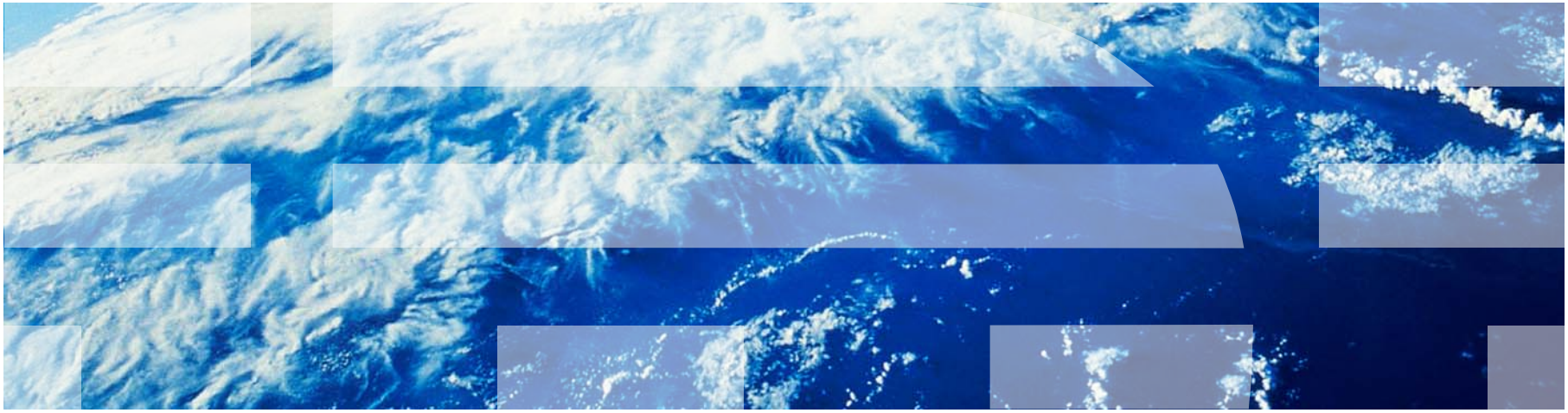
IBM Worklight V6.1.0
Getting Started

Location Services



17 March 2013

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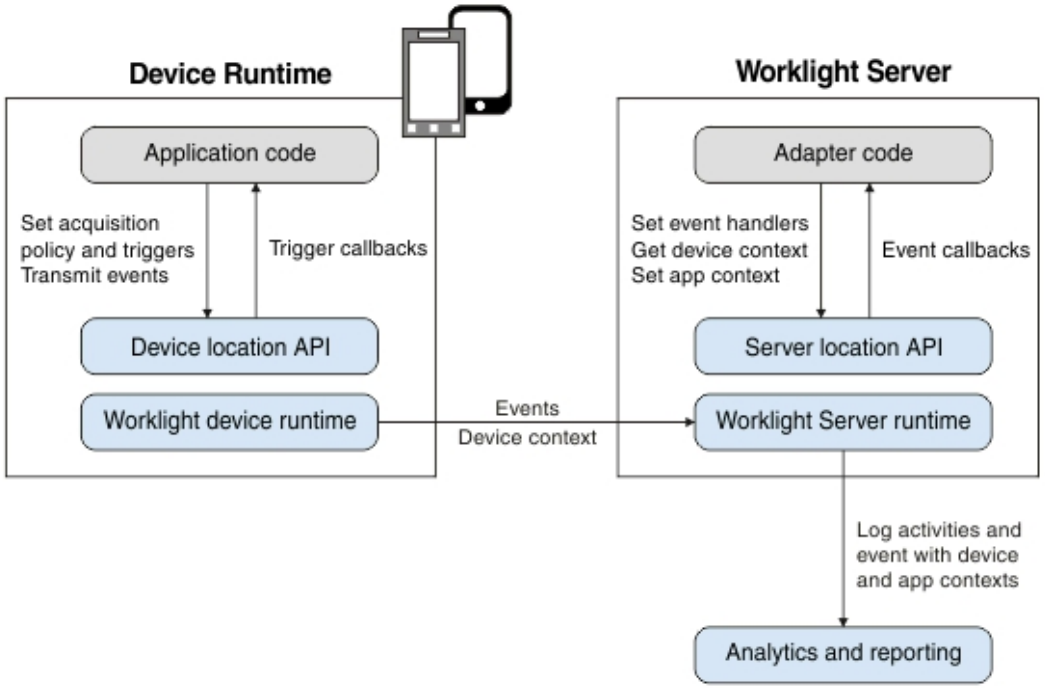
Agenda

