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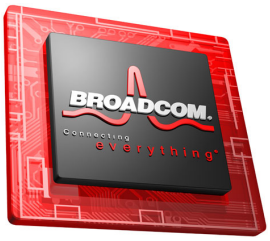
BCM3381 PRODUCT Brief



SINGLE-CHIP DOCSIS® CHANNEL-BONDED MODEM

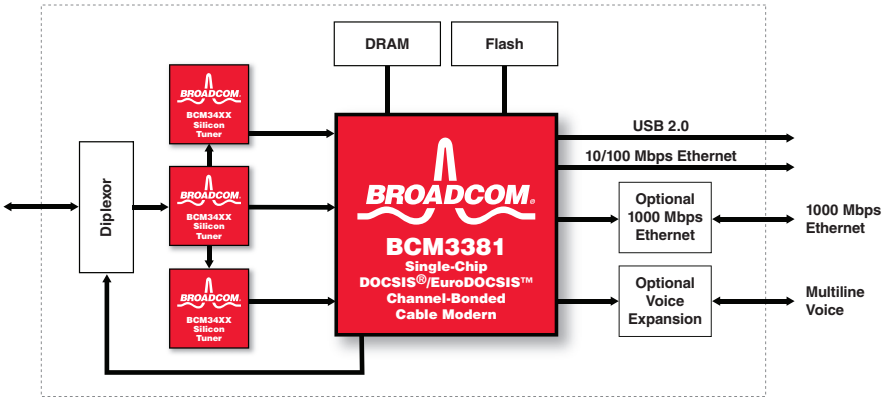
FEATURES

- **The industry's first fully integrated DOCSIS® channel-bonded cable modem solution**
- **The BCM3381 integrates:**
  - High-performance MIPS4350 processor
    - 48-KB I-cache and 16-KB D-cache
    - Advanced memory-to-memory DMA controller
    - Scalable clock rates up to 300 MHz
  - DOCSIS 2.0+ channel-bonded MAC with QoS and BPI+
  - Three advanced QAMLink® 1024 QAM downstream demodulators
  - 256 QAM advanced TDMA and SCDMA upstream modulator
  - 2 Gsps upstream power DAC
  - 10/100-Mbps Ethernet MAC and transceiver
  - USB 2.0 device
  - DDR266 memory controller
  - Multiprotocol expansion bus including PCI support
  - Secure boot module
  - Two integrated voltage regulators
- **Fully DOCSIS 2.0-compliant with channel bonding and 2.0+**
  - Three downstream and one upstream channel bonding
  - TurboQAM™ performance enhancements
  - SmartSpectrum™ noise immunity technology
  - Propane® packet accelerator
- **Glueless interface to Broadcom silicon tuner solutions**
- **Ninth-generation technology**
- **416-pin PBGA RoHS package**

SUMMARY OF BENEFITS

- **Advanced, flexible, and cost effective channel bonding**
  - Delivers over 100 Mbps downstream data rate
  - Integrated channel bonding solution eliminates costly FPGA or external logic
  - Extremely flexible bonding with no additional limitation on channel location, modulation, or power levels of bonded channels
  - Works with existing CMTS hardware
  - Uses DOCSIS 3.0 framework for channel bonding
- **800-DMIPS CPU with advanced memory architecture**
  - Delivers unprecedented data rates
  - High-speed DDR266 interface with support to 64 MB
  - Read-ahead cache (RAC) and low-latency DRAM access
- **16 SIDs provide capability for superior QoS performance and simultaneous high QoS and BE traffic.**
- **Secure boot loader and authentication protect against malicious software uploads and service theft.**
- **Flexible expansion with PCI support allows for Gigabit Ethernet connectivity, voice, wireless, gateway, storage, or other peripherals.**
- **SmartSpectrum delivers multiple dB enhanced robustness in noisy plant conditions.**
- **Propane packet acceleration improves throughput and efficiency up to three times.**
- **TurboQAM leads to over 30% increased upstream and downstream performance.**
- **Ninth-generation technology ensures a proven, robust, and reliable solution.**

