Android Connection Methods

To make a connection to an Android system under test (SUT) with TestPlant's testing tools, you need to have a VNC server on the device. You have different connection options with the eggPlant range, and you'll need to choose the best one for your specific devices and testing needs.

Android Gateway

Android Gateway is a tool for use with eggPlant Functional to assist in making connections to Android devices for test automation. You can download Android Gateway from the TestPlant Mobile downloads page.

The Android Gateway enables a VNC connection exclusively for eggPlant Functional. It works with devices running Android OS 4.2.1 and later. For additional information about setting up and using Android Gateway, see Getting Started with Android Gateway.

Automatic Android VNC Server

eggPlant Functional includes a built-in VNC server for Android devices. If you connect a device through eggPlant Functional and it doesn't have a VNC server installed, eggPlant Functional will install and use its own.

The automatic Android VNC server works with Android 4.1 and later. Note: Depending on the specific device and OS version, you might need to switch the ADB version that eggPlant Functional uses, which you can do on the Connections tab of eggPlant Functional Preferences.

eggOn for Android

For older Android devices, you might need to use eggOn, TestPlant's mobile VNC server. eggOn for Android works with Android 2.3 and later. You can download eggOn for Android from the TestPlant website. For installation instructions, please see eggOn for Android Installation.

To learn how to use either of these methods to connect to Android SUTs, please see Connecting to Android SUTs.

Getting Started with Android Gateway

Getting Started with Android Gateway

Android Gateway is a tool for use with eggPlant Functional to assist in making connections to Android devices for test automation. You can connect to Android devices from a local machine where the device is connected via USB, or remotely to a different computer that has a connected Android device.

You use the Viewer window and Connection List in eggPlant Functional to view and manage your connections, letting you create tests against Android devices in the same manner that you would with any other system under test (SUT).

Below is a high-level overview of possible environment architectures for using Android Gateway:
System Requirements for Android Gateway

Android Gateway is a free utility. You can download it from the TestPlant downloads page [1].

You can install and run Android Gateway on the following supported operating systems:

**Windows:** Windows 7 and later; Windows Server 2008 and later

**Mac:** Mac OS X 10.9.5 and later

Android Gateway can be used to connect to Android devices running Android OS 4.2.1 and later.

**Note:** When running Android Gateway on Windows, you might need to install a USB driver to allow Android Gateway to detect some devices. Please see OEM USB Drivers [6] on the Google Developers website for more information.

Step by Step: Install Android Gateway

To install the Android Gateway, please follow the steps below:

1. Navigate to the Android section of the eggPlant Mobile downloads page [1] on the TestPlant website, and download the Android Gateway application for the appropriate platform (Windows/Mac).
2. To install the Android Gateway application, double-click the install package.
   - On Mac OS X, drag the Android Gateway application into the Applications folder on the Mac.
   - On Windows, follow the on-screen instructions in the Setup wizard to finish installation.
3. Launch the Android Gateway application.

From this point, you should be ready to make connections to your Android devices. You can learn about that process in Using Android Gateway [7].

The Android Gateway UI

The Android Gateway consists of several screens, accessed by the tabs along the top of the UI. The tabs and screens are as follows:

- **Service:** This screen displays any detected devices and is where you start and stop the VNC service.
- **Device:** This screen provides controls for working with the device and the installed VNC server and displays information about the currently installed VNC version. See The Android Gateway Device Screen [8] for more information.
- **Settings:** This screen lets you change connection ports, select screen scaling options, and enable reverse VNC connections. See Android Gateway Settings [9] for more information.
- **Advanced:** This screen includes advanced settings options; in most instances, you won't need to change these options.
settings. See Android Gateway Settings for more information.

• **About:** This screen includes application version information along with credits for Android Gateway.

The **Status** message and the event log are visible on every screen. These two sections provide information you can use to see, for instance, if Android Gateway has detected a connected device or why a connection might have failed. Note that you can expand the size of the Android Gateway window by dragging from the bottom if you want to see more of the event log at once.

**Using Android Gateway**

**Using Android Gateway**

Android Gateway works together with eggPlant Functional to let you make connections to your mobile test devices. After you establish a connection, you can use eggPlant Functional to write scripts and create and perform tests against your Android environments.

