

Processor market: CPUs, GPUs and APUs hold the keys

Processor Quarterly Market Monitor – Q1, 2021

MARKET DYNAMICS :

- Key figures:
The APU¹ market should generate US\$44 billion of revenue for designers in 2021.
Revenue for CPU²s are expected to grow to US\$70 billion in 2021.
GPU³s continue to grow, with US\$15 billion revenue in 2020 reaching beyond US\$25 billion in 2025
- US-China trade disputes – Status:
China is looking to preserve the Huawei's long-term viability.
China could still take retaliatory action against US-based companies, but would be sensible to wait for any policy changes the Biden administration might make.
In the meantime, where Huawei has been restricted from Western markets, Xiaomi is emerging as a formidable player, at least in the personal device markets.
- COVID-19 outbreak:
Economic uncertainty and supply chain challenges impacted both supply and demand of certain luxury consumer electronics in the first half of 2021.
The production of electronic goods remained somewhat strong, as we saw foundries and chip designers fair well through the whole of 2021.

THE PROCESSOR LANDSCAPE IS REORGANIZING AMIDST GLOBAL TRADE DISPUTES AND DESIGNER INNOVATIONS

While finding new application, and sustaining the established ones, CPUs, GPUs, and APUs hold the keys to the next ten years of the processor market.

Recent events have created the potential to re-align the massive processor market. These include: Apple turning to in-house designs for Mac processors, the meteoric rise of GPU accelerated coprocessing in the datacenter and restructuring the APU supply chain around China-US trade tensions.

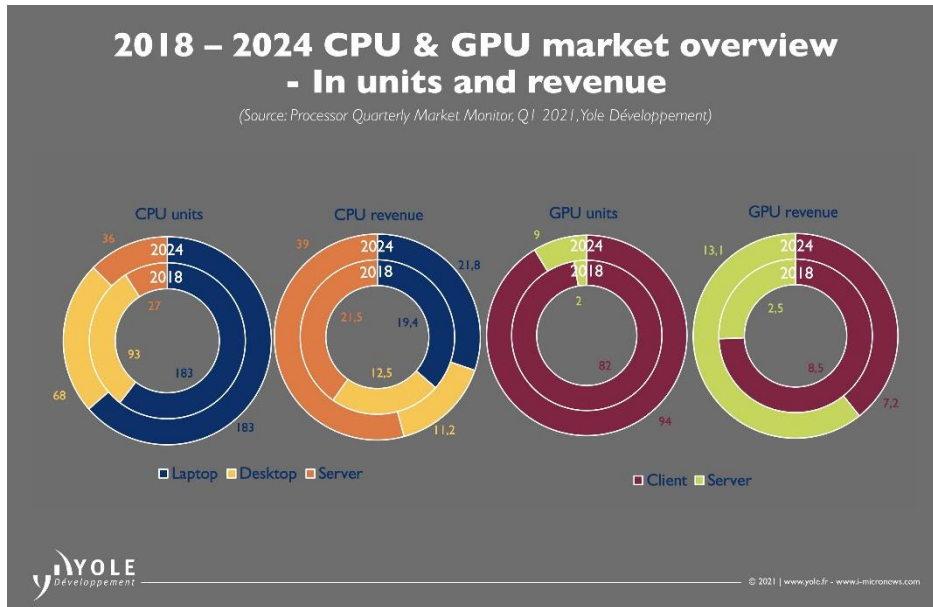
According to **John Lorenz, Technology & Market Analyst, Computing & Software at Yole Développement (Yole)**: *“The APU is the central chip for managing and executing the many functions of which modern “smart” devices are capable. In fact, as more consumer devices*

¹ APU: Application Processing Unit

² CPU: Central Processing Unit

³ GPU: Graphics Processing Unit

become always on and always-connected, the APU becomes an attractive alternative to its traditionally more power-hungry x86-based counterparts”.



Appearing across the connected consumer device spectrum, APUs saw US\$37 billion of revenue in 2020 alone. Adding in CPUs for PC and server (US\$61 billion), and discrete GPUs for PC and server (US\$17 billion), the bulk of this processor market generated US\$115 billion of revenue for their designers.

