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The Impact and Benefits of SHoW DMX™ RF Interference Reduction

In November 2007, CTI commissioned testing of SHoW DMX™ and three other competitors' wireless DMX systems with regard to DMX data fidelity[1] and potential interference with WiFi systems. The results proved that SHoW DMX's patent pending technologies provided dramatically improved performance in both areas.

The Problem

The growing use of 2.4GHz wireless technology in entertainment has increased the potential for interference between systems, and the need for a new generation of equipment that offers improved strategies for interference reduction.

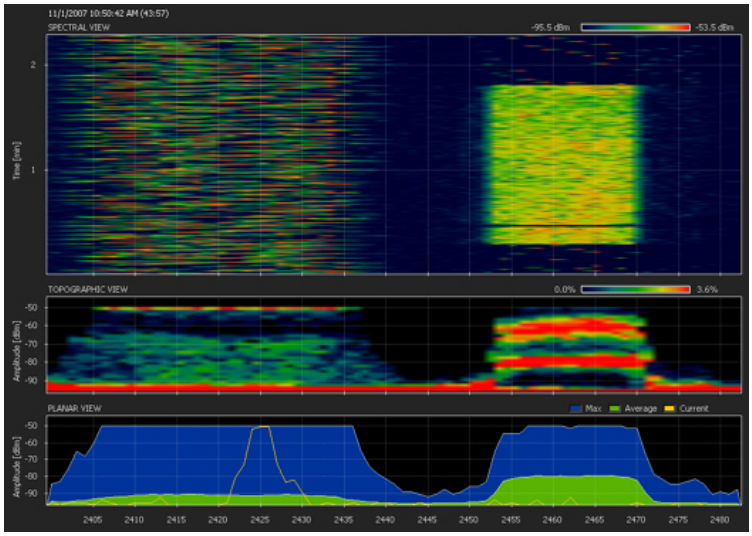
Conventional Frequency Hopping Spread Spectrum (FHSS) radio provides a reliable and robust wireless data delivery system that is inherently resistant to interference loss. But conventional FHSS uses the entire 2.4GHz spectrum, which means that other 2.4GHz signals (e.g. WiFi) in the same environment can be interfered with.

The SHoW DMX Solution

City Theatrical's SHoW DMX (Synchronized Hopping of Wireless DMX) incorporates a complete suite of interference reducing solutions that can minimize or eliminate these interference problems.

Limited Bandwidth Frequency Hopping: SHoW DMX can operate in full spectrum 2.4GHz FHSS mode or may be configured to work in one of three sub-bands of the full 2.4GHz spectrum. Each sub-band occupies approximately 2/5s of the full band, with one sub-band positioned at the low end, one in the center, and one at the high end of the full spectrum. The three sub-bands overlap and each avoids some combination of WiFi channels. This allows the SHoW DMX system to broadcast in a different part of the spectrum than other equipment being used in the area, in order to minimize or eliminate interference with WiFi or other channel specific or limited bandwidth equipment.

The figure on the right shows a WiFi Transmission (to the right of the image) assigned to WiFi channel 11 and a SHoW DMX Limited Bandwidth transmission (on the left of the image) assigned to WiFi 1 – 6. This screen shot (from a WiSpy frequency analyzer) clearly shows that the two transmissions are occurring in different areas of the 2.4GHz band.

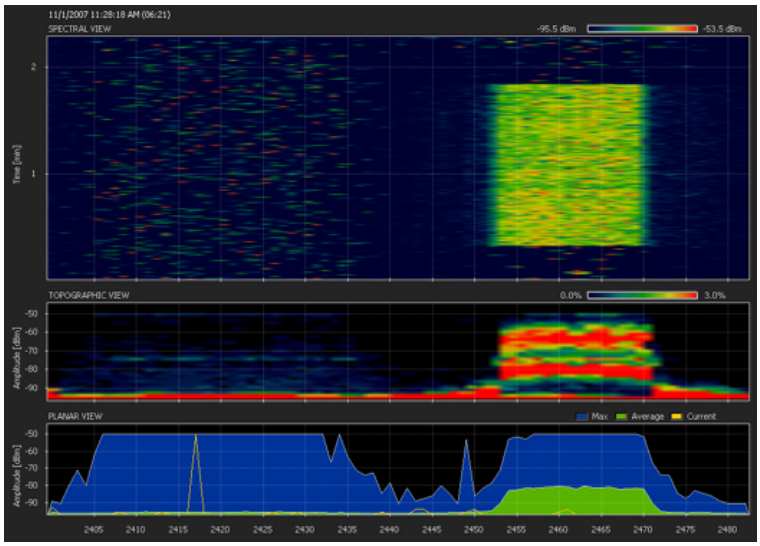


[1] This CTI White Paper discusses the issue of RF Interference Reduction. For more about DMX data fidelity, please see *The Impact and Benefits of SHoW DMX High Data Fidelity.*

Limited Burst DMX Transmission: Limited Burst mode reduces the number of DMX slots and the amount of radio energy that is broadcast by the SHoW DMX Transmitter. If all 512 DMX slots are not being used and the radio energy in the venue must be controlled as much as possible, then Limited Burst can be used to target only the DMX slots needed and reduce the systems radio footprint even further.

In Limited Burst mode, the user may select any contiguous group of 30 or more DMX slots in multiples of 32 slots. These may be assigned to any starting address that will accommodate the burst.

The figure on the right also shows a WiFi transmission (to the right of the image) assigned to WiFi channel 11 and a SHoW DMX Limited Bandwidth transmission (on the left of the image) assigned to WiFi 1 – 6, but in this case the SHoW DMX transmission is also Limited Burst. Note that the two transmissions are occurring in different areas of the 2.4GHz band, and that the SHoW DMX transmission appears much sparser and fainter than in the Limited Bandwidth Full Burst shown in the figure above.



Adjustable Broadcast Power: Common sense suggests that interference is a function of output power, and CTI's ETL testing confirmed it. Other wireless DMX systems are only provided with a single fixed output power, but the SHoW DMX system's adjustable output power feature allows the user to match the system's power to the requirements of the application, and many applications do not require the maximum power available. While SHoW DMX is capable of up to 125mW FCC (394mW ETSI) broadcast power, 10mW is adequate for many professional venues. In fact, CTI's 10mW WDS Transmitters have been commonly used on Broadway shows.

Any one of these SHoW DMX features will help reduce interference with other 2.4GHz wireless equipment and using them in combination will provide even more protection from interference with WiFi and other 2.4GHz wireless systems that are often used in the same venues with wireless DMX systems.