

# Accelerating the Network Performance of NAVER Cloud

To improve packet forwarding bandwidth and reduce latency, NAVER Cloud teamed with Intel to quickly develop and launch a network virtualization solution based on a SmartNIC from Intel.

## At a Glance

- Throughput increased by up to 25x<sup>1</sup>
- Latency decreased by up to 2.5x<sup>1</sup>
- NAVER Cloud proved to customers that it is an early adopter of groundbreaking technology
- Collaboration with Intel helped NAVER Cloud be first-to-market with an FPGA-based solution

# NAVER Cloud

NAVER Cloud is a cloud service provider (CSP) subsidiary of South Korea's leading internet portal and search engine, NAVER. NAVER Cloud primarily offers cloud computing services like a Financial Cloud Zone as well as various cloud instances. NAVER Cloud and Intel worked together to solve the company's network performance challenges and be first-to-market with a network virtualization solution using Intel® Field-programmable Gate Arrays (Intel® FPGAs).

## Challenge

To serve the South Korean financial securities and futures market, NAVER Cloud offers a Financial Cloud Zone in addition to its Public Cloud Service portfolio. However, NAVER Cloud needed to solve network performance issues to serve its customers more effectively.

## Solution

NAVER Cloud and Intel worked together to accelerate NAVER Cloud's network performance, using a highly customizable Intel FPGA-based SmartNIC, which enables high-throughput, low-latency, and high-bandwidth applications. The design of NAVER Cloud's virtual private cloud (VPC) network allows the use of SmartNICs to better serve latency-sensitive workloads, compared to NAVER Cloud's legacy network switch.

## Results

The SmartNIC solution improved packet forwarding bandwidth by up to 25x and decreased latency by up to 2.5x.<sup>1</sup> By offering FPGA-accelerated networking, NAVER Cloud is proving itself to be an emerging innovative power in the field of cloud computing services and an early adopter of cutting-edge technologies that can change the way the world does business.

## Cloud Services Need Lightning-Speed Networks

Infrastructure services such as virtual switching, security, and storage can consume a significant number of CPU cycles, especially at higher performance thresholds, reducing the number of cores available for revenue-earning services. And as network traffic increases, latency reduction poses a significant challenge for cloud enterprises. This is especially true in the financial services sector, where traders need to make split-second trades—even a tiny delay has the potential to cost them a deal.

### Speed up the Network with Intel FPGAs

NAVER Cloud worked with Intel to overcome network performance challenges. SmartNICs with Intel FPGAs can help CSPs like NAVER Cloud make the most of network capabilities and help improve revenue from infrastructure investments. SmartNICs accelerate infrastructure services by freeing up CPU cores to increase network and application performance.

NAVER Cloud's specific solution used a SmartNIC equipped with an Intel® Arria® 10 FPGA. The Arria 10 uses up to 40 percent less power than the previous generation.<sup>2</sup> And because the Arria 10 is programmable, as NAVER Cloud's business needs change, the FPGA can be reprogrammed accordingly.

When NAVER Cloud began exploring the use of FPGAs, it found that local engineers with FPGA experience were scarce. Intel provided crucial engineering support, such as helping debug packet flows, training NAVER engineers to program FPGAs, and assisting in quickly setting up a proof of concept to help bring the solution to market in a timely manner.

“The spirit of collaboration between NAVER Cloud and Intel was critical to the project's success.”

—**Kyungsu Shin**,  
Principal Engineer, NAVER Cloud Corporation

### Solution Ingredients

- Intel® Xeon® Gold 5220 processor
- Intel® SSD D3-S4510 Series
- Intel® Arria® 10 FPGA

### Twenty-five Times the Throughput in Less than Half the Time

According to NAVER Cloud's testing, adding an Intel FPGA to the network increased the number of packets per second (PPS) by up to 25x for small (128-byte) packets.<sup>1</sup> The solution also reduced latency by up to 2.5x. That means that if before a packet arrived in 1 millisecond (ms), now it arrives in a half-ms or less. In addition, the amount of data

traffic that a server can process increased from 10–40 GB to 100–200 GB.<sup>1</sup> As the amount of traffic per server increases, the servers can provide reliable service and response time without needing to distribute the traffic over 10 to 20 servers. Therefore, fewer servers can be used to process more traffic, leading to cost and power savings. NAVER Cloud's services featuring SmartNICs and Intel FPGAs lets the company offer a differentiating product that can attract new customers. Since beginning to use SmartNICs and Intel FPGAs in the Financial Cloud Zone, the same solution has been used in NAVER's own hybrid cloud, Neurocloud, as well as in NAVER Cloud's private VPC Zone.

Based on the impressive results from using Intel FPGAs for network virtualization, NAVER Cloud plans to explore using them for virtualized computing services. It is also considering creating products that can train engineers by providing a virtualized FPGA environment where users can design and build the features or services they want. NAVER Cloud hopes that such a product will lower barriers to entry by making it easier for educational institutions to teach FPGA programming.

### Spotlight on NAVER Corp. and NAVER Cloud

NAVER Corporation is headquartered in Seongnam, South Korea. It operates the search engine NAVER. Its subsidiary, NAVER Cloud, manages the IT infrastructure for NAVER's flagship services, including its Public Cloud Service. Founded in 1999, NAVER is South Korea's largest portal operator. The firm has established itself as an early pioneer in the use of user-generated content through the creation of the online Q&A platform Knowledge iN and is an early adopter of innovations such as 2nd generation Intel® Xeon® Scalable processors and Intel® FPGAs.

NAVER Cloud's customer support center runs 24 hours a day, 365 days a year, to address user problems quickly and accurately—typical response time is less than five hours.<sup>3</sup> NAVER Cloud has acquired the Cloud Security Alliance (CSA) Security, Trust and Assurance Registry (STAR) Gold certification, and has also earned an international standard certification for health information security.

### Learn More

- Intel® Xeon® Scalable processors
- Intel® FPGAs
- SmartNICs
- NAVER Financial Cloud Zone

Find the solution that is right for your organization. Contact your Intel representative or visit [intel.com/fpga](https://intel.com/fpga)



<sup>1</sup> Tested by NAVER as of February 2020. Common configuration: Intel® Xeon® Gold 5220 processor (24.75M Cache, 2.20 GHz); Intel® SSD D3-S4510 (480 GB, 2.5in SATA 6Gb/s, 3D2, TLC); Intel® Ethernet Converged Network Adapter X550-T2; Intel® Ethernet Controller XL710-BM2; Intel® Ethernet Server Adapter I350-T4V2  
Performance improvements achieved by adding an Intel® NFV Accelerator Design with Intel® Arria® 10 FPGA; Workload: 128-byte packets

<sup>2</sup> [https://www.intel.com/content/dam/www/programmable/us/en/pdfs/literature/hb/arria-10/a10\\_overview.pdf](https://www.intel.com/content/dam/www/programmable/us/en/pdfs/literature/hb/arria-10/a10_overview.pdf)

<sup>3</sup> [http://world.kbs.co.kr/service/contents\\_view.htm?lang=e&board\\_seq=371373](http://world.kbs.co.kr/service/contents_view.htm?lang=e&board_seq=371373)

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