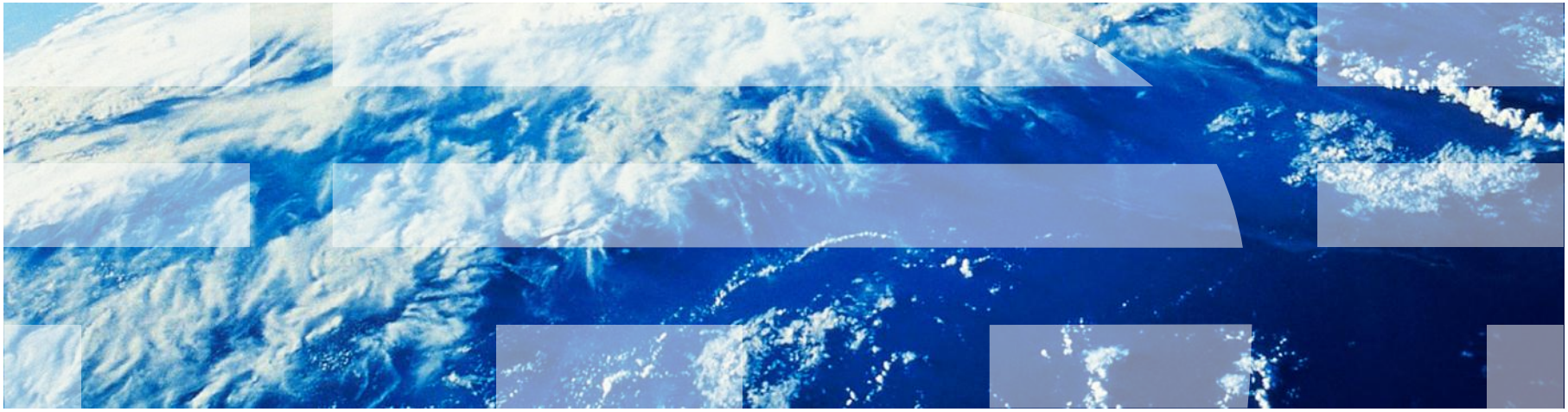
IBM Worklight Foundation V6.2.0 Getting Started

Location Services in Worklight applications



20 June 2014

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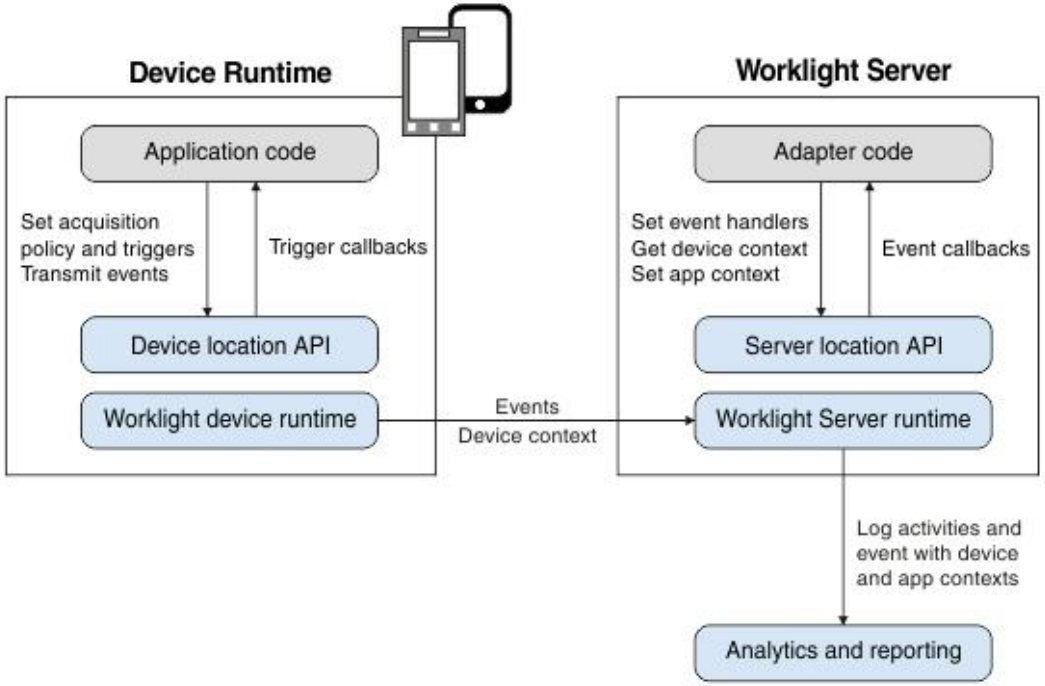
Agenda

