Report on TCB Council Activities for MIC MRA Workshop 2016

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Agenda

- Introduction me, FCC History, TCB's & TCB Council
- How FCC Rules Change
- Reason for Changes - keeping up with technology changes
- FCC Knowledge Database (KDB) System & Updates
- Current hot-topics for FCC/TCB's
  - Configuration Control
  - U-NII Software Security
  - U-NII 802.11ac & DFS
  - LTE Rel. 10 Carrier Aggregation
  - RF Exposure Categorical Exclusion
  - New FCC Measurement Standards
  - Proposed Changes in FCC 15-92

Introduction

- Chris Harvey
  - 29 years of experience in EMC/Wireless
  - Very active in our community as Executive Director of TCB Council
  - Organize/Run TCB Council Workshops
  - I know many of you already, and many of your colleagues
  - Born and raised in Japan (Tokyo & Fukushima)
  - Philosophy of work: know your resources and how to navigate them
    - You don't have to memorize everything
    - I am a resource ☺ (and so are your colleagues)
  - Please ask questions during the presentation.

FCC Certification History

- The Federal Communications Commission is the regulatory body in the US for Equipment Certification, according to the Communications Act of 1934
- Before the 2000 everyone had to go directly to the FCC for all approvals
  - The process for Certification was slow and not very customer focused
- Then in June 2000, the FCC authorized the first 13 TCB's to issue Certifications for some types of device, some were 'excluded'
- In June 2000 less than 1% of approvals were issued by TCB's
- In July 2015 the FCC authorized TCB's to approve ALL devices
- Today 100% of FCC Certifications are issued by TCB's (over 48k line entries in 2015)
- Now in March 2016 there are 38 TCB's worldwide

What is a TCB?

- Telecommunication Certification Body
- The TCB's are private companies
- TCB's are accredited to ISO/IEC Guide 17065
  - Certification Bodies (Conformity Assessment)
    - Program & Quality System requirements
    - Personnel qualifications
  - Difficult to obtain and maintain accreditation
    - Yearly requirements and re-assessments
    - Requires qualified personnel and regular training

Ongoing Challenges for the Equipment Authorization Program

- All the reviews need to emphasis quality while needing to handle quantity
- Complex products need much greater attention on reviews:
  - Continued updating of technical expertise of laboratory testers, reviewers, assessors
  - Detailed review of operations descriptions
  - Challenges for timely review considering volume of applications
  - Provide guidance, assistance and education to applicants
- Need to get "fundamentals" correct
- FCC Continue to provide guidance through comprehensive reviews of KDB
- ***This is why the TCB Council is so important….***

What is the TCB Council?

- The TCB Council is the organization of members who all share the common interest of FCC (and worldwide) wireless regulatory compliance
- We are a non-profit, education organization based in US

- www.tcbcouncil.org

The Purpose of the TCB Council is to provide (1):

- "A forum for periodic dialogue between the Federal Communications Commission ("FCC") and the Telecommunication Certification Bodies ("TCBs")."
  - The TCB Council provides services for the monthly conferences between the FCC and all TCBs

The Purpose of the TCB Council is to provide (2):

- "Facilitation of ongoing activities geared towards the improvement of TCB technical and administrative performance."
  - TCB Council has sponsored 35 FCC/TCB Workshops since August 2001
  - Next workshop will be April 11-14, 2016 in Baltimore

The Purpose of the TCB Council is to provide (3):

- "A forum for raising issues of concern to the FCC and vice versa"
  - In addition to hosting the monthly phone calls, the TCB Council meets twice each year in an open forum with the FCC, with NIST and with ANSI.

The Purpose of the TCB Council is to provide (4):

- "A common dissemination point for up-to-date FCC interpretations and rulings."
  - Our staff broadcasts messages to all Members of the TCB Council
  - Members can subscribe to different lists based on their interests and needs

The Purpose of the TCB Council is to provide (5):

- "A dissemination point for interpretations of other governments that are Mutual Recognition partners with the U.S."
  - Information is provided to our membership via email regarding developments in our MRA partner countries.

