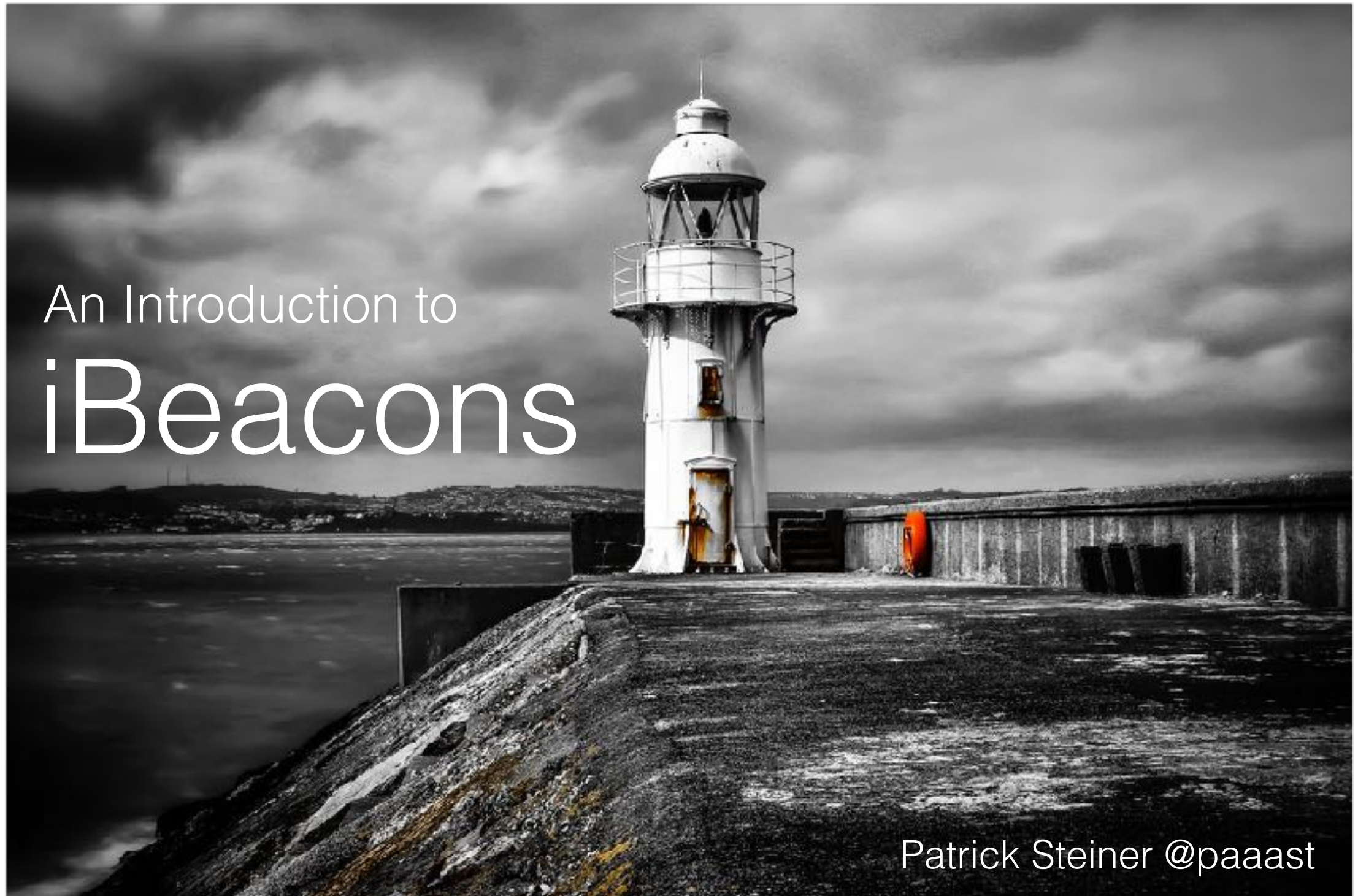


# An Introduction to iBeacons



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# iBeacons - Overview

- Simple Device
- Sends it's own unique ID in a given time interval
- Doesn't collect or store any user data
- Introduced 2013 by Apple

