

# SmartNodes<sup>®</sup>

Smart management solution  
for light points



Use your street lighting infrastructure to create smart roads

# LACROIX illuminates the smart city

ADAPT THE SMART  
LIGHTING SOLUTION  
TO MEET NEEDS

Connected  
management  
of light points  
with SmartNodes 1

Connected  
management  
of the cabinet with  
the TEGIS control unit 2

LACROIX offers a unique smart lighting solution to manage all the services supplied by the street lighting network from cabinets to light points, at all times of the day and night. The SmartNodes solution answers the needs of cities and territories by providing smart management of light points.



## Ensuring the attractiveness of cities while reducing the environmental impact of lighting

- **Ensuring safety in mobility, both soft and active**, as lighting is adapted to the presence and speed of users.
- **Ensuring the attractiveness of cities and territories** by planning dimming scenarios to suit the different areas and events of the city.
- **Reducing the environmental impact** by only providing lighting when necessary.



## Controlling investment and operating budgets

- **Reducing energy expenditure** with dynamic lighting and dimming scenarios based on detection (motion and speed).
- Capitalizing on the **investments that have already been made** in the installation of luminaires equipped with NEMA or Zhaga sockets.
- Optimizing installation costs thanks to automatic configuration of **SLC connected nodes**.
- Overcoming the constraints of the electricity network **through radio communication**.



## Preparing the smart city

- **Ensuring the interoperability of systems within the light point**, based on the current standards in force (DALI2/D4i).
- **Enabling the creation of a local communication network**, using the nodes that are installed for other sensors in the smart city.

# SmartNodes: a smart management solution for light points

## 1 Control and management of light point groups



- Automatic geolocation of light points, using the nodes' on-board GPS.
- Management of light points by group, as defined by the user on the remote management interface.
- On-board smart functions within the nodes, allowing the configuration recorded locally to be maintained in the event of a communication fault.



### CONTROL

#### Synchronized astronomical clock

- On-board each connected node.
- Configurable offset.

#### Clock at fixed hours

- **Override**
- Real-time control.

### MANAGEMENT

#### Creation of dimming scenarios

- Up to 6 transitions.
- Unlimited number of scenarios.

#### Creation of light point groups

#### Dimming schedule

- Configurable calendars.
- Scenarios applied to a group of light points.
- Several possible scenarios per group of light points.



More than **20,000 light points** equipped with the SmartNodes solution since 2018

Solutions already live in 10 European countries: Belgium, France, Netherlands, Germany, Switzerland, Romania, Finland, Denmark, Iceland, Norway.

## 2 Monitoring of the light point

### Malfunctions

Identification of malfunctions in the light point (related to the driver and LED panel) and the SmartNodes equipment (communication between nodes, and with the APS).

### Text & email notifications

If any faults are observed, text and email alerts can be configured and sent automatically.

## 3 Reporting and analysis of the consumption

### Reading D4i driver information

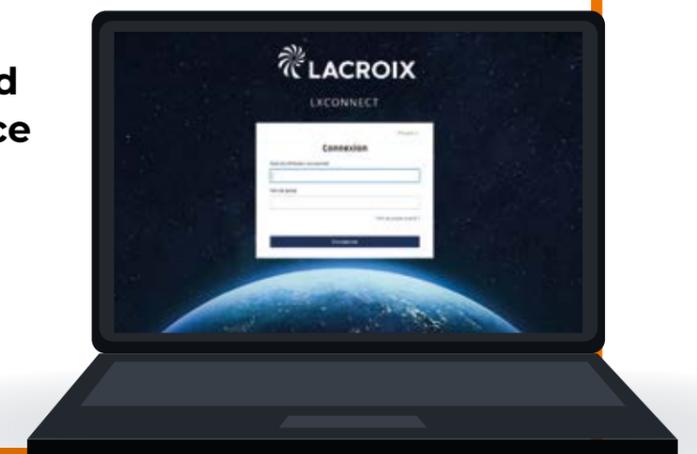
- Active energy (kWh)
- Active power (W)
- Etc.

### Active power measurement

Optional with SLC NEMA connected nodes.

