About Billion

Billion Electric Co. Ltd. (Taiex: 3027, trading as BILLION) is founded in Taiwan in 1973 and has grown to be one of the leading providers of network equipment and power supply products in the Asia Pacific. With the establishment of the Communication Division, Billion has reinforced its commitment to developing next-generation network equipment and Internet access devices to meet the needs of home users, telecommuters, SOHOs and SMBs around the globe.

Billion has received a number of awards for its networking products and has acquired a considerable customer base across Europe, America, the Middle East, Africa and the Asia Pacific. Since March 2009, Billion’s Power Division has added its investment in R&D and manufacturing of Smart Grid business in addition to the power supply products. This division has been officially re-named the “Power and Energy Management Division” (PEM Division) to illustrate Billion’s long-term focus on “Green” product development. With the supply of Smart Grid to reduce carbon emissions resulting in more energy-saving products, Billion aims to contribute to environmental protection and green planet. For more information, please visit www.billion.com.tw and www.smartgrid.com.tw.

About BEC Smart Energy Solutions Inc.

BEC Smart Energy Solutions Inc. (BEC-SES) focuses on state-of-art initiatives to address energy saving, global warming, power grid reliability and critical infrastructure security protection. Being a subsidiary of Billion Electric, BEC-SES leverages on the parent company’s 30 years leadership and experience in the areas of telecommunications, and power and energy management, which are fundamental to any smart energy solution. For more information, please visit www.becsmartenergy.com.

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Intelligent Streetlight Control and Management Solutions

Overview
As energy efficiency becomes increasingly important for controlling costs, improving energy independence and reducing environmental impact, street lighting using advanced technology like the LED (Light-Emitting Diode) and enhanced HID (High Intensity Discharge) could become the world’s leading technology to meet energy conservation objectives. Compared with traditional HPS (High-Pressure Sodium) streetlights, these new streetlight solutions also provide improved life cycle cost and better color rendering. Therefore, more and more cities adopt the environmentally friendly and energy efficient lighting solutions without compromising illumination quality.

Technology
With the embedded sensors in the light head, streetlights can automatically switch on/off according to the outside conditions. When full lighting is not required, they can also automatically dim and adjust for energy efficiency. Furthermore, the technicians can monitor and control the streetlights via the Billion So-Max advanced wireless network through a web-based communication system.

Challenges
- The initial cost of implementing an advanced streetlight system is higher than traditional HPS lights.
- Ease of installation could be a key factor that affects the success or failure of the implementation.

Billions’ core strength
Billion Electric Co., Ltd. is one of the leading companies capable of providing both Power and Communication solutions.

CM (Contract Manufacturing) services
With 37 years of production experience and well-established factory facilities, Billion is capable of manufacturing high-performance outdoor and indoor light head drivers / power supplies. Billion now employs more than 1,600 people and has manufacturing locations in Taiwan, Malaysia and China. All the factories are ISO9002 certified and every product is 100% tested twice to ensure the best quality and zero defects. By working together with its customers from the early design stages, Billion has built up OEM business that is extremely competitive and offers efficient logistical support.

ODM business
With the belief that cutting-edge technology and the continuity of product offerings with the best quality are the key factors to business success, Billion has in-house research and development laboratories with over 185 engineers specializing in the fields of communications, networking, power and energy management. The R&D teams are located at Taipei and Hsin-chu in Taiwan, Nanjing and Guan-Dong in China. They work together to meet the needs of Billion’s ODM partners from across the globe.

Target customers
As a leading solution provider, Billion can offer a choice of advanced solutions for intelligent streetlight control and management. We can classify our target customers into two groups:

1. System Integrators / project managers at utilities, departments of transportation, transit authorities, and municipalities.

