



**Deviceworx Technologies Inc.**

**xTAG Explorer App**

**for**

**xTAG BEACON**

**Users Guide**



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## Revisions

Rev	Author	Notes	Date
1.0	Mark Janke	Original Draft	June 10, 2021
2.0	Mark Janke	Updates after internal review and bug fixes.	Sept 27, 2021

## Overview

This document is intended to provide users of the Deviceworx xTAG BEACON (“xTAG” within the remainder of this doc unless stated otherwise) with details on how to use the xTAG along with its supporting xTAG Explorer Android App. The xTAG incorporates a Bluetooth Low Energy (BLE) transceiver with Near Field Communications (NFC) tap support. The xTAG Explorer App communicates with xTAG devices for monitoring and configuration purposes over BLE 5.0 to a maximum distance of 300’ (100 m).

## xTAG Explorer App Support for All Deviceworx xTAGs

The xTAG Explorer App also supports the management of other xTAG types including xTAG BLE Vibration Sensors, listing all xTAG types on its main screen. Selecting a listed xTAG opens a Detail screen that is specific to the type of xTAG selected. This document covers only the screens visible when interacting with xTAG BEACON devices. For information on xTAG Explorer screens supporting other xTAG types (e.g. the xTAG BLE Vibration Sensor), please consult Deviceworx for appropriate user documentation.

## xTAG BEACON

The figure below shows an xTAG BEACON.



## Mount Points

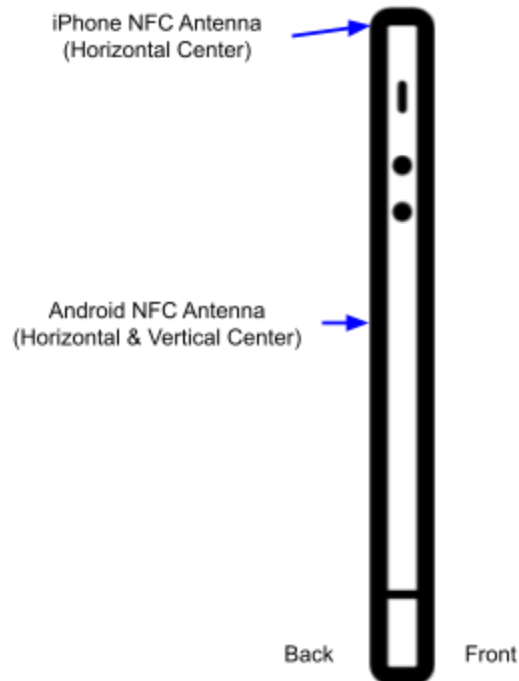
The enclosure includes flanges to support mounting the xTAG on a wood or metal base. Because the internal xTAG antenna is 30 mm+ away from the xTAG's base, BLE comms are not adversely affected by RF issues related to mounting XTAGs on metal base structures.

## NFC Tap Target

A NFC mark is provided on the xTAG BEACON enclosure directly above where its NFC antenna is located within the enclosure. This provides users with an indication of where they can tap to get phone messages. They can line up their phone antenna to the xTAG antenna. Users are generally aware of their phone NFC antenna location based on previous "tap to pay" experience.

## Phone NFC Antennas

Both iPhones and Android phones, in general, stick to standard locations for NFC antennas. This ensures that users always know where to tap - even after Smartphone upgrades. See the figure below.



## White Labeling

Deviceworx encourages customers to rebrand xTAGs using their own sticker in place of the "xTAG BEACON" sticker shown above. Contact [sales@deviceworx.com](mailto:sales@deviceworx.com) for sticker dimensions and a template that can be used that includes the NFC mark location.

## xTAG Beacon Functionality

### No App Required

Pre-loaded Apple Wallet coupons within iPhones or Android Smartphones with 3rd party wallets (e.g. Pass2U) can be triggered for display (automatically) whenever these Smartphones receive an iBeacon from an xTAG. Deviceworx dashboard includes a tool that can be used to create Apple Wallet coupons. Contact [sales@deviceworx.com](mailto:sales@deviceworx.com) for more information.

### Background or Foreground Apps

Apps can be developed, or existing apps extended, to support the display of notifications to users whenever beacons from xTAGs are received on a Smartphone. iBeacon receptions trigger notifications within iPhones and Eddystone UID beacon receptions trigger notifications within Android phones. Critically, these notifications can even be triggered when the apps are not running.

