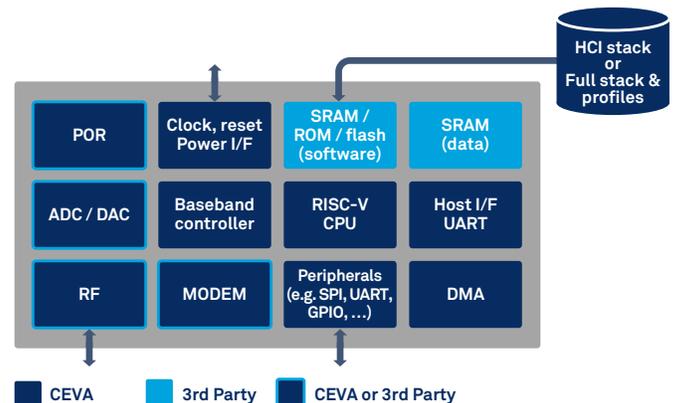


RivieraWaves Bluetooth

Comprehensive set of Bluetooth low energy and Bluetooth dual mode Silicon Intellectual Properties composed of hardware baseband controller, software protocol stack and transceiver (hardware modem, ADC/DAC and radio)

HIGHLIGHTS

- › Comprehensive Bluetooth 5.1 IP for:
 - Bluetooth low energy
 - Bluetooth dual mode
- › Consists of hardware baseband controller plus RF/modem block, coupled with software stack
- › Flexible RF interface for deployment with alternative radios
- › Agnostic to embedded processor and operating system, with portable source code software stacks and an AMBA® AHB interface from baseband hardware
- › Reference integrated platform with embedded RISC-V CPU also available
- › Designed for minimum die area and power, with low gate count, low memory footprint and low MIPS requirement
- › Complemented by RivieraWaves 802.11a/b/g/n/ac/ax (Wi-Fi 4/5/6) IPs



Example of RivieraWaves Bluetooth Chip Implementation

Introduction

The CEVA RivieraWaves Bluetooth IP family offers a comprehensive suite of products for embedding Bluetooth connectivity into SoCs/ASSPs, with optimised solutions for both Bluetooth low energy and dual mode operation.

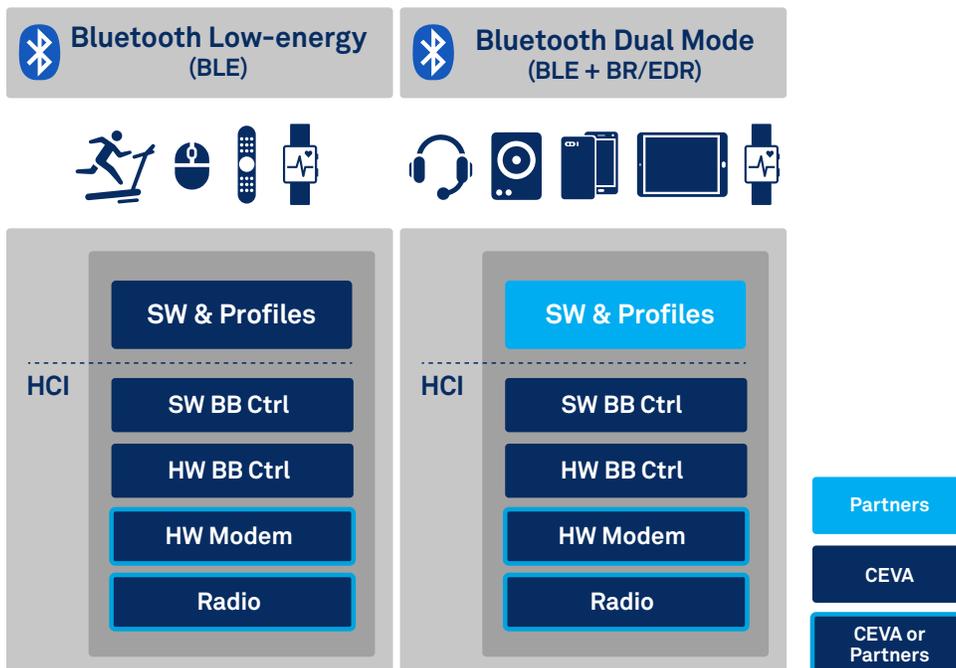
With the RivieraWaves family of wireless connectivity IP, CEVA is the only IP provider offering a complete suite of Bluetooth products plus a wide portfolio of Wi-Fi IP products for 802.11a/b/g/n/ac/ax (Wi-Fi 4/5/6) IPs.