You can connect to Android devices that are connected by USB to the machine that is running eggPlant Functional, in which case Android Gateway is not required, although using it provides additional control over the device and the connection. If you want to make a connection to an Android device that is connected to a remote computer, you will need to have Android Gateway running on the remote computer.

**Step by Step: Connecting to Devices with Android Gateway**

Follow these steps to use Android Gateway to create a connection between eggPlant Functional and an Android device:

1. Launch the Android Gateway application.
2. Attach an appropriate Android device via USB to the machine where Android Gateway is running. When the Android Gateway detects the device, you’ll see the **Status** message change from *No Android device detected* to *Ready to start VNC service*. **Note:** Android Gateway works with devices running Android OS 4.2.1 and later.
3. (Optional) Adjust the settings on the **Settings** and **Advanced** tabs as necessary for your environment and intended connection. See Android Gateway Settings for information about these settings.
4. Select the **Service** tab if it isn’t already selected, then make sure the connected device is selected in the **Device** drop-down list. The list shows the model number of the detected device (as shown in the device’s Settings), followed by the device serial number in parentheses. Note that if you have multiple Android devices connected to the machine running Android Gateway, each of them will be displayed in the drop-down list, so be sure you select the correct device.

   ![Select the device you want to connect to on the Service screen](image)

5. (Optional) If you want eggPlant Functional to require a password for connecting to this device, enter it here in the **Password** field. You’ll need to enter the same password in the **Connection List** in eggPlant Functional.
6. Click **Start** to start the VNC service on the connected device. When the VNC service is running, the **Status** message
turns green and displays the IP address and port you need to use to connect to the device. However, see Other Connection Considerations below for special connection circumstances.

7. In eggPlant Functional, create a Connection List item for the Android device. For information about using the eggPlant Functional Connection List, see Creating a Connection from eggPlant Functional.

8. Use the Connection List in eggPlant Functional to open the connection to your Android device.

When you've established a connection, the eggPlant Functional Viewer window displays the Android device screen. You can now capture images on the device and write scripts in eggPlant Functional, using the Android device as you would any other system under test (SUT).

Other Connection Considerations

Remember that you can make connections with Android Gateway both from your local machine to a locally connected device as well as to a remote machine that has a device (or devices) attached. The instructions above work for making both types of connection. To make a remote connection, you must ensure that eggPlant Functional is able to reach the IP address where the Android Gateway is running.

If you're making a connection to a device attached to your local machine, you can set the Android Gateway so that it makes the device available only from that machine. To make this setting, go to the Settings tab in Android Gateway and set the External port and Local port to the same port number. Note that you can change settings only if the VNC service is not currently running.

Thereafter, when you start the VNC service, the connection information displayed in the Status field shows the localhost IP address, 127.0.0.1, and whichever port number you used in Settings. Use these numbers when you create your connection in eggPlant Functional.

Step by Step: Making a Reverse Connection with Android Gateway

If the device you're testing has security that prevents it from accepting a connection, you can use Android Gateway and eggPlant Functional to create a reverse connection where the device establishes the connection to eggPlant Functional. Note that reverse connections can be made locally (eggPlant Functional and Android Gateway running on the same machine) as well as remotely (eggPlant Functional and Android Gateway running on different machines).

Note: To make a reverse connection, the Android device must be using Wi-Fi and must be on the same Wi-Fi network as the machine running eggPlant Functional. The exception to this requirement is if you are testing devices running Android OS 5.0 and later, and the device is connected to the same machine that is running eggPlant Functional. In that case, you can use the localhost IP address, 127.0.0.1, for the reverse IP address to make a connection without Wi-Fi.

Follow the steps below to set up and open a reverse connection:

1. Launch eggPlant Functional.
2. In eggPlant Functional, go to the Connections tab in Preferences (eggPlant > Preferences) and ensure that Listen for reverse connections is selected. Note that you can change the port where eggPlant Functional listens for reverse connections; be sure that the port matches the port you set in Android Gateway (see step 5).

Make sure that eggPlant Functional is listening for reverse connections

3. Launch Android Gateway, then connect an Android device via USB to the machine where it is running.
4. On the Settings screen of Android Gateway, select the checkbox for Enable reverse connection, then in the IP Address field, enter the IP address for the machine where you're running eggPlant Functional.
5. For the reverse Port field, 5500 is entered as the default. You can use a different port. However, make sure the port you use here matches the port that eggPlant Functional expects for reverse connections (step 2).
6. On the Service screen in Android Gateway, click Start. When the connection is established, the Connection List in eggPlant Functional automatically shows the active connection. Double-click the connection if you want to open a Viewer window.
The Android Gateway Device Screen

The Device screen of Android Gateway provides controls for working with connected devices and the VNC server installed on those devices. This screen also displays information about the installed VNC server version.

