Computer Systems, Inc.
MERCURY

RF Channel Emulator Component

FM3TR Waveform Reference Implementation

SDR Forum Contract

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Revision 1.0

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1 Component Name

RFChannelEmulator

2 Component Processing Summary

The RFChannelEmulator component adds noise to the baseband MSK signal before demodulation to emulate the effects of a noisy channel in wireless communications links.

3 Where used

The RFChannelEmulator exists between the MSK modulator and demodulator components in all FM3TR waveforms.

4 Data Input and Output Ports

The RFChannelEmulator component has one uses and one provides data port. Both the input (RF_In) and output (RF_Out) data ports operate on a sequence of signed complex short integers.

5 Control Interfaces

The RFChannelEmulator component inherits the control interfaces from CF::Resource.

6 Component SCA Properties

Aside from the DLL execparams, the RFChannelEmulator has one SCA configure property, “Noise_Power_dB” which sets the amount of noise injected on the transmitted signal before demodulation.

7 Component Attributes/Key Variables

Below is a list of several key variables to the RF channel emulator component with a brief description of their purpose.

`m_sigma`	Noise variance.

8 Processing Details

The RFChannelEmulator provides two distributions for injecting noise on the transmitted signal: Gaussian and uniform. Once the noise is generated, it is added to the incoming signal and the result is passed to the demodulator.

8.1 Method: ComplexAWGN()

The *ComplexAWGN()* method generates a sequence of complex additive white gaussian noise (AWGN) samples. This is accomplished by summing *N* Bernoilli trials to generate

binomial random variable. This is a simple way to approximate a Gaussian random variable, although it is not as efficient as other methods.

8.2 Method: ComplexAWUN()

The *ComplexAWUN()* method generates as sequence of complex additive uniform noise (AWUN) samples using the standard *rand()* function.