



> RivieraWaves Wi-Fi



Innovative set of tailored 802.11a/b/g/n/ac MAC and Modem Intellectual Properties composed of hardware and software for easy integration into SoCs, from 11n 1x1 up to 11ac 4x4

Product Features

- > Comprehensive Wi-Fi IP family consisting of a set of MAC and modems IPs compliant with 802.11a/b/g/n/ac tailored for various applications including IoT, wearable, mobile and gateway
- > Industry's smallest and most power efficient Wi-Fi IP 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 from 72.5Mbps (802.11n 1x1) up to 1.7Gbps (802.11ac 4x4)
- > SoftMAC/ThinMAC and FullMAC software stacks
- > Comprehensive choice of tailored modems:
 - 20/40/80MHz bandwidth support
 - from 802.11n 1x1 up to 802.11ac 4x4
 - hardwired implementation for low power, or CEVA DSP based implementation for higher flexibility implementations
- > 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 control for use with Wi-Fi radios from various RF partners such as Catena and others
- > Can be customized for other radios

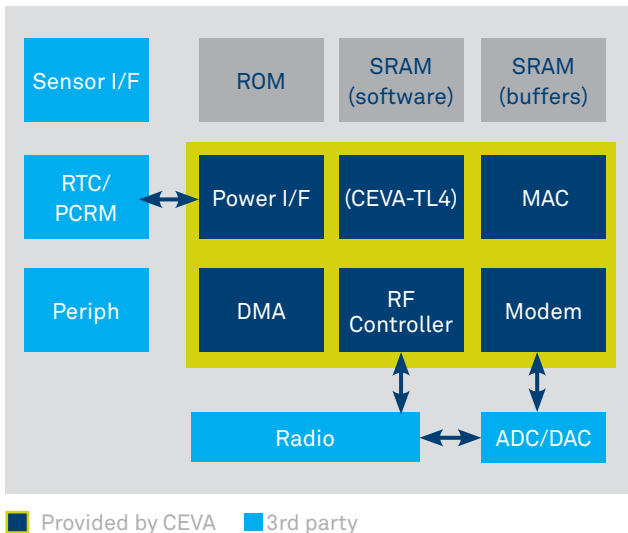
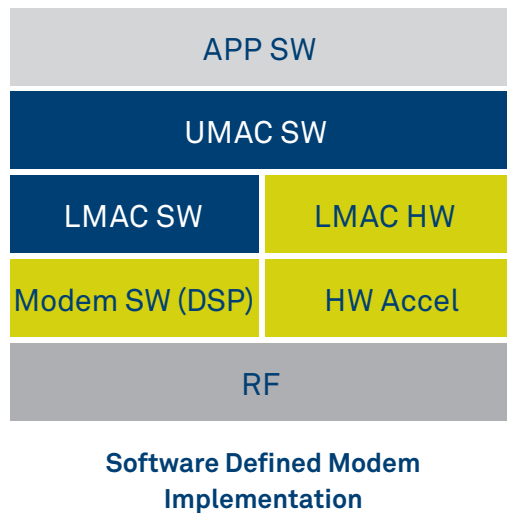
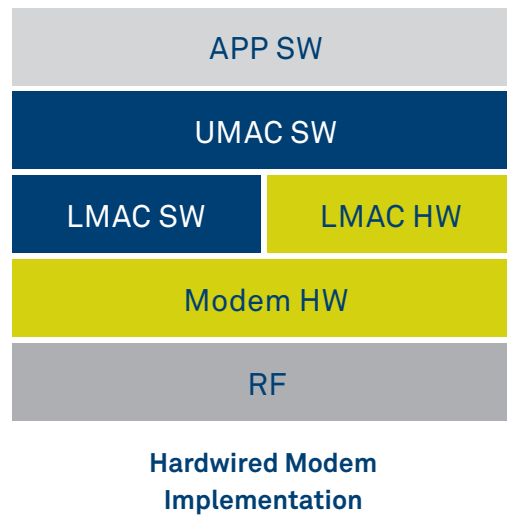
Introduction

The RivieraWaves Wi-Fi IP family offers a comprehensive suite of platforms for embedding Wi-Fi connectivity into SoCs/ASSPs (ex: microcontrollers, 'combo' peripheral chips when co-existing with e.g. BT / FM / GPS / NFC / Zigbee / ..., super-integrated cellular application/baseband processors). Optimised 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.

The RivieraWaves Wi-Fi IPs incorporate the complete Upper MAC (UMAC), Lower MAC (LMAC) and Modem functions. It can be provided with either a hardwired modem or a flexible, software defined modem for SDR-type deployment. 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 and others.

