Push notifications in native Android applications

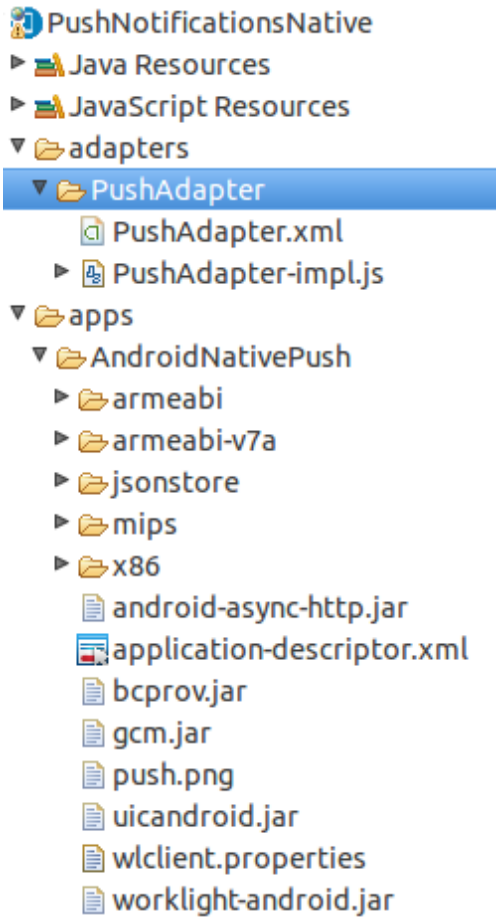
Overview

This tutorial explains the concept, API, and usage of push notification in the context of native Android applications.

The following topics are covered:

- Setting up for push notification
- Server-side notification APIs
- Client-side notification APIs
- Tag-based notification
- Broadcast-based notification
- Sample application

Setting up your native Android application for push notification



In MobileFirst Studio, create a MobileFirst project and add a MobileFirst Android Native API and HTTP adapter.

The native API includes the following files:

- The *gcm.jar* file contains classes that are necessary for the Android application to register with Google Cloud Messaging (GCM).
- The *push.png* file is an icon file that is displayed when a push notification arrives.

Edit the application-descriptor.xml file.

- Replace the `key` and `senderId` values with your API key and project number respectively in the `pushSender` tag.
  In case you do not have an API key, you can get one from the Google GCM Console (https://code.google.com/apis/console)
  - Your project's number is the `senderId`
  - Your Android key is the GCM `key` (can be generated in **API & Auth > Credentials**)

```
<nativeAndroidApp xmlns="http://www.worklight.com/native-android-descriptor" id="AndroidNativePush" platformVersion="6.3.0.00.20141105-0943" securityTest="MySecurityTest" version="1.0">
 <pushSender key="SOME-GCM-KEY" senderId="SOME-GCM-ID"/>
</nativeAndroidApp>
```

Deploy the native API and the adapter.

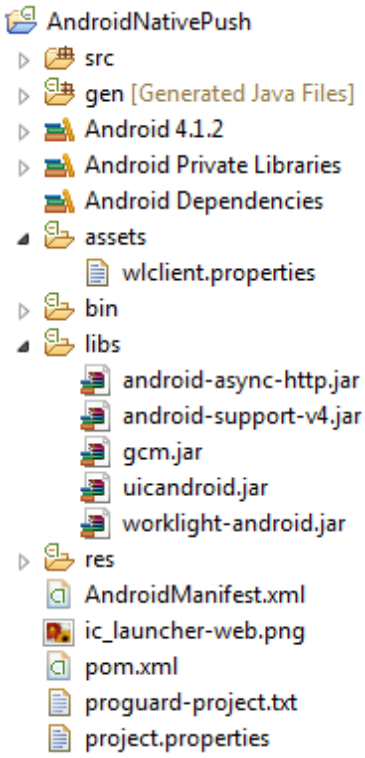
Right-click the generated NativeAPI and select **Run As > Deploy Native API**.

