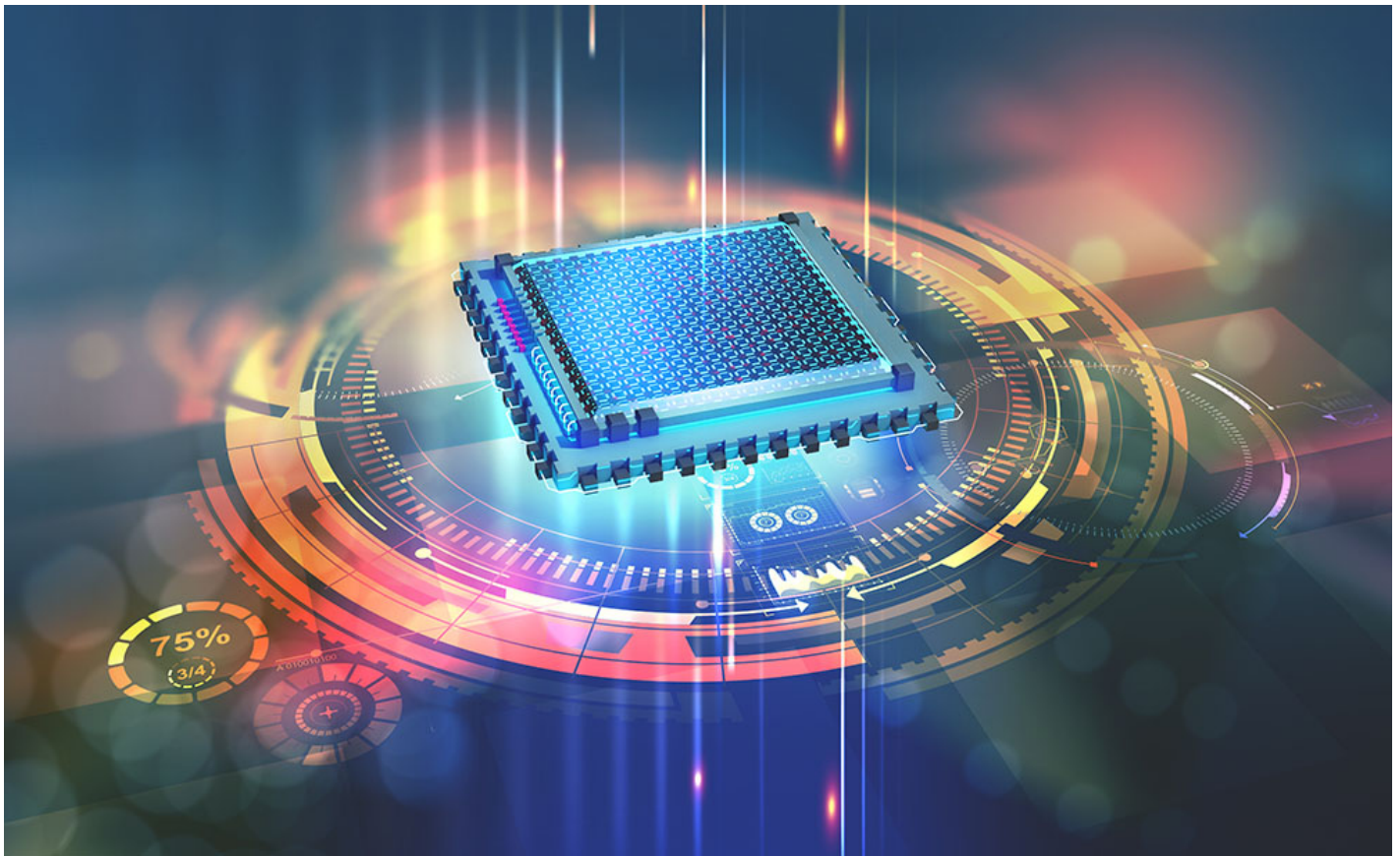


Understanding Intel's Tiger Lake



Tiger Lake is Intel's 11th generation mobile CPU architecture coupled with its 12th generation integrated graphics. The integrated graphics can utilize up to 96 execution units (EU) for competitive video performance with also the option for a discrete graphics processing unit (GPU). Tiger Lake CPUs rely on the successor to the Sunny Cove cores, Willow Cove, with SuperFin (SF) 10nm process technology. This is an enhanced 10nm node which allows Tiger Lake to replace Ice Lake in what Intel calls an optimization step, the last of three steps in their three-year developmental paradigm.

Tiger Lake mobiles CPUs come in initially at the 9W and 15W total thermal design power (TDP) points with models ranging from 7W to 28W. This includes both dual- and quad-core processors. Future models will go up to 45W TDP and up to eight cores, or octa-core. One notable area of improvement with Tiger Lake is with the maximum turbo boost clock speeds, which can reach up to 4.8 GHz. Base clocks are also improved, for example from 1.3GHz to 3.0GHz with the i7. This also includes 1.55 GHz from 1.1GHz for the integrated GPU, which as noted above can have 96 EUs versus just 64 with the previous Ice Lake.

