Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of:	)	
	)	
	)	
Office of Engineering and Technology	)	ET Docket No. 16-191
Announces Technological Advisory	)	
Council (TAC) Noise Floor Technical Inquiry	)	
	)	

COMMENTS OF
THE NATIONAL PUBLIC SAFETY TELECOMMUNICATIONS COUNCIL

The National Public Safety Telecommunications Council (NPSTC) submits these comments in response to the Commission's Public Notice seeking input to help answer questions about the study of changes to the noise floor over the past 20 years.[1] NPSTC appreciates the Commission's attention to the radio frequency (RF) noise floor issue. In these comments, NPSTC provides information concerning impact the public safety community has experienced to the radio frequency (RF) noise floor by both unintentional and intentional radiators.

[1] Office of Engineering and Technology Announces Technological Advisory Council (TAC) Noise Floor Technical Inquiry, ET Docket No. 16-191, DA 16-676 released June 15, 2016.

The National Public Safety Telecommunications Council

The National Public Safety Telecommunications Council is a federation of public safety organizations whose mission is to improve public safety communications and interoperability through collaborative leadership. NPSTC pursues the role of resource and advocate for public safety organizations in the United States on matters relating to public safety telecommunications. NPSTC has promoted implementation of the Public Safety Wireless Advisory Committee (PSWAC) and the 700 MHz Public Safety National Coordination Committee (NCC) recommendations. NPSTC explores technologies and public policy involving public safety telecommunications, analyzes the ramifications of particular issues and submits comments to governmental bodies with the objective of furthering public safety telecommunications worldwide. NPSTC serves as a standing forum for the exchange of ideas and information for effective public safety telecommunications.

The following 16 organizations serve on NPSTC's Governing Board:

American Association of State Highway and Transportation Officials
American Radio Relay League
Association of Fish and Wildlife Agencies
Association of Public-Safety Communications Officials-International
Forestry Conservation Communications Association
International Association of Chiefs of Police
International Association of Emergency Managers
International Association of Fire Chiefs
International Municipal Signal Association
National Association of State Chief Information Officers
National Association of State Emergency Medical Services Officials
National Association of State Foresters
National Association of State Technology Directors
National Council of Statewide Interoperability Coordinators
National Emergency Number Association
National Sheriffs' Association

Several federal agencies are liaison members of NPSTC. These include the Department of Homeland Security (the Federal Emergency Management Agency, the Office of Emergency Communications, the Office for Interoperability and Compatibility, and the SAFECOM Program); Department of Commerce (National Telecommunications and Information Administration); Department of the Interior; and the Department of Justice (National Institute of Justice, Communications Technology Program). Also, Public Safety Europe is a liaison member. NPSTC has relationships with associate members: The Canadian Interoperability Technology Interest Group (CITIG) and the Utilities Technology Council (UTC), and affiliate members: The Alliance for Telecommunications Industry Solutions (ATIS), Open Mobile Alliance (OMA), Telecommunications Industry Association (TIA), TETRA Critical Communications Association (TCCA), and Project 25 Technology Interest Group (PTIG).

NPSTC Comments

The Commission's Public Notice seeks input to help answer questions about the study of changes to the noise floor over the past 20 years. NPSTC views this study as very timely and appreciates the Commission's and the TAC's attention to this issue. Over the past 20 years, the spectrum has become increasingly crowded. Historically, public safety communication system design has relied on a relatively low noise floor as sufficient sites to counteract a high noise floor are not affordable for many jurisdictions and may not even be possible in some areas because of environmental regulations and esthetic concerns.

As indicated in the Public Notice, there are different categories of devices from a regulatory perspective that contribute to the RF Noise Floor:

1) Incidental radiators, i.e., devices that are not designed to generate or emit RF energy but do so as a result of their operation. Examples include electric motors, switching power supplies, power lines, etc.
2) Unintentional radiators, i.e., devices designed to use RF energy internally or send RF signals by conduction via connected wiring but are not intended to emit RF energy. Examples of unintentional radiators include energy efficient lighting, computers, etc.
3) Intentional radiators, i.e., devices designed to generate and emit RF energy by radiation or induction. An intentional radiator can be licensed, such as a cellular transmitter, or unlicensed such as a Wi-Fi or Bluetooth device. The Commission has also included Industrial, Scientific and Medical (ISM) Radiators in this overall category.

These NPSTC comments focus primarily on unintentional radiators and licensed intentional radiators, both of which have been involved in causing interference to public safety communications. In particular, NPSTC provides information on energy efficient lighting and on cellular transmitters in proximity to public safety systems. These comments also raise the need for additional study regarding potential interference from wind farms and other equipment such as solar panel inverters.

Energy-Efficient Lighting

The Energy Independence and Security Act of 2007 required improvements in energy efficiency of lighting equipment.[2] These requirements have led to the gradual phase out of traditional incandescent lighting and helped spur the development of energy-efficient lighting technologies. As a result, homes, businesses, and local, state and Federal government facilities are transitioning to compact fluorescent lighting, LED lighting, electronic ballasts, and other forms of energy-efficient lighting products. Therefore, energy-efficient lighting is a fact of life in our current environment. While energy-efficient lighting products have many benefits, experience shows they can also cause radio frequency (RF) interference, impacting nearby communications equipment, including that of public safety entities.

