3D-PAWS Particle Boron: 3rd Party SIM Setup and Configuration Guide

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On the underside of the Particle Boron board is a slot for a SIM card. This SIM slot can be used instead of the built-in SIM. Particle's software stores the state of what SIM is being used and cell provider information in nvram. The state is either set INTERNAL or EXTERNAL. We can control this state by the existence of the SD file SIM.TXT. The user needs to create file SIM.TXT and place it at the top directory on the SD card.

If the SIM.TXT file contains the below and it passes syntax checks, then at boot software sets the SIM to use to EXTERNAL and the file is then renamed to SIMOLD.TXT, so we don't do this on the next boot.

Below are the instructions for setting up a 3rd Party SIM.

Setting Up Development Environment for 3D-PAWS Datalogger

Overview

Before customizing and flashing code to your Particle Boron, you'll need to install the Particle CLI (command-line interface) and download the 3D-PAWS codebase. This section guides you through:

1. Installing Particle CLI - Required for device management and firmware flashing
2. Downloading 3D-PAWS Codebase - Contains data logger firmware
3. Folder Structure Setup - Organizing files for efficient development

Step 1: Install Particle CLI

Windows Users

1. Download Installer
   Get the Windows CLI installer from Particle's official CLI docs
2. Run Installer
   Double-click `particle-cli-setup.exe` and follow prompts
3. Verify Installation
   Open Command Prompt and type:

```
None
particle --version
```

4. *Should display version like 3.23.4 or higher*

Mac/Linux Users

1. Open Terminal
   Launch Terminal (Mac: Spotlight > Terminal | Linux: Ctrl+Alt+T)
2. Run Install Command

```
None
bash <( curl -sL https://particle.io/install-cli )
```

Step 2: Download 3D-PAWS Codebase

- Get Repository
  Download from GitHub: [3D-PAWS-Particle-FullStation]
    - Select the green “<> Code” dropdown
    - Download ZIP
- Unzip Files
  Extract to a dedicated project folder:

```
None
Recommended path:
Windows: C:\Users\[YourName]\Documents\3D-PAWS\3D-PAWS-Particle-FullStation\
Mac: /Users/[YourName]/Documents/3D-PAWS/3D-PAWS-Particle-FullStation/
Linux: /home/[YourName]/Documents/3D-PAWS/3D-PAWS-Particle-FullStation/
```

Setting the 3rd Party SIM APN (Access Point Name)

The APN ("Access Point Name") specifies how the Particle device should connect to the Internet. The setting varies by carrier, and sometimes by country. If you're searching Google for your APN, be aware that some carriers may list separate WAP APN or MMS APNs; you want to use the Generic or Internet APN.

There is no set structure to an APN. Here are some examples: broadband, internet, three.co.uk.

If you have set your APN correctly the Particle device should proceed through the normal states: breathing white, blinking green, blinking cyan, fast blinking cyan, and finally to breathing cyan, even before you've claimed the Particle device. In fact, the Particle device must be in breathing cyan to complete the claiming process.

1. Insert SD Card
    - Place your microSD card into your computer's card reader.
2. Access Root Directory
    - Open File Explorer (Windows), Finder (Mac), or your Linux file manager.
    - Navigate to the SD card's root directory (e.g., E:\ on Windows).
3. Create SIM.TXT and add the APN.

Windows Instructions

Using Notepad:

1. Open Notepad
2. Type: **`APN your_apn_here`**
3. File > Save As
4. Set:
    - Filename: **`SIM.TXT`** (all caps)
    - Save as type: All Files
    - Encoding: UTF-8

Mac OS/Linux Instructions

Terminal Method (Recommended):

1. Open the Command Line
2. Navigate to your desired directory
3. Enter the following command

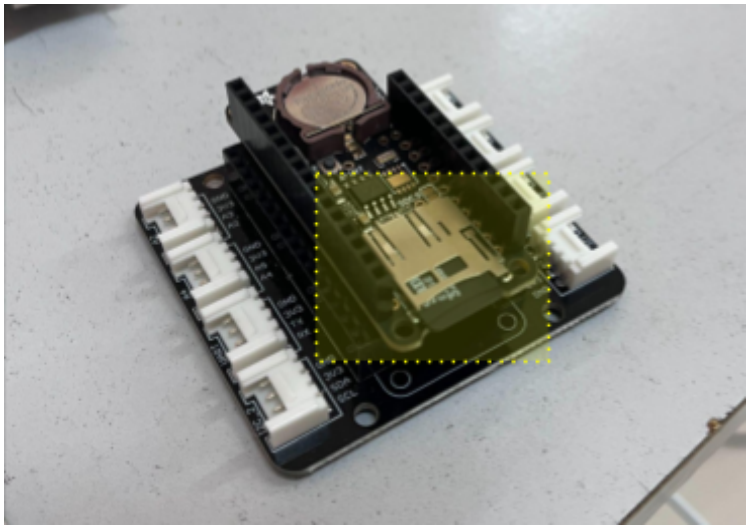
```
None
echo "APN your_apn_here" > SIM.TXT
```

TextEdit Method:

1. Open TextEdit > Format > Make Plain Text
2. Type APN line
3. File > Save > Name: `SIM.TXT` (all caps)
4. Edit Contents
    - Open `SIM.TXT` and add only this line:
    - `APN your_apn_here`
    - Example: APN epc.tmobile.com

Preparing and Connecting the Particle Data Logger Hardware

Eject the SD card from your computer and insert it into the feather board.



