The BluTech EcoSystem – Jan 2024

BluTech (BT5) EcoSystem

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1-613-531-4722

5.0

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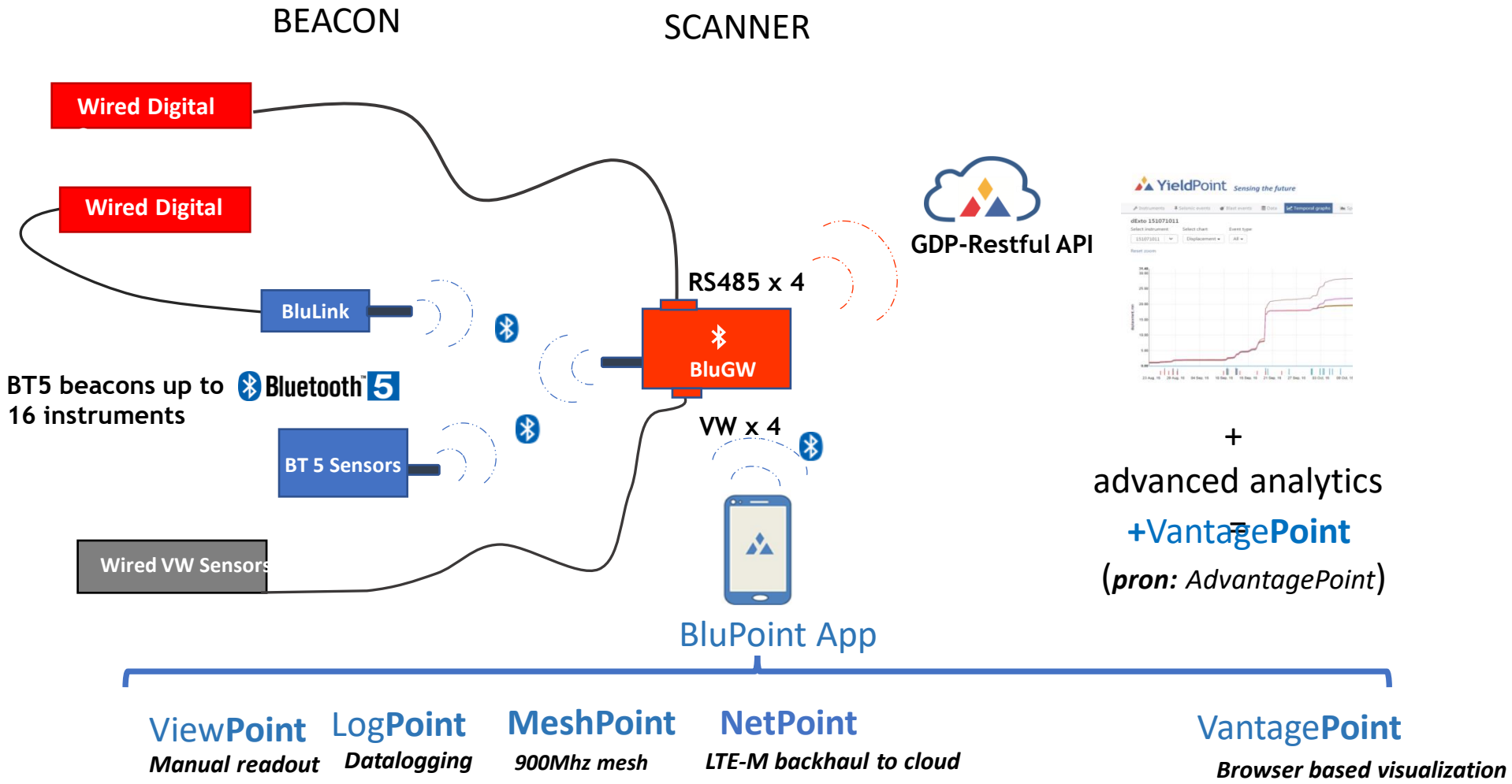
BluTech EcoSystem-2024

The BluTech EcoSystem - Jan 2024



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YieldPoint's Ecosystem

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YieldPoint introduces BluTech, a user-friendly ecosystem to network clusters of geotechnical instruments without leadwires. BluTech changes the rules because the physical hardware actually costs less than for a wired solution.

BluTech features include:

(i) Extended range: BT5 Beacons up to 100m
(ii) Android phone/tablet access (BluPoint)
(iii) Low power, Battery powered.
(iv) 4 x the range of BLE4.
(v) User friendly data-logging for arrays of wired/wireless instruments
(vi) BluGateways enabling WiFi, ethernet and LTE-M and 900Mhz mesh (Blu900) data backhaul
(vii) Cloud platform for health monitoring
(viii) Very low cost

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BluTech EcoSystem 2024

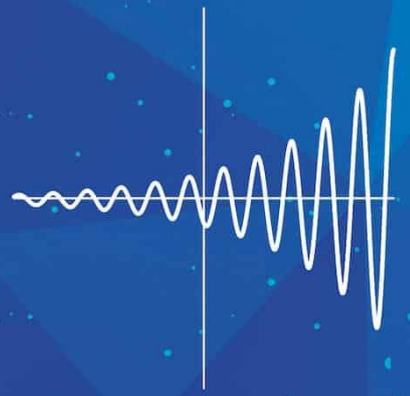
The emerging benefits of Bluetooth™ 5

Bluetooth 5 with mesh networking can technically support an **unlimited number of devices on a network**.

The range of **Bluetooth 5** is up to four times that of its predecessors, meaning you can cover larger areas using fewer devices. And with mesh **network topology enabling every device to connect to every other device, network sizes are technically limitless**.

Bluetooth 5 can deliver **up to 10 years' service from a single cell battery**.

Bluetooth beacons will be greatly improved by **Bluetooth 5**, giving assets the ability to **transmit longer messages at higher data rates over greater distances**.



Thanks to techniques such as channel hopping and slot availability masks, **Bluetooth 5 has better interoperability and coexistence with other wireless technologies**.

MOUSER ELECTRONICS

Link to webinar: **http://mou.sr/RFtechsolutions**

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Bluetooth 5

Battery Power:

BluPoint hardware is typically powered with D-cell or AA –cell **LITHIUM** primary batteries.

The energy capacity of D batteries is:

Chemistry	Nominal Voltage	Capacity
Lithium D	3.6V	13 000mAh
Lithium AA	1.5V	3000mAh

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

Under typical operating conditions (1 reading/hr) AA Lithium batteries will last 1.5 years in a Blutech instrument, and D-cell lithium batteries over 2.5 years. However, always check the specifications on each device.

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Battery Requirments

Range:

Bluetooth 5 sacrifices data rate (125kbs) for increased 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 -92dB.

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

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Range and RSSI

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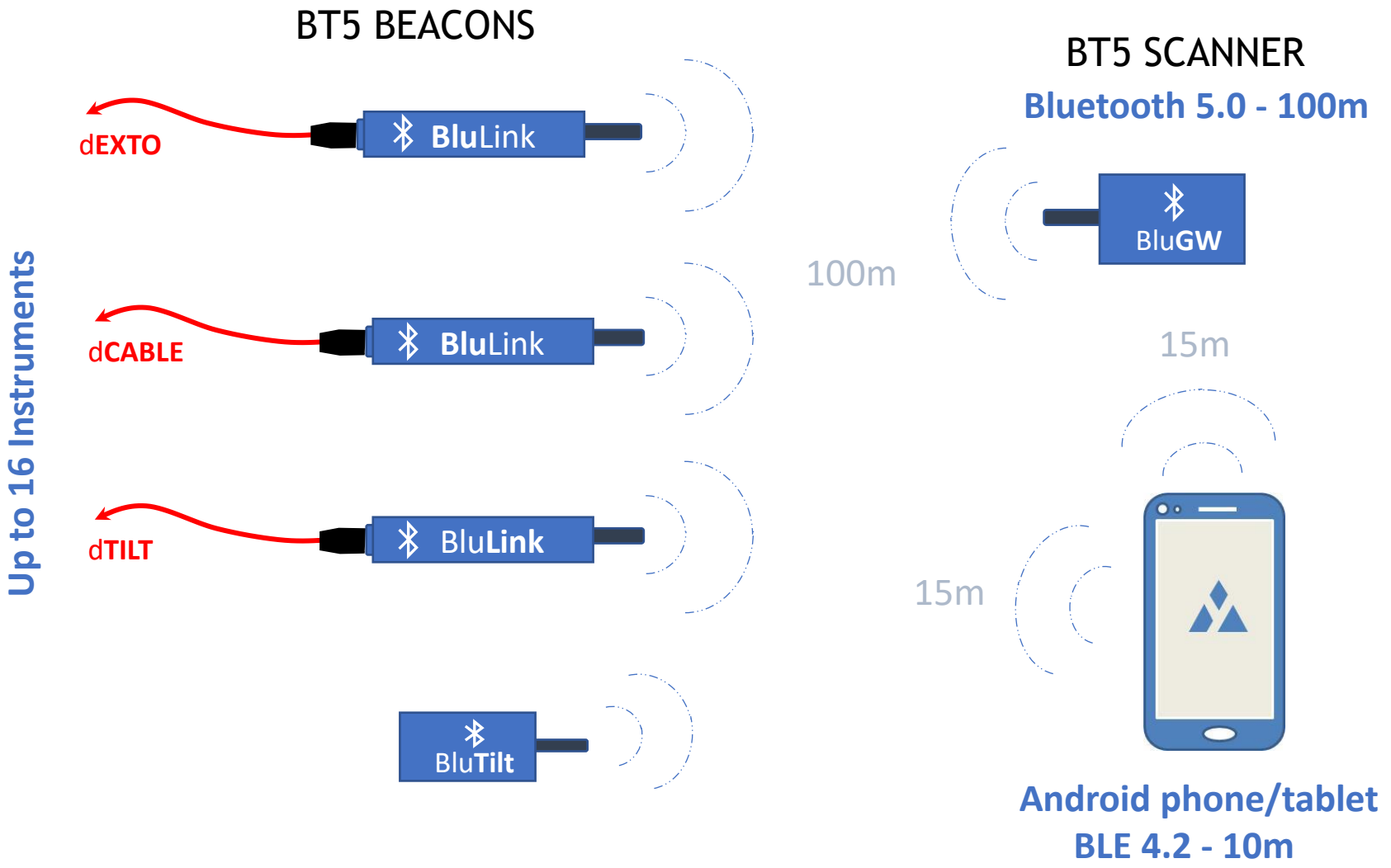

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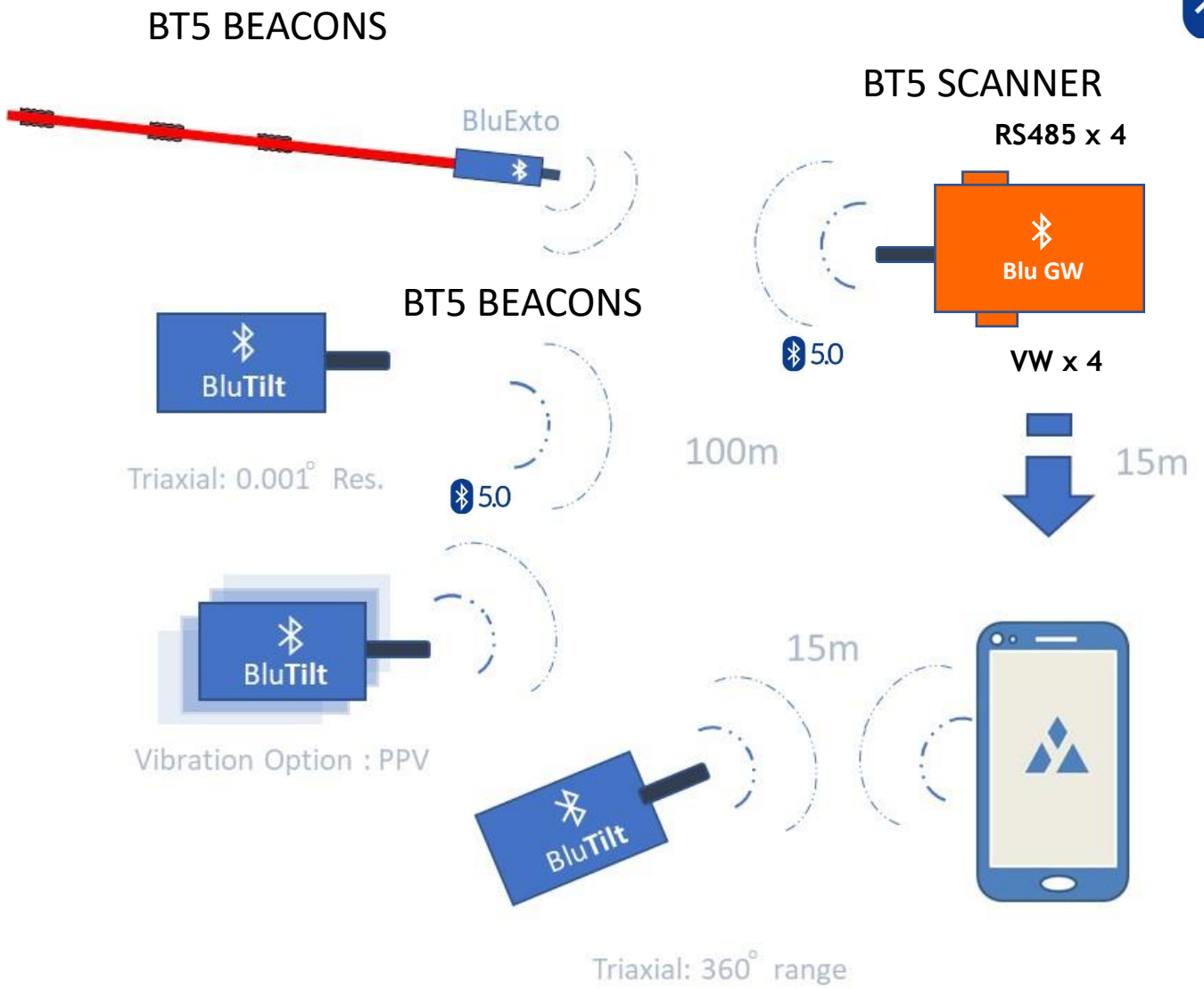
BluTech Connectivity

BluPoint instruments, BluTilt, BluEXTO, BluHID are fully integrated geotechnical measurement and data-logging systems.

They combine the functionality of

(i) An instrument
(ii) A data-logger
(iii) A wireless BT5 beacon

Essentially they integrate an instrument and a BluLink together



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BluTech Beacons

BluTech **BEACONS** :

1. **BluLink**- Link to all YP485 instruments,
2. **BluEXTO** – BT5 enabled dEXTO,
3. **BluTilt** – triaxial tiltmeter,
4. **BluHID** – BT5 enabled HID cell interface.

All BluTech BEACONING instruments are single instrument standalone data-loggers (30,000 readings)and can beacon the latest reading to a BluTech Scanning Gateway.

Data on BluTech beacons is managed using the LogPoint activity within The BluPoint App.

BluTech **SCANNERS**:

1. **BluLogger:** No backhaul telemetry
2. **WiFi BluGW** - WiFi/ Ethernet
3. **LTE-M BluGW** - LTE-M cellular – BluCell
4. **Blu900** (Node and Gateway) - 900MHz mesh

SCANNING devices Listen for BT5 beacons and store the data (30,000 readings) from multiple instruments prior to transmitting via WiFi, Ethernet, Cellular or 900MHz to the cloud:

The aggregated data is managed using the LogPoint activity

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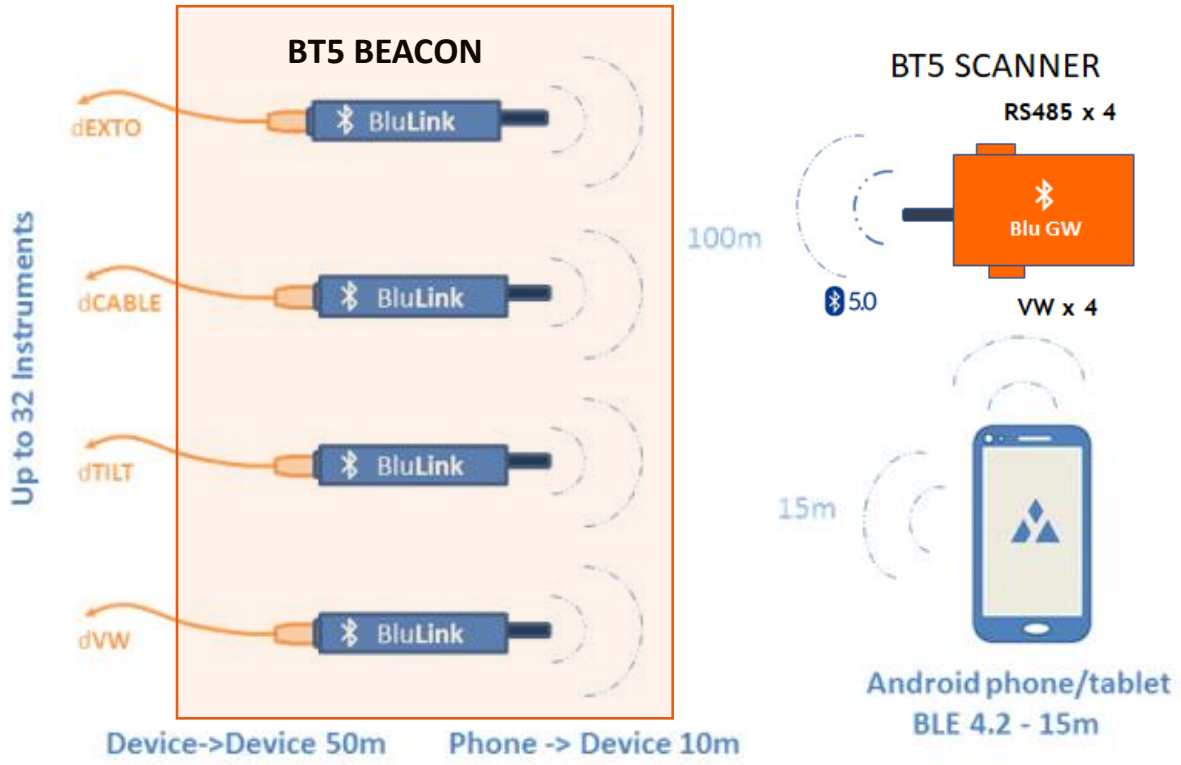
Beacons and Scanners



BluLink loggers turn any YieldPoint instrument into a BT5 BEACON and datalogger. 30,000 readings saved, 50 to 200m transmission range, adjustable reading frequency. BluPoint Android application. Sends data to BluGW for backhaul to cloud.

The BluLink-S is fully encapsulated and will operate indefinitely underwater.

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BluLink-S (sealed)

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BluLink-R: BT5 Beacon + Logger

Works with any YieldPoint digital instruments.

Confirms instrument connection by flashing LED.

Stores 30,000 data strings at user intervals.

Beacons new data string via Bluetooth 5.

Data strings are date & time stamped events.

Communicate with 4G LTE-Cat M1.

IP67 enclosure, external BLE5 antenna included, replaceable **lithium D-cell batteries** good for 3 years.

Batteries not included.
2 x 3.6V Lithium batteries required

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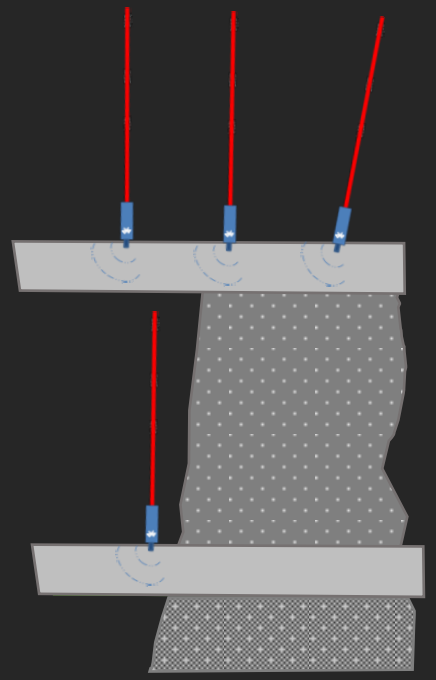
BluLink – R (replaceable)

BluTech Beacons

The BluEXTO is a 6-point borehole extensometer with measurement resolution of 0.01mm and stroke length up to 300mm. Integration includes a grout hose, a breather tube and a foaming tube which greatly simplifies the installation procedure. The diameter of the head is 57mm or 2.25” and the device is designed to be installed in 63mm or 2.5” boreholes (ask about smaller diameters).



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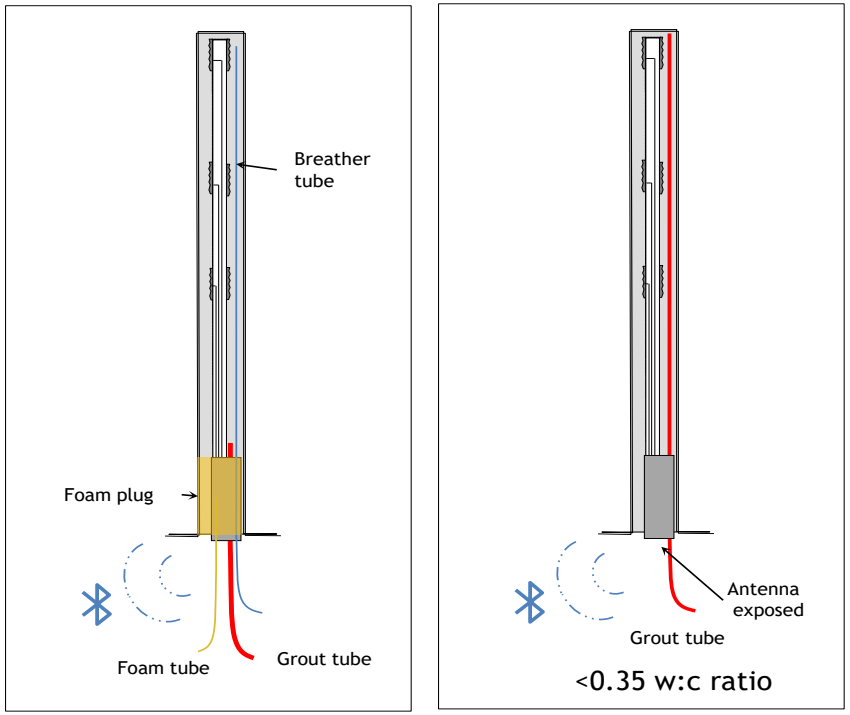
BluEXTO

BT5 beacon: BluEXTO



Grouting tubes fully integrated

Designed for 2.5in (63mm) borehole

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BluEXTO

BluTech Beacons

BluTilt: 360° Triaxial Tiltmeter.

- BT5 Beacon with >100m range LoS
- Data logger 30,000 readings capacity.
- IP68 metal enclosure 140x90x60mm (5.5/3.5/2.5”). Optional.
- High resolution at 1/1000th degree on all 3 axes.
- Range 360 degrees on all 3 axes.
- Mounts on any kind of structure.
- Can be installed on any angles thanks to triaxial 360 degrees range.
- Bluetooth BLE5 Communications.

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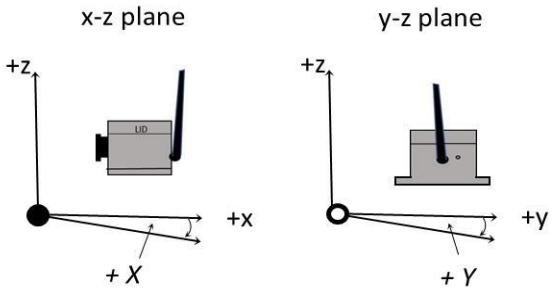
BluTilt

BT5 Beacon: BluTilt

		Output CSV values					
		Channel Number					Tilt_mode
Mode Desc	Tilt_mode	Temp	1	2	3	4	5
Raw	0	T°	a_x	a_y	a_z	-	0
Vector	1	T°	a	n_x	n_y	n_z	1
2-angle	2	T°	X	Y	Z	tilt_z_up	2
3-angle	3	T°	j	q	y	-	3



Output Channels:

1	2	3	4	5	6
T	X	Y	0	0	2

Triaxial Tilt sensor:

0.001° resolution
4 modes of operation

BluTech Beacons

: BluHID – HID cell interface

BluHID is a BluTech Beacon and data-logging enabled interface for CSIRO HID cell, made by ESS in Australia.

The device interrogates the stress cell and returns a single output string with the respective values for the 12 strain gauges.

Could also become available as a 4G LTE-M gateway in the future.

GEOSYSTEMS

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BluHID

BluTech Scanners

WiFi BluGW

YieldPoint's WiFi/Ethernet BluGateWay is a BlueTooth 5.2 Gateway that can aggregate readings a population of geotechnical instruments emitting three types of signal:

(i) 4 xRS485 digital signal,
(ii) BlueTooth 5 (Coded PHY) beacons,
(iii) 4 x VW + 2 x RS485 digital signal

It can then backhaul the data over WiFi/Ethernet.

The WiFi BluGW is a fully functioned datalogger with realtime clock and memory for 30,000 readings.

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WiFi BluGateway

BluTech Scanners

LTE-M BluGW

YieldPoint's BluGW – LTE is a gateway that can aggregate readings from a cluster of geotechnical instruments that transmit three types of signal:

(i) 4 xRS485 digital signal,
(ii) BlueTooth 5 (Coded PHY) packets,
(iii) 4 xVW instruments.

The LTE-M BluGW is a fully functioned datalogger with realtime clock and memory for 30,000 readings.

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LTE-M BluGateway

BluTech Scanners

Blu900GW

YieldPoint's Blu900GW can aggregate readings from a cluster of geotechnical instruments that transmit three types of signal:

(i) BlueTooth 5 (Coded PHY) packets,
(ii) A 900MHz (ISM band) wireless mesh with up to 16 nodes.

The Blu900GW is a fully functioned datalogger with realtime clock and memory for 30,000 readings.

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Blu900Gateway

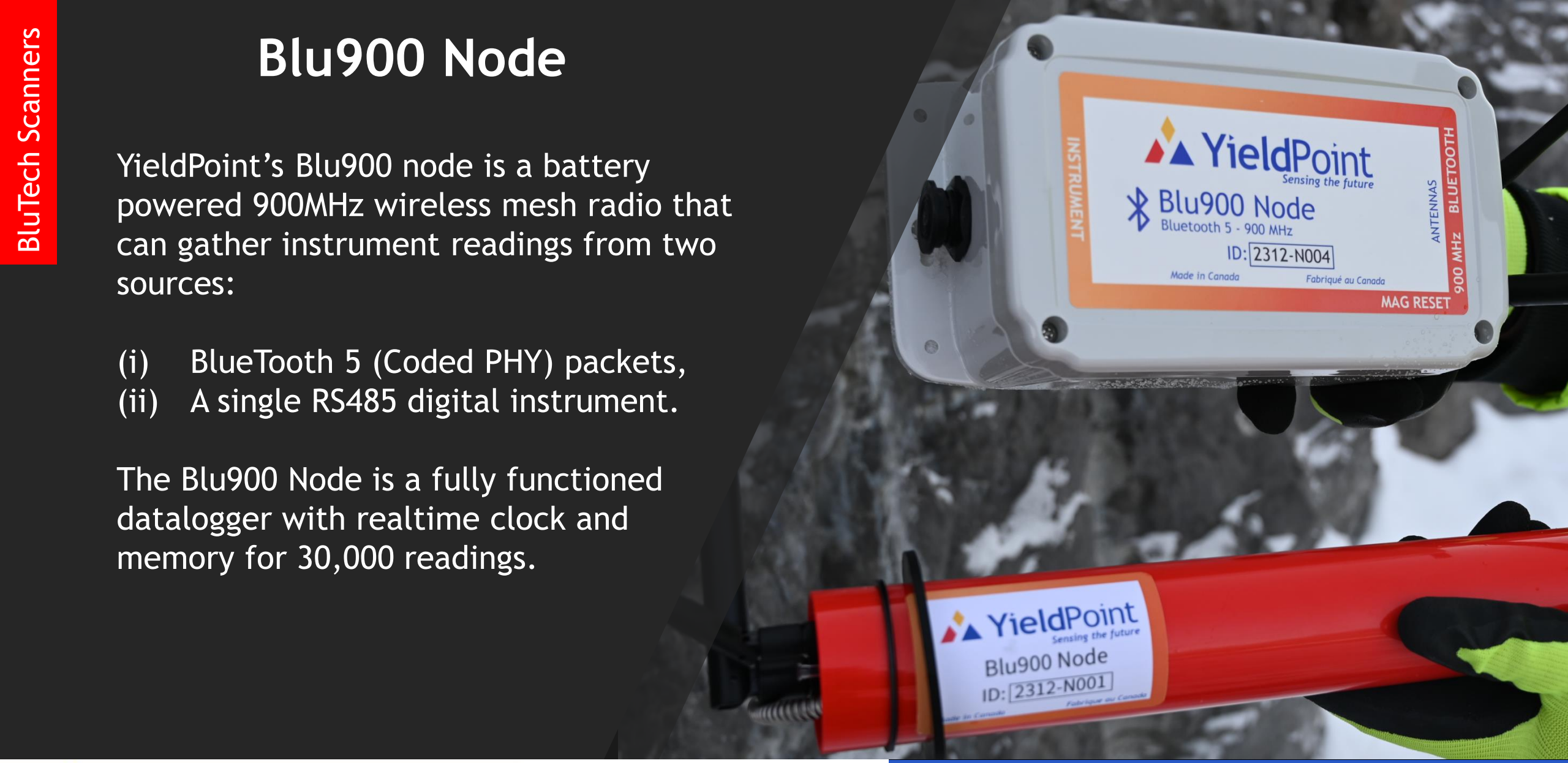
BluTech Scanners

Blu900 Node

YieldPoint's Blu900 node is a battery powered 900MHz wireless mesh radio that can gather instrument readings from two sources:

(i) BlueTooth 5 (Coded PHY) packets,
(ii) A single RS485 digital instrument.

The Blu900 Node is a fully functioned datalogger with realtime clock and memory for 30,000 readings.



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Blu900 Node

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BluTech Software

The **Blu**Point App

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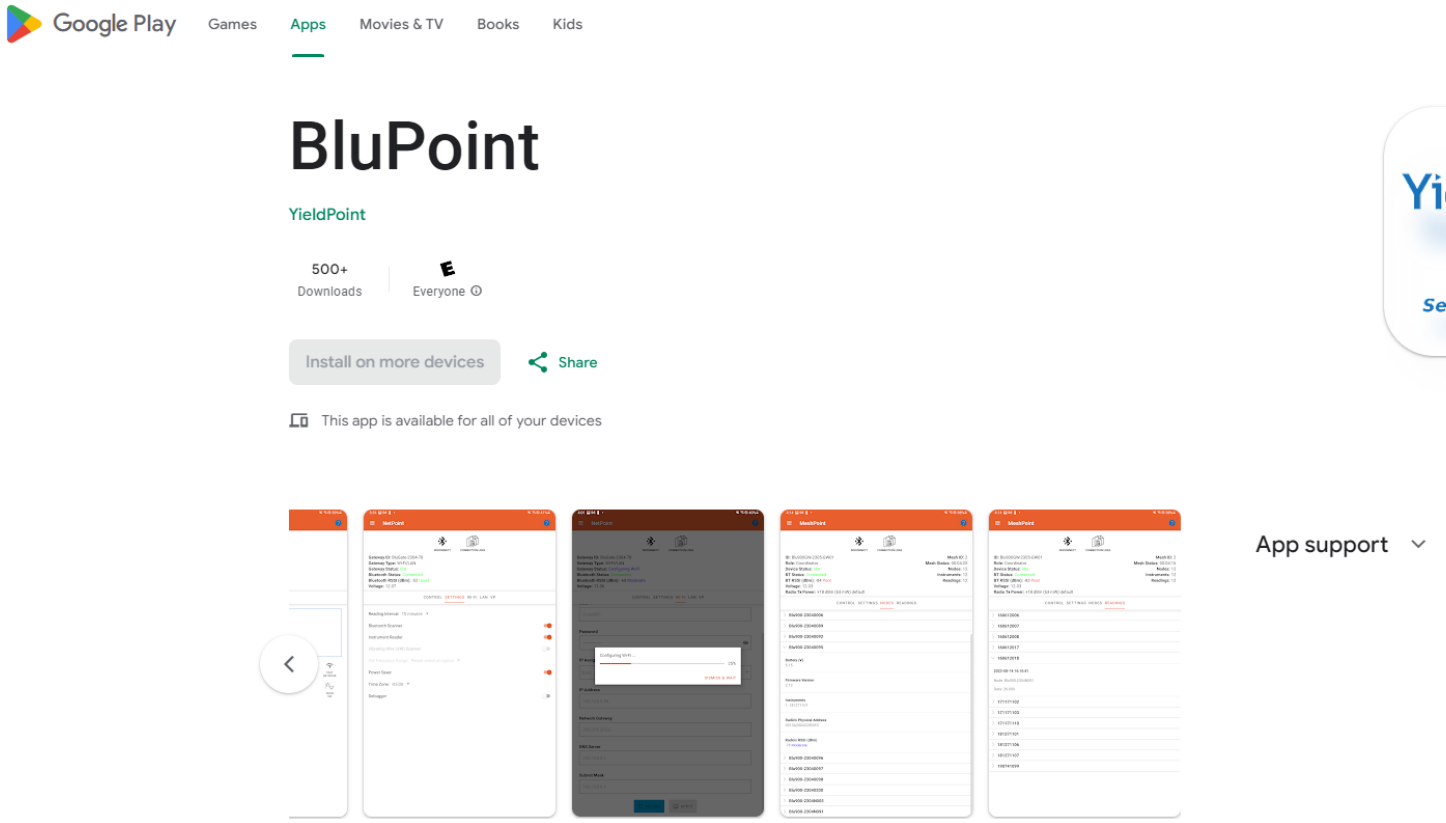
The BluPoint App