The Purpose of the TCB Council is to provide (6):

- "Links and liaisons with other domestic and/or International organizations."
  - Liaisons exist with:
    - R&TTECA and REDCA
    - ACIL
    - ACTA
    - ETSI BRAN
    - ITIC
    - TR 41
    - TIA

Who are our Members?

- All TCBs (US and non-US) – currently 38
- 14 ExOfficio Members including
  - FCC
  - NIST
  - Industry Canada
  - IDA
  - R&TTE CA
  - JVLATE

Who are our Members?

- ~100 Associate Member Companies representing Industry and Test Labs
  - Board includes a Test Lab representative and a Manufacturer representative
  - $850/year membership fee for Associate membership
  - Currently waiving membership fees for the first year to new test labs who wish to join

What is the TCB Council doing?

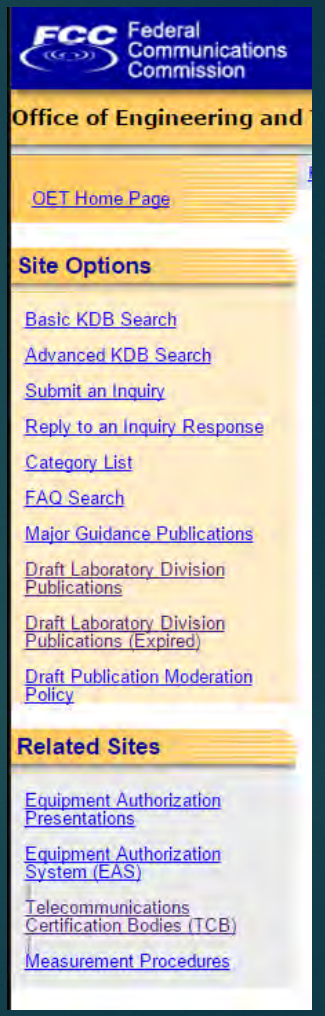
- Continuing to sponsor the development of ANSI C63.10 and C63.26
  - C63.10-2013 (unlicensed) published and adopted
  - C63.26-2015 (licensed) just published in January
  - Art Wall acts on the TCB Councils behalf and has been instrumental in pushing the standards along
- Improving relationships with other certification agencies
  - MIC in Japan, KCC in Korea
  - Growth areas for new TCB/CAB opportunities

TCB Council Workshops

- The TCB Council currently holds 2 Workshops per year
  - April – typically 1 day of Basic Training + 3-day Workshop
  - October – typically 3-day Workshop
  - We hold the Workshops near the FCC to encourage their participation

Reason for FCC Changes – keeping up with technology changes

- The FCC Rules are not written for specific technology
- In order to keep up with changes in technology…
  - FCC provides Guidance in their **Knowledge Database (KDB)** system
  - Public KDB's are numbered (random) and regularly revised (version and revisions)
  - https://apps.fcc.gov/oetcf/kdb/index.cfm
  - Can perform text search to find guidance
    - Use key words
    - Trial and error to find guidance
- You can also ask questions – KDB Inquiry
  - Request guidance for specific issues



Draft KDB's – you can comment!

- Some Guidance Documents are provided in Draft to get comments from our community:
- https://apps.fcc.gov/oetcf/kdb/reports/PublishedDocumentList.cfm
  - **Recent examples of DRAFT KDB's (all closed now)**
    - **551693** Grant Comments DR02-42299 (revision)
    - **640677** D01 LED LIGHTING DR02-42299 (new)
    - **905642** D02 UNII DFS Compliance Procedures New Rules DR02-42293 (revision)
    - **550594** Medical Body Area Network MBAN DR01-42292 (new)
- FCC allows (typically) **30 days** for review and comments
- You can help FCC and our community by reviewing these draft documents and commenting to FCC

FCC How it Becomes Law/Rule

- FCC Procedural Terms:
  - **NPRM** – Notice of Proposed Rulemaking
    - Always open for comments (and reply-comments)
    - You have the opportunity to make a change, you can comment
      - Comments must be filed in time
  - **Report & Order (R&O)**– final action, published **Final Rules**
  - **Petitions** for Reconsideration – Filed by interested Parties
    - Requests to change rules
  - Effective Dates:
    - FCC NPRM's and R&O's are published in the US Government's Federal Register (https://www.federalregister.gov/)
    - Typically become **effective 30 days** after being published in the FR
  - You Have a Voice – how?

