Nexus Blue User Manual

Document Version: 1.0

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Sentek

Legal

This manual is created to provide the knowledge to install the Nexus Blue quickly and correctly.

Reading this manual will assist you with the choice of the right tools and procedures. It should save you time and ensure the correct installation of the DTU.

Please test the **Drill & Drop Connect App** and **Nexus Blue** before installing it in the field.

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Nexus Blue - Statement of Compliance

FCC note of compliance and statement of liability

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

Information to user

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the distance between the equipment and the receiver.
- Connect the equipment to the outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC ID 2ARQB-SM200

IC Compliance

ICID: 26216-SM200

EMC approvals

The Drill & Drop system complies with the following specifications:

HL7800

AS/CA S042.1:2018 Part 1: General Requirements for connection to an air interface of a Telecommunications Network.

- AS/CA S042.4:2018 Part 4: IMT Customer Equipment Requirements for connection to an air interface of a Telecommunications Network.
- 2014/53/EU – Radio Equipment Directive (RED)
- EN IEC 62368-1:2020+A11:2020 (For article 3.1a, Safety) Audio/video, information and communication technology equipment - Part 1: Safety requirements
- EN 50665: 2017 (For article 3.1a, Health) Generic standard for assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz).

- ETSI EN 301 489-1 V2.2.3 (2019-11) (For article 3.1b, EMC) Common technical requirements.
- ETSI EN 301 489-17 V3.2.4 (2020-09) (For article 3.1b, EMC) Specific conditions for Broadband Data Transmission Systems.
- ETSI EN 301 489-52 V1.2.1 (2021-11) (For article 3.1b, EMC) Specific conditions for Cellular Communication Mobile and portable (UE) radio and ancillary equipment.
- ETSI EN 301 908-1 V15.2.1 (2023-01) (For article 3.2, Radio) IMT cellular networks; Harmonized Standard for access to radio spectrum; Part 1: Introduction and common requirements.
- ETSI EN 301 908-13 V13.2.1 (2022-02) (For article 3.2, Radio) IMT cellular networks; Harmonized Standard for access to radio spectrum; Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE).
- ETSI EN 300 328 V2.2.2 (2019-07) (For article 3.2, Radio) Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

HL7802

- EN 301 511 V12.5.1 (2017-03) (For article 3.2, Radio) Global System for Mobile communications (GSM); Mobile Stations (MS) equipment.
- EN 301 908-1 V11.1.1 (2016-07) (For article 3.2, Radio) IMT cellular networks; Harmonized Standard for access to radio spectrum; Part 1: Introduction and common requirements.
- EN 301 908-13 V13.1.1 (2019-11) (For article 3.2, Radio) IMT cellular networks; Harmonized Standard for access to radio spectrum; Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE).
- EN 303 413 V1.1.1 (2017-06) For article 3.2, Radio (For article 3.2, Radio) Satellite Earth Stations and Systems (SES); Global Navigation Satellite System (GNSS) receivers; Radio equipment operating in the 1 164 MHz to 1 300 MHz and 1 559 MHz to 1 610 MHz frequency bands.

RoHs

- EN 50581:2012 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

Marking

The above EMC approvals allow the product to be marked CE, RCM and FCC.

Modifications

Any modifications to any part of the equipment or to any peripherals may void the EMC compliance of the equipment.

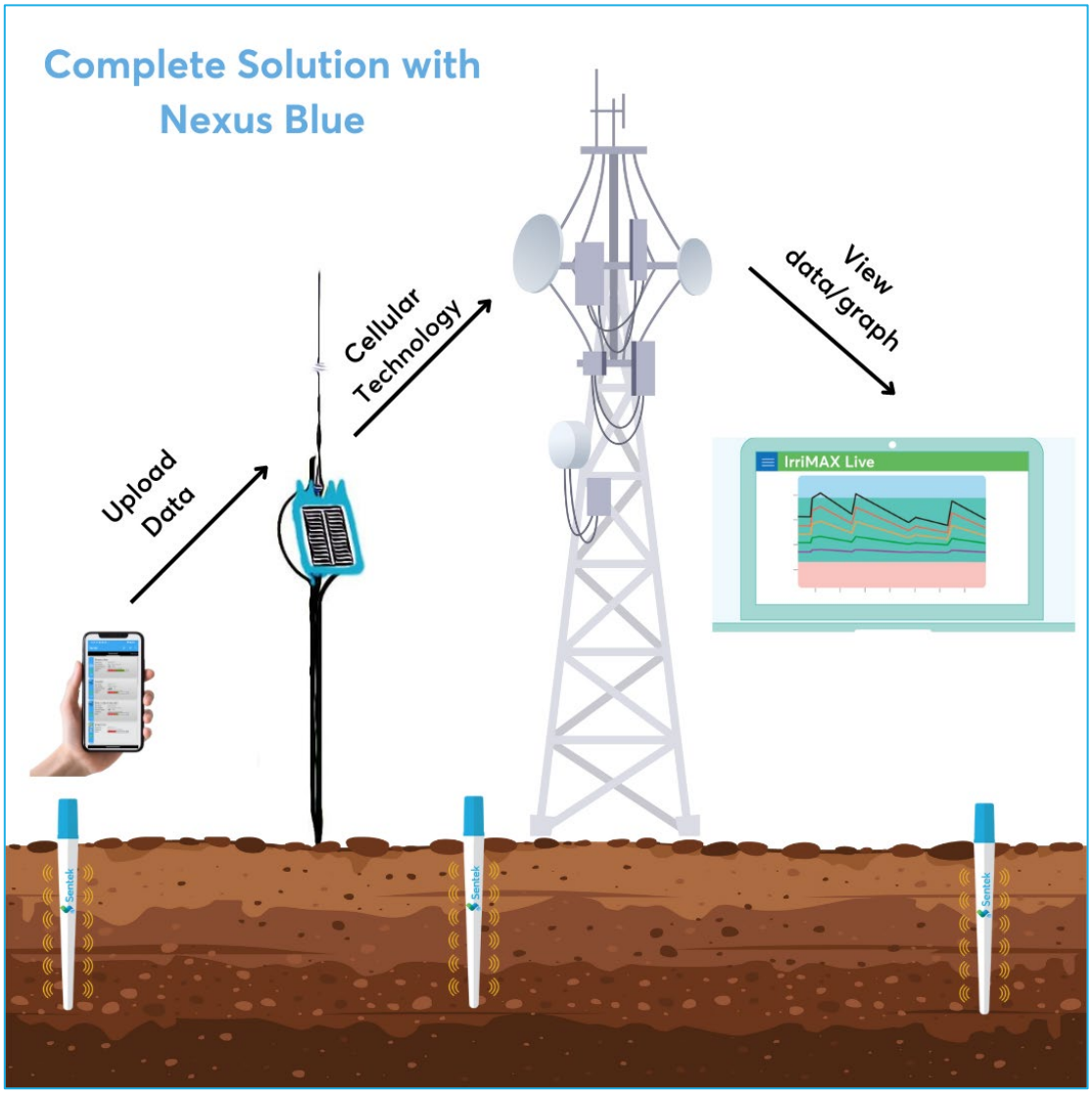
Radio Interference

The Sentek soil moisture probe is not to be operated in free air as it may cause interference to radio communication devices. Installation of all sensors completely below ground (not including the battery cap and antenna) is required.