Insert the SIM card into the bottom of the Particle data logger.

Now, connect the data logger to your computer using a microUSB cable.

Flashing Firmware to the Particle Boron via CLI

Step-by-Step Flashing Process

1. Place the device in DFU mode (blinking yellow LED):
    - Hold MODE button
    - Press RESET button
    - Release RESET while keeping MODE pressed
    - Release MODE when LED blinks yellow (~3 seconds)
2. Login to Particle CLI using the command prompt/terminal

```
None
particle login
```

Enter your Particle account credentials when prompted

3. Identify Device

```
None
particle identify
```

Copy the 24-character device ID from output

```
None
Your device id is e00fce68bb58d899d356d79c
Your IMEI is 354762119784053
Your ICCID is 89883070000036790986
Your system firmware version is 6.2.1
```

4. Flash Pre-Compiled firmware .bin file which is located in the 3D-PAWS codebase: 3D-PAWS-Particle-FullStation-master/Install/firmware-boron-YYYYMMDD_VXX.bin

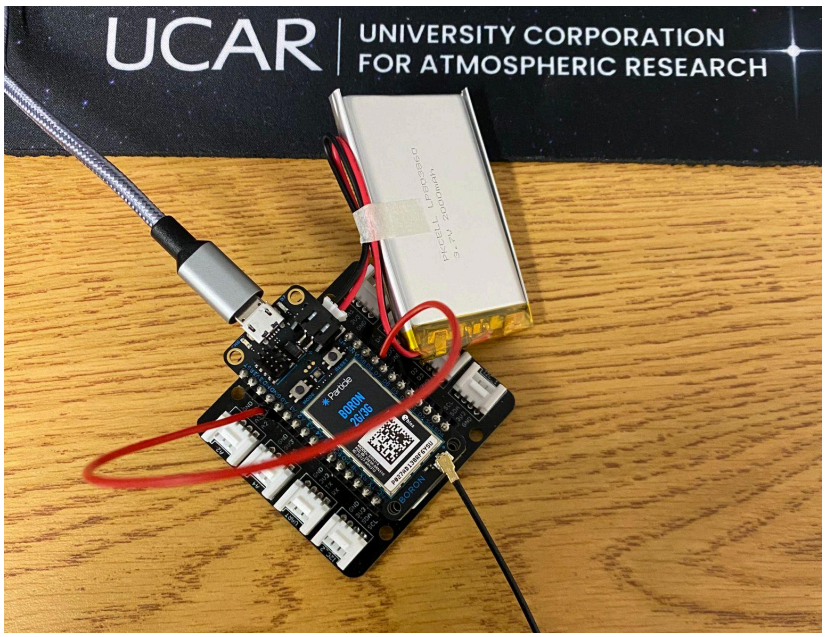
```
None
particle flash --local <device_id> path/to/firmware.bin
```

Paste the device ID and add the entire file path to the .bin file

Example:

```
None
particle flash --local e00fce68bb58d899d356d79c
/User/Doocuments/3D-PAWS-Particle-FullStation-master/Install/firmware-boron-YYY
YMMDD_VXX.bin
```

5. Ensure the Particle completes its firmware flash. Device blinks **magenta** and eventually turns **green**
6. Monitor Serial Output
    - Add a jumper connecting GND to D8 on the particle



Upon Particle board boot with the jumper wire connected, software will wait 60 seconds for you to connect the serial monitor. Flashing the board led. After 60 seconds the software will continue the boot process. Below is an example of what you might see as the software initializes and discovers connected devices.

```
None
particle serial monitor
```

Expected output message:

```
None
$ particle serial monitor
Opening serial monitor for com port: " /dev/tty.usbmodem2101 "
Serial monitor opened successfully:
OLED:Disabled
SC:Enabled
SER:OK
Copyright [2024] [University Corporation for Atmospheric Research]
FSAC-250121v39
SD:Online
SD:OBS DIR Exists
N2S:Exists
CF:NO CONFIG.TXT
CF:NO CONFIG.TXT
EEPROM DUMP
 LEN:4096
 RT1:0.40
 RP1:0.00
 RT2:0.00
 RP2:0.00
 RGTS:1745616789
 N2SFP:1099
 CS:1745617888
 CSC:1745617888
2000-01-01T00:00:09+
2025-04-25T21:36:03*
RTC:VALID
STC: Valid
2025-04-25T21:36:03=
SIM:Internal
SIMF:Open
SIMF:ID[APN]
SIM:Set External-APN
SIM:Set Credentials
 APN[super]
SIMF:RENAME OK
==============
!!! REBOOT !!!
==============
```

