iBeacons

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Who cares?

- MLB Licenses iBeacon Tech
  - http://www.engadget.com/2014/03/28/san-francisco-giants-mlb-ibeacon/
- NFL Licenses iBeacon Tech
  - http://www.nytimes.com/2014/01/31/technology/For-Super-Bowl-Personalized-Phone-Alerts.html?_r=0
- Grocery Testing
  - http://techcrunch.com/2014/01/06/inmarket-rolls-out-ibeacons-to-200-safeway-giant-eagle-grocery-stores-to-reach-shoppers-when-it-matters/
- Apparel Retail
  - http://techcrunch.com/2014/01/16/shopkick-starts-100-store-ibeacon-trial-for-american-eagle-outfitters-the-biggest-apparel-rollout-yet/

Just For Completeness

- Android Compatibility
  - http://components.xamarin.com/view/xamarin-android-ibeacon-service
  - http://developer.radiusnetworks.com/ibeacon/android/
  - https://github.com/RadiusNetworks/android-ibeacon-service

Getting/Building iBeacons

- http://estimote.com
- http://www.radiusnetworks.com/ibeacon/buy-beacons.html (Available for demo)
- http://redbearlab.com/ibeacon/
- https://www.gimbal.com (Available for demo)
- Raspberry Pi + BLE USB (Available for demo)

What is an iBeacon?

- Much as Kleenex has become the standard eponym for facial tissues, I believe iBeacon will eventually become the generic name for BLE devices of similar use
  - BLE stands for Bluetooth Low Energy
- iBeacon hardware is simply a BLE device that follows a specific protocol
  - most important: UUID, Identifier, Major, Minor

What is an iBeacon?

- Assuming a device is broadcasting the required information, another BLE enabled device can connect and begin to communicate
- This basic communication is available to any BLE enabled device, thus allowing Android/Windows/Blackberry… to communicate with an "iBeacon"

iOS Basic Understanding

- iBeacon extends iOS Location Services (1)
    - runs on iOS 7 or later
        - iPhone 4s or later
        - iPad (3rd generation) or later
        - iPad mini or later
        - iPod touch (5th generation) or later

CLBeaconRegion

- Extends CLRegion (2)
  - API provides easy creation of region for monitoring
    - initWithProximityUUID:identifier:
    - initWithProximityUUID:major:identifier:
    - initWithProximityUUID:major:minor:identifier:

CLBeaconRegion

- Monitoring BeaconRegion through CLLocationManager
    - startMonitoringForRegion:
    - startRangingBeaconsInRegion:

CLBeaconRegion

- Getting data from beacon
  - peripheralDataWithMeasuredPower:
    - for using iOS device as beacon

CLBeacon

- Object detected after region monitoring
  - specifically available after ranging
- not explicitly created
  - locationManager:(CLLocationManager *)manager didRangeBeacons:(NSArray *)beacons inRegion:(CLBeaconRegion *)region

CLBeacon

- Properties extended
  - proximity (CLProximity)
  - accuracy (CLLocationAccuracy)

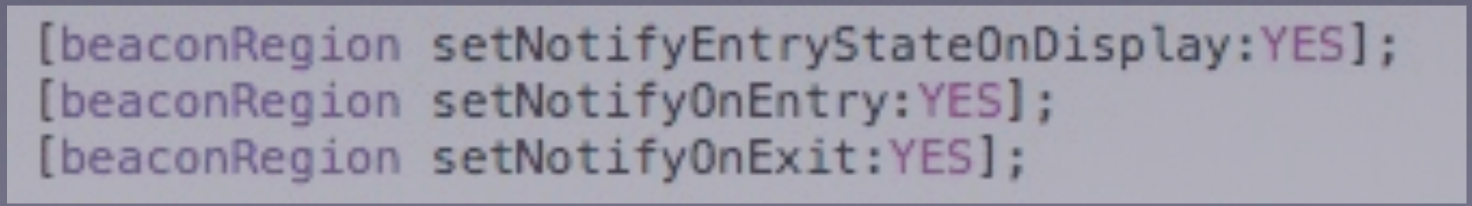
Monitoring

Why region monitoring might not be available: (3)

- The device doesn’t have the necessary hardware to support region monitoring.
- The user denied the app the authorization to use region monitoring.
- The user disabled location services in the Settings app.
- The user disabled Background App Refresh in the Settings app, either for the device or for your app.
- The device is in Airplane mode and can’t power up the necessary hardware.

Monitoring

- Monitoring can/does happen in the background depending on settings
  - setNotifyEntryStateOnDisplay:
    - App will be launched and the delegate will be notified via locationManager:didDetermineState:forRegion:when the device's screen is turned on and the user is in the region. By default, this is NO.
  - setNotifyOnEntry:
    - App will be launched and the delegate will be notified via locationManager:didExitRegion: when the user exits the region. By default, this is YES.
  - setNotifyOnExit:
    - App will be launched and the delegate will be notified via locationManager:didEnterRegion: when the user enters the region. By default, this is YES.



```
[beaconRegion setNotifyEntryStateOnDisplay:YES];
[beaconRegion setNotifyOnEntry:YES];
[beaconRegion setNotifyOnExit:YES];
```

Ranging

- locationManager:didRangeBeacons:inRegion:
  - passes in locationManager, array of CLBeacons and their CLBeaconRegion
  - this is typically where the beacon information will be passed to an online API for more data
- locationManager: rangingBeaconsDidFailForRegion:withError:
  - can be quite helpful with debugging (4)

Advertising

- peripheralManagerDidUpdateState:
  - passes in CBPeripheralManager
- stopAdvertising
- startAdvertising:
  - passes in NSDictionary with CLBeaconRegion information

Resources

1. http://support.apple.com/kb/HT6048?viewlocale=en_US&locale=en_US

2. https://developer.apple.com/library/ios/documentation/CoreLocation/Reference/CLBeaconRegion_class/Reference/Reference.html

3. https://developer.apple.com/library/ios/documentation/userexperience/conceptual/LocationAwarenessPG/RegionMonitoring/RegionMonitoring.html

4. https://stackoverflow.com/questions/20905843/locationmanagerrangingbeaconsdidfailforregionwitherror-kclerrordomain-16