

Android Emulator

The Android SDK includes a mobile device emulator — a virtual mobile device that runs on your computer. The emulator lets you develop and test Android applications without using a physical device.

This document is a reference to the available command line options and the keyboard mapping to device keys. For a complete guide to using the Android Emulator, see [Using the Android Emulator \(/tools/devices/emulator.html\)](#).

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[Using the Android Emulator](#)
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Keyboard Commands

Table 1 summarizes the mappings between the emulator keys and the keys of your keyboard.

Table 1. Emulator keyboard mapping

Emulated Device Key	Keyboard Key
Home	HOME
Menu (left softkey)	F2 <i>or</i> Page-up button
Star (right softkey)	Shift-F2 <i>or</i> Page Down
Back	ESC
Call/dial button	F3
Hangup/end call button	F4
Search	F5
Power button	F7
Audio volume up button	KEYPAD_PLUS, Ctrl-F5
Audio volume down button	KEYPAD_MINUS, Ctrl-F6
Camera button	Ctrl-KEYPAD_5, Ctrl-F3
Switch to previous layout orientation (for example, portrait, landscape)	KEYPAD_7, Ctrl-F11
Switch to next layout orientation (for example, portrait, landscape)	KEYPAD_9, Ctrl-F12
Toggle cell networking on/off	F8
Toggle code profiling	F9 (only with -t race startup option)
Toggle fullscreen mode	Alt-Enter
Toggle trackball mode	F6
Enter trackball mode temporarily (while key is pressed)	Delete
DPad left/up/right/down	KEYPAD_4/8/6/2
DPad center click	KEYPAD_5
Onion alpha increase/decrease	KEYPAD_MULTIPLY(*) / KEYPAD_DIVIDE(/)

Command Line Parameters

The emulator supports a variety of options that you can specify when launching the emulator, to control its appearance or behavior. Here's the command-line syntax of the options available to the emulator program:

```
emulator -avd <avd_name> [-<option> [<value>]] ... [-<qemu args>]
```

Table 2. Emulator command line parameters

Category	Option	Description	Comments
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AVD	-avd <avd_name> or @<avd_name>	Required. Specifies the AVD to load for this emulator instance.	You must create an AVD configuration before launching the emulator. For information, see Managing AVDs with AVD Manager .
	-cache <filepath>	Use <filepath> as the working cache partition image.	An absolute or relative path to the current working directory. If no cache file is specified, the emulator's default behavior is to use a temporary file instead. For more information on disk images, use <code>-help-disk-images</code> .
	-data <filepath>	Use <filepath> as the working user-data disk image.	Optionally, you can specify a path relative to the current working directory. If <code>-data</code> is not used, the emulator looks for a file named <code>userdata-qemu.img</code> in the storage area of the AVD being used (see <code>-avd</code>).
	-initdata <filepath>	When resetting the user-data image (through <code>-wipe-data</code>), copy the contents of this file to the new user-data disk image. By default, the emulator copies the <code><system>/userdata.img</code> .	Optionally, you can specify a path relative to the current working directory. See also <code>-wipe-data</code> . For more information on disk images, use <code>-help-disk-images</code> .
	-nocache	Start the emulator without a cache partition.	See also <code>-cache <file></code> . Default value is <code><system>/ramdisk.img</code> .
Disk Images	-ramdisk <filepath>	Use <filepath> as the ramdisk image.	Optionally, you can specify a path relative to the current working directory. For more information on disk images, use <code>-help-disk-images</code> . Default value is <code><system>/sdcard.img</code> .
	-sdcard <filepath>	Use <file> as the SD card image.	Optionally, you can specify a path relative to the current working directory. For more information on disk images, use <code>-help-disk-images</code> .
	-wipe-data	Reset the current user-data disk image (that is, the file specified by <code>-datadir</code> and <code>-data</code> , or the default file). The emulator deletes all data from the user data image file, then copies the contents of the file at <code>-initdata</code> data to the image file before starting.	See also <code>-initdata</code> . For more information on disk images, use <code>-help-disk-images</code> .
Debug	-debug <tags>	Enable/disable debug messages for the specified debug tags.	<tags> is a space/comma/column-separated list of debug component names. Use <code>-help-debug-tags</code> to print a list of debug component names that you can use.
	-debug-<tag>	Enable/disable debug messages for the specified debug tag.	Use <code>-help-debug-tags</code> to print a list of

