



NEW RULEMAKINGS & ISSUES FOR LICENSED SERVICES

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Topics Covered

New Rules for Millimeter Wave – Parts 15 & 101

New Rules for 1.7 & 2.1 GHz bands – Part 27

New Rules for 4.9 GHz band – Part 90

New Rules for ITS applications in 5.9 GHz band

FCC Policy for Amplifier, Boosters, Repeaters

NEW RULEMAKINGS & ISSUES FOR LICENSED SERVICES



FCC 03-248: Rule Making

ALLOCATIONS AND SERVICE RULES FOR THE 71-76 GHZ, 81-86 GHZ AND 92-95 GHZ BANDS - Released on 11/04/2003

http://hraunfoss.fcc.gov/edocs_public/quickSearch/getResult

Adopts service rules to promote the private sector development and use of the "millimeter wave" spectrum bands pursuant to Parts 15 and 101 of the Rules.

Millimeter Wave spectrum allocations:

- **71-76 GHz - Part 101**
- **81-86 GHz – Part 101**
- **92-95 GHz - Part 15**



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R & O - FCC 03-248: Rule Changes Made

RF Exposure Requirements for Millimeter Wave

- **Fixed – No change to 1.1307**
- **Mobile – No change to 2.1091**
- **Portable – Routine Evaluation required for 15.257. (no Part 101 devices)**



R & O - FCC 03-248: Rule Changes Made

92-95 GHz bands operation (Part 15):

- **Average power density: 9 uW/sq. cm @ 3m**
- **Peak power density: 18 uW/sq. cm @ 3m**
- **Peak transmitter output power: 500 mW**
- **Fundamental emissions must be contained within the frequency bands**
- **Indoor operation only**
- **Aircraft/satellite operation prohibited**



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R & O - FCC 03-248: Rule Changes Made

PART 101 – FIXED MICROWAVE SERVICES

Maximum bandwidth is licensed in segments of:

- 1.25 GHz for the 71-76 and 81-86 GHz bands**
- 2 GHz from 92-94 GHz**
- 0.9 GHz segment from 94.1 to 95 GHz**
- The maximum allowable RF power: 55 dBW**



NEW RULEMAKINGS & ISSUES FOR LICENSED SERVICES

FCC 03-251: Rule Making

Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands - Released on 01/30/2003

http://hraunfoss.fcc.gov/edocs_public/quickSearch/getResult

Report and Order adopts service rules for Advanced Wireless Services (AWS) in the 1710-1755 and 2110-2155 MHz bands.

- **FCC allocates two 45-megahertz blocks of contiguous spectrum that could be paired, and used to support a variety of AWS applications, such as “3G” and “IMT-2000” technologies.**



NEW RULEMAKINGS & ISSUES FOR LICENSED SERVICES

R & O - FCC 03-251: Rule Changes Made

§ 27.5 Frequencies :

- **Two paired channel blocks of 10 megahertz each are available for assignment.**



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R & O - FCC 03-251: Rule Changes Made

§ 27.50 Power and antenna height limits:

- **Fixed and base stations in the 2110-2155 MHz band: 1640 watts EIRP and a peak conducted power of 100 watts.**
- **Fixed, mobile, and portable (hand-held) stations in the 1710-1755 MHz band: 1 watt EIRP.**



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R & O - FCC 03-251: Rule Changes Made

§ 27.53 Emission limits

- **1710-1755 MHz and 2110-2155 MHz bands:
the power of any emission outside a licensee's
frequency block shall be attenuated below the
transmitter power (P) by at least $43 + 10 \log_{10} (P)$ dB.**



NEW RULEMAKINGS & ISSUES FOR LICENSED SERVICES

FCC 03-99: Rule Making

**The 4.9 GHz Band Transferred from Federal Government Use
- Released on 05/02/2003**

http://hraunfoss.fcc.gov/edocs_public/quickSearch/getResult

- **Establishes licensing and service rules for the 4940-4990 MHz band (4.9 GHz band).**
- **Allocates fifty megahertz of spectrum in the 4.9 GHz band for fixed and mobile services for public safety use.**
- **Promotes effective public safety communications and innovation in wireless broadband services in support of public safety.**



NEW RULEMAKINGS & ISSUES FOR LICENSED SERVICES

R & O - FCC 03-99: Rule Changes Made

RF Exposure Requirements

§ 2.1091 Radiofrequency radiation exposure evaluation: mobile devices.

- **4.9 GHz Band Services under Part 90 of this chapter are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if their ERP is 3 watts or more.**



NEW RULEMAKINGS & ISSUES FOR LICENSED SERVICES

R & O - FCC 03-99: Rule Changes Made

RF Exposure Requirements

§ 2.1093 Radiofrequency radiation exposure evaluation: portable devices.

- **4.9 GHz Band Services under Part 90 of this chapter are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use, regardless of power.**



NEW RULEMAKINGS & ISSUES FOR LICENSED SERVICES

R & O - FCC 03-99: Rule Changes Made

§ 90.205 Power and antenna height limits.

