

Tridonic Building Solutions Overview

Making light work

for buildings, business, and people.



TRIDONIC



Tridonic has created a new market approach called Building Asset360 to meet the challenges faced by Asset, Estate, and Facility Managers, and generally, clients trying to manage their lighting assets.

Our Building Asset360 approach focuses on the operational phase of the building life cycle and views the lighting luminaire as a building asset much like a boiler or an air handling unit that provides data on its health and performance.

The Tridonic Building Asset360 market approach is suitable for all types of buildings. Within this model, Tridonic have looked at 3 key areas:

- Asset Management**
- Net Zero Carbon**
- People + Wellbeing**

Each of these 3 main areas are made up of solutions and data driven applications to provide business value to End Users, Facilities, and Asset Managers.

	Condition Based Monitoring	API Interoperability Data Sharing	Wireless Emergency	Emergency Black Box Data	Remote Emergency Reporting	Business Value Partnering	Remote Monitoring	Wireless HCL	Cradle 2 Cradle	Wellbeing and Air Quality
Asset Management (Remote Monitoring)										
Net Zero Carbon										
People + Wellbeing										

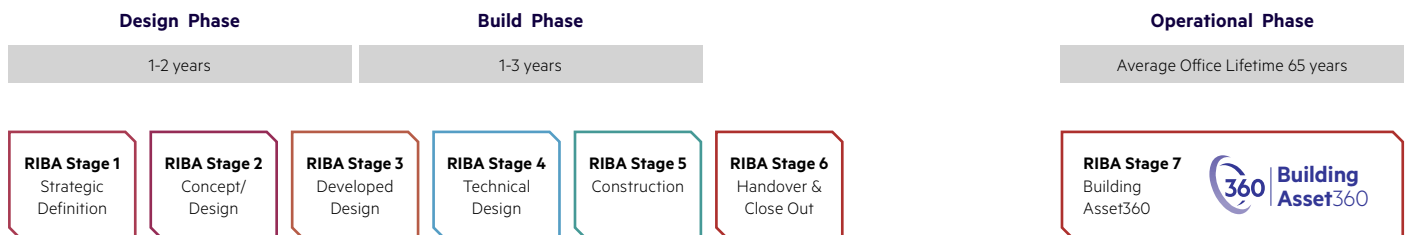
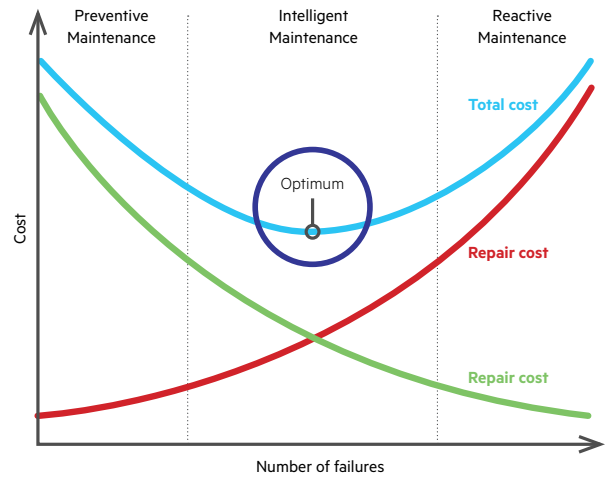
Our understanding of these challenges facing building owners and operators has created the Tridonic Building Asset360 market approach



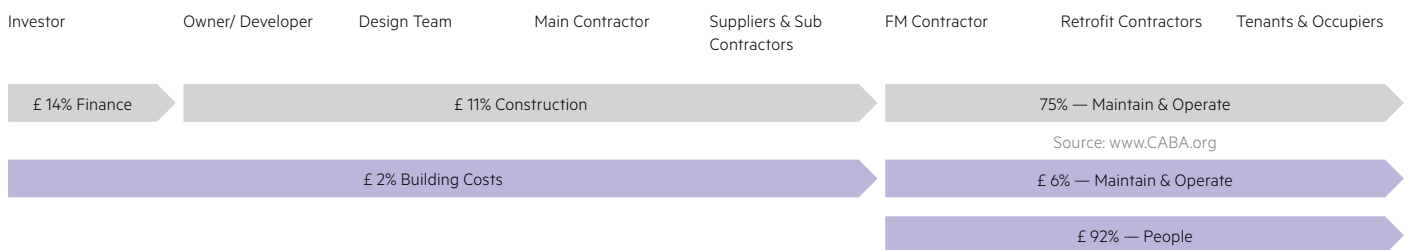
This not only provides outstanding luminance for today from 50+ years of being a lighting component manufacturer, but now also provides data and benefits for the whole life view of the lighting systems in buildings built on a wireless system for an easy cost-saving approach. Tridonic Building Asset360 is a model to optimise your lighting investment and to provide clear transparency of performance not only for today but for the whole life cycle of the lighting asset.

Our goal is to provide 'Intelligent Maintenance' — a proactive asset management strategy that bridges the gap between reactive and preventative lighting asset management.

The key to this solution is not only the Lighting data available but also, the easy accessibility to the data using integration with BMS and third party systems which are described later in this document.



TRIDONIC



RIBA 7 Stage Construction Model

Source: Sustainable Building Technical Manual 1994

Modern buildings have an average lifetime of 65 years that falls within the operational phase. Within this phase, the maintenance, operations, and the additional cost of the people involved to carry out these processes equates to 92% of the overall cost of a building (as demonstrated on the RIBA model above), making this stage the most significant phase in a buildings life cycle when considering the overall cost of a building.

Tridonic's Building Asset360 has targeted this phase specifically to provide the most benefit to Building Owners, Facilities Managers, and Building Occupiers by reducing the costs involved in this phase through predictive maintenance, wireless emergency testing, and more energy-efficient lighting.

