Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
WTB Seeks Comment on Impact of Global Semiconductor Shortage	)	WT Docket No. 21-195
	)	
	)	

COMMENTS OF THE INFORMATION TECHNOLOGY INDUSTRY COUNCIL

The Information Technology Industry Council (ITI)[1] appreciates the opportunity to submit these comments to the U.S. Federal Communications Commission (FCC or Commission) in response to the Public Notice in the above-captioned docket seeking information regarding the global semiconductor shortage.

I. INTRODUCTION AND EXECUTIVE SUMMARY

The current global semiconductor shortage is having a significant impact on many sectors of the economy, including the domestic communications sector. While the U.S. Government (USG) as a whole is reviewing the shortage and what steps may be taken to support ongoing industry efforts to alleviate the problem, the Commission can play a strong role in working closely with the Administration and Congress to ensure that communications sector needs are addressed on equal footing with other affected industries. Industry specific set-asides like those

[1] ITI is the premier global advocate for technology, representing the world's most innovative companies, including companies directly involved in the semiconductor manufacturing and packaging supply chain as well as downstream consumers and users of microelectronics technology. Founded in 1916, ITI is an international trade association with a team of professionals on four continents. We promote public policies and industry standards that advance competition and innovation worldwide. Our diverse membership and expert staff provide policymakers the broadest perspective and thought leadership from technology, hardware, software, services, and related industries.

that have been proposed elsewhere could seriously jeopardize important priorities of this Commission, including closing the digital divide, increasing equitable access to telemedicine services and remote learning, enhancing opportunities for communities of color and those living in economically distressed or remote areas, and fostering deployment of next-generation networks for 5G and other wireless services. Any approaches to address the current shortage should be market-based and should not pick winners and losers.

In general, ITI and its members[2] strongly believe that for the U.S. to maintain its leadership in technology and innovation, strategic investments by the USG to promote a strong semiconductor ecosystem are necessary, in particular by building U.S. manufacturing and advanced packaging capacity. We welcome the Senate's recent action to dedicate $52 billion to fund programs under the Creating Helpful Incentives to Produce Semiconductors (CHIPS) for America Act, and we look forward to House action as well. Likewise, we urge the Administration to cooperate with allies and partners to secure and diversify semiconductor supply chains globally. However, while these longer-term efforts are likely beyond the purview of the FCC, there is still an immediate role for the Commission to play in the broader discussion. In particular, the FCC can increase its understanding of the urgency of the supply shortage within the communications industry and effectively guard against any proposals to artificially allocate chip supplies through administrative or other action. We stand ready to support these efforts by responding to the Public Notice and offering our industry's expertise.

[2] *ITI Members*, https://www.itic.org/about/membership/iti-members (last visited June 10, 2021).

II. EFFECTS OF THE SHORTAGE ON THE COMMUNICATIONS INDUSTRY

We applaud the FCC's efforts to consult with industry to assess the impact of a continuing global shortage of semiconductors on the U.S. communications sector and Commission priorities. Semiconductors represent the foundational building blocks of—and serve as fundamental enablers of—information and communications technology (ICT) products and services, which in turn are integral to driving economic and innovative activity across most industries and sectors, including the communications sector. Semiconductors are vital to U.S. economic competitiveness and national security, as are many of the technologies that rely on a secure supply of chips, such as 5G, Internet of Things (IoT), Artificial Intelligence (AI), quantum computing, and supercomputer development. During the pandemic, semiconductors have been particularly vital in powering the ICT products, communications networks, and services necessary to provide healthcare and support the government's response to COVID-19, as well as enabling millions of students and employees to learn and work remotely.

- *Has the global semiconductor shortage spread to the communications sector? If so, to what segments? What are the impacts on lead times and costs of communications equipment and devices? Are there other industry trends that are relevant?*

The global semiconductor shortage has had an impact on the communications sector, as semiconductors are a crucial input for virtually every communications product. The global semiconductor shortage is impacting all products and segments, including core networking products, such as ethernet switching and routing, wireless technology, security products, collaboration equipment, and 5G access products. Semiconductor lead times are currently twice what would normally be expected, extending to 50 or more weeks in some cases. These delays in turn are causing significant product delays. According to some ITI member companies,

normal shipping times for communications products would be expected to range from 2-4 weeks but have stretched to 8-12 weeks recently. Price increases are being driven by multiple factors, including increased costs for air freight, overtime charges, and premium rates paid for inventory distribution and brokers.