As a leading solution provider, Billion can offer a choice of advanced solutions for intelligent streetlight control and management. We are glad to classify our target customers into three groups in order to offer tailor-made streetlight control and management solutions:

Solution 1:
1. Intelligent Streetlight Control and Management System (LCMS)
2. So-Max wireless communication modules / Access Points (AP)
3. So-Max gateway
4. LED lamps

Solution 2:
1. Intelligent Streetlight Control and Management System (LCMS)
2. So-Max wireless communication modules / Access Points (AP)
3. So-Max gateway
4. HID lamps

2. LED lighting application vendors / manufacturers
Billion also offers a series of customizable drivers with control / communication modules to LED or HID light head vendors / manufacturers. Billion LED drivers include various types such as 50W, 70W, 100W, and 150W. Key features of the Billion LED driver series are as follows:

- Universal AC input 90 ~ 305Vac
- Constant voltage / Constant current operation
- Built-in active PFC function
- Protections: SCP, OVP, OCP, and OTP
- IP67 compliant rugged design for high level of protection against dust and water
- Natural-convection cooling
Intelligent Streetlight Control and Management System (LCMS)

Billon Intelligent Streetlight Control and Management System (LCMS) enables a community to meet energy conservation objectives. Energy savings of up to 60 to 70% is achievable as a result of improved performance of luminaries, lamps and intelligent control management. It is ideal for project managers at utilities, departments of transportation, transit authorities, and municipalities. The completed solutions will allow them to meet their energy conservation goals without sacrificing performance, safety, flexibility, efficiency, or color rendering.

The advanced streetlight which is built with the Billon intelligent ballast has embedded dimmer, power metering and temperature sensors to provide high performance, efficiency and reliability and extend the life expectancy of the streetlights.

Major system components of Billon Intelligent Streetlight Control and Management System (LCMS) include:
- Intelligent Streetlight Control and Management System (LCMS)
- So-Max wireless communication modules / Access Points (AP)
- So-Max gateway

Via the LCMS, users can:

**Benefits of LCMS**
- Create and maintain streetlight asset information and create map representations on these asset.
- Monitor the streetlight asset with alarm mechanisms to alert the operator to take action.
- Have multiple levels of graphical zooming and alarm summarization to effectively management large numbers of networked streetlights.
- Set profile and criteria to trigger alert condition for special attention and action.
- Keep track of streetlight performance and health condition for proactive management, tuning and trend analysis.*
- Manage user access with different levels of authorization and control.
- Manage the infrastructure which allows different subsystem entities to interconnect in a secure manner and meet service performance objective.

**Features of LED streetlights**
- Flexible and scalable architecture with choice of luminaries and light heads to meet community budget and resource constraints.
- Automatically switch on/off or dimming according to environmental light conditions, time of day or other programmable conditions.
- Automatic temperature sensing and adjusting the light levels to extend the light head luminaries life span.
  - Remote monitoring and fault diagnosis on the health of individual streetlight.
  - Secure communications among system entities.
  - Browser based management system with levels of zooming for management of large scale street light deployments.*
- Power usage measurement for energy saving and efficiency.*

**Benefits of LED streetlights**
- Higher community satisfactions

The streetlight which is built with Billon power drivers can automatically dim according to the weather or environmental illuminations in order to provide high performance, efficiency and reliability of the street-lighting service to the community via built-in light sensor. Proactive maintenance program and management allow quick problem identification and isolation.

* Future Release
Features of HID Streetlights
- Mechanical design in protection level and easy maintenance by light weight design.
- High intensity shield glass and special surface treatment ensures safety of drivers and pedestrians and high efficiency with superior uniformity.
- Precision aluminum alloy pressure die-casting is strong and durable, safe and aesthetic.

Life extension of light Head luminaries and power supply
The built-in temperature sensors in the Billion streetlight can dim the light module automatically when the light and power supply are overheated, hence extend the life expectancy.

Immediate reduction in energy usage
The Billion intelligent streetlight automatically dims and adjusts the lighting based on time of day and programmed conditions for energy efficiency. This together with advanced light head and luminaries provide immediate reduction in energy usage to meet energy conservation objectives.

