

APPLICATION TECH NOTE

PRODUCTS SUPPORTED:
DIALOG® 20

CLEARONE DOCUMENT NTS-0063-001
(REVISION 1.0) March, 2018

Using DIALOG® 20 Wireless Microphone Systems without WiFi or other Radio Interference

Overview

The DIALOG 20 Wireless Microphone System is designed to be used in rooms where a lower number of wireless mics is required (typically 1-4 mics in one room). The DIALOG 20 operates within the 2.4 GHz frequency band, which is also shared with other devices such as WiFi, Bluetooth, cordless telephones, and wireless mice and keyboards, often in the same room. The DIALOG 20 system is designed to ensure the availability of required RF without interference. The system incorporates the following RF features that allow it to avoid interference from WiFi and other 2.4 GHz devices:

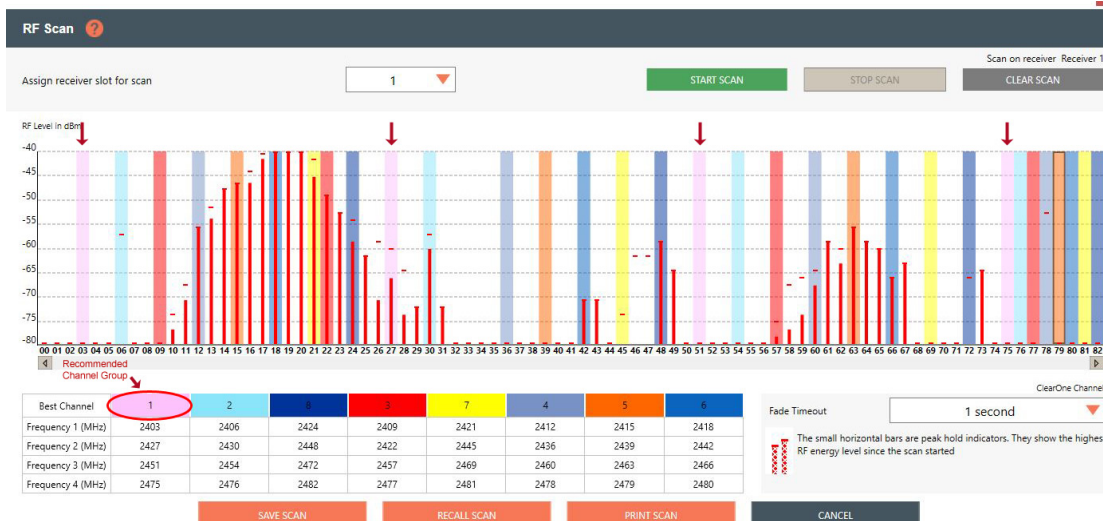
1. Channel Mode
2. Ultra-fast 500-micro-second Frequency Hopping Spread Spectrum (FHSS)
3. Spatial diversity using RSSI and PER
4. Retransmission of lost audio packets
5. Soft mute squelch circuit
6. Power setting
7. Line-of-sight

1. CHANNEL MODE

Channel Mode	Channel Spacing	Pros	Cons
Wide Band (default)	Uses four frequencies spaced widely per RF channel, with 8 RF channels total.	Can cause less interference to WiFi devices that are occupying the same frequencies.	Does not always take advantage of white spaces between WiFi devices. Smaller number of channels.
Narrow Band	Uses four frequencies narrowly grouped per RF channel, with 16 RF channels total.	Can allow the use of more narrow white spaces between WiFi devices.	Can cause more interference to WiFi devices that are occupying the same frequencies. Greater number of channels.

