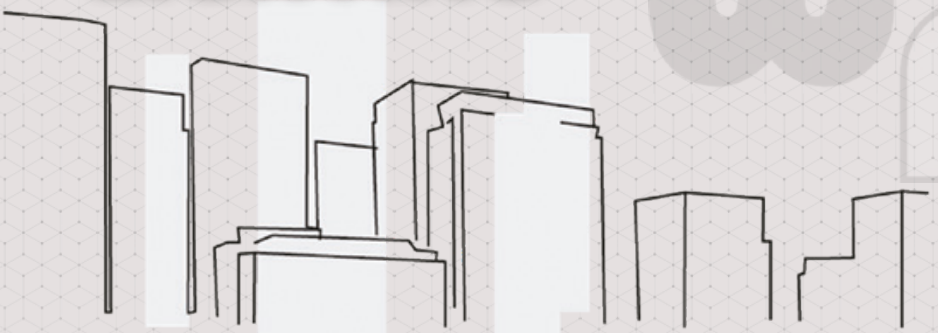
WM SYSTEMS LLc

WHITE PAPER

PUBLIC LIGHTING



2023

PUBLIC LIGHTING

INTRODUCTION

Urban areas are now leveraging the Internet of Things (IoT) to enhance their existing advantages. With IoT, we see the emergence of intelligent streetlights equipped with sensors that adjust their luminosity based on the proximity of cars and pedestrians. To illustrate, these advanced streetlights can integrate with a city's surveillance systems to spot pedestrians. Moreover, IoT facilitates centralized control, such as brightening all lamps around a stadium when a match concludes.

The capabilities provided by IoT result in significant electricity savings compared to older practices like using timers or maintaining a constant light intensity. They also help in diminishing light pollution, which affects the natural sleep-wake cycle of urban and suburban dwellers.

Historically, first-generation ripple control systems were constrained by unidirectional communication, which had been used for centralized power management and peak load leveling. Contemporary Distribution Automation solutions and sophisticated metering systems necessitate bidirectional communication, demanding higher data transfer rates than what the second-generation PLC systems could achieve.
Licensed and standardized cellular networks present a viable technology to overcome performance challenges posed by other wireless systems for both metering and DA tasks. The essence of intelligent street lighting lies in its connectivity. Traditional intelligent municipal lighting systems that utilized PLC and Mesh communications often faced the challenges with delay, oversight, and other factors.

Cellular platforms, including LTE, 5G, and NB-IoT, are perfectly suited for overseeing, regulating, and administering smart streetlights.

LTE

NB-IoT

Cat.M

CDMA 450

For rudimentary intelligent lighting services that produce minimal data and premier communication platforms include Long-Term Evolution (LTE) or the up-and-coming cellular IoT standards as Narrow Band-IoT (NB-IoT) and LTE Cat.M, crafted specifically for Low-Power Wide-Area Networks (LPWANs).

Another feasible alternative is the CDMA 450 network, operating on the 450MHz frequency recognized as a universal CDMA standard. Typically, this is earmarked for utilities and state-related purposes.

The capacity to remotely supervise municipal lighting infrastructures offers immense advantages. Not only does it ensure superior lighting for the populace, but it also permits service providers to fine-tune both maintenance schedules and energy expenditures.

OVERVIEW OF OUR INVOLVEMENT IN STREET LIGHTING MANAGEMENT

In 2016, WM Systems secured a contract from the European tender to introduce automated street lighting systems in several major European cities, including multiple municipalities in the Netherlands.

To cater to dynamic public lighting needs, we developed an internet-enabled two-way communication device which stands as the central unit of the Smart Grid Platform.

This device is a cellular router equipped with a light control feature, named the M2M Industrial Router Control Box.

ABOUT OUR COMPANY

With over two decades of expertise, WM Systems boasts 21 years in R&D, crafting and evolving electricity metering modems, industrial routers, and IoT switches.

Each product in their line-up communicates with the HES via cellular networks and establishes wired connections with the respective meters and apparatuses.

WM Systems offers a range of IoT solutions catered to diverse sectors, including Smart Metering, Industrial Automation, Remote Machinery Monitoring, Smart Grid, and Street Lighting.

