

RADIO APPROVAL OF FINISHED UNITS – Program Source Code for supporting radio approval processes



Table of content

1. INTRODUCTION	3
1.1. REFERENCES.....	3
2. OPERATION	3
2.1. SERIAL INTERFACE.....	4
3. CONFIGURATION	5
3.1. RADIO SETTINGS	5
3.2. PIN CONFIGURATION.....	5
4. GETTING STARTED – STEP BY STEP	6

RADIO APPROVAL OF FINISHED UNITS

1. INTRODUCTION

This application note provides support for the radio approval process. Radio regulations are specific in every country. Where it is possible, EnOcean already did a module approval (i.e. EU, USA). In these countries products with EnOcean original modules do not need additional certification. The conformity declarations are available on our website [5], separate for each product. However in some countries there is no module approval allowed and every end product has to be certificated.

For this case we provide this application note with source code. The source code provides typical functionalities that are required during radio approval process in a lab. This are:

- send unmodulated CW (continues wave)
- send modulated PN9 signal
- send common telegram with 3 sub-telegrams
- receiver mode

1.1. References

- [1] EnOcean Serial Protocol 3 Specification –
[\(http://www.enocean.com/en/knowledge-base/\)](http://www.enocean.com/en/knowledge-base/)
- [2] EnOcean Software Download –
[\(http://www.enocean.com/en/download/\)](http://www.enocean.com/en/download/)
- [3] Keil Licensing options –
[\(http://www.enocean.com/en/knowledge-baseasicapi%3Aissue%3Akeillicensesordering/\)](http://www.enocean.com/en/knowledge-baseasicapi%3Aissue%3Akeillicensesordering/)
- [4] Source Code for RADIO APPROVAL OF FINISHED UNITS -
[\(http://www.enocean.com/application-notes/\)](http://www.enocean.com/application-notes/)
- [5] EnOcean Product Page -
[\(http://www.enocean.com/en/products/\)](http://www.enocean.com/en/products/)

2. OPERATION

The operation of the radio approval source code is shown in Figure 1. At start up the module is initialized. Then it reads out the configurations pins CONF_0 and CONF_1. Based on the configuration it performs the corresponding action. A pin can be either connected to GND (logical value 0) or not connected (logical value 1). The operations are summarized in Table 1.

Table 1: Operations table

CONF_1	CONF_0	Action
GND (0)	GND (0)	Receive mode. Receives any EnOcean telegram and passes it to the serial interface.
GND (0)	NC (1)	Sends out every 1000 ms a common EnOcean telegram. The telegram consists of 3 sub-telegrams (4BS, Data = 0x00000000).
NC (1)	GND (0)	Send out a continuous wave. The wave is send until the PINs are changed.
NC (1)	NC (1)	Send out a PN9 sequence. The sequence consists of 64 bytes and is send in infinite loop.

