DESIGN: Monitoring Station Packaging

Great Lakes Data Watershed (gldw.org)

Instrument Toolkit Program

Revised: June 18, 2019

# Monitoring Packages Overview

The Instrument Toolkit Program has been created to support the development of high quality monitoring devices based on commonly available hardware and utilizing VDAB dataflow programming and customized nodes for instrument construction. **This document describes the three different monitoring station packages that will be supported by the toolkit.**  All of these stations will support acquisition from up to four different sensors. The Integrated and Standalone Raspberry PI Stations based stations will include VDAB and are capable of serving as a Hub for other stations in the vicinity. The standalone station is based on the ***EnviroDIY Mayfly Data Logger* *Board*** developed by ***Stroud Water Research Center*** and would include sketch components making it easy to communicate with VDAB running on another station or standalone hub.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Integrated Station** | **PI3-VDAB Logger/Hub** | **Mayfly Logger** |
| Station Size | * Station size 6”x6”x3” | * Station size 4”x4”x2” | * Station size 3”x3”x2” |
|  |  |  |  |
| Power Consumption | * Moderate | * Moderate | * Low – Very Low |
| Battery | * Rechargeable Moderate | * Rechargeable Moderate | * Disposable * Rechargeable Small |
| Solar Power | * 12x12 panel | * 12x12 panel | * 4x4 panel |
| Uplink Radio | * LoRa WAN * 4 G LTE | * LoRa WAN * 4 G LTE | * LoRa WAN * 4 G LTE * WiFi (requires hub) * ZigBee (requires hub) |
| Downlink Radio (as Hub) | * LoRa WAN * WiFi * Zigbee and ZWave | * LoRa WAN * WiFi * Zigbee and ZWave | NA |
| Link Protocol | * VDAB * MQTT * HTTP | * VDAB * MQTT * HTTP | * MQTT * HTTP |
| Software | * VDAB | * VDAB | * C Sketches |
| Acquisition channel | * 4 Analog * IC2 | NA | * 4 Analog * IC2 |
| Optional Station  Features | * Fluid Control \* * Serial Control * Mechanical Control | NA |  |

\* These capabilities support the development of completely automated wet chemical methods.

# Integrated Station Configuration

In this configuration both ***EnviroDIY Mayfly Data Logger Board*** and a ***Raspberry Pi*** running VDAB are housed in the same station container. They communicate using a USB port using serial communication. The Mayfly draws power from the PI3.  
With the flexibility and computing power available with the Raspberry Pi, additional features including fluid and mechanical control can be added to the station.

**Integrated Station**

Mayfly

PI3 -VDAB

**Integrated Station**

Mayfly

PI3 -VDAB

**Integrated Station**

Mayfly

PI3 -VDAB



# Mayfly Data Loggers and VDAB Hub

In this configuration, the ***EnviroDIY Mayfly Data Logger* *Board*** communicates using Wi-Fi and connect to a VDAB hub either A) indirectly or B) directly with the Raspberry Pi Hub acting as an access point. While Wi-Fi communication is ubiquitous and most straightforward other radio types can be supported. Communication between the Mayfly data logger and the VDAB hub can be accomplished using either HTTP or MQTT protocols and a standard sketch will provide those as options.

If the Raspberry Pi is not itself connected to the cloud, some form of uplink would be provided using 4G or Lora Wan.

## VDAB Hub using the Raspberry Pi as an Access Point



**Data Logger**

Mayfly

**VDAB AP/Hub**

PI3 –VDAB

**Data Logger**

Mayfly

**Data Logger**

Mayfly

## VDAB Hub through Wi-Fi Cloud Connection

**Data Logger**

Mayfly

**VDAB Hub**

Any Computer

**Data Logger**

Mayfly

**Data Logger**

Mayfly

