Connect IQ Mobile SDK

A Guide to building companion mobile apps on iOS for Monkey C applications

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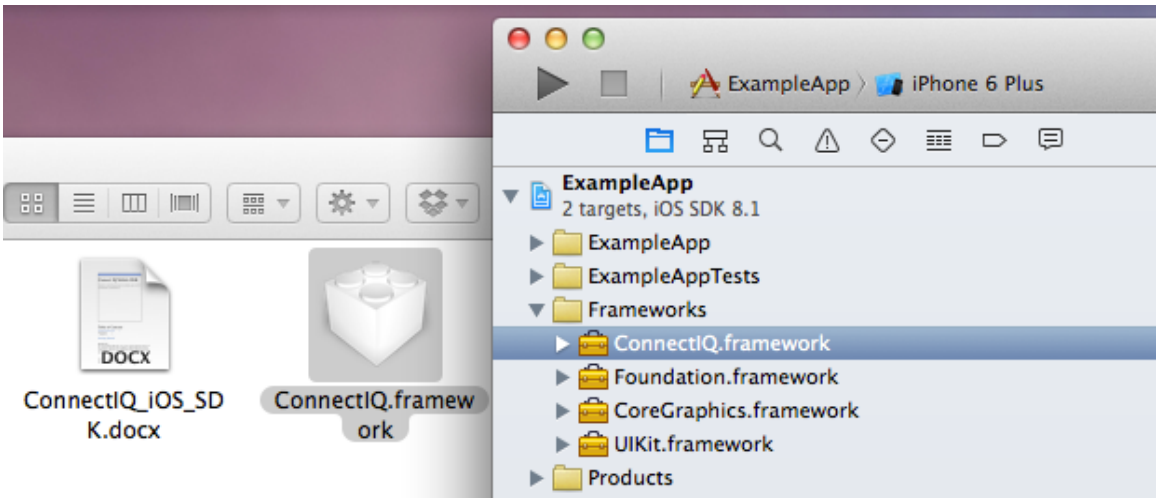
Introduction

The Connect IQ Mobile SDK allows companion iOS applications to be created that interact with Monkey C applications running on Garmin wearable devices. This allows feature-rich user experiences to be built by retrieving remote data or offloading resource-intensive tasks from the wearable device to the iOS device. This document will guide you through adding the Mobile SDK to an iOS project, as well as introducing the SDK's API and how to communicate with your Monkey C apps.

