



Security Communications Center

Software Module and Task Specification Report

Team 3

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1. Introduction

This document aims to introduce what the subsystems and modules of the software system are and their relations with the hardware systems and environment. It will include the modules and requirements (important classes, functions) for software part of application and their interaction with HW modules (devices) and general architecture of the system from aspect of computer engineering.

Secure Communications Center (SCC) Associates has been founded by 6 shareholders in order to provide secure messaging and location tracking on mobile phones. Dynamism and youth are the defining characteristic of us. The main aim of the company is to produce innovative and secure messenger program being run on smart phones (using Android operating systems with version number 2.1 and newer) and having the feature of enabling users to see the positions of each other on a map. All the information shared within the group is encrypted.

Considering the capabilities of the company, the innovative product that is designed, Secure Communications Center (SCC) Associates aims to dedicate itself to serve for the military and police service according to their needs. Our product is finally named as “Cher Ami” (it was SafeMessenger at first step) bird accepted as fourth heroic animal in history which has remarkable story behind it. Also, metaphorical features exist between the heroic bird and our product.

This document firstly shows the general overview of the system. Secondly, it will provide a detailed description of the subsystems and modules (classes shown in UML diagram) overviewed in first part. Then, how the control of the hardware systems by the software system is handled will be clarified. This is actually a part of Software Modules heading because the interactions between application and hardware system are provided in

this part. Finally, software system requirements in terms of time, space and hardware will be adverted.

2. System Overview

At the beginning of the application, user will be asked for his username and password. If authentication fails user will be asked to reenter his information through warning message, otherwise he will be directed into main page of the application.

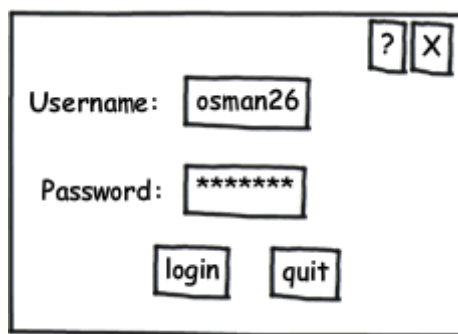


Figure 10: Login Screen

Later on user's location information is taken from gps device and is sent to crypto device for encryption. After the encryption which is stated above in detail as a part of hardware explanation is completed, encrypted data is sent back to the smart phone. Incoming data is transmitted into database server via internet connection. Last 10 locations of each user are hold in database to enable users to guess where their offline friends might be. After gps locations are taken from users, they are distributed to friends of those users to be shown on their screen.

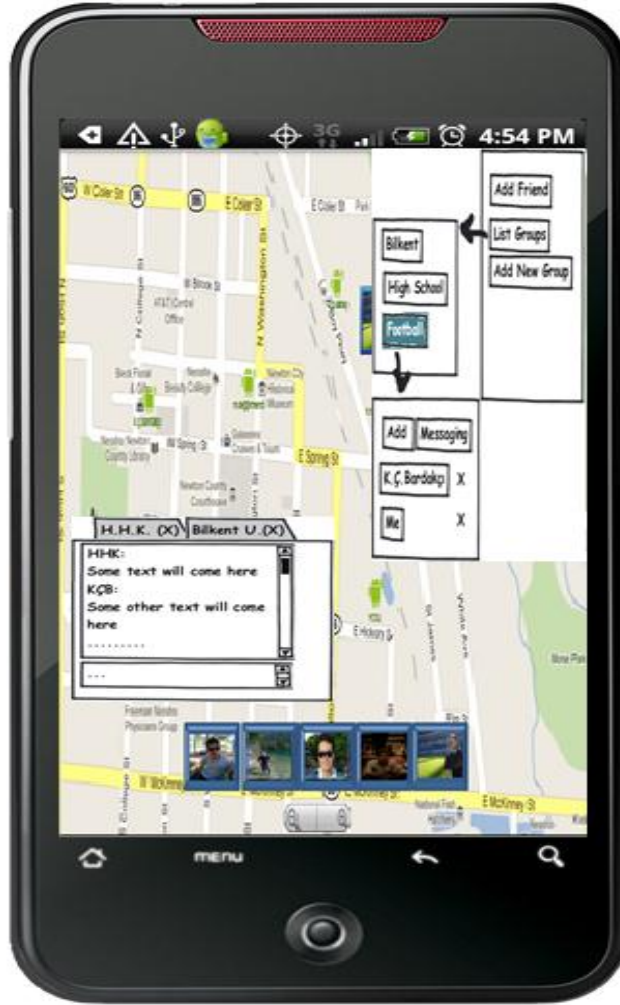


Figure 11: A View from Application

Before showing transmitted data on maps of users, these data are sent to the encryption device for decryption. Online users are represented with green color and offline users are represented with gray color. Users are able to see photos of other users by touching symbols of them. A user is able to see distance between own position and other users' position in terms of longitude and latitude. In addition, last 10 locations of offline users are shown below distance information. In the case of message encryption, texts are sent through the same path as location information sent. However, encrypted texts are sent directly to desired user/s instead of sent into database for recording. Message decryption phase is same with location decryption phase.



Figure 12: Message Dialog Screen

Users are able to create new groups and join groups which are created before. Groups consist of up to 10 users.

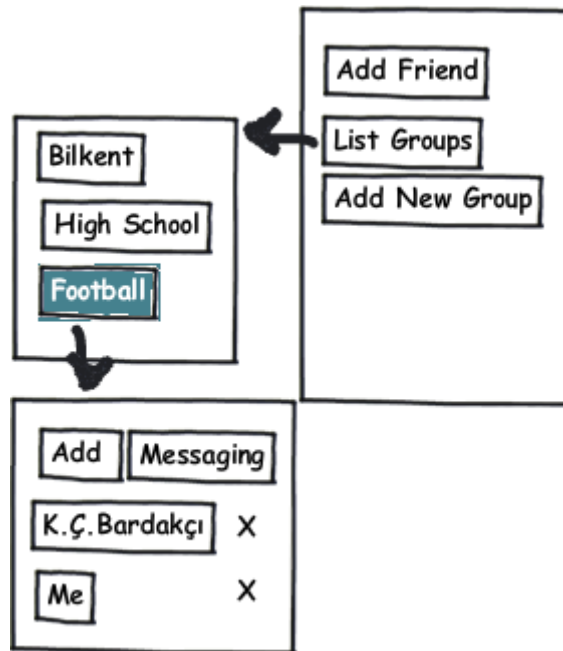


Figure 13: Add/Join/List Group Screen

Users have the right to prevent “his location to be seen by others”.

