



IIoT Solutions

# Software Platform for Outdoor Lighting Management



# About the Company



ámbiot company was founded in 2019 in cooperation with **Lighting Technologies**, lighting market leader company in Russia. We have established great work relationships with strong & reliable partners who are the best in their area such as **ER-Telecom Holding**, major russian IoT services and network telecom provider, and **Microchip Technology Inc.**, world leading company in the microelectronic components field.

**We Make IIoT Simple and Useful**

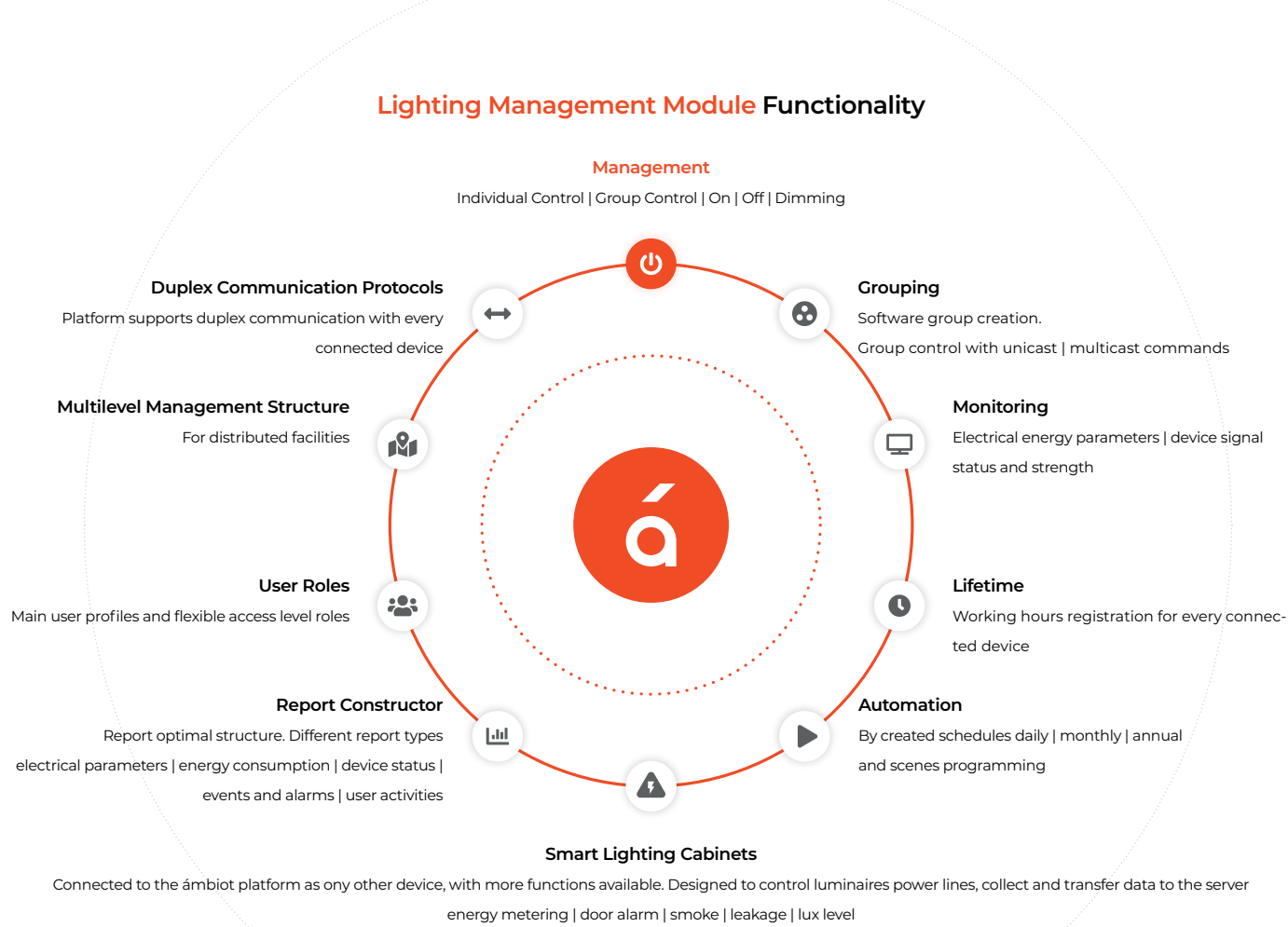
ámbiot company produces software and hardware solutions for IIoT lighting applications.

