

# Webinar Q&A:

## Connected DALI-2 lighting control for intelligent, occupant-friendly buildings

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The webinar is available on demand here:

[www.luxreview.com/webcasts/how-to-make-lighting-smart-with-dali-2/](http://www.luxreview.com/webcasts/how-to-make-lighting-smart-with-dali-2/)

The presentation materials are available here:

[www.dali2.org/downloads/](http://www.dali2.org/downloads/)

If you require further information on DALI, DALI-2 and D4i, please contact the DALI Alliance (DiiA):

[www.dali2.org/contact](http://www.dali2.org/contact)

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**The DiiA Product Database does not seem to have easy search / filter capabilities for the data Parts (251, 252, 253), it only has selections for the bus power and aux power elements.**

The Product Search has a large number of filters for each main product type. Click on the Control Gear button in Product Search and a subset of filters will appear, including Parts 251-253.

**Are there plans to standardise the communication between two DALI subnets? For example, if I want an input device on one DALI line to switch a luminaire on another DALI line, I need the application controllers on those two DALI lines to talk to each other.**

This level of application controller functionality has always been out of scope for the DALI standards. All such operations are manufacturer-specific, which allows lots of freedom for manufacturers according to the needs of different applications. However, we are working to standardize bridges between wired DALI subnets and DALI over wireless (or DALI over IP) networks.

**For DALI-2 certification, do we need to register as a Regular member? What test equipment is required to conduct in-house testing?**

The certification process is documented on our website ([www.dali2.org/certification](http://www.dali2.org/certification)). For certification of DALI-2 products you will need to become either an Associate or Regular member of DiiA. Full details of benefits and costs are here: [www.dali2.org/membership/benefits.html](http://www.dali2.org/membership/benefits.html). Testing information can be found here: [www.dali2.org/testing](http://www.dali2.org/testing).

### **Will there be a standardized calibration for RGBWAF colour control?**

RGBWAF is a colour type that cannot be calibrated, and this applies universally, not just to DALI. However, xy and Tc (tunable white) colour types do allow calibration on a manufacturer-specific basis. After calibration is done, the control gear carries out the calculations internally, so the application controller in the system can simply request a particular xy coordinate or colour temperature (in the case of Tc control), and this output is generated by the lamps.

### **What are the timescales for the rollout of "wireless DALI"?**

This is determined by our members, since they design and make the products. Our role is to develop the specifications and tests. However, we feel it's unlikely that we will see certified products before next year. Our processes have been delayed by the Covid-19 crisis, for example it has been difficult for members to access their test equipment when working from home.

### **Our customer has DMX on site. Can I connect luminaires with DALI-2 and DMX?**

Yes, there are products on the market to do this, in both directions, but these are not fully standardized. There may be a standardized application controller on the DALI side, but the conversion process is not standardized.

### **Does DALI work with PoE wire?**

Conventional DALI operates over a dedicated 2-wire DALI bus. Part 104 of the DALI standard describes DALI communication over different wired and wireless carriers, and one option is UDP, an internet protocol. UDP datagrams (packets) can be carried by several different physical layers, including WiFi and Ethernet, as well as Thread (which combines a specification for the physical layer, IEEE 802.15.4, with 6LoWPAN). PoE combines power with Ethernet, allowing part 104 over UDP. Initial tests and certification in DiiA are likely to require Thread-based IP solutions, with other UDP methods such as Ethernet or PoE likely to follow, depending on the priority from our members.

### **Is DALI-2 colour tuning included in D4i?**

No, colour tuning is not part of D4i. The D4i requirements are explained here: [www.dali2.org/d4i](http://www.dali2.org/d4i). But some D4i drivers also have colour tuning (Part 209) as an additional feature.

### **Does DALI wireless require wiring or not?**

For DALI over wireless the products communicate wirelessly, using the DALI language throughout, so wiring would not be required for communication between these devices. For a wireless gateway, the DALI side of the gateway is a wired network, either a D4i luminaire or a DALI-2 subnet.

**When using DALI the wiring limitations are always stated as 300m when using 1.5mm cable. Is this the total cable length or the maximum distance between two DALI devices? i.e. Can I star-wire 64 DALI devices all with 150m runs?**

The answer is yes, you can have multiple runs of 150m, but care is required. The value of 300m is the distance between the furthest-apart devices. In the example given, which is quite extreme, you are maintaining the 300m maximum distance, but if you had lots of these branches then at some point you might hit cable capacitance issues, depending on the cable type. For larger systems it's common to split the system into subnets so that the 300m distance is not exceeded. Another example is a system with 4 devices equally spaced by 150m along a straight cable. In this example, the end devices are 450m apart, so this would not meet the requirement that the furthest-apart devices are within 300m.

