



Nvidia and Arm: The Perils of Technology Platform Acquisitions

As Capitol Hill tries to turn back the clock on the past decade's Big Tech buyouts, a new deal is making its way through the same regulatory process that greenlighted predatory moves by Facebook, Google and others. If consummated, Nvidia's deal to buy Arm will instantly give one competitor great power over a critical technology platform.

Do regulators have the tools to recognize the danger? Here's a framework for assessing potential harm in modern-day technology markets.

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Executive Summary

Legislators have been exploring actions like breaking up Facebook and Google in hopes of reversing at least some of the damage from the last decade's most detrimental antitrust decisions. And to keep history from repeating itself, Washington desperately wants to update the nation's antitrust framework, so it's better armed to identify anticompetitive behavior in high-tech.

But while there's a will, Congress has yet to settle on a way.

That's particularly troublesome now, as one of the most potentially anticompetitive acquisitions to come along in years – Nvidia's proposed \$40 billion buyout of Arm – is making its way through the approval process. And without a structured method for examining acquisitions of 21st-century technology, regulators might not have the proper tools to spot the hazards.

At first glance, the Nvidia-Arm deal might not look like much of a threat. For one thing, chipmakers aren't nearly as visible as companies like Apple, Facebook and Google, which control dominant platforms we interact with every day. As well, a chipmaker buying a chip designer sounds more like a run-of-the-mill vertical acquisition than anything with antitrust implications.

But Arm is no ordinary chip designer. It is a rule maker that lords over a foundational architecture for everything from smartphones and wearables to industrial robotics and automotive driver assist platforms.

As such, no company with architectural interests of any consequence should be allowed to take over the front office and dictate what 1,000 other Arm licensees can do with their license. Not AMD or Intel. Not Amazon, Apple or Google. Not Broadcom, NXP or Qualcomm. And not Nvidia.

In that respect, this proposed deal is more blatantly anticompetitive than many of the acquisitions that legislators are now trying to undo. No need to wonder whether the buyout would help Nvidia build a monopolistic presence, as with Facebook's acquisition of Instagram. Because Arm's architecture is already so pervasive and enduring in key markets that it's practically topple-proof. If this deal is approved, Nvidia would have all the critical mass it needed to bend the market to its will.

Analysis

Competition and the Platform Business Model

When it comes to technology platforms, critical mass is, well, critical. In fact, it is arguably more important than the relative merits of the technology itself. And once attained, the hurdles that competitive platforms face are often insurmountable. Consumers don't have much choice but to utilize the platform. And businesses that want to reach those consumers are likewise beholden.

Facebook, for example, has become an indispensable link to so many others: long-lost friends and classmates. People with shared interests. Colleagues. Which helps explain why, for all the disgust over Facebook's abuse of our personal data, daily average users continue to grow unabated, as they have for each quarter over the past decade.

Apple and Google platforms are similarly indispensable. Anyone who wants a smartphone knows that they effectively have but two platform choices: iOS and Android. App developers that want to sell services – everything from music streaming to newspapers – must go through those platforms' app stores. With such a captive developer base, Apple and Google have been able to extract a hefty 30 percent cut from every app's mobile subscriptions. Both are now beginning to adjust pricing – but in response to legal and governmental threats, not market pressures.



Of course, technology is more than just the operating systems and apps we use every day. There are layers of technology underneath that power our phones and ensure that everything works together as effortlessly and seamlessly as possible. Consumers don't see these technologies. But the platforms everyone does see won't operate without them. Banking apps, for example, couldn't talk to banks without wireless communications standards like Wi-Fi, Bluetooth, LTE and 5G.

Fueling these indispensable mobile devices is Arm, a foundational hardware platform that is as integral to the smartphone as iOS and Android.

Clearly, many platforms have a lock on some facet of the mobile market. So how should we define them? Are they, in effect, industry standards like USB and Bluetooth? Or are they foundational ingredients, like uranium is to nuclear power? And, from an antitrust perspective, does it matter?

