

The Project Manual for the Comodule Task “GPS Advertising” - by Furkan Kopar

The project for programming an nRF52840 Development Kit as a beacon to transmit GPS coordinates is developed utilizing the example projects in the nRF5 SDK and on SEGGER Embedded Studio for ARM v5.40 IDE. This manual presents how the program works by explaining how it can be run.

The main source code for the project can be found inside the following directory;

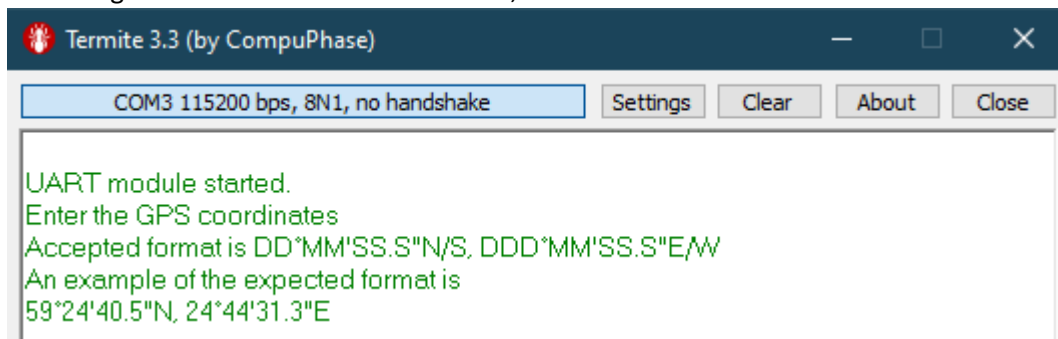
/examples/ble_peripheral/ble_app_beacon

The *main.c* source code includes the main program while the project can be opened as a solution using SEGGER from the following path;

/examples/ble_peripheral/ble_app_beacon/pca10056/s140/ses/ble_app_beacon_pca10056_s140.emProject

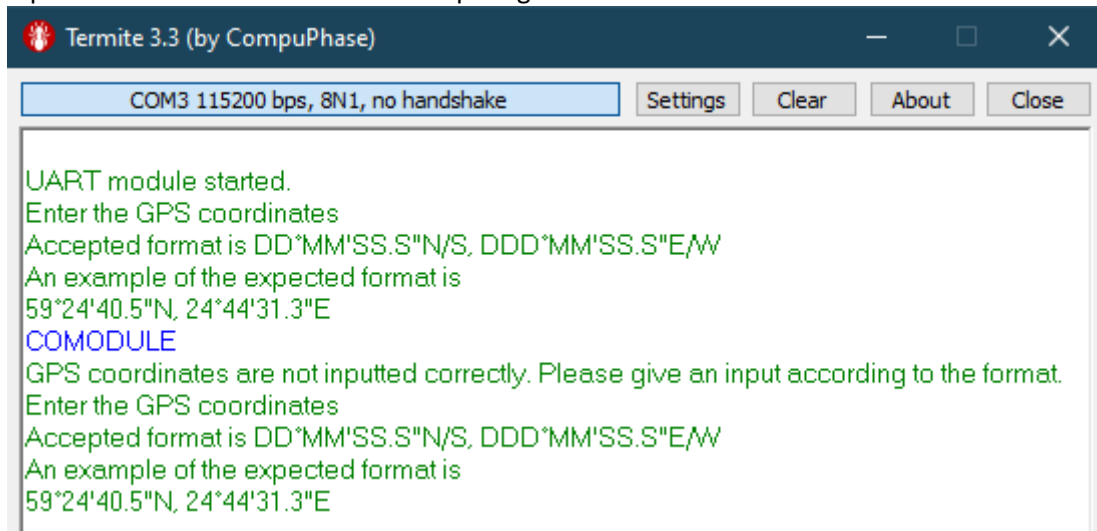
Steps to run the program:

1. Connect an nRF52840 Development Kit to a computer via a micro-USB cable, and power up the kit using the power switch.
2. When the device is detected by the computer, check the device's port number from the Device Manager.
3. Open up a terminal application such as Terminate. Set the following serial port configurations and connect the device with the terminal:
 - a. Baud rate: 115200
 - b. Data bits: 8
 - c. Stop bits: 1
 - d. Parity: none
 - e. Flow control: none
4. Open the project solution from an IDE supporting J-Link such as SEGGER Embedded Studio for ARM v5.40. The *.emProject* file path for SEGGER is given above.
5. Rebuild the solution from Build -> Rebuild Solution. The project should build successfully.
6. Run the program from Build -> Build and Run. The solution should now be programmed to the development kit.
7. Switch to the terminal application. The following message should be seen on the application indicating the successful UART connection;

