### **Parsing Data**

This part is the continuation of the lab 3. We will analyze the received packets.  
The raw data received must be parsed from *hex*values to real values. To do so, it is important to first of all identify which of the bytes above corresponds to which sensor:

00 FF FF 00 46 05 00 06 0F FF 00 00 00

First of all, we analyze the header:

00: This byte indicates it is an AM message

FF FF: These two bytes are the Destination address (FF FF indicates broadcast)

00 46: These two bytes are the Source address. It indicates the address of last mote before the sink node. As this is a one-hop application, it is also the Origin of the message

05: This byte contains the Length in bytes of the payload. 05 indicates that the payload of the message has 5 bytes

00: The next byte is the Group id, which is not used

06: This byte is the Handler id. It is configurable and it permits identifying the type of message received. In this case, we know it corresponds to a TestSE1000Events\_AM\_ID message

The rest of the message is the Payload, the actual data of the message.

0F FF: Raw Voltage

00: PIR Sensor state

00: MAG Sensor state

00: MIC Sensor state

**Important:** As already stated, it is important to adjust the threshold level individually for each sensor in **Security.h**. Particularly for the microphone sensor this is a must.

#### Internal Mote Voltage

#### The internal voltage sensor uses the microcontroller's 12-bit ADC. To convert the raw value of the ADC to the corresponding voltage, if needed, perform the following calculation:

**Voltage = value/4096 × Vref**

where Vref = 1.5 V   
  
If an absolute value of the voltage is needed, a calibration could be necessary.

#### PIR, Magnetic Contact & Microphone

In the ***Security***components, we have set the threshold above which the sensors generate events. In our case, the following setup has been established:

* PIR State = 00 -> No presence detected
* PIR State = 01 -> Presence detected
* MAG State = 00 -> Magnetic contact sensor parts touching
* MAG State = 01 -> Magnetic contact sensor parts not touching
* MIC State = 00 -> Sound below threshold
* MIC State = 01 -> Sound above threshold detected

Let’s see the sequence of events in the provided example above. In our setting, the PIR sensor was orientated towards a corridor, while the magnetic contact sensor was installed in a door. The sequence of events received were as follows:

00 FF FF 00 46 05 00 06 0F FF 00 00 00 -> Initial State: no presence detected, room door closed.

00 FF FF 00 46 05 00 06 0F FF 01 00 00 -> Presence detected in corridor

00 FF FF 00 46 05 00 06 0F FF 01 01 00 -> Room door opened (corridor presence state still active)

00 FF FF 00 46 05 00 06 0F FF 01 00 00 -> Room door closed (corridor presence state still active)

00 FF FF 00 46 05 00 06 0F FF 00 00 00 -> No presence detected in corridor

So, basically, a person was detected walking through the corridor, he or she entered a room, and then closed it behind him or her.

**Main Project:**

Your final report must include your solution to the following project. Please include all the challenges you encounter during the tasks.

Project:

You are tasked by a marketing company with setting up a system to perform the following study.

In a marketing study, we would like to know if the order in which customers see adds plays a role in their decision-making.

We arrange three stations, each one displaying a face-down pictures of different holiday destinations: a beach, a ski resort and the Eiffel Tower. The participants should go to each one of the stations, see the pictures by turning them face-up, and, at the end., they reply to tbhe following multiple-choice question:

If you had to decide now, which holiday destination would you choose?

\_\_\_ Beach \_\_\_Ski \_\_\_Paris

We will use the motes to determine if the order in which the participants looked at the pictures influences in any way their choice of a destination.