

July 1999

doc.: IEEE 802.11-99/143

## Update on RF Lighting Issue

### *Revised Proposal on In Band Emissions for RF Lights in 2.45 GHz ISM Band*

Submission

Slide 1

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## NPRM 98-42

- Recommended authorization of RF Lights operating in 2.45 GHz ISM band
  - NO LIMIT on in-band emissions!
  - Only FDA limits on human exposure apply
  - Final OET recommendation sent to Commission in December, 1998
- Part 15 Interests appealed directly to Commission
  - Commission delayed final resolution pending efforts of interested parties to seek resolution

Submission

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## Unrestricted Devices

- Can be used by public without special precaution
  - e.g. microwave ovens
  - Non-occupational limit is  $1\text{mW}/\text{cm}^2$
  - measured at 20 cm from any surface
- By using point source approximation, de facto limit can be estimated:
  - For  $r = 20\text{ cm}$ , surface of sphere:  
$$\text{Area} = 4 \pi r^2 = 5026\text{ cm}^2$$
  - EIRP of unrestricted device
    - $\text{EIRP} = 5026\text{ cm}^2 \times 1\text{ mW}/\text{cm}^2 = 5\text{ Watts!!!}$

Submission

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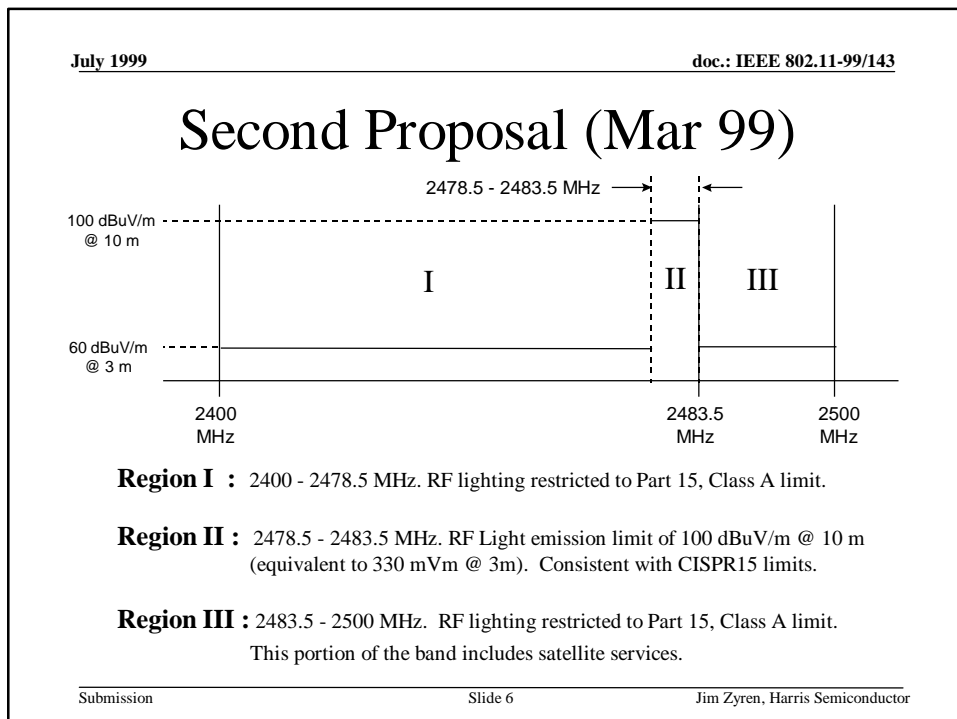
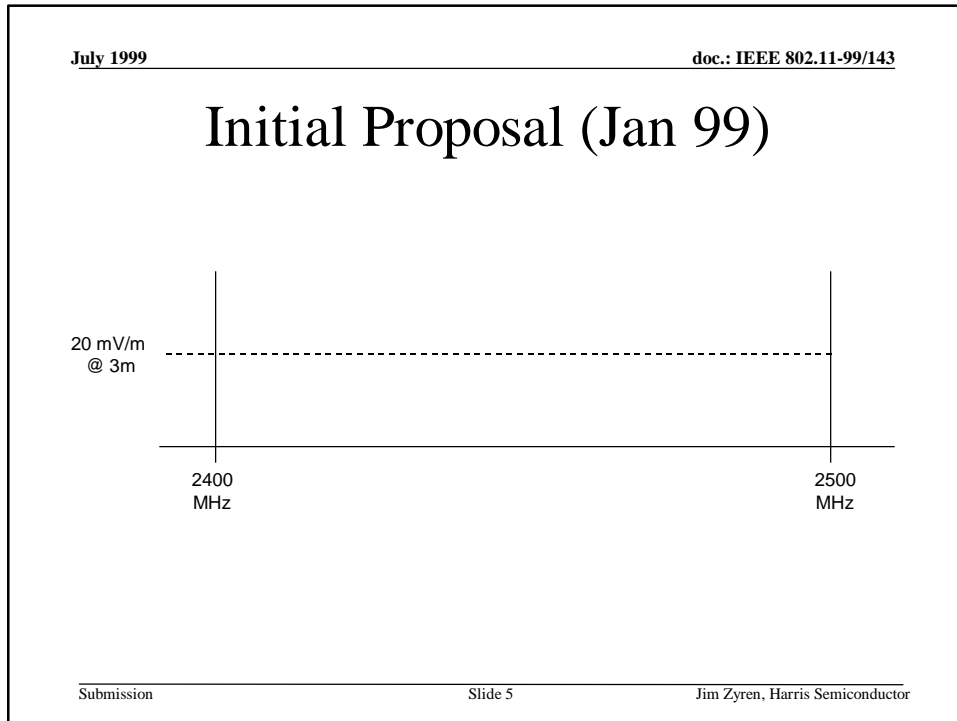
## Restricted Devices

- Can radiate at much higher power
  - physical access must be barred
  - same limit applies ( $1\text{ mW}/\text{cm}^2$ )
  - e.g. array of lights on a 12 meter mast
    - applications include stadium lights, parking lots, etc.
    - if tower is equipped with ladder, access is barred with a gate
    - assume no one can come within 10 meters of lights
    - Surface of sphere with 10 m radius is  $12.5 \times 10^6\text{ cm}^2$
  - Allowable EIRP is 12.5 kW!!!

Submission

Slide 4

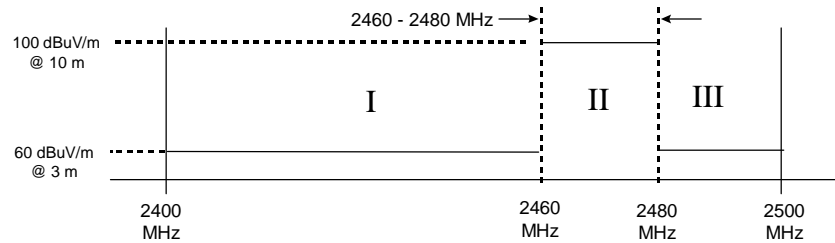
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## Latest Proposal (Jun 99)



**Region I :** 2400 - 2460 MHz. RF lighting restricted to 10 mV/m (avg)

**Region II :** 2460 - 2480 MHz. RF Light emission limit of 100 dBuV/m @ 10 m (equivalent to 330 mVm @ 3m). Consistent with CISPR15 limits.

**Region III :** 2480 - 2500 MHz. RF lighting restricted to 10 mV/m (avg)  
This portion of the band includes satellite services.