**Smart cities | Smart factory or other industrial facility | Smart office.**

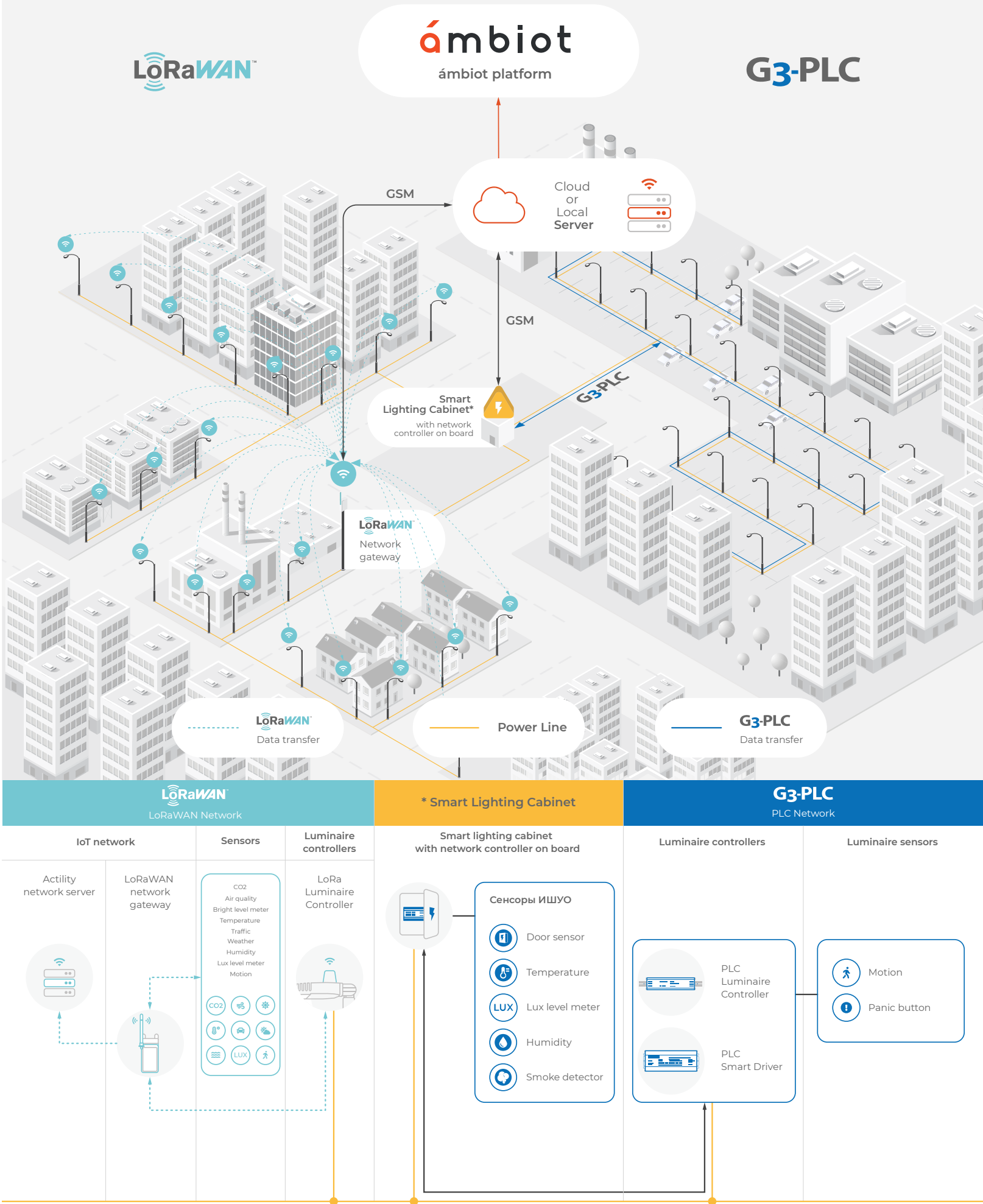
Our main goal is to make IIoT simple and useful. ámbiot team believes in hybrid system ideology and uses it in software & hardware products design. We expect this concept to be a cornerstone for IoT technologies in future, so we create our software according to this trend to be fully prepared for integration.

**Hybrid Multifunctional Lighting Management Platform**

At the moment we have developed a hybrid multifunctional IIoT platform for connected lighting management. It is possible to connect to this platform both ámbiot hardware solutions and 3rd party devices. Our software platform provides monitoring and control functions, supports **LoRaWAN | NB-IoT | BLE** technologies for wireless communication, **G3 PLC | DALI | DMXRDM** technologies for wired | bus communication.