**Which kind of sensors and sensor data is in scope of DALI Part 306 for General-Purpose Sensors? What is the timeline for standardization?**

The Part 306 specification covers sensing of many physical quantities, not just lighting-related. The list of possibilities includes temperature, carbon dioxide, humidity and many others. It will probably take until next year for the IEC standard Part 306 to be published.

**How will DALI over Wireless be differentiated from existing wireless protocols like Casambi or Silvar?**

DALI over Wireless is the DALI command set carried over alternative protocols, such as Bluetooth mesh or Thread. All the rich lighting functionality from DALI is available - such as colour types, or emergency - and this is all standardized, all tested and all part of the certification program. This is not available with other protocols.

**Are there any standards regarding the following : Fire rating of DALI-2 equipment, and performance under fire conditions of emergency lighting?**

Fire rating is out of scope of DALI. There are other standards covering these features. DALI is about communication and lighting performance.

**Are any Bluetooth-based DALI gateways available now?**

There are no standardized gateway products at the moment, but we are working on the specifications and tests. Various DiiA members offer gateways between DALI and different protocols, including Bluetooth, KNX, BACnet and others. Currently, it is possible to test and certify the DALI-2 side of a gateway, so some of these products are visible in our Product Database ([www.dali2.org/products](http://www.dali2.org/products)).

**Is DALI suitable to transport data that are not directly related to lighting, but are captured by a sensor located within the lighting fixture - for example, an air quality sensor?**

Yes, such sensors will be included in the forthcoming DALI Part 306 for General-Purpose Sensors, which is now in development (see earlier answer).

**Do you plan to have an alternative to the random addressing of components?**

This has always been possible: you can address the products using “identification” together with a programming tool, or on a 1:1 basis using a programming tool, or by pre-configuring the addresses.

**How do we get involved in the next Plugfest and are there any proposed dates?**

Plugfests are open to Regular members of DiiA, and in some cases they are also open to Associate members. Our schedule has been disrupted by the current situation. When we have proposed dates, these will be communicated to members, and published on our member website ([www.dali2.org/members/meetings](http://www.dali2.org/members/meetings)).

**Why is colour consistency not part of DALI-2 certification in DT8 applications?**

For colour control, we started with tunable white, and DALI-2 products are already available from our members. We are working on xy tests just now; this enables precise colour selection. At the moment, the tests don't physically measure the colour output, but we plan to add automated colour measurement to the testing. We've identified a couple of USB colour meters that can be used for this purpose.

**Is the 64-device limit applicable to DALI over wireless?**

Yes and no. There is a limit of 64 control gear plus 64 control devices, which is the number of short addresses. However, DALI over Wireless (described in Part 104 of the standard) adds a “system address”, which multiplies this by 255, amounting to roughly 32,000 devices. In an IP-based system, you can also make use of IP addressing, so the number of addresses is effectively unlimited.

**If DALI is specified in a project, in order to upgrade to DALI-2 there will cost implications. Can you give a rough estimate on cost difference?**

We can't comment on specific pricing, but we can say there is now a very wide choice of DALI-2 products on the market (see [www.dali2.org/products](http://www.dali2.org/products)).

**What would happen if 230V was applied to DALI, would that cause the driver to fail?**

Over-voltage protection at the DALI bus connector is an optional feature, but most control gear on the market includes this. Check the manufacturer's data sheet.

**DALI-2 and D4i are describing advanced diagnostic data like energy data. When speaking with DALI driver suppliers it is very unclear which DALI-2 drivers support these features. Some manufacturers have data in these registers, some very accurate, some less accurate or slow refresh times, some have no data in these registers. How can it be more clear for customers what is exactly included?**

The Product Database ([www.dali2.org/products](http://www.dali2.org/products)) on the DiiA website allows you to search for products with those specific features, for example Parts 252 and 253 for energy and diagnostics data. You can tick the appropriate boxes to show products where those features have been implemented in a standardized way, tested and certified. D4i certification indicates that control gear implement the three data Parts 251-253, as well as some other features. The standard already specifies that the data update rate is 30s or more frequently. The accuracy of measurements is product-specific, so check the manufacturer's data sheet for the accuracy specification.

**What are the main differences between DALI-2 and D4i on level of the communication protocol?**

None. D4i is an extension of DALI-2, so the communication specifications are the same. However, D4i has some specific requirements, such as the data Parts 251-3, and the need for an integrated bus PSU for control gear.

**Do you feel harmonisation of one protocol (especially a wireless protocol) will ever be achieved, with so many protocols available that all work with DALI?**

I think the market will decide – it's not for DiiA to say. We are partnering with the organisations necessary to support the wishes of our members, and the programmes we have in place cover the leading options preferred by our members. If DALI can play a part in helping harmonisation, and I believe specific to lighting controls we probably can, then we will work with those partners accordingly.

