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Driving New Networking Efficiencies with Dell Technologies' PowerEdge Servers and Intel Xeon 5G Core Solutions

Maximizing 5G Performance: Higher Compute Density, Lower Power, and Reduced Footprint



Operators continue to push the technology envelope toward gaining new capabilities that make their operations more cost efficient. In parallel, they're also increasingly focused on revenue generation initiatives that leverage the same underlying solutions and infrastructure. The challenge operators face with each new wave of technology is that there are often real physical limitations that must be overcome. Things like space constraints, power consumption, complexity management, and application validation can be obstacles to realizing the full benefits of new technology innovations. Fortunately, the mobile ecosystem is working hard to reduce these obstacles, particularly in network infrastructure.

Dell Technologies™, in collaboration with Intel®, has significantly improved the velocity of development and production, improving Time-to-Market (TTM) by up to half. The Dell Technologies PowerEdge® R670 with Intel® Xeon® 6 E-Cores is groundbreaking in its design as an extremely compute dense¹, air-cooled, and power-efficient 1U server for communication service providers. Based on Dell Technologies' assessments, this server could allow operators to save up to 79% on infrastructure cost and footprint compared to prior 5G Core server platform generations¹.

But what about power consumption? Fortunately, Dell has you covered!

Increasing core count while simultaneously decreasing power consumption seems almost unfathomable, but Dell and Intel have achieved this! Processor core densities and power efficiencies have both been dramatically increased with the introduction of Intel Xeon 6 processors, previously codenamed Sierra Forest. Looking back only five years, the typical Cloud Core deployment consisted of dual-socket, 24-core, 2nd Gen Intel Xeon processors, compared to the introduction of Intel Xeon 6 processors in the Dell PowerEdge R670, which today has a capacity of up to a dual-socket, 144-core server configuration.

Dell Technologies' internal evaluation has shown that this massive increase in compute density can potentially deliver:

- Server reductions of up to 83% for an equivalent core count per Cloud Core instance
- Up to an 80% reduction in valuable data center rack space
- Potential to achieve up to 72% power reduction for the same number of cores

In other words, today, the PowerEdge R670 provides compute capacity that would have required up to 6 x R640s, of only a few years ago.

In addition, such a dense core count, offered in the new Intel Xeon 6 processors, also give the operator the opportunity to reduce complexity in their Cloud Core by using a 1U, single-socket processor, such as what is available in the Dell PowerEdge R470 server. Even with a single 144-core Intel Xeon 6 processor, the R470 can offer a dense compute environment with a single NUMA node – something only dreamed of a few years ago.

The single NUMA architecture in the R470 offers:

- A server reduction of up to 63% for an equivalent core count per Cloud Core instance
- Up to 60% reduction in data center rack space
- The possibility to achieve up to a 60% reduction in servers (e.g. the 144-core R470 can support the same core density of 3 x R640s)



Figure 1. Dell PowerEdge R470 – Intel Xeon 6 Processor-based Single Socket Server

Many mobile operators are uncomfortable with increased densification of their Packet Core due to concerns that loss of a single server could impact the overall network. Overwhelmingly, mobile operators want to improve their power efficiency while maintaining the same server footprint. By adopting the latest server technology, they can take advantage of the move to a single NUMA zone in the R470 while maintaining the same thread-to-core density. Typical packet core server configurations over the past two generations have maintained a dual-socket, 32-core processor footprint (2 x 32c = 64c, 128 threads). Dell Technologies’ evaluation has shown that the R470 with a single 128-core Intel Xeon 6 processor can maintain this same compute density while reducing power consumption by up to 26% versus the previous generation 4th Gen Intel Xeon Scalable processors.

You may ask, will such dense processor solutions be compatible with demanding telecom environmental requirements? Improved thermal designs, including new fans and highly efficient heatsinks, provide superior cooling solutions for the Intel Xeon 6 processor-enabled R470 and R670 servers. Initial thermal chamber testing by Dell Technologies indicates that both the R470 and R670 performance will be able to achieve the industry’s needed environmental compliance using the densest 144-core Intel Xeon 6 CPUs available. It’s an incredible achievement by Dell’s design engineers that provides both footprint and power reduction for Packet Core deployments while maintaining the elevated, mission critical thermal performance required by many wireless operators. These Dell PowerEdge servers with Intel Xeon 6 processors in either a single- or dual-socket form factor will deliver industry-leading levels of thermal performance, which is a requirement for customers who need an air-cooled solution.

In summary, if you are looking for a highly performant, power-efficient and cost-effective 5G Core solution, the PowerEdge line up of R770, R670, R570 and R470 platforms powered by Intel are ready to meet your demanding networking and business needs.



¹ Gen-on-gen server comparisons created as of Feb. 2025 using Dell’s Enterprise Infrastructure Planning Tool - <https://dell-ui-eipt.azurewebsites.net/#/>

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