In addition to notifications, apps can use xTAG beacon signals to triangulate a user's position for tracking or wayfinding purposes within an app.

## xTAG NFC Functionality

### No App Required

The majority of both iPhone and Android phones now include NFC. NFC is commonly used to support Apple Pay and Google Pay, but also supports a variety of additional features. Whenever phones tap an NFC Tag (like the xTAG), they are sent (over NFC) a Uniform Resource Identifier (URI) descriptor that tells the phone which action to take along with required detail. For example a URI can tell the phone to open its browser and load a web page. Or, a URI can tell the phone to open its phone app to dial a specific phone number. Available actions include:

- Open a browser and display a web page.
- Open a phone app to dial a specific phone number.
- Open a text app to send a text to a specific phone number.
- Open an email app to send an email to a specific recipient.
- Launch a specified app and provide data to that app (e.g. user location).

For information describing all NFC capabilities and how to set them up in xTAGs, reach out to [sales@deviceworx.com](mailto:sales@deviceworx.com).

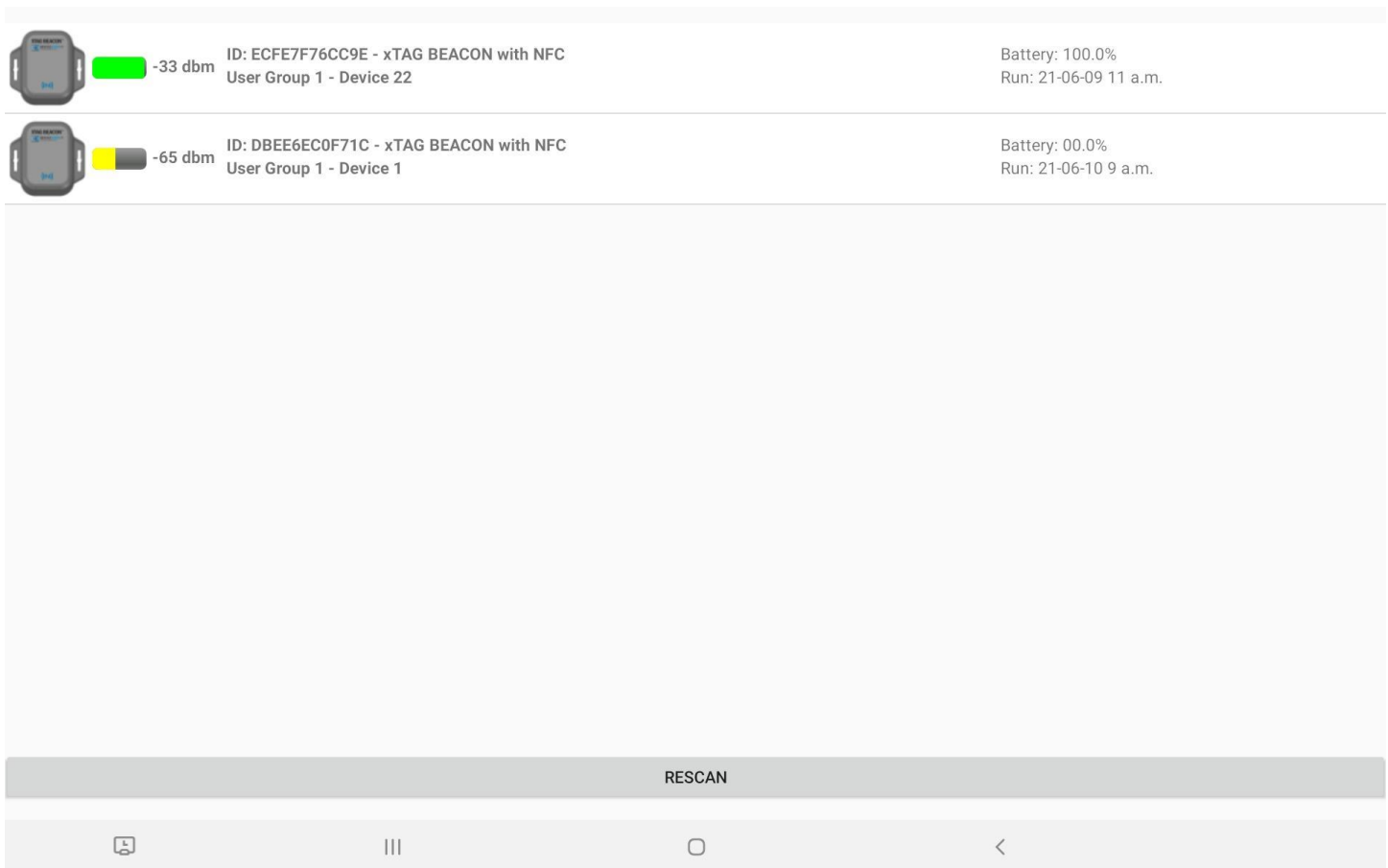
### App Support

Smartphones can signal installed apps (whether they are running or not) whenever an NFC tap occurs. The app is provided with the globally unique NFC ID of the tapped xTAG and can use this ID to perform an action either in the foreground (auto launching if required) or in the background. For example, a vaccine passport app can be opened when a user taps an xTAG at a known location (the app stores NFC IDs for xTAG install locations or queries a server). The app can then signal another device at that location, such as a security guard's tablet, to display the Smartphone user's vaccination status. The time delay from a tap to the display of vaccination status may be as fast as 1-2 seconds.

## xTAG Explorer App

The xTAG Explorer App (or “App” for brevity) is available for install from the Google Play Store. Note that Apple devices are not supported. Also note that the App works best on the 10” Samsung Galaxy Tab A or Galaxy A7 Tablets running Android 9 or better. Other Android tablets may work, but only the Samsung Galaxy Tab A and A7 have been validated by Deviceworx. This tablets are inexpensive (approx \$200 USD) and can be easily purchased worldwide. If another tablet is used, validating that it supports 1080p or better resolution will ensure that App screen layouts are optimized. Importantly - Deviceworx validation testing indicates that Samsung Galaxy tablets include the most robust BLE support and are recommended.

