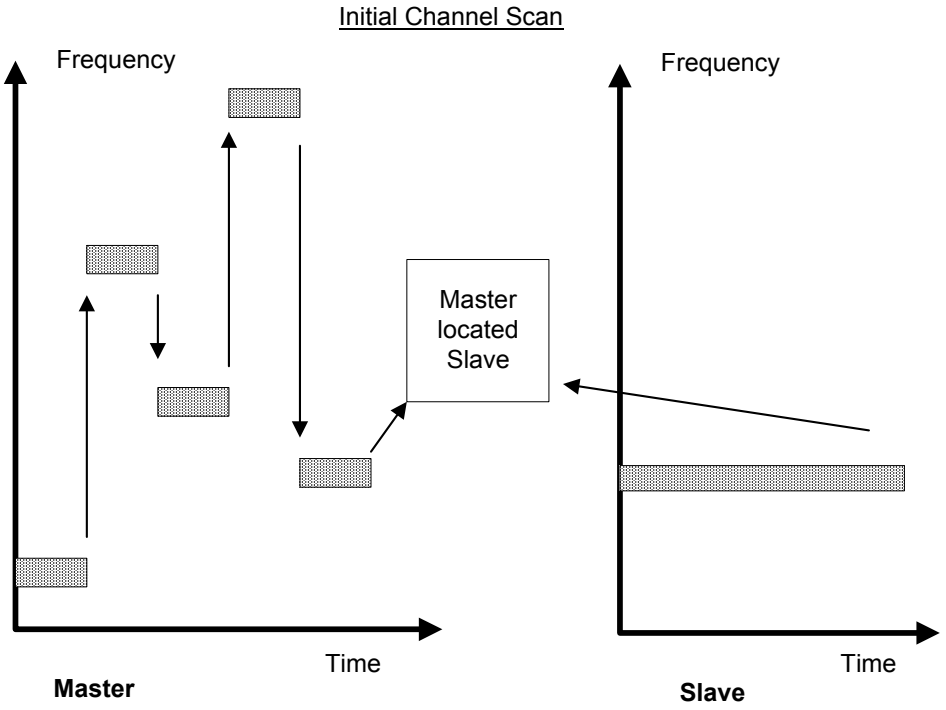
Pseudorandom Frequency Hopping Sequence

Describe how the hopping sequence is generated. Provide an example of the hopping sequence channels, in order to demonstrate that the sequence meets the requirement specified in the definition of a frequency hopping spread spectrum system, found in Section 2.1.

When both the master and slave modules are power up, the master and slave modules will enter into a channel scan mode where initially both the master and slave will hop on 10 pre-defined channels in pseudo-random sequence to search for each other. These pre-defined channels are distributed equally over the 79 channels. The hopping sequence is generated through a pseudo-random generator.

In the figure below, both the master and slave hops on the 10 predefined channels in a pseudo-random random sequence to locate each other. The master hops at every 625μs while the slave hops at every 160ms.



Once the master module detected the presence of a slave module with an identical unique 28-bit device ID in the initial channel scan mode, both modules will continue to hop on the remaining 69 channels to establish a reliable channel link to commence wireless audio delivery. Based on the unique 28-bit device ID which both the paired master and slave have in common, both the master and slave will hop in synchronization to test the communication link before starting the audio content delivery. The wireless link quality is determined from the number of errors generated in the Forward Error Correction (FEC) computation. If there is no error or the number of error is below a preset threshold, the wireless link is considered as good..

Equal Hopping Frequency Use

Describe how each individual EUT meets the requirement that each of its hopping channels is used equally on average (e.g., that each new transmission event begins on the next channel in the hopping sequence after the final channel used in the previous transmission event).

When an interference source interferes with the communication channel which the paired modules are, the existing communication channel becomes unreliable and the error detection from the FEC computation exceeds a preset error threshold. The modules will immediately and automatically hop to the secondary channel which will now become the primary channel to continue audio content transfer. Meanwhile the modules will continue to hop to search for a secondary channel.

Over a period of time, there will be equal usage of the frequency channels by the modules because the interference source may also hop or exist intermittently. And the communication channel will not remain unchanged for more than 400ms.

System Receiver Hopping Capability

Describe how the associated receiver(s) has the ability to shift frequencies in synchronization with the transmitted signals.

After the master and the slave have been paired and started audio delivery on the primary channel, they will hop to another channel to test the communication link quality. The channel which both the master and slave hop, will depend on the unique 28 bit device ID that both the paired master and slave have in common. Once a channel with good communication link has been identified, the paired master and slave will hop to the channel (known as secondary channel) to verify the communication link at interval of about 5ms periodically. If the secondary channel link is poor, the searching for another secondary channel will be repeated.

Once interference occurs on the primary channel, the paired master and slave will hop directly to the secondary channel which will now become the primary channel. The search for the secondary channel will again be repeated.

System Receiver Input Bandwidth

Describe how the associated receiver(s) complies with the requirement that its input bandwidth (either RF or IF) matches the bandwidth of the transmitted signal.

Both the master and slave modules operate as a RF transceiver. In the wireless communication protocol, there are handshake between the master and the slave to determine the communication link quality and control of the data packet transmission. After every 3 packets of transmission, the master will switch to become a RF receiver. Similarly the slave will switch to become a RF transmitter to acknowledge the data packet received from the master module. All data packet received in the slave will be buffered for further processing such as Forward Error Correction and audio decompression.

The above control will ensure the slave is able to match the transmission bandwidth of the master.

Section 15.247(g)
Describe how the EUT complies with the requirement that it be designed to be capable of operating as a true frequency hopping system.

The master and slave module use GFSK modulation on the 2.4GHz wireless communication band. Based on the 28-bit unique ID in the paired modules, both the master and slave will randomly hop on one of the 69 channels for audio transmission and simultaneously hop to other channels to determine and verify a secondary channel link quality. Over a period of time, the use of the 69 channels will be evenly distributed.