	-debug-no-<tag>	Disable debug messages for the specified debug tag.	debug component names that you can use in <tag>.
	-logcat <logtags>	Enable logcat output with given tags.	If the environment variable ANDROID_LOG_TAGS is defined and not empty, its value will be used to enable logcat output by default.
	-shell	Create a root shell console on the current terminal.	You can use this command even if the adb daemon in the emulated system is broken. Pressing Ctrl-c from the shell stops the emulator instead of the shell. <device> must be a QEMU device type. See the documentation for '-serial dev' at http://wiki.qemu.org/download/qemu-doc.html for a list of device types.
	-shell-serial <device>	Enable the root shell (as in -shell and specify the QEMU character device to use for communication with the shell.	Here are some examples: <ul style="list-style-type: none">• -shell-serial stdio is identical to -shell• -shell-serial tcp::4444,server,nowait lets you communicate with the shell over TCP port 4444• -shell-serial fdpair:3:6 lets a parent process communicate with the shell using fds 3 (in) and 6 (out)• -shell-serial fdpair:0:1 uses the normal stdin and stdout fds, except that QEMU won't tty-cook the data.
	-show-kernel <name>	Display kernel messages.	
	-trace <name>	Enable code profiling (press F9 to start), written to a specified file.	
			Equivalent to -debug-init.
			You can define the default verbose output options used by emulator instances in the Android environment variable ANDROID_VERBOSE. Define the options you want to use in a comma-delimited list, specifying only the stem of each option: -debug-<tags>.
	-verbose	Enable verbose output.	Here's an example showing ANDROID_VERBOSE defined with the -debug-init and -debug-modem options: ANDROID_VERBOSE=init,modem For more information about debug tags, use <-help-debug-tags>.
Media	-audio <backend>	Use the specified audio backend.	
	-audio-in <backend>	Use the specified audio-input backend.	

	-audio-out <backend>	Use the specified audio-output backend.	
	-noaudio	Disable audio support in the current emulator instance.	
	-radio <device>	Redirect radio modem interface to a host character device.	
	-useaudio	Enable audio support in the current emulator instance.	Enabled by default.
	-dns-server <servers>	Use the specified DNS server(s).	The value of <servers> must be a comma-separated list of up to 4 DNS server names or IP addresses. The value of <proxy> can be one of the following: http://<server>:<port> http://<username>:<password>@<server>:<port>
	-http-proxy <proxy>	Make all TCP connections through a specified HTTP/HTTPS proxy	The http:// prefix can be omitted. If the -http-proxy <proxy> command is not supplied, the emulator looks up the http_proxy environment variable and automatically uses any value matching the <proxy> format described above.
Network	-netdelay <delay>	Set network latency emulation to <delay>.	Default value is none. See the table in Network Delay Emulation for supported <delay> values.
	-netfast	Shortcut for -netspeed full -netdelay none	
	-netspeed <speed>	Set network speed emulation to <speed>.	Default value is full. See the table in Network Speed Emulation for supported <speed> values.
	-port <port>	Set the console port number for this emulator instance to <port>.	The console port number must be an even integer between 5554 and 5584, inclusive. <port>+1 must also be free and will be reserved for ADB. <socket> must use one of these formats: tcp:<port>[,server][,max=<seconds>] unix:<port>[,server][,max=<seconds>]
	-report-console <socket>	Report the assigned console port for this emulator instance to a remote third party before starting the emulation.	Use -help-report-console to view more information about this topic. Supported values for <delay> are integers between 0 and 1000.
System	-cpu-delay <delay>	Slow down emulated CPU speed by <delay>	Note that the <delay> does not correlate to clock speed or other absolute metrics — it simply represents an abstract, relative delay factor applied non-deterministically in the emulator. Effective performance does not always scale in direct relationship with <delay> values.

