

DALI Explained

Deciphering the DALI hype

By Leah B. Garriss

DALI: This four-letter acronym has been creating quite a stir in the lighting industry recently. But what is it? How is it different from the lighting system you currently have? Why should you (or why shouldn't you) pursue DALI in your own facilities? Who can use it? Keep reading, because you're about to find out the answers to those questions you've been asking ...

What is it?

Put simply, DALI (digital addressable lighting interface) is a two-way communication system that brings digital technology to lighting. An international standard for communication, DALI defines the commands that ballasts need to recognize in order to be considered DALI ballasts. The system allows individual ballasts to "talk" to the user ... and allows the user to "talk" back via DALI controllers, computers equipped with appropriate software, or building management systems (BMS).

"DALI sends messages around, and just like computer networks, those messages are picked up by the ballasts via addresses," explains Wayne Morrow, president, Westminster, CO-based Starfield Controls. "The ballast with that address picks it up and follows the instruction. A simple message would be, 'All lights in Room 10 turn off.' You send that message, and all the lights in Room 10 know who they are. They pick up that message and say, 'It says here I'm supposed to turn off.' And that's what [happens]."

Stuart Berjansky, dimming product manager, Rosemont, IL-based Advance Transformer Co., explains that DALI is similar to a 0-10V system due to features like low-voltage wiring and daylight harvesting capabilities. "But, I call [DALI] 0-10V plus, because it gives you even more," he says. Communication in a 0-10V system is unidirectional; the control system tells the ballast what to do, and it adjusts according to the voltage on the control circuit. DALI, on the other hand, provides a two-way method of communication, giving the ballast a chance to communicate as well.

How long has it been around?

The history of DALI is an interesting one. The idea first came from a ballast company in Europe over 10 years ago. Three other

ballast companies joined with the first to form a proposal for the International Electrotechnical Commission (IEC) in order to create a standard on communication protocols used for ballasts. About six years ago, the United States became involved as well. "Finally, the standard is being published this year," says Pekka Hakkarainen, director of technology and business development for Coopersburg, PA-based Lutron Electronics and chair of the Lighting Controls Council at Rosslyn, VA-based National Electrical Manufacturers Association (NEMA). "[The standard] has been in its final form for maybe a little less than two years. [It] is included in the IEC standard for fluorescent ballasts, and it's one of the annexes in the standard. It defines a method of communicating to the ballast that the industry has agreed on." The current standard doesn't yet define much for the DALI controls, other than the fact that they must have the capability to send messages to the ballasts.

DALI was accepted as an international standard in 2002; the first DALI ballasts were introduced into the United States in the late '90s.

How does DALI work?

Most of the hardware used in a DALI system is the same as what's used in a more typical system. The big difference: With DALI, ballasts can be linked to a central computer, allowing each one to be controlled independently. DALI systems are currently available for T5, T5HO, T8, and compact fluorescent lamps.

Ballasts are connected using Class 1 (inside the conduit) or Class 2 (outside the conduit) wiring to make up a loop of no more



RT03 router allows its two full power DALI networks to be operated independently or bridged together.

PHOTO: STARFIELD CONTROLS

than 64 ballasts. Each is given an address in the DALI system, and the loop is connected to a DALI control device. One individual network isn't enough to cover an entire building; rather, several must be linked together to create a "network of networks," Morrow describes.

Who's using it?

According to Starfield's Morrow, most of the DALI installations so far have been in retrofit situations. But, installing DALI technology during new construction is best. "Almost all buildings should be running DALI wires at this point because it's so cheap. That one's almost a no-brainer," he explains. Mike Williams, product marketing manager at Danvers, MA-based OSRAM SYLVANIA, agrees. "Where the building owner is going to get the biggest bang for his buck is definitely on new installations," he says.

"When you put it in a retrofit, you don't gain all the advantages DALI can provide," explains Advance's Berjansky. "With DALI, when you wire it up, you wire your lighting independent of your lighting control circuits. When you look at an existing building, those circuits already exist; you have one switch for those 10 fixtures and another switch for these 10 fixtures. You're limited in taking advantage of that lack of requirement for control circuits."

DALI isn't being used very often in U.S. applications yet. "Those who most love technology, or the ones who are looking for the latest whiz-bang kind of thing, they're the ones buying the first shipments," explains Hakkarainen. He also offers other explanations for lack of use: "Part of the reason may be that the standard isn't complete yet; it only includes the ballast portion and doesn't say anything about the controls. It could also be just because everyone's watching to see, 'What are my neighbors doing?'"

