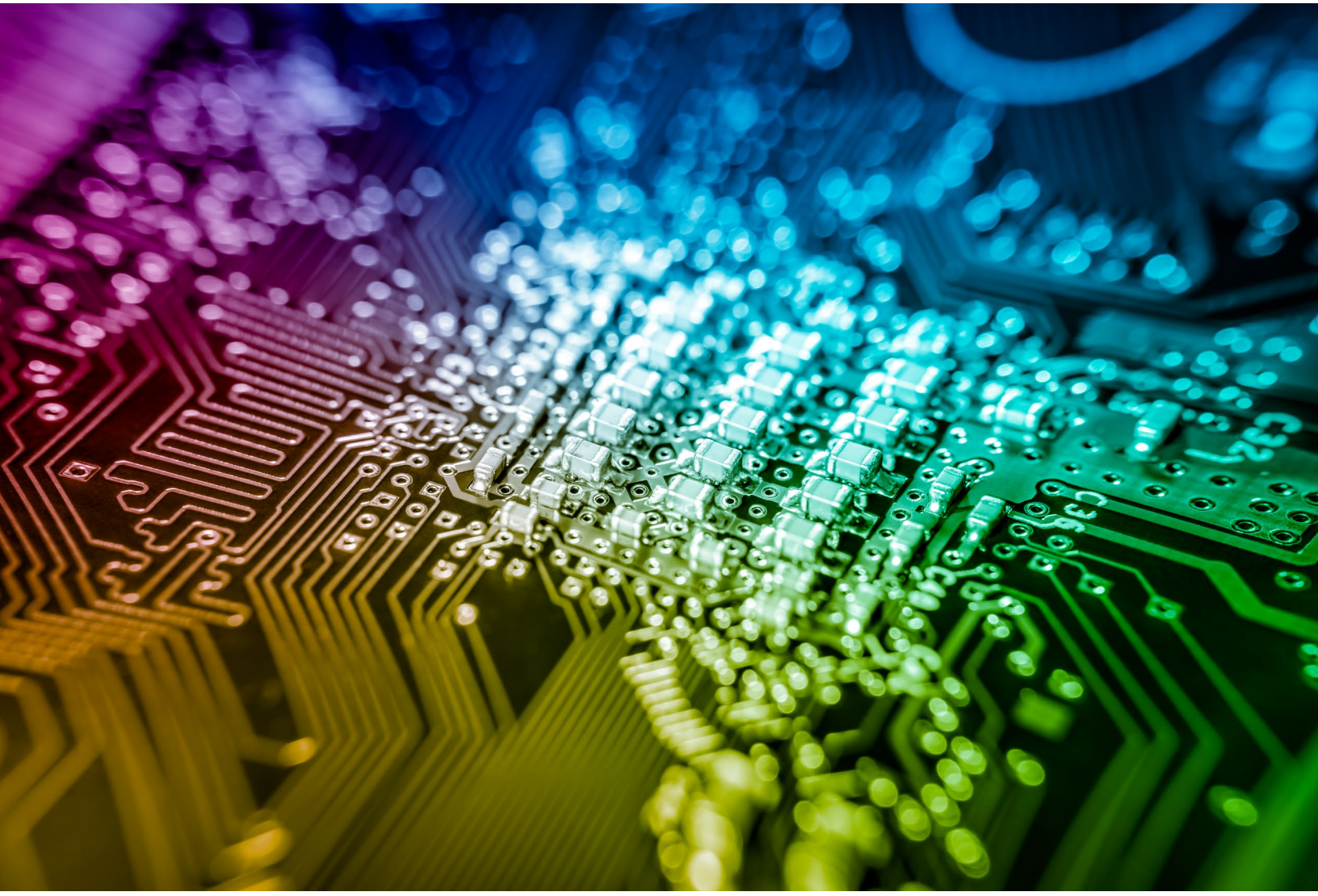
SEMICONDUCTOR SUPPLY CHAIN RESILIENCY



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1. CURRENT SITUATION— THE SEMICONDUCTOR SHORTAGE'S IMPACT ON THE ICT ECOSYSTEM

THE GLOBAL SEMICONDUCTOR SHORTAGE, exacerbated by the COVID-19 pandemic, has deeply affected Information Communications Technology ("ICT") industries, including broadband and other communications providers. Semiconductors of varying size and complexity are used at every level of the ICT ecosystem, including in the administration, management and operation of 5G and next-generation broadband networks.

