

Over the past few months I have written several technical articles about DMX512 (**D**igital **M**ultiplex**X**) for moving lights, special effects and the consoles that use it. By now you know this communications protocol is a method that allows the lighting table and the other equipment which must use the same DMX address in order for the lighting table to “talk” to moving lights, dimmers or other devices. Right now, this must be done manually by a technician.

But it would be a much simpler and better world if dimmers, moving lights, effects machines AND lighting consoles could communicate with each other and announce themselves automatically through a DMX cable. This is no longer a dream. It is possible because of a new technology known as Remote Device Management (RDM).

In principal, DMX is a serial, one-way system that broadcasts information through a cable of no more than 100 meters connecting a maximum of 32 devices to the communication cable. For distances of more than 100 meters (or for systems that will use more than 32 DMX devices) you need to use a splitter/amplifier which will guarantee that the signal will be strong enough for all the lights and other devices to respond reliably to each command that is sent through the DMX cable.

RDM entirely changes the methods we use to communicate with these machines because they will have the ability to directly talk to each other. This will eliminate the tedious setting of addresses on each moving light. And that will also mean the lighting console will no longer have to be manually set to each moving light address either.

Another major advantage of the RDM protocol system is that it was designed to function in a DMX cabling environment. This means that older equipment can still be addressed using a conventional patch while the newer RDM equipment will be able to address themselves within a lighting table and then be assigned to specific channels as required by a lighting designer or board operator.

This will not be a completely pain-free upgrade from standard DMX to the DMX-RDM universe for one obvious reason. RDM is a two-way communications protocol. A lighting table will send a signal through the DMX cables “asking” all equipment to reveal itself to the console. And the lighting table needs to be able to “hear” the answers. For this reason you will need to use the next generation of splitter/amplifiers that will permit two-way communication.

The quality of your DMX cable will become more important as well. And if you have never used a terminator in your DMX system ... well, I guess you didn't read my article (October 2009) about the advantages of doing this. With the new RDM protocol system it will be absolutely necessary to use a terminator to close the circuit and keep out signals that might find their way into an unsecured (unterminated) DMX communications cable.

Within the electronics and software that make the equipment respond to the operator's commands are RDM packets which are inserted between existing DMX data packets that are used to control moving lights and other devices. DMX512 specification requires DMX packets to begin with a start code of 0x00. By using this start code, RDM data can be safely inserted between DMX data without older non-RDM aware devices attempting to read them. Older DMX devices will simply ignore the signals that are not addressed to them and newer RDM devices will be able to interpret both types of data.

The DMX512 specification requires DMX connectors to be a 5-pin XLR type, with only the first 3 pins being used (pins 4 and 5 were reserved for "future use"). Unfortunately, various manufacturers started using the final two pins for various, proprietary purposes, such as low-voltage power or proprietary talk-back protocols. As a result, the decision was made to have all RDM communications on pins 2 and 3. But this raises concerns about data collision.

The RDM standard solves this problem by ensuring that in all cases (except Discovery) only one device is authorized to be transmitting at any given time. In general operation only the lighting table can transmit RDM messages. The lighting table always initiates RDM communication. And all RDM devices must have a unique identifier (UID) that consists of a manufacturer ID and serial number. Using the UID, the personality of a device can be determined by the lighting table making it simple for the operator to use the effects of that device.

There are three types of RDM communication; Discovery, Unicast communication and Broadcast communication.

### **Discovery**

Discovery is the only situation in which data collisions can occur. The lighting table will ask all devices to identify themselves and waits for a reply. A response will indicate to the lighting table that at least one device exists. More than one device might have responded at the same time but the lighting table cannot determine if only one responded. It will then need to communicate directly with that device to determine if it has been discovered correctly. Once the lighting table is sure that it has discovered a single device (by using the UID) it can move on to the next device and then repeat the request until all devices are discovered.

The lighting table needs to regularly perform searches for new devices but does not need to re-search for known devices.

### **Unicast communication**

General communication with a specific fixture occurs in a request-response pattern. The lighting table sends the request to the device, addressing it by the

device's UID. When the request has been sent, the controller relinquishes control of the DMX line for a given period of time, so the device can transmit its response. Unicast communication is the only way in which data can be retrieved from a fixture (other than using the discovery method above). If the device does not respond within a given period of time, the controller can assume communication has failed, and may retry.

### **Broadcast communication**

To quickly send instructions to multiple fixtures, RDM uses broadcast communication. This allows the lighting table to send an instruction to all devices. Because more than one device might be receiving the message, responses are not permitted in broadcast communication.

There are already a few newer boards that are RDM compliant as well as a few moving lights and dimmers. This is just the beginning of the RDM revolution. Imagine a time in the near future when your lighting table will know that your new Vari\*Lite is overheating or needs a new lamp. Or that your hazer is almost out of fluid. This will be coming to rock and roll shows soon. I can guarantee it. It is already possible, using RDM, to receive data from the latest electronic dimmers systems. You will be able to know when your dimmers are over-loaded or overheating without having to run to your dimmer room from the booth. And you will be able to remotely change the DMX address using a RDM compliant dimmer without having to send your assistant to do the job.

Beyond the technical information that RDM compliant equipment will bring the light board operator, this technology may provide other information as well. For example, in the future you might have a weather vane and wind speed device mounted on the highest section of truss in an outdoor concert. The system would alert you when the wind speed and direction reached a pre-determined level. (I know that this would be very helpful in places like DisneyWorld or Universal's Islands of Adventure.) True two-way communication will allow your lighting desk to control and monitor more complex machines. Machines that have yet to be dreamed of ...

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A handwritten signature in black ink, appearing to be 'D. ...' with a stylized flourish.