

RADIO APPROVAL OF FINISHED UNITS – Program Source Code to support the radio approval process

1. INTRODUCTION

This application note provides support for the radio approval process. Radio regulations are specific to every region and where possible, EnOcean has already attained radio approval (i.e. in the EU and USA). When using EnOcean original modules in these countries, additional certification is not needed. The conformity declarations are available on the EnOcean website [5], separate for each product.

In some countries however this is not possible and every end product has to be certified. For this case we provide this application note and source code, to help with the approval process. The source code provides typical functionalities that are required during radio approval process in a lab. These are:

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

1.1. References

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

2. OPERATION

The operation of the radio approval source code is shown in Figure 1. At startup the module is initialised and configuration pins CONF_0 and CONF_1 are read out. The values of the configuration pins determine the function of the module. A pin can be either connected to GND (logical value 0) or not connected (logical value 1). The operations are summarised 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 a standard EnOcean telegram every 1000ms. The telegram consists of 3 sub-telegrams (4BS, Data = 0x00000000).
NC (1)	GND (0)	Send out a continuous wave. The wave is sent until the configuration pins are changed.

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NC (1)	NC (1)	Send out a PN9 sequence. The sequence consists of 64 bytes and is sent in an infinite loop.
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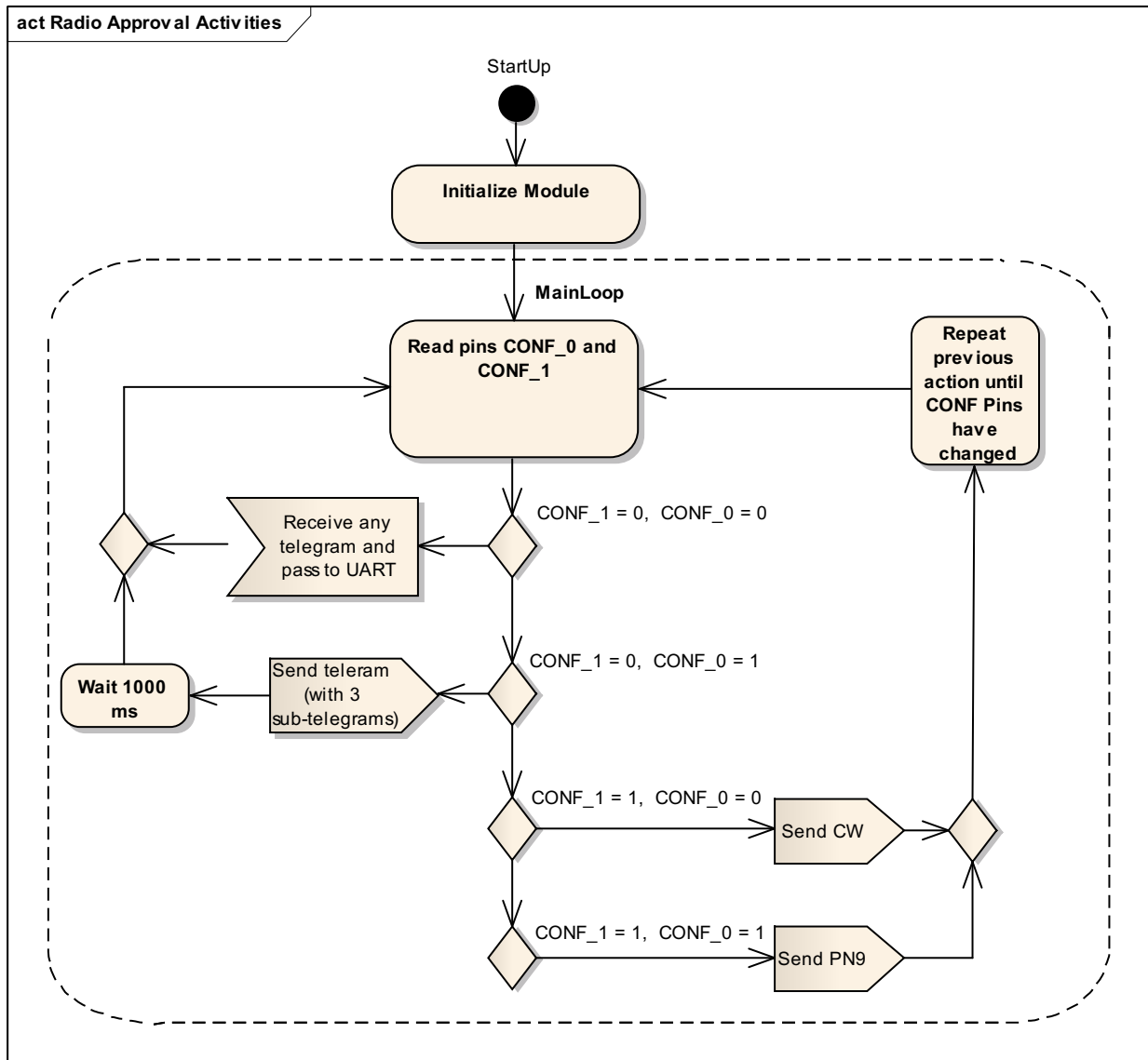


