

Increasing Spectral Efficiency for Point-to-Multipoint Broadband Service in the License Exempt Bands

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WBOC Proposal

- Amend Section 15.247 to permit higher power transmission for P-to-MP systems in the 902-928 MHz, 2.4 GHz, and 5.8 GHz bands
- Permit higher power transmission in all geographic areas, not just rural areas
- Measure power via new metric: “Maximum Average Interference Power” or “MAIP”:

$$MAIP = \text{Instantaneous Transmitter ("ITX") Power} * TX \text{ duty cycle} * (\text{Horizontal Antenna Beamwidth}/360)$$

BENEFITS OF WBOC PROPOSAL

- **Permits P-to-MP systems to achieve more capacity, improved range, and better in-building penetration**
- **Reduces spectral inefficiencies from pure omnidirectional operations**
- **Reduces interference by limiting transmissions to where they are most needed**
- **Eliminates “disconnect” between P-to-MP and PTP rules in Part 15**

Why Use MAIP?

- **Presently, Section 15.247 generally limits point-to-multipoint transmissions to 1W at 100% duty cycle**
 - $MAIP = 1W * 100\% * 360^\circ/360^\circ = 1W^\ddagger$

- **WBOC Proposal:**
 - Maintain MAIP at 1W, consistent with current limit
 - Allow higher Instantaneous TX power (ITX) so long as the product of ITX, duty cycle and horizontal beamwidth does not exceed the 1W limit

- **Use cognitive technology to mitigate impact of interference on your own network**

‡up to 4W with antennas of less than 6db gain

Rationale

- **Average radio interference signal independent of the antenna pattern, and dictated by TX power at antenna port**

- **Proposal provides an incentive to use directional antennas and lower duty cycles**
 - Increases signal strength for receivers in specific illuminated region
 - Avoids interference in non-illuminated regions
 - Allows efficient “air-sharing” on time division basis
 - Permits license-exempt broadband operators to improve range, building penetration and system capacity as *quid pro quo* for greater spectral efficiency

- **While outage probability and interference variance may increase in limited situations, performance of total network under MAIP model still superior to that of existing networks under current rules.**

- **Interference further mitigated by cognitive radio techniques**

WHY PERMIT MAIP IN NON-RURAL AREAS?

- **RURAL VS. NON-RURAL HARD TO ENFORCE IN LICENSE-EXEMPT BANDS – DEVICES MAY OPERATE ANYWHERE**
- **LICENSE-EXEMPT BROADBAND NETWORKS ARE DESIGNED FOR WIDE-AREA COVERAGE – RURAL VS. NON-RURAL NOT OPERATIONALLY SIGNIFICANT**
- **COMMISSION’S SECTION 706 MANDATE TO PROMOTE BROADBAND APPLIES TO ALL AREAS, NOT JUST SOME OF THEM**
- **DEFINING “RURAL” BY LEVEL OF NOISE FLOOR CREATES INTERFERENCE ISSUES FOR EQUIPMENT DESIGNED TO OPERATE BELOW NOISE FLOOR**
- **OTHER PART 15 POWER LIMITATIONS DO NOT DRAW RURAL VS. NON-RURAL DISTINCTION**