network applications, such as intelligent transportation systems (ITS), power distribution, and water treatment and distribution systems. Moxa's OnCell LTE gateways deliver reliable connectivity in harsh environments for 24/7 wireless operations to meet the diverse needs of your large-scale network applications.

Connection Reliability

Moxa's OnCell LTE gateways are designed to provide continuous connectivity. The dual-SIM cellular operator backup provides automatic switchover when one of the links goes down. Dual power inputs ensure power redundancy and connection reliability. In addition, Moxa's GuaranLink technology implements a 4-tier connection check method that makes continuous connectivity a reality.



Low Power Consumption

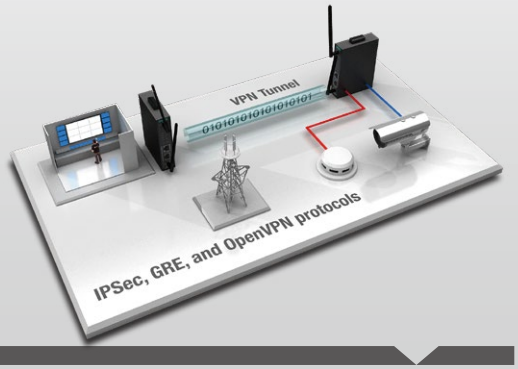
The OnCell 3120-LTE-1 provides two standby modes to reduce power consumption when the device is idle. The sleep mode effectively reduces the power consumption to less than 2 Watts and the OnCell can be woken up using remote SMS control commands or based on a preset schedule. The hibernation mode puts the OnCell device into deeper sleep, which reduces the power consumption to less than 40 mini Watts. You can wake the OnCell from hibernation mode by using the schedule management function.

Industrial-Grade Design

Moxa's OnCell LTE products come with a rugged hardware design that includes high-level EMS protection, antenna/power isolation for insulation protection, and built-in DI/DOs for real-time event alarms and notifications. The OnCell LTE gateways meet stringent industry standards, such as ATEX Zone 2 and IECEx, making them well suited for applications in hazardous locations. In addition, Moxa's LTE gateways can operate reliably in extreme temperatures, making it easy to deploy and operate these devices in harsh environments, including the interior of wayside cabinets.

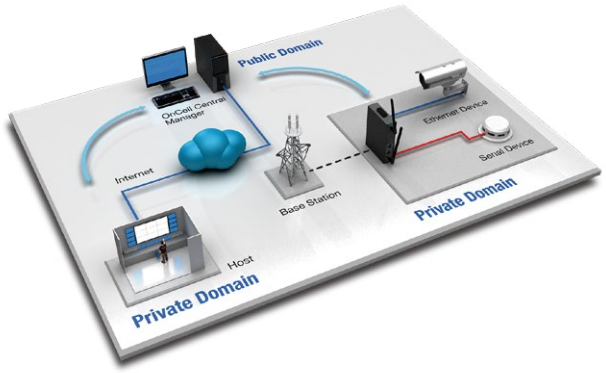
High Security

To prevent attacks from malicious persons or applications and strengthen the security of critical data over a cellular network, Moxa's OnCell LTE gateways provide secure VPN communication in both server and client roles. Network protocols, such as IPsec, GRE, and OpenVPN, are supported to help you easily establish secure and reliable connections between two networks. The gateways meet the technical security requirements of the IEC-62443 security standard to provide high device-level security.



Smart Central Management

Cellular networks, in most cases, are located in remote hard-to-reach areas that are spread over different geographical locations. The powerful OnCell Central Manager tool ensures effective management of remote devices. This cellular device management tool can easily configure and manage a high volume of remote devices over cellular networks using functions such as commands to remotely reboot devices and perform firmware upgrades. The user-friendly dashboard with RSSI historical data and RESTful APIs that can be used for cross-platform monitoring facilitate quick troubleshooting, thereby reducing network downtime.



