lumenradio

Going from Wired to Wireless with W-DALI

Your practical guide to getting started with wireless control for DALI lighting

Wireless control is smarter control

DALI (Digital Addressable Lighting Interface) has become one of the most widely adopted protocols for commercial and industrial lighting control. Its open standard and interoperability between manufacturers have made it the go-to choice for offices, retail spaces, educational institutions and factories worldwide.

However, as buildings evolve, so do the expectations for lighting systems. Facility managers, electrical contractors and lighting designers are increasingly looking for solutions that offer more flexibility, faster installation and greater energy efficiency.

This guide is designed to help you understand how wireless control can unlock the full potential of your DALI infrastructure. You'll learn what makes wireless control for DALI lighting different, how it works in practice and how LumenRadio's W-DALI solution can help you retrofit without costly rewiring, downtime or compromise.

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CHAPTER ONE

Why go wireless with W-DALI?

The limitations of wired DALI

As the landscape of building infrastructure is evolving and buildings become smarter, the limitations of traditional cabling are becoming more apparent. Facility managers are expected to adapt lighting to new layouts on short notice, contractors are asked to minimize downtime during upgrades and sustainability targets call for energy-efficient systems that can be deployed without wasteful renovations. In this environment, a purely wired infrastructure can feel rigid, costly and slow to adapt.

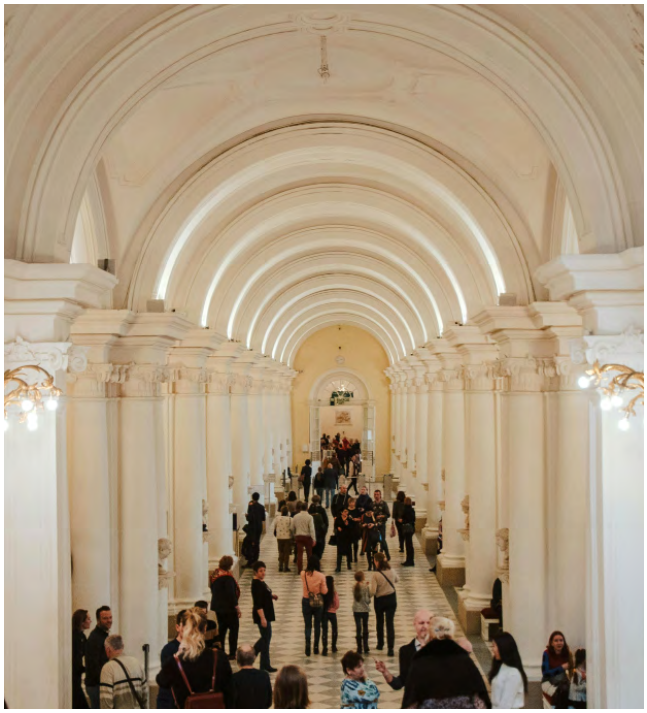
- **High cost of rewiring** – pulling new control cables through ceilings and walls can be labor-intensive and expensive.
- **Inflexibility** – changing room layouts or expanding the lighting system often means additional wiring work and construction.
- **Lengthy installations** – in occupied buildings, the downtime and disruption caused by pulling new DALI cables can be a major headache.
- **Time-consuming troubleshooting** – localising a fault in a traditional wired DALI network requires step-by-step isolation of segments. Checking each luminaire or connection can involve hours of trial and error before finding the root cause.

The benefits of wireless control with W-DALI

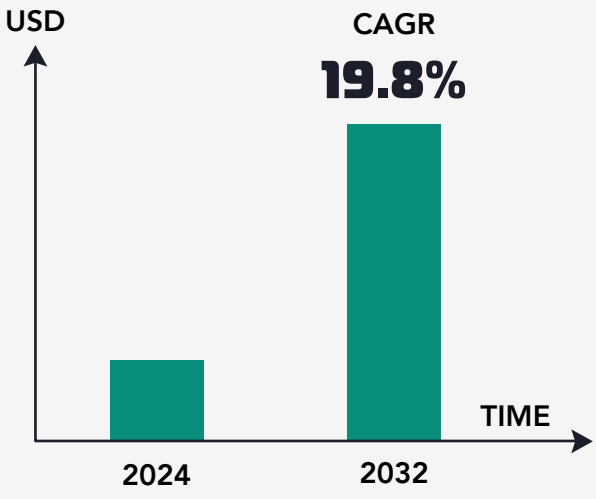
W-DALI delivers the same trusted DALI functionality, but without the constraints of physical wiring. By replacing control cables with secure, reliable wireless communication, W-DALI opens the door to faster projects, more flexible spaces and retrofit opportunities that would otherwise be impractical.

