Title: Evaluation of RF Exposure from CellNet Transmitters for General Population / Uncontrolled Exposure

Methodology:

Using Table 1 in Appendix A of FCC OET Bulletin 65 (Edition 97-01), the Maximum Permissible Exposure limit for general population / uncontrolled exposure is specified as a power density:

$MPE = f / 1500$ milliwatts per square centimeter, where f is in MHz (between 300 and 1500 MHz)

averaged over 30 minutes. Based on spherical surface around the source, the minimum distance D can be computed as:

$D = \mathrm{SQRT}(EIRP / (4\pi * MPE)$

where D is in centimeters, $EIRP$ is in mW, and MPE is in mW per square centimeters.

Table 1. Maximum Permissible Exposure (MPE) Limit for General Population / Uncontrolled Exposure

Hardware	average transmit power (dBm)	antenna gain (dBi)	duty cycle (averaged over 30 minutes)	avg EIRP (dBm)	avg EIRP (mW)	frequency (MHz)	MPE (mW per sq. cm)	minimum distance (cm)	minimum distance (inches)
CM	32	11	100%	43.00	19953	953	0.6353	50	20
RR	28	11	10%	29.00	794	929	0.6193	10	4
RAMWAN	33	5	2%	21.01	126	902	0.6013	4	2
cellphone	34.8	5	2%	22.81	191	880	0.5867	5	2
Repeater (Selective)	27	5	4%	18.02	63	918	0.6120	3	1
Repeater (Repeat All)	27	5	25%	25.98	396	918	0.6120	7	3
LAN xcvr	27	5	2%	15.01	32	918	0.6120	2	1
TOMM	30	0	0.01%	-11.15	0	918	0.6120	0	0
MCC (with Remote Radio & LAN Transceiver)					826.03	929 , 918	0.6120	10	4
MCC (with RAMWAN Radio & LAN Transceiver)					157.89	902 , 918	0.6013	5	2
MCC (with Cellphone WAN & LAN Transceiver)					222.70	880 , 918	0.5867	5	2

Notes:

1. Minimum safe distance to Cell Master Antenna for uncontrolled exposure is 20 inches.
2. Minimum safe distance to an MCC with unknown WAN type for uncontrolled exposure is 4 inches.
3. Minimum safe distance to a Repeater with unknown configuration for uncontrolled exposure is less than 3 inches.
4. Duty cycle denotes how long the transmitter is ON over the thirty-minute averaging period. A duty cycle of 100% means the transmitter is ON for 30 minutes.
5. A remote read of all TOU+Demand meters on an MCC is representative of heavy WAN load. This can result in about 80 bytes of WAN payload (after data compression) per TOMM or 60,000 bytes for 750 TOMMs. Additional WAN traffic due to MCC health checks, polling, etc., are assumed to have a small contribution to the duty cycle.
6. The 9QPR WAN protocol limits transmissions from the MCC to less than 10% duty cycle.
7. RAMWAN has a 1,000 byte per second rate and so will be transmitting for 60 seconds out of 30 minutes for a duty cycle of less than 1% for the heavy WAN load shown above. A similar duty cycle for cell phones is assumed. A 2% duty cycle was entered in the table above for margin.
8. Simple Repeater assumes extreme LAN utilization and no transmit attenuation.
9. Selective Repeater assumes 250 plain vanilla electric TOMMs in the repeater table being received at high PSR and no transmit attenuation.

Reference:

[1] FCC OET Bulletin 65 (97-01 Edition), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields", August 1997.
[2] FCC OET Bulletin 56 (under revision).

Enclosure

* Practice limited to matters and proceedings before federal courts and agencies.

RF Emissions Statement

The instant device, a Part 15 spread spectrum transmitter, is a fixed device professionally installed inside an enclosed utility meter. Accordingly, the device is not designed to be used by any person. The antenna associated with the device is not external but is rather also contained within the same utility meter enclosure. The device communicates with a fixed local area network.

This transmitter does not fit within the definition of a "mobile device" set forth in section 2.1091(b) of the Commission's rules, 47 C.F.R. § 2.1091(b), because it is designed to be used in fixed locations. In addition, the transmitter does not meet the definition of a "portable device" contained in section 2.1093(b), because it is not designed to be used by any person. Furthermore, section 1.1307(b)(1), which is referenced by section 15.247(b)(4), categorically excludes this Part 15 device from the requirement to conduct a routine environmental evaluation for RF exposure since the device is neither a millimeter wave device, nor an unlicensed personal communications service device.

In any event, based on the maximum output power (+30 dBm) and antenna gain information contained in the underlying equipment authorization application for this device, the emissions for the device are well below the maximum exposure limits set forth in sections 1.1310 and 2.1093(d). Furthermore, the device only emits approximately six very brief transmissions in any given one-half hour period, each with a duration approximately 0.0027 seconds. Accordingly, the RF emissions for the device are well within the limits set by the Commission.