



# Mobile Application Performance SDK

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## iOS Integration Guide



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# 1 Summary

This document details the process of integrating the Mobile Application Performance (MAP) SDK with your iOS application to accelerate web traffic.

## 2 Introduction

MAP SDK includes various performance-enhancing features for your mobile app. It prepositions Web content onto the mobile device based on subscribed content groups (“segments”) and policies set up between the client and server. Acceleration of live traffic, as well as statistics collection, are handled internally by the SDK. MAP SDK’s API allows defining user subscriptions, control over which connections receive acceleration, and other controls defined in this guide.

The API also provides developers access to real-time network conditions. This information can be used to augment the user experience by taking necessary actions based on network state.


API calls are available for logging user-initiated events to the server. These can be used to associate network traffic originating from the app with events such as tapping a button.

## 3 Getting Started

The iOS platform provides several ways to request network resources via HTTP and HTTPS. MAP SDK accelerates the two direct download approaches, NSURLSession and NSURLConnection. It also enhances Web pages loaded through UIWebView. WKWebView and SFSafariViewController are run by the OS outside of the app process, and are not enhanced by the SDK at this time.

| Request Class   | Request Type    | Requires Extra Setup?                                    |
|-----------------|-----------------|--|
| NSURLConnection | Individual file | NO   |
| NSURLSession    | Individual file | YES for custom sessions.<br>Shared session is automatic. |
| UIWebView       | Web view        | NO   |

Table 1 - URL Request Types



NSURLConnection, UIWebView, and the default NSURLSession are automatically accelerated once the SDK is installed. NSURLSessions using custom configurations require a MAP configuration call. Each approach is covered in the API Reference section.

The MAP SDK library also collects network-related statistics while serving content. These include HTTP time to first byte, request size, response size, duration, and others. These stats are periodically sent to the MAP SDK server for access via the Web portal.

## 3.1 Requirements and Dependencies

MAP SDK requires iOS 8 or higher.

A MAP SDK API key is required to enable features. This is provisioned via the MAP SDK Web portal.

Your application's bundle ID (found in Xcode at **Project** → choose target → **General** → **Identity** → **Bundle Identifier**) must match the “iOS Application ID” provided in the MAP Web portal configuration.

In order to pre-position content, MAP SDK uses Firebase Messaging (FCM). See the appendix for guidance on enabling background notifications with FCM.

## 3.2 Installing the iOS SDK

### 3.2.1 CocoaPods

CocoaPods is an open source dependency manager for Swift and Objective-C Cocoa projects. Refer to the [CocoaPods Getting Started guide](#) if you are unfamiliar with CocoaPods.

1. Create a Podfile or reuse existing file.
2. Open the Podfile in a text editor.
  - a. Add MAP SDK to your Podfile. This will automatically pull in the AkaCommon framework.

```
target 'YOUR_APPLICATION_TARGET_NAME_HERE' do
  use_frameworks!
  pod 'Aka-MAP'
end
```

- b. With the Podfile written, run the CocoaPods install command. This downloads the latest frameworks and creates (or edits) your Xcode workspace.

```
pod install
```

3. Close Xcode and re-open your project via the .xcworkspace file generated by CocoaPods. Always open the project using the workspace, not the project, in order to include the frameworks.

### 3.2.1.1 Integrating with mPulse SDK

MAP and mPulse SDKs share the same AkaCommon framework. CocoaPods takes care of the proper framework imports. Replace the MAP block in your Podfile with the following. Cronet may be added as well.

```
target 'YOUR_APPLICATION_TARGET_NAME_HERE' do
  use_frameworks!
  pod 'Aka-mPulse'
  pod 'Aka-MAP'
end
```

Refer to the mPulse SDK documentation to use its API in your app.

## 4 Integration with your iOS Application

### 4.1 Import SDK Frameworks

CocoaPods adds the *AkaCommon* and *AkaMap* frameworks to your project automatically.