- **No new control cables** – keep your existing DALI luminaires, drivers and controllers but remove the need for new wiring.
- **Faster deployment and commissioning** – install and configure devices in a fraction of the time and without disruption to tenants.
- **Ideal for retrofits and heritage projects** – avoid invasive work in protected or hard-to-access spaces.
- **Open and interoperable** – no vendor lock-in and no need to learn a new programming language.
- **Troubleshooting** – compared to a wired system, errors in a wireless network can be quickly found and actioned.

By removing the physical constraints of wiring, W-DALI makes it possible to modernise your lighting system quickly, cleanly and cost-effectively – while keeping the same level of control and reliability you expect from DALI.



Smart lighting market



Wireless on the rise

- The global smart building market is set to soar from around USD 139 billion in 2025 to approximately USD 310 billion by 2030, growing at a robust 17.3% compound annual growth rate (CAGR) (**Mordor Intelligence**)
- The smart lighting market – a key component of building intelligence – is expected to climb globally from USD 16.8 billion in 2024 to nearly USD 70 billion by 2032, at a 19.8% CAGR (**P&S Intelligence**)
- By building lifecycle, retrofit projects already represent 62.5% of today's global smart building deployments – and wireless connectivity is accelerating, forecast to rise at an 18.8% CAGR to 2030 (**Mordor Intelligence**)

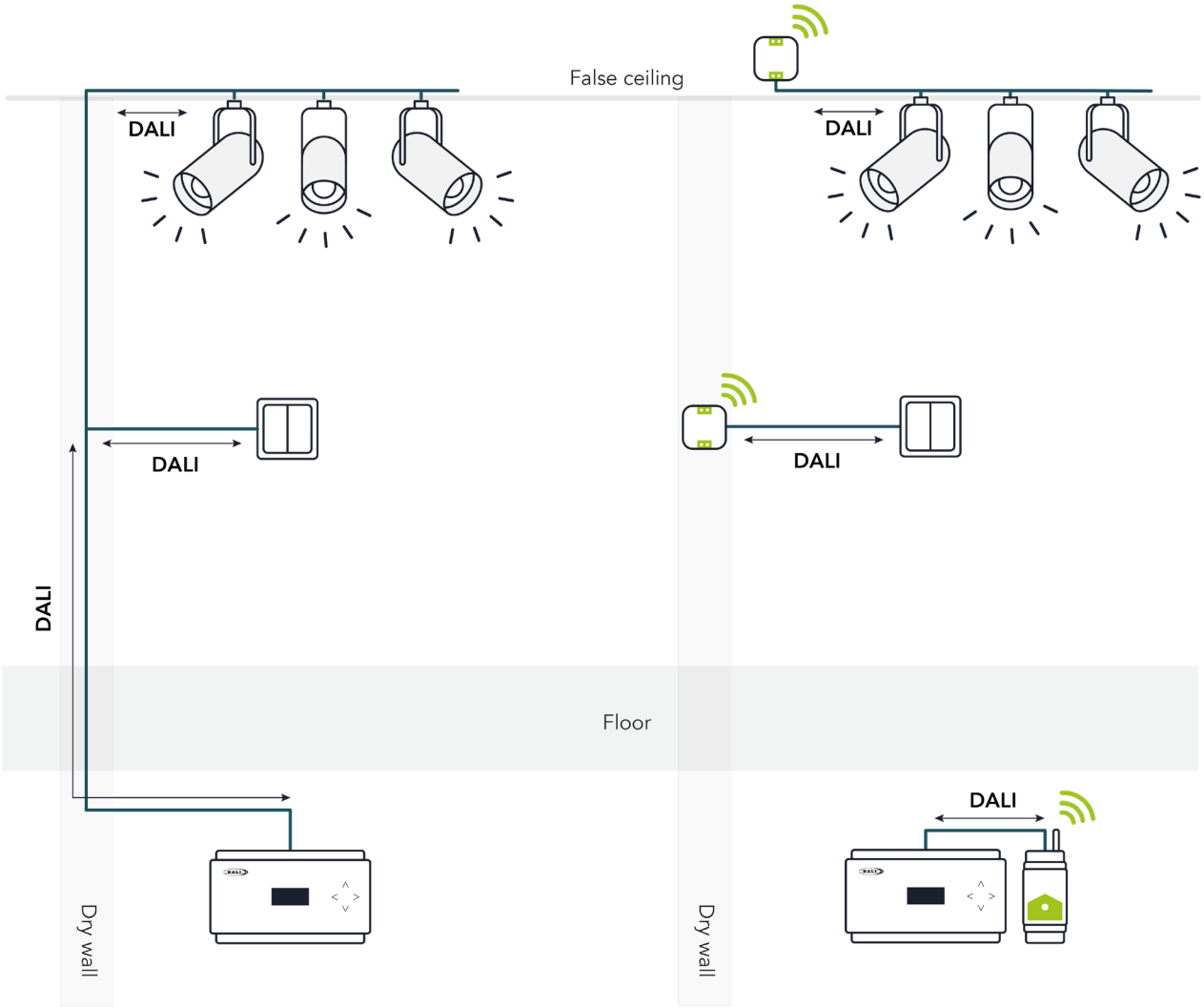
CHAPTER TWO

It's DALI, just without the cable

What is W-DALI?