Why should I use it?

Consider DALI for the following reasons:

- You can easily reconfigure your lighting without having to tear into the ceiling, making the process of rearranging people, offices, and furniture easier. "You don't have to re-route the control wiring to the fixtures," explains OSRAM's Williams. "You can just reconfigure the DALI fixture to tell it, 'Now you take commands for this new control scene (grouping) as opposed to

DALInet™ System Diagrams

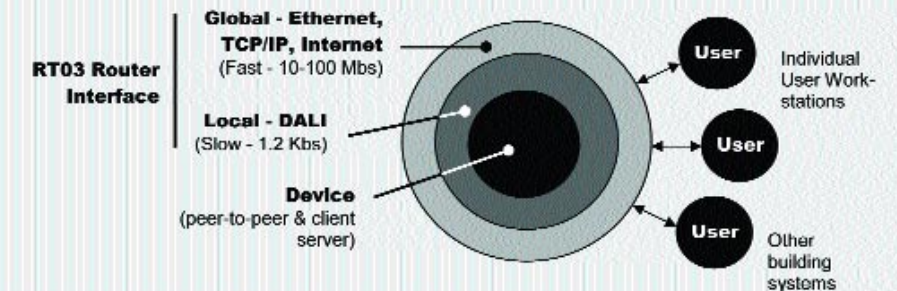


Fig 1 - DALInet Communication Layers Diagram

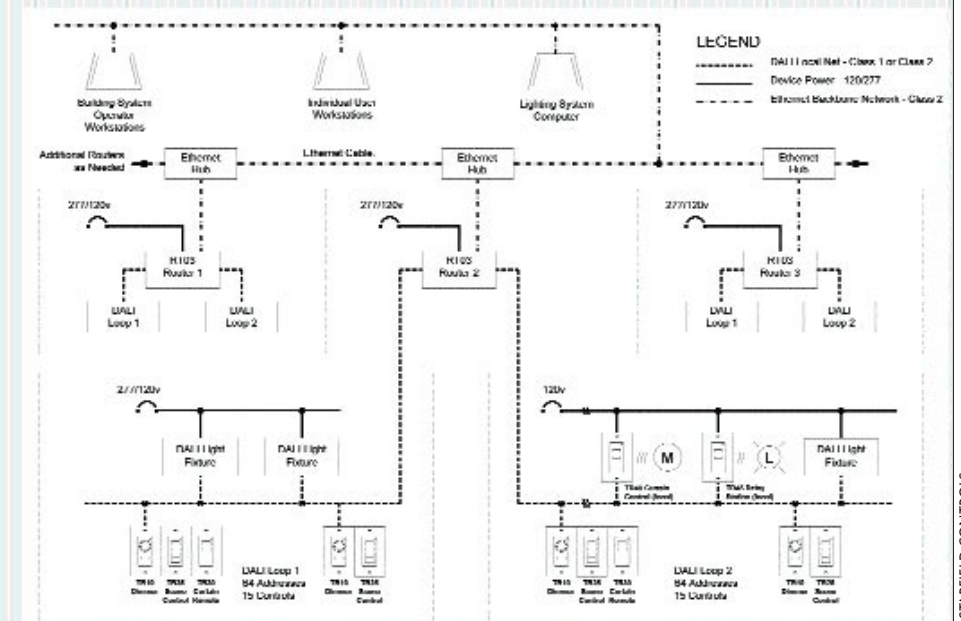


Fig 2 - DALInet Hierarchical System Schematic

Sample of sophisticated DALI network and how it operates.

DIAGRAM: STARFIELD CONTROLS

the one that you used to listen to.' Changes can be done via software instead of going in and doing hard-wire changes."

- Lighting can be tailored (either individually or across the entire facility) to accommodate peak demand, amount of visible daylight, energy rates, etc. For example, in an office area, some lights can be adjusted as necessary without affecting the other lights in the room. Other systems provide this feature as well, but DALI allows the user to control each light separately.
- Open protocol allows for many different companies to be involved. "Interoperability is huge," explains Morrow. "We can all co-exist on a DALI network. We worked very hard at that interoperability. There's a NEMA committee that oversees this. We get together and talk about making sure our products are all interoperable, which is very new."
- Installation of the control wiring can be simple with DALI's five-wire system. "To gain the level of control people need in

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