

Introducing DALI and the DALI Alliance



The DALI Alliance



The global lighting-industry organization for the Digital Addressable Lighting Interface (DALI)

We are also known as the Digital Illumination Interface Alliance (DiiA)



Regular members



[Acuity Brands Lighting, Inc.](#)



[BEGA Gantenbrink-Leuchten KG](#)



[BOKE Drivers Co., Ltd](#)



[CP Electronics](#)



[OSRAM GmbH](#)



[Panasonic Corporation](#)



[Renesas Electronics Europe GmbH](#)



[Shenzhen Sunricher Technology Limited](#)



[Delta Electronics, Inc.](#)



[Eaglerise Electric & Electronic \(China\) Co., Ltd](#)



[ERCO GmbH](#)



[ESYLUX GmbH](#)



[Siemens Schweiz AG](#)



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[Silvair, Inc.](#)



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[STEINEL GmbH](#)



[Synapse Wireless](#)



[Tridonic GmbH Co. Kg.](#)



[LiFud Technology Co., Ltd.](#)



[Lutron Electronics Co.](#)



[Niko NV](#)



[Novar ED&S Ltd. \(A Honeywell Company\)](#)



[TRILUX GmbH & Co. KG](#)



[Vossloh-Schwabe Deutschland GmbH](#)



[WAGO GmbH & Co. KG](#)



[Zencontrol Limited](#)



[Zhuhai LTech Technology Co., Ltd.](#)



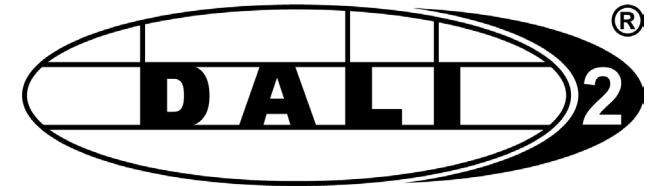
Alliance

DALI: The basics

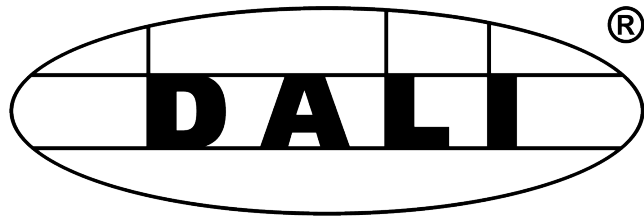


Digital Addressable Lighting Interface

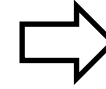
- DALI® is the industry-standard protocol (language) for bi-directional, digital communication between lighting-control devices.
 - Dedicated to lighting, with a rich feature set
- DALI is derived from the open, global standard IEC 62386.
- DALI-2™ is the certification program based on the latest version of the DALI protocol.
 - Driven by the DALI Alliance (DiiA)
 - Ensures interoperability through testing and certification
- DALI, DALI-2, D4i and DALI+ trademarks controlled by the DALI Alliance (DiiA)



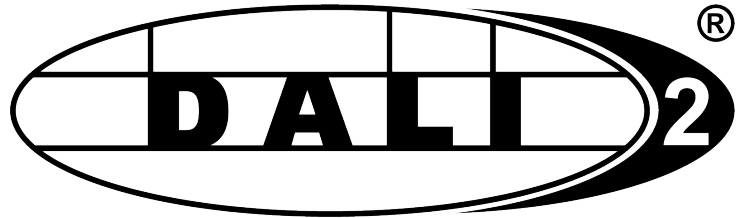
DALI product brands



- Self-testing and registration (no third-party verification)
- Control gear only



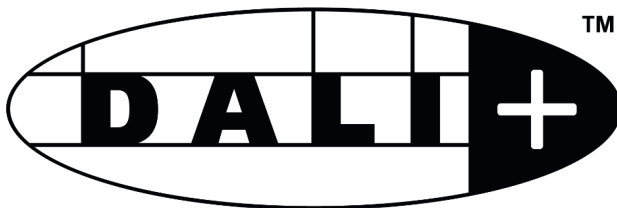
DALI version-1 registration ended April 2022



- Certification, backed by rigorous testing & verification
- All product types



- Part of DALI-2 certification, with compulsory feature set
- Enables smart, connected luminaires
- LED drivers and luminaire-mounted control devices

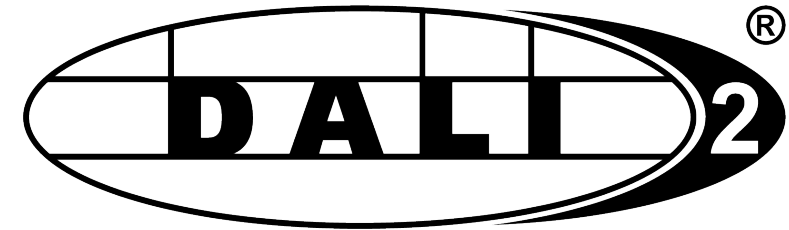


- New certification programs for DALI over wireless and/or IP-based carriers
- First is DALI+ with Thread (in progress)
- All product types



DALI-2 certification: Overview

- DALI-2 certification indicates **multi-vendor product interoperability**
- **Rigorous and detailed testing**, followed by **verification** of test results
- Allows **trademark use**
- Products are **traceable** in the Product Database
 - www.dali-alliance.org/products
- DALI Alliance drives DALI-2 certification
 - First DALI-2 products (LED drivers) certified in September 2017
 - Ongoing addition of new features and new products types
- DALI Alliance creates DALI-2 Test Procedures
 - Test Sequence software is provided to members
 - Members can perform testing, or use accredited test houses



Based on open,
global standards



Rigorous testing
+ verification



Cross-vendor
compatibility

Key features of DALI-2

Focuses on **multi-vendor interoperability**, backed by DALI-2 **certification**.

More features and clearer specifications.



More detailed and comprehensive **testing requirements.**

Extends to all devices in a lighting-control system, including **input devices** (e.g. sensors) and **application controllers.**

Designed for **backwards-compatibility** with older DALI systems.