Submission

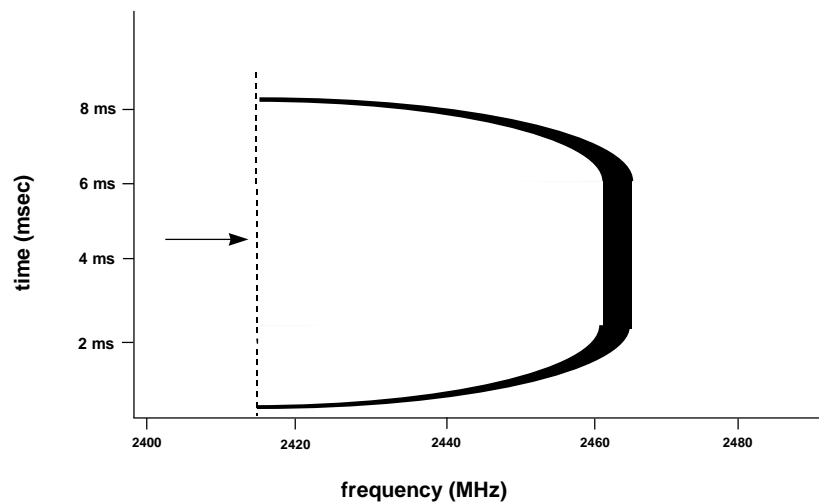
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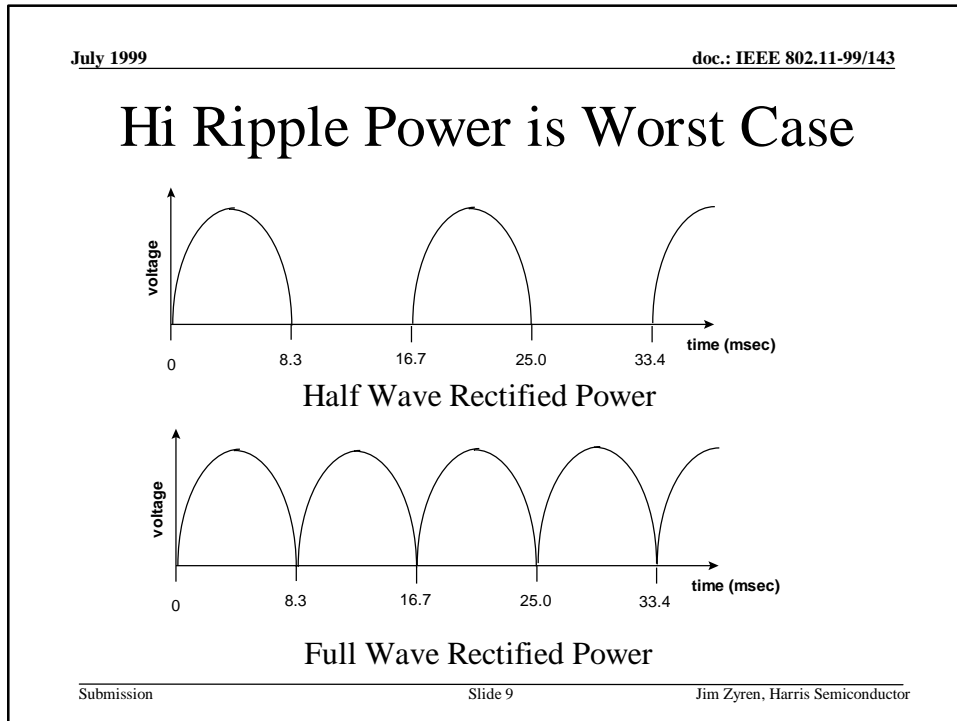
## Magnetrons Sweep in Frequency



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## Effect of New Proposal

- Requires RF Lights to use low (relatively) ripple DC power
  - stabilizes magnetron operating frequency
  - data from Fusion demonstrates that lights eqipeed in this manner can comply with new proposed limit
  - operating BW of stabilized magnetron is <1 MHz
- New limit restricts hi power to 2460 - 2480 MHz
  - rest of band limited to 10 mV/m @ 3m (avg)
  - Effective average power of -15 dBm

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