- *What is the nature and extent of semiconductor shortages or shortages of other components that are critical to the communications sector? What is the short- and long-term capacity of manufacturers of semiconductors and semiconductor components to keep up with the communication sector's demand? How long is the current shortage expected to last?*

The current supply-demand market disruption is a relatively short-term phenomenon that the global industry is working hard to resolve. This supply-demand imbalance in the semiconductor market was largely caused by the continuously increasing need for semiconductors by industries across the board and was dramatically accelerated by the COVID-19 pandemic. The pandemic unleashed demand-drivers associated with a massive shift to remote work, distance learning, and telemedicine, leading to a disruption in worldwide supply chains. The result has been short-term market uncertainty with some segments of the semiconductor industry unable to fully meet increased demand despite a substantial increase in the foundry capacity utilization rate, a term used to describe the percentage of total manufacturing capacity available at any given time.

The demand spike has been particularly acute in the communications sector, as increased consumer demand for communications products has remained above even conservative forecasting, due to market uncertainty brought about by the COVID-19 pandemic. Specifically, some of our companies have reported that semiconductor components and those that use semiconductors in assembly (e.g., programmable logic devices (PLD), memory, application-

specific integrated circuits (ASIC), and power supply) are on extended lead times. We have also been informed that estimated demand for 2022 is expected to be more than 150% of total semiconductor foundry capacity. Finally, the supply of substrate, an input critical to the creation of semiconductor chips, could be constrained through 2023.

It is worth highlighting here that the communications industry has been able to better manage the supply-demand imbalance relative to other industries. This is largely due to effective supply chain management and significant communication and transparency at all levels of the supply chain. The semiconductor industry, for its part, has continued to produce semiconductors at a rate above pre-pandemic levels—a testament to the resiliency of their globally integrated supply chains—and has worked to ramp up production to meet the steep jump in demand across the board. This is noteworthy given that semiconductor manufacturing, by its nature, is not suited to large, rapid demand shifts. As noted earlier, our members report that current lead times are stretching to upwards of 50 or more weeks for chips, but even during non-pandemic times, lead times of up to 26 weeks are the norm to finish a chip, which is built using one of the most complex manufacturing processes on earth.

- *Which semiconductor technology nodes in particular have been impacted or are expected to be impacted by the shortage? Which technology nodes are important to the short- and long-term needs of the communications sector?*

Some of our companies have reported that the most mature technology (16nm and above) is typically facing the largest constraints within the communications sector, in part stemming from competition with the automotive industry. That said, advanced nodes (14nm and below) are critical for the present and future of the communications sector. From cloud centers relying on advanced processors for servers to infrastructure equipment relying on FPGA and other

advanced chips, resilience of and expansion of communications infrastructure is highly dependent on the semiconductor industry's ability to continue to drive improved power-performance in advanced nodes.

The recovery of the supply chain will be heavily dependent on the level of demand through the next couple of years. Assuming demand stays strong due to the dramatic economic shift toward virtual applications and services that was caused by the global pandemic, our members do not expect to see a full supply recovery in 2022.

- *What are the factors impacting the supply of semiconductors and other manufacturing components which are critical to the communications sector? Commenters should consider the ongoing COVID-19 pandemic, the availability of materials, manufacturing capacity, shipping, rapidly increasing demand for particular types of products, excessive reliance on certain manufacturers for critical semiconductor components, and any other factors impacting these markets.*

Our member companies have reported observing a range of factors impacting the supply of semiconductors and other manufacturing components for the communications sector. Competition for the existing supply of semiconductors and components with other industries has proven to be a significant challenge for communications equipment manufacturers. The communications sector must compete with industries ranging from automotive to crypto mining to consumer electronics and gaming, who all need chips for various purposes, including touch panels, video drivers, multi-core processing units (MPU), and graphics processing units (GPU).

As noted previously, finite manufacturing capacity and time-intensive manufacturing processes are major determinates of the chip supply for the communications sector. Further, with fewer suppliers available, unforeseen incidents at individual facilities and in their geographic regions, such as factory fires, volcanic activity, and a host of severe weather

incidents, are having an outsized impact on production and distribution, and the global COVID-19 pandemic has been posing an ongoing, potential health risk in these regions as well.

Coupled with the factory-level constraints, a reported short supply of raw materials has also had a significant impact on production, including shortages of unique raw materials such as polymer substrate or photoresist chemicals, laminate, resin, steel, copper, and gold, along with displays, paper, and foam. The lack of semiconductor substrate is the largest constraint severely impacting the entire industry. Finally, commercial shipping shortages have even had an impact, whether scant capacity on container ships or ocean carrier disruptions such as the recent Suez Canal blockage, increased processing times at ports of entry, lack of ground transport available for final delivery, and increased costs stemming from each of these other factors.

