

# RF Safety



# Ionizing versus Non-ionizing radiation

Effects of radiation on the human body

Need to control exposure and prevent  
over exposure



Controlled Access

## Uncontrolled Access



Microwave cooking recipe:

- Time
- Power

Power:

- Duty Cycle
- Antenna gain

Data versus Voice

## Data Duty Cycle:

- 50 millisecond blocks
- Messages average 6 blocks or less
- 10 messages per hour
  
- 50 times 6 times 10
- 3000 milliseconds per hour (3 seconds)
- $3/3600 = .00083$  (about .8%)

800 MHz frequency  
 3dB gain antenna  
 1% duty cycle

UHF frequency  
 3dB gain antenna  
 10% duty cycle

### Calculation Results

Average Power at the Antenna	0.200 watts
Antenna Gain in <u>dBi</u>	3.00 <u>dBi</u>
Distance to the Area of Interest	3.00 feet
Frequency of Operation	810.000 MHz
Are Ground Reflections Calculated?	Yes
Estimated RF Power Density	0.0098 mw/cm <sup>2</sup>

	Controlled Environment	Uncontrolled Environment
Maximum Permissible Exposure (MPE)	2.71 mw/cm <sup>2</sup>	0.55 mw/cm <sup>2</sup>
Distance to Compliance From Center of Antenna	0.23 feet	0.45 feet
Does the Area of Interest Appear to be in Compliance?	yes	yes

### Calculation Results

Average Power at the Antenna	4.000 watts
Antenna Gain in <u>dBi</u>	3.00 <u>dBi</u>
Distance to the Area of Interest	3.00 feet
Frequency of Operation	450.000 MHz
Are Ground Reflections Calculated?	Yes
Estimated RF Power Density	0.1945 mw/cm <sup>2</sup>

	Controlled Environment	Uncontrolled Environment
Maximum Permissible Exposure (MPE)	1.50 mw/cm <sup>2</sup>	0.30 mw/cm <sup>2</sup>
Distance to Compliance From Center of Antenna	1.13 feet	2.47 feet
Does the Area of Interest Appear to be in Compliance?	yes	yes

# Safety Precautions:

- Mount the transmitter antenna on the roof of the car
- Remain in the car when sending a message
- Do not touch the antenna when the IP Mobilenet radio turned on- data may be transmitted automatically without the driver's knowledge
- Do not spend any more time than necessary standing around the antenna when the IP Mobilenet system is operating