Configuring a project to use the Mobile SDK

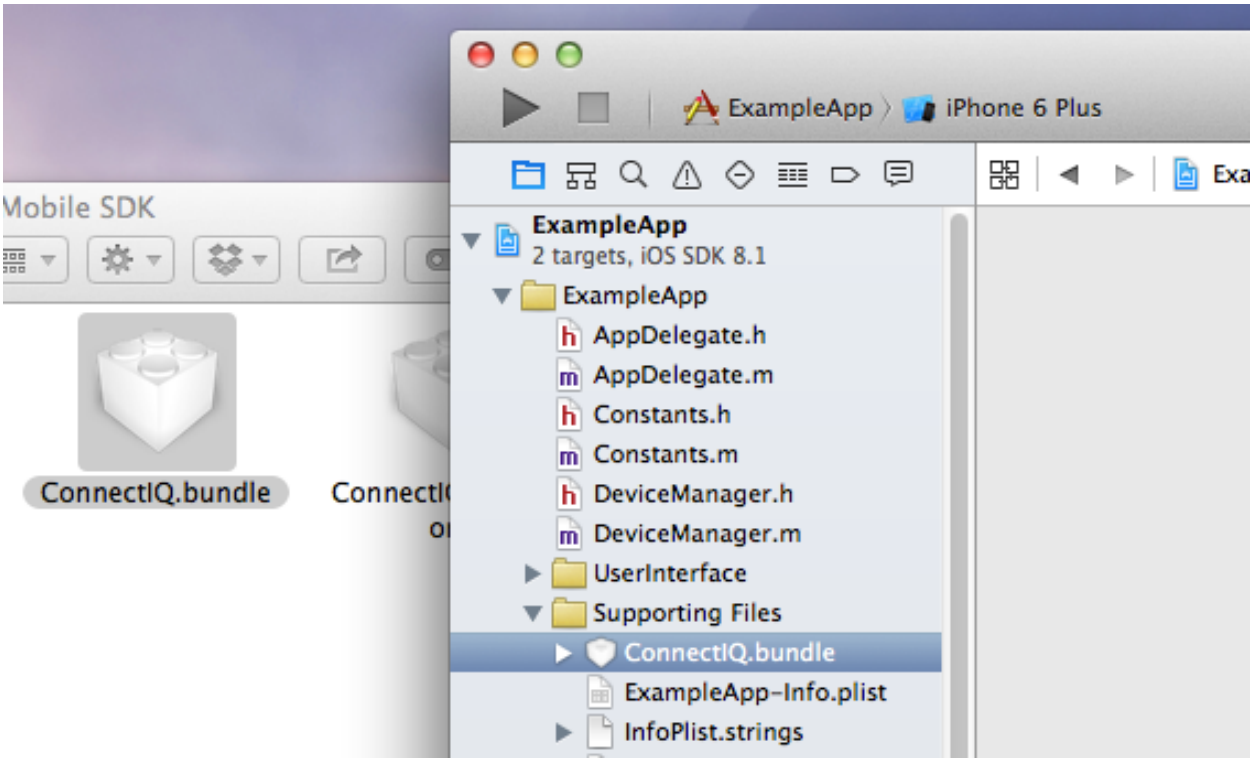
1. Add the framework to the project

The Mobile SDK for iOS is distributed as an iOS framework package and can be found in the `ios/lib` directory of the Connect IQ SDK. First, drag the `ConnectIQ.framework` into the Frameworks group of the project in Xcode.



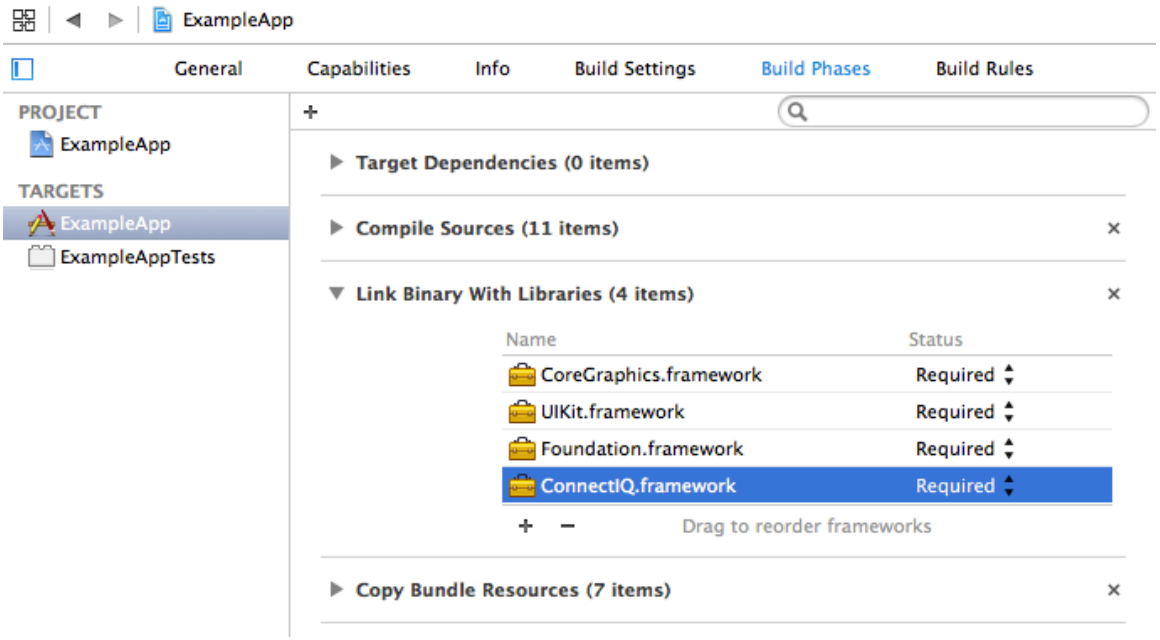
2. Add the bundle to the project

The Mobile SDK for iOS is also distributed with a bundle containing resources used by the SDK, and can be found in the `ios/lib` directory of the Connect IQ SDK. To allow the SDK to access these resources, they must be added to the project that is referencing the SDK's framework. Drag the `ConnectIQ.bundle` file into an appropriate folder of the project in Xcode (e.g. Resources or Supporting Files).