### Accessible and configurable through the dedicated LACROIX web interface

- User-friendly
- Easy to use
- Accessible 24/7
- Secure
- TALQv2 certified



# SmartNodes: a solution that combines remote management and dynamic lighting locally

## ADJUSTMENT OF LIGHTING WHEN PEDESTRIANS ARE DETECTED

SLC NEMA  
CONNECTED NODE  
20% LIGHTING

SLC NEMA  
CONNECTED NODE  
100% LIGHTING

CONNECTED  
NODE WITH SLS  
DETECTION  
100% LIGHTING

## ADJUSTMENT OF LIGHTING BASED ON VEHICLE SPEED

CONNECTED  
NODE WITH SLS  
DETECTION  
100% LIGHTING

SLC ZHAGA  
CONNECTED NODE  
100% LIGHTING

SLC ZHAGA  
CONNECTED NODE  
100% LIGHTING

SLC ZHAGA  
CONNECTED NODE  
50% LIGHTING

Thanks to its sensors (PIR and radar doppler) and embedded intelligence, the SLS adjusts the light level in real time, based on the presence and speed of pedestrians, cyclists and vehicles. That way, the lighting adapts to suit the needs of users, depending on the situation and their location.

**SmartNodes makes it possible to form a scalable communication network** that can be deployed on a large scale



**A mesh communication network that adapts to the surrounding environment, for greater reliability on a large scale:**

**Self-forming:** the network is automatically created by itself by considering the spatial configuration of the nodes. Each node creates a communication route with multiple adjacent nodes, facilitating redundancy and reliability of information, while providing a solution that can be easily deployed at scale.

**Self-healing:** if a connected node is no longer accessible by the network, the network generates new communication routes with adjacent nodes to ensure optimal communication.

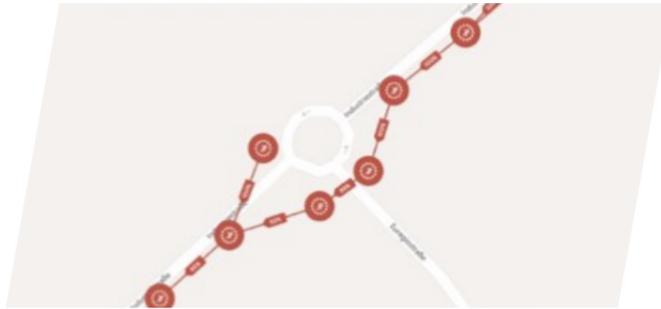
**Automatic selection of the gateway (APS)** to facilitate equipment configuration and commissioning.

**Self-adaptable:** thanks to the 40 communication channels available, each node is able to choose the communications channel that is best suited to its local environment, thus avoiding any local disturbances that may be present and offering a high degree of reliability for the deployed network.



 Wirepas local mesh network 
  
 Secure cellular or Ethernet communication

The gateway regularly sends queries to all the connected nodes, in order to ensure the completeness of the mesh network, regardless of the number of units installed.



### A secure, decentralized, local mesh network

- 2.4 GHz frequency;
- 128-bit AES encryption + OMAC1 authentication;
- 1 single point of connection to the cloud from which to access the web interface;
- Up to 150 nodes supported by the gateway;
- A cost of communication per light point with no recurrence.

### A scalable network

- Remote firmware update (Over the Air Programming - OTAP) for new features or new uses;
- The network quickly and easily integrates any new connected node once it is switched on and connected, for rapid and large-scale deployment.

## The SmartNodes solution

### SLC: standardized connected node

SLC NEMA and Zhaga are standardized nodes, and are compatible with any luminaire which is equipped with the corresponding socket. They control, monitor and provide information on the energy consumption of the luminaire. They communicate with the other nodes and with the APS via the Wirepas mesh RF communication network.

### SLS: connected node with detection

The SLS (Smart Lighting System) is a connected node enabling dynamic lighting using two sensors: motion (PIR) and speed (radar). It consists of an SLN (Smart Lighting Node) and an SLP (Smart Lighting Power Unit). It also communicates with the other nodes and with the APS via the Wirepas mesh RF communications network.

### APS: gateway

The APS ("Access Point System", also called "Gateway") connects the SLC and SLS nodes to the Internet, and to the LACROIX remote management web interface.

Depending on the version, the APS communicates via cellular network (3G or 4G) or Ethernet in order to transmit and receive information remotely. Locally, the gateway uses the Wirepas mesh RF communication network to connect and communicate with the nodes.