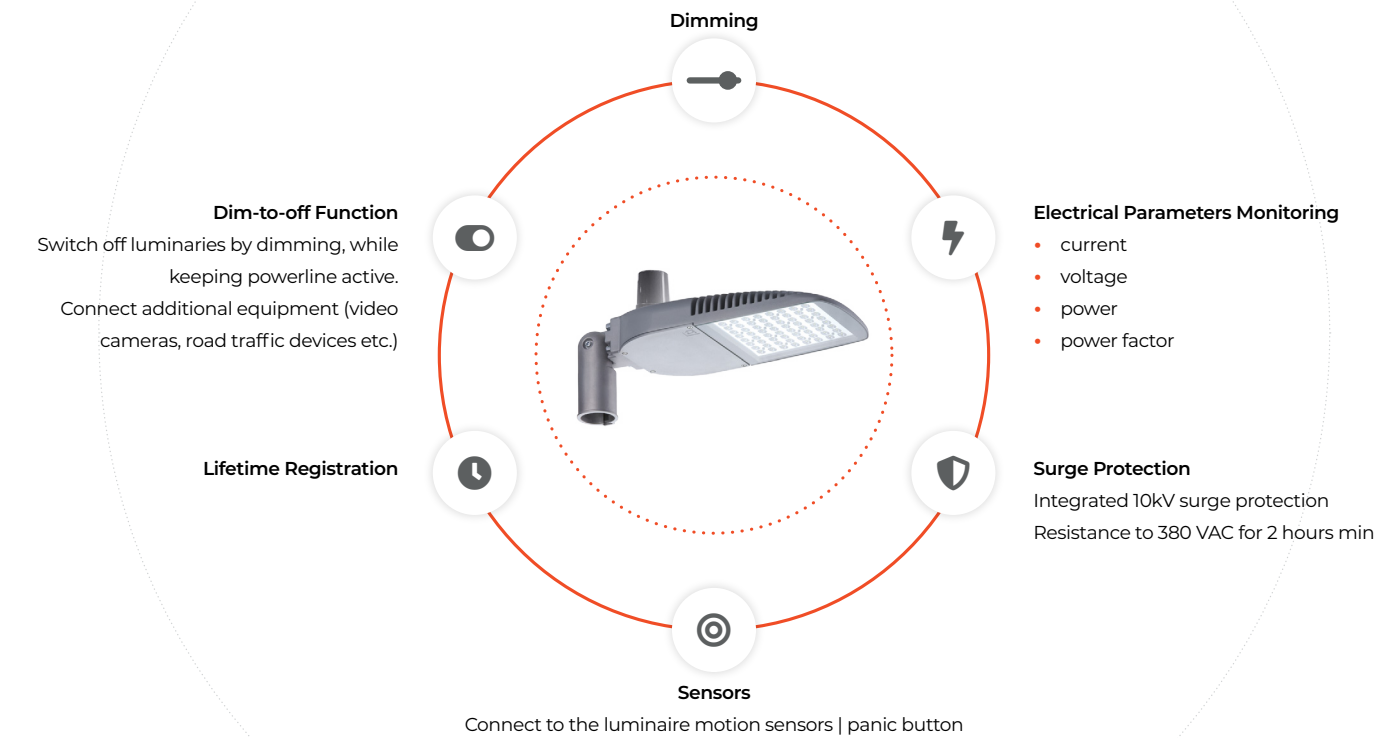


**75% energy savings** due to flexible programming and control



# Technical specification

## Outdoor Connected Luminaire General Functionality



### LoRaWAN™ | NB-IoT™ Luminaire Controller



Connect luminaires and other devices to the ámbiot IIoT platform by wireless LoRaWAN™ | NB-IoT™ network



#### GPS | Gyroscope | Accelerometer

Control lighting pole angle | car incidents | exact location with additional options for devices

### Luminaire Controller General functionality

#### 0-10V

##### Control Interface 0-10 V

Control external devices (drivers and other devices) with 0-10V protocol



#### Electrical Energy Parameters Monitoring

Integrated energy meter provides electrical parameters for each luminaire



### G3 PLC Luminaire Controller



Connect luminaires and other devices to the ámbiot IIoT platform by powerline G3 PLC protocol



#### Supports

IPv6, UDP, CoAP, LWM2M, IPSO



#### Group Dimming

Control individual luminaire | group. Unicast | multicast support.

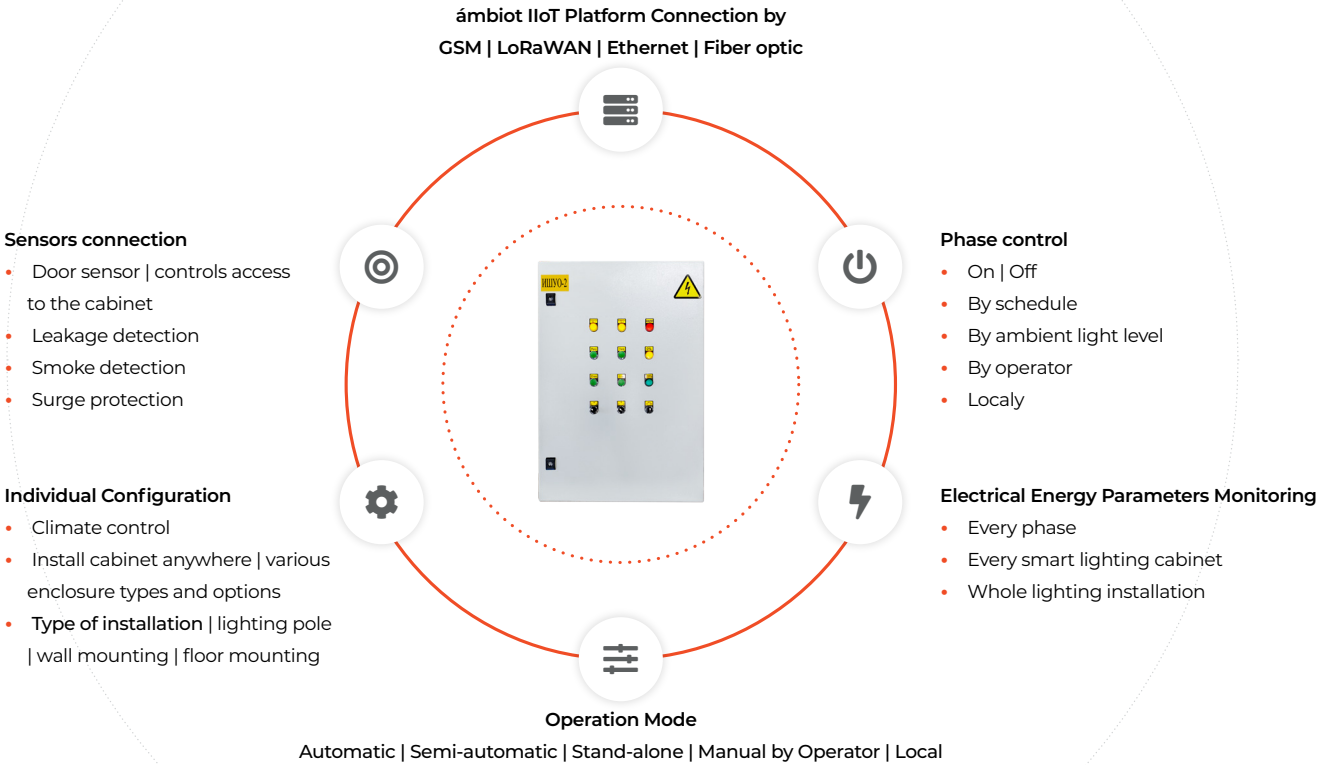


#### Automatic Control

Manage your system by schedules | patterns

# Technical specification

## Smart Lighting Cabinet Functionality



## Smart Lighting Cabinet Technical Specification

Final technical specification of smart lighting cabinet could be defined after completing questionnaire



### Network Controller

Create and manage luminaire controllers network | connected sensors



### Surge Protection Devices SPD

Protect smart lighting cabinet from overvoltage



### Inrush Current Limiters

Protect smart lighting cabinet from inrush currents



### Electrical Energy Quality Analyzer

Analyze | backlog | download report file with detailed energy parameters



### Energy Meter

Measure | backlog | download and send report file with verified energy parameters



