X-Haul Wireless Modem IP

Enables Telecom OEMs to deliver high capacity low-latency products for 5G front-haul and back-haul

Datasheet

HCL offers Telecom OEMs a complete modem IP suite for millimeter-wave and microwave radios supporting high-capacity, low-latency products for 5G front-haul and back-haul. Also, we provide a comprehensive suite of consulting services to integrate our IP into designs and flexible licensing models to develop cost-effective X-Haul radio solutions

X-Haul Product Overview

A scalable and configurable set of modem IP for 5G wireless front-haul and back-haul applications.

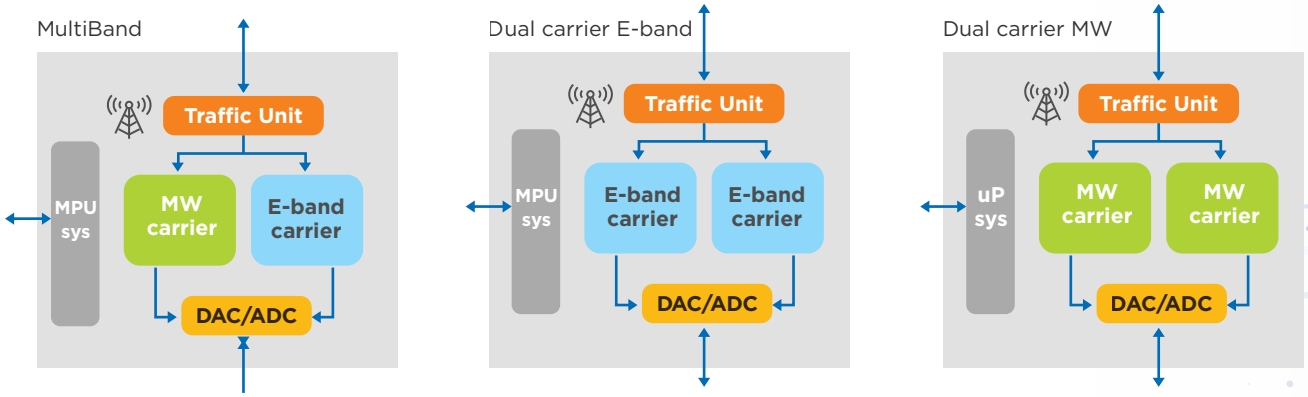
The product family includes:

- Multi-Band modem, 1x uW + 1x E-band carrier
- E-band dual carrier modem with full XPIC capabilities and 4x4MIMO support
- MicroWave single and dual carrier modem, with full XPIC capabilities

The modem IPs are designed to be technology-independent

- The demonstrator system is optimized for Xilinx RF-SoC FPGAs
- The IPs are portable to Intel FPGAs or other technologies using external DAC/ADC converters
- Select the target technology as per your choice

Illustration of Radio link product configuration



MPU:	Handles the radio link configuration & monitoring and some specific PHY layer control loops
MW Carrier:	Includes all the modulation and demodulation functions for the microwave RF carrier
E-band Carrier:	Includes all the modulation and demodulation functions for the millimeter wave RF carrier
Traffic Unit:	Implements the Ethernet L1 traffic handling
DAC:	Implements the final up-sampling of the signal and the conversion to analog domain
ADC:	Implements the analog signal conversion to digital domain and first down-sampling

Business Need

5G X-haul

Higher Capacity
5G requires wireless transport solutions with significant higher capacity

Lower Latency
5G requires wireless transport solutions with much lower latency

Telecom OEMs

Product Differentiation
Telco OEMs specific functions can be integrated with HCL modem IPs to deliver a custom product solution

Radio Architecture Optimization
HCL modem IPs can be tailored to match the target radio architecture

Business Benefits

- Increase product differentiation
- Reduce time to market for new features
- Reduce total solution cost with optimized design
- Remove dependence on a single silicon supplier

Key Features

- Dual Carrier E-Band modem with up to 25Gbps bandwidth and < 50µs latency
- Dual band hybrid (E-band & uW) modem for high reliability and high throughput
- MicroWave modem with best-in-class spectral efficiency – supporting up to 16K QAM
- mmWave Modem front-haul ready supporting up to 50 Gbps with 4x4 MIMO configuration
- Flexible solution for wireless communication & mobile X-haul based on RF SoC technology
- Select the right technology depending on the stage of your product in the lifecycle
    - Initial deployment with FPGA based baseband modem processing
    - Flexible choice of target FPGA technology – multiple vendors support
    - Structured ASIC or standard-cell ASIC option for high volume production

Deliverable Set

- Modem IP optimized for the target technology
- Demonstrator system based on Xilinx RF-SoC evaluation board
- Complete SW package to configure and operate the modem IP set including:
    - API libraries delivered as linkable object code
- Reference modem application delivered as source code
- Configuration and Monitoring GUI delivered as source code
- Full driver set for demonstrator board peripherals
- Specific drivers for the modem IP functions

Features

Microwave Modem specific features	
Channel spacings	7, 14, 28, 40, 56, 112, 224 MHz (ETSI) 5, 10, 20, 40, 50, 80 MHz (ANSI)
Net radio throughput	>1.25 Gb/s payload traffic per carrier at 112MHz CS
QAM constellations	4, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096, 8192, 16384 symbols
Non Linearities compensation	5th order polynomial, for AM/AM and AM/PM compensation RX over the hop detector
RF Interface support	IF or I/Q baseband, depending on customer application
XPIC / MIMO	full XPIC / 2x2 line-of-sight MIMO / 4x4 MIMO (dual polarization)

Millimeter Wave E/D band modem specific features	
Channel spacings	62.5 125, 250, 500, 750, 1000, 1250, 1500, 1750, 2000 MHz (ETSI) with XPIC support
Net radio throughput	> 5 Gb/s at 1GHz CS, >10 Gb/s at 2 GHz per carrier 25/50 Gbps dual carrier / four carrier full XPIC and MIMO configurations
QAM constellations	4, 16, 32, 64, 128, 256, 512, 1024 symbols
Non Linearities compensation	3rd order for AM/AM and AM/PM compensation RX over the hop detector
RF Interface support	I/Q baseband with full unbalance compensation support
XPIC / MIMO	Full XPIC/4x4 MIMO

Modem common feature	
Channel Coding	MLC – L1: LDPC - L2: Reed-Solomon or uncoded LDPC code Rates: ½, 3/4 and 7/8 mother codes block length 4k,8k, 12k and 16kb Reed-Solomon: GF(256), t = 2, 4, 8 with shortening support
Automatic Link Adaptation	Hitless Adaptive Coding, Modulation and Bandwidth
Radio Framing & Signalling	Frame Alignment for fast link recovery / acquisition Pilots management In band control channels for PHY layer over-the-hop loops management
SyncE – 1588	frequency and phase synchronization with clock protection support

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