ETC Information Guide

Multiverse Wireless Setup

Overview

This document is a resource for setting up ETC products that use City Theatrical Multiverse® wireless communication.

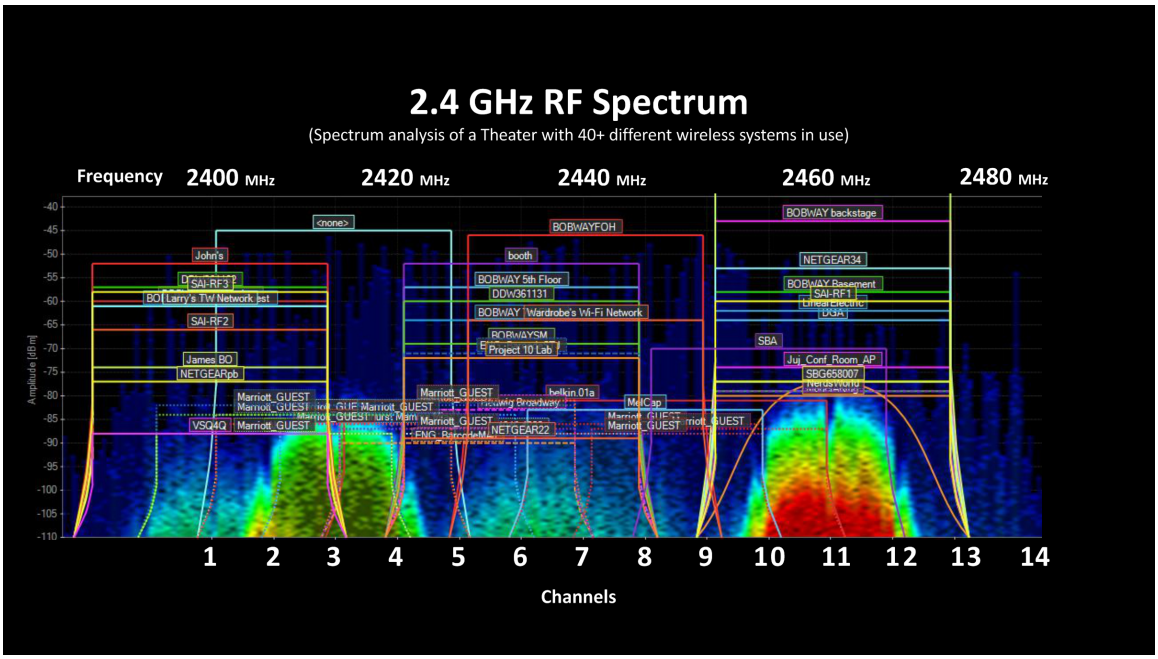
Assess the Wireless Environment

Before you configure Multiverse wireless devices for use with ETC Multiverse-enabled products, assess the current wireless usage in the space where the products will be used. Determine which channels are currently being used, and which channels are used by mission-critical devices. After you determine which channels are being used and are mission-critical, you can configure the Multiverse devices to avoid conflict with these channels.

You can use several methods to find this information:

- Check with others who work in the space to see what wireless devices they are using and what channels those devices use.
- Use tools for Wi-Fi spectrum analysis, such as City Theatrical RadioScan® Spectrum Analyzer (citytheatrical.com/Products/radioscan). This tool will measure Wi-Fi and non Wi-Fi activity, and identify SSID (Service Set Identifiers) and their broadcast channels for networks within range. RadioScan helps you choose the best SHoW ID based on the number of universes being broadcast and the best area of the spectrum to broadcast in.
- City Theatrical DMXcat® Multi Function Test Tool (citytheatrical.com/Products/dmxcat) has a built-in basic Wi-Fi frequency analyzer, as do many cell phone apps. These tools show Wi-Fi activity, but do not show frequency-hopping radios like wireless DMX. However, if no other frequency analyzer is available, these apps can give basic information about the spectrum activity to avoid.

The image below shows the RadioScan spectrum analysis of a crowded Wi-Fi environment.



