





Digital & Open

Moving Lighting Controls into the 21st Century

by Michael Johnson

We moved into the 21st Century over 17 years ago. We can ask “Alexa” to play us songs, lock the doors and order pizza. Everywhere you go people are talking about “the Internet of Things.” You carry a computer in your pocket more powerful than the computers NASA used to send people to the moon. So why are we still clinging to analog, 20th Century technology when it comes to dimming our lights? The technology I’m referring to is called 0-10 volt dimming.

DALI provides two-way communication between the light fixture and what's controlling it. DALI fixtures not only receive commands, but acknowledge they received the command and then confirm that the command was executed.

DALI fixtures are also capable of reporting if something has failed on the fixture and their run time.

If you work in facility operations or maintenance you are probably familiar with the term 0-10v. For those of you who aren't as familiar, 0-10v was developed as a way to dim florescent lighting, and it is one of the oldest dimming standards still in use. With 0-10v, a control device sends a simple, analog signal that ranges from 0v to 10v. In most cases 0v will cause the fixture to dim to its lowest possible level, while a signal of 10v will cause the fixture to go to its maximum light output.

I often hear people defend the use of 0-10v systems saying things like: "It's proven technology, it's rock solid and it works!" And all of that is true, just as all of that was true for the car I drove in HighSchool, a gold, '73 Plymouth

Valiant. Sure it only had an AM radio, no A/C and did I mention it was gold? But it started every morning and got me where I needed to go. But do I still drive it?

In the course of my lifetime we've moved from an analog world to a digital world. The move from analog lighting to digital lighting is through DALI.

DALI Explained

DALI (Digital Addressable Lighting Interface) is a communication standard designed specifically for lighting. DALI defines how each component in a lighting control system communicates and gives each fixture a unique address. DALI is also an "Open" standard. Why is that

important? As an open standard any manufacturer can create devices that communicate using DALI.

For example a DALI driver from one manufacturer will work with control stations, sensors, etc. from any other manufacturer using DALI. The standard has also been recently upgraded to what is now called DALI2 (backward compatible with the original standard) which now assures that a DALI certified component from one manufacturer will work with components from other manufacturers.

Advantages of DALI over 0-10v

Intelligence and Communication 0-10v

0-10v based systems send one-way analog signals to the fixtures they control. The signal sent is simply a change in voltage from 0 to 10 volts. The problem starts with how each driver interrupts that signal. You could have two seemingly identical LED fixtures but with drivers produced by different manufacturers. What 2v means to driver "A" could be something totally different than what it means to driver "B".

One driver may go all the way to off at 0v while another may only dim down to 10%. If you have multiple fixture types and want all of

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them to dim to 50% you may have to send different 0-10v values to each type of fixture. 0-10v is also only one-way communication and for lack of a better word creates “dumb” devices. Fixtures can only receive commands and cannot report back that the command has been received. They also cannot report if there is a failure on the fixture, how long they have been running and other valuable data.

DALI

DALI systems send digital commands that tell the fixture exactly how to dim and operate. A command to dim to 50% percent sent to any and all fixtures in a space, no matter what type and from any manufacturer will dim to exactly 50% of their maximum output. DALI also provides two-way communication between the light fixture and what’s controlling it. DALI fixtures not only receive commands, but acknowledge they received the command and then confirm that the command was executed. DALI fixtures are also capable of reporting if something has failed on the fixture and their run time.



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Installation and Wiring

Installation of a 0-10v based system is easy! You run two wires from the sensor, switch or panel outputting the 0-10v signal and then just daisy-chain them from fixture to fixture. Easy!

However, believe it or not, installing a DALI based system is even easier. You still use just two wires and you still daisy-chain them from fixture to fixture. But unlike 0-10v, you can land either wire on either input on the driver. With 0-10v you have to make sure you land the same color wire on the same input on each and every fixture. Cross a wire and at best the system won't work, and you'll have to spend extra time going back to every fixture until you find the mistake. At worst you end up replacing multiple fixtures. For those of you planning to retro-fit your lighting, those existing wires currently being used for 0-10v can easily be re-purposed for DALI. DALI doesn't require any special cables.