This architecture also allows for a wider range of peripherals and storage options, a perfect fit with our SSDs regardless of form factor. 2.5" or M.2, SATA or NVMe™, up to and including fast PCIe™ drives, Tiger Lake has full support for our drives as a reliable and fast storage solution.

Architectural Improvements

Tiger Lakes CPUs have several notable improvements, including significantly larger L2 and L3 caches. This generally improves performance but especially latency and works well with the platform enhancements discussed below. Instruction support includes adding advanced vector extensions (AVX/AVX2) to the Pentium Gold and Celeron CPUs while also adding the VP2INTERSECT AVX-512 instruction to the rest. Security is improved through total memory encryption and control flow enforcement technology (CET) with the option for Intel key locker technology (KPT) using AES encryption. Defense against several attack methods also comes from the presence of indirect branch tracking and a shadow stack.

The Tiger Lake integrated GPU, or Xe-LP with the DG1 discrete option, offers a 50% uplift in performance. It includes support for high efficiency video coding (HEVC, or H.265) up to 12-bit 4:2:2/4:4:4, VP9 up to 12-bit 4:4:4, and AOMedia Video 1 (AV1) up to 10-bit 4:2:0. Display support includes up to a single 8K 12-bit display or dual 4K 10-bit HDR displays. Also supported is Dolby Vision with vision sensing and adaptive dimming for a better user experience. Further, texture sampler feedback for DirectX 12 is supported.

These enhancements are complementary to our included SSDs, for example helping professionals work

more quickly than ever with large video files. Gamers will also eventually benefit from DirectStorage as part of Windows 10, while those in enterprise can utilize drive security functions with Tiger Lake's improvements to ensure end-to-end protection.

Platform Improvements

The Tiger Lake platform offers many improvements with peripheral support. This includes four lanes of PCIe™ 4.0, useful for the very fastest storage. Also supported is Thunderbolt 4 (TB4) and USB4, the latter offering improvements in bandwidth and higher effective data rates than USB3 thanks to tunneling. Tiger Lake also supports LPDDR4X-4267 with the capability of support for LPDDR5-5400; this allows for very high performance especially in combination with the larger CPU caches. There is also very fast Wi-Fi 6 support with Intel wireless. The overall architecture allows for a M.2-sized circuit board to contain everything.

Intel claims up to 2.7 times faster content creation on Tiger lake with a 20% improvement to office productivity. Integrated GPU improvements, including clocks and EUs as mentioned, allow for up to 2x faster gaming when streaming. This is not just fluff – Intel noted many real-world workflow improvements. Many areas are also interesting for developers as Tiger Lake includes support for Intel GNA, a neural co-processor, as well as neural network inferencing with DP4a and INT8 support. The platform as a whole therefore offers something for users, power users, and content creators.

Those who work with streaming and recording will not have to worry about a hard drive bottleneck or random slowdowns with our fast and reliable drives, available with the Tiger Lake platform. Developers utilizing cutting-edge peripherals and AI technology can also rely on rapid access with high storage processing throughput.

Summary: What it Means for the End User

The most significant area of improvement with Tiger Lake is undoubtedly the much increased single-core performance – many applications still perform best with a few or just one core. The combination of a good instructions per clock (IPC) metric and a high boost clock therefore translate to real world improvements. GPU improvements are also significant with Tiger Lake, allowing for light gaming or extensive content creation with high visual clarity and support for industry standards. The CPU and GPU together offer a lot of power in a mobile platform with a wide range of products to meet specific performance needs.

This flexibility extends to other parts of hardware including the memory, for example LPDDR4X or LPDDR5, and peripherals. PCIe™ 4.0 allows for fast interconnect speeds with cutting-edge solid state drive (SSD) storage while TB4 and USB4 allow for the fastest upcoming external devices while also having legacy support. The Wi-Fi 6 standard promises not only very high wireless speeds but overall superior wireless efficiency within the network infrastructure. Developers also can benefit from Intel's various AI-focused options with a look at the edge and overall productivity.

Tiger Lake also improves multimedia support through both AVX/AVX2 as well as HDR codecs. The user experience is improved through this, the addition of hardware-accelerated Dolby Vision, and overall performance enhancements especially for streaming. All of this is backed by several security options and improvements useful for both enterprise and the average consumer – revocable keys for the former, full memory encryption for both, on top of other technologies and architectural improvements aimed at securing the system.

Tiger Lake therefore means performance, flexibility, usability, productivity, and security for all users, significantly improved from the last generation. Much higher clocks for both the CPU and GPU with modest power requirements for optimal efficiency and real-world performance gains; wide standard and peripheral support for past, current, and future devices; multimedia improvements for gaming and design. The overall platform allows the user to get the most out of their hardware at just the right level. Completing this package is our integrated SSDs which make sure you're getting the most out of this new technology, from more and faster cores to a plethora of peripheral options – all while being secure.

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Our SSD Solutions

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- Random read/write up to 1000K/1000K IOPS
- Low latency
- LDPC technology



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