The figure below shows the Home screen within the App. This screen lists nearby xTAGs (that are currently beaconing) and is refreshed periodically or can be refreshed immediately at any time by pressing the “RESCAN” below the list.





Each listed device will contain (on the left) the device information shown in the figure below.



- ID: Each xTAG has a universally unique ID. This ID is the fixed Bluetooth Address of the xTAG. Note that the type of xTAG is also listed with the ID (“xTAG BEACON with NFC” in the figure above).
- User Group ID: This unique number (“1” in the figure above) can be set within the App (covered in following sections) to group devices. This allows devices to be identified more effectively by users before BLE connections are made.
- User Device ID: This unique number (“22” in the figure above) can also be set within the App to identify the xTAG device within a group.
- Signal Strength: A color-coded bar indicates the strength of the BLE signal. No color indicates a very low signal strength, red indicates a low signal strength, yellow denotes an OK signal strength, and green denotes a very strong signal strength. To the right of the bar, the actual signal strength in dbm is shown. To improve signal strength, get closer to the xTAG or increase its transmission (Tx) power level (discussed in a section that follows).

Each listed device will contain (on the right) the device information shown in the figure below.

Battery: 100.0%  
Run: 21-06-08 3 p.m.

- The percentage of battery remaining **as it relates to voltage**. This percentage shows the level of the battery between 3.0+ VDC (100 percent) and 2.2 VDC (0 percent). Because battery voltages are not linear, this percentage will not be linear. In general, the battery will stay at a level above 75 percent (2.8 Vdc) for a very long time and then it can drop quite quickly to 0 percent. Note that low ambient temperatures can lower a battery’s voltage.
- Run: The date and time that the firmware (software) started on the xTAG. In general, this date should match the date of manufacture, or the date when a battery was last inserted into the xTAG.

