# iSMAC as an advanced street light monitoring system

(eMaintenance street lights solution for energy efficiency and high availability)

## Executive Summary

Street lighting is an essential element in street and highway infrastructure as these lights provide proven and indispensable value to these assets. Maintenance of these streetlights is vital to sustaining stable performance of these assets, and in turn, resolving problems that might otherwise occur. The iSMAC (iSCADA Streetlighting, Monitoring, Alerting and Control) system, developed by Devices World Sdn Bhd, provides real-time monitoring and overview of the streetlight feeders. This system is designed to provide an overview of streetlight feeder pillars and help monitor the energy consumption, the status of the feeder, and alert the user to any unauthorized access to the feeder.

Using the iSCADA platform, iSMAC allows users to receive real-time updates on their streetlight feeders and optimize these feeders' efficiency in terms of energy usage. The iSMAC system provides a proactive solution to ensure street lights are functioning normally to support road safety to users and also manage traffic congestion and avoid road accidents due to light failures. It also aims to provide the best maintained and least down-time street (and traffic) lights using state-of-the-art technology for the benefit of the road users.

The purpose of this paper is to present iSMAC as an advanced streetlight monitoring system for general maintenance and optimization purposes, while also providing security features such as alerts to operation managers and control of the streetlight feeders.

# Importance of monitoring street lighting

As is with all electrical utilities, street lights require monitoring in case of malfunctions or issues with their performance. It is obvious that the maintenance of these lights is of high importance as they provide the vision needed on the roads while driving. The normal running of these lights allows for safer roads, less congestion and accidents. There are a few key challenges faced when maintaining public utilities that affect street lighting and endanger drivers; iSMAC seeks to provide solutions to these challenges.

The key challenges faced by maintaining public utilities are as follows:

**Street Lights monitoring**

- Lightning can cause circuit breakers to trip. There is no alerting system when the breakers trip. It may be days or weeks before someone is alerted that the lights are out. Unlit areas can be an opportunity for criminals.

- Light bulbs fuse from time to time. Again, it is difficult and costly to check them periodically.

- The conventional method to identify and rectify the failure is time consuming and expensive.

- At different times of the year, sunrise and sunset timings change. With the use of the traditional time, it is costly to change the time of turning on and off lights. This results in inefficient use of electricity.

The purpose of iSMAC is to introduce a more efficient and effective method of maintenance for street lights and other public lighting facilities via the internet, known as eMaintenance, to provide immediate alerts when lights are not working, and provide an energy usage profile for facilitating energy efficiency efforts.


# How iSCADA is implemented in street light monitoring

Conventionally, electricity usage is only known at the end of the billing period when the electricity bill is presented. However, with the iSMAC solution and its eMaintenance objective, users are supplied with the ability to understand their street lighting consumption pattern as well as monitor light status in high detail, with relative ease, and in real-time. The benefit of active monitoring of street lighting will give users insight into consumption patterns, reduce light failures, counteract traffic congestion and contribute to road safety. By using a hosted system, iSCADA provides many benefits such as high transparency, high capability, low CAPEX, real-time updates, data exports, and trending data graphics. All these components contribute to the solution that is iSMAC.

