

# The BluPoint Solution

by:



YieldPoint introduces BluPoint - a user friendly method to network clusters of geotechnical instruments without wires - changes the rules because the physical hardware actually costs less than for a wired solution.

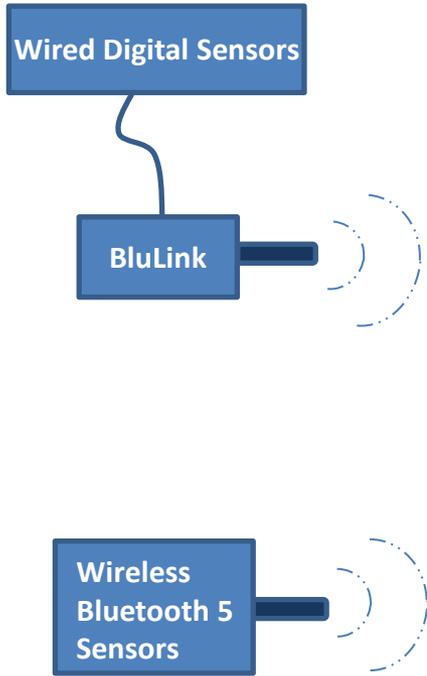
BluPoint features include:

- (i) Extended range: Reliable up to 100m
- (ii) Android phone/tablet access
- (iii) Extremely Low Energy
- (iv) 4 x the range of BLE4.2
- (v) User friendly BluLoggers
- (vi) BluGateways enabling WiFi, LTE-M connectivity
- (vii) Cloud data platform and analytics
- (viii) Operates in star configuration
- (ix) Low cost

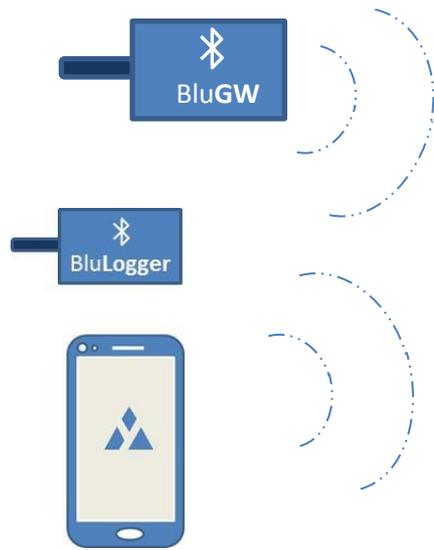
Hardware: Designed by prefix **Blu\*** *i.e.* BluLink, BluTilt

Software: Designated by suffix **\*Point** *i.e.* ViewPoint, VantagePoint

## ViewPoint



## LogPoint



## AccessPoint

CheckPoint  
(local)

## DataPoint (AWS)



Wi-Fi  
LTE-M

## VantagePoint



+  
advanced analytics  
=  
+VantagePoint  
(pron: AdvantagePoint)

## Battery Power:

BluPoint hardware is typically powered with AA batteries that can be either Alkaline or Lithium. For applications below a temperature 0°C lithium batteries are recommended.

The energy capacity of AA batteries is:

Chemistry	Nominal Voltage	Capacity
Alkaline	1.5V	1800mAh
Lithium	1.5V	3000mAh

Several factors affect battery-life, the most important being the reading frequency.

Under typical operating conditions (1 reading/hr) alkaline batteries will last 2-3 years in a Blutech instrument, and lithium batteries over 4 years.

## Range:

Bluetooth 5 sacrifices data rate for range. Under ideal conditions the maximum range (125kb/s Coded PHY) is around 250m LoS. In testing we have routinely established reliable connection over 100m LoS.

Factors effecting range are:

- (i) Line of Sight OS: 2.4GHz technology has limited capability to pass through walls and reflect around structures
- (ii) Characteristics and orientation of antenna.
- (iii) Height above ground surface.
- (iv) Vegetation especially when wet.
- (v) Vehicles periodically in LoS.

## RSSI (Received Signal Strength Indicator):

-40 to -60

**Good**

Radios can communicate down to an RSSI of -92.