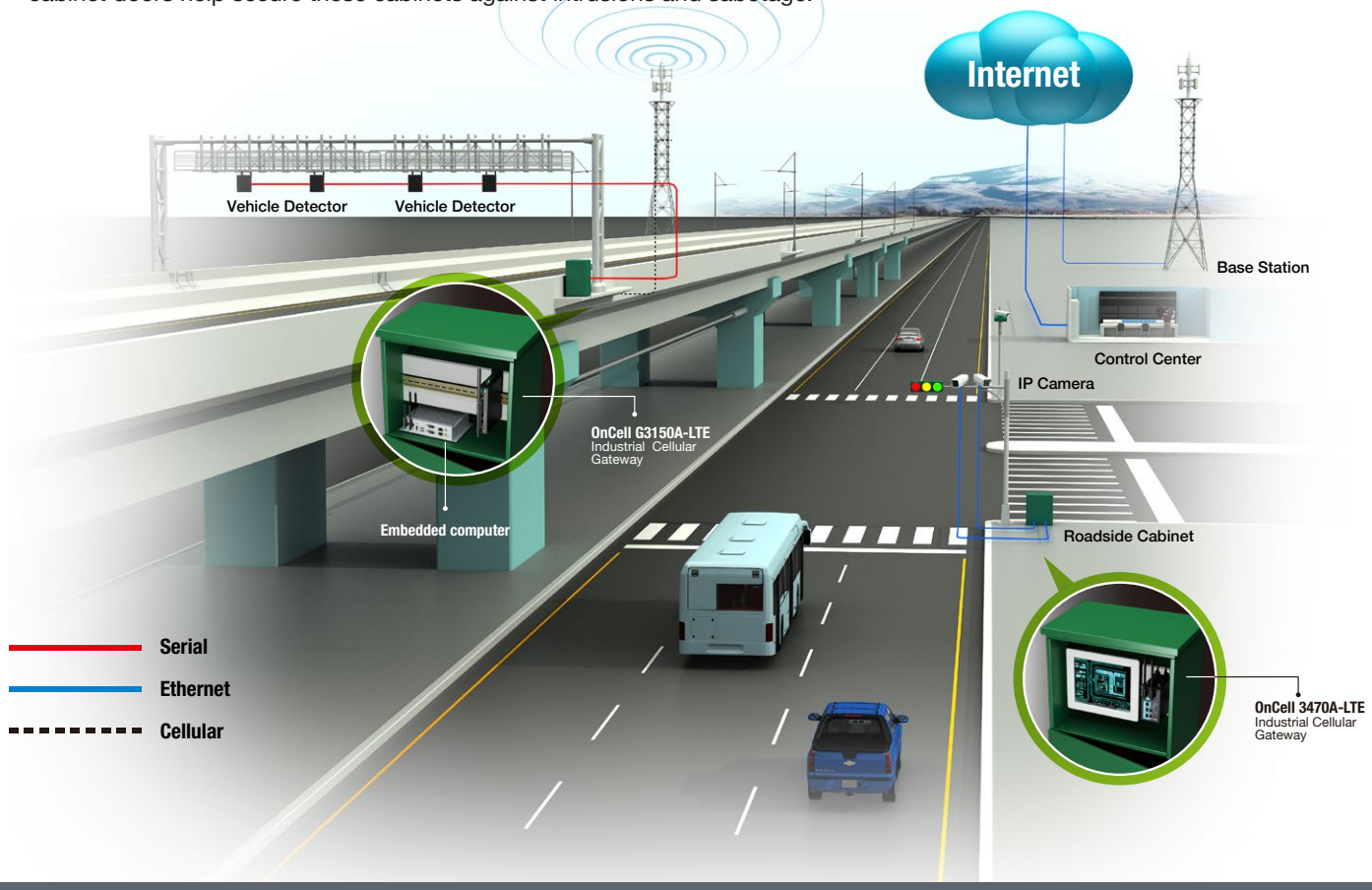
OnCell Series Industrial Cellular WAN

	OnCell 3120-LTE-1 Series Cellular Gateway with Serial Connectivity	OnCell G3150A-LTE Series Cellular Gateway with Serial Connectivity	OnCell G3470A-LTE Series Cellular Router with 4-Port Ethernet Switch Connectivity
OnCell LTE Gateways			
Key Features	• Low power consumption for battery powered applications • European, US, and AU LTE band support • Dual SIM for cellular operator backup • GuaranLink for reliable cellular connectivity • OnCell Central Manager tool support for remote device deployment, device management, and system scalability	• European and US LTE band support • Dual SIM for cellular operator backup • GuaranLink for reliable cellular connectivity • Dual power inputs and built-in DI/DOs • OnCell Central Manager tool support for remote device deployment,device management, and system scalability	
Interfaces	2 Ethernet ports (10/100 Base T(X), RJ45) 1 serial port (RS-232/422/485)	1 Ethernet port (10/100 Base T(X), RJ45) 1 serial port (RS-232/422/485)	4 Ethernet ports (10/100/1000 Base T(x), RJ45)
Operating Temperature	Standard models: 0 to 55°C Wide temp. models: -30 to 70°C	Standard models: 0 to 55°C Wide-temp. models: -30 to 70 °C	Standard models: -30 to 55°C Wide-temp. models: -30 to 70 °C
Isolation Protection	-	High-level EMS with power input isolation	High-level EMS with power input and antenna isolation
Standards and Certifications	EMC Level EN 61000-6-2/6-4 (industrial-grade)		
Security	GRE, IPsec, and OpenVPN	GRE, IPsec, and OpenVPN	IPsec
Hazardous Zone	UL/cUL Class 1 Division 2, ATEX Zone 2, IECEx	ATEX Zone 2, IECEx	UL/cUL Class 1 Division 2, ATEX Zone 2, IECEx
Dimensions	128.5 x 26 x 89.1 mm (5.06 x 1.02 x 3.51 in)	126 x 30 x 107.5 mm (4.96 x 1.18 x 4.23 in)	66.3 x 124 x 90 mm (2.61 x 4.88 x 3.54 in)
Weight	550 g (1.21 lb)	492 g (1.08 lb)	1300 g (2.87 lb)
