

Document History

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1. Introduction

This document describes the Security Tag application supplied with the CSR μEnergy™ Software Development kit (SDK) and provides guidance to developers on how to customise the on-chip application.

The application demonstrates the Find Me and the Proximity profile which is specified by the Bluetooth SIG.

1.1. Application Overview

1.1.1. Profiles Supported

The Security Tag application supports the profiles described in sections 1.1.1.1 and 1.1.1.2.

1.1.1.1. Find Me Profile

The Find Me profile defines the behaviour when a button is pressed on a device to cause an immediate alert on the remote connected device. This profile is used to locate devices.

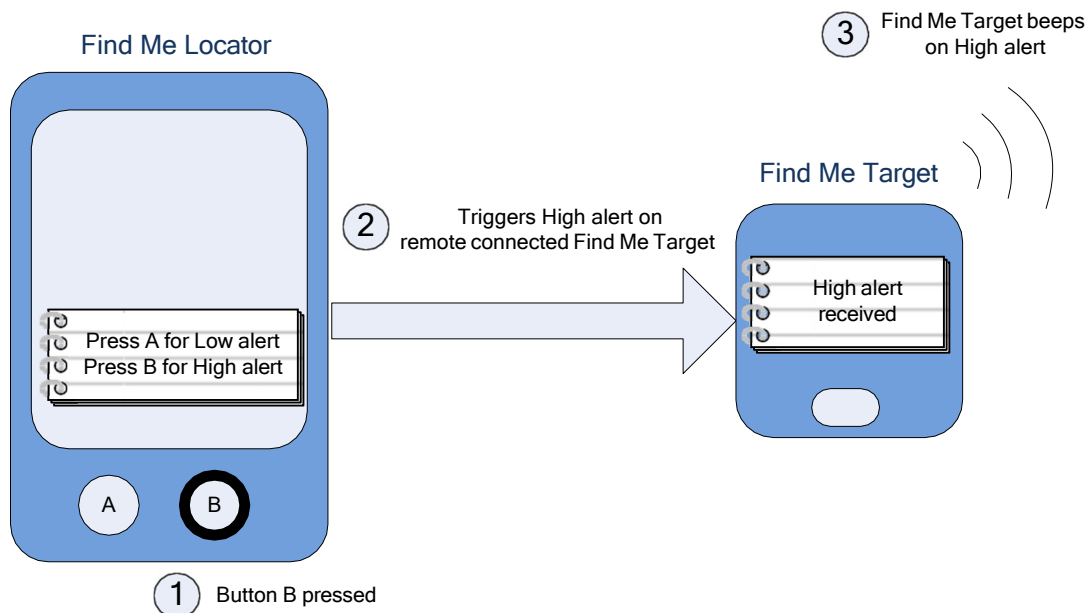


Figure 1.1: Find Me Profile

The Find Me profile defines two roles, see Table 1.1:

Role	Description
Find Me Locator	Find Me Locator is the device that causes an immediate alert on the remote connected device.
Find Me Target	Find Me Target is the device that alerts when triggered by the remote connected Find Me Locator.

Table 1.1: Find Me Profile Roles

For more information about the Find Me profile, see *Find Me Profile Specification Version 1.0*.

1.1.1.2. Proximity Profile

The Proximity profile defines the behaviour when a device moves away from a remote connected device so that the connection is dropped or the path loss increases above a preset level, causing an immediate alert. This alert can be used to notify the user that the device has been separated. As a consequence of this alert, a device may take further action, for example it may lock itself so that it is no longer usable.

