# FCC / IC RF Exposure Exhibit

## CETECOM Inc., CA, Milpitas

**Duty Cycle Analysis to support application to waive FCC/IC SAR testing for the following equipment:**

**Applicant: SentriLock LLC.**

**Remote Access Device (RAD) – cellular enabled wireless smartcard reader**

**FCC ID: W9T-P10300; IC: 8174A-P10300**

### Operational Description

The Remote Access Device (RAD) is one instance of a system to control and record access to real estate which can be utilized by registered realtors. The other instances are the REALTOR® NXT Wireless lockboxes (containing property keys), the SentriCard® (containing security information) and the REALTOR® Lockbox Web Site (mainly to gather property access information etc)

The major functions of the RAD in this system is to provide local wireless (Zigbee) communication with the lockbox to enable for access to it, based on security data residing on the SentriCard®, and to relay communication between the REALTOR® NXT Wireless lockboxes and the REALTOR® Lockbox Web Site over WWAN (GPRS).

### Technical details:

WWAN radio: Cinterion BGS2-W, FCC ID: QIPBGS2; IC ID: 7830A-BGS2;
quad band 850&900&1800&1900MHz GSM / GPRS Multislot Class 10;

Max. conducted output powers (*): 850 MHz: 35 dBm, 1900 MHz: 32dBm;
(* acc. to Cinterion HW Interface Description for BGS2-E/BGS2-W, Version: 01.301, Doc Id: BGS2_HID_v01.301)

Antenna: trace to surface mount antenna; peak gain: 2.0 dBi @ 850 MHz, 3.7 dBi @ 1900 MHz;

Zigbee radio: Atmel ATmega128RFA1, IEEE 802.15.4

Frequency band: 2405 – 2480 MHz; 16 channels;

Max. conducted output power (measured): 1.6 dBm;

Antenna: dual pcb trace dipole; peak gain: -1.0 dBi;

Equipment size: 13 x 7 x 2.5 cm;

Power: 3.7 V lithium ion polymer battery, rechargeable via a standard micro USB interface;

The Atmel chip also serves as the microprocessor used to control the system, including the cell module (over the USART bus), OLED display, the smart card interface, and a piezo-electric speaker.

The device is used for data only.

The radios may transmit simultaneously. However, the contribution of the Zigbee radio to RF exposure is neglected since the it's measured conducted output power of 1.6 dBm (1.44 mW) is far below the 5 mm distance SAR exclusion threshold value of 10 mW for 2450 MHz provided in appendix A of KDB 447498 D01 General RF Exposure Guidance v05.

## RF Exposure Conditions

RF exposure environment: general population / uncontrolled.

exposure conditions: primarily handheld and near body.

## Duty Factor Considerations

According to the manufacturer's description, the equipment is designed to communicate with the REALTOR® Lockbox Web Site over WWAN either once per day or when a user initiates a session. When not in one of these sessions, the radio is powered down and not connected to a cellular network.  Since a user only needs to initiate a session once for every property they visit, the manufacturer conservatively estimates the shortest reasonable duration between access sessions to be thirty minutes (time to retrieve keys, ready property for showing, showing property to prospective buyers, locking up, moving to the next property).  The time between transmission sessions is taken here as 30 minutes.

Using their server logs as evidence, the manufacturer states that the largest amount of data they have seen transmitted in one session to be 750 bytes.

The GPRS data rate per TDMA slot when worst case coding scheme CS-1 is applied from the network under poor radio conditions is 8 kBit/s (MAC header not considered). With having 2 of the 8-slot TDMA frame available (ms class 10) a total minimum uplink data rate of 16 kBit/s can be assumed to be available for the payload.

With a data rate of 16 kBit/s the transmission of the 750 Bytes package takes 0.375 seconds. (transmitting with a maximum slotted average power of 35 dBm @ 850 MHz and 32 dBm @ 1900 MHz)

The tx duty cycle factor over this 0.375 second period is 25% (2 slots per 8 slot frame), i.e. 0.09375 seconds.

The tx duty cycle factor over a 30 minute period (shortest period between 2 sessions) is (0.09375 s / 1800 s) x 100 % =  0.0052 % which relates to -42.8 dB;

With this the conducted output power averaged over a 30 minute period becomes
for 850 MHz: 35.0 dBm – 42.8 dB = -7.8 dBm or rounded 0.2 mW;
for 1900 MHz: 32.0 dBm – 42.8 dB = -10.8 dBm or rounded 0.1 mW;

Both values are far below the 5 mm distance threshold values of 16 mW for 850 MHz and 11 mW for 1900 MHz as given in the table 'SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm' of appendix A of KDB 447498 D01 General RF Exposure Guidance v05.

For this reason SAR test exclusion is claimed.