Copy libraries from the MobileFirst native API to the Android project.

- Copy the following files from the MobileFirst project to the Android project.

MobileFirst project	Android Activity project
wlclient.properties	assets/wlclient.properties
gcm.jar	libs/gcm.jar
worklight-android.jar	libs/worklight-android.jar
android-async-http.jar	libs/android-async-http.jar
push.png	drawable*/push.png

- After you copy the libraries, the native Android project appears as shown:



Edit the wlclient.properties file.

Edit the wlclient.properties file in your native Android project and enter appropriate values for the following fields:

- wlServerHost – Hostname or IP address of MobileFirst Server.
- wlServerPort – Port on which MobileFirst Server is listening.
- wlServerContext – Context root of your MobileFirst Server instance.
- GcmSenderId – The project number that you obtained through the Google API console.

```
wlServerProtocol = http
wlServerHost =
wlServerPort = 10080
wlServerContext = /PushNotificationsNative/
wlAppId = AndroidNativePush
wlAppVersion = 1.0
wlEnvironment = Androidnative
wlUid = wY/mbnwKTDDYQUvuQCdSgg==
wlPlatformVersion = 6.3.0.00.20141012-0730
#languagePreferences = Add locales in order of preference (e.g. en, fr, fr-CA)
#For Push Notifications,uncomment below line and assign value to it
GcmSenderId =
```

Modifications to the native Android project

Add the following permissions to the AndroidManifest.xml file of your Android project:

```
<permission android:name="com.imf.androidnativepush.permission.C2D_MESSAGE"
android:protectionLevel="signature" />
<uses-permission android:name="android.permission.INTERNET" />
 <uses-permission android:name="android.permission.GET_TASKS"/>
 <uses-permission android:name="com.worklight.androidnativepush.permission.C2D_MESSAGE" />
 <uses-permission android:name="com.google.android.c2dm.permission.RECEIVE" />
 <uses-permission android:name="android.permission.WAKE_LOCK" />
 <uses-permission android:name="android.permission.GET_ACCOUNTS" />
 <uses-permission android:name="android.permission.USE_CREDENTIALS" />
 <uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE" />
 <uses-permission android:name="android.permission.ACCESS_WIFI_STATE"/>
```

Add the `launchMode` attribute to the main `AndroidNativePush` activity. Set its value to `singleTask`.

```
<activity
    android:name="com.worklight.androidnativepush.AndroidNativePush
"
    android:label="@string/app_name"
    android:theme="@android:style/Theme.Black.NoTitleBar"
    android:launchMode="singleTask">
```

Add an intent-filter to the main `AndroidNativePush` activity for notifications.

```
<intent-filter>
  <action android:name="com.worklight.androidnativepush.AndroidNativePush.NOTIFICATION" /
>
  <category android:name="android.intent.category.DEFAULT" />
</intent-filter>
```

Add the `GCMIntentService` and add an intent-filter for RECEIVE and REGISTRATION of notifications.

```
<service android:name="com.worklight.wlclient.push.GCMIntentService" />
<receiver android:name="com.worklight.wlclient.push.WLBroadcastReceiver" android:permission="com.goo
gle.android.c2dm.permission.SEND">
  <intent-filter>
    <action android:name="com.google.android.c2dm.intent.RECEIVE" />
    <category android:name="com.worklight.androidnativepush" />
  </intent-filter>
  <intent-filter>
    <action android:name="com.google.android.c2dm.intent.REGISTRATION" />
    <category android:name="com.worklight.androidnativepush" />
  </intent-filter>
</receiver>
```

Notification API: Server side

Creating an event source.