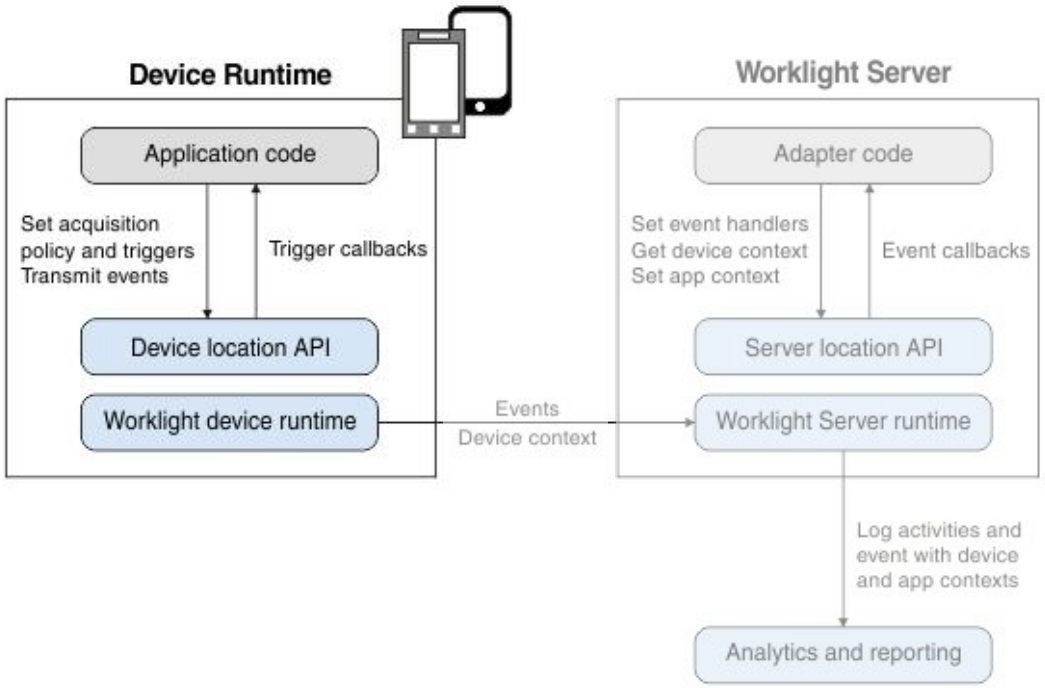
- Overview
  - Architecture
  - The two code lines that you need to know
- Acquisition policy
  - Geo
  - WiFi
  - Permissions
- Triggers
- Events
- Testing hybrid applications
- Samples

Overview – Architecture (1 of 4)



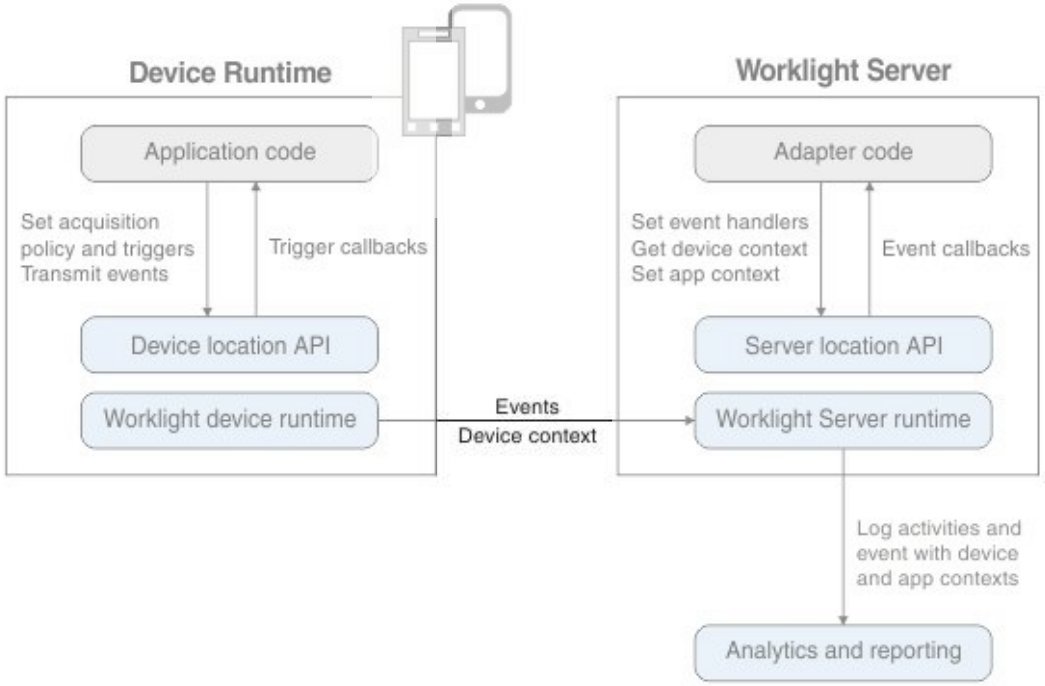
Overview – Architecture (2 of 4)

- 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.