In a wired DALI network, a DALI controller communicates with luminaires across a building through a two-wire cable. With W-DALI, those same commands are carried over a wireless mesh network. W-DALI quite simply replaces the traditional DALI control cable with wireless communication.

Wired DALI **W-DALI**



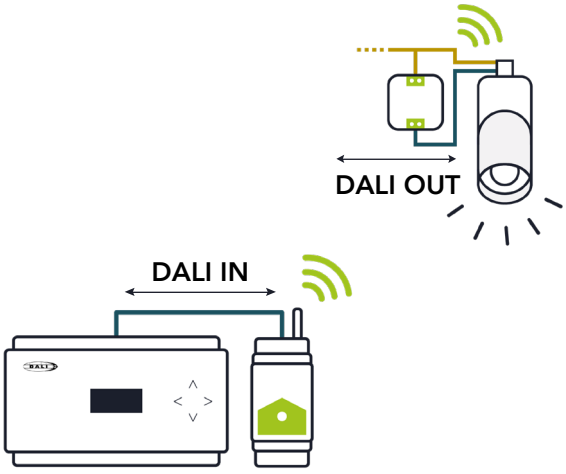
Core components of a W-DALI system

The transmitter – a W-DALI DIN Rail

Designed to be mounted in an electrical cabinet and connected to the existing DALI controller. Can also be used as a receiver for extra range.

The receiver – a W-DALI Node

Wirelessly receives DALI data for up to 10 DALI devices. W-DALI nodes are installed either in a junction box or inside the luminaire itself. Integrated DALI PSU for powering your DALI devices – so no need for an extra power source for your luminaires.



Key features of W-DALI

- **DALI in, DALI out** – W-DALI is standard-compliant – there are no changes to the protocol itself and no new programming languages to be learnt.
- **Full DALI-2 compatibility** – W-DALI is designed to work with all existing DALI controllers and luminaires supporting the DALI-2 protocol so there is no vendor lock-in.
- **Hybrid systems** – wired and wireless DALI segments can coexist in the same installation.
- **Plug-and-play retrofit** – existing installations can be upgraded without tearing out cables or replacing luminaires.
- **Low latency, high reliability** – LumenRadio's patented wireless technology ensures secure communication and stable operation, even in crowded wireless spaces and complex building environments.

For more on the wireless technology behind W-DALI, see Chapter 4.

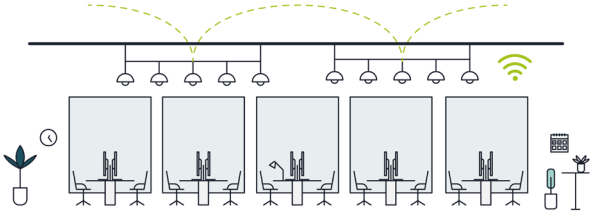
CHAPTER THREE

Use cases and applications

Giving buildings the flexibility to keep getting smarter

Every lighting project presents its own set of challenges – whether it's adapting to new tenants, preserving a historical interior or extending control to outdoor areas. This is where W-DALI really proves its worth. By eliminating the need for new control cabling, projects are made simpler, faster and more cost-effective.

Here are some of the most common scenarios where W-DALI delivers a clear advantage:



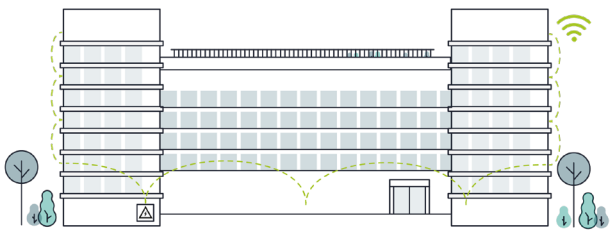
Retrofitting office buildings

Modern office spaces evolve constantly – open-plan one year, partitioned the next. With W-DALI, lighting systems can be reconfigured to match new layouts without pulling new cables. Contractors save time, facility managers avoid downtime and employees experience minimal disruption.

This also makes W-DALI ideal for retrofitting sites like schools, hospitals or hotels where it is not only inconvenient but often unfeasible to close down sections of the building.

Historical buildings and protected properties

Heritage buildings come with strict regulations that prohibit drilling and installing new cabling. Even minor alterations can risk damaging the building's historical character. With W-DALI, you can introduce modern lighting control whilst preserving the integrity of walls, ceilings and other decorative features.