Certified System certop ISO 9001

Certified System certop ISO 27001

AAA Highest Creditworthiness

ADVANTAGES OF OUR INNOVATIVE SOLUTION

WM Systems presents a comprehensive light control management system, fortified with advanced router security features. This innovative solution enables automated remote control and management of public street lights through on-the-spot actions, scheduled switching, and manual interventions, complete with On/Off power dimming and the intricate programming capabilities.

The system also optionally integrates features for detecting failures, as well as for monitoring lamp statuses and consumption metrics, such as voltage, current, and power factor.

All these advantages come with the assurance of cost-effective operations.

UNDERSTANDING THE PROCESS

When an integrator embeds the M2M Industrial Router Control Box within the pre-existing feeder pillar cabinets, it empowers operators to regulate street lights by managing the power delivered to the lighting cables.

Thanks to specialized street lighting software, there's also the capability to adjust the light intensity by modulating the supply voltage.

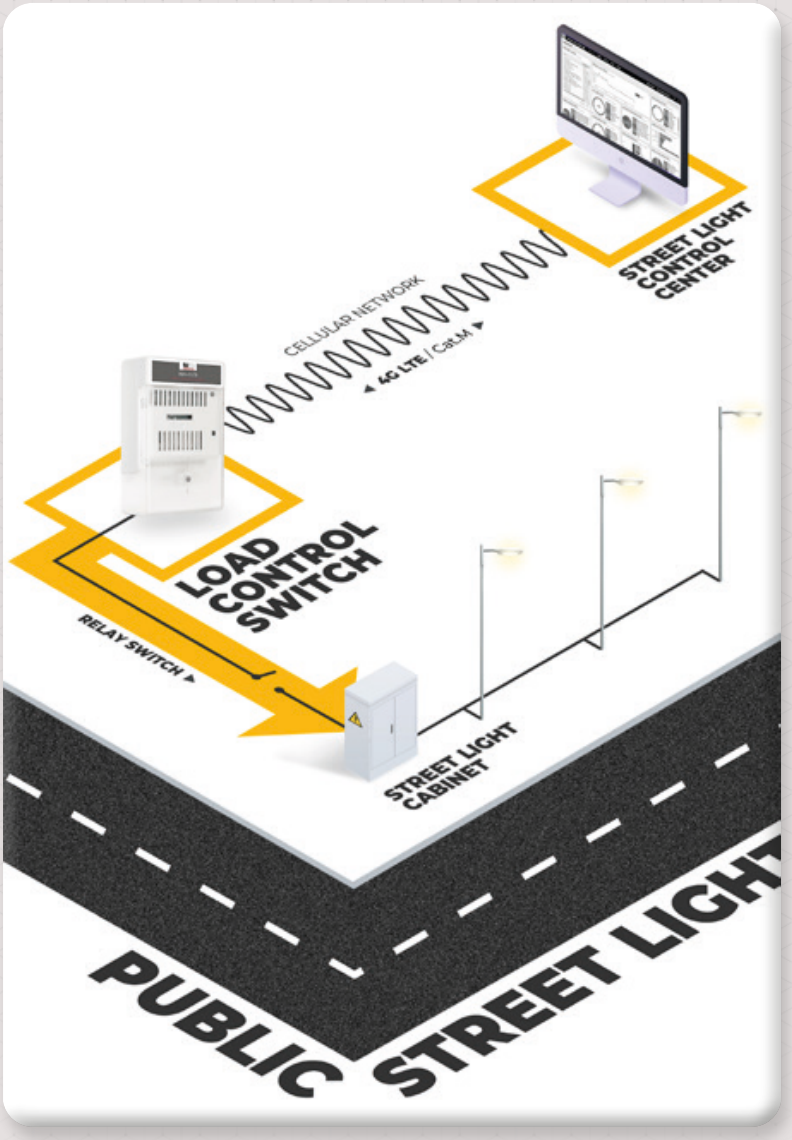
Sets of street lights can be orchestrated based on light sensors, time and date settings, or even manually via a dedicated management platform.

Enhance your street lighting cabinets with our smart Load Control Box.

Administer the lighting framework remotely by activating the relays for street lights through the control cabinet.

Seamlessly configure, oversee, and supervise your groups of lamps from the central head-end (HES).

Key features encompass real-time monitoring, oversight, and comprehenive reports facilitated by dependable data transmission and insights.