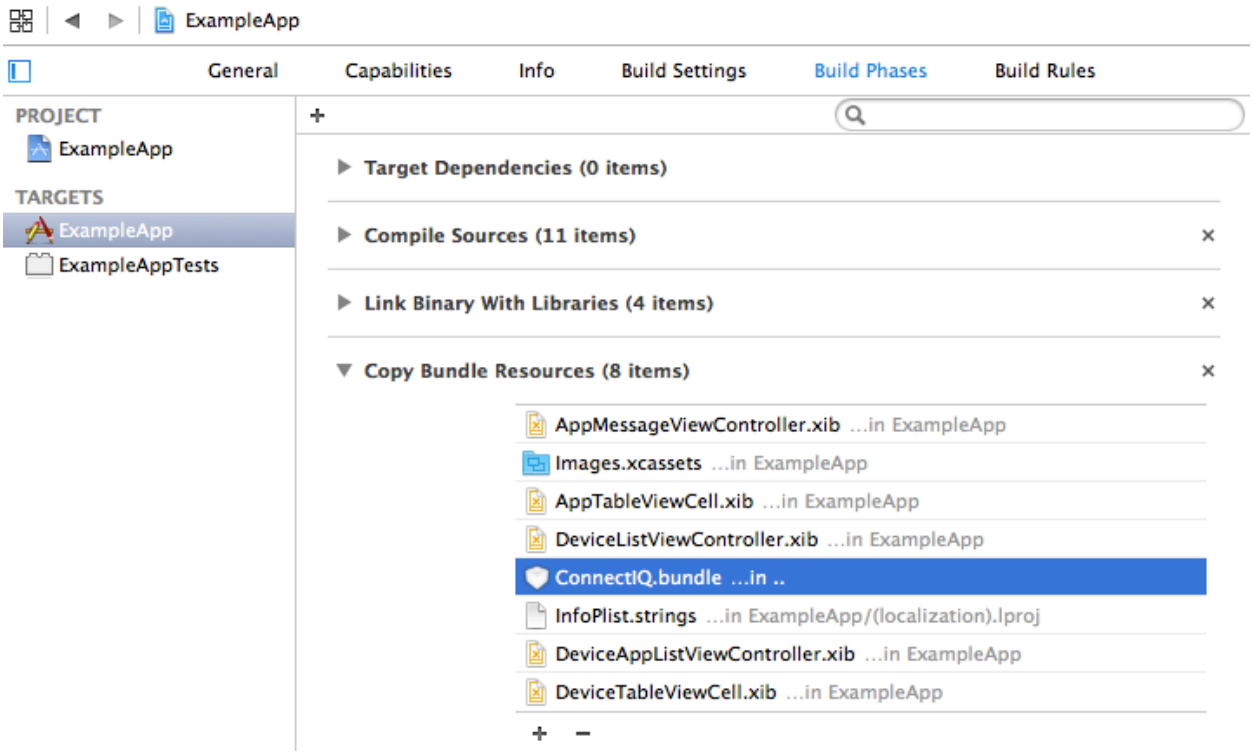
3. Add a linker dependency to the framework

To allow a project to build with the Mobile SDK, add a linker dependency to the framework for each of the project's targets by adding an entry to the `Target > Build Phases > Link Binary With Libraries` panel.