Tested and proven to be effective in the data it provides, along with an alert system provided as standard, the iSCADA platform provides users a solution that will give the overview of streetlight feeder pillars and help monitor the energy consumption, the status of the feeder, and alert the client to any unauthorized access to the feeder. Below is an example of the architecture of a traditional SCADA platform as compared to the iSCADA platform.
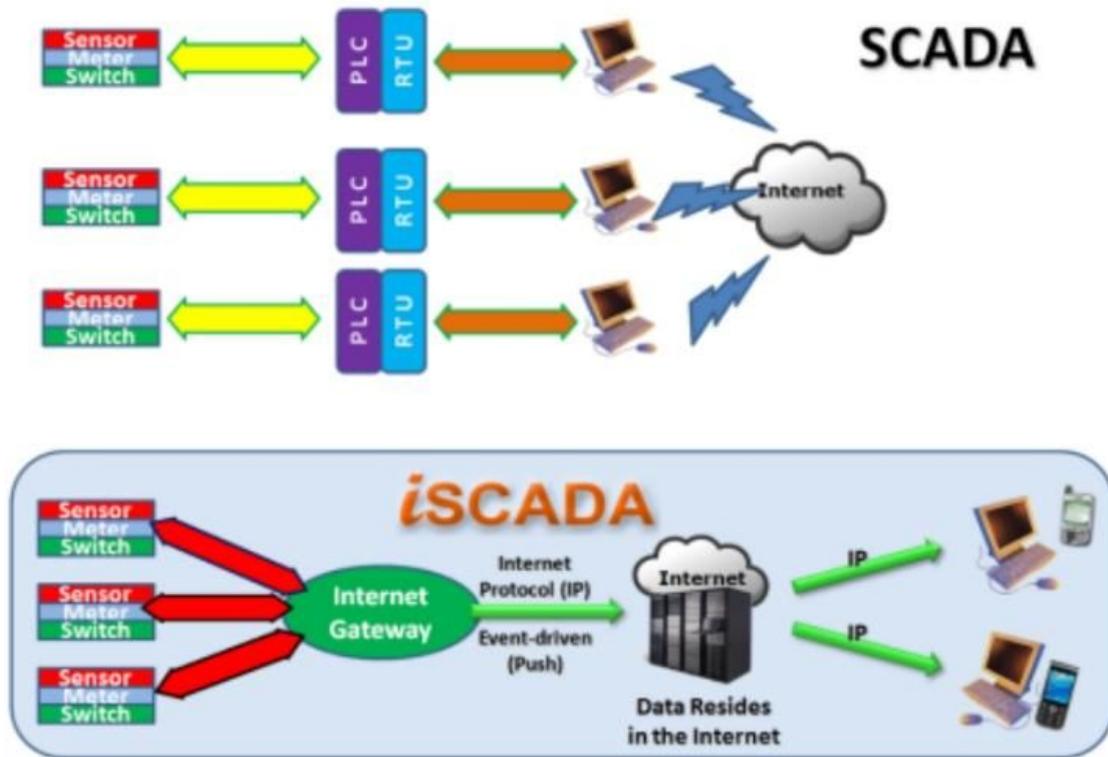


**Figure 1. Traditional SCADA Architecture vs iSCADA Architecture**

# iSMAC (iSCADA Street lighting, Monitoring, Alerting and Control) architecture

iSMAC has three layers of technology; this is to bring the maximum possible benefit to the user and to ensure the solution delivers high availability while being energy efficient.

**Layer 1**
iSCADA monitoring.

iSCADA shall monitor, and provide remote control output points for the site. Part of the monitoring system is to provide data for energy usage and current pattern. This allows users:

- To know that the sites are functioning as normal

- To detect defective light bulbs

- To obtain data for energy efficiency measures

When faults or events occur, the iSCADA central server shall send out automatic alerts to designated and configured recipients for fast response and action. The benefits are:

- Reduced down time

- Saves man-power to check on sites.

**Layer 2**

This is to manage the tripping of ELCBs due to lightning strikes. This layer deploys an approved Surge Protection Device (SPD), with typical ratings of 80kA but can be increased to 200kA if so required.

It will also protect the equipment from damage. This SPD has an output for the iSCADA to monitor. If the SPD is damaged due to repeated surges, iSCADA shall provide an alert for the SPD to be replaced.

**Layer 3**

An intelligent ELCB shall be deployed at the site. The intelligent ELCB shall be able to perform the following:

- Filter out noise from surges to avoid nuisance tripping

- Maintain safety level to prevent electrocution.