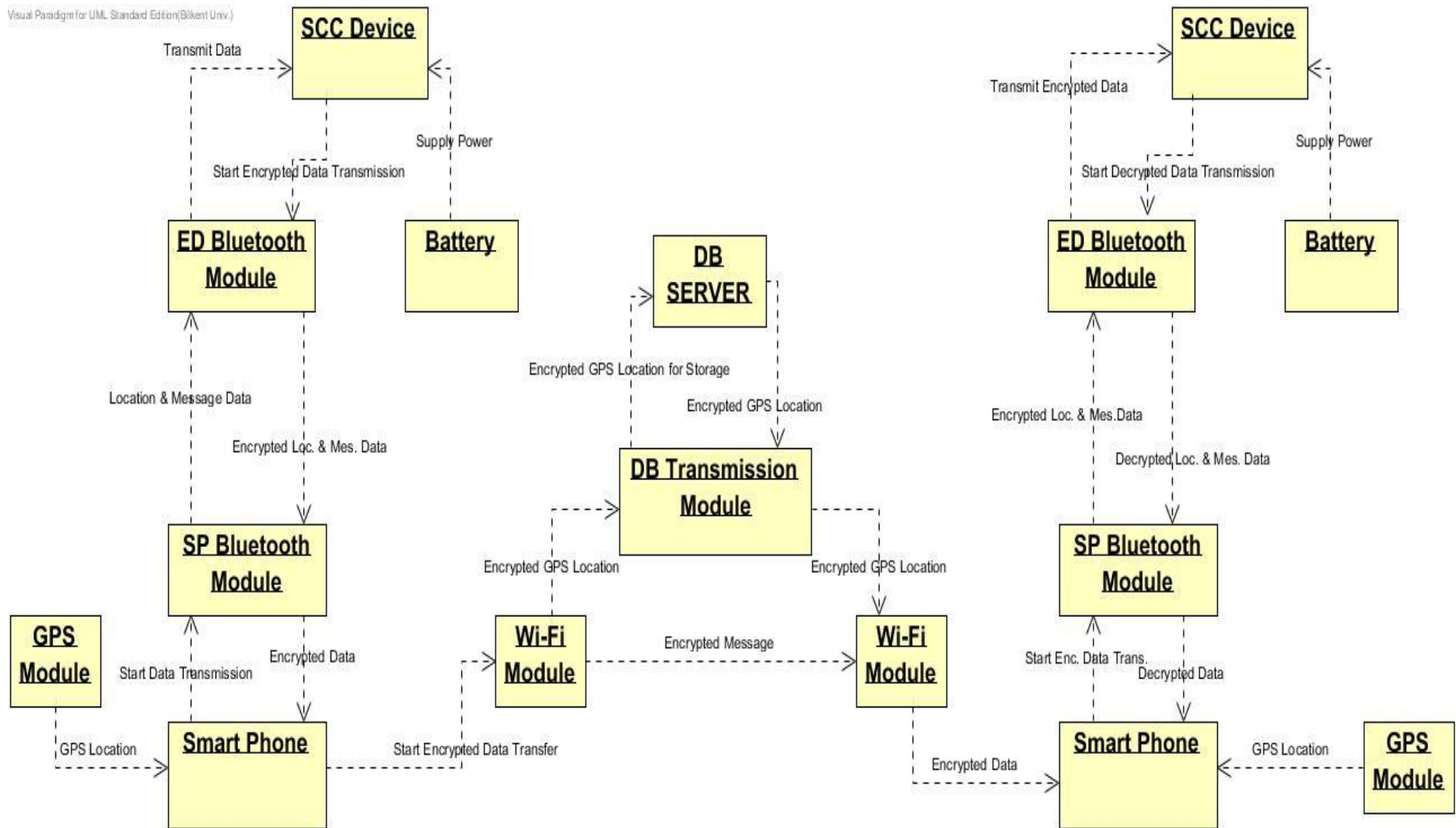


Figure 1 - Software System Overview

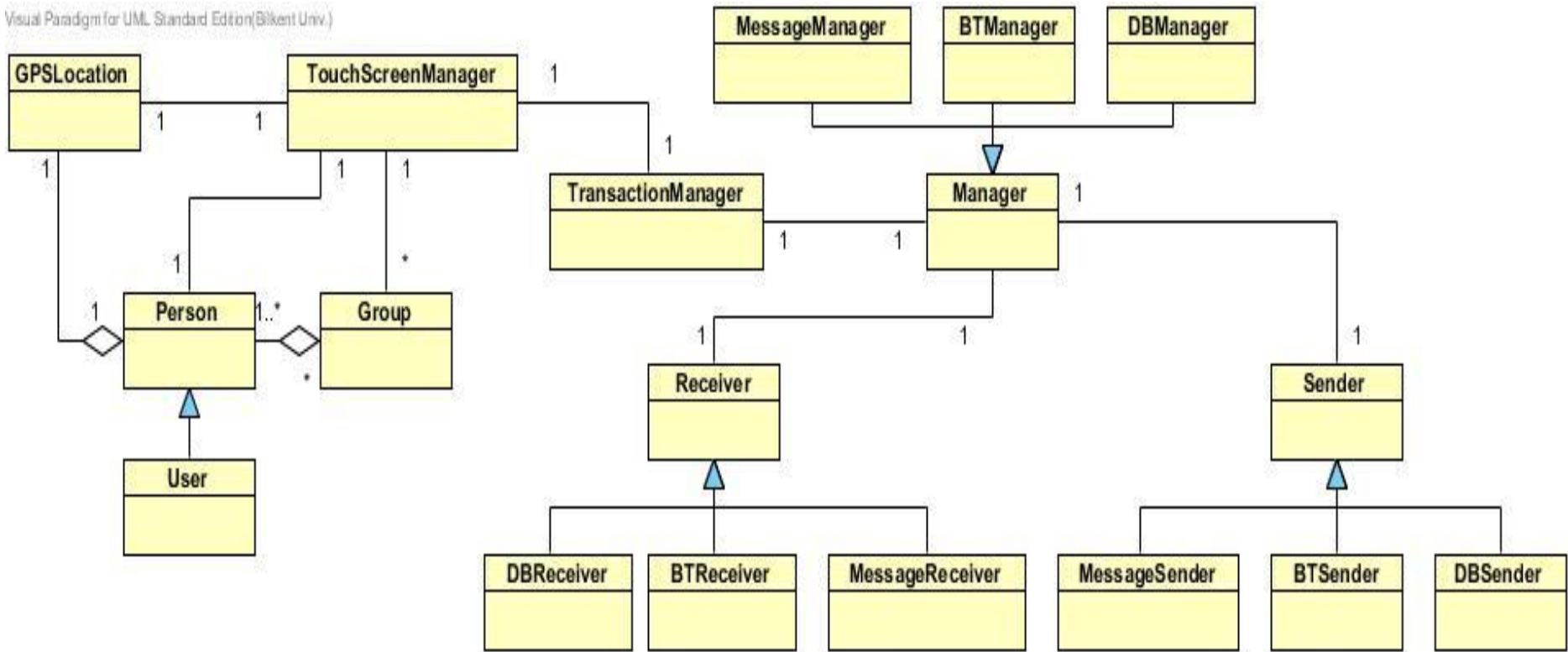


Figure 2 - UML Class Diagram

3. Software Modules

SCC Device:

Classification: Subsystem

Definition: It is device for the security of our system. It will make the data more secure.

Responsibilities: SCC device is responsible for the encryption and decryption of the data to have a secure communication system. This device uses RSA public key algorithm to encrypt and decrypt the data. It generates two different keys: public and private.

