For example, two of the common industry standard methods for dimming control of lighting systems are 0-10V dimmers and the Digital Array Lighting Interface (DALI), both of which provide digital control of the power output of lighting systems. Both of these methods are effective, but require the provision of control wiring separate from the conventional AC power lines. The addition of 0-10V dimmers or DALI to a lighting installation thus generally requires the retrofitting of any proposed installation site with the necessary control wiring, which typically requires ripping out existing wiring and the addition of new control wiring. The addition of convention dimming controls, such as 0-10V dimmers or DALI to a lighting installation thereby often imposes significant additional costs as well as additional time to accomplish the installation of the control wiring and controls.

[0005] There are existing dimming technologies used for traditional lighting sources which do not require extra communication wires. While there are many, two of the most popular are TRIAC (triode for alternating current) dimmer and Electronic Low Voltage (ELV) dimming. Both "phase chop" the AC signal, making less AC power available for the traditional light sources, hence causing the traditional light sources to provide less light output. These dimming technologies have been adapted to solid state lighting fixtures, however, since they are analog in nature, they are not an ideal solution due to the strictly digital nature of LEDs. There are two distinct disadvantages to incorporating TRIAC or ELV on the LED fixture. For example, there is an added cost associated with adding analog circuitry in order to transmit TRIAC or ELV dimming signals over a power line and to convert the analog signals to digital signals suitable for controlling LED fixtures. In addition, the addition of such specific purpose circuitry commits the LED fixture manufacturer to one technology, thus limiting the ability of the manufacturer to adapt to other dimming technologies that may be required in different applications and installations.

[0006] ~~The~~Embodiments of the present invention seek to provide~~s~~ a solution to the above noted as well as other related problems associated with the prior art.

SUMMARY

[0007] ~~The~~Embodiments of the present invention ~~is directed to~~ provide a powerline communication control system for controlling a light emitting diode (LED) lighting unit comprised of one or more white or red, green and blue LEDs, or combinations thereof, and the associated circuitry for controlling the light outputs of the LEDs of the fixture.

[0007a] In an aspect of the present invention, there is provided a master controller for controlling a light emitting diode (LED) lighting unit via the LED lighting unit's power

distribution system for supplying operational power to the LED lighting unit, the master controller comprising: a lighting control command processor configured to receive a lighting unit control input from any one of a plurality of different conventional dimmer lighting controllers and configured to generate corresponding lighting unit command outputs in a lighting system command format in response to an indication of a user-adjusted setting of any one of the plurality of different conventional dimmer lighting controllers; and a power distribution system interface configured to superimpose the lighting unit command outputs onto the power distribution system and a power signal present thereon as a lighting command signal according to a lighting unit command transmission mode.

[0008] A powerline communication control unit of the present invention includes a master controller that includes a lighting control command processor for receiving a lighting

unit control input from a lighting controller and generating corresponding lighting unit command outputs in a lighting system command format and a power distribution system interface connected to a power distribution system for superimposing the lighting unit command outputs onto the power distribution system and a power signal present thereon as a lighting command signal according to a lighting unit command transmission mode.

[0009] The system further includes at least one lighting slave unit including at least one LED lighting unit, a command receiving interface connected from the power distribution system for receiving the lighting command signal, separating the lighting command signal from the power signal and generating corresponding slave control commands, a slave control processor for converting the received slave control commands into lighting unit control commands, and a lighting unit interface for providing the lighting unit control commands to the at least one lighting unit to control the at least one lighting unit.

[0010] In one embodiment of the present invention, each master controller includes: for each lighting controller, a corresponding lighting control conversion circuit for converting control inputs from a corresponding lighting controller into corresponding command inputs to the microprocessor.

[0011] In another embodiment of the present invention, a master controller includes: a lighting controller and a lighting control conversion circuit for converting control inputs from the lighting controller into the command inputs to the microprocessor.

[0012] ~~In one aspect~~As disclosed, at least one embodiment described herein provides a powerline communication control system for controlling a lighting fixture includes a master controller and at least one lighting fixture controller. The master controller includes a configurable interface, a lighting control processor and a power distribution system interface. The configurable interface is suitable for interconnecting to at least one of several different conventional dimmer controllers and the lighting control processor. The lighting control processor is adapted to generate a lighting unit command output in a lighting unit system command format in response to an indication of a user-adjusted setting of an interconnected one of the several different conventional dimmer controllers received from the configurable interface. The power distribution system interface is in communication with the lighting control processor and adapted for interconnection to a power distribution system. The power distribution system interface is adapted to superimpose the lighting unit system command output onto the power distribution system when connected thereto. The at least one lighting fixture controller includes a command receiving interface, a slave control processor and a lighting unit interface. The command receiving interface is adapted for interconnection to the

power distribution system and for separating the lighting unit system command output from the power distribution system when connected thereto. The slave control processor is in communication with the command receiving interface and adapted to convert the received lighting unit system command output into a corresponding lighting unit control command. The lighting unit interface is configured for providing the lighting unit control command to at least one lighting unit. The lighting unit interface is configured to control the at least one lighting unit in response to the user-adjusted setting of the interconnected one of the conventional dimmers.

[0013] ~~In another aspect~~As disclosed, at least one embodiment described herein provides a master controller for powerline communication including a configurable interface suitable for interconnecting to one of several different conventional dimmer controllers. The master controller includes a lighting control processor and a power distribution system interface. The lighting control processor is in communication with the configurable interface and adapted to generate a lighting unit command output in a lighting unit system command format in response to an indication of a user-adjusted setting of an interconnected one of the several different conventional dimmer controllers received from the configurable interface. The power distribution system interface is in communication with the lighting control processor and adapted for interconnection to a power distribution system. The power distribution system interface is adapted to superimpose the lighting unit system command output onto the power distribution system when connected thereto.

[0014] ~~In yet another aspect~~As disclosed, at least one embodiment described herein provides a process for controlling a lighting fixture, including determining a user-adjusted setting of one of a plurality of different conventional dimmer controllers. The process also includes generating a lighting unit command output in a lighting unit system command format in response to the determined user-adjusted setting of the conventional dimmer controllers. The lighting unit command output is distributed through a power distribution system to at least one lighting fixture. The lighting unit command output is converted at the at least one lighting fixture into a corresponding lighting unit control command. At least one lighting unit is controlled in response to the user-adjusted setting of the interconnected one of the conventional dimmers.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The invention will now be described, by way of example, with reference to the accompanying drawings in which: