Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance	)	ET Docket No. 22-137
	)	
	)	

REPLY COMMENTS OF
THE TELECOMMUNICATIONS INDUSTRY ASSOCIATION

INTRODUCTION

The Telecommunications Industry Association ("TIA")[1] welcomes the opportunity to submit these reply comments in the above-referenced proceeding.[2] TIA represents the global manufacturers and vendors of trusted information and communications technology ("ICT") equipment and services that empower communications networks worldwide. TIA operates nine engineering committees that develop guidelines for public safety / critical infrastructure radio equipment, cellular towers, VOIP equipment, structured cabling, satellites, telephone terminal equipment, accessibility, data centers, mobile device communications, vehicular telematics, smart device communications, and smart utility mesh networks. More than 1,000 individuals –

[1] TIA is the leading trade association for the information and communications technology ("ICT") industry, representing companies that manufacture or supply the products and services used in global communications across all technology platforms. TIA represents its members on the full range of policy issues affecting the ICT industry and forges consensus on voluntary, industry-based standards.

[2] Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance, Notice of Inquiry, FCC 22-29 (rel. Apr. 21, 2022) ("NOI").

All references to "Comments" in this reply are to comments filed in ET Docket No. 22-137 on or about June 27, 2022.

representing network equipment manufacturers, service providers, government entities, and end users – currently serve on TIA's Engineering committees.[3]

TIA and its members share the Federal Communications Commission's ("FCC's" or "Commission's") interest in ensuring that all equipment forming the foundation of U.S. ICT networks are designed to make efficient use of our nation's airwaves. TIA agrees with the Commission that consideration of receiver performance characteristics, in addition to transmitter performance characteristics, is an important step in assessing and understanding interference, and ultimately achieving more efficient use of the nation's spectrum resources. As such, TIA applauds the Commission for issuing the NOI, which spurred a substantial record containing many positions and ideas for the Commission and industry to consider further.

TIA, supported by TIA's Private Radio Section ("PRS") and TIA's Private Radio Engineering Standards Formulating Committee (Mobile and Personal Private Radio), files these targeted reply comments to add support for the Commission's inquiry and to further highlight the valuable role that voluntary standards organizations, like TIA, play in promoting efficient receiver performance. TIA's own standards demonstrate that receiver performance is not a "one-size-fits-all" exercise. TIA encourages the Commission to continue to support these voluntary efforts to improve spectrum efficiency.

[3] *See* Telecommunications Industry Association, https://standards.tiaonline.org (last visited July 19, 2022).

DISCUSSION

I. THE RECORD CONFIRMS THAT VOLUNTARY ASSOCIATIONS PLAY AN IMPORTANT ROLE IN DEVELOPING STANDARDS FOR RECEIVER PERFORMANCE.

The record in this proceeding makes clear that voluntary industry standards are an important component of spectrum management. Commenters observe that industry-driven Standards Development Organizations ("SDOs") can "generally develop actionable standards quicker than the Commission can develop rules" and they are well-positioned to "consider the potential economic impact of standards including how to address and protect intellectual property (IP) issues."[4] Thus, using industry-driven standards is a "logical approach to solving most adjacent band incompatibilities."[5] In the case of TIA's TR-8 standards, equipment providers and users work together to create standards that result in the best possible spectral efficiency and interference protection.

The record contains many examples of industry standards bodies that work to develop standards that promote efficient spectrum use, including through efficient receiver performance design. For example, several commenters in the wireless community cite to the benefits of the 3GPP and its impact on promoting new technologies such as 5G through the use of receiver performance standards and testing.[6] Other sectors point to the success of efforts by the European

[4] Comments of CommScope, Inc. at 5-6 ("CommScope Comments").

[5] Comments of Motorola Solutions, Inc. at 5.

[6] *See, e.g.*, Comments of 5G Americas at 3-4; CommScope Comments at 4; Comments of CTIA at 5-6; Comments of Verizon at 8.

Telecommunications Standards Institute.[7] Meanwhile, National Telecommunications and Information Administration and others highlight the role of the standards developed by TIA.[8]

To aid in the Commission's review, we add to this record additional information about TIA's role in developing equipment standards for use in private land mobile radio services. As an American National Standards Institute ("ANSI") accredited SDO, TIA and TR-8 provide processes, procedures, and appropriate governance to develop highly technical performance recommendations and methods of measurements relating to transmit and receive aspects of wireless systems. As equipment is developed and deployed, this process provides stakeholders an opportunity to further refine recommendations or measurement methods to resolve ambiguities, interference and other issues that may arise among equipment manufacturers, equipment end users, and service providers.

TIA and TR-8 have developed several standards that are widely deployed in support of public safety operations. These include the following transmitter and receiver performance recommendations and related methods of measurement:[9]

- TIA-102.CAAA: Digital C4FM/CQPSK Transceiver Measurement Methods;
- TIA-102.CAAB: Land Mobile Radio Transceiver Performance Recommendations, Digital Radio Technology, C4FM/CQPSK Modulation;
- TIA-102.CCAA: Two-Slot Time Division Multiple Access Transceiver Measurement Methods;

[7] *See, e.g.*, CommScope Comments at 4; Comments of EchoStar Satellite Services, LLC and Hughes Network Systems, LLC at 2-4; Comments of Robert Bosch LLC at 27; Comments of Shure Incorporated at 5.