How to Comment?

- Before you Comment, you must know what is happening
- Get connected to information – Stay Connected
  - FCC EDOCS, Federal Register, Associations, Labs, TCB Council

- ECFS – Electronic Comment Filing System
  - http://apps.fcc.gov/ecfs/
  - **Hot Dockets in the Office of Engineering and Technology**
    - **http://apps.fcc.gov/ecfs/bureau/view?code=ET**
  - Individuals/Companies can submit comments, sometimes through Regulatory Compliance Lawyers
  - Trade Associations (such as TIA)

TCB Council Workshop Report - October 27-29, 2015

- The Workshop contained 3-days of presentations from
  - FCC
  - Industry Canada
  - MIC Japan
  - Manufacturers/Technology
  - International organizations
  - many others…

TCB Council has hosted 35 Workshops in 14 years – I have attended all.

In Baltimore we get Great FCC attendance

FCC Updates per R&O FCC 14-208

- FCC is no longer accepting applications for Certification
  - All Certifications are now issued by TCB's
- The OLD Permit But Ask **(PBA)** procedure is updated and now called Pre-Approval Guidance **(PAG)**, but is mostly the same (KDB 388624 D01 v11r01)
  - The past Exclusion List is removed and included in the PAG List (KDB 388624 D01 v16r01)
- FCC stopped accepting 2.948 Lab Descriptions for Listing
- July 2016 – Lab Accreditation required for all testing for Certification
  - Lab Accreditation only available for US-MRA partners
  - There are currently NO procedures for Lab Accreditation for non-MRA countries
  - https://apps.fcc.gov/edocs_public/attachmatch/FCC-14-208A1.pdf
- These changes get reflected in updates to KDB's

FCC KDB Updates

- On October 26 the FCC had just released 20 KDB Updates
  - There are approximately 230 total KDBs
- In preparation for the TCB Council Workshop they reviewed existing KDB Guidance and made updates/corrections
  - 6 KDB Entries were expired – no longer needed
    - The guidance is now found in other KDB's
  - Many updated to reflect changes due to FCC Report & Order
  - Here are the links to all of the updates by KDB #:
    - 212821 ,447498 ,941225 248227 865664 616217 648474 615223 996369 643646
    - 926956 350078 614963 252613 208873 297513 232568 388624 178919 249634

Recent FCC KDB Updates Summary

- Formatting, PBA/PAG & 1528 updates, editorial changes etc.
  - – KDB 615223 D01, 648474 D03 & D04, 865664 D01 & D02, 941225 D01, D05, D05A, D06 & D07, 643646 D01, 248227 D01, 447498 D01 & D02, 616217 D04
- Specific changes in individual KDB publications
  - – 248227 D01: removed incorrect 802.11g 40 MHz column from tables in Appendix C, the configuration does not exist
  - – 447498 D01 & D02, 616217 D04: deleted 1.2 W/kg PBA requirement; PBA was removed earlier, it is now handled by KDB inquiry
  - – 447498 D01: included a few clarifications and some general cleanup
  - – 941225 D05: removed outdated LTE info and included general guidance for TDD, NS signaling & test channel requirements for wide frequency bands
  - – 941225 D05A: included channel BW & selection details for downlink carrier aggregation power measurement requirements
  - – 648474 D04: updated text to match recent generation smartphones
  - – 648474 D03: expanded the procedures to cover Qi, PMA & A4WP

