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DMX – Lighting control's best kept secret?

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Introduction

Most custom installers will have heard of DMX but not very many know a great deal about it. It is perhaps best known as the control mechanism for dimming LEDs especially those which color change. Often a special and expensive additional interface is added to another lighting control system to enable these fittings to work.

The Extra Vegetables ArtNet DMX driver has enabled DMX fittings to be controlled directly from Control4. This has allowed installers to control these fixtures without the expensive add-on to their usual lighting system.

However this is not using DMX to its full potential. DMX can be used as the **ONLY** lighting control system in a residential property with Control4. It is reliable, flexible and very cost effective.

Most lighting control systems are proprietary and the companies that produce them employ a sales and technical team to promote and educate dealers. More open systems such as KNX that are supported by many manufacturers still have an overall association that promotes the protocol.

DMX is different. It is a well defined standard that is supported by hundreds of manufacturers. But you are never going to have a sales representative from DMX knock on your door. This is probably why you aren't using it as the only lighting control system in your installations.

Over the next few pages we are going to provide you with the information you will require to specify a complete DMX lighting control system. You can then decide if this is a good fit for your business. Along the way we will dispel a number of myths surrounding DMX. It is probably the simplest lighting system you've never used!

What is DMX

DMX, or to be more technically accurate DMX512, stands for 'Digital Multiplex with 512 pieces of information'. It was originally developed for stage and theatrical lighting in the mid-1980s. Around this time more sophisticated stage lights with the ability to move and automatically change color were being introduced. Each manufacturer was using a different connector and software. A standard was required so that sophisticated lighting shows could be controlled from the same lighting desks. DMX512 was the result and it is still the standard used in just about every Rock 'n' Roll and theater show you will see.

A lighting network in DMX is known as a universe. Each universe has 512 channels. Each of these channels has 256 lighting levels. Complicated theatrical lights may use a number of channels to represent the color and effects produced by the fitting. However in a domestic environment a single DMX universe usually has sufficient lighting channels for all the lighting.

Myth 1 – DMX is only for Rock and Roll

Well given the number of domestic light fittings that support DMX this obviously isn't the case. But there are some good reasons why you should consider a 'rock and roll' lighting system.

Today's light shows are incredibly sophisticated and they are nearly all run on DMX. A band arrives in town, the gear is unloaded and the show takes place. Then it's off to the next town. That lighting show travels with them. DMX is robust and reliable. How many other lighting systems would you trust to assemble, disassemble and reassemble right across the world every day over nine months!

Myth 2 – DMX is complicated

There is no doubting that the programs for the 'rock and roll' shows are complicated. But it is unlikely you will be going to that extent at home. But if you are then look no further than our amBX ambient XC integration!

DMX light fittings and dimmers are nearly all addressed using simple DIP switches on the light fittings. In a residential or small commercial set up that's the only set up that's required outside of the Control4 programming. There's no programming of the dimmers you don't need to break out the computer as you physically install the lighting.

Myth 3 – DMX is expensive

Often interfaces from another lighting control system to DMX are expensive. That's because they are trying to discourage you from using DMX controlled fittings. The more of them you use the less of the lighting control system equipment you buy.

DMX fittings and control equipment are not expensive.

Take LED fittings for example. Nearly all of these require a physical LED driver to control the intensity of the LEDs. You could buy a driver that has a 0-10v control line input and then buy a 0-10v dimmer interface for your chosen lighting control system. You could also buy a DMX driver and then buy a DMX interface for you chosen lighting control system. Or you could just control the fitting directly by DMX and save the purchase of these additional interfaces, the time to install them and the programming time.

Remember whatever you do you still have to purchase the physical LED driver – but if you use pure DMX that's all you have to buy. That cost of the physical LED driver should be in the light fixtures budget – not the lighting control budget.

Professional dimmers for regular low voltage and mains voltage halogen and incandescent lights are around £65 (sixty five) or $80 (eighty) for a 4 channel 10A unit. That's not expensive in fact that's **ten times less** than some lighting systems we know!

When using DMX with Control4 you don't need an expensive DMX lighting controller. The Control4 system is your lighting controller. Our driver and the Enttec ODE interface will cost you £260/$410. That is all you need.

Myth 4 – DMX is only for LEDs

Not true. Whilst DMX is great for LEDs they aren't the only type of fittings that can be controlled by DMX. As mentioned in the paragraph above you can buy DMX controllable dimmers for regular lighting for a fraction of the cost of many other lighting control systems.