Creating Groups and Zones

If you are designing a system with more than one zone, a 0-10v system can actually be up to 60% more expensive based on the need for additional wire, conduit and 0-10v output devices. In addition, because each fixture in a DALI system has a unique address, you can segment out any of the fixtures that are part of the daisy-chain group and have them dim to different levels. With 0-10v every fixture in the group will receive the same command.

Aren't there other systems that can do the same thing?

There are—sort of. Lighting control manufacturers recognized that they needed to provide systems that allow each fixture to be addressable and have the ability to be regrouped through software.

There seemed to be two choices, adopt DALI or create their own proprietary protocol. While the adoption of DALI would seem to be the way to go, old habits die hard. The urge to create proprietary systems is strong and the idea of locking an institution in with a proprietary system is compelling. Ultimately, many of them chose to create their own communication protocols and structures.

But they were still limited when it came to the drivers in the fixtures. They had just two choices, DALI or 0-10v. Since they weren't going to use DALI, they had to make-do with 0-10v. This means that in order to have each fixture addressable they have to install a 0-10v output module on each and every fixture. This does make the fixture addressable, but it still doesn't make the fixture "smart" or provide two-way communication and feedback from the driver.



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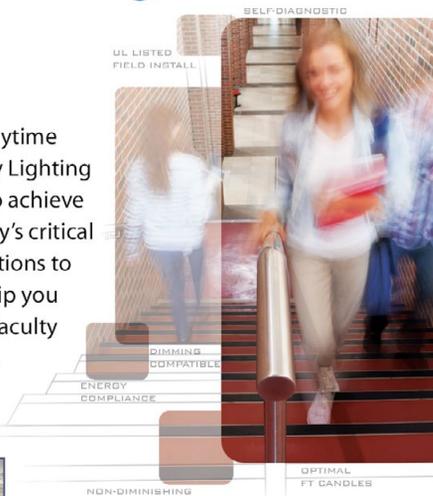
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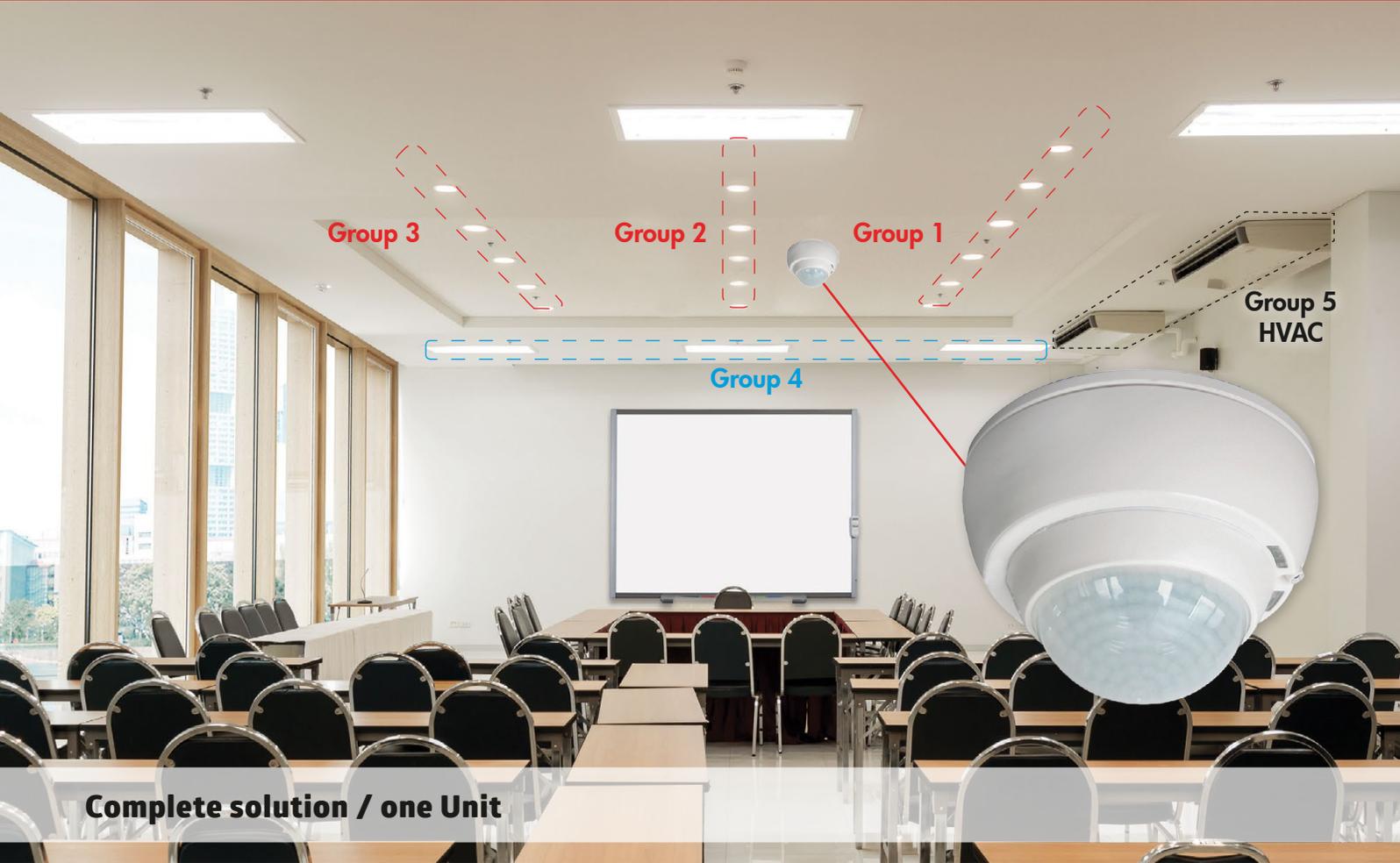
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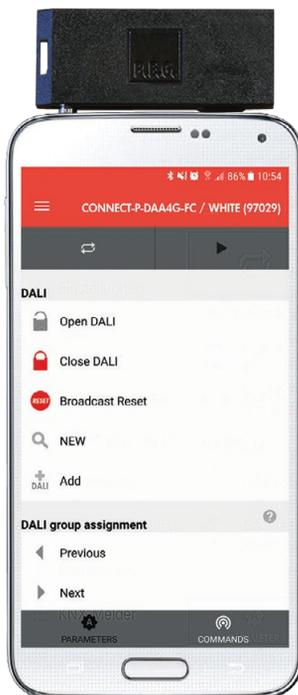