- **4940-4990 MHz.** Limitations on power are specified in § 90.1215 of this part:

The peak transmit power should not exceed:

Channel BW (MHz)	Peak Power (dBm)
1	20
5	27
10	30
15	31.8
20	33

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R & O - FCC 03-99: Rule Changes Made

- **Devices are also limited to a peak power spectral density of 20 dBm per 1 MHz.**



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R & O - FCC 03-99: Rule Changes Made

§ 90.210 Emission masks

- ***Emission Mask L.*** For transmitters operating in the 4940-4990 MHz frequency band, any emission must be attenuated below the output power of the transmitter as shown in slide notes.

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FCC DOC-242309: News Release

FCC ADOPTS RULES FOR INTELLIGENT TRANSPORTATION SYSTEMS TO ADVANCE HOMELAND SECURITY AND TRAVELER SAFETY - Released on 12/17/2003

http://hraunfoss.fcc.gov/edocs_public/quickSearch/getResult

On November 15, 2002, the Commission issued a Notice of Proposed Rulemaking (NPRM) to establish service and licensing rules for the 5.850-5.925 GHz band for dedicated short-range communications services (DSRC) based intelligent transportation services (ITS) applications. The NPRM is part of an overall federal effort led by the Department of Transportation (DOT).



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FCC : DOC-242309 – News Release

Examples of DSRC-based ITS applications:

- **probe data collection**
- **traffic information**
- **toll collection**
- **vehicle safety inspections**
- **commercial vehicle operations**
- **driver's daily log and drive thru payment.**



NEW RULEMAKINGS & ISSUES FOR LICENSED SERVICES

Action by the Commission December 17, 2003, by R&O (FCC 03-324):

- **Adopted conclusion that the 5.9 GHz band be used primarily for public safety purposes.**
- **Adopted for ITS the standard developed by the American Society for Testing and Materials (ASTM) and the Federal Highway Administration, an agency of DOT.**
- **Adopted a geographic area licensing regime.**
- **Concluded that DSRC operations in the 5.9 GHz band must coordinate frequencies through the National Telecommunications and Information Administration.**

AMPLIFIER, BOOSTER, and REPEATERS – ISSUES



- **Part 2.815--** *External radio frequency power amplifiers.*
- **Part 22**
 - *Repeater*
 - *Signal booster*
- **Part 90**
 - *Mobile repeater station*
 - *Signal booster*

AMPLIFIER, BOOSTER, and REPEATERS– *General Definitions*



- **Fiber-optic RF Systems**
- **For EAB Certification use**
 - AMP (equipment class)
 - general term “booster”
 - general term “repeater”

AMPLIFIER, BOOSTER, and REPEATERS– *Reminder Sheet*



[] Equipment class--

- AMP for *External radio frequency power amplifiers*,
- otherwise use TNB/PCB
- state “booster” or “repeater” in grant comment

[] Applicable rule part.

- What specific rule part the device will be used with.
- Verify applicable emission masks etc and if booster rules apply.
- Verify frequency and device is licensable in applicable rule part.

AMPLIFIER, BOOSTER, and REPEATERS– *Reminder Sheet*



- [] **Booster rules.** Applicant should be FYI'd *“Device must meet all criteria stated in 90.219 and 22.383 for related booster/in-building operations. Boosters can only be installed and operated by the FCC licensee.”*

- [] **Single or multiple FCC IDs-** One FCC ID per transmitter box or rack not per system.

- [] **Form 731 line items--** All transmitters should be included and tested (uplink/downlink).

AMPLIFIER, BOOSTER, and REPEATERS– Reminder Sheet



- [] System operation— When transmitter requires other devices in a system check Form 731 “system” box.**

- [] List type of emissions (i.e. F3E) in emission designator field.**

AMPLIFIER, BOOSTER, and REPEATERS– Reminder Sheet



- [] Frequency stability-- Measure if device contains translation circuitry. If not, List AMP in frequency tolerance field of Form 731.**

- [] Radiated Spurs (box). One test only with a narrow signal. CW is worst case. (low, mid. and high freq.)**

- [] Conducted Spurs- Test all modulation types (TDMA, CDMA, FM covers GSM and F1D)(low, mid. and high freq.)**

AMPLIFIER, BOOSTER, and REPEATERS– Reminder Sheet



- [] Intermod. testing--3 signals at maximum drive level**

- [] Occupied bandwidth. (use RBW 300 Hz or 1% RBW). Use typical signal(s). Input vs output characteristics. The spectral shape (not level) of the output should look similar to input.**

AMPLIFIER, BOOSTER, and REPEATERS– Reminder Sheet



[] Output power

- Power on Form 731 composite or carrier. Include in remarks "*Power output listed is composite for multi-channel operation.*"
- Maximum input drive level for uplink/downlink
- Saturation prevention-level control and burst response
- power limits of 90.219

[] Test for rejection of out-of-band signals. Filter freq. response plots is acceptable in lieu of tests.