PUBLIC LIGHTING CONTROL SYSTEM

-TECHNICAL DESCRIPTION -

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LIGHTING

CONTROL SYSTEM

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NIS 2015.

PUBLIC LIGHTING CONTROL SYSTEM

I - SYSTEM DESCRIPTION

The system solves the main problems in the management of public lighting, such as:
- Turn on / off of all light bulbs in the system in exactly defined time by astronomical calendar
- Turn on / off certain areas affected transformer at the request of city management
- Feedback of the situation on the field
- Reducing the cost of system maintenance

The system consists of the following components:
1- regional controller for public lighting (streetlight segment controller), which consists of
  - Measuring part - electricity meters
  - Public lighting switching unit and timer contactor
  - GPRS communication modem
2- center management of public lighting

1. Regional controler for public lighting (streetlight segment controller)

It is located in the power supply unite of the region (power substation or public lighting control station)
The controller is the link between the software central surveillance system of public lighting and lamps in that area. Therefore, we need to support standard communication layers (such as TCP / IP over GPRS interface) for sending data, receiving commands and configuration service controller of public lighting.
The controller should provide the following features and services in an integrated package:
- Historical data log that covers up to several weeks.
- Astronomical calendar to determine the time of dusk and dawn to geo position region controller public lighting.
- Planes time turning on / off and time reduction of brightness in accordance with the astronomical calendar
- Notification of alarm conditions to send messages about critical failures
- Remote control of lights in the area by central management software, through standardized interfaces such as Web Services / XML
- possible to extend the functional module for user customization of the controller specific customer requirements
- Standardized interfaces such as Web Services / XML for remote configuration region controller public lighting.

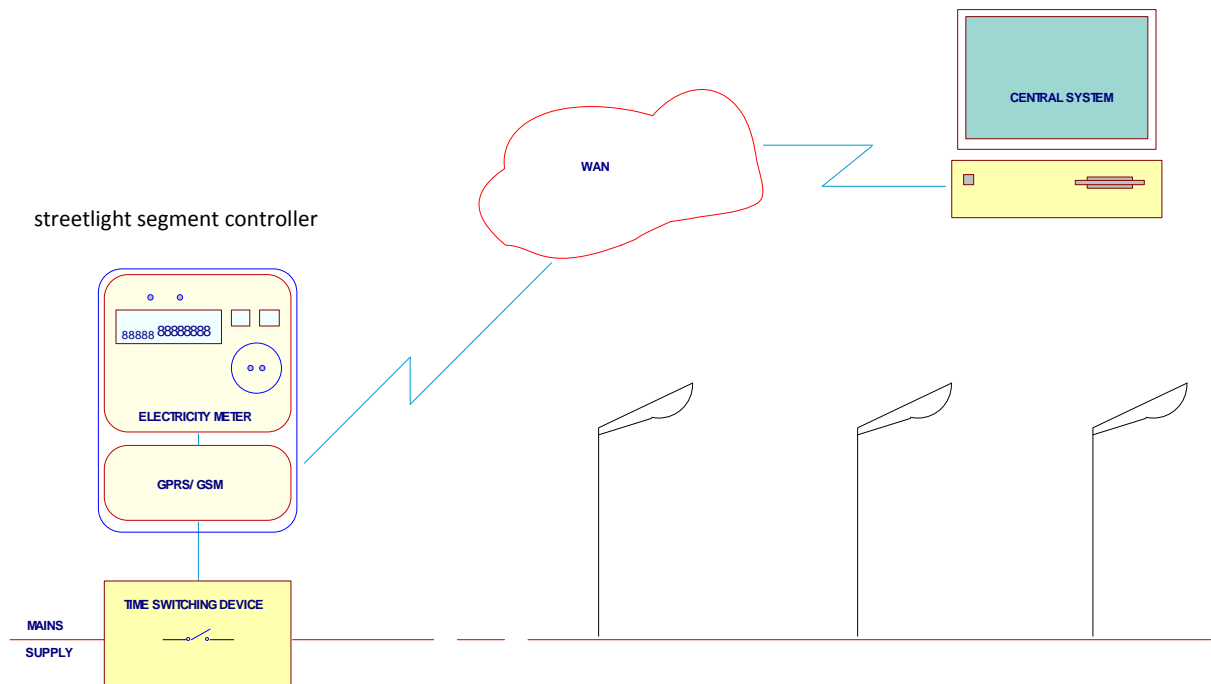1.1. Measuring part, electricity meters, provides the necessary data for basic system functions.
By collecting and analyzing these data center management can provide regular access to state of the system, to the level of determining the percentage of failure in bulbs by specific areas.
1.2. Switching unit for public lighting provides reliable autonomously turning on / off to light bulbs within the area affected by managing regardless of whether the communication link with the center management functions or not. It can be implemented as an independent device in a separate housing or can be integrated into the chassis GPRS modem.
1.3. Communication GPRS modem provides communication between system components providing measured data to the central system, as well as modification of certain parameters of the system.
Communication with the center management is initiated in several ways:
- Scheduled for automatic answer
- By an extraordinary request - alarm condition
- Upon request from the control center