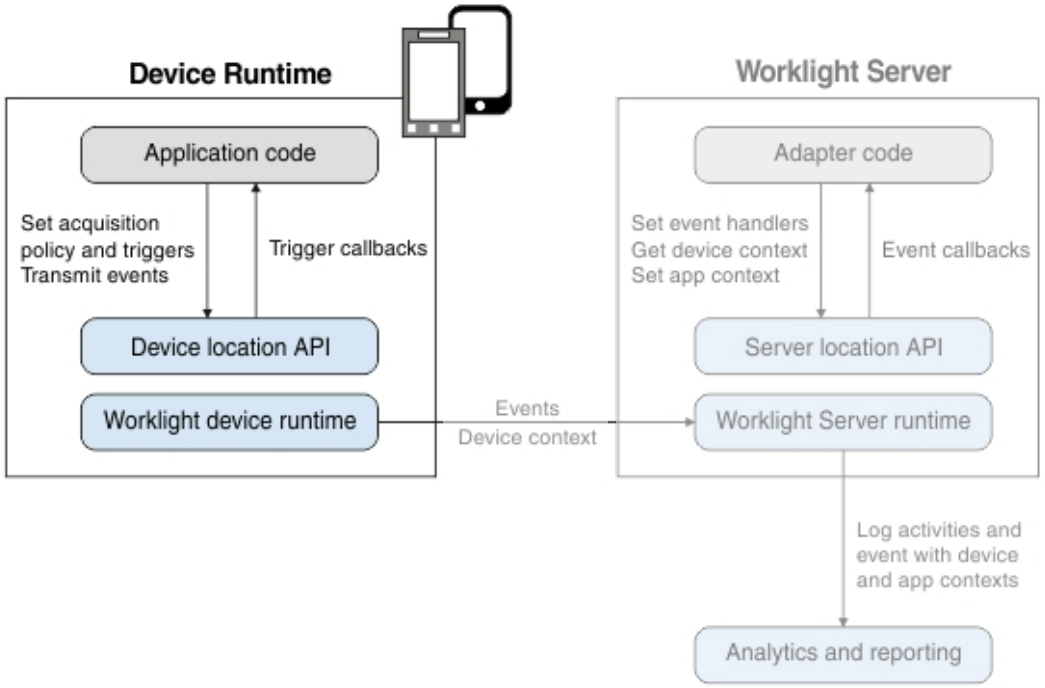
- Overview
  - Architecture
  - The two code lines that you need to know
- Acquisition policy
  - Geo
  - WiFi
  - Permissions
- Triggers
- Events
- Testing hybrid applications
- Samples

Overview – Architecture (1 of 4)



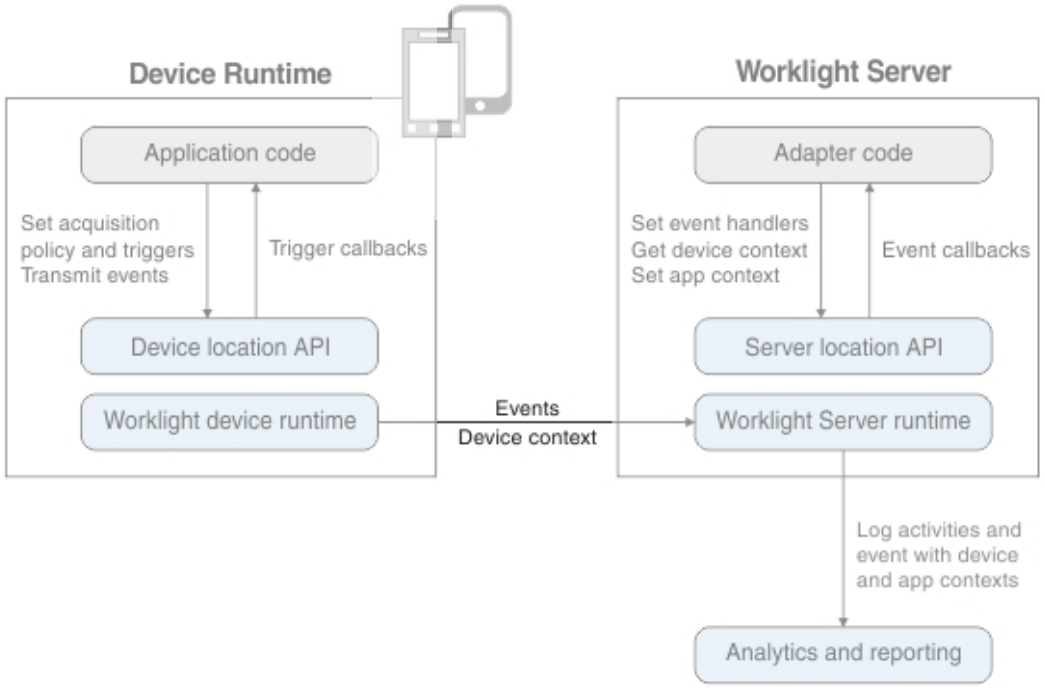
Overview – Architecture (2 of 4)

- The application code on the mobile device, in the form of an acquisition policy, controls the collection of data from device sensors.
- The collected data is referred to as the device context.
- When a change occurs in the device context, such as a change in the geolocation of the device, or the fact that it entered a WiFi zone, triggers can be activated.
- The triggers specify that an action should occur: either a callback function is called, or an event is sent to the server, based on the device context.



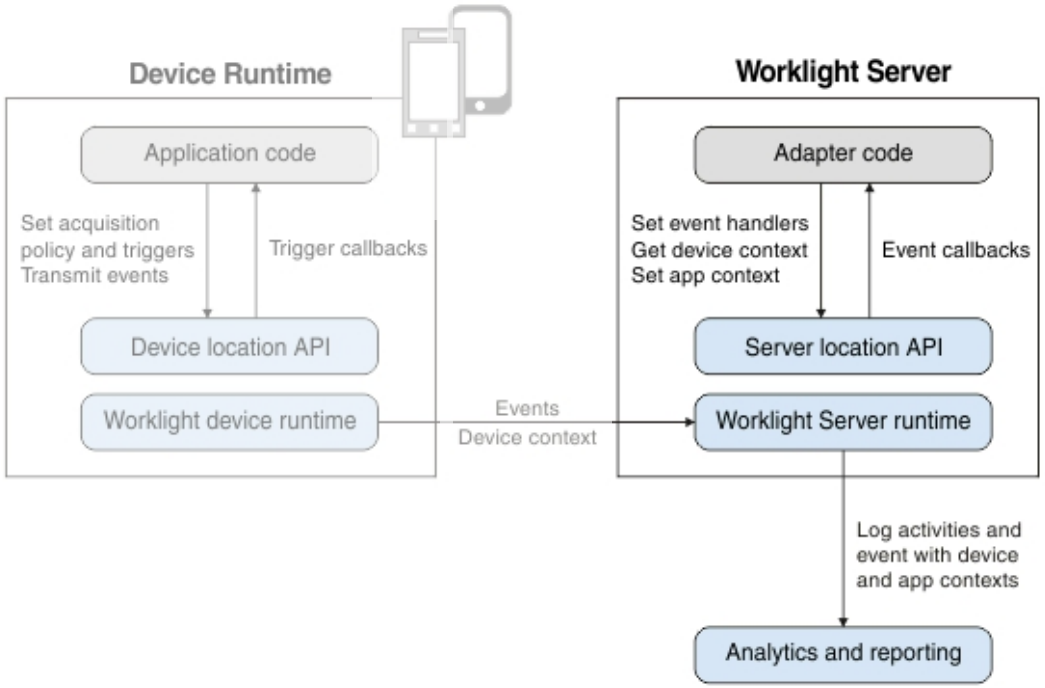
Overview – Architecture (3 of 4)