Industry-Standard Architecture?

Microprocessors that power both dominant phone OSes conform to what's known as the Arm instruction set architecture, or ISA. But it might as well be called an industry-standard architecture. The ISA is like a language that only Arm processors speak and understand. It details data structures and commands, which in turn dictates how they process information.

Many electronics market segments beyond smartphones, from automotive and industrial robotics to smartwatches and streaming media devices, rely heavily on the Arm ISA to define hardware compatibility.

Once dominant, ISAs tend to be impervious to competition. That's not due to any anticompetitive behavior. Rather, it's because an entire ecosystem has devoted years to extracting efficiencies, improving operating systems, writing software, fixing bugs, patching security holes and developing enhancements – all built on top of a specific ISA.

Intel learned the hard way that Arm's lock on the Android smartphone market was essentially unassailable. It spent more than \$10 billion, by some estimates, trying to break in with processors built around its own x86 ISA. Conversely, Arm processor suppliers have been trying for more than eight years to make a serious dent in the PC market, where x86 is the dominant standard.

Natural Barriers

In effect, Arm holds a monopoly over tech markets built around the ISA. But because of Arm's unique status as a neutral third party, it doesn't stifle competition and innovation. It encourages it. Makers of smartphones and other electronics can choose Arm processors and add-ons from multiple chipmakers. Some larger electronics suppliers like Apple and Samsung even license the ISA so they can tailor chips for their own systems.

In a very real sense, the care and feeding of the Arm ISA is really about setting and maintaining standards. Except that Arm is not a standard-setting body – at least not in the traditional sense, like the Bluetooth Special Interest Group or the USB Implementers Forum. It's a for-profit company.

There are other microprocessor architectures, of course, though Arm's for-profit licensing model is currently unique among them. Intel makes and sells processors built around its own x86 ISA. But until recently, it hasn't considered licensing the architecture in more than three decades. (AMD uniquely makes x86 chips as well, the result of a 2009 legal settlement.) The MIPS architecture, which is popular in embedded markets like internet gateways, is an open ISA. And RISC-V, a new architecture that is gaining momentum in some segments, is completely open-source.

Buying a Standard

Standards serve as a critical foundation for growth and innovation in most any vibrant market. Plumbers can be confident, for example, that they can install without modification any showerhead from American Standard, Kohler, Moen or any other hardware maker. Home entertainment installers know to keep HDMI cables on hand to connect TVs to home theater systems and streaming video players, regardless of whether they're made by LG, Samsung or Sony. And DIYers can fit any Baldwin, Kwikset or Schlage deadbolt into any front door.



Imagine for a moment that Moen proposed a deal to buy an independent standards-setting body like the International Association of Plumbing and Mechanical Officials. Naturally, the Federal Trade Commission would block such an absurdly anticompetitive move out of hand.

Because once in control, Moen would have the ability, for example, to manipulate standards to create hurdles for competitors. It could pile on new training and certification requirements for plumbers installing non-Moen hardware. And, using similar tactics, the company could bully its way into ancillary markets like ice makers and toilets.

As discussed, Arm isn't a traditional standard-setting body like the IAPMO. But due to the intricate web of ecosystem compatibility, Nvidia would have even more levers at its disposal to reshape markets to its advantage than Moen would in the hypothetical.

Cornering a Market

Proponents argue that the buyout of Arm amounts to little more than an innocuous example of vertical integration – that is, a manufacturer pursuing the supplier of a critical ingredient to gain control over costs, quality and direction. But it's far more than that.

If this were simply a vertical transaction, then Nvidia would be buying an Arm processor vendor like Marvel, MediaTek or Qualcomm. Instead, Nvidia wants to buy Arm itself, thereby taking control of a platform that's not only vital for all Arm processor licensees, but for the markets that rely on them as well. In that sense, the acquisition of Arm by any one of competitors is more akin to cornering a market for a critical ingredient.



