Marvell. Moving Forward Faster

PRODUCT OVERVIEW

The Marvell® TopDog™ 88W8366 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. Marvell TopDog devices are IEEE 802.11n draft 2.0 compliant. For complete interoperability, the 88W8366 is backward compatible with payload data rates of existing 802.11a/g/b solutions.

To achieve high performance data rates, the device is designed to operate in Multiple Input, Multiple Output (MIMO) systems, with multiple antennas at the transmitter and the receiver sides.

This device provides the combined functions of the IEEE Standard 802.11/802.11b Direct Sequence Spread Spectrum (DSSS), 802.11a/g Orthogonal Frequency Division Multiplexing (OFDM), MIMO baseband modulation, Medium Access Controller (MAC), on-chip CPU, internal memory, and host interface on a single integrated chip.

The 88W8366 core units are connected with a high throughput interconnect system. A high level of integration and full implementation of the power management functions specified in the IEEE 802.11 standard minimize system power requirements.

The 88W8366 is designed to work seamlessly with the Marvell 88W8063 MIMO Radio Frequency (RF) transceiver to provide a complete high performance wireless solution. A 3-wire serial interface is used for controlling communication between the SoC and the RF device.

The 88W8366 supports IEEE 802.11i security standards through implementation of 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. Also supported are 802.11h Dynamic Frequency Selection (DFS) for detecting radar pulses when operating in the 5 GHz band, plus 802.11j channels for Japan.

The 88W8366 supports a PCIe v1.1 host interface, coexistence capability for co-located Bluetooth devices, and is available in a 132-pin TFBGA package.

Figure 1 shows a top block diagram of the device.

Figure 1: Top Block Diagram
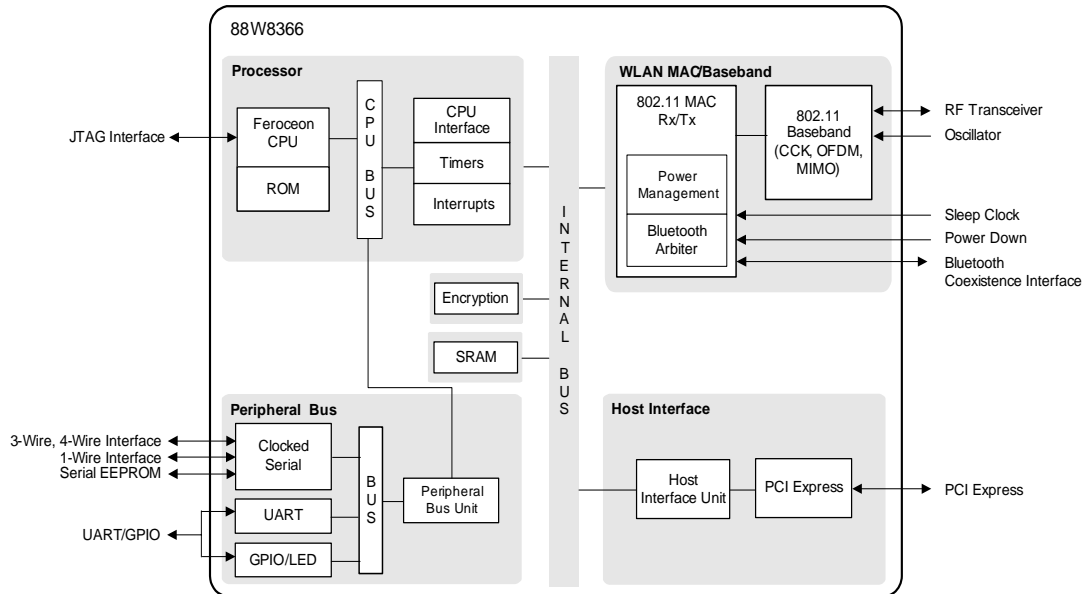
Applications

- Personal computer systems
- Wireless gateways, routers, and access points
- Wireless client cards and bridges
- Wireless home audio and video entertainment systems including TV, set-top boxes, media servers, and gaming platforms