IP deliverables

- RTL package for RivieraWaves Wi-Fi hardware MAC and modems
- C code package for RivieraWaves Wi-Fi MAC software protocol stack
- C code package for RivieraWaves Wi-Fi SDM software running on CEVA DSP.



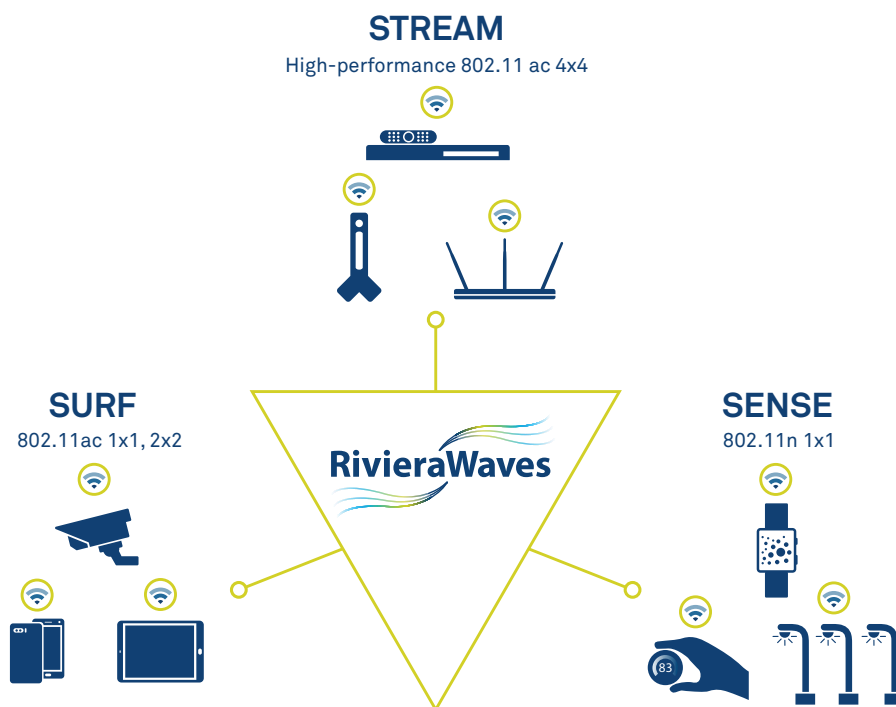
Example Chip Implementation

IP Packages Available

The RivieraWaves Wi-Fi IP family consists of:

- **Sense:** the industry's smallest footprint and lowest power Wi-Fi CERTIFIED n IP compliant with 802.11a/b/g/n. This is targeted at IoT peripherals, including wearables, medical devices, wireless audio and other use cases where power and cost are critical factors. It consists of a hardware MAC accelerator with SoftMAC & FullMAC software protocol stacks, provided with either a hardwired, small and low power modem or a flexible software defined modem with software running on a CEVA-DSP core.
- **Surf:** the industry's smallest footprint and lowest power Wi-Fi CERTIFIED ac IPs compliant with higher bandwidth 802.11a/b/g/n/ac 1x1 and 2x2. This is aimed at the vast array of smart consumer devices including smartphones, tablets, the smart home, surveillance cameras and more. It consists of a hardware MAC accelerator with SoftMAC & FullMAC software protocol stacks, provided with either SISO or 2x2 MIMO hardwired, small and low power modem.
- **Stream:** highest performance 802.11ac up to 4x4. This addresses 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 Stream modem is provided as a software-defined implementation, employing a high end CEVA DSP core such as the CEVA-XC4210. It is provided with a hardware MAC accelerator with SoftMAC & FullMAC software protocol stacks.

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.



Supported Features

	Sense	Surf		Stream
Configuration	11n 1x1	11ac 1x1	11ac 2x2	11ac 2x2 - 4x4
Versions	802.11b/g/n	802.11a/b/g/n/ac		
Bands	2.4 GHz	2.4/5 GHz		
Bandwidths	20MHz or 20/40MHz	20/40/80MHz		
Max Throughput	72 Mbps (20MHz) 150 Mbps (40MHz)	433 Mbps	867 Mbps	1.3 Gbps (3SS) 1.7 Gbps (4SS)
Options	WAPI, LDPC, Mesh	WAPI, LDPC, MU-MIMO (Wave 2), Mesh		
Other Features	<div>- STBC (improve link reliability minimizing the effects of scattering, reflection, refraction)</div> <div>- STA, AP and Wi-Fi Direct Modes supported concurrently</div> <div>- Security (WEP/WPA/WPA2/WPS), Quality of Service (WMM,WMM-PS)</div>			

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



Wi-Fi 802.11n/ac validation platform

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