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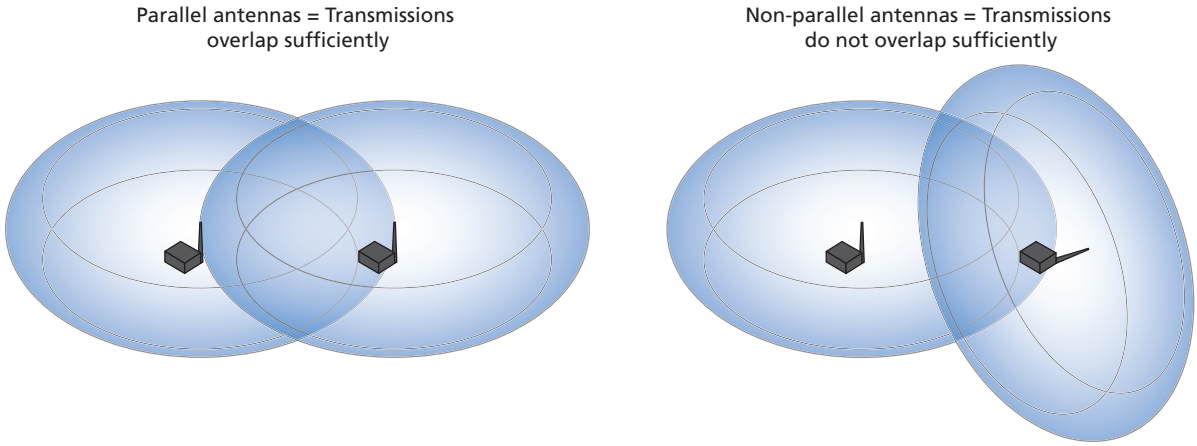
Guidelines for Wireless Setup

When planning the positioning of ETC Multiverse-enabled products, you can assume a range of approximately 100 m (328 ft) for indoor applications. This range can be affected by a number of factors, though.

- Range can be decreased by:
  - Broadcasting through scenery, walls, or people
  - Broadcasting from inside an enclosed booth (transmission through glass can cause problems)
  - Differences in wall material
  - Reflections off walls
  - Interference from other radios (which causes signal strength to decrease)
- Range can be increased by:
  - Positioning the transmitter and receiving device in the same line of sight and with as few obstructions as possible
  - Positioning transmitter antennas as high as possible
  - Replacing the default omni-directional antenna with a panel antenna or directional (Yagi) antenna

Omni-directional antennas (the antennas on most wireless DMX products) create doughnut-shaped patterns, and the patterns must overlap between the transmitting device and receiving device. To ensure the overlap, make sure that the antennas are parallel to each other.



Practical suggestions for transmitter placement include:

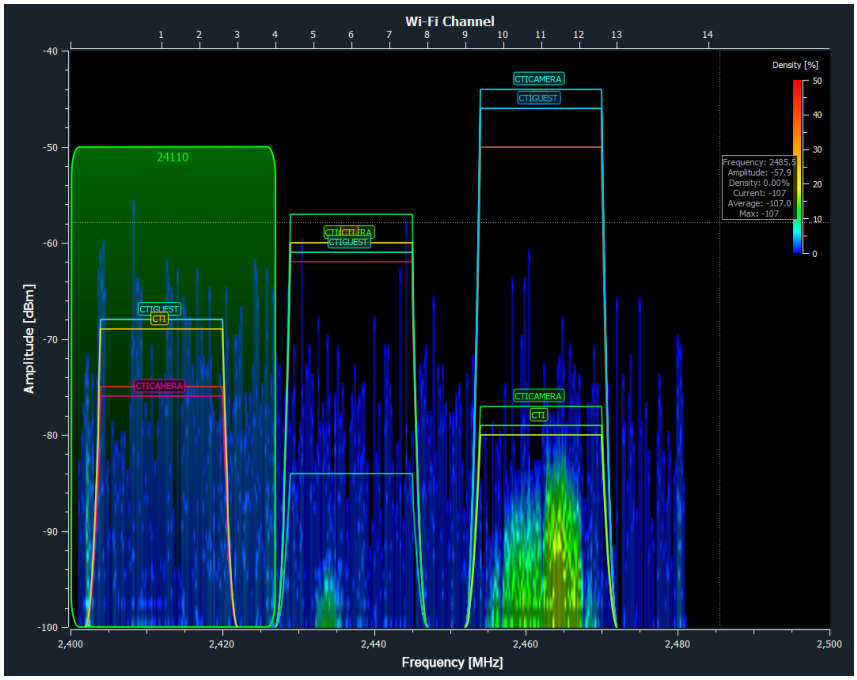
- Attach the transmitter on the balcony rail with a panel antenna pointed at the stage
- When fixtures are positioned with large differences in height, position the transmitter at mid-position between the highest and lowest fixtures, with a horizontally positioned antenna

Optimize the Wireless Configuration

After you assess the environment and set up your wireless transmitters and ETC Multiverse-enabled products, you can optimize the Multiverse configuration.