This 4 channel 10A leading edge DMX dimming pack is wall mountable, has anti-tamper screws and measures 210 x 215 x 45mm. It has a retail price of around £90/$150.

Use this to control legacy halogen and table lamp lighting circuits in the property. Similar versions are available in North America – see the list at the end of this document.

As well as dimmers there many different DMX relay units available to control lighting or other devices that only need to be switched.

Myth 5 – DMX equipment takes up a lot of space

DMX is in fact very space efficient and ideal for apartments and other MDUs. With the dimming capabilities built into all the LED drivers you only need to find space for the legacy dimmers for halogen and tungsten lighting.

Since there's no central controller or processor these on-wall dimmers can be placed in suitable locations throughout the property.

What is ArtNet?

ArtNet is a communication protocol or language that allows a DMX network to be controlled over Ethernet. Our driver uses the ArtNet language to 'talk' to the Enttec ODE which then controls the DMX network. As an installer you do not need to know anything more about ArtNet.

Remeber that all DMX fittings are compatible with one another – and there's no such thing as an ArtNet DMX light – just a DMX light!

The System Design

Cable Infrastructure

DMX uses a simple daisy chain cable infrastructure. In a simple system the DMX control cable would start at the DMX controller (Enttec ODE) and daisy chain through all of the dimmers and LED drivers in a property. At the end of the line a DMX terminator (a simple 120Ω resistor) is fitted. This terminator is not always required – especially on shorter lengths, but you should always plan to install them. This chain can be up to 1,200 metres or 3,900 ft (nearly ¾ of a mile) long.

DMX spurs and splitters

In larger properties a single run daisy chain may not be practical or convenient. In these cases it is possible to run a number of spurs out to all of the light fittings. However these spurs cannot simply be joined together in a terminal block. A special DMX splitter and booster should be used. This takes the DMX signal, isolates it and sends it out each spur. This is not an expensive item. An 8 way rack mounted splitter will cost around £120/$200.

DMX Cable & Connectors

This is another area that causes concern over DMX. For stage shows special DMX cables are used that are made with flexible coaxial cable and fitted with XLR connectors. This is primarily because the cables need to withstand the abuse they will receive on tour.

In permanent installations Cat5 cable can happily be used for DMX installations. Whilst we would recommend the usual careful treatment of the Cat5 cables during installation they will survive considerably more abuse than they would if required for a data network.

Many domestic LED dimmer drivers are fitted with RJ-45 sockets. You can also readily purchase XLR – RJ45 fly leads and converters for a few bucks. Some theatrical DMX fittings use 3 pin XLRs and others 5 pin versions. All are compatible with one another – just keep a few 3 – 5 pin adaptors of both sexes in your toolbox!