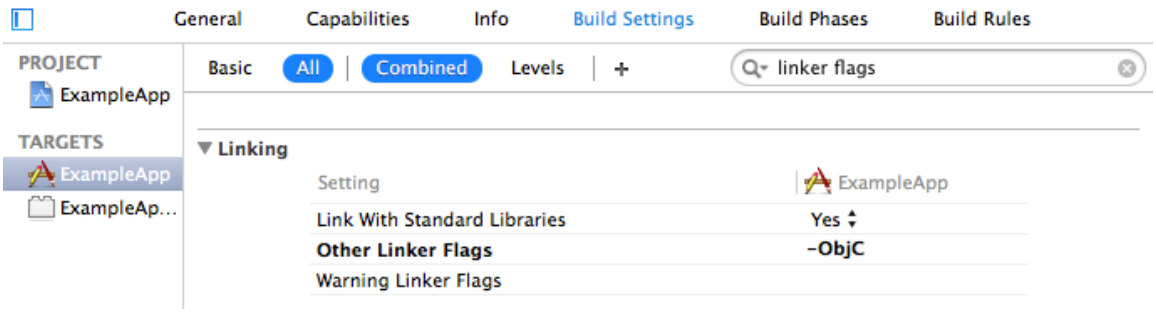
4. Copy bundle resources

Similarly, in order for the resources inside the bundle added in step 2 to be available at runtime, they must be copied to the target's resources at build time. This can be accomplished by adding an entry to the `Target > Build Phases > Copy Bundle Resources` panel.



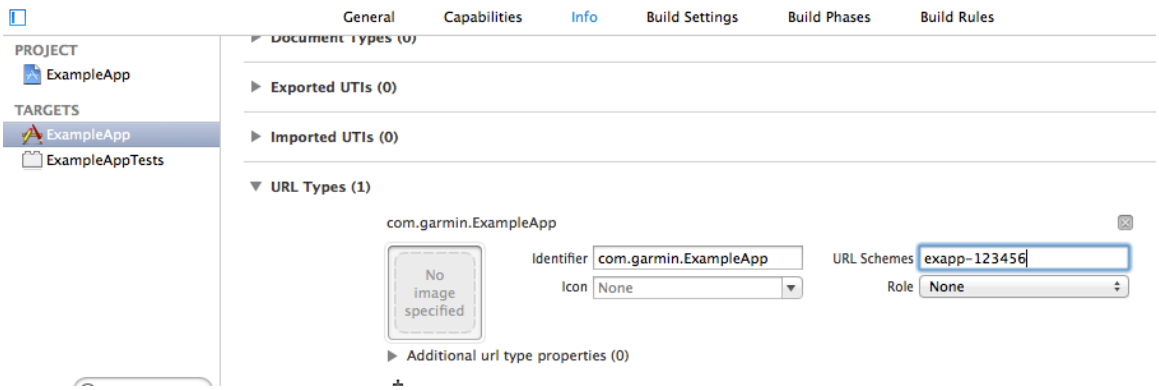
5. Add required linker flags

The Mobile SDK for iOS utilizes category methods internally. When importing a library that uses category methods, an additional flag must be specified to allow the library to be linked correctly. To do this, add the `-ObjC` flag to the `Target > Build Settings > Other Linker Flags` setting.



