

# Gr-EnOcean An OOT for a Commercial IOT Protocol

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# Why EnOcean



- EnOcean is a commercial IoT standard targeted for low power/solar powered sensors
- EnOcean protocol is an open standard - documentation is publicly available
- There are integration efforts with Aruba networks to combine the IoT sensor data to backend Wi-Fi access points
- EnOcean has some security being added, so having a base PHY level interface from GNU Radio could be useful
- It seemed like it would be fun



# EnOcean Protocol



- There are 2 PHY level protocols for EnOcean
  - Amplitude-shift keying (ASK)
  - Frequency-shift keying (FSK)
- The FSK standard is the current main standard and the only one for which I could acquire sensors



# EnOcean Protocol



## General Specifications

The following table provides the key parameters for the EnOcean Radio Protocol 2.

Parameter	Min.	Value	Max.	Unit
Frequency Error	-18		-18	kHz
Modulation <sup>1</sup>		FSK		
Frequency Deviation	±55.0	±62.5	±70.0	kHz
Data Rate		125		kbps
Data Rate Tolerance <sup>2</sup>	-30		+30	ppm
PA Ramp-On Time			40	µs
PA Ramp-Off Time			40	µs
Coding		NRZ		
Code for 1		+62.5		kHz
Code for 0		-62.5		kHz

Figure 2

From EnOcean Radio Protocol 2 July 31, 2020



# EnOcean Protocol



## Live Demo



[www.redwiretechnologies.us](http://www.redwiretechnologies.us)

# EnOcean Frame

## 3.2 Frame Specification

The data to be transmitted is transmitted in frames. Each frame is preceded by a preamble for bit synchronization and the generation of the data slicing thresholds. After this a synchronization word is transmitted to enable the receiver to synchronize to the data bytes. The first byte transmitted after the synchronization word the length of the Data\_PL. Its value is the number of the bytes transmitted in the Data\_PL.

A complete frame is shown in the following diagram.

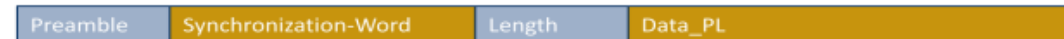


Figure 5

The following table provides the parameters for the frame structure.

Parameter	Value
Endianness	The MSB is transmitted first (Big-Endian).
Preamble	16 bit 0b1010101010101010 (0xAAAA)
Synchronization Word	16 bit 0b1010100100111100 (0xA93C)
Length	1 <sup>st</sup> Byte, containing the number of data bytes.
Data_PL	Bytes containing the transmitted data.
Minimum Number of Data Bytes	1
Maximum Number of Data Bytes <sup>3</sup>	255

Figure 6

From EnOcean Radio Protocol 2 July 31, 2020

# EnOcean Protocol



## Live Demo

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# EnOcean Serial



- The serial protocol is in the document  
EnOcean Serial Protocol 3 (ESP3) V1.51 August 12th 2020
- A Python program (EnOcean) can parse the serial protocol into meaningful data  
<https://github.com/kipe/enOcean>
- The radio-based packet format must be modified to the serial interface to be used  
by the Python EnOcean program





# EnOcean Protocol



## Live Demo

[www.redwiretechnologies.us](http://www.redwiretechnologies.us)



# Gr-EnOcean



The code is available at

[https://github.com/redwiretechnologies/  
gr-enocean](https://github.com/redwiretechnologies/gr-enocean)



[www.redwiretechnologies.us](http://www.redwiretechnologies.us)

# Gr-EnOcean



## Questions

[www.redwiretechnologies.us](http://www.redwiretechnologies.us)