# iBeacon Hardware

- Estimote
- RedBearLab (Shield for Arduino)
- Kontakt.io
- GeoHopper

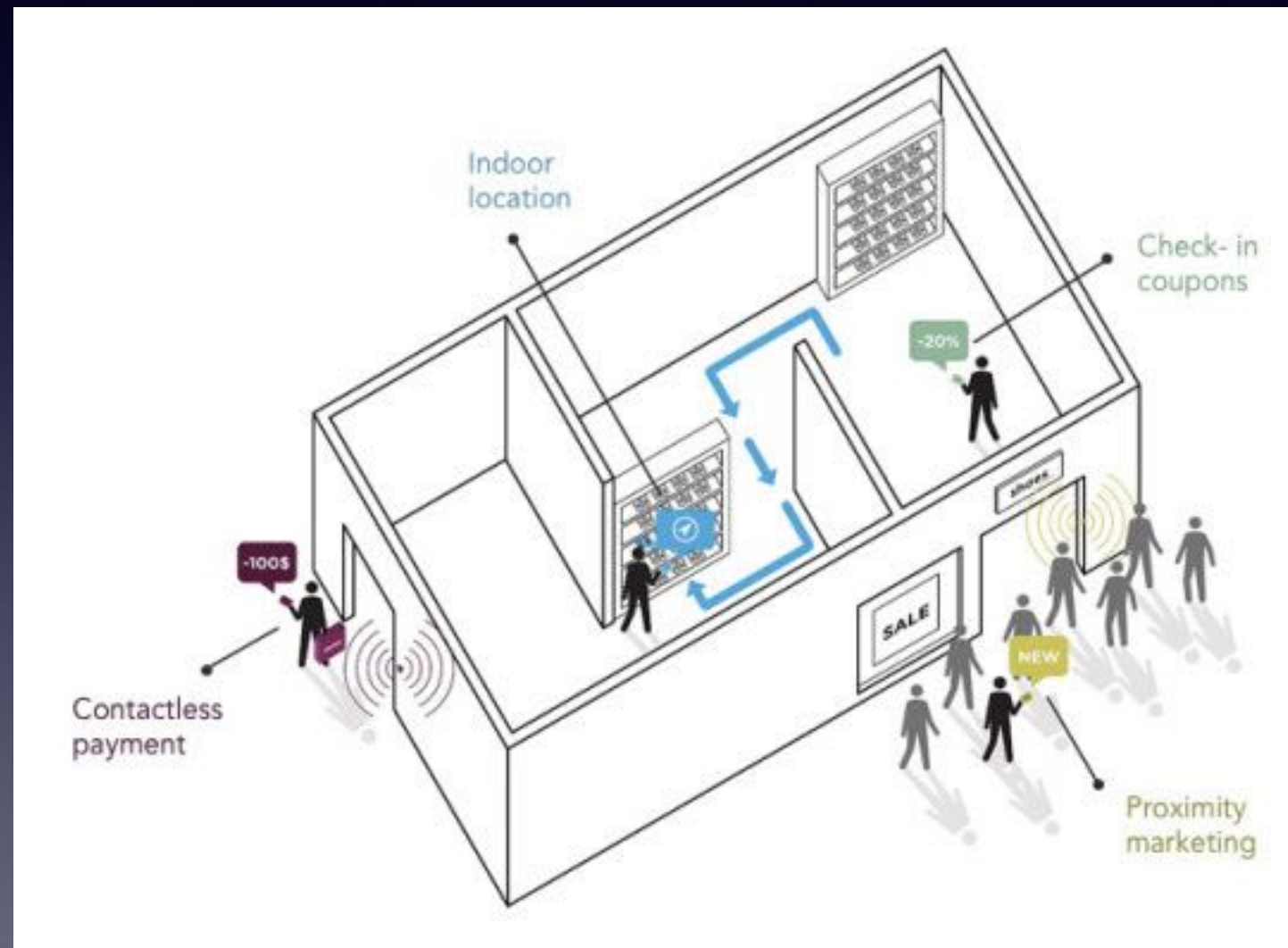


# iBeacon Usage

- Locations Based Informations
  - Ads
  - Extended product information (Ingredients)
  - Museums
  - Sport Stadiums (MLB)
  - Public transport (Timetable)
- Indoor Navigation (Airport)