D4i overview

- D4i is an extension of DALI-2 certification
- D4i components have a compulsory set of features
 - Based on power-supply and data specifications from DiiA
- All D4i LED drivers provide luminaire, energy & diagnostics data
- D4i enables DALI inside intelligent, IoT-ready luminaires
 - Other D4i implementations are also permitted
- D4i simplifies addition of sensors and communication devices to luminaires
- D4i enables plug-and-play interoperability when combined with a connector system
 - e.g. Zhaga Books 18 & 20 or NEMA/ANSI C136.41



Product Database

- Product Database (www.dali-alliance.org/products) contains all certified (DALI-2 and D4i) and registered (DALI version-1) devices
- Allows users to check that devices are certified
- Results can be filtered by brand, product type, DALI features and more

	DALI-2 certified products Fully tested, independently verified	<ul style="list-style-type: none">• Control gear• Application controllers• Input devices• Bus power supplies• Aux power supplies
	D4i certified products Fully tested, independently verified	<ul style="list-style-type: none">• LED drivers• Luminaire-mounted control devices
	Registered DALI version-1 products Self-declaration of test results, no verification Closed to further registrations	<ul style="list-style-type: none">• Control gear only

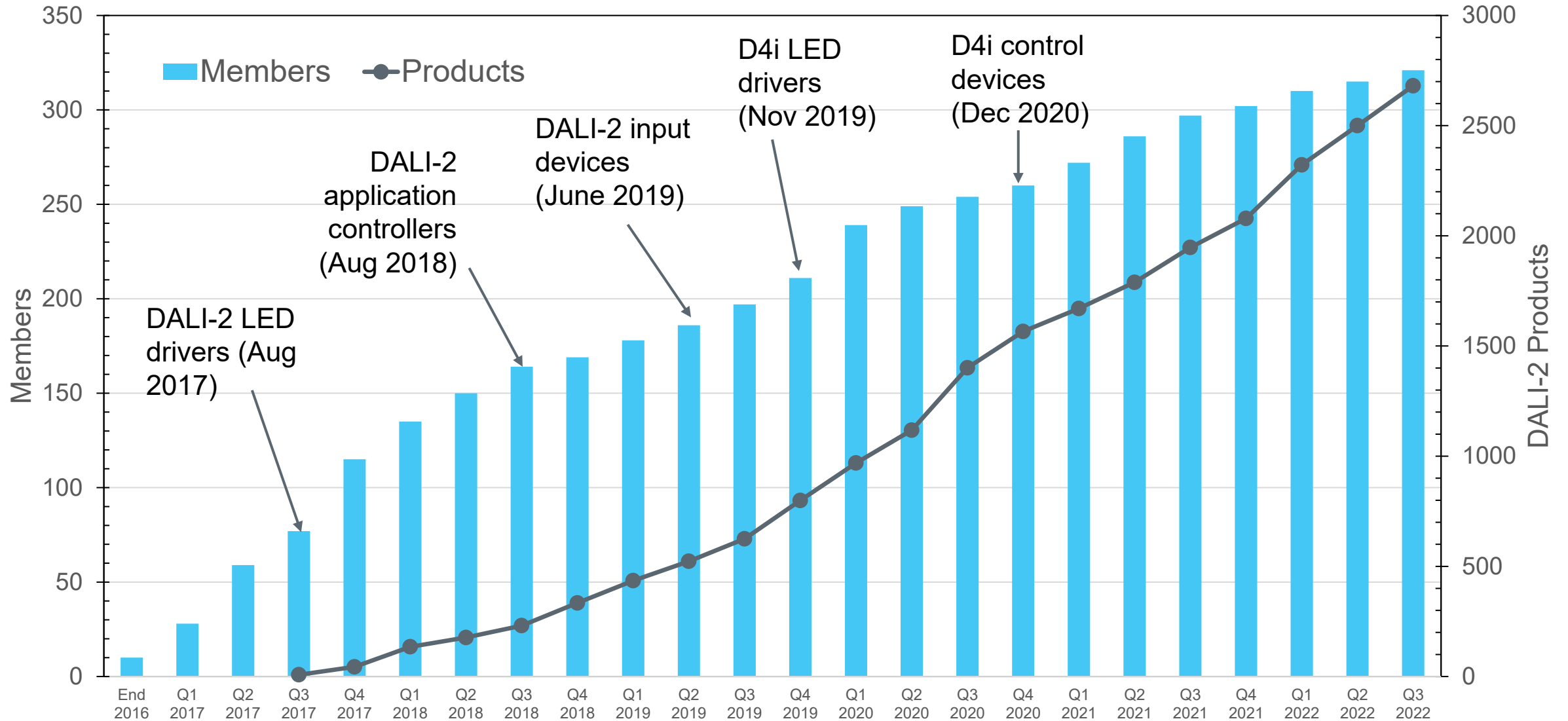
Organization

The DALI Alliance

- The DALI Alliance is an open, global consortium of lighting companies that aims to grow the market for lighting-control solutions based on DALI.
- Also known as  Digital Illumination Interface Alliance
- More than **300 members** worldwide
 - Industry leaders in lighting and control
 - Full list on our [website](#)
- Membership allows certification or registration of products:
 - More than 2,700 **DALI-2 certified products**
 - More than 1,600 DALI version-1 registered products
- Membership allows **trademark use**
 - Logos and word trademarks: DALI, DALI-2, D4i and DALI+



Members and DALI-2 certified products



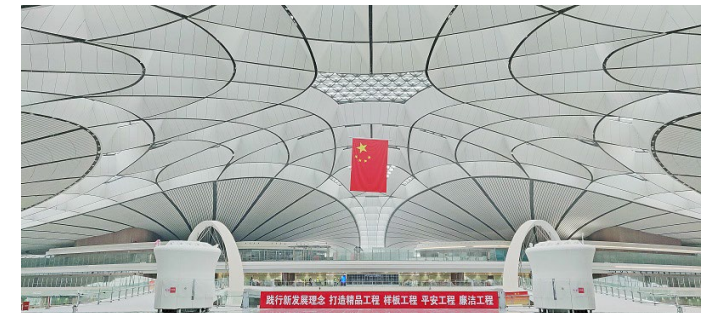
DALI Alliance member benefits

- Two membership classes: **Regular & Associate**
- **Community** registration is free for luminaire makers
- All members (**Regular & Associate**) can:
 - Certify products (DALI-2, D4i, DALI+)
 - Receive test-sequence software
 - Use DALI Trademarks (according to usage rules)
- In addition, **Regular members** can:
 - Participate in Work Groups
 - Influence future developments
 - Have access to draft specifications, progress reports etc
 - Participate in interoperability test events (Plugfests)

	ASSOCIATE MEMBER	REGULAR MEMBER	COMMUNITY (note 2)
Access to DiiA test sequences	X	X	
Certification of DALI-2 products, use of DALI-2 logo on certified products	X	X	
Use of logos (DALI-2, DALI version-1) on luminaires containing DALI devices from DiiA members	X	X	X
Use of DALI version-1 logo on products other than luminaires	X	X	
Use of DiiA logo and DALI version-1 logo for marketing materials	X	X	X
Access to members-only website	X	X	
Participation in General Assembly meetings	X	X	
Receive membership communication	X	X	X
Access to draft deliverables (test sequences, specifications)		X	
Approval of final deliverables		X	
Participation and voting in working groups. Contribute to DiiA roadmap and development of test specifications.		X	
Participation in interoperability events (Plugfests)		X	
Eligible for Board of Directors membership		X	

