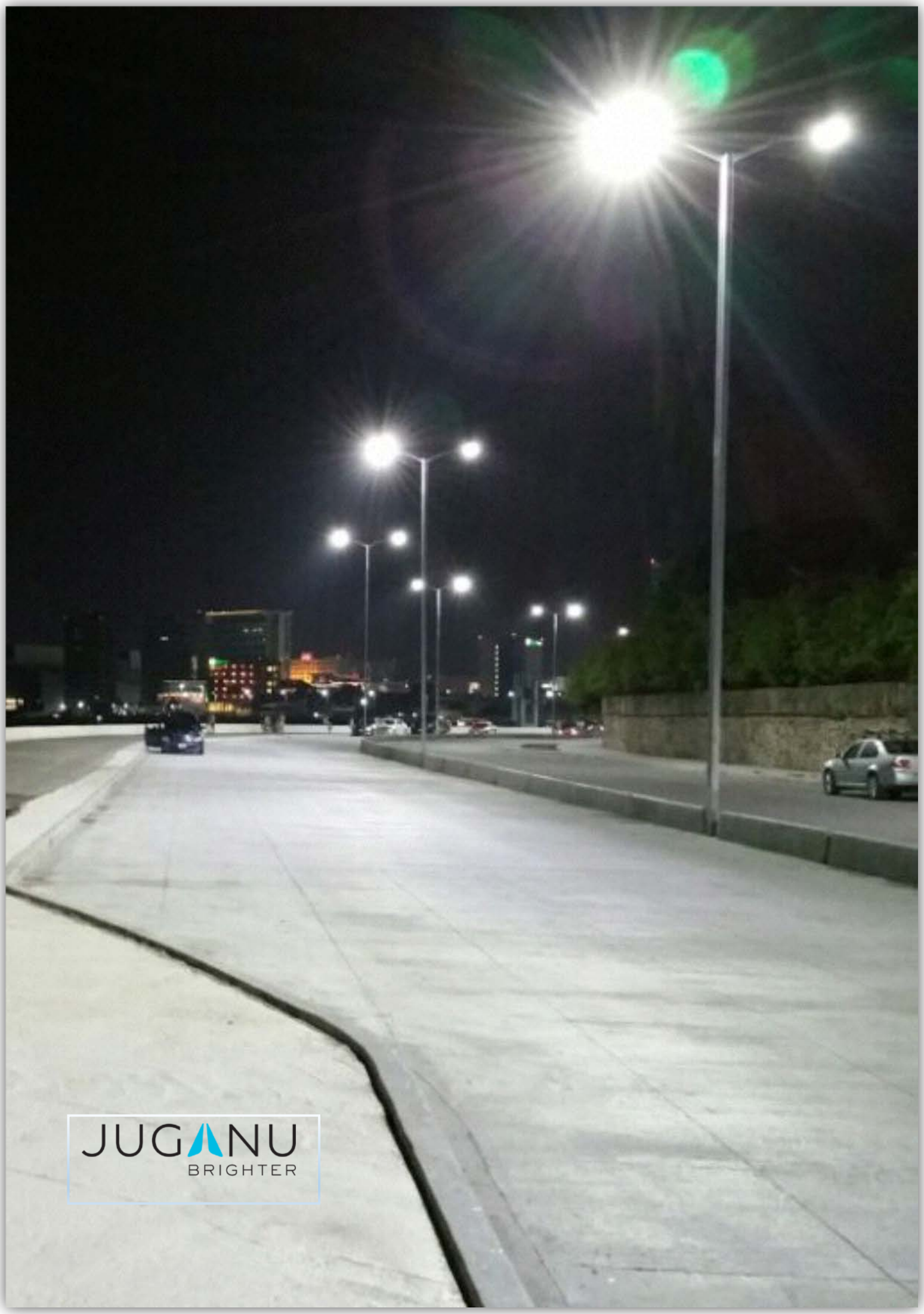
JUGANU
BRIGHTER

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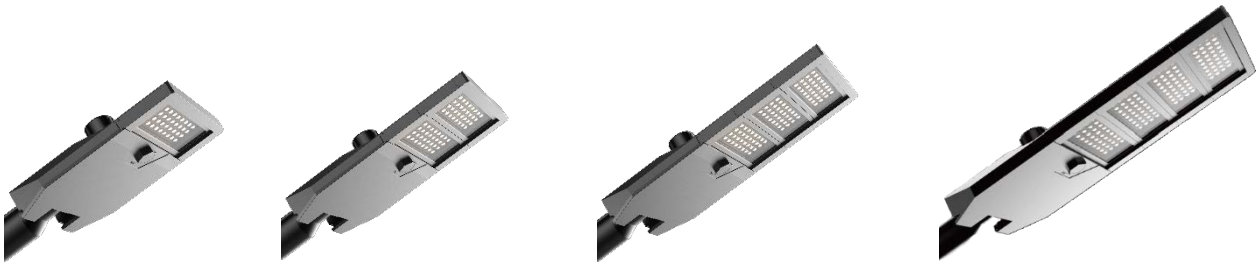

JLED Street Light

JLED ***Street & Road*** Light enables ***Smart City***

Estella family of Street & Road lights by Juganu are efficient, lightweight and reliable. High SYSTEM efficacy of 150 LPW allows significant electricity savings of 75-90%, compared to HPS and 30% and compared to other LEDs. Negligible reduction of light with time of under 3% per year allows stable lighting for many years. Optimized optics direct the light where it is needed, providing uniform illumination, while meeting the international standards for Street & Road lighting. JLED fixtures withstand severe weather conditions, such as tropical rains and proximity to the sea.

Estella family provides infrastructure for smart city and incorporates various pre installed modules, such as sophisticated wireless communication with cloud management and control software and GPS, which allows autonomous operation, accurate power management module, AC total protection module, various sensors, video cameras, cellular microcells, Wi-Fi AP's and more.

Estella family supports the ANSI C136.41 (7 pin NEMA) for remote management system.

Estella family provide modular configuration with up to 4 modules with up 240W.

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BENEFITS

- Increase quality of life and public security