- Input for remote reset when used with iSCADA
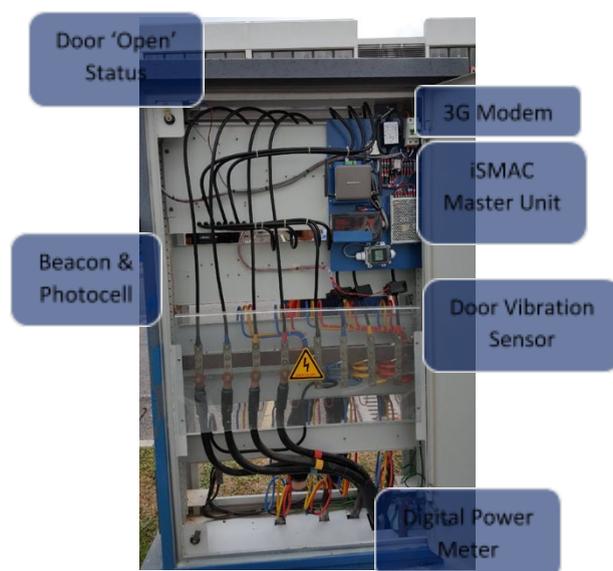
**BEFORE INSTALLATION**          **AFTER INSTALLATION**

**Figure 2. Street Lighting Feeder Box Before and After Installation (Rear View)**

**Figure 3. iSMAC Architecture**

## System objectives of iSMAC

The main objective of the iSMAC system is to provide real-time monitoring and overview of the streetlight feeders. It allows users to monitor the energy consumption of the streetlights and make sure the feeders are vandalism free and running at optimal levels. The system helps:

i.   Provide an in-depth overview of each streetlight feeder pillar, providing energy consumption, lux levels, vibration, and door open/closed status.
ii.  Send out SMS alerts that can be set by the user, alerting users to issues that may surface with the feeder pillar, ie. TNB supply failure, vibration/door open, and maintenance issues.
iii. Log and time stamp maintenance issues and door status to allow users to see when the pillar was accessed and when issues occurred.

This is achieved by:

● Installing the iSCADA system to monitor streetlight feeder pillars and provide data to users.
● Uploading collected data to secured servers, with automatic data back ups.
● Allowing users to access the data from the comfort of their offices or homes.

# Key solutions iSMAC provides

iSMAC as a solution for street lighting monitoring is an example of eMaintenance. iSCADA offers cost-effective and efficient means to implement eMaintenance. It enables users to remotely monitor and manage the maintenance from various locations.

eMaintenance provides an unprecedented level of transparency, efficiency and availability. It compliments and supervises over the conventional maintenance processes that rely on periodic manual inspections and tests. Key solutions provided by iSMAC through eMaintenance are:

1.      **eMaintenance for street (and traffic) lights.** Fast response to failures, reduce downtime and complaints. Ensure that all asset and facilities are working at all times.

2.      **Immediate alerts with remote ELCB reset feature.** Immediately turn street lights back on when they are affected by lightning. This ensures that street lights are working at all times for improved road safety for all road users.

3.      **24 hours monitoring of electricity consumption, power supply status, etc. and automatic alert system via SMS.** Get alerts before the road users complain. Efficient usage of manpower to attend to other important matters.

4.      **Consolidated monitoring for all sites on one screen.** Efficient and transparent maintenance management for all the road assets and facilities.

# Devices World Sdn Bhd

Devices World Sdn. Bhd. ("Devices World"), incorporated in 2000, is a 100% Malaysian-owned technology company. Devices World's goal is to research, develop and market state-of-the-art Enterprise Solutions in the areas of web-based Data Acquisition in all areas where traditional SCADA systems exists. Electronic Maintenance (eMaintenance) for Facilities Managers is a key area of focus as well as energy management, resource optimization and any area where 'cloud' based monitoring solutions will deliver clearly defined business benefits.

For more information on the iSMAC solution or iSCADA as a platform, please find the appropriate contact details below:

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