Versatile interface for outdoor luminaires

The Zhaga Consortium
Webinar: February 18th, 2016
Agenda

• Welcome and Introduction (Zhaga Consortium)
• Need for upgradeable, intelligent luminaires (Martin Creusen, Philips Lighting)
  – Existing standards for connectors
• New connector proposal (Jonathan Catchpole, TE Connectivity)
• System architecture (Martin Creusen, Philips Lighting)
• Next steps and Q&A (Zhaga Consortium)
Introducing Zhaga

Zhaga is a global lighting-industry consortium that is standardizing LED light engines and associated components including LED modules, holders and LED drivers (electronic control gear).

Zhaga is creating a set of Interface Specifications, known as Books, which define conditions necessary for interchangeability.

**New proposal:**
A specification for the interfaces between a sensor / communication module and an LED luminaire for outdoor use
Zhaga specification development

Zhaga members submit proposals for new specifications

Proposal A
Proposal B

Merged proposal

Specification development

New specification (Zhaga “Book”) published

Transfer to an SDO

Inside Zhaga (members only)
Purpose of this webinar

Zhaga members submit proposals for new specifications

Proposal A
Proposal B

Merged proposal

Specification development

Inside Zhaga
(members only)

Input from members and non-members
Need for upgradeable, intelligent luminaires

Existing standards for connectors

Martin Creusen, Philips Lighting
Need for upgradeable, intelligent luminaires (1)

• “System Ready” (SR) luminaires as basic proposition enabling future “Systems & Service” upgrades
Need for upgradeable, intelligent luminaires (2)

- Luminaires installed with Gen 1 connectivity / controls systems to be upgraded in the field
  - de-couple useful life connectivity & controls functionality from other luminaire electronics

![Diagram showing installation, upgrade, and end of useful life of luminaires with different connectivity/controls systems.](image-url)
Upgradeable luminaires: existing standard

ANSI C136.41 standard for external locking (mainly US/UK)

- Mechanical interface: 5 pin / 7 pin NEMA connector
- Electrical interface: Mains and 0-10V (or DALI)
- Designed for controls installation / upgrade in the field
Trends in luminaires

• **LED technology enabled:**
  – Miniaturization of luminaires
  – New form factors of luminaires

• **Internet of Things (IoT) driving new Systems and Services**
  – More functions (connectivity, sensors)
  – Many proprietary and non-proprietary solutions available

• **Commoditization** of LED luminaires inducing continuing price erosion
New Zhaga connector proposal

Jonathan Catchpole, TE Connectivity
Platform Overview

Proposal:
- To fit a Ø20-22mm hole in the bulkhead of the luminaire
  - Only requires Ø30mm flat around aperture for sealing
  - Can fit a bulkhead thickness from 1.5 to 6.7mm. Removing any tolerance issues
- Diameter significantly smaller than 35mm
- Height significantly smaller than 10mm
- The smaller footprint will allow greater design flexibility of the luminaire
- 4 positions: DC+, DALI+, DALI- and Logic Signal Input (LSI)
- Separate and customizable anti rotational feature
Zhaga Specification Proposal

Zhaga will specify the following features:

- **Mechanical interface:**
  - Bayonet mounting feature (between receptacle and module)
  - Defined gasket area (between receptacle and module)
  - Module contact dimensions
  - Receptacle contact interface

- **Electrical interface:**
  - Number of Poles: 4
  - Pole assignment: DC+, DA+, DA- and LSI
  - Voltage rating: 24Vdc typ. 30Vdc max.
  - Current rating: 500mA max.

- **Control interface:**
  - Reference to DALI 2.0 standard

Features not included in specification:
- Interface and sealing to the luminaire
- Wiring connection to receptacle
- Receptacle contact detail
- Anti-rotation feature within luminaire
- Module housing or base size and shape (except at interface area)
Simplifying LED luminaire design

Luminaire Receptacle

Benefits:

• Integrated seals for luminaire and module interfaces
  – Therefore no loose seals for an operator or installer to work with
  – IP66 (also tested to IP65)

• Module is able to be mated with a simple insert and twist to lock
  – No tool needed
  – One hand application
  – Module can be exchanged or upgraded in a few seconds. Without electrically isolating the lighting pole or with skilled labor
  – Module polarized by the locking features

• No flying leads
  – Allowing flexible placement of receptacle on luminaire
  – Reducing logistics issues during manufacturing

• Contacts rated to 1.5A, 30VDC
  – Though Zhaga will standardise 12W only will be available to the module
Module and Sealing Cap Example

Proposal:
• Specified module base will allow custom electrical designs and branded housings
• Module concept is scalable
  – Allowing a wide range of sensors and communications to be designed in. Future proofing the concept
• A simple ‘O’ ring used to seal between base housing
  – Provide IP66
• Sealing cap available for shipping or for a luminaire with no intelligence
Luminaire Mounting

Orientation

• Receptacle concept allows for flexible module design
  – Which can be mounted to both a cobra head or post top luminaire

• Designed to allow for multiple mounting options
  – Upward, downward or side facing
System Architecture

Martin Creusen, Philips Lighting
System Ready drivers
The foundational building block for Connected Lighting

Today:
Many additional luminaire components to make a fixture ‘connected’

Tomorrow:
• Reduction of cost and complexity
• Integration for reliability and simplicity
• Standardized interface driver to sensor

SR drivers enable cost-effective connectivity by:
• Standardized open digital interface
• Integration of 2 low-voltage power supplies for sensors and controllers
• Integrated power metering
• Readout of diagnostics
Technology solutions in Outdoor

Luminaire

Light Engine System Ready Driver

- LV supply
- Power metering
- Diagnostics
- Output stage
- DALI SR
- Dali

Partner lighting controller

Control

Partner Gateway

Intelligent network partner systems

- Energy and maintenance dashboards
- Asset management
- Maintenance planning
- Remote commissioning and configuration
SR Driver benefits for Control Systems

From:

Benefits:

- No need for power box / power conversion
- Universal Mains controller
- Surge protection by the driver
- Energy metering components can be eliminated from controller
- Simplified luminaire integration (less wiring & components)
- Dim-to-off: no need for a relay
- Additional LED driver diagnostics available

To:

CMS Controller

SR interface (based on DALI 2.0)

Energy Metering 1% accuracy Diagnostics

Dimming commands

Energy data Diagnostics

24V power supply

Mains
Standardization of connectivity via “SR Socket”

- **4-pin:**
  - 24V
  - DALI (2)
  - LSI
  - LV supply
  - Power metering
  - Diagnostics
  - Output stage

**Control**
- Partner Gateway
  - Large cost down vs. NEMA socket
  - No mains pins
  - Open standard/multiple suppliers

**Intelligent network partner systems**
- OEM & Network agnostic
- Easy to upgrade
- Simplifies luminaire integration

**LED+ / LED-**
SR Outdoor Box to connect non-SR drivers

Full SR functionality:
- 24V power supply
- DALI power supply
- 1% power metering
- Diagnostics
Next steps and Q&A

The Zhaga Consortium
Next steps

• Feedback is requested
  – Zhaga would like to receive comments about the proposed specification
  – **Please complete the questionnaire** that will be sent to all participants by email

• To have a **direct influence on the specification**, please attend the upcoming Zhaga meetings:
  – February 23-25: Shanghai, China
  – April 12-14: Eindhoven, the Netherlands
  – June 21-23: Penang, Malaysia

• **Zhaga membership** is required to attend these meetings