### 4.2 Initialize SDKs

MAP SDK is initialized by calling the AkaCommon library's *configure*. This detects the linked MAP framework and passes it the API key and other MAP options specified in your Info.plist file.

```
#import <AkaCommon/AkaCommon.h>

[AkaCommon configure];
```

To make optional API calls from AkaCommon, send them to the shared instance.

```
AkaCommon *akaCommon = [AkaCommon shared];
```

### 4.3 Using MAP APIs

Optional calls to the MAP framework are made on the AkaMap shared instance. Its API is defined through AkaMapProtocol.

```
#import <AkaMap/AkaMap.h>

@property (strong, nonatomic) id<AkaMapProtocol> akaService;

self.akaService = [AkaMap shared];
```

## 4.4 API Key

The MAP API key is specified in your Info.plist file. An API key is obtained from the MAP Web portal.

Optional: Initial pre-position content segments are also specified here. These segments are immediately joined the first time the API key is provided (i.e., the first time running the app with this API key).

Changing content segments after first install requires the 'subscribeSegments' API.

It is strongly recommended that PII (personally identifiable information) not be directly used in naming your content segments.

| Key                        | Type       | Example                    |
|----------------------------|------------|----------------------------|
| <code>com.akamai</code>    | Dictionary | <code>{:}</code>           |
| <code>&gt; map</code>      | Dictionary | <code>{:}</code>           |
| <code>&gt; api_key</code>  | String     | <code>123456ABCDEF</code>  |
| <code>&gt; segments</code> | Array      | <code>{}</code>            |
| <code>&gt; Item 0</code>   | String     | <code>banner_images</code> |
| <code>&gt; Item ...</code> | String     | <code>core_files</code>    |

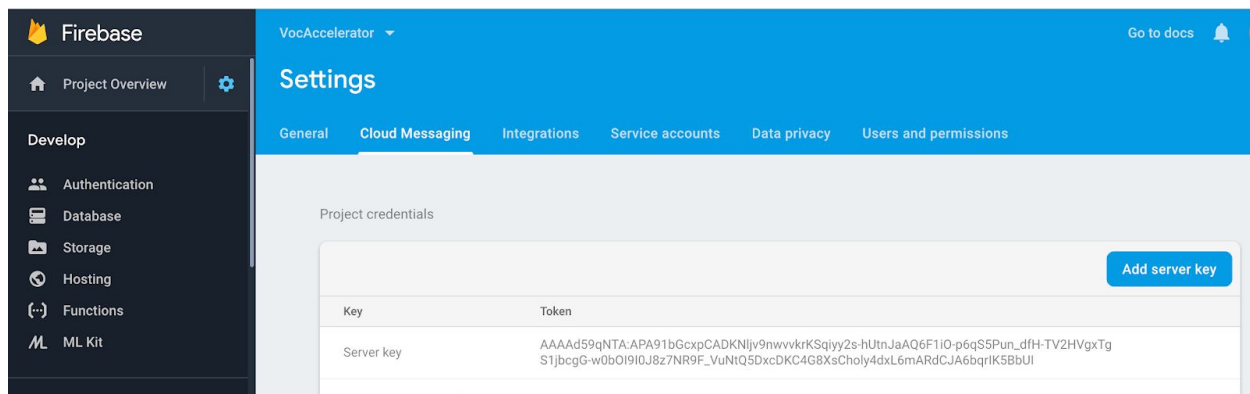
## 4.5 Integrating with Firebase Cloud Messaging (Optional)

*This step is optional and is intended for pre-positioning content in the background.*

MAP SDK uses Firebase Cloud Messaging (FCM) notifications to sync pre-positioning content and MAP configuration, including while the app is in the background.

In order for FCM background notifications to work, follow Google's [Firebase Messaging integration guide](#). This involves enabling the remote-notification property for your app in Xcode. After Firebase is integrated in the app, complete the following two steps:

1. Add/Update the FCM server API key to the MAP portal under the app's configuration screen. The FCM server API key can be found in the Firebase console's project settings, Cloud Messaging screen, as shown below.



