

Scotti-BYTE Enterprise Consulting Services

Stream Tutorial: Amazon Fire Stick 4K Enhancements

The Amazon Fire Stick 4K was first released in 2018 and is a very powerful streaming device capable of several enhancements. The Fire Stick 4K is a 1.7 Ghz quad core CPU paired with a Technologies PoweVR GE8300 GPU. The unit has 1.5 GB of DDR4 RAM and 8GB of internal storage. The unit runs Fire OS 6, which is basically an Amazon enhanced version of Android.

The Fire Stick 4k can display 720p, 1080p and up to 2160p. It supports a wide variety of Android applications and with the addition of a bluetooth keyboard that provides a mouse or touchpad, a wider variety of android applications can be sideloaded.

Fire OS uses about 3GB of the 8GB internal storage leaving 5GB for applications and data that the end user may load. These apps can be Amazon apps or sideloaded apps.

The Fire TV 4k has a MIMO 802.11 a/b/g/n/ac wifi and Bluetooth 5.0 with BLE. The performance of the device is fabulous, but there are some very nice things you can do to augment the performance.

I mentioned above that a bluetooth keyboard is a nice addition. This is true because some sideloaded android apps require a keyboard or a mouse. The keyboard is also a big help if you plan to enter a lot of data where an on-screen keyboard is too laborious.

My recommendation is the Rii i4 Mini Bluetooth keyboard with touchpad on Amazon. This is a \$30 device and supports bluetooth connectivity and also has a 2.4Ghz USB dongle for use with a PC.

As you can see at right, this keyboard has a directional arrow pad and a multi-touch touch pad. The keyboard is USB chargeable and has a micro-USB charging port.



The MIMO 802.11ac is very high performance for a wifi connection. That being said, no matter how high performance that your wifi might be, wireless protocols introduce latency. To provide a better connection, I suggest considering a wired Internet connection for your Fire TV 4k stick.

I recommend the "Cable Matters" Micro USB to Ethernet Adapter for Streaming sticks which sells for \$15 on Amazon. This device has a Micro USB plug that connects to the Fire TV 4K stick and a USB Type A plug that connects to power. The ethernet connector can be connected to a port on your router or switch.

In the Fire TV settings screen, you can then use the "wired" connection as opposed to a wifi connection. My experience is that on very high rate streaming services, the wired connection has eliminated any buffering, provided that the overall connection bandwidth is sufficient.



In the beginning of this tutorial, I indicated that the Fire Stick 4K provides about 5GB of free space for apps and user data. As it turns out, 5GB is not a lot of space and it is easy to max out the storage.

Since the Fire Stick 4k is basically an Android device, it is possible to add external storage. You can add a USB flash drive to your Fire 4k stick. I used a 64GB flash drive which cost about \$15.

The problem comes in connecting your flash drive and your new ethernet adapter and your power to the Fire TV 4k at the same time. To do this, I recommend the "Tusita Micro USB Hub Adapter with power" on Amazon for \$9.90.

This device is pictured at right. Be sure that you turn off the OTG switch on the side of this device. The reason is that our Ethernet adapter has OTG support built in.

Use the male micro-USB to plug into the Fire Stick 4k. The female micro USB plug on the device should go to a cable that connects your Fire TV 4k power supply.

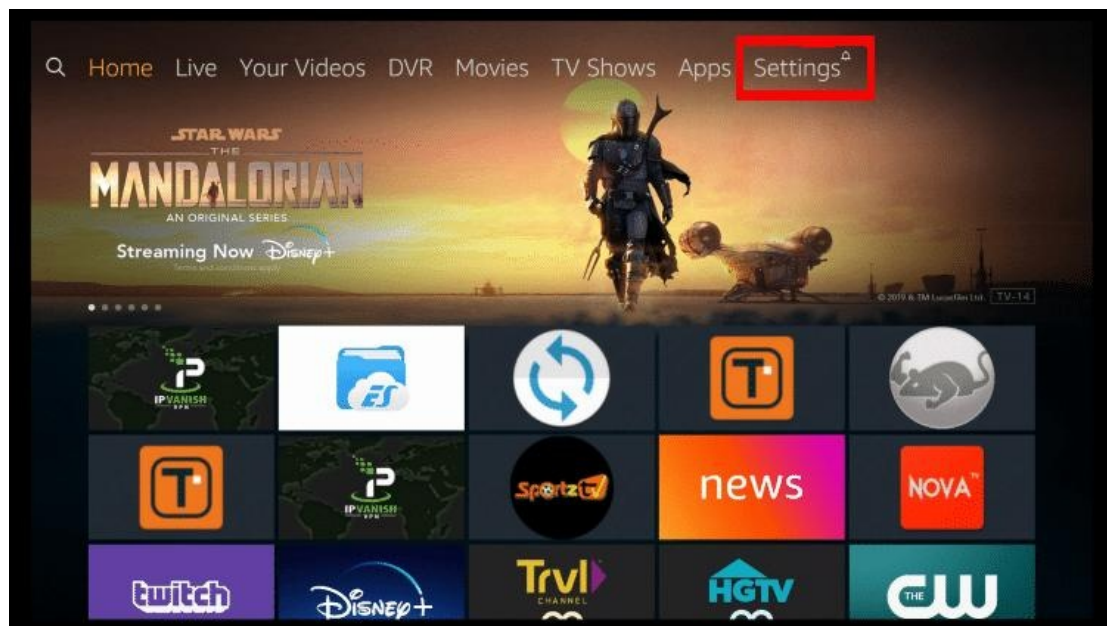


You also need to purchase the SIENOC USB male to Micro USB female convertor adapter on Amazon for \$5.50. You will plug one of these into one of the remaining three female ports on the Tusita adapter and then insert the micro usb plug from the ethernet

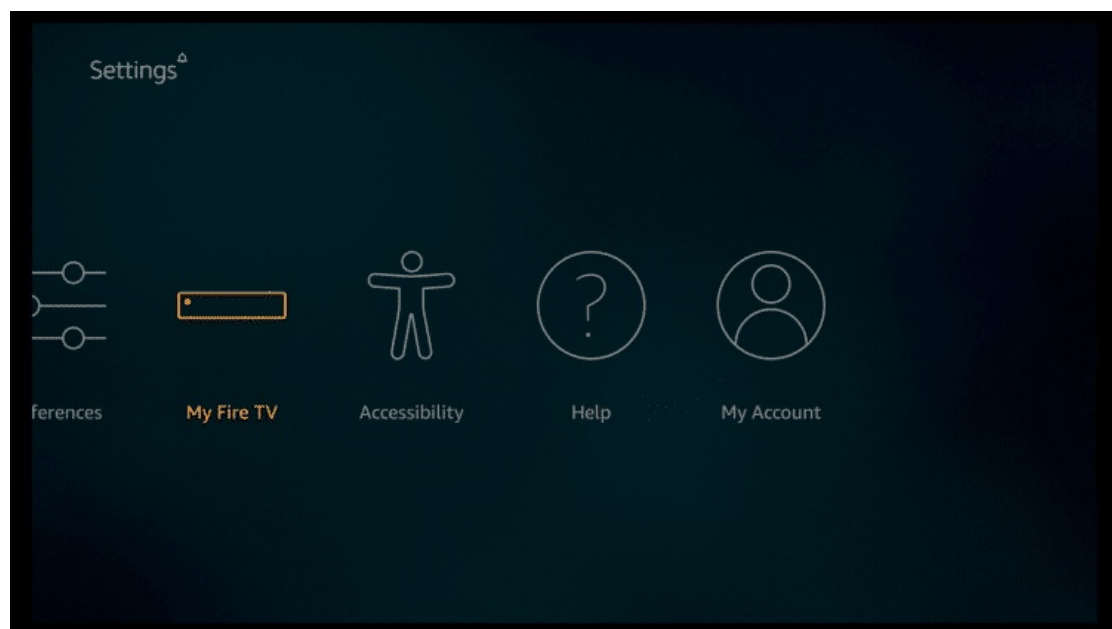


adapter into that plug and the USB A plug on the ethernet adapter plugs in NOWHERE. The USB thumb drive plugs into one of the remaining two USB ports.

