CEVA®

PRODUCT BRIEF

RivieraWaves

RivieraWaves Wi-Fi

Innovative set of tailored Wi-Fi 4 (802.11a/b/g/n), Wi-Fi 5 (802.11ac) and Wi-Fi 6 (802.11ax) MAC and Modem Intellectual Properties composed of hardware and software for easy integration into SoCs, from 1x1 up to MIMO 4x4

Product Features

- Comprehensive Wi-Fi IP family consisting of a set of MAC and modems IPs and platforms compliant with Wi-Fi 4 (802.11a/b/g/n), Wi-Fi 5 (802.11ac) and Wi-Fi 6 (802.11ax) tailored for various applications including IoT, wearable, mobile and gateway
- Industry's smallest and most power efficient Wi-Fi IPs and platforms
- Supports AP, STA & Wi-Fi Direct modes of operation
- Security modes: WEP, WPA, WPA2, WPS
- Hardware encryption: TKIP, RC4, AES128, SMS4
- Quality of Service: WMM, WMM-PS
- Scalable MAC supporting any throughput from a few Mbps (802.11n 1x1) up to multi Gbps (802.11ax 4x4)
- Lower MAC and FullMAC software stacks
- Comprehensive choice of tailored modems:
  - 20/40/80MHz bandwidths support
  - From 802.11n 1x1 up to 802.11ax 4x4
  - Hardwired implementation for low power, or CEVA DSP based implementation for higher flexibility
- STBC
- Beam Forming both as a transmitter and as a receiver
- Mixed mode and Green Field preambles
- Short guard interval
- RIFS
- A-MPDU & A-MSDU frames aggregation
- Block acknowledgement
- Various optional features available: WAPI (with hardwired SMS4 encryption engine), LDPC, MU-MIMO (as STA and as AP), mesh, radar detection mechanism (DFS)
- Bluetooth coexistence interface
- Power Down and Sleep modes implemented in Hardware and Software
- Reference digital front end, radio controller and AGC/CCA software defined state machine for use with Wi-Fi radios from various RF partners such as Catena and others
- Can be customized for other radios

Introduction

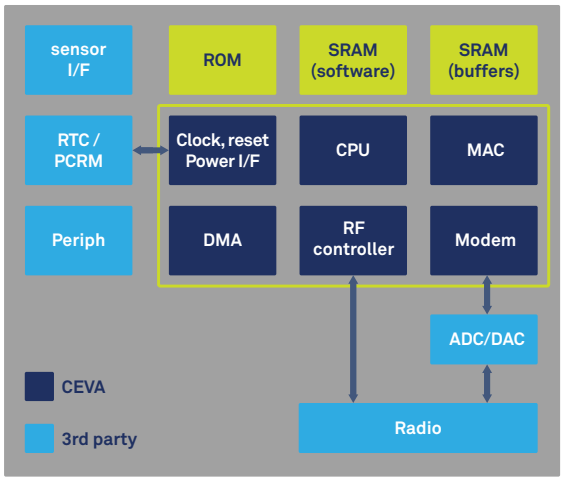
The RivieraWaves Wi-Fi IP family offers a comprehensive suite of IPs and platforms for embedding Wi-Fi connectivity into SoCs/ASSPs Optimized implementations are available for various applications, from low power IoT peripherals right up to high performance, multi-user gateways and spanning all flavours of 802.11a/b/g/n/ac/ax.

Each RivieraWaves Wi-Fi solution incorporates PHY modem functions and MAC functions, including Lower MAC (LMAC) and Full MAC software protocol stacks. It can be provided with either a hardwired modem (for minimal die area and extremely low power consumption) or a software defined modem (SDM) that gives extra flexibility. For the latter implementation, the modem software is executed on a CEVA DSP core, with the DSP core selection matched to customer's requirements. Designed for flexibility, the RivieraWaves Wi-Fi IPs can support several RFs in various foundries and process nodes from RF partners such as Catena and others. The MAC software stack is easily portable to customer's choice of embedded processor, such as CEVA DSP, ARM® Cortex-M™ family, ARC® EM family, AndesCore™ family, Cortus APS family, RISC-V and others. The IP is provided with an integration-ready processor and operating-system- agnostic platform, simplifying deployment in SoC/ASSP designs.

