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# ***TCB Workshop***

## ***Part 15 approval and rulemaking updates***

**Joe Dichoso**

**Senior Electronics Engineer**

**Equipment Authorization Branch**

**FCC Laboratory**



# Overview

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## ➤ Part 15 approval updates

- ▶ Recent Interpretations and TCB conference calls.

## ➤ Part 15 Rulemaking updates

- ▶ NPRM Modification of Parts 2 and 15 of the Commission's Rules for unlicensed devices and equipment approval.
- ▶ NPRM on Cognitive Radio Technologies
- ▶ NPRM on Interference Temperature
- ▶ 2<sup>nd</sup> R&O and MO&O Part 15 deregulation
- ▶ R&O UNII devices

# ***Multiple Modulation Capabilities in One Device***

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- **All modes must be tested.**
  
- **For example, 802.11(g) wireless fidelity (Wi-Fi) device has several modulation capabilities.**
  - ▶ BPSK modulation at 1 and 2 Mb/s
  - ▶ CCK modulation at 5.5 and 11 Mb/s
  - ▶ OFDM modulation at 54 Mb/s



# ***AC line conducted data for Part 15 Modules.***

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- **Section 15.207(a) requires test data unless the device is battery powered.**
- **Battery powered examples.**
  - ▶ The transmitter is powered by an on-board battery.
    - ▶ Transmitter has a battery connector/compartment.
  - ▶ The transmitter is only intended for battery powered applications and installed by OEM.
    - ▶ Device is conditioned only for battery powered applications and a limited module approval is issued.
    - ▶ Any new non-battery application requires a new authorization.
  - ▶ The transmitter is installed only in the manufacturers equipment that will be battery powered.
    - ▶ Device is conditioned accordingly and a limited module approval is issued.



# ***CISPR AC Line Conducted Limits for All Transmitters***

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- **The recently adopted CISPR AC line conducted limits only apply to Part 15 and 18 devices.**
  - ▶ Devices that operate under any other rule parts (e.g., 22, 24, 90, etc.) are not affected by this rule change.
- **To update a Part 15 grant, a Class II permissive change filing is submitted showing compliance with the CISPR AC line conducted limits.**
  - ▶ Applies to devices will continue to be marketed after July 11, 2005.
  - ▶ The conducted output power of the device does not change beyond the tolerance for this measurement (+/- 0.5 dB).
- **The policies for filing Class II permissive changes are different for some Part 18 devices because Part 18 devices had no AC line conducted emissions limits before we adopted the CISPR limits.**
  - ▶ Microwave ovens  
[http://hraunfoss.fcc.gov/eas\\_public/SilverStream/Pages/pg\\_html\\_fts\\_res.html?letter=1344](http://hraunfoss.fcc.gov/eas_public/SilverStream/Pages/pg_html_fts_res.html?letter=1344)
  - ▶ Contact the lab for other devices

# ***FCC certification on Vehicular Battery Chargers (VBC) for Cellular Phones.***

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## **➤ Exempted per Section 15.103(a).**

- ▶ The VBC is not promoted for applications other than use within a vehicle. Section 15.103(a) exempts digital devices used exclusively in transportation vehicles
- ▶ Classified as a digital device under Part 15 of our rules.
- ▶ Subject only to our non-interference provisions (Sections 15.5 and 15.29).



# **Part 15 In ground Water Meter transceivers**

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- **Website:**  
[http://hraunfoss.fcc.gov/eas\\_public/SilverStream/Pages/Fpg\\_html\\_fts\\_res.html?letter=1366](http://hraunfoss.fcc.gov/eas_public/SilverStream/Pages/Fpg_html_fts_res.html?letter=1366)
  - **Allows testing in ground as opposed to an open area test site (OATS).**
  - **Professional installation is required.**
  - **Instructions must provide appropriate details for the installation of the transmitter in the pits and must specify the types of pits.**
  - **Condition grant accordingly.**
    - ▶ Professional installation and specific types of pits.
  - **Tests**
    - ▶ Use mast. Do not use a tripod with fixed height.
    - ▶ Section 8.1 in ANSI C63.4 should be consulted. Frequency scans of the EUT field strength with both polarities of the measuring antenna shall be made at a minimum of 16 azimuth angles (nominally 22.5 degrees) around the EUT.
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# ***RMS measurements for UWB devices***

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**Website:**[http://hraunfoss.fcc.gov/eas\\_public/SilverStream/Pages/Fpg\\_html\\_fts\\_res.html?letter=1364](http://hraunfoss.fcc.gov/eas_public/SilverStream/Pages/Fpg_html_fts_res.html?letter=1364)

- **The first option is to use an analyzer that incorporates an RMS detector. Check analyzer specifications.**
- **Set integration time properly.**
  - ▶ In order to obtain the maximum 1 millisecond (mS) integration time, the ((sweep time) / number of bins), should be less than or equal to 1 mS. The default number of bins(also referred to as points) on some analyzers is 601 points (pts).
  - ▶ Do not use trace averaging or average detector.
- **Alternatively**
  - ▶ When an analyzer does not incorporate a true RMS detector, there is also a method described in Appendix F, paragraph (3) in the First Report and Order (FCC 02-48)
    - ▶ Detailed in the interpretation letter at the above website.
    - ▶ When obtaining RMS values in either manner, describe and/or provide the formula used to post-process the data with the Certification filing.