-60 to -80

**Moderate**

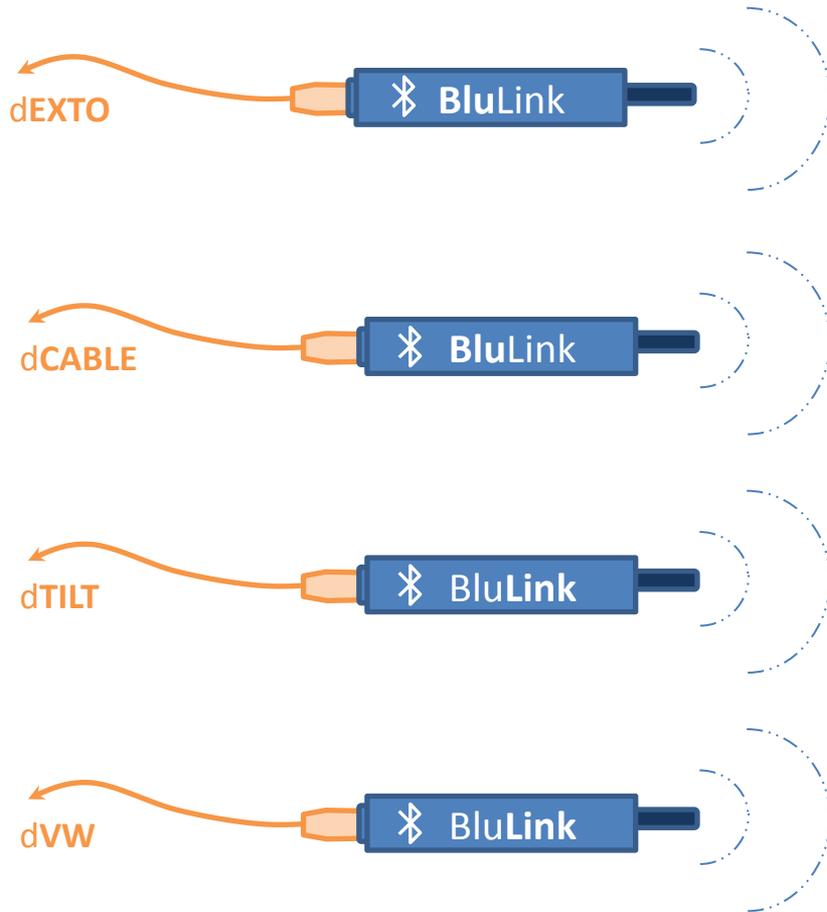
<-80

**Poor**

**IMPORTANT:** Whatever the orientation of the device, the antenna should be VERTICAL



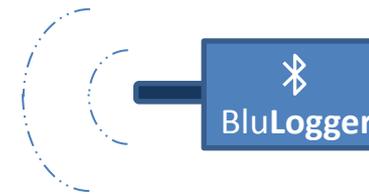
Up to 16 Instruments



Device->Device 100m

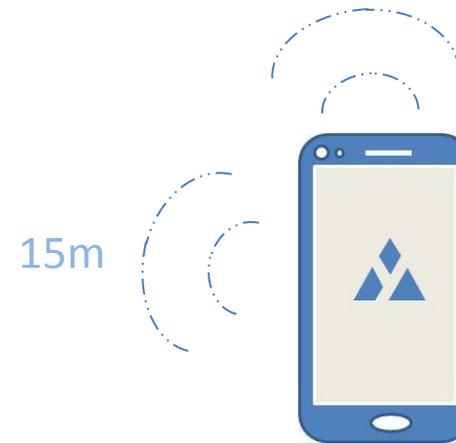
Phone -> Device 10m

Bluetooth 5.0 - 100m



100m

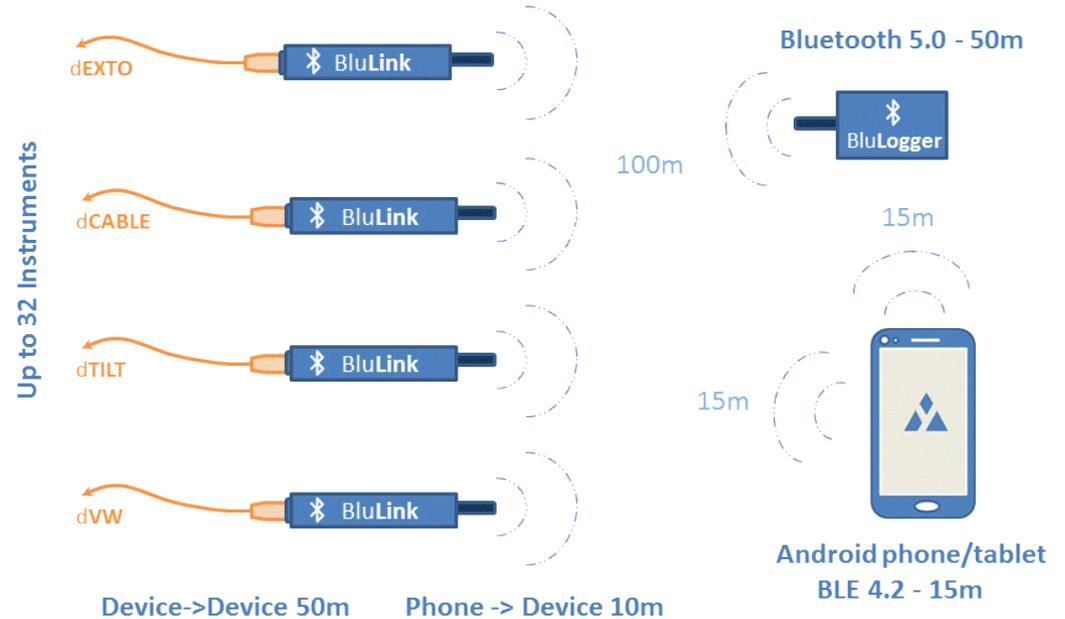
15m



15m

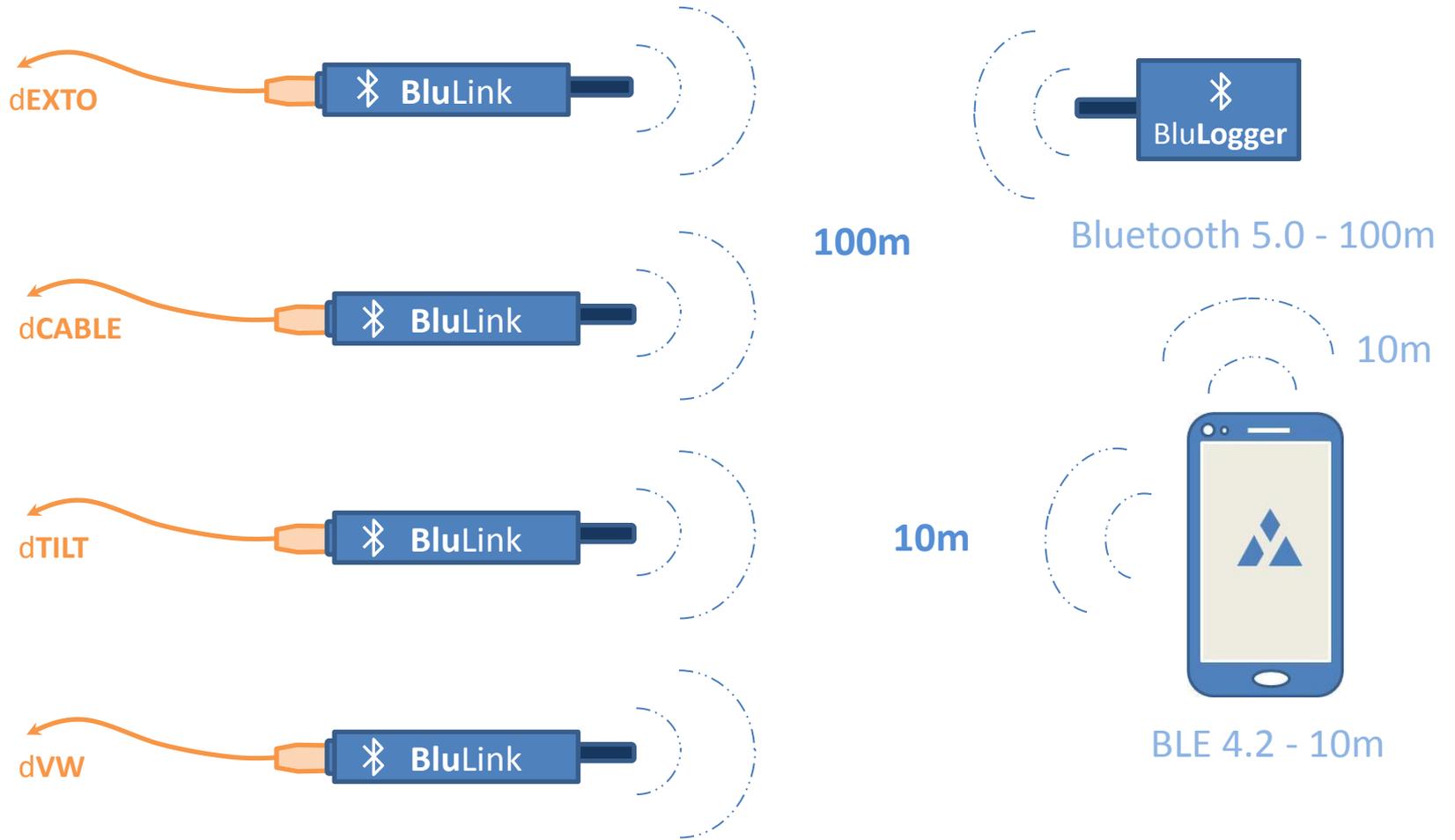
Android phone/tablet

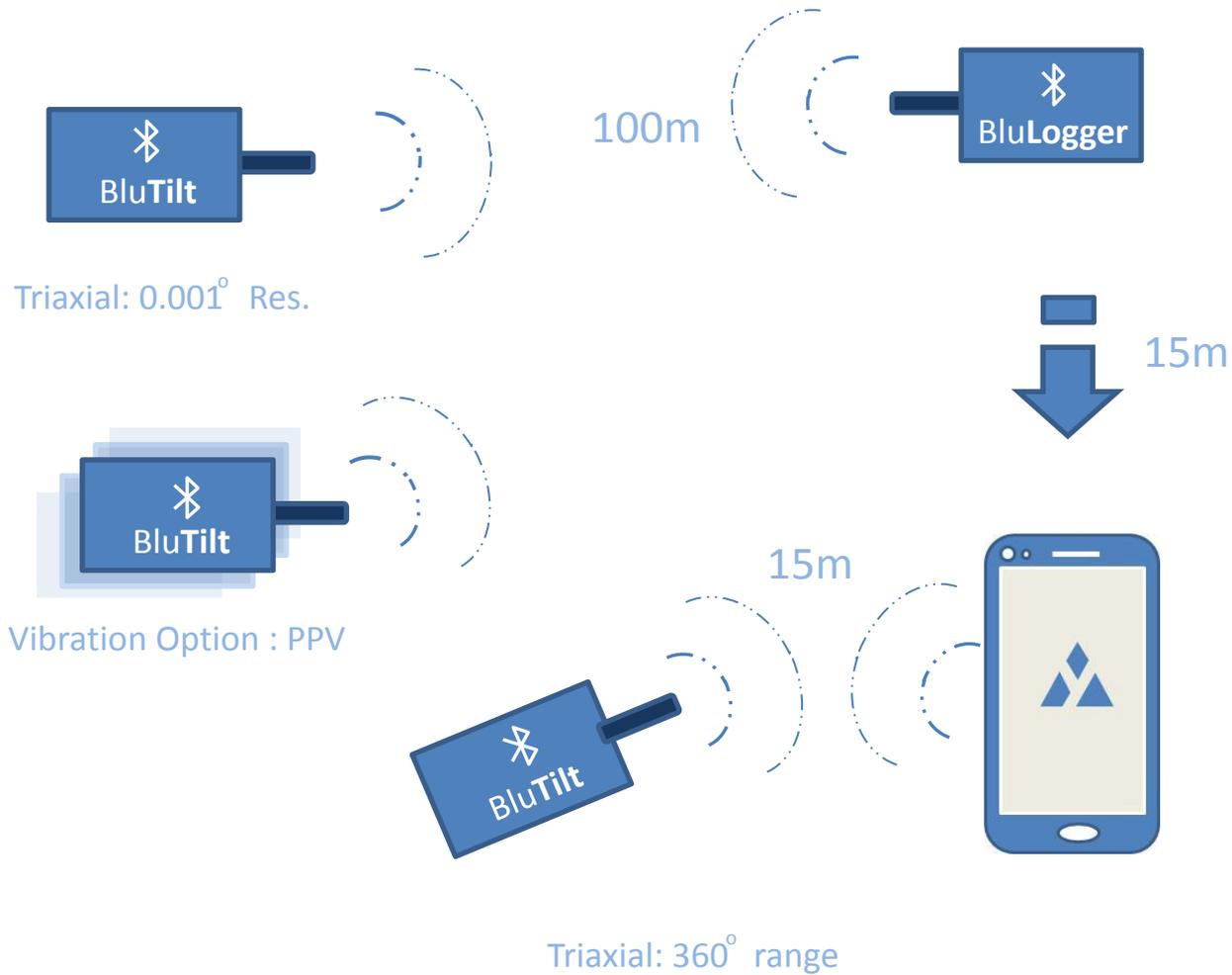
BLE 4.2 - 10m

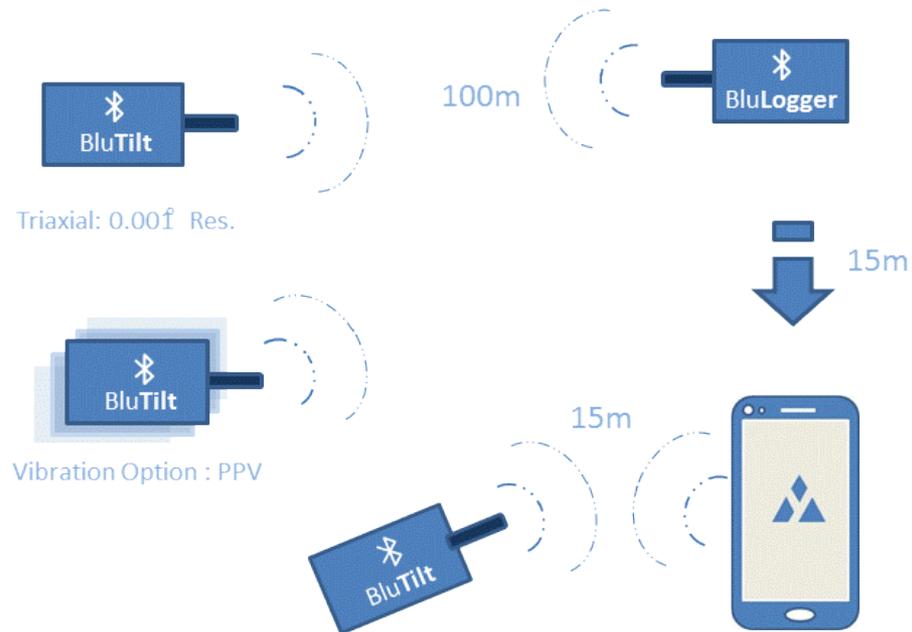


The **BluLink** adds **BluPoint** functionality for any YP digital instrument. It is an economical solution for creating a wireless sensor network. The wireless hardware costs of creating a Bluetooth 5 wireless solution will typically be comparable or less than a wired solution by reducing costs related to (i) leadwire and (ii) multiple wired loggers. **BluLink** runs off internal alkaline batteries which will last longer than two years when set to 1 reading/hour.

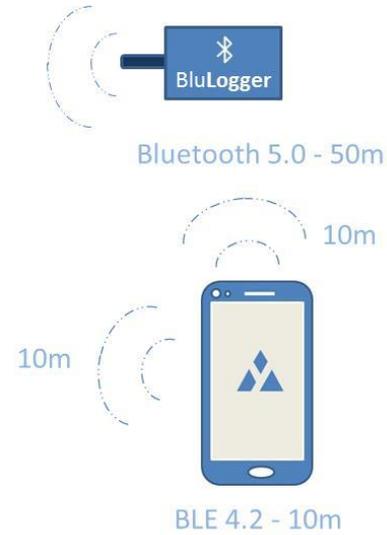
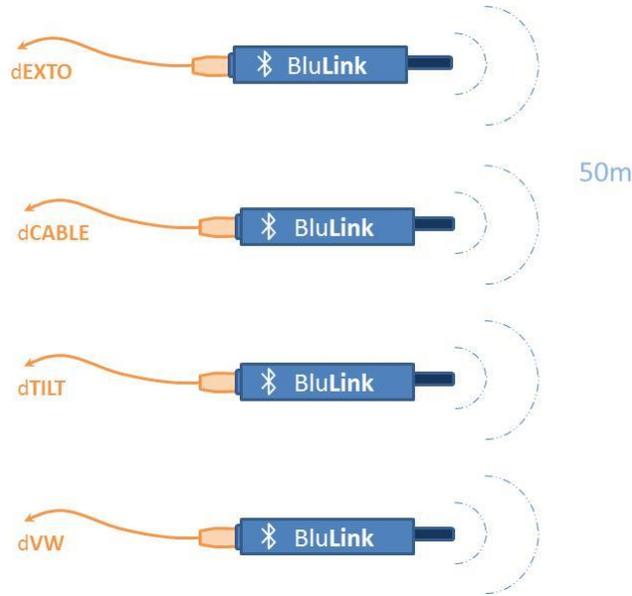
# BluLink : Digital to Bluetooth 5 connectivity