This can be achieved by creating a notification event source in the adapter JavaScript™ code at a global level (outside any JavaScript function).

```
WL.Server.createEventSource({
    name: 'PushEventSource',
    onDeviceSubscribe: 'deviceSubscribeFunc',
    onDeviceUnsubscribe: 'deviceUnsubscribeFunc',
    securityTest:'PushApplication-strong-mobile-securityTest
'
});
```

- `name` – A name by which the event source is referenced.
- `onDeviceSubscribe` – An adapter function that is called when the request for user subscription is received.
- `onDeviceUnsubscribe` – An adapter function that is called when the request for user unsubscription is received.
- `securityTest` – A security test from the authenticationConfig.xml file that is used to protect the event source.

Sending a notification

Notifications can be either polled from, or pushed by, the back-end system. In this example, a `submitNotifications()` adapter function is invoked by a back-end system as an external API to send notifications.

```
    function submitNotification(userId, notificationText) {
    var userSubscription = WL.Server.getUserNotificationSubscription('PushAdapter.PushEventSource', userI
d);
    if (userSubscription === null) {
        return { result: "No subscription found for user :: " + userId };
    }
    var badgeDigit = 1;
    var notification = WL.Server.createDefaultNotification(notificationText, badgeDigit, {custom:"data"});
        WL.Server.notifyAllDevices(userSubscription, notification);
    return {
        result: "Notification sent to user :: " + userId
    };
}
```

Notification API - Client side

The first step is to create an instance of the `WLClient` class:

```
final WLClient client = WLClient.createInstance(this);
```

You derive all push notification operations from the `WLPush` class.

`getPush` – Use this method to retrieve an instance of the `WLPush` class from the `WLClient` instance.

```
WLPush push = client.getPush();
```

`WLOnReadyToSubscribeListener` – When connecting to MobileFirst Server, the application attempts to register itself with the GCM server to receive push notifications.

```
client.getPush().setOnReadyToSubscribeListener(listener);
client.connect(listener);
```

The `onReadyToSubscribe` method of `WLOnReadyToSubscribeListener` is called when the registration is complete.

```
@Override
public void onReadyToSubscribe() {.....}
```

`WLPush.registerEventSourceCallback`

To register an alias on a particular event source, use the `WLPush.registerEventSourceCallback` method.

The API takes the following arguments:

`alias` - An alias name.
`Adaptername` - Adapter in which the event source is defined.
`EventSourceName` - The event source on which the alias is called.

Example:

```
WLClient.getInstance().getPush().registerEventSourceCallback("myAndroid","PushAdapter","PushEventSour
ce",this);
```

Typically, this method is called in the `onReadyToSubscribe` callback function.

```
@Override
public void onReadyToSubscribe() {
  WLClient.getInstance().getPush().registerEventSourceCallback("myAndroid","PushAdapter","PushEventSo
urce",this);
}
```

In the Android activity class, override the methods that define the Android activity life cycle as follows:

`onPause()` must call the `setForeground(false)` method of the `WLPush` instance to receive the notification in the notification bar when the application is paused.

```
@Override
protected void onPause() {
    super.onPause();
    if (push != null)
 push.setForeground(false);
}
```

`onResume()` must call the `setForeground(true)` method of the `WLPush` instance to receive the notification in the callback of the application.

```
@Override
protected void onResume() {
    super.onResume();
    if (push != null)
 push.setForeground(true);
}
```

`onDestroy()` must call the `unregisterReceivers` method of the `WLPush` instance to avoid leak exceptions from the receiver when the application exits.

```
@Override
protected void onDestroy() {
    super.onDestroy();
    if (push != null)
 push.unregisterReceivers();
}
```

Subscribing to push notifications

To set up subscription to push notifications, use the `WLPush.subscribe(alias, pushOptions, responseListener)` API.

The API takes the following arguments:

`alias` – The alias to which the device must subscribe.
`pushOptions` – An object of type `WLPushOptions`.
`responseListener` – An object of type `WLResponseListener`, which is called when subscription completes.

Example:

```
WLClient client = WLClient.getInstance();
client.getPush().subscribe("myAndroid",new WLPushOptions(), new MyListener(MyListener.MODE_SUBSC
RIBE));
```

MyListener Implements `WLResponseListener` and provides the following callback functions:

`onSuccess` – Called when subscription succeeds.
`onFailure` – Called when subscription fails.