### LACROIX web interface: central management system

The web interface enables users to configure, control, monitor and analyze the consumption of their street lighting infrastructure.

It provides a user interface that is ergonomic, secure, and adapted to suit street lighting management needs.

# Technical details

	Connected node - SLC		Connected node with detection - SLS		Gateway - APS		
	SLC NEMA	SLC Zhaga	SLN	SLP	External - GSM	In cabinet - GSM	In cabinet - Ethernet
							
<b>Mechanical characteristics</b>							
Casing	PBT (base) and PC (dome)	PBT (base) and PC (dome)	Luran ASA	ABS - Flame retardant V0	PC		
IP (EN 60529)	IP66	IP66	IP67	-	IP67		
IK (EN 62262)	IK09	IK09	IK08	-	IK08		
Connection type	NEMA 7-pin connector	Zhaga	Molex Micro -Fit 3.0 connector		Power supply cable: 2×1.5	Power supply cable: 2×1.5 2 coaxial cable outputs for antenna	Power supply cable + Ethernet output: 2×1.5
Type of assembly	On NEMA pre-equipped luminaire	On Zhaga pre-equipped luminaire	On mast with screws and/or a clamp	On DIN rail in a box	On post, with screws or fasteners	In cabinet, on DIN rail	In cabinet, on DIN rail
Weight	600 g	75 g	810 g	105 g	~ 550 g		
<b>Electrical characteristics</b>							
Power supply voltage	110 V - 240 V <sub>AC</sub> / 50-60 Hz	12 V - 24 V <sub>DC</sub>	-	110 V - 240 V <sub>AC</sub> / 50 - 60 Hz	110 V - 240 V <sub>AC</sub> / 50 - 60 Hz		
Maximum relay load	1.2 kVA @ 240V	-	-	240W @ 60°C	-		
Max relay current	5 A	-	-	5 A	-		
Rated current	-	25 - 80 mA	-	-	-		
Power consumption	0.8 W	0.6 W	< 3 W	< 0.7 W	3.7 W on average, 5 W when sending data		
Electrical class	Class II, double galvanic isolation		-	Class II	Class II		
<b>Radio link and communication</b>							
Mesh radio link network	Wirepas				Wirepas		
Frequency	2.4 GHz				2.4 GHz		
Rated power	8 dBm				8 dBm		
RX sensitivity	-94 dBm				-94 dBm		
Modulation	GFSK				GFSK		
Inter-node range	175 m maximum, with an empty field				175 m maximum, with an empty field		
Flow	1 Mbit/s				1 Mbit/s		
Network security	128-bit AES encryption + OMAC1 authentication				128-bit AES encryption + OMAC1 authentication		
Modem	-	-	-	-	Compatible with 2G, 3G, 4G		
<b>Sensors and other components</b>							
Power measurement (optional)	Active power	-	-	Active power	-		
Geolocation	GPS	GPS	GPS	-	GPS		
Motion	-	-	PIR (Passive InfraRed)	-	-		
Speed	-	-	Doppler radar	-	-		
<b>Ambient conditions</b>							
Ambient temperature	-30°C + 70°C	-30°C + 70°C	-30°C to + 60°C	-30°C to + 60°C	-30°C to + 52°C		
Humidity	0% - 100% RH	0% - 100% RH	0% - 100% RH	0% - 100% RH	0% - 100% RH		
Storage temperature	-30°C + 70°C	-40°C + 80°C	-40°C + 80°C	-40°C + 80°C	-30°C + 70°C		
<b>Certification and Standards</b>							
Certifications	CE	CE	CE	CE	CE		
Product standards	EN55015; EN55032; EN61000-3-2				EN55015; EN55022; EN55032; EN 61000-3-2/3		
	EN61000-4-2/3/4/6/5/11; EN3014889-1V2.1.1; EN301489-17 V3.1.1				EN61000-4-2/3/4/6/5/11		
	EN300328 V2.11; EN300330 V2.11				EN300328 V2.11; EN300330 V2.11		
	IEC 62368-1				IEC 62368-1		
	IEC 62386		-	IEC 62386	IEC 62386		
<b>Dimensions in mm</b>							
Height	98	38.5	63	-	65		
Diameter	84	80	102	-	-		
Length	-	-	-	-	178		
Width	-	-	-	-	-	-	161



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