- **Band:** Set the band for the transmitters based on your assessment of other wireless activity in the environment. For example, if other critical devices are using channels 1–6, set the band for the Multiverse devices to 3 (high-band channels 7–11) or 4 (extremely high-band channels). See more about the Band parameter in *SHoW ID on the next page*.

  In the image below, most Wi-Fi traffic is in the center and upper regions of the band, even though there is Wi-Fi available in all areas. In this environment, set the band to 1 (channels 1–6) to target the low-band channels.



- **Output power:** After you have set the band, test the setup. Use the signal quality bars or other signal quality indicators on ETC products (see *Signal Quality on page 5*), or use RDM to monitor the signal quality, and then decrease the output power to the minimum level required for successful communication between transmitters and ETC products. Excess power output can cause reflections and can degrade performance.

Optimize Settings on ETC Multiverse-enabled Products

The output power parameter on the ETC product sets the strength of the data sent back to the wireless transmitter. This parameter is labeled **Power** on some products (for example, fos/4, Desire Fresnel, and Source Four LED Series 3 fixtures) and **Strength** (`Str`) on others (for example, ColorSource fixtures).

You may need to increase the output power of the ETC products if you encounter any of the following problems:

- ETC products either do not appear or drop offline in Concert (or in another RDM device)
- Radio Connection Status value (`Con`) on ColorSource V series fixtures is less than 3
- RDM drops out
- RDM responses are delayed

Recommended Multiverse Device Settings

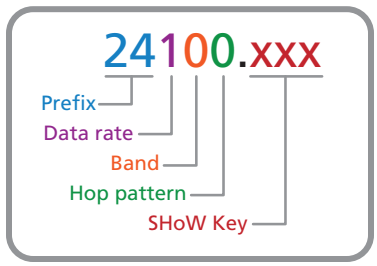
Error Correction

For most uses, we recommend that you set the **Error Correction** parameter to **Off** on the transmitting device.

When enabled, this setting improves reception fidelity at the cost of a reduced data rate. However, when **Error Correction** is enabled, you can see "steppy" fades caused by the delays in data propagation. As a result, we recommend that you only enable **Error Correction** as needed when using wireless DMX to set static looks.

SHoW ID

We recommend that you start with a Multiverse SHoW ID of 24100.xxx and then adjust values as needed while you test the wireless setup. Use the image at right and the table below to set the SHoW ID value appropriately for your environment.



Parameter	Description	Values	Recommended Value
Prefix	Multiverse product type	24 = 2.4 GHz Multiverse	24
Data rate	• Faster data rate = more DMX universes • Slower data rate = greater range and more immunity to interference	Value / Universes / Indoor Range / Outdoor Range 1 / 1 / 100 m / 500 m 2 / 2 / 100 m / 500 m 3 / 5 / 15–25 m / 300 m	1
Band	Channels within the wireless band that the frequency hopping utilizes. Set this parameter to avoid channels being used by other mission-critical wireless devices or as guided by RadioScan Spectrum Analyzer.	• 0 = Use full range of 2.4 GHz band. • 1 = Use only low-band channels (1–6). • 2 = Use only mid-band channels (4–9). • 3 = Use only high-band channels (7–11). • 4 = Use only extremely high-band channels to avoid Wi-Fi. • 5 = Adaptive hopping. Avoid busy channels by analyzing spectrum.	0
Hop pattern	Pattern for frequency hopping. If multiple wireless systems must operate with the same data rate and band, use this value to minimize the overlap between the two systems. Because each hopping pattern is unique, only the receiving devices with the same hopping pattern will receive the DMX broadcast.	Any value from 0–9.	0
SHoW Key	Security value. Set a SHoW Key to ensure that only Multiverse-enabled devices with the correct SHoW Key can interact with the Multiverse transmitters. This prevents other transmitters from communicating with the receiving devices.	Any value from 0–500.	Any

Troubleshooting

ETC Multiverse-enabled products have built-in resources for troubleshooting wireless performance. The key values to examine are **Signal Quality** (percentage) and **Signal Strength** (RSSI). Good signal quality but low signal strength may indicate that the system is susceptible to noise (for example, the system functions well when the theatre is empty, but has issues when an audience is present).

Signal Quality

Signal quality indicates the ratio of good packets to bad packets over a given number of samples.