- Increase safety for drivers, riders and pedestrians
- 75-90% savings in electricity costs
- 95% saving in maintenance costs
- Infrastructure for Smart City

APPLICATIONS

- Designed to meet Street & Road luminance and illuminance requirements

FEATURES

- Several types of optics for various road conditions
  - Lateral distribution: Type II and III
  - Longitudinal distribution: Short and Medium
- Modular configuration of up to 4 LED modules and up to 240W
- Easy replacement of faulty LED modules
- CCT (typical)
  - 3000K ÷ 6500K

RATINGS

- Environmental: IP66
- Temperature range: –25° to 40°C ambient
- Compliant with the material restriction requirements of RoHS
- Impact shock: IK08
- 10KV surge protection
  - Compliance to UL1449 Type 4 Component Assembly
  - Compliance to IEC 61643-11 Class II / EN61643-11 Type 2
  - Compliance to CE Class I & II Installation
  - Protects Line to Neutral, Line to Ground and Neutral to Ground in accordance with IEEE/ANSI C62.41.2 Guidelines
  - Compliance to IEC 61000-4-5, Class 5, 20kV @ 1.2/50µs, 10kA @ 8/20µs using 2ohm Source Impedance
  - Pulse Rating @ 8/20µs (No. of Strikes @ I):
    - 1 @ 10,000A
    - 1 @ 10,000A
    - 2 @ 6,500A
    - 10 @ 3,000A
    - 1000 @ 1,500A
- AC input of up to 277V

MOUNTING

- Integral die cast mounting pipe stop feature
- Suitable for 1.77 ÷ 2.56 in. (45mm to 65mm) mounting pipe
- Inclination: integrated with ±15°