- *To what extent are supply constraints impacting different uses of semiconductors, such as systems-on-a-chip, microprocessors, memory chips, and standard chips?*

Our companies have reported that legacy semiconductor processes are currently the most constrained due to a lack of investment and the shift to smaller geometries. While memory pricing is increasing and supply is tight, Dynamic Random-Access Memory (DRAM), Flash, and Solid-State Drive (SSD) supply is in better shape than bulk Complementary Metal-Oxide-Semiconductor (CMOS). Analog semiconductor supply is also reportedly in extremely tight supply.

- *What are the impacts of shortages of semiconductors or other critical components on the communications sector, including on consumers, enterprise system users, private network operators (such as critical infrastructure), and service providers? To what extent are these shortages driving changes to stakeholders' plans and priorities and resulting in changes to the communications industry more broadly?*

Some ITI members have reported that semiconductor shortages are causing lead time extensions on the full range of routing, switching, wireless, collaboration, and security products. These increased lead times are affecting enterprise users, small businesses, service providers, and private operators and are delaying planned infrastructure deployments and 5G network upgrades, along with limiting the ability to scale broadband access. These delays threaten to postpone the economic and social benefits that flow from a well-connected, digital economy, including greater access to information and choice through virtual banking and e-payments, medical care and mental health access, education and e-learning, small business development resources, and remote working opportunities, among others.

III. EFFECTS OF THE SHORTAGE ON THE COMMISSION'S PRIORITIES

These delays will affect a range of Commission priorities, specifically those related to security and the deployment of next generation technologies intended to help close the digital divide. For example, there has been a bipartisan focus by the FCC on securing communications networks, with actions taken to replace certain existing equipment in networks and proposals raised to make broader changes to the equipment authorization process.[3] Increased demand for equipment either to replace existing components or to meet future needs will very likely create a shortage problem for suppliers and customers alike, exacerbating the current supply crunch.

[3] *See* Press Release, FCC Announces Tentative Agenda for June Open Meeting (May 27, 2021), https://docs.fcc.gov/public/attachments/DOC-372817A1.pdf.

- *What are the impacts of these shortages on the public interest? How do these challenges affect the security of the United States and its competitiveness in the global economy? How do these challenges impact the deployment of next-generation networks and technologies? How do these challenges affect communities of color, economically distressed areas, and small businesses?*
- *What are the effects of semiconductor shortages on remote learning, telehealth, and other services that have moved online during the pandemic?*

First, regarding national security and economic competitiveness, while the bulk of manufacturing capacity is concentrated in a limited number of U.S.-allied countries, the United States could face an existential threat to its safety, the health of its citizens, its democratic processes, and its ability to support commerce if access to the limited number of production centers is diminished or restricted. This dependence also could threaten our ability to deploy critical infrastructure in a timely manner and as intended. The U.S. leads the world in most research and development (R&D)-intensive activities, including Electronic Design Automation (EDA), core Intellectual Property (IP), and chip design, but would benefit from increased capacity to fabricate wafers and key materials, as well as to build assembly, packaging, and testing equipment. These globally integrated supply chains are at risk of disruption due to geopolitical tensions, in addition to market forces, and such disruption could have an outsized impact on the U.S. economy and national security.

Second, there has been extensive bipartisan agreement under the last Administration and under the current leadership of Acting Chairwoman Rosenworcel on devoting Commission resources toward bridging the digital divide and addressing broadband disparities that remain between communities, some of which still struggle to connect to the Internet for work or school. This problem was magnified by the stark effects of the global pandemic and an increased reliance on remote work and school, along with increased reliance on telemedicine services where they were available. Remote learning, healthcare, and other virtual applications and

services require safe, secure, and cost-efficient networks and devices to operate. Without timely access to semiconductors, needed network components and devices cannot be produced rapidly enough to meet demand.

Unfortunately, the chip shortage is affecting both broadband service providers who are working to bring more Americans online[4] and manufacturers who provide the devices needed to connect consumers with virtual applications and services.[5] We have observed, for example, that radiation-hardened components needed for satellite broadband services are already facing a shortage in lab testing capacity. Thus, an already lengthy manufacturing process likely will be extended due to the current semiconductor shortage, creating further delays in reaching deployment targets. Ultimately, any delays in deploying cutting edge technologies that can help to close the digital divide and slow deployment of critical communications infrastructure means more Americans will continue to be sidelined from participating in the digital economy.