Download the latest version of the BluPoint App from Google Playstore



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The BluPoint App

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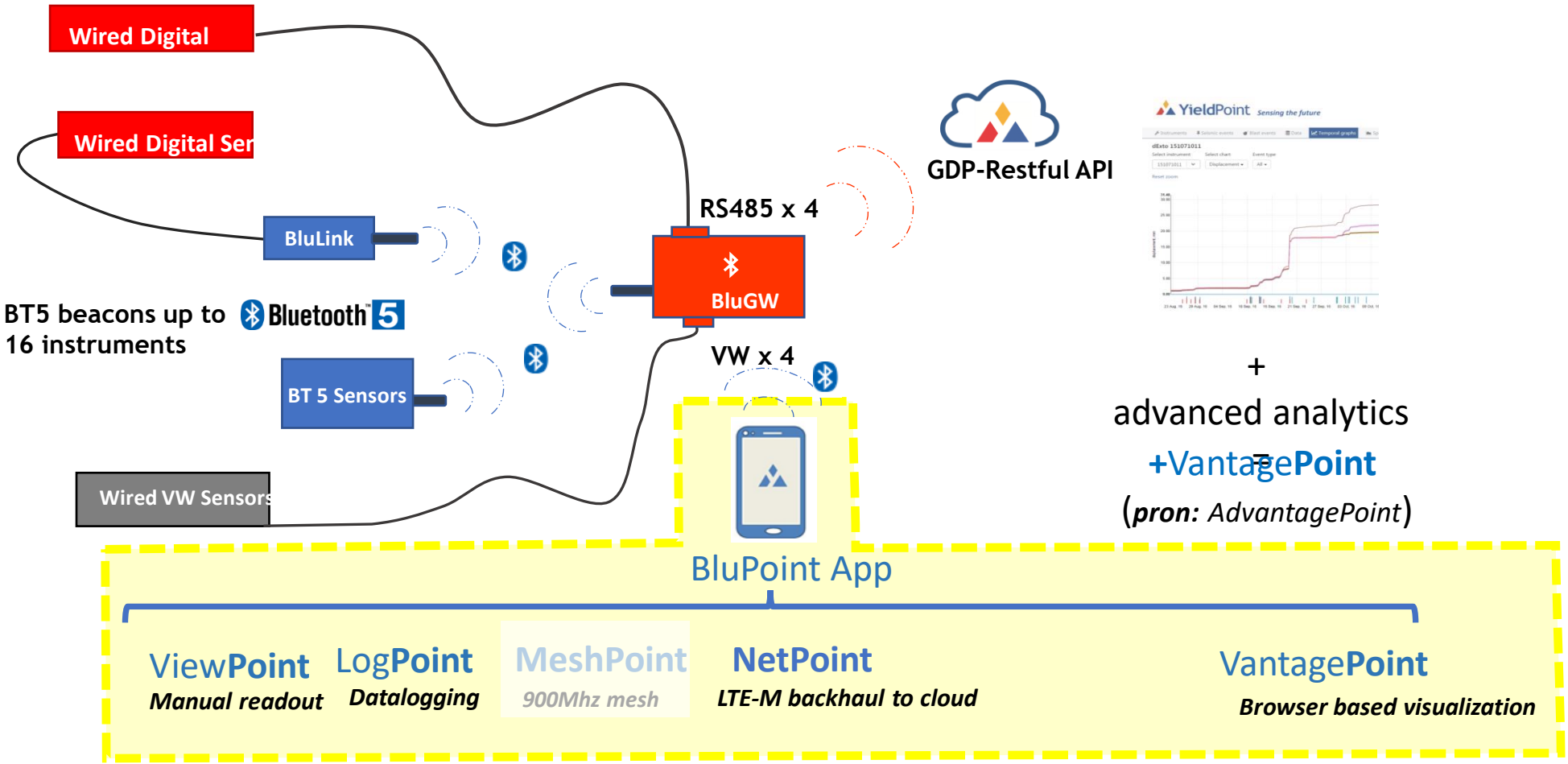

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The BluPoint App

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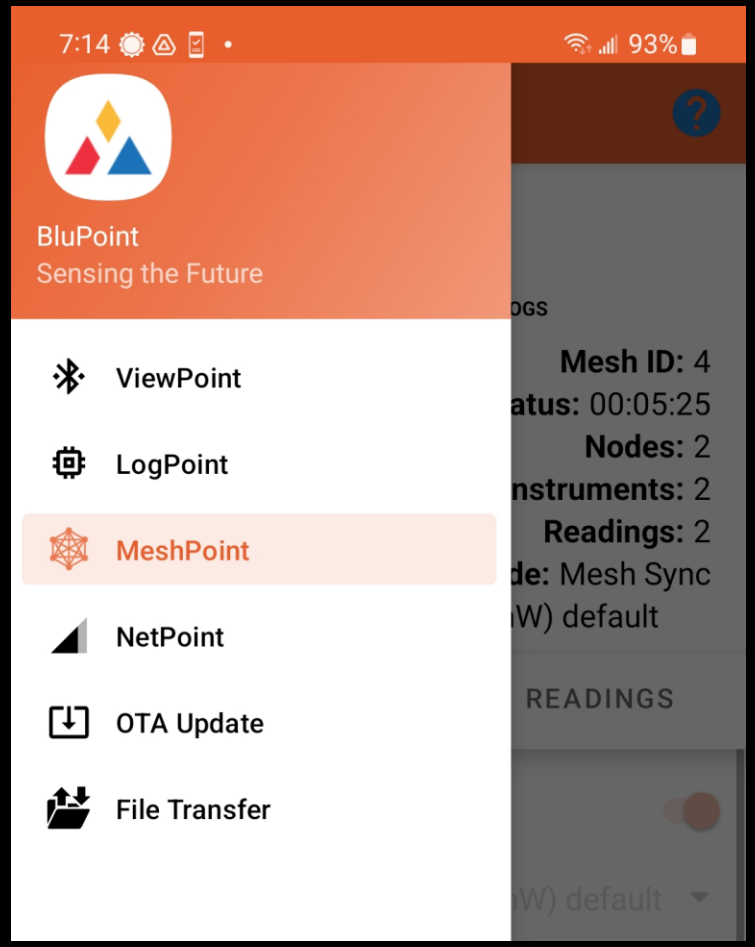
Step 1: Swipe from the left to select the BluPoint Activities.



Swipe from the left to reveal the BluPoint Activities.

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

LogPoint: Connect to a BluTech devices. Extract data onto Andoid device. Manage data-logger functionality.

MeshPoint: Configure and monitor 900MHz mesh

NetPoint: Configure BluGateway IP settings. Wifi/Ethernet/LTE-M

OTA Update: Update Blulink and BluGateway Firmware

Firmware Update: Update WiFi/Ethernet modem software

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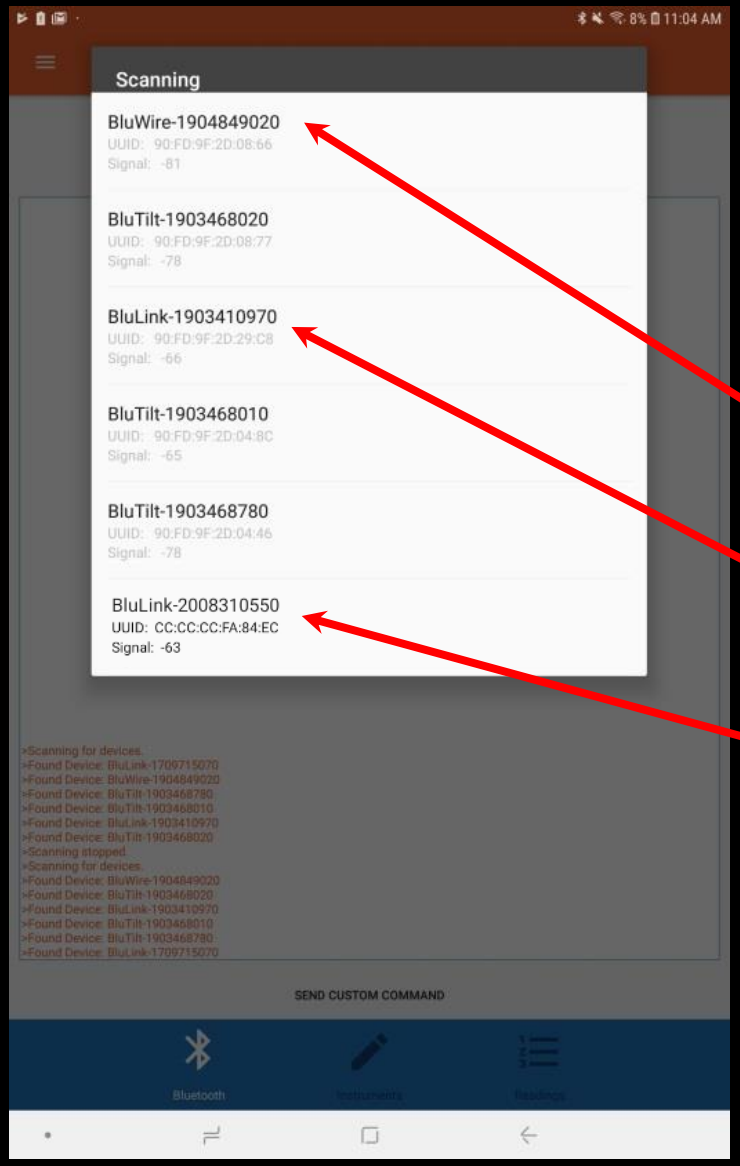
BluPoint Activities



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 BluWire (wired connection) with ID 200394788

Blulink: attached to a 3 point dExto with ID 200831055

3 **Blu**Tilts are also on the network

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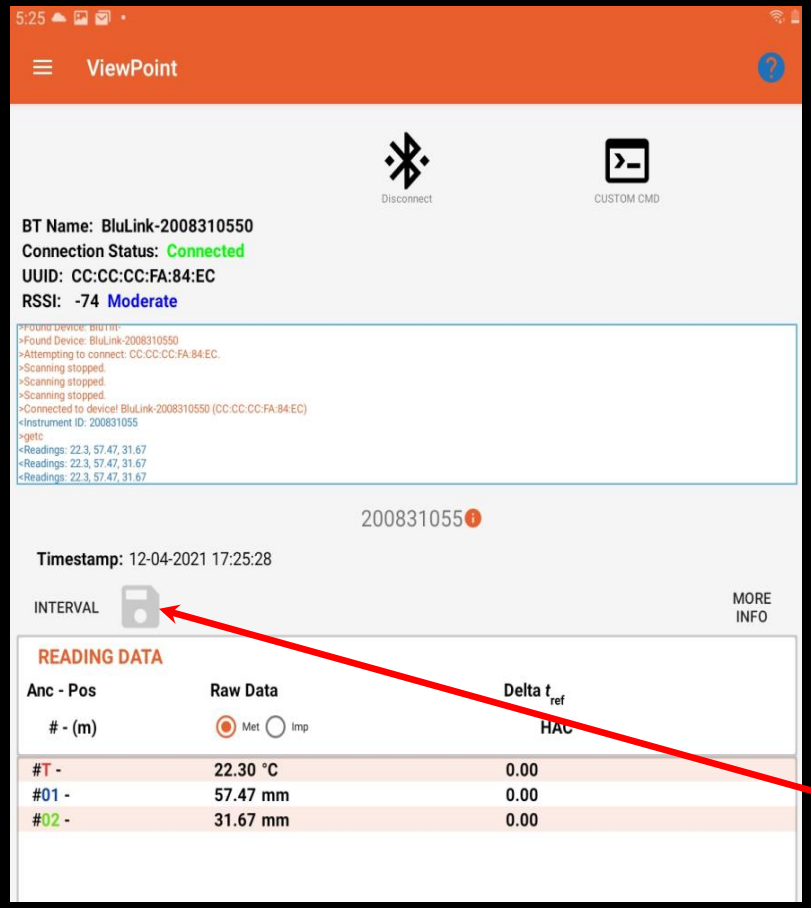
ViewPoint Activity

The ViewPoint Activity functioning like a manual readout unit



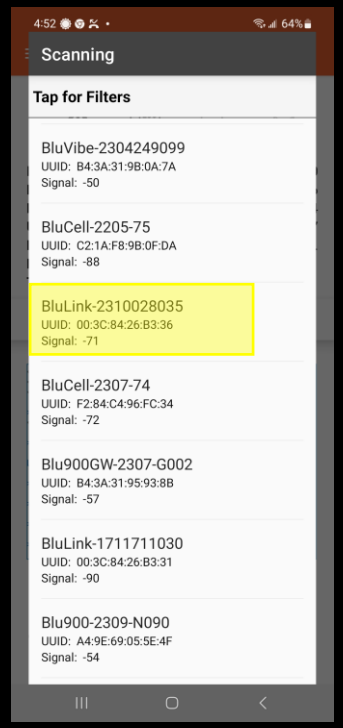
Connected to Instrument ID 200831055

Temp: 22.3C, Anch 1: 57.47m, Anch 2: 31.67mm

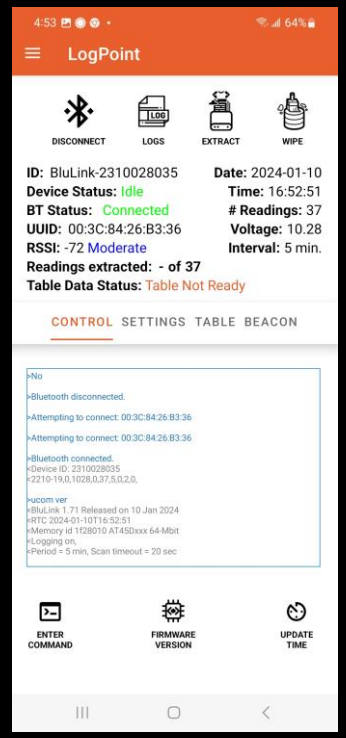
Save Readings

Step 1: Swipe from the left to activate the BluPoint Activity list . Select LogPoint

Tap the Connect icon:
A list of devices will appear



Tap a BluLink, BluTilt or BluGateway from the list to connect



The BluLink assumes the ID of the d-Tech instrument Plugged into it

RSSI should be greater than -80dBm for reliable comms

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LogPoint Activity

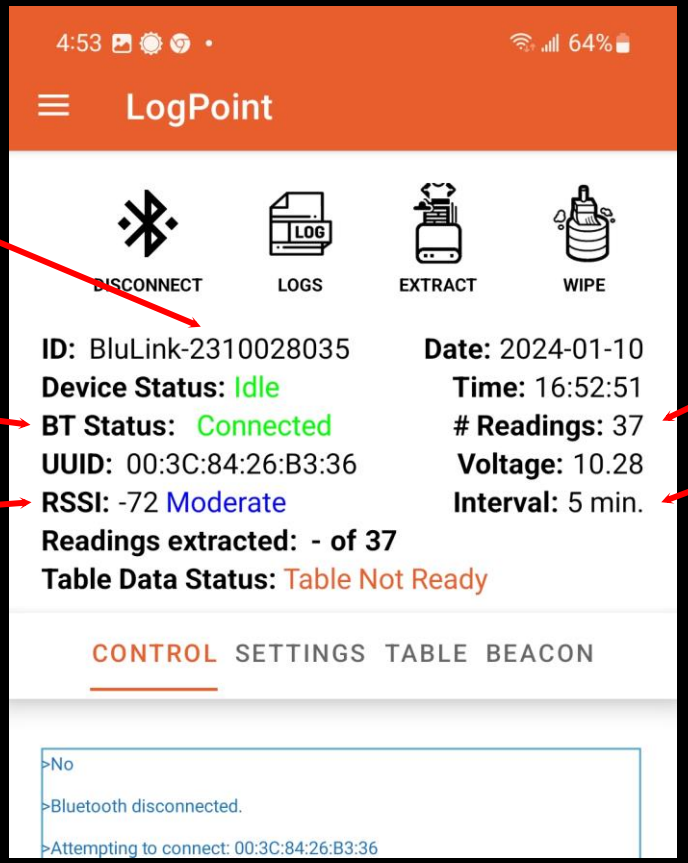
After connection:

Device Names:
BluLink 2310028035

Connection Status

RSSI Values:

-40 to -60	Good
-60 to -80	Moderate
<-80	Poor

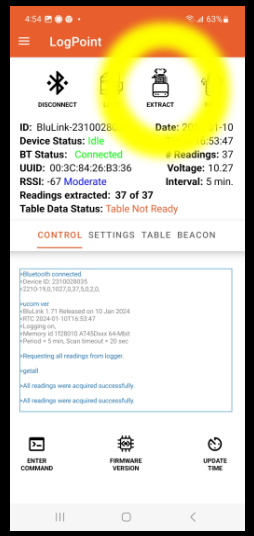


Number of readings

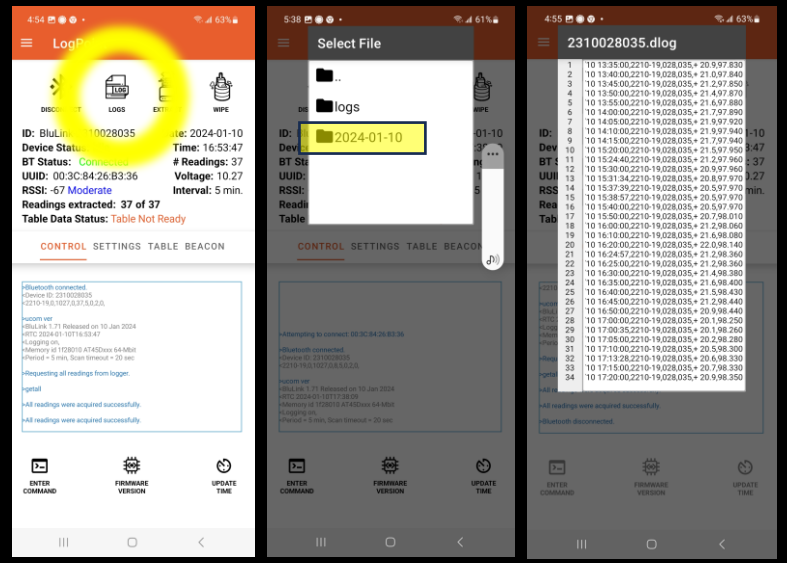
Logger Reading Interval

After connection:

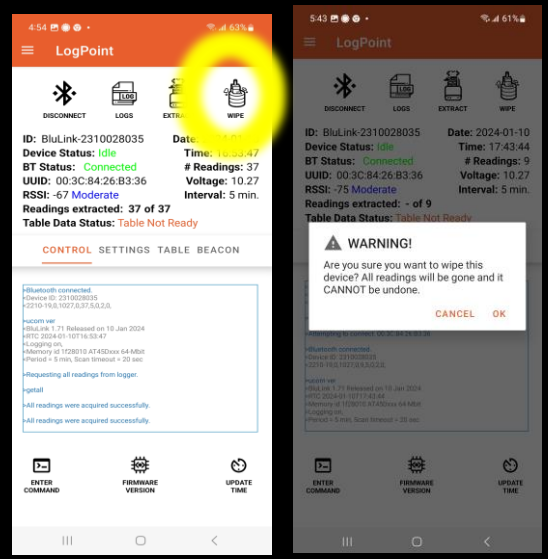
Tap the **Extract All** button to downloads readings:



Tap **Logs** and inspect the Log file



Tap **Wipe** to erase logger



A BluLogger/BluGateway may have saved data from a whole cluster of instruments. These will all be downloaded synchronously.