2. Then add/update the key to MAP SDK portal in the “Google FCM Key” field as shown below. The API Key is used by MAP’s control server to trigger MAP-related notifications -- for pre-positioning the app’s ingested content and notifying apps of configuration changes.

App Name:  SDK License Key:

iOS Bundle ID:  Android Package Name:

**Upload Push Notification Certificates**

Apple Prod APNS:

Google FCM Key:

Apple Dev APNS:

3. The Firebase portal provides step-by-step instructions for integrating and testing your app with Firebase. These instructions are available at <https://firebase.google.com/docs/cloud-messaging/ios/client>
4. Your app will need to pass remote notifications to MAP SDK for processing. Below is an example that implements the system callback for remote notifications and passes its message to AkaCommon. If AkaCommon returns false, MAP SDK will not process the message and your app must call the completion handler.

```
- (void)application:(UIApplication *)application didReceiveRemoteNotification:(NSDictionary *)userInfo fetchCompletionHandler:(void (^)(UIBackgroundFetchResult result))completionHandler
{
    AkaCommon *akaCommon = [AkaCommon shared];
    BOOL mapHandledNotification = [akaCommon didReceiveRemoteNotification:userInfo fetchCompletionHandler:completionHandler];
}
```



```
if (mapHandledNotification) {  
    // MAP will call completionHandler after processing notification.  
} else {  
    // otherwise your app should handle remote notification and call completion  
    completionHandler(UIBackgroundFetchResultNoData);  
}  
}
```

MAP looks for “mapsdk” in the notification and returns *true* if so. It then processes the notification and calls the fetch completion handler. If “mapsdk” is not present, *false* is returned, no processing is done by MAP SDK, and your app should handle the message. MAP will not call the completion handler in this case.

MAP uses notifications to alert the app of new content or configuration changes. Pre-positioned content will download in the background for a limited time, with the SDK resuming any unfinished downloads later.

## 5 API Reference

This section discusses MAP features and provides example API usage. Features are enabled at the MAP Web portal.

### 5.1 Pre-Positioned Content

Pre-positioned content begins loading onto the device at app start and continues downloading at regular intervals, including in background, until it is downloaded. Firebase Messaging (FCM) is used to notify the app that additional content is available.

At app start, the SDK refreshes content in cache using If-Modified-Since checks.

When changing subscriptions, content that is no longer subscribed is purged from cache.

Segments are joined in two ways:

- The first time the SDK starts, it joins the segments specified in Info.plist. These are used only on first app install or upon upgrade if it is the first time MAP SDK is installed.
- Segments are changed at runtime via the subscribeSegments API.

Subsequent app starts continue using the latest subscribed segments. Segments in Info.plist are ignored after the first run.

Pre-positioning occurs automatically while your app runs. Content is used as follows:

- Your app’s network requests are served from matching pre-positioned content, if available. Analytics record this as a CACHE\_FETCH event.
- If the content is not pre-positioned then it will be fetched from the network. Analytics record this as a CACHE\_MISS event.

### 5.1.1 Updating Pre-Positioning Subscriptions

Segments are named collections of URLs defined on the MAP Web portal. With MAP's pre-positioning feature, the URLs in a segment are preemptively downloaded into the app's MAP SDK cache. Pre-positioned files are instantly available when the app's requests are served by MAP SDK.

The first app launch of MAP SDK will join segments listed in the Info.plist file. This prepares the first downloads as soon as possible. Relaunching the app ignores segments in the plist file, and instead continues subscriptions from when the app was last used.

Segment subscriptions may be changed any time through the MAP API.

```
// Example: join 2 segments, leaving any previous segments.
NSSet *segments = [NSSet initWithObjects:@"basics", @"banner-images", nil];
[akaService subscribeSegments:segments];
```

To unsubscribe from a segment, pass the whole list of subscribed segments excluding the one(s) you want to remove. An empty set is used to unsubscribe from all segments.