Here is how to make use of the new USB flash drive to expand internal storage on the Fire Stick

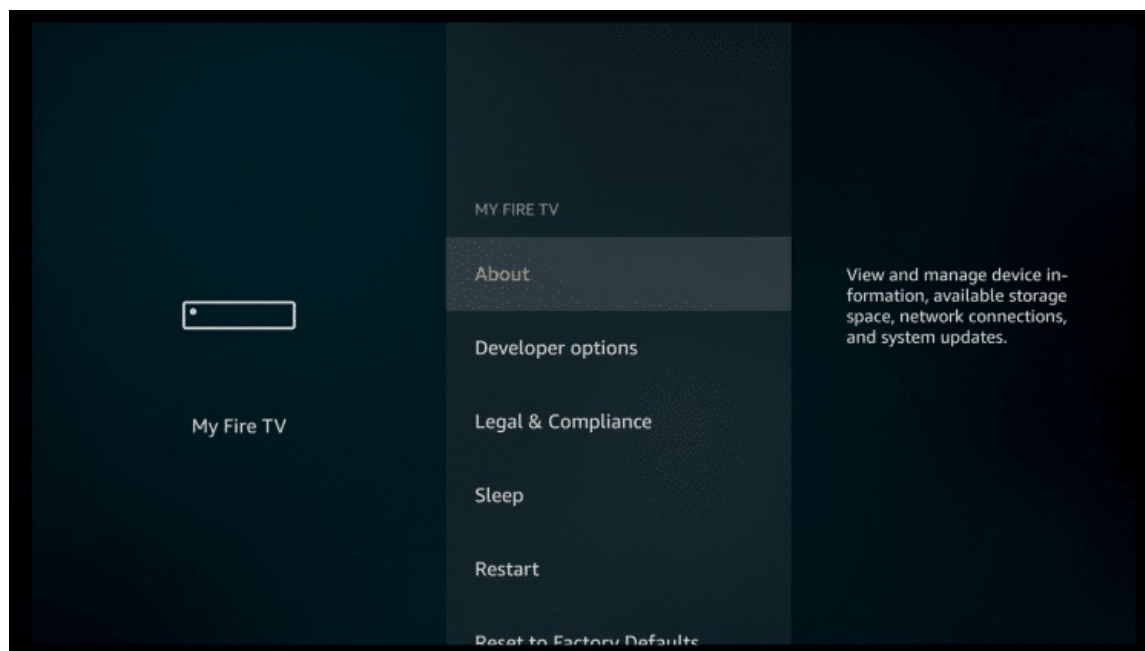


4k.

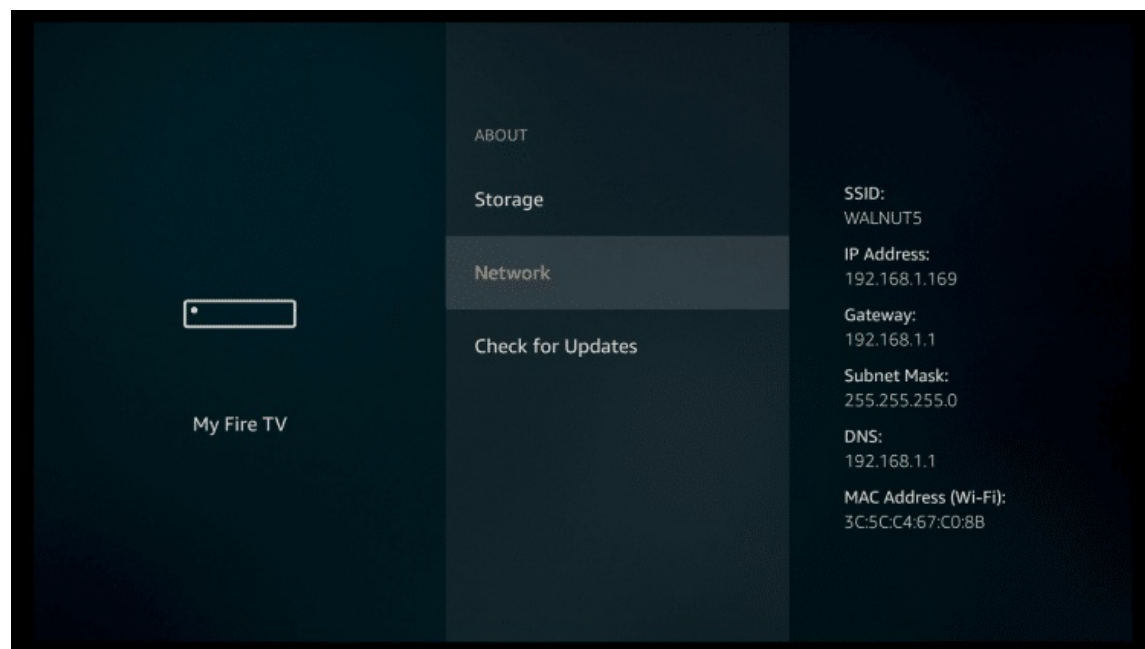


1. Click Settings.
2. Click My Fire TV.

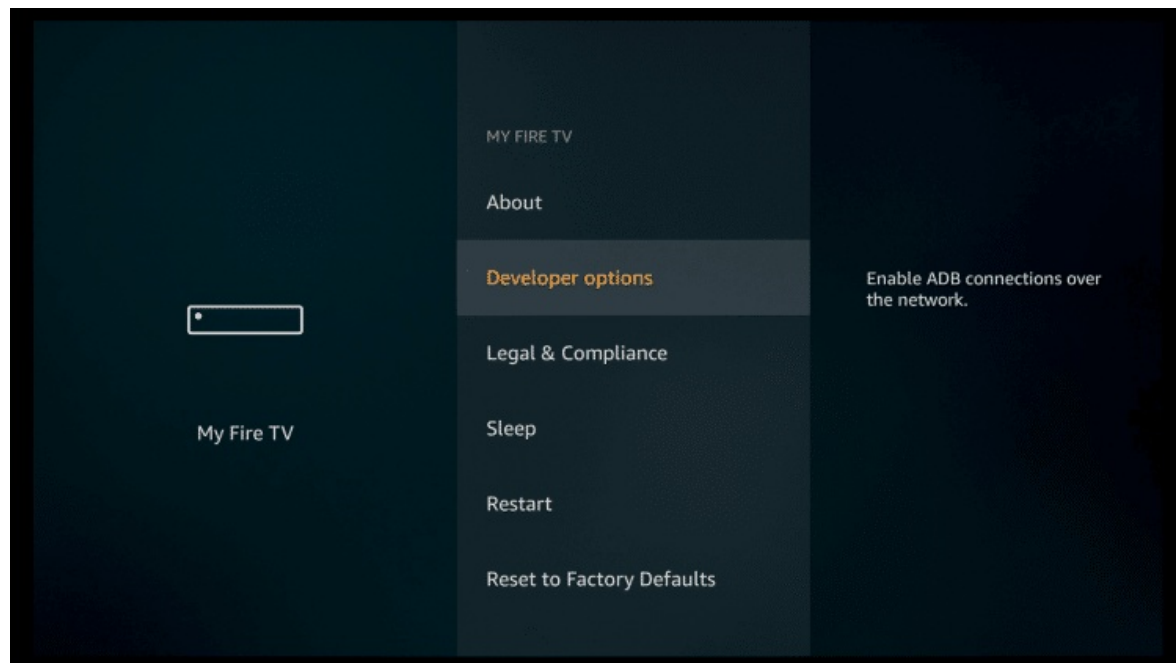
3. Click About.