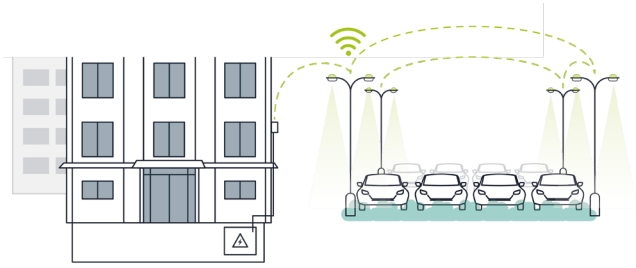


Multi-tenant commercial properties

In multi-tenant office buildings, tenant turnover often requires fast adaptations. W-DALI makes it easy to isolate and reconfigure lighting control one section at a time, without any construction work or disruption to daily business.

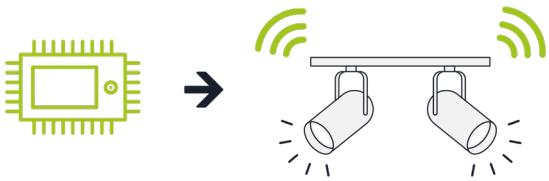
Expanding smart buildings

As smart building projects grow, scalability is key. W-DALI allows new lighting zones or additional luminaires to be added wirelessly, integrating seamlessly with existing wired DALI infrastructure. This flexibility supports long-term building automation strategies and makes it easier to adapt to tenant growth, building extensions or evolving space usage.



Extending indoor control to outdoor lighting

From parking lots to building facades, outdoor areas often present wiring challenges. With accessories such as external antennas and outdoor kits, W-DALI extends the reach of indoor control networks to outdoor luminaires.



Lighting fixtures (OEM integration)

The whole timeline for the integration of the W-DALI module into a lighting fixture – from testing to product launch – can be completed in less than one year. With pre-certification, technical reliability and minimal engineering required, this ensures a smooth and swift implementation process.

Emergency lighting (OEM integration)

For OEMs developing emergency lighting solutions, W-DALI provides standards-compliant, DALI in-DALI out wireless control, ideal for product integration. Since the W-DALI module is pre-certified this also ensures a faster time to market.

Use case	Typical challenges	How W-DALI helps
Retrofitting office buildings	Rewiring disrupts tenants, high cost, long installation times	Avoids downtime and enables quick reconfiguration of lighting for new layouts
Historical buildings	Invasive construction work is not allowed, ruling out installation of new control cables	Modernizes lighting while preserving all protected features
Multi-tenant commercial properties	Frequent tenant turnover, need for flexible zoning	Simplifies reconfigurations, supports isolation of lighting control for different tenants
Expanding smart buildings	Adding new rooms or floors requires extending cabling and added cost	New lighting zones are integrated easily, at less cost and with zero disruption
Indoor-to-outdoor	Running cables to outdoor areas, like carparks, is costly and requires digging	Indoor lighting control can be extended to outdoor areas using the indoor controller
Lighting fixtures (OEM)	Integration process is lengthy	Pre-certification and minimal engineering ensure a quick time to market
Emergency lighting (OEM)	Adding wireless capability requires a pure DALI solution	DALI in-DALI out with pre-certified modules for faster time to market

CHAPTER FOUR

How it works: technical overview

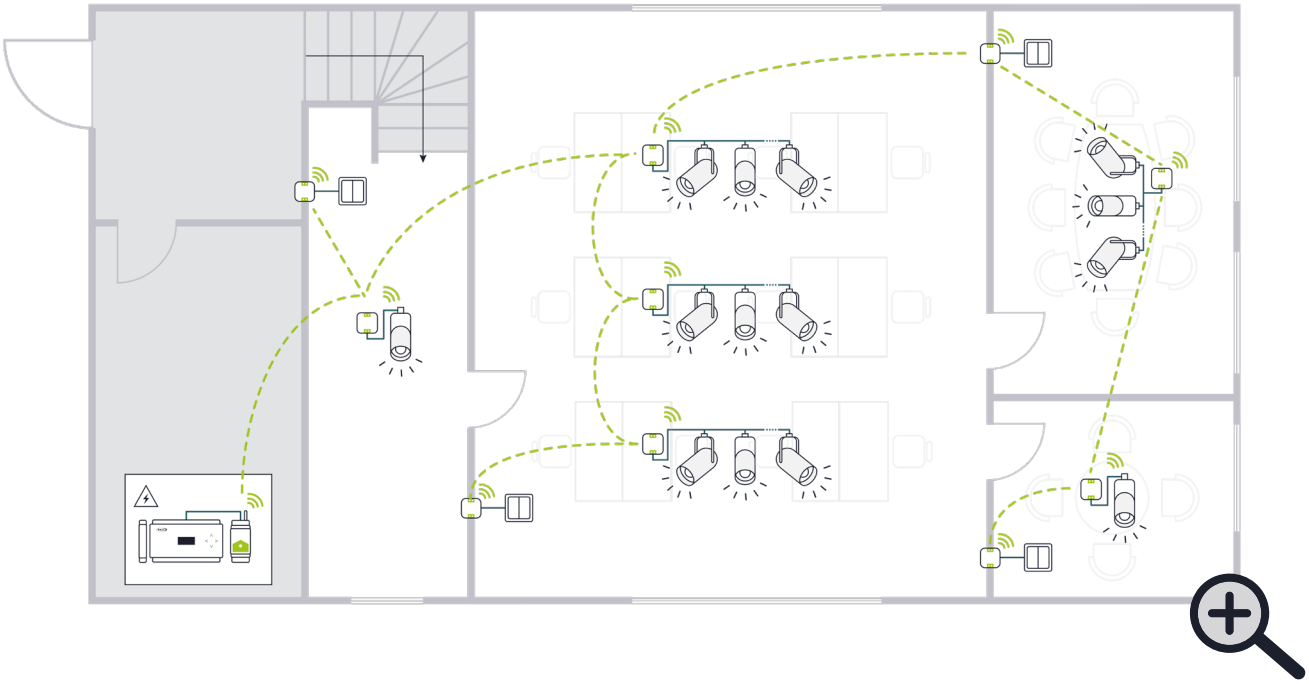
W-DALI is built on a simple but powerful principle: it behaves exactly like a wired DALI line – only without the cable. Instead of running commands over a physical two-wire bus, W-DALI carries the same DALI messages across a secure wireless mesh network.