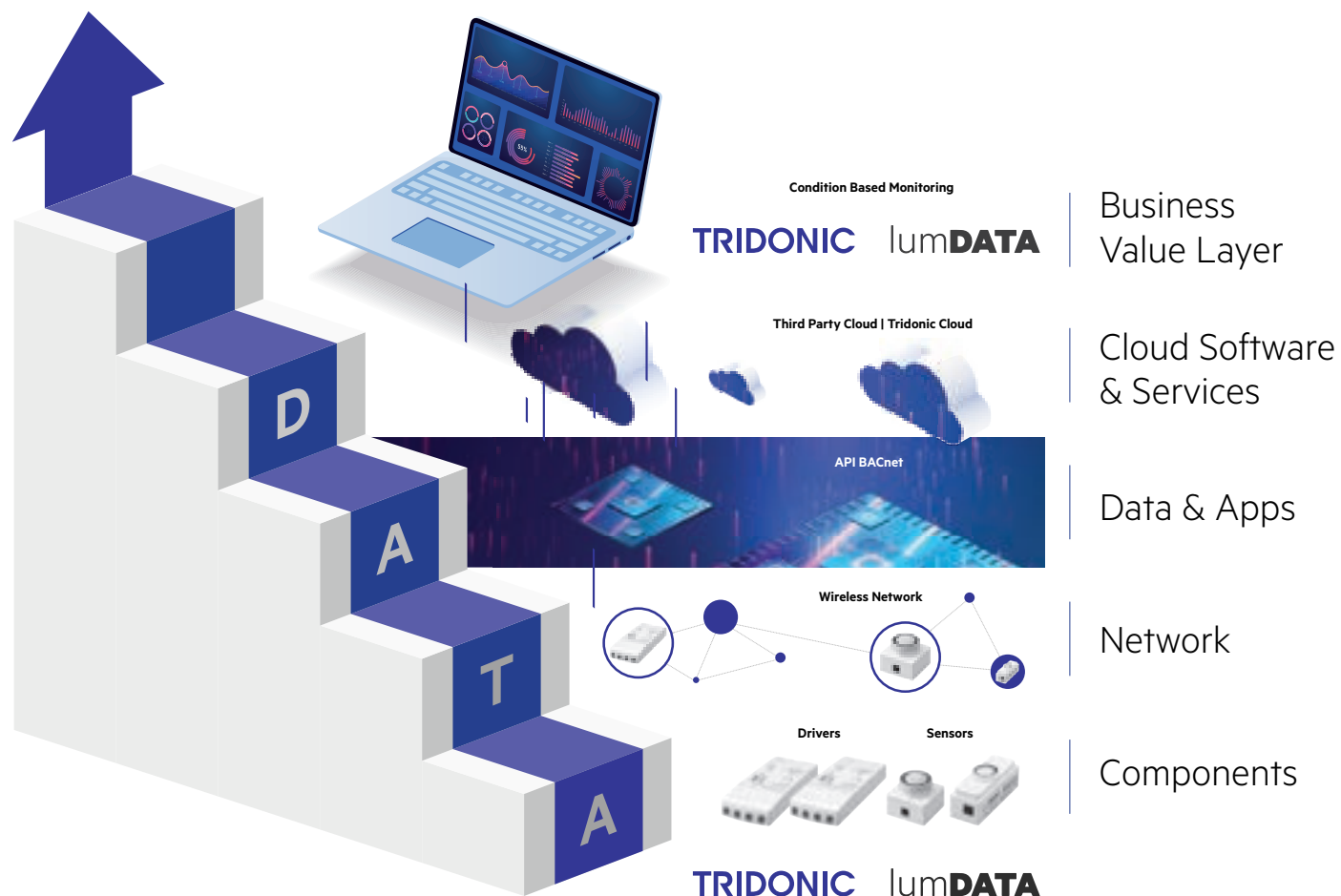
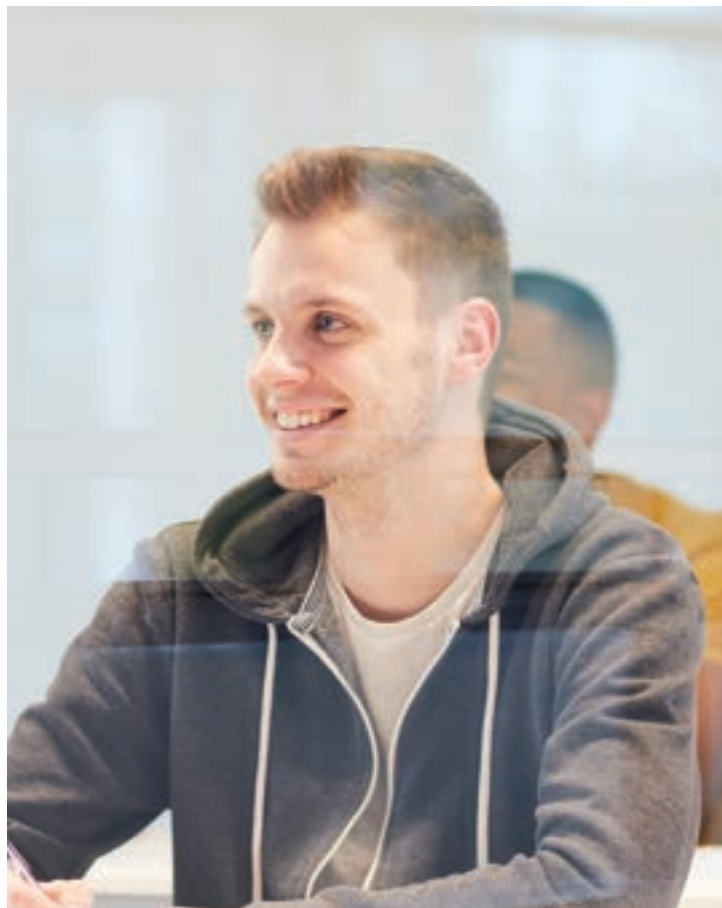
Controls and Solutions

Five-layer model

Tridonic uses a simple 5-layer model to describe its solutions. In the case of Building Asset360, you can see from the 5-layer model that our components at the lowest layer provide luminance for the space but more importantly, lighting data that we call lumDATA.

This data can flow through our wired or wireless network and can be extracted onto the cloud OR in the building by an open API, MQTT, or BACnet interface and enable - as an example - the ability to provide a condition-based view of the lighting asset.

This remote monitoring and testing of the lighting installation means that engineers do not need to visit sites to conduct function or duration testing, and where there is a fault, proactively know what is required to fix the problem. This reduces operational costs and encourages a 'first-time-fix'!

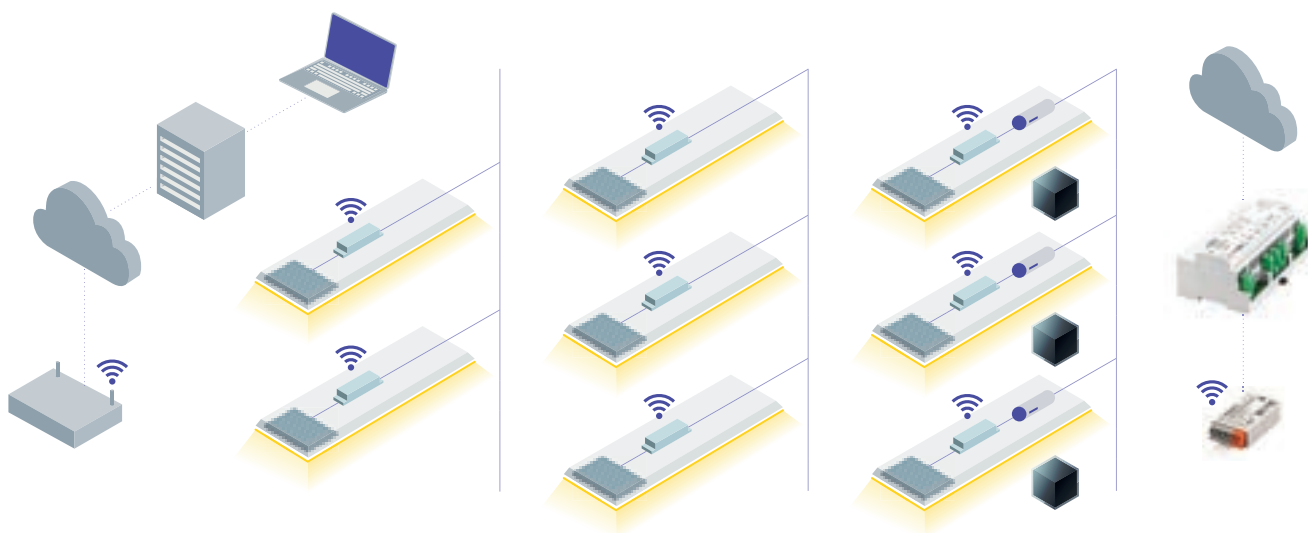




TRIDONIC lumDATA

Building Asset360 encompasses wireless controls technology that extracts important data from within the luminaire (lumDATA) from across the wireless mesh.

