

QUAD-PORT 10/100/1000BASE-T GIGABIT ETHERNET TRANSCEIVER

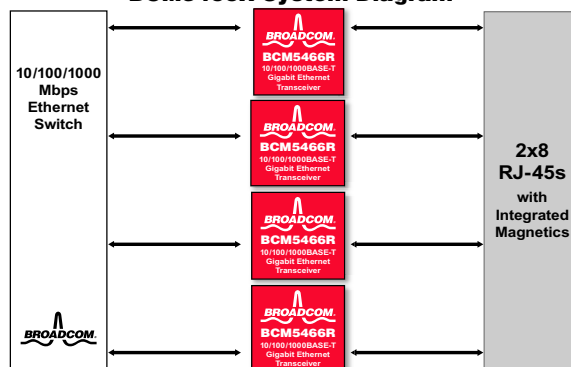
FEATURES

- Four fully-integrated 10BASE-T/100BASE-TX/1000BASE-T Gigabit Ethernet transceivers
- RGMII, SGMII, and SerDes MAC interface options
- 1-Gbps line-side SerDes with an RGMII MAC interface
- Fully compliant with IEEE 802.3, IEEE 802.3u, and IEEE 802.3ab standards
- 0.13-micron CMOS for low power consumption and low cost
- Supports copper or fiber operation in RGMII mode
- Low power
 - 750 mW per port
 - Advanced power management
- Trace-matched output impedance
- Line-side loopback
- Ethernet@Wirespeed™ support
- Low EMI emissions
- CableChecker™ diagnostics
 - CableChecker software detects cable plant impairments.
 - Link quality indication LED.
 - Automatic detection and correction of wiring pair swaps, pair skew, and pair polarity.
 - Automatic MDI/MDIX crossover at all speeds.
- Robust cable-sourced electrostatic discharge (CESD) tolerance
- Support for jumbo packets of up to 10 kB
- IEEE 1149.1 (JTAG) boundary scan
- 256-pin BGA package