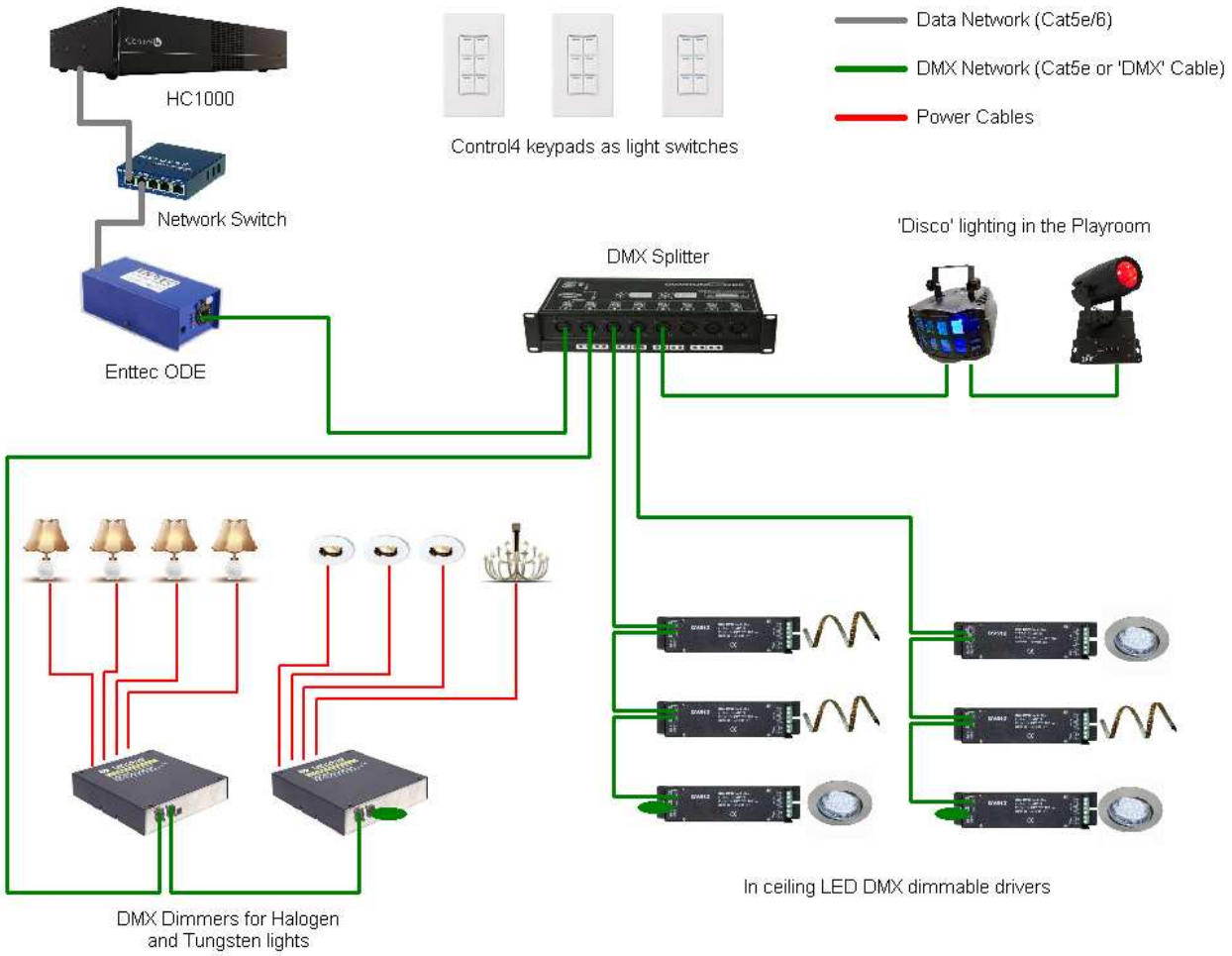
Flexibility after Installation

This is a huge selling point. With a regular central panel lighting control system your circuit design in a room is fixed. So during the design phase your customer tells you the Grand Piano is going to be in one corner of the room – so the lighting circuits are split so you have a circuit dedicated to highlight the piano. Six months and three interior designers later the Piano has moved in the room. With a central panel system you're stuck.

Because DMX addresses can be set on each individual down light in the room you have complete flexibility of the lighting circuits. You simply change the DIP switches on the drivers and the circuits have been changed. It even allows your customers to adjust the lighting arrangements in the room next time they re-decorate without pulling any new wire.

General Schematic

This shows the general schematic of a complete DMX lighting control system using Control4.



The Control4 keypads will communicate Zigbee to the Control4 system (via an HC200 or HC300 controller – not shown).

Control4 will communicate ArtNet to the Enttec ODE which then sends the DMX signals to the network of dimmers and drivers. As we are using spurs the DMX signal is split using an 8 way splitter unit. Each spur has a terminator fitted.

You can use wall mounted dimmer panels for your table lamps and other legacy light fittings, chandeliers etc. Each of the units we have shown can control 4 circuits of light – we've only shown one lamp per circuit for clarity.

Multiple LED circuits are daisy chained together. The setting of the DIP switches determines their circuit number. Multiple drivers can be set to the same circuit number – they don't even have to be on the same spur from the splitter. Again we've just shown one lamp connected to each driver – but there could be several.

We've then shown some fun 'Disco' lights in the Playroom area.

Lighting Keypads

You can find specific DMX keypads – however these are almost always DMX controllers in their own right. A DMX system can only have one controller so these cannot be used in conjunction with the Enttec and the Control4 system.

However Control4 make keypads and these are most suitable for use with the DMX lights. These are available in multiple colors and with 2, 3 or 6 buttons. They can be further enhanced with engraved buttons in many territories and you can also change the frames to various metallic finishes from third party suppliers. They keypads are a US industry standard insert size.

