

Synopsys and Netronome

Netronome Selects Synopsys' DesignWare DDR Controller and PHY IP for High-Performance Network Processor SoC



With a tight time-to-market window, we needed a reliable IP vendor that would offer a high-quality DDR3/2 IP solution that met our performance and feature requirements. Synopsys was our choice.”



Chunli Cai, Senior Principal Engineer, Netronome

Business

Netronome is a leading supplier of highly programmable semiconductor products that are used for intelligent flow processing in network and communications devices.

Challenges

- ▶ Meet aggressive time-to-market window and achieve first-pass silicon success with a reliable DDR IP solution
- ▶ Achieve high-performance and low power design requirements
- ▶ Meet performance target of 1333 Mb/s with full DIMM support with future upgradability to 1600 Mb/s

DesignWare® IP Solutions

- ▶ DDR3/2 Protocol Controller and PHY

Benefits

- ▶ Met target schedule and completed the project within 18 months from architecture design to silicon
- ▶ Acquired high-quality DDR IP that met the feature and performance requirements
- ▶ Received excellent support from experienced IP engineering team, which operated as a single virtual team alongside Netronome design engineers

Overview

Netronome's solutions include high performance, highly integrated network flow processors and acceleration cards that scale to more than 20 Gbps. They are used in carrier-grade and enterprise-class communications products, as well as virtualized servers and appliances that require deep packet inspection, flow analysis and content processing, all at very high speeds for millions of simultaneous flows.

The NFP-32xx is the industry's first processor designed for unified computing architectures by combining high-performance network, content and security processing with I/O virtualization. Additionally, the NFP-32xx is the only line of processors backward-compatible with the market-leading Intel® IXP28XX, protecting customers' existing investments in field-proven and network-hardened software. Powered by 40 multi-threaded programmable networking cores running at 1.4 GHz, Netronome's NFPs are the first fully programmable processors capable of addressing the increasingly complex requirements of unified computing architectures. This programmability, coupled with line-rate packet processing, provides the highest level of inspection and throughput in the industry.



Synopsys' high-quality DesignWare DDR3/2 IP is easy to integrate and includes all the required features including per-bit deskew capabilities, full write-leveling and DIMM support.”

Chunli Cai, Senior Principal Engineer, Netronome

Leading DesignWare IP Solution

Unlike network processors and multicore CPUs that lack L4-L7 programmability or cannot scale to 10 Gbps and beyond, Netronome's NFP 32xx flow processors deliver 2000 instructions and 50 flow operations per packet at 30 million packets per second, enabling 20 Gbps of L2-L7 processing with line-rate security and I/O virtualization. This complex flow processor chip consisting of approximately half a billion transistors incorporates a variety of standard interfaces, including two DDR2/3 memory interface each operating up to 1600 Mb/s and providing over 200 Gb/s of total memory bandwidth.

With a critical time-to-market window, Netronome set out to find a high-quality DDR3 IP solution that would meet their performance requirements and was functionally robust in terms of signal integrity to guarantee performance for particular combinations of substrate, packaging, external DIMMs and PCB layout. Equally important considerations included completeness of deliverables and ease of use. Empirical evidence of design verification test results from test silicon was also a key part of the IP selection process.

After extensive evaluation of several IP providers, including on-site visits, Netronome selected Synopsys. Synopsys' silicon-proven DesignWare DDR3/2 IP, operating at data rates of up to 2133 Mb/s, which easily met Netronome's performance requirement. Furthermore, Synopsys provided Netronome with critical features that were needed for their design, including per-bit deskew capabilities, full write-leveling and DIMM support.

High-Quality IP and Excellent Support

Ensuring first-pass silicon success was a top priority for Netronome and due to the tight schedule they could not afford to have any re-spins. Synopsys provided Netronome with a high-quality DesignWare DDR3/2 IP solution that is easy to integrate and supported by an experienced technical team. Furthermore, Netronome's visits to the Synopsys lab enabled them to meet the engineering group, evaluate the technical features and see the performance of test chips first-hand, giving them further confidence in the IP.

Netronome felt that Synopsys' technical support team is among the best they have seen from an IP provider in terms of responsiveness and protocol expertise. Mr. Cai commented, "We were already pursuing a very aggressive schedule when we decided to go with Synopsys. The Synopsys engineering team understood the urgency and held joint weekly meetings to ensure that we stayed on track. The technical rapport with the Synopsys engineering team was excellent and their follow-up was always prompt and accurate. In short, their support was invaluable."

With the completion of the NFP 32xx flow processor family, Netronome has already started designing for the next geometry and intends to include Synopsys' DesignWare DDR IP in future products. "By providing a high-quality IP solution that is technically correct, easy to integrate and backed by excellent technical support, Synopsys makes a compelling case to continue to be a key IP supplier to Netronome," said Cai.

“Synopsys technical support is definitely among the best we have seen from an IP provider. The engineers are extremely responsive and experts in their field.

Chunli Cai, Senior Principal Engineer, Netronome



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