Contents

Product Overview

The Sentek Nexus Blue is an efficient, low-cost Data Transmission Unit (DTU) that connects with multiple Drill & Drop Bluetooth probes (within a 5-metre range) to upload data to Sentek's IrriMAX Live Cloud platform using the latest low-power cellular technology. It utilises cellular communication to transmit soil moisture, salinity, temperature, and voltage data from the probe to the IrriMAX Live software. Additionally, it is equipped with Bluetooth Low Energy, allowing for wireless testing using an Android or iOS device (phone or tablet) with the Drill & Drop Connect App. Minimal maintenance is required over the product's lifetime, as it is powered by a solar panel that charges its battery.



Features

Mechanical features:

- **Probe Type:** Drill & Drop Bluetooth probes.
- **Built-in Solar Panel:** Attached to a rechargeable lithium-ion battery with integrated protection, which provides power to run the system and charges the battery.
- **Sealed Housing:** Protects against moisture intrusion.
- **Clip-in Fastening:** The DTU box is secured without screws or nuts.
- **Non-Corrosive Mounting Bracket:** Can mount the product to a star dropper, wooden post, or circular pole using a hose clamp, 2x 4 mm UV cable ties, or 2x 12-gauge self-tapping screws.
- **Push Button Switch:** Located at the bottom, this switch can be used to take the DTU out of shipping mode and put it back into shipping mode. It can also initiate scanning for downloads.
- **User Access:** Designed to provide an easy method to open the unit, allowing users to insert their own SIM card or perform maintenance tasks such as battery replacement.
- **Operating Temperature:** -20 °C to +60 °C; solar charging is limited to below +40 °C.
- **Weight:** 850 g (excluding mounting bracket).
- **Speaker:** Provides audible feedback when the button is pressed.

Power features:

- 3350 mAh (11.1 V) rechargeable Lithium-ion battery with integrated protection.
- Solar Panel 3W, 15V.
- Battery life of 4 years under standard operating conditions (30-minute sampling, 3-hour uploads in a good signal strength area).
- Lithium-ion battery can last for 2 months without solar charging (under standard operating conditions).

Firmware features:

- Supports shipping mode on Firmware Version 1.1.1 and onwards.
- Supports remote firmware update.
- Supports downloading/uploading from unlimited number of Bluetooth probes within 5m of Nexus Blue.
- Supports multiple DTUs for redundancy (DTUs will share the downloading).

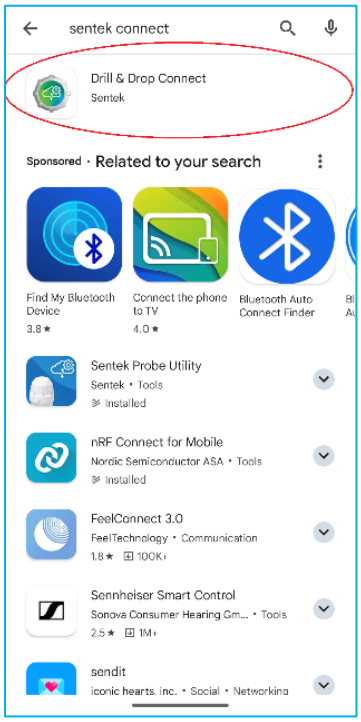
Mobile Application features:

- Configuration in less than 5 minutes (in typical cases) within a 10m operating distance between the mobile device and Drill & Drop Bluetooth probe.
- Android Platform 5.0 Support or higher (Samsung S4 equivalent or higher).
- iOS Platform support (iPhone 5 equivalent or higher).

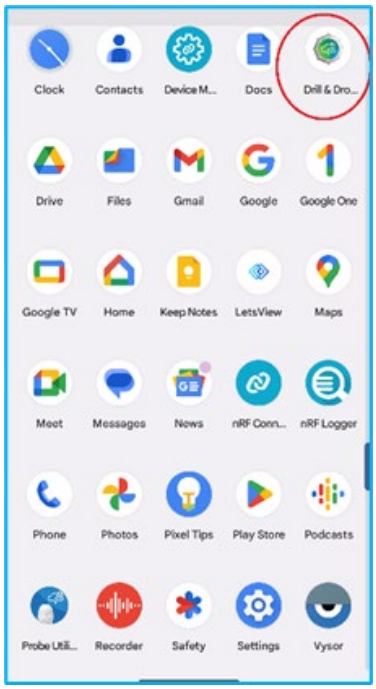
- App displays the current firmware version and prompts the user to upgrade the firmware.
- Cellular: 4G Cat-M1 and 2G networks only (**note:** hub firmware needs to be updated to support other technologies, e.g. 3G or 4G).

Installing the Drill & Drop Connect App

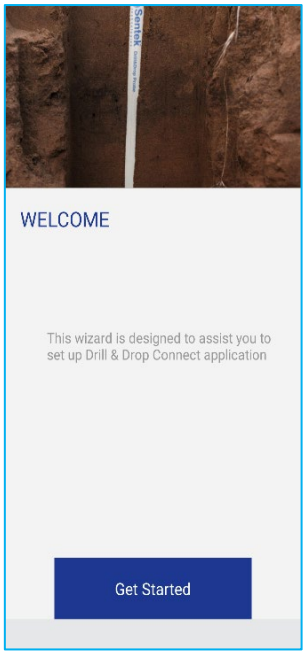
1. On your mobile device, open the **App Store** (iOS) or **Google Play Store** (Android) and search for "**Sentek Connect**" on the Search tab.

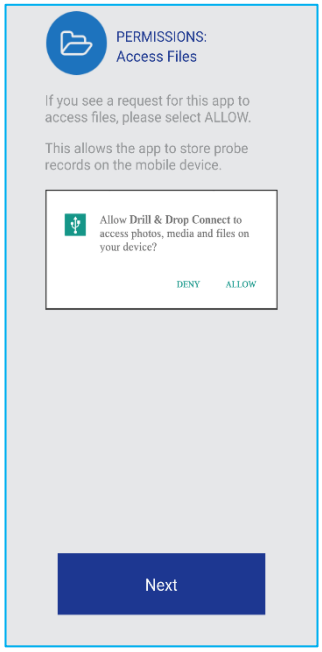


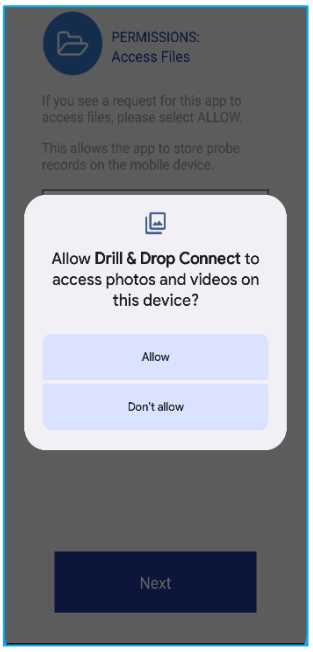
2. Install the App on your phone. Once the installation is complete, the App icon will display on the **Home Screen** of your mobile device.



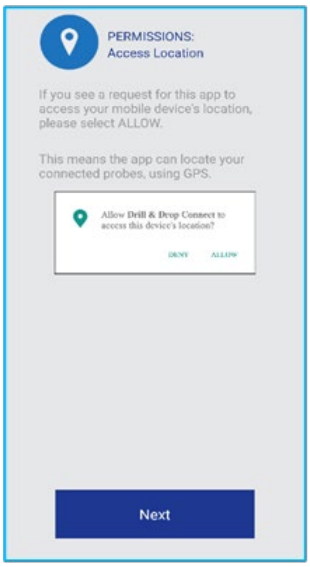
3. Proceed through the Introduction Wizard. Clicking on ***Next***, allow access to files: photos and videos on the mobile device.