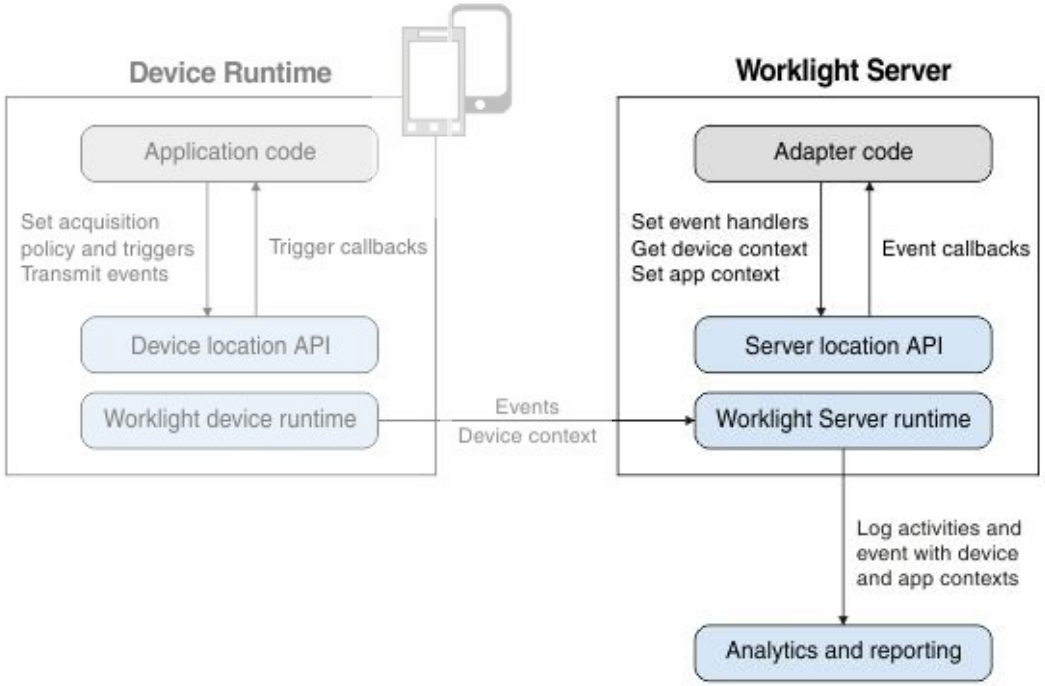
Overview – Architecture (3 of 4)

- 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.



For more information, see the section Location services of the IBM Worklight Foundation user documentation.

Overview – The two code lines that you need to know

Note: The following functions should be called after the Worklight framework is initialized (within or after the `wlCommonInit()` function).

In hybrid applications:

- **`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

In native applications:

- Android:

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

- 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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  - Permissions
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Acquisition policy

- Defines how acquisition takes place (in hybrid applications)

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

Acquisition policy – Geo acquisition

- Geo acquisition

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

Acquisition policy – Geo acquisition

- 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

- 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"},
             {SSID: "Net2", MAC: "*"}]
        }
    }
};
```

For more information, see the topic Setting an acquisition policy of the IBM Worklight Foundation user documentation.

Acquisition policy – WiFi acquisition

- WiFi acquisition

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

Acquisition policy – WiFi acquisition

- 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

- 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(),
    Wifi: {
        interval: 10000,
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            [{SSID: "Net1"},
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        }
    }
};
```

Acquisition policy – WiFi acquisition

- 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.
  - Consider 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(),
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        interval: 10000,
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            [{SSID: "Net1"},
             {SSID: "Net2", MAC: "*"}]
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```
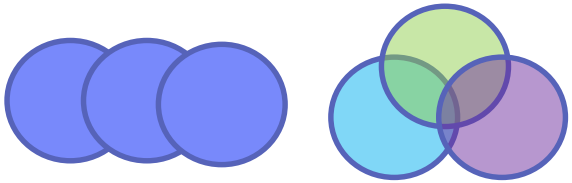

Acquisition policy – WiFi acquisition

- 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.
  - Consider 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)

For more information, see the topic Setting an acquisition policy of the IBM Worklight Foundation user documentation.