For example, if you are subscribed to segments A, B, and C and you want to remove segment B, call subscribeSegments with A and C. Since B is no longer subscribed, its contents will be purged. Files are kept in cache if they remain in at least one subscribed segment.

```
// Join A, B, C.
NSMutableSet *segments = [NSMutableSet initWithObjects:@"A", @"B", @"C", nil];
[akaService subscribeSegments:segments];

// Leave B.
[segments removeObject:@"B"]; // segments = [A, C]
[akaService subscribeSegments:segments];
```

## 5.2 MAP Cache Size

The MAP cache is shared by all features: pre-positioning, foreground pre-caching, and universal cache. Its total size is configurable as follows. This should be called early in your AppDelegate before the cache is filled.

```
// Change cache size to 1 GB
akaService.cacheSize = 1 * 1024 * 1024 * 1024;
```

## 5.3 NSURLConnection

Requests using `NSURLConnection` automatically received MAP SDK features. For example, an asynchronous `NSURLConnection` can be created as before and will see MAP benefits such as pre-positioning.

```
NSURL *requestURL = [NSURL URLWithString:@"https://www.akamai.com"];
NSURLRequest *request = [NSURLRequest requestWithURL:requestURL];
NSURLConnection *connection = [[NSURLConnection alloc] initWithRequest:request
delegate:self];
// ...followed by the asynchronous response handlers: connection:didReceiveResponse:,
connection:didReceiveData:, etc.
```

Synchronous connections are similarly straightforward. No changes to the connection are required to benefit from MAP SDK acceleration.

```
NSData *data = [NSURLConnection sendSynchronousRequest:request returningResponse:&response
error:&error];
```

## 5.4 UIWebView

`UIWebView` will also use prepositioned content automatically and without modification.

## 5.5 NSURLSession

`NSURLSession` may use either the shared app session or a custom configuration. MAP SDK automatically handles the shared session:

```
// MAP is implicitly used for this request

NSURLSession *session = [NSURLSession sharedSession];
NSURL *requestURL = [NSURL URLWithString:@"http://www.akamai.com/"];
[[session dataTaskWithURL:requestURL] resume];
```

More common for `NSURLSessions` to have a custom configuration. Custom configurations must be passed into MAP SDK for setup:

```
// MAP must be added to custom URLSession configurations

NSURLSessionConfiguration *sessionConfig = [NSURLSessionConfiguration
defaultSessionConfiguration];

// ... modify sessionConfig as required by the app ...

[[AkaCommon shared] interceptSessionsWithConfiguration:sessionConfig]; // sessionConfig now
uses MAP
```

```
NSURLSession *session = [NSURLSession sessionWithConfiguration:sessionConfig delegate:self
delegateQueue:nil];

NSURLSession *requestURL = [NSURLSession URLWithString:@"http://www.akamai.com/"];

[[session dataTaskWithURL:requestURL] resume];
```

## 5.6 Custom Event Tracking

Custom events are actions triggered by the app to produce metrics on the Web portal. This could be a user activity such as a button click, a timer for duration spent on a particular app screen, or an internal timer for resources to load. Multiple events may be tracked concurrently. Custom events are classified as timed or instantaneous.

### 5.6.1 Timed Events

A *timed* event has associated start and end points. The two endpoints are paired by calling `startEvent:` and `stopEvent:` with matching event names, and the time between these endpoints is recorded. In addition to logging durations, timed events are useful for monitoring the network activity between endpoints. For example, custom event start and stop points can be recorded in-line with network activity and reviewed collectively from the Web portal. Note that unrelated, asynchronous requests may be recorded during user events depending on your app design. Do not add any data to the event name that has privacy implications.

```
// timed user event
[akaService startEvent:@"Event Name"];
// activity
[akaService stopEvent:@"Event Name"];
```

### 5.6.2 Instantaneous Events

*Instantaneous* events are recorded in the server logs as a name and a series of timestamps when the event occurred. They are useful for recording a sequence of activities or to form a timeline of events. Note that instantaneous events are in Tech Preview and are not yet displayed in the portal.

```
// instantaneous event
[akaService logEvent:@"tapped home button"];
```

## 5.7 Network Aware Experience

The SDK provides API access to the client-side network quality state in order to help developers augment client requests. The return value is either excellent, good, or poor. The meaning of these values is defined in the configuration portal.