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SPECIFICATIONS

- **Power consumption** | 0 to 240W (Continually dimmable)
- **Dimming** | factory set / 0 to 10V / wireless control
- **System efficacy** | 150 LPW (including PS & Optics)
- **Correlated Color Temperature (CCT)** | 3,000-6,500K
- **Color Rendering Index (CRI)** | > 70
- **Photometry** | IESNA types II and III, Medium, short
- **Maintenance of Lumen output** | Light reduction < 3% / Year
- **Operating temperature Range** | -25 to +50 °C
    - **Main voltage** | 180 – 277 VAC
- **Frequency range** | 47 to 63 Hz
- **Surge protection** | 10KVA Protection
- **Lumen maintenance LM80, TM21**
    - **L90** 50,000 hours
- **Power factor** | > 0.92, max current THD 15% at 220V
- **MTBF** | > 900,000 hours Telcordia SR-332 (Bellcore)
- **Material** | Aluminum, Glass, PC
- **Maintenance** | No internal cleaning required

Options of power & lumens

Power [W]	Light module	Typ. efficacy [LPW]	Maximum lumens [LM]
Up to 65	1	150	9,750
Up to 120	2	150	18,000
Up to 180	3	150	27,000
Up to 240	4	150	36,000

Ordering information

Product ID	Power	Family	CCT	Wireless COM	ANSI C136.41 7 pin (NEMA)	AC protection unit	Distribution curve
JLED-SL	xxxW	Estella	xx	NA	Nx	NA	Dxx

CCT (other values possible)	**30** – 3000K	
	40 – 4000K	Standard
	50 – 5000K	
	65 – 6500K	
Wx	**W0–Wireless controller not included**	Standard
	WL – JWLC (LBW wireless controller in NEMA) included	
	WM – JWSC1 (MBW wireless controller in NEMA) included	
	WH – JWSC2 (HBW wireless controller in NEMA) included	
Nx	**N0** – NEMA not included, wireless not included	Standard
	NS – NEMA - shorting cap	
	NP – NEMA with photocell	
	NW – NEMA with wireless wireless COM	
	NC – NEMA with photocell and wireless COM	
Px	**P0** – Standard surge protection (10kV) included; AC total protection module not included	Standard

	P1 – JACTP (*AC total protection module 10kVA in NEMA*) included	
Distribution curves	**D01 – TYPE 2, SHORT** **D02 – TYPE 2, MEDIUM** **D03 – TYPE 3, MEDIUM** **D04 - TYPE 3, SHORT**	

Ordering example:

JLED-SL-065W-ESTELLA-40-W0-N0-P1-D01

Description:

JLED street light of Estella family with 65W, 4000K, no wireless, no NEMA, and with distribution curve D01

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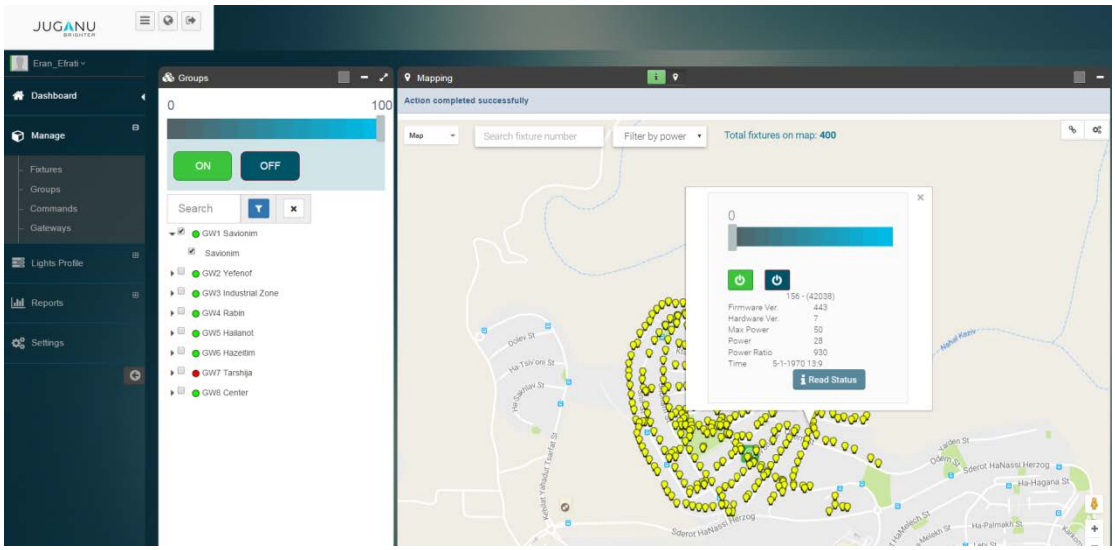
CLOUD BASED MANAGEMENT SOFTWARE

