The BluPoint Solution

by:

YieldPoint  
Sensing the future

BluPoint  : Bluetooth 5 for GeoTech
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
YieldPoint

BluPoint: End-to-End Solution

ViewPoint

Wired Digital Sensors
BluLink

LogPoint
AccessPoint

Wireless Bluetooth 5 sensors
BluLink

BluPoint

Bluetooth 5 technology for GeoTech

DataPoint

(AWS)

Wireless Bluetooth 5
advanced analytics

VantagePoint

+VantagePoint
(pron: AdvantagePoint)

CheckPoint

(Wi-Fi LTE-M)

(local)
**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:

<table>
<thead>
<tr>
<th>Chemistry</th>
<th>Nominal Voltage</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaline</td>
<td>1.5V</td>
<td>1800mAh</td>
</tr>
<tr>
<td>Lithium</td>
<td>1.5V</td>
<td>3000mAh</td>
</tr>
</tbody>
</table>

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
-60 to -80 Moderate
<-80 Poor

Radios can communicate down to an RSSI of -92.

IMPORTANT: Whatever the orientation of the device, the antenna should be VERTICAL
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**BluLink**: Digital to Bluetooth 5 connectivity

- **dEXTO**
- **dCABLE**
- **dTILT**
- **dVW**

**Device -> Device 100m**

**Phone -> Device 10m**

**Bluetooth 5.0 - 100m**

**BluLogger**

**Android phone/tablet**

**BLE 4.2 - 10m**

**Up to 16 Instruments**

**BluPoint**: Bluetooth 5 technology for GeoTech
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.
YieldPoint  ✨ BluLink : Digital to Bluetooth 5 connectivity

- **dEXTO**
- **dCABLE**
- **dTILT**
- **dVW**

BluLink: Bluetooth 5 technology for GeoTech
BluTilt: Triaxial, 360° range, 0.001 Res, PPV Option

Triaxial: 0.001° Res.
Vibration Option: PPV

Triaxial: 360° range

BluPoint: Bluetooth 5 technology for GeoTech
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.
**YieldPoint**

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**BluLink** : Digital to Bluetooth 5 connectivity

- **BluLink**
  - dEXTO
  - dCABLE
  - dTILT
  - dVW

50m

**BluLogger**

- Bluetooth 5.0 - 50m
- BLE 4.2 - 10m

**BluPoint** : Bluetooth 5 technology for GeoTech
**INSTRUMENT NODES**

- dEXTO
- dCABLE
- BluTilt
- BluVW

**YieldPoint**
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**BluLink**: Digital to Bluetooth 5 connectivity

**VantagePoint**
WiFi, LTE-M

**BluPoint**: Bluetooth 5 technology for GeoTech
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 autonomous collect data that can be downloaded by Android devices.
(i) 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

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BluPoint: End-to-End Solution

ViewPoint

Wired Digital Sensors

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AccessPoint

WiFi

LTE-M

DataPoint

Wireless Bluetooth 5 Sensors

BluGW

Advanced analytics

= + VantagePoint

(pron: AdvantagePoint)

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BluPoint: Bluetooth 5 technology for GeoTech
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
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 smartphone 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

<table>
<thead>
<tr>
<th>Instrument ID: 190341097</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;Instrument ID: 190341097</td>
</tr>
</tbody>
</table>

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

>getc
Activity 2: LogPoint

by:

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

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

BluPoint : Bluetooth 5 technology for GeoTech
**Step 1:** Swipe from the left to activate the BluPoint Menu. Select BluLogger

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

<table>
<thead>
<tr>
<th>Device Names:</th>
<th>RSSI Values:</th>
</tr>
</thead>
<tbody>
<tr>
<td>BluLog 1903-14-03</td>
<td>-40 to -60</td>
</tr>
<tr>
<td>1904 YYMM of manufacture</td>
<td>-60 to -80</td>
</tr>
<tr>
<td>14 Unique identifier</td>
<td>&lt;-80</td>
</tr>
<tr>
<td>03 Number of instruments in range</td>
<td></td>
</tr>
</tbody>
</table>

**Connection Status**

- **RSSI Values:**
  - Good: -40 to -60
  - Moderate: -60 to -80
  - Poor: <-80

**Logger Reading Interval**

- Interval: 10 min.
- RSSI: -46 (Good)
**Tap the Extract All button:**

The LogPoint Activity downloads all readings

<table>
<thead>
<tr>
<th>Finished requesting readings.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The following readings were not found on the logger: 77</td>
</tr>
<tr>
<td>Readings Extracted: 76 of 76</td>
</tr>
<tr>
<td>Requesting all readings from logger.</td>
</tr>
<tr>
<td>getall</td>
</tr>
</tbody>
</table>

**BluLog ID:** 1903-23  
**Connection Status:** Connected  
**Logger Status:** Downloading...  
**Readings extracted:** 40 of 76  
**# Readings:** 76  
**Interval:** 10 min.  
**RSSI:** -41 Good
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.
Where are my Files?

Plug a USB charging cable into the Android device:

A new folder for each download date

For import into Excel

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LogPoint: Step 3  View files from PC

BluPoint: Bluetooth 5 technology for GeoTech
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LogPoint : The Logger Button

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
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:

```
> COM102960 baud - Tera Term VT

File Edit Setup Control Window Help

dev 4: VU00724035a: 1087/210197, ch-2, data=17.980,79.680
mem write 168
mem write 1639
mem write 1630
mem write 1648

ver 19.01.2019

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

The Settings Tab

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LogPoint
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BluPoint  :  Bluetooth 5 technology for GeoTech
Activity 3: AccessPoint

by:

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

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.
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AccessPoint: Bridge to IT backbone

ViewPoint

LogPoint

AccessPoint

DataPoint

VantagePoint

Wired Digital Sensors

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CheckPoint (local)

Wi-Fi LTE-M

YieldPoint Sensing the future

BluPoint: Bluetooth 5 technology for GeoTech

+ advanced analytics = +VantagePoint (pron: AdvantagePoint)
**VantagePoint**: Bridge to IT backbone

**Wired Digital Sensors**

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**Wireless Bluetooth 5 Sensors**

**CheckPoint** (local)

**BluGW**

**BluLogger**

**Wi-Fi LTE-M**

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**AccessPoint**

**ViewPoint**

**YieldPoint**: Sensing the future

**BluPoint**: Bluetooth 5 technology for GeoTech

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(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
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BluGateway: change the IP destination

Open BluPoint
Select AccessPoint
Scan

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BluLogger : Update Firmware

Connect to device
Go to WiFi Settings
See Settings
**YieldPoint**

**BluPoint**: Sensing the future

**BluGateway**: change the IP destination

Set GDP IP to *Dynamic*

Enter desired IP Address

Check new IP Address

**BluPoint**: Bluetooth 5 technology for GeoTech
Go to Set Username/Password and enter new Credentials
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BluGateway: Send data files

Open BluPoint

Open LogPoint

Scan for devices

YieldPoint
Sensing the future

BluPoint: Bluetooth 5 technology for GeoTech
Connect to device

Click View Files

Hold on Selected file
Menu appears
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BluGateway: Send data files

Choose app

Send file

BluPoint: Bluetooth 5 technology for GeoTech