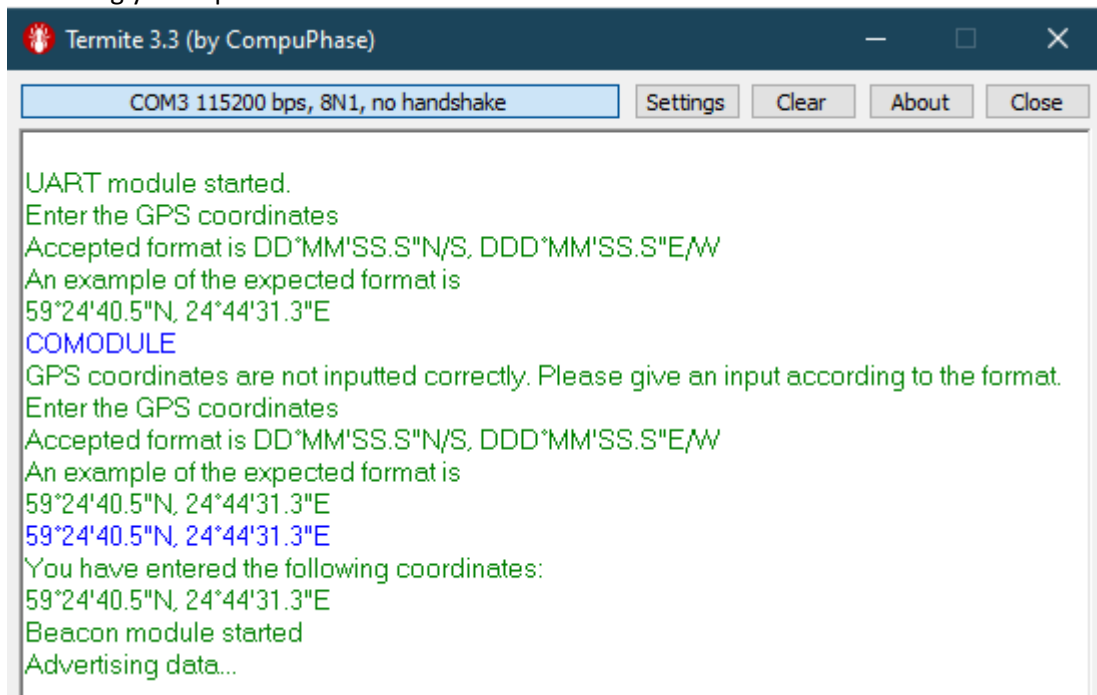


8. The program expects user input at this point. The example GPS coordinates can be inputted in this stage. Try inputting “59°24'40.5\"N, 24°44'31.3\"E” which is the location of the Comodule factory.

It should be noted that the system takes user input until either the user writes 27 characters in total, or the user gives the character 'E' or 'W' as the input. The system checks if the user inputted a valid format and asks an input again if the format is incorrect.



9. After giving the GPS data by pressing Enter, the terminal should show an information message indicating your input.



The LED1 on the development kit should now start blinking. This indicates that the inputted coordinates are being advertised.

10. Open up the nRF Connect mobile app. Keep the phone close to the development kit so that the advertising data can be seen with higher signal. Tap the "Scan" button or refresh the feed by sliding it down. A device called "Comodule_Task" should be visible on the feed.
"Comodule_Task" is the name of the Bluetooth device advertising the GPS coordinates.
11. After the manufacturer data information (Nordic Semiconductor ASA <0x0059>), a couple of hexadecimal numbers should be visible under the Comodule_Task indicating the ASCII numbers of each character that is being advertised. For the example coordinates "59°24'40.5"N,

24°44'31.3"E", the advertising ASCII string should be 0x35-39-B0-32-34-27-34-30-2E-35-22-4E-2C-20-32-34-B0-34-34-27-33-31-2E-33-22-45-00.

The nRF52840 development kit is programmed to advertise GPS coordinates as a beacon in this task. Beacons are transmitters which advertise either their identification or custom data. The nearby devices that can receive Bluetooth low energy data are able to obtain the broadcast. This wireless GPS data transmission provided by the beacon can be used in devices such as electronic scooters so that they can advertise their location to nearby mobile app users wishing to ride the scooter.