Acquisition policy

In native applications:

- **Android**

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

- **iOS**

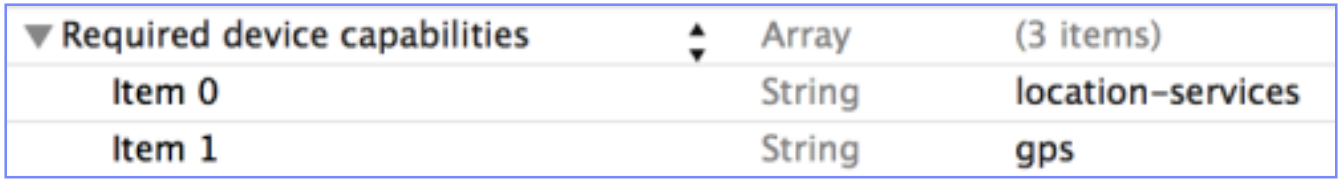
```
WLAcquisitionPolicy* policy =
   [[
      [[WLAcquisitionPolicy alloc] init]
          setGeoPolicy: [WLGeoAcquisitionPolicy getLiveTrackingProfile]]
          setWifiPolicy:
             [[
                [[WLWifiAcquisitionPolicy alloc] init]
                     setInterval: 10000]
         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

Acquisition policy – Permissions – Geo

- **Android**
  - Add the following permissions in `AndroidManifest.xml`:

```
<uses-permission
  android:name="com.google.android.c2dm.permission.ACCESS_COARSE_LOCATION/>

<uses-permission
  android:name="com.google.android.c2dm.permission.ACCESS_FINE_LOCATION"/>
```

- **iOS**
  - Add a `UIRequiredDeviceCapabilities` node in *`yourAppName`*`-info.plist` with items:
    - location-services
    - gps (when `enableHighAccuracy=true`)

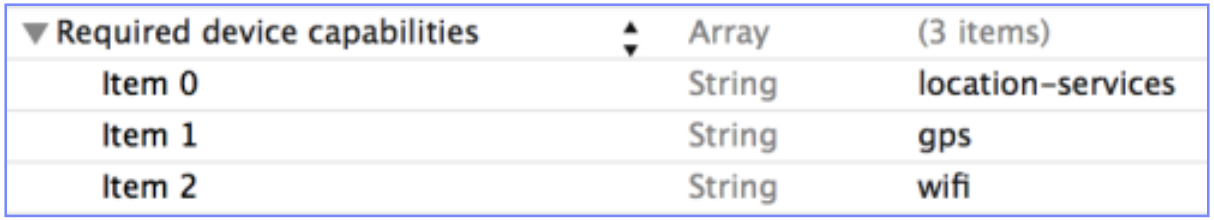


Acquisition policy – Permissions – WiFi

- **Android**
  - Add the following permissions in `AndroidManifest.xml`:

```
<uses-permission
   android:name="android.permission.ACCESS_WIFI_STATE"/>
<uses-permission
   android:name="android.permission.CHANGE_WIFI_STATE"/>
```

- **iOS**
  - Add a `UIRequiredDeviceCapabilities` node in *`yourAppName`*`-info.plist` with items:
    - 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"
                }
            }
        }
    }
};
```

For more information, see the topic Triggers of the IBM Worklight Foundation user documentation.

Triggers

In native applications:

- **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"));
```

- **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:
  1. Triggers
  2. Calling API methods:
     - **Hybrid:**
       - `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([…])`

For more information, see the topic Working with geofences and triggers of the IBM Worklight Foundation user documentation.

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Testing hybrid applications

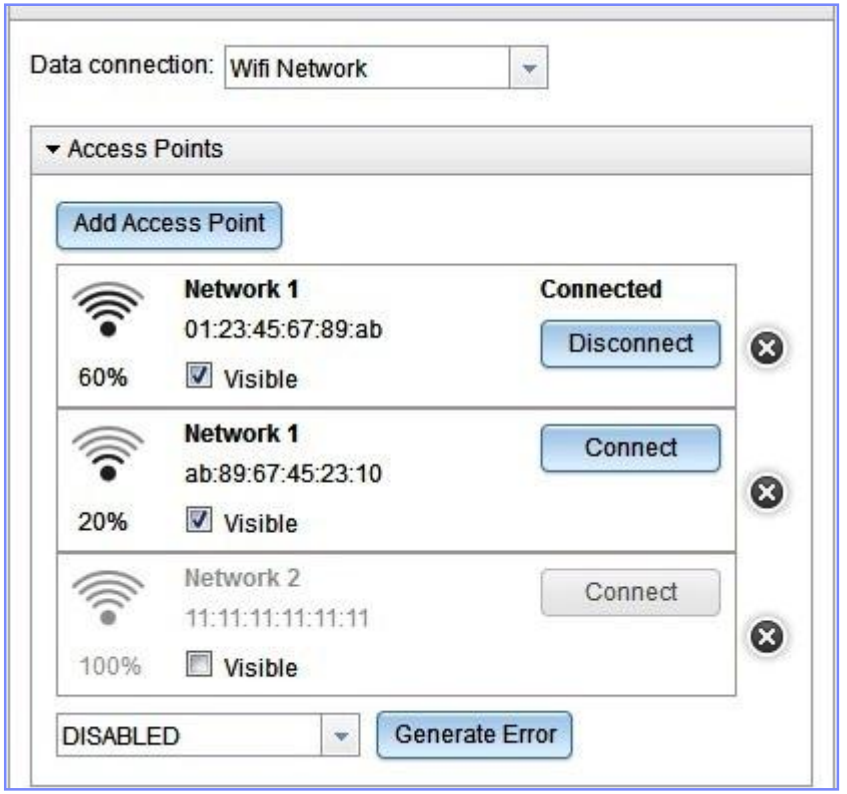
- In order to test your application you might need to test the various triggers and error handling logic that your application uses.