Applications	Solar-powered applications, Water treatment, smart lighting	ITS, water and wastewater treatment	Power, energy, bus and train surveillance

Reliable Cellular Network for Intelligent Transportation Systems

Background:

Intelligent transportation systems (ITS) ensure commuter safety by efficiently coordinating traffic operations. They help users better understand traffic information by building intelligence into the transport networks. Uninterrupted real-time high-bandwidth data transmission between the numerous traffic points and the traffic control center is the key to improving traffic flow and reducing accidents. LTE cellular gateways are ideal solutions for ITS applications, such as electronic toll collection (ETC), vehicle detection, intersection monitoring, message boards, traffic light sequencing, and weather information systems. For example, in an ETC system, the accuracy of the vehicle details and toll information is vital to efficient toll collection. An LTE cellular gateway can be used to establish reliable, fast communication between ETC terminals and the control center to transfer data collected from the various remote devices and IOs. Traffic light sequencing and control systems and video surveillance at the intersections help coordinate and monitor the traffic flow and detect violations. Data from a variety of devices connected to the Ethernet ports of the gateway needs to be transmitted to the traffic control center using the cellular network. The cellular gateways deployed in small outdoor cabinets located along highways and roads should be able to withstand the high temperature generated inside these cabinets. In addition to the large volume of data collected from the wayside devices, information such as the status (open/closed) of the wayside cabinet doors help secure these cabinets against intrusions and sabotage.



