

Marvell. Moving Forward Faster

## PRODUCT OVERVIEW

The Marvell® 88W8786U is a highly integrated wireless local area network (WLAN) system-on-chip (SoC), specifically designed to support high throughput data rates for next generation WLAN products. The device is designed to support IEEE 802.11g/b and 802.11n payload data rates.

This device provides the combined functions of the IEEE Standard 802.11/802.11b Direct Sequence Spread Spectrum (DSSS), 802.11g and 802.11n Orthogonal Frequency Division Multiplexing (OFDM), baseband modulation, Medium Access Controller (MAC), CPU, memory, host interfaces, direct-conversion WLAN RF radio, and Bluetooth coexistence on a single integrated chip.

The 88W8786U is equipped with a fully integrated RF-to-baseband radio that operates in the 2.4 GHz ISM radio band for 802.11 applications. For optimum performance, the gain adjustment of the integrated LNA and AGC on the receive path is seamlessly controlled by baseband functions. An integrated transmitter up-converts the quadrature baseband signal and

delivers the signal to an external power amplifier for radio band transmission.

Local oscillator frequencies are generated by a fully integrated programmable frequency synthesizer with no external components. The loop bandwidth is optimized for phase noise and dynamic performance and quadrature signals are generated on-chip.

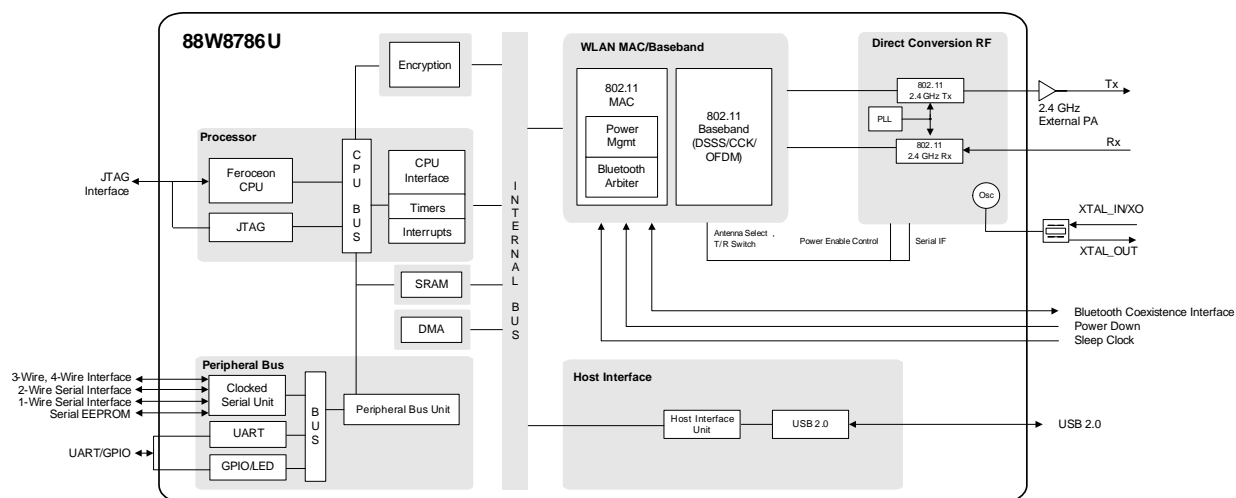
For security, the 88W8786U supports IEEE 802.11i security standards through implementation of the Advanced Encryption Standard (AES)/Counter Mode CBC-MAC Protocol (CCMP) and Wired Equivalent Privacy (WEP) with Temporal Key Integrity Protocol (TKIP) security mechanisms.

For video, voice, and multimedia applications, 802.11e Quality of Service (QoS) is supported.

The 88W8786U supports a USB 2.0 host interface, coexistence capability for co-located Bluetooth devices, and is available in a 68-pin QFN package.

Figure 1 shows an overall block diagram of the device.

