

April 13, 2018

Submitted via email to: [DDTCTPublicComments@state.gov](mailto:DDTCTPublicComments@state.gov)

Submitted via [www.regulations.gov](http://www.regulations.gov)

Ms. Engda Wubneh  
Office of Defense Trade Controls Policy  
Department of State  
2401 E St., NW  
Washington, D.C. 20037

Re: Notice of Inquiry; Request for Comments Regarding Review of United States Munitions List Categories V, X, and XI (Federal Register Notice of February 12, 2018; RIN 1400-AE46)

Dear Ms. Wubneh:

The Semiconductor Industry Association (SIA) is the voice of the U.S. semiconductor industry, one of America's top exporting industries and a key driver of America's economic strength, national security and global competitiveness. Semiconductors – microchips that control all modern electronics – enable the systems and products we use to work, communicate, travel, entertain, harness energy, treat illness and make new scientific discoveries.

The semiconductor industry directly employs nearly 250,000 people in the United States. In 2017, U.S. semiconductor company sales totaled \$189 billion – roughly half the global market share – and semiconductors are the foundation of the trillion-dollar global electronics industry. SIA seeks to strengthen U.S. leadership in semiconductor manufacturing, design and research by working with Congress, the Administration, and other key stakeholders to encourage policies and regulations that fuel innovation and drive international competition.

SIA is pleased to submit the following comments in response to the request for comments to inform the State Department's review of the controls implemented in recent revisions to Category XI of the United States Munitions List (USML).

## **I. Introduction and Background**

SIA strongly supported the Department's efforts setting forth revisions for 18 USML categories to create positive lists of controlled items using objective criteria and, with limited exceptions, to eschew the use of subjective criteria and catch-all phrases to control unspecified items. We agree that a more positive list can and should be tailored to satisfy the national security and foreign policy objectives of the U.S. Government by controlling defense articles that provide a critical military advantage, without

inadvertently controlling items in normal commercial use. Finally, SIA supports the Department's continuing efforts to regularly revise and update the International Traffic in Arms Regulations (ITAR) to account for technological developments and continue to ensure that the ITAR do not control semiconductors, and related technology and other items, in or soon to become in normal commercial use.

## **II. Evolution of 5G Networks and Systems**

The primary area of concern to SIA where revisions to the USML XI are now and will be needed over the next several years pertains to fifth-generation (5G) mobile networks. Mobile network operators in the U.S. and foreign nations have ambitious plans to establish 5G networks in the immediate future. The advantages of 5G include much higher data rates and system capacity, reduced latency, and massive device connectivity. 5G systems are needed to provide richer and faster content to mobile phones and other devices, to enable the Internet of Things, and to enable the high data rates and low latency needed for connected and autonomous vehicles to meet specifications.

In the U.S., each of the major mobile network operators have announced plans for the deployment of 5G networks in 2018. AT&T has announced plans for portable 5G hotspot service in twelve U.S. cities by the end of 2018. Verizon will launch fixed 5G service in three to five cities in 2018, with 5G smartphones and networks by early 2019. T-Mobile plans to have 5G in thirty cities by the end of 2018, and a nationwide mobile network by 2020. Sprint has announced plans for 5G-like service in six U.S. cities.

Foreign mobile operators have also announced plans for the deployment of 5G networks. Korea Telecom launched a 5G pilot program during the 2018 Winter Olympics and plans a nationwide roll out in late 2019. In Japan, NTT DOCOMO, Japan's largest mobile operator, announced plans for a 5G mobile network in commercial service by 2020. China Mobile will launch a trial network in four large Chinese cities, and smaller trials in twelve other cities, in 2018. In Russia, telecom operators MegaFon and Rostelecom have signed a cooperation agreement to jointly develop a 5G network, and MegaFon will have 5G test zones in Moscow and St. Petersburg during the 2018 World Cup. In total, there are twenty-two operators in sixteen countries currently committed to deploying 5G according to the Global Mobile Suppliers Association (GSMA).