- Events are created by triggers and application code, and include a snapshot of the device context at the time of their creation.
- Events are buffered on the client, and are transmitted to the server periodically.
- The server might process the event later.
- During the event transmission process, the device context is synchronized transparently to the server.



Overview – Architecture (4 of 4)

- To handle the events, the server uses adapter application code.
- This code sets up event handlers on the server. These handlers filter event data and pass matching events to a callback function.
- The code also accesses the client device context (its location and WiFi network information) and sets an application context.
- Server activities and received events are logged, together with the device and application contexts, for future reporting and analytics.



Overview – The two code lines that you need to know

- **`WL.Device.startAcquisition(policy, triggers, onFailure)`**
  - `policy`: how do you acquire the sensor data?
  - `triggers`: what do you act on and how?
  - `onFailure`: how do you handle acquisition failures?

- **`WL.Server.setEventHandlers(eventHandlers)`**
  - `eventHandlers`: what events do you act on and how?

Overview – The two code lines that you need to know

- Native Android:

```
WLClient.getInstance().getWLDevice().startAcquisition(config)
```

- Native iOS:

```
[[[WLClient sharedInstance] getWLDevice] startAcquisition: config]
```

  - `config`: WLLocationServicesConfiguration, gives access to:
    - `policy`: how do you acquire the sensor data?
    - `triggers`: what do you act on and how?
    - `failureCallbacks`: how do you handle acquisition failures?

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Acquisition policy

- Defines how acquisition takes place

```
var policy = {
    Geo: WL.Device.Geo.Profiles.LiveTracking(),
    Wifi: {
        interval: 10000,
        accessPointFilters: {
            [{SSID: "Net1"},
             {SSID: "Net2", MAC: "*"}]
        }
    }
};
```

Acquisition policy

- Geo acquisition

```
var policy = {
    Geo: WL.Device.Geo.Profiles.LiveTracking(),
    Wifi: {
        interval: 10000,
        accessPointFilters: {
            [{SSID: "Net1"},
             {SSID: "Net2", MAC: "*"}]
        }
    }
};
```

Acquisition policy

- Geo acquisition
- LiveTracking – a preset profile that uses the most accurate settings to track the device.

```
var policy = {
    Geo: WL.Device.Geo.Profiles.LiveTracking(),
    Wifi: {
        interval: 10000,
        accessPointFilters: {
            [{SSID: "Net1"},
             {SSID: "Net2", MAC: "*"}]
        }
    }
};
```

Acquisition Policy

- Geo acquisition
- LiveTracking – a preset profile that uses the most accurate settings to track the device.
- Additional configuration options
  - RoughTracking and PowerSaving profiles
  - Custom settings

```
var policy = {
    Geo: WL.Device.Geo.Profiles.LiveTracking(),
    Wifi: {
        interval: 10000,
        accessPointFilters: {
            [{SSID: "Net1"},
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Acquisition policy

- WiFi acquisition

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var policy = {
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        }
    }
};
```

Acquisition policy

- WiFi acquisition
- The polling interval, in milliseconds; WiFi polling is performed each interval.

```
var policy = {
    Geo: WL.Device.Geo.Profiles.LiveTracking(),
    Wifi: {
        interval: 10000,
        accessPointFilters: {
            [{SSID: "Net1"},
             {SSID: "Net2", MAC: "*"}]
        }
    }
};
```

Acquisition policy

- WiFi acquisition
- The polling interval, in milliseconds; WiFi polling is performed each interval.
- Which access points are of interest?
  - Acquisition ignores everything except “Net1” and “Net2” – doing so assists in dynamic environments, such as when there are mobile hotspots.

```
var policy = {
    Geo: WL.Device.Geo.Profiles.LiveTracking(),
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        interval: 10000,
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```

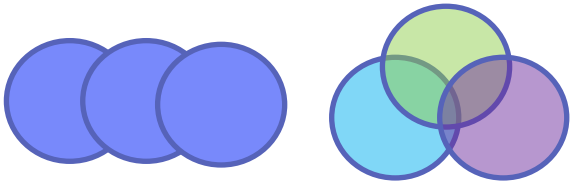
Acquisition policy

- WiFi acquisition
- The polling interval, in milliseconds; WiFi polling is performed each interval.
- Which access points are of interest?
  - Acquisition ignores everything except “Net1” and “Net2” – doing so assists in dynamic environments, such as when there are mobile hotspots.
  - Treat all “Net1” access points as though they were one access point.
  - Differentiate “Net2” access points by MAC address.

