

white paper

Wireless Control of Architectural and Theatrical Lighting via DMX-512

When it comes to controlling lighting in theatres, convention facilities, ballrooms, large restaurants, nightclubs, churches and educational facilities the predominant control protocol is DMX-512. Historically wireless methods of interfacing with DMX-512 have been complex and costly, but with the use of EnOcean based radios and energy harvesting technologies, a simple and effective control method has been implemented.

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1. What is DMX-512?

DMX-512 is the most predominant theatrical lighting control protocol used in many theatrical and architectural lighting control devices worldwide. DMX-512 has been in use since 1990. DMX-512 is so common that most dimmers produced today are manufactured DMX-512 compatible. There are dozens of manufacturers producing DMX dimmers from simple single channel 500 watt dimmers all the way up to 96 channel dimmers that can control over 200Kw of lighting load. DMX-512 can simultaneously control up to 512 channels of lighting control - this group of 512 channels is generally referred to as a DMX "universe".

DMX-512 signals are traditionally carried by RS-485 twisted pair cables from transmitting devices to receive devices. DMX is transmitted at 250Kbaud with a maximum update rate of 44 times per second with 512 channels. DMX-512 transmitting devices are mainly theatrical memory consoles with manually operated faders used to program complex scenes (presets) that are stored and then recalled later, by button press or automated sequence. DMX-512 receiving devices are mainly lighting control dimmers, RGB LED fixtures or moving light fixtures that read the DMX-512 transmitted signal and interpret the information as lighting levels, color hue, fixture position etc.

2. Wireless Control of DMX

The term "wireless DMX" usually refers to replacing the RS-485 DMX cables with a suitable wireless RF link. This requires a continuous RF signal usually utilizing spread spectrum techniques. There are a number of manufacturers that already produce this type of wireless RF DMX link. A wireless RF DMX transmission link is not what is being described in this document. What has been implemented here is a method of DMX-512 "translation" using the wireless UHF EnOcean protocol via the PTM based telegrams from momentary contact switches, though all EnOcean telegrams can be supported by this RF interface.

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This system has 2 main components, the Wireless Interface/controller and the PTM switches. The PTM switches transmit standard wireless EnOcean telegrams which are received and processed by the Interface which then translates the received information into an industry standard DMX-512 data stream. The DMX data is then connected to any industry standard DMX device (usually a dimmer) where the DMX signals are interpreted and output as lighting levels.

3. Functionality of the Control Interface

Current controllers have 3 modes of operation: a basic up/down dimming mode, an economical pre-programmed preset recall mode and the programmable “snapshot” mode.

Up/down dimming mode - this is the simplest Interface mode. The PTM switches function as manual dim up or dim down controls when pressed. Each press of the button smoothly dims up or down the pre-configured DMX control channels in increments of 10%. Each button can control up to 48 DMX channels.

Pre-programmed preset recall mode - this is the most economical “Preset Recall” mode. Factory programmed scenes (combinations of lights and levels) are stored in the Interface and recalled by PTM pushbuttons with a 3 second fade between scenes. Each button can control up to 48 DMX channels.

Programmable DMX snapshot mode - the Interface when used with any industry standard DMX-512 controller or console can store “snapshots” of scenes set up by the DMX controller for recall by PTM control stations. These scenes are repeatable lighting “looks” created by adjusting DMX lighting control channels to create the desired combination of lights and levels. The number of DMX control channels per scene can be up to 512 channels. The fade time between scenes is a fixed 3 seconds (the fade time is factory adjustable). Scenes can be modified “live” by an up/down master PTM switch in 10% increments.

4. Specifications

PTM control stations are available with 2, 4 or 8 scenes. Multiple DMX “universes” are possible by using separate interface modules. The DMX interface has fully bi-directional communication capability for future use with RDM compliant devices. The Interface is available in 120V/240V/277V/347V and low voltage (class 2) versions.

5. Benefits

A benefit of using wireless technology is that the information sent by devices is accessible anywhere in a room or space, not just along the wires. So components can be optimally positioned without concern for existing wires or the difficulty in getting wires to certain locations. It also allows a simple and cost effective method of upgrading and expanding current DMX based lighting control systems which are often located in large and extremely hard to wire buildings. Combining a wired DMX system with EnOcean wireless components allows an installation to benefit from both technologies.

6. Where do we go from here?

Addition of more wireless signal sources will allow for a wider variety of lighting control scenarios implementing devices such as Photo sensors, occupancy sensors and time based devices.

About Echoflex Solutions

Echoflex, located in Squamish, British Columbia, is a manufacturer specializing in the EnOcean wireless and energy harvesting protocol. The Echoflex engineering team, with over 80 years of combined controls experience, creates wireless and battery-less switches, sensors and controller/receivers, that are designed to create smart spaces that optimize energy consumption for lighting, HVAC and various process applications. Echoflex prides itself on its ability to develop innovative and quality products in a timely manner that are easily installed, easily commissioned, and maintain flexibility.

www.echoflexsolutions.com

About Luella Enterprises

Luella Enterprises, located in Squamish B.C. Canada, are theatrical and architectural lighting control specialists. The company was formed in 1994 and their primary business was lighting control system service. Luella has since evolved into lighting control system integrators and manufacturers of custom lighting control interfaces. Luella Enterprises current business focus is on custom product development and their expertise in dimming systems and RF engineering naturally led them to collaborate with Echoflex Solutions.

www.luellaenterprises.ca

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