The RivieraWaves Bluetooth products incorporate a hardware baseband controller coupled with a software stack and an optional RF/modem block. In addition, CEVA has multiple RF partners to help address deployment on various foundries and process nodes; RF partners include CSEM, Catena, IMEC, Orca, Aura and others. The software stack is easily portable to customer's choice of embedded processor, such as the ARM® Cortex-M™ family, ARC®EM family, AndesCore™ family, Cortus APS family, RISC-V processor and others.

An optional cost effective fully integrated reference platform is also available to speed up SoC design and minimize time to market. This platform is provided with a RISC-V processor, relieving customers from the need to license a 3rd party commercial processor.

The Bluetooth IPs are provided with an optional FPGA platform plus a comprehensive GUI validation tool for manual testing and automatic execution of test scripts for laboratory testing.

The RivieraWaves Bluetooth IPs are complemented by the comprehensive list of RivieraWaves Wi-Fi IPs and by CEVA's extensive portfolio of audio/voice solutions and Always-On sensor hub solutions, based around the CEVA DSP core family.



RivieraWaves Bluetooth 5.1 low energy

KEY FEATURES

- > Supports all the latest features including Direction Finding (AoA / AoD), 2Mbps, Long Range, Advertising Extensions, Channel Selection #2
- > Supports advanced master and slave topologies
- > Comprehensive software stack spanning all protocol layers: HCI, L2CAP, ATT, SMP, GAP, GATT
- > Extensive list of Profiles: FindMe, Proximity, Health Thermometer, Heart Rate, Time, Blood Pressure, Glucose Monitor, HOG, Alert Notification, Phone Alert Status, Running Speed, Cycling Speed, Cycling Power, Location and Navigation, A4WP wireless charging, etc.
- > Mesh profile
- > Extremely low power design, permitting local embedded processor to operate with a clock of only 8MHz in active connections
- > Frequency Hopping with channel assessment for higher link robustness and improved coexistence with interferers such as WLAN devices

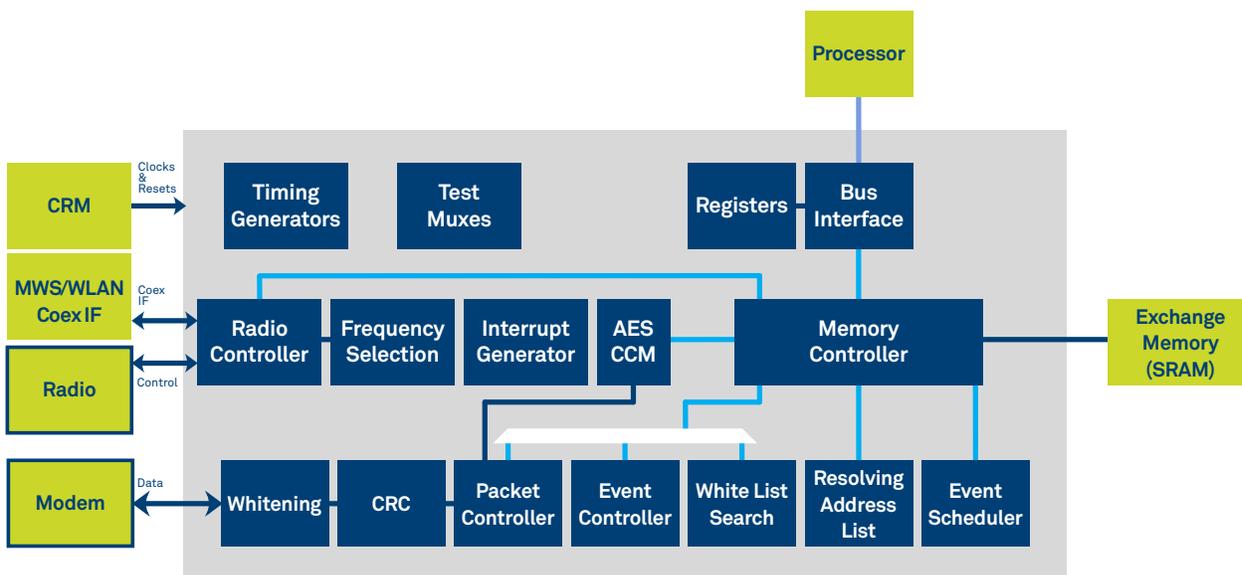
OVERVIEW

The RivieraWaves Bluetooth low energy IP is a very low power, low MIPs & low gate count solution, ideally suited for a wide range of IoT applications including smartwatches, hearing aids, wearable sensors for medical /sports (heart rate, glucose, temperature), remote controls, toys, environment sensors, location beacons and many other machine-machine communications.

Compatible with the BLE hallmark features of the Bluetooth 5.1 specification, the Bluetooth low energy IP consists of a hardware baseband controller coupled with a complete software stack including a comprehensive list of services and profiles.

The hardware baseband controller is provided as a Verilog IP package. It performs packet encoding/decoding and frame scheduling and is complemented by a hardware AES128 encryption engine.