The GSMA expects 5G connections to reach 1.1 billion, or 12% of total mobile connections, by 2025. 5G will infuse data center, edge computing, networks, modems and IP. The global semiconductor industry totaled \$400 billion in sales in 2017. Communications currently accounts for over 30 percent of sales by end use, with computers and servers close behind at 30 percent. Consumer and automotive are each above 10 percent. All of these segments – comprising over 80 percent of total sales – will become 5G-enabled. SIA member companies must participate in the development of this technology to maintain our leadership position in the global semiconductor market.

### **III. ITAR Controls are Incompatible with Global Electronics Supply Chains**

Because semiconductors are components in hardware for 5G systems, semiconductor companies must work with the providers of such hardware well in advance of system deployment to ensure American semiconductor products and technology are used in the 5G systems of the future. Developers and vendors of this purely commercial wireless technology will not partner with U.S. semiconductor companies if their items and activities are subject to the military controls of the ITAR. This is a basic fact of commercial life in all sectors – non-U.S. companies will almost never agree to allow their commercial products be subject to extra-territorial military export controls of the United States. They will generally choose suppliers from other allied countries, such as South Korea, Japan, and those in the European Union, where such military controls do not exist over components for 5G systems. These countries have a general rule that components not specially designed for military systems are not subject to their munitions controls.

To be clear, SIA is not objecting to export controls over sensitive dual-use components that are used in 5G systems. Indeed, SIA and its member companies consider themselves partners with the U.S. Government in keeping the descriptions of such sensitive dual-use components correct and current so that they can be properly controlled by the United States and its dual-use multilateral regime allies. Rather, SIA and its member companies will provide information regularly to the U.S. Government regarding the evolution of 5G systems and networks to ensure that such purely commercial applications are not subject to the ITAR. If regular updates are not made over the years, SIA companies will fall far behind international competitors in the development and commercialization of this significant emerging civilian technology – a market worth hundreds of billions of dollars worldwide. This would significantly reduce our ability to keep high-technology manufacturing and export-led employment in the United States.

### **IV. Specific Comments**

For business proprietary reasons, SIA members will be submitting their own comments to the U.S. Government pertaining to their products in normal commercial use that are or might be within the scope of a USML paragraph. U.S. semiconductor companies are currently marketing their solutions to manufacturers of 5G mobile devices and infrastructure components. With fierce competition between members to have their semiconductor products and solutions incorporated into hardware for this extremely commercially significant, yet still burgeoning market, companies are very reluctant to publicly disclose details of their technology, sales and products to competitors. Thus, SIA, for now, is making only the following two general comments about two Category XI subparagraphs. We and our member companies then look forward to reviewing the proposed rule to help ensure that any proposed changes would not inadvertently capture commercial 5G and other networks and systems.

## A. USML XI(c)(4)

USML Category XI(c)(4) controls “Transmit/receive modules or transmit modules that have any two perpendicular sides, with either length  $d$  (in cm) equal to or less than 15 divided by the lowest operating frequency in GHz [ $d \leq 15 \text{cm} \cdot \text{GHz} / f \text{ GHz}$ ], with an electronically variable phase shifter or phasers that are a Monolithic Microwave Integrated Circuit (MMIC), or incorporate a MMIC or discrete RF power transistor.”

High-bandwidth frequency ranges under development for 5G are roughly 25 GHz, 40 GHz, 60 GHz, and 75 GHz. Though the highest two bands may or may not ultimately be used, they are under active development in the United States and abroad. At these frequencies, phased-array antennas are the only practical antennas for transmitting or receiving. Fundamental physics dictates that the antenna elements must be spaced less than one-half wavelength apart. One-half wavelength is 15 cm divided by the operating frequency in GHz, exactly the control threshold. Since transmission-line or waveguide losses are extremely high at these frequencies, the transmit and receive electronics must be located immediately next to the antenna elements and therefore themselves be less than one-half wavelength in size in order to fit within the available space. Thus, category XI(c)(4) controls the electronics for all 5G antenna systems.

