

### Dual-Port 1000/2500BASE-X Ethernet Controller with Integrated TCP Processing Engine, RDMA, and iSCSI with PCI Express<sup>®</sup>

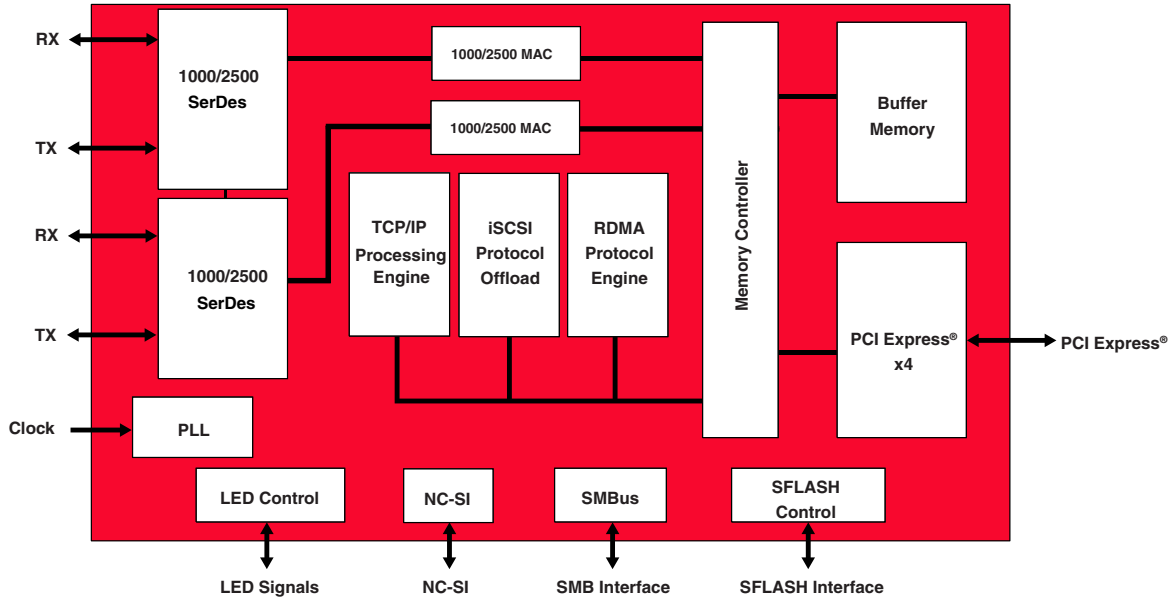
#### FEATURES

- **Dual-port single-chip solution for LAN on Motherboard (LOM) and network interface card (NIC) applications**
  - Dual-media capability; can either be configured for SerDes or Copper transceivers
  - Integrated 1000/2500BASE-X SerDes
    - Auto-negotiation between 1G and 2.5G modes
  - Integrated 10BASE-T/100BASE-TX/1000BASE-T transceivers
  - Host interface
    - PCI Express<sup>®</sup> x4 host interface
    - PCI Express V2.0-ready
- **TCP processing engine**
  - Full fastpath TCP processing
  - Support for IPv4 and IPv6
- **iSCSI controller**
  - iSCSI initiator
- **RDMA controller (RNIC)**
  - RDMA over TCP (iWARP)—RDMAC 1.0-compliant
  - Hardware-based data placement in application buffers without CPU intervention (for user and kernel modes)
- **Other performance features**
  - Receive side scaling (RSS)
  - TCP, IP checksum offload
  - TCP segmentation offload
  - Adaptive interrupts
  - Message signal interrupt (MSI and MSI-X) support
- **Robust manageability**
  - Network controller sideband interface (NC-SI)
  - PXE 2.0 remote boot
  - Network controller—sideband interface (NC-SI) support
  - Wake-On LAN
  - IPMI pass-through feature
  - Statistics gathering (SNMP MIB II, Ethernet-like MIB, Ethernet MIB (802.3x, clause 30))
  - Comprehensive diagnostic and configuration software suite
  - ACPI 1.1a-compliant power management
- **Advanced network features**
  - Virtual LANs—802.1q VLAN tagging
  - Jumbo frames (9 KB)
  - 802.3x flow control
- **Low-power CMOS design**
- **On-chip power circuit controller**
- **656-ball 27 x 27 mm FBGA package**
- **3.3V I/Os**
- **JTAG**

#### SUMMARY OF BENEFITS

- **Industry's first dual-port 1000/2500 SerDes-based TOE solution—power and space optimized for server blade and low-profile NIC applications**
- **Extremely low CPU utilization for TCP/IP applications**
  - Host CPU is free to run application code
- **Accelerated IP-based storage**
  - Lower CPU utilization for file-level storage protocols such as CIFS and NFS
  - iSCSI functionality with low CPU utilization
- **RDMA support for data placement in application buffers reduces CPU utilization and lowers data transit latencies**
- **Future-proof**
  - Flexible implementation for TCP, iWARP, and iSCSI can accommodate specification changes and interoperability issues
- **Performance-focused—optimized for throughput and CPU utilization**
  - Adaptive interrupts reduce system overhead for network processing
  - 2.5 Gigabit Ethernet
  - RSS reduces CPU utilization on multi-CPU systems
  - MSI and MSI-X allow interrupt distribution in a multi-CPU host system
  - PCI Express host interface allows a low-latency access to CPU and Memory resources
- **Robust and highly manageable**
  - NC-SI enables high bandwidth out-of-band system management functionality over shared infrastructure
  - NC-SI interface standardized through the DMTF for easier product integration
  - PXE 2.0, ACPI 1.1, Wake-On LAN
  - IPMI pass-through capability allows on-board management controllers access to the network in OS-present and OS-absent states
- **Server class reliability, availability, and performance features**
  - Link aggregation and load balancing
    - Switch-dependent
  - 802.3ad (LACP), generic trunking (GEC/FEC)
    - Switch- and NIC-independent
- **Low power consumption**
  - Advanced power management
- **Minimal real estate—ideal for LOM**
  - On-chip power circuit controller

# OVERVIEW



**BCM5709S Block Diagram**

The BCM5709S provides a fully integrated dual-port Layer 4 and Layer 5 solution—TCP/IP, RDMA, and iSCSI along with a complete 1000/2500BASE-X Gigabit Ethernet, IEEE 802.3-compliant media access control (MAC), and physical layer transceiver solution for high-performance network applications. By itself, the BCM5709S provides a complete single-chip dual-port Gigabit Ethernet NIC with a TCP/IP processing engine, RDMA NIC (RNIC), iSCSI HBA, or LOM solution.

The BCM5709S is different from other network controllers because it can process the TCP/IP and relevant L5 protocols on data directly from the application buffers on the host, thereby relieving the host CPU from these time-consuming operations. On the receive path, the BCM5709S processes the frame up to the highest layer supported present in it. For example, the BCM5709S processes the frame for RDMA when the frame is an RDMA frame.

With the appropriate configuration, the BCM5709S can simultaneously support the following three functions:

- RDMA network interface controller (RNIC)
- iSCSI host bus adapter
- TOE chimney-enabled network accelerator

### Target Applications of the BCM5709S

- Gigabit Ethernet NICs and LAN-on Motherboard (LOM)
- 2.5 Gigabit Ethernet server blade applications
- iSCSI host bus adapters (HBA)
- RDMA network interface card (RNIC)

#### Network Interface Cards (NIC) Designs

Dual 1000BASE-SX/LX	PCI Express x4 NIC
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#### LAN on Motherboard (LOM) Designs

Dual 1000/2500BASE-X	PCI Express x4, x2, or x1 LOM
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