## xTAG Connection and Use

### BLE Pairing

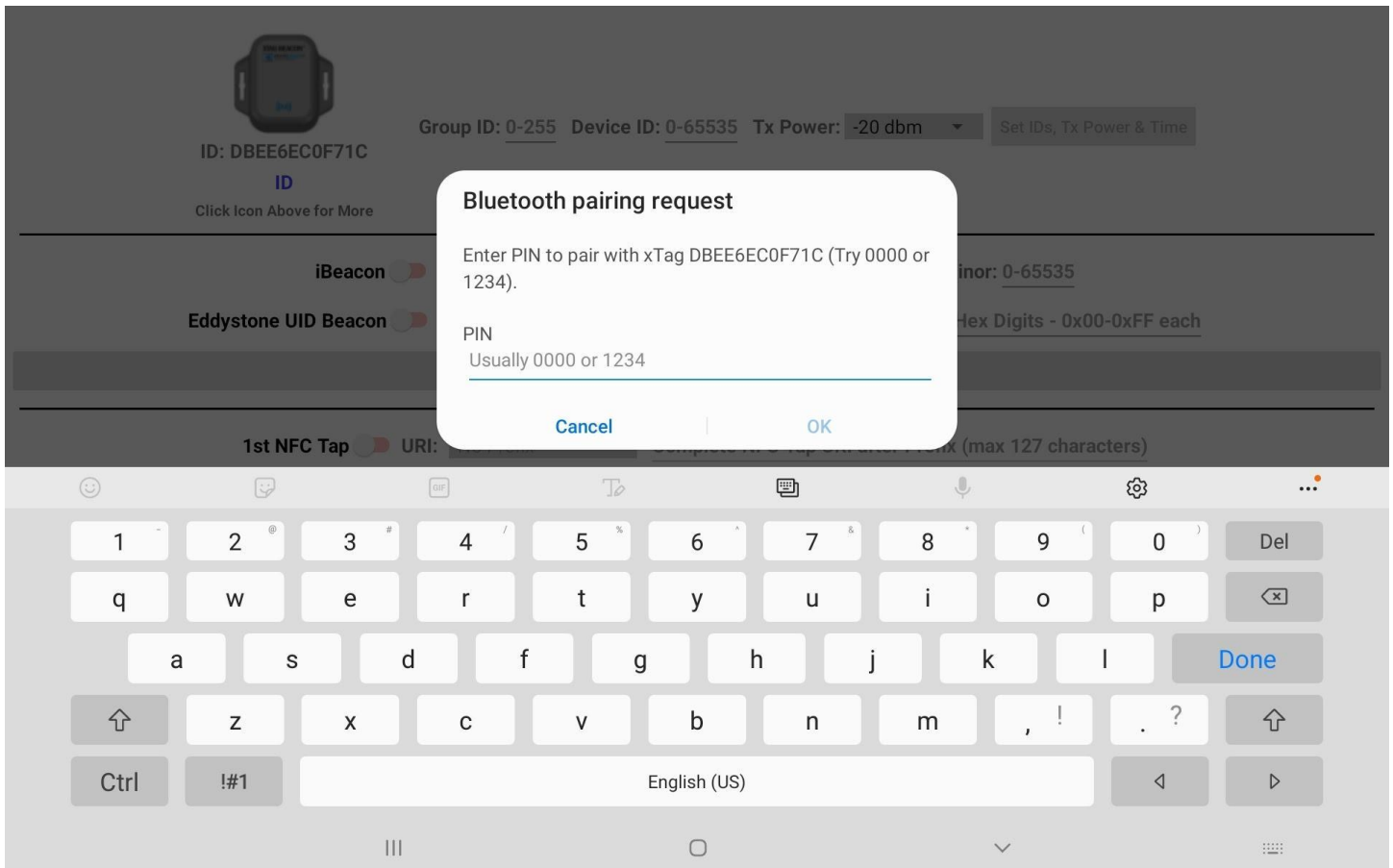
From version 2 forward, xTAG Explorer supports secured access to xTAGs. This is accomplished through the BLE pairing and bonding process. Bonding simply stores pairing data so that pairing only has to occur once. Specifically, xTAGs utilize JustWorks Pairing (requires no user passkey entry to pair and bond) for limited security and Passkey Pairing (user enters 6 digits to pair and bond) for strong security. Both techniques are supported by the more secure Low Energy Secure Connections (LESC) standard. Each xTAG customer is assigned their own unique 6-digit pin. If Passkey Pairing is enabled on their xTAGs they must enter this passkey once when connecting to their xTAGs for the first time. If JustWorks Pairing is enabled on their xTAGs, they simply select a “Pair” option to pair without pin entry.