Working in collaboration with our ecosystem of Business Value Partners and our System Integrators, we are able to interpret this data and display it in a user-friendly way, allowing users to understand what is happening with the luminaires and sensors on their wireless mesh - where any faults are, what maintenance is required, and if there are any other maintenance activities they can conduct whilst on site to prevent upcoming predicted faults.



Condition Based Monitoring for lighting

When lighting is maintained and attended at the optimum point, we need to provide intelligent data.

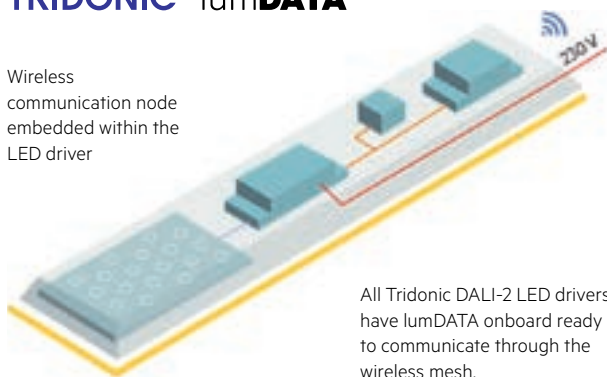
Tridonic have changed the way we look at luminaires, switching from looking at luminaires that just illuminate a space to **building assets and building data engines.**

Tridonic premium (PRE) DALI-2 Drivers are now installed with two important factors:

1. Onboard wireless communication nodes
2. Onboard lumDATA

TRIDONIC lumDATA

Wireless communication node embedded within the LED driver



All Tridonic DALI-2 LED drivers have lumDATA onboard ready to communicate through the wireless mesh.

Tridonic created lumDATA on the back of the standardisation within the DALI-2 implementation, which means our premium (PRE) DALI drivers have the data banks able to provide meaningful data in **3 main areas:**



Asset Data

What are the devices inside the luminaire that can provide accurate repair inventory? When was it installed that triggers the warranty expiration date? Who manufactured the luminaire?



Energy Data

The granular active power and energy can be accessed from each driver for benchmarking and energy analysis.



Fault & Diagnostic Data

This data bank provides a real insight into the status, performance, and end life characteristics of each driver. For example a combination of operating time and temperature would allow us to estimate the remaining lifetime of the components.

lumDATA



What do we do with luminaire data?

Tridonic utilise the lumDATA and display it via the platforms created by our various dashboard partners and system integrators.

Tridonic lumDATA can be described as a lighthouse alarm, which, by definition, are created to warn users before a problem has occurred to facilitate preventative maintenance and to ensure that teams carrying out tasks on the lighting mesh can attend to any other luminaires that will require work in the short term.

This helps reduce the number of times facilities managers need to attend site, thus contributing to lower carbon emissions through reduced travel and the ability to prolong the lifetime of a luminaire through part replacement rather than full asset replacement.

Costs associated to maintenance will also be reduced through less requirement for on-site assistance, in addition to a lower number of luminaires being fully replaced.

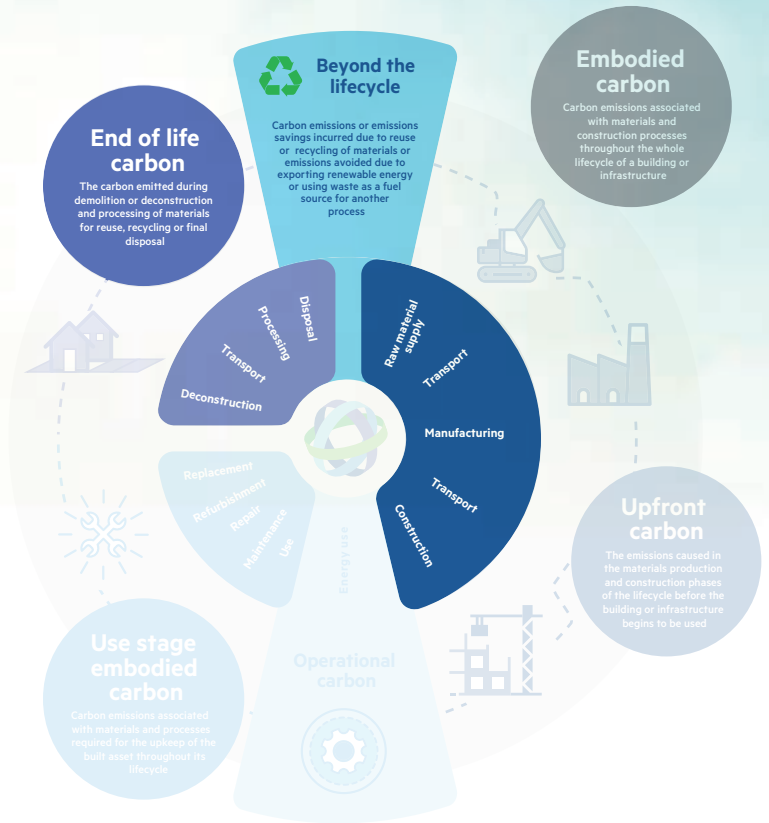
Net Zero Carbon

A whole life consideration

How does lumDATA effect our customer net zero carbon strategies?

Building Asset360 and Net Zero Carbon are linked by their whole life approach. The best way to Net Zero Carbon from lighting is by maximising the use of the Lighting Asset as described best by the World Green Building Council (WGBC).

The WGBC makes clear the best path to lowering embodied carbon to raise the overall sustainability of buildings is to maximise the use of existing assets and to explore opportunities to avoid construction altogether.