Reduce manual maintenance cost and improve productivity
Control center can monitor the status of light and energy consumption of each light element and send field technician to proactively replace the bulbs when they expired or burned out.

Reduced greenhouse gas emissions
Optimized energy usage will result in a corresponding reduction in community carbon footprint.

Provide energy consumption metering
It allows gauging and management of precise energy consumption, removes uncertainties and highlights potential energy leakages. This also allows accurate balancing and improves settlement.

Provide full monitoring and control
It provides central management of streetlight asset, timely awareness of lamp failure, eliminates day burners, and reduces night patrolling (especially in the dangerous area).

Improve streetlight asset management
The historical data on streetlight information allows better understanding of electrical performance profiles for lamps and supply and strengthens inventory control.

HID Lamps
Benefits of HID Streetlights
- High energy-saving and efficient solution
  - With high efficient system and excellent optical design, HID saves 80% more energy and CO₂ emission per year (compared with conventional lighting solutions).
  - Patented appearance design enhances thermal conductivity and fixture efficiency which guarantees long product life, easy installation and high cost-effectiveness.
  - Intelligent electronic ballast stabilizes current, extends lifespan of bulb and reduces power consumption. It can be upgraded for IP based wireless control by central management system.
  - Intelligent self-dimming.
- Comfort and safety
  - High quality and avant-garde design fits all kinds of harsh environments. Stable liberation of heat reduces the maintenance cost.
  - High efficient lighting and superior uniformity bring zero discomfort glares, which ensures driving & street security.
  - 96Ra provides daylight quality CRI. Images of people and substances stay real and crime rate decreases.
- Ease and convenience
  - Less than 6 kg lightweight that is half weight of conventional streetlight
  - Simplest and easiest tool free design and effortless bulb changing by one hand.
  - Light head is flexible to adjust with the different diameter of poles and fit into all categories of roads.

Billion So-Max Wireless Technologies
- Basic concepts
  With the explosion of cellular phone use and Internet multi-media services, wireless networks are becoming increasingly congested. The increased demand has raised our expectations, while creating capacity problems and a need for greater bandwidth. However, if the transmitted power of wireless units is significantly reduced, then there is a potential solution.
  This implies a signal-to-noise ratio improvement: the ratio is affected by numerous parameters, including radio frequency and path. The Billion So-Max Wireless continually determines optimal points along that path to support each transmission.

  - Adaptation
    The Billion So-Max Wireless Technology uses many adaptation techniques to optimize communications, but one of the most powerful is path diversity. From origin to destination, So-Max stations relay the transmissions in an intelligent and efficient manner.
    - Each subscriber builds the network
      The available optimal paths will increase as subscribers join the network, supporting a fundamental aspect of the So-Max philosophy: Communications are dynamic and local, best controlled at the station level, rather than from some centralized source. Each So-Max network station is an intelligent burst-mode radio, which can use all the available bandwidth some of the time. However, as with any technology, weather or general network conditions can affect transmissions.
    - Efficiency with sub-bands
      Like cellular networks, the So-Max network stations operate in the same wide frequency band, but frequency hopping, at lower data rates, introduces sub-bands. Because transmission is packet based and connectionless, stations relay packets from neighbor stations. For each packet, a station optimizes the transmission by adapting the route, power, data rate, packet length, frequency, time window and data quality over a wide range. Each station has responsibility and much autonomy for routing and service-enhancing adaptation to the current environment. For security, stations accept the authority of a network supervisor.

- So-Max Wireless Access Point
  - So-Max wireless technology
  - Plug-and-Play
  - Driver-free LAN port plug surf
  - Very low transmission power
  - DHCP server built-in
  - Self-configuration / healing
  - Up to 3.5Mbps bandwidth
  - Enhanced data security
  - Over-the-air firmware updates