Creating ANT+ Android Applications

Copyright Information and Usage Notice

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1 Overview

The purpose of this document is to provide developers all the information (or the location of information) they will need to create applications which will run on the Android platform and communicate with ANT+ devices.

The list of manufacturers who are releasing phones with ANT support, and the number of Android devices with ANT support is constantly growing. The ANT USB Service provides ANT support on Android devices with the USB Host feature, through the use of attached ANT USB sticks. Additionally, Android Emulator support for ANT is possible, allowing anyone with a PC and an ANT USB stick to develop ANT+ applications for Android even without a physical device. Watch for growing availability of Android accessories and bridge devices to further expend devices with access to ANT support.

More information on ANT, ANT+ and related downloads and documentation can be found on the ANT Wireless website, http://www.thisisant.com.

1.1 ANT and ANT+

For an overview of the difference between ANT and ANT+, please see http://www.thisisant.com/developer/ant-plus/ant-antplus-defined/

2 ANT+ Application Requirements

2.1 Android Device ANT functionality

In order to utilize ANT in Android, ANT support is required on the target device. This can be present as a built-in feature of the Android Device, or via an externally attached accessory such as an ANT USB stick. A list of officially supported devices with built-in ANT support is maintained at http://www.thisisant.com/directory/filter/~/60/~/. Refer to http://www.thisisant.com/developer/ant-basics/ant-in-android/ for detailed device support information.

To utilize ANT support, the ANT Radio Service is required to be installed. This may be pre-installed on a user's device. External ANT accessory support is added through the addition of one or more ANT Chip Provider Services.

2.1.1 ANT Radio Service (REQUIRED)

The ANT Radio Service manages controlling the ANT radio and sharing it between multiple apps. It is required to utilize ANT on all devices. This is an application users can install and update via the Google Play Store, and is also included in the SDK.

2.1.2 ANT USB Service

Optional. The ANT USB Service, in addition to the ANT Radio Service, is required to communicate with ANT USB sticks using the Android USB Host feature. Note: not all Android devices support USB

Host feature. This is an application users can install and update via the Google Play Store, and is also included in the SDK.

2.1.3 Third-party Add-ons

Optional. It is possible to use other add-on ANT Chip Provider Services behind the ANT Radio Service. These work in much the same way as the ANT USB Service, but using custom hardware instead of an ANT USB Stick.

2.1.4 Android Emulator Bridge

Optional. This is intended to be used by developers only. See section 4.1below.

2.2 ANT+ Plugins Service

The functionality to connect to and communicate with devices implementing the ANT+ profiles are provided via the ANT+ Plugins Service. Which ANT+ profile implementations are provided is dependent on the version of the ANT+ Plugins Service. This is an application users can install and update via the Google Play Store, and is also included in the SDK.

2.3 ANT+ Plugin Lib API

The "ANT+ Plugin Lib" library enables applications to interact with the ANT+ Plugins. The library provides interfaces that are specialized to communicate with devices implementing the supported ANT+ Device Profiles through the ANT Plugins Service. This library is the recommended way to interact with any ANT+ devices.

The library and documentation are available on the http://www.thisisant.com website.

2.4 ANT+ Membership and License Agreement

In addition to the services and libraries, in order to access various ANT and ANT+ related documentation, additional downloads, and receive support directly or through the ANT forums you must sign up for an ANT+ membership on http://www.thisisant.com. Signing up for an 'adopter' level account is free and provides access to most resources. Details on the various levels of membership are explained on the website.

3 Using the ANT+ API

3.1 Overview

The ANT+ Plugins are the recommended way to interact with ANT+ devices. Applications reference the antpluginlib.jar package in order to use the ANT+ Plugins. Interaction with a specific plugin type is done through the associated plugin communicator objects, called PCCs.

An application can utilize the plugins by following these general steps:

1. Search for devices
    - The preferred method to search for devices is to use the MultiDeviceSearch object. Simply pass in the list of devices you are searching for and wait for the results on your

callback. When you find a device you wish to connect to, close the search and move to step 2 using the device number. Refer to the Plugin Sampler code for an example.