DALI market

- Very large installed base of projects, spanning three decades
 - See our [website](#) for case studies and winners of the DALI Lighting Awards
- From small installations to major infrastructure projects
 - e.g. Crossrail in London, New York City Transit and Beijing Airport
- DALI is “the **largest wired digital open protocol** in the world for lighting.”
 - Pål Karlsen, Omdia, LED Professional May/June 2020 issue, [Link](#)
- “Open protocols will be the growth winners over the next few years in smart lighting and connected controls.”
 - Ibid
- “DALI is the **largest segment for smart lighting**, with **15% CAGR** expected over the next 5 years”
 - Global Smart Lighting Market research report, [Link](#)



DALI Lighting Awards 2021







DALI Lighting Awards 2022

- Deadline: December 2, 2022
- Entry requirements and submission form: www.dali-alliance.org/awards2022



DALI trademarks and logos

- All wordmarks and logos shown here are Trademarks in various countries in the exclusive use of DiiA. Full details here: www.dali-alliance.org/trademarks
- Trademarks (logos and wordmarks) **may be used by DiiA members ONLY.**
- DALI devices can use Trademarks only if they are visible on our website
 - Does not apply to luminaires

<p>DALI[®]</p>  <p>• Used on DALI version-1 registered products • Used to show membership of DiiA</p>	<p>DALI-2[®]</p>  <p>• Used on DALI-2 certified products only</p>
<p>D4i[™]</p>  <p>• Used on D4i certified products only</p>	<p>DALI+</p>  <p>• Used on (future) DALI+ certified products only</p>

* Word Trademarks apply regardless of font, style or other properties.

Key technical features

DALI: The basics



Digital Addressable Lighting Interface

The internationally-standardized protocol for digital communication between lighting-control devices

- **Digital**
 - Two-way communication and exchange of data between lighting-control devices
- **Addressable**
 - DALI devices are individually addressable
- **Lighting**
 - DALI is dedicated to lighting, with a rich feature set

DALI protocol: Key features

DALI enables:

- **Control, configuration & querying** of DALI devices over a 2-wire bus
 - DALI power and data on same pair of wires
- **Individual, group & broadcast addressing** to any DALI device
- Recall of pre-programmed scenes
- Flexible reconfiguration using software
- Each DALI subnet has a maximum of **64+64 addresses**
 - 64 control gear (e.g. LED drivers) AND 64 control devices (e.g. sensors)
- Robust digital communication
- Two-way data exchange and feedback



DALI protocol: Commands and scenes

- Commands allow **control, configuration and querying** of DALI devices.

Command type	Examples
Control	<ul style="list-style-type: none">• start a fade to a defined light output level• recall scenes• turn the lights off
Configuration	<ul style="list-style-type: none">• change the fade time• change the light level stored in a scene
Query	<ul style="list-style-type: none">• ask what the current light output level is• ask whether there is a lamp failure

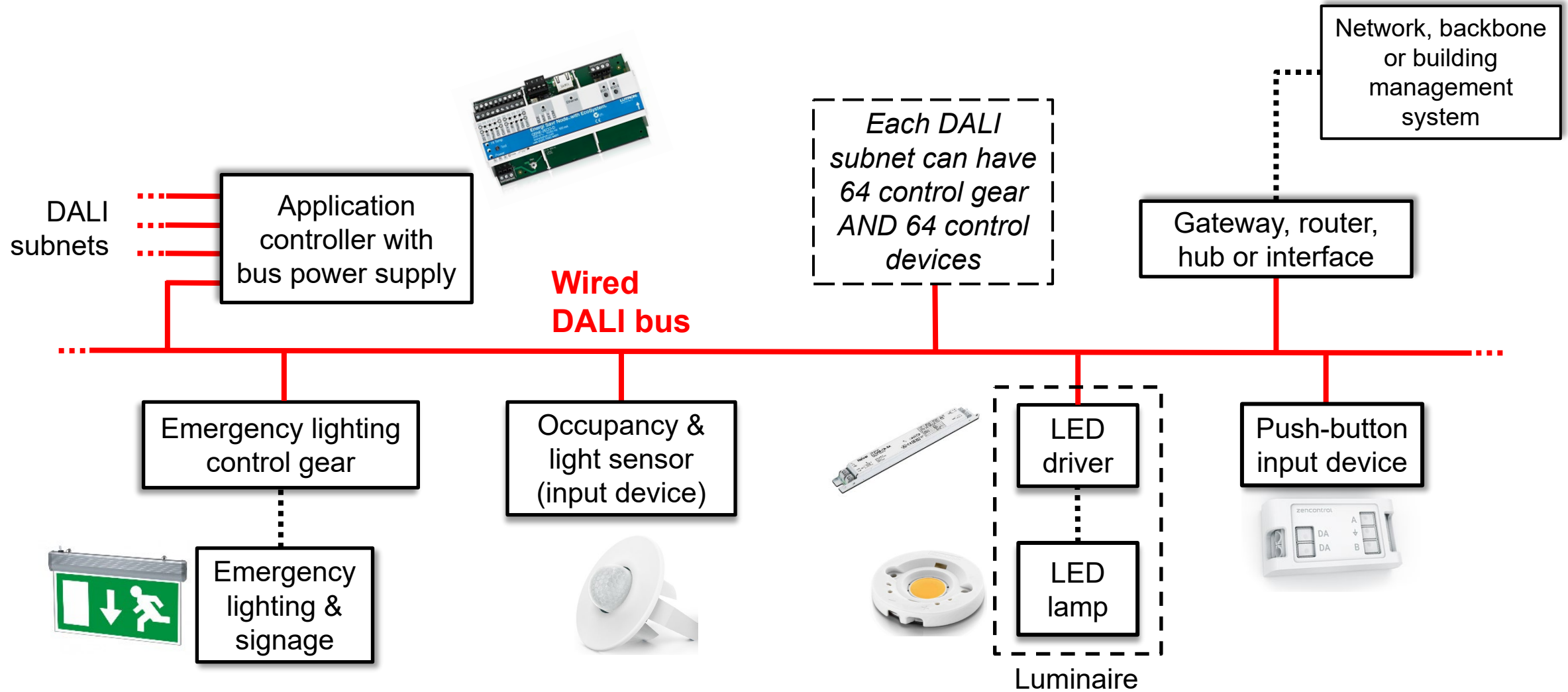
- Commands can be **addressed** to **individual** devices, to a **group** of devices, or **broadcast** to all devices. This makes communication very efficient.
- **Scenes** allow fast and efficient recall of light levels across the system.
 - Each item of control gear has 16 scenes. A single GO TO SCENE command instructs all the lights, or any combination of the lights, to go to individually pre-defined levels and/or colours.