### Smart Lighting Cabinet Sensors

Door sensor | Smoke detector | Leakage detection | Temperature sensor



### Smart Lighting Sensor

Lux level monitoring | data transfer to ámbiot platform | phase control if network controller was damaged



## Network Controller General Functionality



### Control Load by Relays

Automatically by schedule | manually by operator | locally



### Energy Parameters Monitoring

Collect data from connected verified energy meter | energy quality analyzer



### Control Luminaires Individually

Connect 300 luminaire controllers



### Extend Ports with Extension Module

Connect | control | observe additional powerlines



### Connect sensors | other devices to binary inputs

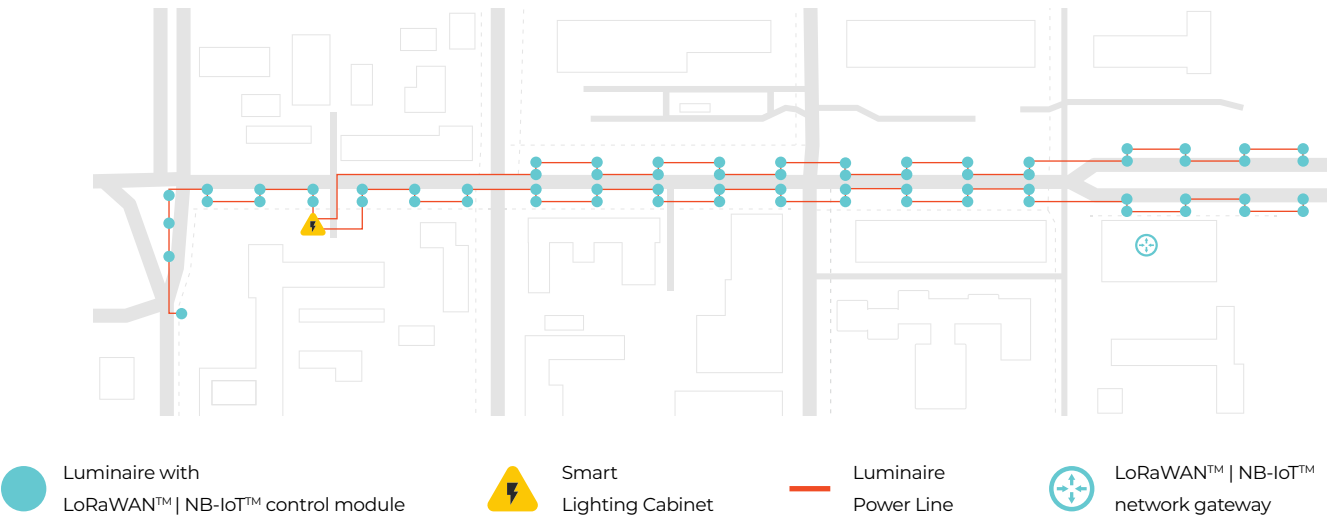


Protect server connection with extra communication channel

# Standard Applications

About 19% of world energy consumption is used for artificial lighting, while general costs goes to the public lighting sector | streets| roads | squares| high-ways etc. Use ámbiot platform to reduce energy costs for such facilities, providing complex smart lighting solution with control and monitoring options.

## Outdoor connected lighting | | LoRaWAN™ and | or NB-IoT™



### Solution technical specification

ámbiot outdoor connected lighting management system designed as hardware and software system, that includes:

- software ámbiot platform;
- network controller(s) | installation into smart lighting cabinets;
- LoRaWAN™ | NB IoT™ luminaire controllers

### Software functionality

ámbiot platform is a cloud based software with following functionality:

- phase switching;
- connected devices individual | group control;
- map viewing;
- alarms and events;
- collected data log | events log | reports | file downloads;
- different user roles and access levels.

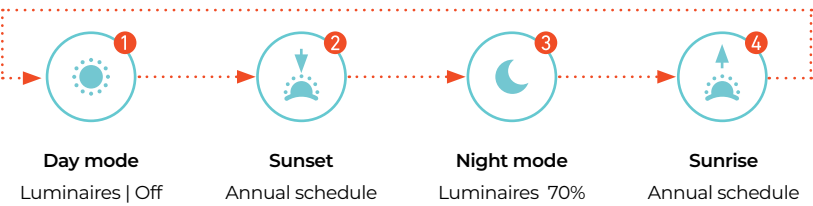
### Connected luminaires with LoRaWAN™ | NB IoT™ modifications

**Luminaire With Pre-installed LoRaWAN™ | NB IoT™ Controller**

Plug&play solution.

Luminaire automatically connects to the ámbiot platform | downloads location | sends electrical energy measurements after installation.

**LoRaWAN™ Controller with socket ANSI C136.41-2013 NEMA 7 pin**



### Solution Efficiency

Energy saving up to 60% | schedule control | group control | dimming | monitoring.

LoRaWAN technology allows to connect to the platform extra devices and following sensors:

pollution | temperature | humidity | pressure | lux level | sound | motion | vibration and others.