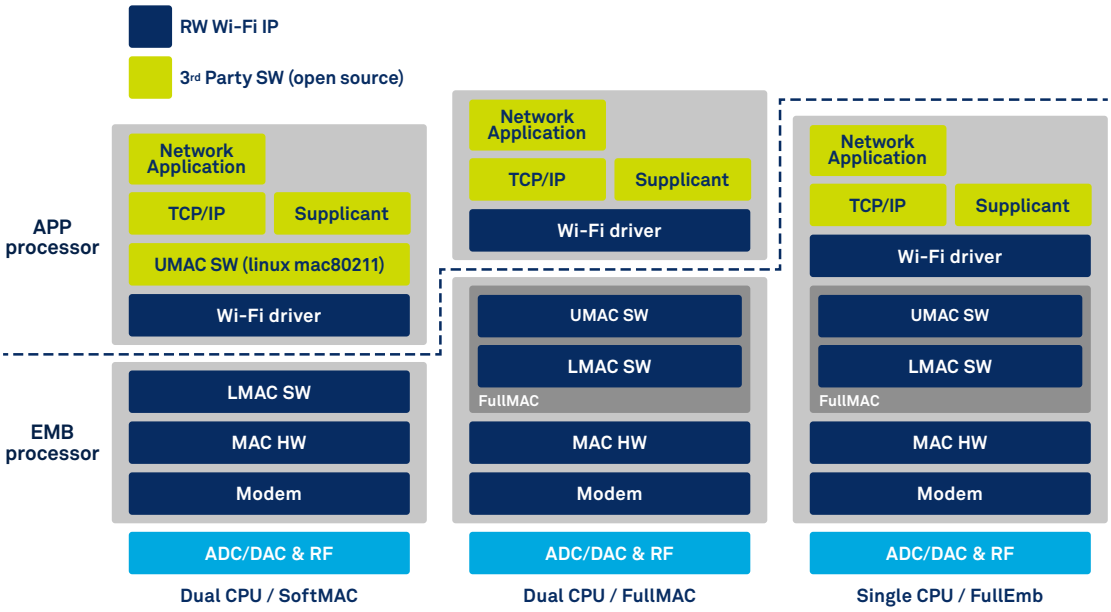
IP deliverables

- RTL package for RivieraWaves Wi-Fi hardware MAC and modems
- RTL package for an example of hardware platform with embedded processor
- C code package for RivieraWaves Wi-Fi MAC software protocol stack
- C code package for RivieraWaves Wi-Fi SDM software running on CEVA DSP.

Single CPU standalone Wi-Fi Chip



RivieraWaves Wi-Fi HW+SW Architecture



IP Packages Available

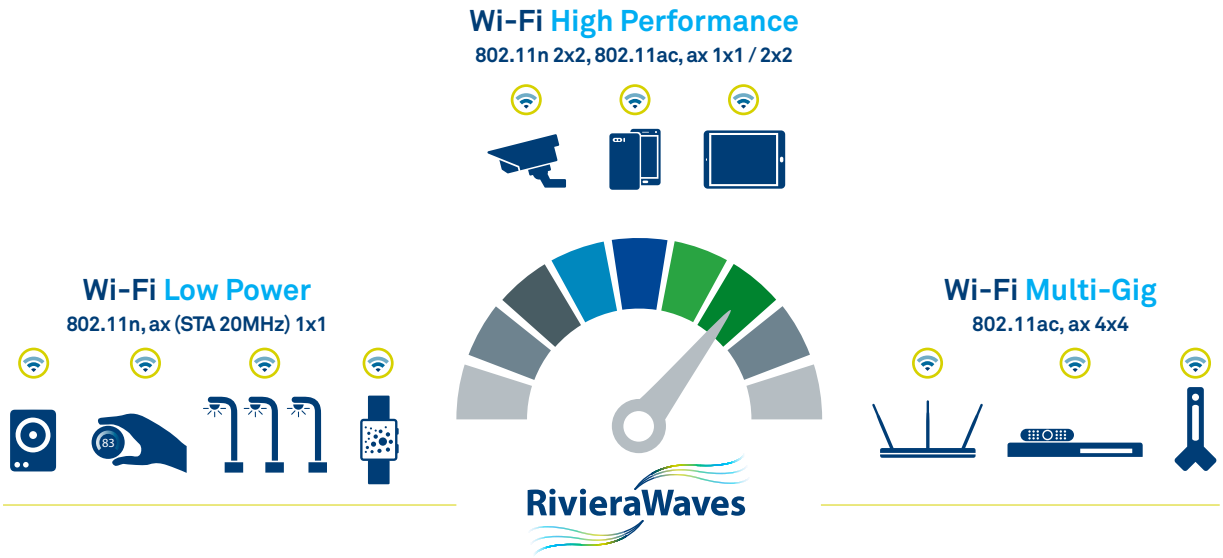
The RivieraWaves Wi-Fi IP family addresses a broad range of applications and contains a suite of solutions, each optimized for various target products, with a range of configurations. The Wi-Fi family is organized into 3 categories:

