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# INSIDE QUALCOMM'S SNAPDRAGON X ELITE

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## BACKGROUND

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Qualcomm unveiled its highly anticipated [Snapdragon X Elite](#) system-on-a-chip (SoC), representing a significant leap in its chip design capabilities. This next-generation Arm-based SoC is designed to power Windows devices and showcases Qualcomm's commitment to high-performance computing.

Developed by Qualcomm's Nuvia team, the new part is set to lead the way for a new generation of Qualcomm SoC designs. While Qualcomm focused on the device's potential to power a new generation of Arm-based PCs during its launch, the new Snapdragon X Elite SoC has even greater potential to accelerate Qualcomm's march to the intelligent edge.

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## SNAPDRAGON X ELITE SOC

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The Snapdragon X Elite SoC features a homogenous CPU design with 12 Oryon CPU cores, breaking them down into three clusters of four cores each.

The new SoC features a cutting-edge 4nm architecture and includes several key components to deliver exceptional performance and advanced capabilities:

- **CPU Performance:** The Snapdragon X Elite is equipped with the Qualcomm Oryon CPU, a 12-core processor that excels at handling demanding workloads. It also incorporates Dual-Core Boost technology, which ensures incredibly fast responsiveness.
- **GPU for Graphics:** The SoC includes the Qualcomm Adreno GPU, known for delivering stunning graphics performance. This GPU enhances the quality of graphics in entertainment and gaming applications, providing an immersive experience.
- **AI Engine:** One of the standout features is the Qualcomm AI Engine, which integrates a Hexagon NPU (Neural Processing Unit). This AI Engine enables

transformative experiences across various domains, including creativity, video conferencing, security, and productivity.

- ❑ **AI Model Processing:** The Snapdragon X Elite can run generative AI models with up to 13 billion parameters on the device, delivering high-speed AI processing. This capability is beneficial for AI-accelerated applications and experiences.
- ❑ **Connectivity:** The SoC supports lightning-fast 5G connectivity, allowing for seamless and jitter-free cloud connectivity. It also incorporates Wi-Fi 7 with HBS Multi-Link, enabling smooth switching between devices.
- ❑ **Audio Quality:** For audio enthusiasts, the Snapdragon X Elite offers high-fidelity audio with the Snapdragon Sound Technology Suite, ensuring a top-notch listening experience with wireless headphones.
- ❑ **Security:** Security is a priority, and the SoC includes a Secure Processing Unit for enhanced security and privacy. It supports features like total memory encryption and secure login experiences.
- ❑ **USB and Connectivity:** The SoC supports USB4 and features multiple USB-C ports for versatile connectivity options.

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## INSIDE THE SOC

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The Snapdragon X Elite has a 128-bit LPDDR5x memory bus, which aligns Qualcomm with the latest PC chip memory technology support. The chip also features a substantial cache of 42MB, including L2 and L3 caches.

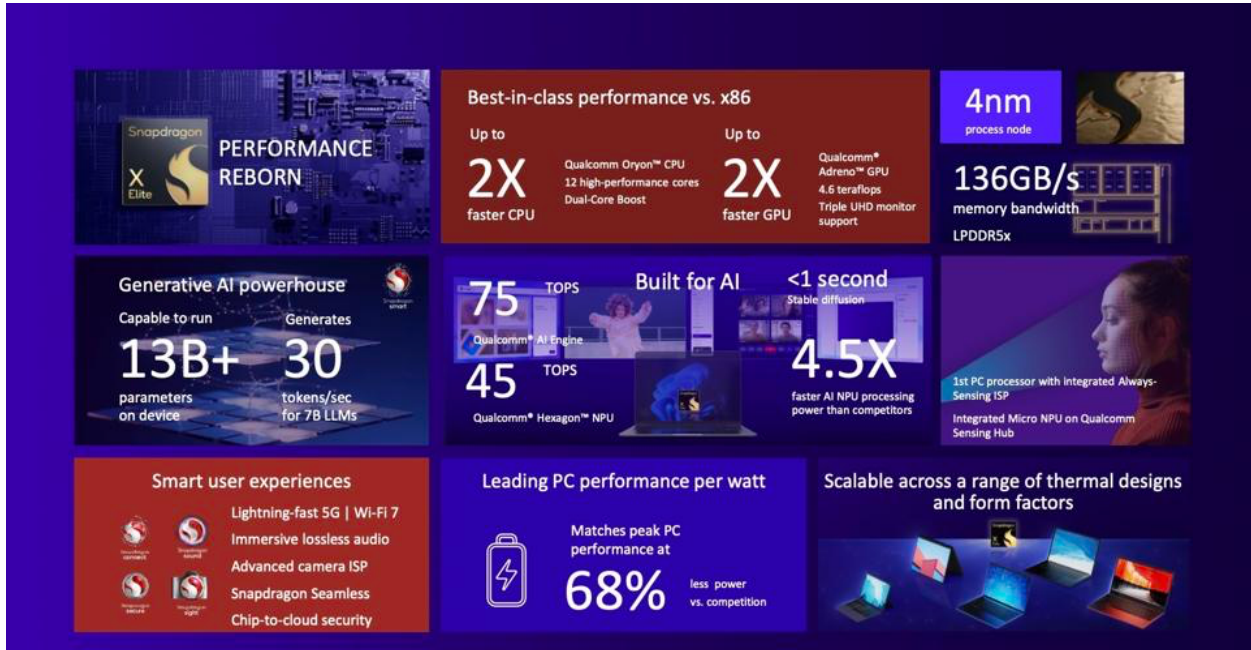
On the GPU front, Qualcomm incorporates its latest generation Adreno GPU with ray tracing support, aligning it with DirectX 12 Ultimate capabilities, which will be an asset within the Windows ecosystem. The GPU offers impressive display support, driving up to four DisplayPort displays, including 5K and 4K options.