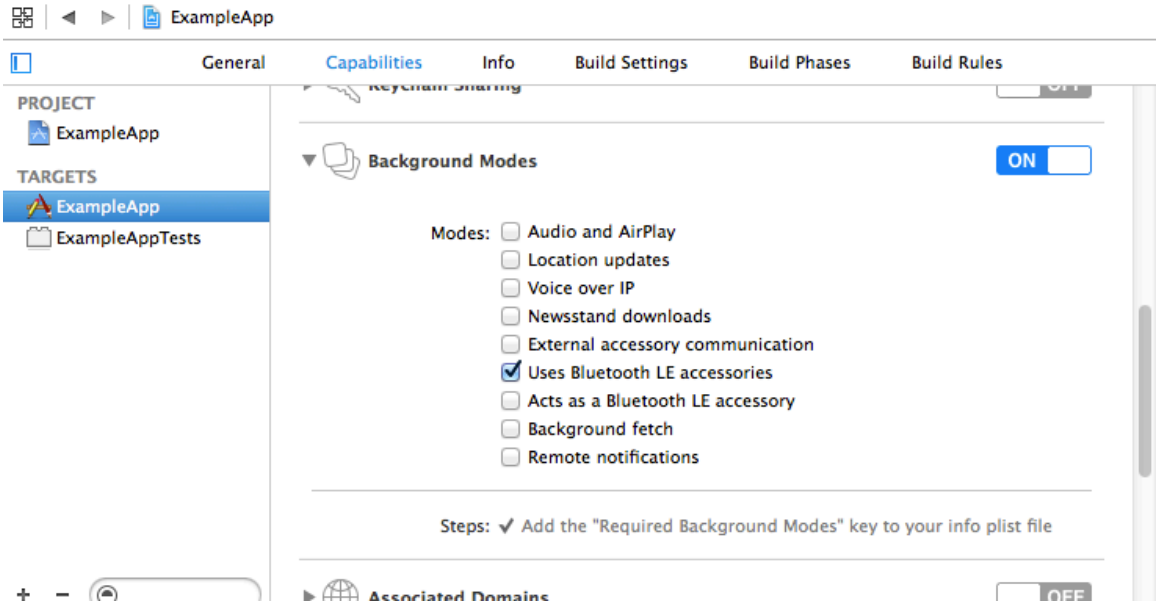
6. Register a URL scheme

Unlike the Mobile SDK for Android, apps created with the Mobile SDK for iOS are standalone apps and do not directly rely on Garmin Connect Mobile (GCM) to communicate with a wearable device. They do, however, require GCM to initially discover Connect IQ-compatible devices that are available for communication, or to install Monkey C applications on the wearable device. The companion app and GCM exchange information by launching each other via the iOS URL scheme system. To facilitate this, a URL scheme that GCM can send data to must be registered by the app. To do this, add an entry to the `Target > Info > URL Types` panel. A string that is not likely to collide with any other apps on the iOS device should be chosen. See the Apple documentation for more information on custom URL schemes.



7. Set background execution mode (optional)

The iOS system allows apps that communicate with Bluetooth devices to be woken up to execute in the background when a connected device has data to send. This can be useful for companion apps that process requests for their respective Monkey C applications on a wearable device. To enable this behavior, turn on the `Uses Bluetooth LE accessories` option in the `Target > Capabilities > Background Modes` panel.



Initializing the SDK

All interaction with the Mobile SDK is done through the `ConnectIQ` class. This class must be initialized during app startup with the project's URL scheme and a UI override delegate. Typically this is done within the app delegate's `application:didFinishLaunchingWithOptions:` method.

```
[[ConnectIQ sharedInstance] initializeWithUrlScheme:@"exapp-123456"
                                    uiOverrideDelegate:self];
```

The URL scheme should be the same string chosen in Step 4 of *Configuring a project to use the Mobile SDK*.

When invoking a method of the `ConnectIQ` class that requires GCM to be installed and it is not present on the iOS system, by default an alert dialog will be shown to the user that allows them to go to the Apple App Store page for GCM to install it. By passing an instance of an object that conforms to the `IQUIOverrideDelegate` protocol here, custom behavior or a specialized UI may be specified in this case. To use the default alert dialog and behavior, pass `nil`.

Implementing a UI override delegate

If a UI override delegate was specified and an action was performed that requires GCM to be installed, the `ConnectIQ` class will call the `needsToInstallConnectMobile` method on that delegate. The app should inform the user that GCM is required for this action and give the user the option to open the Apple App Store page for GCM or to cancel the action that triggered it. If the user chooses to install GCM, the `showAppStoreForConnectMobile` method may be called.

```
- (void)needsToInstallConnectMobile {
    // Show alert to user with choice to install GCM
    if (alert.result == YES) {
       [[ConnectIQ sharedInstance] showAppStoreForConnectMobile];
    }
}
```

Note that this example is synchronous, but if UI is shown to the user, the `showAppStoreForConnectMobile` method should be called as a result of user input instead of directly in the `needsToInstallConnectMobile` method.