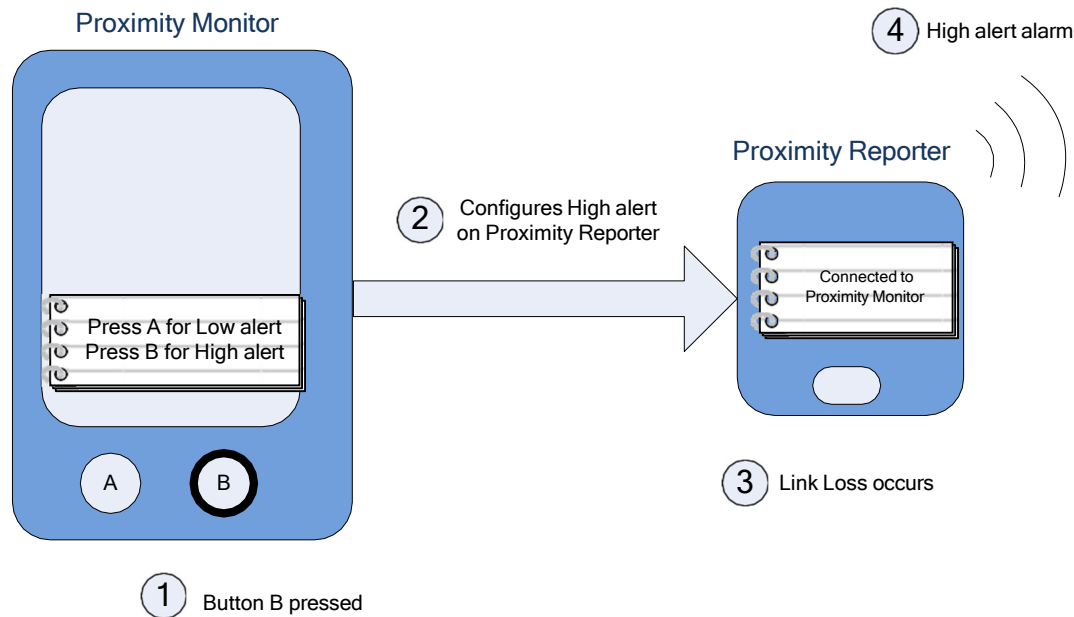


Figure 1.2: Proximity Profile

The Proximity profile defines two roles, see Table 1.2:

Role	Description
Proximity Reporter	Proximity Reporter is the device that alerts on link loss and optionally on path loss.
Proximity Monitor	Proximity Monitor is the device that configures the alert on the Proximity Reporter.

Table 1.2: Proximity Profile Roles

For more information about the Proximity profile, see *Proximity Profile Specification Version 1.0*.

1.1.2. Application Topology

The Security Tag application implements the Proximity profile in Reporter role and the Find Me profile in both Find Me Locator and Find Me Target role. It uses the following topology:

Role	Proximity Profile	Find Me Profile	GAP Service	GATT Service	Device Information Service	Battery Service
GATT Role	GATT Server	GATT Server and GATT Client	GATT Server	GATT Server	GATT Server	GATT Server
GAP Role	Peripheral	Peripheral	Peripheral	Peripheral	Peripheral	Peripheral

Table 1.3: Application Topology

Role	Description
GATT Server	It accepts incoming commands and requests from the client and sends responses, indications and notifications to the client.
GATT Client	It initiates commands and requests towards the server and receives responses, notifications and indications sent by the server.
GAP Peripheral	It accepts connection request from the remote device and acts as a slave in the connection.

Table 1.4: Responsibilities

For more information about GATT server, GATT client and GAP peripheral, see *Bluetooth Core Specification Version 4.0*.

Note:

The remote connected device supporting the Proximity and the Find Me profiles is referred to as the **Security Monitor** in this application note.

1.1.3. Services

The Security Tag application exposes the following services:

- Immediate Alert (Version 1.0)
- Link Loss (Version 1.0)
- Tx Power (Version 1.0)
- Battery (Version 1.0)
- Device Information (Version 1.1)
- GAP
- GATT

The Find Me and the Proximity profiles together mandate three services: Immediate Alert, Link Loss and Tx Power. GAP and GATT services are mandated by *Bluetooth Core Specification Version 4.0*. Battery and Device Information Services are optional, see Figure 1.3.

