**Federal Communications Commission**
**Office of Engineering and Technology**
**Laboratory Division Public Draft Review**

## Laboratory Division Draft Presentation

**Title:** Modular Transmitters

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**Presented:** TCB Workshop April 2013 Baltimore Maryland

**Purpose of Draft Presentation:**
This presentation was made to invite comments prior to any additional action related to this publication. We invite comments:

- On the proposed clarifications.
- Areas that need to be further addressed.
- Additional questions or concerns.
- Other comments related to this subject.

Additional action may include modification to the current publication or first posting a detailed draft prior to a modification of the current publication.

**Subject of Draft Presentation:**
This presentation was made to modify KDB Publication: 996369 (Modular Transmitter Guide) for further clarification: Clarification is intended to:

- Amend attachment 996369 D01 Module Certification Guide to provide further Guidance to Module Grantees for:
  - Information in OEM instructions.
  - Clarification and procedure for defining host dependency (limited modules).
- Develop a second attachment to KDB 996369 for providing guidance to host manufactures using certified modules in their product.

# Modular Transmitters

TCB Workshop April 2013

James Szeliga

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# Certified Transmitter Modules (Modules)

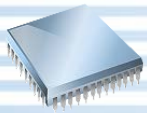
- Module Review for Grantee
  - Importance of OEM instructions
  - Host dependency
- Guidance for Host Manufactures
  - Basics for using modules
  - Steps to take for ensuring regulatory compliance:
    - Single & multiple modules transmitting simultaneously
    - EMC Requirements & Total power requirements
    - RF Exposure
  - Approval Procedures

# OEM Instructions

§ 15.212 (vii) …**provide adequate instructions along with the module to explain any such requirements**. A copy of these instructions must be included in the application for equipment authorization.

- Regulatory rules covered by the module
- Other general regulatory requirements
  - RF safety requirement conditions
- Define all conditional module use requirements
- Host platform requirement and dependencies(i.e. software or hardware control of RF) that is applicable
- Conditions for Co-location of other transmitters and Simultaneous transmission conditions.
- Antennas that must be used (licensed and unlicensed)
- Information and labeling requirements for final Host & end User disclosures.
- Restrictions on modification

# Host Dependent – Limited Conditions



| Host Dependency (limited) | | Host Needed for |
|---|---|---|
| A | Particular (Specific) host | Only granted in specific Host:<br>•RF Exposure |
| B | Host platform type provides additional hardware capabilities for proper module operation | Only granted in host that demonstrates having additional:<br>Shielding amplitude buffered inputs power regulation, antenna calibration |
| C | Host integrator and Module grantee have shared responsibility for Compliance | Host involved/controls/sets frequency, power, modulation, operating condition, regulatory domain. |

# Host Dependent – Limited Conditions

(A) Limited to Particular Host

- Compliance with RF exposure can only be demonstrated for particular product configurations. Certification must be tested in the particular host.

(B) Limited to Host Platform Types

- Compliance is ensured when integrated in hosts that provide similar capabilities
  - Authorization application must clearly include the conditions the host must provide: e.g., shielding, minimum signaling amplitude, buffered modulation/data inputs, or power supply regulation, antenna locations, software configurations.
  - OEM instructions must clearly list conditions
    - Grantee may also retain design control

# Host Dependent – Limited Conditions

(C) Modules that use or require the host based configurations

- Configurations set through host
- Examples include controller chip, or any other parameter to set frequency, power, modulation or operating condition to operate as granted is a host shared dependent module
  - For other software options later discussions
- Limited by joint responsibility - options
  - Split modular or similar in certification procedure.
  - Host and module require an authentication/security method defined in the application, grant conditions and OEM Instructions.
  - Not accessible and changeable by any third parties (Similar/or SDR).
  - Contractual joint responsibilities agreement
  - Under PBA

# Guidance for Host Manufactures

- Host Manufactures using a module(s) are responsible for compliance to all the rules that apply to the product.-
  - No different than a product not using modules.
- The advantages of a module are: reduction in (1) testing and/or (2) certification procedure(s).
- Regulatory compliance required for general conditions of operation, licensing, marketing, importation, labeling, identification and information to users.
- Most modules are not certified to operate with other modules
  - No Collocation conditions may be applicable (TCBs must use this condition if really necessary)
  - Additional testing and certification may be necessary when multiple modules are used
  - OEM instructions must make this clear