- The Mobile Browser Simulator provides capabilities to simulate sensor data and errors.
- The Mobile Browser Simulator can be accessed by right-clicking an application 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.

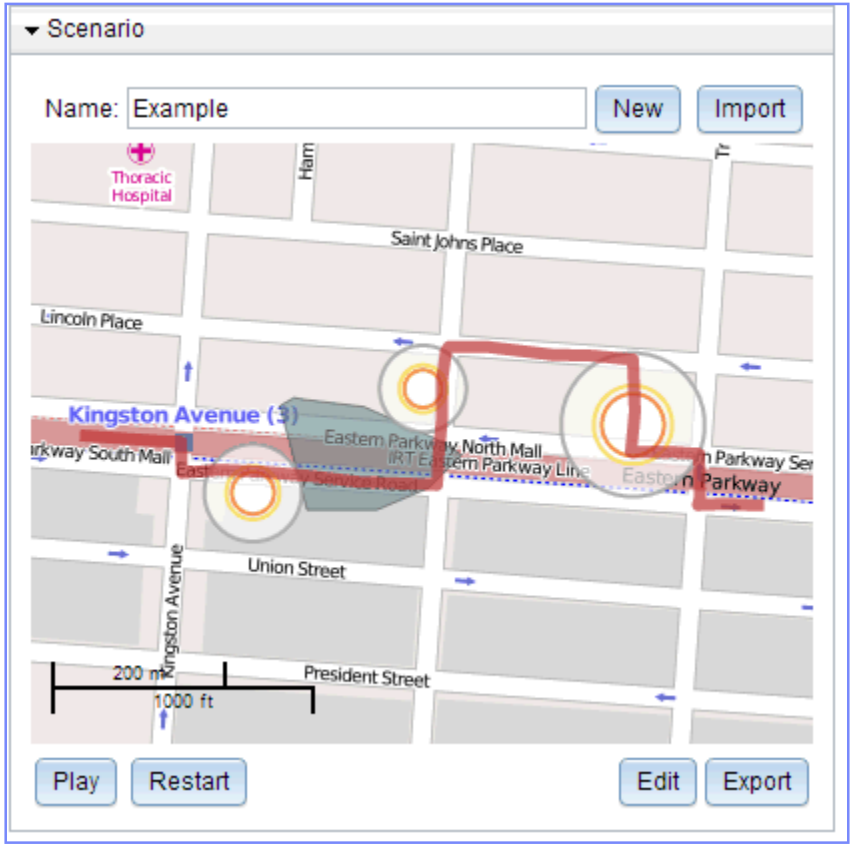
Testing hybrid applications – Manual WiFi testing

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

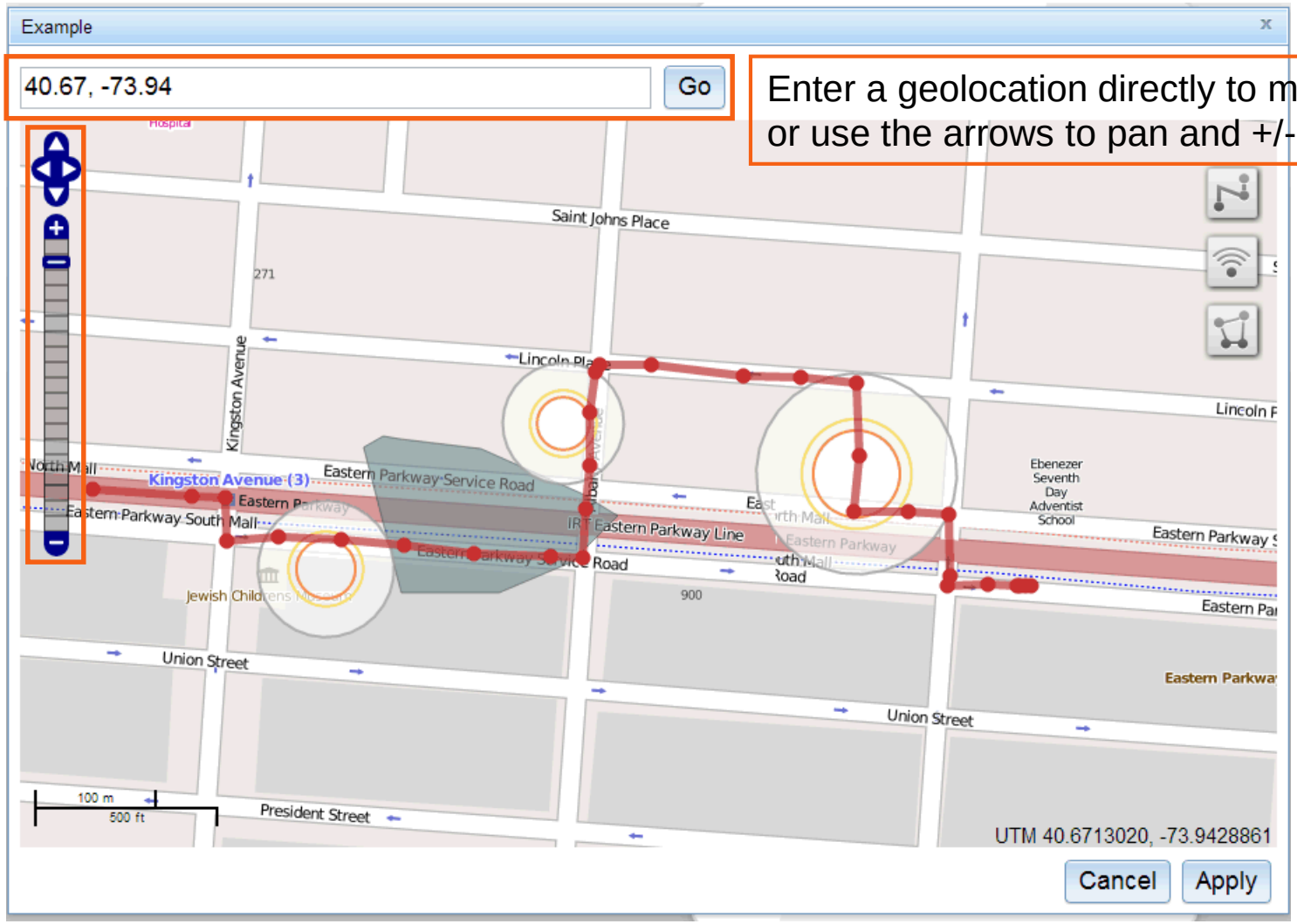


Testing hybrid applications – Scenarios

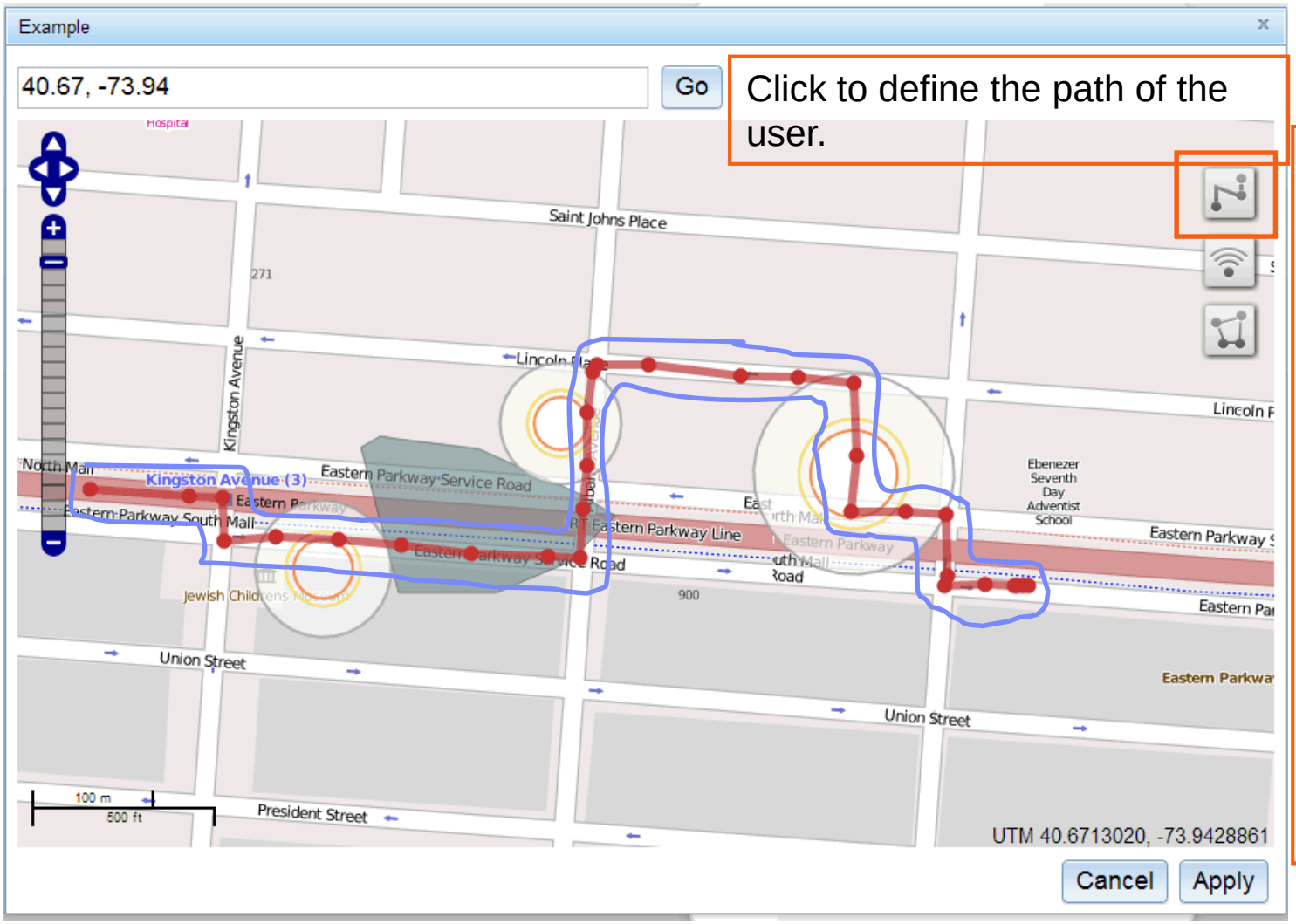
- The Scenario widget can be used to automatically simulate a user moving through an environment in a complex way.
- A scenario consists of:
  - The path of the user, and the point when the user reaches each path point