Modules caught by Category XI(c)(4) may or may not meet the control parameters of ECCN 3A001.b.12 depending on their rated operating frequencies, power and bandwidth. ECCN 3A001.b.12 is a relatively new ECCN. With Wassenaar Arrangement Member States’ consensus, the Commerce Department created this ECCN in 2017 to consolidate the old and new controls for the types of MMICs also controlled by Category XI(c)(4). See 82 Fed. Reg. 38766 (Aug. 15, 2017). Such a change, we understand, occurred after a technical analysis and policy agreement among the departments of Defense, Commerce, and State that some MMICs of the same type as those controlled by Category XI(c)(4) should not be on either the Wassenaar Munitions List or the Dual-Use List if they fell below the power and bandwidth parameters in the new ECCN.

It is our understanding that the U.S. Government is aware of this issue and plans to remedy it with a change to USML Category XI(c)(4) so that it includes peak saturated power output parameters that exceed those described under ECCN 3A001.b.12, along with other changes to resolve the overlap between the USML and CCL. We nonetheless make this comment to preserve the point – and to encourage the U.S. Government to promptly implement the fix in order to help ensure continued leadership by U.S. companies.

## **B. USML XI(c)(10)**

USML Category XI(c)(10) controls “Antennas, and specially designed parts and components therefor, that:

- (i) Employ four or more elements, electronically steer angular beams, independently steer angular nulls, create angular nulls with a null depth greater than 20 dB, and achieve a beam switching speed faster than 50 milliseconds;
- (ii) Form adaptive null attenuation greater than 35 dB with convergence time less than one second;
- (iii) Detect signals across multiple RF bands with matched left hand and right hand spiral antenna elements for determination of signal polarization; or
- (iv) Determine signal angle of arrival less than two degrees (e.g., interferometer antenna).”

A note to the paragraph states that it does not control Traffic Collision Avoidance Systems (TCAS) equipment conforming to FAA TSO C-119c. There are no notes stating that it does not apply to commercial 5G applications, although we do not believe that it was the intention of the U.S. Government to apply USML controls to items in civil telecommunications applications.

However, null-steering antenna satisfying subparagraphs (i) and (ii) may be required in 5G infrastructure (e.g., base stations, mobile stations, and transportable stations) in order to avoid interference with neighboring 5G infrastructure and from large nearby metal objects. Also, angular resolution of subparagraph (iv) may be required to locate individual handsets. Therefore, this entry will apply to 5G cellular infrastructure within the next five years.

As a practical matter, as described above and elsewhere, U.S. industry cannot participate in the international market with such items subject to ITAR control. The risk of potential military controls over purely commercial applications discourages foreign partners in allied countries from participating with U.S. businesses. Furthermore, due to the incompatibility of ITAR controls with global electronics supply chains for civilian applications, no U.S. manufacturer we know of would knowingly build systems that are within the scope of an ITAR paragraph for a civil application. Thus, we do not have examples of specific civilian products that meet the standards in XI(c)(10).

We do, however, know that it is a reasonable possibility that, within the next five years, 5G infrastructure operators will need to have the flexibility to take appropriate action to resolve purely commercial 5G antenna issues without the possibility of control under USML XI(c)(10). Although we are willing to discuss other ideas with the U.S. Government to resolve this issue, one simple solution would be to limit the scope of the paragraph to only those articles that are “specially designed for defense articles.” We

appreciate that the State Department generally wants to limit the use of “specially designed” control parameters in favor of more positive descriptions. However, in situations where positive list parameters would be too unwieldy or elusive, State has occasionally used such solutions. They still tailor the control to specific articles but ensure that dual-use items are properly subject to the controls of the Export Administration Regulations (EAR) rather than the ITAR. State, working with its Defense and Commerce colleagues, can ensure that dual-use antennae that are not specially designed for defense articles but are nonetheless sensitive have the proper reasons for control attached to them in the bookend Commerce Control List entry.

## **V. Conclusion**

SIA supports the Department’s efforts to revise the USML to ensure it does not cover items in normal commercial use, and we look forward to submitting robust, detailed comments on a future proposed rule. If you have any questions regarding these comments or the issues in general, please do not hesitate to contact me at 202-446-1713 or [jpasetti@semiconductors.org](mailto:jpasetti@semiconductors.org).

Sincerely yours,

Joseph Pasetti  
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Semiconductor Industry Association