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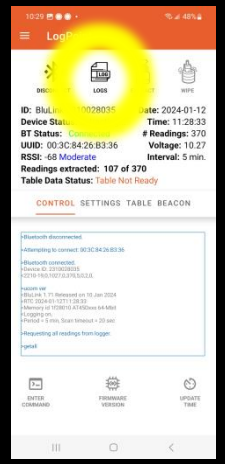
LogPoint Activity

Where are my Extracted Files?

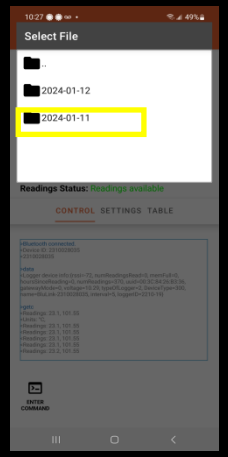
The files extracted from the BluTech device are in the directory:

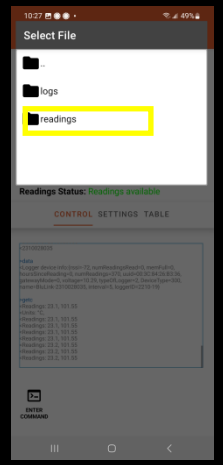
/ Tablet / YieldPoint / *download_date* / *instrument ID* .dlog

Important: A folder is created for each download date.

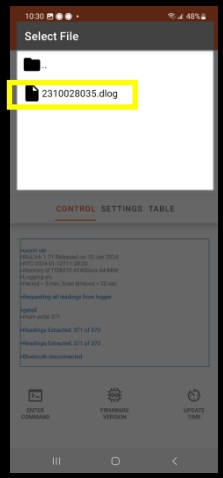


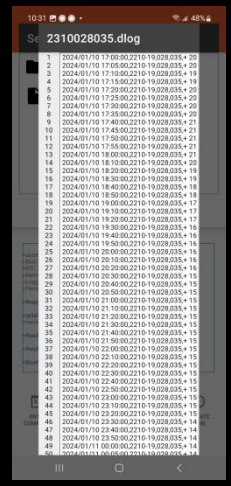
A new folder for each download date





Logs: Connection log
Readings: Instr. data





The data for 231028035

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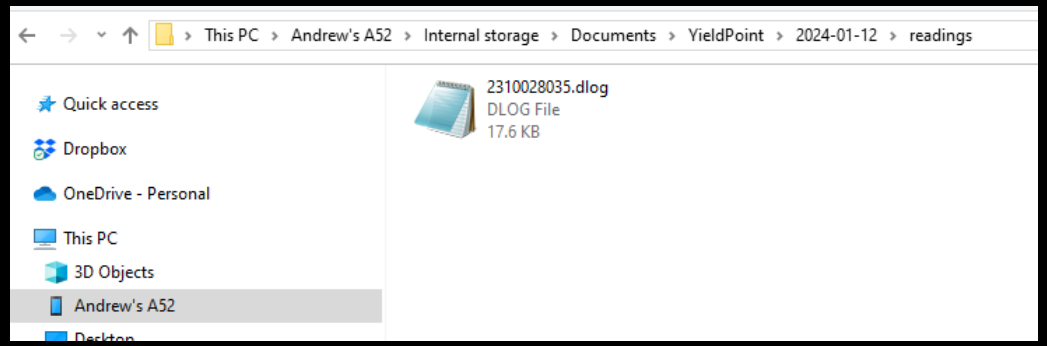
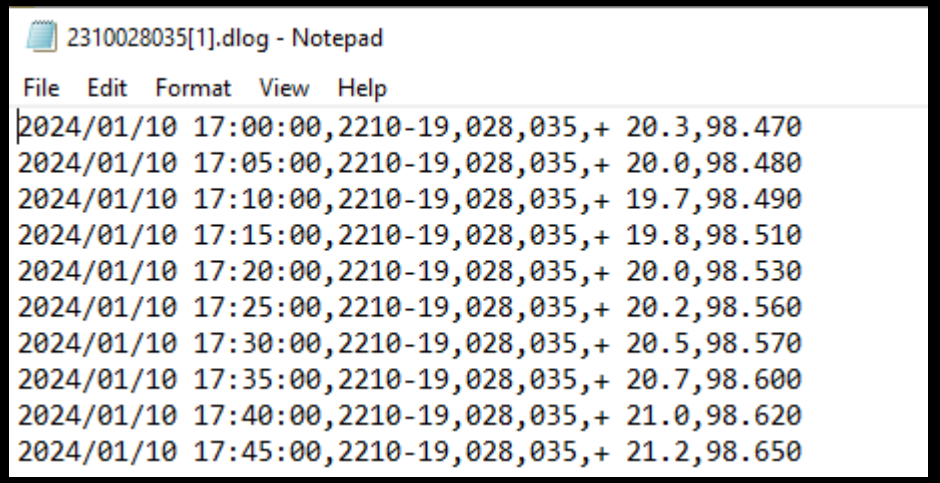
LogPoint Activity

Where are my ExtractedFiles?

Plug a USB charging cable into the Android device:

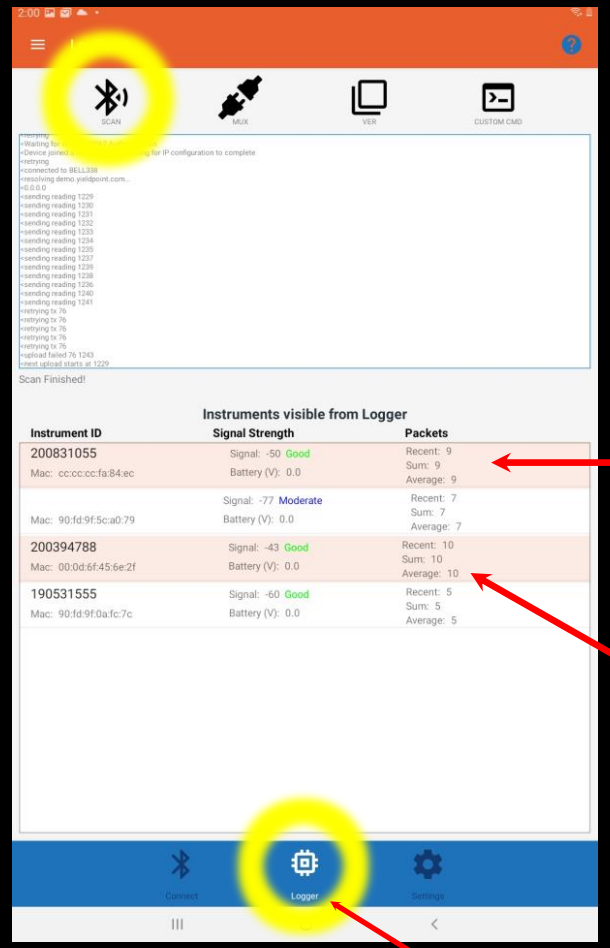


A new folder is created for each download date



For import into VantagePoint or Excel

Scanning from The Gateway:



d2EXTO + BluLink

packets received during scan window

The Logger Button

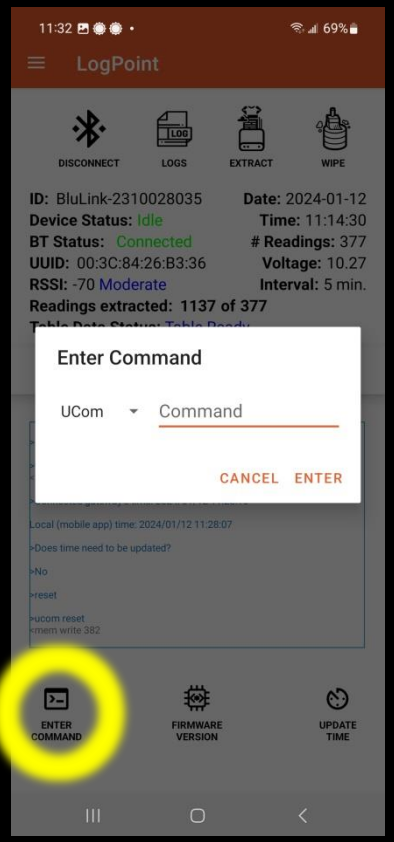
The scan command instructs the Gateway to listen and count Bluetooth 5 beacons for a 20s period (note: must already be connected)

During a scan a timer will count down from 20s to 0.

The RSSI from is between the Gateway and BluInstruments and represents Bluetooth 5 extended range for the Coded PHY.

The scan may be interrupted by other logger tasks

Custom commands can be entered using the Custom Button:



Main Commands:

Select “any in drop down”

getall -> Download all data
wipe -> Erase all data
time -> Synchronise time to Android device

ucom addr -> Retrieve logger Bluetooth Mac address
ucom scan -> Bluetooth scan (SCANNER only).
Reads instrument (BEACON):
ucom **stop** -> Stop Bluetooth scan (SCANNER Only)
ucom logon -> Start periodic data logging
ucom logoff -> Stop periodic data logging

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LogPoint Activity

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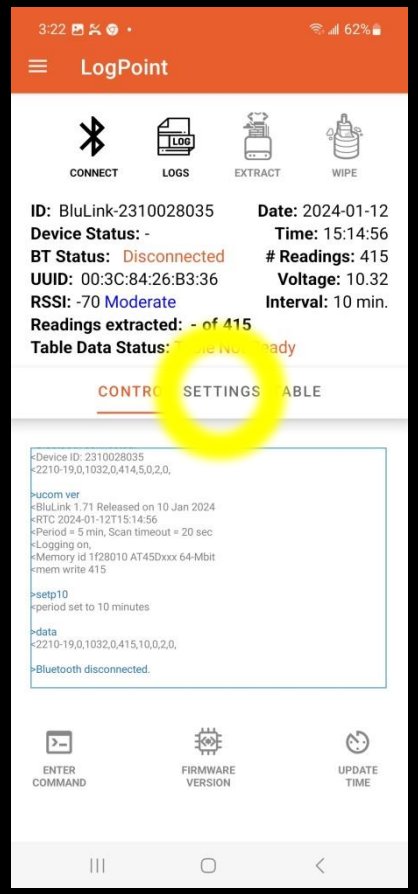
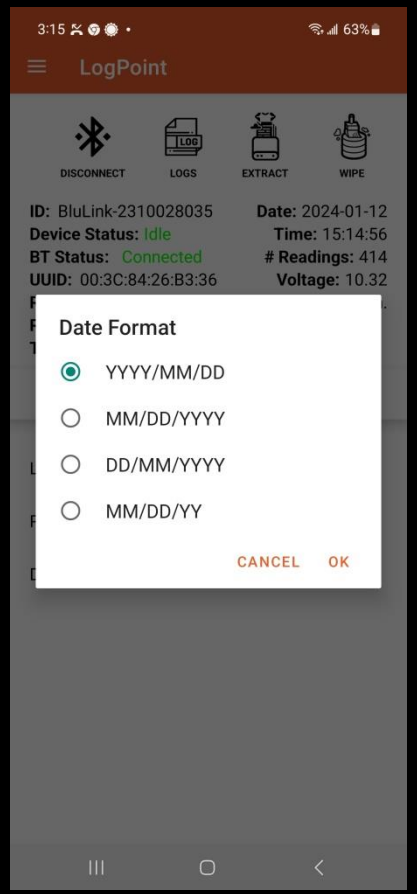
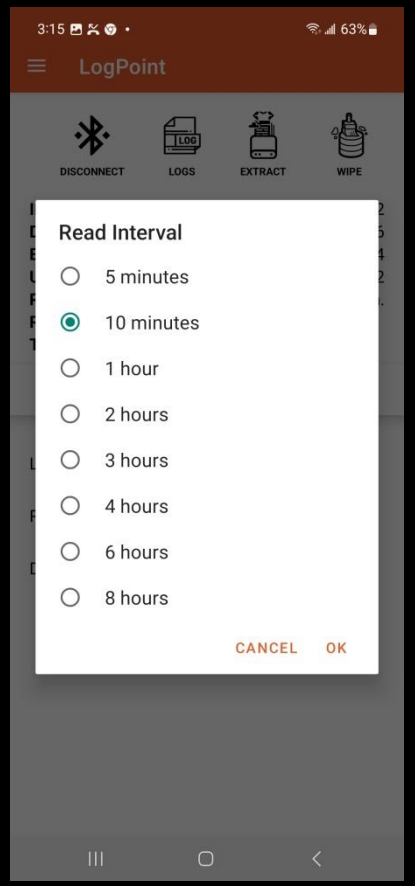
Date Format Options

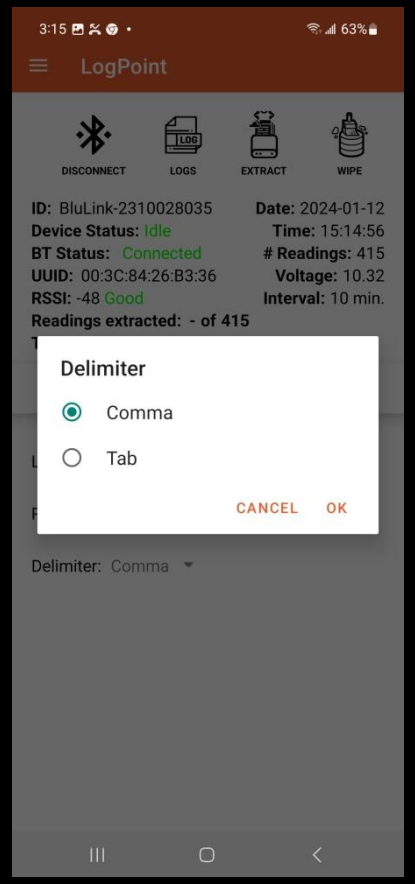
The BluLogger Interval

Delimiter for file extraction







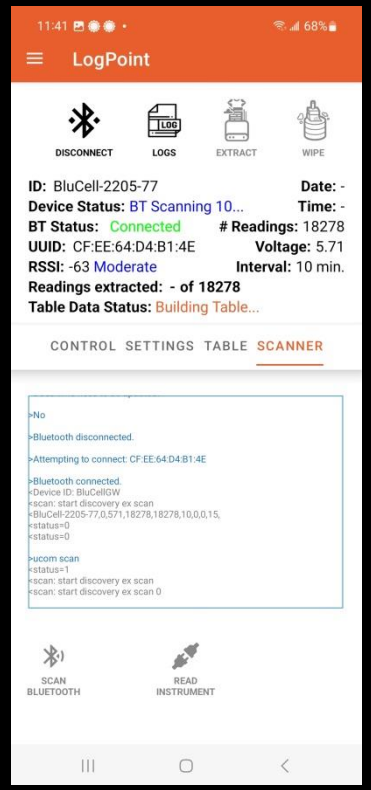


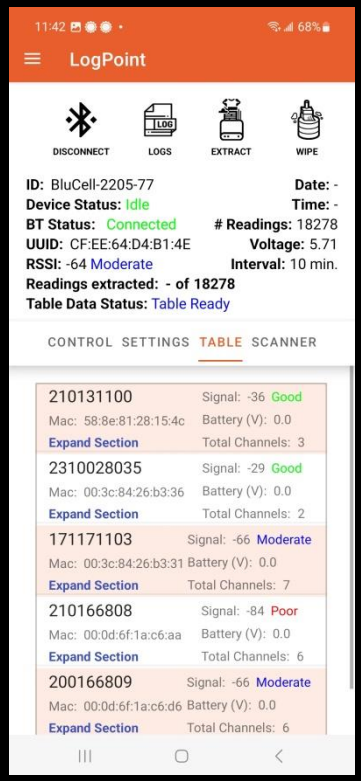
YieldPoint Sensing the future

LogPoint SETTINGS Tab

Date Format Options

The BluLogging Interval





The Table Tab presnts data from a BlueTooth scan (SCANNERS ONLY)

YieldPoint *Sensing the future*

LogPoint: TABLE Tab

NetPoint Activity

NetPoint, is an activity within the BluPoint Android App that is used to:

(i) Configure the Time and Reading Interval
(ii) Configure the LTE APN
(iii) Configure the upload interval
(iv) Configure the cloud DB target
(v) Check that the system is running correctly
(vi) Generate trouble-shooting logfiles

YieldPoint Sensing the future

BT5 Signal strength or RSSI

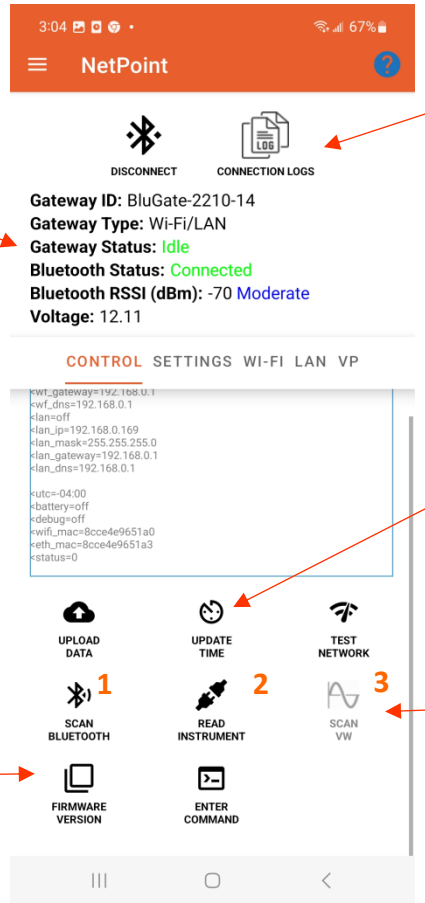
RSSI (Received Signal Strength Indicator in dB): Radios can communicate down to an RSSI of -92.