7. Reboot Device
    - Press RESET button on the Particle to reboot the system
    - Restart serial monitor and verify `SIM: External`:

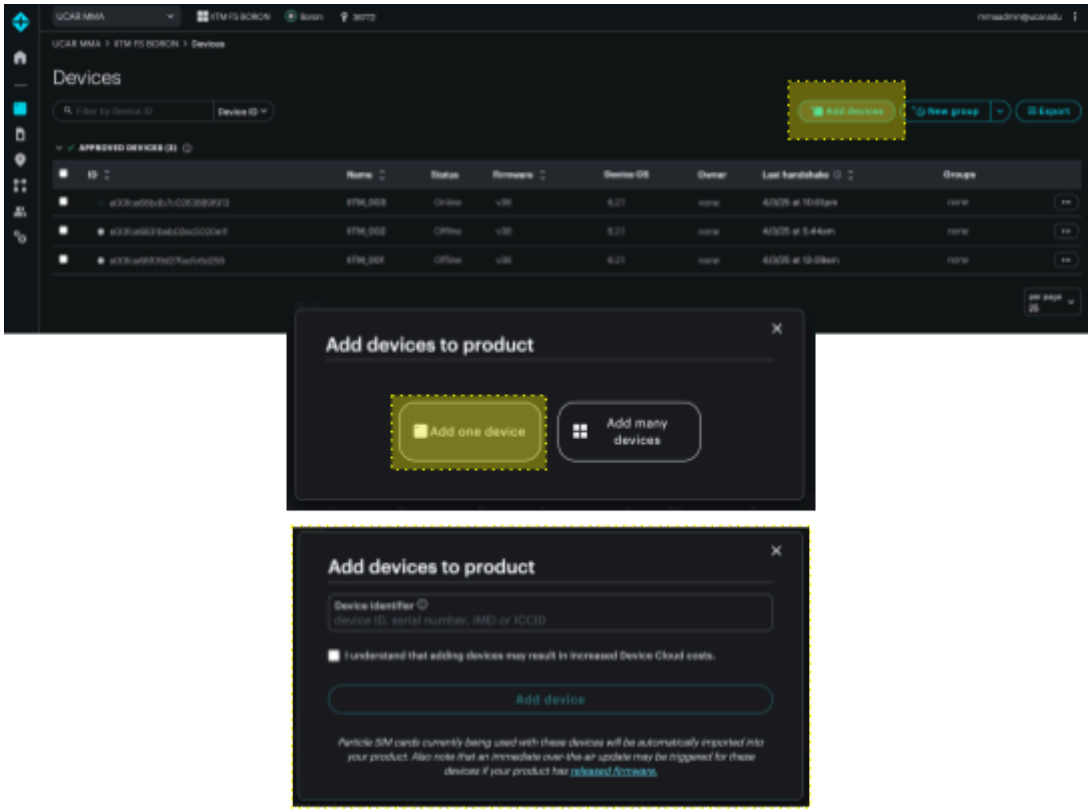
```
None
$ particle serial monitor
Opening serial monitor for com port: " /dev/tty.usbmodem2101 "
Serial monitor opened successfully:
OLED:Disabled
SC:Enabled
SER:OK
Copyright [2024] [University Corporation for Atmospheric Research]
FSAC-250121v39
SD:Online
SD:OBS DIR Exists
N2S:Exists
CF:NO CONFIG.TXT
CF:NO CONFIG.TXT
EEPROM DUMP
 LEN:4096
 RT1:0.40
 RP1:0.00
 RT2:0.00
 RP2:0.00
 RGTS:1745616789
 N2SFP:1099
 CS:1745617888
 CSC:1745617888
2000-01-01T00:00:14+
2025-04-25T21:37:45*
RTC:VALID
STC: Valid
2025-04-25T21:37:45=
SIM:External
SIM:NO UPDATE FILE
TXI:INIT
TXI=15M
A4:INIT
A4=NULL
A5:INIT
...
```

8. Verify Connectivity
    - LED Sequence:
        - Green = Cellular connected
        - Cyan = Cloud connected

Adding Device to a Particle Product

Console UI (Single Device)

1. Login to Particle Console
   Go to console.particle.io and select your product
2. Import Device
   - Navigate to Devices > Import
   - Enter your device ID (24-character code from `particle identify` or CLI)
   - Click Import Devices
3. Verify Successful Claiming
   Device will appear under Devices list with:
   - Last Heard timestamp updating
   - Status showing "Connected" (cyan LED on device)
4. Note: After a device is added to a Particle product, it will be able to receive firmware updates over the air (OTA) through the Particle cloud.



You now have a connected device using a 3rd Party SIM! 🥳

At this point, you are ready to proceed to the next step which is to add the new instrument to the database (see https://3dpaws.comet.ucar.edu/data-access-and-visualization/chords).