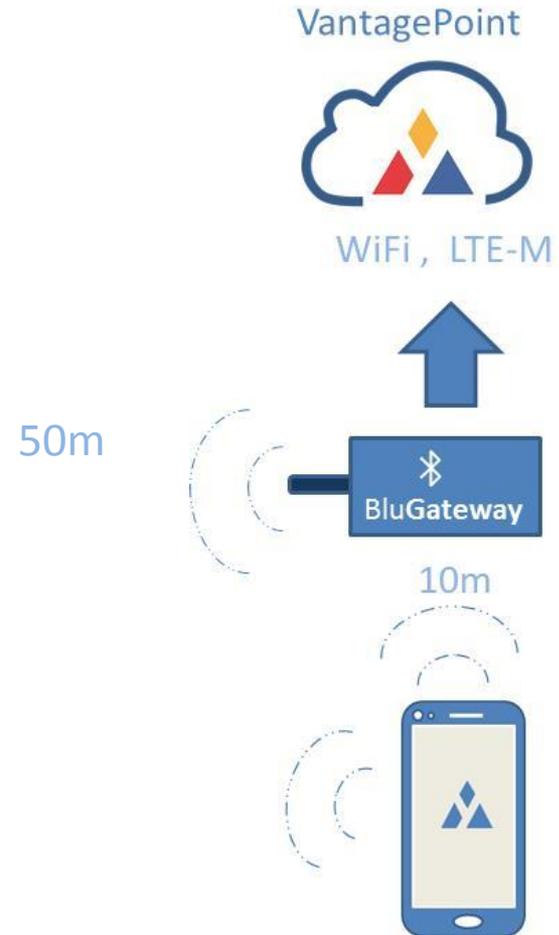
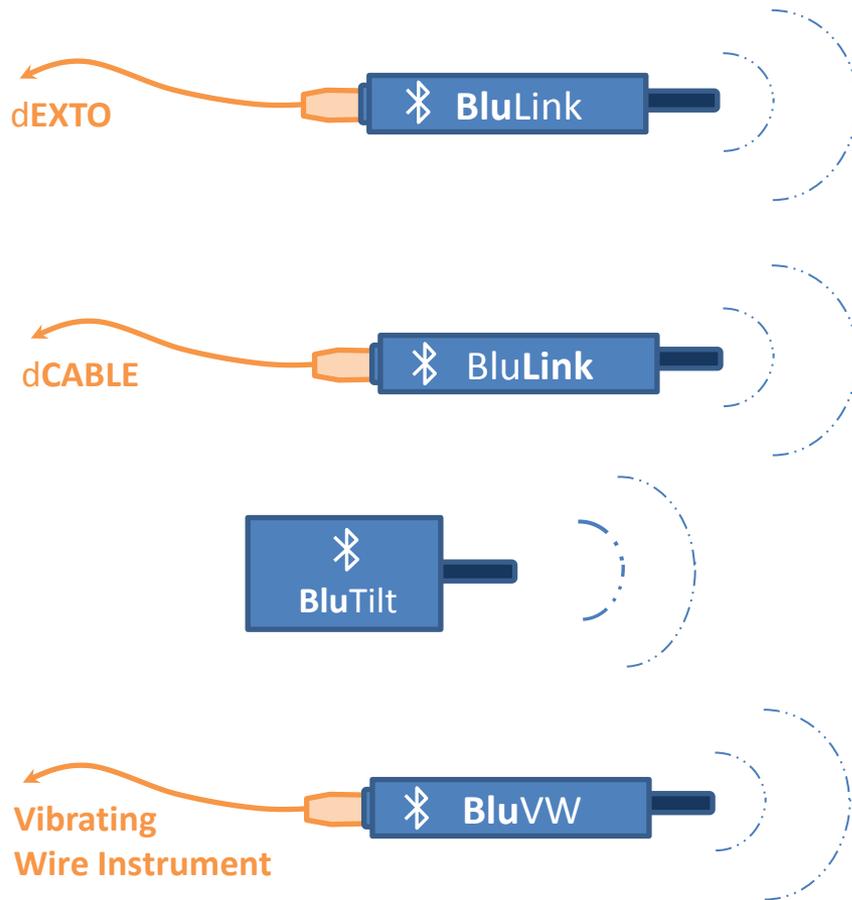




The **BluTilt** is a full 360 arcdeg triaxial wireless tiltmeter for very precise measurement (0.001 arcdeg resolution) of changes in inclination. The instrument uses a very low noise MEMS accelerometer that enables a resolution of 0.001 arcdeg with a stability of +/-0.001 arcdeg.



## INSTRUMENT NODES



## Data aggregation options:

YieldPoint's BluPoint enables data to be accessed from many sources:

- (i) Local personnel can use an Android phone or tablet to take the latest readings.
- (ii) Devices can be enabled to autonomously collect data.
- (iii) BluLoggers can autonomously collect data that can be downloaded by Android devices.
- (iv) BluGateways can autonomously collect data and download via a WiFi or LTE-M network.
- (v) BluLoggers can be fitted to vehicles to aggregate readings during drive by.

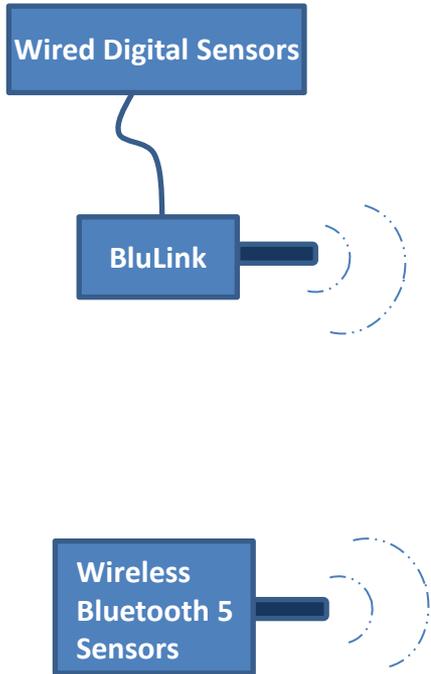
All the data can be uploaded to a cloud or local server either autonomously when network becomes available or using a single button in the VantagePoint Activity.

# The BluPoint App

by:



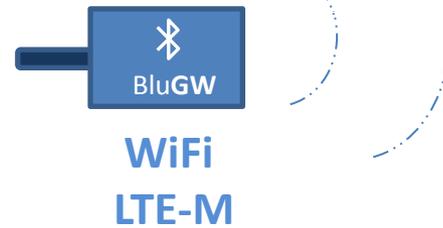
## ViewPoint



## LogPoint



## AccessPoint



## DataPoint



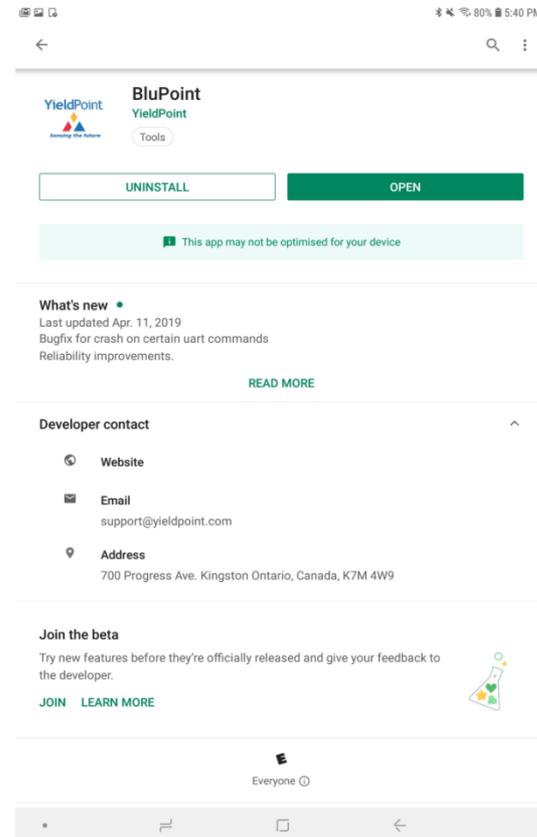
## VantagePoint



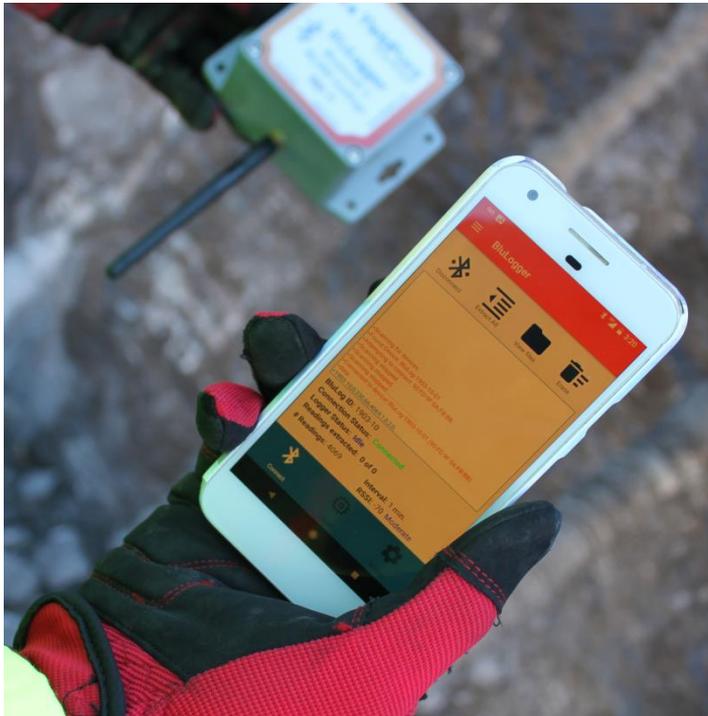
+  
advanced analytics  
=  
+VantagePoint  
(pron: AdvantagePoint)

## Installing the BluPoint App

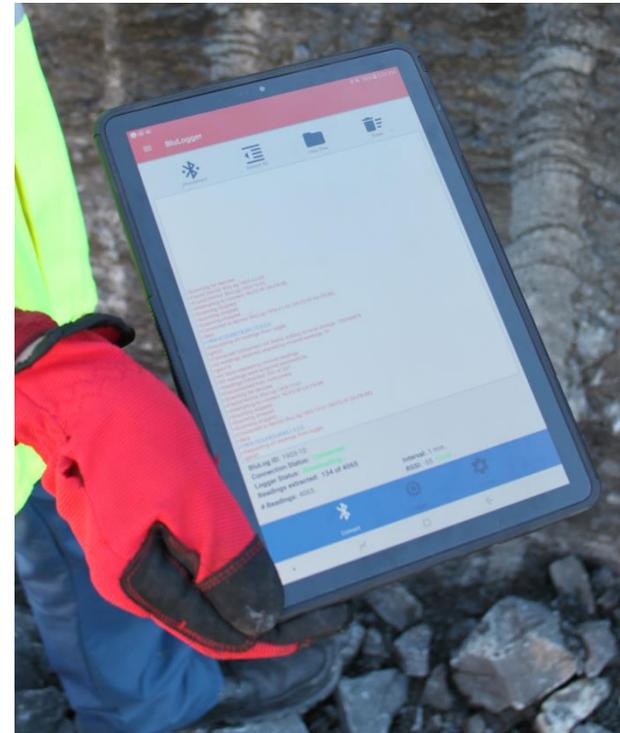
The BluPoint App can be downloaded from the Google Play Store. Search for BluPoint and then install:



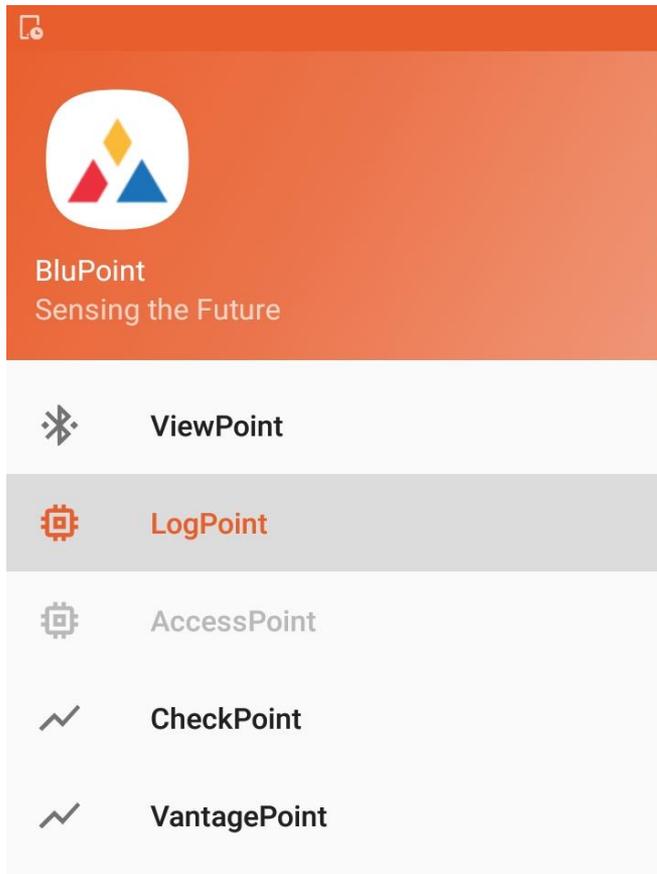
## The BluPoint App



(i) Android Phone



(ii) Android tablet



## The BluPoint App

The BluPoint App is the software interface between Android devices and BluPoint hardware. Swiping from the left reveals a number of Activities that comprise the App.

**ViewPoint:** Connect to an instrument (10m range) to view/save the latest data

**LogPoint:** Connect to a BluLogger. Extract data onto Android device. Scan the instruments in range(50m) of the BluLogger

**AccessPoint:** Log onto a BluGateway. Download stored data.

**CheckPoint:** Android App to display data when offline

**VantagePoint:** A Geotechnical Data Platform (GDP) for visualization and analysis of data

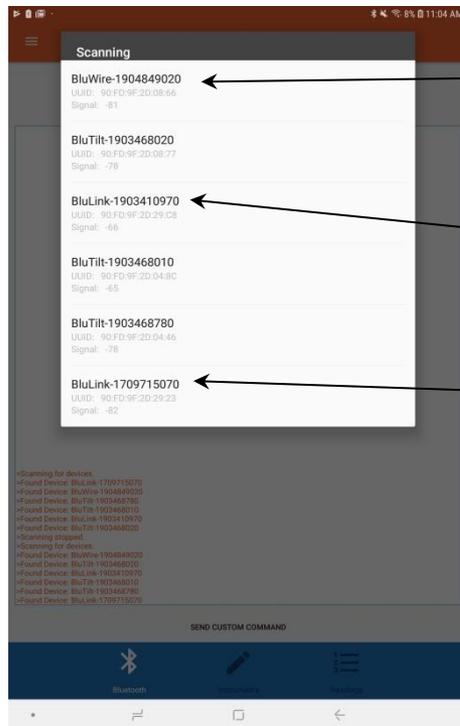
**Step 1:** Swipe from the left to activate the BluPoint Activities.

# Activity 1: ViewPoint



*ViewPoint is an Android manual readout activity. It allows a user to connect to an individual instrument and take/store readings using a smart phone or tablet.*

Tap Scan to discover instruments. All instruments in range will be displayed. This may take up to 20s to complete. If you are scanning from a Bluetooth 4.2 device the range is around 15m



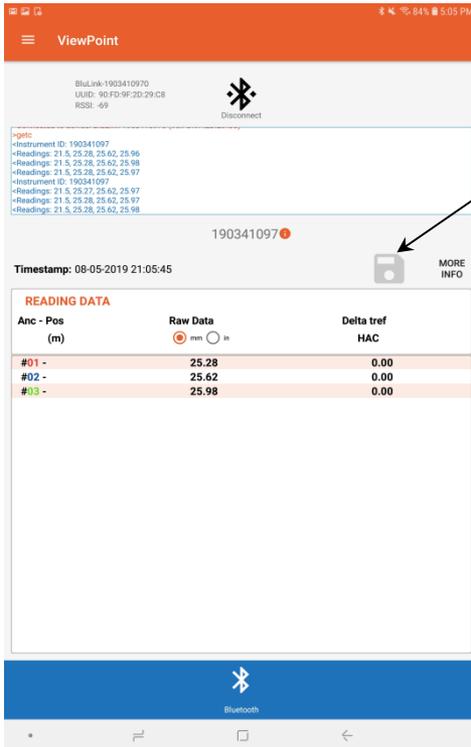
← **BluWire: 4 x vibrating wire interface**

← **Blulink: attached to a 3 point dExto with ID 190341097**

← **Blulink: attached to a 7 point dExto 170971507**

**3 BluTilts are also on the network**

Tapping on BluLink 190346801 connects and a command is issued to stream readings.



Save Readings

```
>getc
<Instrument ID: 190341097
<Readings: 21.5, 25.28, 25.62, 25.96
<Readings: 21.5, 25.28, 25.62, 25.98
<Readings: 21.5, 25.28, 25.62, 25.97
<Instrument ID: 190341097
<Readings: 21.5, 25.27, 25.62, 25.97
<Readings: 21.5, 25.28, 25.62, 25.97
<Readings: 21.5, 25.28, 25.62, 25.98
```

Temp: 21.5C,  
X-axis: 25.28mm  
Y-axis: 25.62mm  
Z-axis: 25.98mm

# Activity 2: LogPoint

by:



*LogPoint is an Android Activity to manage configure, monitor and download/uplink data for BluLoggers.*

## Follow the top Menu bar:

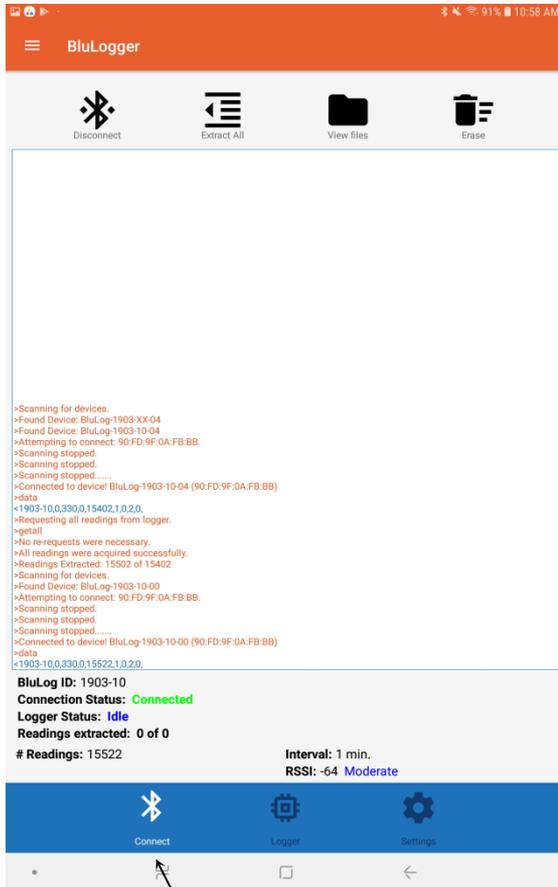
**Step 1: Connect**

**Step 2: Extract All**

**Step 3: View files**

**Step 4: Erase**

Then the dataset can be checked in either the CheckPoint or VantagePoint activities



The Connect screen

**Tap the Scan button:** A list of devices will appear with their IDs and RSSI values

**Device Names:**

**BluLog 1903-14-03**

**1904 YYMM of manufacture**

**14 Unique identifier**

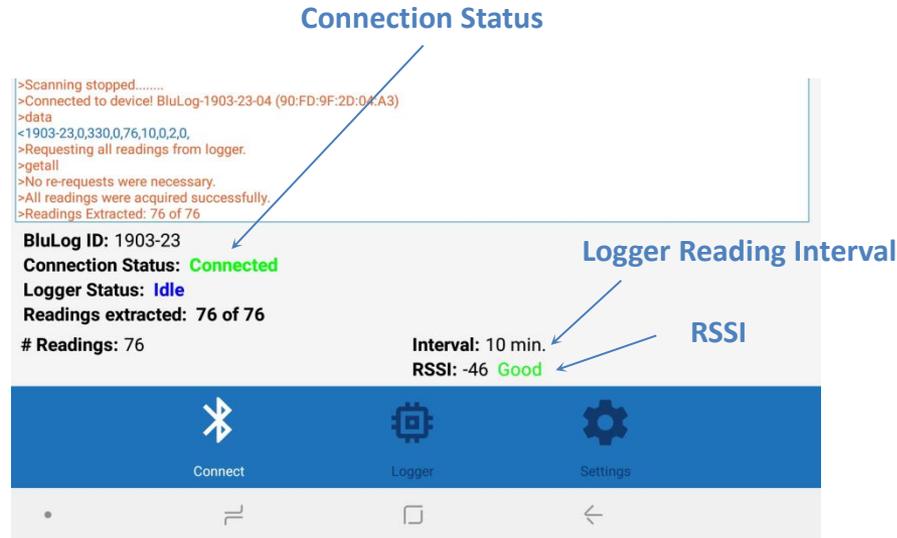
**03 Number of instruments in range**

**RSSI Values:**

**-40 to -60 Good**

**-60 to -80 Moderate**

**<-80 Poor**



**Step 1:** Swipe from the left to activate the BluPoint Menu. Select BluLogger

Tap the Extract All button:

The LogPoint Activity downloads all readings

```
>Finished requesting readings.  
>The following readings were not found on the logger: 77  
>Readings Extracted: 76 of 76  
>Requesting all readings from logger.  
>getall
```

**BluLog ID:** 1903-23

**Connection Status:** **Connected**

**Logger Status:** **Downloading...**

**Readings extracted:** 40 of 76

**# Readings:** 76

**Interval:** 10 min.

**RSSI:** -41 **Good**



Connect



Logger



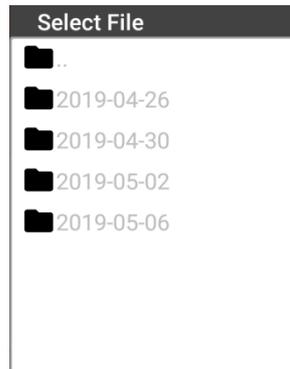
Settings

## Where are my Files?

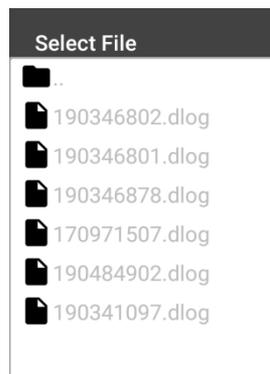
The files extracted from the BluLogger are in the directory:

*/ Tablet / YieldPoint / download\_date / instrument ID .dlog*

**Important:** A folder is created for each download date.



A new folder for each download date



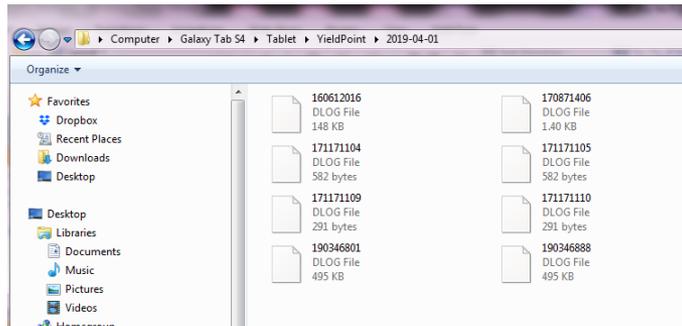
6 Instruments



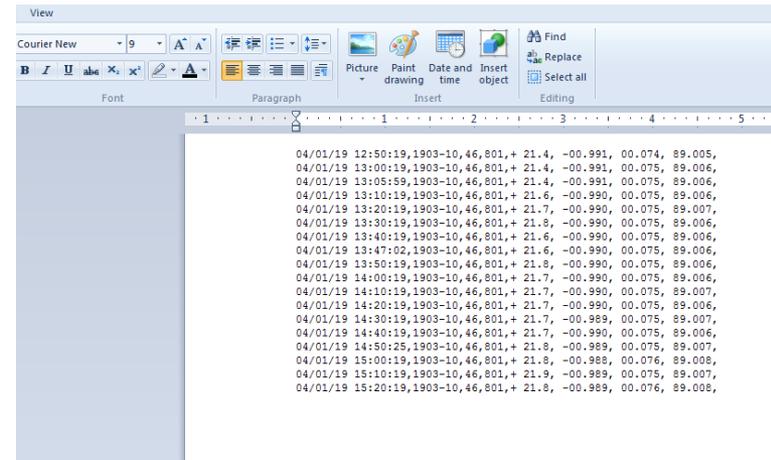
The data for 190346801

## Where are my Files?

Plug a USB charging cable into the Android device:

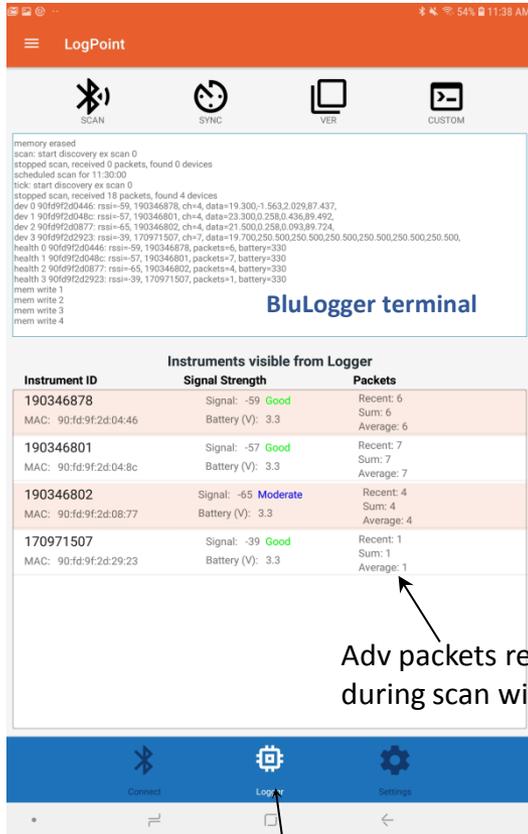


A new folder for each download date



For import into Excel

## Run commands on the BluLogger:



**SCAN:** BluLogger will scan all instruments within a 100m radius of the BluLogger.

**Important:** The BluLogger (BT 5) will detect instruments that the Phone (BLE 4.2) will not.

**SYNC:** Sync the time/date on the BluLogger with this Android device

**VER:** Returns the BluLogger Firmware Version

**CUSTOM:** Send a custom BluLogger Command.

Adv packets received during scan window

The Logger Button



## Connect a USB Download Cable to the COMS BluLogger:

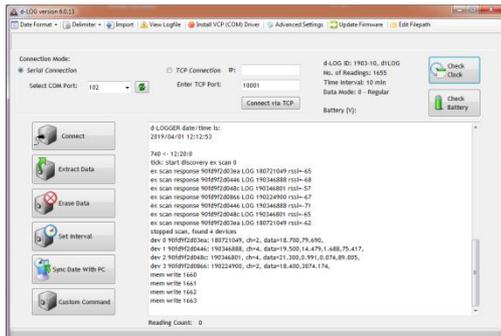
### Option 1:

Use dLOG software identical to a wired Logger

### Option 2:

Use a terminal emulator such as TeraTerm.  
**Baud rate: 9600,N,8,1**

[https://en.wikipedia.org/wiki/Tera\\_Term](https://en.wikipedia.org/wiki/Tera_Term)



*Note: USB download cable purchased separately*

## Custom commands are entered using a terminal window:

```
COM102:9600baud - Tera Term VT
File Edit Setup Control Window Help
dev 3 90fd9f2d03ea: 180721049, ch=2, data=17.900,79.680,
mem write 1637
mem write 1638
mem write 1639
mem write 1640
ver
BlueLogger Rev 0.6
RTC DS3231M 2019-04-01T11:48:06
Memory id if28010 AT45Dxxx 64-Mbit
Logging on, Period = 10 min, Scan timeout = 20 sec
scan
scan: start discovery ex scan 0
ex scan response 90fd9f2d0866 LOG 190224900 rssi=-71
ex scan response 90fd9f2d0446 LOG 190346888 rssi=-66
ex scan response 90fd9f2d048c LOG 190346801 rssi=-68
ex scan response 90fd9f2d03ea LOG 180721049 rssi=-73
ex scan response 90fd9f2d0866 LOG 190224900 rssi=-73
ex scan response 90fd9f2d0446 LOG 190346888 rssi=-70
ex scan response 90fd9f2d048c LOG 190346801 rssi=-58
ex scan response 90fd9f2d03ea LOG 180721049 rssi=-60
ex scan response 90fd9f2d0866 LOG 190224900 rssi=-73
ex scan response 90fd9f2d048c LOG 190346801 rssi=-60
stopped scan, found 4 devices
dev 0 90fd9f2d0866: 190224900, ch=2, data=18.100,3074.774,
dev 1 90fd9f2d0446: 190346888, ch=4, data=18.800,14.421,1.648,75.480,
dev 2 90fd9f2d048c: 190346801, ch=4, data=20.900,0.993,0.075,89.003,
dev 3 90fd9f2d03ea: 180721049, ch=2, data=17.900,79.680,
mem write 1641
mem write 1642
mem write 1643
mem write 1644
sync
sending sync
```

} *scheduled reading*

} ver get version number

} scan scan for instruments read,  
save to BluLogger

} sync synchronize BluLogger with  
android device

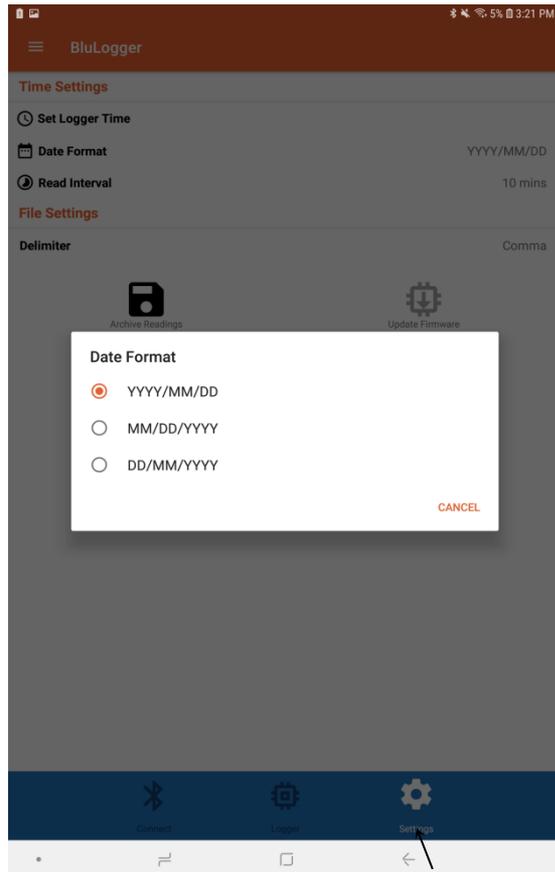
These commands can be sent using the custom button in dLOG software

## Custom commands can be entered using the Custom Button:

Commands:

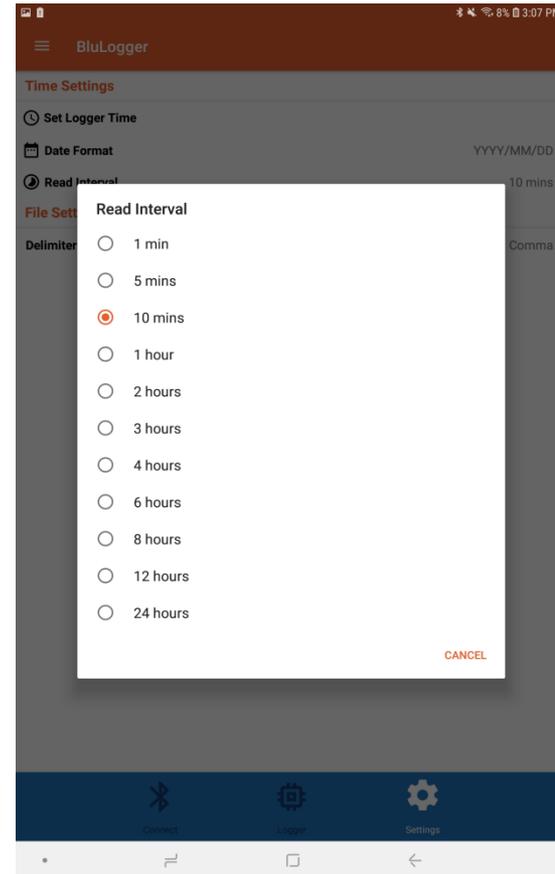
- addr** -> print logger Bluetooth Mac address
- scan** -> Bluetooth scan
- stop** -> stop Bluetooth scan
- last** -> print results of last Bluetooth scan
- logon** -> start periodic data logging
- logoff** -> stop periodic data logging
- readall** -> download all data
- delay** -> flash blue LED
- sync** -> send out sync packet
- reset** -> reset logger memory and set device id: example: “reset 1903-88”  
will clear memory, write memory structure, and set the logger id

## Date Format Options



The Settings screen

## The BluLogging Interval



# Activity 3: AccessPoint

by:



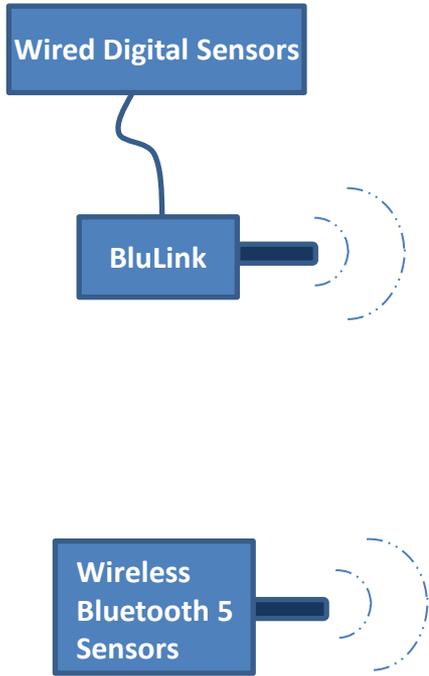
*AccessPoint is a BluPoint Technology that is used to configure BluGateways so that data can be autonomously transmitted over either WiFi or LTE-M networks.*

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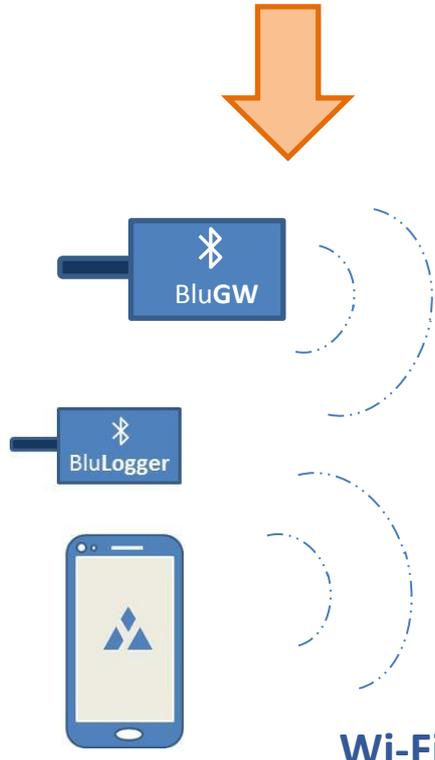
BluGateways, are battery powered wireless bridges between a Bluetooth 5 sensor network and an IT backbone (WiFi or LTE).

The first demo products will be available in July 2019

## ViewPoint



## LogPoint



## AccessPoint



## DataPoint



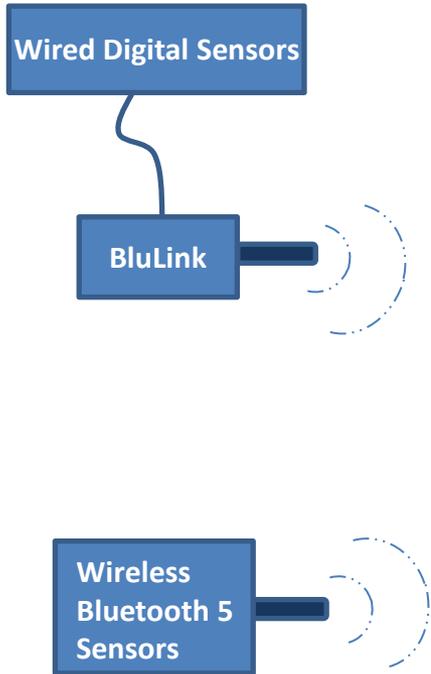
Wi-Fi  
LTE-M

## VantagePoint



+  
advanced analytics  
=  
**+VantagePoint**  
(*pron: AdvantagePoint*)

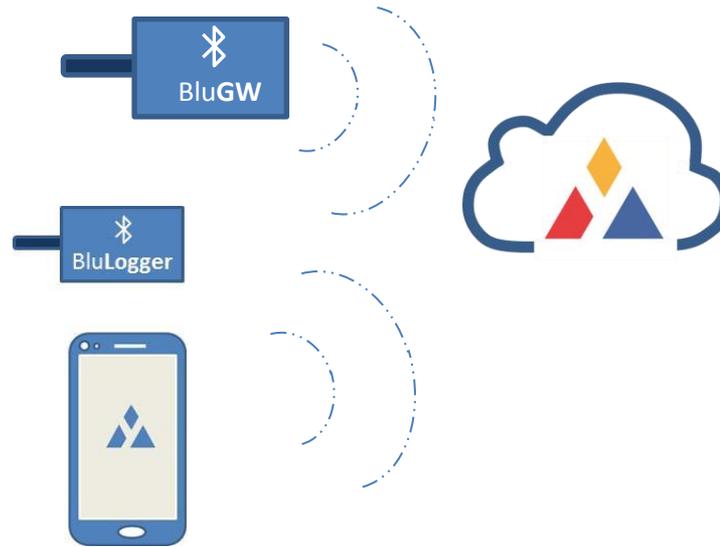
## ViewPoint



## LogPoint

## AccessPoint

## DataPoint



CheckPoint  
(local)

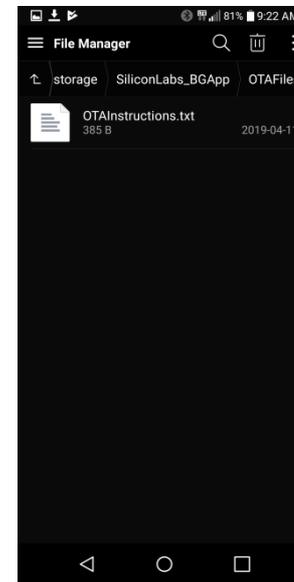
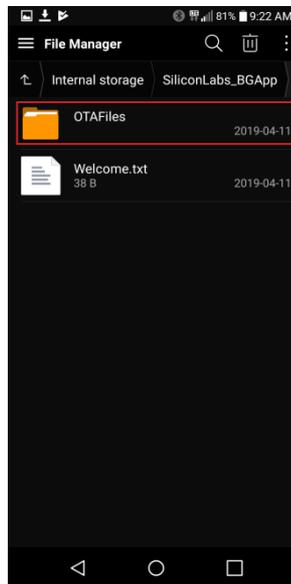
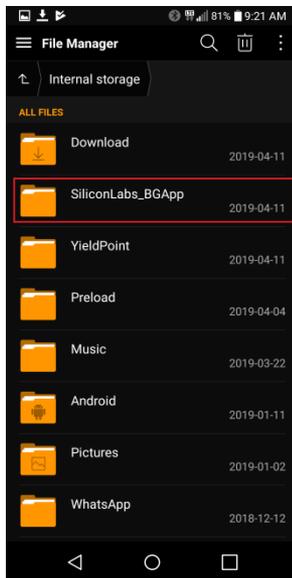
Wi-Fi  
LTE-M

## VantagePoint



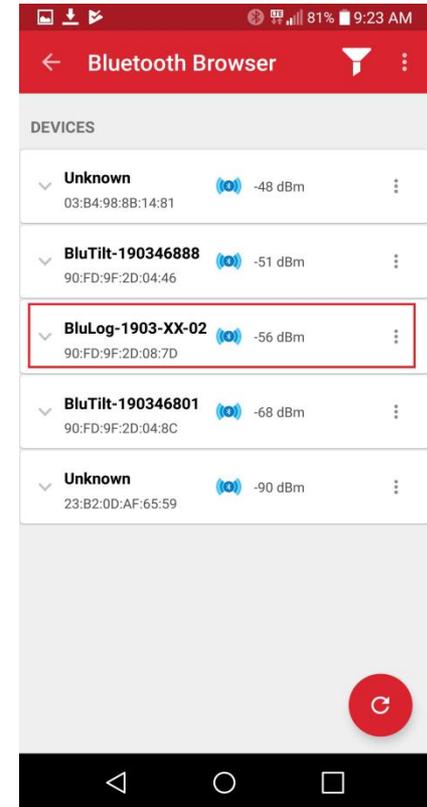
+  
advanced analytics  
=  
+VantagePoint  
(pron: AdvantagePoint)

1. Install "Blue Gecko" app from google playstore and run the app once
2. A new folder is automatically created called "SiliconLabs\_BGApp" in the main android internal storage directory
3. Go to directory  
SiliconLabs\_BGApp/OTAFiles/  
and create a new folder called "blulog"
4. Move the attached file into the new folder so that its final destination is:  
.../SiliconLabs\_BGApp/OTAFiles/blulog/application.gbl



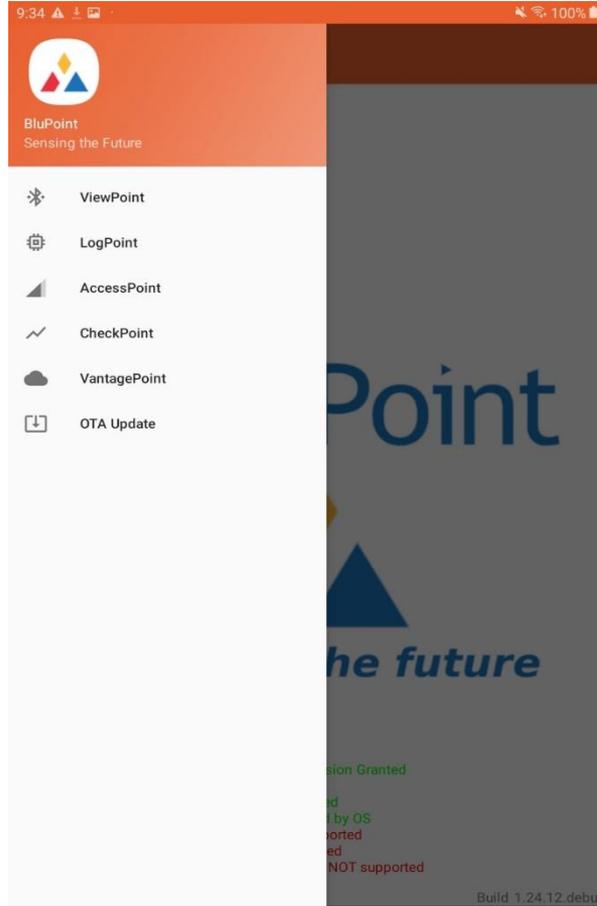
5. Open the Blue Gecko again app and press "Bluetooth Browser"
6. Find the blulogger device there, it will have a name such as BluLog-1903-XX-XX  
then press on it to connect
7. Once connected and attributes are loaded press on the 3 dots on the top right to reveal a menu, then select "OTA"
8. In the new window, under the "Folder" menu, select "/blulog"
9. Under the "App" menu select "/application.gbl"
9. Press the now red "OTA" button and wait for the process to complete
10. Press "END" and the BluLogger should restart with the new updated firmware

Attached is the updated firmware file and along with a pdf file containing screenshots of the above process