UTILIZATION CHOICES FOR OUR LIGHTING CONTROL SYSTEM

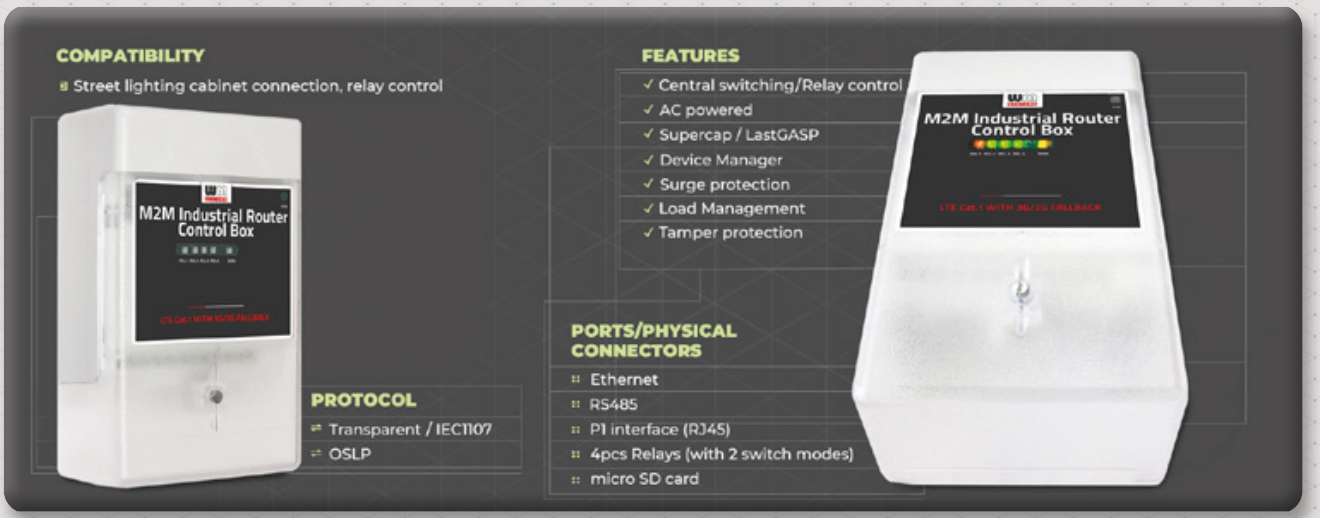
The M2M Industrial Router Control Box can be operated remotely from the server end through various means, such as:

- Utilizing the OSLP (Open Street Light Protocol) for seamless integration with the existing systems of municipal lighting operator enterprises
- Adhering to the IEC1107 communication protocol, a well-recognized standard in smart metering and industrial automation
- Our forthcoming Device Manager software

ATTRIBUTES OF OUR ROUTER CONTROL BOX

An uncomplicated yet adaptable tool apt for a broad spectrum of IIoT operations. Our equipment fluidly combines a cellular modem and a 4-relay switch within a sleek layout. This allows operators to conveniently connect through the cellular grid for distantly operating devices linked to the relays, either spontaneously or according to preset plans.

Our unified 4-relay load control switch presents a simplified and cost-conscious method for remote operation of connected apparatuses. This holistic solution, which optionally pairs a switch with an intelligent metering modem, ensures ideal energy utilization in sealed distribution systems spanning multiple industries. This leads to notable monetary benefits.



The box offers precise oversight and regulation of every component, from lights to adjusting luminosity levels for each electric cabinet based on specific requirements. A single unit can manage 4 groups of street lights, encompassing hundreds of individual lights, either on-the-spot or following a set schedule.

Each control unit is equipped with our solution that incorporates numerous features for optimal intelligent integration. In addition, comprehensive monitoring and administration tools are integrated.

Tailoring to unique requirements is also an option!

COMMUNICATION MODALITIES

CELLULAR MODULE CHOICES

- Opting for CDMA450 is advantageous for proprietary networks, allowing exclusive device control. It's a prime pick for operations that are mission-critical and necessitate high availability.
- LTE emerges as the top option for utilities and service corporations looking to leverage the expansive reach of cellular grids coupled with high-speed data transfer.
- LTE Cat.M / Cat.NB stands out for exclusive networks (suitable for industrial automation and intelligent metering) where utility operations are maintained securely, accompanied by minimal upkeep costs and a reasonable monthly tariff.