Constraints: The minimum length of the generated public and private keys must be at least 128 bits.

ED Bluetooth Module:

Classification: Subsystem

Definition: Exchanges data over short distances for encryption block as an additional module.

Responsibilities: This module's task is to receive the location data from the smart phone via Bluetooth, and transmit the encrypted data to smart phone.

Constraints:

- Operating voltage: 2V-3.6V

- Operating Temperature: -40C – 85C

SP Bluetooth Module:

Classification: Subsystem

Definition: A module which is integrated into smart phone.

Responsibilities: Sends data to ED Bluetooth module for encryption.

Battery:

Classification: Subsystem

Definition: Converts stored chemical energy into electrical energy.

Responsibilities: Supplies power to SCC Device.

Constraints:

- Charging Time: 2.5hrs
- Temperature range: -40°C – 125°C

GPS Module:

Classification: Subsystem

Definition: Space-based satellite navigation system that provides location and time information where there is an unobstructed line of sight to four or more GPS satellites.

Responsibilities: Gives current location information to the application which will be developed as a raw data.

Wi-Fi Module:

Classification: Subsystem

Definition: Mechanism for wirelessly connecting electronic devices.

Responsibilities:

- Enabling users to connect database server.
- Enabling users to communicate with each other through messaging.
- Enabling user to update program if necessary.

Smart Phone:

Classification: Subsystem

Definition: Advance mobile phone which substitutes for portable media players, low-end compact digital cameras, pocket video cameras, GPS navigation units. Also includes high-resolution touchscreens, web browsers that can access and properly display standard web pages and high-speed data access via Wi-Fi.

Responsibilities: Users interact with the application via smart phone. It has responsibilities to run GPS Module, Wi-Fi Module, and Bluetooth Module.

DB Server:

Classification: Subsystem

Definition: Provides database services to computer programs or computers as defined by the client–server model.

Responsibilities: Holds profile information of users, gps locations, group information etc.

Constraints: Data that will be hold in database server should not exceed 150 GB.

DB Transmission Module:

Classification: Subsystem

Definition: Module that transmits data into database and transmits data from database to other devices.

Responsibilities: Receives encrypted data from wi-fi module and records it into database.

Also transmits encrypted data from database to wi-fi module.

4. Explanation of Classes

Person: Has properties of id, name, surname and location. Friends of users are defined as *Person*.

User: *Users* are *Persons* but they also have password, groups and friends. *Users* have ability of editing profile, creating groups, adding friends, deleting groups, quitting groups, messaging etc.

Group: Has properties of id, group name and list of people. It includes methods which are delete group, add group, rename group, edit group.

GPSLocation: Has two properties longitude and latitude. Through this class gps location from gps device is taken and converted into proper format.

Receiver: Is an abstract class which will have common properties of *DBReceiver*, *BTReceiver* and *MessageReceiver*. The main goal of this class is to convert received data into proper format.

DBReceiver: Extends *Receiver* class. Converts received data which comes from database server into proper format.

BTReceiver: Extends *Receiver* class. Converts received data which comes from bluetooth device into proper format.

MessageReceiver: Extends *Receiver* class. Converts received message which comes from other users into proper format.

Sender: Is an abstract class that converts data which will be sent into proper format.

DBSender: Extends *Sender* class. Converts encrypted gps locations that will be sent to database into proper format.

BTSender: Extends *Sender* class. It converts data that will be sent to Bluetooth device into proper format.

MessageSender: Extends *Sender* class. Converts encrypted gps locations that will be sent into proper format.

Manager: Is an abstract class that controls and manages data will be sent and received.

DBManager: Extends *Manager* class. It manages data flow between database server and smart phone.

BTManager: Extends *Manager* class. It manages data flow between bluetooth device and smart phone.

MessageManager: Extends *Manager* class. It manages messaging between users.

TransactionManager: Is an upper class of manager classes that controls all data flow activities.

TouchScreenManager: Is the uppermost class which controls interaction between screen and user. It manages all classes. Interprets commands from touch screen and take proper action according to them.

5. Software System Requirements

Time Requirements:

The time that the data will spend starting from the start of the transmission until coming back to the smart phone will be approximately 100 milliseconds.

The application will spend about 500 milliseconds to obtain GPS location data.

The delivery of the data to the database will take about 1.5-2 seconds.

The total delivery time is about 4 seconds for GPS location and about 3 seconds for text messages.

Space Requirements:

The size of the software will be about 5 MB.

The size of the database on server will be 150 GB.

Hardware Requirements:

The battery of the bluetooth device used for the encryption device will have at least 4.5 hours lifetime continuously.

The SCC device must be light to carry and easy to hold so it will be about 100 grams and with sizes 40mm x 60mm x 15 mm.