Tasked with keeping America connected, broadband providers have sustained work, school, healthcare and commerce throughout the pandemic, accelerating our social and economic dependence on technology. Growth in videoconferencing and other remote options led to a dramatic, record-breaking increase in traffic. One large provider measured a 40% year-over-year increase, in petabytes of data crossing the network.[1] Another provider measured a 1,200% increase in use of collaboration tools, some of which are resource-intensive.[2] Traffic—and with it, society's need for semiconductors—seems likely to remain elevated going forward, as the willingness of people and institutions to rely upon digital connectivity is here to stay.

As a direct consequence of current shortages, telecommunications companies have had to change their processes. Broadband providers have had to release orders up to 15 months in advance rather than the standard three.[3] Earlier product forecasts mean less flexibility and a need to carry more inventory, resulting in increased inventory storage costs. Broadband providers have also been forced to acquire alternate suppliers, and transportation costs alone are estimated to have increased by a factor of four. In some cases, the products of alternate suppliers may be more expensive, further increasing costs.

Because the shortage of necessary components is caused by the lack of adequate semiconductor supply, there is no clear end in sight for the shortage absent a sustained ramp-up in semiconductor manufacturing capacity. Given the substantial lead time to expand capacity in the semiconductor industry, these shortages are expected to last for a considerable amount of time and may become more acute before the market adjusts. However, there is a clear opportunity for government and industry to collaborate in order to accelerate an increase in semiconductor manufacturing capacity and mitigate some of the effects of this difficult environment.

2. HOW WE GOT HERE— THE PANDEMIC EXACERBATED AND EXPOSED A PRE-EXISTING PROBLEM

WHILE COVID-19 DID NOT SOLELY CREATE the semiconductor shortage, the uncertainty it generated exacerbated trends affecting both supply and demand. On the *supply* side, the pandemic exposed the vulnerabilities of a weak and struggling supply chain: insufficient manufacturing capacity; failure to invest in sustainable; long-term productivity; a lack of collaboration in international efforts to secure supply chains; over-concentrating outsourced manufacturing in one geographic area; and failing to keep up with other countries' investments in manufacturing and technology.

Furthermore, the semiconductor manufacturing capacity that does exist is unbalanced; the United States currently produces just 12% of the world's semiconductors, while 75% comes out of Asia, in large part due to government subsidies and a lower cost of operation.[4] Since 2001, supplier diversity for leading-edge semiconductors has decreased radically, from 30 companies to only three companies: TSMC (Taiwan), Samsung (South Korea), and Intel (United States).[5] This is considered a national security threat by many, as over-reliance on outside sources for this critical equipment that fuels our military and civilian life contains risks.

In recent years, much of the world's new manufacturing capacity has come from China because of the lower cost of opening and operating expensive manufacturing facilities there, due to lower regulation and a larger, lower-cost workforce.[6] In turn, locating manufacturing in China has helped Chinese companies to aggressively stockpile chips, making U.S. companies less able to compete and satisfy critical economic needs. This underscores the importance of restoring U.S. chip manufacturing leadership.

On the *demand* side, virtual school and telework have increased the demand for chips significantly. While remote learning was meant to be temporary, about one-fifth of school systems have considered or have planned to continue this method of learning.[7] Remote work will likely continue in various industries and depend upon reliable, secure digital collaboration technologies for employees. With no end in sight for this increased reliance on digital communication, strong networks and the multitudes of devices that rely upon fixed and mobile broadband infrastructure are crucial.

"In-sourcing"—restoring domestic manufacturing—will not be quick or easy, but is vital to preserving U.S. technology leadership and economic competitiveness. Going forward, strengthening semiconductor supply chains will protect the United States from the economic and national security risks of outsourcing this critical work.

3. POLICYMAKERS ARE ADDRESSING THE PROBLEM—CHIPS ACT—WHAT CAN WE EXPECT IT TO RESOLVE?

U.S. POLICYMAKERS ARE WORKING to address the semiconductor shortage, with the most notable measure to date being the CHIPS Act.[8] On June 8, 2021, the U.S. Senate passed a similar policy as part of the larger U.S. Innovation and Competition Act (USICA).[9] Such legislation, if enacted, will promote United States investment in the full semiconductor supply chain, from research and development to manufacturing—while potentially creating over 22,000 jobs.[10]

As a key consumer of semiconductors, the communications sector would greatly benefit from the investments authorized under the CHIPS Act. Supporting critical infrastructure and services as well as national broadband deployment, the industry is also critical to our national security and economic growth.

