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## Application Note – DAB Radio Development with the Modus 3 DAB+

**Project:** Modus  
**Subject:**  
**From:** Graham Norgett  
**To:**  
**Copy:**  
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### DAB Radio development using the Modus 3 RF Signal Generator

The Modus 3 DAB+ RF signal generator provides a comprehensive test solution of development and production test of DAB, DAB+, DMB-T, and DMB-R radios.

CellMetric provide a range of RF test streams which support:

- DAB
- DAB+
- DMB-T
- DMB-R

In the development environment the Modus 3 provides a known, repeatable RF stimulus for radio receiver development. The test streams provide a range of audio sine waves and music tracks for the radio to receive and decode. This includes metadata within the stream.

The stages of development of a receiver should be as follows:

#### RF Receiver qualification

DAB derived standards use COFDM modulation in the VHF and L Bands. The Modus 3 can generate RF signals in these bands.

When developing a radio receiver it is useful to transmit a COFDM modulated test tone to allow alignment and tuning of the RF receiver down converter. Modus can also generate a RFC W tone in addition to the 1.7MHz COFDM modulates test signal.

Fixed test tones from a cw or modulated source allows checking that receive synthesisers are aligned, that receive filters are working correctly and that the correct IF signal is reaching the receiver A/D converter.

### **Demodulation and Audio Decode**

Testing that the DAB COFDM Demodulator is working correctly can be achieved by feeding the RF Test signal through the RF downconverter and A/D converter and determining that the COFDM demodulator can see RF energy and can report a BER from the received signal. This will be determined by reading the receive registers in the demodulator from the driver software.

Cellmetrics test streams allow determination of the audio frequency response of the receiver by providing a range of encoded audio frequencies, including white noise. They also provide right and left identity channels and audio silence.

Long test tones can be used for measuring susceptibility to interference of the receiver.

### **Data Decode**

CellMetric Test Streams include messaging within the stream which allows DLS messaging to be decoded by the DAB receiver.

### **Test Streams**

The key difference between the test streams we supply are:

- The CellMetric test streams provide a known and defined DAB/DAB+ test stimulus, for example a sine wave at a fixed frequency and level which allows the engineers to measure level, frequency response and total harmonic distortion figures. We also provide silence, white noise and left and right channel identification signals. The sinusoids are also very important for measuring susceptibility to interference. The test labs who use our equipment (MIRA the UK automotive test lab and Ford cars) use the received sinusoid in high interference field strengths to detect a receivers susceptibility to interference.
- The test streams also provide both popular and classical music tracks which are copyright free and can be used both for testing and demonstration of reception.
- The test streams are known to be compatible with Frontier receivers and have DLS messaging as well as audio data.
- The World DMB Test streams provide a range of ETI recordings placed on the DMB server by broadcasters around the world. They tend to be very useful for checking the protocol reception of a receiver to check that it can receive and parse the transmission and decode the audio and other advanced services. The World DMB test streams tend not to be useful for audio quality and susceptibility to interference testing.
- CellMetrics DAB Gen COFDM offline modulator is ideal for generating test streams for the Modus 3 from the World DMB Test Streams.

In an ideal test setup you would first test with the CellMetric test streams and then move onto the World DMB test streams to check full compatibility with broadcasters transmissions.