streetlight segment controller

CENTRAL SYSTEM

WAN

ELECTRICITY METER

88888 88888888

GPRS/ GSM

TIME SWITCHING DEVICE

MAINS
SUPPLY

Functional diagram of the public lighting managing system

2. Control center

It consists of a central computer with application software and database

Application software for monitoring of public lighting is installed on the central computer in the service center. This software acts as a data aggregator (unifiying to) for several tens or hundreds regional controllers for public lighting. Provides:
- Installation tools for reducing the time and cost of configuring network
- Administrative tools to simplify the process of installing and configuring the controller of regional
  public lighting
- The methods for collecting data and calculating the degree of cancellation, energy consumption,
  busines indicators
- Intuitive user tools for maintenance personnel to quickly and easily identify faults, remote control of public lighting, providing other business indicators on service level

The software is a bridge between the public lighting and the existing town (or companies for public lighting) information systems and business processes. Information obtained from public lighting software can be used to manage accounts management and billing applications for electricity. The software is a hidden technical complexity of the monitoring of public lighting, lower demands for the necessary knowledge of end-users as well as reducing installation costs.

Software for monitoring public lighting, which provides intuitive reports for maintenance and operations through a secure Web access to end users, company owners can grant access to data and business information of interest to other users.

The basic functions of control center are:
- Administration functions
- The function of reading / collecting and archiving data
- Reporting function

2.1. Administration functions includes
- Administration system components
  Includes remote control / modification of parameters of electricity meters, switching unite of public
  lighting and / or communication modem, with the appropriate administrative rights.
- Administration of control center
  Provides access to control system components and control center, administration of reporting
  functions as periodically archive (back up)of important data