Range: -40 to -60 Good
-60 to -80 Moderate
<-80 Poor

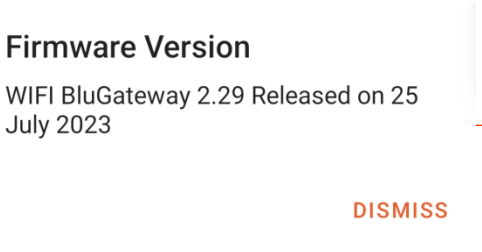
IMPORTANT: Whatever the orientation of the device, the antenna should be VERTICAL

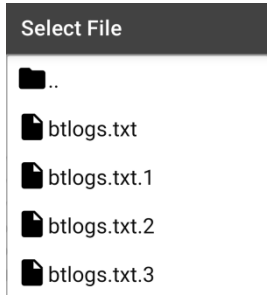
Gateway Status:

0: Idle (responsive)
1. BT Scan
2. Read Instrument
3. VW Scan
4: Uploading Data

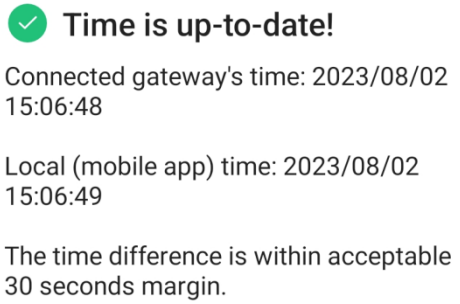


Console: Log of commands/ responses generated from session :





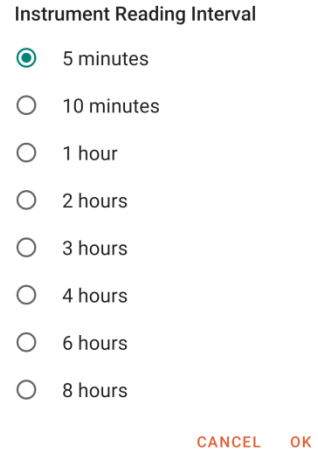
Share BT logs with Yieldpoint for trouble-shooting

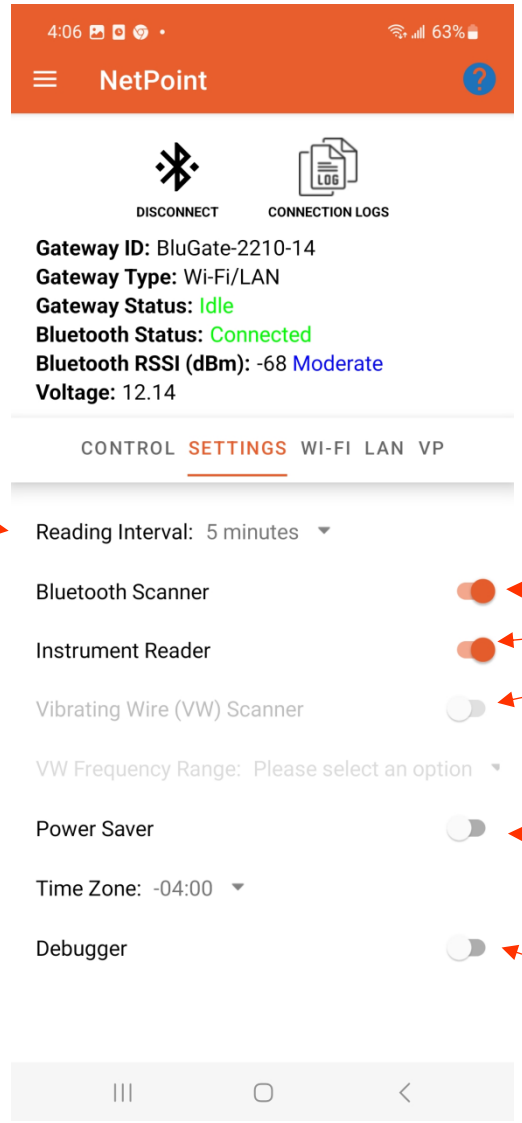


1 20 s BT5 beacon scan
2 Mux RS485 d-Tech instruments
3 Mux VW (grey = No hardware)

YieldPoint *Sensing the future*

NetPoint: CONTROL Tab





Disable the Bluetooth 5.2 scanning

Disable RS485 d-tech instrument scanning

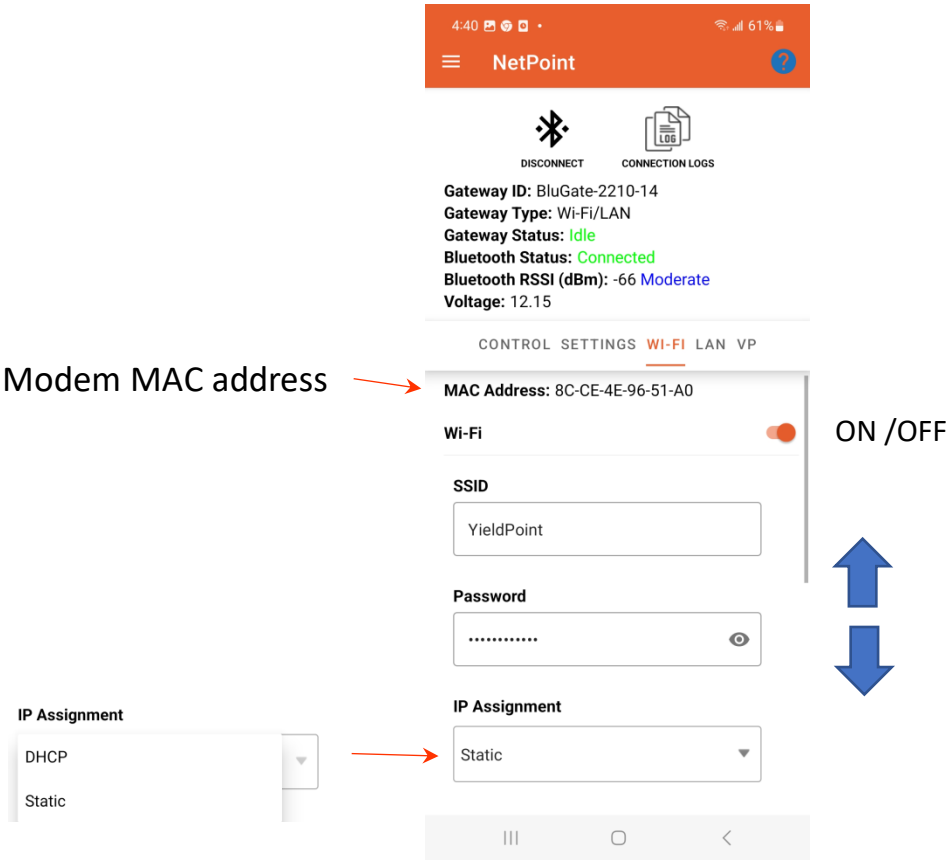
Disable VW scanning (grey: hardware not present)

OFF: External power.
ON: Internal battery power (webpage configuration disabled)

Turn on enhanced messaging for troubleshooting
See all Ucom and AT commands.

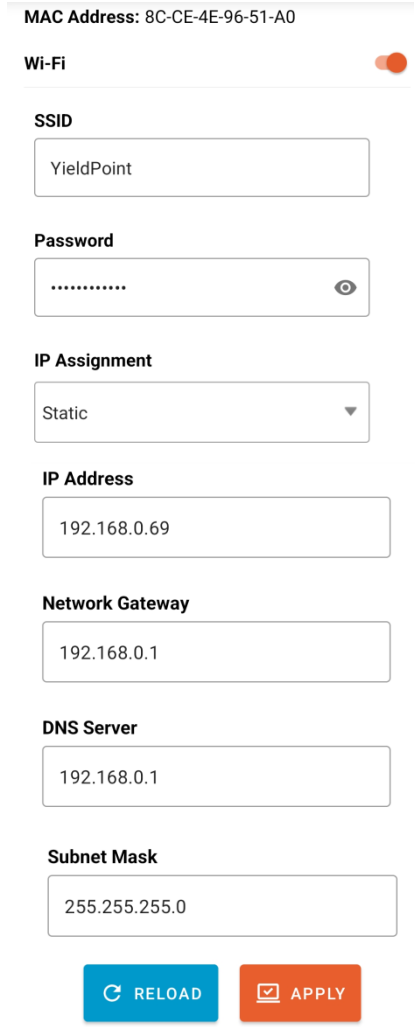
YieldPoint *Sensing the future*

NetPoint: SETTINGS Tab

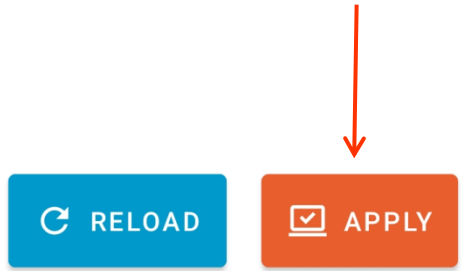


Wi-Fi Modem MAC address

ON /OFF



Applies entered values

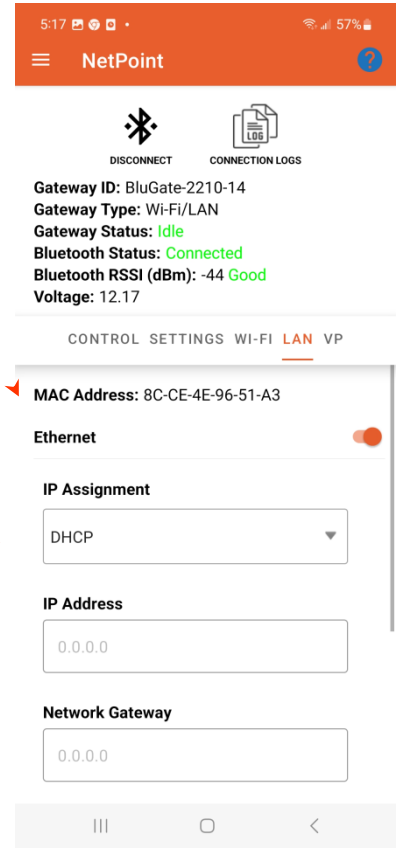


The button of “TRUTH”. Returns the true values of the IP settings.

Tap RELOAD to Discover true DHCP IP address.

YieldPoint *Sensing the future*

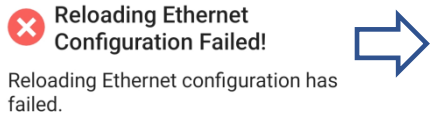
NetPoint: WiFi Tab



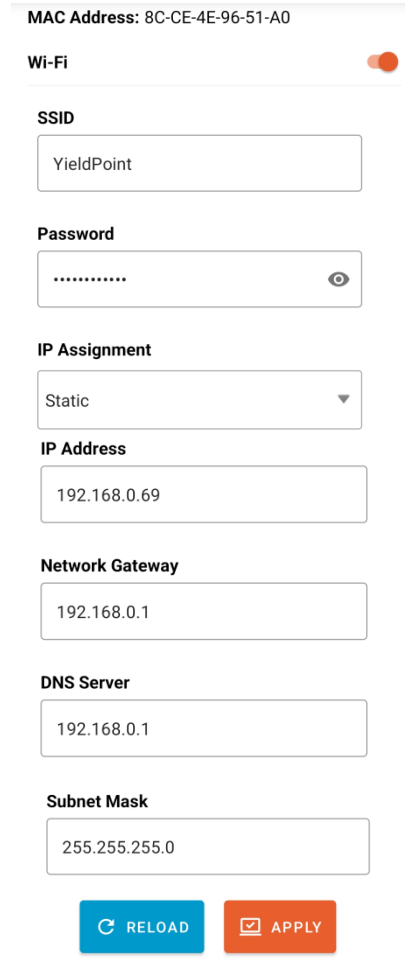
Ethernet Modem MAC address

ON /OFF

Tap RELOAD to populate

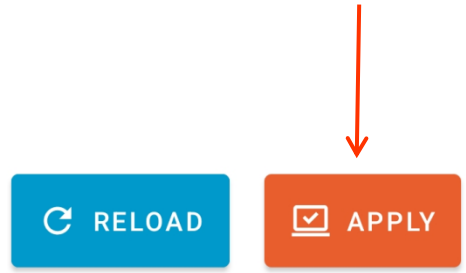


Check Ethernet connection



ON /OFF

Applies entered values

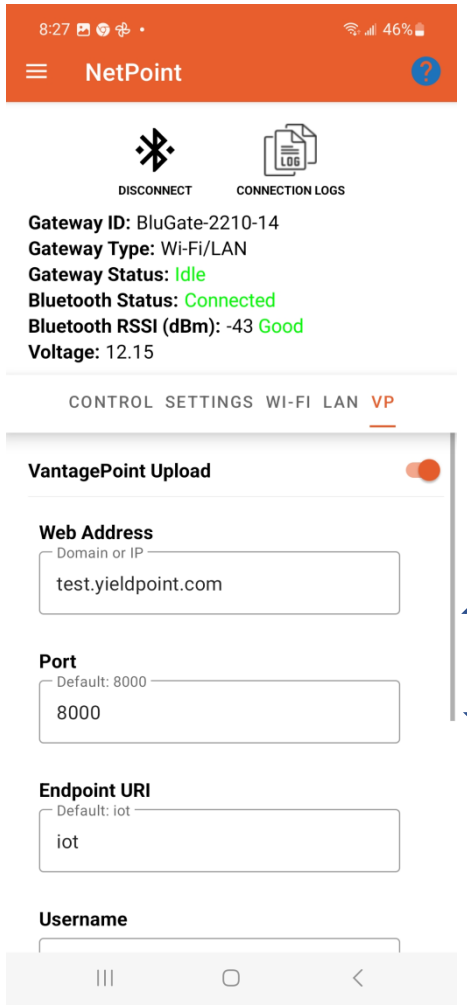


The button of “TRUTH”. Returns the true values of the IP settings.

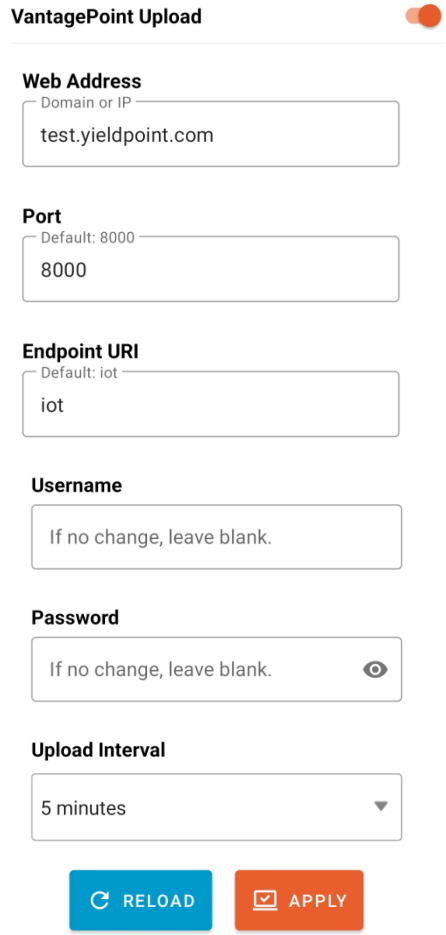
Tap RELOAD to Discover true DHCP IP address.

