

DMX Multi-Zone Universe

White Paper

DMX also called DMX512 is an RS485 communication standard used for non-critical lighting systems. There is no error correction or retuned data. What makes DMX work is that the same packets get sent out over and over. A lot of people think that DMX communicates to a light by sending the address to a light, and they would be wrong. What can really twist your mind is you can have a lighting console with 512 faders, but DMX only uses byte values of 255 and the packet is only 512 bytes plus some steering bits. So how can I address 512 channels? Basically there is a large packet with 512 slots that sequentially represent the addresses of the lights and there is only one byte of data for each slot. By the way you do not need to send all 512 bytes for the light to work. You only really need to send the number of bytes that will cover the range of lights. The name that represents a single RS485 DMX system is called a Universe.

Typically DMX lights use 3 of the slots for different operations of the light, and is normally called RGB. For spots and other stage lighting you might find Slot 1 or channel 1 is sometimes used for strobe, slot 2 is dimmer and slot 3 is mode. You will need to look up the data for the lights to see how the channels are used. When you setup the addresses for lights, space the addresses three apart (1, 4, 7...).

Most people think of stage lighting when DMX is mentioned. Actually a lot of commercial lighting uses DMX to control their lights. Before you go off thinking you can use RS485 from a control system to do DMX, you should just make your life easy and purchase an RS232 to DMX controller. There are several units out there that can do this, and a lot of times all you really need to do is just recall presets.

When creating a lighting system for commercial use, it is most important to know how many lights are required, and will there be more than one room. Typically you need to use DMX splitters on systems that have more than 30 lights. If there is more than one room, then you are really going to have a problem using one DMX Universe to control the lights. For example, you have a ballroom and they want to add stage lighting. By the way, the ballroom can be divided into two rooms with lights in each room. The lights are all connected together with one DMX Universe. From the control system all you want to do is recall presets using a DMX recorder, seems easy enough. When the lighting programmer comes in and starts to set up the lights, everything is great as long as the rooms are combined. Now the lighting programmer tries to setup presets when the rooms are separated and there is no way to recall a preset without affecting both rooms. Remember when I mentioned there are no addresses for the lights in the DMX protocol. Now you have a dilemma of how to control two zones of lights on a single DMX Universe.

Multi-Zone Lighting Solution

When controlling multiple lighting zones, there are only two alternatives. One is to create a DMX Universe for each zone, and the other is to find a unit that can mask an address range. Adding a DMX Universe requires multiple lighting controllers, extra home run wiring and extra control system serial ports. A much better alternative is to use a lighting controller that can mask an address range.

An address mask range only allows the lights in a defined range to change. Wait, earlier I said there are no addresses in the DMX protocol, so how is this possible? It's not possible, but we will just fake

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it. For this to work the lighting controller must know all of the current levels. When a preset is called with a mask, only the levels within the mask are changed, and all other levels remain the same.

When setting up the lighting addresses for the lights in a room, keep the addresses sequential and three channels apart.

- Room 1 Addresses (1, 4, 7, 10, 13, 16)
- Room 2 Addresses (20, 23, 26, 29, 32)



One DMX controller that does a fantastic job of controlling the lights and can mask address within a preset recall is made by Engineering Solutions Inc. This unit cost about \$245 and can be found at: <http://response-box.com/gear/2010/04/rs-232-driven-dmx-engine/>

The protocol for the unit is all ASCII and easy to implement. Creating level control for the lights was easy to do and the response was quick. The following features are available with the unit:

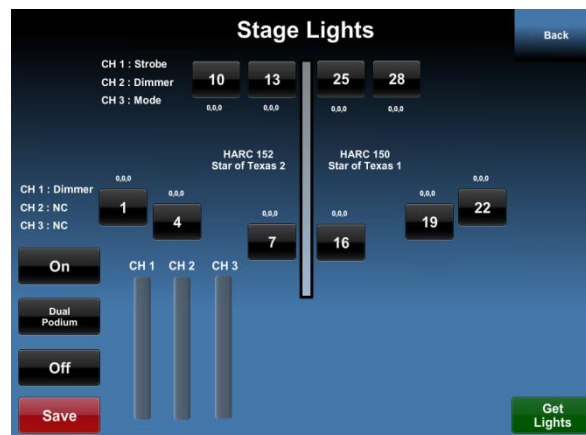
- Get the levels of lights within a range of addresses
- Set each channel of a light
- Set a preset for all of the lights
- Recall a preset for all of the lights
- Recall a preset for a group of lights using a masking range

Using a Crestron Control and the system and the Engineering Solutions DMX Engine, I created a module that allows up to four rooms with 10 lights each to be controlled. The module allows for the entry of the starting DMX channel for each light and the Start and End Mask for each room. Control and setup of the lights is done completely using the lighting page in the Crestron. On the lighting page the light buttons are laid out like they are in the room and each light button number is the DMX starting channel of the light.

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At each light button there are three channel values for each light. These values represent the RGB or channel values for the light. Pressing the “Get Lights” button queries the DMX Engine for all current values and displays them at each button. To help the user, I show them what each channel value does for each group of lights. When a light button is selected, the current values for the light are shown on the three bar graph level controls. Dragging the channel level or pressing a position sends the level directly to the light and the channel value is shown at the light button.



To setup a lighting preset, first select a global preset on the left. A global preset recalls all of the channels on the entire DMX Universe. Press the “Get Lights” button to read all of the levels. Next select the light you want to adjust and change the channel levels. After you have adjust every light, press the “Save” button. There are 10 Global presets supported by the module.

For recalling presets in a room, the module has room presets signal controls for up to 10 presets. These presets use the Start and End Mask values to recall only the channel values associated with the room.

Conclusion

Using the Engineering Solutions DMX Engine simplifies the ability to implement DMX lighting with a control system. Having the ability to fully control the lights and setup lighting presets from a touchscreen, now gives the administrator of the system the ability to fully setup their stage lighting used in commercial applications without having to call in a lighting programmer.

Specialized control system, programs, modules and drivers for the TEKVOX TEK 3 are available from TEKVOX sales.

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