



Adobe AIR SDK Release Notes

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1 Release Overview

Release 51.1.1.1 starts a new major/minor category of 51.1, with additional settings being added to the application descriptor file, and a number of new features being introduced. No changes have been made to the ActionScript APIs or versioning, so the SWF version for this continues to be 51.

1.1 Key changes

The changes are fairly wide-ranging: one key change for Android users is that the target SDK API value is now set to 34 by default, removing the need to explicitly set this within your application descriptor file. Internally the build processes have also been updated to this, with a number of deprecated functions no longer being used.

Another update for Android is on the ANE side, where it is now possible to have a single “Android” platform definition (unless using native/JNI shared libraries) where this can then be set to include either a JAR file as previously supported, or an AAR file.

For Android TV, support has been added for the variable icon and banner sizes, with ADT automatically adjusting to use the different icon sizes for each resolution category for applications that are specified as supporting Android TV.

The AS3 compiler has been updated, to fix a bug in ‘debugline’ instruction generation, to allow developers to restrict the ABC versioning/functionality to remove ‘float’ support, and to add support for a Unicode character definition of the form “\u{nnnnnn}” where ‘nnnnnn’ is a full Unicode character code that will be split into a surrogate pair of UTF-16 character codes if necessary.

There are a number of other fixes and updates, see sections 3.4 and 3.5 for details.

1.2 Deployment

To obtain the release, it is recommended that developers install the AIR SDK Manager. Whilst the monolithic zip files will still be available from the <https://airsdk.harman.com> website, this may be updated less frequently in the future with only major releases. The goal is for the AIR SDK Manager to help us publish minor updates/fixes with a quicker cadence without resulting in a large amount of effort and data downloads.

The AIR SDK Manager is now available from the <https://airsdk.dev> website, as part of the “getting started” instructions, or directly from github at: <https://github.com/airsdk/airsdkmanager-releases>

1.3 Limitations

For macOS users on 10.15+, the SDK may not work properly unless the quarantine setting is removed from the SDK: `$ xattr -d -r com.apple.quarantine /path/to/SDK`

Please note that there is no longer support for 32-bit IPA files, all IPAs will use just 64-bit binaries now so older iPhones/iPads may not be supported.

Android development should now be performed with an installation of Android Studio and the SDK and build tools, so that the new build mechanism (using Gradle and the Android Gradle Plug-in) can use the same set-up as Android Studio.

Linux runtimes are built using Ubuntu 16 for x86_64 variants in order to provide maximum compatibility; however for arm64, the build environment uses Ubuntu 22 which then restricts usage to similar versions of Linux (i.e. that have glibc version 2.34 or later).



1.4 Feedback

Any issues found with the SDK should be reported to adobe.support@harman.com or preferably raised on <https://github.com/airsdk/Adobe-Runtime-Support/issues>.

The website for AIR SDK is available at: <https://airsdk.harman.com> with the developer portal available under <https://airsdk.dev>

1.5 Notes

Contributors to the <https://airsdk.dev> website would be very welcomed: this portal is being built up as the repository of knowledge for AIR and will be taking over from Adobe's developer websites

The AS3 documentation for AIR is updated and now also available under this site:
<https://airsdk.dev/reference/actionscript/3.0/>

We will continue to provide the shared AIR runtime for Windows/macOS; however, this is not a recommended deployment mechanism, it is preferably to create native installers based on the "bundle" deployments.

On MacOS in particular, the use of the shared AIR runtime to 'install' a .air file will not create a signed application, hence new MacOS versions may block these from running. To ensure a properly signed MacOS application is created, the "bundle" option should be used with native code-signing options (i.e. those appearing after the "-target bundle" option) having a KeychainStore type with the alias being the full certificate name.

2 Release Information

2.1 Delivery Method

This release shall be delivered via the AIR SDK website: <https://airsdk.harman.com/download>

The update will also be available via the AIR SDK Manager. The latest version of this can be downloaded from <https://github.com/airsdk/airsdkmanager-releases/releases>.

2.2 The Content of the Release

2.2.1 Detailed SW Content of the Release

Component Name	51.1.1.1
Core Tools	3.2.0
AIR Tools	3.0.0
Windows platform package	3.2.0
MacOS platform package	3.2.0
Linux platform package	3.2.0
Android platform package	3.2.0
iPhone platform package	3.2.0

2.2.2 Delivered Documentation

Title	Document Number	Version
Adobe AIR SDK Release Notes	HCS19-000287	51.1.1

2.2.3 Build Environment

Platform	Build Details
Android	Target SDK Version: 34 Minimum SDK Version: 21 Platform Tools: 28.0.3 Build Tools: 34.0.0 SDK Platform: Android-34 Note – these are the versions we use to build the AIR SDK and runtime, we also recommend developers match the same ‘target SDK’ version as here.
iOS	iPhoneOS SDK Version: 17.5 iPhoneSimulator SDK Version: 17.5 XCode Version: 15.4 Minimum iOS Target: 12.0

tvOS	tvOS SDK Version:	17.5
	tvSimulator SDK Version:	17.5
	XCode Version:	15.4
	Minimum tvOS Target:	12.0
MacOS	MacOS SDK Version:	14.5
	XCode Version:	15.4
	Minimum macOS Target:	10.13
Windows	Visual Studio Version:	14.0.25431.01 Update 3
Linux	GCC Version	5.4.0 (Ubuntu 16.04.1 – x86_64) 11.4.0 (Ubuntu 22.04.3 – arm64)

2.3 AIR for Linux – Restrictions

The AIR SDK now supports both x86_64 and arm64 based Linux platforms. These are only available to developers with a commercial license to the SDK, and have some restrictions:

- No “shared runtime” support: applications would need to be built as ‘bundle’ packages with the captive runtimes
- Packaging into native installers (“native” target type for .deb or .rpm files) is currently not working: please create a “bundle” target and use Linux tools to distribute these
- No “StageWebView” component.

2.4 AIR for Flex users

HARMAN have continued Adobe’s strategy of issuing two AIR SDKs per platform: the first of these (“AIRSDK_[os].zip”) contains the newer ActionScript compiler and is a full, self-contained SDK for compiling and packaging AIR applications. The second of these is for combination with the Flex SDK (“AIRSDK_Flex_[os].zip”) which doesn’t include a number of the files necessary for ActionScript/MXML compilation. These SDKs should be extracted over the top of an existing, valid Flex SDK.

The original instructions from Adobe are at <https://helpx.adobe.com/uk/x-productkb/multi/how-overlay-air-sdk-flex-sdk.html> but a few alterations to this are needed to Step 4 if running on macOS. For this platform, the downloaded AIR SDK zip needs to be expanded to a temporary area and then the copy command needs to copy symbolic links as links rather than resolving them to files. This can be done using a capital ‘R’ rather than lowercase, hence:

```
cp -Rf /tmp/AIRSDK_Flex_MacOS/* /path-to-empty-FLEXSDK-directory
```

Please note that the config files (air-config.xml, airmobile-config.xml, flex-config.xml) may need to be updated to support new features and updates in AIR or in dependencies such as ANEs. For example to ensure the correct SWF version is output, the below line would need to be updated (e.g. to ‘50’ for AIR 50.x, or ‘44’ for AIR 33.1, etc):

```
<swf-version>14</swf-version>
```

3 Summary of changes

3.1 Runtime and namespace version

Namespace: 51.1

SWF version: 51

The namespace and SWF version updates are made across all platforms and may be used to access the updated ActionScript APIs that have been introduced with AIR version 51.0. The namespace update is required for opening any SWF file that's got a SWF version of 51, or when using any of the new XML application descriptor flags.

3.2 Build Tools

The Android build tools and platform used to create the AIR runtime files has been updated to Android-34 with the default target SDK now set to this level in the generated Android manifest files.

Xcode 15.4 and the latest macOS and iPhoneOS/tvOS SDKs are now being used to build the AIR SDK. Please note when the update was made to use Xcode 15.0, the minimum iOS/tvOS target version was increased to 12. Additional note: these are the versions that AIR itself is built with. The versions shown in IPA files are manually injected by ADT and don't (yet) take the version codes from the local build environment. See [Issue #3030 \(github.com\)](#).

The build system for this is on a version of macOS that doesn't support 32-bit processes hence we cannot generate the 32-bit versions of the stub files. This means that we can no longer support older 32-bit iPhone/iPad devices.

3.3 AS3 APIs

No changes.

3.4 Features

Reference:	AIR-6196
Title:	Allowing ANEs for Android to have a single platform
Applies to:	Core build tools
Description:	When packaging an ANE for Android, if it just uses Java code, there is no longer a need to specify the different platforms for different CPU variants, i.e. Android-ARM64 etc. A single "Android" platform can now be used for Java-based Android ANEs.

Reference:	AIR-6197
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Title:	Ability to use AAR files for Android ANEs
Applies to:	Core build tools
Description:	As well as using a JAR file, it's now possible to use an AAR file for Android ANEs. This will be expanded and the classes plus resources will be packaged into the ANE for use by the application.

Reference:	AIR-6679
Title:	AIR app bundle creation to use architecture option
Applies to:	Core build tools
Description:	For macOS application bundle creations, the "-arch" option can be used in ADT to determine whether the output bundle contains "x64" (x86_64) binaries only, or "armv8" (arm64) binaries, or (if omitted, by default) the existing output which contains universal binaries (x86_64 and arm64).

Reference:	AIR-7069
Title:	AIR URL requests should include app-id in a custom header
Applies to:	All runtime components
Description:	When a URL request is made from AIR, a number of headers are included in the HTTP request; this change adds a new one "x-air-appid" which has a SHA-256 hash of the AIR's Application ID. This is intended to help server code to ensure the correct application is accessing resources.

Reference:	AIR-7114
Title:	Ability to turn off rotation animations for AIR apps with 'orientationAnimation'
Applies to:	Android and iOS runtime components, core build tools

Description:	<p>A new flag in the 'initialWindow' section of the application descriptor file can be used to turn off the animations that are seen when a user rotates a phone (assuming "autoOrients" is set to "true"). The default is "standard" i.e. the standard operating system animation will be applied. This value can be set to "none" which will mean the display switches immediately between landscape and portrait or vice versa.</p> <p>Note that the 'size' event listener should be used to detect the change in the display, as the 'orientation' change handlers pick up different sensors on some devices and may trigger independently of the display's orientation.</p>
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Reference:	AIR-7121
Title:	Updating Android Gradle builds to AGP 8.4, minSdk 21, target 34
Applies to:	Android runtime components
Description:	The build system has been updated so that that Android runtime classes and native libraries are built using an Android 34 platform with Android Gradle Plug-in version 8.4. The minimum SDK is now 21 across all CPU variants.

Reference:	AIR-7139
Title:	Updating icon/banner sizes for Android TV applications
Applies to:	Core build tools
Description:	Android TV applications require slightly larger icon sizes for the different resolution / DPI variants. This change adds support for the necessary image sizes in the application descriptor file, as well as introducing new 'bannerXXXxYYY' variants for the banner images. ADT will now package the Android TV applications with appropriate files in the resource folders.

Reference:	AIR-7150
Title:	Android app descriptor elements for manifestPlaceholders
Applies to:	Core build tools
Description:	A new "manifestPlaceholders" element is available in the "android" section of the application descriptor file. This holds a list of "manifestPlaceholder" values that are used to set variables (for example, license keys or user/app specific settings) that could be required by third party libraries.



Reference:	AIR-7157
Title:	AIR Android support for display cut-out modes
Applies to:	Android runtime components and core build tools
Description:	<p>A new “displayCutoutMode” element is available in the “android” section of the application descriptor file. This is then used to provide the style for the application in how cut-outs are handled for full-screen applications. Values mirror those available on Android, default/always/never/shortEdges.</p> <p>See https://developer.android.com/develop/ui/views/layout/display-cutout#handle</p>

Reference:	AIR-7299
Title:	Adding configuration settings for ELS to control fallback and key storage
Applies to:	All runtime components, core build tools
Description:	<p>A new section in the application descriptor, called “encryptedLocalStorage”, can be used to specify how the user-specific key is stored (“storageMode”) and whether a fallback to older ELS mechanism is used (“fallbackMode”). These settings can be adjusted to prevent any possibility of operating system messages appearing asking for permissions or passwords.</p>

Reference:	AIR-7303
Title:	Compiler to support '\u{nnnnnn}' format for Unicode chars
Applies to:	Core build tools
Description:	<p>The compiler for AS3 has been updated to support a “{nnnnnn}” format following the \u Unicode delimiter, in addition to the \unnnn format. The value in the brackets are hexadecimal but can be any character code in the Unicode range i.e. not limited to 0xFFFF. If a value higher is used, it will be encoded as two UTF-16 code points within the string.</p>

Reference:	AIR-7315
Title:	websocket to dispatch and respond to certificate errors
Applies to:	All runtime components

Description:	WebSocket clients use a SecureSocket internally, so this change hooks up the “certificateError” events that could be sent from that object, and passes it out from the WebSocket object. Event listeners can therefore call the ‘preventDefault’ function to allow connections to proceed despite the SSL certificate issue.
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Reference:	Github-461 https://github.com/air sdk/Adobe-Runtime-Support/issues/461
Title:	Adding ADT handling and updating platform conversion for cmdline bundle
Applies to:	Desktop runtime components, core build tools
Description:	<p>Similar to a “bundle” target for ADT, a new “cmdline” option can be used to create command-line applications that have a captive AIR runtime, for the desktop operating systems. The applications that are then run will not generate a native window and cannot access any UI-related components. They can be quit either via a ctrl-c type command from the console/terminal, or within the application via NativeApplication.exit().</p> <p>Note that there appears to be an issue with the macOS command-line application so this will be investigated and a fix provided shortly.</p>

Reference:	Github-3297 https://github.com/air sdk/Adobe-Runtime-Support/issues/3297
Title:	Adding Android app descriptor settings for compileSdk and build tools folder
Applies to:	Core build tools
Description:	<p>New application descriptor values within the “android” section allows for greater control over the build settings and environment used for Android APK/AAB creation. “androidCompileSdkVersion” is a number specifying the API level used for compilation; “androidBuildToolsVersion” is a version string specifying the build tools folder to use; note that the Android Gradle Plug-in behaviour changes in later versions such that this would be ignored and the latest available build tools always used.</p>

Reference:	Github-3298 https://github.com/air sdk/Adobe-Runtime-Support/issues/3298
Title:	Adding support for ios simulator in the ADT configuration file
Applies to:	Core build tools

Description:	A new item has been added to the build configuration file, “iosSimulator”, which can be set to one of the names of the available simulators that is available on the macOS device for installation and debugging an AIR app via the simulator.
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Reference:	Github-3349 https://github.com/air sdk/Adobe-Runtime-Support/issues/3349
Title:	Adding '-compiler.float' option to turn off float support
Applies to:	Core build tools
Description:	A new compiler option has been provided to ensure that new SWFs can be generated that do not have the “float” support, hence remaining compatible with other tools that interpret the ABC format without expecting a 'float' table in the constant pool.

Reference:	Github-3371 https://github.com/air sdk/Adobe-Runtime-Support/issues/3371
Title:	Android webView to allow file chooser dialogs in forms
Applies to:	Android runtime component
Description:	The WebView functionality has been updated to support the pass-through of file chooser requests, such that an HTML form can request a file or files which will result in the appropriate file picker dialog to be displayed by Android. Multiple files can be returned where this has been requested.

3.5 Bug Fixes

3.5.1 Release 51.1.1.1

Reference:	AIR-7142
Title:	Android OpenGL ES context is lost on device rotation
Applies to:	Android runtime component
Description:	When an Android device is rotated, the EGL context was being destroyed because of an issue with surface/size detection. However this appears to have been a historical issue, so the code has been updated so that it now attempts to retain the EGL context, meaning that all the GPU assets will be available following the display’s orientation switch.



Reference:	AIR-7265
Title:	Enhanced ELS v2 file format with error checking
Applies to:	All runtime components
Description:	The format used to store ELS data has been updated so that it can include some error-checking for the decryption process. This will ensure that it can check that the correct application and user is accessing the file i.e. whether the decryption process actually created sensible results.

Reference:	Github-162 https://github.com/air sdk/Adobe-Runtime-Support/issues/162
Title:	Fixing rounding to ensure large scaled-down bitmaps display properly
Applies to:	All runtime components
Description:	An earlier fix had not completely fixed the issue where large but scaled-down bitmaps result in an arithmetic overflow with internal matrix operations in the AIR rendering code. This should complete the fix to allow this behaviour.

Reference:	Github-1494 https://github.com/air sdk/Adobe-Runtime-Support/issues/1494
Title:	Hooking up webview permission requests to existing PermissionManager implementations
Applies to:	All runtime components
Description:	When an embedded browser engine used by a WebView control is requesting permissions from the end user, this is now being redirected into the AIR application logic to check whether the application already has those permissions. If so, the appropriate response is sent to the webview control; if not, the user is prompted to grant/deny the permissions via the current PermissionManager mechanisms.

Reference:	Github-3307 https://github.com/air sdk/Adobe-Runtime-Support/issues/3307
Title:	Ensuring win32 webview loads an HTML-based AIR app via a FILE url
Applies to:	Windows runtime component



Description:	If a file path was used for loading a URL, on Windows with webview2 this had not been working due to some internal mechanisms for resolving paths. The fix means that URLs based on files or application URLs can now be used, rather than needing everything to be loaded via HTTP.
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Reference:	Github-3310 https://github.com/air sdk/Adobe-Runtime-Support/issues/3310
Title:	Removing redundant webKit/FP files from AIR SDK
Applies to:	Various runtime components
Description:	Some of the unnecessary/obsolete files have been removed from the SDK.

Reference:	Github-3334 https://github.com/air sdk/Adobe-Runtime-Support/issues/3334
Title:	Correcting debugline values for 'getlex' instructions
Applies to:	Core build tools
Description:	The compiler has been updated so that 'getlex' instructions are now included in the opcodes for which a 'debugline' value could be generated. This corrects some issues (typically during start-up/definition of classes) where an invalid debug line was shown.

Reference:	Github-3356 https://github.com/air sdk/Adobe-Runtime-Support/issues/3356
Title:	Fixing Array/Vector 'includes' method for strings created via parsing
Applies to:	All runtime components
Description:	An invalid object comparison type had meant that the 'includes' method for Arrays and Vector types was not working properly when used with strings that weren't directly equivalent (i.e. the underlying string storage might have been different). This should fix the comparisons to make them more match the idea of "indexOf(var) != -1"

Reference:	Github-3357 https://github.com/air sdk/Adobe-Runtime-Support/issues/3357
Title:	Preventing iOS crash when starting up with Scout



Applies to:	iOS runtime components
Description:	A recent update for native window handling had caused a problem when Adobe Scout was also present and configured to connect to a host computer during start-up. Additional defensive programming has been added to avoid the problem.

Reference:	Github-3360 https://github.com/airSDK/Adobe-Runtime-Support/issues/3360
Title:	Allowing file uploads from content URIs on Android
Applies to:	Android runtime component
Description:	Uploading a 'File' object to a web server using the FileReference API mechanisms was not working with 'content' URIs, i.e. files that have been selected from a file browser using the new Storage Access Framework. A number of changes have been added to enable this capability.

Reference:	Github-3370 https://github.com/airSDK/Adobe-Runtime-Support/issues/3370
Title:	Fixing Android ELS key being reset by AS3 call
Applies to:	Android runtime component
Description:	When 'reset' was called on Encrypted Local Storage, it was also removing the OS-specific storage used by the new ELS key store mechanism. The identifiers used for this have been updated to avoid this conflict.

4 Configuration File

ADT uses an optional configuration file to change some of its behaviour. To create a configuration file (there is not one by default within the SDK), create a new text file and save this with the name “adt.cfg” in the SDK’s “lib” folder (i.e. alongside the ‘adt.jar’ file). The configuration file is in the standard ‘ini file’ format with separate lines for each option, written as “setting=value”. Current options are listed below:

Setting	Explanation
DefaultArch	Used as a default architecture if there is no “-arch” parameter provided to ADT. Values may be ‘armv8’, ‘armv8’, ‘x86’ or ‘x64’.
OverrideArch	Used where an architecture value is being provided to ADT using the ‘-arch’ parameter, this configuration setting will override such parameter with the value given here. Values may be ‘armv8’, ‘armv8’, ‘x86’ or ‘x64’.
DebugOut	If set to “true”, results in additional output being generated into a local file which can aid in debugging problems within ADT (including the use of third party tools from the Android SDK). Values may be ‘true’ or ‘false’, default is ‘false’.
UncompressedExtensions	A comma-separated list of file extensions that should not be compressed when such files are found in the list of assets to be packaged into the APK file. For example: “UncompressedExtensions=jpg,wav”
AddAirToAppID	Configures whether or not the “air.” prefix is added to an application’s ID when it is packaged into the APK. Values may be ‘true’ or ‘false’, default is ‘true’.
JavaXmx	Adjusts the maximum heap size available to the Java processes used when packaging Android apps (dx/d8, and javac). Default value is 1024m although this is automatically overridden by any environment variable or value passed to the originating application. If this config setting is present, e.g. ‘2048m’, then it takes priority over all other mechanisms.
CreateAndroidAppBundle	Overrides any usage of ADT with an APK target type, and instead generates an Android App Bundle. Note that the output filename is not adjusted so this may result in generation of a file with “.apk” extension even though it contains an App Bundle. Values may be ‘true’ or ‘false’, default is ‘false’.

KeepAndroidStudioOutput	<p>When generating an Android App Bundle, rather than using a temporary folder structure and cleaning this up, this option will generate the Android Studio file structure under the current folder and will leave this in place).</p> <p>Values may be 'true' or 'false', default is 'false'.</p>
AndroidPlatformSDK	<p>A path to the Android SDK, that can be used instead of the "-platformsdk" command line parameter. Note that on Windows, the path should contain either double-backslashes ("c:\\folder") or forwardslashes ("c:/folder").</p>
iOSPlatformSDK	<p>A path to the iOS/iPhone/iPhoneSimulator SDK, that can be used instead of the "-platformsdk" command line parameter.</p>
JAVA_HOME	<p>This can be set as an override or alternative to the system environment variable that is read when ADT needs to use Java (e.g. when creating an Android App Bundle). Note that on Windows, the path should contain either double-backslashes ("c:\\folder") or forwardslashes ("c:/folder").</p>
UseNativeCodesign	<p>On macOS, this will mean that the IPA binary is signed using the "codesign" process rather than using internal Java sun security classes within ADT. This is "false" by default, unless ADT detects that the sun security Java classes are not available.</p>
SignSwiftFiles	<p>By default, any swift libraries that are included in an IPA payload are signed in the normal way. This can be turned off by setting this value to "false".</p>
OnlyIncludeSwiftUsedArchsInSupport	<p>If this is set to "true" then for ipa-app-store builds that include a "SwiftSupport" folder, the swift libraries will be updated via lipo to only include architectures that are used by the application (e.g. armv7 and arm64, omitting armv7s and arm64e).</p>
OnlyIncludeSwiftUsedArchsInPayload	<p>This is similar to the above flag but applies to the versions of the swift libraries that are included in the "Payload" folder within the IPA package. This (and the above) are now defaulting to "false" so that the swift libraries are just copied into position, but to get the legacy behaviour this should be set to "true".</p>
iosSimulator	<p>The name of a simulator to use when installing or running an IPA file on an iPhone simulator on mac. Note that this value will be overridden by any command-line option or by an environment variable should this be set as well (i.e. AIR_IOS_SIMULATOR_DEVICE).</p>

5 Android builds

5.1 AAB Target

Google introduced a new format for packaging up the necessary files and resources for an application intended for uploading to the Play Store, called the Android App Bundle. Information on this can be found at <https://developer.android.com/guide/app-bundle>

AIR now supports the App Bundle by creating an Android Studio project folder structure and using Gradle to build this. It requires an Android SDK to be present and for the path to this to be passed in to ADT via the “-platformsdk” option (or set via a config file – it also checks in the default SDK download location). It also needs to have a JDK present and available, and will attempt to find this either from configuration files or via the JAVA_HOME environment variable (or if there is an Android Studio installation present in the default location, using the JDK provided by that).

To generate an Android App Bundle file, the ADT syntax is similar to the “apk” usage:

```
adt -package -target aab <signing options> output.aab <app descriptor and files> [-extdir <folder>] -platformsdk <path_to_android_sdk>
```

No “-arch” option can be provided, as the tool will automatically include all of the architecture types. Signing options are optional for an App Bundle.

Note that the creation of an Android App Bundle involves a few steps and can take significantly longer than creating an APK file. We recommend that APK generation is still used during development and testing, and the AAB output can be used when packaging up an application for upload to the Play Store.

ADT allows an AAB file to be installed onto a handset using the “-installApp” command, which wraps up the necessary bundletool commands that generate an APK file (that contains a set of APK files suitable for a particular device) and then installs it. If developers want to do this manually, instructions for this are available at https://developer.android.com/studio/command-line/bundletool#deploy_with_bundletool, essentially the below lines can be used:

```
java -jar bundletool.jar build-apks --bundle output.aab --output output.apks --connected-device
```

```
java -jar bundletool.jar install-apks --apks=output.apks
```

Note that the APK generation here will use a default/debug keystore; additional command-line parameters can be used if the output APK needs to be signed with a particular certificate.

5.2 Play Asset Delivery

As part of an App Bundle, developers can create “asset packs” that are delivered to devices separately from the main application, via the Play Store. For information on these, please refer to the below link:

<https://developer.android.com/guide/playcore/asset-delivery>

In order to create asset packs, the application XML file needs to be modified within the <android> section, to list the asset packs and their delivery mechanism, and to tell ADT which of the files/folders being packaged should be put into which asset pack.

For example:

```
<assetPacks>
```

```
<assetPack id="ImageAssetPack" delivery="on-demand"
folder="AP_Images"/>
</assetPacks>
```

This instruction would mean that any file found in the "AP_Images" folder would be redirected into an asset pack with a name "ImageAssetPack". The delivery mechanisms can be "on-demand", "fast-follow" or "install-time" per the Android specifications.

Note that assets should be placed directly into the asset pack folder as required, rather than adding an additional "src/main/assets" folder structure that the Android documentation requires. This folder structure is created automatically by ADT during the creation of the Android App Bundle.

The asset pack folder needs to be provided as a normal part of the command line for the files that should be included in a package. So for example if the asset pack folder was "AP_Images" and this was located in the root folder of your project, the command line would be:

```
adt -package -target aab MyBundle.aab application.xml MyApp.swf AP_Images
[then other files, -platformsdk directive, etc]
```

If there were a number of asset packs and all of the relevant folders were found under an "AssetPacks" folder in the root of the project, the command line would be:

```
adt -package -target aab MyBundle.aab application.xml MyApp.swf -C
AssetsPacks . [then other files, -platformsdk directive, etc]
```

To access the asset packs via the Android Asset Pack Manager functionality, an ANE is available via the AIR Package Manager tool. See <https://github.com/air sdk/ANE-PlayAssetDelivery/wiki>

5.3 Android Text Rendering

Previously, the rendering of text on Android had been handled via a native library built into the C++-based AIR runtime file. This had some restrictions and issues with handling fonts, which caused major problems with Android 12 when the font fallback mechanism was changed and the native code no longer coped with this. To resolve this, a new text rendering mechanism has been implemented that uses public Android APIs in order to set up the fonts and to render the text.