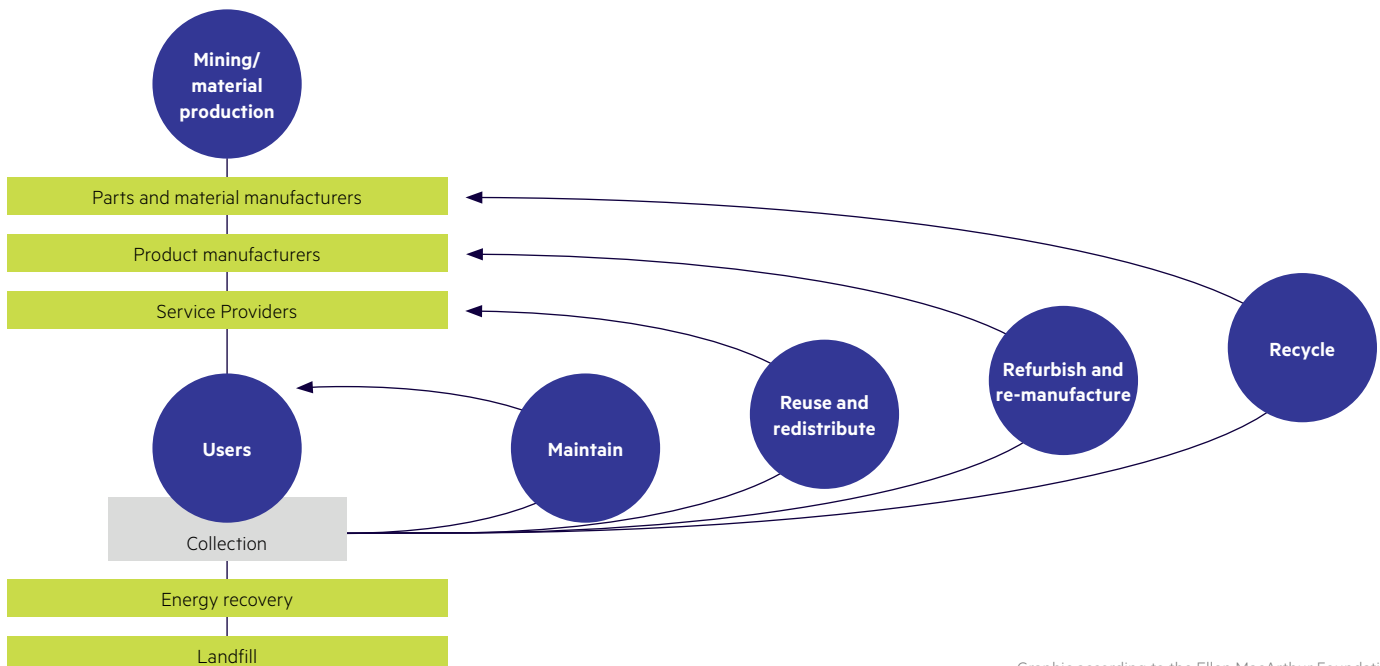


The Tridonic lumDATA provides a health assessment of each luminaire, which means in the longer term, each luminaire will be replaced knowingly on its health and not from a time-bound strategy. When it comes to embodied carbon, again we use data to understand when the circular economy can be triggered and luminaires be recycled.

For building operators to know when to exercise a circular replacement programme, it has to understand when this will be triggered. The diagram below shows the options available from maintain to recycle, but the key is WHEN. This decision can only be triggered by lumDATA-made decisions

Technical cycle

TRIDONIC lumDATA



Graphic according to the Ellen MacArthur Foundation.



Tridonic Intelligent Maintenance
Building Asset360

Proactive approach to lighting
asset management



Controls and Solutions

Overview

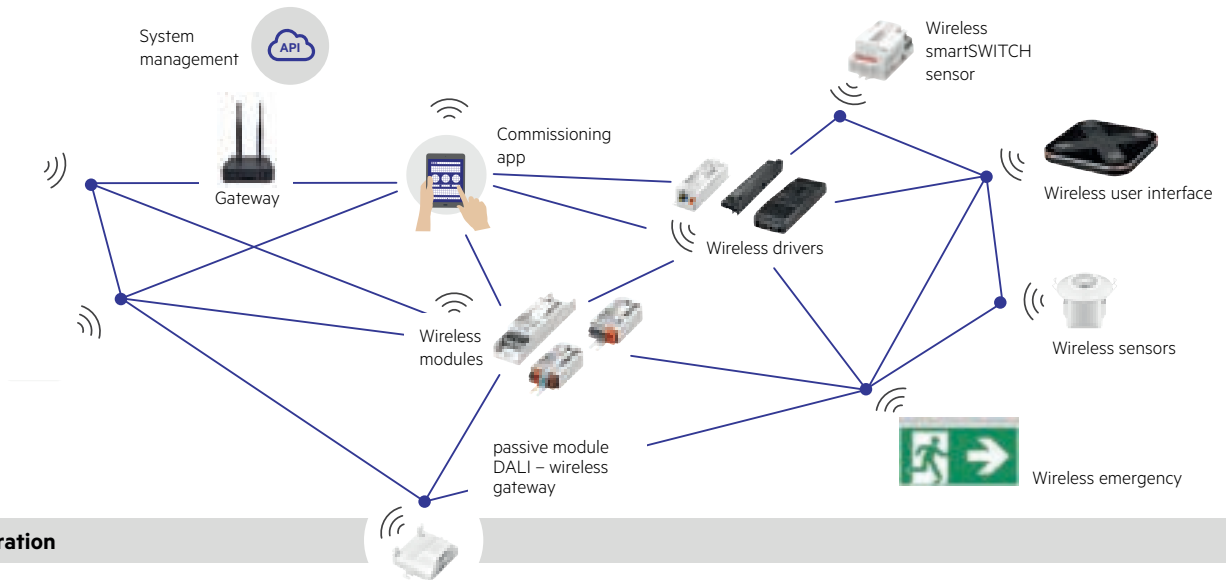
sceneCOM evo DA2 Controller

At the core of the Tridonic controls solution is the sceneCOM evo DA2 controller, which can manage both wired and wireless lighting architectures. The sceneCOM evo DA2 controller is a DALI-2 application controller which has the ability to not only control devices, but also, collect data such as lumDATA from each lighting luminaire, whether it is wired or wireless. In addition to

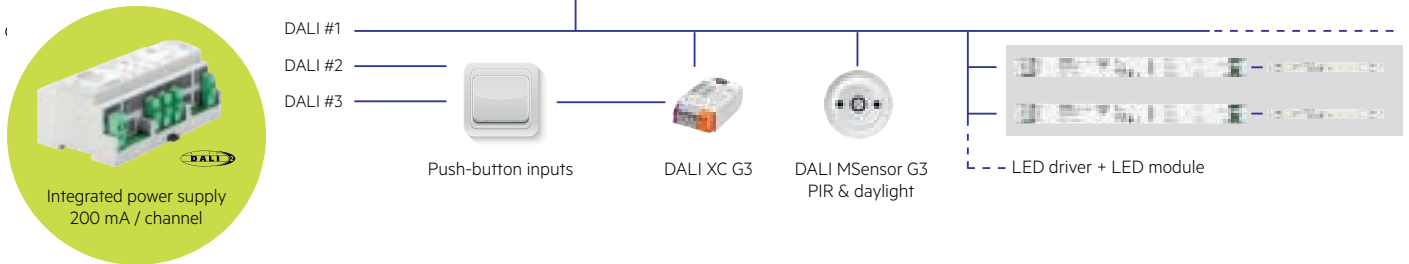
this, sceneCOM evo DA2 also has the capability to run automatic emergency testing both wired (DALI Wiring) and wirelessly.

The sceneCOM evo DA2 is a powerful 3-line DALI-2 controller, supporting 64 devices per line for a total capacity of 192 devices. An indicative architecture is shown below:

Wireless mesh network



Wireless integration



The main features of the Tridonic sceneCOM evo DA2 controller are detailed here:



DALI-2 Certification

- _ DALI-2 certified Application Controller
- _ Ideal form factor
- _ DALI power supplies upgrade

Linking via Ethernet

- _ Linking multiple controllers as one DALI system
- _ Simpler handling of big installations

Integration

- _ Connect to BMS System via BACnet per controller (1000 points)
- _ Connect to BMS System via API or MQTT

SW license extensions

- _ Activate apps via license keys
- _ BACnet interface license per controller

DALI-2 sensor support

- _ Compatible with Tridonic DALI-2 sensors
- _ Support of 3rd party DALI-2 sensors and push-button input devices
- _ More flexibility in projects and tenders


Wireless integration

- _ Flexible installations with mixed wireless and wired devices

Integration with third party systems

BMS, dashboard partners

The sceneCOM evo DA2 controller has many attributes and one of them is the way it can share the data it gets from the LED drivers and emergency converters. The controller has 3 main ways it can share data.