YieldPoint *Sensing the future*

NetPoint: LAN Tab

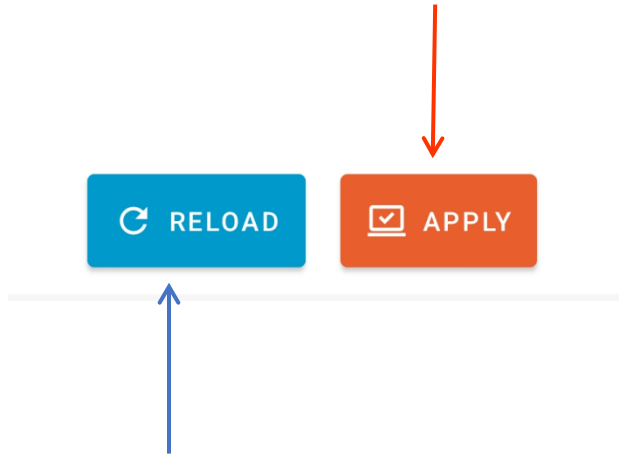


ON /OFF



ON /OFF

Applies entered values

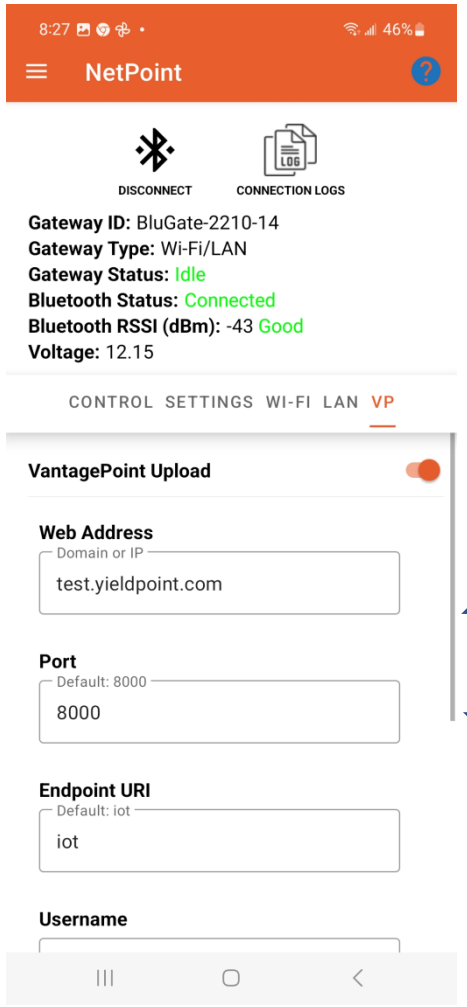


The button of “TRUTH”.
Returns the true values
of the VantagePointP settings.

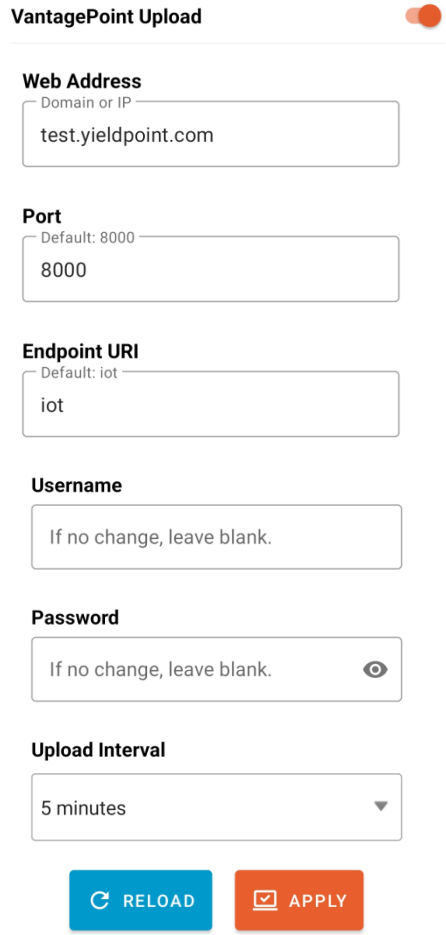
Tap RELOAD to Discover true
VP settings.

YieldPoint *Sensing the future*

NetPoint: VP Tab

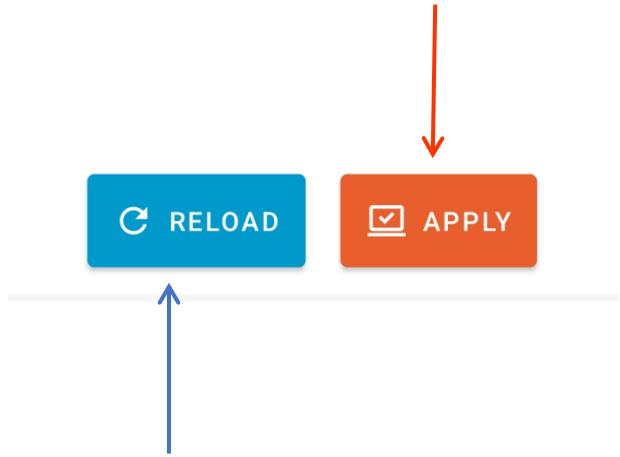


ON /OFF



ON /OFF

Applies entered values



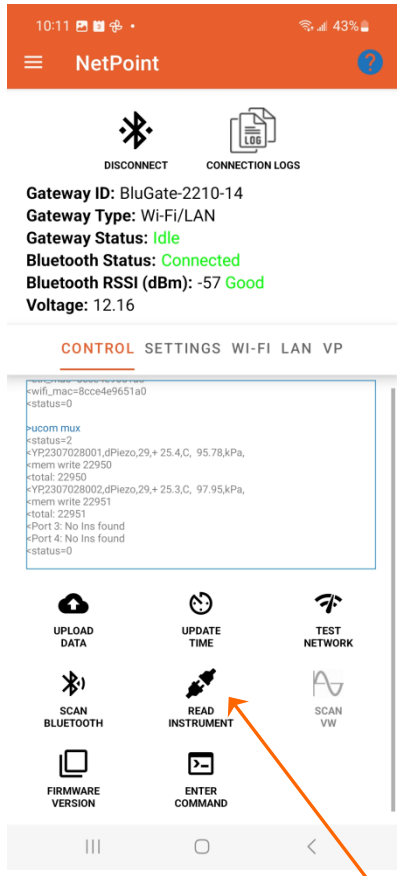
The button of “TRUTH”.
Returns the true values
of the VantagePointP settings.

Tap RELOAD to Discover true
VP settings.

YieldPoint *Sensing the future*

NetPoint: VP Tab

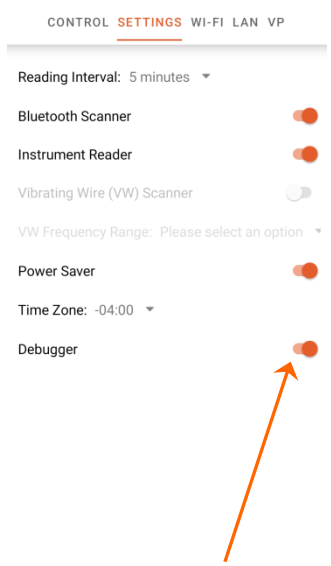
STEP 1: Generate some readings



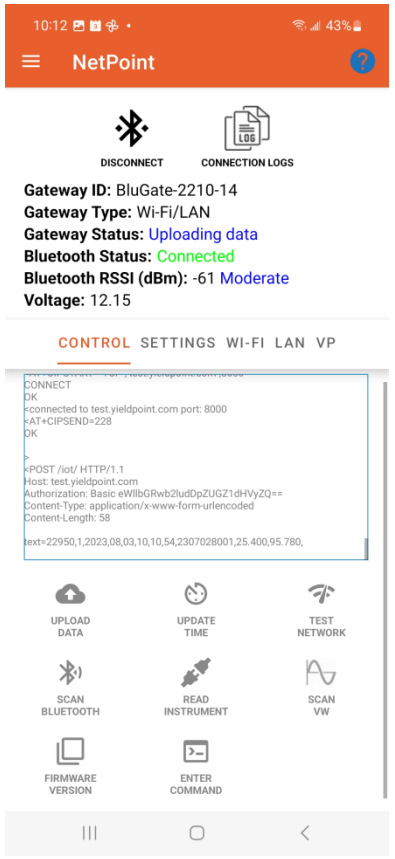
Readings

Read instrument

STEP 2: Turn on Debugger and UPLOAD DATA

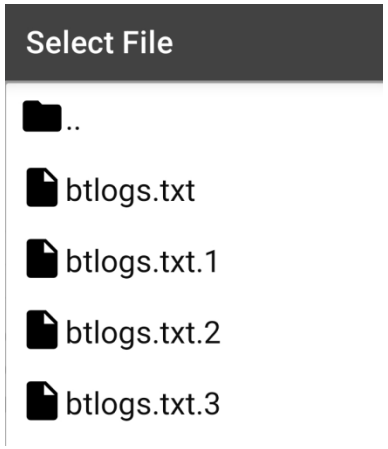


Turn Debugger on for all messaging



Messages

STEP 3: Share blogs files



The Logfiles will include all the messages on the console.

Share with YieldPoint for trouble shooting

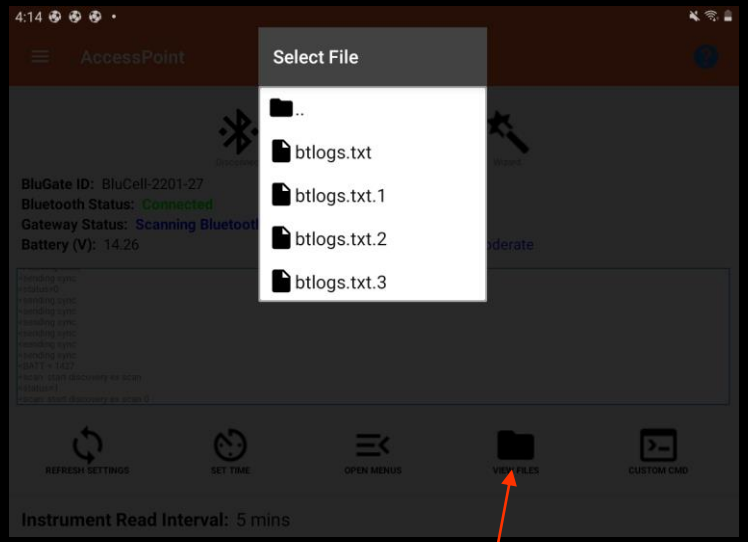
YieldPoint *Sensing the future*

NetPoint: Test GW

Connection Log Files

AT Commands and responses with the LTE modem exchange quickly. A logfile of connection session is stored in the logfile

On the Status page:



Click view files to select a Logfile. Btlogs, btlogs.txt.1 are the youngest.

```
75  2022-02-08T15:50:47.693-05:00: <OK
76  2022-02-08T15:50:47.701-05:00: <AT+CFUN?
77  2022-02-08T15:50:47.707-05:00: <+CFUN: 1OK
78  2022-02-08T15:50:47.770-05:00: <+CGSN: "352656102524439"OK
79  2022-02-08T15:50:47.777-05:00: <AT+CGSN=1
80  2022-02-08T15:50:47.843-05:00: <AT+CGMI
81  2022-02-08T15:50:47.851-05:00: <Nordic Semiconductor ASAOK
82  2022-02-08T15:50:47.858-05:00: <AT%HWVERSION
83  2022-02-08T15:50:47.927-05:00: <AT+CGMR
84  2022-02-08T15:50:47.941-05:00: <%HWVERSION: nRF9160 SICA B0AOK
85  2022-02-08T15:50:47.997-05:00: <AT+CEMODE?
86  2022-02-08T15:50:48.008-05:00: <mfw_nrf9160_1.2.0OK
87  2022-02-08T15:50:48.078-05:00: <%XCBAND: (12)OK
88  2022-02-08T15:50:48.088-05:00: <+CEMODE: 2OK
89  2022-02-08T15:50:48.101-05:00: <AT%XCBAND=?
90  2022-02-08T15:50:48.154-05:00: <AT+CMEE?
91  2022-02-08T15:50:48.165-05:00: <+CMEE: 0OK
92  2022-02-08T15:50:48.174-05:00: <AT+CMEE=1
93  2022-02-08T15:50:48.225-05:00: <+CNEC: 0OK
94  2022-02-08T15:50:48.235-05:00: <AT+CNEC?
95  2022-02-08T15:50:48.245-05:00: <OK
96  2022-02-08T15:50:48.296-05:00: <AT+CGEREP?
97  2022-02-08T15:50:48.304-05:00: <OK
98  2022-02-08T15:50:48.313-05:00: <AT+CNEC=24
99  2022-02-08T15:50:48.373-05:00: <AT+CGDCONT?
100 2022-02-08T15:50:48.385-05:00: <+CGEREP: 0,0OK
101 2022-02-08T15:50:48.453-05:00: <AT+CGACT?
102 2022-02-08T15:50:48.465-05:00: <+CGDCONT: 0,"IP","globaldata.iot","",0,0OK
103 2022-02-08T15:50:48.524-05:00: <+CGACT: 0,0OK
104 2022-02-08T15:50:48.532-05:00: <OK
```

Part of the LTE-M connection exchange

```
120 2022-02-08T15:50:51.236-05:00: <Operator: "", Band: 12, Cell ID: "00889E09",
121 2022-02-08T15:50:51.246-05:00: <Connected
122 2022-02-08T15:50:51.264-05:00: <Connected
123 2022-02-08T15:50:51.519-05:00: <OK
124 2022-02-08T15:50:51.527-05:00: <AT#XTCPCLI=0
125 2022-02-08T15:50:51.667-05:00: <AT#XTCPCLI=1,"test.yieldpoint.com",8000
126 2022-02-08T15:50:52.212-05:00: <#XTCPCLI: 1,"connected"OK
127 2022-02-08T15:50:52.225-05:00: <AT%XMONITOR
128 2022-02-08T15:50:52.347-05:00: <%XMONITOR: 5,"","","302720","6720",7,12,"00889E09",184,5060,6(
129 2022-02-08T15:50:52.355-05:00: <Uploading 30328
130 2022-02-08T15:50:52.444-05:00: <AT#XTCPSEND="POST /iot/ HTTP/1.1Host: test.yieldpoint.com,
131 2022-02-08T15:50:53.186-05:00: <#XTCPSEND: 230OKHTTP/1.1 201 CreatedDate: Tue, 08 Feb 20
132 2022-02-08T15:50:53.340-05:00: <: 213SEND: 230OKHTTP/1.1 201 CreatedDate: Tue, 08 Feb 2022
133 2022-02-08T15:50:53.397-05:00: <Uploading 30329
134 2022-02-08T15:50:53.472-05:00: <AT#XTCPSEND="POST /iot/ HTTP/1.1Host: test.yieldpoint.com,
135 2022-02-08T15:50:54.166-05:00: <#XTCPSEND: 230OKHTTP/1.1 201 CreatedDate: Tue, 08 Feb 20
136 2022-02-08T15:50:54.296-05:00: <: 213SEND: 230OKHTTP/1.1 201 CreatedDate: Tue, 08 Feb 2022
137 2022-02-08T15:50:54.304-05:00: <Uploading 30330
138 2022-02-08T15:50:54.456-05:00: <AT#XTCPSEND="POST /iot/ HTTP/1.1Host: test.yieldpoint.com,
139 2022-02-08T15:50:55.133-05:00: <#XTCPSEND: 229OKHTTP/1.1 201 CreatedDate: Tue, 08 Feb 20
140 2022-02-08T15:50:55.283-05:00: <Uploading 30331
141 2022-02-08T15:50:55.295-05:00: <: 213SEND: 229OKHTTP/1.1 201 CreatedDate: Tue, 08 Feb 2022
142 2022-02-08T15:50:55.351-05:00: <AT#XTCPSEND="POST /iot/ HTTP/1.1Host: test.yieldpoint.com,
143 2022-02-08T15:50:56.172-05:00: <#XTCPSEND: 252OKHTTP/1.1 201 CreatedDate: Tue, 08 Feb 20
```

