



Adobe AIR SDK Release Notes

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1 Release Overview

Release 51.0.1.2 is a bug-fix release, based on 51.0.1.1 which was the first redistributable release of version 51.x of the AIR SDK. This can be used for production applications and should be used instead of 51.0.1.1 which had a number of key errors.

Updates for release 51.0.1.2 are display in an orange font.

1.1 Key changes

There are a number of bugs that have been fixed in this version, across a variety of platforms and functional areas.

One of the key bugs in 51.0.1.1 was in the output of the just-in-time assembler for AS3 code on 64-bit ARM processors, in the handling of the 'number' type when doing subtraction/multiplication/division. Despite it not actually using the 'float' type, the existence of this as a possible data type exposed a bug in the handling of these maths functions, resulting in miniscule results being returned (and consequently, maths and layout errors resulting from this).

A number of stability improvements have been made, particularly around HTTP/HTTPS handling on iPhones, and on Windows when encountering an out-of-memory scenario.

On Android, there is better handling for different versions of Gradle and the Android Gradle Plug-in, and the required versions for these can be specified in the application descriptor (as before, in an undocumented variable which will be formalized in the next minor version update).

Bug fixes for 51.0.1.2 can be found in section 3.5.2.

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/actionsript/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/air sdkmanager-releases/releases>.

2.2 The Content of the Release

2.2.1 Detailed SW Content of the Release

Component Name	51.0.1.1	51.0.1.2
Core Tools	3.1.0	3.1.1
AIR Tools	3.0.0	
Windows platform package	3.1.0	3.1.1
MacOS platform package	3.1.0	3.1.1
Linux platform package	3.1.0	3.1.1
Android platform package	3.1.0	3.1.1
iPhone platform package	3.1.0	3.1.1

2.2.2 Delivered Documentation

Title	Document Number	Version
Adobe AIR SDK Release Notes	HCS19-000287	51.0.1

2.2.3 Build Environment

Platform	Build Details
Android	<p>Target SDK Version: 33</p> <p>Minimum SDK Version: 16 (ARMv7, x86); 21 (ARMv8, x86_64)</p> <p>Platform Tools: 28.0.3</p> <p>Build Tools: 33.0.2</p> <p>SDK Platform: Android-33</p> <p>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.</p>
iOS	<p>iPhoneOS SDK Version: 17.5</p> <p>iPhoneSimulator SDK Version: 17.5</p> <p>XCode Version: 15.3</p> <p>Minimum iOS Target: 12.0</p>

tvOS	tvOS SDK Version: 17.5
	tvSimulator SDK Version: 17.5
	XCode Version: 15.3
	Minimum tvOS Target: 12.0
MacOS	MacOS SDK Version: 14.4
	XCode Version: 15.3
	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: 51.0

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-33 with the default target SDK now set to this level in the generated Android manifest files.

Xcode 15.3 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-6288
Title:	Implementation of digests and encryption using CommonCrypto for mac/ios
Applies to:	macOS and iOS runtime components
Description:	Functionality for "Digest" and "Encryption" classes had been missing on iOS; this has now been implemented using the Apple CommonCrypto library, and this implementation is now also used for macOS builds.

Reference:	AIR-6979
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Title:	Colour profile conversion for macOS displays
Applies to:	MacOS runtime components
Description:	<p>Rather than the earlier implementation where an external JPEG was modified during loading, to match the colour profile of the main display, the new <code>BitmapData.convertColorProfile()</code> method has been added to allow conversions between different displays. Typically, to use this, if an image has been loaded via "Loader", it can then be displayed using:</p> <pre>var original : BitmapData, converted : BitmapData; original = (loader.content as Bitmap).bitmapData; converted = original.convertColorProfile(null, screen); addChild(new Bitmap(converted));</pre> <p>where "screen" is the <code>flash.display.Screen</code> object on which the current window is being displayed.</p>

Reference:	Github-907 https://github.com/air sdk/Adobe-Runtime-Support/issues/907
Title:	Adding support for fileType icon size 256x256
Applies to:	Core build tools
Description:	The "fileType" icon definitions had been prevented from supporting 256x256 icon sizes due to the ADT manifest validation; this has been updated to allow the "image256x256" value to be provided for file types.

Reference:	Github-3010 https://github.com/air sdk/Adobe-Runtime-Support/issues/3010
Title:	Provide mechanism for remote linking an IPA's executables on a macOS machine
Applies to:	Core build tools
Description:	Enabling remote building on a mac computer, when using Windows. See 7.2.2 for more details.