Interfaces

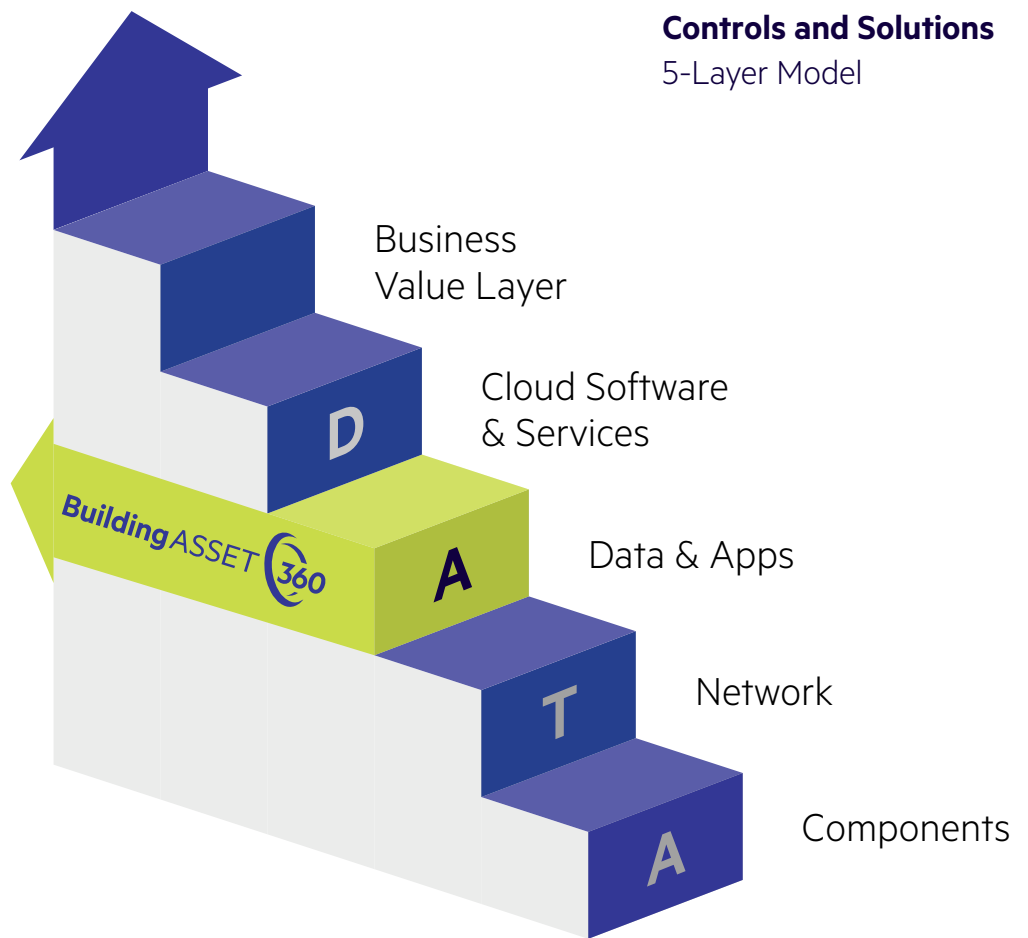
- MQTT
- { REST:API }
- ASHRAE BACnet

TRIDONIC lumDATA



Controls and Solutions

5-Layer Model



BACnet

BACnet is a global standard for data exchange between different systems and devices. Our sceneCOM evo DA2 controller has the capability of providing read/write functionality via BACnet by enabling the functionality through our BACnet license.

REST:API

RESTful API is an interface that two computer systems use to exchange information securely over the internet. sceneCOM evo DA2 has a free-of-charge API function which can be accessed to extract lumDATA & Emergency Test data. This data can be accessed when the API is queried.

MQTT

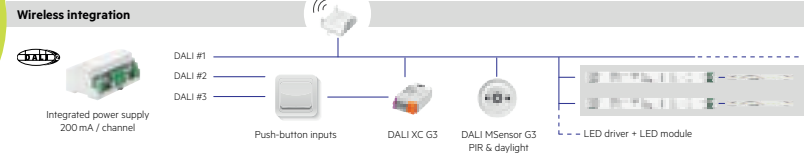
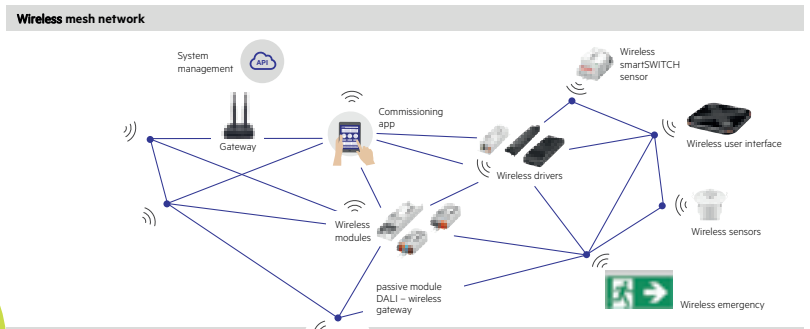
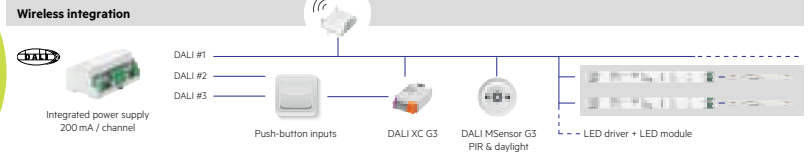
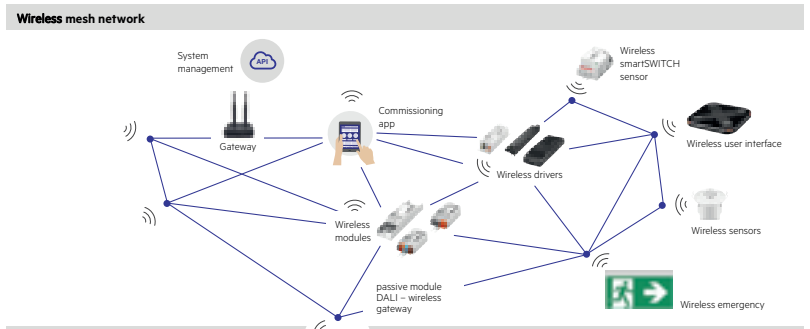
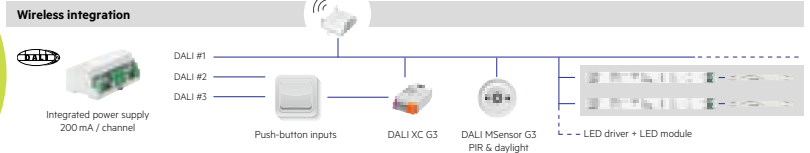
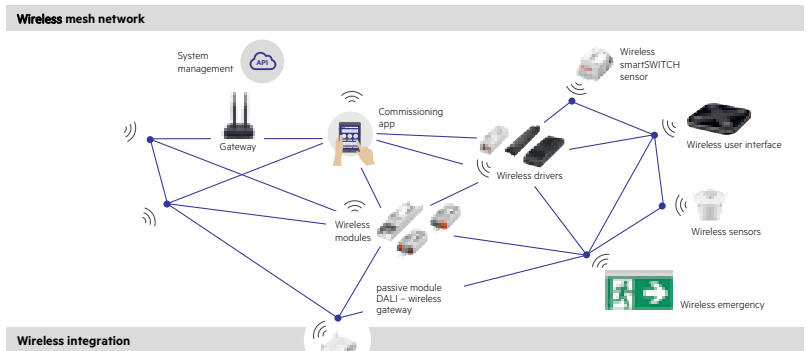
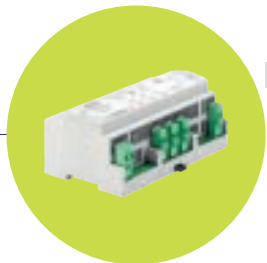
MQTT is a standards-based messaging protocol, or set of rules, used for machine-to-machine communication. sceneCOM evo DA2 has a free-of-charge MQTT function, which can be accessed to extract lumDATA & Emergency Test data. This data can be sent in real-time via MQTT from the controller.