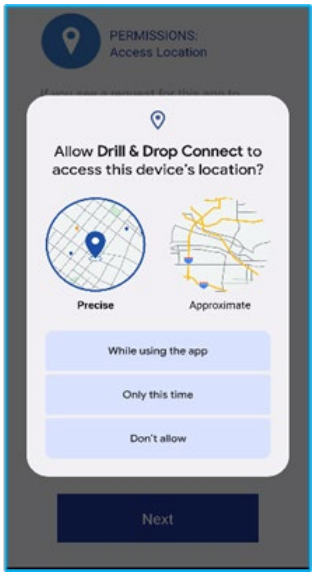




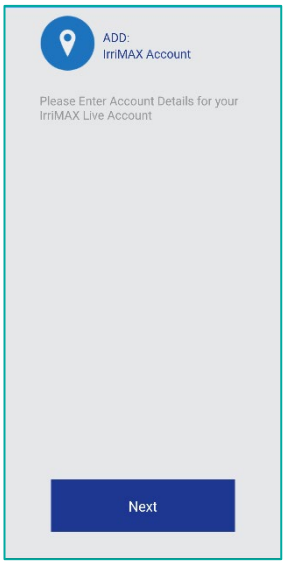


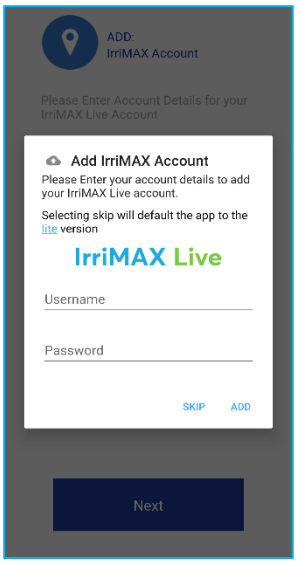
4. Allow access to **location.**





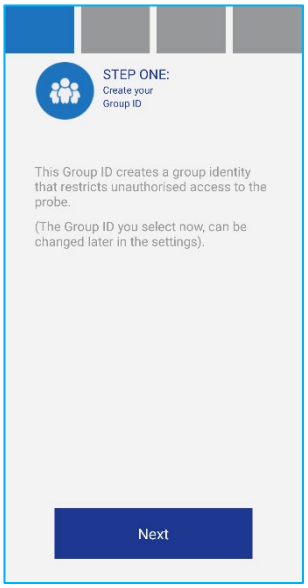
5. Enter your **IrriMAX Live Account** details (Username and Password).
If you do not have an IrriMAX Live Account, selecting **skip** will revert the App to the **Lite version.**

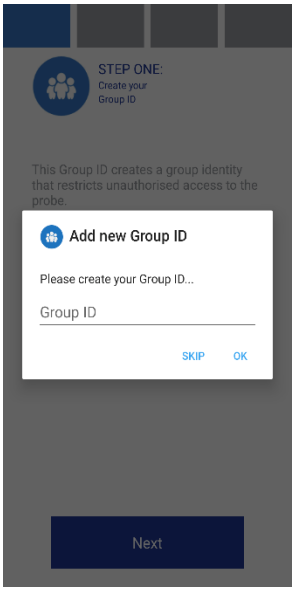




6. Create your **Group ID**.

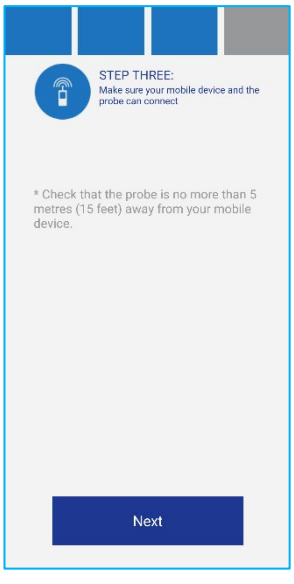
The Group ID will appear on the **Group ID List**. The **Nexus Blue** and the **Drill & Drop Bluetooth probes** can be added to the Group.



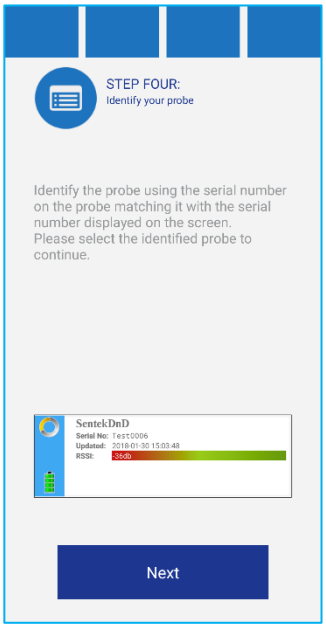


7. Ensure the **battery** and **metal shim** supplied along with the probe is installed correctly as instructed in the App.

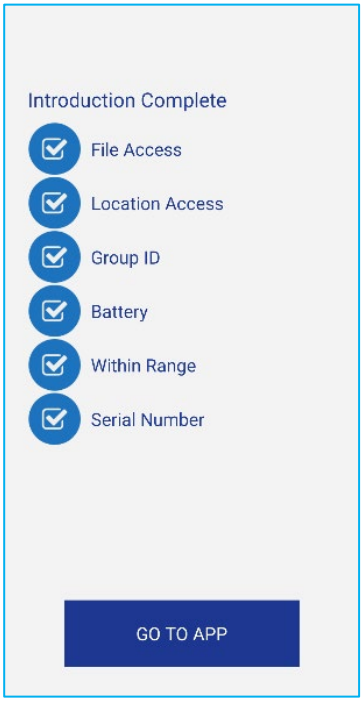
8. Ensure the **probe** is within 5m of your **mobile device**. Click **"Next"** to enable **Bluetooth** access.



9. Verify that the **serial number** on the probe cap matches the serial number shown on the **scan screen**.

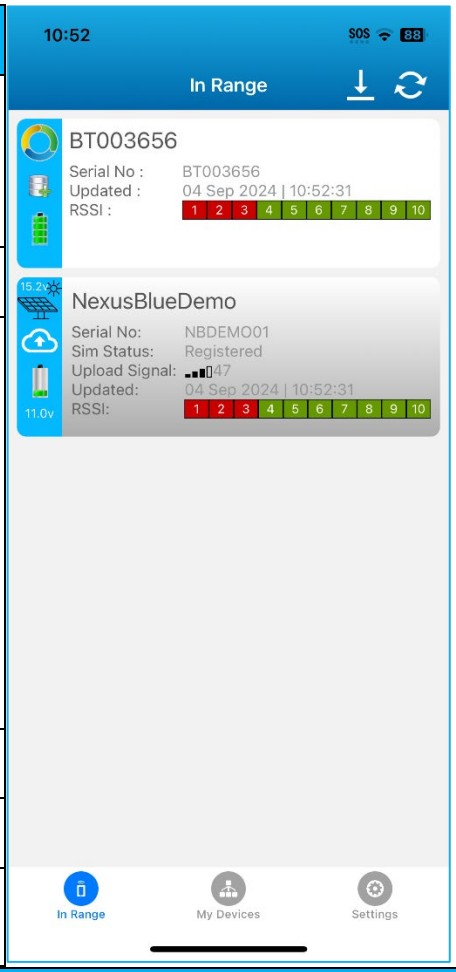


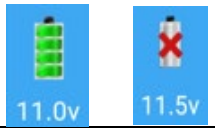
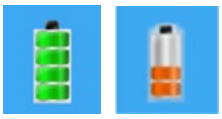
10. **The Introduction Wizard** is now complete. Clicking on **GO TO APP** will direct the App to the **Main Screen** (Scan screen).