![Android Gateway Device Screen](image)

The Device screen lets you work with connected devices and the VNC server

The Installed VNC Version section of the screen shows information about the VNC server installed on the device that's currently selected on the Device drop-down list on the Service screen. If <none> is selected, or if no device is detected, this section of the Device screen shows NONE.

You can take the following actions with the buttons on this screen:

- **Restart ADB**: This button restarts the ADB daemon.
- **Reboot**: Use this button to reboot the attached Android device.
- **New Instance**: Use this button to create an additional instance of Android Gateway, which you can use to connect to multiple devices simultaneously.
- **Refresh**: Use this button to query the device for information about the currently installed VNC server. Information is updated in the Installed VNC Version section of the window.
- **Install/Reinstall**: Use this button to install (or reinstall) the VNC server on the connected device. If the VNC server isn't installed when you start the service (on the Service screen), Android Gateway should install it automatically. However, you can manually install or reinstall the server if you need to.
- **Uninstall**: This button uninstalls the VNC server from the device.

Android Gateway Settings

Android Gateway Settings

You can use the settings options in Android Gateway to customize the application and to specify special circumstances for connections. Although the default settings are fine for most devices and environments, you might need to make adjustments from time to time.

Settings options are split between the **Settings** screen and the **Advanced** screen. Descriptions of the features found in both sections are found below.

**Note**: To change or update any settings on either the **Settings** screen or the **Advanced** screen, the VNC service must not be running.

The Settings Screen
The **Settings** screen lets you change connection ports, select screen scaling options, enable reverse VNC connections, and determine the touch screen compatibility mode. These features are described in detail below.

**The Settings screen lets you control common connection options**

- **External port**: Android Gateway uses the external port for connections with eggPlant Functional running on a different machine. The external port must be different from the local port for port forwarding to work. Default port: 5900.
- **Local port**: Use this port to connect from eggPlant Functional running on the same machine as Android Gateway. Default port: 5950.
- **Allow multiple clients**: Use this option to allow multiple connections to the device simultaneously. (Selected by default.)
- **Screen scale factor**: This setting scales down the screen by the specified factor. For example, a setting of 2 reduces screen resolution to one-half of the actual width and height. This option enables faster screen updates, which is especially useful on high-resolution screens.
- **Max frames/sec**: This setting lets you limit the rate at which screenshots are taken on the device for drawing the remote screen. This value is specified in number of frames per second (FPS). Using a larger number of frames per second makes devices more responsive but can drain the batteries even when the device is plugged into a power source. The default value is 5. Most devices are not able to take more than 5 screenshots per second.
- **Blend pixels when scaling**: Use this option to get better images if you're using scaling. However, blending will likely cause slower performance.
- **Enable reverse connection**: Select this option if you want to use a reverse VNC connection.
  - **IP address**: Use this field to enter the IP address of the eggPlant Functional machine when you're using a reverse VNC connection.
  - **Port**: Use this field to set the port number over which Android Gateway communicates the reverse VNC connection. Note that eggPlant Functional must be configured to listen for reverse connections on the same port number. (You can set the port in eggPlant Functional by going to **eggPlant > Preferences** and selecting the **Connections** tab.) Default port: 5500.
- **Touch screen control / Compatibility mode**: The default mode for this feature is **enhanced**, which works on most devices and provides the best touch gesture support. However, some devices can work better in compatibility mode. Some touch gestures, such as pinch and long hold, are not supported in compatibility mode.

The **Advanced Screen**

The **Advanced** screen includes advanced settings options. In most instances, you won't need to change these settings. The options on this screen are described below.
The Advanced screen provides advanced settings options

- **ADB version**: Use the drop-down list to switch between Android Debug Bridge (ADB) version 1.0.32 or 1.0.31. Some devices might require one version over the other. **Note**: To ensure the version switches, you should click **Restart ADB** on the **Device** screen after switching the version.
- **Enable traces**: This setting enables extensive logging for debugging, which is useful for troubleshooting connection errors and other problems. If you enable this feature, the event log displays the trace information. Typically, you would need to use this information only in conjunction with TestPlant Support.
- **Allow autoreboot**: Select this checkbox if you want the Android Gateway to automatically reboot the device if it encounters multiple failed connections.
- **Range of ports used on the device**: Android Gateway uses one port to communicate internally within the connected device. It selects the port from the port range specified in the **Min** and **Max** fields. If you have a port conflict with an app running on the phone, you can adjust the port range here.
- **Custom parameters**: This field accepts parameters for use when making a connection to the device. **Note**: This feature should typically be used only as directed by TestPlant Support.