DIVERSE APPLICATIONS FOR INTELLIGENT GRIDS

The potential of our solution extends beyond the obvious; as Load management is pivotal in shaping the next wave of energy management systems. This empowers utilities and intelligent grid managers to harmonize energy supply and demand by adjusting the electrical load instead of the output from power stations. Our offering is apt for an array of smart grid operations.

For example, operators of solar farms can employ remote inverter controls to equalize energy provision and consumption. Within Demand Response Systems (DR), our load control switch proves invaluable in surveilling regional energy use. In response to demand surges, it can autonomously deactivate high-consumption units, such as water heating systems or HVACs. Moreover, the four relays in the switch can be fine-tuned to manage distinct electric loads.

PRODUCTS / IoT SWITCHES

Simple, but versatile cellular based 4-relay switch solution for public lighting control and load management. This device would became the heart of the smart grid communication.

ONLINE MANAGEMENT | QoS & ANALYTICS | REMOTE FW UPDATES | CENTRAL CONTROL

M2M INDUSTRIAL ROUTER CONTROL BOX

NETWORK

4G LTE Cat.1 / 3G / 2G

LTE Cat.M / Cat.NB / 2G

mini SIM (2FF)

CONNECTIVITY

ETHERNET

RS485

P1 Interface (RJ45) - 5VDC power

4 Relays (2-3 way switching)

microSD card slot

DESIGN

IP52 enclosure, built-in mounting

FEATURES

Street Lighting / Load Management

Supercapacitor

OpenWrt / WebGUI

IEC 1107 / OSLP / TLS

HARDWARE

Mobile	Order options: ▪ 4G LTE Cat.1 / 3G / 2G ▪ LTE Cat.M / Cat.NB with 2G "fallback"
Powering	~100..240V AC ±10%, 50-60Hz ±5%
SIM	mini SIM (2FF)
Antenna connectors	1 Antenna connector (SMA, 50 Ohm)
Ports	Ethernet (RJ45, 10/100Mbit, LAN), RS485 (isolated, for meters), P1 interface (RJ45, for meters) with 5V DC power output, microSD card slot
Relay switching	4 latching relays (2pcs: COM, NC and 2pcs: COM, NC, NO) / 250VAC, 50Hz-60Hz / 16A
Housing / Mounting / LEDs	Plastic (ABS) IP52 casing / built-in mounting / 5 status LEDs (operation and relays)
Operating Temperature	from -40'C to +85'C
Dimensions / Weight	175 x 104 x 60mm / 420 gr.

SOFTWARE

Operation system / UI / Management	OpenWrt® with Linux kernel v4.94 / LuCi® web user interface, Device Manager platform
Operation	Scalable Smart Grid control and Public Lighting systems control: on-demand / scheduled, data sending to Concordia software (by OSLP protocol)
Protocols	DHCP, DynDNS, IP route, NAT, IPv4/IPv6, IP passthrough, HTTP(S), SSHv2, IPSec, IEC 1107, OSLP, TLS v1.2
Security	Watchdog, firewall, supercapacitor (outage management), time zones, handling daylight saving, continuous monitoring, alerts, reports

COMPATIBILITY

- Street lighting cabinet connection, relay control

PROTOCOL

- Transparent
- IEC1107
- TLS
- OSLP

FEATURES

- ✓ Central switching/Relay control
- ✓ AC powered
- ✓ Supercap / LastGASP
- ✓ Device Manager
- ✓ Surge protection
- ✓ Load Management
- ✓ IP52 enclosure

PORTS/PHYSICAL CONNECTORS

- Ethernet
- RS485
- P1 interface (RJ45)
- 4pcs Relays (with 2 switch modes)
- micro SD card

PRODUCTS / DEVICE MANAGEMENT

Device Manager emerges as a holistic tool for the distant administration of devices and gateways. This ensures not only swift deployments but also the reliable performance of IoT devices post their launch.

Our software delivers cutting-edge management features: swift bulk device onboarding, streamlined administration, detailed device status insights, real-time performance metrics, security updates, and logical device groupings for mass software and firmware overhauls for our routers, modems.