From the controller's point of view, nothing changes. The system remains fully DALI-compliant: DALI in, DALI out. All luminaires, drivers and controllers continue to work as expected, with no new programming language to learn and no compromise on functionality.

Behind the scenes, a W-DALI DIN Rail unit acts as the wireless bridge, transmitting commands to W-DALI Nodes that distribute them to the connected luminaires. Together, these devices form a self-healing wireless mesh that ensures commands are delivered reliably, even in complex or interference-prone environments.

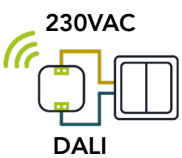
The result is wired-DALI behavior delivered wirelessly – combining the trusted standard of DALI with the flexibility, speed and scalability of LumenRadio's patented wireless technology.

System overview

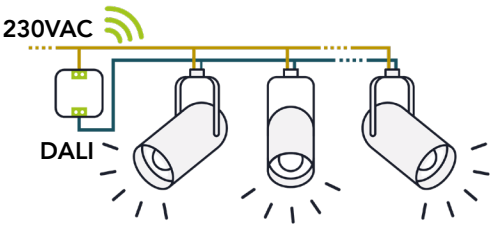


24VAC/DC

W-DALI DIN rail can also be powered from the DALI bus



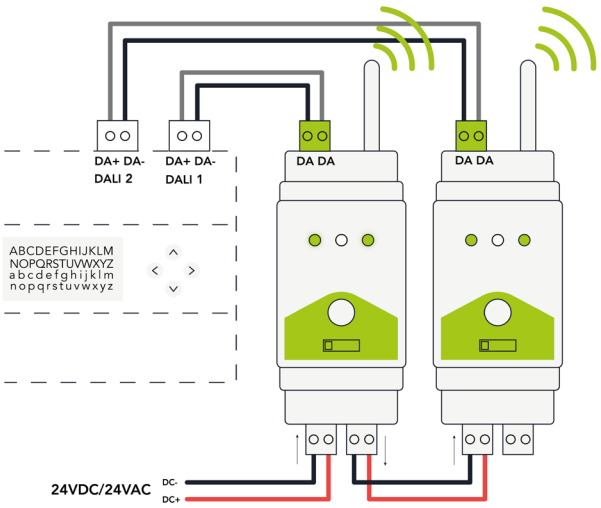
Built in DALI PSU in the W-DALI Node



Up to 10 individually controlled devices per W-DALI Node

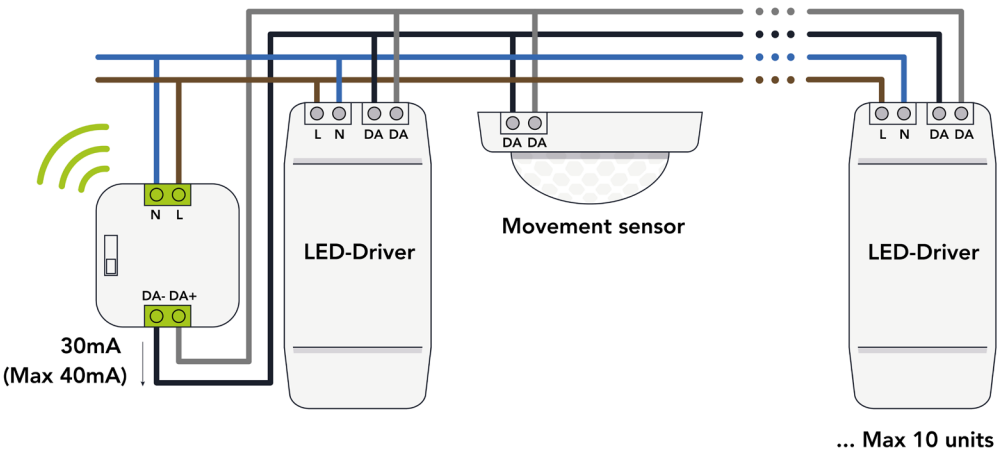
W-DALI DIN Rail – wireless transmitter

- **Direct connection** – Easily connects to your DALI controller.
- **No address consumption** – Functions just like a DALI cable.
- **Flexible power options** – Operates via DALI or 24V AC/DC.