	-gps <device>	Redirect NMEA GPS to character device.	Use this command to emulate an NMEA-compatible GPS unit connected to an external character device or socket. The format of <device> must be QEMU-specific serial device specification. See the documentation for 'serial -dev' at http://wiki.qemu.org/download/qemu-doc.html .
	-nojni	Disable JNI checks in the Dalvik runtime.	
	-qemu	Pass arguments to the qemu emulator software.	Important: When using this option, make sure it is the <i>last option</i> specified, since all options after it are interpreted as qemu-specific options.
	-qemu -enable-kvm	Enable KVM acceleration of the emulator virtual machine.	This option is only effective when your system is set up to use <u>KVM-based VM acceleration</u> . You can optionally specify a memory size (-m <size>) for the VM, which should match your emulator's memory size: -qemu -m 512 -enable-kvm -qemu -m 1024 -enable-kvm
	-qemu -h	Display qemu help.	
	-gpu on	Turn on graphics acceleration for the emulator.	This option is only available for emulators using a system image with API Level 15, revision 3 and higher. For more information, see Using the Android Emulator .
	-radio <device>	Redirect radio mode to the specified character device.	The format of <device> must be QEMU-specific serial device specification. See the documentation for 'serial -dev' at http://wiki.qemu.org/download/qemu-doc.html .
	-timezone <timezone>	Set the timezone for the emulated device to <timezone>, instead of the host's timezone.	<timezone> must be specified in zoneinfo format. For example: "America/Los_Angeles" "Europe/Paris"
	-version	Display the emulator's version number.	
	-dpi-device <dpi>	Scale the resolution of the emulator to match the screen size of a physical device.	The default value is 165. See also -scale.
	-no-boot-anim	Disable the boot animation during emulator startup.	Disabling the boot animation can speed the startup time for the emulator.
UI	-no-window	Disable the emulator's graphical window display.	
	-scale <scale>	Scale the emulator window.	<scale> is a number between 0.1 and 3 that represents the desired scaling factor. You can also specify scale as a DPI value if you add the suffix "dpi" to the scale value. A value of "auto" tells the emulator to select the best window size.

Help	-raw-keys	Disable Unicode keyboard reverse-mapping.	
	-noskin	Don't use any emulator skin.	
	-keyset <file>	Use the specified keyset file instead of the default.	The keyset file defines the list of key bindings between the emulator and the host keyboard. For more information, use <code>-help-keyset</code> to print information about this topic.
	-onion <image>	Use overlay image over screen.	No support for JPEG. Only PNG is supported.
	-onion-alpha <percent>	Specify onion skin translucency value (as percent).	Default is 50.
	-onion-rotation <position>	Specify onion skin rotation.	<position> must be one of the values 0, 1, 2, 3.
	-skin <skinID>	This emulator option is deprecated.	Please set skin options using AVDs, rather than by using this emulator option. Using this option may yield unexpected and in some cases misleading results, since the density with which to render the skin may not be defined. AVDs let you associate each skin with a default density and override the default as needed. For more information, see Managing Virtual Devices with AVD Manager .
	-skindir <dir>	This emulator option is deprecated.	See comments for <code>-skin</code> , above.
	-help	Print a list of all emulator options.	
	-help-all	Print help for all startup options.	
	-help-<option>	Print help for a specific startup option.	
	-help-debug-tags	Print a list of all tags for <code>-debug <tags></code> .	
	-help-disk-images	Print help for using emulator disk images.	
	-help-environment	Print help for emulator environment variables.	
	-help-keys	Print the current mapping of keys.	
	-help-keyset-file	Print help for defining a custom key mappings file.	
	-help-virtual-device	Print help for Android Virtual Device usage.	