Wi-Fi Issues -

- Before June 2014 both 15.247 DTS and 15.407 NII had 'Old Rules'
- On June 2, 2014 FCC published 'New Rules' for 15.407 and transition to remove 15.247 approvals
  - DTS Operation in FCC 15.247 - 2.4GHz (old rule had 5.8GHz band)
  - NII Operation in FCC 15.407 – all 5GHz bands
  - Transition the U-NI-3 5745-5850 MHz band from DTS 15.247 to NII 15.407
    - All new applications MUST file in NII 15.407 (as of today)
    - Class II Permissive Changes (C2PC) are allowed in 15.247 until June 2, 2016
    - All devices marketed, imported, or sold as of June 2, 2016 must meet the "New Rules."
    - Devices already sold to users can still be operated

KDB 594280 D01(v02r01) - Configuration Control

- Devices that rely on Software to configure the regulated operating parameters
- This KDB addresses the software of non-SDR devices
  - SDR guidance is given in KDB 442812 D01
- User cannot modify configuration to violate approval
  - Items such as frequency and power not allowed beyond approved parameters
  - Users can still select allowed channels
- How does the manufacture prevent violations?
  - Must address the details within application
  - Information is filed as confidential

Wi-Fi channel 12&13, geo-location

- continued KDB 594280 D01

  - If the device is not approved for operation on Ch 12&13 (&14) then it should never operate on those channels in the USA
  - Must show HOW unapproved operation is prevented
  - Default mode of operation must comply with FCC/US approval
  - In order to operate outside of US capabilities must verify location
  - Geo-Location is acceptable but based on physical location of use
    - Can use verifiable source, such as cellular network MNC/MCC or multiple Access Points.

U-NII Device Security KDB Pub 594280 D02 (v01r03)

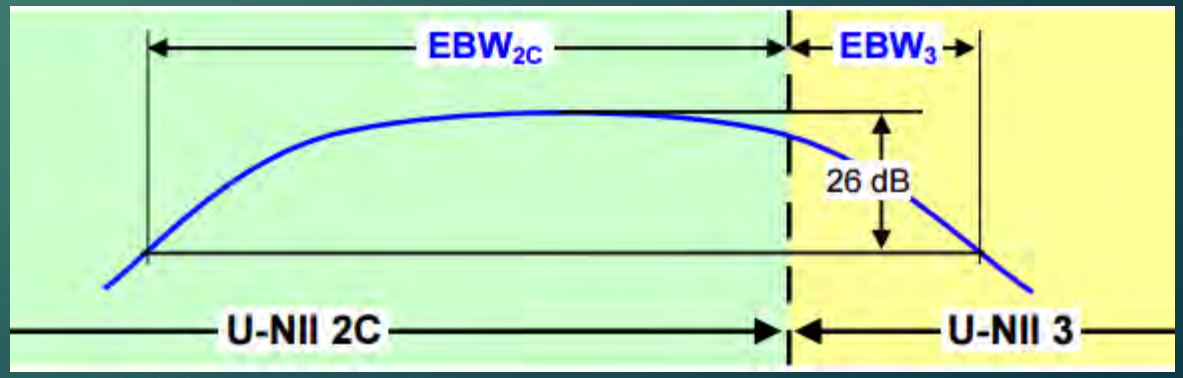
- KDB 594280 D02 was revised to address **security implementation** concerns and **third-party** access.
  - **General description** is about the software as a whole, not about RF parameters.
  - **Authentication and verification protocols** must be described in detail, including encryption.
  - Need to demonstrate how device is protected from "flashing".
- Revision also clarifies requirements for modules and "Third-Party Access"
  - Module grantee must ensure that host manufacturers meet all software security requirements for U-NII devices.

U-NII Device Security (cont.)