Scalability

IP architecture

As the sceneCOM evo DA2 controller is an IP-addressable controller. Each controller can exist on an open IP architecture or an existing IP architecture like a BMS network. This installation will then allow for the controllers and systems to freely exchange data.

IP architecture

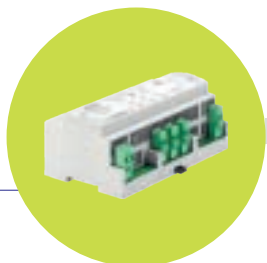


IP architecture

MQTT

{ REST:API }

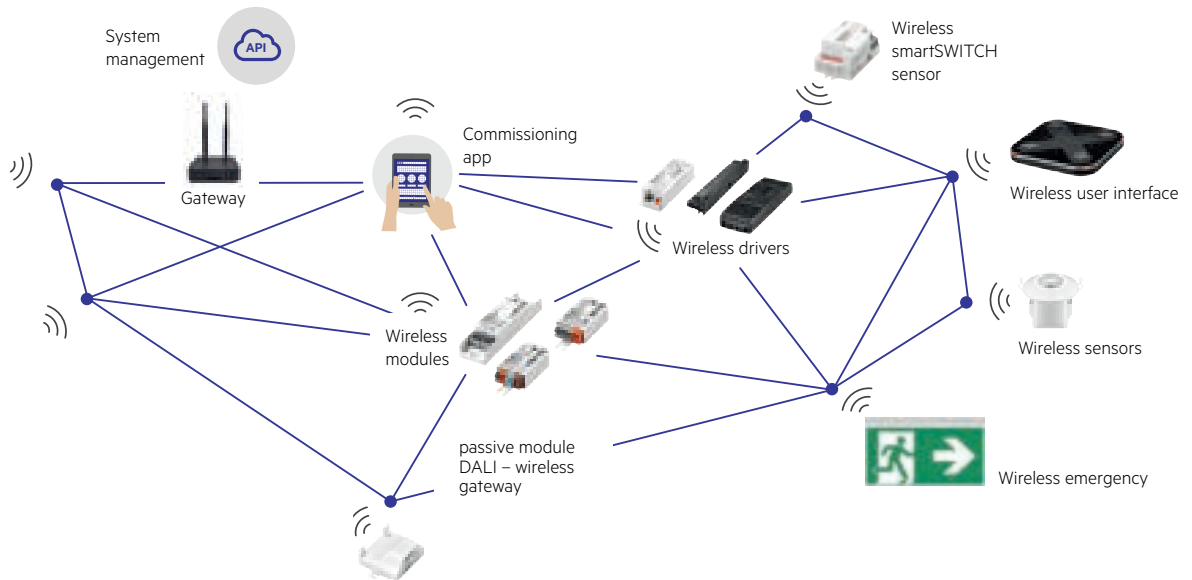
ASHRAE BACnet®



Wireless mesh

Tridonic have embedded the Wireless technology within our sensors and LED drivers.

Wireless mesh network



The Wireless control technology allows versatile and professional interaction with all luminaires within an area – fully intuitive and with no additional wiring required.

Multiple light points can be controlled via Wireless switching on and off and dimming functions. Simple grouping of luminaires and creating lighting settings plus human-centric lighting are all available within the lighting mesh. Sensors can be integrated within the luminaire or stand alone in the lighting mesh.

Wireless is the ideal solution for updating conventional lighting without requiring any additional construction effort. There are hardly any limits to the usage area with this. In office buildings for instance, each room and zone benefits from the system's easy-to-use and multi-functional intelligence.



Wireless emergency mesh

Tridonic has an answer to the increasingly stringent maintenance and testing regulations applying to emergency lighting.

The new wireless emergency system based on Tridonic's secure Wireless solution can be integrated into existing installations in compliance with existing standards and without additional wiring. Within the mains lighting mesh, we can now add wireless emergency fittings to exist and communicate through the main lighting mesh. This now completes the full system as an operating wireless mesh solution.

Tridonic have been market leaders for many years with their emergency lighting components, and their EM PRO range is no exception. EM PRO was a range developed off the back of the success of Tridonic's Wireless lighting solution, which was extended to create Tridonic Wireless Emergency.

Facilities, Asset and Estate Managers, who every month attend buildings to regularly test emergency lighting, can now install the Tridonic Wireless Emergency Lighting Solution, configuring testing to run automatically whilst storing emergency test reports centrally in the sceneCOM evo controller.

	Condition Based Monitoring	API Interoperability Data Sharing	Wireless Emergency	Emergency Black Box Data	Remote Emergency Reporting	Business Value Partnering	Remote Monitoring	Wireless HCL	Cradle 2 Cradle	Wellbeing and Air Quality
Asset Management (Remote Monitoring)										
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Remote Emergency Reporting:

The pandemic of 2020 highlighted the labour-intensive regulatory actions every month for Estate, Facilities, and Asset Managers to test emergency lighting, as they needed to maintain empty buildings.

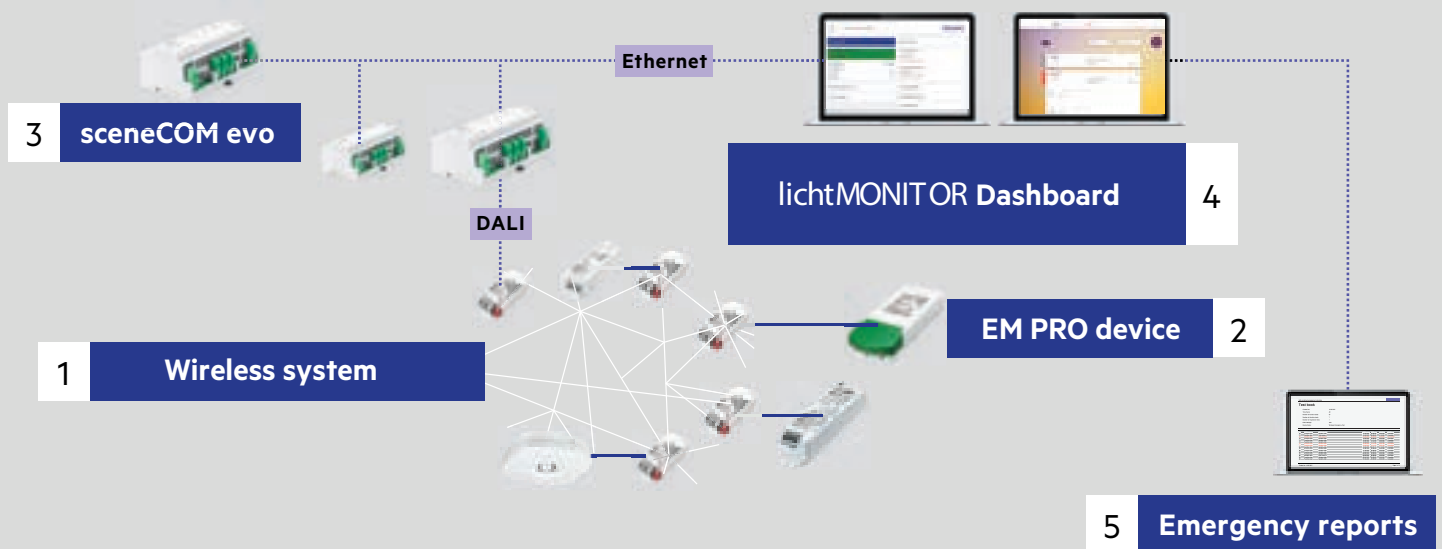
Tridonic, with its Wireless and Emergency Lighting solution, offers a great retrofit package that – when installed – provides automated emergency testing and the ability to receive the test reports in a number of ways, i.e. BACnet, API, MQTT, etc.