Unsubscribing from push notifications

To set up unsubscription from push notifications, use the `WLPush.unsubscribe(alias, responseListener)` API.

The API takes the following arguments:

`alias` – The alias to which the device has subscribed.
`responseListener` – An object of type `WLResponseListener`, which is called when unsubscription completes.

Example:

```
WLClient client = WLClient.getInstance();
client.getPush().unsubscribe("myAndroid",new MyListener(MyListener.MODE_UNSUBSCRIBE));
```

MyListener Implements `WLResponseListener` and provides the following callback functions:

`onSuccess` – Called when unsubscription succeeds.
`onFailure` – Called when unsubscription fails.

Additional client-side API methods:

`isPushSupported()` - Indicates whether push notifications are supported by the device.

```
WLClient client = WLClient.getInstance();
boolean supported = client.getPush().isPushSupported();
```

`isSubscribed()` - Indicates whether the device is subscribed to push notifications.

```
WLClient client = WLClient.getInstance();
boolean bIsSubscribed = client.getPush().isSubscribed("myAndroid");
```

Receiving a push notification

When a push notification is received, the `onReceive` method is called on an `WLEventSourceListener` instance.

```
public class MyListener implements WLOnReadyToSubscribeListener, WLResponseListener, WLEventSo
urceListener{
```

The `WLEventSourceListener` instance is registered during the `registerEventSourceCallback` callback.

```
WLClient.getInstance().getPush().registerEventSourceCallback("myAndroid", "PushAdapter","PushEventSou
rce", this );
```

The `onReceive` method displays the received notification on the screen.

```
@Override
public void onReceive(String arg0, String arg1) {
   AndroidNativePush.updateTextView("Notification received  " + arg0)
;
}
```

If the application is not running, the notification icon appears on the notification bar at the top of the screen

Notification API - Tag-based notification

This notification type enables sending and receiving messages by tags.
Tags represent topics of interest to the user and provide the ability to receive notifications according to the chosen interest.

Tags are defined in application-descriptor.xml:

```
<tags>
   <tag>
      <name>PushTag1</name>
      <description>About pushTag1</description
>
   </tag>
   <tag>
      <name>PushTag2</name>
      <description>About pushTag2</description
>
   </tag>
</tags>
```

Client-side API methods:

- `WLPush.subscribeTag(tagName,options)` - Subscribes the device to the specified tag name.
- `WLPush.unsubscribeTag(tagName,options)` - Unsubscribes the device from the specified tag name.
- `WLPush.isTagSubscribed(tagName)` - Returns whether the device is subscribed to a specified tag name.

Notification API - Broadcast notification

Broadcast notifications are enabled by default for any push-enabled MobileFirst application. A subscription to a reserved tag, `Push.ALL`, is created for every device.
You can disable broadcast notifications by unsubscribing from the reserved tag `Push.ALL`

For more information about broadcast notification, see the topic about broadcast notification in the user documentation.

Common APIs for tag-based and broadcast notification

Client-side API:

- `WLNotificationListener`
  Defines the callback method to be notified when the notification arrives.

- `client.getPush().setWLNotificationListener(listener)`
  This method sets the implementation class of the `WLNotificationListener` interface.
- `client.getPush().setOnReadyToSubscribeListener(listener)`
  This method registers a listener to be used for push notifications. This listener should implement the onReadyToSubscribe() method.
- The `onMessage(props,payload)` method of `WLNotificationListener` is called when a push notification is received by the device.
  - **props** - A JSON block that contains the notifications properties of the platform.
  - **payload** - A JSON block that contains other data that is sent from MobileFirst Server. The JSON block also contains the tag name for tag-based or broadcast notification. The tag name appears in the "tag" element. For broadcast notification, the default tag name is `Push.ALL`.