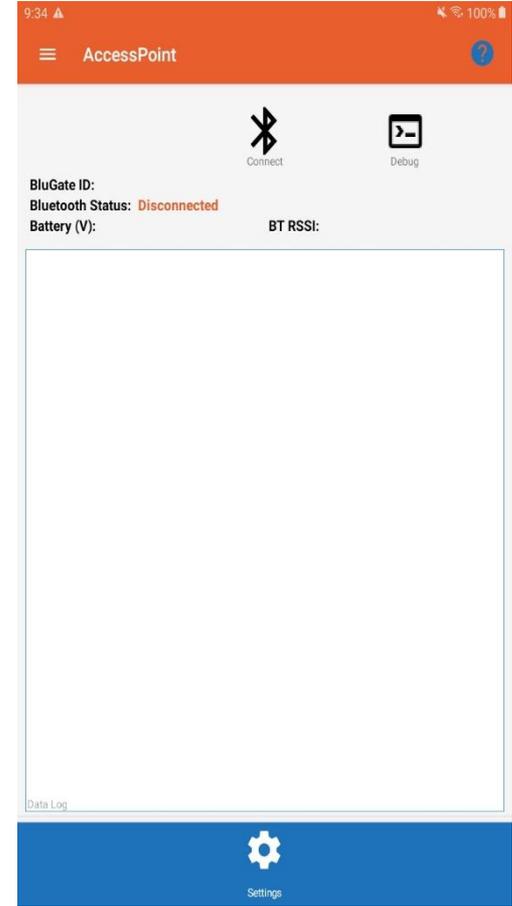




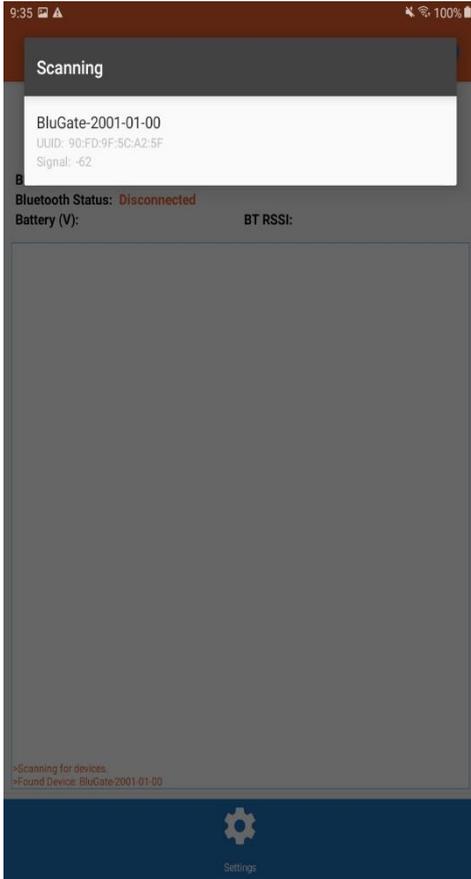
Open BluPoint



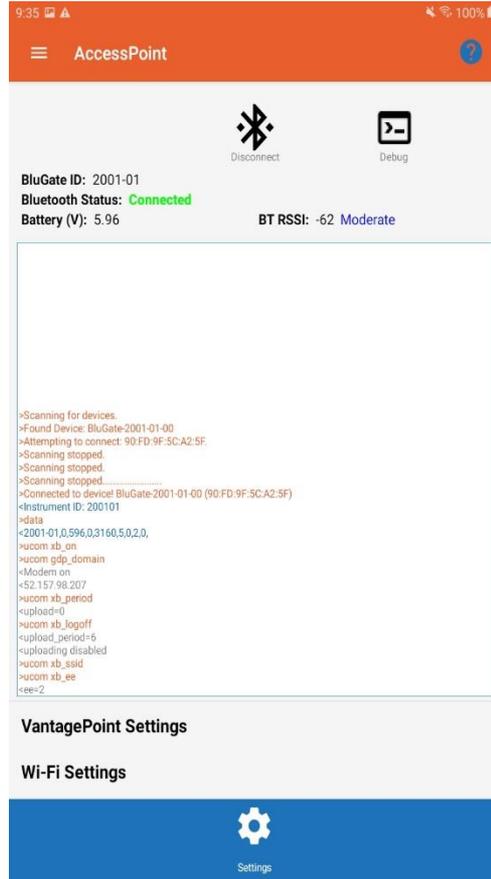
Select AccessPoint



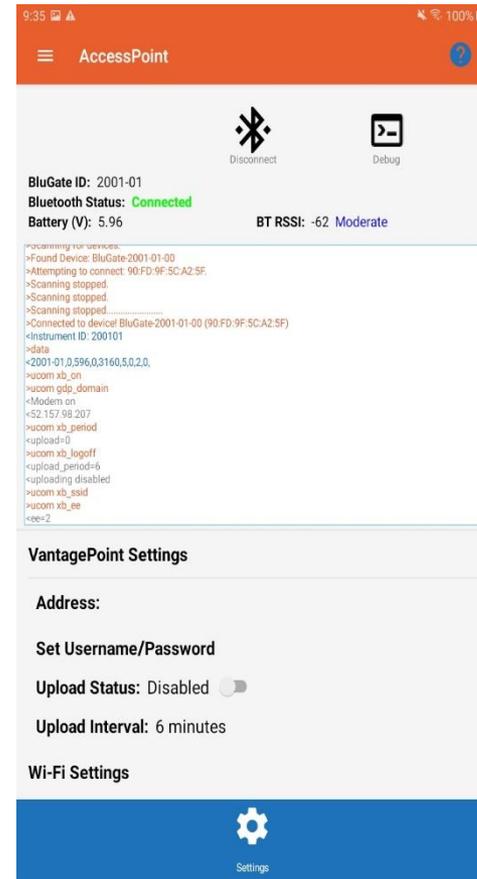
Scan



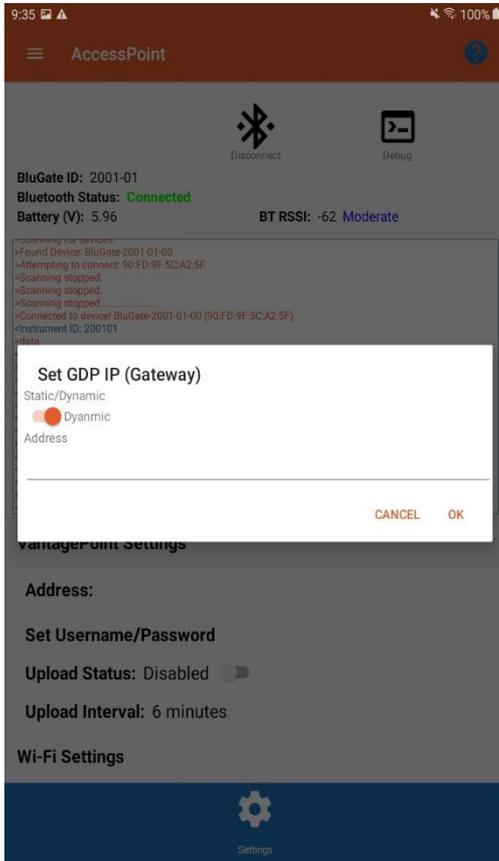
Connect to device



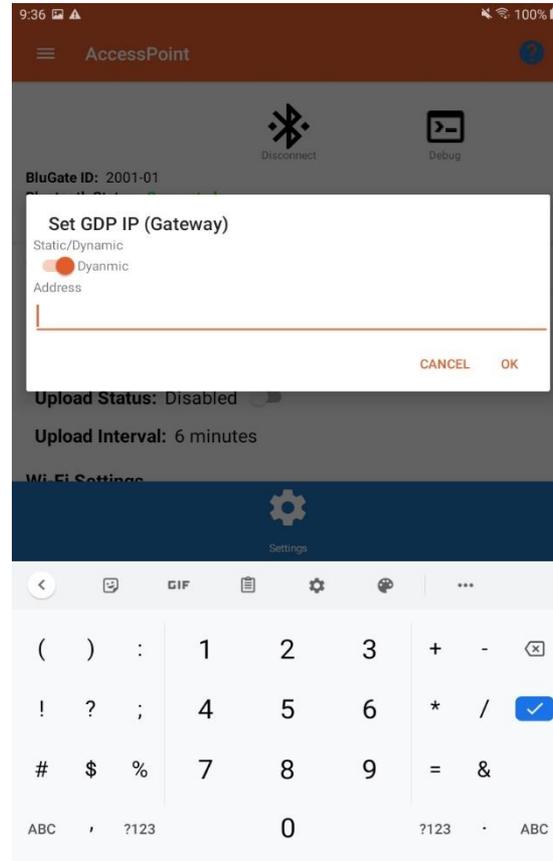
Go to WiFi Settings



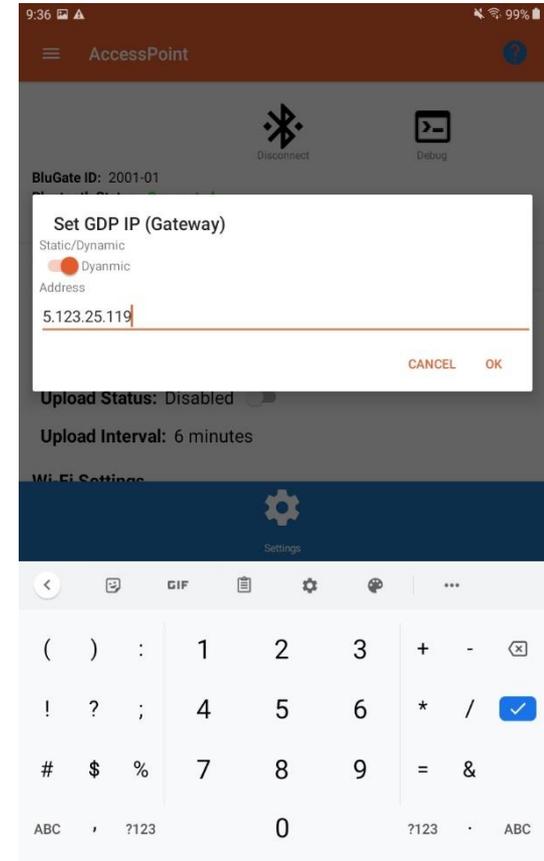
See Settings



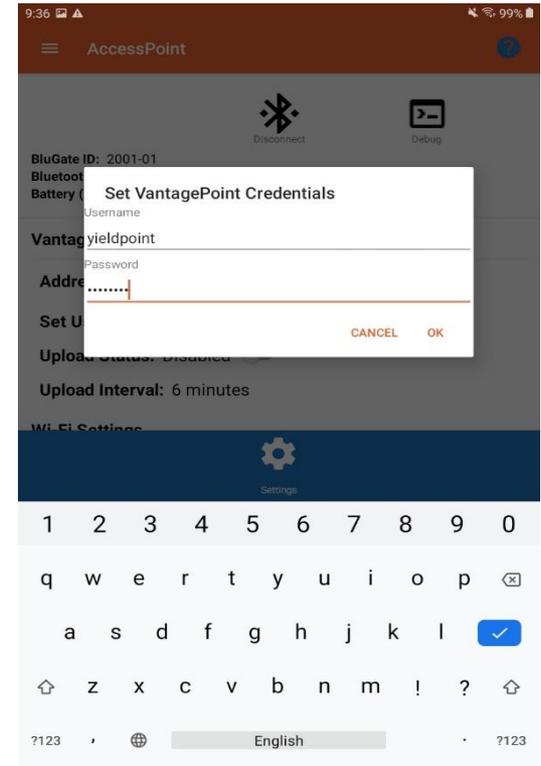
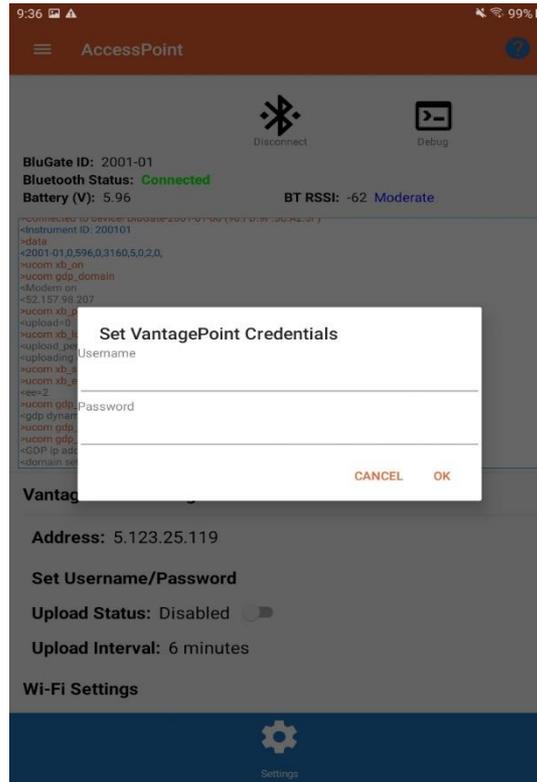
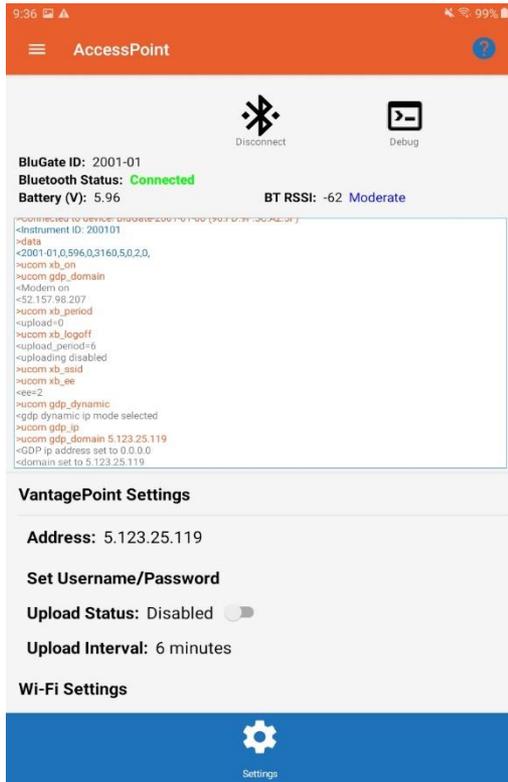
Set GDP IP to *Dynamic*