+100-Mbps DOCSIS®/EuroDOCSIS™ Channel-Bonded Cable Modem



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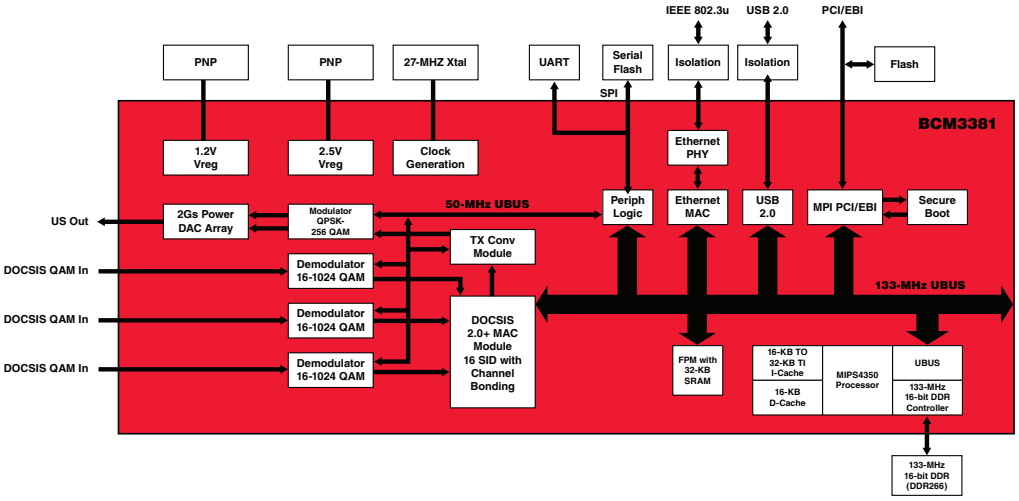
OVERVIEW



BCM3381 Block Diagram

The BCM3381 is the industry's first integrated, single-chip channel-bonded cable modem solution, delivering over 100 Mbps data rates. When used with Broadcom's silicon tuner solutions, the resulting channel-bonded modem does not have additional limitations on channel location, modulation parameters, or power levels, enabling maximum flexibility for channel bonding. Additionally, with advanced integration, the BCM3381 requires no costly FPGA or external logic to implement DOCSIS channel bonding. DOCSIS 2.0-compliant, the BCM3381 is interoperable on today's networks, and supports channel bonding with existing CMTS hardware enabling immediate deployment.

The BCM3381 combines RF receivers with advanced QAM and S-CDMA demodulators, an advanced QAM transmitter, a complete DOCSIS 2.0+ Media Access Controller (MAC) with channel-bonding capability, an 800-DMIPS communication processor, a 16-bit 133-MHz DDR266 DRAM interface, a 10/100 Ethernet MAC with integrated transceiver, and a USB 2.0 device.

The QAM receivers directly sample tuner output with an 11-bit ADC and input ACG amplifier. The receiver digitally resamples and demodulates the signal with recovered clock and carrier timing, filters and equalizes the data, and passes soft decisions to an ITU-T J.83 Annex A/B/C compatible decoder. The receiver supports variable symbol rate 4/16/32/64/128/256/512/1024 QAM FEC decoding. The final received data stream is delivered in a serial MPEG-2 transport format. All gain, clock, and carrier acquisition and tracking loops are integrated in the QAM receiver.

The upstream transmitter takes burst or continuous data, provides FEC encoding and pre-equalization for DOCSIS applications, filters, applies 2/4/8/16/64/128/256-QAM or S-CDMA modulation to the data stream, amplifies the signal through the integrated upstream power amplifier, and provides a direct 0 MHz– 65 MHz analog output.

The BCM3381 channel-bonding MAC includes all features required for full DOCSIS 1.0, 1.1, and 2.0 compliance, including full support for baseline privacy (BPI+) encryption and decryption. To enhance operational support, the BCM3381 MAC provides extended network management MIB/diagnostic features as well as immediate UCC (on-the-fly), using independent resets for downstream and upstream and both individual queue reset/flush for upstream queues.

The BCM3381 device's expansion capabilities enable a wide range of peripheral functionality, including VoIP, wireless, or 1000 Mbps Gigabit Ethernet connectivity, as well as any other PCI peripheral.

Enhanced end-to-end 2.0+ features increase overall performance and robustness. First, SmartSpectrum is a suite of technology that delivers increased noise immunity and improved performance in noisy conditions. SmartSpectrum includes Hi-PER SCDMA (High Power SCDMA) mode for highly attenuated connections, BPSK modulation which delivers a 3 dB gain in poor plant connectivity, impulse noise mitigation to reduce packet error rate caused by impulse noise, and Trellis Coding (TCM-TDMA) which provides up to a 2 dB RF signal gain.

Secondly, certified Propane packet accelerator technology delivers enhanced efficiency with DPHS (Dynamic Payload Header Suppression), which increases upstream payload capacity by up to three times, and Sync-TDMA (Synchronous TDMA), which increases capacity with a smaller preamble.

Lastly, Broadcom's TurboQAM technology significantly increases overall performance of the system. 1024 QAM downstream and 256 QAM ATDMA upstream delivers an over 30% performance increase.

The BCM3381 pinout has been optimized to allow for small, low-cost channel-bonded cable modem solutions. Without the need for an FPGA or external logic to support channel bonding, and the incorporation of an upstream power amplifier, the BCM3381 allows a complete high-speed channel-bonded cable modem to be assembled with a minimal set of external components.

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