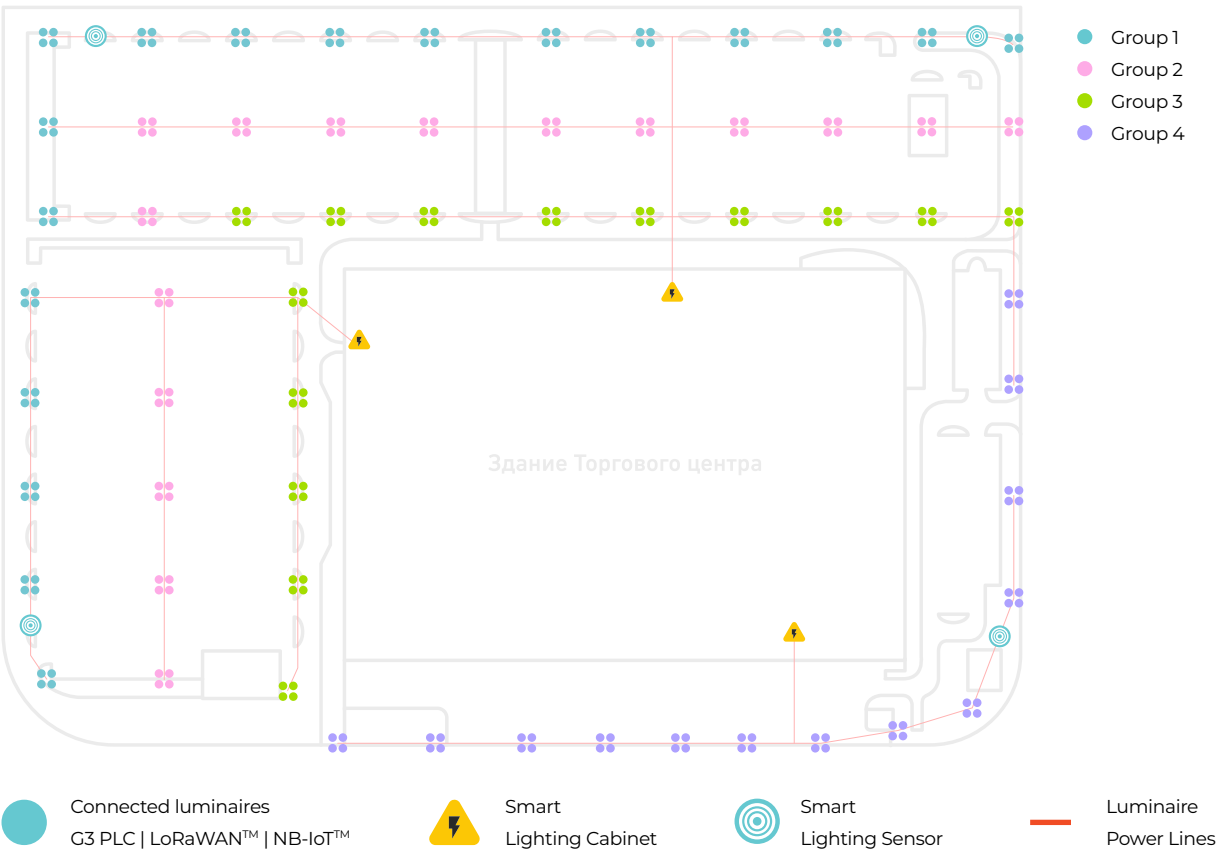
This option allows to go beyond the functionality of lighting control.

# Standard Applications

## Outdoor Car Parking

The ámbiot platform is perfectly suited for street parking lots and other venues. By dividing the luminaires into groups and using various dimming profiles, it is possible to configure the lighting system with sufficient flexibility to achieve maximum economic effect. Lighting management platform helps not only to attract customers closer to the entrances of the shopping center that affects the safety and comfort for customers, but also significantly reduces energy consumption and increases the economic efficiency of the whole lighting installation.

## Street parking G3 PLC mesh | LoRaWAN™ | NB-IoT™



### Solution technical specification

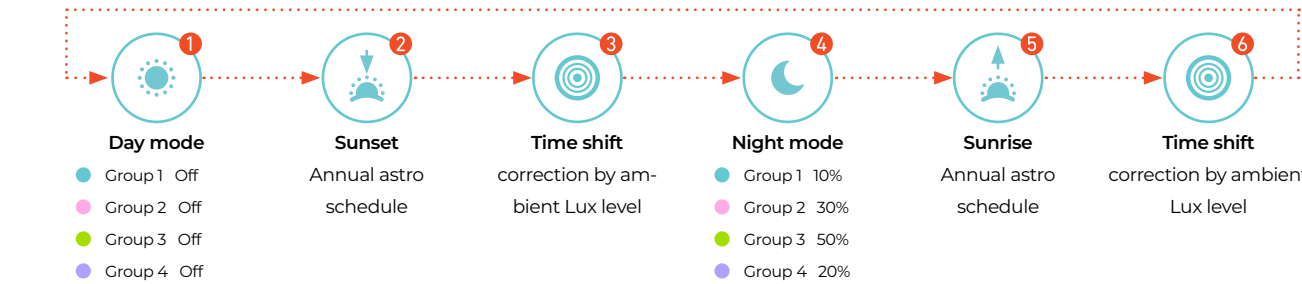
ámbiot platform is a cloud based software with following functionality:

- ámbiot software platform;
- network controller(s) | installation into smart lighting cabinets | create G3 PLC network with luminaire controllers;
- connected luminaires with G3 PLC | LoRaWAN | NB IoT technology which provide control | monitoring;
- smart lighting sensor that provides ambient Lux level | CCT | temperature

### Solution Efficiency

Energy saving up to 65% | flexible programming of lighting management system | create schedules | alarms and events notifications | control | monitoring etc.

All these features allow increase quality of services | reduce cost maintenance | deliver real value for shopping mall facility.



Connect Outdoor Lighting to ámbiot Platform with G3 PLC Technology

G3 PLC luminaire controller LC-1

Connect lighting fixture | another device to software platform ambiot with G3 PLC | Network controller NC-1. Install controller LC-1 inside luminaire | lighting pole. Use powerline for data transfer, no need in additional signal wires or bus. Controller provides dimming 0-10 V | electrical energy parameters | lifetime.