```
var policy = {
    Geo: WL.Device.Geo.Profiles.LiveTracking(),
    Wifi: {
        interval: 10000,
        accessPointFilters: {
            [{SSID: "Net1"},
             {SSID: "Net2", MAC: "*"}]
        }
    }
};
```

Acquisition policy

- WiFi acquisition
- The polling interval, in milliseconds; WiFi polling is performed each interval.
- Which access points are of interest?
  - Acquisition ignores everything except “Net1” and “Net2” – doing so assists in dynamic environments, such as when there are mobile hotspots.
  - Treat all “Net1” access points as though they were one access point.
  - Differentiate “Net2” access points by MAC address.



- Enterprise / Area-wide: unify by SSID (Net1)
- Indoors: differentiate by MAC address of access points (Net2)

Acquisition policy

- Native Android

```
WLAcquisitionPolicy policy = new WLAcquisitionPolicy()
    .setGeoPolicy(WLGeoAcquisitionPolicy.getLiveTrackingProfile())
    .setWifiPolicy(new WLWifiAcquisitionPolicy()
            .setInterval(10000)
            .setAccessPointFilters(Arrays.asList(
                    new WLWifiAccessPointFilter("Net1"),
                    new WLWifiAccessPointFilter("Net2", "*"))));
```

- Native iOS

```
WLAcquisitionPolicy* policy =
   [[
      [[WLAcquisitionPolicy alloc] init]
          setGeoPolicy: [WLGeoAcquisitionPolicy getLiveTrackingProfile]]
          setWifiPolicy:
             [[
                [[WLWifiAcquisitionPolicy alloc] init]
                     setInterval: 10000]
                     setAccessPointFilters: [NSMutableArray arrayWithObjects:
                        [[WLWifiAccessPointFilter alloc] init: @"Net1"],
                        [[WLWifiAccessPointFilter alloc] initWithSSID: @"Net2" MAC: @"*"],
                        nil]]];
```

Acquisition policy – Permissions

- Permissions for Geo
  - AndroidManifest.xml:
    ACCESS_COARSE_LOCATION
    ACCESS_FINE_LOCATION
  - iOS info.plist
    UIRequiredDeviceCapabilities:
    location-services, gps
  - Windows Phone 8 WMAppManifest.xml:
    ID_CAP_LOCATION

```
var policy = {
    Geo: WL.Device.Geo.Profiles.LiveTracking(),
    Wifi: {
        interval: 10000,
        accessPointFilters: {
            [{SSID: "Net1"},
             {SSID: "Net2", MAC: "*"}]
        }
    }
};
```

- Permissions for WiFi
  - AndroidManifest.xml:
    ACCESS_WIFI_STATE
    CHANGE_WIFI_STATE
  - iOS info.plist
    UIRequiredDeviceCapabilities: wifi

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Triggers

- You can set up triggers for:
  - Geo / WiFi fences
    - Enter / Exit
    - Dwell Inside / Outside
  - Movement
    - Geo: PositionChange
    - WiFi: VisibleAccessPointsChange
  - WiFi Connect / Disconnect

```
var triggers = {
    Geo: {
        trigger1: {
            type: "Enter",
            circle: {
                longitude: -74.044444,
                latitude: 40.689167,
                radius: 100},
            callback: libertyAtLast,
            eventToTransmit: {
                event: {
                    bring: "me",
                    your: "huddledMasses"
                }
            }
        }
    }
};
```

Triggers

- You can set up triggers for:
  - Geo / WiFi fences
    - Enter / Exit
    - Dwell Inside / Outside
  - Movement
    - Geo: PositionChange
    - WiFi: VisibleAccessPointsChange
  - WiFi Connect / Disconnect
- When a trigger activates, it can:
  - Call a callback function.
  - Create an event to be sent to the server.

```
var triggers = {
    Geo: {
        trigger1: {
            type: "Enter",
            circle: {
                longitude: -74.044444,
                latitude: 40.689167,
                radius: 100},
            callback: libertyAtLast,
            eventToTransmit: {
                event: {
                    bring: "me",
                    your: "huddledMasses"
                }
            }
        }
    }
};
```

Triggers

- Enter Trigger
  - Activates after the device enters the circle.
  - `longitude` and `latitude` are the coordinates of the center of the circle.
  - The circle `radius` is given in meters.

```
var triggers = {
    Geo: {
        trigger1: {
            type: "Enter",
            circle: {
                longitude: -74.044444,
                latitude: 40.689167,
                radius: 100},
            callback: libertyAtLast,
            eventToTransmit: {
                event: {
                    bring: "me",
                    your: "huddledMasses"
                }
            }
        }
    }
};
```

Triggers

- Native Android

```
WLTriggersConfiguration triggers = new WLTriggersConfiguration();
triggers.getGeoTriggers().put("trigger1",
        new WLGeoEnterTrigger()
            .setArea(new WLCircle(new WLCoordinate(40.689167, -74.044444), 100)))
            .setCallback(libertyAtLast)
            .setEvent(new JSONObject()
                        .put("bring", "me")
                        .put("your", "huddledMasses"));
```

- Native iOS

```
WLTriggersConfiguration* triggers = [[WLTriggersConfiguration alloc] init];
[[triggers getGeoTriggers] setObject:
   [[[
      [[WLGeoEnterTrigger alloc] init]
         setArea: [[WLCircle alloc]
            initWithCenter:[[WLCoordinate alloc] initWithLatitude:40.689167 longitude:-74.044444]
            radius:100]]
         setCallback: libertyAtLast]
         setEvent: [NSMutableDictionary dictionaryWithObjectsAndKeys:
           @"me", @"bring",
           @"huddledMasses", @"your",
           nil]]
   forKey:@"trigger1"];
```

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Events – Client side

- Events are created on the client in one of two ways:
  - Triggers
  - Calling `WL.Client.transmitEvent(`*`event`*`,`*`immediate`*`)`
    - Native Android:
      `WLClient.getInstance().transmitEvent(`*`event`*`,`*`immediate`*`)`
    - Native iOS:

```
[[WLClient sharedInstance]
  transmitEvent: event immediately: immediate]
```

- By default, events are periodically sent to the server.

Events – Server side

- In adapter code, create event handlers by using:

  `WL.Server.createEventHandler(`*`filter, handlerFunction`*`)`

- Events that match *`filter`* will be passed to *`handlerFunction`*.
  - Filter examples:
    - `{status: "platinum"}` – handle platinum members only
    - `{hotel: { country: "USA" } }` – hotels in the USA
    - `{}` – all events
- Register the event handlers by using:

  `WL.Server.setEventHandlers([…])`

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Testing hybrid applications

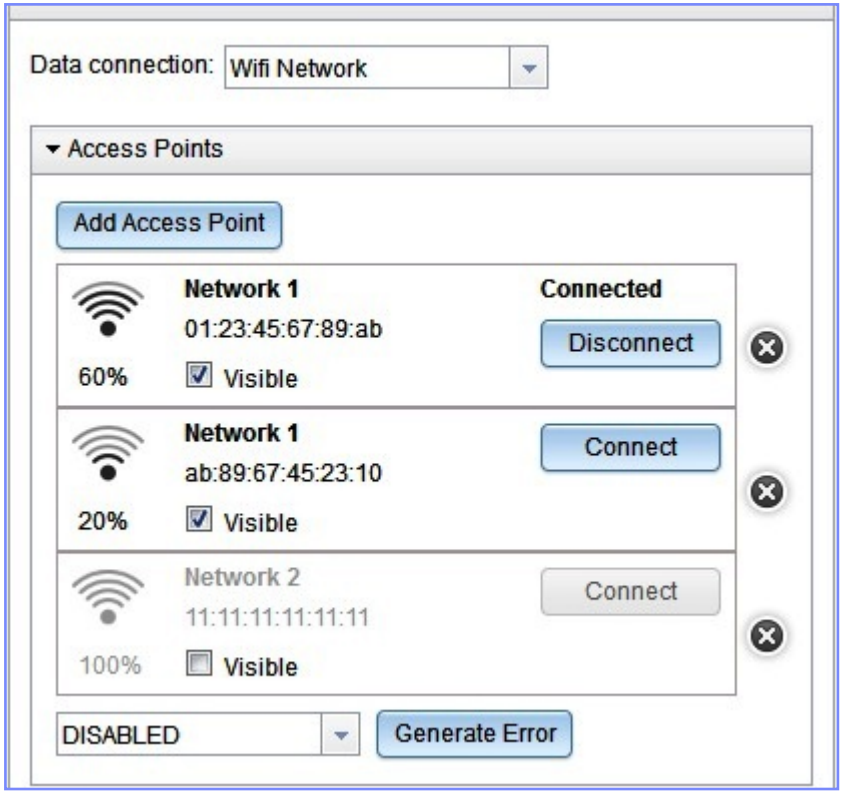
- In order to test your application you may need to test the various triggers and error handling logic your application uses.
- The Mobile Browser Simulator provides capabilities to simulate sensor data and errors.
- The Mobile Browser Simulator can be accessed by right-clicking an application's environment, and selecting the **Preview** option under the **Run As** menu.

Testing hybrid applications – Manual Geo testing

- The Geolocation widget can be used to set a specific position through manual entry, or by clicking on the map.