Each luminary is connected to the Juganu cloud-based management system. After log-in identification process, Graphical User Interface loads very fast (on mobile device or PC) and allows for comfortable and easy management of lighting at single fixture and street/neighborhood/city levels. Each lamp or an entirecity can be programmed to follow certain lighting schedules, to provide different light levels at different times. The reported power consumption is very accurate. Each lamp, which was damaged or destroyed, shows up as a RED dot on the map, allowing for cost-effective planning of maintenance.

- Cloud WEB-Based Graphical User Interface
- Accessible through PC Tablet & or Smartphone
- Clean and Easy interface
- The system requires Authorized credentials to Log in
- Control Luminary individually or in groups (street, neighborhood, city)
- Multi-level user access
- Shows the current status of Luminaries
- Shows Luminaries on Google maps
- Each Luminary is controlled at the component level
- Maintenance made easy



Remote Management Systems can be conceptually described as a set of three interacting component layers:

1. Lighting controllers (potentially includes different additional services)
2. Network (COM nodes, gateways, routing and addressing logic…)
3. Management System (UI, management tools and more)

While the layers contain different types of physical devices, information is shared across all the layers. The system is established by the arrangement of controllers, which fundamentally consume and produce data, attached communication nodes and arrangement of one or more gateways. The gateways are backhauling information to and from the nodes.

Outdoor lighting system controllers typically both consume data in the form of instructions control the luminary and produce data in the form of measurements of consumption instantaneous power and energy consumption over time.

Multiple controllers typically route data through gateways, which at minimum, act as communication bridges to outside networks, but may also provide other system functions. The controllers, connected to nodes, may be accessed and managed remotely by a Management System, which typically facilitates user interaction through Graphical User Interface (GUI) and consolidates and stores retrieved data. Management Systems communicates with controllers through nodes and one or more wired/wireless backhaul connections, such as gateways.

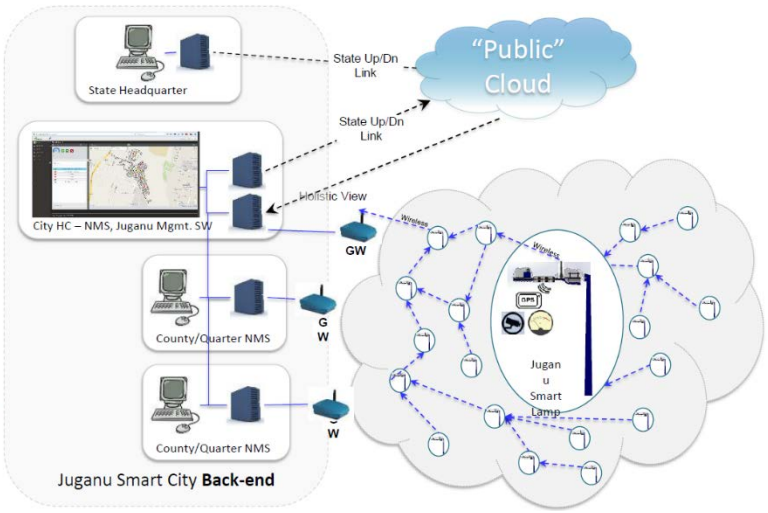


Figure 1 - Networked Outdoor Lighting Control Systems

System provides a means to:

- Set the frequency with which luminaires information is collected.
- Set luminaire into controlled and monitored groups.
- Manually control the state of a single light fixture or group of fixtures.
- Create schedules control, where the state of a single lamp or a group of fixtures is modified according to a predefined schedule.
- Create scheduled control programs based on the following criteria recurring:
    - Daily;
    - Weekly;
    - Weekend;
    - Special events.
    - Integrate with other systems of the Contracting Command Center, through API (Application Program interface) Web Service type.
    - Compare all collected parameters and informed by the fixtures and generate error messages in real time (based on availability of data reported) for any condition that violates the threshold specification of a particular indicator.
    - Error messages generate automatic defect tickets fromthe management system of the Contracting Called Operating through API (Application Program Interface) Web Service type.
    - Generate custom monitoring reports.
    - Export report data in PDF and CSV standards.
    - Generate notifications, whereby remote monitoring reports specified (predefined or custom) will be sent to the assigned users and / or groups of users via text message (SMS) and / or email.

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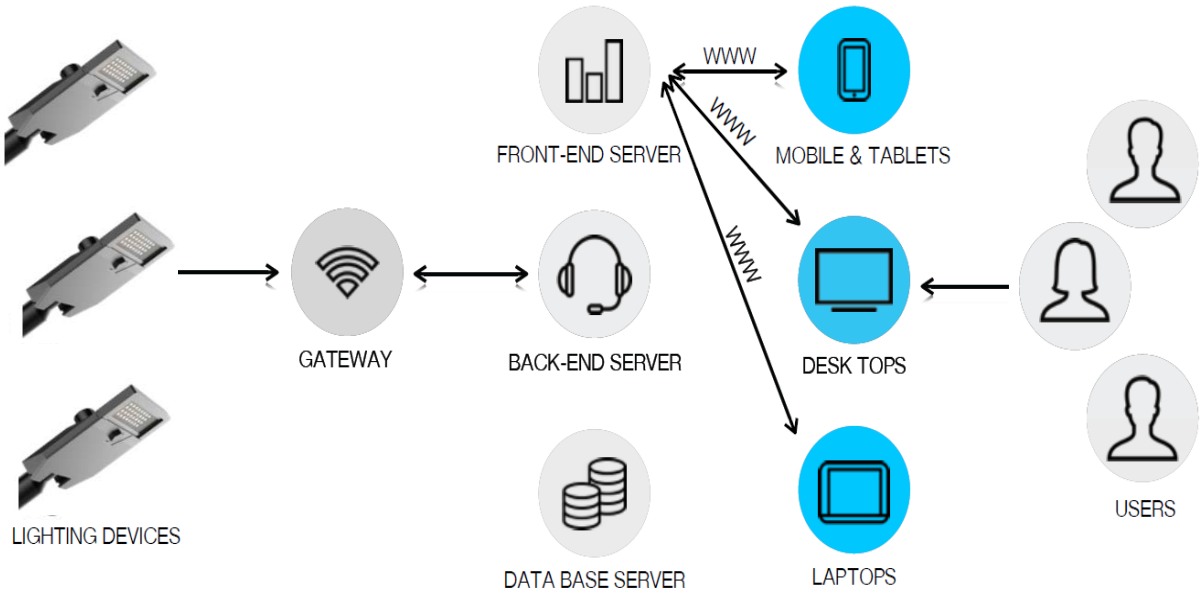
JWLC (Juganu wireless lighting control module)

Integrated Wireless Communication Lighting (wireless ready) by Juganu utilizes a proprietary, patent-pending, wireless communication technology which provides full-proof, stable and secure management and control of individual fixtures and lighting arrangements, both locally and cloud-based Graphical User Interface (GUI)