System Requirements:

- Reliable long-distance high-bandwidth wireless network to transmit traffic information to the traffic control center
- Equipment that can withstand harsh environments and high temperatures inside roadside cabinets for 24/7 operations
- Easy large-scale deployment and day-to-day maintenance of remote devices

Why Moxa

- 4G-LTE technology that provides data rates of up to 100 Mbps for downloads and 50 Mbps for uploads, ensuring smooth data transmission
- Dual-SIM and GuaranLink function provide a backup option in case one cellular link fails, ensuring uninterrupted data transmission
- Moxa's solution can meet various ITS application requirements, including Ethernet ports and serial ports in one gateway, and integrated 4-port gigabit Ethernet switch support
- OnCell Central Manager (OCM) tool reduces network downtime by supporting mass configuration of a large number of devices and remote maintenance

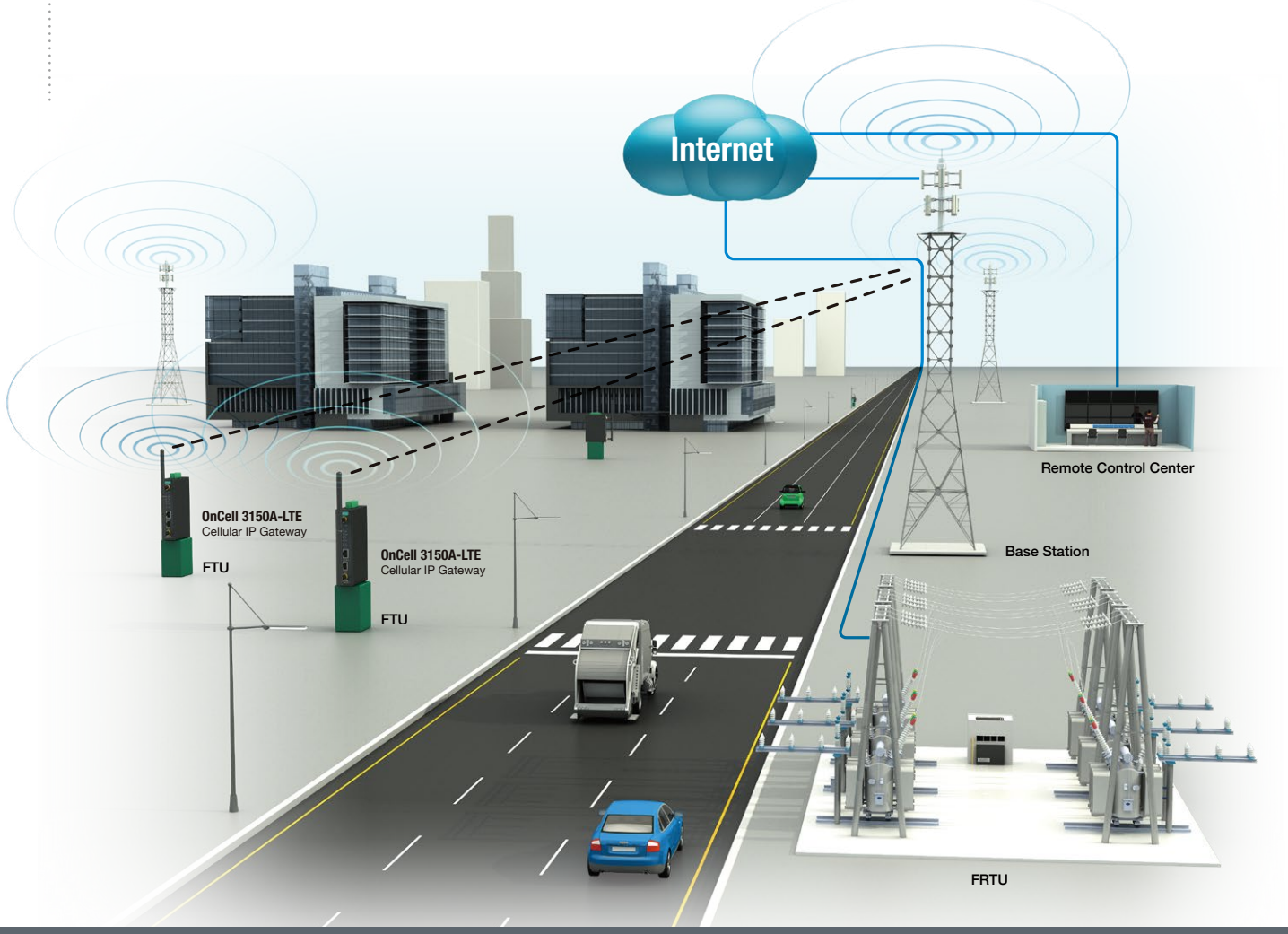
FTU Automation in Power Grids

High-Speed Cellular Connections for Feeder Terminal Unit (FTU) Automation

Background:

Power lines deliver electricity from the plant to the power substations, where it is converted to a lower voltage before being distributed to the local community. Since power plants are often located far from the population centers they serve, electricity needs to be transmitted across long distances at a high voltage. For transmission safety, feeder terminal units (FTUs) are set up on the roadside to monitor I/O statuses of the distribution equipment. The FTUs collect and process digital and analog data at each site.

An electric power utility company may divide its power grid into several districts. Each district consists of several FTUs that are connected in a ring topology and monitored by an FRTU. A reliable IP-based cellular gateway is required at each FTU to ensure reliable cellular connectivity for sending notifications to the FRTU whenever one of the FTUs goes down.



System Requirements:

- An IP-based solution to enable reliable TCP/IP communication between the FRTUs and the FTUs
- Self-healing technology for prompt recovery of the monitoring network when an FTU goes down
- Both serial and Ethernet ports to accommodate devices with different interfaces

Why Moxa

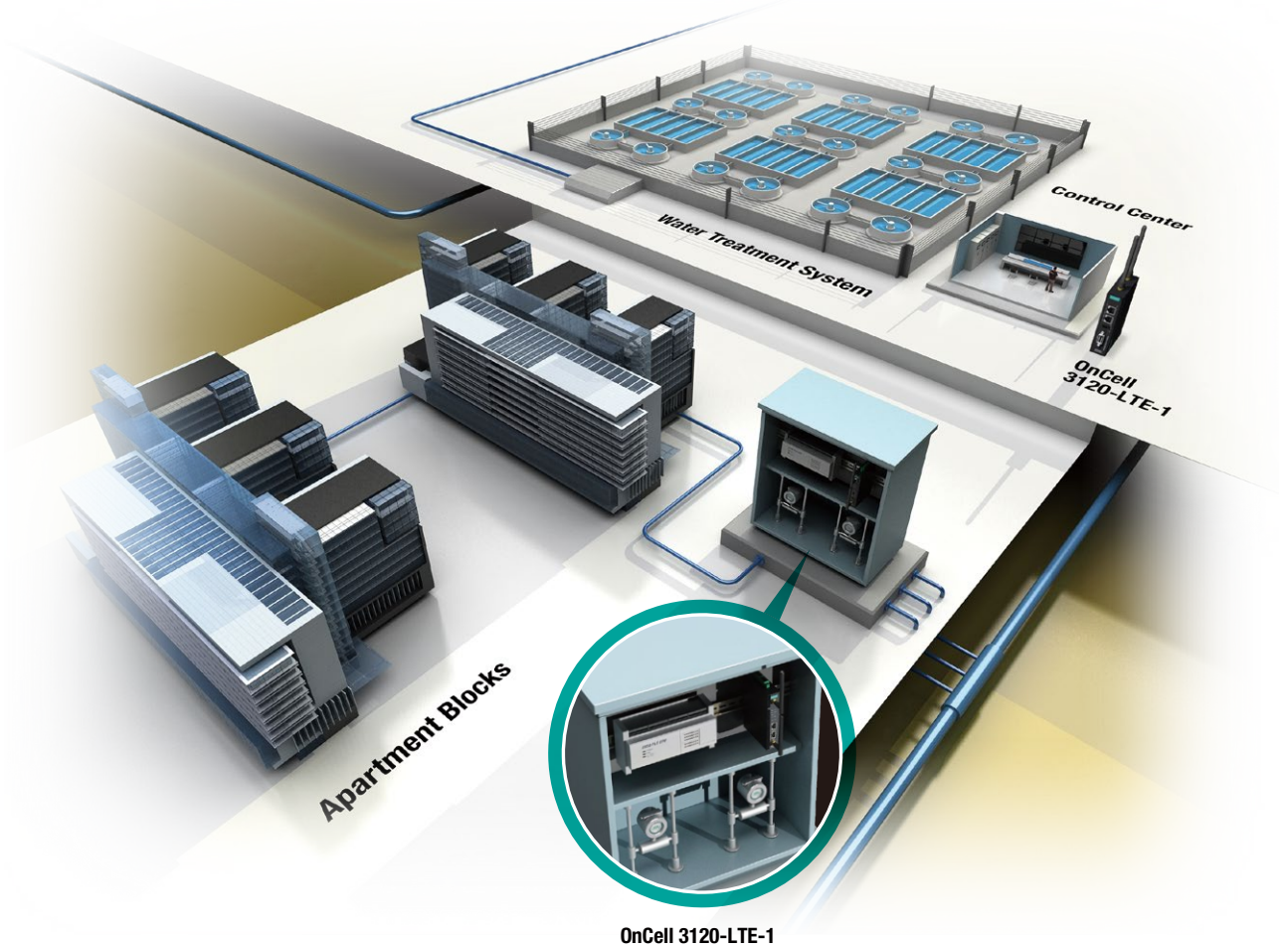
- An IP-based solution to enable reliable TCP/IP communication between the FRTUs and the FTUs
- GuaranLink technology that ensures reliable cellular connectivity between the FTUs and the FRTUs
- OnCell G3150A-LTE supports DI/DO and configuration of real-time SMS/email alerts
- Network operators can use SMS commands to remotely control devices, upgrade device firmware, and rectify faulty devices
- Both serial and Ethernet ports for flexible deployment of sensing equipment at the FTUs

