

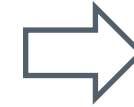
D4i: Standardization and Certification for Intra-luminaire DALI

April 2020



D4i specifications for intra-luminaire DALI

- D4i brings standardization to intra-luminaire DALI
 - D4i extends DALI-2 by adding a specific set of features
- D4i enables intra-luminaire DALI for smart luminaires by:
 - Taking care of power-supply requirements
 - Providing Luminaire, Energy and Diagnostics data
- D4i certification enables D4i logo use
 - Indicates interoperability of luminaires, LED drivers and control devices such as sensors and wireless transceivers
- D4i is aligned with the new ANSI C137.4 standard.
- D4i is compatible with socketed connector systems:
 - e.g. NEMA/ANSI C136.41 and Zhaga Book 18



Intra-luminaire DALI refers to a DALI bus inside an individual luminaire. The bus connects the LED driver(s) with any DALI-2 control devices such as sensors or application controllers.

D4i on the DiiA website:

www.dali2.org/d4i

Download specifications:

www.dali2.org/specifications/download.html

D4i products:

www.dali2.org/products



D4i enables smart, connected luminaires

- Intelligent luminaires:
 - D4i drivers store and report important data relating to luminaire, light source and driver
 - D4i sensors collect environmental inputs
- Connectivity:
 - D4i simplifies addition of wireless gateways to luminaires
 - Two-way communication between the DALI-enabled luminaire and the external lighting-control network
 - Stand-alone luminaires operate as IoT/network nodes
- Future-proofing:
 - D4i enables socketed systems
 - Allows addition and replacement of modules for sensing and communication
 - Luminaires easily upgraded to keep pace with rapid developments in digital networking technology

D4i: Power and Data

POWER – D4i takes care of **power-supply requirements** inside luminaires:

- D4i drivers with on-board bus power supply
 - Power available for DALI bus and some control devices
- D4i includes 24V auxiliary (AUX) power supply for higher-power requirements
 - e.g. city-wide wireless transceivers
- Eliminates components, simplifies designs, compatible with socketed systems

DATA – D4i includes LED drivers with **smart data** capabilities:

- D4i drivers can store and report data for:
 - Enhanced asset tracking
 - Performance monitoring (energy usage, diagnostics & maintenance)
- Data storage in DALI memory banks
 - Standardized format & locations
- Benefits include automated commissioning, asset tracking, accurate point-of-use billing, predictive maintenance etc

D4i power-supply specifications



- **DiiA Part 250 – Integrated Bus Power Supply**
 - For control gear with an integrated DALI bus power supply:
 - Suitable for powering some devices—such as sensors—in a luminaire
 - Memory bank:
 - Current ratings can be read
 - PSU can be enabled or disabled – allowing use in systems with multiple bus PSUs
 - For D4i certification, Part 250 must be included, with the bus PSU enabled by default.
- **DiiA Part 150 – AUX Power Supply**
 - 24V DC power supply
 - Can be built into control gear, or designed as a stand-alone product
 - Provides 3W average, 6W peak
 - Suitable for devices with higher-power requirements
 - e.g. City-wide wireless transceivers

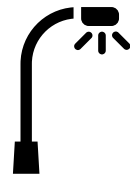
Data specifications for LED drivers



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



Luminaire Data

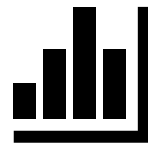


DiiA Part 251

- Includes luminaire supply power & voltage, light output, CCT & CRI, light distribution, luminaire colour and other luminaire data.



Energy Data



DiiA Part 252

- Active energy/power, apparent energy/power, load-side energy/power



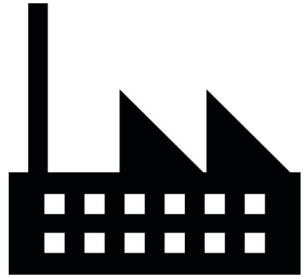
Diagnostics Data



DiiA Part 253

- Failure conditions for control gear and lamps, including counters.
- Control gear information: Operating time, start counter, supply voltage and frequency, power factor, temperature and output current.
- Light source information: Operating voltage, current, temperature, light source start counter, light source on time.