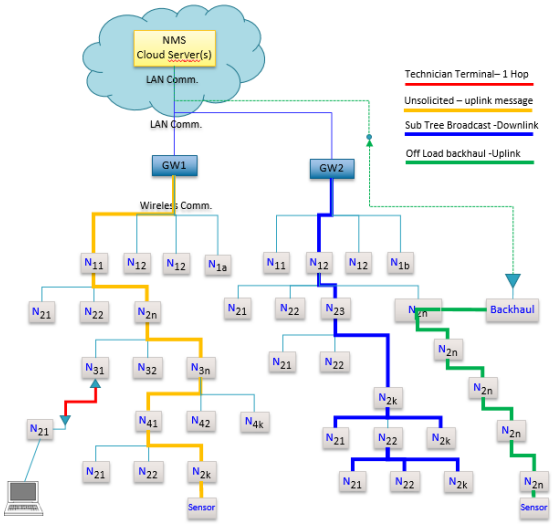
- Management & Control allows both simple and sophisticated, collective or individual control of each lighting fixture
- Each luminary is presented on a customized map and allows tracking of malfunctions and maintenance activities
- The power consumption of each fixture is measured and reportedAbnormal behavior is analyzed and maintenance can be predicted, planned and reported
- Any number of light fixtures are defined as group and group of groups. Each group is collectively controlled, including automatic dimming programs

BLOCK DIAGRAM



JWSC1

“JWSC1” networks use a proprietary tree/Mesh topology routing algorithm. Juganu provides a secured, robust, stable and relialbe protocol, for controlling tens of thousands of Juganu nodes. With this network having higher data bandwidth, the Juganu node can support multiple sensors and accessories, to enhance functionality and customer operation integration.



RF communication specifications: (for Brazil , 915 to 928MHz)

Parameter	Value	Remarks
Frequency range	902÷928 MHz	
RF Channel spacing	0.8 MHz	
RF output power	+14 dBm	typical
Reception sensitivity	-92 dBm	typical
Adjacent channel rejection	27 dB	offset = 300 kHz; interferer tone not modulated
Modulation	FSK	
Frequency channels	13	

- Grouping, Multicast & Sub Tree Broadcast
  - Patent pending predefined attribute based Multicast connectivity
  - Patent pending dynamic optimization of broadcast message to reduce traffic load
  - Support gathering a collection of lamps (IOT) into logical group for selective Control & Monitoring
- On Demand off Loading
  - Patent pending support an ad-Hoc Uplink back haul connection to off load traffic data
  - Provide a data shortcut from any tree location to the NMS
- Unsolicited uplink connectivity

  - Support truly native uplink message, initiated by the Network Node
  - Enable IOT and Smart city notifications
  - Efficient uplink routing outcome of the source routing tree nature
- Field maintenance
  - Special Ad-Hoc Technician Terminal connectivity
  - Enable field engineer to communicate with a specific, in proximity desired Node, for maintenance purpose
- Robust Security
  - Proprietary protocol & algorithms, open and standard for integration at application level

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JWSC2

“JWSC2” Juganu *"Digital world"* solution use a proprietary tree/Mesh topology routing algorithm for data backhaul, while providing practically every IoT standard protocol connectivity.

"Digital world" solution enables easy, large scale (up-to entire city) deployment of smart/safe city, IoT management, V2I (Vehicle to infrastructure), public Wi-Fi, better cellular coverage and more. When enabled in large scale, the platform can offer many services and benefits to the city and the public. *WM-JWSC2* is designed with the most advanced technology offered by Qualcomm, to ensure best-in-class performance.
Extracted from the leading IoT protocols, Juganu provides a secured, robust, stable and reliable protocol, for controlling tens of thousands of Juganu nodes. With this network having very high data bandwidth, the Juganu node can support streaming video cameras, public WiFi, multiple sensors and accessories, to enhance functionality and customer operation integration.
WM-JWSC2 is designed for simple deployment with no need for pre-planning and special knowledge.