The next example suggests how loading content may be tweaked based on network quality status.

```

id<VocNetworkQuality> networkQuality = akaService.networkQuality;
switch (networkQuality.qualityStatus) {
    case VocNetworkQualityPoor:
        [self flashMessage:nil withTitle:@"Network Quality: Poor"];
        // Exit download
        break;
    case VocNetworkQualityGood:
        [self flashMessage:nil withTitle:@"Network Quality: Good"];
        // Throttle download
        break;
    case VocNetworkQualityExcellent:
        [self flashMessage:nil withTitle:@"Network Quality: Excellent"];
        // Download content
        break;
    case VocNetworkQualityUnknown:
        [self flashMessage:nil withTitle:@"Network Quality: Unknown"];
        break;
}

```

To receive callbacks as the network is measured, see [5.9 Receiving MAP Service Callbacks](#).

## 5.8 Pinned Certificates / Custom TLS Certificate Handling

MAP SDK uses the device's default certificate chain to decide which servers to trust. There are cases where an app needs to customize this behavior. These apps should implement the optional delegate callback:

```

- (void)vocService:(nonnull VocService *)vocService
  didReceiveChallengeForRequest:(nonnull NSURLRequest *)originalRequest
    currentRequest:(nonnull NSURLRequest *)currentRequest
    challenge:(nonnull NSURLAuthenticationChallenge *)challenge
  modifiedTrust:(nullable SecTrustRef) modifiedTrust
  completion:(nonnull void (^)(NSURLSessionAuthChallengeDisposition disposition,
                             NSURLCredential * _Nullable credential))completion;

```

This passes the app several pieces of information, with full details in the header file:

- the original request made by the app for identifying the URL in question
- the TLS server challenge
- the modified trust object that can be used for verification
- a completion block to be called with the result of the evaluation

The callback will be made for all requests and prepositioned downloads made through the SDK. Its usage and parameters are fully explained in the header file.

To define a delegate handler that receives this callback, see the next section, [Receiving MAP Service Callbacks](#).

## 5.9 Receiving MAP Service Callbacks

Setting a custom MAP SDK delegate allows your app to receive optional callbacks. These are for:

- custom pinned certificate handling, described above;
- network quality state measurements, if that feature is enabled.

The following example makes AppDelegate the MAP SDK delegate. The delegate can be any object that implements *VocServiceDelegate*.

```
#import <AkaCommon/AkaCommon.h>
#import <AkaMap/AkaMap.h>

@interface AppDelegate () <VocServiceDelegate>

- (BOOL)application:(UIApplication *)application didFinishLaunchingWithOptions:(NSDictionary *)launchOptions
{
    [AkaCommon configure];

    // Optional: set a custom MAP delegate.
    id<AkaMapProtocol> akaService = [AkaMap shared];
    [akaService setDelegate:self withOperationQueue:NSOperationQueue.mainQueue];
}

// Optional handler: Demonstrate receiving a callback.
// Called when Network Quality is enabled and measures a new value.
- (void)vocService:(id<VocService>)vocService
networkQualityUpdate:(id<VocNetworkQuality>)networkQuality
{
    NSLog(@"App received network quality update: %@", @(networkQuality.qualityStatus));
}

// Optional pinned certificate handler, -didReceiveChallengeForRequest:, described above
```

Setting *[akaService -setDelegate:nil withOperationQueue:nil]* will stop notifying your custom delegate object.

## 5.10 Cache-Control Request Parameters

Requests passing through MAP SDK are served transparently from either the MAP cache, the OS cache, or the server. The SDK ensures delivery of fresh content by following content expiration headers, performing refreshes as necessary. In certain cases, it may be desirable to override this behavior. For example, in case of poor connectivity, the app may accept stale responses for a particular request. In another case, the app may decide to force cached content to be revalidated by the origin server by controlling its expiry time and date.

