

# Intel Core GEN 7 processors – a fresh breeze for embedded systems

By Peter Ahne, Portwell

*Kaby Lake captured the embedded world quickly. The first board-level products were introduced in parallel to the launch of the processor family, and just a couple weeks later at the Embedded World trade show almost every manufacturer had it on table. From there, it was only a short way to the systems on offer now.*



■ Almost 13 years ago Intel launched the Pentium M and made the transition from the pure hunt for more performance by constantly rising the clock frequency as it used to be in the days of the Pentium X processors, to the age of less power consumption. In 2006, the Tick-Tock model with its continuously improved production technology was announced – every Tick represented a fabrication process with a new die shrink. Every Tock delivered an update of the processor architecture. In alternating cycles, this represents the long-established Tick-Tock Model, standing for a new microarchitecture. Back then, some may have asked themselves; “When will Intel with Tick hit the physical limits?”

The answer is ten years. Intel engineers meanwhile needed a significant slowdown in the frequency of “shrink” processes. In order to make this possible, a so-called refresh instead of a Tick, was established. Refresh means that production technology and microarchitecture remain the same, while an internal improvement of the processor leads to an increase in performance. Additionally, there may be a new graphics engine or any other add-ons which contribute to this performance increase. This new development process is called PAO: Process–Architecture–Optimization. For many of us, the introduction of this new model has raised the question: “Does it make

sense to take this step?” One thing is clear: the Intel Core i7-7700 offers sufficient computing power for most users. Improvements can be found in the details. Hence the Kaby Lake processors clearly stand out from their preceding Skylake through an optimized production process and a correspondingly faster basic clock frequency. As a consequence, in terms of working speed, the i7-7700 gains an edge over the previous Sky Lake i7-6700 - even though the gap is relatively small. The improvements in energy efficiency, the new graphics engine and the support of a new data storage technology, make the essential differences. All these relatively small improvements add up to a great leap forward.

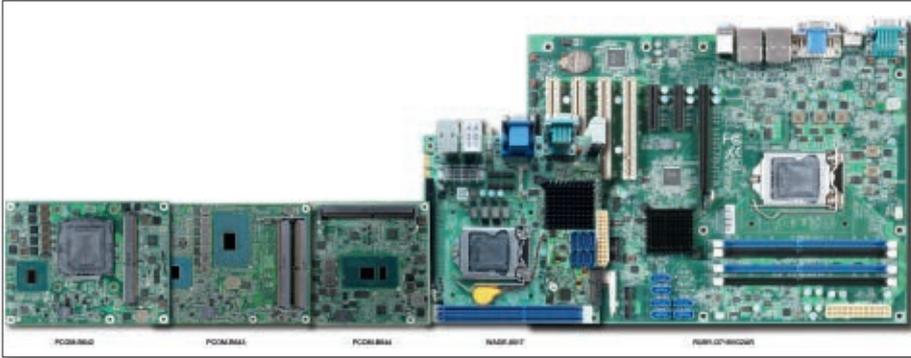
Same as with the 6th generation, the Embedded Community is able choose from a wide range of 17 processors. Again, Intel Celeron provides a vast variety for price-sensitive and less demanding applications, from the i3, i5, i7 up to Xeon, on the shelves. As there have not been any major changes in basic architecture, compared to the 6th generation, there should not be any surprises in terms of production and availability of the Atom Family latest offspring. Any Windows applications, however, which have not yet migrated to Windows 10, will stay behind with the 7th generation of core processors. It is not to be expected that Intel will go further with Kaby Lake to

integrate Windows 7 and 8.1 in the list of supported operating systems. But what are the technical innovations and what is the good in them?

Processor: as already mentioned, the improvements in production process and architecture do only have a small impact. Compared to its predecessors, the power loss was frozen and decreased minimally. The computing performance will now be 5 to 10% higher in range, depending on the processor and, in particular, on the application.

New graphic: significantly more has changed in terms of graphic. In general, and with only a few exceptions, Kaby Lake comes with the new Intel HD 630 graphics. This guarantees a smooth playback of video and image material in ultra-high-resolution (3840x2160 pixels) without judders. Kaby Lake hardware with 630 graphics support the HEVC standard with 10 bits as well as the competing VP9 format. Regarding graphics performance, there should be a performance boost up to 65% as well as improved color depth and quality.

Innovation in storage technology: with the introduction of Kaby Lake, Intel provides a memory technology that promises new standards in data throughput. The new Optane technology has to be differen-



*Close to its predecessor and quickly on the shelves – board-level products based on Kaby Lake*

tiated in Optane Memory and Optane SSD. SSDs with Optane technology should be working on all current platforms, whereas for Optane memory, a Z270 platform is required - Intel has established a corresponding logo, which can be used by main-board manufacturers, providing that at least

one M.2 connector is available. Speaking of storage technology: good old DDR3 may survive with Kaby Lake, as the integrated storage controller supports both the current DDR4 (up to 2,400 MHz, with Sky Lake still 2,133 MHz) and the old DDR3L standard (maximum 1,600 MHz). ■