Water-treatment System

Secure Cellular Communication for Water-treatment Applications

Background:

In a water-treatment plant, thousands of water quality parameters have to be measured and monitored as raw water goes through the treatment/purification process to produce drinking water that is safe for human consumption. In addition to water treatment/purification, the handling and distribution of water after it is processed is equally important to ensure the quality of drinking water. A common practice to avoid recontamination of water in the distribution system is the retention of residual disinfectants in the treated water. To ensure that the disinfectants do not reach dangerous levels, the quality of water is monitored by equipment installed inside roadside cabinets along the distribution lines. Water meters monitor the quantity of water consumed. Since these equipment cabinets are located in remote areas, a reliable, secure, and fast communication solution, such as an LTE cellular connectivity, which can send the consumption, diagnostic, and status parameters to the control center, is required for effective centralized management of the plant.



OnCell 3120-LTE-1

System Requirements:

- Secure and reliable long-distance transmission of process parameters
- Access to private IP devices from the Internet for centralized management and control
- LED indicators for troubleshooting connection issues

Why Moxa

- Compliance with the technical requirements of the IEC 62443-4-2 cybersecurity standard to prevent unauthorized access of network resources
- Multiple VPN tunnel options for secure and reliable communication over a cellular network
- The LEDs on the front panel of the OnCell 3120-LTE-1 indicate the current signal stream and cellular mode status