Reference:	Github-3108 https://github.com/air sdk/Adobe-Runtime-Support/issues/3108
Title:	Updating AIR xml signatures to use SHA-256 for signed info
Applies to:	Core build tools

Description:	When generating a “.air” package, the code signature used by AIR had previously been using SHA-1. However this is not considered suitable and so a switch has been made to SHA-256. It should still be possible to install new AIR packages built with this, using older versions of the shared AIR runtime, although there are some known issues that appear to be certificate-specific (and are therefore not considered to be caused by this change).
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Reference:	Github-3116 https://github.com/air sdk/Adobe-Runtime-Support/issues/3116
Title:	Adding support for PrivacyAdditions tag
Applies to:	Core build tools
Description:	Within the “<iPhone>” section of an application descriptor, a new element can be used, “PrivacyAdditions”. This works in a similar way to the “InfoAdditions” mechanism, where any entries that are created here will be merged in with other privacy manifest information (from the default AIR runtime plus from any ANEs) – the merging is additive where necessary i.e. if a privacy manifest entry can contain multiple options or an array, then new entries will be added without removing previous ones. Otherwise, for privacy manifest entries that can only have one value, the values given here will have the priority.

Reference:	Github-3171 https://github.com/air sdk/Adobe-Runtime-Support/issues/3171
Title:	Allow Android manifestAdditions to override activity's screenOrientation attribute
Applies to:	Core build tools
Description:	The Android activity's “screenOrientation” attribute can now be overridden by manifestAdditions in the application descriptor. The default from the AIR templates is “user”.

Reference:	Github-3172 https://github.com/air sdk/Adobe-Runtime-Support/issues/3172
Title:	Mac bundle creation to generate CFBundleDisplayName tag
Applies to:	macOS runtime component
Description:	When creating a macOS native application, the Info.plist file will now contain a “CFBundleDisplayName” as well as the “CFBundleName”, both of which take their value from the application descriptor “name” field.

Reference:	Github-3173 https://github.com/air sdk/Adobe-Runtime-Support/issues/3173
Title:	Mac bundle creation to generate CFBundleSupportedPlatforms tag
Applies to:	macOS runtime component
Description:	When creating a macOS native application, the Info.plist file will now contain a “CFBundleSupportedPlatforms” tag with the value “MacOSX”. A future version of AIR may include the ability for this tag to be overwritten via the InfoAdditions field.

3.5 Bug Fixes

3.5.1 Release 51.0.1.1

Reference:	AIR-6054
Title:	Ensuring zip extraction creates subfolders where needed
Applies to:	All runtime components
Description:	When a zip file did not contain explicit entries for each directory (as opposed to for a file), the folders were not being created on the target filesystem which meant that files in those subfolders were not then written.

Reference:	Github-2409 https://github.com/air sdk/Adobe-Runtime-Support/issues/2409
Title:	Including new AS3 implementations into tvOS runtime
Applies to:	iOS runtime components
Description:	The tvOS builds had not been correctly updated to define all of the new AS3 API symbols. This has been updated so that tvOS applications should now link correctly.

Reference:	Github-2903 https://github.com/air sdk/Adobe-Runtime-Support/issues/2903
Title:	Fixing instability when breaking into a debugger on uncaught error
Applies to:	All runtime components



Description:	Some logic within the debugger, where an uncaught error was being trapped by the debugger and then the debugger started querying the local variable stack, caused a null pointer dereference within the AIR runtime. The code here has been made more robust to ensure that these null values cause the debugger to continue without the instability.
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Reference:	Github-2976 https://github.com/air sdk/Adobe-Runtime-Support/issues/2976
Title:	Adding 'property' as a supported Android Manifest tag
Applies to:	Core build tools
Description:	ADT had been throwing an error when trying to set a "property" within the manifestAdditions in an application descriptor file. This is a valid manifest value though and has now been included in the supported tags.

Reference:	Github-3049 https://github.com/air sdk/Adobe-Runtime-Support/issues/3049
Title:	Ensuring we avoid the hang on debugger on iOS with nagle check
Applies to:	All runtime components
Description:	A number of updates were needed here, firstly to avoid hanging on iOS, and also to prevent an instability when running with ADL on some macOS machines.

Reference:	Github-3098 https://github.com/air sdk/Adobe-Runtime-Support/issues/3098
Title:	Ensuring a/v from NetStream.appendBytes() works with SoundMixer.computeSpectrum()
Applies to:	All runtime components
Description:	Previously, the code to compute the audio spectrum would have considered this a security risk due to the application not being considered to "own" the audio. This has been updated for the specific use case where appendBytes() is being used (rather than when the sound is loaded from a different domain).

Reference:	Github-3126 https://github.com/air sdk/Adobe-Runtime-Support/issues/3126
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Title:	Fixing issue with Loader.loadBytes() throwing errors in workers
Applies to:	All runtime components
Description:	Primarily an issue on macOS, there had been a problem with the use of Loader.loadBytes() when running from a background Worker thread, because this had been triggering the creation of a Stage object and display lists elements cannot run on background Workers.

Reference:	Github-3154 https://github.com/air sdk/Adobe-Runtime-Support/issues/3154
Title:	Preventing iOS worker crash caused by background alert
Applies to:	iOS runtime component
Description:	If a worker is set up on iOS using a SWF file that contains ActionScript, this cannot then be executed. However, the background worker had been attempting to display a notification to the user which is not permitted in the background thread; instead, the worker will now just throw an ActionScript error and not start running.

Reference:	Github-3160 https://github.com/air sdk/Adobe-Runtime-Support/issues/3160
Title:	Ensuring Linux bundles can be created even if the rpm/deb identification checks fail
Applies to:	Linux runtime component
Description:	On arch linux, the checks for a rpm/deb platform had been failing – however, this should not have impacted the creation of a “bundle” package, so the check has been moved so it only raises the error when that is blocking functionality (i.e. if someone tried creating a “native” Linux installer).

Reference:	Github-3195 https://github.com/air sdk/Adobe-Runtime-Support/issues/3195
Title:	Fixing crash in worker start-up caused by lack of Stage
Applies to:	All runtime components
Description:	A side-effect of github-3126, this change ensures that the Worker is not attempting to send stage-related events as it starts up. Worker objects do not have display lists and there should be no way for them to access the stage.

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Reference:	AIR-6054
Title:	Fixing zip file type flags for DOS attributes
Applies to:	All runtime components
Description:	The zip flags had been defined using the unix-based file properties, but weren't then handling zips that were created on Windows that had DOS attributes. These are now being translated and modified such that the AS3 flags match the definitions and are handling DOS-based zip files.

Reference:	AIR-7090
Title:	Fixing crashes when shutting down due to OOM signal on windows
Applies to:	Windows runtime component
Description:	When an application was shutting down due to an out of memory scenario, a number of initializations and property accesses were causing a crash, resulting in alerts and entries in the application log. This fix tries to ensure that the shutdown uses a more controlled and standard mechanism.

Reference:	AIR-7097
Title:	AS3 JIT failure on Android arm64 for double conversion
Applies to:	All runtime components
Description:	This issue had been found on Android but theoretically applies to other ARM64 based platforms. The updates in the JIT code to support the 'float' type caused an additional condition to be inserted in some mathematical operations to ensure the correct variable types would be used; however this exposed a bug in the ARM64 JIT code when trying to convert this back to the standard double type.

Reference:	AIR-7100
Title:	Crash in AIR on rasterisation of bitmap/texture with zero dimension



Applies to:	All runtime components
Description:	A crash log showed a root cause of a zero-sized bitmap – which should not normally be rendered, so it is unclear how this scenario occurred. However, additional protection has been added into the rasterization code to avoid this.

Reference:	AIR-7101
Title:	AIR windows 32-bit should support large addresses
Applies to:	Windows runtime component
Description:	The 32-bit runtime was hitting an “out of memory” error at around 1.4GB of memory usage (i.e. “VirtualAlloc” started returning NULL). This update ensures that we can use the full 32 bits of memory pointers and increases the memory capacity “VirtualAlloc” now continue to return new memory regions up to almost 4GB.

Reference:	AIR-7102
Title:	Cannot build for iPhoneSimulator if using native codesign
Applies to:	Core build tools
Description:	If the adt.cfg file had been set up to use the ‘native’ codesign utility on macOS, then the simulator build types were failing during the (unnecessary) code signing step. This update eliminates the attempt to use codesign for a simulator build.

Reference:	AIR-7111
Title:	ADT tries to validate externalSwfs even for non-iOS builds
Applies to:	Core build tools
Description:	If an application descriptor contained the “externalSwfs” element – used by IPA builds for the AOT processing – then these SWFs needed to be provided as part of the packaging process. This has now been updated so that the SWFs are only required for IPA builds.