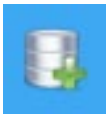


Main Screen Showing Probe and Nexus Blue Information

Icon name	Description
Device Name	The device name is used to supply the IrriMAX database name. The device name can be up to 16 alpha-numeric characters and underscore. It cannot be blank. The default is the serial number.
Serial Number	The serial number is unique for the probe/DTU for identification and warranty purposes.
RSSI (Received Signal Strength Indicator)	RSSI indicates the signal strength between the probe/DTU and the mobile device running the app. A stronger signal ensures a better connection quality. Conversely, a low RSSI value suggests a weak or poor-quality signal, which can lead to slow data transfer rates or other connectivity issues. To improve the connection, the phone should be moved closer to the Nexus Blue/probes. Probes/DTUs located near the app will display higher RSSI numbers. If the RSSI appears in red, the signal is marginal, and communication may fail.
Upload Signal (DTU)	The Upload Signal indicates the cellular signal strength.
Sim Status (DTU)	The Sim Status indicates the registered network of the SIM card inserted in the DTU.
Updated	Date and Time of when probe or hub was last seen scanning.



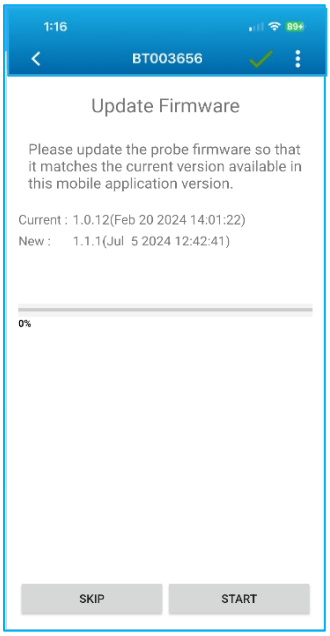
Icon	Description
Solar voltage 	This displays the solar voltage as measured by the Nexus Blue.
Battery voltage (Nexus Blue) 	This displays the battery voltage as measured by the Nexus Blue on the Hub tile.
Battery voltage (Probe) 	This displays the Battery capacity of the Bluetooth probe **Four Green bars** – Fully operational **Two Orange bars** – Battery marginal (Change battery soon) **One Red bar** – Samples not being taken (Change battery immediately).
Data Upload 	The hub will only download data from probes that are showing this arrow.

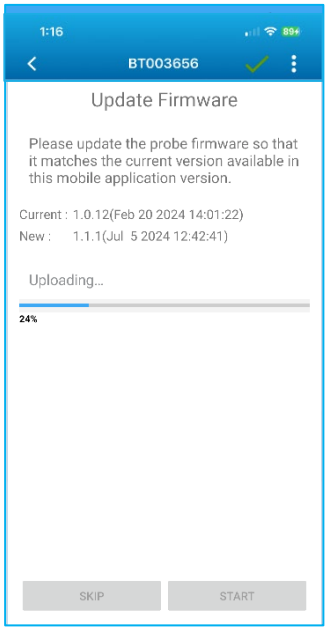
Data Download 	The 'plus' symbol indicates that the probe contains data that needs to be downloaded.
Three segment circle 	**Grey** – Process not yet done **Yellow**- Probe configured **Green** – Download successful **Blue** – Field Tested **Yellow + Green** - Configured **Yellow + Green + Blue** - Configured and Field Tested
Upload Data 	The **Cloud Icon** appears on the screen, on the Hub tile, only when the DTU is active: while uploading/downloading from probes on range.
Global Download 	Clicking on the **Global Download** icon initiates the downloading/uploading of all the probes on the screen. The progress of download of each probe can be viewed on the Scan screen of the App. After completion of each download, the App sends a notification.
Scanning 	The App will continuously scan when Nexus Blue is in the vicinity. Clicking on the **Scan icon** will stop the scanning. Clicking on it again will resume the scanning process. **Note:** In newer Android versions, apps are only permitted to request scans up to three times. If you repeatedly stop and start beyond this limit, the app will be locked out from scanning for 30 seconds.
Settings 	Clicking on the ***Settings*** icon opens the menu for confirming the global parameter for the App.

Configuring the Drill & Drop Bluetooth Probe

1. The App will prompt the user to **upgrade firmware** if the Firmware version in the probe is less than V1.1.1.

   Note: The probe requires V1.1.1 or higher to work with the Nexus Blue.





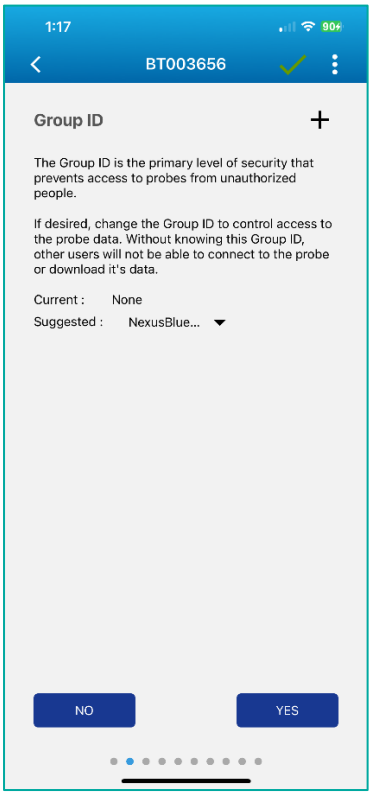
2. Users can change the **name** of the probe. The name can be changed to anything up to 16 alpha-numeric characters and underscores.

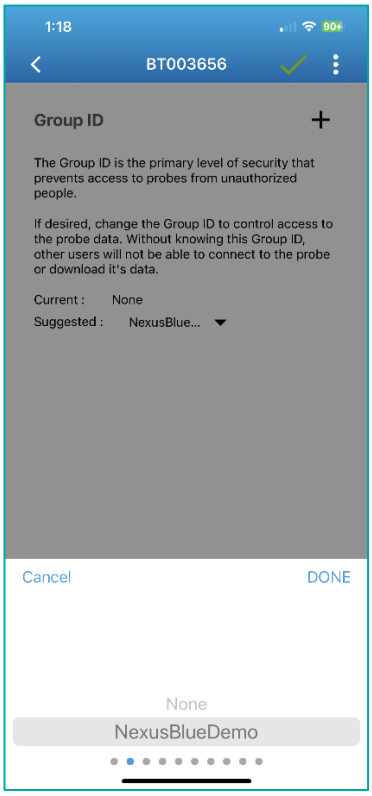
3. **Group ID** is recommended to prevent anyone accessing your probe. This prevents unauthorised access, allowing only people included in the Group ID access to the probe details.

   The App displays the **Current** Group ID of the probe, and a **Suggested** Group ID based on your Group **ID list**.

   Clicking on the Suggested **arrow** opens the Group ID list, from which the desired Group ID for the probe can be chosen.

   Note: By default, the hub will download from any group.

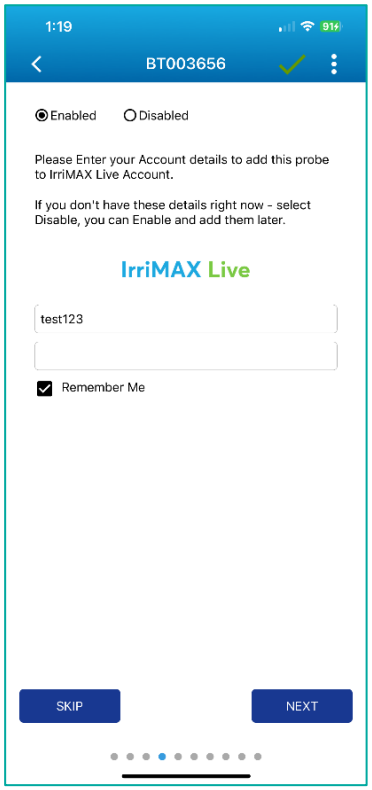




4. Enter **IrriMAX Live Account** details: **Username** and **Password** to add the probe to the desired **IrriMAX Account. IrriMAX Account** is used to upload data to the Cloud.