# Host Integrator Considerations

- Steps to be considered by Host Integrator
  - Identify all rules applicable for the host product
  - Determine the areas covered by the module grants and identify additional regulatory issues to be addressed
    - Case 1 – The integrated host complies with all rules and no new submission necessary to the FCC
    - Case 2 – Additional compliance information to be submitted to the FCC

# Host Integrator – EMC Considerations

- EMC Consideration
  - §§ 15.31, 2.1041, 2.1091, 2.1093 requirements must be satisfied
    - Demonstrate that the final host product is compliant with all transmitters operating simultaneously, if applicable.
  - Host Manufacture can use reasonable engineering judgment & testing following the requirements of §15.31 and procedures outlined for verification (§§ 2.953 and 2.948)
  - Out-of-band, restricted band and spurious requirements for single and/or simultaneous operation must be considered

# Host Integrator – EMC Considerations

- In Band Power Limit for Simultaneous (Multiple Modules) when used in the same band (KDB 662911 applies)
  - A set of modules used in the same band transmitting simultaneously, each individual module (transmitters) must comply with its specific requirement. The total power contribution from all modules (transmitters) can not exceed the power level permitted in that band for the operation type ( point to multipoint, point to point, Omni directional)
  - For example:
    - One < 75 FHS (125 mW limit) 2.4 GHz module Plus 1 DTS (1 W limit) 2.4 GHz module , non pt.-to-pt., the total power of both modules would be limited to 1 watt or 125 mW FHS module Plus 750 mw DTS module
    - Four - DTS (1 W Limit.) 2.4 GHz modules, 4 separate 6dBi antennas non overlapping beams antenna would be limited to 1 w per module. 15/247 (c) (2) smart antenna rules
    - Four- DTS/UNII (1 W/ea. Limit) 5725-5825 modules, pt.-to-pt., would also be limited to 1 W or 250 mW per module

# Host Integrator – RF Exposure Considerations

- RF Exposure Evaluations
  - Must review applicable KDB General and Host Guidance (Applicable procedures)
  - Multiple Modules transmitting Simultaneously
    - The grant note “not to be co-located with any other transmitters except in accordance with the FCC multi-transmitter product procedures” means that the module can not be co-located without further evaluation/certification.
    - Host manufacture may have to perform additional tests to demonstrate compliance in all modes

# Case 1 – No FCC Submission Required

- If the Host Integrator determines after all the evaluations that the host will continue to comply under all conditions, no submission is necessary to the FCC
- Manufacturer must maintain records of the final tests as per requirements of Section 2.953 and 2.948 as a guide. FCC may request to inspect the records

# Case 2 – FCC Submission Required

- If the Host manufacture  determines that the compliance information provided for each of the module is not sufficient to cover the host conditions, additional information must be provided to FCC.
  - Require updating EMC compliance for the modules through power management
  - Require additional RF Exposure information
  - Require Host use condition limitations for compliance – like indoor operation or master control
- Additional Certification Options must be used.

# Additional Certification Options

- Module Grantee files a permissive change or a change in ID (module grantee code) to address additional requirements.
  - In case of multiple modules one module grantee files (use one main module as a non certified sub-assembly)
    - Use one module to establish a certification record:
    - it is permissible to upload relevant test reports.
    - Additional test reports can be provided to demonstrate full compliance
    - Have written permission from the original grantee.
- Host integrator requests a new ID for one module
  - Have written permission from the original grantee.
  - Additional test reports can be provided to demonstrate full compliance
- Host integrator requests a new FCC ID ( all modules treated as non certified sub-assemblies)
  - Permissible to upload original relevant test reports from module grants
  - Have written permission from the original grantee(s).
  - Additional test reports to be provided to demonstrate full compliance
- Details in Question 1 of KDB996369

# Comments on Proposal

- Propose to modify KDB Publication:
  - KDB 996369 (Modular Transmitter Guide)
  - Include some of the discussions in this presentation and plan for further guidance
- Draft KDB publications will be created to invite comments prior to modification of the current versions. We invite comments on:
  - Proposed clarifications
  - Areas that need to be further addressed
  - Questions or concerns on the proposals
  - Other comments

# Questions and Answers

**Thanks!**