

WIRING COSTS LIMIT DIMMING APPLICATIONS

Combining daylighting, personal controls, and load shedding offers enormous potential for reducing energy consumption from lighting in commercial buildings. At the same time, integrated lighting control systems can enhance occupant comfort and improve organizational productivity.

However, even with new advances in digital lighting technology, the benefits of integrated lighting controls have been largely limited to newly constructed buildings. A huge untapped reservoir of energy savings lies in the 4.6 billion square feet of commercial building floor space in California. Until now, installing advanced lighting controls into existing buildings required additional control wiring, which is cost-prohibitive because of the labor required.

To tackle this problem, a proof-of-concept dimmable lighting control system was created that does not require additional control wiring in the ceiling. The system uses a new power line control communication technology, called the Phase Cut Carrier (PCC), to send digital commands over existing lighting power circuits.

The PCC reliably sends control signals from a junction box-mounted encoder to dimming ballasts embedded with decoders. The PCC controls all ballasts on a lighting switch-leg without adding additional ceiling wires.

FLUORESCENT DIMMING WITH INTEGRATED LIGHTING CONTROLS

LBNL'S RESEARCH TEAM CREATED A PROOF-OF-CONCEPT DIMMABLE LIGHTING CONTROL SYSTEM THAT DOES NOT REQUIRE ADDITIONAL CONTROL WIRING IN THE CEILING. LBNL IS COMMUNICATING WITH VARIOUS MANUFACTURING PARTNERS ABOUT PRODUCING SYSTEM COMPONENTS.

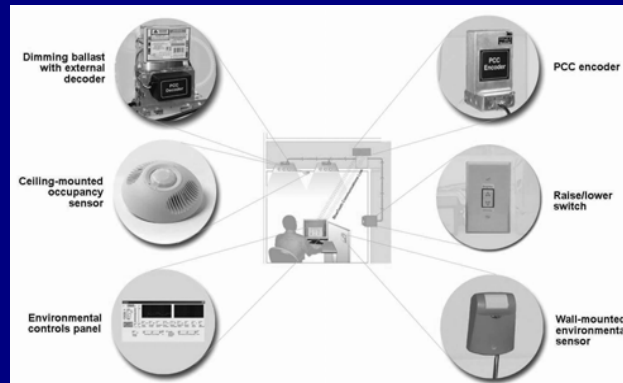


Illustration of the System Components

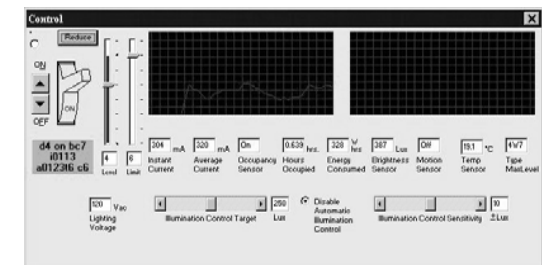
The proof-of-concept system integrates:

- Dimming ballast with decoder
- Ceiling-mounted occupancy sensor
- Power Cut Carrier encoder
- Occupant control switch
- Environmental sensor
- Computer control panel
- Bluetooth wireless technology

WIRELESS CONTROLS OFFER INSTALLATION COST SAVINGS

Benefits

- Less expensive to install in existing buildings than conventional dimming systems.
- Enables lighting system to respond to available daylight and demand response control.
- Allows building occupants to control their local lighting systems.
- Allows organizations to set overhead light levels according to workgroup preferences.
- Integrates dimming control with occupancy control.
- Does not compromise the electrical distribution system with additional undesirable current harmonics.
- Favorable signal-to-noise ratio compared to conventional Power Line Carrier (PLC) techniques.
- Eliminates the possibility of interfering with other upstream building equipment.



From this computer desktop control panel, the user can monitor and control all aspects of system operation, and log the workplane illuminance and power consumed by the overhead lighting system.

INTERESTED?

Building owners/managers, lighting designers and specifiers, lighting equipment manufacturers, code developers, contractors, and utility staff can use the information about this proof-of-concept system.

Key next steps include:

- *Controls, Ballast, and Sensor Manufacturers*— License the Phase Cut Carrier (PCC) technology to move the proof-of-concept system towards prototype development and product commercialization.
- *Lighting Industry and Utility Staff*— Educate potential user groups on dimming benefits
- *Code Developers*— Consider the improved cost-effectiveness of wireless dimming to promote daylighting controls and load-shedding

This project was part of the PIER Lighting Research Program. To view the project results, as well as other current research activities, visit www.energy.ca.gov/pier.

Additional information about this technology can be found on the following websites:

- PIER contractor site:
www.archenergy.com/lrp/products/controls.htm
- PIER researcher site:
http://lighting.lbl.gov/l_controls.html

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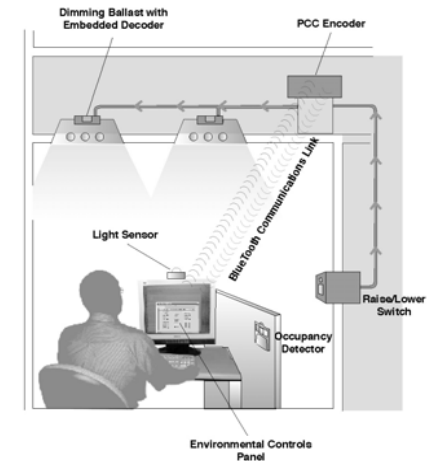
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WIRELESS FLUORESCENT DIMMING WITH INTEGRATED LIGHTING CONTROLS



A SMART AND ENERGY EFFICIENT LIGHTING CONTROL SYSTEM



Public Interest
Energy Research