# ***Comparison Noise Emitter (CNE) exempted under Section 15.103(c)***

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- **Website**  
**[http://hraunfoss.fcc.gov/eas\\_public/SilverStream/Pages/Fpg\\_html\\_fts\\_res.html?letter=1368](http://hraunfoss.fcc.gov/eas_public/SilverStream/Pages/Fpg_html_fts_res.html?letter=1368)**
  
- **Comparison Noise Emitter (CNE) used to evaluate anechoic chambers and Open Area Test Sites (OATS is exempt from an Equipment Authorization under Section 15.103(c).**
  - ▶ The CNE in question
    - ▶ broadband noise source
    - ▶ low power
    - ▶ permanently attached antenna
    - ▶ operates over the frequency range of 9 kHz to 2 GHz.
    - ▶ Used by a skilled technician
  
- **Other types of reference noise sources must be used in a shielded enclosures for immunity and similar types of testing, or a license must be obtained under Part 5 of the Rules.**



## **15.407(d) Integral Antenna Requirement for 5.2 GHz UNII devices**

- **The integral antenna rule requires that the antenna is permanent or not removable.**

### **Acceptable methods**

- **Antenna and/or antenna connectors are soldered together.**
- **Permanent Loctite or industrial strength epoxy can be used.**
- **A locking connector that cannot be removed, even with a special tool.**
  - ▶ **Must be locked prior to shipment.**
- **An antenna and/or connectors inside of a non-accessible (there is no need for the user to ever open the case)**
  - ▶ **Assumed that users will open desktop computers.**



## ***15.407(d) Integral Antenna Requirement for 5.2 GHz UNII devices (continued)***

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- Exceptions
  
- **For a 5.15-5.25GHz UNII mini-PCI card installed in a notebook computer with built-in antennas ...**
  - ▶ Bios locking feature satisfies the rule
  
- **Antenna with embedded code.**
  - ▶ Code ensures that the proper antenna is used
  
  
- **Reminder**
  - ▶ 5.2 GHz is for indoor use only. No outdoor antennas.



## ***15.407(d) Integral Antenna Requirement for 5.2 GHz UNII devices (continued)***

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### **➤ Unacceptable methods.**

- ▶ A unique connector is not sufficient.**
  
- ▶ Bios lock with external antenna. Antenna can still be removed and the Bios lock feature does not check whether the correct antenna is used.**
  
- ▶ A locking connector that can be removed with a special tool does not satisfy the requirement.**
  
- ▶ Heatshrink.**
  
- ▶ User Warnings.**



## ***User Selectable Frequencies***

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- **End user selectable frequencies for non USA frequencies are not allowed.**
  - ▶ User selectable options must be disabled.
  - ▶ Check exhibits in the filing, user manual or descriptions for these options.
  
- **Section 15.15(b) prohibits adjustments of any control by the user that will cause operation of a device in violation of the regulations.**
  - ▶ Addressed in Cognitive Radio rulemaking.

# User Selectable Frequencies



- **For 2.4 GHz 802.11b/g WLAN devices, operating in the 2400 - 2483.5 MHz frequency band the following channel plan is generally used.**
  - ▶ Channel 1 : 2412 MHz
  - ▶ Channel 2 : 2417 MHz
  - ▶ Channel 3 : 2422 MHz
  - ▶ Channel 4 : 2427 MHz
  - ▶ Channel 5 : 2432 MHz
  - ▶ Channel 6 : 2437 MHz
  - ▶ Channel 7 : 2442 MHz
  - ▶ Channel 8 : 2447 MHz
  - ▶ Channel 9 : 2452 MHz
  - ▶ Channel 10 : 2457 MHz
  - ▶ Channel 11 : 2462 MHz
  - ▶ Channel 12 : 2467 MHz
  - ▶ Channel 13 : 2472 MHz
  - ▶ Channel 14 : 2484 MHz
  
- **Operation on channel 14 is not allowed.**
- **Operation on the channels near the restricted band but within the allowed frequencies is possible only if it meets all of the requirements.**
  - ▶ Restricted band field strength limits have to be met. The antenna must be taken into account. For devices with low output power, these channels may be compliant with a low gain antenna but non-compliant with a higher gain antenna.
  - ▶ Section 15.215(c) which requires that the 20 dB bandwidth of the emission to be within the 2400-2483.5 MHz band for this device.
    - ▶ Check all modulations and data rates.