Server-side API:

This method takes two mandatory parameters:

`WL.Server.sendMessage(applicationId,notificationOptions)`

applicationId - (mandatory) The name of the MobileFirst application.
notificationOptions - (mandatory) A JSON block containing message properties.

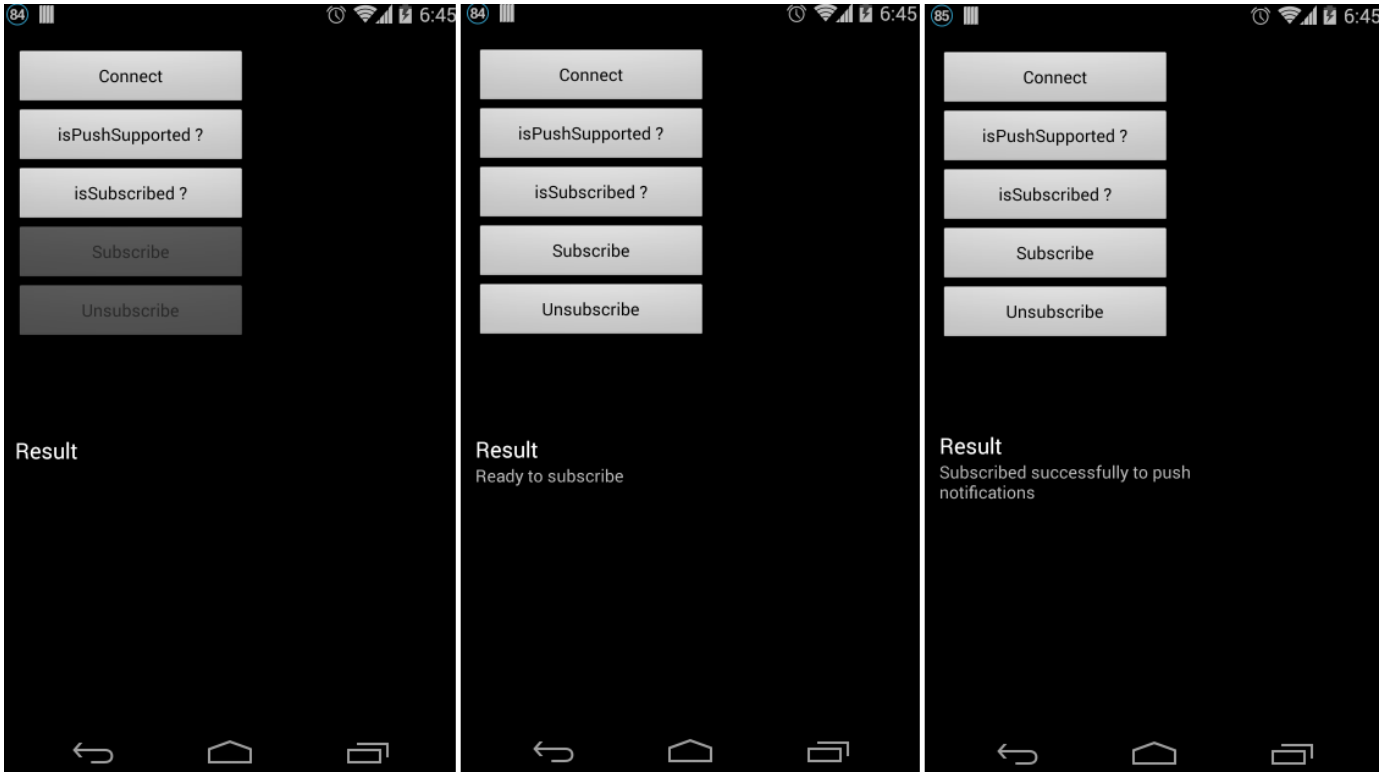
Submits a notification that is based on the specified target parameters.
For a full list of message properties, see the user documentation.