Wireless Emergency — Black Box Data:

Tridonic have used all its years of experience in Emergency Lighting to create a bank of meaningful emergency data within its converters. This development is unique to Tridonic and provides real insight into the status, performance, and end-of-life characteristics of each emergency luminaire

With Building Asset360 emergency black box data, planned maintenance for emergency lighting can be carried out before any testing, ensuring the availability of this life-saving service is maintained.





1. Wireless system

With the well-established backbone of the Wireless system, the Wireless Emergency system uses a fail-safe wireless mesh network.



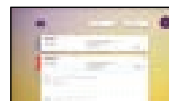
2. EM PRO device

With the addition of a Wireless module, every DALI emergency luminaire containing a Tridonic EM PRO device can easily be converted to be used in the Wireless Emergency system.



3. sceneCOM evo

This is the gateway which connects all the wireless emergency luminaires. A single controller can then connect up to 192 emergency luminaires.



4. lichtMONITOR Dashboard

Up to 200 sceneCOM evos can be connected with lichtMONITOR Dashboard. The information from all sceneCOM evos is collected on a single page.



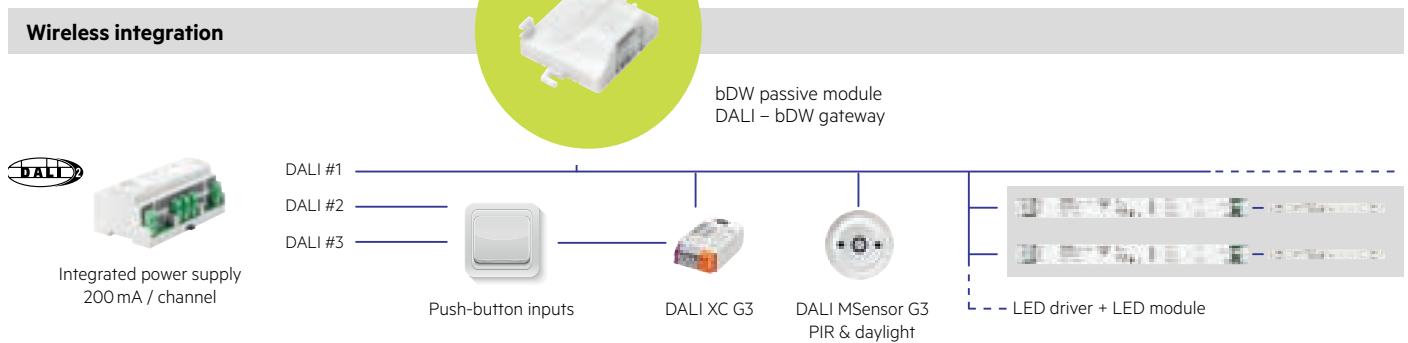
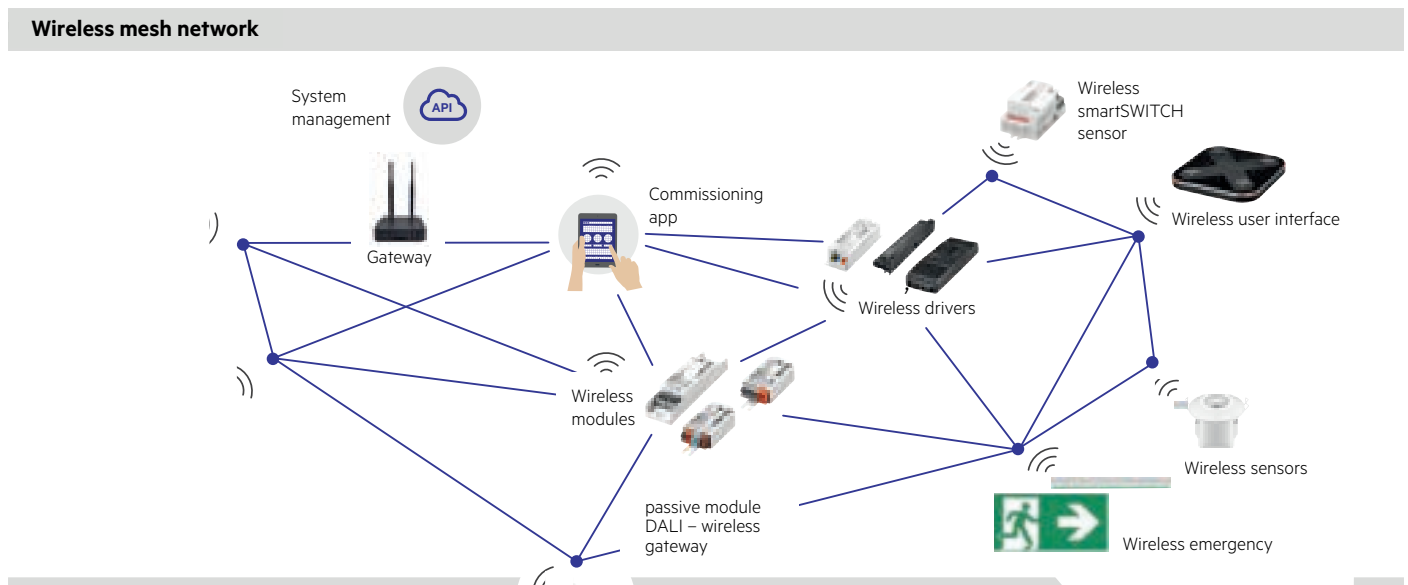
5. Emergency reports daily/weekly

At a glance, a dashboard provides information about the current status of the system and each luminaire as well as the latest test results.

