Please consider this item an addendum to the previously circulated Report of the General Counsel to the Board of Directors, Section I.B.14.

**14. ET Docket 16-191; FCC Technological Advisory Council Noise Study**.

On June 15, 2016 the Commission issued a Public Notice, DA 16-676 announcing that its Technological Advisory Council (TAC), an FCC advisory group on which ARRL has been very effectively represented for many years by Greg Lapin, N9GL, will investigate changes and trends to the radio spectrum noise floor to determine if there is an increasing noise problem. Greg is the leader of this group and this is a very large step forward in our effort to deal with ambient noise in the HF, MF, LF and VHF ranges especially. If it finds that there is such an increasing problem, the TAC will investigate its scope and the quantitative evidence available. Initially, FCC on behalf of the TAC is asking for comments about how a noise study should be performed. Comments are due by **August 11, 2016**. It is anticipated that ARRL will be filing comments prepared with the assistance of the ARRL EMC Committee and the Executive Committee.

The comments are intended to help the TAC determine the scope of the study. The TAC will seek to determine changes to the spectrum noise floor over the past 20 years. It is not frequency-limited, though most of the complaints in ARRL's experience typically concern ambient, man-made noise in the Medium Frequency, High Frequency and VHF bands Noise in this context is defined as unwanted radio frequency energy from man-made sources. The FCC Public Notice indicates that the expectation of the TAC is a finding that the noise floor in the radio spectrum is rising. This assumption is based on the fact that the number of unlicensed, intentional and unintentional RF radiators and industrial, scientific and medical devices in use that emit radio energy increase. However, FCC cites a dearth of what it terms "concrete evidence" of increased noise floors and a lack of quantitative data to support the presumption. The TAC asks for help in strategizing how the available data can be added to, in order to advise FCC.

This study is long overdue and very welcome. FCC does not have a working knowledge of ambient RF levels in different environments and has not had such for years. Without this, it is impossible to know whether the Part 15 radiated and conducted emissions limits for intentional, unintentional and incidental radiators are adequate. Because FCC has neither the resources nor the inclination to address individual cases of interference attributable to, for example, RF devices, power lines, switching power supplies, RF lighting systems and the vast array of other noise contributors in the field, it is critical that ambient RF be regulated prior to the point of retail sale. The results of this study will clearly help evaluate the adequacy of the current Part 15 and Part 18 regulations.

The TAC is asking a very wide-ranging series of specific and general questions and many sub-questions about how an ambient noise study should be conducted and how noise should be evaluated, including the following:

1. Is there a noise problem?
   If so, what are the expected major sources of noise that are of concern?
   What services are being most impacted by a rising spectrum noise floor?
2. Where does the problem exist?
   What frequency bands are of the most interest?
   In what environments?
3. Is there quantitative evidence of the overall increase in the noise floor across various segments of the radio frequency spectrum? At what levels does the noise floor cause harmful interference to particular radio services? What RF environment data from the past 20 years is available, showing the contribution of the major sources of noise?
4. How should a noise study be performed?
   Would receiver noise measurements commonly logged by certain users (e.g. radio astronomers, cellular, and broadcast auxiliary licensees) be available and useful for noise floor studies?
   How much data must be collected to reach a conclusion?

The Amateur Radio community is both uniquely affected by increases in ambient noise, and uniquely qualified to participate in this study. The geographic distribution of ARRL members in all RF environments makes ARRL an asset to the TAC in the conduct of this study. We owe a major debt of gratitude to Greg Lapin for initiating this as ARRL's representative on the TAC.

The full text of the Public Notice follows:

**DA 16-676**
**Released: June 15, 2016**

**OFFICE OF ENGINEERING AND TECHNOLOGY ANNOUNCES TECHNOLOGICAL ADVISORY COUNCIL (TAC) NOISE FLOOR TECHNICAL INQUIRY**

**ET Docket No. 16-191**

**Comment Deadline: August 11, 2016**

The FCC's Technological Advisory Council (TAC), an advisory group to the FCC operating under the Federal Advisory Committee Act, is investigating changes and trends to the radio spectrum noise floor to determine if there is an increasing noise problem, and if so, the scope and quantitative evidence of such problem(s), and how a noise study should be performed. In this public notice, the Office of Engineering and Technology (OET) announces the TAC's public inquiry, seeking comments and answers to questions below for the TAC about radio spectrum noise.[1]

**TAC Noise Floor Technical Inquiry**

[1] https://transition.fcc.gov/bureaus/oet/tac/tacdocs/meeting6916/TAC-Noise-Floor-Technical-Inquiry.pdf

The TAC is requesting input to help answer questions about the study of changes to the spectrum noise floor over the past 20 years. Noise in this context denotes unwanted radio frequency (RF) energy from man-made sources. Like many spectrum users, TAC members expect that the noise floor in the radio spectrum is rising as the number of devices in use that emit radio energy grows. However, in search for concrete evidence of increased noise floors, we have found limited available quantitative data to support this presumption. We are looking to find ways to add to the available data in order to answer important questions for the FCC regarding this topic.