**Connecting to Android SUTs**

Connecting via the built-in Android server or via eggOn for Android is essentially the same. (Keep in mind, however, that to use eggOn, you first have to install it on the device manually.) The connection must be made initially over USB so that eggPlant Functional can start the server, and then subsequent connections over Wi-Fi are possible.

**Launching the Android Server and Connecting over USB**

**Note**: You must complete these steps before you can connect over Wi-Fi.

1. Launch eggPlant Functional on your computer.
2. Plug the device into your eggPlant Functional machine over USB. If no VNC server is present, eggPlant Functional pushes the Android server to the device. **Note**: If you've installed eggOn (or another mobile VNC server), the built-in server isn't installed; eggPlant Functional uses what you have on the device.
3. On the device, navigate to **Settings > Developer options** and ensure that **USB debugging** is enabled:
4. Also on the Android device, navigate to **Settings > Security** (Note: This location might be **Security & Screen Lock** on some Android devices), and select the **Unknown sources** checkbox:

5. Create a new connection for the device in the eggPlant Functional **Connection List**. In the **Server** drop-down list, you should see the device represented by its serial number; select the device:

   ![Connection List](image)

   **Note**: If the connected Android device doesn't appear in the drop-down list, you might need to switch the ADB version eggPlant Functional is using, which you can do on the **Connections** tab of eggPlant Functional **Preferences**.

   The server can be started over either port 5900 or 5901, but the default port for the running server is 5901.

   Give your device a **Display Name** to identify it in the eggPlant Functional **Connection List**, then click **Save**.

6. To connect to the device, double-click the device in the **Connection List** or select it and click **Connect**. This starts the server and creates a connection to the device over USB. You can continue using connections via USB from this point or follow the directions below to make a Wi-Fi connection.

**Connecting to Android Devices Over Wi-Fi**

This section applies to using eggOn and assumes that the steps for launching the server under **Launching the Android Server and Connecting Over USB** above have already been completed. You should have an active connection to the device over USB, and you should be able to see it in the eggPlant Functional **Viewer** window.

To make a Wi-Fi connection to the device, follow these steps:

1. Create a new **Connection List** item (separate from the one that describes the existing USB connection). Specify the device by using the IP address for the device's Wi-Fi connection in the **Server** field (instead of the USB identifier in the drop down list). You can find the IP address on the device by going to **Settings > Wi-Fi** and selecting the active Wi-Fi connection. You can also find this information in the eggOn application on the device.

   If desired, give the device a display name to identify it in your **Connection List**. Save the connection.

2. Make a connection to the device using this new Wi-Fi connection. You should see two remote screen windows, showing the same device.

3. To work with the Wi-Fi connection only, unplug the device from your computer without closing the USB connection. The USB connection will drop, and the Wi-Fi connection will be left active. You are now connected to your device over Wi-Fi.

**eggOn for Android Installation**
eggOn for Android Installation

eggOn for Android is a mobile VNC server that you can use to test Android devices. (For information about eggOn for iOS devices, please see eggOn for iOS.) These instructions can be used to install eggOn on all Android platforms; installation does not require rooting the device.

Step-by-Step: Installing and Licensing

Downloading and Licensing eggOn

1. On the Android device where you want to install eggOn, navigate to the TestPlant website.

2. Download the eggOn application and install it on the device.

3. Open the application and enter your eggOn license key, or use the Hands-Free Licensing for eggOn on Android.

   If you do not have an eggOn license key, contact your TestPlant account manager or TestPlant support for assistance.

   Note: The server will not be running, but do not try to start it manually.

Launching eggOn

eggPlant Functional is required to start the eggOn VNC server on Android. The connection must be made initially over USB, so that eggPlant Functional can start the server, and then subsequent connections over WiFi are possible.