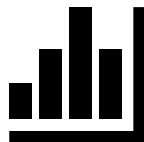
Smart Data for outdoor lighting



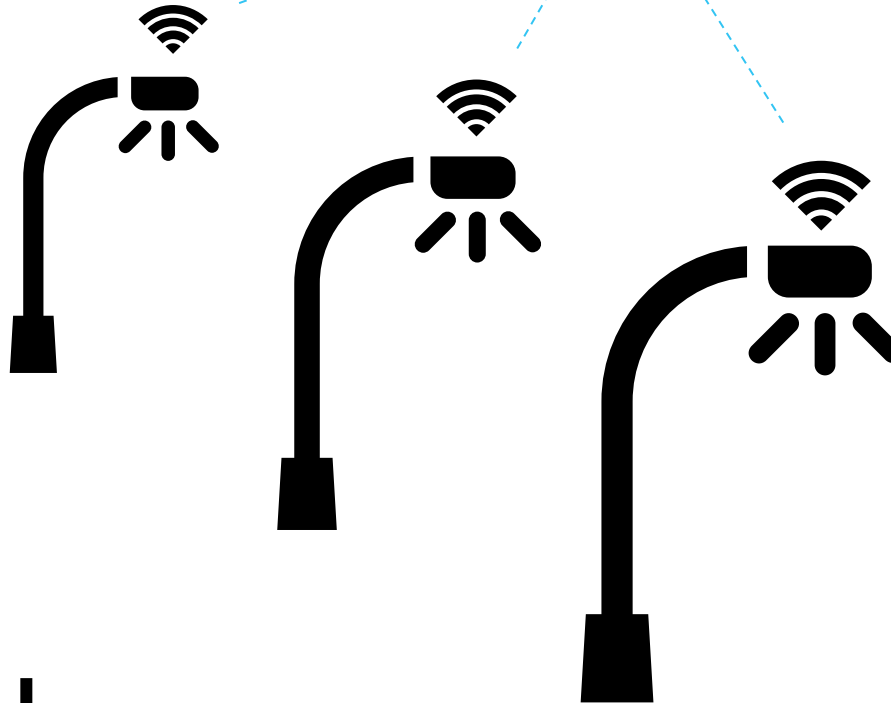
In the factory:
Luminaire data is
programmed into
drivers.

During operation:
Performance monitoring

- Energy usage data can be used e.g. for accurate billing.



Network



In the field:

Automated commissioning

- When installed, luminaire automatically transfers data to remote network.
- Reduces human error, saves installation time and cost.
- Operator has a full map of asset information.

During operation:

Predictive maintenance

- Diagnostics data allows network operator to anticipate need for maintenance.
- Repair team has knowledge of location and type of fixture