RADIO APPROVAL OF FINISHED UNITS

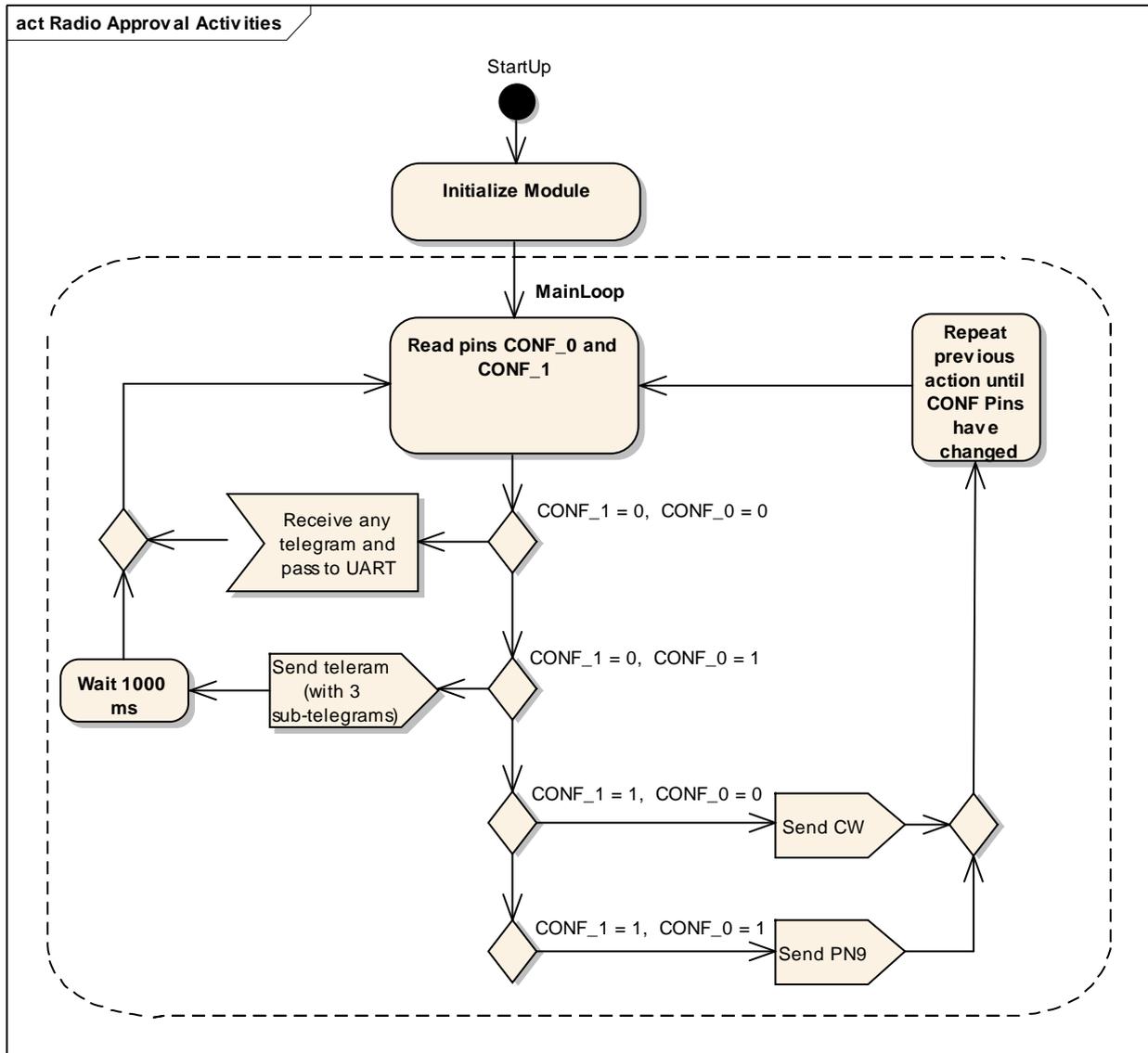


Figure 1 Overview of Radio Approval Firmware activity

2.1. Serial Interface

The pins ADIO6 (RX) and ADIO7 (TX) are used for the serial communication. The UART is in half-duplex mode. The configuration of the Serial Interface is specified in the EO3000I_CFG.c file, which is included in the source code project folder. By default the configuration is:

- 57600 BAUD RATE
- 1 stop bit
- No parity bit
- No flow control
- 8 data bits

RADIO APPROVAL OF FINISHED UNITS

In the configuration file only the BAUD RATE and buffer length can be changed.

In receiver mode (CONF_0 = GND, CONF1 = GND) received radio telegrams are sent to the serial interface. The serial messages correspond to the ESP 3 format [1].

3. CONFIGURATION

You can adjust the application note source code as you need. You can add functionality or actions, which are needed for your approval process. There are two important configurations we want to focus on:

1. Radio Settings
2. Pin Configuration

3.1. Radio Settings

The source code can run on every Dolphin based EnOcean module. To compile the project you have to specify a radio settings assembler file. The radio settings file is specific for:

- Module type (e.g. STM)
- Module step code (e.g. DA)
- Module frequency (e.g. 868.3 MHz)

Please choose a radio settings file according to the module you want to use for the approval process. As default file the radio settings for TCM, 868.3 MHz, Step Code: DA are linked. How to link other radio settings file is explained in chapter 4.