  - WiFi access points
  - No GPS coverage zones
- To open the scenario editor, use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



Testing hybrid applications – Scenario Editor



Testing hybrid applications – Scenario Editor

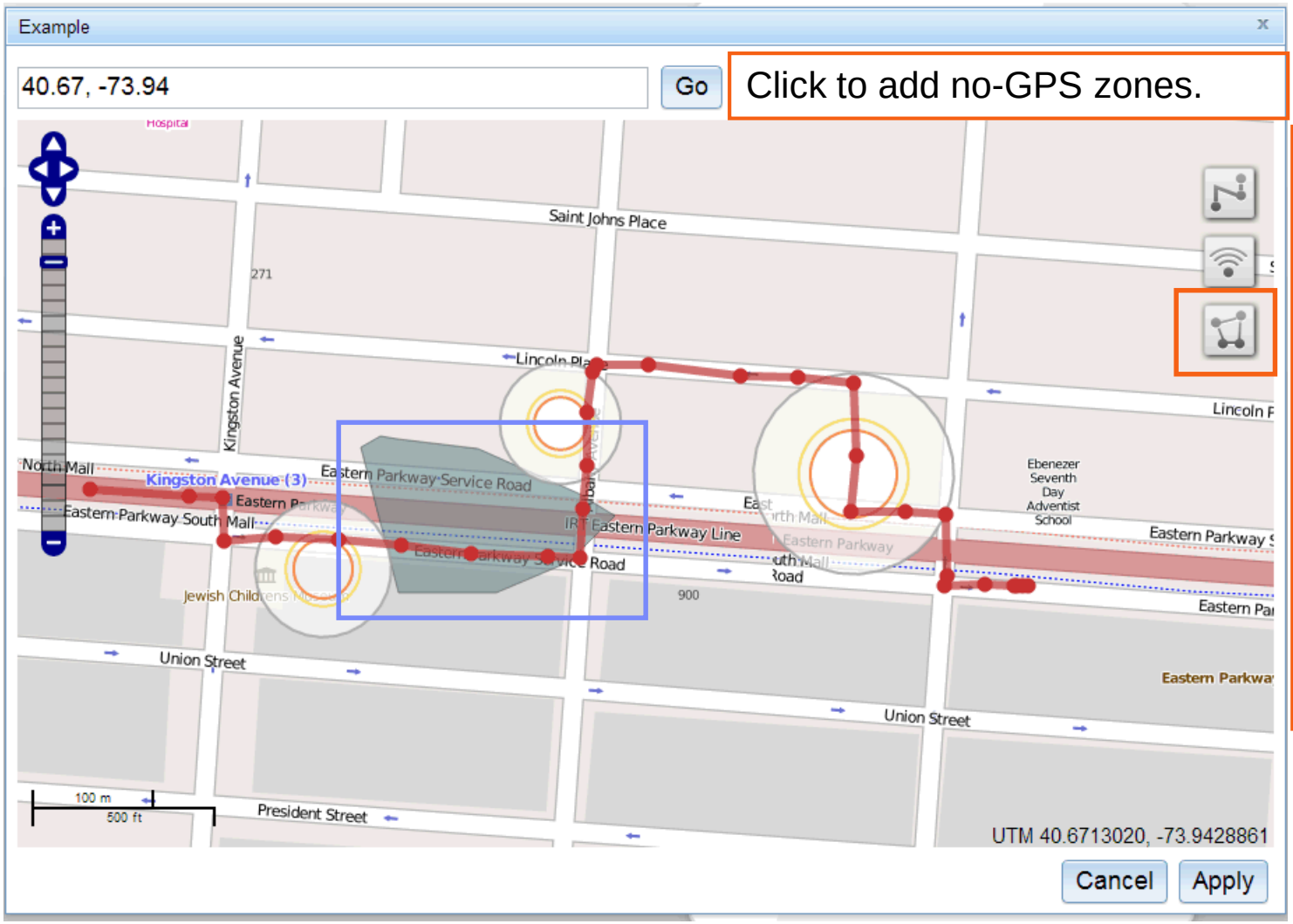


- Click on the map to add each path point; double-click to add the last point.
- You can drag points to new locations.
- Click on a point to set the user's arrival time to that point, or to delete the whole path.

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.

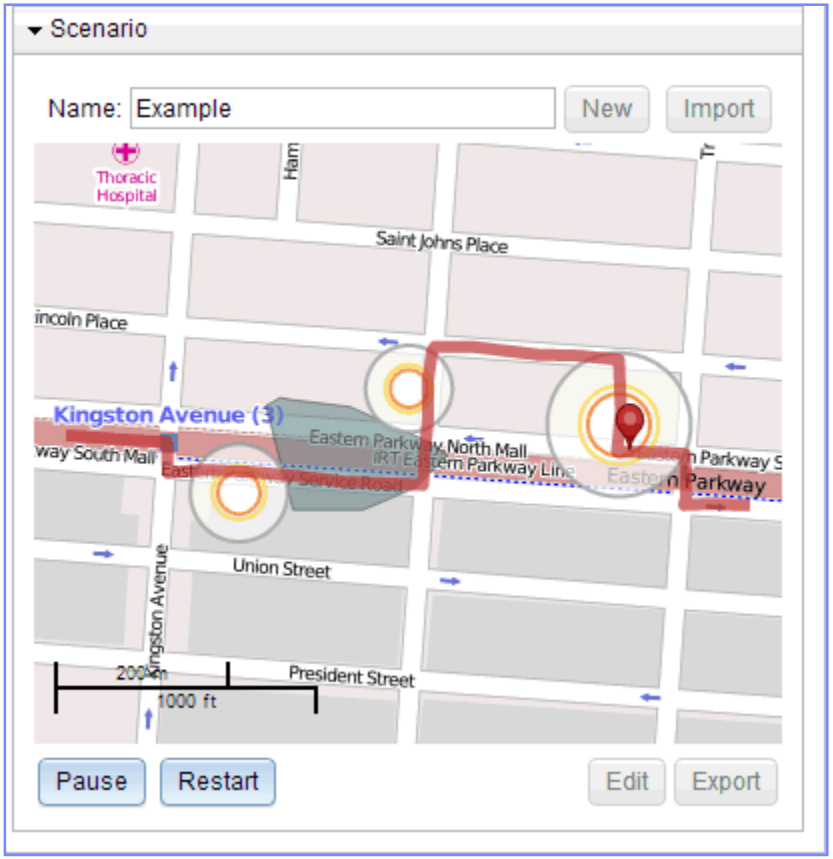
Testing Hybrid Applications – Scenario Editor