Sample application

Click to download (http://public.dhe.ibm.com/software/products/en/MobileFirstPlatform/docs/v630/PushNotificationsNativeProject.zip) the Studio project.
Click to download (http://public.dhe.ibm.com/software/products/en/MobileFirstPlatform/docs/v630/AndroidNativePushProject.zip) the Native project.

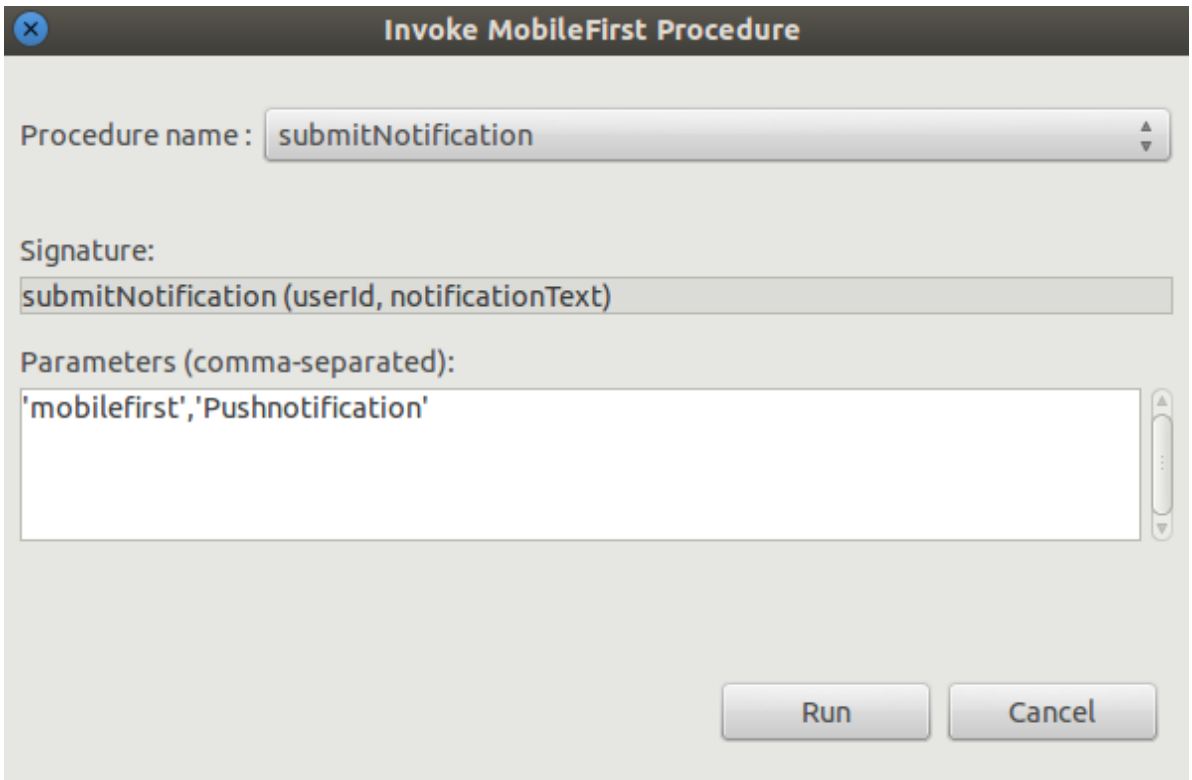
The sample contains two projects:
-The **PushNotificationsNativeProject.zip** file contains a MobileFirst native API that you can deploy to your MobileFirst Server instance.
-The **AndroidNativePushProject.zip** file contains a native Android application that uses a MobileFirst native API library to subscribe to push notifications and receive notifications from GCM.
Make sure to update the wlclient.properties file in AndroidNativePushProject with the relevant server settings.

To run the Android application, select **Run As > Android Application**.



In MobileFirst Studio, right-click **Push Adapter** and select **Run As > Invoke MobileFirst Procedure**.

Call `submitNotification` to send a push notification.



Push notification received - application in background

Push notification received - application in foreground