   Selecting the **Remember Me** option, the App will remember the entered IrriMAX details.

   Note: Data cannot be uploaded to the **Cloud** without an active **IrriMAX Live Account.**

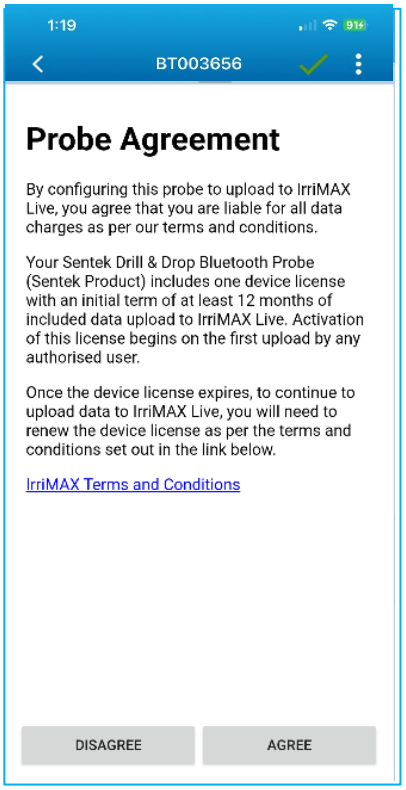


5. Click on the **link** provided on the **Probe Agreement** screen to view the complete **Terms and Conditions**.

   The Probe Agreement informs users that they are liable for all **IrriMAX Live** data charges.

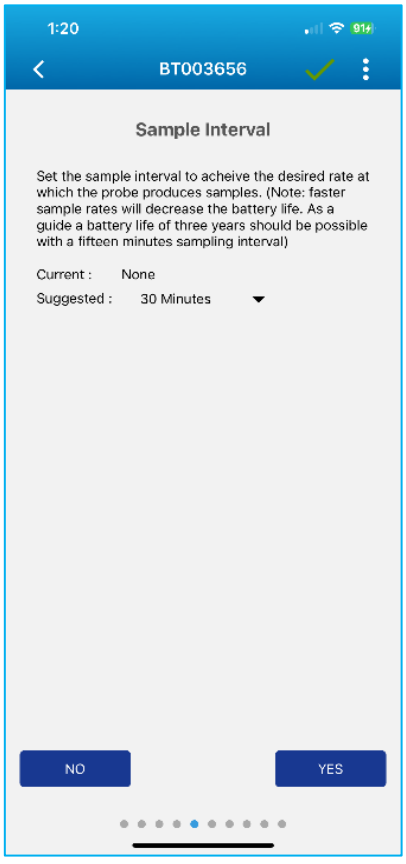
   Clicking on **Agree**, the App advances to the next screen.

   Clicking on **Disagree**, the uploads to **IrriMAX Live** will be disabled.



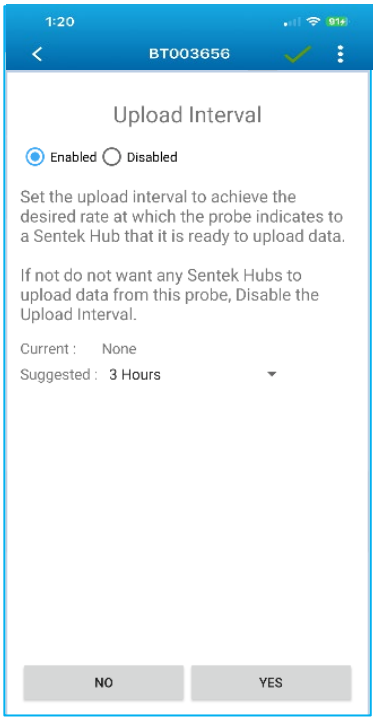
6. **Sample interval** can be set between 1 minute and 12 hours. For increased battery life, it is recommended to set the sample interval to the default setting of 30 minutes.

   The App also displays the **current** and **suggested** sample interval on the screen.



7. The **upload interval** for the Nexus Blue must be **enabled**. Once activated, the desired interval can be set, ranging from 1 minute to 12 hours, with a default setting of 30 minutes. To stop uploads from the **Nexus Blue**, simply disable the upload interval, and the probe will indicate that there is data to upload.

   The app also displays the **current** and **suggested** sample intervals on the screen to help manage the upload schedule effectively.

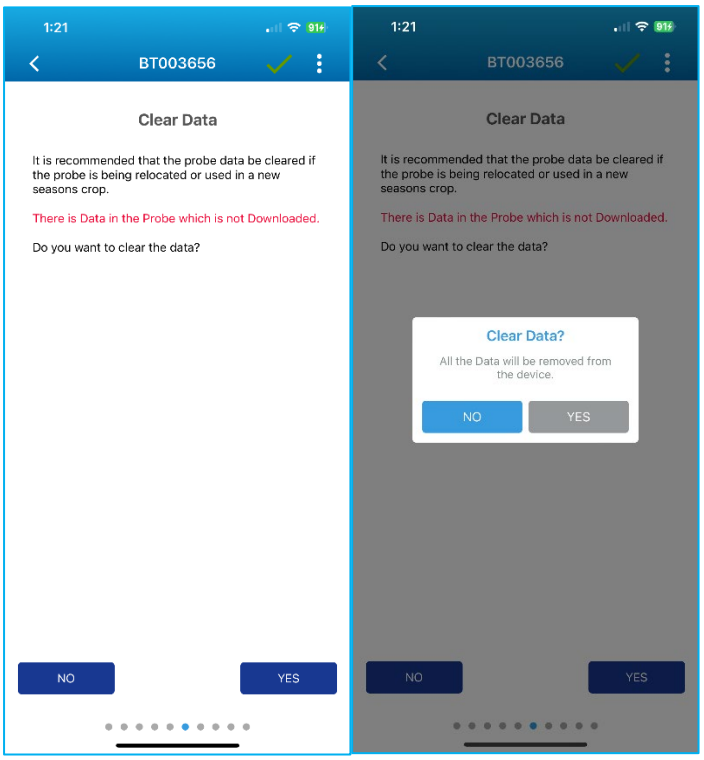


8. The App prompts the user to **clear all data** from the probe.

   If the probe has been moved to a **new location**, it is recommended that the data from the previous location is cleared before uploading data from the new location.

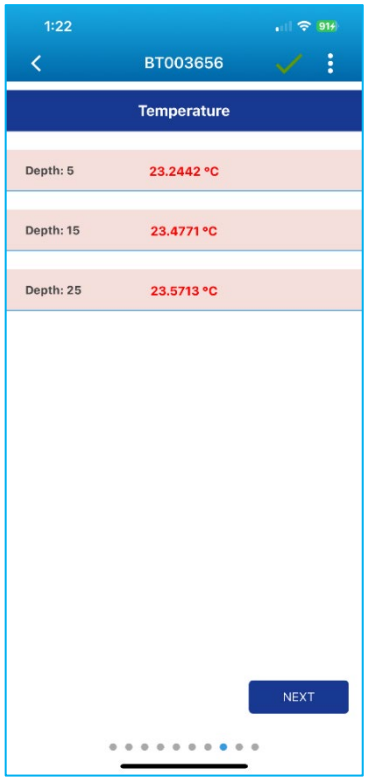
   In some cases, users electing to set new **Start Date** on the **IrriMAX Live probe account**, it is recommended Download existing data from the probe and Upload to **IrriMAX Live** before clearing existing data.