The new mechanism uses JNI to communicate between the AIR runtime and the Android graphics classes for this, and has some differences with the legacy version. One of the changes that has been made is to correct the display of non-colored text elements when rendering to bitmap data: in earlier builds, if some text included an emoji with a fixed color (e.g. "flames" that are always yellow/orange even if you request a green font color) then these characters appeared blue, due to the different pixel formats used by Android vs the AIR BitmapData objects. With the new mechanism, AIR correctly renders these characters to BitmapData (although the problem still remains when rendering device text to a 'direct' mode display list).

Some developers may not want to switch to this new mechanism yet, and others may want their applications to always use it. Some would perhaps want it only when absolutely necessary i.e. from Android 12 onwards. To cope with this request, there is a new application descriptor setting that can be used: "<newFontRenderingFromAPI>" which should be placed within the <android> section of the descriptor XML. The property of this can be used to set the API version on which the new rendering mechanism takes place. The default value is API level 31 which corresponds to Android 12.0 (see <https://source.android.com/setup/start/build-numbers>). So for example if you always want devices to use the new mechanism, you can add:

```
<newFontRenderingFromAPI>0</newFontRenderingFromAPI>
```

whereas if you never want devices to use this, you could add:

```
<newFontRenderingFromAPI>99999</newFontRenderingFromAPI>
```

5.4 Android File System Access

In the earlier versions of Android, it was possible to use the filesystem in a similar way to a Linux computer, but with a set of restrictions that had a fairly high-level granularity:

- It was possible to read/write to an application's private storage location. AIR exposes this via `File.applicationStorageDirectory`.
- If the app requested the 'read/write storage' permission, the app could then read and write in the user's shared storage location and to removable storage. The main home folder was accessible via `File.userDirectory` or `File.documentsDirectory`, and later AIR 33.1 added `File.applicationRemovableStorageDirectory`.
- Later, this was updated such that the user had to also grant permission via a system pop-up message. To trigger this pop-up, AIR developers could use `File.requestPermission()`

With the introduction of "scoped storage" however, a lot of this has changed. Android files are treated in a similar way to other resources, with URLs using the "content://" schema which can refer either to filesystem-backed files, or to transient resources, or elements within other storage mechanisms such as databases and libraries. Permission to access each resource depends upon the creator of that resource, and by default it's not possible for an application to open a file that another application had created. Permissions for the top-level internal storage (i.e. `File.documentsDirectory`) have been changed so that applications cannot create entries here but must use sub-folders of these (a set of standard sub-folders is generally created by the OS).

Within AIR, we have been attempting to add support for the "content://" URIs, and to switch the File class "browseForXXX" functions so that they use the new intent-based mechanisms for selecting files to open and save, or to select a folder. Within these calls, we are also requesting the appropriate read/write permissions (and persisting these so that they can be used in the future). This means that it should be possible to call `browseForOpen()` and allow the user to select a shared file that can then always be opened (for reading). Equally a `browseForDirectory()` call should mean that an application then has read/write access into the selected directory and its sub-tree.

Requesting file system permissions has to be handled in a similar way, with permissions either granted for a file or for a folder tree. The `File.requestPermission()` function therefore looks at the native path of the File object this is called on, and decides whether to show a file open intent (if there's a normal path or URL in the `nativePath` property), or to show a folder selection intent (if the path ends in a forward-slash), or whether to just ignore the call with a 'granted' response and then wait for later permission requests for individual files (if the File object has not had a `nativePath` set). This last option is intended to allow apps to work across different Android versions and is the recommended option: early in the application lifecycle, create a new File and call `requestPermissions()`: if the app is running on an earlier Android version, the permission pop-up will appear, otherwise the app will need to request specific file access later on via the "browseForXXX" functions or by requesting permission for a specific file. Sadly it isn't possible to ensure that the user only gives a yes/no response for these file/folder open intents, they are able to browse for other files, so it may be that the file the user selects is not the one you are trying to open. If this is detected, the permission status event will show as 'denied', so if you are happy for the user to choose a different file, use `browseForOpen()` rather than `requestPermission()`.

There is an exception to having to use scoped storage and the storage access framework, which is if an application has the "MANAGE_EXTERNAL_FILES" permission. This permission is intended for utilities such as file manager apps and anti-virus scanners that have a legitimate need to access all the (shared storage) files on the device, but if an app requests this permission and is submitted to the Play Store, but doesn't justify itself, then the submission is likely to be rejected.

Some applications are not distributed via the Play Store though, at which point this permission can be used to turn the behaviour back to how it used to be in earlier Android versions. The



“`File.requestPermission()`” capability has been overridden in the cases where AIR detects this permission has been requested in the manifest, and it will now display the appropriate dialog to ask the user to turn on the ‘all files’ access for this app. Once this has been granted (asynchronously), it would then be possible to create, read and write files and folders including in the root storage device.



6 Windows builds

The SDK now includes support for Windows platforms, 32-bit and 64-bit. We recommend that developers use the “bundle” option to create an output folder that contains the target application. This needs to be packaged up using a third party installer mechanism, in order to provide something that can be easily distributed to and installed by end users. HARMAN are looking at adapting the previous AIR installer so that it would be possible for the AIR Developer Tool to perform this step, i.e. allowing developers to create installation MSI files for Windows apps in a single step.