Working With Devices

Finding Connect IQ-compatible devices

The Mobile SDK for iOS can communicate directly with Connect IQ-compatible devices over Bluetooth. However, it must first know which devices are available. To accomplish this, a companion app must call the `showConnectIQDeviceSelection` method.

```
[[ConnectIQ sharedInstance] showConnectIQDeviceSelection];
```

This method launches GCM to the foreground and allows the user to choose which paired Connect IQ-compatible devices to share with the companion app. If GCM is not installed and a UI override delegate was set, its `needsToInstallConnectMobile` will be called.

> Note that by launching GCM, this method causes the companion app to go into the background, possibly resulting in the app being suspended. **The companion app should expect to be suspended when calling this method.**

Once the user has selected which of the paired devices to share with the companion app, GCM will launch the companion app (via its registered URL scheme), passing the list of devices as serialized URL query items. The companion app should override its app delegate's `application:openURL:sourceApplication:annotation:` method to listen for this. The companion app may then call the `parseDeviceSelectionResponseFromURL:` method to extract the query items into an `NSArray` of `IQDevice` objects that it can use with the Mobile SDK.

```
- (BOOL)application:(UIApplication *)application
            openURL:(NSURL *)url
  sourceApplication:(NSString *)sourceApplication
         annotation:(id)annotation {
    if ([url.scheme isEqualToString:ReturnURLScheme] &&
        [sourceApplication isEqualToString:IQGCMBundle]) {

        NSArray *devices = [[ConnectIQ sharedInstance]
                             parseDeviceSelectionResponseFromURL:url];
        if (devices != nil) {
            [self.devices removeAllObjects];
            for (IQDevice *device in devices) {
```

```
                self.devices[device.uuid] = device;
            }
            return YES;
        }
    }
    return NO;
}
```

Note that in this example, the parsed devices are stored to a dictionary for later use within the app, but are not cached in any kind of persistent storage.

To avoid needing to launch GCM excessively to discover devices, **companion apps should cache devices to persistent storage.**

When a list of devices is returned by GCM, companion apps should clear all previously cached references to devices they may have known about. **Always use only the latest list of devices that the user has authorized.**

Listening for device events

Once the companion app has one or more `IQDevice` instances from GCM, it may register with the `ConnectIQ` class to receive notifications when that device's connection status changes by calling `registerForDeviceEvents:delegate:`.

```
[[ConnectIQ sharedInstance] registerForDeviceEvents:device
                                           delegate:self];
```

The delegate passed in must be an instance of a class that conforms to the `IQDeviceEventDelegate` protocol. Once registered, the delegate's `deviceStatusChanged:status:` method will be invoked when the device's connection status changes. The `getDeviceStatus:` method may also be called to get the current connection status of the device. These methods both return a device's status as an `IQDeviceStatus` value.

A companion app must register to receive device events before calling methods that operate on devices or apps, such as `getDeviceStatus:` or `sendMessage:toApp:progress:completion:`.

To stop listening for device events, a companion app may call either the `unregisterForDeviceEvents:delegate:` or `unregisterForAllDeviceEvents:` method.

```
// Stop listening to a single device
[[ConnectIQ sharedInstance] unregisterForDeviceEvents:device
                                              delegate:self];
// ... or unregister all devices for this listener
[[ConnectIQ sharedInstance] unregisterForAllDeviceEvents:self];
```

Working With Apps

Creating an app instance

Apps are represented in the Mobile SDK as instances of the `IQApp` class. An instance of the `IQApp` class represents a single app on a single device. This means that in order to work with an app that's installed on two different devices, a companion app will need two instances of the `IQApp` class with the same app ID, one for each device. To create an app instance, use the `IQApp` class's `appWithUUID:device:` method.

```
NSUUID *uuid = [[NSUUID alloc] initWithUUIDString:@"<YourAppID>"];
IQApp *app = [IQApp appWithUUID:uuid device:device];
```

Requesting an app's status

Once an `IQApp` instance has been created that links an app ID to an `IQDevice` instance, a companion app may request the status of the app on that device by calling the `getAppStatus:completion:` method.

```
[[ConnectIQ sharedInstance] getAppStatus:app
                              completion:^(IQAppStatus *appStatus) {
    if (appStatus != nil && appStatus.isInstalled) {
        NSLog(@"App is installed! Version: %d", appStatus.version);
    }
}];
```

This method communicates with the device over Bluetooth, and therefore is asynchronous. The completion block will be invoked when the device responds, or the request times out.