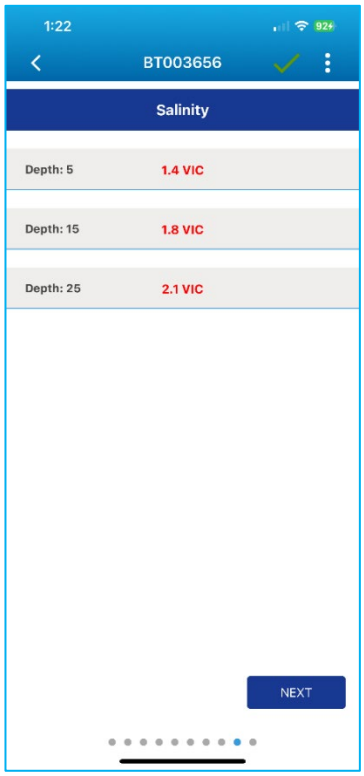
   It is suggested that the user **Clear Data** before the probe is installed in the ground. This removes any data that was collected when setting up the probe prior to installation.



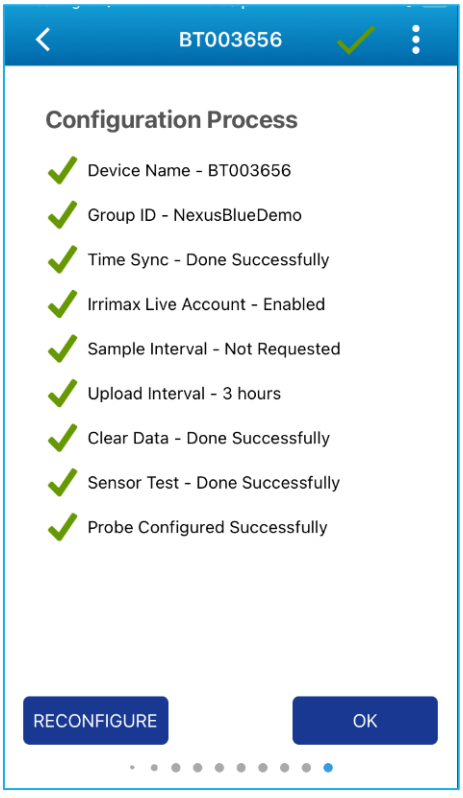
9. **Continuous sampling** of sensors is displayed until **NEXT** is clicked. The background changes colour when sensors are being sampled.

   To view samples of other **sensor types**, swipe to move between tabs.



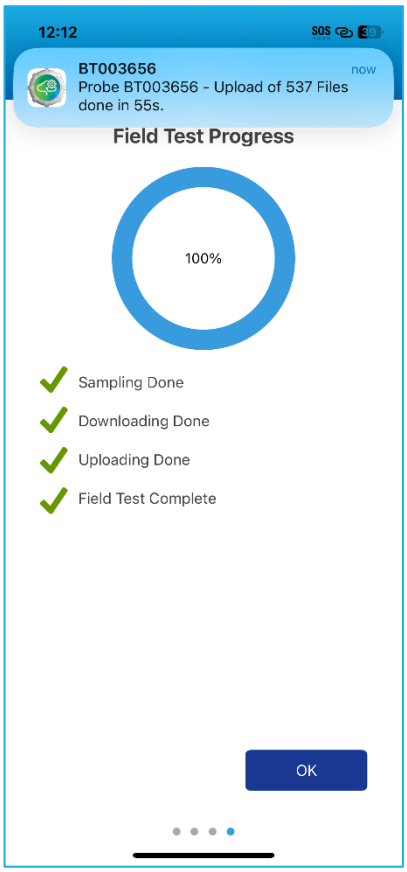


10. This screen displays the **Final Configuration** progress. The App displays a **green tick** against each successful step and a **red cross** against steps that are not configured to the probe.



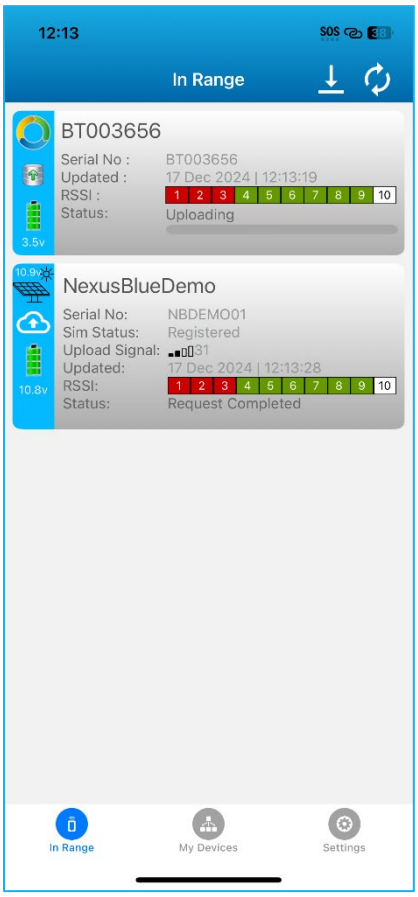
Test to Verify If the Unit is Set-up Correctly

1. Click on the probe's name to connect. From the menu select **Field Test**.
2. Once the app connects to the probe, click on **Skip** or **Next** to move to the field test progress screen.
3. Wait for the app to complete the **Field Test**.
4. Once the **Field Test** is completed, click **OK** to proceed to the scan screen and long press on the hub tile. This should initiate a **Download/Upload.**

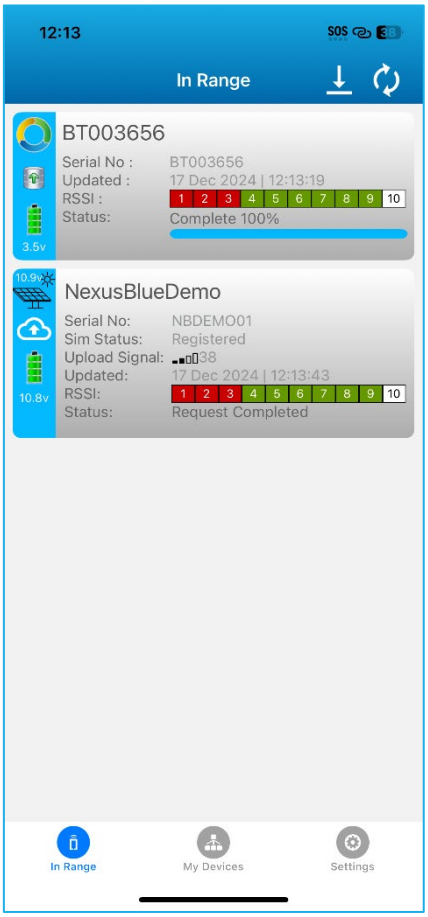


5. Observe the hub and probe, the app should be scanning and updating the two devices (the scan icon should be rotating). If the status does not change to connecting or fails without advancing to uploading, this could indicate that the probe and hub are too far apart.

   Note: The probe needs to be within 5m of the hub, with minimal obstruction. If the canopy is very dense, the hub may need to be moved closer.



6. The probe status should indicate the hub connecting to it and downloading. It should then show uploading and finish with a Complete 100% status.