- **Full DALI subnet management** – Supports up to 64 control gear (e.g. LED drivers) and 64 DALI-2 control devices (e.g. sensors & buttons).
- **Available in receiver mode** – Configure your DIN rail as a W-DALI Node to extend your network further.

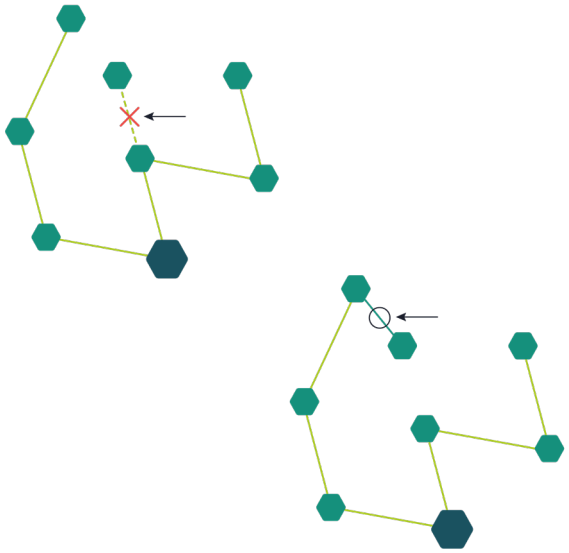


W-DALI Node – wireless receiver

- **Versatile connections** – Connects to LED drivers and DALI control devices with up to 10 addressable DALI devices per W-DALI node.
- **Integrated power supply** – 216-253VAC powered with built-in 30mA DALI PSU.
- **Compact design** – Small footprint, fits in an appliance box.
- **Secure and reliable** – Locked to a W-DALI DIN rail with unique encryption, ensuring no disruption from other W-DALI nodes.



How W-DALI leverages LumenRadio's core wireless technology



W-DALI and wireless mesh

W-DALI is powered by LumenRadio's unique wireless mesh technology. Unlike simple point-to-point connections, a mesh network allows every node to communicate with multiple others, creating a self-configuring, self-healing network. If one path is blocked, data automatically reroutes, ensuring high reliability and long-range coverage across an entire building.

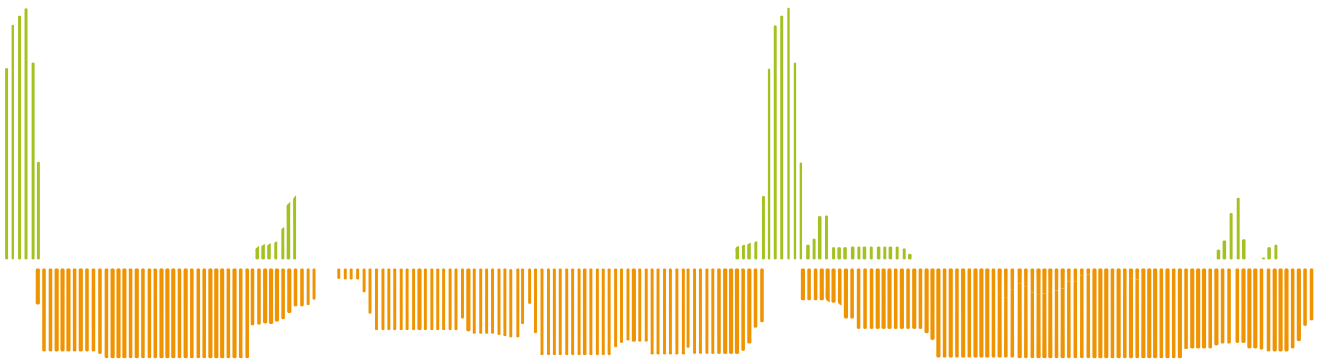
For more on this, check out our Beginner's Guide to Wireless Mesh.