# TEST SETUP ERROR

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- Radiated EMC test setup for mini-PCI card on extender-card with monopole diversity-antenna system (Part 15 modular stand-alone setup)
- **DO NOT LAY ANTENNAS ON WOOD TABLETOP**
  - ▶ Antenna positioning in test setup should represent typical final-product configuration
  - ▶ In this example antennas should be supported in vertical position, e.g., using foamed-polystyrene blocks



## ***Co-located transmitters. i.e. Laptop w/ LAN & BLUETOOTH***

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- ▶ **The radio's must be tested individually.**
  - ▶ **Submit all appropriate tests.**
- ▶ **Tests for simultaneous transmission is required, if applicable.**
  - ▶ **Submit antenna conducted measurements with both transmitters on, if transmitters share an antenna.**
  - ▶ **If radiated data for simultaneous transmission is no worse (no new intermod, spurs or increased levels) than individual tests, then also submit statement that simultaneous transmission was investigated and no new emissions were found.**
  - ▶ **If new emissions were found during simultaneous tests, provide data and indicate the worst case condition.**





# **Modular approvals**

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- **Modular intent is to allow manufacturers to build new devices with same transmitter in multiple hosts without the need for Re-Certification of the transmitter.**
  
  - **Filing must clearly state whether modular approval is applied for.**
    - ▶ Provide required cover letter when requesting modular approval.
    - ▶ Non-modular approvals must be complete.
      - ▶ i.e. Laptops with tx must contain all exhibits.
  
  - **Condition grant accordingly and state appropriate type of approval (“Limited modular approval” or “Modular approval”).**
    - ▶ Remove all modular references on grant if non-modular.
  
  - **Limited modular approval.**
    - ▶ Limited in order to meet a module, EMC or RF safety requirement.
      - ▶ I.e. Limited to specific host, i.e. laptops, to meet shielding requirement.
      - ▶ i.e. Limited to specific host to meet antenna rule 15.203, 15.407
      - ▶ i.e. Limited to laptops with specific antenna installation to meet RF safety requirement.
    - ▶ Put Limited modular approval on grant not Modular approval.
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## ***Modular approvals (continued)***

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- **A change from non-modular approval to modular approval requires a new FCC identifier.**
- **A change from modular approval to limited modular approval requires a new FCC identifier.**
- **Watch out for undeclared and optional co-located transmitter. i.e. Bluetooth**
- **Licensed modular transmitters requirements are similar.**



## ***NPRM Modification of Parts 2 and 15***

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- **Proposal in ET Docket No.03-201, FCC 03-223**
- **Published December 10, 2003**
  - ▶ Comments were due February 7, 2004
  - ▶ [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/FCC-03-223A1.doc](http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-03-223A1.doc)
- **1) Clarify the rules for advanced antenna technologies**
  - ▶ (I.e. phased array systems) in 2.4 GHz band.
- **2) Modify the rules on replacement of Part 15 antennas**
- **3) Modify the rules on configuring transmission systems**
  - ▶ No need to obtain separate authorization for every combination of system components. I.e. adding amplifiers
- **4) Harmonize the measurement procedures for digital modulation systems under the Spread Spectrum and UNII rules.**



## ***NPRM Modification of Parts 2 and 15 (continued)***

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- **5) Modify the channel spacing requirements for hoppers in the 2.4 GHz band to allow wider bandwidth hoppers.**
  
- **6) Clarify and change modular approval requirements.**
  
- **7) Make other changes to update or correct Parts 2 and 15 of our rules.**
  - ▶ Delete STA provisions under 15.7
  - ▶ Change import conditions
  - ▶ Mandatory Electronic filing of applications or Grantee code.
  - ▶ Reassess test labs every two years by Accrediting Body.
  - ▶ Re-accredit TCB's every two years.

# ***NPRM on Cognitive Radio Technologies***

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## **➤ Proposal in ET Docket No. 03-108**

- ▶ Adopted: December 17, 2003
- ▶ Released: December 30, 2003
- ▶ **Comment date: 75 days from publication in Federal Register**
- ▶ **Reply comment date: 105 days from publication in Federal Register**
- ▶ [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/FCC-03-322A1.doc](http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-03-322A1.doc)

## **➤ News release**

- ▶ [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-242312A1.doc](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-242312A1.doc)



# ***NPRM on Cognitive Radio Technologies (continued)***

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- **Proposal seeks comments on use and applications of Cognitive radios. I.e.....**
  - ▶ Facilitate secondary markets(third party use of spectrum)
  - ▶ Facilitate use of unlicensed devices in licensed spectrum.
  - ▶ Allow higher power for unlicensed devices in rural and underserved areas.
  - ▶ Facilitate public safety interoperability
- **Cognitive or “Smart” radios adapt use of spectrum in response to information sensed from RF environment.**
  - ▶ Use vacant channels
  - ▶ Change power levels or modulation
  - ▶ Act as a communications bridge between two different radio services.