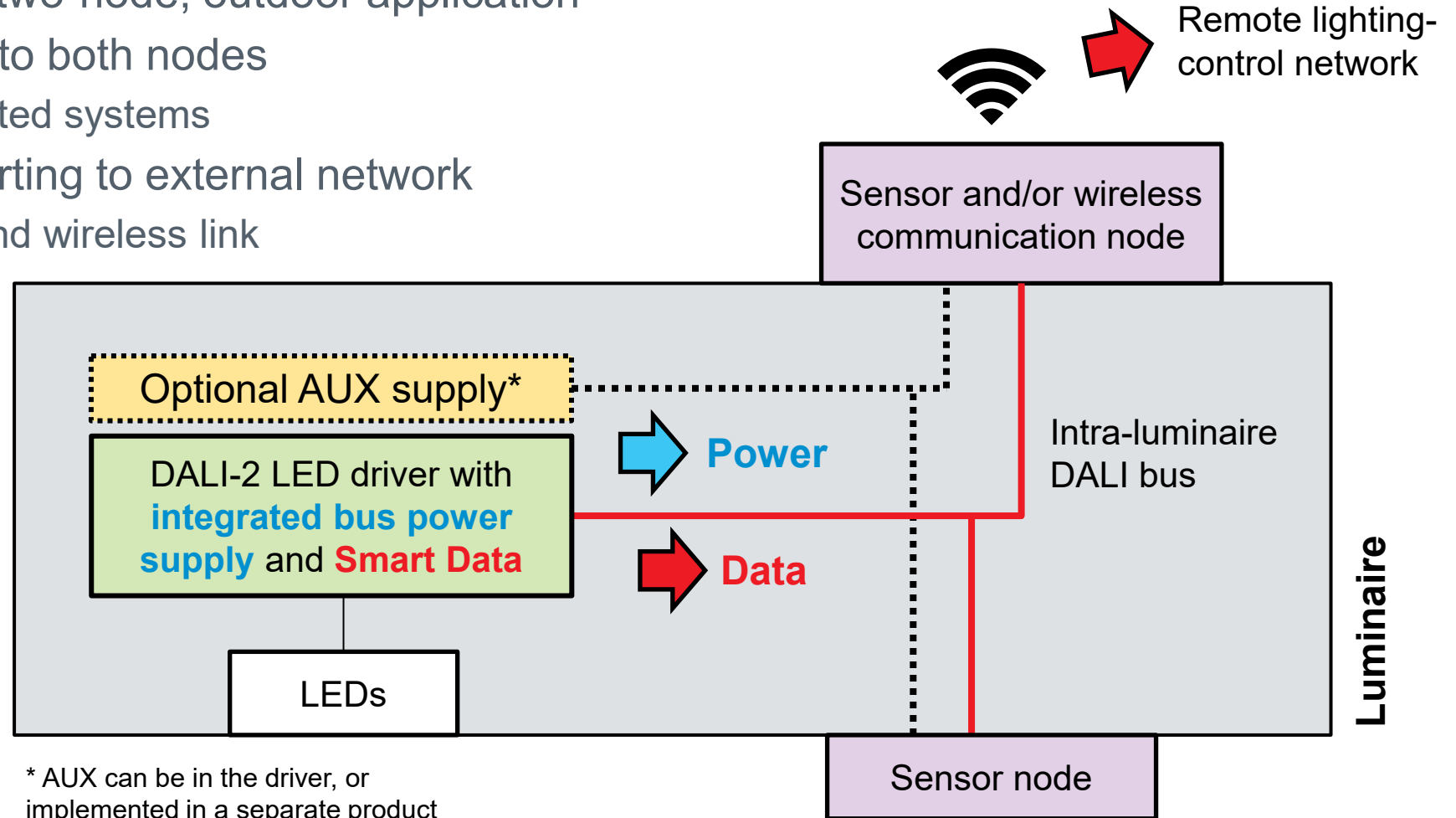
Part 351 for control devices



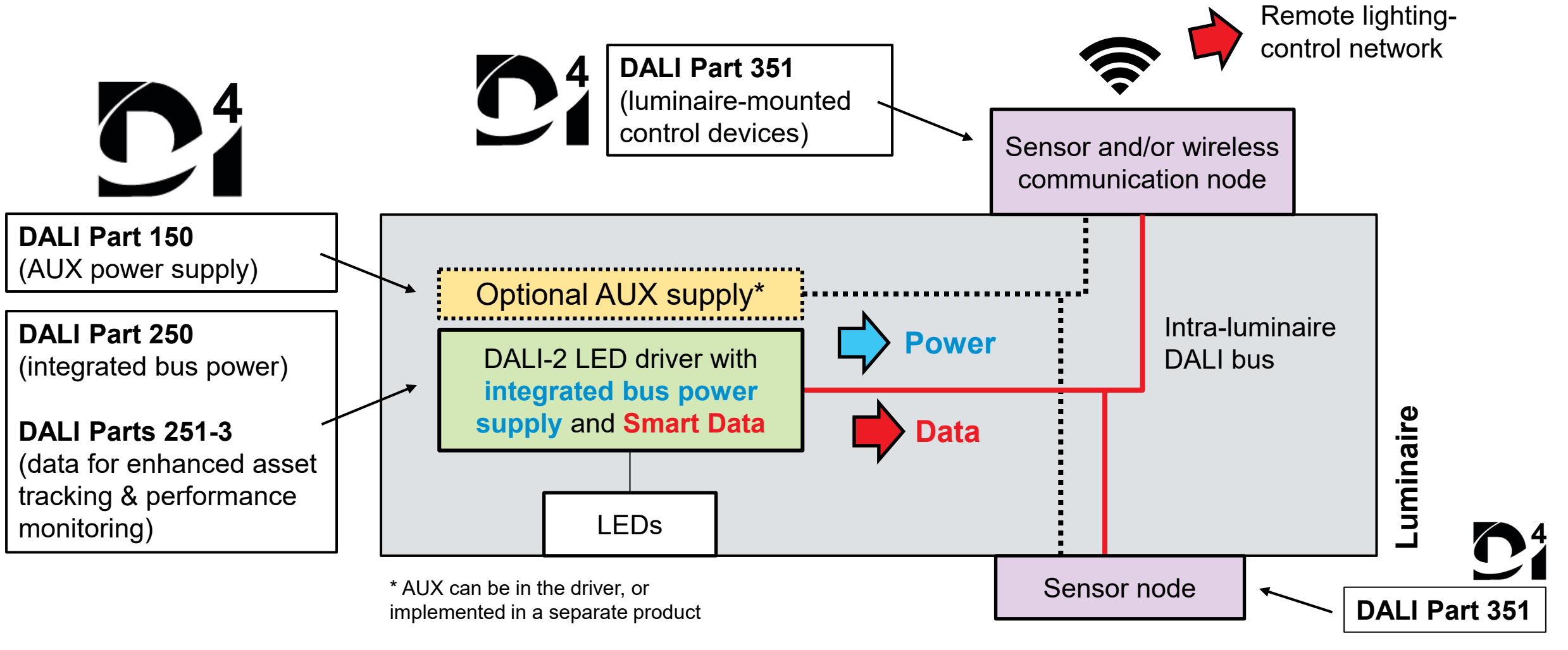
- **DiiA Part 351 – Luminaire-mounted control devices**
 - Examples: Sensors, wireless communication nodes with a DALI gateway
- Control devices can be bus-powered or externally powered (e.g. by AUX supply).
- Part 351 specifies four types of control device (types A-D)
- Specification includes:
 - Requirements for power consumption
 - A mechanism to arbitrate between multiple application controllers
 - A memory bank definition for multi-master devices