W-DALI and Cognitive Coexistence

W-DALI – like all of LumenRadio's wireless control solutions – is built on a patented technology called Cognitive Coexistence. Compared to normal wireless systems, Cognitive Coexistence is "interference-immune", making far more effective use of the gaps on the overcrowded 2.4 GHz frequency band to ensure the signal always gets through.

This is why it has become a technology relied upon by professionals in industries like entertainment lighting, industrial IoT and building automation.

For a deeper dive on just how reliable LumenRadio's wireless communication is, download our Insider's Guide to Cognitive Coexistence.



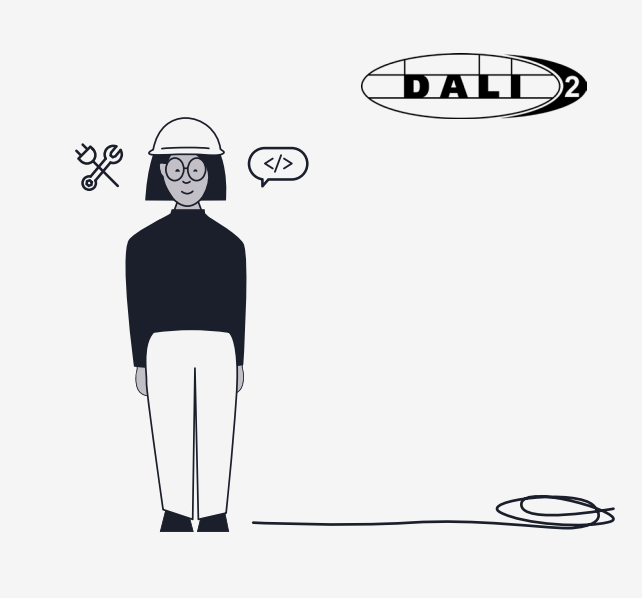
CHAPTER FIVE

Getting started: what you need

One of the strengths of W-DALI is that is doesn't require a complete system overhaul. If you already have an existing DALI installation or are used to working with a specific type of controller, adding wireless capabilities has never been easier. Below is a handy list to help you understand what's required before you begin.

Essentials for deploying W-DALI

- **Skills & knowledge** – Electricians and installers do not need to spend time learning a new programming language. Think of W-DALI as a wireless DALI cable. All you need is an understanding of standard DALI installation principles.
- **Existing DALI infrastructure** – Check your existing DALI infrastructure. The W-DALI Node has a built in DALI PSU with a capacity of 30 mA.
- **W-DALI components** – You will need one W-DALI DIN Rail acting as a transmitter in the system. Connect the DIN Rail to one of your DALI output ports on your DALI controller. In addition, you need at least one W-DALI Node acting as a receiver in the system. Connects to LED drivers and DALI control devices with up to 10 addressable DALI devices per W-DALI node.



- **Basic setup tools & software** – There are two ways to complete the W-DALI commissioning once the units have been installed at site, with or without the W-DALI app.

– With app

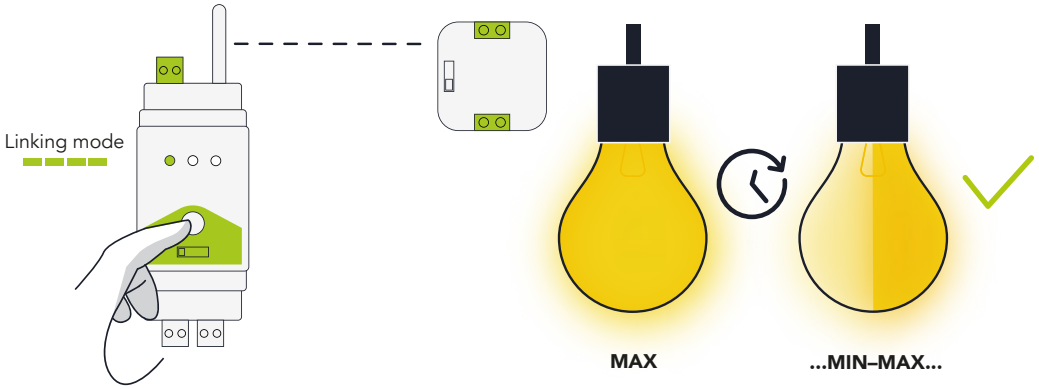
This method is recommended when multiple DALI subnets are powered on in the same area. Using the app, simply walk through the space and add each node to the W-DALI subnet. You only need to be within Bluetooth range of a Node to complete the process; physical access to the Node is not required.

Watch the full installation guide or download the instructions for use.

– Without app

This approach is recommended when you can power each W-DALI network one at a time. Power on the W-DALI Nodes and the W-DALI DIN rail you want to include in the network, then simply press the button on the DIN rail. All the luminaires pulse with min-max intensity. Once the button has been pushed again, commissioning is complete.

Watch the full installation guide or download the instructions for use.



CHAPTER SIX

Frequently asked questions

Does it support DALI-2?