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

Testing hybrid applications – Scenarios

- When playing a scenario:
  - The position of the user 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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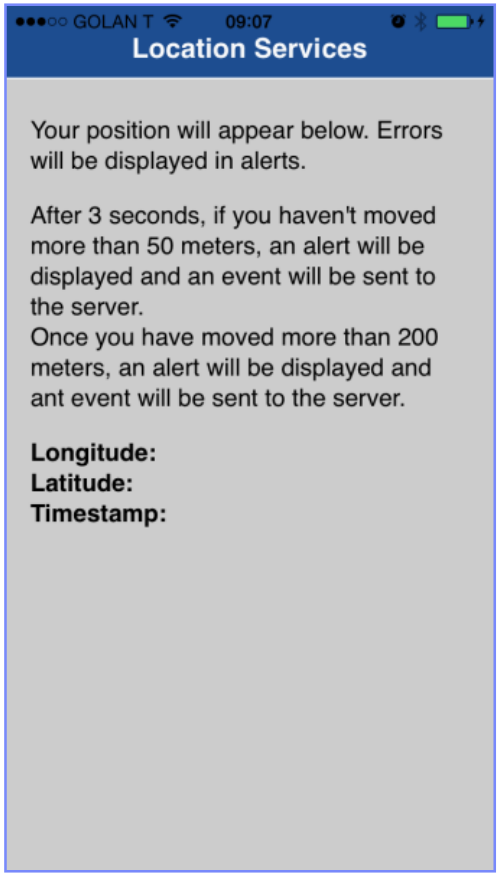
Exercise

- 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.



Sample

- The LocationServices sample demonstrates:
  - Acquiring an initial position
  - Using a Geo profile
  - Geo Triggers for: DwellInside, Exit area, and PositionChange
  - Transmitting event to the server on DewllInside and Exit area
  - Ongoing acquisition

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