- KDB Pub 594280 D02
  - U-NII SDR Devices
    - Must address selected **security questions** in KDB 594280 D02, in addition to questions in KDB 442812 D01(SDR).
    - All application purposes must address both KDB Publications (D01 & D02).
  - General observations
    - All questions must be answered and descriptions must be provided. A simple yes/no is not acceptable. If a specific question does not apply you must provide justification.
    - All application purposes must include security information (i.e. original, permissive changes, etc…)
    - Software Security document must be in the operational description or software exhibit, preferably as a separate document

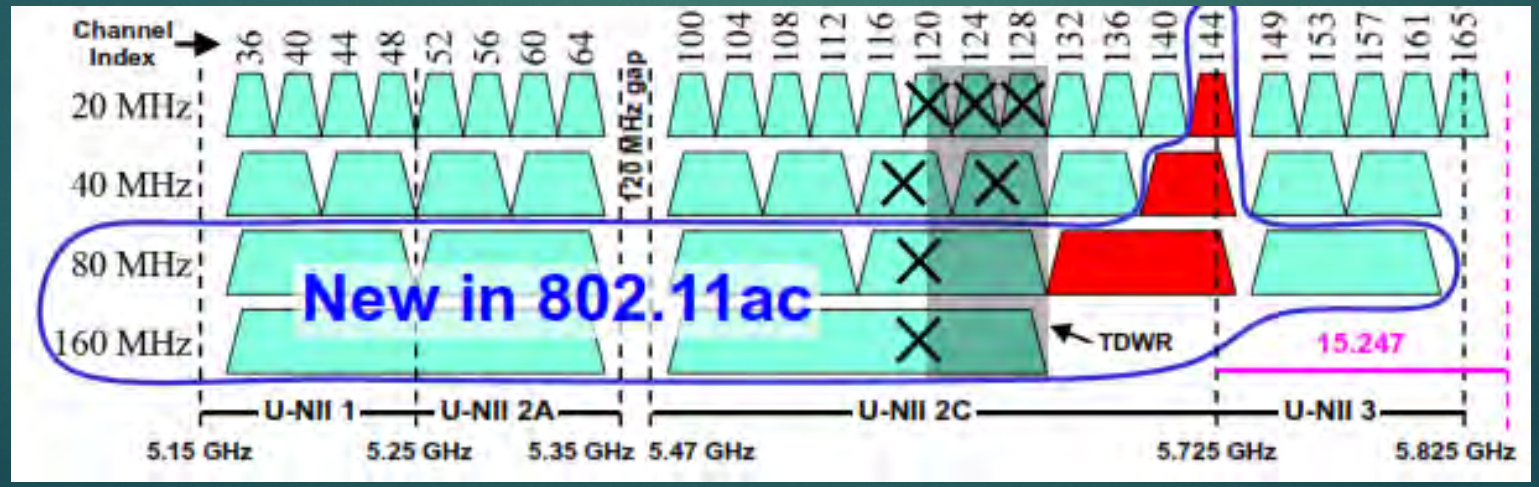
U-NII Straddle Channels

- 644545 D03 v01Guidance for IEEE 802.11ac Straddle Channels are Band-Cross Channels
  - Ch. 138 – 80 MHz BW Mode
  - Ch. 142 – 40 MHz BW Mode
  - Ch. 144 – 20 MHz BW Mode
- These Channels must comply with U-NII Rules in the band they operate
- The following tests are required for these channels
  - Conducted power
  - Power spectral density
  - Must meet all DFS requirements



U-NII 802.11ac DFS Testing

- 802.11ac – 80 + 80 Mode
  - Refer to KDB Publication 644545 D03
  - There are No 80 + 80 Master Devices Available (yet)
    - Clients must be tested at widest available Channel BW
    - Clients can be tested with an approved 80 MHz Master device until the 80+80 Masters are available



U-NII DFS Issues – Current Rules

- DFS Test per FCC KDB 905462 D02 v01
- Non-DFS channels that may overlap into the DFS Bands

