User Manual

SIMBA-G
Wireless Communication Device

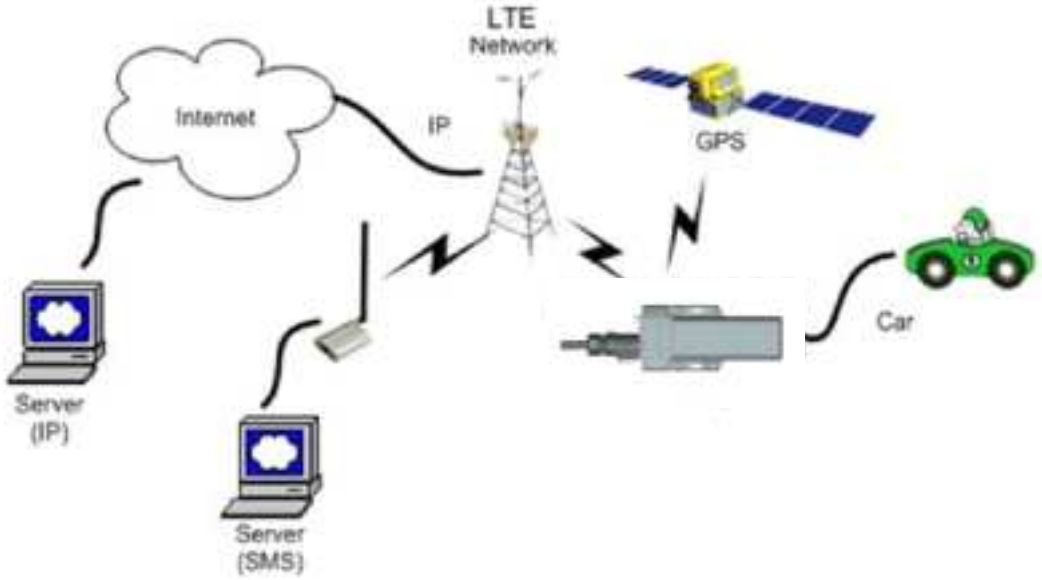
May 07, 2025

1 Introduction

The device comes pre-configured from the factory. It is ready to use. The SIMBA appears to a user or a server application as an endpoint device. It can be queried, updated and configured either through a serial connection, an over the air IP connection, or through SMS messaging. The SIMBA presents itself over these connections as an enhanced cellular modem with attached functional elements. These elements include:

- GPS location engine
- Accelerometer
- Input/outputs dedicated for ignition, relay, buzzer, and general purpose
- Serial UART port
- Timers
- Watchdog lockup protection
- Power management
- Event reporting
- Voltage monitoring

Access to these elements and general purpose interface is done through an extended AT command set. Configuration parameters are stored to flash memory and are automatically used on the next power up event. For more details, please reference the AT Command document.



2 Hardware Design

2.1 Basic Hardware

Items	Requirement
Cellular Modem	Based on Quectel EC21-A Module
Cellular Network Interface	Support for LTE B2, B4, B12 WCDMA B2 B4 B5

Frequency	B2:TX (1850--1910) MHZ RX (1930--1990) MHZ B4:TX (1710--1755) MHZ RX (2110--2155) MHZ B12:TX (699--716) MHZ RX (729--746) MHZ WCDMA B2:1900MHz WCDMA B4:1700MHz WCDMA B5:850MHz
Cellular Antenna	Internal single antenna
GPS Antenna	Dedicate high performance ceramic antenna
UIM requirement	Support： 4FF SIM Interrupt Mode No Support：Hot Plug/Unplug
Battery Monitor	Internal analog input
Build in battery manager	Yes
Interface	Debug UART
	12V DC Input（1A current）, Ground
	Relay Drive (Open Drain , 500mA current)
	Dedicated Output for buzzer control
	Ignition Input
	GPIO
Dedicate Timers	Yes
Watchdog	External HW via MCU
Motion Detect	Supported（GPS/G-Sensor）
LED	3 LED Supported 1- RED; 1- Green;1-Orange
Battery	built in battery（4400mAH Lion）
Working Time	6 months
Power switch	No
Power Cable color	4 or 6 colors
Power Cable connector type	12-pin connector+5pin
Power Consumption	< 5Watts

The SIMBA provides support for specialized hardware features through extended AT commands. The features supported include the following:

Accelerometer

The accelerometer can be used for motion detection and driver behavior monitoring.

3.2 Remote Update

The SIMBA supports OTA field upgrades of the resident application. An over the air FTP connection is made over an IP connection. A replacement file is then transferred from a server to the SIMBA and that file replaces the previous application image.

3.3 Power Modes

The SIMBA device supports several power modes that are set by AT commands. In full power mode the GPS is active and the cellular subsystem will maintain a persistent cellular connection whenever service is available. IP connection is maintained according to the configuration of the device.

The device can be put in low power mode whenever it runs on a backup battery or if the external battery is low or if it is not moving. In low power mode the GPS is not running and the LED's are off. The device would return to full power whenever an event occurs that triggers a report. Those events include:

- Periodic report
- GPIO change
- IP change
- Battery threshold
- Heartbeat
- Watchdog
- Power-up
- Ignition
- Trip start and stop

Any hardware or software reset will return the device to full power mode.

4 Test Method

4.1 Hardware

Test Item	Description
Baseband Function Test	• Power Input Test • Power Consumption and Current Test • Heat Dissipation Test • UART Stability Test • GPIO Level Test • LED Stability Test • Drop Down Test • ESD Test • High/Low Temperature Test • Humidity Test
RF Test	• RF Performance Test • GPS Performance Test • Antenna Performance Test

4.2 Software Test

Test Environment Construct

- Message Test environment

1. USB dongle and PC as message server
2. Send message to SIMBA

- UDP Test environment

1. Connect dongle to PC and create dialup as ip server
2. SIMBA create IP connection to server

- UART Test environment

1. Connect SIMBA to PC with com serial cable
2. Open Terminal tool and send at command
3. Response can be shown at terminal window

FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a par stallation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio/TV technician for help.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC RF Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. To comply with FCC RF Exposure compliance requirements, this grant is applicable to only Mobile Configurations. The antennas used for the transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Canada Regulations:

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

(1) This device may not cause interference; and

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présentappareilestconforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitationestautorisée aux deux conditions suivantes :

(1) l'appareil ne doit pas produire de brouillage;

(2) l'utilisateur de l'appareildoit accepter tout brouillageradioélectriquesubi, mêmesi le brouillageest susceptible d'encompromettre le fonctionnement.

Caution：

This transmitter must not be co-located or operating in conjunction with any other antenna or transmit- ter. This equipment should be installed and operated with a minimum distance of20centimeters between the radiator and your body.

Cet émetteur ne doit pas être Co-placé ou ne fonctionnant en même temps qu'aucune autre antenne ou émetteur. Cet équipement devrait être installé et actionné avec une distance minimum de 20 centimètres entre le radiateur et votre corps.