See *Immediate Alert Service Specification Version 1.0*, *Link Loss Service Specification Version 1.0*, *Tx Power Service Specification Version 1.0* for more information on Immediate Alert, Link Loss and Tx Power services respectively.

For more information on GATT and GAP services, see *Bluetooth Core Specification Version 4.0*.

For more information on Battery and Device Information services, see *Battery Service Specification Version 1.0* and *Device Information Service Specification Version 1.1*.

See Appendix B for information on the characteristics supported by each service.

Note:

The Security Tag application does not support any characteristic for GATT service. See *Bluetooth Core Specification Version 4.0* for more information.

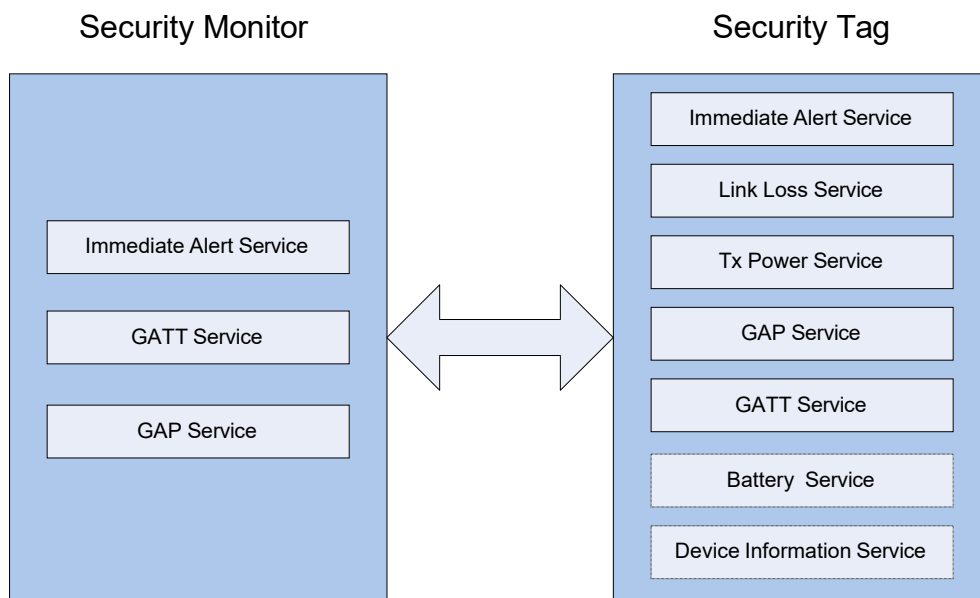


Figure 1.3: Primary Services

2. Using the Application

This section describes how the Security Tag application can be used with the μEnergy Profile Demonstrator application available from CSR.

2.1. Demonstration Kit

The application can be demonstrated using the components listed in Table 2.1:

Component	Hardware	Application
Security Tag	CSR1000 Development Board	Security Tag Application
Security Monitor	CSR8510 USB dongle	μEnergy Profile Demonstrator Application

Table 2.1: Demonstration Components

Note:

Although the Security Tag application primarily targets the CSR1000 development board, the CSR1001 development board may also be used as an alternative hardware platform.

The μEnergy Profile Demonstrator application, CSR device drivers and user guides are available to download from www.csrsupport.com/uEnergy.

2.1.1. Security Tag

The SDK is used to build and download the Security Tag application to the CSR1000 development board. See the *μEnergy xIDE User Guide* for further information.

Ensure the development board is switched on using the Power On/Off switch. Figure 2.1 shows the switch in the Off position.

Note:

When disconnected from the USB to SPI Adapter, wait at least 1 minute before switching the board on. This allows any residual charge received from the SPI connector to be dissipated.



Figure 2.1: CSR1000 Development Board

2.1.1.1. User Interface

This application makes use of the button, buzzer and LED available on the CSR1000 development board.