This can be controlled with standard HTTP parameters added directly to the NSURLRequest:

```
NSMutableDictionary *cacheControlHeaders = [NSMutableDictionary new];
cacheControlHeaders[@"Cache-Control"] = @"no-cache";
NSURL *requestURL = [NSURL URLWithString:@"https://www.akamai.com/some_image.jpg"];
NSMutableURLRequest *mRequest = [NSMutableURLRequest requestWithURL:requestURL];
[mRequest setAllHTTPHeaderFields:cacheControlHeaders];

NSURLSessionDataTask *dataTask = [self.mySession dataTaskWithRequest: mRequest];
[dataTask resume];
```

MAP's cache behavior can be controlled with the following key-value pairs.

- Pragma:no-cache: Forces SDK to revalidate cached response.
- Cache-Control:no-cache: Same as Pragma:no-cache.
- Cache-Control:max-age='x': Forces SDK to select expiry for the content as Min('x', expiry calculated from response headers).
- Cache-Control:max-stale='x': If assigned a value, the client is willing to accept a response that has exceeded its expiration time by no more than the specified number of seconds. If present and no value is assigned to max-stale, then the client is willing to accept a stale response of any age. Developers can use this under poor network conditions to serve stale responses.

Note: max-age/max-stale is ignored if no-cache is present.

## 5.11 Debugging APIs

MAP's error is output to both SDK log files and the Xcode console. Developers may print extended debug output to the console with the following calls.

Note: **do not** use these in production/App Store builds as the extra output can lead to performance slowdowns.

| debug function            | frequency                 | purpose  |
|---------------------------|---------------------------|--|
| setDebugConsoleLog:<BOOL> | continuous until disabled | Running reports of URLs intercepted by MAP SDK.  |
| printCurrentConfiguration | one time                  | Display enabled features, timestamp of last configuration received.  |
| printCache                | one time                  | Lists subscribed segments. Also lists all URLs known to the cache with their statuses (cached, failed to download, in queue, ...). |

```
// enable real-time extended debug info to Xcode console
[akaService setDebugConsoleLog:YES];

// print subscribed segments, followed by each URL with its download status
[akaService printCache];
```

```
// print last received SDK features as configured through the portal
[akaService printCurrentConfiguration];
```

The `debugSendAnalytics` call may be used to test that records are sent correctly from your app. It immediately sends the latest batch of analytics from the device and reports to the developer console. This results in additional uploads and should not be used in production code.

```
// Debug only - test analytics upload by sending outside of regular cycle
[self.akaService debugSendAnalytics];
```

Note: there will be a delay before analytics are aggregated for display on the portal.

## 5.12 MAP State Properties

The current state of MAP may be queried at runtime.

### 5.12.1 Enabled Flag

This returns whether MAP SDK has received a valid configuration from the Web portal and that MAP features are turned on.

```
BOOL mapEnabled = [akaService enabled];
```

### 5.12.2 Subscribed Segments

This returns a set of content segments to which the app currently subscribes.

```
NSSet *subscribedSegments = [akaService subscribedSegments];
```

These segments are subscribed but not necessarily downloaded yet. To print the current cache, see [5.9 Debugging APIs](#).

## 6 QUIC Library Integration

MAP SDK has the option to download using the [QUIC protocol](#) as implemented in the Chromium/Cronet library. The following conditions must be present to use QUIC:

- QUIC must be enabled at the MAP portal.
- An additional framework needs to be included in the client app. See the Cronet option discussed in [3.3.1 CocoaPods](#).
- Your content server(s) must support QUIC.



With QUIC enabled and Cronet imported, all app requests through MAP attempt using QUIC by default. If the server supports QUIC the response is served over QUIC; otherwise it falls back to HTTP/S.

