



# Ensigma Whisper

## Low Power Wi-Fi Baseband IP

### IEEE 802.11 a/b/g/n 2.4/5 GHz Single Stream

Ensigma™ Whisper is a family of lower power wireless connectivity IPs for standards such as Bluetooth Low Energy (BLE), Bluetooth Dual-Mode, IEEE 802.15.4 and Wi-Fi. Specifically designed to meet the communications requirements for emerging low-power consumption markets such as the Internet of Things (IoT) and wearables, Ensigma Whisper implements all of the connectivity requirements of tomorrow's complex low-power System-on-Chips (SoCs).

The Ensigma Whisper Low Power Wi-Fi IP is a low power baseband (PHY & MAC) that interfaces to a Micro Controller Unit (MCU) through an AXI host interface. At the front end the IP interfaces with the AFE/RF interfaces through Digital I/Q.

The Whisper IP enables compact ultra-small form factor solutions designs which can be easily integrated in an SoC. The baseband and MAC uses several algorithmic optimisations to deliver the lowest active and idle power. This extends the system battery life while maintaining consistent connectivity and still provides a rich set of features.

### IEEE 802.11 Standards Support

<b>2.4 GHz</b>	IEEE 802.11b DSSS/CCK (1/2/5.5/11 Mbps)
	IEEE 802.11g OFDM (6/9/12/18/24/36/48/54 Mbps)
	IEEE 802.11n OFDM up to 72 Mbps 20 MHz channels, MCS0-7
<b>5 GHz</b>	IEEE 802.11g OFDM (6/9/12/18/24/36/48/54 Mbps)
	IEEE 802.11n OFDM up to 72 Mbps 20 MHz channels, MCS0-7

### Features

- Multi-standard Demodulation and Connectivity Platform
- Scalable from Single Channel to Multi stream multi standard
- Flexible RF interfaces
- Industry-leading PHY performance
- Choice between Integrated Wi-Fi MAC's

### Benefits

- Complete Multi-standard baseband solution
- Proven solution that minimizes risk and time to market
- Can provide all the required connectivity for a world standard SoC
- Easy integration into an SoC

### Applications

- Digital TV and set-top boxes
- Digital Radio (consumer or automotive)
- Tablets/smartphones
- Connected consumer products
- Internet of Things

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## General Features

- Complies with 802.11 b/g/n SISO
- Data rates up to MCS7, 20 MHz bandwidth
- Transmit power up to 16 dBm
- Optimised bit width to reduce area/power
- Slowest clock speed
- Optimised listen mode power consumption
- Increased immunity to noise/interference
- Dynamic power management based on packet signal quality
- Meets or exceeds standard specified sensitivity requirements including ACI/AACI
- 6.3 mm<sup>2</sup> die area including pads in TSMC 40 nm for Fully Embedded MAC
- 4.6 mm<sup>2</sup> die area including pads in TSMC 40 nm for Thin MAC

## Software

- Fully Embedded MAC with RPU running the supplicant, SoftAP and Wi-Fi Direct functionality
- Host Software load limited to running the TCP/IP stack, wpa cli and Customer Application
- HW/SW partition optimised to minimise power consumption
- Upper MAC Processor absorbs most of the traditional HOST functionality
- Optimum PHY configuration based on previous beacon processing
- Save/restore implementation and retention memories.

## Power Management Options

- GFSK modulation
- Power Management System Comprising
  - DC-DC converters (External)
  - LDO regulators
  - 32 kHz Real Time Clock
- Sleep Controller
  - Always On Block (AON) – Logic for 32 KHz design
- Multiple Power Domains

## Frequency Reference Options

- Works with open source Bluetooth host stack implementations such as BlueZ , Blue Droid
- On-chip 32.768 kHz crystal oscillator and RC oscillator for Sleep Mode
- Option for an external 40 MHz external clock

## Process

- TSMC 40 nm LP (1P8M, 1.1V/2.5V)
- 1P8M\_5X0Y2Z0R0U\_ALRDLmetal stack
- Required process options:
  - DNW (Deep N-Well)
  - MOM (requires no extra mask)
  - SVT and HVT

## Package

- Support for QFN packages – no requirement for external matching
- Other packages are supported but may require custom external matching

## Wi-Fi Alliance Certification

- Wi-Fi Alliance IEEE 802.11b/g/n certified

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