

# Application processor market: Yole's analysts announce inflections with threats and opportunities<sup>1</sup>

## Quarterly Market Monitor

### MARKET DYNAMICS:

- Q2-20 APU<sup>2</sup> revenue expected just below US\$7 billion - Heading towards US\$31 billion for 2020
- APU unit shipments expected to grow more than 3% per year through 2025
- Embedding processor cores specifically for AI<sup>3</sup> acceleration will add complexity to the design and manufacture of APUs, while adding more value to the APU market
- US-China trade disputes – Status:  
At the center of the latest trade dust-up are Chinese OEM<sup>4</sup> Huawei (APU designer: Hisilicon) and TSMC.  
As the US Dept of Commerce has restricted from Huawei, the sale of goods that use US technology, and TSMC are signaling that they are in-line with US order. A number of dominoes could start to fall...
- COVID-19 outbreak:  
Yole Développement (Yole) points out a strong impact on both supply and demand of certain luxury consumer electronics<sup>5</sup>. No return back to pre-COVID shipment levels will take place until mid-2021.  
The sudden shift to working and learning from home has lifted prior shipment expectations of tablets and notebooks, specifically Chromebooks. Roughly 10% of Chromebooks contain an APU-based processor...

### PUTTING “SMART” IN SMART DEVICES

The application processor is the central chip for managing and executing the many functions of which modern “smart” devices are capable. In fact, as more consumer devices become always-on and always-connected, the APU becomes an attractive alternative to its traditionally more power-hungry x86-based counterparts. Within the smartphone segment alone, 2019 saw about US\$28 billion of revenue for application processors, making up 6% of total semiconductor revenue for that year.

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<sup>1</sup> Extracted from Application Processor Quarterly Market Monitor, Yole Développement, June 2020

<sup>2</sup> APU: Application Processor Unit

<sup>3</sup> AI: Artificial Intelligence

<sup>4</sup> OEM: Original Equipment Manufacturer

<sup>5</sup> Including: Smartphone, Smartwatch, SmartTV, and SmartSpeaker

Among the emerging applications that are dependent on application processors are wearables, connected home, AR/VR<sup>6</sup>, and ultralight PCs. Though not as large as the smartphone market, these are the areas that are seeing real growth.

*“For reasons of optimum user experience and improved data security, chip designers and software developers are moving more and more processing functions out of the cloud to the edge”, explains **John Lorenz, Technology & Market Analyst, Computing & Software at Yole.** “The edge is where the application processor is key, whether in mobile, IoT, connected home, or the many other various consumer devices.”*

### **COVID-19 PANDEMIC: WHERE WE GO...**

The Application Processor Quarterly Market Monitor from Yole examines and forecasts the application processor segment of the semiconductor industry, as dissected across multiple dimensions. With this new product, the market research & strategy consulting company tracks processor revenue, units, and wafer volumes at both fabless chip designers and at the foundries themselves, sliced across various relevant parameters including process node, end-product segment, core and IP<sup>7</sup> type, etc.

In addition, COVID-19 and its impact on the application processor industry have been deeply analyzed by Yole’s Computing & Software team. Today, within the Q2 2020 monitor, analysts deliver key near-term and long-term results:

- First, seasonally weak Q1-20 and COVID-19 impacts are overlapping to make H1-20 15% below H1-19, details John Lorenz from Yole. And he announces: *“At Yole, we assume a return to pre-COVID trajectories in mid-2021. And we will investigate this point during the next months...”*
- Later, following the bounce back of demand in 2021, Yole expects modest unit and ASP<sup>8</sup> growth to combine for growing APU revenues, topping US\$50 billion by 2024.

### **APPLICATION PROCESSOR INDUSTRY: WHAT’S NEXT?**

The long-term trend within the application processor industry is for OEMs to seek differentiation and demand increasing processing power for end-products, while living within the power and BOM<sup>9</sup> constraints of high mobility.

Designers, IP 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.

In fact, AI enablement (through 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 application processors will be no different.

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<sup>6</sup> AR/VR: Augmented/Virtual reality

<sup>7</sup> IP: Intellectual Property

<sup>8</sup> ASP: Average Selling Price

<sup>9</sup> BOM: Bill of Materials

“However, we are witnessing a slowdown in the rate of cost decline for a unit of computing capability, and therefore application processor designers will have a choice to make: continue computational improvements at historical levels and accept the increasing costs, or slow their innovation to match the rate of cost decline and live within historical BOM and margin bands,” analyzes John Lorenz.

Yole expects 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.

Which logic nodes are critical for application processors over the next 12-24 months? What are the price and cost trends within the multiple tiers of the smartphone market? How many 10nm/7nm/5nm/3nm wafer starts are needed to satisfy the demands of the application processor market for the next 5 years? Who will have the necessary capacity to deliver for OEMs?... The market research & strategy consulting company Yole is unveiling today, within the Application Processor Quarterly Market Monitor, its Q2 2020 analysis.

The Application Processor Quarterly Market Monitors will be published every beginning of March (Q1), June (Q2), September (Q3) and December (Q4).

Aim of the Yole’s Computing & Software team is to give a closer look at the main markets and players. In addition to smartphones, tablet and smartwatch, Application Processor Quarterly Market Monitor Q2 2020, includes smart speaker, AR/VR<sup>10</sup>, smart TV and Ultralight PC.

Q3 2020 edition will reveal figures and trends focused on the automotive infotainment and smart assistant.

Yole’s analysts invite you to follow Yole’s activities on i-Micronews, especially under this complex context due to the Covid-19 impact.



- Application Processor Market Responses to COVID and Beyond – LIVE MARKET BRIEFING

The APU market is a representative cross-section of the logic and foundry space, whose segments bear witness to varied COVID impacts.

Recorded session on i-Micronews – Register today!

- Embedded Vision Summit 2020 (Virtual Conference) on September 15-25

Stay tuned on i-Micronews!

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### About the Computing & Software team at Yole Développement

**John Lorenz** is a Technology and Market Analyst within the Computing & Software 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.

As a Technology & Market Analyst, **Yohann Tschudi**, PhD is a member of the Semiconductor & Software division at Yole Développement (Yole). Yohann is daily working with Yole's analysts to identify, understand and analyze the role of the software parts within any semiconductor products, from the machine code to the highest level of algorithms. Market segments especially analyzed by Yohann include big data analysis algorithms, deep/machine learning, genetic algorithms, all coming from Artificial Intelligence (IA) technologies.

After his thesis at CERN (Geneva, Switzerland) in particle physics, Yohann developed a dedicated software for fluid mechanics and thermodynamics applications. Afterwards, he served during 2 years at the University of Miami (FL, United-States) as a research scientist in the radiation oncology department. He was involved in cancer auto-detection and characterization projects using AI methods based on images from Magnetic Resonance Imaging (MRI). During his research career, Yohann has authored and co-authored more than 10 relevant papers.

Yohann has a PhD in High Energy Physics and a master degree in Physical Sciences from Claude Bernard University (Lyon, France).

### 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 as well as reverse engineering and reverse costing services. 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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