DALI systems: Wiring and bus power

- DALI uses a **2-wire bus** for communication (commands/data)
 - **Power and data** on the same pair of wires
- DALI bus must be powered to allow communication
 - **250 mA max.** bus power supply
 - Same pair of wires also supplies **bus-powered devices** e.g. sensors, push-buttons
- **Standard 2-core cable** (1.5 mm²) can be used
- **Maximum 300 m** cabling recommended (between furthest-apart devices)
- **Polarity-free & free wiring topology** is allowed
 - Bus wiring can use daisy-chain or star connections, or combinations of these
 - A closed loop should not be used



Wired DALI lighting-control system example

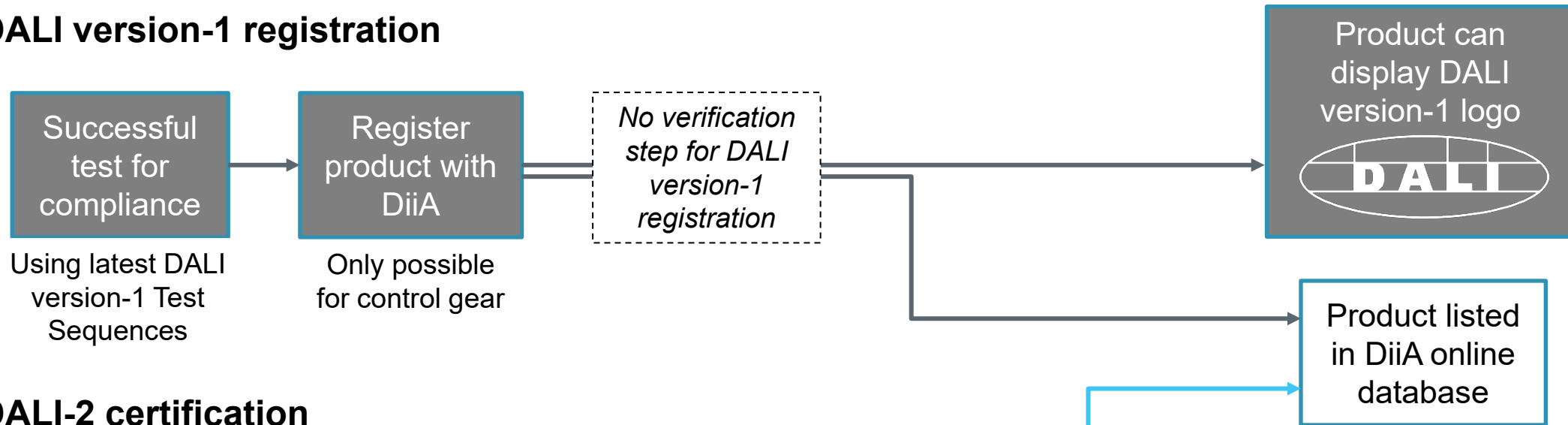


DALI-2 certification & specifications

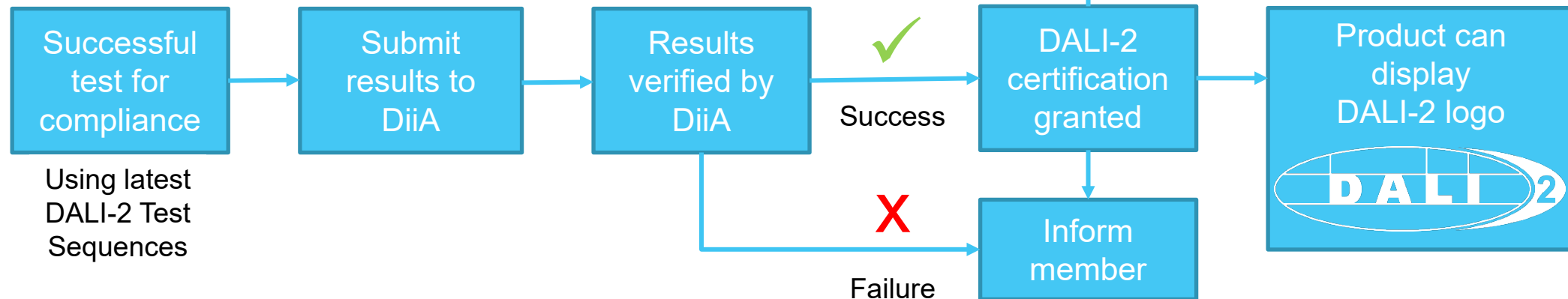
DALI-2 certification

Overview and comparison with DALI version-1

DALI version-1 registration



DALI-2 certification



DALI-2 certification

Overview and comparison with DALI version-1

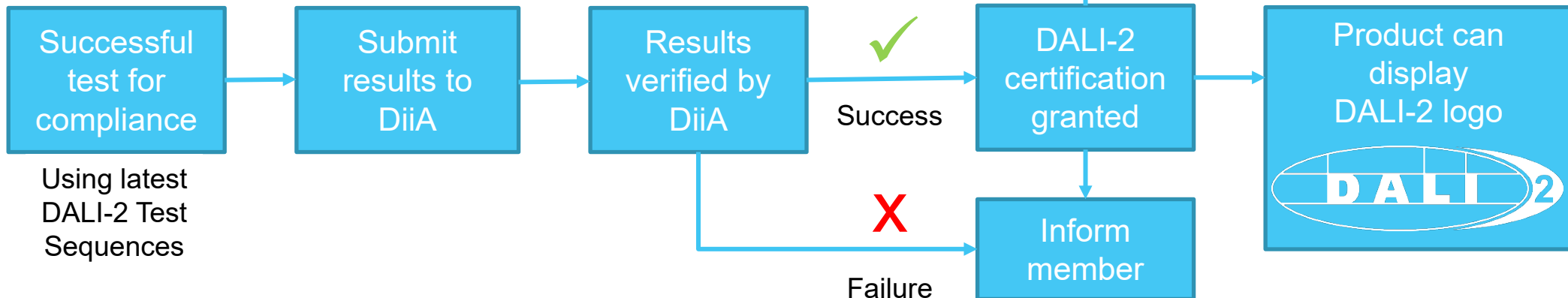
DALI version-1 registration

DALI version-1 registration ended on April 17, 2022
All registered products will remain visible in the Product Database