4. PROBLEMS WITH PREFERENTIAL TREATMENT (E.G., AUTOMOTIVE INDUSTRY PROPOSALS)

The automotive industry has proposed that the United States government direct some funding directly to automakers.[11] Auto industry leaders argue that their proposal is crucial to increase production of electric vehicles and therefore align with the widespread goal to cut emissions from the transportation sector. In this context, preferential treatment would amount to undue market interference and would directly constrain supply. While a significant economic contributor, auto industry interests should not be prioritized ahead of the demand for semiconductors in communications, in defense, in the financial sector, and in all of the sectors that comprise critical infrastructure.

The demand for semiconductors in the automobile industry should not come at the expense of the essential needs of broadband providers and the continued technological leadership and economic security of the United States. Semiconductors have enabled broadband providers and other ICT industries to sustain our economy and keep Americans connected during the pandemic. The United States government should avoid advancing any policies that favor the needs of specific industries, as such treatment would have various unintended consequences. Though the auto industry has been

impacted by the semiconductor shortage, policy measures such as inventory set-asides and mandatory allocation of chip supplies, distort and potentially harm market forces that determine chip allocation today. Set-asides for automakers would also potentially put at risk the needs of sectors crucial to U.S. innovation and economic growth, such as broadband services and the nation's communications infrastructure.

Preferential treatment would only fuel the competition for semiconductors in domestic industry. Automakers such as GM and Ford plan to partially build vehicles until more materials are available, and others are looking to purchase parts from smaller suppliers in order to cut out the current supply chain. Though the auto industry has been severely impacted by the semiconductor shortage, preferential treatment of automakers will support just their industry, while investment in various industries can stimulate economic growth.

The automakers' case for preferential treatment hinges upon their need for a different version of semiconductors known as "legacy chips." High-tech industry cannot utilize these older chips, but automakers do not need the more advanced options in their manufacturing. Therefore, automakers are asking for the distribution of legacy chips to favor their industry. This unequal distribution will harm the communications sector, which can also operate these older chips in IoT devices which do not require a more advanced option. Beyond IoT, the communications sector needs legacy chips for many other devices. While Congressional funding should be directed towards production of semiconductors, including legacy chips, there should be no preferential treatment for one industry.

Even before social distancing as a result of the COVID-19 pandemic dramatically increased demands for remote work, remote learning, telehealth, and other broadband services, the communications sector has been one of the fastest growing segments of the semiconductor industry customer base.[12] Preferential treatment toward automakers would overlook this fact, as the communications sector is crucial in enabling broadband providers to sustain our economy and keep Americans connected during the pandemic.

5. THE PATH TOWARD SEMICONDUCTOR SUPPLY CHAIN RESILIENCY

The United States urgently needs to increase manufacturing capacity for semiconductors. Looking forward, significant efforts will be needed over the short and long term to respond to the semiconductor shortage and enhance the United States' supply chain resiliency. While the global chip shortage will remain in the near term, efforts are moving in the right direction to address this issue.

Corporations are working to mitigate the short-term effects of the shortage on customers, including the communications industry, and we, in turn, are working to minimize the impact of the shortage on users. Chipmakers and chip-users across the industry have taken a number of important, immediate steps to address the immediate impacts of shortages, including adapting longer planning horizons as lead times stretch; improving communication and information sharing with key supply partners; and engaging in public policy dialogue to help shape long-term solutions. But uncertain lead times, increased transportation timelines, and increased costs are likely to persist as shortages resolve through 2022 and beyond absent action.

Looking ahead, it is critical that the United States invest in U.S.-based manufacturing, R&D, and innovation as laid out in the CHIPS Act and USICA. Both parties in Congress and the Administration have supported the strategy embedded in the legislation, which calls for investment in semiconductor manufacturing facilities and R&D. And it is important for the U.S. to follow through on refundable investment tax credits for U.S. semiconductor manufacturer investments and equipment purchases. Put simply, policymakers agree that the United States can no longer rely on such a high concentration of chip supply coming from one supplier in one part of the world.

Leading companies have already begun to plan ways to mitigate today's shortages and to reduce the risk of future shortages, from short term measures like improved supply chain transparency and increased inventory of essential components, to additions of new U.S.-based chip making capacity to meet the growing demand for chips. But the issues the industry and therefore the economy face cannot be addressed in any meaningful way by the private sector alone; there is a need for government partnership. The CHIPS Act and USICA are two vehicles to create those partnerships. The time for public-private partnership on chip manufacturing has come. ■

ENDNOTES

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