Posting data to VantagePoint

YieldPoint *Sensing the future*

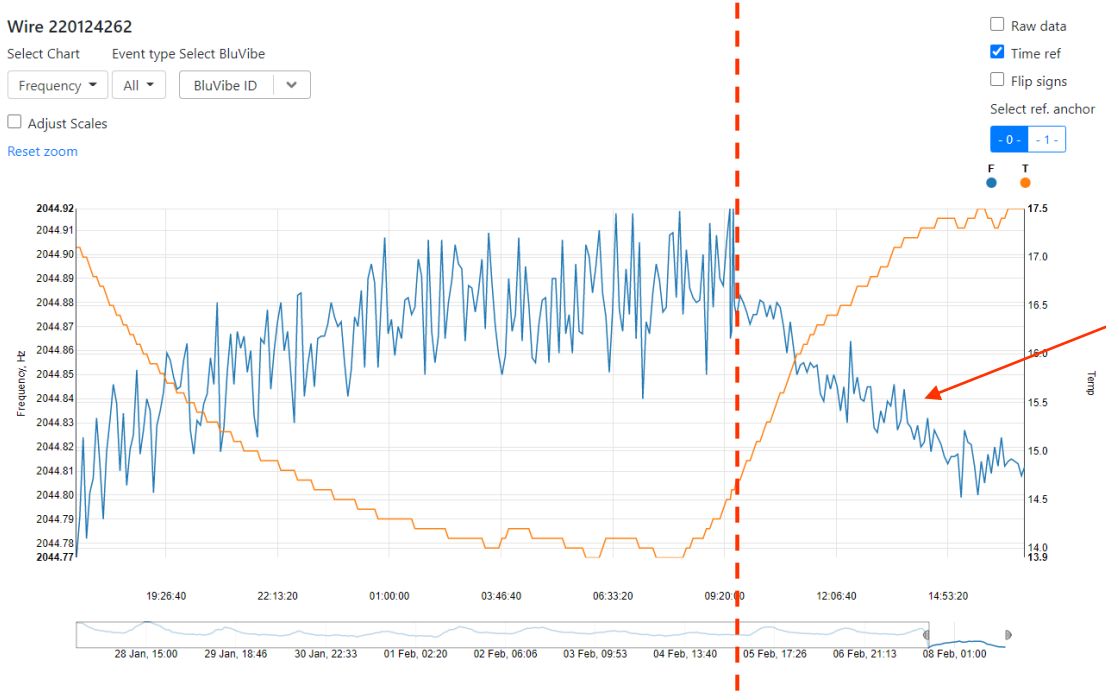
NetPoint Activity

VW Range setup

Freq Ch# Start(Hz) Span(Hz)

freq 2 1000 4000

freq 2 1800 500



Chirp is from 1800hz to 2300Hz

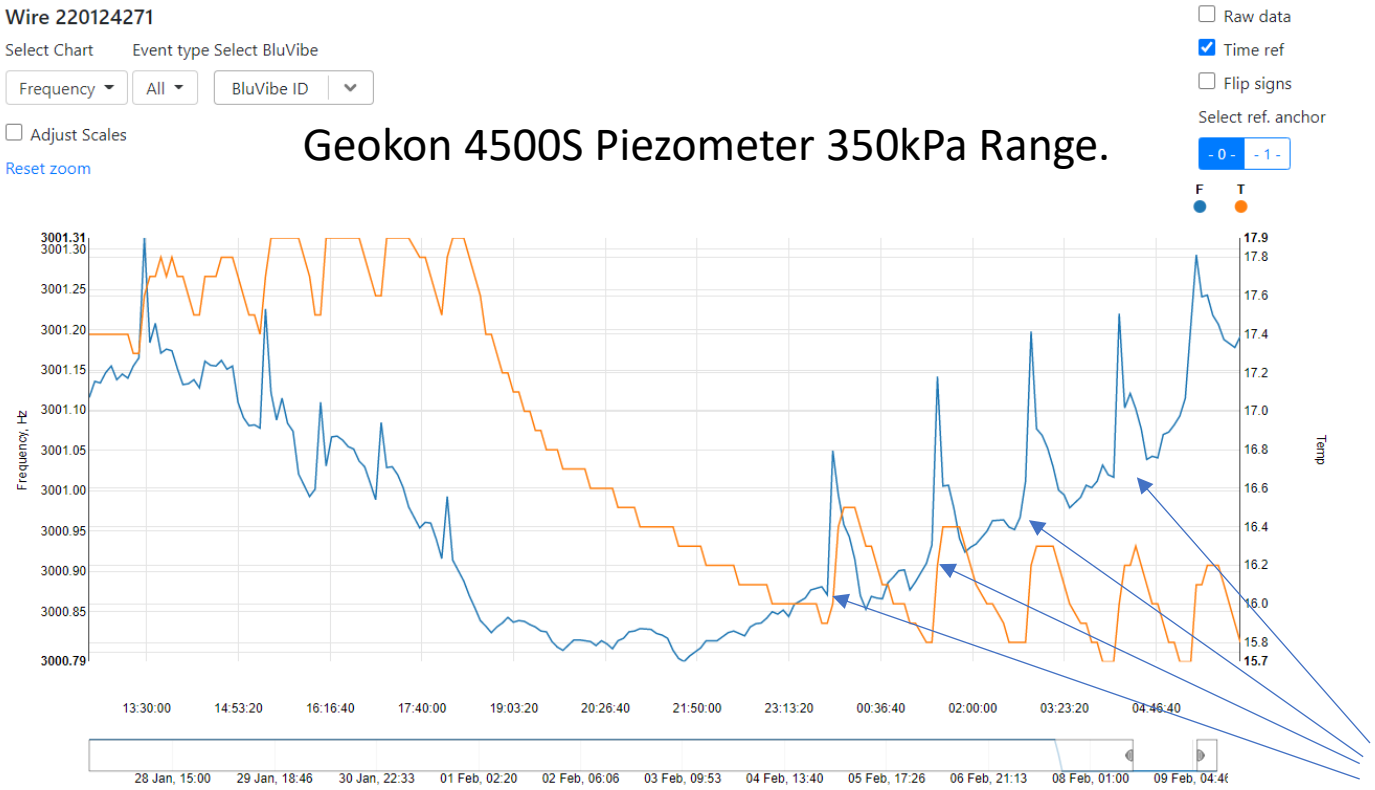
Reduced noise due to lower frequency range for excitation chirp

Output from Roctest PWL -70kPa vented piezometer

YieldPoint *Sensing the future*

NetPoint Activity

VW Range setup



ΔP due to Indoor Heating system cycles

YieldPoint *Sensing the future*

NetPoint Activity

Blu900 Health - Jan 2024

BluTech Health Monitoring

sales@yieldpoint.com

+1-613-531-4722

5.0

YieldPoint *Sensing the future*

BluTech Health-2024

Why the change?

Gen 1 YP Gateways were based on a BeagleBone Black (BBB) Edge computer which became impossible to source during the pandemic.

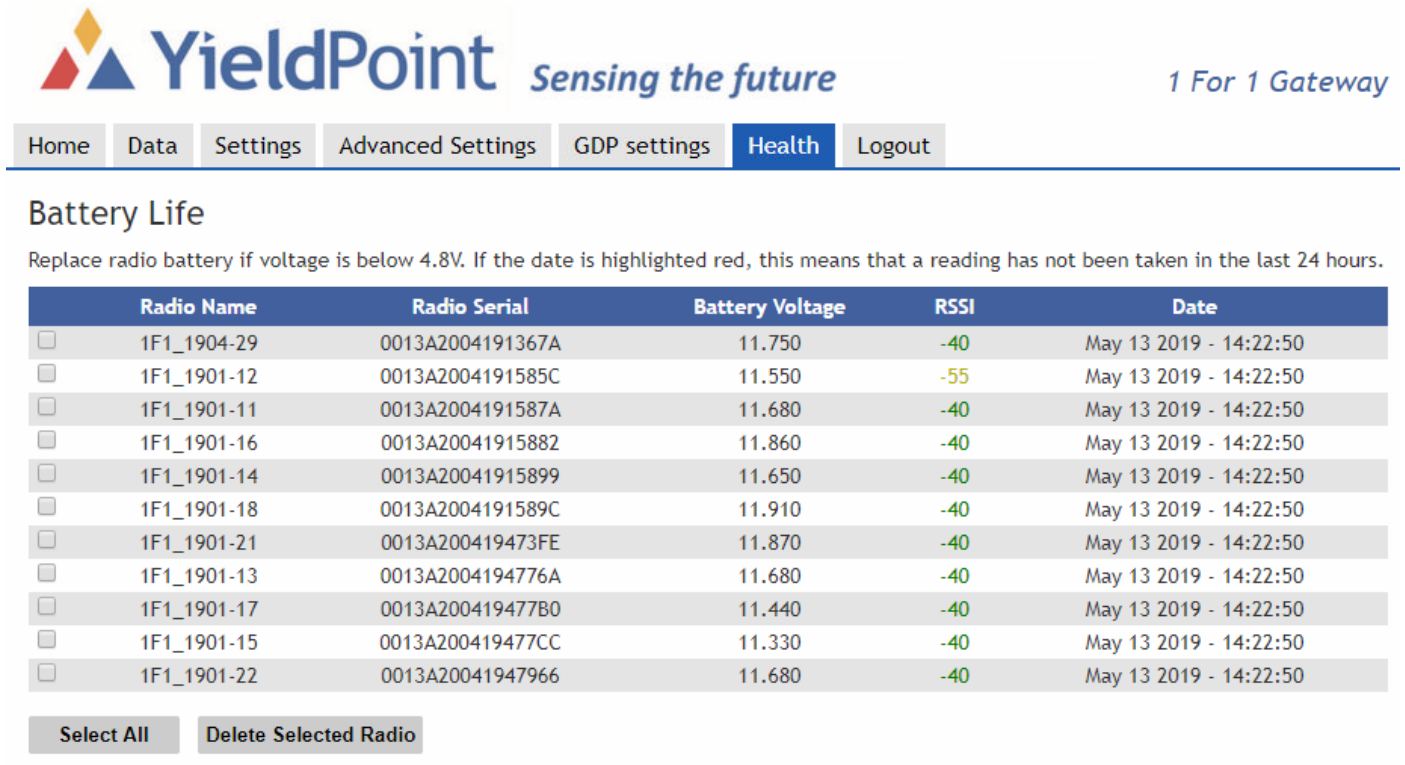
YieldPoint made a strategic decision to develop its BluTech ecosystem using more modern, more robust, and more power efficient ARM Cortex controllers.

As part of this change a decision was made to offload some functionality from the BluGWs:

(i) Configuration and setup using the BluPoint Android app in addition to web browser.
(ii) Health monitoring was be directed to VantagePoint in the cloud so that the readings data and the health data are more closely associated.

Hence VanatagePoint becomes the visualizer For both instrument readings and telemetry Health.

1 For 1 Gateway Health Tab



For legacy YP Gateways the health monitoring data was stored onboard in a SQL database.

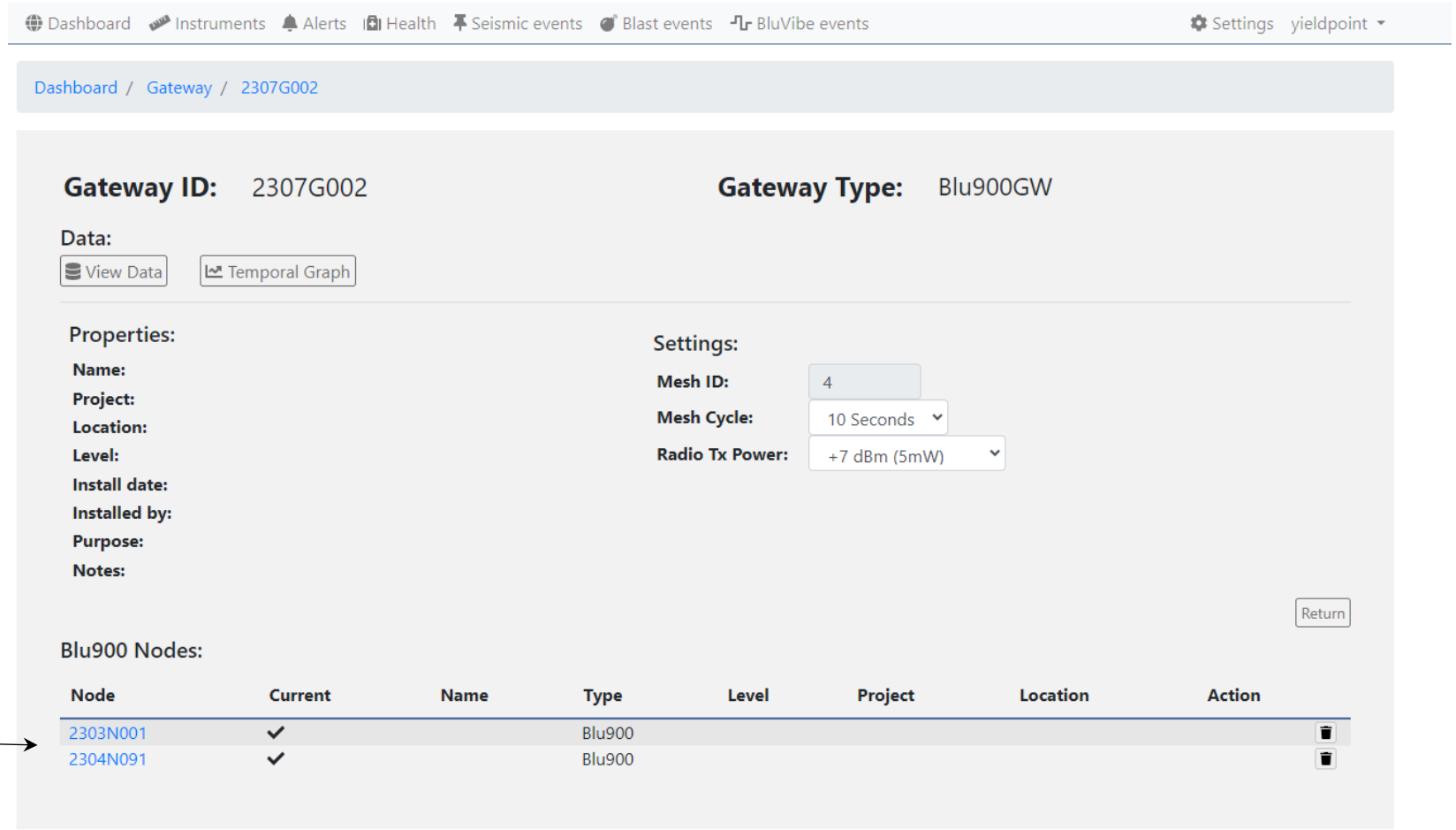
However, this solution did not scale well especially as the number of nodes on a gateway increased