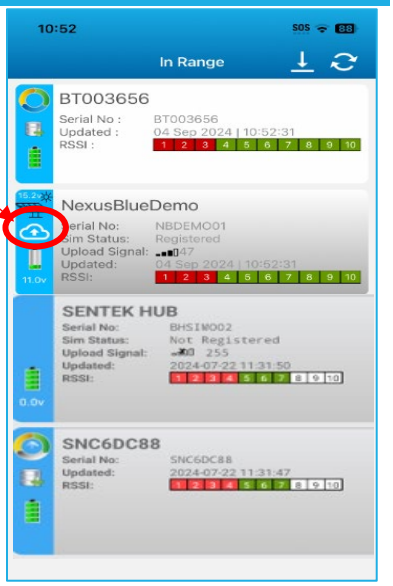
7. If the status does not change to complete or shows **IrriMAX Live** upload failure, this could be due to a problem with the network. This can occur normally; however it is only a problem if it is consistently failing. Check the signal strength and the unit may need to be raised higher to get better cellular coverage. If the **Registration** changes between **Registered** and **Not Registered**, this could also be a problem with poor signal quality.

   Note: It is important to note that the app must be used to verify operation by observing the status in steps 4 & 5, performing a field test using the app would have already uploaded the data so checking that the data is on **IrriMAX Live** would not be confirmation that the hub has worked.

Downloading/Uploading

1. When the **Nexus Blue** is **active** and scanning for probes in range to download/upload from, the **cloud icon** appears on the Hub tile on screen.

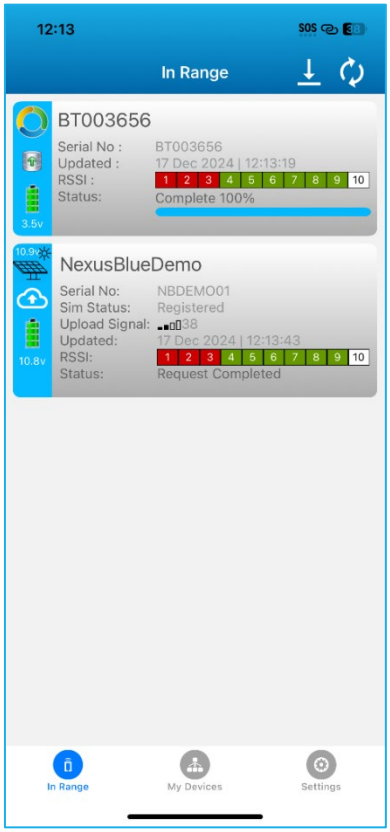
   Note: The **Nexus Blue** will only download from probes that indicate there is data available for download (shown by the up arrow in the database icon).



2. When the **Nexus Blue** is connected to a **Bluetooth Probe** (in range) and starts to download, the **status** of the download can be viewed on the **Probe** on the App.

3. Once the download is **completed** on the first probe, the Nexus Blue moves to the next Bluetooth probe (in range) to **download** from.

   Note: By default, the hub will search for probes for up to 2 minutes before returning to sleep mode. However, there is a default upper limit of 10 minutes, meaning that if there are too many probes to download within that time, the hub will stop searching and exit the state.



Connecting All the Equipment

Drill & Drop Bluetooth Probe

iPhone/Android Mobile Device

Nexus Blue

External Antenna for Nexus Blue

Exiting Shipping Mode

Unscrew the cap and press the button at the bottom of the unit to activate or begin downloads.

Do not remove cover before the activation!

To activate or start downloads unit requires 30 minutes of sunlight to function.

Basic Sound Indicators:
3 Beeps: Searching for a network.
1-5 Pips: Indicates signal strength (5 pips represent excellent signal strength).
Single Beep: Probe detected.
3 Fast Beeps: Connecting or downloading.

Additional Tone Indicators:
Registered: An ascending tone signifies successful registration on the network.
Registration Denied: A descending tone ending with a very low tone.
Out of Coverage: A descending tone followed by the standard three beeps indicating network search.
No SIM Card: A descending tone with three low tones.
Modem Not Working: A descending tone with six faster-paced low tones.
Low Battery: A low-tone SOS signal.

Insert Own Sim Card

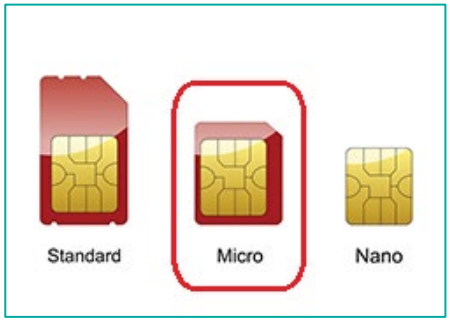
1. Ensure the **DTU box** is disconnected from the Antenna cable before opening the DTU.

   Carefully remove the casing from the DTU box using the **pull cord** provided.

2. Insert the **SIM card** into the SIM holder.

3. Use the correct SIM card size (Micro SIM 3FF).

   Recommended = 1MB/month.



Data Usage

Under typical conditions, with a 30-minute sample interval and 1–3-hour upload intervals, each probe typically uses approximately 10KB of data per upload, regardless of size or type of probes. (e.g. 30cm through 120cm) or type of probe (e.g. moisture or salinity type).

For example, a Nexus Blue uploading data from a single probe with a 3-hour interval would result in approximately 8 uploads per day (80KB/day). Over a 30-day period, this equates to approximately 2400KB of data usage. Therefore, a 3MB data plan is recommended.

Note: Data usage will increase if the signal strength is poor, e.g. below 30 for 4G and below 12 for 2G and can also increase slightly if the signal strength between the Bluetooth probe and the DTU is also poor. in cases where data usage needs to be lower due to high costs of data, it is possible to turn off secure https uploading of data to reduce data usage and to contact Sentek customer service to make this change.

Bluetooth Communication

The Nexus Blue uses Bluetooth V4.0 Low Energy protocol technology to communicate to the Sentek Drill & Drop Probe. Ensure that the Sentek Drill & Drop Probe and Nexus Blue are positioned within 5 meters of each other to establish a stable Bluetooth connection, allowing data to be uploaded to IrriMAX Live according to the set upload intervals.

The Nexus Blue downloads the samples stored in the Bluetooth probes and uploads the data, using the Internet to IrriMAX Live (via the user's account).

Installation and Set-up of Nexus Blue/Drill &Drop Bluetooth Probe

The physical installation of the Nexus Blue is detailed in the IoT DTU Installation Manual, while the installation of the Drill & Drop Bluetooth Probe is covered in the Drill & Drop Installation Manual. **Scan the QR code or click the link provided below to access the manual.**

Instructions for setting up and configuring the probe can be found in the page (**9 -12**). **Scan the QR code or click the link provided below to access the Drill & Drop App for probe settings.**

QR Codes and Links

Sentek IoT DTU Manual

Bluetooth Drill & Drop Manual

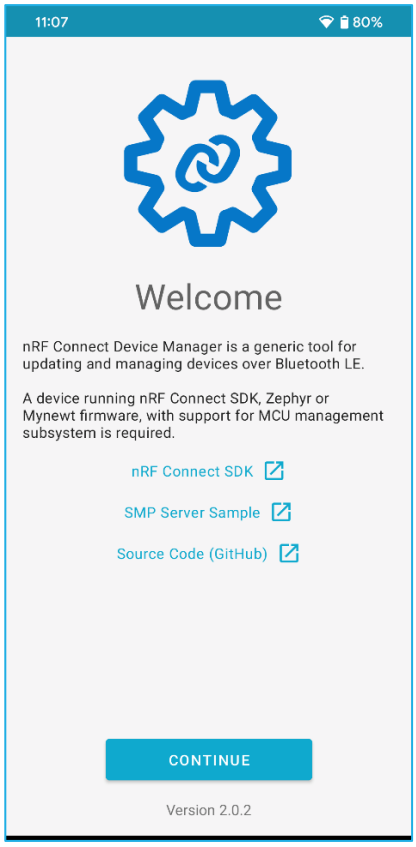
Drill & Drop Connect iOS

Drill & Drop Connect for Android

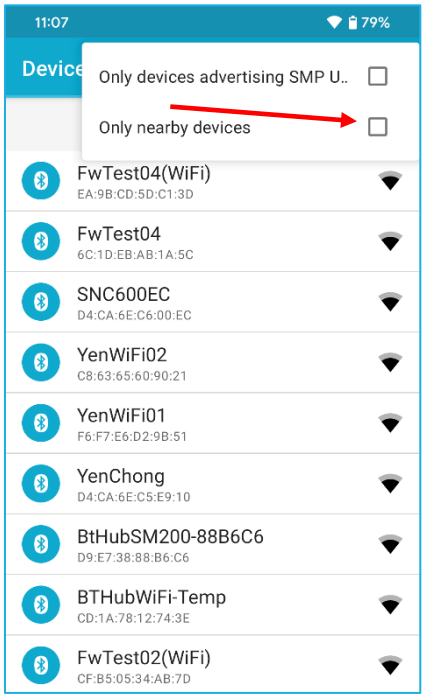
Appendix A Setting APN Using Device Manager App