PLC Luminaire  
Controller LC-1

Model   Modifications	LCPY-02(b)4-1E	LCPM-02(b)4-1E
Frequency range	Cenelec B Band: 95 kHz to 125 kHz	FCC 155 kHz to 487 kHz
Driver control protocol	0-10 V	
Power consumption average, W	2 W	
Current max, mA	250 mA	
Operating temperature range, °C	-40...+75 °C	
Ingress protection, IP	IP66	
Communication technology	G3-PLC   CENELEC   EN 50065-1	
Network parameters	Powerline 230   400VAC   freq 50Hz	
Binary inputs, pcs	2 pcs	
Body type	alluminium   waterproof	
Average lifetime, hours	10 years	
Dimensions L x H x W, mm	135 x 29 x29 mm	
Weight, g	170 g	

Network controller NC-1

Connect smart lighting cabinets | another complex technical solution to software ambiot with GSM | Ethernet | Fiber optics | LoRaWAN™ | NB-IoT™. Create network with luminaire controllers by G3 PLC technology.



Main Controller NC-1

Power supply voltage, V DC	24V +/-10%
Power consumption max, W	15
Voltage OUT, V DC	24V +/-10%
Current max OUT, A	100 mA
Operating temperature range, °C	-40...+55 °C
Ingress protection, IP	IP20
Binary inputs, pcs	6 pcs
Analog inputs, pcs	2 pcs
Relay, pcs	4 pcs
Network interfaces   wired	RS485   G3 PLC   Ethernet   LoRaWAN   GSM
Body type	Modular for DIN-rail   TH-35mm
Dimensions, L x H x W mm	157,5 x 90 x 60 mm
Average lifetime, year	10
Weight, g	500 g

Model | Modification | Order code

Modification		Description
NC-123-1R	Network controller NC-1 GSM	Binary inputs 6 pcs (SW1..SW6) Relays 4 pcs (REL1..REL4) GSM interface (ext SMA antenna)
NC-113-1R	Network controller NC-1 Ethernet	Binary inputs 6 pcs (SW1..SW6) Relays 4 pcs (REL1..REL4) Ethernet interface
NC-153-1R	Network controller NC-1 Ethernet   GSM	Binary inputs 6 pcs (SW1..SW6) Relays 4 pcs (REL1..REL4) GSM interface (ext SMA antenna) Ethernet inteface
NCL-143-1R	LoRa Network controller NC-1	Binary inputs 6 pcs (SW1..SW6) Relays 4 pcs (REL1..REL4) LoRaWAN interface (ext SMA antenna)
NCPM-123-1R	PLC Network controller NC-1 GSM	Binary inputs 6 pcs (SW1..SW6) Relays 4 pcs (REL1..REL4) GSM interface (ext SMA antenna) G3 PLC interface
NCPM-113-1R	PLC Network controller NC-1 Ethernet	Binary inputs 6 pcs (SW1..SW6) Relays 4 pcs (REL1..REL4) Ethernet interface G3 PLC interface
NCPM-153-1R	PLC Network controller NC-1 Ethernet   GSM	Binary inputs 6 pcs (SW1..SW6) Relays 4 pcs (REL1..REL4) GSM interface (ext SMA antenna) Ethernet interface G3 PLC interface

Connect Outdoor Lighting to ámbiot Platform with LoRaWAN™ | NB-IoT™ Technology

LoRaWAN™ | NB-IoT™ luminaire controller LC-2

Connect lighting fixture | another device to software platform ambiot with LoRaWAN | NB IoT. Install controller LC-2 on top of luminaire with standard socket ANSI C136.41-2013 (NEMA-7PIN). Controller provides dimming 0-10 V | electrical energy parameters | lifetime.



LoRa Luminaire  
Controller LC-2

Power consumption average, W	2 W
Power consumption max, W	6 W
Power supply voltage, V (mod. 1, 2, 3, 4, 5, 6, 9, 11)	10.8-13.2 V DC
Power supply voltage, V (mod. 7, 8, 10)	90-264 V AC
Operating temperature range, °C	-40...+75 °C
Relative humidity, %	0...95 %
Ingress protection, IP	IP 66
Weight, g	300 g
Connector type	ANSI C136.41-2013 (NEMA 7 pin)
Driver control protocol	0-10 V   Dim-To-Off
Driver control protocol   alternative	UART
Network interfaces   wireless	LoRaWAN   864-868 MHz
Max coverage area	1.5 km
Data security   2 levels	128-bit AES
Surge protection	2 kV
Max switching load, A	4 A
Binary inputs, pcs	1 pcs
Dimensions L x H x W, mm	84 x 108 x 84 mm

LoRaWAN controller functionality

Functionality	LoRaWAN™ luminaire controller v 2.0 modifications										
	01	02	03	04	05	06	07	08	09	10	11
Power supply											
- Current   constant DC	DC 12V	DC 12V	DC 12V	DC 12V	DC 12V	DC 12V	AC 220V	AC 220V	DC 12V	AC 220V	DC 12V
- Current   alternating AC											
- Power supply voltage											
Luminaire control on   off   dimming	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Luminaire control by schedule	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Reports	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Electrical energy parameters metering	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GPS module	✗	✗	✓	✓	✓	✓	✗	✓	✓	✓	✗
Lux sensor	✗	✗	✗	✗	✓	✓	✗	✓	✗	✓	✓
Cyroscope   accelerometer	✗	✗	✗	✓	✓	✗	✗	✗	✗	✓	✗
Bluetooth module	✗	✗	✗	✗	✓	✓	✗	✓	✓	✓	✗
Driver control protocol   0-10 V	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Driver control protocol   UART	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Binary inputs   dry contacts	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Modification | Order code

Order code	Modification
01	LCL-01(b)4-2
02	LCL-01(b)4-2-E
03	LCL-01(b)4-2-EN
04	LCL-01(b)4-2-ENGA
05	LCL-01(b)4-2-ENPGAB
06	LCL-01(b)4-2-ENPB
07	LCL-01(b)1-2-E
08	LCL-01(b)1-2-ENPB
09	LCL-01(b)4-2-ENB
10	LCL-01(b)1-2-ENPGAB
11	LCL-01(b)4-2-EP



Connect Outdoor Lighting to ámbiot Platform

Smart lighting sensor LS

Smart lighting sensor measures ambient light level | temperature | CCT. Connect to network controller by MODBUS RTU.