5.0

YieldPoint Sensing the future

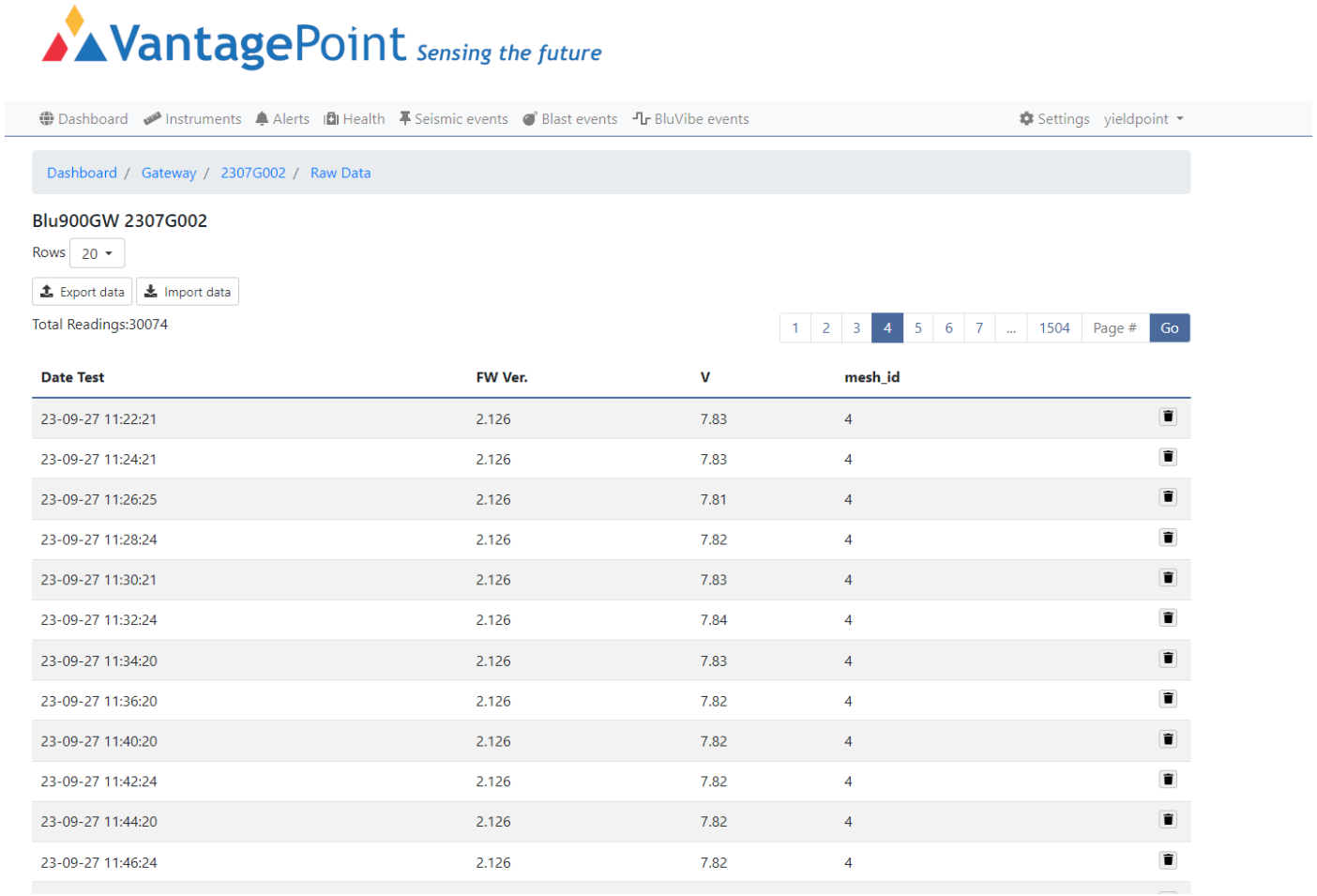
Legacy Health Monitoring

Blu900 Gateway in VP



2 Nodes →

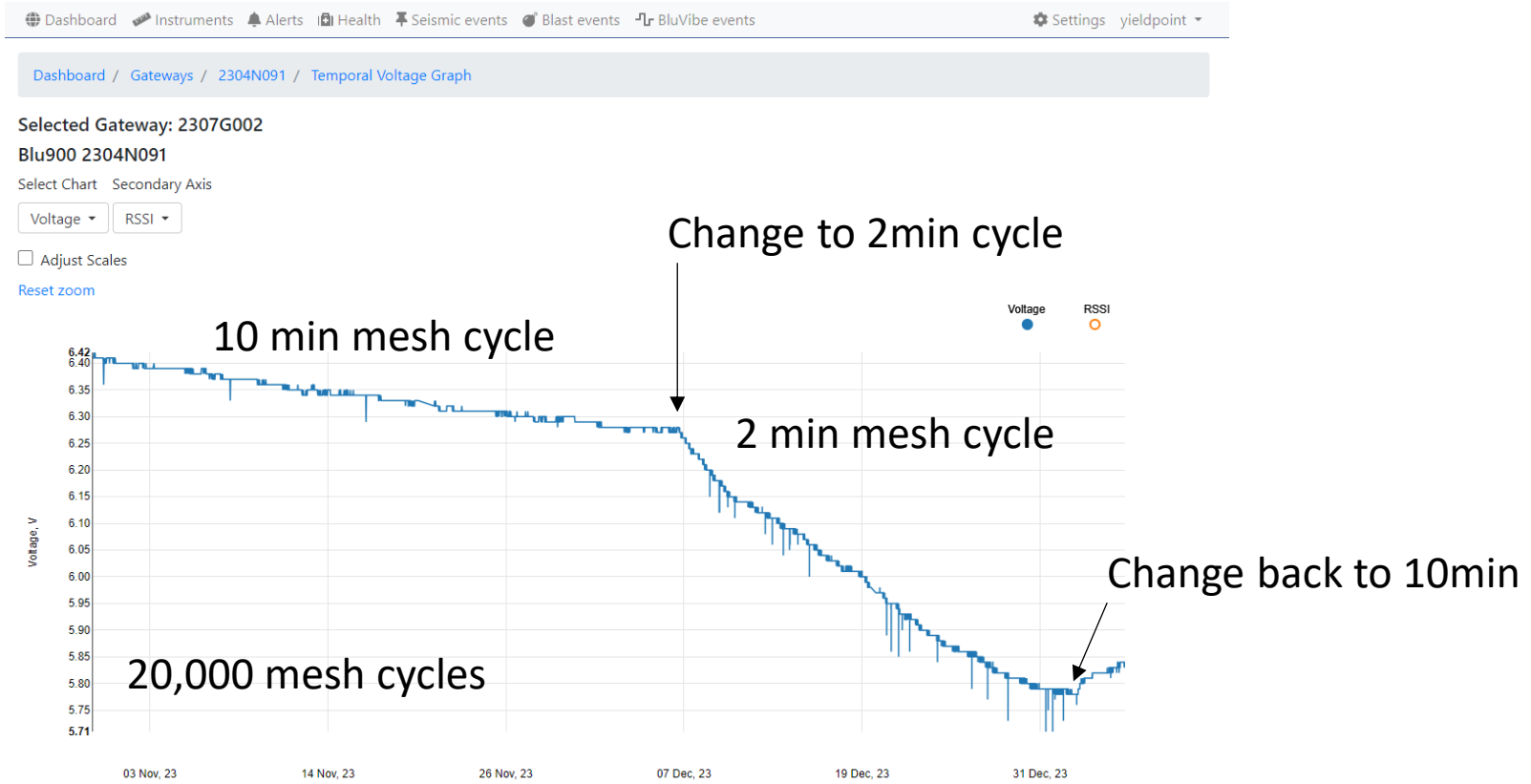
Blu900 Gateway in VP



Date Test	FW Ver.	V	mesh_id
23-09-27 11:22:21	2.126	7.83	4
23-09-27 11:24:21	2.126	7.83	4
23-09-27 11:26:25	2.126	7.81	4
23-09-27 11:28:24	2.126	7.82	4
23-09-27 11:30:21	2.126	7.83	4
23-09-27 11:32:24	2.126	7.84	4
23-09-27 11:34:20	2.126	7.83	4
23-09-27 11:36:20	2.126	7.82	4
23-09-27 11:40:20	2.126	7.82	4
23-09-27 11:42:24	2.126	7.82	4
23-09-27 11:44:20	2.126	7.82	4
23-09-27 11:46:24	2.126	7.82	4

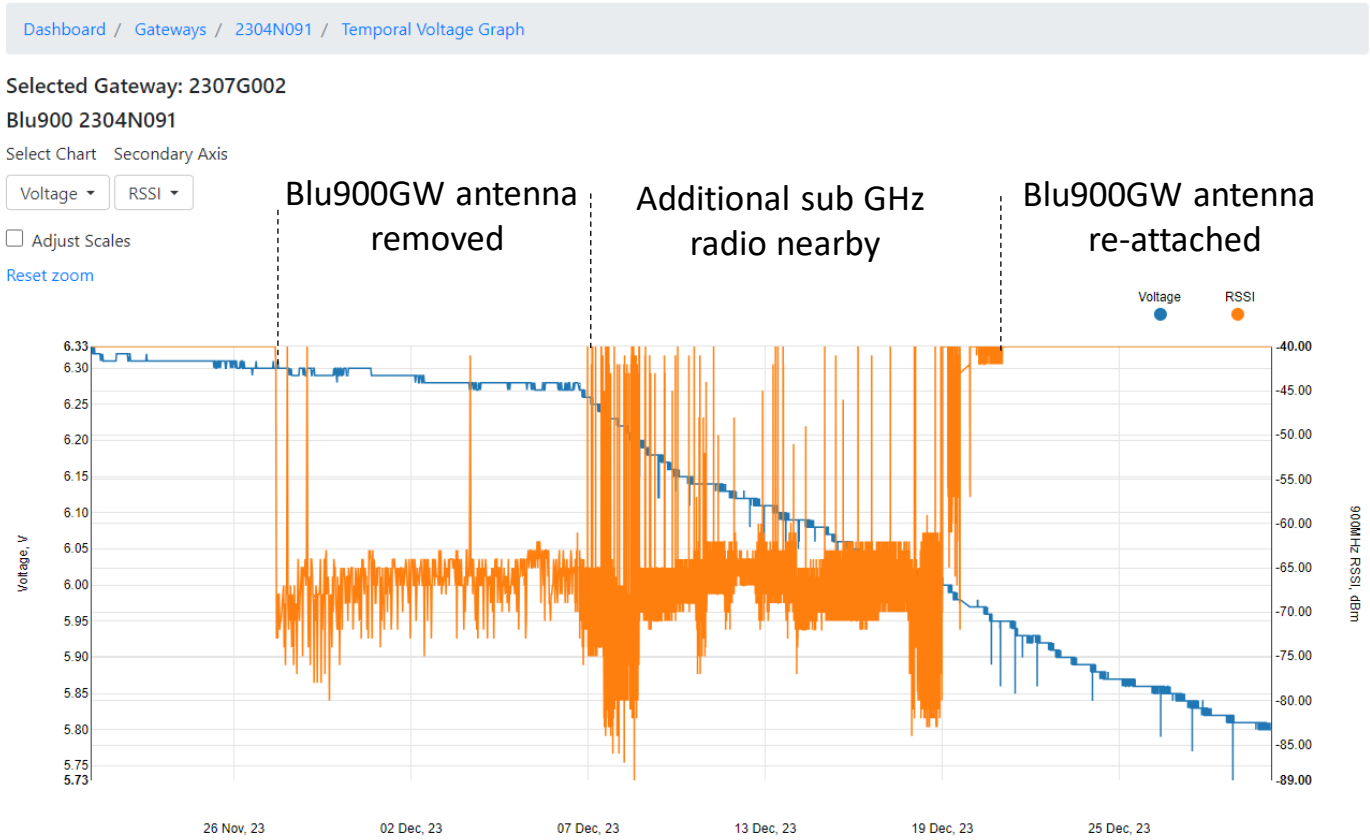
Blu900 Node in VP health

20,000 health readings just for this node



Blu900 Node in VP Health

20,000 health readings just for this node

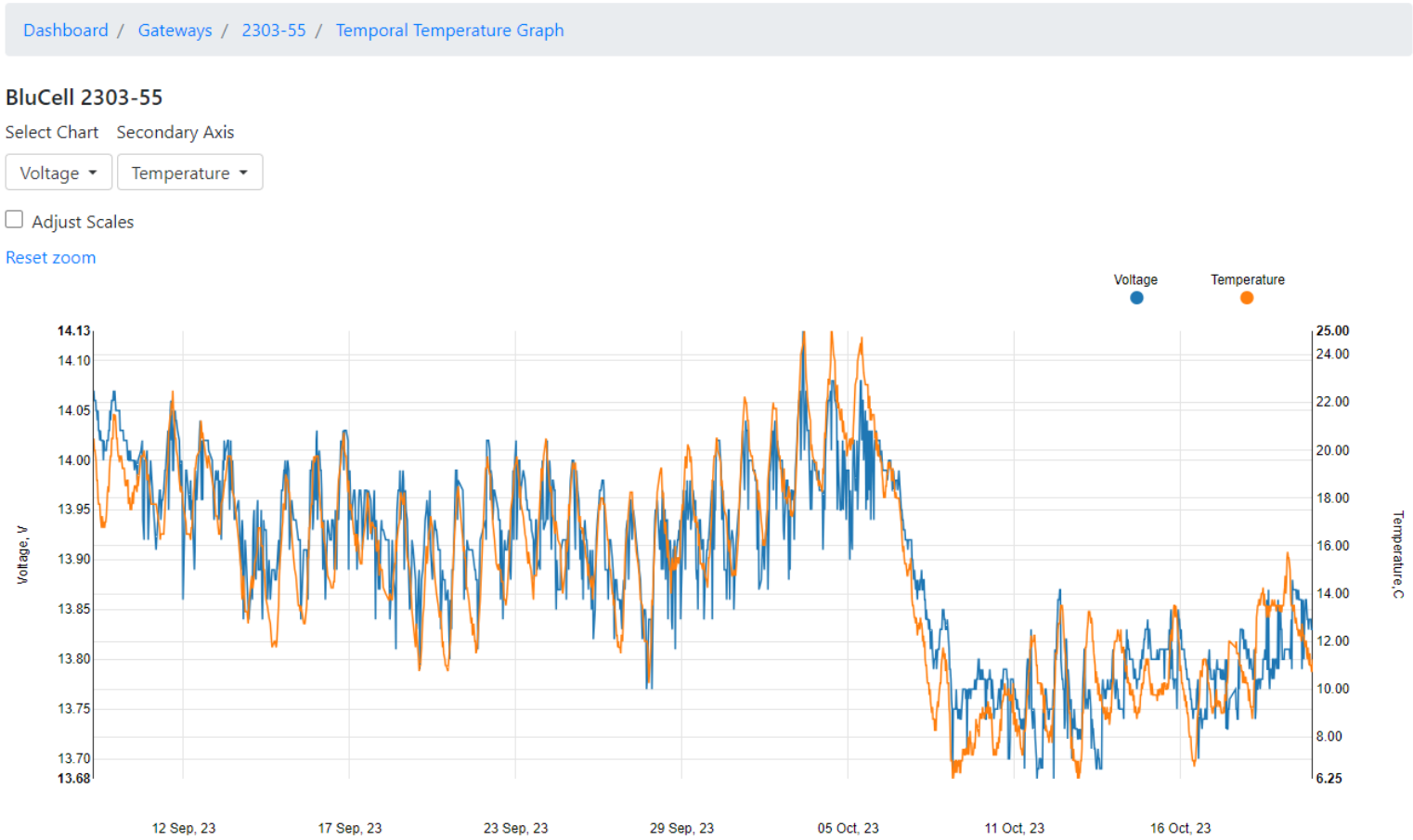


5.0

YieldPoint *Sensing the future*

BluCell GW in VP Health

Relation between 4 x 3.6 V Primary lithium-thionyl chloride (Li-SOCl2) and temperature

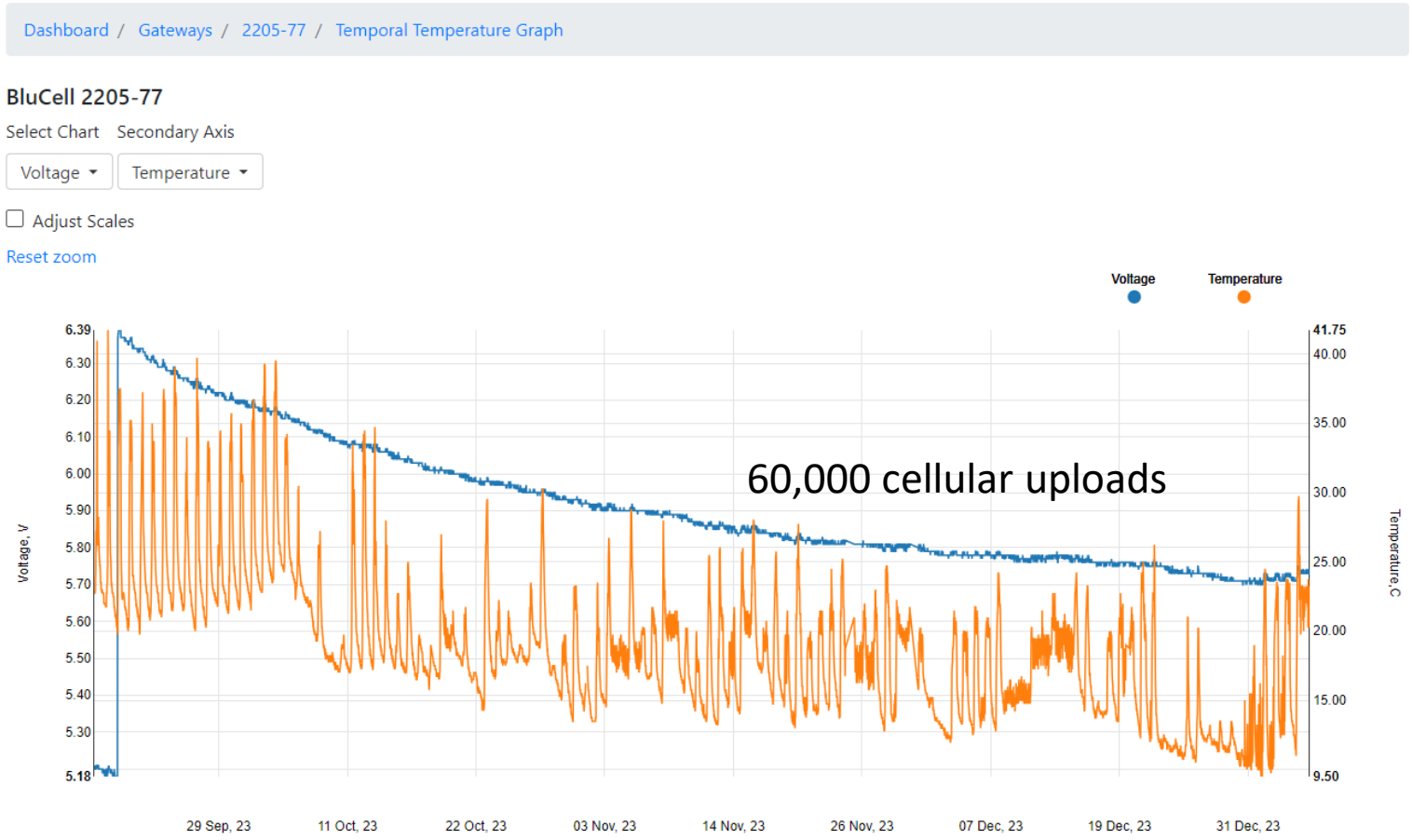


5.0

YieldPoint *Sensing the future*

Blu900 Node in VP Health

Battery discharge for a cellular gateway. 4 x D-cell alkaline



5.0

YieldPoint *Sensing the future*

Blu900 Solution-2023

Summary

Health monitoring for Blu900 telemetry components is a critical function within the ecosystem.

The health monitoring of populations of nodes on a single Blu900GW with multiple nodes becomes data intensive over time.

The redirection of health monitoring from the gateway to VP in the cloud is a much more scale-able and user friendly solution.

The data can be graphed over time and inter-relations between variables (e.g. temp and voltage) can investigated.

Alarms and alerts can be set.

The solution will continue to evolve.

VW details

Freq Ch# Start Span