Radio spectrum noise is generated by many different types of devices. Devices that are not designed to generate or emit RF energy but do so as a result of their operation are called *Incidental Radiators*. Most electric motors, light dimmers, switching power supplies, utility transformers and power lines are included in this category. There is little regulation governing the noise generated by these devices. Noise from such sources is expected to be minimized with "Good Engineering Practices."

Devices that are designed to generate RF energy for internal use, or send RF signals by conduction to associated equipment via connected wiring, but are not intended to emit RF energy, are called *Unintentional Radiators.* Computers and many portable electronic devices in use today, as well as many new high efficiency lights, are included in this category. Current regulations limit the levels of emitted RF energy from these devices.

*Unlicensed Intentional Radiators, Industrial, Scientific, and Medical (ISM) Radiators, and Licensed Radiators* are devices that are designed to generate and emit RF energy by radiation or induction. Cellular phones and base stations, unlicensed wireless routers, Bluetooth devices, broadcast TV and radio stations, and radars of many types, are all examples of licensed / unlicensed intentional radiators, and microwave ovens, arc welders, and fluorescent lighting are examples of ISM equipment. Such emitters contribute to the noise floor with emissions outside of their assigned frequencies. These are sometimes generated as spurious emissions, including, but not limited to, harmonics of desired frequencies and intermodulation products. Regulations that permit the operation of these devices also specify the limits of emissions outside of licensed or allowed (in the case of unlicensed devices) frequencies of operation.

We are looking for responses to the following questions to help us identify aspects of a study to determine trends in the radio spectrum noise floor.

1. Is there a noise problem?
    a. If so, what are the expected major sources of noise that are of concern?
    b. What services are being most impacted by a rising spectrum noise floor?
    c. If incidental radiators are a concern, what sorts of government, industry, and civil society efforts might be appropriate to ameliorate the noise they produce?
2. Where does the problem exist?
    a. Spectrally
        i. What frequency bands are of the most interest?
    b. Spatially
        i. Indoors vs outdoors?
        ii. Cities vs rural settings?
        iii. How close in proximity to incidental radiators or other noise sources?
        iv. How can natural propagation effects be accounted for in a noise study?
    c. Temporally
        i. Night versus day?
        ii. Seasonally?

3. Is there quantitative evidence of the overall increase in the total integrated noise floor across various segments of the radio frequency spectrum?
    a. At what levels does the noise floor cause harmful interference to particular radio services?
    b. What RF environment data from the past 20 years is available, showing the contribution of the major sources of noise?
    c. Please provide references to scholarly articles or other sources of spectrum noise measurements.
4. How should a noise study be performed?
    a. What should be the focus of the noise study?
    b. How should it be funded?
    c. What methods should be used?
    d. How should noise be measured?
        i. What is the optimal instrumentation that should be used?
        ii. What measurement parameters should be used for that instrumentation?
        iii. At what spatial and temporal scales should noise be measured?
        iv. Should the monitoring instrumentation be capable of determining the directions of the noise sources? If so, how would those data be used?
        v. Is there an optimal height above ground for measurements?
    e. What measurement accuracy is needed?
        i. What are the statistical requirements for sufficient data? Would these requirements vary based on spectral, spatial and temporal factors?
        ii. Can measurements from uncalibrated, or minimally calibrated, devices be combined?
        iii. Is it possible to "crowd source" a noise study?
    f. Would receiver noise measurements commonly logged by certain users (e.g. radio astronomers, cellular, and broadcast auxiliary licensees) be available and useful for noise floor studies?
    g. How much data must be collected to reach a conclusion?
    h. How can noise be distinguished from signals?
        i. Can noise be characterized and its source identified?
        ii. Is there a threshold level, below which measurements should be ignored?

**Procedures**

Interested parties may file comments up until the comment deadline indicated on the first page of this document. Comments may be filed using the Commission's Electronic Comment Filing System (ECFS). *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

- Electronic Filers: Comments may be filed electronically using the Internet by accessing the ECFS: http://fjallfoss.fcc.gov/ecfs2/.

- Paper Filers: Parties that choose to file by paper must file an original and one copy of each filing. If more than one docket or rulemaking number appears in the caption of this proceeding, filers must submit two additional copies for each additional docket or rulemaking number.
  Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

- All hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12th St., SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes must be disposed of before entering the building.

- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743.

- U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington DC 20554.

People with Disabilities: To request materials in accessible formats for people with disabilities (braille, large print, electronic files, audio format), send an e-mail to fcc504@fcc.gov or call the Consumer & Governmental Affairs Bureau at 202-418-0530 (voice), 202-418-0432 (tty).

For further information, please contact TAC Spectrum and Receiver Performance working group co-chairs Greg Lapin, ARRL (GLapin@arrl.org) and Lynn Claudy, NAB (LClaudy@nab.org), or TAC working group FCC liaison Robert Pavlak, FCC Office of Engineering & Technology (Robert.Pavlak@fcc.gov