Digital Illumination Interface Alliance

# DiiA Technical Note

# DALI-2: The latest version of the DALI protocol

Version 1.3

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*This DiiA Technical Note describes the key differences between version 1 of the DALI standard and DALI-2.*

## 1. Overview

The DALI protocol was first drafted in the late 1990s and has undergone a number of revisions as it has evolved. The result is DALI-2, the latest version of the DALI protocol, which is specified in the DALI standard IEC 62386.

The key tenet of DALI is interoperability, and DALI-2 helps fill the gaps in the original standard. DALI-2 adds new features, and introduces standardisation of control devices including the recent addition of input devices, while maintaining backwards compatibility.

## 2. Improvements and additions in DALI-2

### 2.1 Parts 101 & 102 restructured

There are many improvements in the new version of the standard, including several new commands and features. Also, for the first time, IEC 62386 now includes standardisation of control devices.

To accommodate this, changes were necessary in Parts 101 and 102 of IEC 62386 to ensure there would be a clean split between system requirements in Part 101 and control-gear requirements in Part 102. Also, the new Part 103 of the standard introduced general requirements for control devices.

The Tables below list some of the most important changes in Parts 101 and 102.

## Revision of Part 101: General requirements - System

- Bus timing requirements are now collected together (from Part 102 and a previous draft of Part 103), allowing for control devices, including single-masters and multi- masters
- Insulation and earthing requirements are changed/added
- Operation through power interruptions is now defined, including short interruptions and long interruptions
- Bus power supplies and advanced bus power supplies have defined start-up timing
- Signal voltage rating: now 10V minimum for transmitter high level voltage
- Except for devices containing a bus power supply, the interface must be polarity insensitive
- Device marking requirements have changed
- Bus powered units are defined, allowing bus powered control gear and control devices
- Signal rise/fall times and signal timing improved and clarified
- 24-bit frames defined, and 20 & 32 bit frames reserved
- Multi-master timing defined
- Multiple logical units are now allowed within a single bus unit
- Part 101 now includes test sequences

## Revision of Part 102: Control gear

- Fading rules/timing clarified
- Variable *lastActiveLevel* added. Command GO TO LAST ACTIVE LEVEL added
- Extended fade time for fades from 100 ms up to 16 minutes
- Operating modes allow manufacturer specific operation, and a standardised way to return to normal operation
- New WRITE MEMORY LOCATION - NO REPLY command, and RESET MEMORY BANK
- SAVE PERSISTENT VARIABLES command has been added
- QUERY LIGHT SOURCE TYPE added
- PING command defined, but to be ignored by control gear (allows detection of single masters)
- Physical selection has been removed
- Power-on and start-up timing has been updated and clarified
- Many additions and improvements to the test sequences (available to DiiA members)

## 2.2 Control device standardisation: Application controllers & input devices

Publication of Part 103 "*General requirements - Control devices"* also enabled further standardisation on specific Parts for control devices. Parts of the standard have been published for the first four *input devices*; these are a type of control device that provides information – an input – to the system. Another type of control device known as an *application controller* can use the information provided by input devices and other sources to allow them to make decisions and send commands to control gear.

Application controllers can operate as *single masters* or *multi-masters*. The bus communication requirements for both types are described in Part 103. Input devices are multi-masters, but are also capable of operating in a mode where they are simply polled by application controllers.

Highlights from Part 103 can be seen in the table below.

| ***New* Part 103: Control devices** |
|---|
| • Single masters and multi-masters allowed<br>• *Input devices* defined<br>• *Application controllers* defined<br>• 24-bit frame format defined<br>• Timing described in Part 101<br>• Addressing modes defined (64 short addresses, 32 group addresses, instance addressing, instance groups & feature type addressing)<br>• *Events* defined<br>• *Manufacturer specific modes* defined<br>• Memory banks defined<br>• Commands to enable and disable application controllers<br>• *Quiescent mode* defined, where control devices shall not transmit any forward frames<br>• *Event priorities* defined |

## 2.3 Backwards compatibility

The changes introduced in DALI-2 are designed to improve interoperability, including situations such as replacing existing control gear with DALI-2 compliant control gear, or using DALI-2 compliant control devices with DALI version-1 control gear. This backwards compatibility is described on the DiiA website.

# 3. Status & roadmap

## 3.1 Current publications

New editions of existing Parts of the standard – Parts 101 (system) and 102 (control gear) – were published in November 2014, at the same time as the new Part 103, bringing in standardisation of control devices for the first time. The first specifications for input devices – Parts 301 to 304 – were published in February 2017. Due to copyright, the standard cannot be shared but can be purchased from national standards organisations in most countries, or from the IEC webstore.

## 3.2 Planned publications

Several new Parts are currently being written. These include feature extensions (feedback and manual configuration) for control devices. New Parts for control gear are also being written, including features such as load shedding/demand response, lamp and gear thermal information, and power measurement. Some of the control gear Parts, including Part 207, are being updated for DALI-2. The status of different Parts of IEC 62386 can be seen on the DiiA website.

Experts from the lighting industry make up the working group responsible for authoring, reviewing and editing the IEC 62386 standards. These experts come from various companies worldwide. To nominate an expert to join this project team, please contact the IEC national committee representative for your region.

## 3.3 Test procedures and test sequence software

The DiiA's Technical and Certification Working Group (T&C WG) is responsible for maintaining the DALI-2 Test Procedures for all Parts, and carries out beta testing and approval of the test-sequence software before release to DiiA members. All Regular members have the opportunity to join the T&C WG.