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- Additional CONNECT secondary units can be added to extend the detection range.



DALI is a globally accepted, open, digital communication protocol specifically designed for lighting. As we move into the age of the Internet of Things, embracing open communication standards will be vital to any company's success.

What about Wireless?

Put simply, it is important to remember two things about wireless controls: 1) It is possible to use DALI on a wireless system and there are a growing number of wireless systems that use DALI. 2) Wireless systems that don't use DALI still have the same issue as other priority systems that use 0-10v drivers.

Is being an Open Standard that important?

It is not, if you are 100% satisfied with the technology and capabilities from just one manufacturer. If one system or manufacturer can meet all of your needs and requirements—and if you feel comfortable getting pricing on additional or replacement equipment from only one source.

Why is DALI not more common in North America?

Actually, it's very common. It's just not always called DALI. When it comes to manufacturers of DALI products in North America, there are 3 camps: those that talk about and present DALI as their solution; those that use DALI, but because so many people don't understand what DALI is don't use that term; and those that have taken the DALI standard and tweaked it, so that it is no longer proprietary and will only work with their components.

With an open DALI based system, as long as your LED fixtures have a driver certified to the DALI2 standard (and every major driver manufacturer produces DALI drivers) you have total control now, and into the future. When

you are presented with a lighting controls system or solution, you now know to ask the following questions: Is your solution based on DALI? And is it the open DALI2 standard?

Conclusion

DALI is a globally accepted, open, digital communication protocol specifically designed for lighting. As we move into the age of the Internet of Things, embracing open communication standards will be vital to any company's success.

The age of analog and restrictive proprietary protocols is coming to an end. Open standards like DALI even the playing field, allow building owners to select the most optimal components for their needs, and do not lock them in to a single vendor. The use of common communication protocols forces companies to be more innovative when it comes to product design, and it puts a greater emphasis on design assistance and customer support.



ABOUT THE AUTHOR: Michael "MJ" Johnson is a 17-year lighting controls industry veteran who has served in leadership roles with Lighting Control & Design, Acuity Brands, Lumenergi, Lumen Controls and now as VP of Sales and Operations for B.E.G. Controls.



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