Intel’s 10th generation desktop CPUs have arrived—still on 14nm

Enlarge / What if Comet Lake, but longer? This wafer litho image gives us a bird’s eye view of the layout of one of the Comet Lake S-series CPUs, featuring two more cores than prior generations.
Intel Corporation

reader comments

195 with 115 posters participating, including story author

Share this story

So far, 2020 is a tough year for Intel CPU *fans*—in both senses of the word. The newest generation of Chipzilla’s desktop CPUs have arrived, and Intel is scrambling to find ways (mostly involving overclocking) to make them look good compared to AMD’s 7nm Zen 2 parts.

The 10th generation Core, Pentium, and Celeron parts follow the trend established by Intel’s recent laptop H-series launch: they’re old process technology tweaked to within an inch of its life, and Intel still isn’t delivering any hard performance numbers which could be compared directly to the competition’s.

Performance

- Intel is leaning heavily on raw clock rate with the new Comet Lake S-series, just as they did with the H-series

laptop parts earlier this year.
Intel Corporation

- Although Intel did give us year-on-year performance deltas this time, they're still shying away from hard numbers.
  Intel Corporation
- Always read the fine print. The apparent legal inability to say "fastest gaming processor
  Intel Corporation
- To Intel's credit, they did not play GPU games here as they did with the H-series laptops. All system configuration include an RTX 2080Ti.
  Intel Corporation

For the most part, Intel's pre-launch benchmark data looks like what they provided us for Comet Lake H-series laptop CPUs—razor-sharp focus on unqualified raw clockspeed, and a healthy smear of Vaseline on the lens when looking at real performance. Once again, we're seeing single-core turbo speeds on the highest SKUs in excess of 5GHz—and a noticeable veer away from hard performance data that might be directly compared to AMD's 7nm Ryzen CPUs.

To Intel's credit, we do at least have some generation-on-generation performance deltas this time. We still have almost no hard performance numbers, however—let alone direct comparisons with AMD Ryzen. Intel is also still very keen on comparisons to a "three year old PC." Presumably, they're hoping that people who aren't up-to-date on the Intel vs AMD rivalry will just think, "yes, that sounds nice, let's go ahead and upgrade this year."

Intel's marketing this time around leans heavily on their optimization collaboration with game development companies as well as—if not more than—the new CPUs' raw performance. But without direct head-to-head comparisons against Ryzen processors, it's impossible to ascertain whether the game companies' glowing testimonials to Intel's help apply to Intel

vs AMD, or merely to newer generations vs older.

The marketing focus on gaming and gamers with this series of CPUs is both extreme and predictable—single-threaded performance is very nearly the last place Intel can hope to compete directly against its AMD competition, and it's hard to find anyone who cares much about that statistic outside the gaming world.

Modern content creation and compiling workloads tend to be massively multi-threaded and focused more on throughput than latency. Gaming—particularly the highest levels of competitive gaming—tends to be more heavily influenced by input and response latency. If a single core can chew through a game's main loop faster, an elite player may be able to shed a precious extra few milliseconds of reaction time.

Trying to evaluate the real gaming benefit of the fastest possible CPUs is made more difficult since none of the typical industry metrics measure it well—frames per second is a *throughput* metric, not a latency metric. Making matters worse, FPS is typically shown as a mean average, rather than a median or mode. It focuses heavily on the graphics dimension of the gameplay loop while effectively ignoring input and logic.

Quibbles about metrics aside, some of the new Comet Lake S-series presumably got better framerates than their Ryzen equivalents—on the three games Intel tested, at least. We're forced to guess this, based on the fact that Intel lists a Ryzen 9 3950X configuration on one of the "fine print" slides.

We can also guess that this wasn't a particularly compelling difference and it may not hold up widely among most games. Another of the fine print slides notes that Intel's USA marketing tagline "World's Fastest Gaming Processor" cannot be used in a staggering list of countries—in those countries, it's replaced with "Elite Real World Performance" or "Intel's

Fastest Gaming Processor.”

Yes, yes, we know—we’re reading marketing tea leaves, here. But without hard data, they’re all we have to go on.

Architecture

- Officially supported DDR speeds still lag behind Ryzen (DDR4-2933 vs DDR4-3200). Overclocking tweaks—and the need for a new socket—are the biggest story here.
  Intel Corporation
- Turbo Boost Max automatically identifies and boosts the fastest two cores on the individual CPU, rather than a fixed pair.
  Intel Corporation
- Overclocking gets tweakier with Comet Lake S, including the ability to disable hyperthreading on individual cores, rather than the entire CPU.
  Intel Corporation
- Thinning the die allows for the use of a thicker integrated heat spreader, therefore potentially better cooling for the hottest parts of the die.
  Intel Corporation

First and foremost, if you want a 10th generation Intel desktop CPU, you’re going to need to buy a new motherboard. The new CPUs are designed for an LGA1200 socket, rather than LGA1151. These won’t be a drop-in replacement for anyone.

Beyond that, we’re mostly just seeing overclocking tweaks. Turbo Boost Max 3.0 dynamically selects and boosts the fastest two cores on a given individual CPU, and there are lots of new knobs for hardcore overclockers to twiddle in the Extreme Tuning Utility—such as the curious ability to enable or disable hyper-threading on individual cores, not just the CPU as a whole.

The i9 series (and only the i9 series) also gets a new Thermal Velocity Boost feature, which can eke out an additional 100MHz for short periods of time while the CPU is generally running cool.

Intel has also thinned the CPU die on some models, allowing for a thicker integrated heat spreader and therefore potentially better cooling to the hottest-running areas on-die. We don’t have much specific information on the new thinning process—and we don’t know for sure which models it applies to.

The officially supported RAM speed has also increased a bit, from DDR4-2666 to DDR4-2933. It still lags behind Ryzen 3000’s DDR4-3200.

https://arstechnica.com/?p=1672467