Button Behaviour

- In the Connected state, a **Short button press** stops the alert on the Security Tag if it is active; otherwise it triggers a **High alert** on the remote Security Monitor.
- In Idle state, a **Short button press** triggers advertisements and registers the pending **High alert** information, which will be used to trigger a **High alert** on the remote Security Monitor once the connection is established.
- An **Extra Long button press** by the user disconnects the link if any, removes bonding and starts advertising.

Figure 2.2 summarises the Security Tag device behaviour.

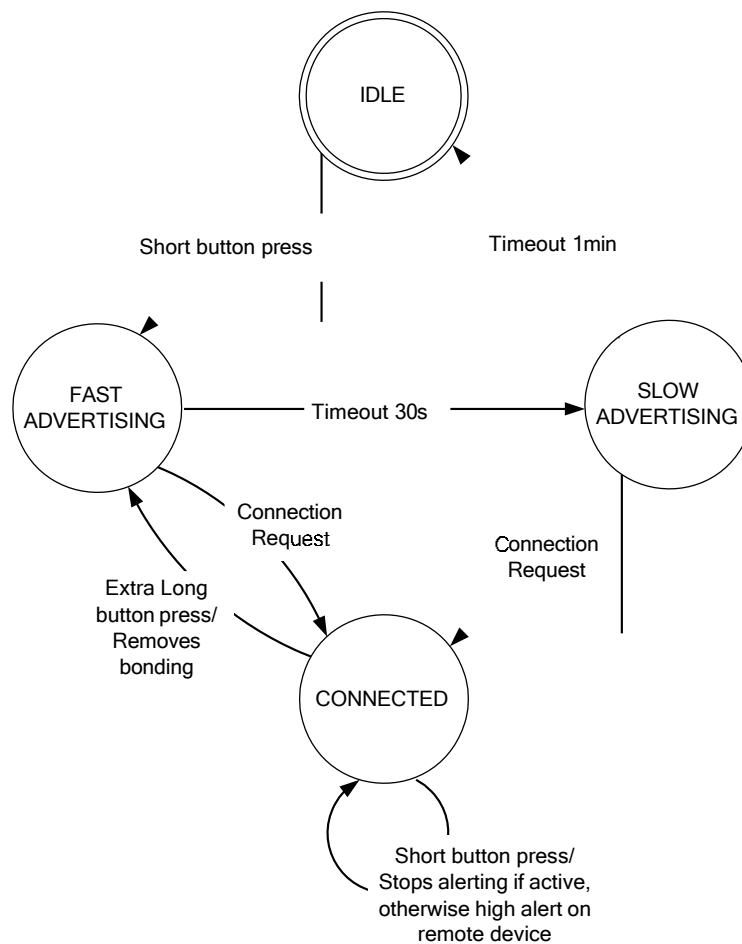


Figure 2.2: Device Behaviour

Note:

As the Security Tag application does not perform any specific operation on a **Long button press**, it is handled in a similar way to a **Short button press**.

Buzzer Behaviour

- A siren sound indicates the **High alert**.

LED Blinking

- A blinking LED indicates the **Low alert**.

2.1.2. Security Monitor

2.1.2.1. CSR8510 USB Dongle

The CSR8510 USB dongle can be used with the μEnergy Profile Demonstrator application to complete the Bluetooth Low Energy link between two devices. To use the USB dongle shown in Figure 2.3, the default USB Bluetooth Windows device drivers must be replaced with the CSR BlueCore device drivers as described in the *USB Device Driver User Guide*.

CSR device drivers and user guides are available to download from www.csrsupport.com/uEnergy.



Figure 2.3: CSR8510 USB Dongle

2.1.2.2. μEnergy Profile Demonstrator Application

The μEnergy Profile Demonstrator application is compatible with a PC running Windows XP and Windows 7 (32-bit and 64-bit). Launch the application once the CSR8510 USB dongle is attached to the PC and drivers have been loaded.

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