If another Android device is connected to the same xTAG, that new Android device will also have to be paired and bonded with the xTAG. To disable secure access to any xTAG, simply “unpair” the xTAG from the Android device within the Android Bluetooth settings.

## xTAG Connection

Connect to any xTAG by selecting it within the Home screen. BLE connections can take a few seconds and can fail intermittently. Once connected, however, BLE connections are retained very effectively. If a connection to an xTAG fails, the home screen will be re-opened and xTAGs nearby will be re-scanned. Re-select the xTAG to attempt another connection. If no pairing to the xTAG is required (because a bond already exists from a previous pairing), the xTAG Detail screen will be opened with controls populated.

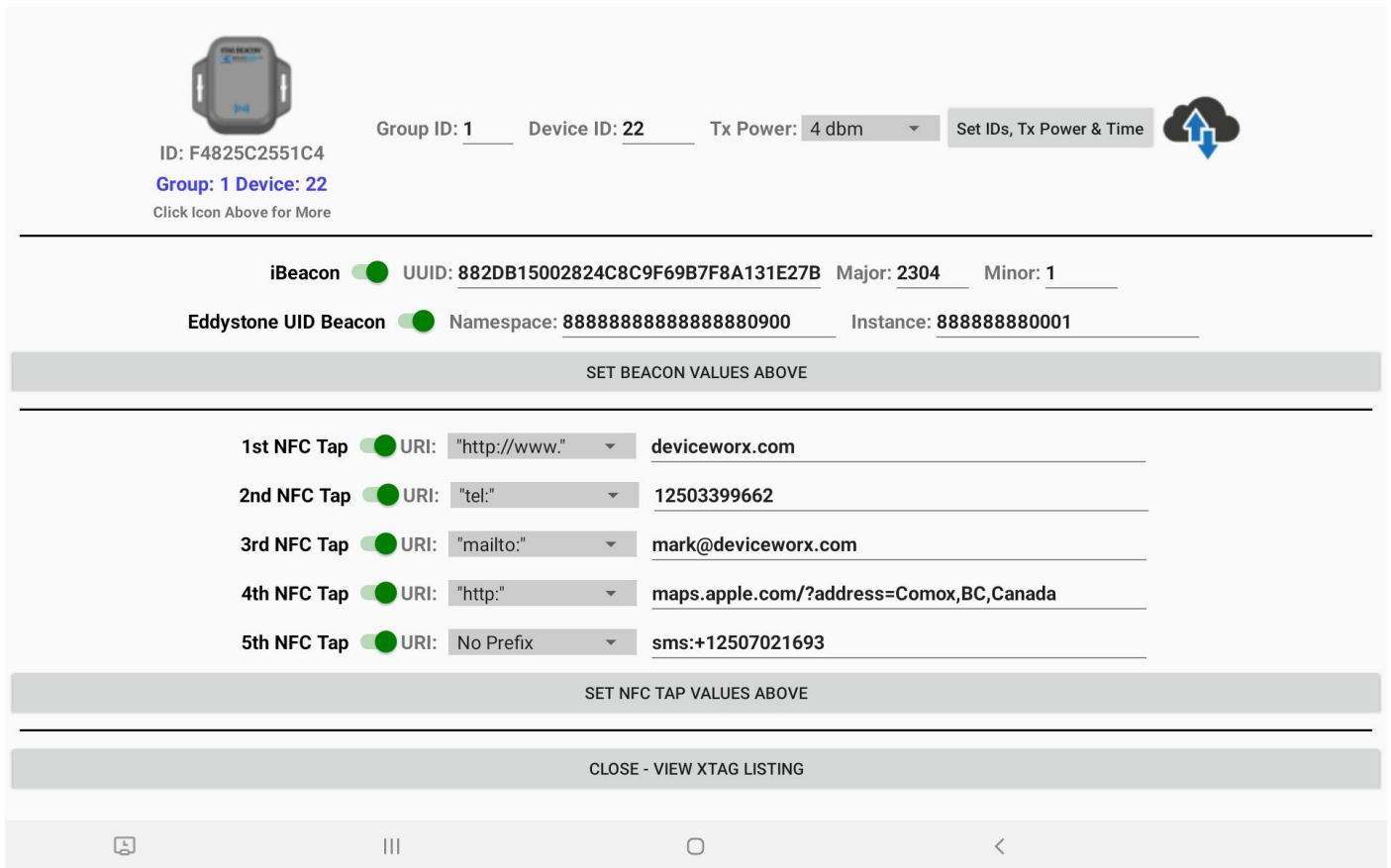
If this is the first connection between the Android device and the xTAG and pairing is required, either a Passkey Entry Dialog will be opened as shown below or a much simpler dialog with “Pair” and “Cancel” options.



