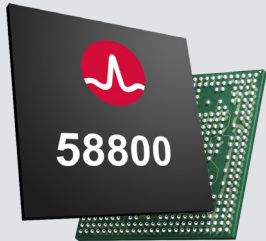# BROADCOM®

Product Brief

BCM58800

High-Performance Datacenter SoC with Integrated NetXtreme Ethernet Controller

Key Features

- Eight 3 GHz 64-bit ARM® v8 Cortex®-A72 cores
- 48 KB L1 instruction cache and 32 KB L1 data cache per CPU
- 2 MB L2 cache per CPU pair and 8 MB L3 system cache
- Integrated NetXtreme E-Series 100GbE controller
- IEEE 802.3by 25 Gb SerDes support
- TruFlow configurable flow accelerator
- RoCE v1/v2 support
- SR-IOV with 2K virtual function (VF) support w/ RoCE support
- PCI Express (PCIe) Gen3 x16 with configurable as endpoint or root complex
- Three channels of DDR4-2400 72 bit with ECC
- 90 Gb/s cryptography engine with single-pass hashing and encryption
- RAID 6 and RAID 5 XOR/Erasure support
- Deduplication (De-Dup) including Rabin Fingerprint, SHA, and MD5
- Secure boot
- Secure key storage
- ARM TrustZone®
- Public Key Acceleration (PKA) engine

Overview

The Broadcom® NetXtreme® S-Series BCM58800 family of datacenter System-on-Chip (SoC) devices are purpose-built to enable solutions in the evolving datacenter. The devices integrate powerful networking and processing subsystems for a wide range of datacenter applications including programmable NIC (or Smart NIC) for dataplane acceleration and high-performance flash storage disaggregation using NVMe-over-Fabrics (NVMe-oF). The BCM58800 devices are fabricated in a low-power, 16 nm FinFET+ process, enabling leading performance in unprecedented power envelopes.

The BCM58800 devices feature NetXtreme E-Series advanced network controllers, high-performance ARM CPU blocks, PCI Express (PCIe) Gen3 interfaces, key accelerators for compute offload, and high-speed memory subsystems including L3 cache and DDR4 interfaces, all interconnected by a coherent Network-on-Chip (NOC) fabric.

The network interface is powered by the latest generation of NetXtreme controller technology, delivering high-packet rates and low latency. Support for the NVMe-oF standard is enabled over RoCE (RDMA over Converged Ethernet) v1 and v2, as well as over TCP and other transports, ensuring a future-proof and scalable platform for the deployment of disaggregated storage over a range of topologies. The powerful TruFlow™ configurable flow accelerator adds a powerful packet inspection and processing capability in the hardware, moving common flow-processing workloads into hardware and freeing CPUs for application workloads.

The ARM CPU subsystem features eight ARMv8 Cortex-A72 CPUs at 3.0 GHz, arranged in a multi-cluster configuration. Each of the eight cores includes 48 KB L1 instruction cache and 32 KB L1 data cache, and each pair of CPUs shares a 2 MB L2 cache, for an aggregate total of 8 MB of L2. The coherent NOC provides an 8 MB L3 cache with flexible association options.

The 16-lane PCIe Gen3 interface is configurable as a root complex, endpoint or a mixture of the two, based on the application.

The memory subsystem is extended by up to three channels of DDR4 memory at 2400 MT/s, each 64-bits wide + ECC, delivering total DDR4 raw bandwidth of 460 Gb/s.

The hardware accelerators in the BCM58800 family include cryptographic support for both bulk and PK, De-Dup calculation, erasure coding calculations for RAID 5 and RAID 6.

High-Performance Datacenter SoC

The BCM58800 Ethernet interface uses a multi-rate SerDes PHY that is common to Broadcom switch silicon, featuring 4-lane 25 Gb/s transceivers to support various configurations up to 100 Gb/s and subset configurations up to four channels. The interface supports direct connection of optical modules or DAC (direct-attach copper) cables without requiring an external PHY. It provides high-performance, standards-based compatibility including 802.3bj, 802.3by and 25GbE consortium, and enables additional benefits in end-to-end solutions with Broadcom-based switches and NICs.

A variety of interfaces are included for boot and OS code, journaling and similar usage, including up to eight SATA3 ports, eMMC/SDIO, 1GbE, USB 3.0 and 2.0, SPI, QSPI, and NAND flash. Other common interfaces include NC-SI, JTAG, UART, BSC, MDIO and GPIOs.

Benefits

- Industry's first 100G Smart NIC with high-performance 3 GHz ARMv8 processors featuring an integrated NetXtreme Ethernet controller with TruFlow packet processing engine, congestion control, multi-host capability and RoCEv2
- Industry's lowest power datacenter SoC enabling integration into industry-standard server platforms including PCIe half-height, half-length form-factor
- Industry's first programmable 3 GHz ARMv8 100G SoC highly optimized for NVMe-oF disaggregated storage designs
- Advanced Smart NIC adapter with highly efficient hardware acceleration engines
  - Integrates encryption/decryption, erasure, and RAID offload engines with a 100G full-featured NetXtreme NIC with TruFlow to accelerate and offload intensive packet processing and application workloads from the host CPU to increase performance and reclaim CPU cycles for host applications
  - Incorporates RoCEv2 and SR-IOV enhancing network data transfers and I/O performance
- Compact low-power, high-performance 100G datacenter SoC
  - Optimal power efficiency and performance enabled by 16nm FinFET+ process
  - Industry-leading octal-core 3 GHz ARMv8 Cortex-A72 CPU architecture
  - Three DDR memory channels delivering up to 50% higher memory bandwidth than two channel solutions for improved application performance
- Highly optimized 100G NVMe-over-Fabric (NVMe-oF) storage target controller
  - Facilitates storage disaggregation allowing pools of flash storage to be scaled independently and efficiently from compute resources in the datacenter.
  - Provides fully-integrated NVMe-oF solution minimizing latency affecting overall system performance.

Applications

- SmartNIC
- NVMe-oF storage arrays
- Cold storage
- Cloud datacenter
- Enterprise datacenter

Ordering Information	
Part Number	**Package**
BCM58800	47.5 mm x 47.5 mm FCBGA, 1 mm pitch, or 33 mm x 33 mm FCBGA, 0.8 mm pitch

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