Wi-Fi Low Power: the industry's smallest footprint and lowest power Wi-Fi IPs targeted at IoT peripherals, including wearables, medical devices, wireless audio and other use cases where power and cost are critical factors. This category includes the RW-N 802.11n1x1 (Wi-Fi 4) compliant and RW-AX 802.11ax 1x1 (Wi-Fi 6) 20MHz STA compliant IPs. It consists of a hardware MAC accelerator with LowerSoftMAC & FullMAC software protocolstacks,provided with either ahardwired, small and low power modem or a flexible software defined modem (for RW-N 802.11n 20MHz only) with software running on a CEVA-DSP core.

Wi-Fi High Performance: the industry's smallest footprint and lowest power but high performance Wi-Fi IPs comprised of RW-N 802.11n 2x2 (Wi-Fi 4), RW-AC 802.11ac 1x1 & 2x2 (Wi-Fi 5) and RW-AX 802.11ax 1x1 & 2x2 (Wi-Fi 6). They are aimed at the vast array of media-sharing consumer devices including smartphones, tablets, cameras and smart home products. It consists of a hardware MAC accelerator with Lower MAC & FullMAC software protocol stacks, provided with either SISO or 2x2 MIMO hardwired, small and low power modem.

Wi-Fi Multi-Gig: highest performance Wi-Fi IPs consisting of the RW-AC 802.11ac 4x4 (Wi-Fi 5) and RW-AX 802.11ax 4x4 (Wi-Fi 6). They address the most demanding central gateway type applications which require premium performance for large numbers of subscribers such as access points, media gateways and Wi-Fi offload in small cells. To satisfy the flexibility and performance requirements of such applications, including co-existence with LTE/LTE-A in infrastructure applications, the RivieraWaves Wi-Fi Multi-Gig RW-AC and RW-AX modems are provided as a software-defined implementation, employing a high end CEVA-XC DSP core, complemented by a platform with hardware MAC accelerator controlled by a Lower MAC software protocol stack.

The RivieraWaves Wi-Fi IPs can be complemented by any of the RivieraWaves Bluetooth IPs for total combo solutions, and by CEVA's extensive portfolio of audio/voice solutions and Always-On sensor hub solutions, based around a CEVA DSP core.



Main Wi-Fi Supported Features

	Low Power		High Performance					Multi-Gig	
	11n 1x1	11ax 1x1	11n 2x2	11ac 1x1	11ax 1x1	11ac 2x2	11ax 2x2	11ac 4x4	11ax 4x4
Wi-Fi versions	a/b/g/n	a/b/g/n/ax	a/b/g/n	a/b/g/n/ac	a/b/g/n/ac/ax	a/b/g/n/ac	a/b/g/n/ac/ax	a/b/g/n/ac	a/b/g/n/ac/ax
Bandwidths	20/40MHz	20MHz	20/40MHz	20/40/80MHz				20/40/80MHz	
Max throughput	72Mbps @ 20MHz; 150Mbps @ 40MHz	114Mbps	150Mbps @ 20MHz; 300Mbps @ 40MHz	433Mbps	480Mbps	867Mbps	960Mbps	1.7Gbps	2.4Gbps
Options	WAPI LDPC Mesh	WAPI LDPC Mesh	WAPI LDPC Mesh	WAPI LDPC Mesh	WAPI LDPC MU-MIMO GCMP Mesh	WAPI LDPC MU-MIMO Mesh	WAPI LDPC MU-MIMO GCMP Mesh	WAPI LDPC MU-MIMO Mesh	WAPI LDPC MU-MIMO GCMP Mesh
Other features	- STBC (improve link reliability minimizing the effects of scattering, reflection, refraction) - STA, AP and Wi-Fi Direct Modes supported concurrently - Security (WEP/WPA/WPA2/WPS), Quality of Service(WMM, WMM-PS) - 11ac/ax:Beamforming - 11ax: TWT, Buffer Report, Two NAV operation, Spatial Reuse, Multi-BSSID, intra-PPDU power save								

Demonstration Platform

A XILINX FPGA based Prototyping platform containing RivieraWaves MAC, modem and RF daughter board is available.
Running at real speed, it can be used for:

- HW & SW prototyping and debug
- Pre-silicon application software development
- Interoperability testing against 3rd party Wi-Fi solution
- Certification
- System demonstration

RivieraWaves Wi-Fi IP validation platform

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