Figure 1: Top Block Diagram





## Applications

- Personal computer systems
- Printers
- Wireless gateways, routers, and access points
- Wireless client cards and bridges

## General Features

- Single-chip integration of 802.11 wireless radio, baseband, MAC, CPU, memory, and host interface
- Integrates all RF and baseband transmit and receive operations, with support for external power amplifier
- Low power dissipation

## IEEE 802.11

- 802.11 data rates of 1 and 2 Mbps
- 802.11b data rates of 5.5 and 11 Mbps
- 802.11g data rates 6, 9, 12, 18, 24, 36, 48, and 54 Mbps for multimedia content transmission
- 802.11g/b performance enhancements for improved range
- 802.11n with data rates up to 150 Mbps
- 802.11e QoS block acknowledgement (with support for 802.11n extension)
- 802.11h transmit power control
- 802.11i security
- 802.11k radio resource measurement
- Fully supports clients (stations) implementing IEEE Power Save mode

## Packaging

- 68-pin QFN

## Processor

### CPU

- Integrated Marvell Feroceon® CPU
- 128 MHz CPU clock speed

### DMA

- Independent 2-Channel Direct Memory Access (DMA)

## Networking Functions

### MAC

- Ad-Hoc and Infrastructure Modes
- RTS/CTS for operation under DCF
- Hardware filtering of 64 multicast addresses and duplicate frame detection for up to 96 unicast addresses
- On-chip Tx and Rx FIFO for maximum throughput
- Open System and Shared Key Authentication services
- A-MPDU Rx (de-aggregation) and Tx (aggregation)
- Reduced Inter-Frame Spacing bursting
- Management information base counters
- Radio resource measurement counters
- Block acknowledgement with 802.11n extension
- Power management
- Transmit rate adaptation
- Transmit power control
- Long and short preamble generation on a frame-by-frame basis for 802.11b frames

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## Baseband

- DSSS modulation
- OFDM modulation
- Advanced Equalizer for Complementary Code Keying (CCK) modes
- On-chip A/D and D/A converters for Inphase/Quadrature (I/Q) channels
- Targeted for multi-path delay spreads up to 680 ns in 11 Mbps mode and 150 ns in 54 Mbps mode
- 12, 19.2, 20, 24, 26, 38.4, and 40 MHz clock support
- 802.11n optional features:
  - 20/40 MHz coexistence
  - Space-Time Block Coding
  - Short Guard Interval
  - Reduced Inter-Frame Spacing (Tx optional/Rx required)
  - Greenfield Tx/Rx

## WLAN Radio

- Integrated direct-conversion WLAN RF radio

## Rx Path

- On-chip gain selectable LNA with optimized noise figure and power consumption
- Direct conversion architecture eliminates need for external SAW filter
- High dynamic range AGC function in receive mode

## Tx Path

- Supports external PA with power control
- Supports closed and open loop power control in increments of 0.5 dB
- Optimized Tx gain distribution, for linearity and noise performance

## Local Oscillator

- Fractional-N for multiple reference clock support
- Fine channel step, AFC (adaptive frequency control)

## Advanced Security

- WEP 64- and 128-bit encryption with hardware TKIP processing (WPA)
- AES-CCMP hardware implementation as part of 802.11i security standard (WPA2)
- Enhanced AES engine performance

## Networking Coexistence

- Supports Marvell 2-Wire Bluetooth Coexistence Arbitration (2WBCA) Scheme
- Supports Marvell 3-Wire Bluetooth Coexistence Arbitration (3WBCA) Scheme
- Supports Marvell 4-Wire Bluetooth Coexistence Arbitration (4WBCA) Scheme

## Host Interface

- USB 2.0 device interface

## Peripheral Bus Interfaces

- Clocked Serial Unit (CSU)
  - 3-Wire, 4-Wire Serial Interface
  - 2-Wire Serial Interface
  - 1-Wire Serial Interface
  - SPI Serial EEPROM
- Universal Asynchronous Receiver/Transmitter (UART)
- General Purpose Input Output (GPIO)
- Flexible GPIO interface with Light Emitting Diode (LED) drivers to indicate Link, Speed, Duplex Mode, Collision, and Tx/Rx Activities

## Memory

### Frame Buffer

- Internal SRAM for Tx frame queues and Rx data buffers

### Boot ROM

- Boot ROM

## Test

- On-chip diagnostic information



**88W8786U**  
**Product Brief**

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