Instructions for creating bundle packages are at:

https://help.adobe.com/en_US/air/build/WSfffb011ac560372f709e16db131e43659b9-8000.html

Note that 64-bit applications can be created using the “-arch x64” command-line option, to be added following the “-target bundle” option.

7 MacOS builds

MacOS builds are provided only as 64-bit versions. A limited shared runtime option is being prepared so that existing AIR applications can be used on Catalina, but the expectation for new/updated applications is to also use the “bundle” option to distribute the runtime along with the application, as per the above Windows section.

Note that Adobe’s AIR 32 SDK can be used on Catalina if the SDK is taken out of ‘quarantine’ status. For instructions please see an online guide such as:

<https://www.soccertutor.com/tacticsmanager/Resolve-Adobe-AIR-Error-on-MacOS-Catalina.pdf>

AIR SDK now supports MacOS Big Sur including on the new ARM-based M1 hardware: applications will be generated with ‘universal binaries’ and most of the SDK tools are now likewise built as universal apps.

8 iOS support

8.1 32-bit vs 64-bit

For deployment of AIR apps on iOS devices, the AIR Developer Tool will use the provided tools to extract the ActionScript Byte Code from the SWF files, and compile this into machine code that is then linked with the AIR runtime and embedded into the IPA file. The process of ahead-of-time compilation depends upon a utility that has to run with the same processor address size as the target architecture: hence to generate a 32-bit output file, it needs to run a 32-bit compilation process. This causes a problem on MacOS Catalina where 32-bit binaries will not run.

Additionally, due to the generation of stub files from the iPhone SDK that are used in the linking process – which are created in a similar, platform-specific way – it is not possible to create armv7-based stub files when using Catalina or later. From release 33.1.1.620, the stub files are based on iOS15 and are purely 64-bit. This means that no 32-bit IPAs can be generated, even when running on older macOS versions or on Windows.

8.2 MacOS remote linking from Windows

Due to a number of updates from Apple around the mach-o linker, and the movement of symbols between different component libraries, it has become increasingly problematic to link Apple binaries on a Windows computer. Originally, Adobe had cross-compiled the “ld64” Apple linker, but without support for the “TBD” format that Apple use for the iPhoneOS/AppleTVOS SDKs. To work around this limitation, the AIR SDK includes “stub” binaries for the SDKs – but it is not then possible to support the movement of symbols i.e. where a particular symbol is found in different frameworks for different iOS versions.

Using LLVM’s linker, which supports the mach-o format, it was also found that Apple restrictions had been preventing some applications from being published via the App Store due to a difference in how symbols were found/stored, and the known/unsupported issues in LLVM meant that this is also not a completely viable solution.

The solution that we will work with now is to use a mac machine to perform the link stage of the build process. The rest of the development and build process can still occur on Windows but linking the AIR application’s object files against the iPhone / AppleTV SDKs should be done on a mac.

There are two ways to achieve this: initially a manual mechanism to allow files to be pushed to a macOS machine, linked via a script, and then the result copied back to the Windows machine where the packaging command needs to be run again to pick up the binary. And with the release of 51.0.1 this is now possible to handle automatically within a single run of ADT, following some initial machine configuration. Details on these two methods follow.

8.2.1 Manual copying and linking

There are a number of steps to the build process in this scenario.

1. Configure ADT to use a specific folder, into which all linker inputs will be placed.

To do this, edit the “adt.cfg” file (in your home folder under an “.airsdk” subfolder) and add a line: “IPALinkFolder=c:/path/to/link/folder”. This must be the name of an existing folder, under which subfolders will be created for each run of ADT. Note that you need to use forward-slashes, or escaped backslashes (“\”), due to how Java reads in property files.

2. Run your normal link command via ADT.

This will then generate a subfolder under your “IPALinkFolder” location, which contains a script file and all the input files needed for the Apple linker.

3. Copy this link folder to your macOS computer.

This can be done with SFTP/SCP or similar tools, or potentially you could have a network shared folder set up.

4. On the macOS computer, run the linker.

Using a terminal window, you will first need to set an environment variable, "AIR_SDK_HOME", and then run the script that was generated by ADT. For example:

```
export AIR_SDK_HOME=/Users/username/Downloads/AIR_SDK/AIRSDK_51.0.1  
./linkerscript.sh
```

5. Copy the resulting file back onto the Windows PC.

The file should be called "linkerOutput" and should be an arm64 macho executable file.

6. Call ADT again, this time providing the linked file.

To do this, add the arguments "`-use-linker-output path_to_linkerOutput`"; this can go within the normal input files list, or at the end of this (similar to "`-extdir`").

ADT will then ignore the normal command to link the binary, and will use the provided executable in order to package and sign the IPA file.

7. Clean up.

The folder that's created under the "IPALinkFolder" location, as well as the linkerOutput file (and of course the files that have been copied to the macOS machine) are not automatically deleted. So these should be periodically cleaned up manually to avoid wasting disk space.

8.2.2 Programmatic remote linking

In order to automatically allow the Windows machine to connect to the macOS machine and to copy files and drive the linker, a password-less mechanism will need to be set up to allow remote access without any user interaction. This requires the use of SSH keys: unless a key-pair is created that doesn't have a passphrase, it will be necessary to use "ssh-agent" to store the passphrase and associate this with the user's Windows credentials.

To set this up (one time only):

1. Create a new key-pair (unless you want to use an existing pair).

On Windows, run "`ssh-keygen`" and provide a filename – the default is "`id_rsa`" but in this walkthrough we shall use "`adt_access`". It then prompts for a passphrase: if you leave this blank, you will not need to follow the "ssh-agent" steps below, but the recommendation would be to create a suitably secure passphrase for this. You should then have two files, "`adt_access`" and "`adt_access.pub`".