Light Sensor LS

Model   Modifications	LSR-6l(r)1-1	LSR-6l(r)1-1-PC	LSPM-6l(r)1-1-PC
Communication protocol	RS-485, Modbus	RS-485, Modbus	PLC
CCT measurement	-	2500-6500K	2500-6500K
Power consumption average, W	0.7 W		
Power consumption max, W	1.3 W		
Sensitivity range, Lux	0.100 Lux		
Power supply voltage, V AC	90-264 V AC		
Operating temperature range, °C	-40...+75 °C		
Relative humidity, %	0...95 %		
Ingress protection, IP	IP66		
Connector type	ANSI C136.41-2013(NEMA 7 pin)		
Max switching load, A	6 A		
Dimensions, L x H x W mm	84 x 108 x 84 mm		
Weight max, g	300 g		

Inrush current limiters ILS

Inrush current limiters are designed for inductive and capacitive loads with different power consumption. Devices are used in phase | relays management systems to limit inrush current in internal powerlines and increase reliability | lifetime of cabinet's equipment



ILS

Model   Modifications	ILS-1-16-1	ILS-3-16-1	ILS-1-32-1	ILS-3-32-1
Body type	1-phase	3-phase	1-phase	3-phase
Working current, max, A	16A	16A	32A	32A
Working voltage, V AC	230 V AC ± 10%			
Frequency, Hz	50 Hz			
Ingress protection, IP	IP20			
Operating temperature range, °C	-40...+70 °C			
Dimensions, L x H x W mm	108 x 72 x 61 mm			
Installation	DIN-rail mounting			

Smart Lighting Cabinet

Smart lighting cabinet provides power to the luminaires.  
Designed for fast installation and deployment of a control system at the facility.

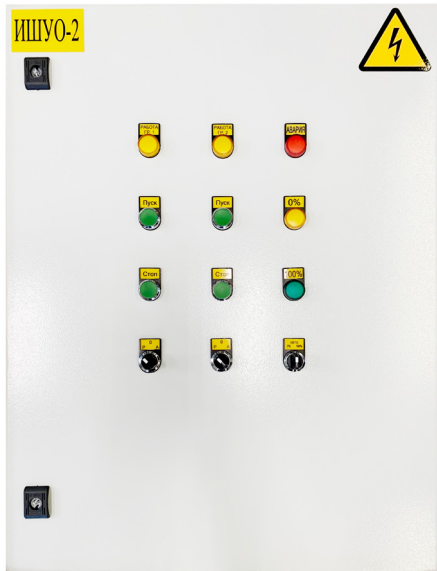
Smart lighting cabinet technical specification:

- network controller NC-1;
- smart lighting sensor;
- control mode switcher;
- electrical energy quality analyzer | optional;
- managed Ethernet | Fiber optics switch;
- circuit Protection devices;
- verified electricity meter;
- door sensor;
- smoke detector;
- leakage detection;
- current sensors

Smart lighting cabinet functionality:

- phase switching automatically by schedule | operator | locally;
- change operation mode with buttons on the front of lighting cabinet;
- server connection by GSM | LoRaWAN | Ethernet | Fiber optic

Final technical specification of smart lighting cabinet could be defined after completing questionnaire



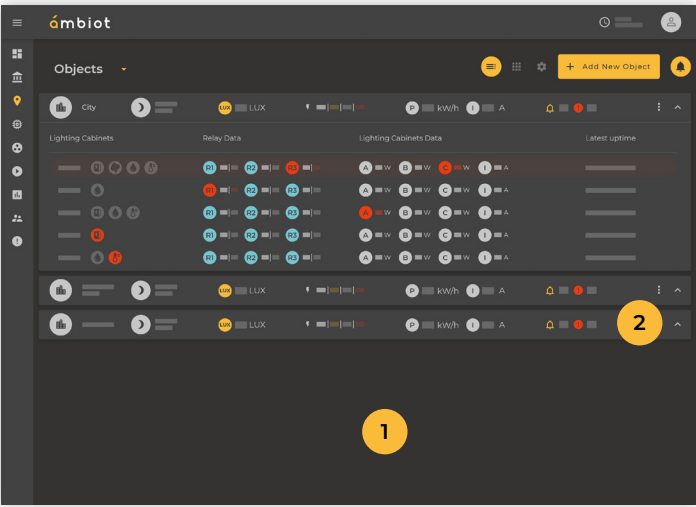
Digital model  
of smart city or smart building  
in your browser



# User interface

### Real-time lighting installation monitoring

Create one of the project type city | building | combined. Get quick access to created projects, observe main project data | notifications | events & alarms.



- Dashboard for the whole installation**
  - Observe status of network controller's ports and connected sensors
  - Control status of electrical components, installed into the lighting control cabinet
  - Server connection signal status and strength
  - Server communication type
  - Electrical energy parameters registration and monitoring
  - Power lines status
- Notifications**
  - Events | alarms | unexpected situation
  - Event log

### Customized dashboard for control and monitoring

Detail and analyze project data and information from connected devices. Customize dashboard using available widgets.