By way of illustration, Trek Bicycle Corp. acquiring Acme Off-Road, a fictitious supplier of mountain bike frames, would be an example of a classic vertical acquisition. Nvidia buying Arm is more analogous to Trek cornering the market for carbon fiber, an essential material in performance bike frame construction. So rather than buying one bike frame maker, Trek would control an ingredient essential to every bike frame maker.

In addition, the bike maker's influence and control would transcend two-wheelers to myriad other markets that depend on carbon fiber's unparalleled combination of lightweight stiffness and strength, like aerospace, automotive and wind energy. With control over carbon fiber, Trek would have an unfair advantage should it ever decide to expand into those markets.

What Would Nvidia Do?

If Nvidia owned Arm, it could, for example, focus resources on the market it cares most deeply about – specifically, the data center, where its high-profit GPUs are a leading source of processing power for artificial intelligence applications. It could forcibly link its own GPUs to Arm cores – whether applications needed them or not – and rationalize much higher licensing fees as a result.

At its annual GTC developer conference, in fact, Nvidia revealed that it is working in that direction. The company disclosed a new Arm-based datacenter processor that will feature its own proprietary high-speed link to its GPUs.

Focusing on the data center and ignoring the mobile phone market, which is such a huge revenue source for Arm, might sound risky. But it's not. Because the Arm ISA is so intertwined with the smartphone that licensees and smartphone makers would have no choice but to accept whatever Nvidia decided. The ecosystem couldn't just pick up and move to RISC-V, for example.

And just because Nvidia isn't participating in a particular market today is no guarantee that it won't one day decide to pursue it. As the judge and jury on future architectural directions, Nvidia would have a built-in advantage over arms-length licensees. That edge could be indispensable in markets like automotive, for example, where Nvidia has been losing share to other Arm licensees.



Conclusions

Is Arm a standard? Or a critical ingredient for electronics markets like smartphone, automotive, wearables and IoT?

It should be clear by now that the answer is yes to both questions. The Arm ISA is effectively a standard that is defined, licensed and advanced by Arm. Likewise, it is a critical ingredient for producing compatible – that is to say, viable – devices in myriad markets.

So it doesn't really matter which definition is used to describe Arm. The critical element is that Arm ISA is vital to many markets. And that's independent of whether it's mined in a remote outpost in China, defined by a standards committee or controlled by an independent IP house.

Once technology platforms become pervasive, they can be difficult to distinguish from standards. And nowhere in technology is there a better example than Arm.

Arm is a neutral third party that, by singularly defining the Arm ISA, lowered the cost of building microprocessors to power mobile phones and other electronics devices. And by licensing and managing the ISA, it also guaranteed that all Arm processors would be compatible with each other.

That sends a more compelling message to those building platforms than any one processor vendor ever could. Because hardware manufacturers, app developers and operating system suppliers know that the licensees will be competing against each other to win the systems business. That speeds innovation and keeps costs in line.

But what happens when an independent standards-like body gets acquired by one of the companies that depends on the standard? Or when a critical ingredient suddenly is controlled by one of the players? In either case, the conflict of interest inherent in transferring ownership from a neutral third party to a fierce competitor is so glaringly obvious that there are no real-life examples from which to draw parallels. It's also why hypotheticals sound absurd.

Indeed, for many of the countless companies that directly or indirectly depend on the Arm ISA, prospects for such a dramatic role change for the keeper of their platform are as jaw-dropping as if, say, China were to acquire the World Bank. Or if the New England Patriots were cleared to buy the NFL.

Ecosystems like the smartphone market, which grew from essentially nothing to billions of units over the past dozen years, opted to standardize on the Arm ISA to a great degree because it was maintained by a neutral third party. As the ruler of this critical platform, Arm's position in the industry is arguably more consequential than that of any other semiconductor industry player. As such, no company with material influence or interest should be allowed to own it. Including Nvidia.

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