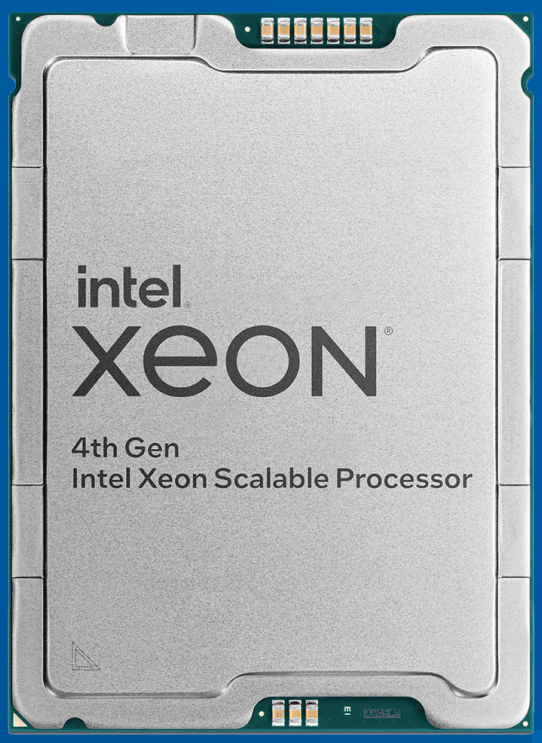
4th Gen Intel® Xeon® Scalable processors with Intel® vRAN Boost

Optimizing vRAN Sustainability: **An End-to-End Approach**



To meet rapidly rising demand for mobile network access and services, communications service providers (CoSPs) are migrating to cloud-native virtualized radio access networks (vRANs) and Open RAN architectures. As they migrate, CoSPs can maximize vRAN sustainability outcomes with 4th Gen Intel® Xeon® Scalable processors with Intel® vRAN Boost to improve energy efficiency, enable network virtualization all the way to Layer 1, reduce the total cost of ownership (TCO), and help organizes reach their own sustainability goals.

5.7B[1]
mobile subscribers by 2025

325 EB[2]
of global mobile data traffic per month by 2028

84%[3]
of CoSPs rate energy efficiency and sustainability as a top priority

New Services Drive **vRAN Data Demand, Power Consumption**

CoSPs are building next-gen infrastructure to meet unprecedented growth in mobile data use, more diverse connected endpoints, and demand for data-intensive, latency-sensitive services. Software-defined RAN offers service providers the opportunity to improve network performance, simplify operations, and reduce costs while gaining flexibility to support evolving service needs, changing infrastructure demands, and scalability for future growth. However, the potential for increasing power costs has made energy efficiency a top priority for CoSPs amid growing industry-wide pressure to improve network sustainability.

Three Foundational Elements to **Maximize Energy Savings**

A power-optimized vRAN architecture is achievable using a holistic approach that leverages three critical elements. While each element delivers a variety of benefits, combining them is a force multiplier that enables highly granular energy management across the entire network.

End-to-end network virtualization

Virtualizing the entire network—all the way to Layer 1—enables CoSPs to avoid dedicated hardware and intelligently optimize processing resources and power consumption across core, edge, and access workloads.

Cloud-native environment

Applying a cloud-native approach to a fully virtualized network empowers CoSPs to deploy composable applications, rapidly deliver new services, and maximize power efficiency while leveraging cloud service provider infrastructure.

Advanced silicon power management

Adopting Intel® Xeon® Scalable processors enables CoSPs to dynamically manage silicon power usage based on fluctuating demand using P-States to modulate processor frequency and voltage and C-States to put cores in various states.

70%+[4]

of CoSPs' total network power usage consumed by RAN

20-40%[6]

of network OpEx allocated to energy consumption

30-40%[5]

reduction in power consumption using intelligent hardware features

Unleash vRAN's **Full Energy-Efficiency Potential**

A cloud-native, fully virtualized architecture enables many power-saving features that are otherwise limited or impossible using a hardware baseband accelerator. These features—and the power savings they each deliver—can result in enormous aggregate power savings across the entire network.

RAN functions as microservices

to tightly manage network performance and power usage, and to reduce downtime by dynamically modulating microservices hosted in containers

Artificial intelligence (AI) and machine learning (ML)

to predict CPU and radio usage, predict traffic loads, and to dynamically reconfigure networks to save energy costs

Automation and workload rebalancing

to dynamically optimize network throughput and minimize power consumption while meeting service level agreements (SLAs) using automation to monitor telemetry data, resource utilization, and variations in traffic

Baseband pooling in the distributed unit

to consolidate baseband traffic on fewer processing cores in periods of low activity, thereby reducing RAN compute power use

Optimal processor usage

to put unused cores to sleep or apply them to other non-traffic processing workloads

Processing Power for
Network Innovation, vRAN Sustainability

4th Gen Intel® Xeon® Scalable processors with Intel® vRAN Boost can empower CoSPs to take full advantage of cloud-native vRAN. Backed by Intel's technology leadership and broad ecosystem of strategic alliances, these processors support virtualization all the way to Layer 1 and are designed to enhance the energy efficiency of service providers' cloud-ready vRAN and Open RAN deployments.

Up to
2x[7]
capacity gains

~20%[8]
power savings from integrated acceleration with Intel® vRAN Boost

By eliminating external vRAN acceleration, Intel® vRAN Boost helps CoSPs maximize network sustainability by reducing vRAN or Open RAN compute power consumption by approx. 20 percent[9] above and beyond the performance-per-watt gains of the 4th Gen Intel® Xeon® platform. With exceptional performance-per-watt, fully integrated vRAN acceleration, P-State and C-State power management, and integrated AI acceleration, 4th Gen Intel® Xeon® Scalable processors with Intel® vRAN Boost address critical performance, scaling, and energy efficiency challenges and help CoSPs evolve the network sustainably.

Learn more at
intel.com/vran

1. "The Mobile Economy 2022." GSMA, February 2022.
2. "Ericsson Mobility Report." Ericsson, November 2022.
3. Hatt, Tim and Joiner, James. "The green generation: bridging 5G and 6G." GSMA Intelligence, November 2022.
4. Kolta, Emanuel and Hatt, Tim. "Going green: benchmarking the energy efficiency of mobile." GSMA Intelligence, June 2021.
5. Panhorst, Jeni. "The Sustainable Network and Edge: Building the Foundation for the Future, Today." Intel, April 2022.
6. Yang, Guang. "The Journey Towards A Net Zero Mobile Network." Strategy Analytics, January 2022.
7. For workloads and configurations visit www.intel.com/PerformanceIndex. Results may vary.
8. Ibid.
9. Ibid.

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