The lines between these markets start to blur with recent developments, such as Apple turning to an APU solution in their PCs. If the MI shows enough success, this market could see more x86-based sockets moving toward APUs.

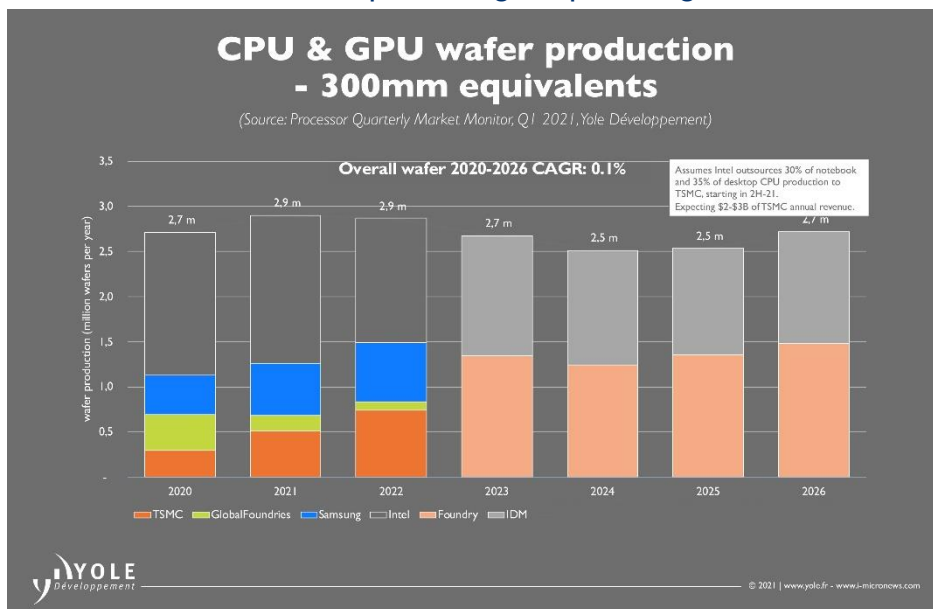
THE PROCESSOR MARKET: TUMULTUOUS 2020 LEADS TO AN INTERESTING 2021 | QUARTERLY MARKET MONITOR

Even setting aside the roller-coaster of COVID-19, 2020 brought changes to the traditional processor landscape, announces Yole Développement (Yole), in its Processor Quarterly Monitor, Q1 2021. Apple’s successful implementation of in-house processor designs for select new MacBook and Mac Mini computers could open the door to more ARM-based PCs. Intel’s confirmation that it is outsourcing some production may show some vulnerabilities of the IDM business model. And AI training and inference growing from the datacenter to the edge hints at the next realm of big semiconductor market growth.

The market research and strategy consulting company, Yole invite you to discover today the status of these markets, one year removed from the start of the COVID-19 pandemic... Discover the full article on i-Micronews.

WHAT’S NEXT?

The long-term trend within the application processor industry is for OEM⁴s to seek differentiation and demand increasing processing power for end-products, while living within the power and BOM⁵ constraints of high mobility. Similarly in the microprocessor space, the system designers seek to deploy ever-increasing computing capabilities at ever-increasing efficiencies. In some cases, this calls for new hardware and software as in AI⁶ training and inference. Designers, IP⁷ licensors, and manufacturers partner to meet those demands by adding capabilities to the traditional areas of computing and graphics, as well as the emerging focus of innovation in neural network processing, deep learning, and artificial intelligence.



For Tom Hackenberg, Principal Analyst, Computing & Software at Yole: *“In fact, artificial intelligence enablement (through standalone or embedded AI accelerators) is the newest differentiator for processor designers and OEMs. Packing ever-increasing computational capabilities into semiconductor devices has long been the trend for the whole of computing industry history. The next decade of processors will be no different. However, we are witnessing a slowdown in the rate of cost decline for a unit of computing capability, and therefore processor designers will have a choice to make: continue computational improvements at historical levels and accept the increasing costs, or adjust their innovation to match the rate of cost decline and live within historical BOM and margin band”.*

Yole’s analysts expect the decision designers make will depend on the specifics of their target markets. The dynamics of players within this industry is continuing to evolve, and a quarterly market monitor is a critical tool for those looking for the advantage of insight.