- A simple simulation mode is also provided by using the **Step** and **Play** buttons, which move the position in the simulated device at the given speed and in the direction of the given heading.
- You can also simulate the generation of errors.

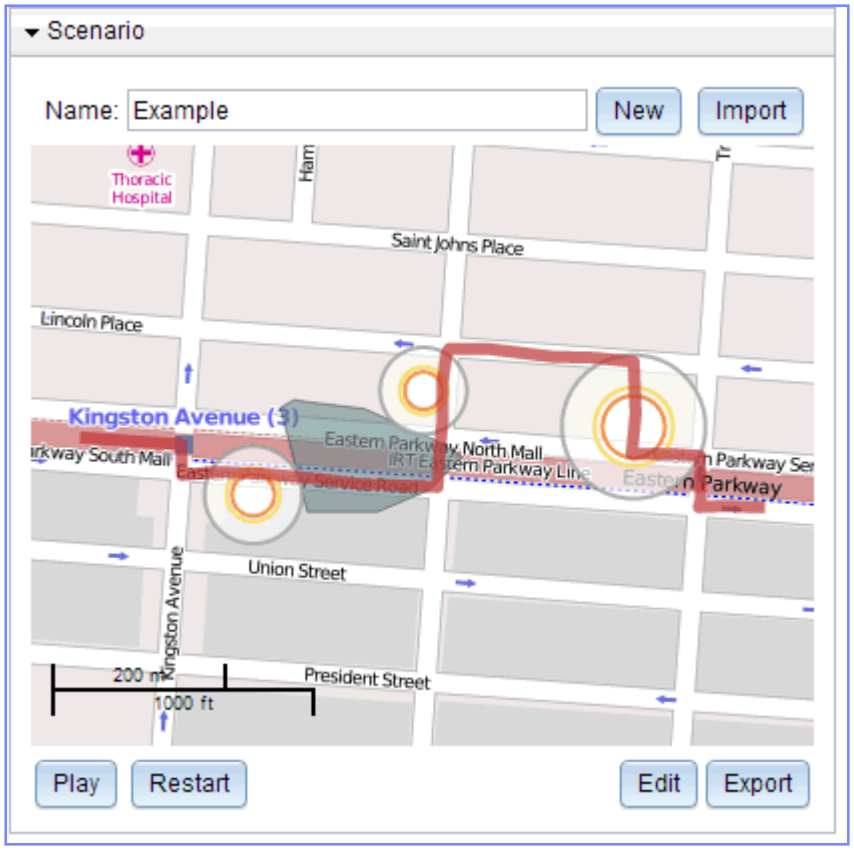
Testing hybrid applications – Manual WiFi testing

- The Network widget can be used to define simulated access points, configure their signal strengths, and simulate connecting or disconnecting an access point.
- You can also simulate the generation of errors.



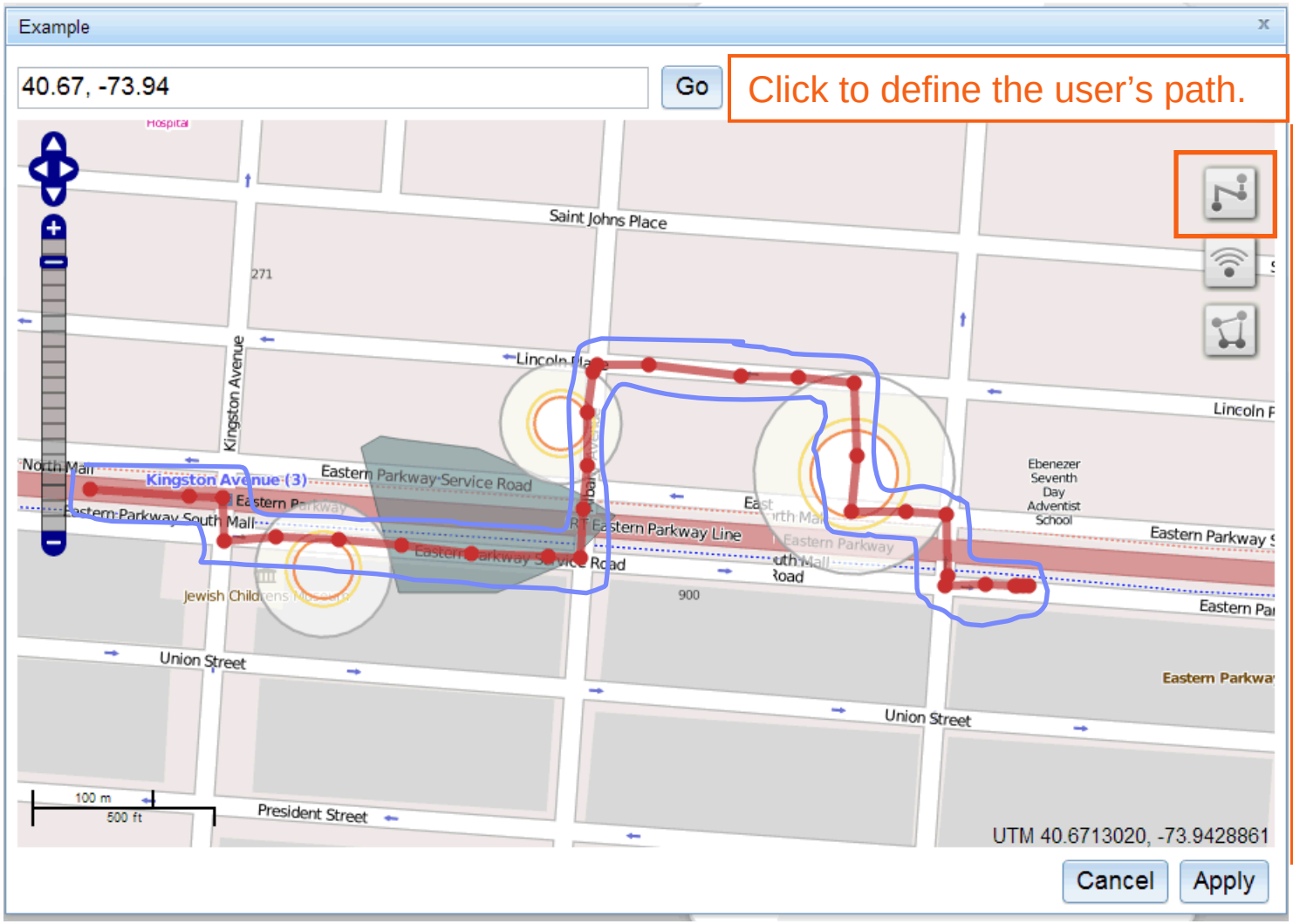
Testing hybrid applications – Scenarios

- The Scenario widget can be used to automatically simulate a user moving through an environment in a complex fashion.
- A scenario consists of:
  - The user's path, and when the user reaches each path point
  - WiFi access points
  - No GPS coverage zones
- To open the scenario editor, use the **Edit** button.



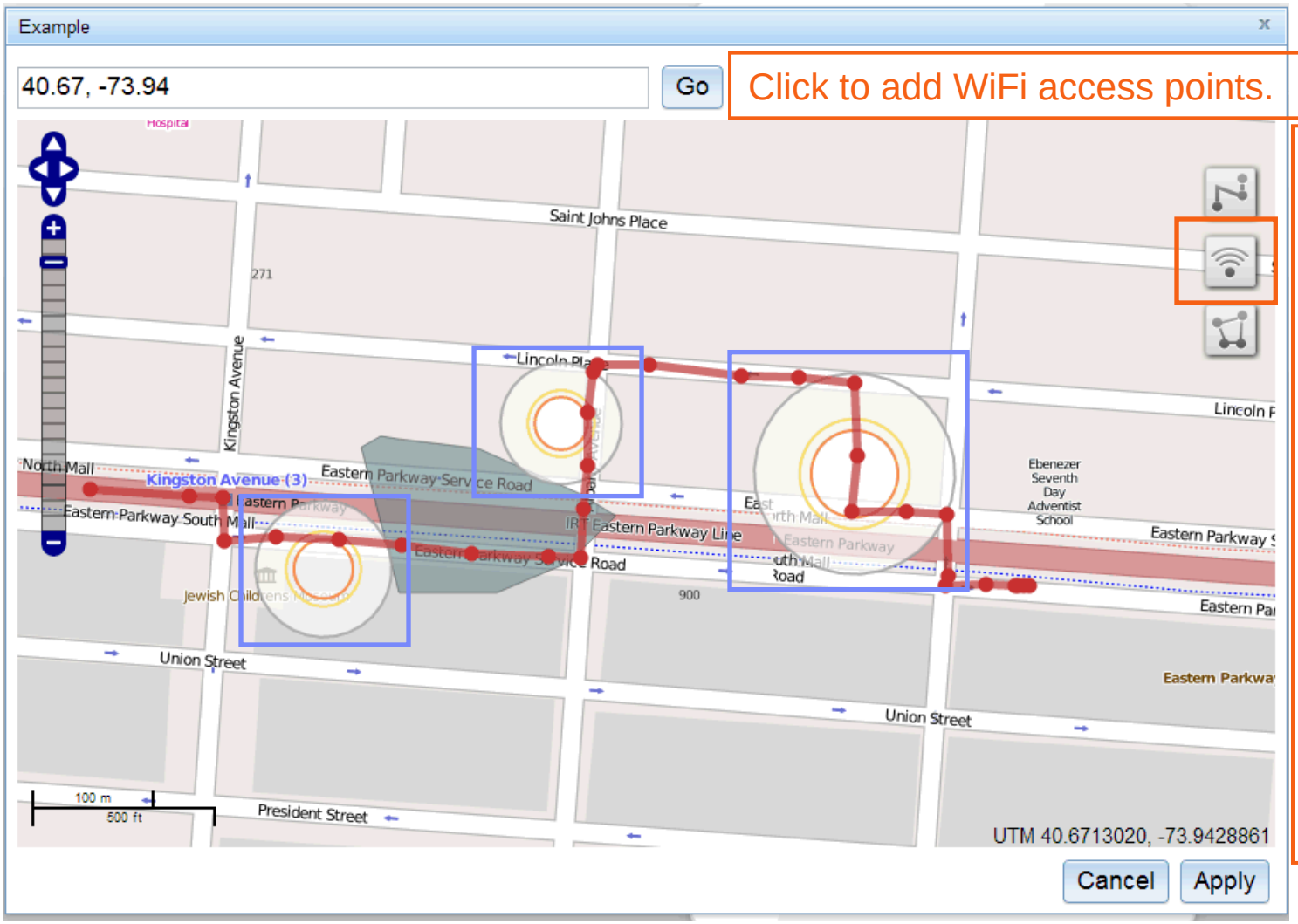
Testing hybrid applications – Scenario Editor

Testing hybrid applications – Scenario Editor



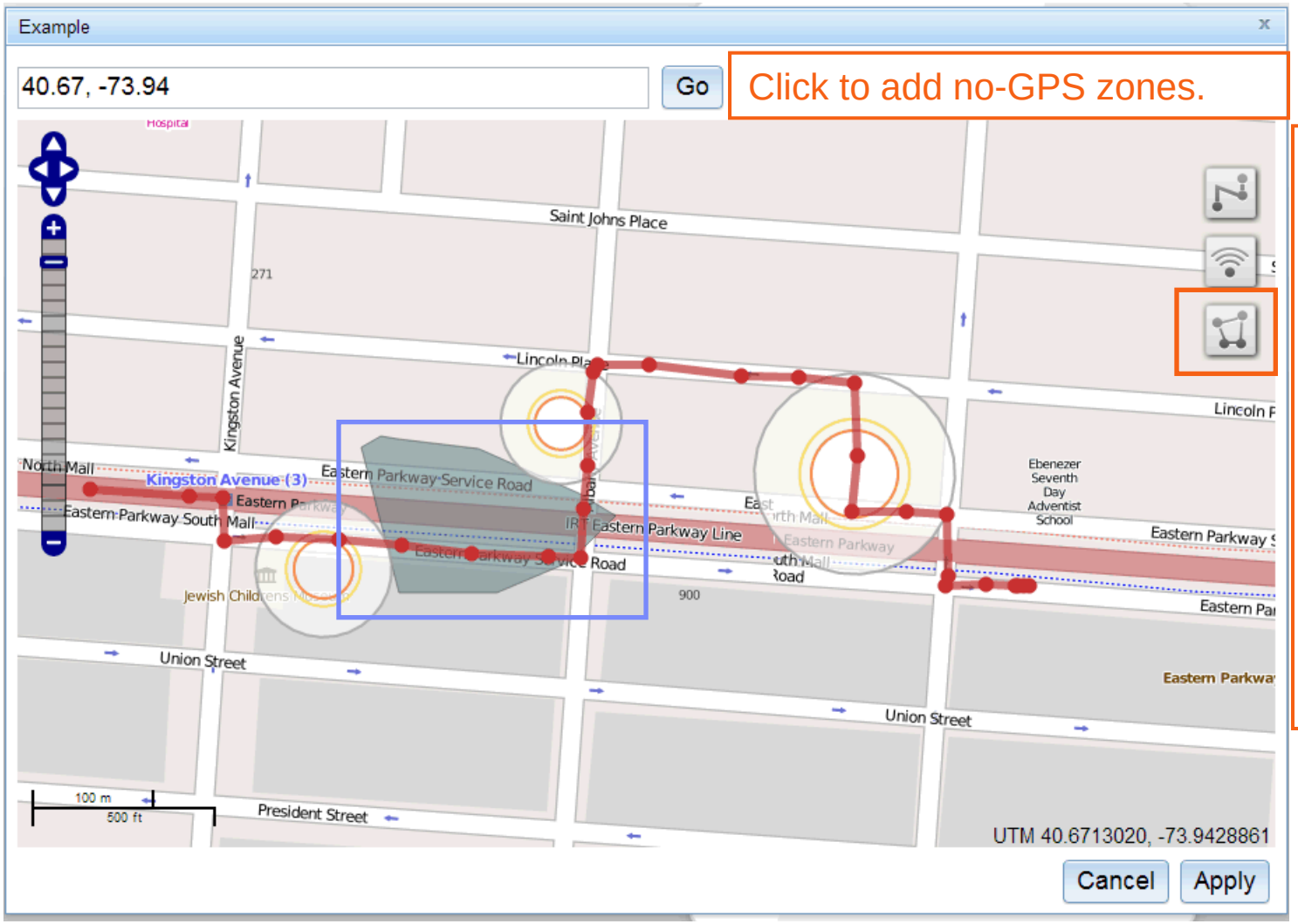
- Click on the map to add each path point; double-click to add the last point.
- You can drag points to new locations.
- Click on a point to set the user's arrival time to that point, or to delete the whole path.

