HOW AS-A-SERVICE CAN BECOME A SUSTAINABLE REVENUE STREAM FOR THE SEMICONDUCTOR INDUSTRY

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The semiconductor industry has been making headlines in the technology sector of late, as United States and China accelerate their quest to achieve self-sufficiency in chip manufacturing. This sector has seen its share of ups and downs recently. On the down side, according to a recent IDC report[1], the global semiconductor market is expected to decline by 6% YoY in 2020, due to Covid-19 with a steady decline in non-memory revenue. It comes on the heels of the semiconductor market recovering from a steep decline of 11.9% in 2019[2]. However, on the upside, the global semiconductors and related devices market is expected to grow at a CAGR of 4.82% and register US$ 688.2 billion by 2023, according to Yahoo Finance[3] based on a report published by ResearchandMarkets.com. Over the past decade, the semiconductor industry has experienced headwinds from rising costs in R&D, design, and manufacturing of new processes, while being constantly challenged with eroding ASPs (average selling prices) in a highly competitive market.

For the past 50 years, Dr. Gordon Moore's maxim has been the guiding principle of the industry. Known as Moore's Law, it states that the number of transistors on a microchip will double every two years. Dr. Moore had proposed his theory in 1965 as an economic model. The semiconductor industry has now come of age, to a point where in the near future, the cost of further miniaturizing the transistor will just not be economically viable any further. A 5nm process has the potential to include over 15 billion transistors, which is over 84 - 87% denser per square mm than the current 7nm[4]. However, the amount of R&D and design and manufacturing costs involved in producing a 5nm or 3nm chip is huge, and not all semiconductor companies will find it economically viable to navigate this dynamic[5]. It makes new revenue generation models imperative for the semiconductor industry. One of the alternative revenue channels is the time tested 'as-a-service' model[6].
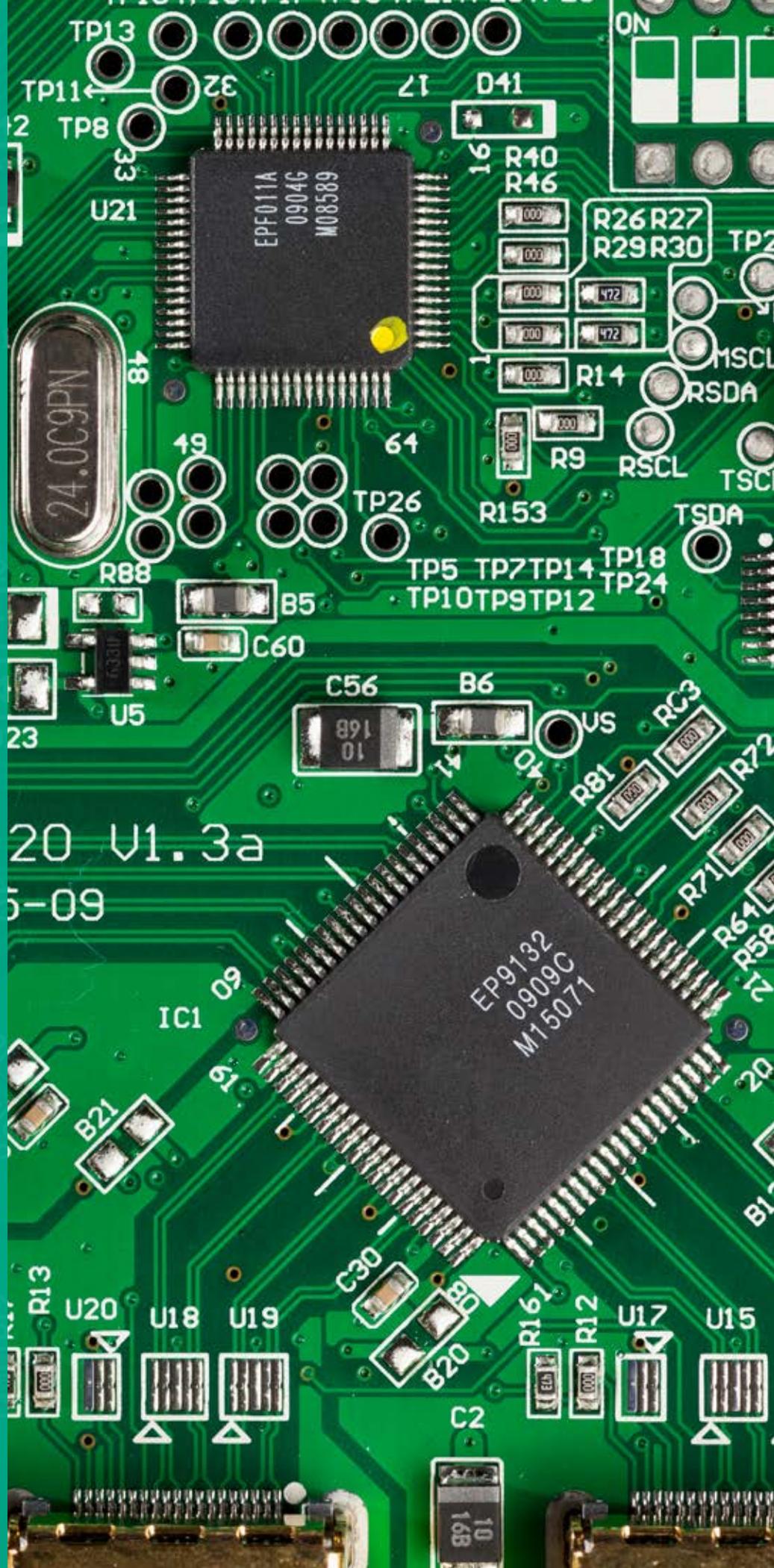
The As-a-Service or subscription model is not new and many allied industries (especially software) were early adopters that reaped benefits. Semiconductor companies can achieve several business goals by embracing this model, some of which are outlined below.