## 6.1 Integrating QUIC

Cronet is an optional dependency for using the QUIC protocol. To use it, replace the MAP block in your Podfile with this:

```
target 'YOUR_APPLICATION_TARGET_NAME_HERE' do
  use_frameworks!
  pod 'Aka-MAP'
  pod 'Aka-MAP/Cronet'
end
```

## 7 Brotli Library Integration

Brotli compression is added automatically by iOS 11 and up. Brotli compression must be enabled by your content server.

## 8 mPulse Integration

See [3.3.1.2 Integrating with mPulse SDK](#) for setting up an Xcode workspace with both MAP and mPulse SDKs.

## 9 Appendix - Requirements and Dependencies

### 9.1 MAP Debug Logs

MAP SDK's debug logs are available on the device or simulator:

```
<application sandbox>/Library/Caches/Logs/<date>_com.akamai.akasdk.log
```

Additional debug info is available through the Xcode console. See [5.9 Debugging APIs](#).

### 9.2 Bitcode

MAP SDK is compiled with bitcode enabled. It works in both bitcode- and non-bitcode-enabled apps.

## 9.3 App Transport Security

iOS 9.0 introduced a new app security feature called App Transport Security (ATS) and it is enabled by default. With ATS, connections must use secure HTTPS instead of HTTP. Additionally, if the app contents that MAP SDK needs to download contain HTTP URLs, those downloads will fail. Application developers must ensure that either:

1. [preferred] HTTPS is used for all content URLs. This is done during ingest at the MAP portal.
2. [insecure] Or ATS exceptions can be added for certain domains by adding the following keys to your app's Info.plist file

Optional ATS key to allow insecure (HTTP) content [not recommended]:


```
<key>NSAppTransportSecurity</key>
<dict>
  <key>NSExceptionDomains</key>
  <dict>
    <key>REPLACE-WITH-YOUR-CONTENT-DOMAIN.com</key>
    <dict>
      <key>NSIncludesSubdomains</key>
      <true/>
      <key>NSExceptionAllowsInsecureHTTPLoads</key>
      <true/>
    </dict>
    <key>EXAMPLE-TWO-DOMAIN.com</key>
    <dict>
      <key>NSIncludesSubdomains</key>
      <true/>
      <key>NSExceptionAllowsInsecureHTTPLoads</key>
      <true/>
    </dict>
  </dict>
</dict>
```

## 9.4 Disabling Redirect Behavior

MAP SDK automatically follows redirects. To return the redirect response directly to your app, set the following MAP config property.

```
akaService.config.autoFollowRedirects = NO;
```

Your app will then receive a response with the status code 301, 302, etc. and a location header, to which you can create a follow-up request.



This property supersedes NSURLSession's -willPerformHTTPRedirection: call, which should be omitted or should simply return the recommended request. Do not implement -willPerformHTTPRedirection with a nil return value even if you choose to not auto-redirect. MAP SDK will follow or not follow based on the *autoFollowRedirects* property.

## 9.5 Framework Size

MAP SDK consists of the AkaMap framework, a shared AkaCommon framework, and an optional Cronet framework. These are all fat binaries, meaning they contain compiled code for several architectures. Apple separates and delivers the appropriate architecture for the end-user device. Approximate end-user sizes are shown in the arm64 and armv7 columns below.

These frameworks are bitcode-enabled, so what the App Store distributes to different devices may vary slightly.

|                                  | fat size in SDK (MB)    | arm64                                | armv7                                |
|----------------------------------|-------------------------|--------------------------------------|--------------------------------------|
| AkaMap (MAP SDK core)            | 18.0 (includes bitcode) | 1.4 MB                               | 1.2 MB                               |
| AkaCommon (shared)               | 2.2 (includes bitcode)  | 252 KB                               | 220 KB                               |
| Cronet (optional)                | 17.0 (no bitcode)       | 4.2 MB                               | 3.9 MB                               |
| Total download size in app store |                         | 1.6 or 5.8 MB<br>depending on Cronet | 1.4 or 5.3 MB<br>depending on Cronet |

Table 2 - Framework sizes as of MAP SDK 20.3.2