Programming keys to operate individual channels or to color mix is very simple. Your engineers will not need to attend a separate training course in order to commission the lighting system in the property. You simply use Composer.

System Commissioning and Testing

The complete lighting control system will only be fully operational when the Control4 system is installed. Whilst this may be seen as a disadvantage of this system there are a two ways in which you can overcome problems of commissioning and testing before the rest of the installation is complete.

Temporarily install a Control4 Controller

Whilst we wouldn't recommend controlling a complete house system from an HC200, it will be fine for commissioning the system. It can act as the Zigbee controller and coordinator for the project. You can create a simple system where you simply program a button on the keypad to switch all of the lights in the room on and off. This should be sufficient for certificate of occupancy purposes.

Use a DMX Tester

Investing in a DMX tester is a good idea when commissioning DMX systems. A tester will allow you to check your connections, cables and to send out basic DMX level commands to the network. This costs in the region of £120/$200.

If you choose a tester that can set all the DMX channels to a level then this can be left on site to allow the lighting to be used during construction. A simple button press on the tester can be used to switch all the lights on or off.

Note generally DMX fittings will not illuminate at all until they receive a DMX signal.

Use the test mode on the Dimmers and Drivers

Most fittings, dimmers and drivers have a setting on the DIP switches that illuminates them fully. Depending on the practicalities of later resetting these to their correct DMX address this is another way of commissioning the system.

Color Changing Effects

Our new DMX driver includes built in routines for automatic/random color changing. This allows you to provide your customer with mood changing lighting effects with very little programming. You can choose to fade and hold colors over varying periods. It is very effective and simple to do.

Bars, Clubs and Commercial Environments

The DMX lighting system is ideally suited to bars and clubs. Whilst the integration is not designed to provide a complete night club experience it is possible to provide a few areas of color changing and some other DMX effects if required.

Our driver allows you to represent lights as well as rotational effects. As the lights can all be included in regular Control4 scenes (and you can add in other motorization effects to these scenes as well) it makes it an ideal control choice for an environment which requires more than standard lighting control.

For complete out of this world DMX lighting control take a look at the amBX amBIENT XC controller and driver. This produces amazing sound to light and video to light experiences with zero programming. In a more sophisticated commercial environment you could provide amBX control of some of the light fittings and the rest can be controlled as described here. For the customer all control is consistent and through their Control4 system.

System Loadings/Redundancy

We have worked hard with version 2 of our ArtNet DMX driver to reduce the load on the Control4 system. However the Control4 processor is also the lighting control processor so it will add additional load to the system. An HC1000 is highly recommended if using DMX lighting control.

If specifying a commercial application where there is likely to be multiple channels of continually changing colored light you need to be aware of what else the system is controlling. If you have any concerns please contact us and we will provide you some advice on what you should offer your customer.

Conclusion

We believe that DMX is probably the least understood, yet one of the most powerful and cost effective lighting control systems available. We hope that this document has opened your eyes to its possibilities. Whilst it may not be the right lighting control system in every installation – where you need to control many circuits of LEDs (color changing or otherwise) it deserves serious consideration.

Products and Suppliers

There are many different suppliers of DMX fittings and dimmers. The list below is by no means definitive and not all products are available in all territories.

Control4 – DMX Interface

Our driver is designed and tested against the Enttec ODE. This is available worldwide direct from the Enttec website.

http://www.enttec.com

DMX LED Drivers

There are many drivers available for LEDs. You should check with the manufacturer of the light fittings as to what drivers they recommend. Usually the electrical contractor will be responsible for supplying and installing these items.

The PX24500 sold under many different brand names is one of the most popular DMX RGB drivers

DMX Dimmers for Halogen & Tungsten Lights

The NJD DPX4/10 provides 4 channels of dimming of up to 10A, whilst theDPX12/4 provides 12 channels of dimming of up to 4A. Both are designed for wall mounting and permanent installation.

In North America the Chauvet range of DMX dimmer packs or the Optima Lighting Matrix DMX Pro 4 offer similar functions. Leviton also have a wide range of DMX equipment.

DMX Tester

A DMX tester is a worthwhile investment for testing and commissioning a system. The Acme CAT-T will provide all the basic functions you require. Again this is available under other brand names.

In the US Leviton have a similar model – although it is more expensive. There is also the Swisson X-MT 120.

We are not associated with any of the above companies and do not sell or offer direct support on any of these products.