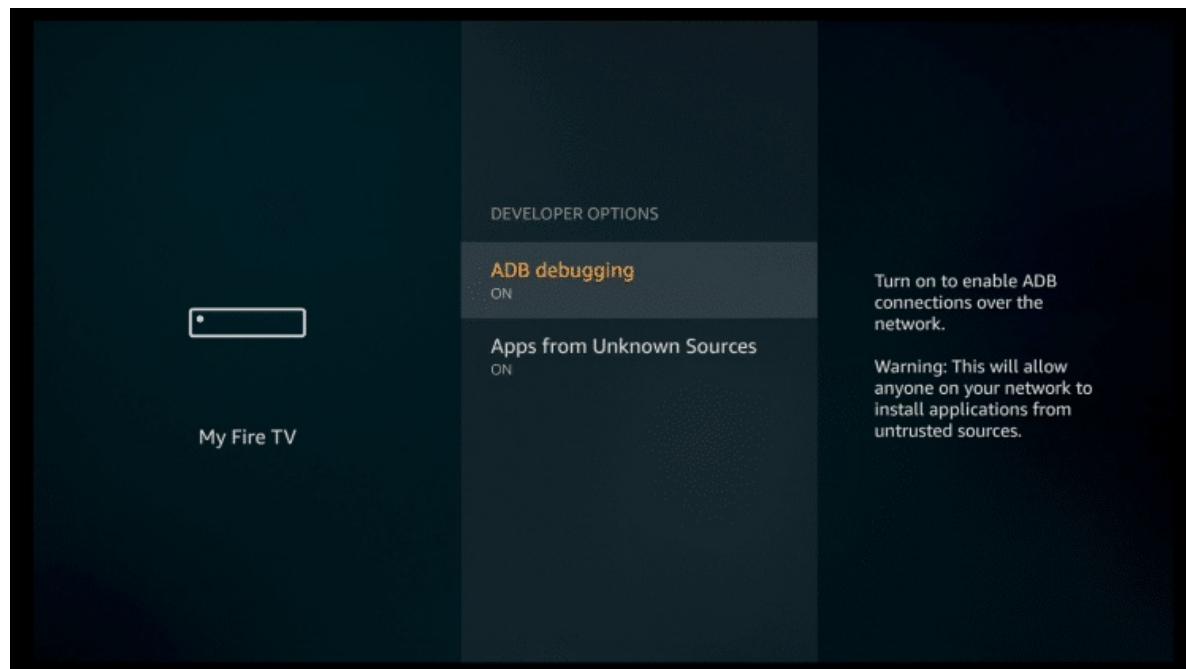
4. Click on "Network" and write down your IP Address.



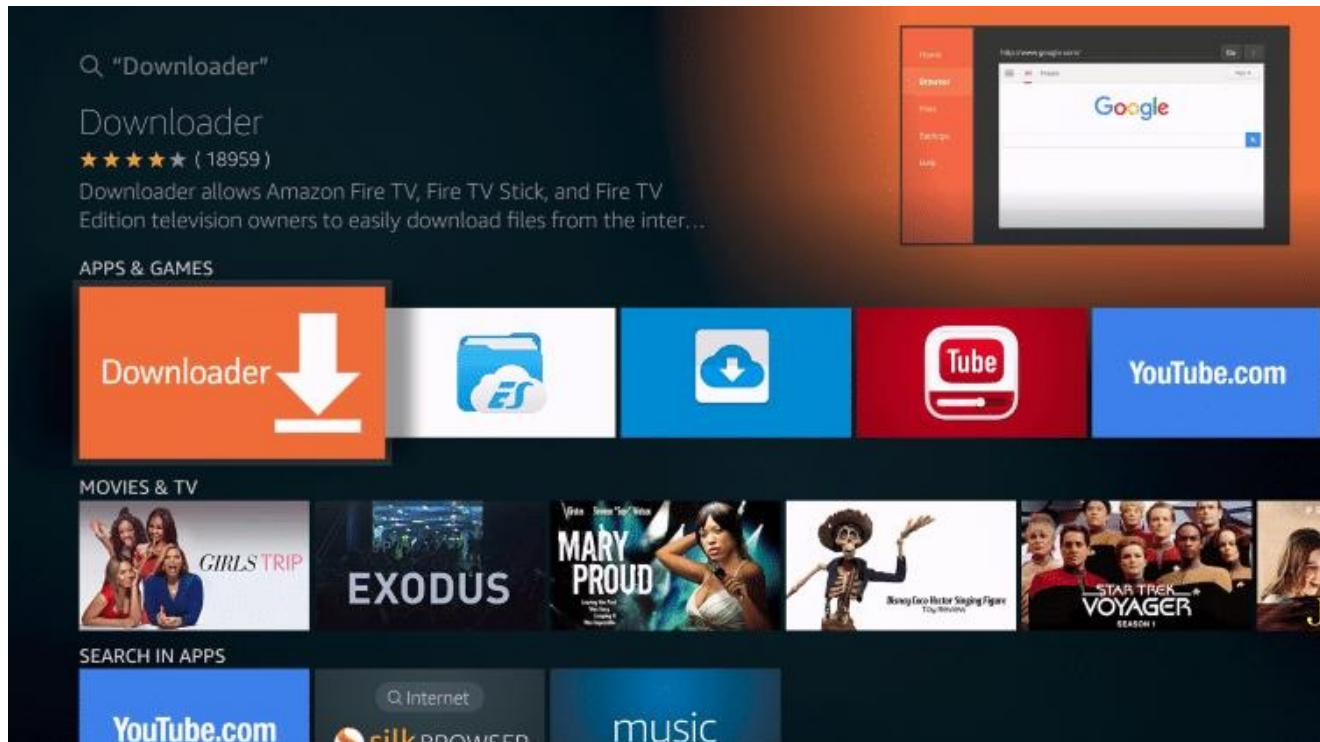
5. Click the Back button on your remote and then click Developer Options on the My Fire TV menu.



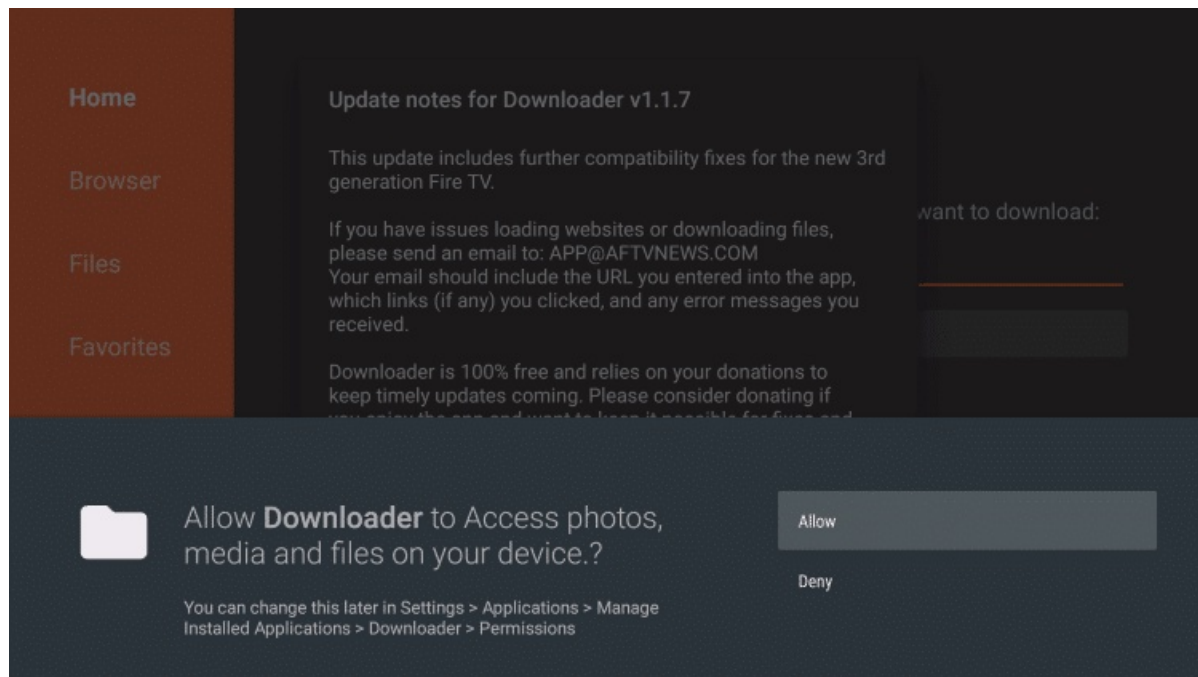
6. Turn on ADB debugging and Apps from Unknown Sources.