If a Passkey Entry Dialog is opened, the user must enter their 6-digit pin and select OK. Pairing will be completed and the xTAG will be bonded so that no future pairing is required. The Detail screen will close. Re-select the xTAG within the list and it will be opened without the need to enter a passkey to pair as the xTAG will be bonded to the Android device.

If a JustWorks Dialog is opened, just select “Pair” instead of entering a passkey. The xTAG will be bonded to the Android device for subsequent secure connections.

When the Detail screen is opened by selecting a device, data is fetched from the xTAG and information such as the Group and Device IDs are displayed as shown in the figure below.



To see more xTAG device details, click on the icon to open the “xTAG Details” dialog box shown below.



The details include hardware and firmware revisions, how long firmware has been running and the currently stored Unix time within the xTAG. The NFC ID is the ID that NFC scanners (e.g. Smartphone apps) read when the xTAG is tapped. It is used to uniquely identify the xTAG when scanned over NFC.

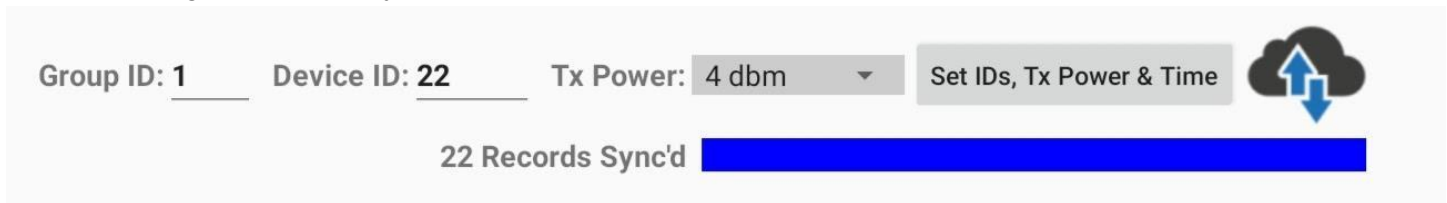
Additional functions supported within the Details screen are discussed below.

## Set xTAG IDs, Tx Power and Time

To identify and group xTAGs for easier identification within the xTAG list shown in the Home screen, enter a group ID (0-255) and device ID (0-65535). Next, select an appropriate transmit power level. xTAG BEACONS can transmit locally to ensure that only close Smartphone users are messaged, or it can transmit up to 300 m (1000') in open air when Smartphone users further away need to be messaged. As a guide, select 0 dbm for 10-15 m transmission range, 4 dbm for 100 m and 8 dbm for 300 m. Next, press the “Set IDs, Tx Power & Time” button to store IDs, transmit power and the Android device date and time (used for timestamping stats) within the xTAG. A temporary confirmation pop-up message will be displayed near the screen bottom when the process is complete.

## Sync NFC Tap Records with the Cloud

Whenever an internet connection is available, the xTAG Explorer app supports copying NFC tap records from the connected xTAG over BLE and transferring them to the Google Cloud for subsequent reporting. This Cloud-Sync of NFC tap records is initiated when the Cloud icon on the right of the “Set IDs, Tx Power & Time” button is selected. As a first step, all NFC tap records are read over BLE. Next, they are sync'd with the Deviceworx datastore in the Google cloud for selection within reports. A blue progress bar will appear below the cloud along with current sync status as shown below.



When the Cloud-Sync has completed, the number of sync'd records will be indicated as shown above.

Note that each xTAG can store up to 16000 tap records and that retrieval of this number of records over a fast internet connection requires about 20-25 seconds.

After sync, data is removed from the xTAG.

Users should sync each xTAG using Cloud-Sync:

- To ensure that resorts are up to date and include records from the xTAG.
- To ensure that xTAG resident records do not exceed the 16000 record limit.

