BROADCOM®

Connecting everything®

BCM3214
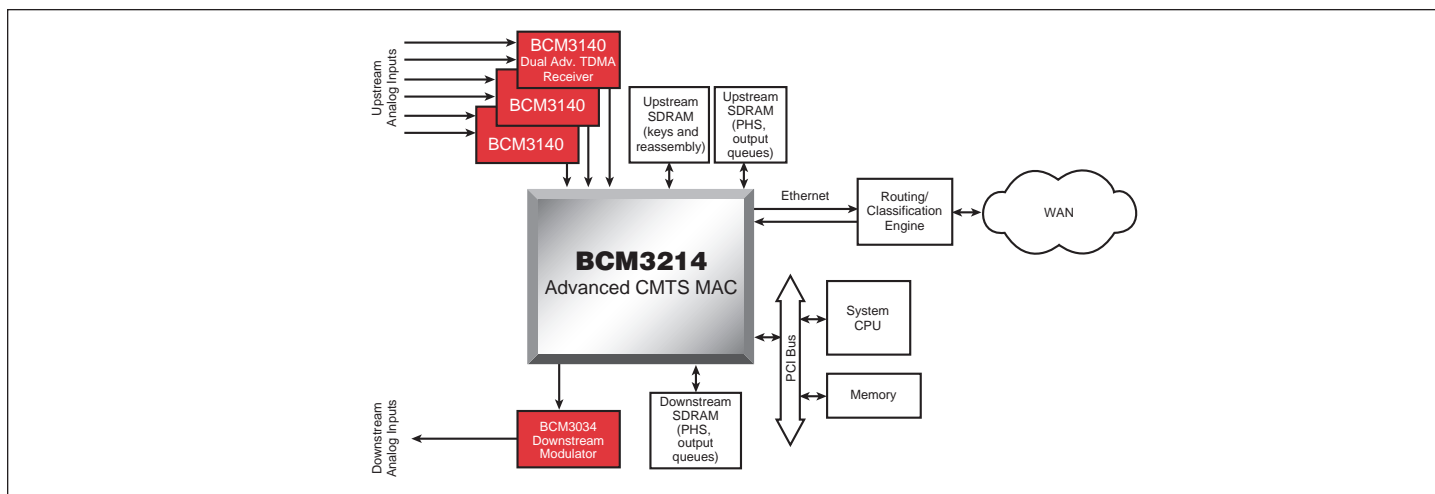## PRODUCT Brief

BCM3214 DOCSIS 2.0 ADVANCED CMTS MAC
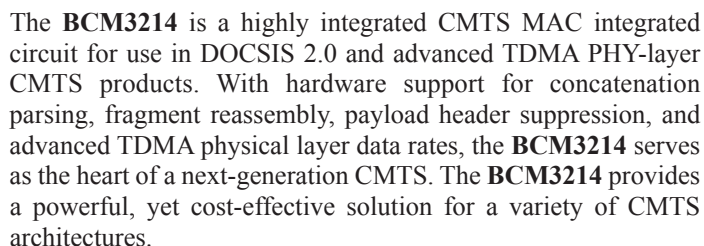
BCM3214 FEATURES

- **Performs DOCSIS™ 2.0 MAC layer functions, including:**
  - Fragment reassembly and deconcatenation
  - Logical channels
  - Payload header suppression and expansion
  - 56-bit DES encryption and decryption
  - Generation and checking of HCS and CRC
  - MPEG encapsulation of downstream traffic
  - Timestamp and SYNC message generation

- **Supports one downstream and up to six upstream channels simultaneously**
  - Many other downstream-to-upstream ratios can be achieved by connecting multiple BCM3214s via the seamless MAP master/slave interface

- **Processes up to 400 000 packets per second in the aggregate over all upstream and downstream channels**