7. Return to the home screen and go to the Search icon and search for and download "Downloader".



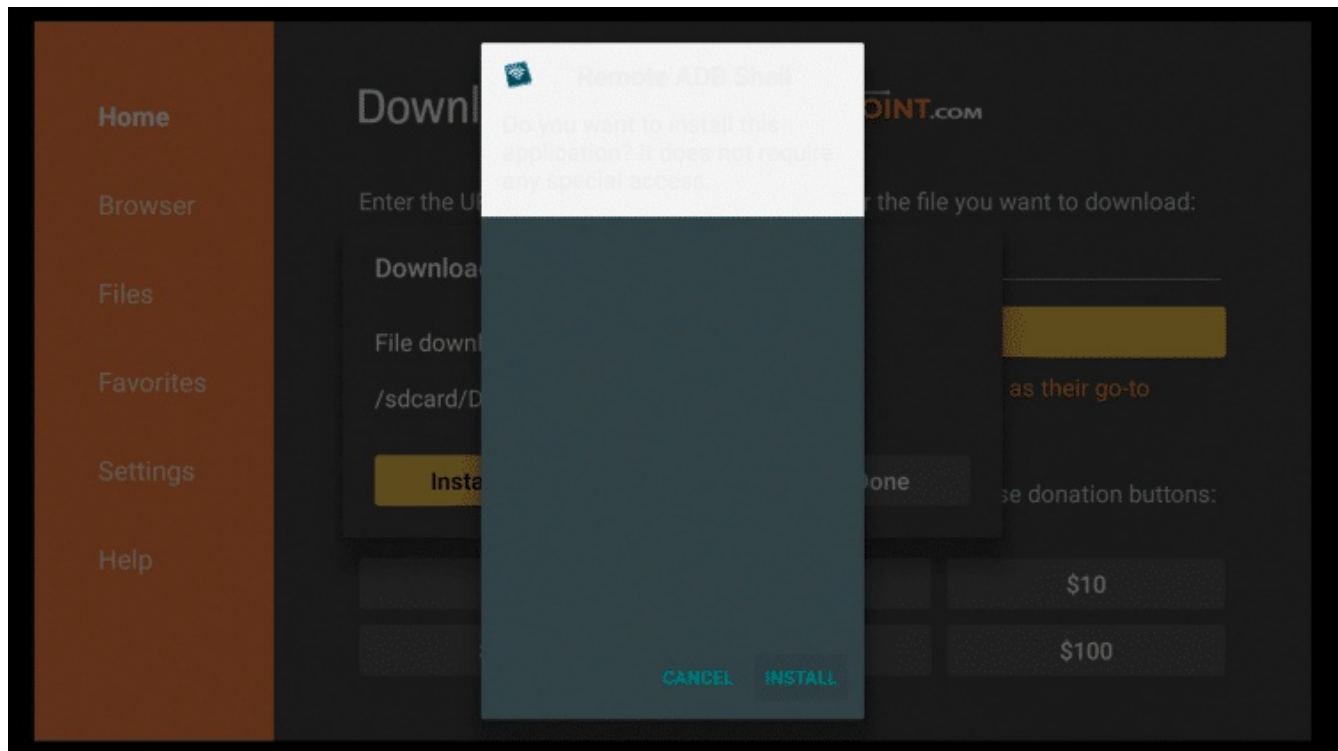
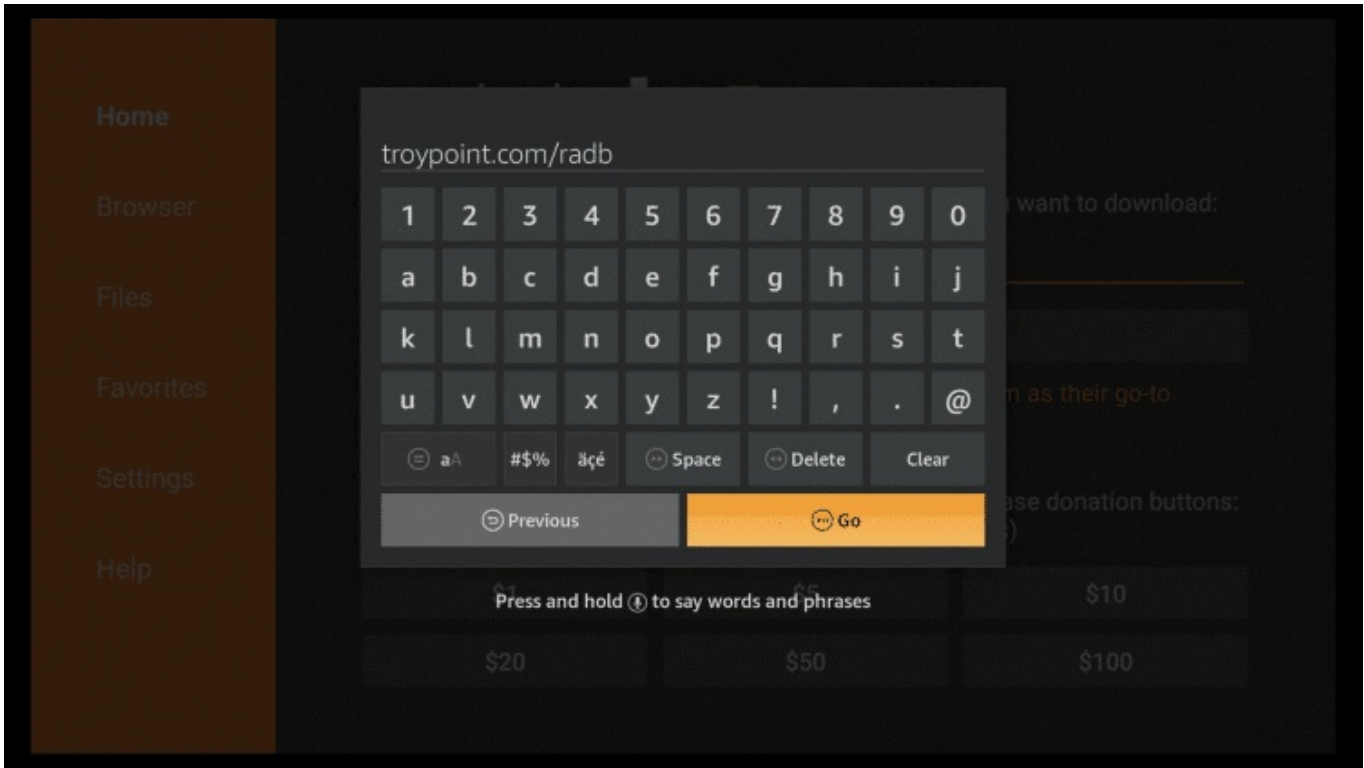
8. Open the Downloader app and click "allow".



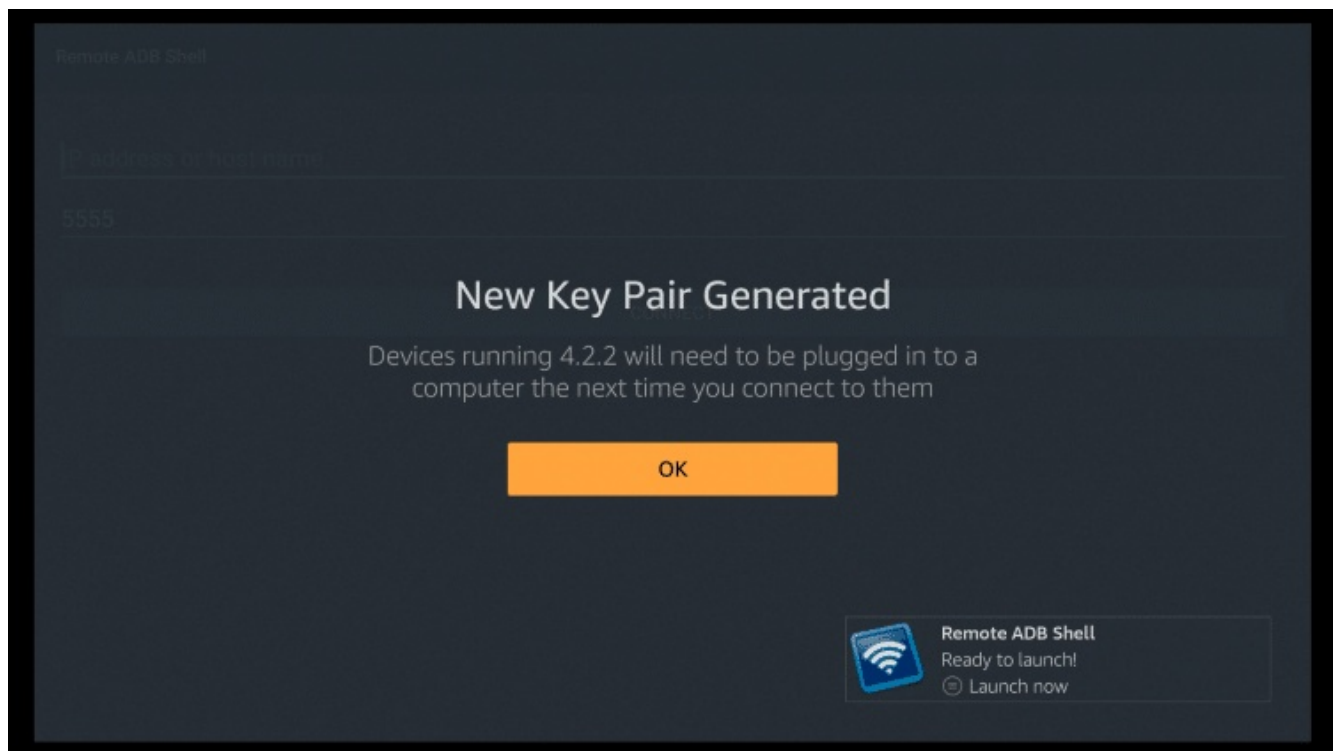
9. In the "Downloader" app, type the following address into the address box:

`troypoint.com/radb`

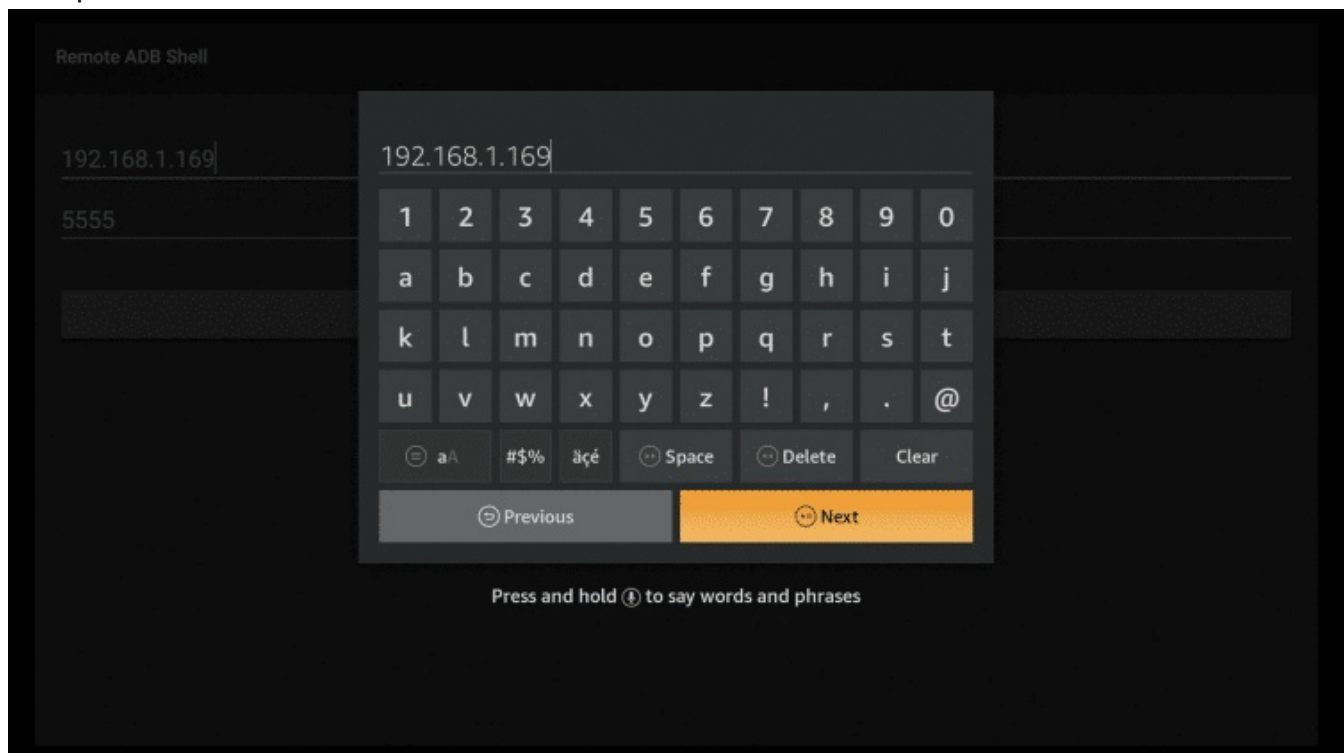
This will install the Remote ADB Shell Application.



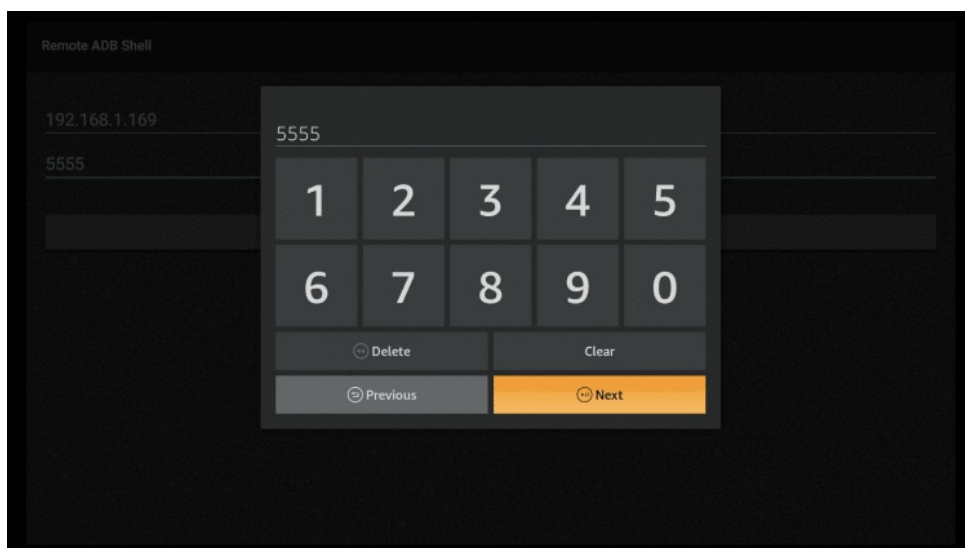
10. Run the ADB Remote app.