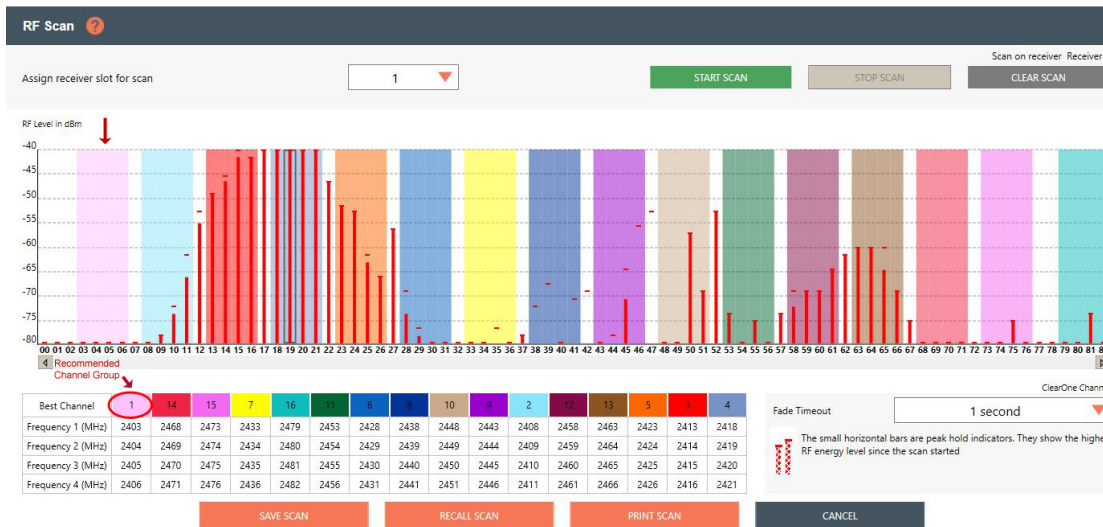
In the image below, with Wide Band Mode selected, the recommended channel group is listed in the first column and then in order from best to worst. The arrows have been added to show the specific channels that will be used during Frequency hopping spread spectrum.

Wide Band Mode



In the image below, with Narrow Band Mode selected, the recommended channel group is listed in the first column and then in order from best to worst. The arrows have been added to show the specific channels that will be used during Frequency hopping spread spectrum.

Narrow Band Mode



2. ULTRA FAST 500 MICRO-SECOND FREQUENCY HOPPING SPREAD SPECTRUM (FHSS)

FHSS technology is a method of transmitting radio signals by rapidly switching a carrier among many frequency channels. This allows the system to avoid interference rapidly and dynamically. It does not hop randomly. The DIALOG 20 frequency hopping is based on signal quality.

3. SPATIAL DIVERSITY USING RSSI AND PER

The DIALOG 20 achieves spatial diversity by utilizing a Received signal strength indicator (RSSI) and Packet error rate (PER) to eliminate nulls, drop-outs, and interference on either of the antennas. RSSI is a measurement of the power present in a received radio signal after any antenna and cable loss. The DIALOG 20 uses this power measurement to determine if the radio energy of the system is clear to send the signal without interference. Packet error rate (PER) is the number of incorrectly received data packets divided by the total number of received packets. The DIALOG 20 will pick the higher RSSI spatial diversity antenna in absence of interference. In the presence of interference, the DIALOG 20 will pick the antenna with the lowest packet error rate.

4. RETRANSMISSION OF LOST AUDIO PACKETS

The DIALOG 20 uses a proprietary protocol to detect packet loss and perform a retransmission of the signal to insure a reliable and complete audio message. Retransmission allows the system to recover lost audio data and filter out interference without interruption of the audio message.

5. SOFT MUTE SQUELCH CIRCUIT

The DIALOG 20 employs a soft mute squelch circuit to eliminate interference, audio pops, and unwanted noise by using a process called selective calling, in which the receiver addresses a subset of all received signals. Instead of turning on the receiver audio for any signal, the audio turns on only in the presence of the correct selective calling code. The DIALOG 20 locks out all signals except the ones with the correct key to the lock (the signals with the correct code).

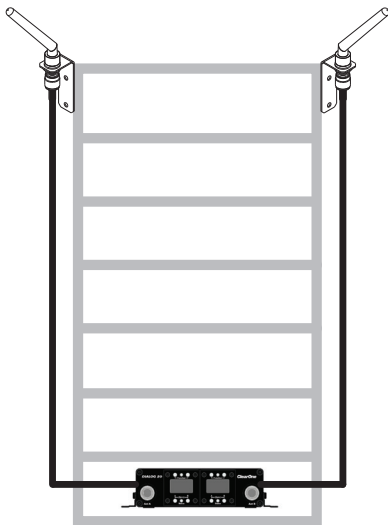
6. POWER SETTING

The DIALOG 20 transmitters only use either a 1 mW or 10 mW transmit power setting. This limits the power and usage of the transmitters within the room which helps to mitigate interference from other 2.4 GHz devices.