For instructions on launching the eggOn server and connecting to Android devices over VNC from eggPlant Functional, please see Connecting to eggOn on Android.
Hands-Free Licensing for eggOn

Hands-Free Licensing for eggOn on Android

**Note:** Hands-free licensing of eggOn is only available with eggOn for Android v1.4.4+.

The eggOn license key can be entered manually as described in the eggOn Installation for Android instructions, or, if you are using eggOn v1.4.4+, eggOn can be licensed via the command line using ADB calls.

If you do not have an eggOn license key for Android, please contact your TestPlant account manager or TestPlant support for assistance.

**Licensing eggOn on Android from the Command Line**

eggOn must be installed manually on the device according to the eggOn Installation for Android instructions before it can be licensed using this hands-free method.

Before you begin, make sure that the device being licensed has internet access. This is required for license validation.

1. In a command line prompt, change directories to the appropriate folder for your platform:
   - **Windows:** C:\Program Files (x86)\eggPlant\Eggplant.app\Resources
   - **Mac:** /Applications/eggPlant/Contents/Resources

2. Launch adb by executing the appropriate adb batch file in that location:
   - **Windows:** adb.exe
   - **Mac:** adb

3. Run the following commands from the command line, substituting your eggOn license key for EGGON_LICENSE_KEY:
   ```bash
   rem Create eggon license key on device
   adb shell "echo -n EGGON_LICENSE_KEY > /data/local/tmp/eggon.license"

   rem Launch eggOn main activity to trigger licensing
   adb shell "am start -n com.testplant.eggon/.MainActivity"

   rem give it some time..
   timeout 5

   rem go back to home screen
   adb shell "am start -a android.intent.action.MAIN -c android.intent.category.HOME"
   ```

eggOn should now be running and licensed on the device. To connect to the device from eggPlant Functional, please see Connecting to eggOn on Android.

**eggOn for Android Settings**

Access the eggOn settings on Android by navigating to the menu and selecting "Settings":

Connection Settings:

1. **VNC Password**: Set this to have eggOn require a password in order to connect.
2. **VNC Port**: Defines the port on which eggOn is listening for new connections.
3. **Grant control to clients** Defines whether clients can control the device or only view the device’s screen but not perform any actions, like tap or enter text. Select this checkbox to allow control, and deselect it to allow view-only connections.

Display Settings:
1. **Display Capture Method**: Change this to gain performance or if display is garbled. Choose Framebuffer to view video and camera.

2. **Screen Rotation**: Rotate the screen display.

3. **Screen Scaling**: Defines whether the screen is returned to the client in full resolution ("1.0") or some alternate resolution. Note that half resolution ("0.5") gives a much faster connection since only half the data needs to be sent back to the client.

4. **Rotate Display by 180°**: To fix some ZTE devices with a framebuffer rotation issue.

5. **Keep Screen On**: Prevent screen from turning off automatically when connected.

**Gesture Speed Control:**

1. **Pixel per step**: Set the number of pixels moved per step.

2. **Interval (ms) per step**: Set the number of milliseconds per step.

**Miscellaneous Settings:**

1. **Show toolbar at bottom**: Defines whether the mobile toolbar will show in eggPlant Functional while connected. This toolbar gives the ability to use some of the hard buttons manually through the VNC viewer. Select this checkbox to allow, deselect to disable.

2. **Start server at boot**: This option only works for rooted devices and is not required for use with eggPlant Functional.

3. **Auto correct rotation**: Select this checkbox to fix some devices with screen rotated incorrectly.
Reverse Connections

Note: Available for Android only.

Reverse connections differ from standard VNC connections in just one way: instead of eggPlant Functional initiating a connection with your device, the device initiates a connection with eggPlant Functional. The distinction is useful for devices that cannot accept incoming VNC connections.

If your device’s network security cannot be modified to allow incoming VNC connections, use a reverse connection. For instance, if you are connecting over a cellular data network, your cellular service provider controls your network security; and you almost certainly need to use a reverse connection.

Opening a Reverse Connection with eggOn

1. Verify that your network security will allow the eggPlant Functional computer to receive connections on port 5501.
2. Have eggPlant Functional listen for mobile connections. In VNC preferences, select the “Listen for mobile connections” checkbox.
3. On your device, in the VNC server’s main menu, choose Reverse Connection.
4. You are prompted to enter an address. Enter the IP address or host name of your eggPlant Functional computer.