If the request is successful, the completion block will be invoked with an instance of the `IQAppStatus` class. A companion app may inspect this status to discover if the app is installed on the device, and if so, what the version of that app is. A companion app could then potentially show a UI that recommends that the user upgrade the app on the device.

If the device is not currently connected or the request times out, the completion block will be invoked with a `nil` status.

Installing, upgrading, or managing an app

If a companion app determines that an app is out of date or not installed, it may allow the user to install or upgrade that app by launching the Connect IQ store within GCM. To do this, simply call the `showConnectIQStoreForApp:` method.

```
[[ConnectIQ sharedInstance] showConnectIQStoreForApp:app];
```

A companion app may also call this method even if the app is installed and up-to-date on the device, to allow the user to manage or uninstall the app from the device.

Like the `showConnectIQDeviceSelection` method, by launching GCM, this method causes the companion app to go into the background, possibly resulting in the app being suspended. **The companion app should expect to be suspended when calling this method.**

Sending messages

Once a companion app has determined that an app is installed on a connected device, the companion app may send messages over Bluetooth to that app's mailbox by calling the `sendMessage:toApp:progress:completion:` method. This method takes an object as a message, an `IQApp` as the destination, and two blocks -- one that is invoked periodically as the data transfer progresses, and one that is invoked once the transfer is finished.

```
NSArray *message = @[@"hello pi", @(3.14159)];
[[ConnectIQ sharedInstance] sendMessage:message
                                 toApp:app
                              progress:^(uint32_t sent, uint32_t total) {
    float percent = 100 * sent / (float)total;
    NSLog(@"%02.2f%% - %u/%u", percent, sent, total);
} completion:^(IQSendMessageResult result) {
    NSLog(@"Send message finished with result %@",
        NSStringFromSendMessageResult(result));
}];
```

The message object that is passed to this method is first converted by the SDK into a Monkey C-compatible type, and is then sent to the app's mailbox on the device. Therefore, **only Objective-C types that can be directly translated to comparable Monkey C types are valid.**

Valid message types include `NSString`, `NSNumber`, `NSArray`, `NSDictionary`, and `NSNull`. Take advantage of nesting other types inside an `NSArray` or `NSDictionary` to form complex messages. Values contained in `NSNumber` objects will be converted to the most appropriate Monkey C value type on the device.

Keep in mind that the wearable devices have limited memory and processing power compared to an iOS device. **Messages should be as small as possible.** However, sending frequent small messages can incur performance and battery life costs. Therefore, it is more desirable to send occasional large messages than it is to frequently send many tiny messages. **Companion apps should aim to balance the costs of memory and performance by sending messages only when necessary and keeping message size to a minimum.**

Receiving messages

A companion app may register to receive messages that are sent from an app on a device by calling the `registerForAppMessages:delegate:` method. This method takes an `IQApp` to listen for messages from, and an instance of an object that conforms to the `IQAppMessageDelegate` protocol as the listener. After registering, when a message from that app is successfully received, the `receivedMessage:fromApp:` method will be called on the listener.

To stop listening for app messages, a companion app may call either the `unregisterForAppMessages:delegate:` or `unregisterForAllAppMessages:` method.

```
- (void)viewWillAppear:(BOOL)animated {
    [[ConnectIQ sharedInstance] registerForAppMessages:self.app delegate:self];
}

- (void)viewDidDisappear:(BOOL)animated {
    [[ConnectIQ sharedInstance] unregisterForAllAppMessages:self];
}

- (void)receivedMessage:(id)message fromApp:(IQApp *)app {
    NSLog(@"Received message from app %@: '%@'", app, message);
}
```

A companion app may register to receive messages from multiple apps across many devices. However, **multiple companion apps should never register to receive messages from the same app**. The nature of Bluetooth communication on iOS prevents the Mobile SDK from determining which companion app to deliver the message to. Therefore, undefined behavior will result from multiple companion apps registering to receive messages from the same app.