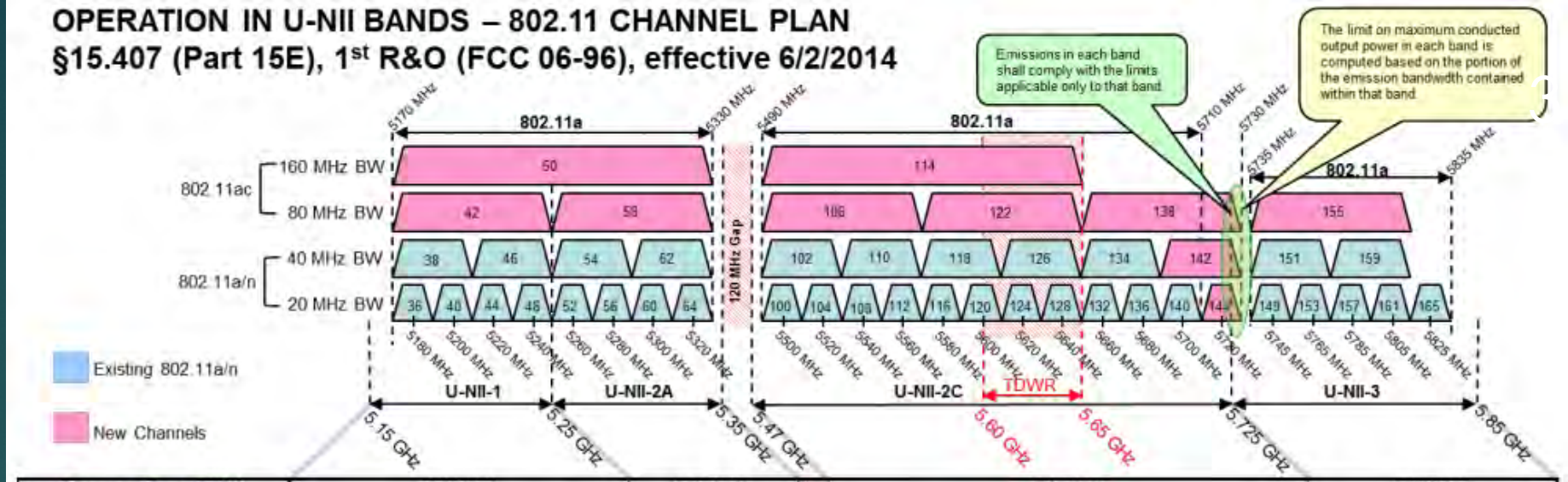
  Measured 99% BW must be < Channel BW to prevent overlap

  – U-NII-1 band channels - DFS detection is required if the OBW based on the 99% BW overlaps 5.25 GHz

  – U-NII-3 band channels - DFS detection is required if the OBW based on the 99% BW overlaps 5.725 GHz
- – Unintended overlap is typically caused by an overdriven amplifier
  - Lower power
  - Check band edge compliance

KDB905462D06

OPERATION IN U-NII BANDS – 802.11 CHANNEL PLAN
§15.407 (Part 15E), 1st R&O (FCC 06-96), effective 6/2/2014