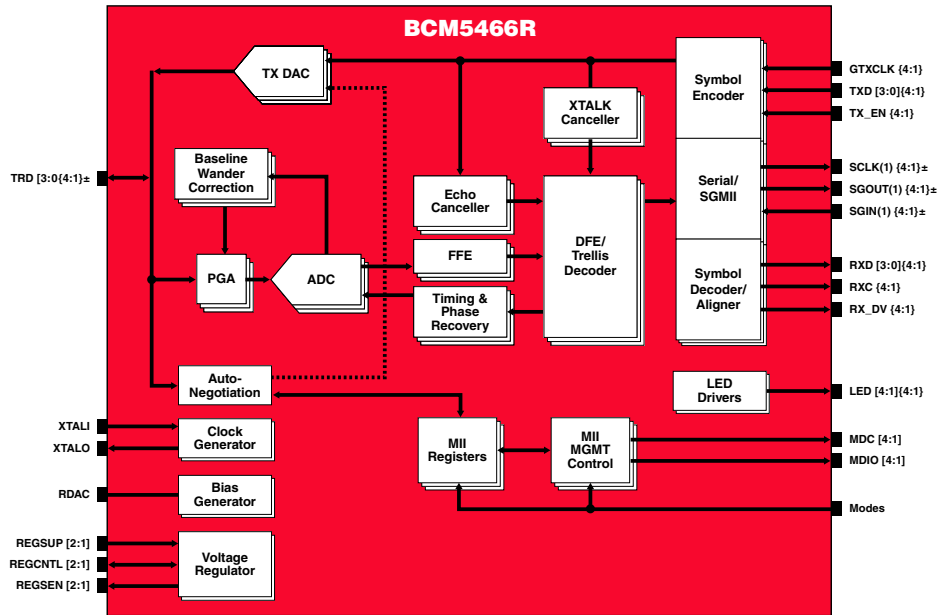
SUMMARY OF BENEFITS

- Low-power, quad-port integration enables single-row, high-port-density switches.
 - Lowers system costs by eliminating PCB layers required for routing high-density solutions.
 - Reduces I/O pin requirements with RGMII (over 50%), SGMII (over 75%), and SerDes (over 80%).
 - Supports clock timing adjustment to eliminate board trace delays required by the RGMII specification.
 - Lowers MAC/switch costs by reducing the number of pins required to interface with the PHY.
- Provides compatibility with IEEE standard devices operating at 10, 100, and 1000 Mbps at half-duplex and full-duplex.
- Lowers system BOM cost and simplifies system design.
- Ethernet@Wirespeed controls auto-negotiation advertising to enable link establishment at lower speeds when a 1000BASE link fails to be established.
- Enables use of low-cost magnetics, even in high-density (48+ port) designs.
- Eases system level debugging.
- CableChecker software characterizes cable plant condition and immediately indicates cabling issues.
 - Prevents erroneous equipment return due to bad cable plants.
 - Prevents manufacturing fallout due to bad cable plants.
- Over 3 kV of CESD tolerance prevents equipment damage and return.
- Operates with larger packets for wider range of packet protocol support and improved efficiency.
- Ease of manufacturing with JTAG support, simplified power supply, and multiple MAC interfaces.

BCM5466R System Diagram



OVERVIEW



BCM5466R Reference Design

The BCM5466R is a member of Broadcom's QuadSquad™ family of quad Gigabit Ethernet PHYs. It consists of four complete 10/100/1000BASE-T Gigabit Ethernet transceivers integrated on a single monolithic CMOS chip. The BCM5466R is optimized for low power and small footprint size to enable high-port-density applications. The BCM5466R enables a new class of cost-effective Gigabit Ethernet equipment by lowering system cost and reducing power dissipation by nearly 25 percent, driving the delivery of Gigabit Ethernet bandwidth to the desktop.

The BCM5466R DSP-based architecture and advanced power management techniques combine to achieve robust and low-power operation over existing Category 5 twisted-pair wiring. The BCM5466R architecture not only meets the requirements of the IEEE 802.3, IEEE 802.3u, and IEEE 802.3ab specifications, but also maintains the industry's highest level of margin over IEEE requirements for echo, near-end crosstalk (NEXT), and far-end crosstalk (FEXT). Low power is key to implementing high-density Gigabit Ethernet switches, and the BCM5466R has the lowest power in the industry at 750 mW per port. In addition, the BCM5466R has extremely low EMI emissions, which reduces the design constraints required to meet EMI radiation specifications.

The BCM5466R supports the RGMII, SGMII, and SerDes MAC interfaces. The RGMII, SGMII, and serial SerDes interfaces are reduced-pin-count (12, 6, and 4, respectively, versus 25) versions of the GMII. The RGMII clock timing can be adjusted to eliminate the board trace delays required by the RGMII specification. These reduced-pin-count interfaces simplify design and lower system cost by reducing the number of layers required to route high-density solutions. In addition, these interfaces allow

fewer pins at the MAC/switch, which reduces MAC/switch cost by enabling smaller die sizes than would be possible with full GMII implementation.

The BCM5466R is another member of Broadcom's 0.13-μm Gigabit Ethernet copper PHY family, joining more than a dozen other quad and single products. The 0.13-μm process is the optimal process that offers the best performance, lowest cost, and lowest power for Gigabit Ethernet copper solutions. Devices based on the 0.13-μm process offer an excellent long-term cost curve, enabling better cost reduction over time (compared to older technologies) without having to redesign or requalify a new part.

Each BCM5466R port is fully independent and has individual interface, control, and status registers, and incorporates a number of advanced features. A link-quality indicator LED gives installers an instant visual indication if there are any wiring plant problems at the preferred speed. This includes physical wiring defects that the BCM5466R cannot automatically correct for, and channel conditions such as excessive cable length and return loss, crosstalk, echo, and noise. Broadcom's CableChecker software provides remote management of the cable and first level diagnostics and fault isolation.

The BCM5466R also has ESD tolerance well above typical industry standards. This prevents ESD damage not only during manufacturing, but also during CESD events in the field when an electrically charged network cable is plugged into a network port. This is an issue becoming more prevalent with contemporary cable installations. The BCM5466R can tolerate over 3 kV of CESD.

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