Wireless DALI gateway



The connection between the wired world and integration capabilities of the sceneCOM evo DA2 controller and the wireless mesh is the wireless DALI gateway, shown below in the main solution architecture:



Wireless DALI Gateway (Gen2 Passive Module)

- _ Acts as wireless DALI gateway between a sceneCOM and wireless mesh network
- _ Allows up to 64 addresses to be controlled via sceneCOM evo DA2 wirelessly

Product description

- _ Wireless controllable with an Android/iOS smart device
- _ Forms automatically a wireless communication network
- _ Small form factor for luminaire installation
- _ Digital output: DALI compatible
- _ Supplied via DALI line
- _ 4 independent push-button inputs
- _ Device firmware can be updated over-the-air
- _ 5 years guarantee (conditions at tridonic.com)

Leveraging from the lighting mesh

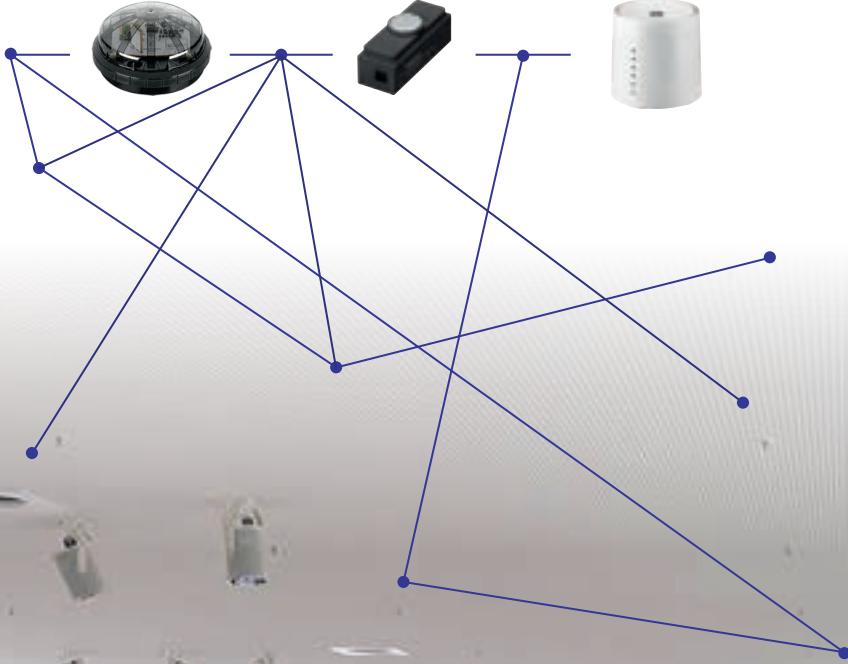
Overview



Bluetooth
wireless outdoor

Air quality sensor
airASPECT

Space utilization sensor
falcoSENSE



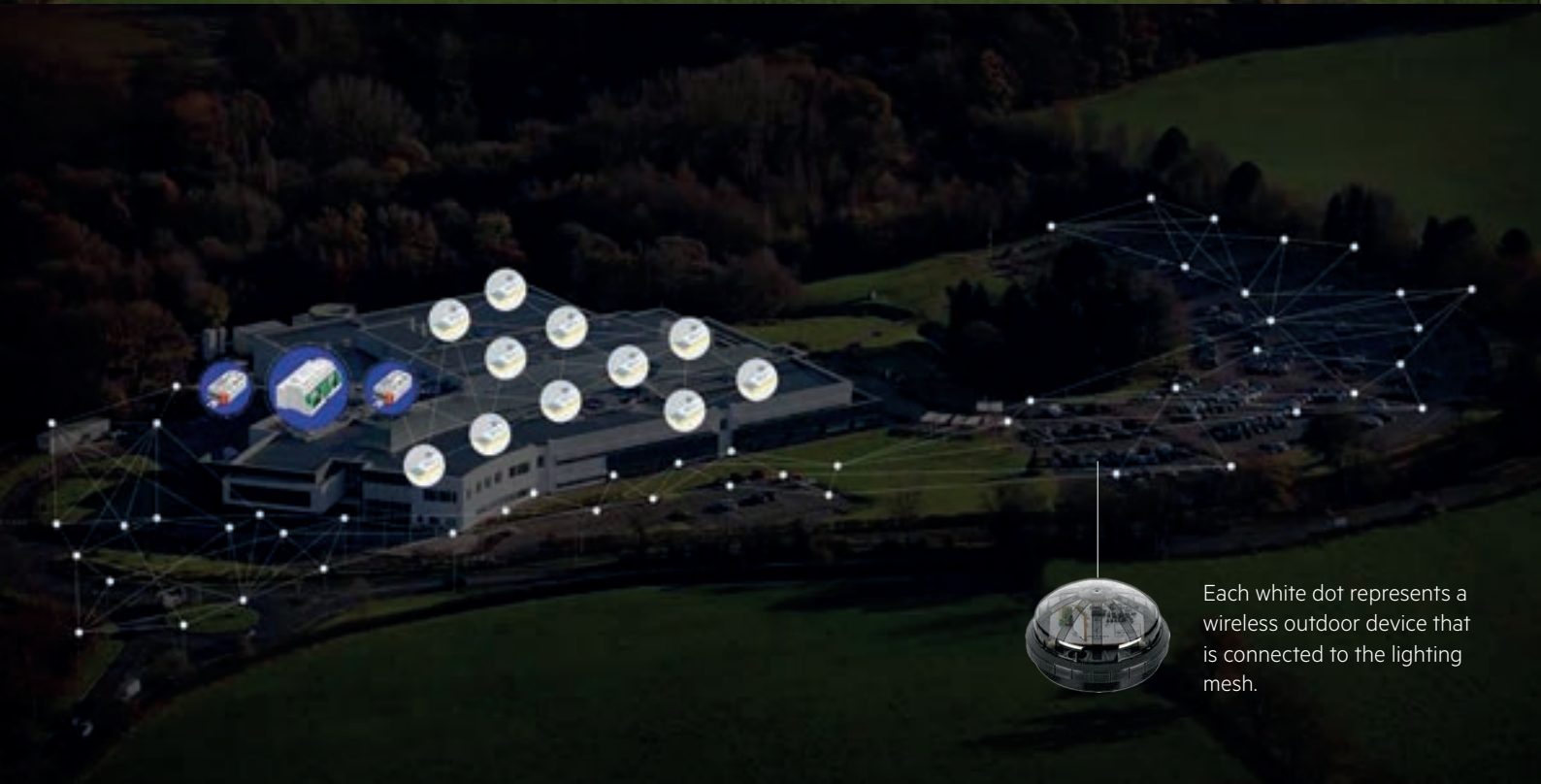
BuildingAsset360 sees luminaires as part of a business wireless interoperable mesh.

The lighting wireless mesh allows other devices to be added to the mesh that provides greater value than just lighting inside a building.

Wireless outdoor

We have now added our wireless technology to the potential of being fitted to an outdoor luminaire which opens up possibilities for car parks, campuses, hospitals, and recreational parks.

The opportunity is to create indoor and outdoor lighting meshes and connect them all onto the same sceneCOM evo architecture as shown on the diagrams below.



Each white dot represents a wireless outdoor device that is connected to the lighting mesh.

Air Quality Sensor airASPECT

Tridonic have developed an air quality sensor that measures temperature, humidity, air pressure, air quality index, and eCO₂.



Space utilisation falcoSENSE

Tridonic have developed a space utilisation sensor that measures people and people movement.

This sensor can be applied in commercial offices, university libraries, and retail shops.

falcoSENSE processes data locally, generating insights that are privacy safe. Only the necessary information is transmitted out.



Real time area capacity information.



Flexible usage of building assets.



Learn and optimise how the space is used.