## 1. The business case for a new revenue stream

The pioneer of the as-a-service model was not a traditional semiconductor player but Google[7]. In 2018, the company rented its AI / ML tailored tensor processing units (TPUs) to its Cloud clients. It provided a dual advantage to Google. First, it reduced Google's dependency on third-party chip manufacturers like Nvidia and Intel, which enabled it to experiment faster on its chips. Secondly, and more importantly, it created a new AI hardware revenue stream as part of its GCP catalog. AWS, AMD, and Nvidia followed with their service offerings around AI-powered chips. This serves as a win-win for both parties, with semiconductor companies generating a revenue pipeline and clients driving innovation avoiding a major hardware overhaul.

2. Smart cities and the rise of inaccessible silicon

The world as we know it is becoming smarter. The rapid growth in Internet of Things (IoT) encompasses smart homes, smart buildings, and smart cities. Smart cities require installation of IoT devices at places that are not easily accessible, like subterranean water pipes, transportation mediums, air-conditioning ducts, street lighting, and parking lots. These devices need to be future-proofed to minimize physical maintenance and renovation. Silicon powering smart-city infrastructure should be reprogrammable and capable of supporting secure in-field feature configuration and over-the-air updates. It will simplify smart city maintenance and protect against future vulnerabilities. But that is not all - the ability to activate or deactivate features remotely in a feature-as-a-service (FaaS) model also provides the flexibility for semiconductor companies to deploy a 'minimum functionality' configuration, letting OEMs and customers pay for activating additional features and pay as they use them.