# iBeacon Usage Example



# Technical Overview

- UUID (Unique ID / Top-Level identity)
  - A572CBDA-2375-1243-B5A4-FF1196FFE8C8
- Major ID (Sports stadium)
  - 16 bit unsigned integer
- Minor ID (Stadium sector)
  - 16 bit unsigned integer
- Three Beacons in range (locate user) (2D) (Trilateration)

# Bluetooth LE

- First introduced by Nokia in 2006
- Energy saving
- Range up to 30 meters
  - Distance measurement via signal strength (Ranging)
    - Immediate (< 50cm)
    - Near (< 2m)
    - Far (up to 30m)
    - Unknown



# iBeacons - iOS

```
[locationManager  
startMonitoringForRegion:@“A572CBDA-2375-124  
3-B5A4-FF1196FFE8C8”];
```

```
$ uuidgen (Generate UUID on OS X)
```



# Setup iOS App

```
- (id)init {  
    if ((self = [super init])) {  
        _myUUID = [[NSUUID alloc]  
                    initWithUUIDString:@"A572CBDA-2375-1243-B5A4-FF1196FFE8C8"];  
        _myId = @"Joe's Hiking Shop";  
        _locationManager = [[CLLocationManager alloc] init];  
        _locationManager.delegate = self;  
    }  
    return self;  
}
```

# Listening for iBeacons

```
- (void)startMonitoringForStores
{
    CLBeaconRegion *region =
        [[CLBeaconRegion alloc]
         initWithProximityUUID:self.myUUID
         identifier:self.myId]];
    region.notifyEntryStateOnDisplay = YES; // only inform if active
    region.notifyOnEntry = NO;
    region.notifyOnExit = YES;
    [_locationManager startMonitoringForRegion:region];
}
```

# Listening for iBeacons

```
- (void)locationManager:(CLLocationManager *)manager
    didEnterRegion:(CLRegion *)region
{
    if (/* have not presented notification */) {
        // present notification to user
    }
}
```

# Listening for iBeacons

```
- (void)locationManager:(CLLocationManager *)manager  
    didExitRegion:(CLRegion *)region  
{  
    // clear notification  
}
```

# iBeacons Ranging

```
- (void)locationManager:(CLLocationManager *)manager
    didEnterRegion:(CLRegion *)region
{
    [_locationManager startRangingBeaconsInRegion:region]
}
```



# iBeacons Ranging

```
- (void)locationManager:(CLLocationManager *)manager
    didRangeBeacons:(NSArray *)beacons
    inRegion:(CLBeaconRegion *)region
{
    if ([beacons count] > 0) {
        CLBeacon *nearest = [beacons objectAtIndex:0];
        if (CLProximityImmediate == nearest.proximity) {
            [self showSpecialOffer];
        }
    } else {
        [self hideSpecialOffer];
    }
}
```

# iBeacons Ranging

```
- (void)locationManager:(CLLocationManager *)manager  
    didExitRegion:(CLRegion *)region  
{  
    [_locationManager stopRangingForRegion:region];  
    [self hideSpecialOffer];  
}
```

# What about Android?

- Bluetooth LE support since 4.3 (API Level 18)
- Android Beacon Library (3rd-Party)
  - <http://altbeacon.github.io/android-beacon-library/>

# iBeacon vs. NFC

	iBeacon	NFC
Range	Up to 30 meters	Up to 20 cm. Works best within 4 cm.
Power	iBeacon can last about 6 months with one battery.	NFC Tag requires no power.
Average Cost	Higher	Low

# iBeacons

Questions ?



# iBeacons

Thanks for your attention! 😊