INDUSTRY LEADERS SHOWCASE ACCELERATOR-BASED CLOUD-RAN SOLUTION

Lenovo, China Mobile, Xilinx, Napatech, Radisys Demo Hardware Acceleration and Decoupling Technologies

Shanghai, China, June 27, 2018

At Mobile World Congress (MWC) Shanghai 2018, Lenovo, China Mobile, Xilinx, Napatech, and Radisys jointly demonstrated the industry's first cloud-RAN solution that supports heterogeneous acceleration hardware and full decoupling of software and hardware.

"RAN cloudification and virtualization are important technology directions in the 5G era and will have far-reaching significance on optimizing operators' network efficiency, enabling business innovation, and enhancing user experience. Lenovo is dedicated to building end-to-end products and services based on NFV technologies. We are continuously innovating in areas such as hardware acceleration and software-hardware total solutions, helping operators transform their networks to achieve cloudification, virtualization, and intelligence," said Dr. Ying Huang, VP of Lenovo and Head of Enterprise & Cloud Research and 5G Research Labs at Lenovo Research.

In February, China Mobile, jointly with several global operators, initiated the O-RAN Alliance to build upon the C-RAN concept. For the first time, the organization introduced the core concept of radio access networks with "embedded intelligence, open interfaces, open-source white-box design". This concept will further drive cloudification and virtualization of mobile base stations and eventually realize open equipment ecosystem via decoupled software and hardware.

NFV virtualization platforms require the use of acceleration hardware to further improve performance, optimize energy efficiency, and cut costs. However, current acceleration solutions have many issues, including customized-function designs and non-unified interfaces, resulting in great difficulties to decouple software and hardware. Given this background and considering operators' actual needs, China Mobile pushed for accelerators enabled with programmable hardware and unified interfaces. Lenovo and industry partners have been actively exploring NFVI solutions under this concept with China Mobile, and together achieved an important milestone.

"This is a valuable step towards NFV general-purpose hardware accelerator solutions. We hope to use programmable hardware accelerators to improve the overall energy efficiency of the NFV platform and reduce the total cost, provided that all software and hardware can be fully decoupled, even for RAN. This joint project will help mature the total technical solutions for cloudification of the mobile wireless networks, We look forward to more partners joining O-RAN Alliance and continue this pursuit of a truly green, soft, open, and smart future network." said Dr. Chih-Lin I, Chief Scientist of China Mobile Research Institute.

The joint demo uses the Lenovo ThinkCloud Accelerator solution, including Lenovo ThinkCloud NFVI carrier-grade cloud platform software, x86 servers and switches. Lenovo ThinkCloud NFVI can automatically adapt and support acceleration hardware from different vendors and of different types. By abstracting and virtualizing the acceleration hardware, ThinkCloud NFVI provides a unified API to VNF applications, reducing the complexity of application development and porting, as well as enabling full decoupling of application software and acceleration hardware.

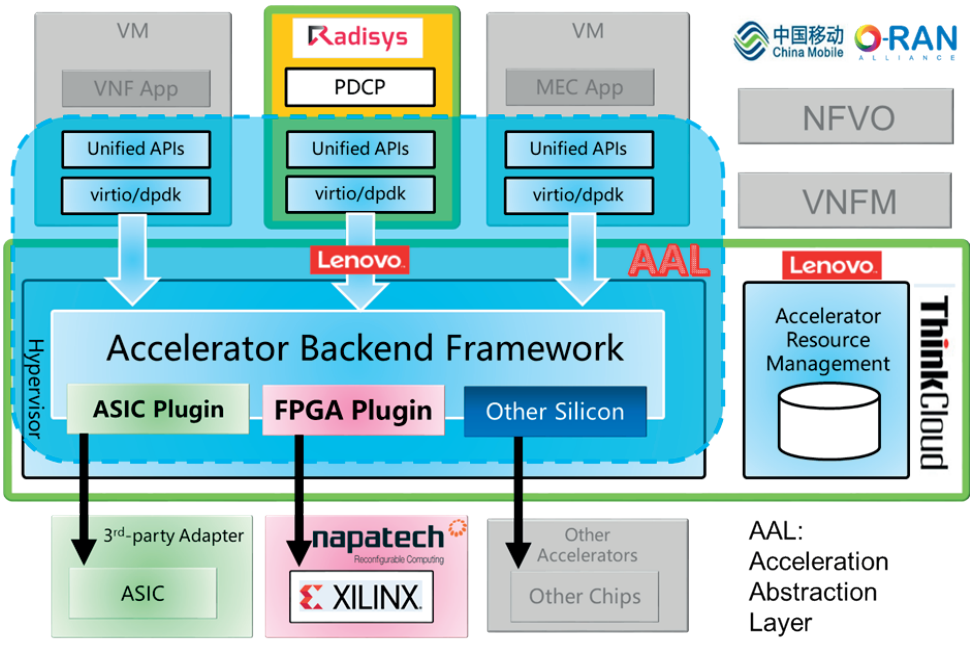
The acceleration hardware in the joint solution includes Napatech SmartNICs based on Xilinx all-programmable FPGA products and 3rd-party adapters based on ASIC design. Xilinx FPGA silicon provides flexible programmability and re-configurability in hardware logic and delivers powerful computing performance and energy efficiency. It can be applied to a wide range of NFV application scenarios, from the edge to the core networks. Based on Xilinx FPGAs, Napatech SmartNIC solutions deliver increased throughput and lower latency for network data forwarding and compute-intensive applications, such as Open vSwitch (OVS) and cryptography algorithms in the mobile base station's PDCP protocol processing. Napatech SmartNIC solutions significantly reduce CPU utilization, improve performance, and cut costs.