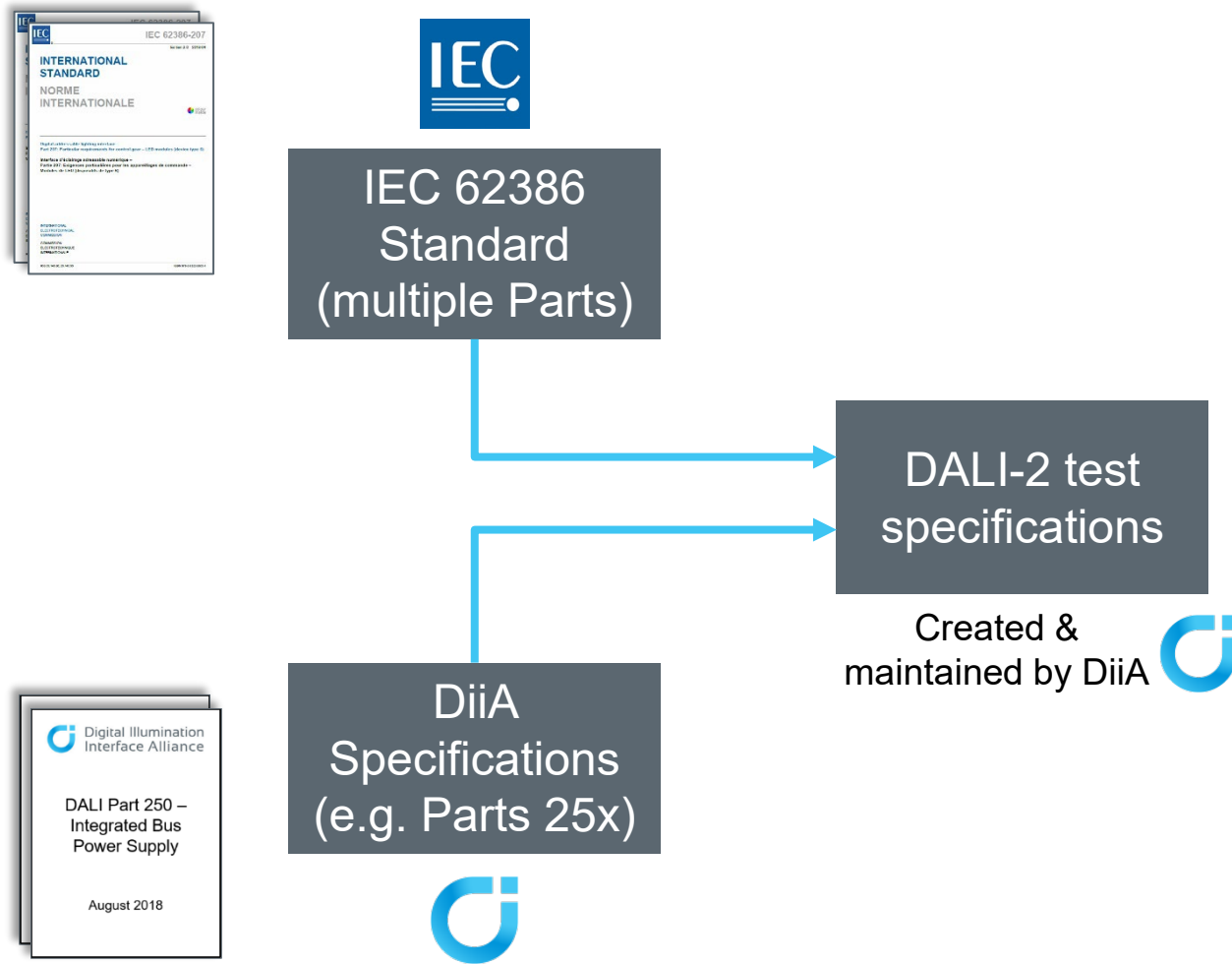


Product listed in DiiA online database

DALI-2 certification



DALI-2 test specifications



DALI-2 test specifications are:

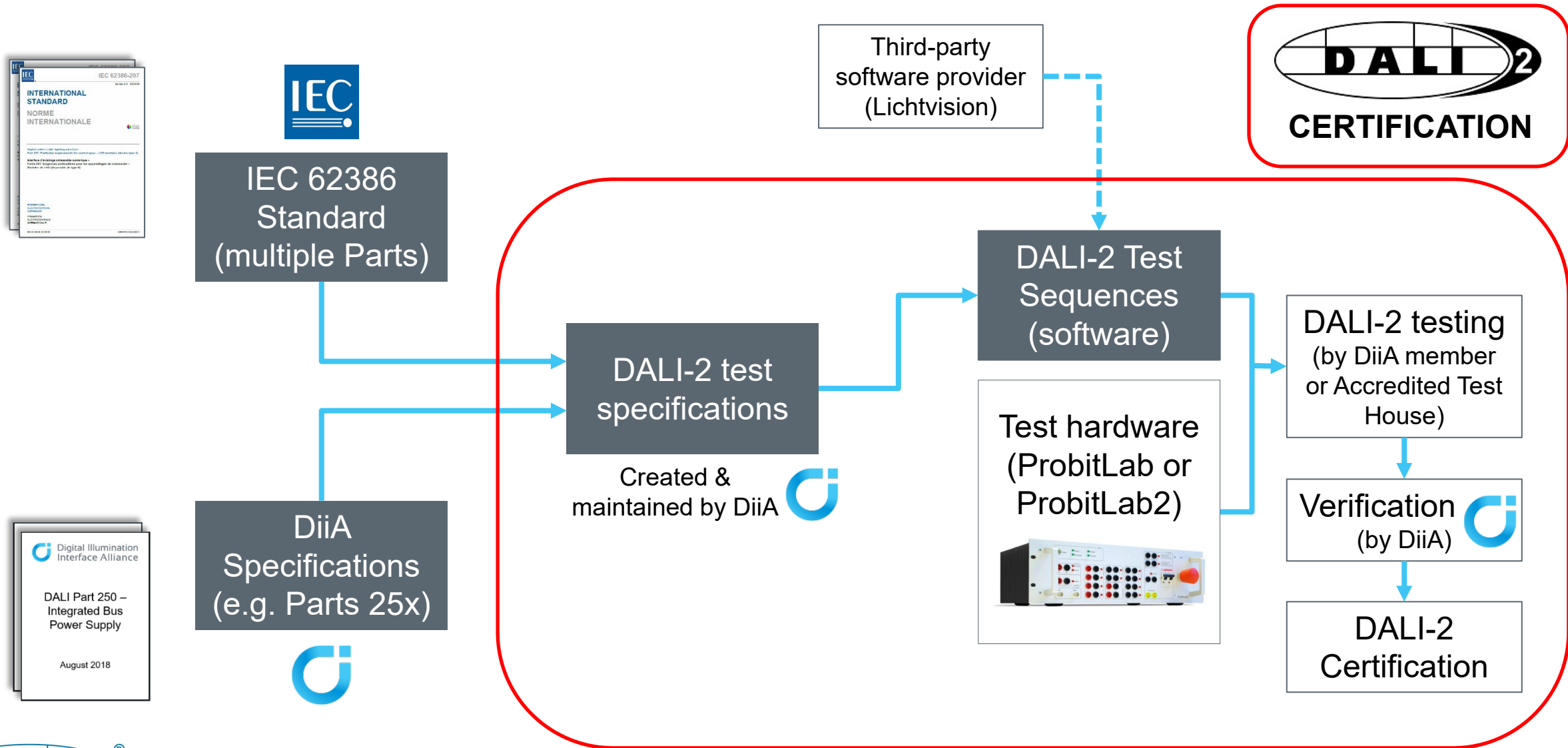
- **Created by the DALI Alliance** to enable DALI-2 certification
- Based on:
 - Individual Parts of **IEC 62386**
 - **DiiA Specifications**
- **Maintained and updated** by the DALI Alliance, with input from Plugfest events