Reference:	Github-15 https://github.com/airSDK/Adobe-Runtime-Support/issues/15
Title:	Ensuring NetStream SoundTransform on iOS can reduce the volume
Applies to:	iOS runtime component
Description:	The playback of MP4 videos on iOS used a different mechanism from a normal NetStream decoder, and this meant that SoundTransform updates had not been applied. This fix adds in the glue between the NetStream sound transform and the underlying AVPlayer object to ensure volume can be adjusted using the AS3 code, within the limits of the user's volume setting.

Reference:	Github-162 https://github.com/airSDK/Adobe-Runtime-Support/issues/162
Title:	Ensuring large scaled-down bitmaps don't cause maths overflows
Applies to:	All runtime components
Description:	When a large bitmap is scaled down to a very small display, and then positioned at a large X or Y value, the transformation matrix used internally within the rendering engine ended up with a transform value that overflowed a 32-bit signed integer value. This has been adjusted so that the overflow is now detected and a 64-bit variant stored, to then be used during rendering to correct the transformation and rasterization of the bitmap display object.

Reference:	Github-1316 https://github.com/airSDK/Adobe-Runtime-Support/issues/1316
Title:	Ensuring NetStream.appendBytes() uses all frames in correct order on windows
Applies to:	Windows runtime component
Description:	The Windows video decoder was not correctly handling the ending or restarting of an H.264 video stream passed in via appendBytes(). For one-time playback, the decoder needed to be put into a 'drain' mode, which had been coded wrongly originally. For looping, the SPS/PPS values detected at the restart of the stream caused issues with the ordering of the packets since they did not have the correct timestamp applied. With this update, it should be possible to play back a video fully, and for looping to work (with the exception of the last frame which is superseded by the first frame of the restarted video, as there is no way to determine the correct timestamp for the first packet of the restart).



Reference:	Github-2303 https://github.com/air sdk/Adobe-Runtime-Support/issues/2303
Title:	Linux EncryptedLocalStore fallback to file system for sudo usage
Applies to:	Linux runtime component
Description:	If an application was run using 'sudo', the Linux ELS implementation (using libsecret) then failed to correctly load in the ELS master key. Following discussions, this is now being implemented via secure file storage when libsecret is present but fails to initialise whilst running as sudo/root.

Reference:	Github-2625 https://github.com/air sdk/Adobe-Runtime-Support/issues/2625
Title:	Eliminating spurious networkChanged events from private ipv6 updates
Applies to:	MacOS runtime components
Description:	An update in macOS had resulted in a lot of networkChanged events being fired, resulting in spurious disconnects of RTMPS connections. The event handling has been adjusted – in a similar manner to how the Chromium browser engine had been updated following the same issue. This means that changes from private IPv6 networks are ignored, the notifications will only happen if any IPv4 changes occur, or if an IPv6 change occurs in a publicly accessible interface, or if any change is related to the primary interfaces.

Reference:	Github-3173 https://github.com/air sdk/Adobe-Runtime-Support/issues/3173
Title:	Updating CFBundlesSupportedPlatforms entry to be an array
Applies to:	Core build tools
Description:	This value was being generated by ADT as a string value, but should have been an array of strings.

Reference:	Github-3212 https://github.com/air sdk/Adobe-Runtime-Support/issues/3212
Title:	Ensuring NetStream.play(null) is allowed (only) in data generation mode
Applies to:	All runtime components

<p>Description:</p>	<p>An earlier update had started checking that the use of “play(null)” for NetStream objects was only possible when they were being first used, i.e. for privacy reasons it should not be allowed to be streaming from a remote URL and then to switch a NetStream object into data generation mode.</p> <p>This however had prevented “play(null)” from being called repeatedly, so the checks have been updated to allow such a usage, whilst still preventing the change of mode.</p>
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<p>Reference:</p>	<p>Github-3229 https://github.com/air sdk/Adobe-Runtime-Support/issues/3229</p>
<p>Title:</p>	<p>Ensuring SWF security context isn't affected when using NetStream data generation mode</p>
<p>Applies to:</p>	<p>All runtime components</p>
<p>Description:</p>	<p>A recent update changed the security context used for a NetStream object in data generation mode, to allow its output to be captured via drawing to bitmap data etc. But this had had the side-effect of updating the player's security context and preventing access to the stage by code in other contexts, such as within an ANE. The earlier change has been adjusted to ensure the main security context is not updated in this scenario.</p>