- Note: For more specific connection scenarios other search options are provided which may do step 1 and 2 together automatically. Refer to the JavaDoc of these static requestAccess methods for more information.

2. Request Access to the Plugin
   - Use the static method **requestAccess()** to secure access to the plugin for the type of device you want to communicate with.
   - The access request will return a PCC with an active connection to the plugin, or failure codes indicating problems accessing the plugin.
3. Subscribe to Events
   - Subscribe to events you wish to receive by calling the subscribe function on the PCC for the specific events you want to receive and passing your event receiver to handle the incoming data.
   - When you no longer wish to receive an event simply unsubscribe from it by passing null into the subscribe function for the event.
4. Use Device while Monitoring the Device Connection State
   - Plugins will inform apps of their state through the stateReceiver passed in the requestAccess function. The states reported can vary from device to device, but all devices will report fatal errors using the 'dead' state, which should always be handled by the app.
   - Some plugins also have request functions to send data to and control connected devices.
5. Release the PCC
   - When you are done with the device and are ready to revoke your plugin access call **releaseAccess()** on the PCC.

Please refer to the PluginLib javadoc for a full description of the APIs and to the ANT+ Plugin Sampler app for an example of how to use the API.

3.2 Sample Applications

3.2.1 ANT+ Plugin Sampler

The ANT+ Plugin Sampler app (code provided as an Eclipse project) shows how to use the ANTPluginLib to connect to the ANT+ Plugins Service and use all of the available devices. It also shows how to handle device state changes and errors requesting access such as the scenario where the ANT Radio Service and/or ANT USB Service have not been installed yet.

4   Development Tools

4.1   Android SDK

All Android application development requires the Android SDK. The required files and the information to get started at http://developer.android.com/sdk/index.html

4.2   ANT Android Emulator Bridge

This ANT Android Emulator Bridge tool can be used with emulators running Android images that support ANT. The bridge allows an ANT USB stick that is connected to a PC running the bridge to be used by the emulator over the PC's loopback or Network interface. This allows ANT Android applications to be developed without the use of a physical android device. The emulator bridge tool is available for download on the Android API page in the developer's zone at thisisant.com.

http://www.thisisant.com/developer/resources/downloads/

The 'ANT Android Emulator Bridge Tool' downloadable package contains the bridge tool application along with documentation explaining how to use the tool.

5   Reference and Support

5.1   ANT+ Device Profile Documentation

The Android ANT+ API allows Android applications to interact with devices implementing ANT+ Profiles at a high level of abstraction, without worrying about most of the profile implementation and messaging details. However, a deeper understanding of the individual profile implementations and their use case details can help you to better understand how each ANT+ plugin works and how to use them more effectively. The ANT+ Device Profile documents describe the detailed specifications of each profile and can be downloaded from the ANT Developer Downloads 'Documents' section:

http://www.thisisant.com/developer/resources/downloads/#documents_tab

5.2   Developer Forums

The ANT Developer's Forums provide a place to search for information, ask questions regarding ANT and ANT+ development, and find details on how to handle common issues you may encounter.

http://www.thisisant.com/forum/

5.3   Android Developers Guide

Android application development has several key differences when compared with developing for other operating systems. Knowledge of the Android framework and the Android application lifecycle will be essential to creating successful ANT+ Android applications. A good starting place is the Android "Getting Started" guide:

http://developer.android.com/training/index.html

6   Notes on Use of ANT+ Logos and Certification

The ANT+ logos are used to inform consumers of an application's interoperability with ANT+ devices. Only certified applications are allowed to use the ANT+ name, logos or icons.

Before using any ANT+ branding, the application must complete the ANT+ certification process to ensure that it complies with the device profiles it implements. The process is similar to the certification process for ANT+ sensors and devices but is streamlined for applications. This process is further streamlined for applications that make use of the ANT+ plugins. For more details please visit: http://www.thisisant.com/developer/ant-plus/certification/ or contact certification@thisisant.com.

Once certification is complete the ANT+ logos can be used on both the application and promotional materials such as on the Google Play Store or other websites where the application is available. Logo files will be distributed upon certification.