Testing Hybrid Applications – Scenario Editor



- Click on the map and drag to set the area covered by the access point.
- Click an existing access point to change its SSID and MAC.
- After clicking, drag to move or resize.

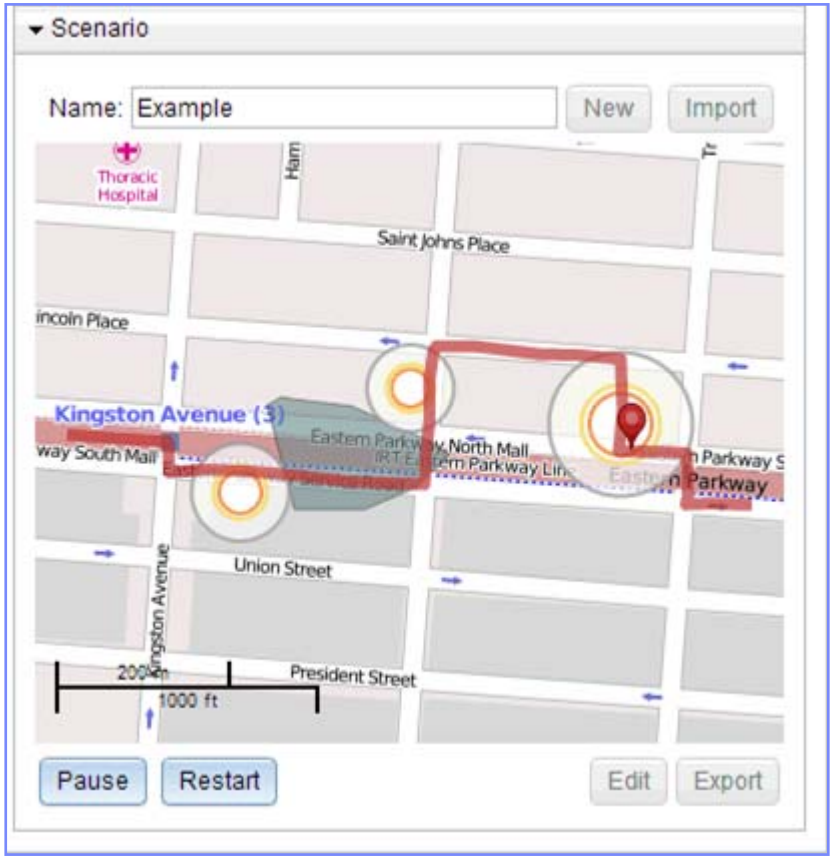
Testing Hybrid Applications – Scenario Editor



- Click on the map to add each vertex of the zone; double-click to add the last point.
- After clicking on an existing zone, you can drag to move, resize, or rotate.

Testing hybrid applications – Scenarios

- When playing a scenario:
  - The user's position is displayed on the map (📍) and is automatically updated. The position that is available to the device is shown in the Geolocation widget (and will not change when in a no-GPS zone).
  - WiFi access point visibility and signal strengths are automatically updated. These updates can be seen in the Network widget.
- Scenarios can be imported and exported to support test reuse.



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Exercise

- The sample for this training module can be found in the Getting Started page of the IBM Worklight® documentation website at http://www.ibm.com/mobile-docs.
- To use the sample for this module, you must install IBM Worklight V6.0.0 Interim Fix (IF) 201307011413 or later.

Samples

- Two sample applications are included: SmallSample and Sample.
- SmallSample is executable. It demonstrates:
  - Acquiring an initial position
  - Using a Geo profile
  - Geo Triggers for: DwellInside, Exit, and PositionChange
  - Ongoing acquisition
- Sample is not executable. It is intended to show how someone could make an express check-in application for a hotel:
  - When receiving a push notification it begins ongoing acquisition in power-saving mode.
  - As the device gets nearer to the hotel it uses Geo Enter triggers to send events to the server, and to change the acquisition policy (including turning on WiFi acquisition).
  - A WiFi Enter trigger is used to detect arrival to the hotel.
  - The application could be extended by adding in UI elements for the check-in.

For more information

- For more information about location services, see the IBM Worklight user documentation at:
  - http://pic.dhe.ibm.com/infocenter/wrklight/v6r1m0/topic/com.ibm.worklight.dev.doc/devref/c_overview_location_services.html
- For more information about location service APIs, see the IBM Worklight user documentation at:
  - http://pic.dhe.ibm.com/infocenter/wrklight/v6r1m0/topic/com.ibm.worklight.apiref.doc/apiref/c_client_api.html

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