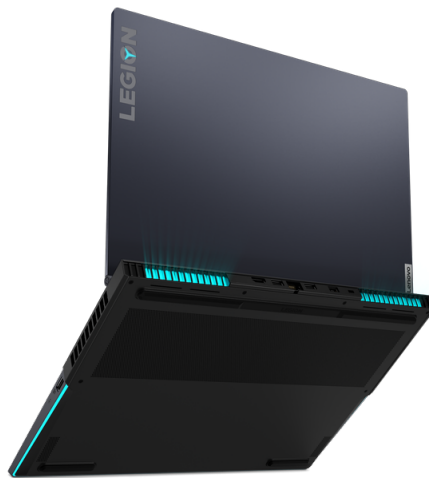


Nvidia, Intel's new laptop chips and tech aim to improve gaming, video editing and more

Razer, Acer, Lenovo, Asus and others will use Nvidia's new tech to produce thinner, more powerful laptops.

This is shaping up to be a busy week for laptops targeting gamers and creators. Monday, we saw the Asus ROG Zephyrus G14, the first with AMD's flagship eight-core consumer mobile chip and first AMD-based laptop with discrete Nvidia RTX graphics. Today, Intel announced its competing 10th-gen Core H series, which is headlined by a new octa-core/16-thread i7 processor, the i7-10875H. Intel's launch is also concurrent with Nvidia's rollout of mobile versions of its GeForce RTX 2070 Super and 2080 Super, welcome step-ups mirroring their desktop counterparts.



Nvidia also announced an updated version of its Max-Q power-saving architecture -- versions of its GPUs designed for thin-and-light high-end gaming laptops. The big news is a series of changes to its Optimus design, dubbed Advanced Optimus. That controls when a laptop switches between its basic integrated graphics and a high-power, battery-killing discrete Nvidia graphics card. The switching in Advanced Optimus is said to be more efficient. Another new feature, Dynamic boost, offers more granular balancing of power allocation (and thus speed) between the CPU and GPU.



This may not sound groundbreaking by itself, but even incremental performance advances can be a boon in gaming and creative work, where every extra frame or encoding minute saved can make a difference.

As ever with Intel and Nvidia launches, they're accompanied by a host of new products from key partners. This time it's the usual suspects, including Razer, Lenovo, Asus, Acer, Gigabyte and MSI. Most of the new releases are simply updates of existing models with the replacement versions of last year's CPUs and GPUs, along with pricing and availability for eagerly awaited (at least by me!) models incorporating the new components that were announced at CES 2020 in January.

These include the MSI Creator 17, which comes with an optional 4K DisplayHDR 1000 mini LED display. It'll ship in mid-April for \$3,799 (about £3,060 or AU\$6,230) with that screen. There's also the Acer ConceptD 7 Ezel Pro and gaming models offering the new 300Hz 1080p screens, such as the updated Razer Blade 15 (expected by the end of June). Also of note: Asus has taken the opportunity to release a version of its dual-screen ZenBook Pro Duo for gamers, the ROG Zephyrus Duo 15 (available starting around June), with a tilting design for its second screen that looks like a real improvement.



But Nvidia says you'll also see prices starting at \$699 for entry-level models with discrete GPUs, such as the GTX 1650. Systems with RTX 2060 GPUs will begin at just under \$1,000. (Those will still use ninth-gen Intel

CPUs.) In addition to the RTX 2060, the plain RTX 2070 will also remain a key mainstream-priced GPU. That's fine by me -- I'll never complain about better performance at an existing price threshold. Despite coronavirus-complicated supply problems, many of the manufacturers say they expect to begin shipping the new models this month. The GTX 1650 Ti and 1660 Ti remain for sale as well.

For the new Max-Q, manufacturers have to update firmware and the electrical system at the very minimum to support power-saving low-voltage GDDR6 video memory and to improve voltage-regulator efficiency. The new Dynamic Boost feature shifts power allocation between the CPU and GPU as needed to eke out better overall performance without wasting battery power unnecessarily (a la AMD's SmartShift).



Nvidia's Advanced Optimus improves on the original by essentially putting a switcher on the bus between the integrated GPU and the discrete GPU so the system can change between them on the fly. You previously had to be on one bus or the other, and the built-in display was usually connected to the iGPU. The switcher allows a direct path between the laptop screen and the discrete GPU, which is how it now enables G-Sync. (The new features will be coming to AMD-based systems as well.) Being able to switch on the fly allows the system to better choose whether to use the slow, low-power iGPU or the fast, high-power discrete GPU. In theory, that means less battery drain and better performance when you need it.

The first laptop announced with Advanced Optimus support are the Lenovo Legion 7i and 5i (which replace the Legion Y740 and Y540) expected later this year. Every Max-Q on laptops first available from today is a new Max-Q, even for older GPUs.

Intel plays it safe

The new 10th-gen H lineup sounds less inspiring. They're Comet Lake-H (14nm), not Ice Lake (10nm) generation -- compare that with AMD's Ryzen 4000 series, which jumps down to 7nm -- and mostly gain some tweaks to power usage, memory speed and small bumps in clock speed over their predecessors. Specifically, those improvements boil down to support for 2,933MHz dual-channel DDR4 memory, Speed Optimizer one-click overclocking for chips that support it, integrated Wi-Fi 6 AX201 (Gig+) and some refinements to existing power-management technologies, like its Adaptix workload-based dynamic frequency adjustments.

10th-gen Core H CPU lineup

ProcessorCores / threads Cache Base frequency (GHz) Max single core turbo (GHz)
i5-10300H4/8 8MB 2.5 4.5
i5-10400H4/8 8MB 2.6 4.6
i7-10750H6/12 12MB 2.6 5.1
i7-10850H6/12 12MB 2.7 5.1
i7-10875H8/16 16MB 2.3 5.1
i9-10980HK8/16 16MB 2.4 5.3

It's not clear yet how their performance will compare over the ninth-gen equivalents, since Intel only provided numbers against three-year-old laptops. CPU and GPU manufacturers like to provide performance comparisons against much older systems -- citing the replacement cycle -- rather than the previous year's. But knowing how they compare against the previous generation is an important consideration when deciding whether it's worth the price premium to buy a laptop with the latest component or if you can safely save money by opting for an older model.

One potential bright spot is a new octa-core i7-10875H, though it's within the realm of possibility that it's just an updated and rebranded replacement for the i9-9980H, since there's no equivalent for that i9 in the new lineup. The six-core i7-10850H supports partial automatic overlocking (for two cores only), and the octa-core i9-10980HK is fully unlocked. It can scale performance up to the 65-watt power envelope typical of big gaming laptops or work within the same 45-watt target of more mainstream, thin and lightweight models that the rest of the processors in the line are designed for.



The devil's in the details, though. AMD's seen a performance advance in single-core workloads with its Ryzen 4000 series mobile CPUs without sacrificing its lead in multicore performance. It'll be interesting to see how the 10th-gen H models stack up in comparison. Intel continued to pursue single-core performance over multicore for this lineup, because many games still don't take advantage of multiple CPU cores. The company says it couldn't achieve the higher speeds if it moved from Comet Lake H to a newer generation.

But that strikes me as short-sighted. Creative applications are quickly moving to take advantage of as many cores as you have. And while current popular games may be optimized for at most four cores, future games are likely to be more demanding. Given that, by Intel's reckoning, people only upgrade their systems every few years, the future should weigh more than it does in Intel's high-end laptop chip strategy.

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