General Features

- Single-chip integration of 802.11 wireless baseband, MAC, CPU, memory, and host interfaces
- MIMO operation, with multiple antennas on the transmitter and receiver sides
- 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
- 802.11a/g 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 draft 2.0 compliant, with data rates up to 450 Mbps
- 802.11e QoS block acknowledgement (with support for draft-802.11n extension)
- 802.11h (DFS and TPC)
- 802.11i security
- 802.11j channels (Japan)
- 802.11k radio resource measurement
- Fully supports clients (stations) implementing IEEE Power Save mode

Packaging

- 132-pin, 8x8x1 mm TFBGA

Processor

CPU

- Integrated Marvell Feroceon® CPU (ARMv5TE-compliant) with integrated tightly coupled memory
- 176 MHz CPU clock speed

DMA

- Independent 4-Channel Direct Memory Access (DMA)

Network

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 (RIFS) bursting
- Management information base counters
- Radio resource measurement counters
- QoS block acknowledgement with draft-802.11n extension
- DFS statistics processing
- Power management
- Transmit rate adaptation
- Transmit power control
- Long and short preamble generation on a frame-by-frame basis for 802.11b frames

Bluetooth 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

Baseband

- DSSS modulation
- OFDM modulation
- MIMO operation
- 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
- Antenna diversity
- DFS supports single-tone and chirp radar detection, including Japan W53 and W56 requirements
- 12, 13, 19.2, 20, 24, 26, 38.4, 40, and 44 MHz clock support
- draft-802.11n optional features:
  - 20/40 MHz coexistence
  - Space-time block coding
  - Short guard interval
  - Reduced inter-frame spacing (Tx optional)
  - Greenfield Tx/Rx

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

Host Interfaces

- PCI Express v1.1

Peripheral Bus Interfaces

- Clocked Serial Unit (CSU)
  - 3-Wire, 4-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

Internal memory

- Internal SRAM for Tx frame queues and Rx data buffers
- Boot ROM

Test

- On-chip diagnostic information

Marvell 2.4 and 5 GHz High Performance WLAN Solutions

The 88W8366 is designed to work seamlessly with the Marvell 88W8063 3x3 MIMO RF transceiver to provide complete high performance WLAN solutions from the RF device through the MAC layer.

Figure 2 shows an example of a Marvell high performance WLAN chipset solution.

Figure 2: Marvell Chipset Solution
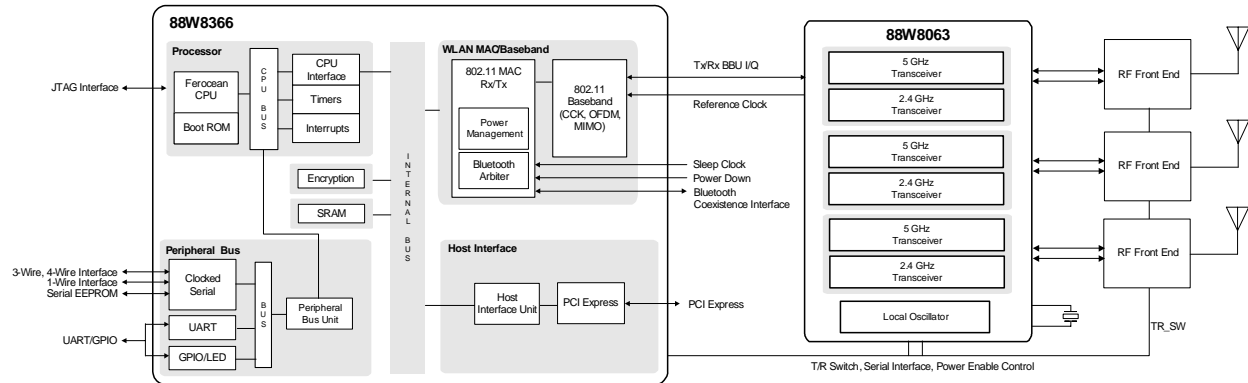
REFERENCE DESIGNS

Marvell reference designs are highly integrated, low cost, production quality reference designs that provide quick time-to-market solutions for customers developing 802.11 WLAN solutions.

For further information, contact Marvell representatives.

For further information about Marvell® products, see the Marvell website: http://www.marvell.com