<p>Reference:</p>	<p>Github-3231 https://github.com/air sdk/Adobe-Runtime-Support/issues/3231</p>
<p>Title:</p>	<p>Ensuring mac socket data events occur more frequently</p>
<p>Applies to:</p>	<p>MacOS runtime component</p>
<p>Description:</p>	<p>The handling of socket data on macOS differed from how this works on Windows and had been buffering and sending out data events on a once-per-frame basis (following initial accelerated start-up). The play loop and asynchronous handling has been updated on macOS to ensure that socket data events are dispatched more regularly, albeit still with some relation to the application frame rate.</p>

<p>Reference:</p>	<p>Github-3236 https://github.com/air sdk/Adobe-Runtime-Support/issues/3236</p>
<p>Title:</p>	<p>Ensuring Android Gradle builds work with compileSdk > 33 and minSdk < 24</p>
<p>Applies to:</p>	<p>Core build tools</p>



Description:	<p>If a user had Android 34 or later on their machine (hence ADT generating a build file with the “compileSdk” setting above 33), and if their minimum SDK had been set below 24 (or left at the default), then the Gradle build failed to complete due to an issue in the Android R8 build tools.</p> <p>With this change, if ADT detects that the later Android version is being used, then it will specify later versions for Gradle and the Android Gradle Plug-in. Some changes are made to the project file generation to ensure that these later tools then build the AIR project successfully.</p>
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Reference:	Github-3242 https://github.com/air sdk/Adobe-Runtime-Support/issues/3242
Title:	Ensuring externalSwfs file list can cope with backslash in paths
Applies to:	Core build tools
Description:	When a list of externalSwfs was provided, these had been required to use forward-slashes in any relative paths that were used. The code has been updated to handle normal back-slashes as well.

Reference:	Github-3245 https://github.com/air sdk/Adobe-Runtime-Support/issues/3245
Title:	ELS does not overwrite short values with long values
Applies to:	All runtime components
Description:	When elements were stored into an encrypted local store, if the same key was used but a different value, then the store attempts to put the new value into the existing storage for this. If it does not fit however, then a new store is appended for this key – but the previous entry was not being properly cleared, leading to this then being still present next time the key was read.

Reference:	Github-3247 https://github.com/air sdk/Adobe-Runtime-Support/issues/3247
Title:	Adding debug output for when an external SWF can't be parsed
Applies to:	Core build tools
Description:	Additional debug outputs have been added to aid in troubleshooting when using the “externalSwfs” mechanism with a lot of files. The ADT log file will now contain details of the files as they are processed, and exception information will provide the full path of any problematic SWF file.



Reference:	Github-3249 https://github.com/air sdk/Adobe-Runtime-Support/issues/3249
Title:	Ensuring local variables can be accessed via the debugger
Applies to:	All runtime components
Description:	An earlier change to avoid a crash in certain scenarios with the debugger had had the side-effect of preventing the debugger from accessing local variables in some situations. The change made here is to adjust the earlier fix, to prevent the crashes but to use default values that allow processing to continue and local variable access to still work in these scenarios.

Reference:	Github-3251 https://github.com/air sdk/Adobe-Runtime-Support/issues/3251
Title:	iOS https crash after connecting via http
Applies to:	iOS runtime component
Description:	The HTTP handling on iOS had been previously updated to ensure we used the operating system to handle the various sessions/connections. However, the way this then worked with callbacks meant that an older connection was being checked for authentication information resulting in a crash. The code has been updated to correctly query the appropriate connection data which should resolve a number of issues and instabilities in this area.

Reference:	Github-3264 https://github.com/air sdk/Adobe-Runtime-Support/issues/3264
Title:	Ensuring TextField autoscroll works for final line visibility
Applies to:	All runtime components
Description:	When auto-scrolling a TextField by dragging the mouse below this, the scroll was stopping based on the selection point; if the horizontal point of the mouse was to the right of the end of the final line of text, then the selection point chosen was on the penultimate line of text (to match the mouse's x value) and the scrolling then stopped at this point. This has been updated to work more like native OS implementations, with the full text being selected if the mouse position is to the bottom right of the final line of text.

4 Android builds

4.1 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.

4.2 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>

4.3 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>
```

4.4 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://" URLs, 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.



5 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.



6 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.

7 iOS support

7.1 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.

7.2 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.

7.2.1 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.

7.2.2 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.

8 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.

8.1 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.

8.2 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.

8.3 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.