In particular, delayed deployments mean individuals living in communities of color and economically distressed areas would continue to be excluded from the economic benefits of the digital economy, while small businesses in these communities also would not be able to access essential tools and technologies needed to scale and compete effectively. As a result, these impacted individuals may continue to lack access to the social and economic benefits of a digital economy, including better access to telemedicine and expanded healthcare options, remote learning and online educational resources, digital payment systems and financial technology, remote work opportunities, and virtual recruiting and work placement assistance programs.

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[4] *FCC Says it is Studying Impact of Chips Shortage on U.S. Communications Sector*, CNBC (May 11, 2021), https://www.cnbc.com/2021/05/12/fcc-says-it-is-studying-impact-on-chips-shortage-on-us-communications-sector.html.

[5] *See* Daphne Leprince-Ringuet, *The Impact of the Global Chip Shortage Continues to Ripple Across the Tech Supply Chain*, ZDNet (May 10, 2021), https://www.zdnet.com/article/the-impact-of-the-global-chip-shortage-continues-to-ripple-across-the-tech-supply-chain/.

- *What are the potential impacts of the failure to sustain reliable access to semiconductors for the communications sector, including the impact on key vertical markets?*

ITI's member companies believe that failing to sustain reliable access to semiconductors for the communications sector could result in a repeated situation (severe supply disruptions and associated delays) or a worse situation, wherein the industry could perpetually be unable to secure adequate chip supplies. The impacts of this outcome would ripple across the entire U.S. economy, limiting access to the digital economy and slowing security upgrades for critical industries, among innumerable other negative effects.

IV. ITI RECOMMENDATIONS FOR THE COMMISSION

The Biden Administration and Congress have devoted extensive resources toward exploring ways for the USG to work with the private sector to address gaps in the domestic semiconductor supply chain, and ITI has commented at length in other proceedings.[6] We incorporate those comments by reference but would offer the following specific recommendations to the FCC.

- *What steps can be taken by the Commission, either working on its own or in concert with Federal partners, to help address these current challenges?*

It is essential that the Commission recognize the urgency of current and future needs facing the communications industry and avoid taking any action that would create through government fiat a preference for one industry over another to obtain semiconductors and related

[6] *ITI Submission to the Risks in the Semiconductor Manufacturing and Advanced Packaging Supply Chain* (Apr. 5, 2021), https://www.itic.org/documents/supply-chain/ITICommentsonSemiconductorSupplyChainRFCFinalSubmission4-5-21.pdf.

components needed by all. We have observed our member companies' efforts in recent months to navigate the current shortage through the use of open markets and transparent business practices, without a heavy-handed federal response. We would strongly oppose any efforts by other industries or the USG to tip the scales in favor of one industry, including through reallocation of supply, funding carve outs for future incentives, or any other form of overzealous intervention. We applaud the Commission for seeking formal comment on this matter and anticipate the development of a helpful record in response.

- *What steps can be taken to prevent similar challenges in the future, particularly those challenges related to unanticipated, catastrophic, global events? How can the Commission help to ensure that the benefits of United States leadership in semiconductor manufacturing will flow to all Americans?*

The USG has a role to play in securing and strengthening the domestic semiconductor supply chain into the future—for the benefit of all downstream industries—by making strategic investments in innovation. This primarily relates to revitalizing high-tech manufacturing and advanced packaging capabilities of semiconductors and bolstering R&D in the United States, which has the potential to drive innovation across many different sectors for decades to come. For the U.S. semiconductor industry to remain competitive, and to strengthen the resilience of critical semiconductor supply chains, the Administration should prioritize incentivizing research, development, prototyping, and manufacturing of advanced semiconductors in the United States.

The FCC especially can play a strong role in this process by working with the Administration and Congress to ensure that any incentives related to semiconductor manufacturing, such as those contained in the *CHIPS for America Act,* also include supplies needed for the communications sector. The industry requires increased domestic capacity, new

materials, and advanced manufacturing technology now and into the future to provide sufficient output and rates of improvement in performance and cost.

V. CONCLUSION

As semiconductors are foundational to the technologies used in the communications and national security contexts, and to help prevent a repeat of the current situation, the U.S. must ensure a consistent domestic supply that is sufficiently insulated from external shocks to the supply chain. Augmenting domestic production of semiconductors, coupled with ensuring the continuity of necessary global supply chains, would help make America's semiconductor supply chains more resilient when facing future crises and ensure the U.S. can supply the advanced chips needed for communications, defense, and other critical infrastructure.

ITI and our member companies appreciate the opportunity to provide feedback regarding this matter and look forward to working with the Commission and other stakeholders on ways to address the issues that we raised.

Respectfully submitted,

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