2.2. Functions of reading / collection and data archiving
This function is responsible for the efficient and reliable way of automatically collects information from
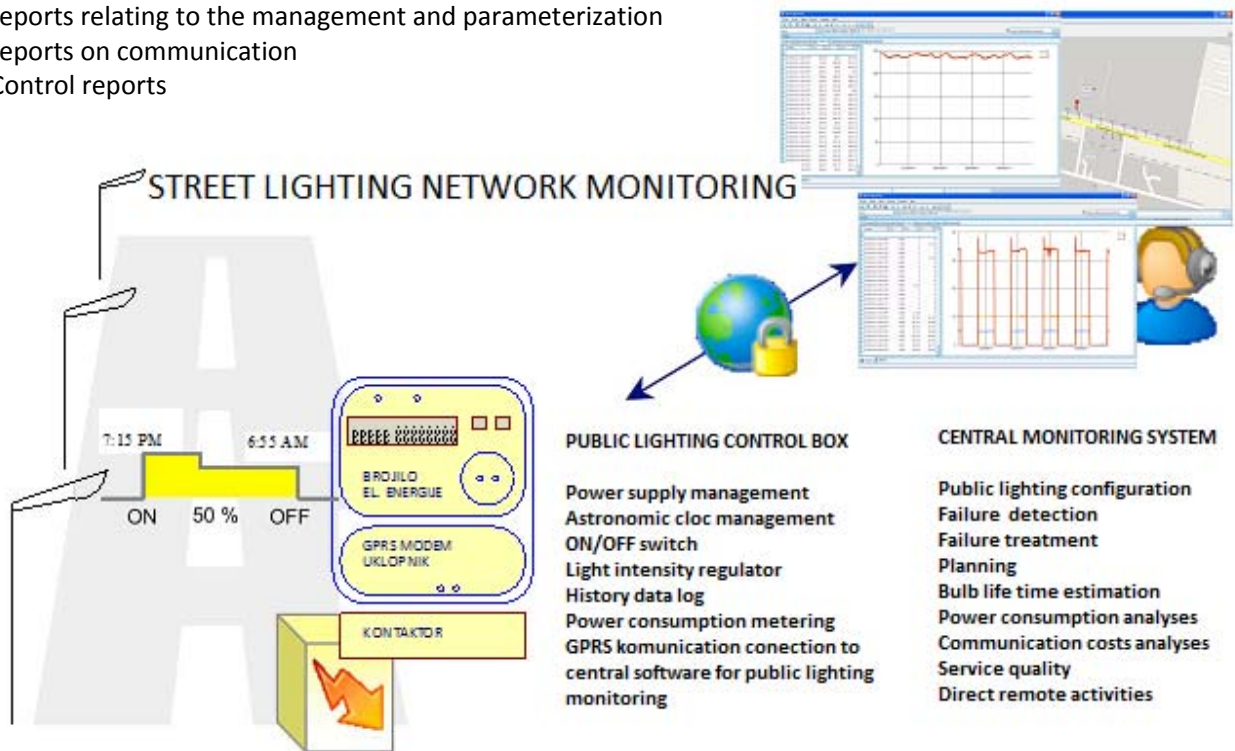system components and to be stored in the database.
The data collected automatically at a predetermined schedule are:
- Currents and voltages in phases
- Instantaneous power per phase
- Total power consumption for electricity metering point (monthly)
- Time for switching on / off light bulbs

2.3. Reporting functions

Include
- reports with analysis of the status and alarms
- reports relating to the management and parameterization
- reports on communication
- Control reports

STREET LIGHTING NETWORK MONITORING

7:15 PM   6:55 AM

ON   50 %   OFF

BROJILO EL. ENERGIJE

GPRS MODEM UKLOPNIK

KONTAKTOR

PUBLIC LIGHTING CONTROL BOX

Power supply management
Astronomic cloc management
ON/OFF switch
Light intensity regulator
History data log
Power consumption metering
GPRS komunication conection to
central software for public lighting
monitoring

CENTRAL MONITORING SYSTEM

Public lighting configuration
Failure detection
Failure treatment
Planning
Bulb life time estimation
Power consumption analyses
Communication costs analyses
Service quality
Direct remote activities