2. Install the public key on the mac machine.

You can use `sftp/scp` for this. The key should be added into your ".ssh" folder – note that you need the username of the mac machine, which we shall assume is just "user". You will then need to configure SSH to allow this public key to be used for connections: if you remote in (or just open a terminal) on the mac, go into the ".ssh" folder, and run: "`cat adt_access.pub >> authorized_keys`". This adds the new key onto the end of the authorized keys list.

3. Set up ssh agent to provide the passphrase.

Firstly you will need to check that ssh-agent is running: open "Services" on the computer, and find an entry with name "OpenSSH Authentication Agent". This should be changed to "Automatic", or "Automatic (Delayed Start)" if you prefer, and if necessary, also started manually. The "Status" column should show that this is running.

Then in a Windows console, run “ssh-add adt_access” and provide your passphrase.

Note that if you get an error message “Permissions for 'private-key.ppk' are too open”, you will need to ensure that only the current user is able to access the private key file (“adt_access”). This means adjusting the “Security” properties on this file, changing the owner of the file to the current local user account, removing inheritance and inherited permissions, and removing all permissions for users/groups other than the current local user. For more details, see the below link:

[Windows SSH: Permissions for 'private-key' are too open - Super User](#)

You can then test the connection by running “ssh -i adt_access user@mac_ip_address”, which should then log on automatically without further prompting.

4. Provide the configuration to ADT.

Now that you have the connectivity set up, you need to create a configuration file for AIR. You will need to add two entries into the “adt.cfg” file that is in your “c:\users\username\.air sdk\” folder:

```
IPALinkFolder=c:/path/to/link/folder  
RemoteLinkMachine=mac_ip_address
```

The first setting is to provide a location into which the linker will output all of the files. This is not strictly necessary but will aid in debugging problems.

The second provides the network location of the remote machine onto which you've put the public ssh key.

You will then need to create a configuration file with the name of this “mac_ip_address” network address, with an “.cfg” extension, and put this into a subfolder “remote_link_configs” under the .air sdk directory. For example:

```
C:\Users\username\.air sdk\remote_link_configs\192.168.1.3.cfg
```

The contents of this file should be:

```
CertPath=C:/path/to/private/key/adt_access  
Username=user  
SdkFolder=/Users/user/Documents/AIR_SDKs/AIRSDK_51.0.1
```

The “CertPath” value points to the private key that we've named “adt_access”, again please note the use of forward-slashes or double-backslashes in the Windows path. “Username” is the user associated with the key from when this was added to “authorized_keys”. And “SdkFolder” is the path on the remote mac machine where an AIR SDK can be found. This path is only used for the runtime libraries i.e. “libRuntimeHMAOT.arm-air.a” and “builtin_abc.arm64-air.o”, the linker won't use this for the actual link binary (ld64) or the stub files; instead, the remote script picks up your iPhoneOS SDK using the “xcrun” utility.

Once that is all set up, you can use ADT as normal for IPA builds, and the remote linking will happen in the background. If there are issues, please check the adt.log (or use AIR SDK Manager's “Troubleshooting” tab) and report an issue via Github.

Please do note that the link folders are not (currently) cleaned up with this approach, so the location under the “IPALinkFolder”, and its copy that is pushed to the remote Mac device (with the same name, within the user's home folder) will still exist after the ADT process has completed. This will help with debugging any issues, but we expect to change this in the future.

9 Splash Screens

For our 'free tier' users, a splash screen is injected into the start-up of the AIR process, displaying the HARMAN and AIR logos for around 2 seconds whilst the start-up continues in the background. There are different mechanisms used for this on different platforms, the current systems are described below.

9.1 Desktop (Windows/macOS)

Splash screens are displayed in a separate window centred on the main display, while the start-up continues behind these. The processing of ActionScript is delayed until after the splash screen has been removed.

9.2 Android

The splash screen is displayed during start-up and happens immediately the runtime library has been loaded. After a slight delay the initial SWF file is loaded in and when processing for this starts, the splash screen is removed.

9.3 iOS

The splash screen is implemented as a launch storyboard with the binary storyboard and related assets included in the SDK. This has implications for those who are providing their own storyboards or images in an Assets.car file:

- If you are on the 'free tier' then the AIR developer tool will ignore any launch storyboard you have specified within your application descriptor file, or provided within the file set for packaging into the IPA file.
- If you are creating an Assets.car file, then you need to add in the AIR splash images from the SDK which are in the "lib/aot/res" folder. These should be copied and pasted into your ".xcassets" folder in the Xcode project that you are using for creation of your assets.

Troubleshooting:

Message from ADT: "warning: free tier version of AIR SDK will use the HARMAN launch storyboard" – this will be displayed if a <UILaunchStoryboardName> tag has been added via the AIR application descriptor file. The tag will be ignored and the Storyboard from the SDK will be used instead.

Message from ADT: "warning: removing user-included storyboard "[name]" will be displayed if there was a Storyboardc file that had been included in the list of files to package: this will be removed.

Message from ADT: "warning: free tier version of AIR SDK must use the HARMAN launch storyboard" – this will be displayed if the Storyboardc file in the SDK has been replaced by a user-generated one.

If a white screen is shown during start-up: check that the HARMAN splash images are included in your assets.car file. Note that the runtime may shut down if it doesn't detect the appropriate splash images.

The runtime may also shut down for customers with a commercial license if a storyboard has been specified within the AIR descriptor file but not added via the list of files to package into the IPA file.