Yes. Both DALI-2 and DALI version 1 are supported by W-DALI. Proprietary DALI frames and non-standard DALI is however not supported.

What's the range of the wireless signal?

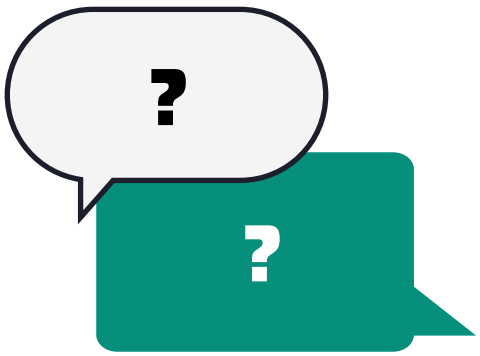
Up to 500 meters (free line of sight) between a W-DALI DIN Rail transmitter and a W-DALI Node receiver. 70-100m indoors. From a W-DALI Node receiver to another W-DALI Node receiver, 40-70m indoors. Note that the range achieved is affected by the surrounding conditions and the choice of antenna. The distance will be shorter when used indoors depending, for example, on the type of material used in a building for walls and ceilings, and also depending on where and how the W-DALI devices are mounted. The W-DALI mesh network supports up to 8 mesh hops.

Can I mix wired and wireless DALI?

Yes, other DALI devices be connected on the same DALI bus as the W-DALI DIN Rail.

Is it secure?

Yes, W-DALI uses AES-128 encryption when communicating wirelessly



How is commissioning done?

First you need one W-DALI DIN Rail transmitter and at least one W-DALI Node receiver. The W-DALI mesh network can then be created in a few steps by adding W-DALI Nodes to the W-DALI DIN Rail – with or without our app. It is also possible to remove W-DALI Nodes if necessary. For further details, you can download W-DALI instructions for use.

Which controller does it work with?

W-DALI is designed to work with all controllers which are compliant with the DALI-2 protocol. Support is not guaranteed for proprietary commands.

How many nodes will one transmitter support?

Up to 128 W-DALI Nodes can be connected to one W-DALI DIN Rail. This is also the maximum amount of DALI devices which can be connected in a single W-DALI mesh network.

Does W-DALI work with other devices such as daylight sensors or occupancy sensors?

Yes, as long as you make sure that the sensors are DALI-2 compliant to ensure full compatibility.

APPENDIX

W-DALI assessment checklist

Is wireless lighting control right for this building?

This checklist is designed as a practical tool for system integrators. It can be used in two ways:

Internally – to help you quickly identify which of your projects or customers might be strong candidates for W-DALI wireless lighting control.

With customers – as a conversation guide to sit down together, walk through the questions, and highlight the specific reasons why a wireless retrofit could make sense for their building.

By going through the checklist, you'll uncover where W-DALI delivers the most value – whether that's avoiding disruptive rewiring, meeting sustainability goals or enabling more flexible, future-proof lighting control.

1. Infrastructure & maintenance

- [ ] Is the DALI infrastructure still functional, but limited by cabling?
- [ ] Would avoiding invasive rewiring (dust, downtime, disruption) be a major advantage?

2. Flexibility & space usage

- [ ] Are layout changes expected (e.g. open office to partitions, tenant turnover, expansions)?
- [ ] Are more adaptable zoning or room-based control needed but without extra cabling?
- [ ] Would faster project timelines (less disruption for tenants/operations) make upgrades more viable?

3. Energy & sustainability

- [ ] Is the current lighting system inefficient compared to modern LED and control solutions?
- [ ] Are there corporate sustainability/ESG goals or certification targets (e.g. LEED, BREEAM, WELL)?
- [ ] Are rising energy costs a concern?

4. Compliance & safety

- [ ] Are there updated building codes for energy efficiency or emergency lighting which need to be met?
- [ ] Does compliant emergency lighting need to be added or new sensors integrated into your system?
- [ ] Is wireless the only practical option (heritage/protected buildings, hard-to-access areas, outdoor spaces)?

5. Future-proofing & integration

- [ ] Should the lighting system be integrated into a larger smart building/BMS platform?
- [ ] Would adding IoT sensors, human-centric lighting or advanced scheduling be valuable?
- [ ] Should the building be ready for future tenant and/or technology needs?

If you checked several of the boxes above, this building is in a strong position to benefit from W-DALI wireless lighting control.

Wireless Without Worries

Want to learn more about frequency-friendly, rock-solid wireless technology?

LumenRadio offers pre-certified radio modules ready for integration to give your devices the most reliable wireless connectivity. We also have end-user products which replace some of the most used cable standards with a more convenient wireless alternative – from Wireless DMX and W-DALI to W-BACnet and W-Modbus.

BOOK A FREE CONSULTATION

REQUEST A W-DALI STARTER KIT