**What should we do if we see things like "DALI compatible" on documentation?**

You can check the status of products in the DiiA product database ([www.dali2.org/products](http://www.dali2.org/products)), which lists all products that are eligible to use our trademarks, including DALI, DALI-2 and D4i. If you have concerns about specific products or claims, please contact DiiA in confidence.

**The work group for DALI over Wireless seems to be focusing on wireless technologies with traction on 2.4 GHz only (Zigbee, BLE, Thread) which is fine for indoor lighting, but what about sub-GHz technologies that have more traction on outdoor lighting installations? Any plans to consider other mesh sub-GHz technologies?**

Outdoor lighting is likely to use D4i luminaires which will typically allow wireless connectivity by plugging in a control device, or node – see the recent DiiA specification, Part 351. Such control devices will not exclude any communication technology at this time – we have simply prioritised partnerships based on our members' preferences.

**Where you have a cold white LED and a warm white LED, you said that DALI can follow the blackbody curve between these two LEDs - how?**

When the system requests a specific colour temperature, the colour control gear (Part 209 = DT8) determines the relative intensity of the warm white and the cool white LED(s). The mixed light output lies on or close to the appropriate point of the blackbody curve.

**Other than refurb projects, all new-builds will need cables to be drawn and terminated to power luminaries – so what applications are envisaged where wireless DALI between luminaires would be needed?**

We are adding flexibility rather than forcing a particular route. Wireless does not replace wired DALI, but adds more options, and the solutions are complementary. It's easy to think of new-build examples where it might be convenient to add some wireless networking.

**North Americans have been late movers to DALI, although I do see Acuity getting into it. Can you tell us about other American manufacturers embracing DALI?**

We are seeing increasing adoption of DALI-2 and D4i, especially in outdoor lighting applications making use of the DiiA specifications for luminaire, energy and diagnostics data. Specific products, as well as US-based members and case studies, can be found on our website.

**What layers of the OSI model does DALI cover? When Bluetooth mesh is included, will this change?**

DALI describes the physical layer up to the application layer. Part 104 describes alternative lower layers, including Bluetooth mesh.

**Will there be any further differentiation for DALI-2 certified application controllers, where single-master controllers are given the same certification as a multi-master controller even though the single-master controller does not support a lot of the features of DALI-2?**

The product database already allows differentiation of these in the features they support. Multi-master application controllers are likely to include support for event messages from input devices, which allows more efficient communication and faster response. Single-masters cannot include this feature. Multi-masters also give the possibility of more than one application controller on the same bus. Both of these features are selectable in the product database when searching for application controllers.

Testing and certification for multi-master application controllers is much more detailed than for single-masters, due to the extra functionality in the multi-masters.

**Some control systems have a self-heal function for replacing failed DALI drivers. I have seen problems in the past where drivers are supplied with address/group data already in which can stop the self-heal from completing successfully. Does DALI-2 solve this by making sure that the drivers are supplied with no preset address or group data?**

Manufacturers are allowed to supply their drivers in a non-default state. This does not affect certification. If a system relies upon the configuration being in the factory default state, then it is recommended to perform a reset of the configuration before installing in such systems.

**Concerning Part 252, is it mandatory to actually measure input power or is an indirect power allowed (hence minimising information crossing the isolation)?**

The method used to measure the input power is manufacturer-specific. Part 252 does not specify the accuracy of this – it is recommended that the accuracy is given in the product data sheet. As an example, it is possible to make a good estimate of input power based upon output power, allowing for losses and other power supplies, optionally improving the estimate for current operating conditions.

**In building automation, what would be the advantage of DALI sensors compared to KNX sensors?**

DALI standards were developed to meet the specific needs of lighting control. As such, sensors for occupancy and light measurement are designed to meet these needs. The DALI bus itself also provides the power, data and bus wiring insulation requirements on a low-cost 2-wire cable which can be the same type of cable often used for lighting circuits (2-core 1.5 sq.mm). In addition, there is likely to be an advantage from having the sensor communication on a DALI bus, since the control gear chosen for an installation is also very likely to use the DALI protocol.

**In a wireless gateway application, if you have a number of devices connected to a gateway, is everything past the gateway individually controlled / addressed or is the gateway a single address and then controlled as a group?**

The devices on the DALI side of a gateway will be individually addressed, allowing data such as power and energy to be read from their memory banks. The gateway specification is in development now, but it is likely a first step will permit a gateway to make the DALI devices appear as a single entity to the wireless ecosystem, with further steps allowing the devices to be individually controllable, or group-controllable from the wireless ecosystem.

**Do you implement a standard encryption for communication security in wireless communication on DALI?**

Encryption is already handled by the wireless ecosystem, for the case of DALI-to-wireless gateways and the Part 104 DALI over Wireless solution. There may be a case to add application-layer security in the future, for DALI 104 frames traversing through different IP networks.