This Microsoft Windows-aligned on-site application is a perfect fit for enterprises or governmental entities with rigorous ICT guidelines.

Elevate the uptime and efficacy of your networked fleet!

ONLINE MANAGEMENT | QoS & ANALYTICS | REMOTE FW UPDATES | CENTRAL CONTROL

DEVICE MANAGER

FEATURES

- Remote Management
- Device Configuration
- Managing Remote Operations
- QoS Monitoring
- Alarms, events, reports

SOFTWARE

- MIcrosoft Windows® client- and server application with database
- Microsoft Active Directory® compatible
- Security: AES encryption, TLS certificate keys

DESIGN

- Scalability
- Full-fledged monitoring
- Quick optimalization of device operation properties
- Easy firmware deployment

APPLICATION

- Public Lighting
- Load Management

DEVICE MANAGER

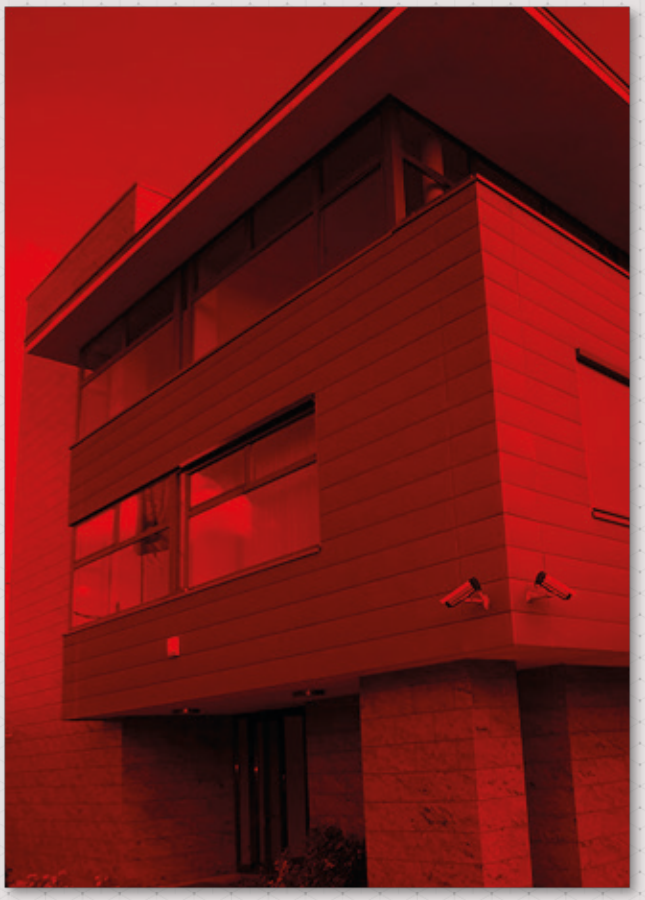
KEY FEATURES

- Coordinate thousands of devices within a unified framework
- Oversee device metrics: availability, cellular signal strength, QoS, crucial signals, and device efficiency
- Collate device messages, notifications, and events
- Centrally store device configurations for effortless reconfigurations
- Execute remote device tasks: rebooting, factory resetting, time sync adjustments
- Roll out firmware updates
- Generate routine reports and statistics
- Support both fixed and dynamic IP addresses
- Ensure data security with AES encryption and TLS certificate key values
- Comprehensive user and device management

CONTACT US

WM SYSTEMS LLc

8 Villa str., Budapest H-1222 HUNGARY
Opening hours: 9.00–17.30 CET



INTERNATIONAL SALES
EUROPE, AFRICA, ASIA,
NORTH-AMERICA, SOUTH-AMERICA

Inquiries related to products and services, requests for proposals, orders, partnership and reseller contracts, projects

+36 70 360 5638

INTERNATIONAL SALES
MIDDLE-EAST

Inquiries related to products and services, requests for proposals, orders, partnership and reseller contracts, projects and product support

+40 733 966 224

WM SYSTEMS

TECHNICAL SUPPORT
online assistance, technical support, tech demo requests

iotsupport@wmsystems.hu

Website: www.wmsystems.hu

WM Systems LLc 8 Villa, Budapest, 1222 HUNGARY
Email: intersales@wmsystems.hu