



Mapping Out an Energy-Efficient and Scalable On-Demand Network Strategy

Lenovo's Power-Smart Network: Effortless Scalability and Efficiency with Intel On-Demand Accelerators

Design scalable, agile, and power-efficient Telco infrastructure with Lenovo's proven servers and Intel's Xeon SP 4th and 5th Gen CPUs with built-in hardware accelerators that come either pre-enabled or that can be enabled later by an activation key aka 'On-Demand'.

Lenovo ThinkSystem V3 Servers with Intel® On-Demand CPUs



[Lenovo ThinkSystem SR650 V3](#)

Adapting to Software-Defined Networking for Enhanced Traffic Processing

Designing an Energy-Efficient datacenter for virtualized 5G Core Network Functions (vUPF, vSecGW, vSBC, vBNG, etc.) can be a challenge to networking professionals especially with the functions that handle large volumes of encrypted endpoints or complex data streams that may need advanced processing like transcoding. Some of these e.g. IPSec, TLS, and transcoding are not well suited to run efficiently at scale on x86 architectures and in the past required the use of specialized hardware like smart-NICs, crypto accelerators and external load balancers but adding these additional peripherals to the server often deviated from the original design goal which was to provide servers for virtualized workloads that are agnostic to the workload placed on them.

Unlock Performance Gains Using HW Acceleration and Reduce Energy Consumption

With the increase in energy prices across the globe it is more important than ever for Telcos to design an energy-efficient virtualization environment. Adding acceleration to some workloads can have a dramatic effect on the power footprint of the solution. Below is an example of enabling QAT for TLS. The number of TLS handshakes per second increased 2x while the number of CPU cores in use dropped by 4x which results in a much more energy-efficient solution.

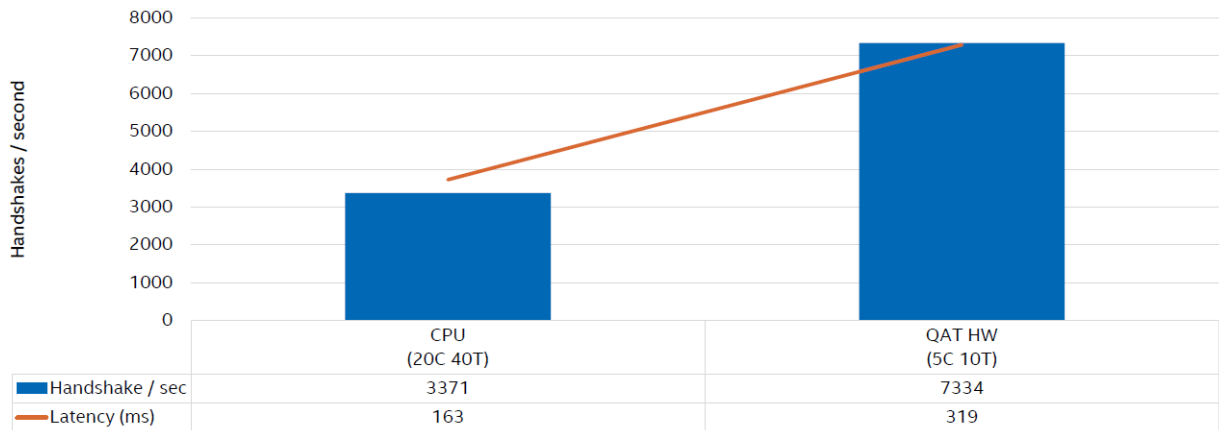


Figure 1. QAT - TLS Handshakes

It is important to note that most virtualized functions will operate without any additional acceleration hardware but as the service gains more users Telcos should consider moving to hardware acceleration to offload some compute intensive tasks from the x86 CPU to maintain overall energy efficiency and save on the number vCPUs needed by the VNF/CNF. This is where difficult decisions present themselves to the Telco professionals because PCI based accelerator devices can often be a costly addition to a new server and are difficult to justify at service inception unless they are guaranteed to be heavily utilized in the future but adding them later will be service impacting and will often incur service disruption and lengthy times to complete the upgrade for a busy Telco.

A New Approach to Network Design and Capacity Planning

A new approach that keeps the Telco's options open is purchasing a Lenovo server with an Intel Xeon SP CPU that supports Intel's On-Demand acceleration hardware. This ensures that the servers can be upgraded with an activation key to unlock accelerator hardware already on the CPU, minimizing downtime and provides the flexibility to adapt to changing needs without adding any new hardware.

Select Xeon SP CPUs supported by the SR650 V3 introduce one or more of these new embedded accelerators to add even more processing capability:

- QuickAssist Technology (Intel QAT)
- Intel Dynamic Load Balancer (Intel DLB)
- Intel Data Streaming Accelerator (Intel DSA)
- Intel In-Memory Analytics Accelerator (Intel IAA)
- Intel Advanced Matrix Extensions (Intel AMX)

[Click here for more information on On-Demand Features](#)

On-Demand Activation Method for Lenovo ThinkSystem Servers

Lenovo supports On-Demand activation of hardware accelerators using the Feature-On-Demand (FoD) key that is ordered as a Lenovo Part No./Feature Code and delivered to the customer via email that can then be activated via the Lenovo XClarity Controller aka BMC.

Part number	Feature code	License bundle	Accelerators and SGX Enclave enabled after the upgrade is applied (NC = No change)				
			QAT	DLB	DSA	IAA	SGX Enclave
4L47A89451	BX9C	Intel On Demand Communications & Storage Suite 4 (CSS4)	4	4	4	NC	No change
4L47A89452	BX9D	Intel On Demand Analytics Suite 4 (AS4)	NC	NC	4	4	No change
4L47A89453	BX9A	Intel On Demand Communications & Storage Suite 2 (CSS2)	2	2	NC	NC	No change
4L47A89454	BX9B	Intel On Demand Analytics Suite 1 (AS1)	NC	NC	NC	1	No change
4L47A89455	BX9E	Intel On Demand SGX 512GB Enclave	NC	NC	NC	NC	512 GB

[Click here for more details on Lenovo's On-Demand activation process.](#)

Conclusion

For the ever-changing demands of modern telecommunication networks, the ability to accelerate processing power based on task, network need or network construction phase through software-defined network planning addresses complex network modernization challenges. This new On-Demand approach of activating hardware acceleration only when the service has built itself up to a level where acceleration is needed provides a valuable addition to the network operator's toolchest and a Xeon CPU with On-Demand hardware acceleration should be considered whenever service growth is uncertain.

Reference Materials

<https://www.intel.com/content/dam/www/central-libraries/us/en/documents/2023-11/5thgen-refresh-cpus-network-security-brief.pdf>

<https://lenovopress.lenovo.com/lp1709.pdf>

<https://lenovopress.lenovo.com/lp1601-thinksystem-sr650-v3-server#processor-features>

https://pubs.lenovo.com/sr650-v3/enable_intel_on_demand

<https://www.intel.com/content/www/us/en/products/docs/ondemand/overview.html>