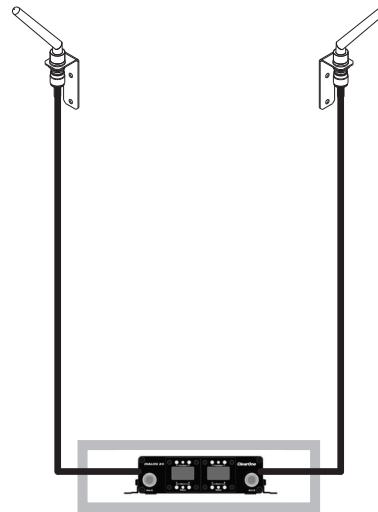
7. LINE-OF-SIGHT

A direct line-of-sight from the transmitter to the receiver reduces the possibility of interference to the system. The DIALOG 20 has a variety of mounting options that help to achieve better line-of-sight between the receiver's antennas and transmitters.

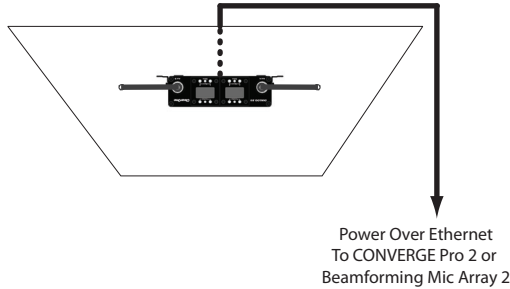
AV Rack Mounted
Using Optional 10'
Antenna Extension Kit



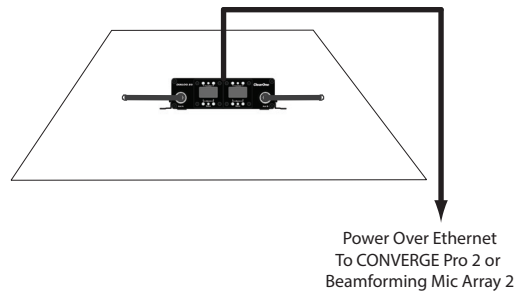
Wall Mounted
Using Optional 20'
Antenna Extension Kit



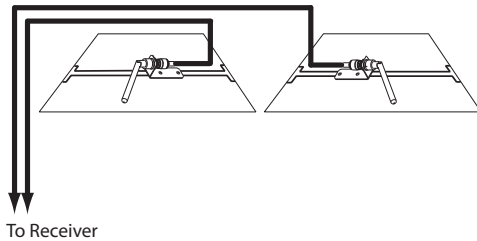
Plenum Rated Receiver Mounted on the Outside of Ceiling Tile with PoE to CONVERGE® Pro 2 or Beamforming Mic Array 2



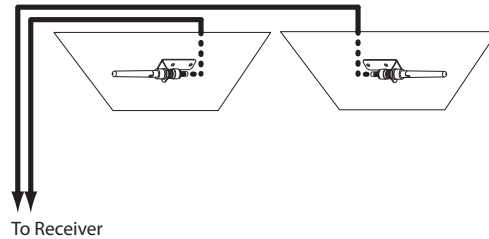
Plenum Rated Receiver Mounted on the inside of the Ceiling Tile, within the Crawl Space, with PoE to CONVERGE Pro 2 or Beamforming Mic Array 2



Plenum Rated Antennas Mounted on the inside of the Ceiling Tile, within the Crawl Space, using optional 25' Antenna Extension Kit and 3rd party "T-Bracket".



Plenum Rated Antennas Mounted on the Outside of Ceiling Tile using optional 25' Antenna Extension Kit



Conclusion

The DIALOG 20 Wireless Microphone System is designed to ensure the availability of the required radio frequency. The features listed above allow the DIALOG 20 to operate within the 2.4 GHz frequency band without interference even when the 2.4 GHz frequency band is being shared with other devices.

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