One of the most significant upgrades in the Snapdragon X Elite SoC is its Hexagon neural processing unit (NPU), designed to meet the growing demand for AI processing on user systems. Qualcomm expects AI usage to continue rising, particularly with AI models running locally on devices.

The new NPU boasts 45 TOPS (trillions of operations per second) of performance, significantly improving over the previous generation's 15 TOPS. It includes enhancements like a 2.5x faster tensor accelerator block and power delivery improvements, targeting large language models and other AI-intensive tasks.

The SoC also features impressive I/O capabilities, including PCIe 4.0 connectivity for NVMe storage and support for USB4, allowing up to three Type-C ports. While Wi-Fi and the modem are discrete components, they are intended to be paired with

Qualcomm's FastConnect 7800 Wi-Fi 7 solution and Snapdragon X65 5G modem, providing high-performance connectivity options.



## SNAPDRAGON X ELITE PERFORMANCE

The Snapdragon X Elite SoC represents a substantial leap forward in Qualcomm's chip design capabilities, focusing on high-performance computing, AI processing, and impressive I/O support, making it a promising option for future Windows devices and potentially beyond.

## ANALYSIS

While Qualcomm was laser-focused on the Snapdragon X Elite's potential to revolutionize Arm-based PCs, it's clear that the new SoC is far more than a laptop processor. The Snapdragon X Elite opens the door to new levels of power-efficient performance and AI capability at the intelligent edge and within automotive – both interesting market-expanders for Qualcomm.

Automotive is a natural home for the new processor. As AI changes how we engage with the world around us, the ability to deliver high-performance inference capabilities in a low-power package becomes paramount. Automobiles need the performance of a modern PC, with a thermal and power envelope closer to that of a mobile device. This is what Qualcomm delivers with the Snapdragon X Elite, made better with Qualcomm's growing AI-focused software stack.

In its most recent [earnings call](#), Qualcomm CEO Cristiano Amon said about automotive:

“We believe the automotive industry will use some of the most advanced edge AI capabilities from large language models for personalized and curated content and services, driver and occupant monitoring and AI virtual assistants to contextual search. ADAS and autonomy applications can be enhanced by the fusion of data from cameras and other sensors for combined real-world perception, drive path prediction and more.”

Qualcomm is seeing solid momentum in the automotive market with its [Snapdragon Digital Chassis](#) products. CEO Cristiano Amon recently told investors that the company had grown its automotive revenues by "double digits" year-over-year. In its recent earnings release, Qualcomm reported revenue for its automotive products of \$434M. That's up 13% year-over-year. Qualcomm has detailed additional design wins since its last earnings call, so we're looking forward to this week's earnings release.

Qualcomm didn't announce new [Snapdragon Digital Chassis](#) products based on the new Snapdragon X Elite, but my guess is that it won't take long. The capabilities are simply too compelling to ignore.

Equally compelling is the applicability of the Snapdragon X Elite in the broader edge and IoT market. Qualcomm has steadily expanded its footprint in this market. Still, the company's ability to deliver a higher level of performance with integrated inference capabilities, coupled with its ability to provide the latest in modem and Wi-Fi technology, should dramatically accelerate Qualcomm's success in the broader intelligent edge space.

While Qualcomm is focused in the near term on penetrating the PC market with the new Snapdragon X Elite, which is a fast path to expansive revenue growth, edge will be next. No company is better positioned than Qualcomm to deliver the combination of performance compute, inference, and radio technology demanded by the next generation of intelligent edge and automotive applications. Qualcomm already has a strong play here; the new Snapdragon X Elite SoC makes its story too compelling to ignore.