11. On the main screen of the Remote ADB App type in your IP Address that you wrote down earlier in step 4.

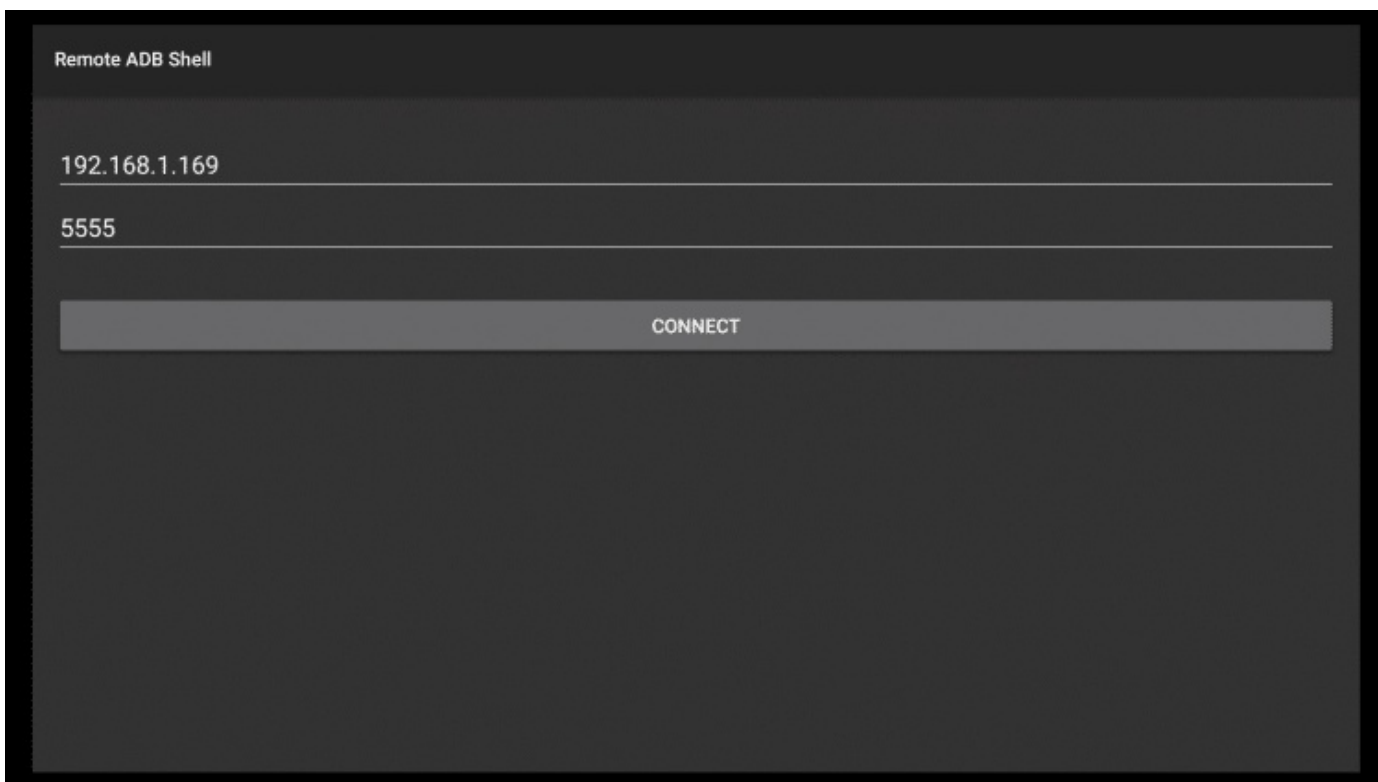


12. Leave 5555 in the box and click Next.



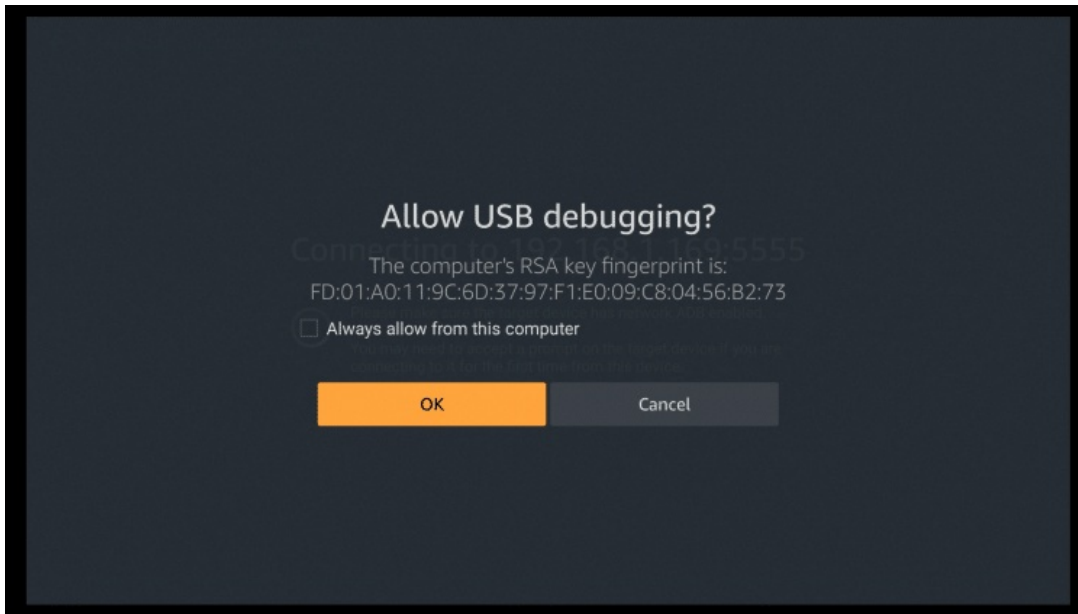
The screenshot shows the 'Remote ADB Shell' interface. It has two input fields: the top one contains '192.168.1.169' and the bottom one contains '5555'. A numeric keypad is overlaid on the right side of the interface. The keypad has buttons for digits 1 through 0, a 'Delete' button, a 'Clear' button, a 'Previous' button, and a 'Next' button. The 'Next' button is highlighted in orange.

13. Click Connect.

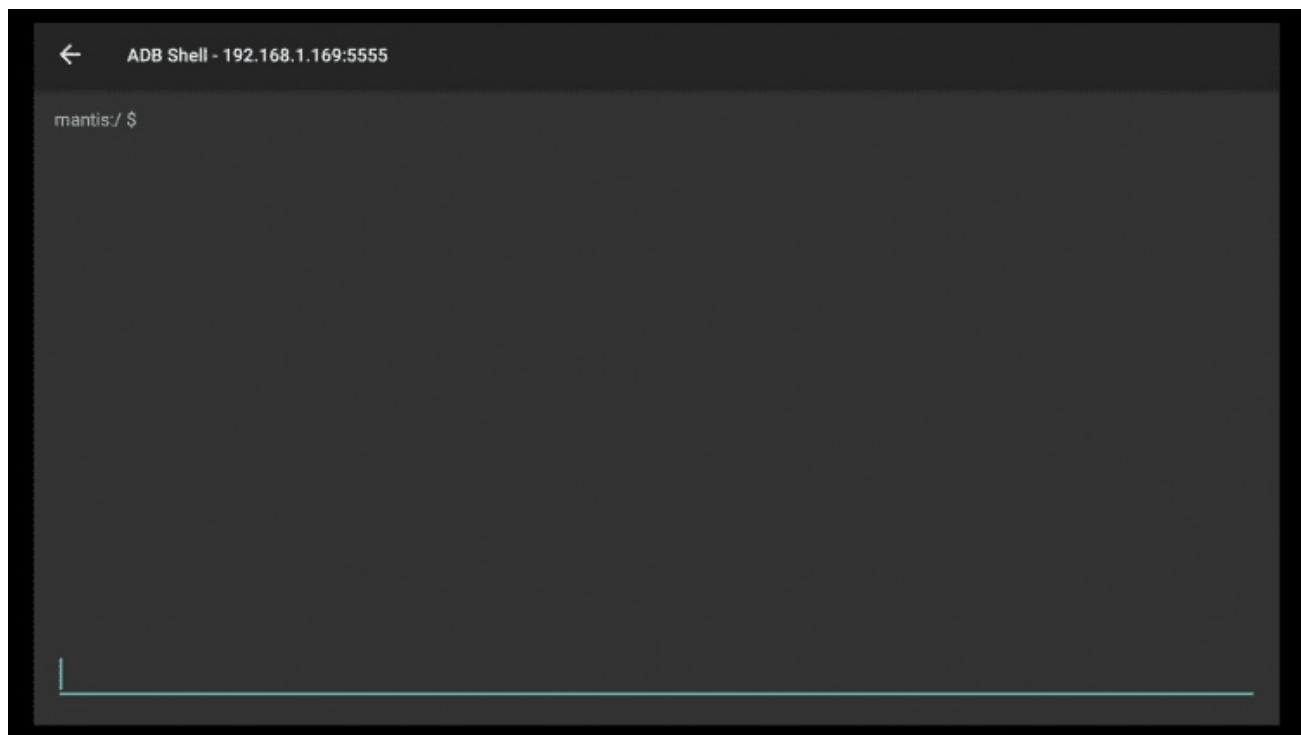


The screenshot shows the 'Remote ADB Shell' interface. The top input field contains '192.168.1.169' and the bottom input field contains '5555'. Below the input fields is a large, light gray button labeled 'CONNECT'.

14. Check the box that reads "Always allow from this computer" and click OK button.



15. You are now presented with the command line within the Remote ADB application. Click the OK button on your remote to open the keyboard.



Type in the command "sm list-disks" and then click "Run". You will see the name of your USB drive, which will probably be 8,0. Make a note of the name.

You now need to decide how you would like to format your USB Flash Drive.

