Near-Field Communication (NFC)

By: Rafael Diaz-Cruz & Josh Luzier

Near-Field Communication

- Allows for read/write of NFC tags
- Typical range ~4cm

Additional Android use:

- Peer-to-Peer Mode
- Card Emulation

How NFC Works

- Initiator
  - Initiates communication
- Target
  - Waits to be read
- Data Transfer
  - Electromagnetic Induction

NFC Devices

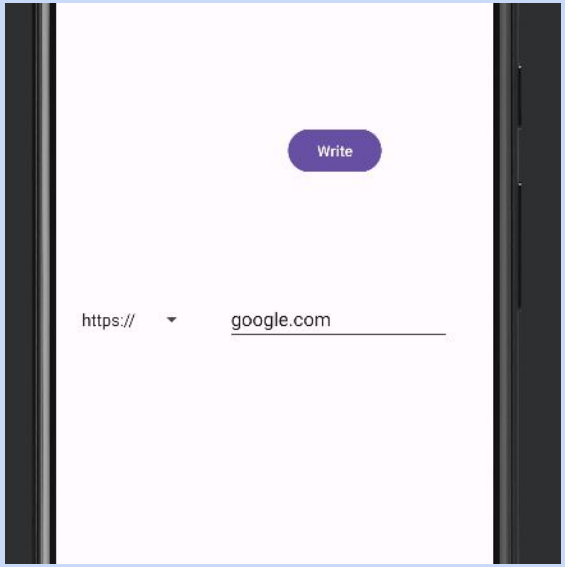
- iPhone 6 & later (2014)
- Samsung (~2012)
- Payment Processors
- Toys
  - Amiibo
  - Skylanders

Android NFC Support

- Android 2.3.3 (Gingerbread)
  - API 10
- Android 4.0 (Ice Cream Sandwich)
  - API 14
- Android SDK

Coding Simple NFC Writer

Simple UI



Permissions

Android.permissions.NFC

- Normal protection level

NFC Adapter

Allows activity to handle tags

OnResume

- *enableForegroundDispatch()*

OnPause

- *disableForegroundDispatch()*

ForegroundDispatch

- *enableForegroundDispatch(*Activity, PendingIntent, filters, techlist*);*
  - If filters and techlist are null, act as wildcards
    - All ACTION_TAG_DISCOVERED calls
- disableForegroundDispatch(Activity);

Pending Intents

```
pendingIntent = PendingIntent.getActivity( context: this,  requestCode: 0,
                                          new Intent( packageContext: this, this.getClass())
                                          .addFlags(Intent.FLAG_ACTIVITY_SINGLE_TOP),
                                          PendingIntent.FLAG_MUTABLE);
```

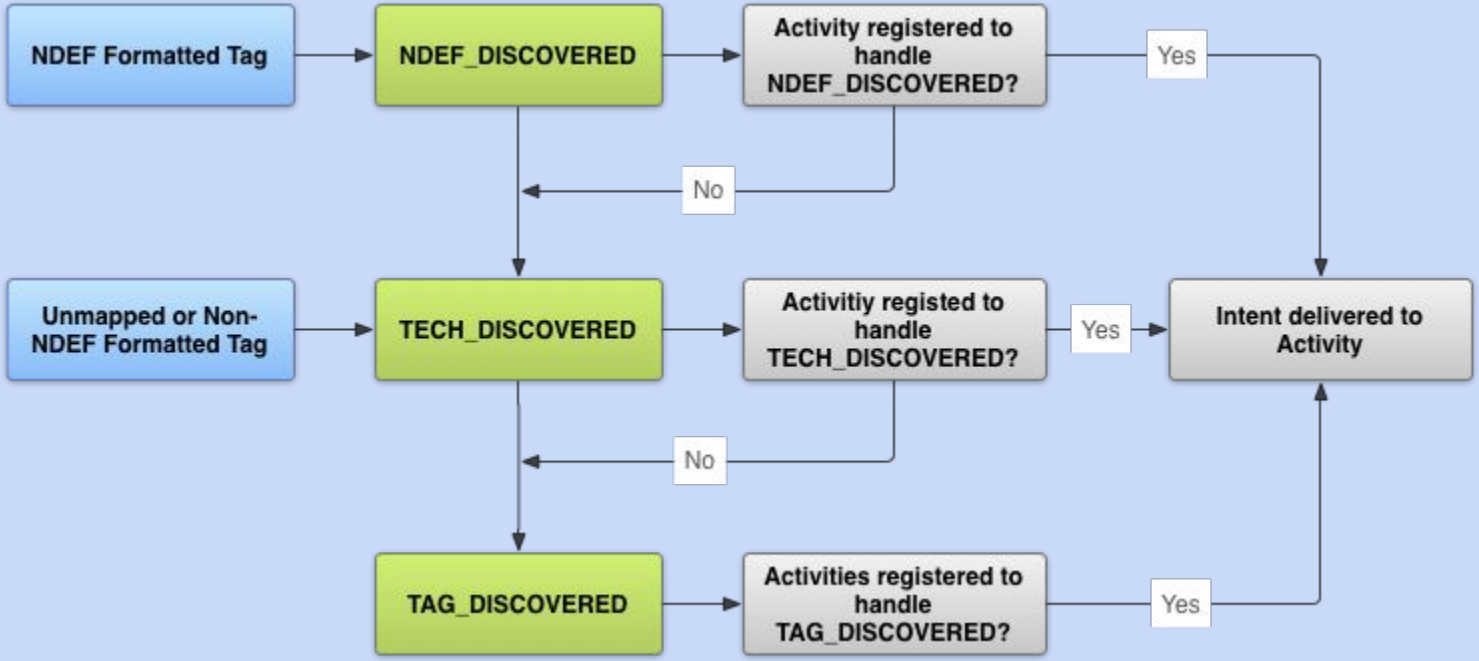
- Allows another application to perform the specified operation with the application’s permissions

OnNewIntent Override

The *Intent.FLAG_ACTIVITY_SINGLE_TOP* from the pending Intent results in OnNewIntent triggering when foreground dispatch occurs

- Will begin the process to write to the tag

Tag dispatching



Ndef (NFC Data Exchange Format)

- Allows writing/reading from NFC chip
- Obtain from a tag object

Ndef Writing

```
private void writeTag(Uri createdUri, Tag tag) {
    Ndef ndef = Ndef.get(tag);
    NdefRecord recordNFC = NdefRecord.createUri(createdUri);
    NdefMessage message = new NdefMessage(recordNFC);
    try {
        ndef.connect();
        ndef.writeNdefMessage(message);
        ndef.close();
    }
    catch(IOException | FormatException e){
        Toast.makeText(context, text: "Write Failed", Toast.LENGTH_SHORT).show();
    }
}
```