Figure 1 Overview of Radio Approval Firmware activity

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

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- 8 data bits

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 use 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. This article focuses on two important configurations:

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 in the approval process. By default the radio settings file for TCM, 868.3 MHz, and Step Code: DA are linked. How to link other radio settings files 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 two different pins. The following pins are available:

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

Please note that the pins you are planning to use have to be set as digital inputs. This is described in chapter 4.

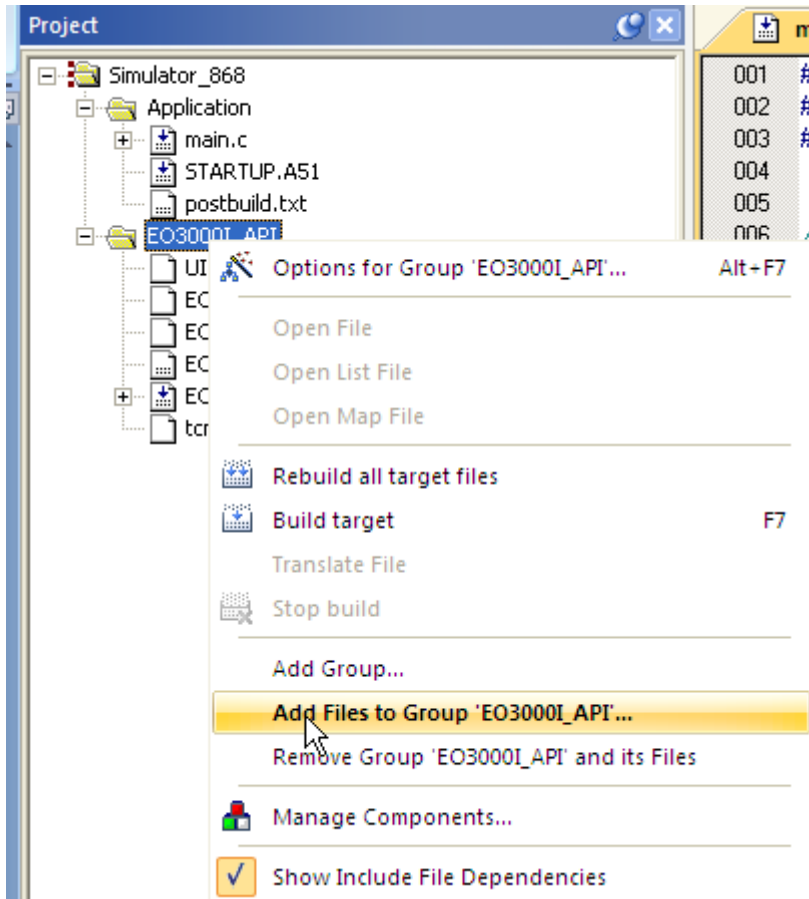
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4. GETTING STARTED – STEP BY STEP

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. First, install the newest version of 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 licensed version of Keil's C51 compiler. 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. if 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.

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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 EnOcean Programmer (EOP). You can connect the EnOcean module to the EOP using 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.