- **Direct interface to:**
  - BCM3040 QAMLink® DOCSIS™ 2.0 Advanced QAM modulator (providing downstream data rates up to 100 Mbps)
  - BCM3140 QAMLink® dual-channel DOCSIS 2.0 burst receiver (providing upstream data rates up to 40 Mbps per upstream channel)

- **Packet port provides a high-throughput data interface to other network equipment via the standard IEEE 802.3z GMII Ethernet interface**

- **PCI interface to external host CPU supports either 32-bit or 64-bit operation at either 33 MHz or 66 MHz**

- **PROPANE™ packet acceleration and Smart Spectrum™ technologies for increased upstream performance**

SUMMARY OF BENEFITS

- **Hardware support for MAC-layer per-packet functions including fragmentation, concatenation, and payload header suppression offloads system CPU, giving higher overall system performance**

- **Extraction of bandwidth requests and DOCSIS MAC management messages allows software to access these messages without examining data packets**

- **Class-based queuing allows traffic prioritization:**
  - High, medium, and low priority downstream queues
  - High priority, low priority, request, and MAC management upstream queues

- **Support for carrier class redundancy via timestamp synchronization across multiple BCM3214 devices**

- **Supports high packet rates for maximum utilization of available cable plant bandwidth**

- **Out-of-band (OOB) generator for messaging to BCM3352-based cable modems**

- **Can be remoted from external routing/classification engine for distributed CMTS (mini fiber node) applications**

- **SPI Master Port Controls register interface to BCM3040 and BCM3140 devices**

- **Packaged in an 841-pin, thermally-enhanced plastic ball grid array**

- **Operates over industrial temperature range (–40 to +85ºC) PCI bus**

Typical Application Block Diagram

BCM3214 Block Diagram

The **BCM3214** is a highly integrated CMTS MAC integrated circuit for use in DOCSIS 2.0 and advanced TDMA PHY-layer CMTS products. With hardware support for concatenation parsing, fragment reassembly, payload header suppression, and advanced TDMA physical layer data rates, the **BCM3214** serves as the heart of a next-generation CMTS. The **BCM3214** provides a powerful, yet cost-effective solution for a variety of CMTS architectures.

The **BCM3214** is based on sophisticated hardware processing engines for both the upstream and downstream paths. To achieve upstream throughput of 200 000 packets per second, the upstream processor design is segmented and uses 2 banks of SDRAM to minimize latency on the internal buses. The upstream processor performs DES decryption, fragment reassembly, deconcatenation, payload header expansion, PROPANE™ packet acceleration, upstream MIB statistic gathering, and priority queuing for the resultant packets. Each upstream queue can be independently configured to output packets to either the PCI or GMII interface. DOCSIS MAC management messages and bandwidth requests are extracted and queued separately from data packets so that they are readily available to the system controller.

The downstream processor accepts packets from priority queues and performs payload header suppression, DOCSIS header creation, DES encryption, CRC and HCS generation, MPEG encapsulation and multiplexing, and timestamp generation on the in-band data. The **BCM3214** also includes an out-of-band generator and TDMA PHY-layer interface so that the **BCM3214** can communicate with the out-of-band receiver of the BCM3352 cable modem device for control of power management functions.

All configuration and management of the **BCM3214** is done via the PCI interface. The PCI interface accommodates either 32-bit or 64-bit hosts operating at either 33 MHz or 66 MHz. The 100/1000 Ethernet MAC provides a standard interface (IEEE 802.3z GMII or MII) for transporting packets to and from the **BCM3214**.

A single **BCM3214** supports the association of 1 downstream channel with up to 6 upstream channels. By connecting multiple **BCM3214** chips via the seamless master/slave interface, many other ratios may be achieved, including 2 downstream to 12 upstream (2:12) and 1 downstream to 24 upstream (1:24). In multiple downstream configurations, upstream channels can be remotely provisioned to be associated with 1 of 2 downstream channels to enable load shifting.

Connecting
everything ®

BROADCOM®