Plugfests (interoperability test events)

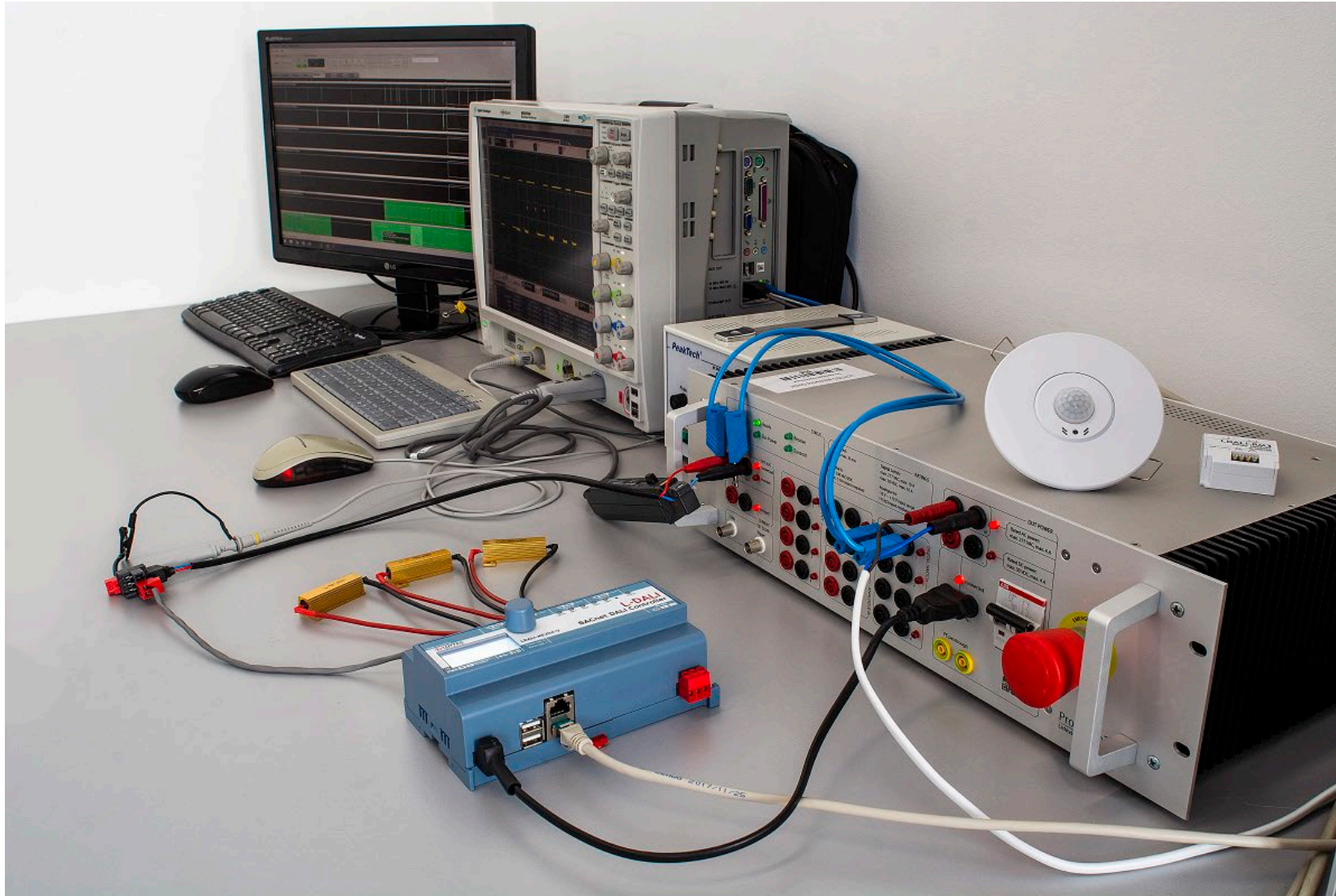
The DALI Alliance organizes interoperability test events (Plugfests) for members, which enable validation and further improvement of DALI-2 Test Procedures.



