RF Exposure Assessment
FCC ID: NSNTPTRACKER

1. Introduction

Device is an Offender Tracking System which is using a CDMA2000 and Zigbee combo card (FCC ID:NSNTPTRACKER).

Zigbee output power of this combo module is 2.5mW, and it is qualified for exclusion from SAR evaluation because the out power is below 60/f(GHz)mW**, as explained in KDB pub 447498.

**Note: Zigbee transceiver operates at 2.5ghz, therefore (60/2.5)mW = 24mw would be the maximum exclusion limit, which is higher than the 2.5mw output power of the device.

RF exposure compliance for the Offender tracking system is also assessed by applying a transmission duty cycle to the maximum transmit power of the CDMA transmitter. Device Transmission mode is 1XRTT, other modes are not available.
This methodology is valid because the transmitter only transmits when the devices reports back position locations at a fixed interval.

The modem is not used to transmit voice or user data other then position location information.
If the adjusted transmit power is below the 60/f(GHz) power threshold defined KDB 447498, SAR measurements are not required for the respective device.

2. Duty Cycle Calculation

The CDMA transmission duty factor is calculated based on the transmission time duration to send the necessary position location information and a fixed value of how often the location information is transmitted.

- Total Transmission time to send location report at CDMA maximum power=10.36 seconds

- Frequency of Location reports= Once every 3 minutes (180 seconds)

  CDMA Transmit Duty Factor: 10.36/180 = 5.76%

3. SAR Evaluation Requirements base on Adjusted Transmit Power Calculations

The Adjusted transmit power in the following table is calculated with the equation:
Adjusted Transmit Power with duty cycle = Max Conducted TX Power * Duty Cycle

Table 1: SAR Evaluation Requirement based on Adjusted Transmit Power (1XRTT data)

CDMA Band 10:10 plan	Frequency (MHz)	Maximum Conducted TX Power (dBm)	Maximum Conducted TX Power (mW)	Transmitter Duty Cycle	Adjusted Transmit Power with duty cycle (mW)	SAR Power Threshold (60/f(GHz) (mW)	SAR Evaluation Result
Band Class 0 (850 Mhz)	824	23.8	239.88	5.76%	13.8	72.8	Less then SAR Pwr threshold
	836	23.8	239.88	5.76%	13.8	71.8	Less then SAR Pwr threshold
	848	23.6	229.09	5.76%	13.2	70.8	Less then SAR Pwr threshold
Band Class 1 (19000 Mhz)	1850	24.7	295.12	5.76%	17.0	32.4	Less then SAR Pwr threshold
	1880	23.6	229.09	5.76%	13.2	31.9	Less then SAR Pwr threshold
	1910	23.5	223.87	5.76%	12.9	31.4	Less then SAR Pwr threshold

4. Alternate duty cycle configurations.

The device can be configured to gather GPS data and to transmit that data at different rates than indicated above. The firmware in the device accepts commands from the monitoring centre as chosen by the user. The firmware is hard-coded to only accept the following 4 possible operating modes:

Table 2: Alternate Duty cycle Configurations

GPS Fix rate (minutes)	Call rate (minutes)	Amt of data	Seconds to transmit	Duty Cycle
1	10	1304	18.64017	3.11%
1	3	513	10.36611	5.76%
3	3	287	8.002092	4.45%
10	10	287	8.002092	1.33%

GPS Fix Rate (Minutes): This figure represents the how frequently the device will acquire a GPS data point and store it for later upload. eg: "1" means the unit will store a GPS data point every "1" minute.

Call Rate (Minutes): This figure represents how frequently the device will upload any stored data to the monitoring centre. Eg: "3" means the device will upload data once every "3" minutes.

Amt of data: Based on knowledge of how much data is stored per GPS location as well as how much other data much be sent with each upload, a total number of bytes can be derived and is represented in this column.
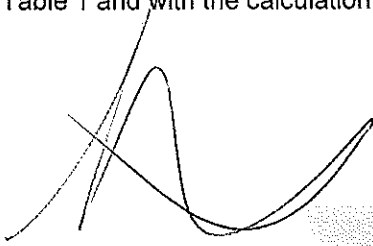
<u>Seconds to Transmit</u> is the amount of time that is required to transmit the data in the "Amt of Data" Column, based on a worst case data rate. Seconds to transmit includes setting up the call (Attach to the network) and actual data transmission. It includes all time the radio is on and transmitting.

<u>Duty Cycle</u> is then (Seconds to transmit)/(Call rate – minutes), expressed as a percentage. The calculation converts the minutes to seconds as would be expected.

Eg: Given that 3 minutes = 3*60 seconds, then 10.36611 / (3*60) = .05758 (5.76%)

The worst case duty cycle then would be a 1 minute GPS fix rate, coupled with a 3 minute Call rate. This worst case scenario was used to calculate the Adjusted Transmit Power cycle with Duty cycle as is represented in Table 1 and with the calculation illustrated immediately above.

Steve Rosset
Director, Technical Operations
March 14, 2011