Option #1: sm partition disk:8,0 mixed 50

If your drive name is different than 8,0 you will want to input that instead when running this code.

This option will create 2 equal-sized partitions on your drive. In my situation, I'm using a 64GB Flash Drive and it will be split into 2 partitions with 32GB on each. One partition will be used for running applications (internal storage) and the other may be used for storing various files (external storage).

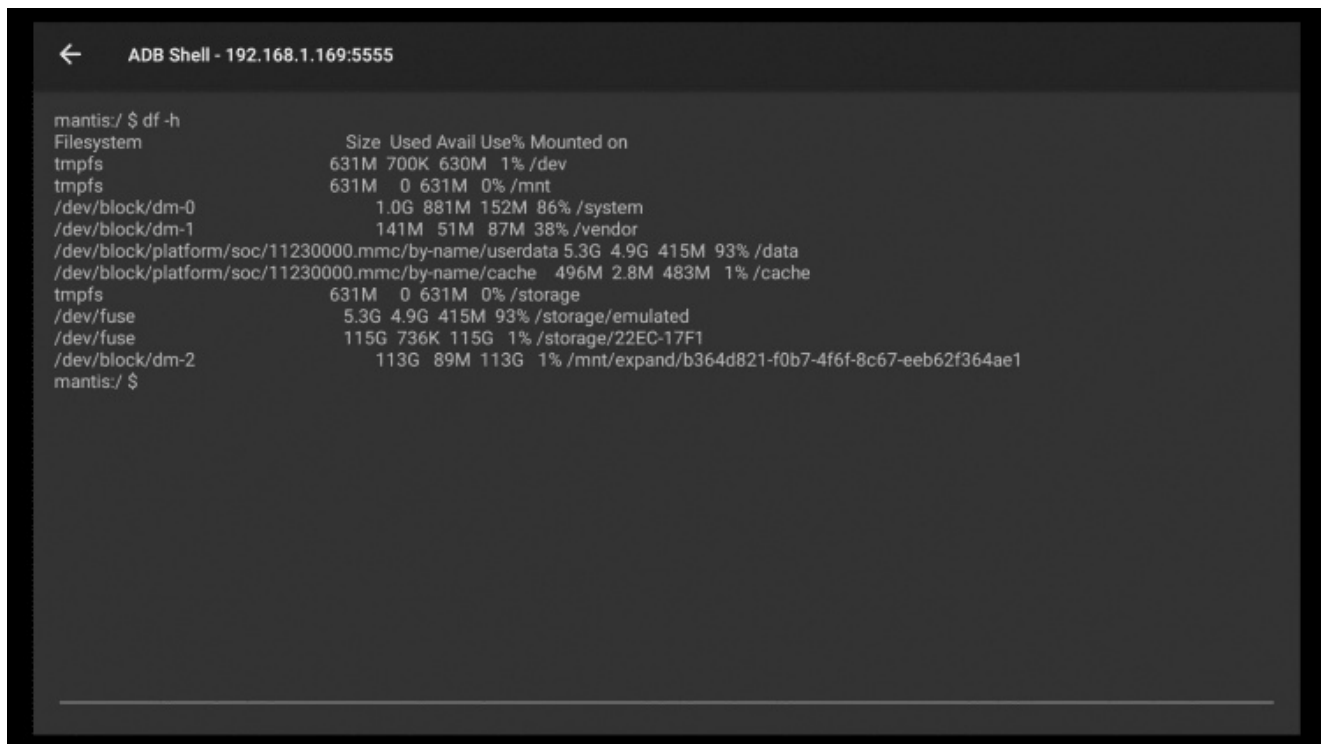
This option allows you to load movies & TV shows from your computer onto the storage partition and then you can play those media files through Kodi or another media player on the Fire TV Stick 4K.

I can also download media through various APKs on the Fire TV Stick 4K and then transfer them to the storage partition through my file explorer for later access. This is a great option when traveling if you don't have Internet access.

Option #2: sm partition disk:8,0 private

This option will format your entire disk as internal storage and you won't have the ability to store or access media files as you would through external storage. This is the option that I chose.

After entering the partition format command, you can type in "df -h" and then click the "run" button and you will see the size of each partition. An example output follows.



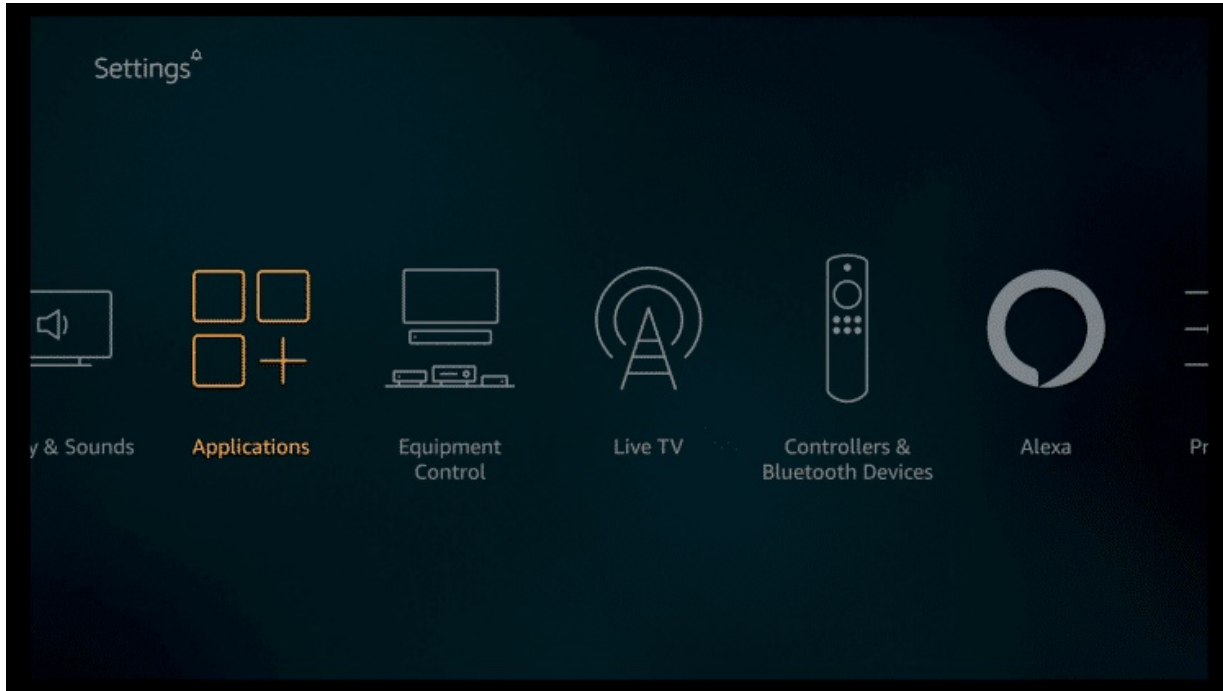
```
ADB Shell - 192.168.1.169:5555
mantis:/ $ df -h
Filesystem      Size  Used Avail Use% Mounted on
tmpfs           631M  700K  630M   1% /dev
tmpfs           631M    0  631M   0% /mnt
/dev/block/dm-0  1.0G  881M  152M  86% /system
/dev/block/dm-1  141M   51M   87M  38% /vendor
/dev/block/platform/soc/11230000.mmc/by-name/userdata 5.3G  4.9G  415M  93% /data
/dev/block/platform/soc/11230000.mmc/by-name/cache    496M  2.8M  483M   1% /cache
tmpfs           631M    0  631M   0% /storage
/dev/fuse       5.3G  4.9G  415M  93% /storage/emulated
/dev/fuse       115G  736K  115G   1% /storage/22EC-17F1
/dev/block/dm-2 113G   89M  113G   1% /mnt/expand/b364d821-f0b7-4f6f-8c67-eeb62f364ae1
mantis:/ $
```