Some ETC products display the signal quality with a wireless indicator ( ) on the main screen (for example, fos/4, Desire Fresnel, and Source Four LED Series 3 fixtures), where three bars is the highest quality and one bar is the lowest. Other ETC products (for example, ColorSource fixtures) use the 7-segment display the show the signal quality ( ). See *Where to Find These Resources on ETC Products on the next page*.

Quality Range	Description
80–100%	Excellent
50–79%	Good
30–49%	Marginal
10–29%	Unacceptable

Signal Strength

Signal strength is the RSSI (Received Signal Strength indicator) in dBm, ranging from -20 (strongest) to -120 (weakest).

Quality Range	Description
-40 to -20	Excellent
-60 to -40	Good
-75 to -60	Marginal
-120 to -75	Unacceptable

Where to Find These Resources on ETC Products

On fos/4, Desire Fresnel, and Source Four LED Series 3 Fixtures

Use the **About Control** screen to see current Multiverse status.

1. Press the **Menu** button, turn the Intensity encoder to navigate to **Diagnostics**, and then press the Intensity encoder to select it.
2. In the **Diagnostics** screen, turn the Intensity encoder to select **About Control**, and then press the Intensity encoder.
3. Turn the green encoder to change the data display from **DMX** to **Multiverse**.

On ColorSource Fixtures

View and modify the Multiverse parameters using the fixture user interface and 7-segment display as described below (ColorSource Spot V and ColorSource Fresnel V) or via the Set Light app (ColorSource Spot VXT).

1. With the display showing the DMX address, press and hold the **Mode** button for 3 seconds. The display shows **ctL** (Control).
2. Press the **Up** button or **Down** button until the display shows **rAd** (Radio), and then press the **Mode** button to display the Multiverse settings.
3. Use the **Up** button or **Down** button to navigate to the Multiverse setting that you want to change (see table that follows). Press the **Mode** button to select the setting, use the **Up** button and **Down** button to modify it, and then press the **Mode** button again to return to the Multiverse settings. (The currently saved setting is indicated by a decimal point at the end of the setting name.)

   If you do not press the **Mode** button, the display will automatically return to the DMX address after 10 seconds of inactivity, and edits will not be saved. This cancels unsaved changes.

   Note: *To disable wireless communication on the fixture, set the Radio Strength (**Str**) to Off (**oFF**). Off is the default setting.*

4. When you have finished configuring the Multiverse settings, navigate to the **rtn** (Return) option to return to the **rAd** (Radio) option, and then navigate to the **rtn** (Return) option to return to the DMX address display.

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Connection Status

When the 7-segment display is active, the dot between the second and third digit indicates the current status:

- **On solid:** Connected to a transmitter, and can receive both DMX and RDM.
- **On flashing:** Connected to a transmitter, but can only receive DMX. The wireless communication is not optimal, and the wireless setup requires attention.
- **Off:** Searching for a signal, but not connected to a transmitter.

Display	Setting	Values	Description
Un i	Universe	001 – 999 (Default = 001)	Set the Universe value.
id	SHoW ID	100 – 359 (Default = 100)	Set the value of the final three digits of the SHoW ID (the prefix "24" is not displayed). For example, for the SHoW ID 24200, set the value to 200. For NEO SHoW IDs, the display alternates between nEo and the ID value. This value must match the SHoW ID value on the Multiverse transmitting device.
PAS	SHoW Key	000 – 500 (Default = 000)	Set the SHoW Key value. This value must match the SHoW Key value on the Multiverse transmitting device.
Str	Radio Strength	• Off (Default) • 1 – 4	Set the value to the minimum level required for successful communication between transmitters and fixtures. Excess power output can cause reflections and can degrade performance. Off = Turns off power to the Multiverse radio. Use this setting to disable wireless communication on the fixture. 1 = Low 2 = Medium 3 = High 4 = Maximum
SAL	Signal Quality	1 – 100	Display of the signal quality. Values above 50% are good signal quality, and above 80% are excellent. This value can be helpful when troubleshooting wireless performance.
SS i	Signal Strength	-20 – -120	Display of RSSI (Received Signal Strength indicator) in dBm, ranging from -20 (strongest) to -120 (weakest). (Note that the negative symbol does not display on the fixture.) A display of "---" indicates that there's no connection.
Con	Radio Connection Status	0 – 3	0 = Searching for a signal, but not connected to a transmitter. 1 = Connected to a transmitter, but can only receive DMX. The wireless communication is not optimal, and the wireless setup requires attention. 2 = Was receiving DMX and RDM, but is no longer connected to a transmitter. 3 = Connected to a transmitter, and can receive both DMX and RDM.
rtn	Return		Return to the rAd option.