



Near Field Communication

Near Field Communication (NFC) is a set of short-range wireless technologies, typically requiring a distance of 4cm or less to initiate a connection. NFC allows you to share small payloads of data between an NFC tag and an Android-powered device, or between two Android-powered devices.

Tags can range in complexity. Simple tags offer just read and write semantics, sometimes with one-time-programmable areas to make the card read-only. More complex tags offer math operations, and have cryptographic hardware to authenticate access to a sector. The most sophisticated tags contain operating environments, allowing complex interactions with code executing on the tag. The data stored in the tag can also be written in a variety of formats, but many of the Android framework APIs are based around a [NFC Forum](#) standard called NDEF (NFC Data Exchange Format).

Android-powered devices with NFC simultaneously support three main modes of operation:

1. **Reader/writer mode**, allowing the NFC device to read and/or write passive NFC tags and stickers.
2. **P2P mode**, allowing the NFC device to exchange data with other NFC peers; this operation mode is used by Android Beam.
3. **Card emulation mode**, allowing the NFC device itself to act as an NFC card. The emulated NFC card can then be accessed by an external NFC reader, such as an NFC point-of-sale terminal.

NFC Basics

This document describes how Android handles discovered NFC tags and how it notifies applications of data that is relevant to the application. It also goes over how to work with the NDEF data in your applications and gives an overview of the framework APIs that support the basic NFC feature set of Android.

Advanced NFC

This document goes over the APIs that enable use of the various tag technologies that Android supports. When you are not working with NDEF data, or when you are working with NDEF data that Android cannot fully understand, you have to manually read or write to the tag in raw bytes using your own protocol stack. In these cases, Android provides support to detect certain tag technologies and to open communication with the tag using your own protocol stack.

Host-based Card Emulation

This document describes how Android devices can perform as NFC cards without using a secure element, allowing any Android application to emulate a card and talk directly to the NFC reader.