Intra-luminaire DALI

- Example shows two-node, outdoor application
- Power available to both nodes
 - Supports socketed systems
- Smart Data reporting to external network
 - Via DALI bus and wireless link



D4i specifications



D4i specifications



- The following D4i specifications are available from the [DiiA website](#):

Specification	Name	Version
DiiA Part 150	AUX Power Supply	v1.1, Oct 2019
DiiA Part 250	Integrated Bus Power Supply	v1.1, Oct 2019
DiiA Part 251	Memory Bank 1 Extension (Luminaire Data)	v1.1, Oct 2019
DiiA Part 252	Energy Reporting	v1.1, Oct 2019
DiiA Part 253	Diagnostics & Maintenance	v1.1, Oct 2019
DiiA Part 351	Luminaire-mounted Control Devices	v1.0, Oct 2019



- The following document is also available:

DiiA Requirements	Version
D4i Certification and Trademark Use	v1.1, Apr 2020

D4i certification and trademarks

- D4i is a new certification program from DiiA, launched in November 2019
- D4i certification is available for:
 - LED drivers
 - Stand-alone AUX power supplies
- Control devices will be added later
- Detailed requirements for D4i certification are explained in the document “**D4i Certification and Trademark Use**”
- D4i certification enables the use of the **D4i logo trademark**
 - Currently on LED drivers only
 - The D4i logo and wordmark are trademarks in various countries in the exclusive use of DiiA
 - D4i certification and trademark use is available for DiiA members only
 - D4i luminaires can also use the D4i trademarks
- D4i-certified products are listed in the DiiA product database
 - See www.dali2.org/products



D4i certification by product type

D4i product type	Requirements for certification	Testing
LED drivers	<p>D4i certification is <u>now available</u> for products that:</p> <ul style="list-style-type: none"> Implement all of Parts 250 and Parts 251-253 Optionally implement Part 150 Meet the requirements in “D4i Certification and Trademark Use” 	Testing is an extension of DALI-2, using ProbitLab2
Standalone AUX power supplies	<p>D4i certification is <u>now available</u> for products that:</p> <ul style="list-style-type: none"> Implement Part 150 	Tests are manual and do not use the ProbitLab2
Luminaires	<p>Certification of luminaires is not currently offered.</p> <ul style="list-style-type: none"> D4i Trademark use allowed on luminaires meeting the requirements in “D4i Certification and Trademark Use” 	n/a
Control devices	<p>Certification is not currently available. Will be available later for products that:</p> <ul style="list-style-type: none"> Implement Part 351 	Testing is an extension of DALI-2, using ProbitLab2

ANSI C137.4-2019 standard

- New ANSI C137.4-2019 standard is aligned with D4i
 - “**American National Standard for Lighting Systems—Digital Interface with Auxiliary Power**”
 - See [DiiA News](#)
- DiiA is represented on the C137 committee, which developed the new standard.

DiiA specifications	Relationship with ANSI standard
DiiA Part 250 – Integrated Bus Power Supply	Included in ANSI C137.4-2019
DiiA Part 150 – AUX Power Supply	
DiiA Part 251 – Memory Bank 1 Extension (luminaire data)	
DiiA Part 252 – Energy Reporting	Expected to be included (by reference) in future version
DiiA Part 253 – Diagnostics & Maintenance	
DiiA Part 351 – Luminaire-mounted control devices	