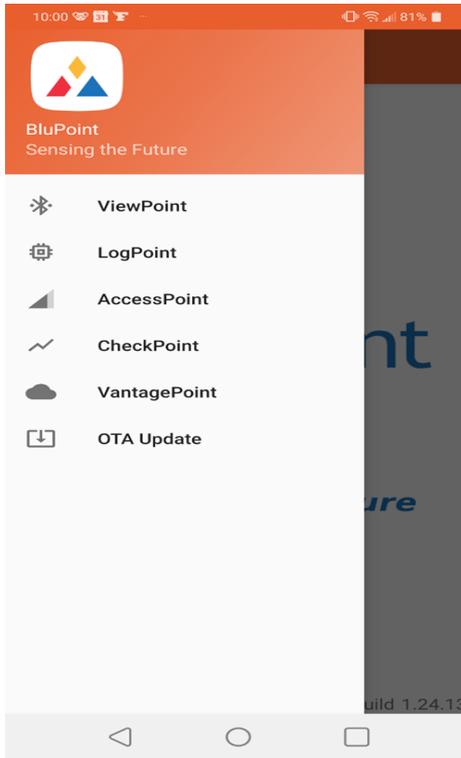
Enter desired IP Address



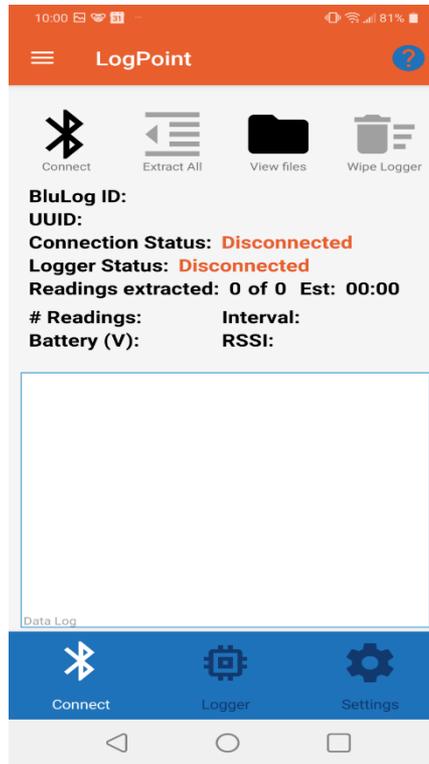
Check new IP Address



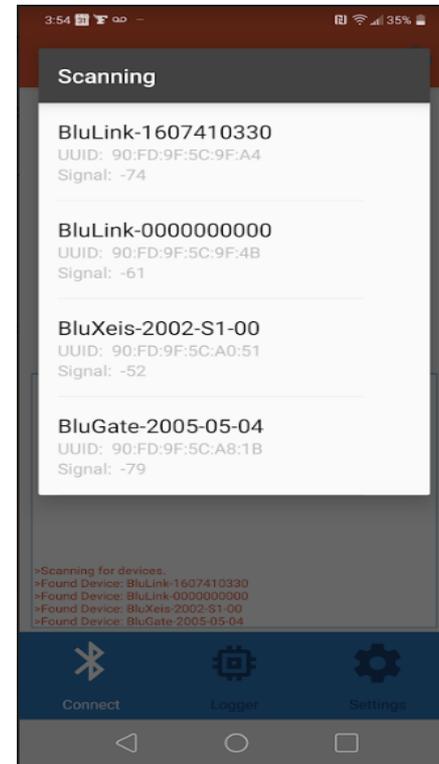
Go to *Set Username/Password* and enter new Credentials



Open BluPoint



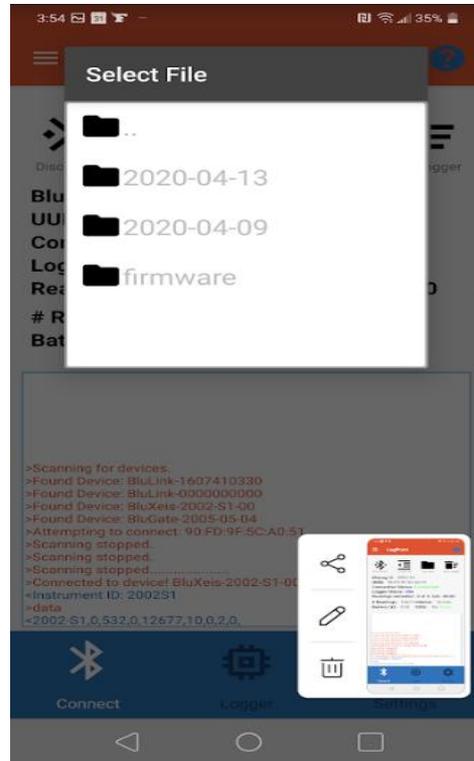
Open LogPoint



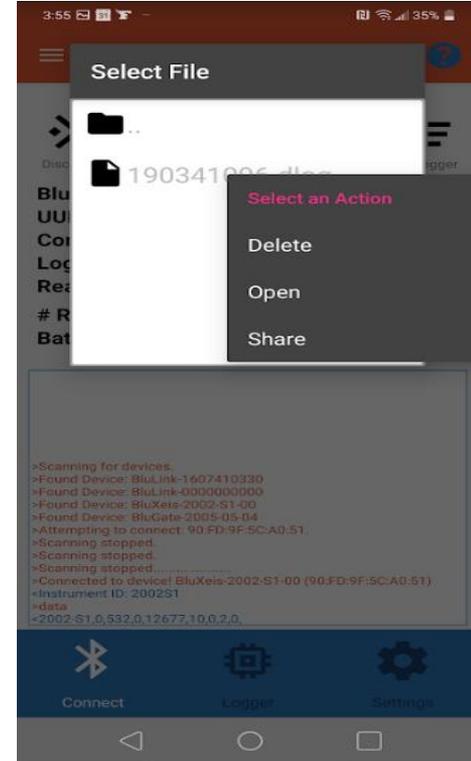
Scan for devices



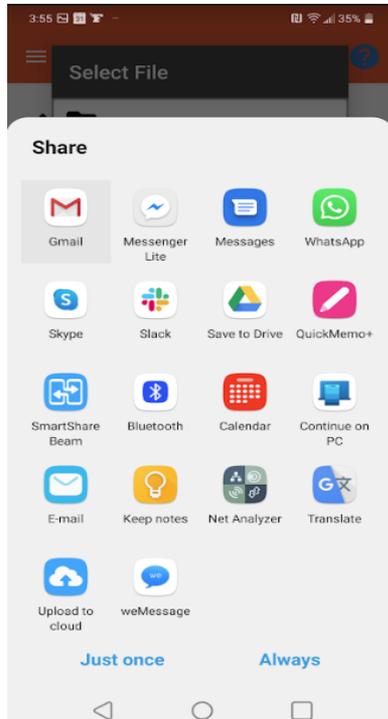
Connect to device



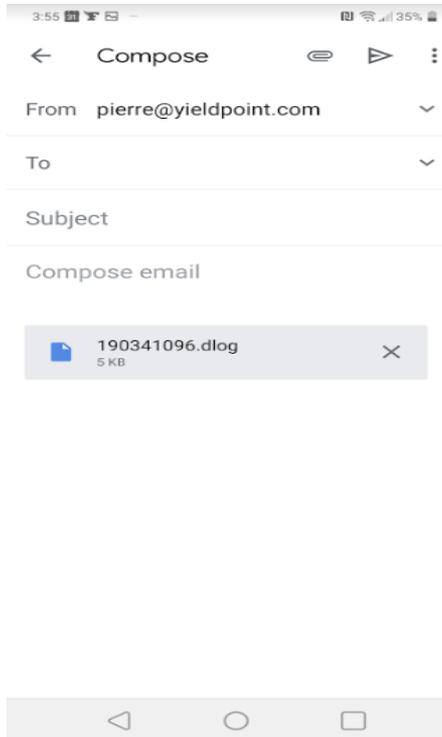
Click View Files



Hold on Selected file  
Menu appears



Choose app



Send file