The software stack is provided as a C code IP package. It consists of Link Layer (LL), L2CAP, ATT, SMP, GAP/GATT services and profiles.



RivieraWaves Bluetooth 5.1 dual mode

KEY FEATURES

- > Comprehensive support of Bluetooth 5.1 dual mode features, including classic BR/EDR Bluetooth along with the latest low energy features including Direction Finding (AoA / AoD), 2Mbps, Long Range, Advertising Extensions, Channel Selection #2 and SAM
- > Supports enhanced dual mode topologies
- > Extended co-existence features for WLAN & LTE environments, including Mobile Wireless Service (MWS) Coexistence Signaling and Train Nudging
- > Sniff Sub-rating, Low Duty Cycle Directed Advertising plus enhanced power control for optimized power consumption
- > SCO & eSCO voice support with dedicated hardware, supporting CVSD, A/u law and PCM interface
- > Frequency Hopping with channel assessment for higher link robustness and improved coexistence with interferers such as WLAN devices

OVERVIEW

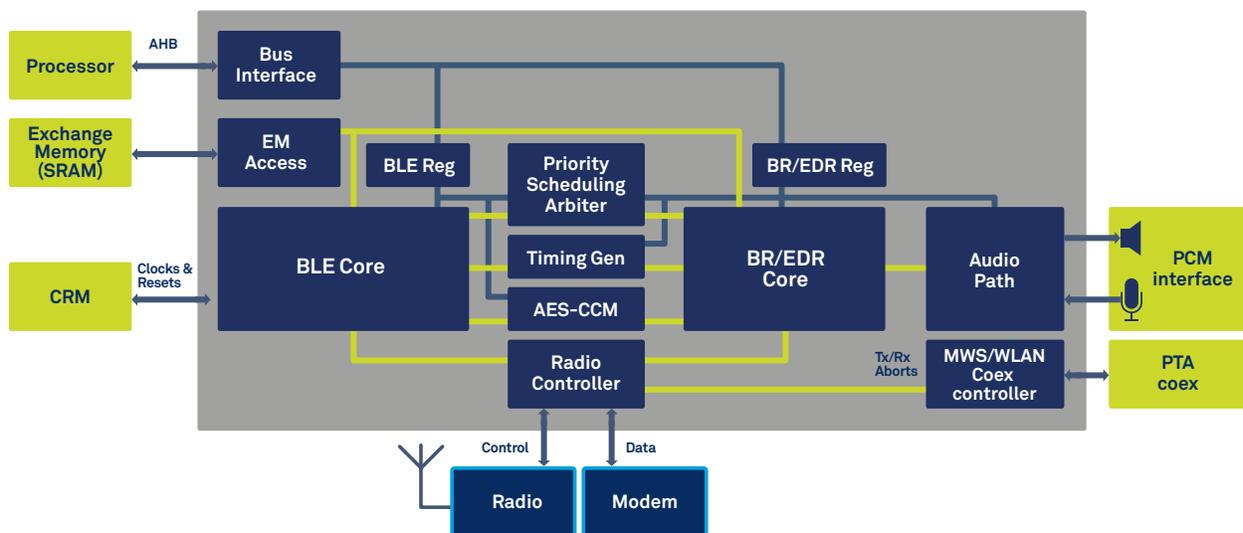
Bluetooth 5.1 dual mode, incorporating Classic Bluetooth & Bluetooth low energy, provides an optimised solution for next generation 'combo' SoCs for cellular phones, tablets, smart speakers, audio accessories and other products.

Backward compatible with earlier versions of the Bluetooth standard, the Bluetooth 5.1 dual mode IP consists of a hardware baseband controller coupled with a software stack up to the standard HCI interface, and an optional modem+RF transceiver. The standard HCI ensures that the Bluetooth Dual-Mode IP can be used with any compliant Host software stack (and profiles), including BlueDroid™ (as per Android™), BlueZ™, Tempow, OpenSynergy, A&W and others.

The Hardware Baseband Controller is provided as a Verilog IP package. It performs packet encoding/decoding and frame scheduling for both Classic (BR/EDR) and Low Energy (BLE) Bluetooth. It is complemented by a CVSD hardware codec with a-law/u-law/linear PCM samples converter for voice applications.

The Controller Software Stack is provided as a C code IP package. It is composed of the BR/EDR Link Controller (LC), LE Link Layer (LL), Link Manager (LM) and Host Control Interface (HCI).

The Modem+RF Transceivers are available in various process nodes and are designed for easy integration into digital SoC. The digital portion (modem and RF controller) is provided as RTL IP package. The analogue portion (ADC/DAC, PLL, LNA, PA, mixer, LDO, ...) is available as a GDSII IP package.



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