⁴ OEM: Original Equipment Manufacturer

⁵ BOM: Bill of Materials

⁶ AI: Artificial Intelligence

⁷ IP: Integrated Processor



Yole's Processor Quarterly Market Monitor will be published every beginning of March (Q1), June (Q2), September (Q3) and December (Q4)... Aim of these services is to provide an in-depth coverage of rapidly changing market dynamics and main players' status and strategy.

Also, Yole's partner, the reverse engineering and costing company System Plus Consulting released the Apple M1 System-on-Chip report. To point out all the details of Apple M1, System Plus Consulting' report features multiple results: a floor plan analysis to understand the high-level chip architecture with IP block area contribution measurements, a front-end construction analysis that reveals the most interesting features of the new TSMC 5nm process, a back-end construction analysis of the packaging structure, and a detailed manufacturing cost analysis. A detailed description is available: [here](#).

In addition, the market research and strategy consulting company Yole released several computing-related reports. Discover them on i-Micronews.

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About the analysts

John Lorenz is a Technology and Market Analyst, Computing & Software within the Semiconductor, Memory & Computing division at Yole Développement (Yole), part of Yole Group of Companies. John is engaged in the development of market and technology monitors for the logic segment of advanced semiconductors, with an initial focus on processors. Prior to joining Yole, John held various technical and strategic roles at Micron Technology. On the engineering side, his roles included thin film process development and manufacturing integration on DRAM, NAND, and emerging memory technologies and industrial engineering / factory physics for the R&D fab. On the strategic side, John ran the memory industry supply & capex model for corporate strategy / market intelligence, and established the industry front-end costing model within strategic finance. John has a Bachelor of Science degree in Mechanical Engineering from the University of Illinois Urbana-Champaign (USA), with a focus on MEMS devices.

Tom Hackenberg is a Principal Analyst for Computing and Software in the Semiconductor, Memory and Computing Division at Yole Développement (Yole). Tom is engaged in developing processor market monitors and research into related technology trends. He is currently focused on low and ultralow power solutions such as MCUs. Tom is an industry leading expert with more than a decade's experience reporting on markets for semiconductor processors including CPUs, GPUs, MPUs, MCUs, SoC ASICs & ASSPs, FPGAs and configurable processors. Tom is also well-versed in related technology trends including IoT, heterogeneous processing, chiplets, AI and edge computing. Prior to joining Yole, Tom was a principal analyst at OMDIA, IHS Markit and began processor market research in 2006 for IMS Research. He worked with market-leading processor suppliers developing both syndicated and custom research. Tom holds a BSECE from the University of Texas at Austin specializing in Processors and FPGAs.

As a Technology & Market Analyst, Computing & Software, **Adrien Sanchez** belongs to the Semiconductor, Memory & Computing division at Yole Développement (Yole), part of the Yole Group of Companies. In collaboration with his team, Adrien produces technology & market analyses covering computing hardware and software, AI, machine learning and neural networks. Prior to Yole, he worked as an intern at AW Europe (Belgium), where he focused on image recognition & comprehension for ADAS. He also worked at ACOEM (France), where he focused on real-time sound classification using deep learning and edge computing. Adrien graduated with a double degree at Grenoble Institute of Technology PHELMA (Grenoble INP Phelma, France) and Grenoble Ecole de Management (GEM, France), and he earned an MSc on AI at Heriot-Watt University (Edinburgh, UK).

About Yole Développement

Founded in 1998, Yole Développement (Yole) has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services, reverse engineering and reverse costing services and well as IP and patent analysis. With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole group of companies has expanded to include more than 80 collaborators worldwide... [More](#)

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