The average life expectancy of public lighting is about 25 years. Therefore, the control system components are based on open, flexible and standard technologies - ensuring the use of the results of the continuous development of more manufacturers instead of proprietary systems supported by only one company.
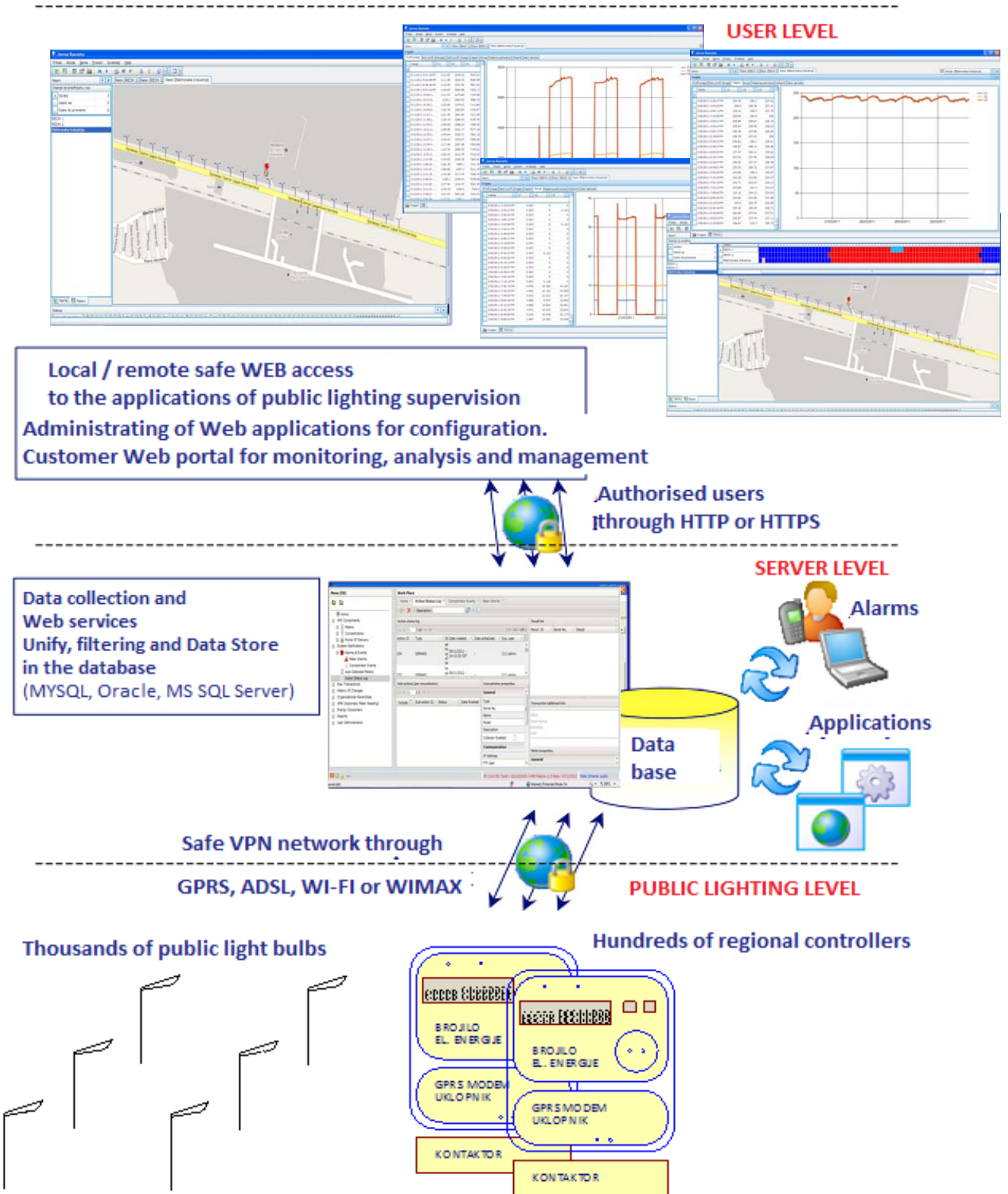
II - DESCRIPTION OF THE SYSTEM BASIC FUNCTION

PUBLIC LIGHTING RACK - The Regional Controller of public lighting

Astronomical calendar - basic tables defined as default in the fixed memory. Activated by transfer to working memory. Possibility to download new tables in the working memory. The times in the table are related to winter timing.

ON / OFF relay - is used to enable / disable part of public lighting in the defined area through contactors, related to the table of astronomical calendar in working memory.

Relay forlight intensity reducing - activated during the night in a fixed time defined as **24h + tp.** Where **tp** parameter is defined as **hh: mm.**

Power supply control - profile (status, voltage, current, rapid changes of current, power) function within the electricity meters.

Electrical energy consumption metering - profile (monthly consumption) functions within electricity meters.

The historical log data - status and alarms, function within the electricity meters.

GPRS communications connection to a central monitoring software -

Configuration of regionalg public lighting controller contains the following information*:*
- ID Modem
- Serial number of the meter
- Address - identification of the controlled region
- Nominal phase power consumption
- Sensitivity on load changes

CENTRAL MONITORING SYSTEM

The collection and storage of data - data from public lighting rack are stored in a central database

Detection and signaling problems - loss of power, loss of phase, region not swiched on in the specified time, region turned off out of given time, the current per phase is less than expected

Configuring public lighting - changing in tables of astronomical calendar, define the expected current in phases, time synchronization, profile defining

Direct remote actions - forced on / off lighting in the area, the violent reduction of lighting in the area, direct reading of data as desired

Reports - quality of service (success of switching on/off), communication quality (performance statistics and costs), power quality and analysis of electricity consumption,

* Planning - providing data for maintenance planning (material, equipment, people), an estimate of the lifetime of the bulbs, establishing the conditions for complaints ...