IBM

PowerNP NP4GS3 Network Processor

Highlights

Advanced, programmable switching and routing system on a single chip

High performance and capabilities for complex applications, operating at wire speed

Comprehensive solution with integrated MACs, tree searches, 16 picoprocessors and software offerings, improving time to market

Supports large memory, using DDR-SDRAMs, allows cost-efficient designs for high-level packet forwarding and filtering

Rich enablement environment and proven technology to help deliver high quality products more rapidly with lower power product designs

Complex functions, delivered at wire speed

The IBM PowerNP™ NP4GS3 network processor is an advanced, robust, programmable, high-performance solution for the most demanding routing applications. A new high-end member of the IBM PowerNP family of network processors, the NP4GS3 implements copper interconnect technology and integrates a switching engine, search engine, frame processors, and multiplexed MACs. Designed to satisfy enterprise, core, and edge networking and Internet requirements, at wire speed, the NP4GS3 processor is scalable to meet increasing bandwidth and functional demands. It can deliver complex functions, such as quality of service (QoS), scheduling, flow control, and differentiated services.

Manufacturers who take advantage of the IBM NP4GS3 in their product designs can benefit from leadership semiconductor technologies and proven network experience. IBM offers a rich suite of hardware and software enablement tools and services to help reduce time to market, and ensure quality products that meet functional specifications.

The NP4GS3 enables product differentiation through the combination of specific features for routing networking applications including:

- 16 programmable picoprocessors providing 2128 MIPS aggregate processing capability
- Embedded IBM PowerPC® processor providing additional design flexibility for network interconnect devices
- Hardware accelerators performing functions such as tree searches, frame forwarding, frame filtering and frame alteration
- 40 Fast Ethernet/4-Gb MACs with SMII, GMII, and 8B/10B interfaces supporting industry standard PHY components
- OC-48c, OC-48, four OC-12, and sixteen OC-3 integrated Packet over Sonet (POS) interfaces supporting industry standard POS framers
- Advanced flow control designed to help prevent TCP collapse
- Hardware support for port mirroring for remote traffic monitoring
- Supporting multi-threads to improve performance

Programmable, high-performance processing

The exceptional processing capability of the IBM PowerNP NP4GS3 is enabled from its embedded processor complex, which is made up of 16 picoprocessors, multiple hardware accelerators, and a PowerPC microprocessor. A pair of picoprocessors share hardware accelerators in a configuration that can process up to 32 frames in parallel and provide an aggregate 2,128 MIPs. The hardware accelerators perform tree searches, frame forwarding, frame filtering, frame alteration, and other functions.

The IBM PowerNP NP4GS3 network processor

The embedded PowerPC gives manufacturers the flexibility to support custom functions, such as enhanced frame processing, configuration, box management, and high-layer protocol. The integrated PCI interface enables connection to new peripheral devices to help meet customer needs.

A foundation for product differentiation

The combination of programmability and coprocessor hardware forms the foundation for building product differentiation. NP4GS3-based products can enforce hundreds of rules with complex ranges and multiple-action types. In addition, the NP4GS3 supports hardware-managed, software-configured bandwidth allocation control for thousands of concurrent communication flows, thereby relieving administrators from having to predict dozens of thresholds on the basis of momentary or assumed traffic patterns. It also offers innovative flow control, based on stability theory, that enables a network processor to withstand higher rates of temporary oversubscriptions without TCP collapse, compared with network processors implementing commonly used random-early-discard methods.

On-chip support for diverse protocols

The NP4GS3's multiplexed MACs can simplify designs for diverse protocols and enable more compact and lower-power products. The NP4GS3 supports 40 10/100 Mb Ethernet ports or 4 gigabit Ethernet ports. Alternatively, it can support 4 OC-12 POS, 16 OC-3 POS or link aggregate POS ports. In Ethernet applications, the NP4GS3 supports IEEE 802.3ad link aggregation, IEEE 802.1q VLAN detection, and jumbo frames (up to 9,022 bytes).

An architecture designed for growth

The scalable IBM PowerNP NP4GS3 architecture allows you to grow solutions to match increasing requirements. The NP4GS3 can operate standalone, or two devices can be interconnected using on-chip DASL connections to double

port quantity and aggregate BW (speed). For large switch applications, up to 64 NP4GS3s can be attached to a switch fabric through the DASL connections.

Comprehensive enablement environment helps improve time to market

The robust IBM PowerNP NP4GS3 reference platform can help expedite hardware design and software development, integration, and testing. The NP4GS3 software tools are available for Windows, Solaris, and Linux environments and include an assembler, full-function simulator, GUI debugger, test case generator, and demonstration picocode and test case scripts. The NP4GS3 simulation environment supports a distributed software model and enables flexible testing configurations for software unit test through system test prior to hardware being available. The tools enable rapid development and deployment of new services which the service provider can deploy in the field as a software upgrade without a change in hardware availability.

IBM is a charter member of the CPIX Common Programming Interface Forum, which has as its goal providing standards for network processor application code. IBM participation in CPIX helps ensure compliance with emerging industry standards.

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