Key specifications:
Frequency (JNET2 network): 802.11ac/ad, standard 2.4GHz, 5GHz and 60GHz
Frequency (standard supported): Sub-1GHz (ETSI 866-870MHz, FCC 902-928, ANATEL 915-928 MHZ, 2.4GHZ (e.g. to support Bluetooth, ZigBee, 6LowPAN, Mbus and more)
Camera: two 4k/60fps cameras pointed to cover the road (no mechanical parts for many years of flawless operation
Storage: up to 12 hours
Public Wi-Fi: 802.11ac 2x2 (867Mbps)
OS: embedded Linux OS designed especially for robust, secure and maintenance free operation.
Integrated sensors: Microphone, Occupancy, Temperature, humidity, air quality, vibration, pressure

Key features:

- Critical mission design. no cellular connectivity dependency. enhanced Quality of service to guaranty critical mission applications operation.
- Integrated design, where all enabled technologies are integrated into Juganu fixture. No more "technology trees" with multiple boxes and cameras mounted on the pole.
- Plug and play installation by standard lighting installers
- Designed for city-scale deployment with minimal costs relative to existing alternatives (e.g. Fiber or P2p links) and better service up-time compare to cellular dependent solution.
- "Evergreen design" ensures future technologies support

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- 1 fiber can support up to 10000 WM-JWSC2 nodes, depending on specific deployment and topology
- Streaming video on-demand from multiple fixtures simultaneously. configurable from VGA/15fps to 4K/60fps to allow better network dynamic use.
- Local recording and local search through storage history (NVR).
- Flexible operating system allows for constant system update with new features and new applications for better service offering
- Integrated standard hardware to support any current and future ISM standard protocol based on sub-1GHz and 2.4 GHz.
- Sensory data offer full meteorological data in at each pole, thus enabling a precise mapping of the city.
- Reliable and secured FOTA (firmware over the air) to ensure future upgrades.

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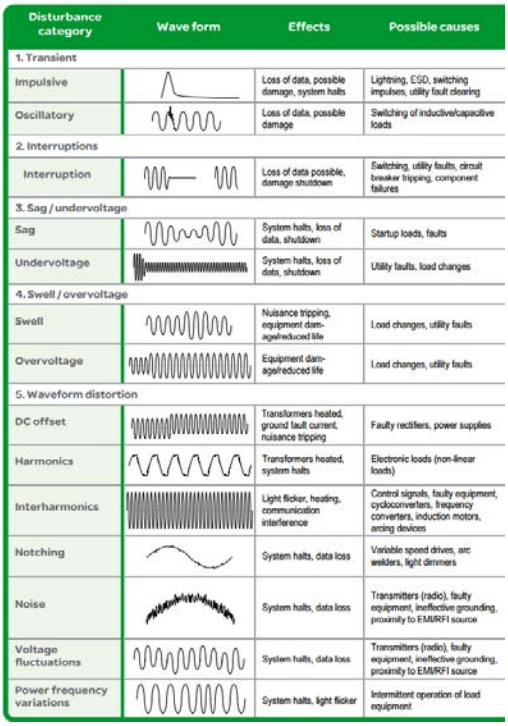
JACTP (Juganu AC total protection module)

The module is a Multi-functional AC system protection unit which is designed for protecting electrical power devices, including light devices from many well-known problems that may harm the devices and/or shorten their lifetime.



Disturbance category	Wave form	Effects	Possible causes
1. Transient			
Impulsive		Loss of data, possible damage, system halts	Lightning, ESD, switching impulses, utility fault clearing
Oscillatory		Loss of data, possible damage	Switching of inductive/capacitive loads
2. Interruptions			
Interruption		Loss of data possible, damage shutdown	Switching, utility faults, circuit breaker tripping, component failures
3. Sag / undervoltage			
Sag		System halts, loss of data, shutdown	Startup loads, faults
Undervoltage		System halts, loss of data, shutdown	Utility faults, load changes
4. Swell / overvoltage			
Swell		Nuisance tripping, equipment dam-age/reduced life	Load changes, utility faults
Overvoltage		Equipment dam-age/reduced life	Load changes, utility faults
5. Waveform distortion			
DC offset		Transformers heated, ground fault current, nuisance tripping	Faulty rectifiers, power supplies
Harmonics		Transformers heated, system halts	Electronic loads (non-linear loads)
Interharmonics		Light flicker, heating, communication interference	Control signals, faulty equipment, cycloconverters, frequency converters, induction motors, arcing devices
Notching		System halts, data loss	Variable speed drives, arc welders, light dimmers
Noise		System halts, data loss	Transmitters (radio), faulty equipment, ineffective grounding, proximity to EMI/RFI source
Voltage fluctuations		System halts, data loss	Transmitters (radio), faulty equipment, ineffective grounding, proximity to EMI/RFI source
Power frequency variations		System halts, light flicker	Intermittent operation of load equipment

The module consists of a combination of passive and active protection elements, analog and digital circuits that are integrated to provide state-of-the-art protection for the connected lighting fixtures.

