

DUAL HD MULTIFORMAT SET-TOP SOC WITH MoCA™ INTEGRATED WHOLE HOME MEDIA CENTER GATEWAY SYSTEM

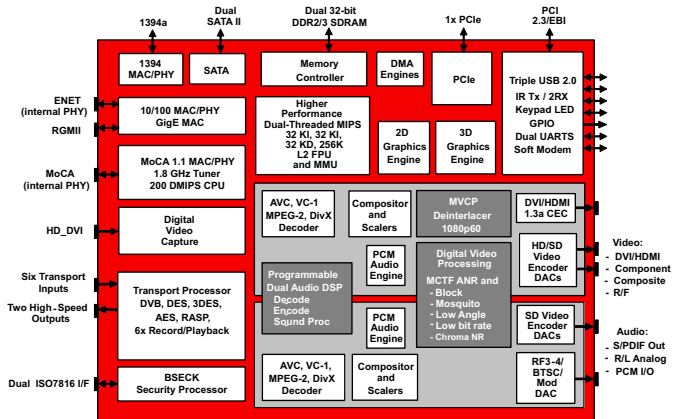
SYSTEM INTEGRATION FEATURES

- **System communication**
 - Complete Integrated MoCA™ 1.0/1.1+ 240 Mbps interface
 - 200-DMIPS CPU/MAC/PHY/1.8 GHz Tuner
 - Ethernet to MoCA Bridging
 - Low-RF support included
 - Integrated 1394a MAC/PHY interface
 - 10/100/1Gigabit Ethernet MAC, RGMII or 10/100 Ethernet PHY
- **Processing**
 - 1500+ DMIPS dual-threaded host processor wth FPU/ MMU
 - Programmable power management controller for EnergyStar[®]
 - Dual DDR2/DDR3 32-bit memory controllers
 - DDR2/DDR3 (667, 800, 1066)
- **Security, Conditional Access, DRM**
 - Broadcom security processor
 - Tru2way™ ready with on-chip MCARD support
 - Dual SmartCard support
- **Device connectivity and control**
 - Dual SATA II for DVR
 - Triple USB 2.0 host controller
 - HDMI 1.3a/DVI 1.0 MAC and PHY with HDCP 1.3
 - Integrated SiLab Si305x system side device for modem support
 - 3.3V PCI 2.3
 - 1x PCIe™ Gen 1 interface
 - Dual UHF remote control receiver
 - Dual IR remote control receiver and IR blaster
- **Video connectivity and support**
 - HDMI/HDCP and Component HD/SD outputs
 - Simultaneous Composite and S-Video SD outputs
 - VBI encoders for CC/TTX with NABTS/CGMSA/WSS/ Gemstar[®] standards and dedicated TTX sideband
 - RF modulator with BTSC encoder
 - HD_DVI input
 - HD_DVO and 656 output ports
 - Macrovision[®] 7.1 and Dwight Cavendish support options
 - SCART 1 and 2 support

VIDEO/ AUDIO/ GRAPHICS FEATURES

- **Dual advanced AVC/MPEG-2/VC-1 decoders**
 - H.264/AVC Main and High Profile to Level 4.1
 - VC-1 Advanced Profile @ Level 3
 - VC-1 Simple and Main Profile
 - HD MPEG-2 and SD MPEG-2
 - MPEG still-picture decode
 - DivX[®] and MPEG-4 part 2 ASP decode
 - H.263
 - AVS option available
- **1080i60 Deinterlacer for “Full HD” 1080p50/60 Video Output**
 - Supported on both HDMI and Component Outputs
- **Dual-channel advanced audio processor**
 - AAC LC, AAC LC+SBR level 2, AAC+ level 2
 - Dolby[®] Digital, Dolby Digital Plus
 - MPEG I layers 1, 2, and 3 (MP3)
 - Windows Media[®] audio
 - Audio transcode and audio leveling
 - Pair of on-chip stereo high-fidelity audio DACs
 - 3D SRS audio support
 - Dual I²S bidirectional ports
 - S/PDIF output
- **2D and 3D graphics drawing engines**
 - Studio-quality text and graphics at HD resolution
 - Supports multiple layers and windows
 - Complete 3D graphics engine with OpenGL[®] ES 1.0 support
- **Digital Noise Reduction (DNR)**
 - Reduces MPEG artifacts including block noise reduction
 - Reduces mosquito noise
 - Reduces low-bit-rate noise
 - Reduces Chroma noise
- **Motion Compensated Temporal Filtering**
 - Reduces encoded artifacts in digital streams
 - Reduces motion induced artifacts
- **Reverse 3:2/2:2 pull-down**
- **Letterbox detection**