1. On your mobile device, open the **Google Play Store**

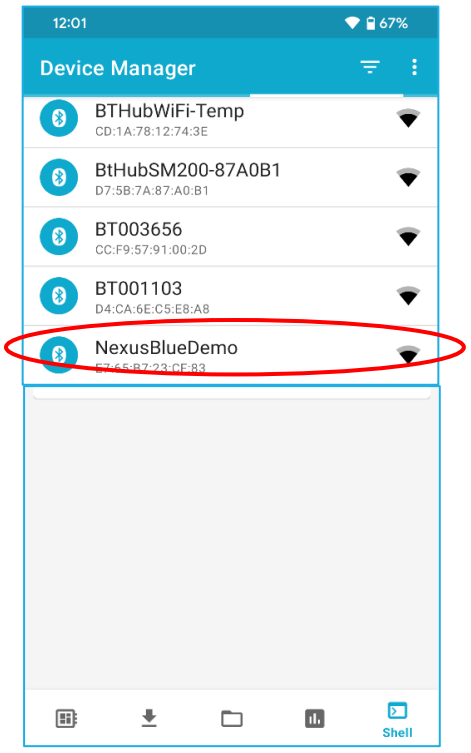
   GET IT ON Google Play (**The Shell command is available only on Android devices**) and search for "**nRF Connect Device Manager**" on the Search tab.



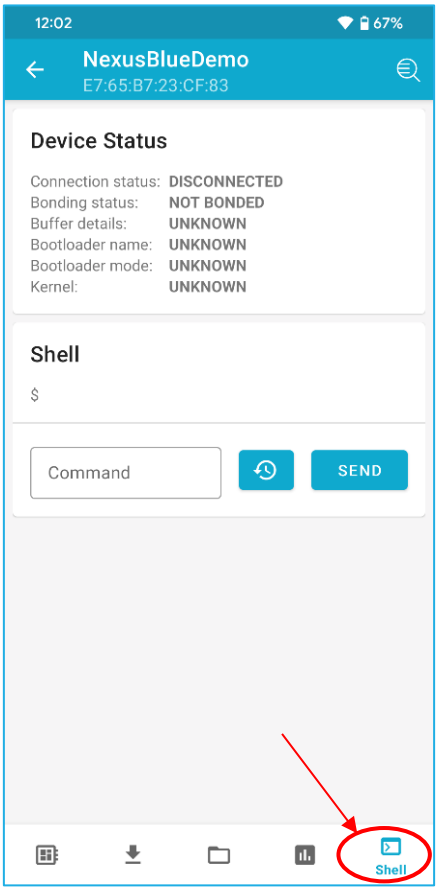
2. To ensure the app detects your probe or hub, **deselect** these two options to enable proper detection.



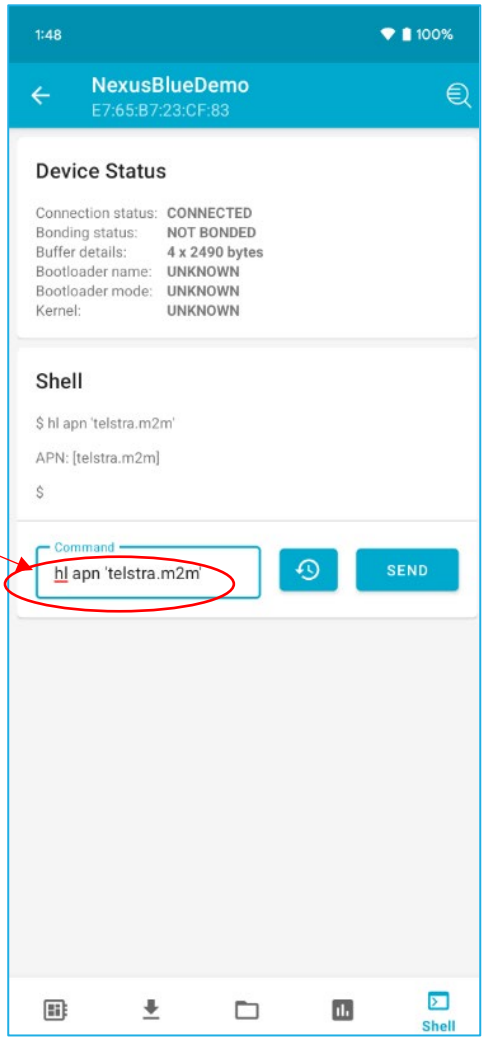
3. The Device Manager will scan for nearby hubs. Please **select** your preferred hub from the list.



4. After selecting the desired probe or hub, click "**Shell**" to input the specific command.



5. Enter the command **hl apn 'telstra.m2m'** and click the "Send" button to execute the command.

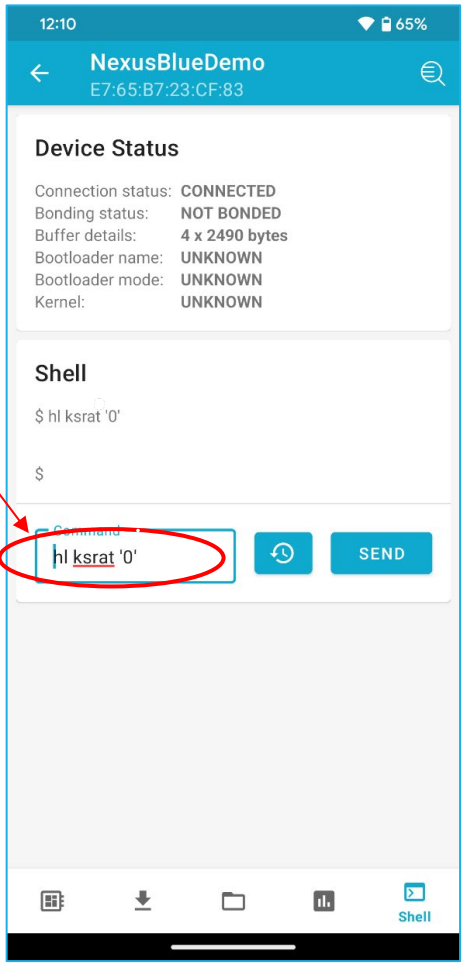


Appendix B Using Different Cellular Type (For European Regions) Setting 2G & 4G Support

1. For European users, the setting command to switch between 2G and 4G support is:

   hl ksrat '2' for 2G

   hl ksrat '0' for 4G



2. The chosen module is based on the network type:

   (i). HL7800 module: used for 4G CAT-M1 Australia and US.

   (ii). HL7802 module: used for 2G and 4G CAT-M1 Europe.

   Note: The modem comes with the module option marked.