Frequency Range (MHz)	5150-5250	5250-5350	5470-5725	5725-5850
Condition of Operation	Indoor/Outdoor, Master/Client, mobile/portable, and fixed Device, unless otherwise noted			
Max Conducted TX Power	30 dBm (1 W) for master device 24 dBm (250 mW) for mobile/portable client device	24dBm (250 mW) or 11 dBm + 10 log B, whichever is lower (B= 26-dB emission BW)		30 dBm (1 W)
Max_EIRP	4 W (36 dBm) with 6 dBi antenna 200 W (53 dBm) for fixed P-t-P application with 23 dBi antenna Additional rule for outdoor operation: Max_EIRP < 125 mW (21 dBm) at any elevation angle > 30° from horizon		1 W (30 dBm) with 6 dBi antenna	4 W (36 dBm) with 6 dBi antenna No EIRP limit for fixed P-t-P application (i.e. no antenna gain limit)
TX Power Reduction (dBm-by-dBi) required when antenna exceeds…	> 6dBi >23 dBi for fixed P-t-P application		> 6 dBi	> 6dBi Not required for fixed P-t-P application with any antenna gain
Out of Band e.i.r.p. Emission	≤-27 dBm/MHz outside 5150-5350 MHz		≤-27 dBm/MHz outside 5470-5725 MHz	≤-17 dBm/MHz within 5715-5725 MHz **and** 5850-5860 MHz ≤-27 dBm/MHz outside 5715-5860 MHz
Max Conducted Power Spectral Density (PSD)	17 dBm/MHz for master device 11 dBm/MHz for mobile/portable client device		11 dBm/MHz	30 dBm/500kHz
Dynamic Frequency Selection (DFS) required?	NO	YES for master device with Detection Threshold of -64 dBm for 200 mW (23 dBm) ≤ Operating_EIRP ≤ 1W (30 dBm); -62dBm for Operating_EIRP < 200 mW (23 dBm) **and** PSD must be ≤ 10 dBm/MHz. **Device must sense for radar signals at 100% of its emission BW** NO, for client device		NO
Transmit Power Control (TPC) required?	NO	YES, if Max_EIRP ≥ 500 mW (27 dBm) and able to lower EIRP below 24dBm NO, if Max_EIRP < 500mW (27dBm)		NO
Minimum BW requirement	N/A			6-dB BW ≥ 500 kHz

905462 D06 802.11 Channel Plans New Rules v01

KDB 941225 D05A
LTE Rel.10 KDB Inquiry Sheet v01r02

- Updates on Power Measurements for Carrier Aggregation
- Updated the uplink (handset) power measurement procedures for SAR test exclusion due to downlink (base station) carrier aggregation (CA)
- SAR test exclusion requires power test configurations & results in reports
  - Note: test configurations and results generally do not qualify for confidentiality
- Reminder: Downlink Carrier Aggregation requires PAG filing

Mobile Device Exposure Evaluation

- FCC Clarified current Requirements for testing MPE
- Routine evaluation for §2.1091 requires **MPE measurement** or numerical simulation to show compliance; i.e., when ERP is
  - ≥ 1.5 W at ≤ 1.5 GHz or ≥ 3.0 W at > 1.5 GHz
- When categorical exclusion applies the required separation distance for MPE compliance may be estimated (calculated)
  - to verify the distance specified in user and installation instructions
  - the estimated distance must be consistent with the instructions provided to users and installers
- For certain devices that operate in mostly isolated and stationary conditions, when routine evaluation applies, a KDB inquiry may be submitted to determine if the required separation distance can be estimated to determine MPE compliance
  - with respect to exposure conditions and distances supported by the installation and use conditions

New FCC Proposal – FCC 15-92

- NPRM – amendment Parts 0, 1, 2, 15 & 18 of FCC Rules re Authorization of RF equipment, ET Doc. 15-170, FCC 15-92, released 7/21/15, comments were due 30 days after publication in FR (early October).
- **Proposal** to:
  - Combine DoC and verification – into Supplier's Declaration (SDoC)
  - Codify (put into Rules) and clarify provisions for modular devices
  - Clarify responsibilities for modular devices
  - Clarify confidentially requirements
  - Codify e-labelling
  - Simplify the FCC importation program
  - Consolidate equipment authorization rules in Part 2
    - ✓ Labelling
    - ✓ Measurement procedures (including adding C63.26)
    - ✓ Rule consolidation and modification (including permissive change rules)
- There have been almost 3000 comments submitted to FCC through ECFS

How to Get Information & Stay Connected

- Join the TCB Council
  - All Laboratories and manufacturers can join as Associate Members
  - To encourage Laboratory Membership we are offering 1 year free membership in the TCB Council (regular fee US$850/year per company)
  - www.tcbcouncil.org

Questions?

- If we do not have time now I am available for remainder of today.
- I can also be reached at

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Thank You!