OVERVIEW



BCM7420 Block Diagram

The BCM7420 redefines media center system integration: a MoCA modem for home networking, 1080p60 quality video, a 1500-DMIPS (Millions of Instructions per Second) CPU, a dual-channel high-definition video decoder (H.264, VC-1, MPEG-2, MPEG-4 Part 2, H.263, and DivX), mosaic video support, a dual-channel multifunction audio decoder, PC class 2D and 3D graphics processing, high-quality video scaling and motion-compensated deinterlacing, seven video DACs, dual-stereo high-fidelity audio DACs, and a suite of peripherals providing a variety of set-top box control functions—all under the oversight of a dynamic power controller for energy efficiency. The BCM7420 supports either DDR2 or DDR3 memory architectures future-proofing the system design. The BCM7420 also contains a programmable security processor and transport engine making the solution perfect for cable, satellite, IP, digital TV and retail business models.

The integrated 1.0/1.1+ MoCA Modem, PHY and on-chip RF transceiver incorporates a 200-DMIPS CPU, 256 QAM for bit loading and an extended frequency range. All flow control and processing is offloaded from the host processor. Support is included for Low-RF mode. The modem is driven by a dedicated on-chip Gbit Ethernet MAC for efficient data transfers and address learning, thereby achieving maximum actual system throughput. When used in conjunction with other Broadcom-enabled devices, additional performance can be realized. The controller is field-programmable, allowing the service provider to tune performance for unique circumstances. When paired with a BCM3450 power amplifier/low-noise filter, it forms a direct connection to a MoCA network.

The BCM7420 incorporates a 1500-DMIPS dual-threaded MIPS32™ microprocessor subsystem, including a floating point unit, memory mapping unit and deep data caches, thereby enabling a plethora of consumer applications such as Flash, Internet video decode formats, JPEGs, and much more.

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7420-PB01-R 10/31/08

The BCM7420 performs upscaling and conversion to 1080p60 of any source input (likewise for 50-Hz-based content to 1080p50). An on-chip filter reduces the effect of digitally captured analog capture noise. The same filter helps eliminate motion-induced encoded artifacts. A key feature is mosaic video support, where multiple live streams can be decoded and arrayed for unique channel guide applications. Also included are motion-adaptive deinterlacing with 3:2 pull-down and letterbox detection. Digital noise reduction filters minimize mosquito noise, AVC/VC-1 low-encoded bit-rate noise, and MPEG artifacts, including block noise. Picture-in-picture, split picture, and independent picture in graphics are supported.

H.264 (AVC) support includes Main and High Profile to Level 4.1 for 720p and 1080i high definition for HD and to Level 3.1 for SD streams. AVC High Profile was added to the fidelity range extensions specifically to address the needs of consumer broadcast and playback applications. The video decoders also support high-definition VC-1 (Advanced Profile Level 3, Main, and Simple Profiles) and MPEG-2, Main Profile at Main and High Levels. The BCM7420 has two advanced audio processors capable of decoding Dolby Digital, Dolby Digital Plus, AAC 5.1, AAC+ level 2, and MPEG 1 layers 1, 2, and 3 with simultaneous pass-through support. This can be combined with transcoding and volume leveling. 3D SRS audio is also supported. Available audio outputs are I²S, S/PDIF, and two pairs of analog outputs.

High-quality video and graphics processing are integrated, featuring advanced studio-quality 2D and OpenGL ES 3D graphics processing. The 3D engine allows for the seamless use and blending of live video for stunning user interface effects.

The BCM7420 dual-stream analog video encoder supports either Macrovision® or Dwight Cavendish encoding options. Output formats include a complete suite of NTSC and PAL formats for worldwide application. The seven configurable DACs support composite, S-Video, SCART, RGB, and YPrPb component. The following output resolutions are supported: 480i, 480p, 576i, 576p, 720p, 1080i, and 1080p 24/30/50/60. The BCM7420 includes a HDMI interface and a channel 3/4 RF modulator. Both a direct HD digital output port and an ITU-R-656 output port are also available, as well as teletext sideband interface.

Integrated peripherals include a 1394 MAC and PHY, UARTS, ISO7816 smart card interfaces, counter/timers, a GPIO, a LED/keypad controller, IR receivers, an IR blaster, two UHF remote control receivers, an integrated soft modem system side device, and BSC and SPI controllers. Advanced connectivity features include a PCI bus, a PCIe x1 port, three USB 2.0/1.1 ports, two SATA II ports, and a second Gigabit MAC, which can be configured to interface to on-chip 10/100 PHY, or to external Gigabit PHY via RGMII.

The transport processor is MPEG-2- and DVB- compliant, supporting external transport inputs and internal playback channels. Dedicated engines offload record, audio, video, and PCR processing, as well as message filtering, including DVR trick mode support. Encryption support includes 1DES/3DES/DVB/Multi2/AES.



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