

# DMX512

## A Primer on the DMX512 Communications Protocol

### Introduction

DMX or DMX512 is a communications protocol used for controlling devices in stage and theatrical applications. It is used to transmit digital multiplexed signals – DMX stands for Digital Multiplexed Signals. The DMX protocol is simple, robust and reliable.

DMX512 provides up to 512 control channels per data link. It can be seen as 512 sliders on a lighting console, connected to 512 light bulbs. Each slider's position is sent over the data link as an 8-bit number having a value between 0 and 255. The value 0 corresponds to the light bulb being completely off while 255 corresponds to the light bulb being fully on.

A technician would use a DMX512 setup to control lights, dimmers, fog machines or any other DMX-compatible device connected to the data stream.

### History

DMX512 was created in 1986 by the United States Institute for Theatre Technology as a standardised method for connecting lighting consoles to lighting dimmer modules. It was revised in 1990 to allow more flexibility. The Entertainment Services and Technology Association has assumed control over the DMX512 standard.

ESTA refers to the current revision as the BSR 1.11 - DMX-512/2000 standard.

### Architecture

DMX devices are connected in a multi-drop or daisy-chain topology. This allows for up to 32 devices to be connected to the same controller link, each individually addressed by DIP switch or rotary switch assignment. The DMX512 signal is transmitted via the industry standard interface EIA485, more commonly known as RS485. The standard wiring is a twisted-pair, shielded, low-capacitance data cable designed for RS485.

Data is transmitted in serial format asynchronously with a transmission speed of 250 kbps. Voltage on both pins (+ and -) should be between +12 volts and -7 volts (measured to ground). EIA485 defines that the signal voltage between the two wires should be at least 200 millivolts. Higher voltage on the + pin and lower voltage on the - pin results in a digital 1. Higher voltage on the - pin and lower voltage on the + pin results in a digital 0. The ground wire is only a reference point and often used for shielding.

Any given channel may be unused or empty, but all 512 channels are always being transmitted – this is a necessary component of the standard.

### Control channels

Each fixture in the data stream has a different number of channels that can be controlled, with some devices having as many as 15 channels. The channels may control movement, colour, pan, fade or any other parameter the device is capable of.

### Connection

There are actually five pin assignments for the DMX protocol, and more sophisticated devices may use the 5-pin XLR connection. For most devices, the standard 3-pin XLR connector and cable is the most common DMX connection. Standard microphone cables may be used, but cable runs should be less than 30 metres. For longer runs, cable designed specifically for data transmission should be used.

### Summary

- DMX512 is a method of connecting a single controlling source to multiple receivers
- Serial data can be sent up to 4000 feet over data cables
- Up to 512 devices, or functions on a device, can be controlled with 8-bit resolution
- All channels are continually being updated