[8] *See, e.g.*, Comments of National Telecommunications and Information Administration at 3; CommScope Comments at 4; Comments of Lockheed Martin at 8; Comments of Wi-Fi Alliance at 6-7.

[9] Methods of measurements for receiver performance include, but are not limited to: reference sensitivity, adjacent channel rejection, co-channel rejection, narrowband intermodulation rejection, and broadband strong signal intermodulation rejection.

- TIA-102.CCAB: Two-Slot Time Division Multiple Access Transceiver Performance Recommendations; and
- TIA-603: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.[10]

Public safety communication systems designed to TIA 102 and/or TIA 603 standards are designed to ensure reliable operation under normal and extreme operating conditions and in the presence of dissimilar services in adjacent frequency bands. This includes cases of cross service interference such as 700 MHz broadband services adjacent to 700 MHz narrowband services. The standards are engineered to support the specific needs of the public safety and critical infrastructure sectors, which "often have stringent operational requirements"[11] including a need for "highly reliable and robust [receivers] to perform their mission-critical activities in times of emergencies[.]"[12]

TIA 102 and 603 series voluntary standards[13] incorporate input from equipment manufacturers, public safety equipment end-users, and commercial service providers (which deploy broadband services in bands adjacent to public safety authorizations) to:

- Evaluate user requirements;
- Address bandwidth and spectrum availability;

---

[10] These standards are available for purchase at https://global.ihs.com/csf_home.cfm?&csf=TIA

[11] NOI ¶ 56.

[12] Comments of T-Mobile USA, Inc. at 7. Receiver performance requirements for public safety and critical infrastructure narrowband operations require careful consideration of reference sensitivity, adjacent channel rejection, and interference immunity.

[13] While TIA's receiver performance recommendations are voluntary standards, the U.S. Department of Homeland Security through its Project 25 Compliance Assessment Program provides public safety agencies access to grant funding to purchase interoperable radio equipment that has been shown (through accredited independent test laboratories) to meet or exceed a subset of these performance recommendations. As such, equipment manufacturers have an indirect incentive to produce equipment that conforms to these voluntary standards. *See* U.S. Department of Homeland Security, Science and Technology, Project 25 Compliance Assessment Program (P25CAP), https://www.dhs.gov/science-and-technology/p25-cap.

- Quantify/Characterize technology deployments;
- Consider the need for transition/guard bands for interference immunity;
- Evaluate performance characteristics and method of measurements for feasibility; and
- Ensure reliable interoperability of equipment from multiple manufacturers that is independently developed to these standards.

In addition to the TIA 102 and/or TIA 603 standards, TIA TR-8 publishes the TSB-88 series of documents which provide a robust evaluation of wireless technology, including modulation formats, spectrum, propagation, interference, and other environmental factors (e.g., foliage, low emissivity glass) to facilitate interoperability and interference analysis across different wireless services and technologies that operate in or adjacent to public safety and critical infrastructure frequency bands. When new wireless services have the potential to impact equipment covered by TIA standards, TSB-88 documents are expanded as necessary to assist in development of new or revised receiver performance recommendations and/or methods of measurements contained in the TIA-102 standards and the TIA-603 standards.

Finally, TIA-10, "Interference Criteria for Microwave Systems" has been used for decades as the standard for addressing interference analysis and frequency coordination between microwave systems and between microwave systems and new entrants.[14] The document is also referred to several times in the FCC rules and serves as a standard reference for mobile systems sharing spectrum with point-to-point microwave systems.[15]

[14] Annex F addresses spectrum sharing considerations between microwave systems and Personal Communications Service systems.

[15] See 47 C.F.R §§ 101.105(c), 24.237(a), 27.1134(b),

II. THE FCC SHOULD CONTINUE TO SUPPORT VOLUNTARY INDUSTRY-DRIVEN STANDARDS WORK TO FURTHER ENHANCE SPECTRUM EFFICIENCY.

To the extent the Commission moves forward with its inquiry, the agency should continue to encourage voluntary industry SDOs to engage in meaningful work that drives efficient transmitter and receiver design. The many standards that have been developed to date demonstrate the complexity of the issues and the fact that a "one-size-fits-all" solution is not likely to be successful. Standards organizations play a critical role in developing standards that support various spectrum use cases, while ensuring that end user equipment remains technically achievable at a reasonable cost and in a form factor that enables widespread adoption.

As an example, public safety wireless systems successfully incorporate technologies that comply with voluntary standards developed by appropriate subject matter experts representing equipment manufacturers, equipment end-users, and service providers systems and designed to balance competing needs. In particular, TIA TR-8 has proven to be an effective vehicle for development of voluntary receiver standards for public safety operators by incorporating input from relevant stakeholders and providing a means to de-conflict existing and new deployments of technology and spectrum.[16]

CONCLUSION

TIA thanks the Commission for launching this inquiry, which has gathered new scholarship and industry developments in a new docket for further examination. TIA is proud that the ICT industry uses TIA standards as a foundation, along with many other voluntary,

[16] TIA notes that lifecycle support of voluntary standards is an essential aspect for de-conflicting interference issues that arise.

industry-led standards. The Commission should continue to encourage such voluntary, industry-led standards as a way to increase spectrum efficiency.

By: ____/s/_____

Melissa Newman
Vice President, Government Affairs

TELECOMMUNICATIONS INDUSTRY ASSOCIATION
1310 N. Courthouse Road
Suite 800
Arlington, VA 22201
(703) 907-7700

July 27, 2022