<u>The module protects the light from the following failure anomalies:</u>

- Voltage drops, surges and transients
- Fast and slow Voltage fluctuations
- Lightning strikes
- Overvoltage, undervoltage
- Disconnection of Neutral
- AC voltage can go up to 440VAC
- Frequency variation
- Voltage imbalance
- Inrush current

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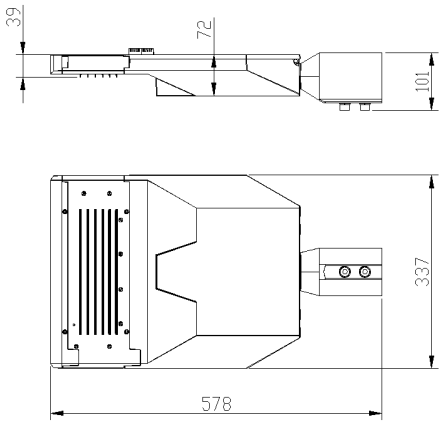
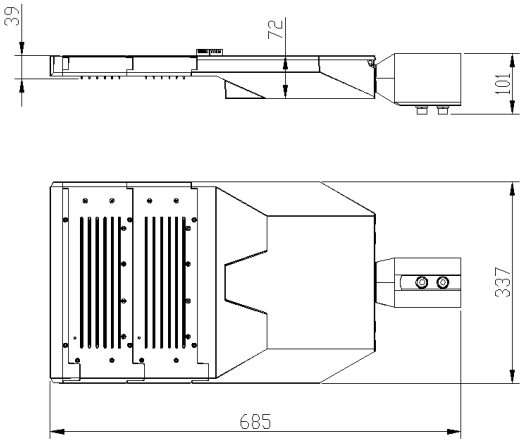
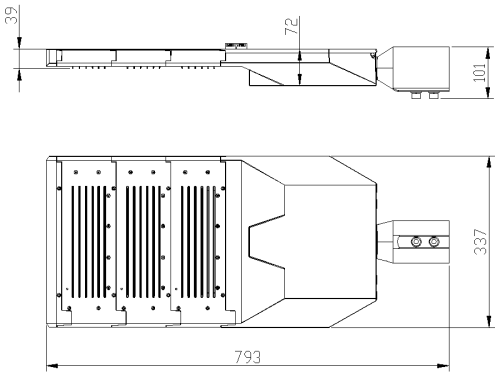
Mechanical Dimensions



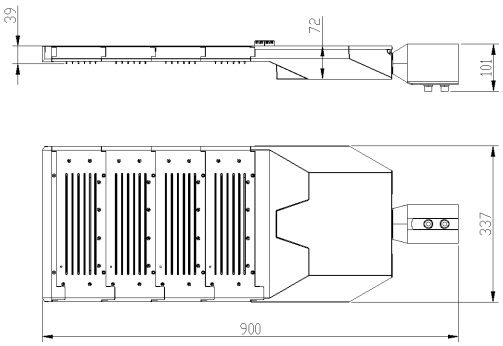
Single LED module



Dual LED Module



Triple LED module



Quad Dual LED Module

Packing and Weight

Power	No. of LED modules	Pack size	Net Weight	Gross weight
Up to 65W	1	660 x 420 x 200 mm	6.9kg	8.2kg
70W to 120W	2	770 x 420 x 200 mm	8.5kg	10kg
125W to 180W	3	880 x 420 x 200 mm	10.5kg	12kg
185W to 240W	4	990 x 420 x 200 mm	12.3kg	14kg