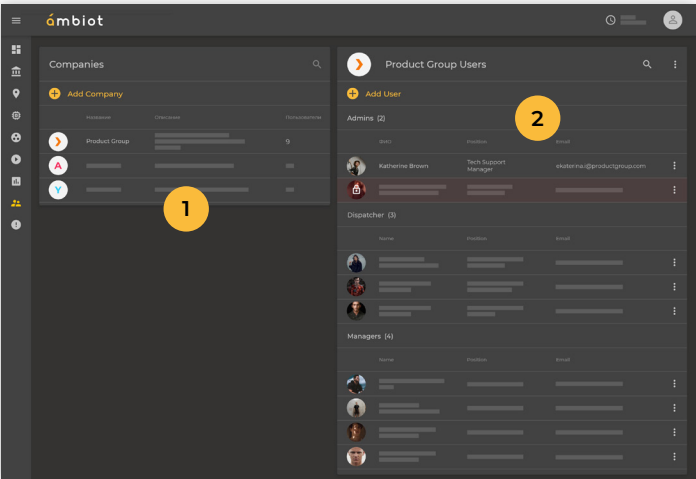


- Widgets for everyone**
  - Smart lighting cabinet widget
  - Operation mode widget
  - Weather forecast widget
  - System reports widget
  - Event log widget
  - Connected devices monitoring
  - Group control widget
- Energy analysis widget**

Use dashboard for real-time analysis of energy saving

### User roles

Use different user roles and profiles to organize access levels for employers. Add new users with defined roles to the existing list. Check user's activities in event log.



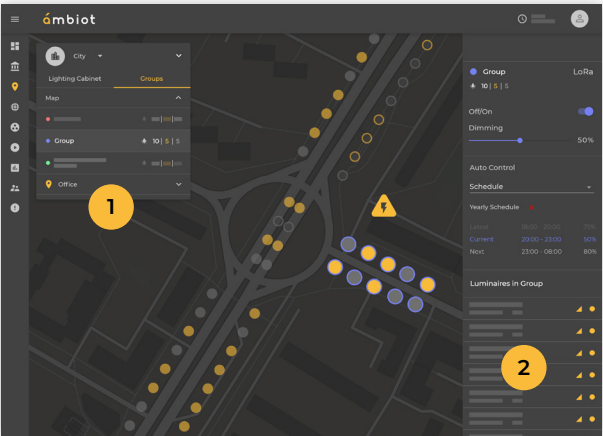
- Create your branch | head office**
  - Create new smart project according your business profile branch | head office
  - Add new smart project to existing branch | head office
  - Add new users with different roles and define their access level
- User list**
  - Create a user role with profile admin | operator | manager
  - Correct existing user role edit | delete | block

# User interface

### Control connected devices individually or in groups

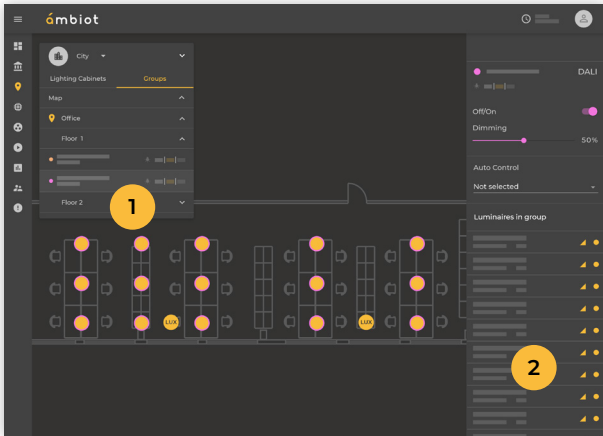
Create digital shadow of you project in ambiot software platform.

Use map | floor plan to observe status | parameters and control connected devices in real time



- Project Quick Navigation Panel**

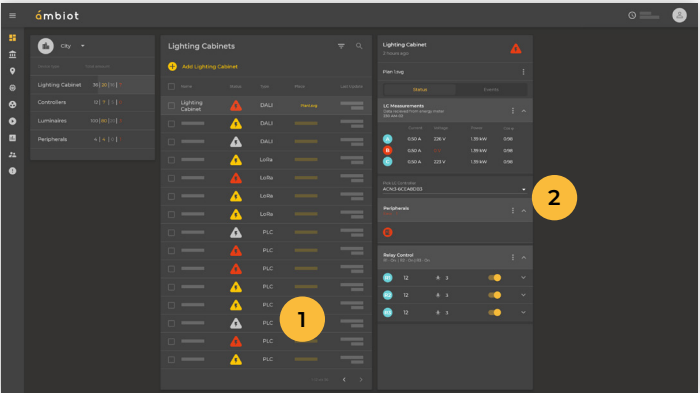
Use for fast navigation and quick access to connected devices and groups on map & plans. Switch the floors.



- Individual | group control**
  - On | Off
  - Dimming | 0-10V signal
  - Assign a schedule
  - Add sensor, create preset
  - Monitor luminaire controllers status

### Fast access to smart lighting cabinets

Use fast access to smart lighting cabinets to observe status of sensors and other equipment, control relays.



- Smart Lighting Cabinets List**

Express monitoring and visual diagnostic of the whole smart lighting cabinet installation
- Monitor & control Smart Lighting Cabinets with web-based software**
  - Relay control On | Off
  - Signal strength level
  - Server communication type
  - Observe parameters and quality of electrical energy
  - Monitor and control power lines of the luminaries
  - Create a schedule for each relay of the connected controllers
  - Observe status of each connected sensor

### Create and download your report

Create new reports using report constructor software module. Detail reports according to your request. Reports are available for single objects and groups.



- Report types**
  - Electrical parameters value, provided by smart lighting cabinets
  - Power consumption for the whole installation
  - Connected devices status online | offline
  - Control commands report on | off | dimming
  - Users activities report
- Chart visualization**
  - Choose time period
  - Choose report parameters
  - Create and download reports as pdf | csv | xml