DALI-2 certification



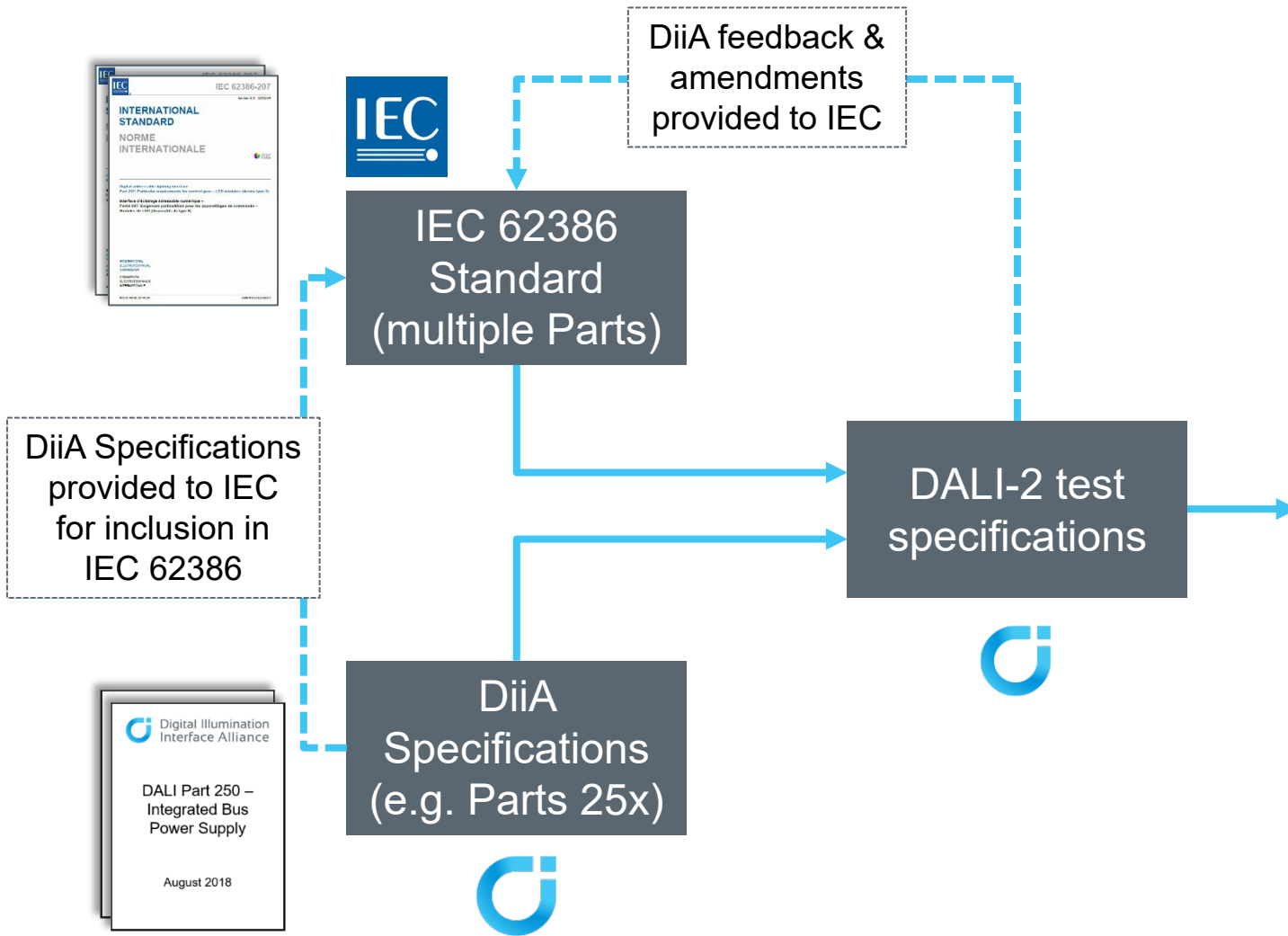
DALI-2 testing: Typical set-up



Testing procedures for DALI-2 are **much more detailed and comprehensive** than for DALI version-1, and are reviewed and updated as required.

Photo: LOYTEC GmbH

DALI Alliance works closely with IEC



- DiiA participates in the **IEC work group WG 11** of TC 34.
- WG 11 **develops and maintains IEC 62386**, the international DALI standard.
- DiiA provides **Clarifications and Recommendations** to WG 11, which are used by IEC in future updates of IEC 62386.
- **DiiA Specifications** are provided to IEC to be incorporated into IEC 62386.

IEC 62386 standard

Purchase standards via the [IEC website](#)
More details on IEC 62386: [DiiA website](#)

Part 101: General requirements – System components

Part 102: General requirements – Control gear

Parts 2xx: Particular requirements for control gear

Published:

- Part 201: Fluorescent lamps
- Part 202: Self-contained emergency lighting
- Part 203: Discharge lamps (excluding fluorescent lamps)
- Part 204: Low voltage halogen lamps
- Part 205: Supply voltage controller for incandescent lamps
- Part 206: Conversion from digital signal into DC voltage
- Part 207: LED modules
- Part 208: Switching function
- Part 209: Colour control

Part 104: General requirements – Wireless and alternative wired systems

Part 105: General requirements – Firmware transfer

DiiA publication (in preparation for IEC):
Part 150: General requirements – AUX power supply

Published:

- Part 216: Load referencing
- Part 217: Thermal gear protection
- Part 218: Dimming curve selection
- Part 220: Centrally-supplied emergency operation
- Part 221: Load shedding
- Part 222: Thermal lamp protection
- Part 224: Integrated light source
- DiiA publications (in preparation for IEC):**
- Part 250: Integrated Bus Power Supply
- Part 251 : Luminaire Data (Memory Bank 1 Extension)
- Part 252 : Energy Data
- Part 253 : Diagnostics & Maintenance Data

Part 103: General requirements – Control devices

Parts 3xx: Particular requirements for control / input devices

Published:

- Part 301: Push buttons
- Part 302: Absolute input devices
- Part 303: Occupancy sensors
- Part 304: Light sensors
- Part 332: Feedback
- Part 333: Manual configuration
- In progress:**
- Part 305: Colour sensor
- Part 306: General-purpose sensor
- DiiA publications (in preparation for IEC):**
- Part 351: Luminaire-mounted Control Devices

DiiA Specifications



Published DiiA Specifications:

www.dali2.org/specifications/download.html

Category	Name	Published	DALI-2*	D4i*
Power Supply Specifications	DALI Part 150 – AUX Power Supply	v1.1, Oct 2019	✓	✓
	DALI Part 250 – Integrated Bus Power Supply	v1.1, Oct 2019	✓	✓
Data Specifications for LED Drivers	DALI Part 251 – Memory Bank 1 Extension (luminaire data)	v1.1, Oct 2019	✓	✓
	DALI Part 252 – Energy Reporting (energy data)	v1.1, Oct 2019	✓	✓
	DALI Part 253 – Diagnostics & Maintenance (diagnostics data)	v1.1, Oct 2019	✓	✓
Specifications for Control Devices	DALI Part 351 – Luminaire-mounted Control Devices	v1.0, Oct 2019	✓	✓
Connectivity Specifications	Part 104 Changes & Additions	v1.01, April 2021	n/a	n/a
	Part 341 – Bluetooth Mesh to DALI Gateway	v1.01, April 2021	**	n/a
	Part 342 – Zigbee to DALI Gateway	v1.01, April 2021	**	n/a

* Availability of DALI-2 and D4i certification

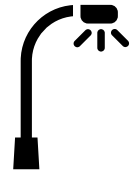
** In progress

DALI data specifications



- Data for enhanced asset management & performance monitoring
- Data storage in DALI memory banks, with standardized format & locations

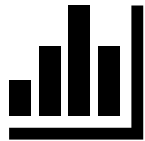
Luminaire Data



DALI Part 251 – Luminaire Data

- Information about the luminaire (e.g. ID code, light output, CCT & CRI, light distribution etc) can be stored in the control gear
- Enables asset management

Energy Data



DALI Part 252 – Energy Reporting

- Provides real-time power & energy usage for control gear

Diagnostics Data



DALI Part 253 – Diagnostics & Maintenance

- Operating data for control gear and lamps, including failure conditions, run-time data
- Enables predictive maintenance

These specifications are available from DiiA, and are also included in ANSI C137.4

DALI-2 certification: Parts available



Part 101: General requirements – System components

Bus power supplies

Part 102: General requirements – Control gear

Part 103: General requirements – Control devices

Application controllers

- Part 202: Self-contained emergency
- Part 205: Incandescent lamp dimmer
- Part 206: Conversion to DC (0/1-10 V)
- Part 207: LED drivers
- Part 208: Switches and relays
- Part 209: Colour control

- Part 250: Integrated bus power supply
- Part 251: Luminaire data
- Part 252: Energy data
- Part 253: Diagnostics data

- Part 301: Push buttons
- Part 302: Absolute input devices
- Part 303: Occupancy sensors
- Part 304: Light sensors

