

LIFEPLAN Firmware Update

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In response to initial deployments of AudioMoth at LIFEPLAN sites two additions to the firmware are implemented.

- A1. It should be possible to set the maximum length of the opportunistic recording, within the sleep period of the regular record / sleep cycle, such that one recording of either the entire sleep duration (allowing for a 5 second file opening and closing times), or the maximum opportunistic recording duration is made.
- A2. It should be possible to set two different record / sleep cycles along with a parameter that defines how many complete cycles of the first combination are completed before the second combination is used. This functionality is intended to allow a period of continuous recording at the start of a deployment, before a switch to a lower duty cycle record / sleep cycle for the rest of the deployment period.

The updated AudioMoth configuration is shown below. As before, the ordering of elements cannot be changed but the blue elements are optional and can be omitted. Note that the `initialSleepRecordCycles` and `initialSleepRecordCycle` elements must always be provided together, and they must be followed by a `sleepRecordCycle` element. However, it is permitted to provide a single `sleepRecordCycle` element, or to omit all three elements.

As before, the recording periods are defined by their start and stop time measured in minutes from the start of the day. They must be non-overlapping and ordered with the earliest recording period first. Any text may be included before the configuration structure, as long as it does not use a `'{'` character. Similarly, any text can follow the configuration structure. Both will be ignored by the AudioMoth.

To ensure backwards compatibility, the updated firmware can read the original configuration files and will behave in exactly the same way as the original firmware. The original firmware will not be able to read the updated configuration files if they contain the new `initialSleepRecordCycles`, `initialSleepRecordCycle` or `maximumOpportunisticDuration` keywords.

```
{
  enableLED: <0 or 1>,
  enableBatteryLevelDisplay: <0 or 1>,
  enableProprietaryFileFormat: <0 or 1>,
  initialSleepRecordCycles: <0 to 255>,
  initialSleepRecordCycle: {
    sleepDuration: <5 to 43200>,
    recordDuration: <1 to 43200>
  },
  sleepRecordCycle: {
    sleepDuration: <5 to 43200>,
    recordDuration: <1 to 43200>
  },
  standardSettings: {
    gain: <0, 1, 3, 4, or 5>,
    sampleRate: <8000, 16000, 32000, 48000, 96000, 192000, 250000 or 384000>,
    filter: {
      lowerFrequency: <0 to sampleRate/2>,
      higherFrequency: <0 to sampleRate/2>
    }
  },
}
```

```

    amplitudeThreshold: <0 to 32768>
  },
  opportunisticSettings: {
    gain: <0, 1, 3, 4, or 5>,
    sampleRate: <8000, 16000, 32000, 48000, 96000, 192000, 250000 or 384000>,
    filter: {
      lowerFrequency: <0 to sampleRate/2>,
      higherFrequency: <0 to sampleRate/2>
    },
    amplitudeThreshold: <0 to 32768>,
    maximumDuration: <1 to 43200>,
    maximumTotalFileSize: <0 to 32768>
  },
  recordingPeriods: [
    {startMinutes: <0 to 1440>, stopMinutes: <0 to 1440>},
    {startMinutes: <0 to 1440>, stopMinutes: <0 to 1440>},
    {startMinutes: <0 to 1440>, stopMinutes: <0 to 1440>},
    {startMinutes: <0 to 1440>, stopMinutes: <0 to 1440>},
    {startMinutes: <0 to 1440>, stopMinutes: <0 to 1440>}
  ]
}

```

Two example deployments are shown:

- i Record continuously at 48 kHz with a record / sleep cycle of 12 hours - 5 seconds / 5 seconds for at least the first 48 hours and then revert to recording for 1 minute out of every 10 minutes for the remainder of the deployment.
- ii Record for 1 minute every 10 minutes at 48 kHz to record birds. Make opportunistic recordings at 384 kHz between these recordings using an amplitude threshold and high-pass filter to record bats with a daily total file size limit of 1024MB and a maximum individual file duration of 3 minutes.

```

1 {
2   enableLED: 1,
3   enableBatteryLevelDisplay: 1,
4   enableProprietaryFileFormat: 1,
5   initialSleepRecordCycles: 4,
6   initialSleepRecordCycle: {
7     sleepDuration: 5,
8     recordDuration: 43195
9   },
10  sleepRecordCycle: {
11    sleepDuration: 540,
12    recordDuration: 60
13  },
14  standardSettings: {
15    gain: 2,
16    sampleRate: 48000
17  },
18  recordingPeriods = [
19    {startMinutes: 0, stopMinutes = 1440}
20  ]
21 }

```

```

1 {
2   enableLED: 1,
3   enableBatteryLevelDisplay: 1,
4   enableProprietaryFileFormat: 1,
5   sleepRecordCycle: {
6     sleepDuration: 540,
7     recordDuration: 60
8   },
9   standardSettings: {

```

```
10     gain: 2,  
11     sampleRate: 48000  
12 },  
13 opportunisticSettings: {  
14     gain: 2,  
15     sampleRate: 384000,  
16     filter: {  
17         lowerFrequency: 48000,  
18         higherFrequency: 192000  
19     },  
20     amplitudeThreshold: 512,  
21     maximumDuration: 180,  
22     maximumTotalFileSize: 1024  
23 },  
24 recordingPeriods = [  
25     {startMinutes: 0, stopMinutes = 1440}  
26 ]  
27 }
```