# ***NPRM on Interference Temperature***

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## **➤ Proposal in ET Docket No. 03-237, FCC 03-289**

- ▶ Adopted: November 13, 2003
- ▶ Released: November 28, 2003
- ▶ Published January 21, 2004
- ▶ Comments due April 5, 2004.
- ▶ Reply Comments due May 5, 2004.
- ▶ [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/FCC-03-289A1.doc](http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-03-289A1.doc)

## **➤ News Release**

- ▶ [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-241226A1.doc](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-241226A1.doc)



# ***NPRM on Interference Temperature (continued)***

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- **RM seeks comments on “Interference Temperature” approach to quantify and manage interference between different services.**
- **Interference temperature model takes into account the cumulative radiofrequency (RF) energy from transmissions of spectrum-based devices and would set a maximum cap on the aggregate of the transmissions.**
  - ▶ **Current interference management approach is based on specifying and limiting transmit powers of individual spectrum-based devices.**
- **Usefulness and applicability of approach will initially be tested by seeking comments on technical rules, procedures and use of interference model on limited basis in 6525-6700 MHz and portions of 12.75-13.25 GHz.**
  - ▶ **Enable use of unlicensed devices in bands used for satellite uplinks and fixed point-to-point microwave services.**



# **2<sup>nd</sup> RO&O and MO&O Part 15 deregulation**

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- **New Rules in ET Docket No. 01-278, FCC 03-149**
  - ▶ Effective date: January 8, 2004
  - ▶ [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/FCC-03-149A1.doc](http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-03-149A1.doc)
- **1) Change emission levels in the restricted bands above 38.6 GHz.**
- **2) Allow data transmission in 15.231.**
- **3) Modify the FS limits for 13 MHz RF ID systems**
- **4) Simplify the labeling requirement for self authorized equipment(DOC).**
  - ▶ Removed “For Home or Office Use” and statement that a complete device was tested for compliance.

# **2<sup>nd</sup> RO&O and MO&O Part 15 deregulation (continued)**

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- **5) other changes to update and correct our rules.**
  - ▶ Incorporate the ANSI C63.17 test procedure for UPCS devices into the rules.
  - ▶ Provide exemption for certain low power devices
    - ▶ <490 kHz and FS is less than 40 dB below Part 15 limits.
  - ▶ Allow user manual information on CD-ROM or on internet if manual is provided likewise.
  - ▶ FRS transmitters tested -20 to +50 degrees C for frequency stability tests.
  - ▶ Accredited labs do not have to file description of measurement facilities with the Commission. However, Certain information is still required. Name, address, contact info, accrediting body's name, designation number and date of renewal.
  - ▶ Miscellaneous rule corrections and deletions.



## ➤ **New Rules in ET Docket No. 03-122,**

- ▶ Effective date, February 19, 2004
- ▶ [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/FCC-03-287A1.doc](http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-03-287A1.doc)
- ▶ Adds 255 MHz of spectrum 5.47-5.725 GHz to current UNII bands.
- ▶ Dynamic Frequency Selection (DFS) for devices in the 5.25-5.35 GHz band and 5.47-5.725 GHz band.
- ▶ Interim DFS Test procedure is in the Appendix of the Rules.
- ▶ Transmit power control(TPC) 5.47-5.725 GHz band.
- ▶ Only a statement that the device has TPC is required to be submitted in the filing. No test required.

## ➤ **New technology**

- ▶ TCB cannot approve any device operating under the new rules.



## ***R&O UNII devices (continued)***

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- **Test procedure will be updated in the near future**
  - ▶ Do not deviate from accepted procedure
  - ▶ Contact NTIA to participate in test procedure discussions.
    - ▶ [CGlass@NTIA.doc.gov](mailto:CGlass@NTIA.doc.gov)
    - ▶ March 3 meeting.
  - ▶ NTIA provides software scripts and schematics needed to operate and build specific test equipment.
    - ▶ [FSanders@NTIA.doc.gov](mailto:FSanders@NTIA.doc.gov)
  - ▶ Complex test requires specialized equipment and software.
- **Class II permissive change for existing equipment**
  - ▶ Allowed only for software change
  - ▶ Any hardware change requires NEW AUTHORIZATION
- **Transition dates; equipment operating in 5.25-5.35 GHz**
  - ▶ 1 year, Certification filings must comply w/ new rules
  - ▶ 2 years, All devices imported and marketed must comply