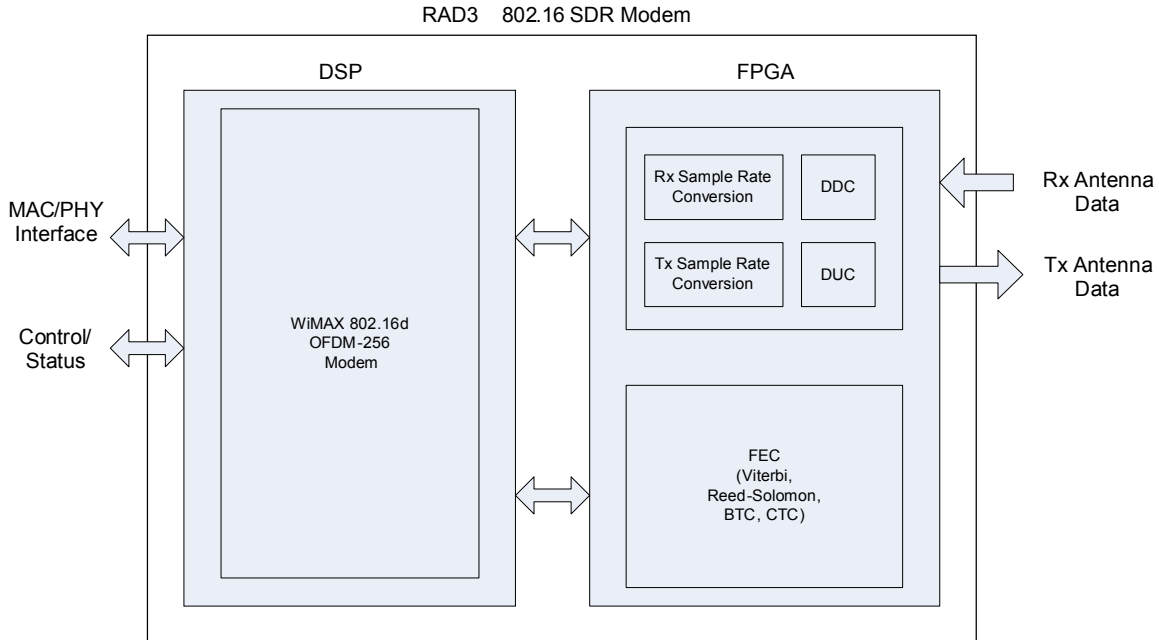


# Product Brief

## Fixed WiMax SDR OFDM Modem



### IP Core Name

|                     |   |
|---------------------|---|
| <b>Name:</b>        | <b>R3WIMAX-FIXED-SDR</b>                          |
| <b>Description:</b> | Fixed WiMax Software Defined Radio OFDM-256 Modem |

### Features

- Complete IEEE 802.16-2004 Software Defined Radio OFDM-256 modem targeted towards WiMAX compliant Fixed Wireless Metropolitan Area Networks (WMAN)
- Support for both Base Station (BS) and Subscriber Station (SS) configurations
- Support for all WiMAX Forum™ specified channel bandwidths and data rates
- Flexible RF interface supports either baseband I/Q or IF interfaces with Digital Up/Down Conversion (DUC, DDC)
- Programmable Sample Rate Conversion (SRC) Filters enables use of a single ADC/DAC clock for all channel bandwidths
- C reference design allows selection of DSP target.
- Scalable solution allowing support for smart antenna techniques such as Space Time Coding or beam forming

# RAD3 IP Cores Series: Fixed WiMax SDR OFDM Modem

## Deliverables

- C source code
- FPGA optimized synthesizable RTL source code in VHDL
- Comprehensive verification test bench and vectors
- Integration documentation and support

## Overview

The RAD3 SDR Modem is a Fixed WiMax compliant DSP or DSP/FPGA OFDM-256 modem. The modem provides a flexible carrier-class solution for the implementation of WiMAX Forum Certified™ base stations. It is designed to be WiMAX compliant and supports the WiMAX specified system profiles.

Functionality includes:

- Base Station and Subscriber Station operation
- Channel coding including implementation of the mandatory concatenated Reed-Solomon/Convolution Code (RS-CC) FEC as shown in Table 1.
- Includes support for the maximum data rates required for 20 MHz channel bandwidth with QAM-64 modulation.
- Support for Uplink Subchannelization and TDD, FDD and H-FDD operation
- Automatic Gain Control (AGC) and Automatic Frequency Control (AFC) circuitry
- Guard Intervals of 1/4, 1/8, 1/16 or 1/32

- Programmable sample rate conversion filters allowing use of a single ADC/DAC sample clock for all channel bandwidths
- Digital up/down conversion for IF interface
- Optional baseband I&Q transmit and receive interface
- Optional support for CTC FEC
- Optional support for Alamouti Space Time Coding (STC) and Adaptive Antenna Systems (AAS)
- MIB support registers for statistics collection

| Modulation | Overall Coding Rate | RS Code     | Coding Rate |
|------------|---------------------|-------------|-------------|
| BPSK       | 1/2                 | (12,12,0)   | 1/2         |
| QPSK       | 1/2                 | (32,24,4)   | 2/3         |
| QPSK       | 3/4                 | (40,36,2)   | 5/6         |
| 16-QAM     | 1/2                 | (64,48,8)   | 2/3         |
| 16-QAM     | 3/4                 | (80,72,4)   | 5/6         |
| 64-QAM     | 2/3                 | (108,96,6)  | 3/4         |
| 64-QAM     | 3/4                 | (120,108,6) | 5/6         |

Table 1: IEEE 802.16-2004 Supported Modulation Modes

The FPGA optimized code can be targeted to low cost FPGA product families such as the Xilinx Spartan 3 and will support the maximum data rates required for 20 MHz channel bandwidth with QAM-64 modulation.

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