## Configure the xTAG iBeacon and Eddystone UID Beacon Transmission

The middle section of the Details screen includes controls that support enabling iBeacon and Eddystone UID beacons as well as setting transmitted iBeacon and Eddystone UID beacon values.

Smartphone actions resulting from beacon reception are described within the [xTAG Beacon Functionality](#) section above. Set up of these actions within the Deviceworx dashboard (as attachments) are described within separate documentation. Whenever required, reach out to [support@deviceworx.com](mailto:support@deviceworx.com) for clarification on how to set up beacon values within the dashboard (as attachments) and how to set xTAGs to transmit those values.

To enable either beacon, select the switch on the left side (a green switch shows enabled). Beacon values can only be set for enabled beacons.

Enabled beacons will be transmitted from the xTAG. Disabled beacons will not be transmitted.

After an iBeacon is enabled, proceed to enter a 16 byte (32 alphanumeric character) UUID value, numeric Major value (0-65535) and numeric Minor value (0-65535). Note that the Android keypad will ignore invalid key inputs (non-numeric for Major and Minor values or non-alphanumeric for UUID values). The keypad will also ignore inputs when a value is already at the maximum allowable number of characters.

After an Eddystone UID beacon is enabled, proceed to enter a 10 byte (20 alphanumeric character) Namespace value and a 6 byte (12 alphanumeric character) Instance value. Note that the Android keypad will ignore invalid key inputs (non-alphanumeric values). The keypad will also ignore entries when a value is already at the maximum allowable number of characters.

Press the “SET NFC BEACON VALUES ABOVE” button to transfer values to the xTAG.

## Configure the xTAG NFC Tap Functions

The bottom section of the Details screen includes controls that support enabling NFC tap actions as well as specifying the Universal Resource Identifier (URI) that defines those actions.

Up to 5 different actions can be performed when users tap an xTAG's NFC antenna multiple times within a session. A session ends when the interval between taps exceeds 6 seconds. When a user taps the xTAG, the 1st NFC Tap action URI is sent to their phone (over NFC) and their phone takes action according to the URI. If the user taps again within 6 seconds, the 2nd NFC Tap action URI is sent and acted upon. If the user continues to tap within the next 6 second window, the 3rd NFC Tap action URI is sent. This process continues until the 5th NFC Tap action URI is sent., On the 6th tap, the sequence resets to the first NFC Tap action. If the user waits longer than 6 seconds to tap, the sequence resets to the 1st NFC Tap action.

Supported tap actions are described within the [xTAG NFC Functionality](#) section above. The URIs supporting these actions can be relatively complex. When required, reach out to [support@deviceworx.com](mailto:support@deviceworx.com) for clarification on how to set a URI for your desired action.

The more important tap actions should always be higher in the list as these actions will, obviously, occur more often. Unused tap actions should always be disabled. If the number of tap actions must be reduced, the tap actions lowest on the list should be disabled before tap actions higher in the list as they will be used less frequently.

Signage is a useful complement to xTAG BEACONS to describe to users what actions occur with each NFC tap on their Smartphone. For example, if an xTAG is mounted at the entrance to a restaurant and supports quick access to restaurant menus and the host, a sign near the xTAG could read "Tap once to see today's food menu in your browser, tap twice for the alcohol menu or tap 3 times to auto-dial the host on your Smartphone".

To enable any tap action, select its switch (a green switch shows enabled). NFC tap action URIs can only be set for enabled beacons.

To set up a URI, select a URI prefix from the drop down menu. The prefix shortens the overall URI entry length. Next enter the URI text that follows the URI prefix and completes the URI. Selecting the URI text entry box will show the Android keypad. Note that the URI text must be 127 characters or less. Keypad inputs will be ignored when the 127 character limit is reached. To explicitly enter the full URI within the text entry on the right, select the "No Prefix" option from the drop down menu. The "sms:" URI action in the screen capture above (auto text action to a specified number) shows how this is done.

Press the "SET NFC TAP VALUES ABOVE" button to transfer values to the xTAG.

## Return to the xTAG List

When updates to the Beacon and NFC values are complete, close the Details screen using the "CLOSE - VIEW XTAG LISTING" button.