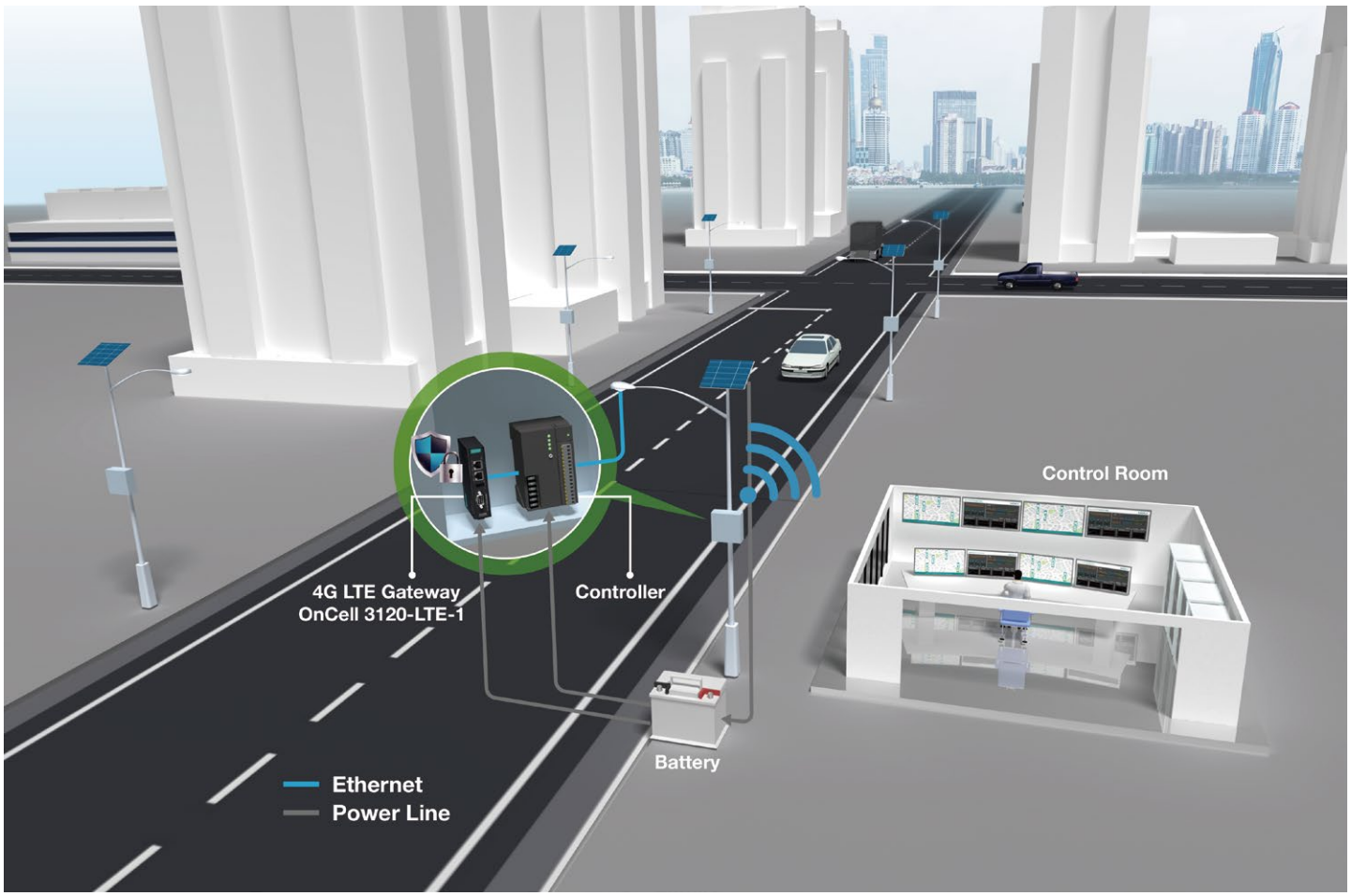
Smart Street Lighting Systems

Smart Street Lighting Systems

Background:

As governments around the world embrace the smart-city trend, street lights are increasingly being connecting to sensor-based networks, allowing the brightness of the lights to be adjusted to conserve energy while still maintaining public safety. For example, the sensors on the street lights will detect when there are no vehicles or people walking and turn down the lights to save energy. The sensors on the street light need a reliable wireless connection, so they can be easy managed from a remote control center.

A cellular gateway can simplify the process of transforming legacy lighting systems into smart energy-conserving systems by offering low-power seamless 4G LTE data communication in a rugged wireless device. The low power consumption features of the cellular gateway is well suited for solar-powered batteries, which are commonly adopted in smart city infrastructures.



System Requirements:

- Compact form factor for installation inside small wayside cabinets
- VPN security for lighting control applications
- Device durability to withstand industrial environments

Why Moxa

- The small form factor and rugged design of the OnCell-3120-LTE-1 enables installation in pole-mounted cabinets
- Two power saving modes to reduce power consumption.
- Built-in device security to block unauthorized access
- IPsec, GRE, and OpenVPN support for secure VPN tunneling