Computer Systems, Inc.

MERCURY

FM3TR Waveform Data Mode

FM3TR Waveform Reference Implementation

SDR Forum Contract

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Revision 1.0

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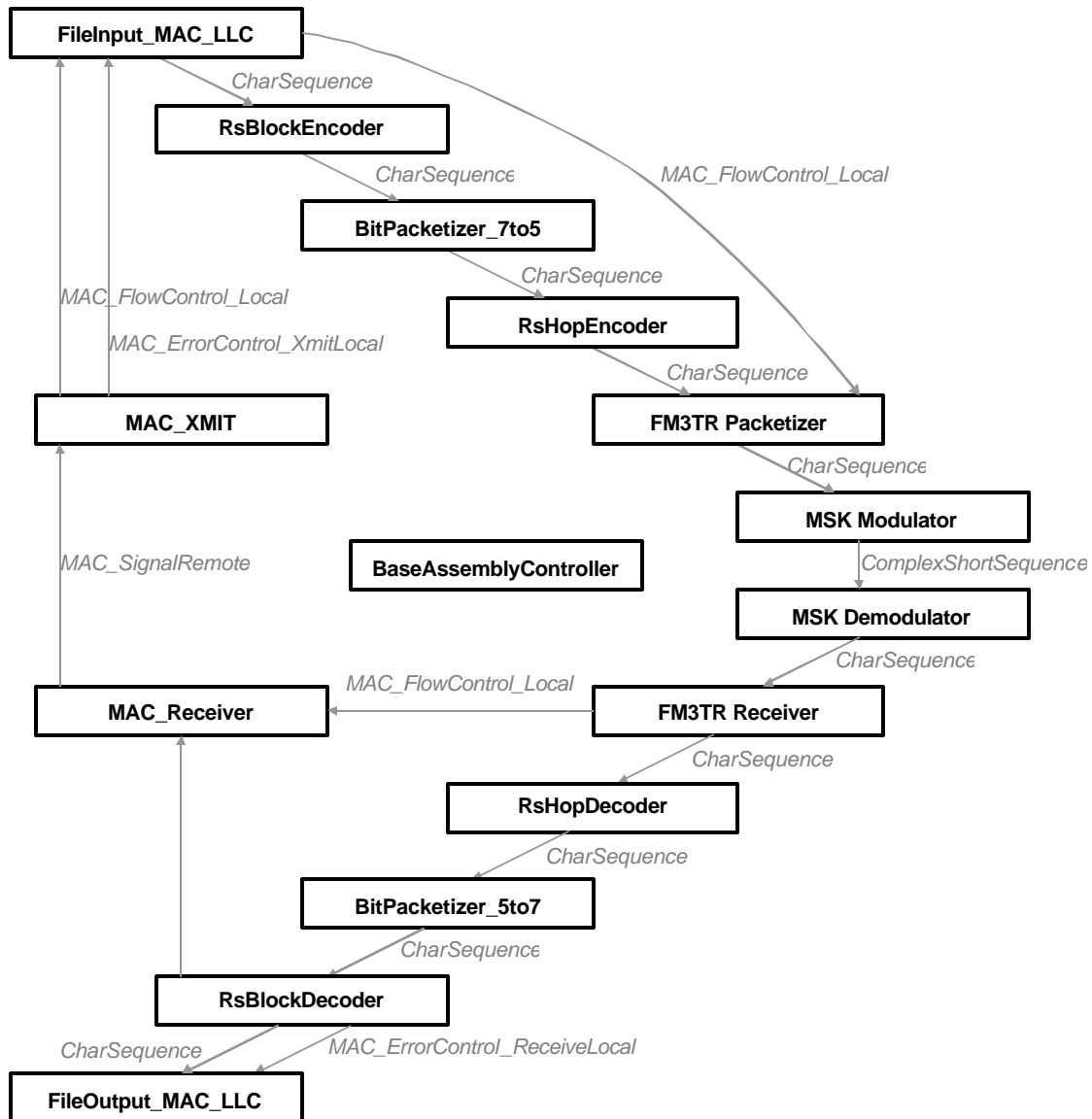
1 Waveform Name

FM3TR_Data

2 Waveform Processing Summary

The FM3TR data waveform reads a file and then encodes the data using a Reed-Solomon forward error correction linear block code before packetizing and modulating. The receiving side of the waveform accepts the complex baseband signal from the modulator and demodulates into a stream of bits. This bitstream is depacketized by the FM3TR receiver which extracts the data blocks for FEC decoding. The resulting data are written to an output file.

The extended data mode provides additional MAC and LLC layer functionalities by allowing erroneous packets to be retransmitted and allowing data flow to be paused if the receivers' buffers are full. These extended functions are accomplished by utilizing special interfaces between two additional components: the MAC Receiver and MAC XMIT components.

3 Waveform Block Diagram

The figure below depcits the component connections within the extended data waveform. Not shown are the connections from the BaseAssemblyController to the resource ports on all other components.

FileInput_MAC_LLC

CharSequence

RsBlockEncoder

CharSequence   *MAC_FlowControl_Local*

BitPacketizer_7to5

CharSequence

RsHopEncoder

MAC_FlowControl_Local   *CharSequence*

MAC_ErrorControl_XmitLocal

MAC_XMIT   FM3TR Packetizer

CharSequence

MSK Modulator

BaseAssemblyController   *ComplexShortSequence*

MSK Demodulator

MAC_SignalRemote   *CharSequence*

MAC_FlowControl_Local

MAC_Receiver   FM3TR Receiver

CharSequence

RsHopDecoder

CharSequence

BitPacketizer_5to7

CharSequence

RsBlockDecoder

CharSequence   *MAC_ErrorControl_ReceiveLocal*

FileOutput_MAC_LLC

4 Waveform Components List

Component	Brief Functional Description
BaseAssemblyController	Connects to resource ports on all components and invokes the start() method on each. It is the assembly controller for the entire waveform.
FileInput_MAC_LLC	Reads file as input; retransmits erroneous packets (error control received from MAC XMIT

	component)
`RsBlockEncoder`	Reed-Solomon FEC coding block; adds redundancy to reduce the probability of errors at the receiver
`BitPacketizer_7to5`	Translates 7-bit symbols to 5-bit symbols
`RsHopEncoder`	Reed-Solomon FEC coding block; adds redundancy to reduce the probability of errors at the receiver
`FM3TR Packetizer`	Packetizer for framing data. Runs in "data" mode.
`MSK Modulator`	Modulates bits into a complex baseband signal
`MSK Demodulator`	Demodulates complex baseband signal into bits.
`FM3TR Receiver`	Extracts data bits from encoded frames. Sends flow control feedback information to MAC Receiver.
`RsHopDecoder`	Reed-Solomon FEC decoding block; uses redundant bits to detect and correct errors
`BitPacketizer_5to7`	Translates 5-bit symbols to 7-bit symbols
`RsBlockDecoder`	Reed-Solomon FEC decoding block; uses redundant bits to detect and correct errors. Sends list of erroneous packets to MAC Receiver
`FileOutput_MAC_LLC`	Writes data to file. Rewrite erroneous packets when retransmitted.
`MAC Receiver`	Sends flow control and error control feedback information to MAC XMIT component
`MAC XMIT`	Receives feedback from MAC Receiver; sends flow control to FM3TR Packetizer (indirectly), error control to FileInput_MAC_LLC.

5 Waveform Assembly Level SCA Properties

The waveform overrides the operational_mode property to set it to the value: "data".

6 Waveform Model Graphical Representation