3.2. Pin configuration

As described in chapter 2 the action of the module is determined by the configuration of two digital pins. By default these are CONF_0 = ADIO0 and CONF_1 = ADIO1. You can change the default pins to different two pins. These pins are available:

- SCSEDIO0
- SCLKDIO1
- WSDADIO2
- RSDADIO3
- ADIO0
- ADIO1
- ADIO2
- ADIO3
- ADIO4
- ADIO5
- ADIO6
- ADIO7
- WXIDIO
- WXODIO

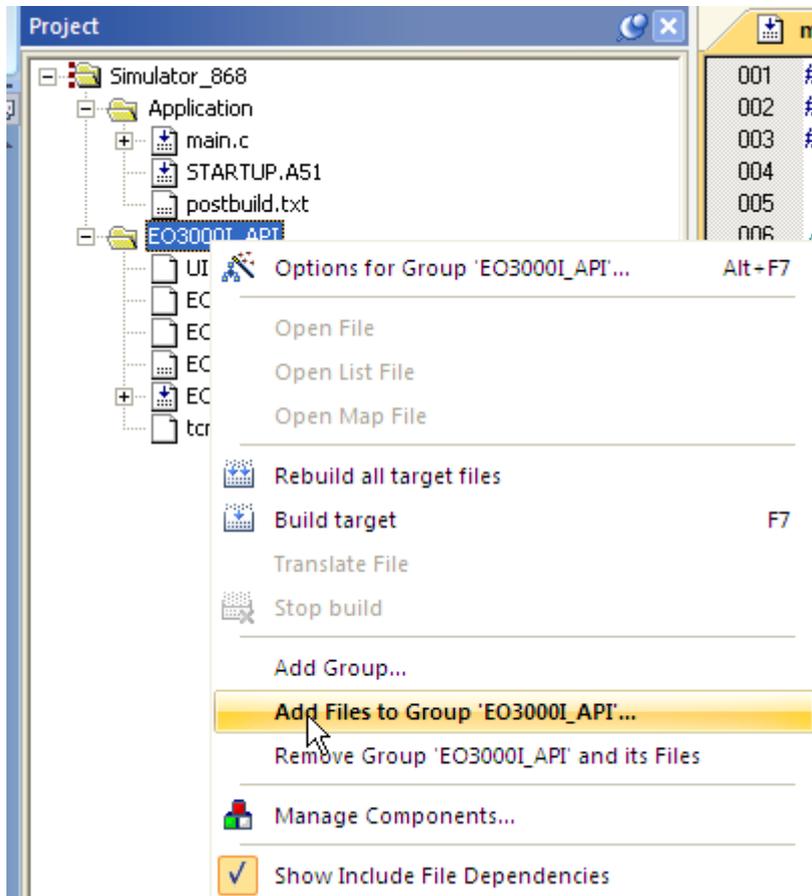
Please note that pins you are planning to use have to be set as digital input. How to change the default pins is described in chapter 4.

4. GETTING STARTED – STEP BY STEP

In this chapter we describe how to use the attached source code project. We explain how to install, configure and download the firmware to the module. Please follow these steps:

1. Before we can start please install the newest DolphinAPI and DolphinStudio. You can download it from the EnOcean software download centre [2].
2. To change and compile the source code you need a KEIL C51 compiler and a licence. This is a third party tool so please download it directly from KEIL. Please read our knowledge base article about the licensing options [3].
3. Download and copy the application note source code [4] project to the example folder of the DolphinAPI. (e.g. when you installed DolphinAPI to C:\Program Files\EnOcean\DolphinAPI then the examples folder will be C:\Program Files\EnOcean\DolphinAPI\EO3000I_API\Examples) The DolphinAPI files are already linked to the project. You need to copy the project to the examples folder to match the default file paths.
4. Open the KEIL Project file. (*.uvproj)
5. Find the radio settings assembler file corresponding to your module. You can find the latest radio settings file in the DolphinAPI installations folder (e.g. C:\Program Files\EnOcean\DolphinAPI\EO3000I_API\EO3000I_LIB\RadioCFG).
6. Link the radio settings file to the project workspace in Keil.

RADIO APPROVAL OF FINISHED UNITS



Please note that only one radio settings file can be linked to the project. Before adding new radio settings files please exclude the previous.

7. Determine which pins are going to be used for configuration. By default these are CONF_0 = ADIO0 and CONF_1 = ADIO1.
8. If needed, change the configurations pins. The pins are determined by defines in main.c:


```
#define CONF_0 ADIO_0
#define CONF_1 ADIO_1
```

 Change ADIO_0 and ADIO_1 to the corresponding pins you have chosen.
9. Connect your module to the PC through an EOP (EnOcean Programmer). You will probably also use an EVA board.
10. Compile and download the firmware to the module.

Disclaimer

The information provided in this document describes typical features of the EnOcean radio system and should not be misunderstood as specified operating characteristics. No liability is assumed for errors and / or omissions. We reserve the right to make changes without prior notice. For the latest documentation visit the EnOcean website at www.enocean.com.