3. Innovate together with your customers and their customers

For long, semiconductor companies have been innovating in a B2B environment, making their chips more efficient while the upstream players such as device manufacturers, system integrators, and cloud providers have been interfacing with end customers on products and solutions in a B2C model. It has created a walled garden of data, preventing semiconductor companies from harnessing the power of data processed at the edge to be able to improve their process designs. More than ever now is the time for semiconductor companies to move up the stack and offer even more chip-to-cloud solutions. There has to be a shift to provide not just the hardware but also associated design studios and real-time analytics workbenches in a platform-as-a-service (PaaS) model, for end users to accelerate their time to revenue (TTR). It creates an ecosystem across the value chain that fosters innovation through the power of data and collaboration.
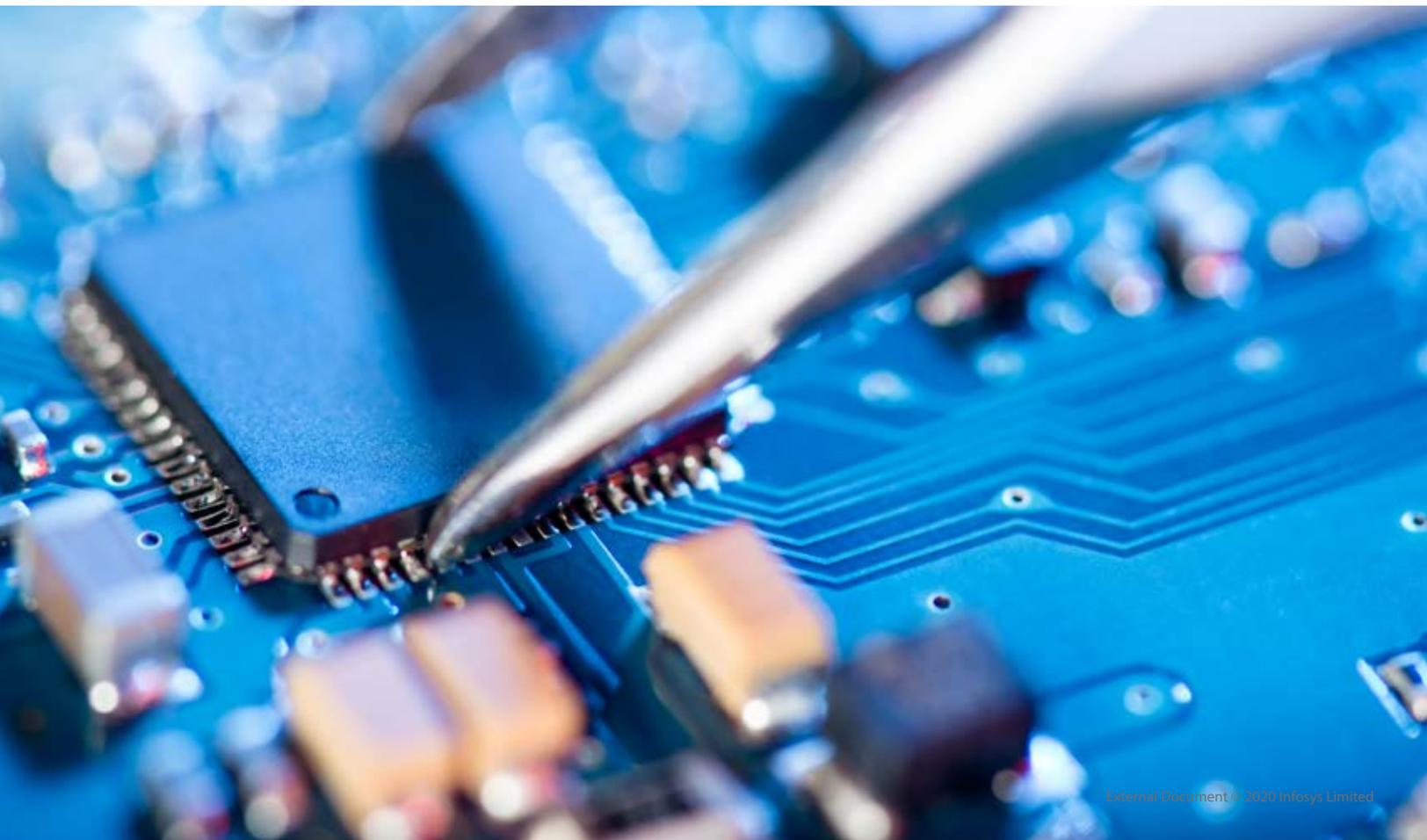
The Challenges

However, there are some challenges in embracing the model. One such challenge is to establish a well-defined silicon licensing scheme to manage semiconductor digital rights. Digital rights management (DRM) technology regulates our access to any digital content that we buy today - movies, apps, subscription to online media, or e-books. DRM will prevent any unauthorized usage of silicon or its features. The French startup Algodone[8] was one of the first to provide the necessary technology to support an as-a-service model. The other challenge that seems insurmountable is the complex nature of the semiconductor supply chain that involves multiple value-added players across the production and distribution cycle.

The Verdict

The shift in business and technology looks promising, though. In October 2019, Analog Devices Inc. launched MeasureWare[9] that provides a plug-and-play suite of hardware and software platform for engineers to design an end-to-end precision measurement system. Companies such as Intel, Qualcomm[10], and Micron have spoken about the need to embrace the as-a-service economy. At the same time, the massive wave of IoT, blockchain, AI / ML and cloud has provided favorable conditions for semiconductor companies to invest in the service model to remain nimble while disrupting the status quo.

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