US needs to rethink strategy to achieve chip self-sufficiency

Instead of pushing Intel to build more plants, Washington should focus on getting TSMC or Samsung to build factories on American soil

The semiconductor shortage has triggered the desire for governments to make their nations independent and reduce their reliance on foreign supplies. In the United States, the White House is looking to Intel for a solution. Intel has, in turn, vowed to spend US$20 billion in Arizona on a new factory. But there’s the hard truth: Intel, the last American tech company that knows how to fabricate advanced chipsets, is not its former self. You may be curious why other US chip makers have not been stepping up. Aren’t AMD, Nvidia and Qualcomm the prime examples of innovation powerhouses?

The answer is yes, but they have done so by shedding the manufacturing aspect. They all rely heavily on Taiwan Semiconductor Manufacturing Co (TSMC) to make their leading-edge products. The fundamental issue is that semiconductor technology has a very well-defined road map. The industry is driven by an engineering determination to double the number of transistors at a rate of about every two years. It does so by shrinking the size of microprocessors.

For more than five decades, the industry has delivered on its promise without missing a beat – so much so that the cadence is immortalised under the name of Moore’s law, named after Intel co-founder Gordon Moore. Without Moore’s law, there would be no Google, Facebook, Uber or Amazon. But Moore’s law is also Intel’s biggest problem. The clarity of the industry also means companies converge to “specialise” in the value chain. TSMC and South Korea’s Samsung Electronics have emerged to specialise in manufacturing, while AMD and Nvidia focus only on chipset design, and some companies only package and test chipsets for others.

Companies such as Nvidia focus only on the design of chipsets.

The value chain, once highly integrated, has fragmented. This allows specialised players to concentrate on innovations in their own chosen areas. Everyone innovates in parallel. Everyone wants to be more than a packaging house. The problem with Intel is that it is the only player that doesn’t play this game. It designs central processing units (CPUs) for personal computers. It manufactures them, packages them and sells them. This sort of vertical integration worked wonders in the past. But today, the product architecture of a chipset is quite mature. Innovation lies in specialisation, not integration.

Vertical integration has caused Intel to get stuck making CPUs for personal computers.

And so, for the US to become independent in supplying semiconductors, it should not push Intel to build more fabs. Rather, it should focus on getting TSMC or Samsung to build new factories on US soil. This speaks to the disconnect between the wishes of politicians and the realities of business.

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