"To meet the agility, scalability and flexibility requirements of the C-RAN in a rapidly evolving 5G environment, the standard open API acceleration has been demonstrated using Xilinx's Adaptable platform on Napatech SmartNIC. Napatech SmartNICs provide an easy-to-manage and easy-to-deploy solution through unified Accelerator Abstract Layer (AAL) APIs for carriers, and satisfies their performance requirements in a flexible, cost-efficient manner. The AAL API based C-RAN accelerator platform deployed with Radisys PDCP Stack on Lenovo server and cloud software platforms demonstrates the advantages such as flexibility, guaranteed latency and performance gains of FPGA based acceleration in Telco cloud," noted Farhad Shafai, Vice President, Communications Markets at Xilinx.

Jarrod J.S. Siket, CMO of Napatech, said:
"The current NFV deployment model for virtualized RANs uses x86 servers, but it is experiencing major performance bottlenecks in practice. By offloading the complex network and security tasks to FPGA-based SmartNICs, operators can maintain the NFV model of using commodity server infrastructure for VNF processing without compromising the performance, latency cost and power goals that LTE and 5G applications require."

Towards the O-RAN concepts of mobile base-station cloudification and virtualization, Radisys delivers 4G and 5G protocol stacks with high performance and extensibility. As part of this joint solution, Radisys provides the VNF for the PDCP protocol stack, which supports running in a single VM, as well as flexible extension to multiple VMs, providing elastic scaling that can meet the different processing requirements under varying load conditions.

"Radisys is delighted to continue our strong collaboration with the various partners for this important demonstration of 5G vRAN evolution for real-world deployment scenarios," said Neeraj Patel, vice president and general manager Software & Services Solutions, Radisys. "Our enabling PDCP software protocol suite including UE Simulator and Traffic Generator has been integrated with our ecosystem partners' software and hardware platforms for this compelling demonstration of accelerated RAN showcased by China Mobile CMCC."



Cloud-RAN Solution based on Hardware Acceleration

The five partnering companies demonstrated at MWC Shanghai the full decoupling of the PDCP VNF software and the NFVI software and hardware platform. The same PDCP software, without modifications, can automatically run on top of FPGA- or ASIC-based acceleration hardware and achieve acceleration of the ZUC encryption and decryption algorithms, and when no acceleration hardware is present, the VNF will automatically choose the CPU-based, software-only implementation.

Compared to the software-only implementation, Napatech SmartNIC based on Xilinx FPGA achieves 10 times higher ZUC encryption throughput, three times higher PDCP system throughput, and 20 times lower latency.

The five companies plan to further optimize the solution and improve performance. They also expect more partners to join the collaboration and promote solutions based on programmable, general-purpose accelerators and unified APIs in the open-source communities. By continuing to improve the maturity of energy-efficient NFVI solutions, they are working to accelerate commercialization of NFV technologies in the mobile wireless industry.

ABOUT NAPATECH

Napatech helps companies to reimagine their business by bringing hyperscale computing benefits to IT organizations of every size. We enhance open and standard virtualized servers to boost innovation and release valuable computing resources that improve services and increase revenue. Our Reconfigurable Computing Platform™ is based on a broad set of FPGA software for leading IT compute, network and security applications that are supported on a wide array of FPGA hardware designs.
Additional information is available at www.napatech.com

NO FORWARD-LOOKING STATEMENTS

This press release may contain forward-looking statements which are only predictions and may differ materially from actual future events or results due to a variety of factors, including but not limited to, business conditions, trends in the industry and markets, global economic and geopolitical conditions, macro-economic factors, and other risks and uncertainties set forth in Napatech's reports. The matter discussed in this release is based on current expectations and may be subject to change. Napatech will not necessarily update this information.

For details, visit us at www.napatech.com

Investor Relations
Carsten Kaalund
+45 2780 4940
cka@napatech.com