- Part 351: Luminaire-mounted control devices

Input devices

- In progress:
- Part 341: Bluetooth Mesh to DALI Gateway
 - Part 342: Zigbee to DALI Gateway

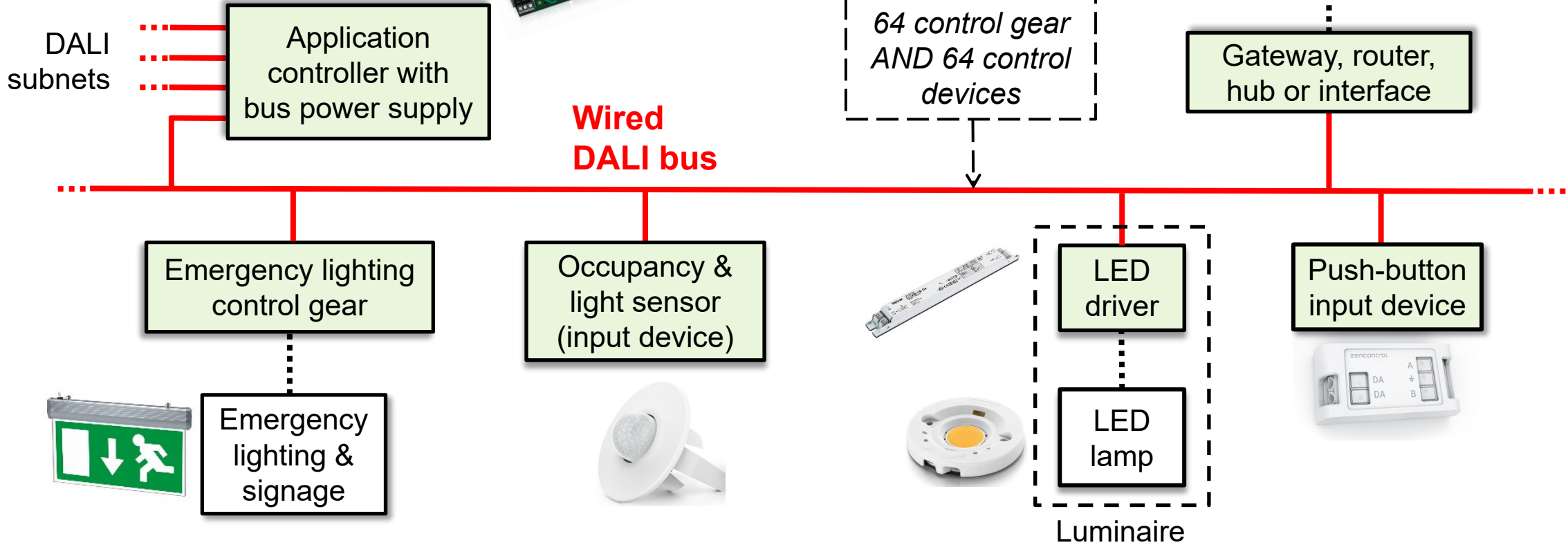
Current status:  www.dali-alliance.org/dali2/status.html

Wired DALI lighting-control system example



Each DALI subnet can have 64 control gear AND 64 control devices

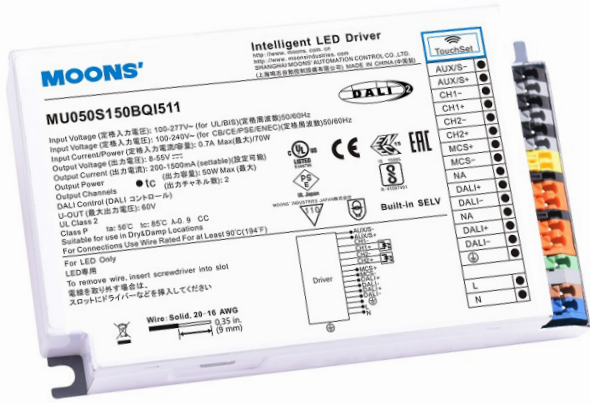
Network, backbone or building management system



DALI-2 LED drivers (control gear)



Certified DALI-2 LED drivers are available from a large number of suppliers



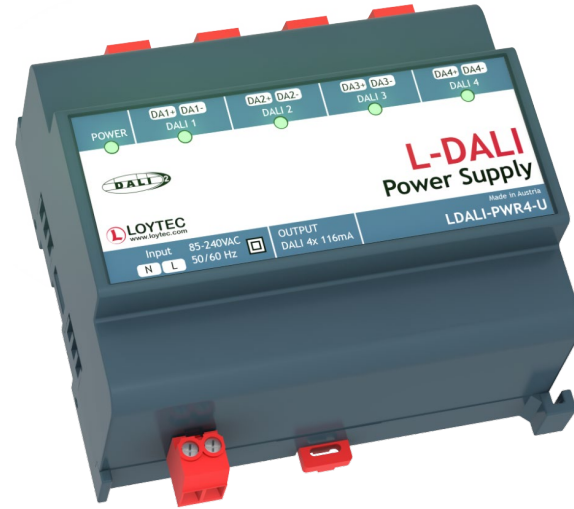
D4i-certified LED driver



DALI-2 application controllers, bus power supplies



DALI-2 single-master application controllers, with integrated bus power supplies



DALI-2 standalone bus power supply

DALI-2 multi-master application controller



DALI-2 input devices



DALI-2 input device (push-button switch)



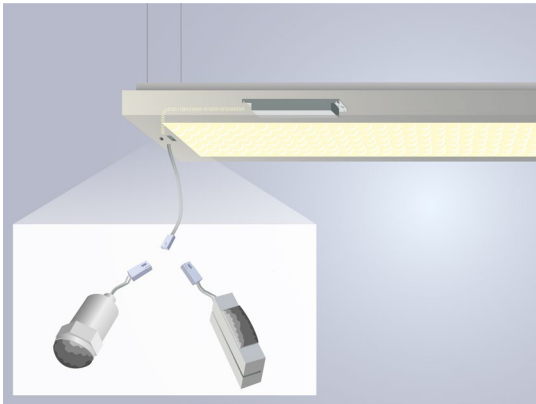
DALI-2 push-button coupler



DALI-2 occupancy and light sensor

Luminaires

- Community registration is free of charge for luminaire makers
- Enables DALI Trademark use for qualifying luminaires
- DALI Alliance does not offer certification of luminaires
- **DALI-2 luminaires** contain DALI-2 certified components from members
- **D4i luminaires** meet the requirements in “D4i Certification and Trademark Use”
- **Zhaga-D4i luminaires** are certified by Zhaga & listed in the Zhaga product database



Certified D4i and Zhaga-D4i products



D4i control device



Zhaga-D4i control device and luminaires



D4i LED driver



DALI Alliance contact information



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Thank you !!



Alliance