As a result of some initial input from public safety agencies that had experienced interference to their communications from energy-efficient lighting, NPSTC developed and compiled a formal questionnaire distributed broadly throughout the public safety community on January 19, 2015. The online questionnaire was closed on February 13, 2015. NPSTC designed the questions to seek information on the frequency band(s) affected, how any interference manifested itself, whether the interference has been resolved, etc.

Seventy-six (76) public safety agency representatives responded to the questionnaire. Fifty-five (55) of those responding said they had no interference, with the remaining twenty-one (21) providing some details on the interference they had experienced. The interference cases reported span across multiple bands and situations, with the VHF and VHF Lowband most often mentioned. The State of Oregon Department of Transportation reported a loss of coverage when its VHF radios

[2]PUBLIC LAW 110–140—DEC. 19, 2007, Subtitle B, Lighting Energy Efficiency

were within 50 to 75 feet of LED traffic lights. Summit County, Ohio reported experiencing a loss of coverage on 800 MHz portable radios within about 15 feet of high efficiency lighting ballasts. The U.S. Coast Guard Auxiliary reported a case in which LED and florescent lighting would lock up radio systems in the scan or trunked mode that affected VHF, UHF, 700 MHz and 800 MHz bands.

NPSTC catalogued all 21 reports of interference from energy-efficient lighting. The resulting NPSTC report entitled Radio Frequency (RF) Interference from Energy-Efficient Lighting was released June 30, 2015 and provided to the Commission's Office of Engineering and Technology. A copy of that report is attached as part of these NPSTC comments so the report becomes associated with the record in this proceeding. Additional information not included in this report provided by some of the respondents shows that offending energy efficient lighting devices emanate from multiple manufacturers, i.e., no one manufacturer is at fault.

The overall results of the questionnaire indicate that while not yet large in number, energy-efficient lighting is a source of noise in the radio spectrum. Given the growing deployment of energy-efficient lighting products for traffic control, commercial lighting and residential lighting it is likely that contributions to the noise floor from these devices will grow as well. Therefore, NPSTC recommends this issue be examined further with the goal of preventing noise and interference rather than having to resolve it after the fact once energy-efficient lighting devices are deployed ubiquitously in the field. That process could include clarity on the applicable Commission rules, measurements on sample devices by the Commission laboratory or members of the TAC, educational efforts, and if needed, additional enforcement.

Cellular Stations in Proximity to Public Safety Receivers

The proliferation of cell sites by multiple cellular carriers has resulted in vast improvements in overall cellular coverage over the last 20 years. At the same time, interference has increased in proximity to these cell sites. Public safety has experienced a number of cases over the years, especially in the 800 MHz band, where communications are impacted in proximity to commercial cell sites.

Interference can be the result of one or more phenomena, including receiver overload by strong cellular signals, receiver intermodulation from strong signals that mix in the receiver, external intermodulation from multiple cellular system signals that mix at the cell site, or out of band emissions (OOBE). The latter, out of band emissions, are considered to be a form of noise when they interference with reception of another system's desired signal. From public safety's experience, commercial system OOBE noise can introduce approximately 3dB to 6dB of degradation to the public safety system. Also, over the past 20 years as commercial cellular systems have transitioned from narrower GSM based channels of 200 kHz to CDMA channels of 1.25 MHz and more recently to broadband LTE channels of 5 MHz or more, the potential for noise increases. In addition, the drive toward co-siting requires additional care to avoid external mixing of multiple signals and the creation of intermodulation interference.

Given interference experienced at 800 MHz, the commercial cellular rules developed later for the 700 MHz band provided stricter OOBE limits with a more defined method of measurement than the rules for 800 MHz commercial system OOBE. Moving forward, NPSTC recommends the Commission and the TAC consider the potential for increased noise in proximity to commercial cellular sites as sites continue to proliferate, more sites are deployed lower to the ground, and

bandwidths increase. Stricter OOBE limits and more specifically defined measurement procedures for cellular systems in the 800 MHz band may be needed.

Windfarms and Solar Inverter Equipment

A few ad hoc reports of interference from windfarms, primarily to microwave paths, and noise from solar system power inverters have surfaced over the last several years. Although most of the interference from wind farms appears to be from path distortions introduced by the large spinning blades, noise from electronics associated with the windfarm generators is also possible. Similarly, noise can be generated from solar system power inverters. NPSTC recommends the TAC consider whether additional investigation of noise from these type of systems is warranted.

Conclusion

NPSTC appreciates the Commission's and the TAC's investigation into radio frequency noise floor issues. Historically, public safety communication system design has relied on a relatively low noise floor as sufficient sites to counteract a high noise floor are not affordable for many jurisdictions and may not even be possible in some areas because of environmental regulations and esthetic concerns. In these comments, NPSTC has provided information about interference various agencies have experienced in proximity to energy-efficient lighting devices, and has attached a copy of the NPSTC report released June 15, 2015 on that issue.

NPSTC also recommends the Commission and the TAC consider the potential increase in noise from out of band emissions as cell sites proliferate, use higher bandwidth channels and co-locate multiple systems on the same on structure where external intermodulation products can increase. NPSTC also recommends the Commission and the TAC consider the need for

additional study on potential RF noise from wind farm systems and solar system power inverters.

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Attachment: Radio Frequency (RF) Interference from Energy-Efficient Devices