App Installation Location

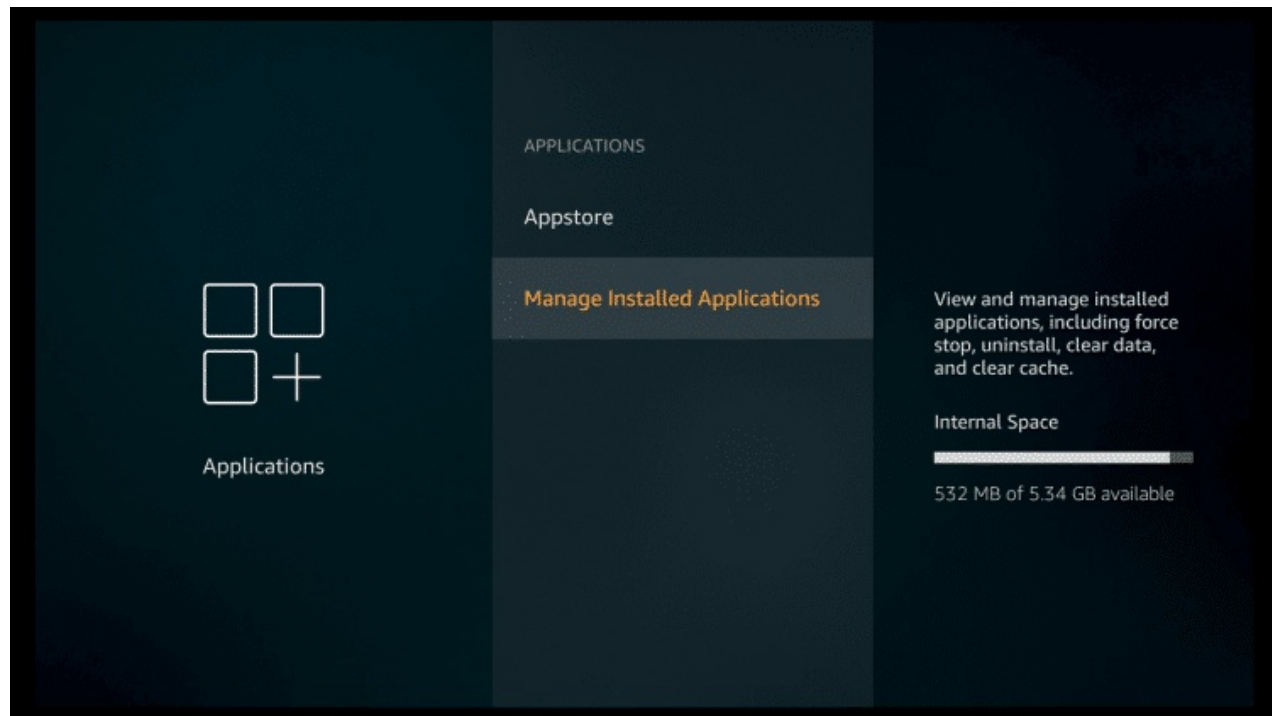
In theory, every application that we install from here on out shall be stored on the dm-2 partition of the USB drive but that's not the case.

After I went through this tutorial, I noticed that many of the apps that I installed through Amazon App store didn't run from the USB drive.

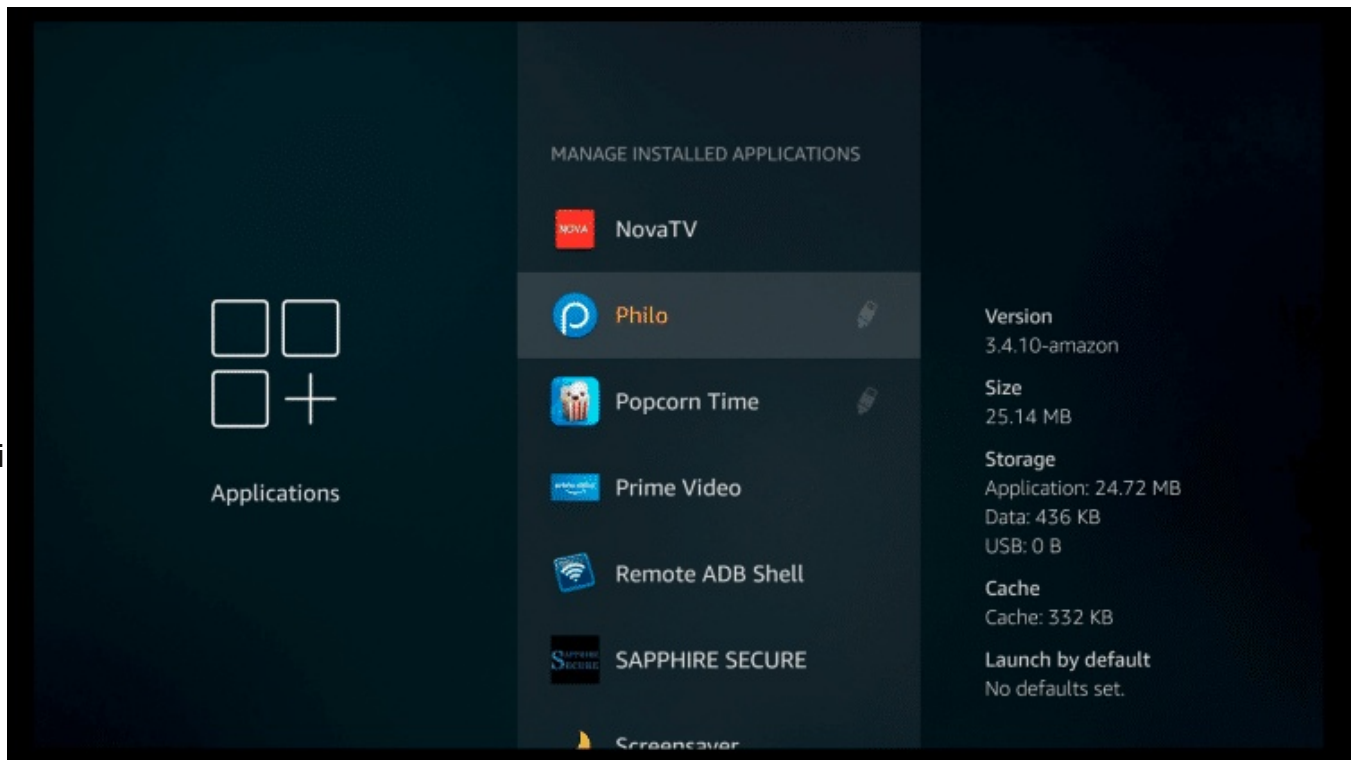
You can quickly determine whether an application is running from the USB drive by going into Fire TV Stick 4K Settings, click Applications.



Click Manage Installed Applications.



You will see a USB icon next to the apps currently running off the USB drive.



If the application author doesn't declare support for running off external storage, it will default to internal storage.

So, if you install an application through the Amazon App Store and it doesn't show as it is running from the USB drive, this means that the app developer didn't declare this in their code.

Two applications that do carry support for external storage are Philo and ES File Explorer. So, if you want to test that your icons are showing properly, try installing one of those apps as a test.

Luckily, we can issue a command through Remote ADB Shell app to move applications over to the USB drive.

How To Transfer Apps from Onboard Storage to USB Drive

The first thing I want to do is write down or take a screenshot of the partition ID where we are moving the application to. We can easily get this by looking at the last command I issued in Remote ADB Shell App which as `df -h`.

If your screen doesn't show this information, just issue the command `df -h` again.

The ID that I will need for this next command that I'm going to issue is `b364d821-f0b7-4f6f-8c67-eeb62f364ae1`. You will see that I am getting this from the `/mnt/` partition below. Yours will be different than mine.

```
← ADB Shell - 192.168.1.169:5555

mantis:/ $ df -h
Filesystem                Size      Used Avail Use% Mounted on
tmpfs                    631M    700K  630M   1% /dev
tmpfs                    631M         0  631M   0% /mnt
/dev/block/dm-0           1.0G    881M  152M  86% /system
/dev/block/dm-1           141M     51M   87M  38% /vendor
/dev/block/platform/soc/11230000.mmc/by-name/userdata 5.3G    4.9G  415M  93% /data
/dev/block/platform/soc/11230000.mmc/by-name/cache  496M    2.8M  483M   1% /cache
tmpfs                    631M         0  631M   0% /storage
/dev/fuse                 5.3G    4.9G  415M  93% /storage/emulated
/dev/fuse                 115G   736K  115G   1% /storage/22EC-17F1
/dev/block/dm-2           113G     89M  113G   1% /mnt/expand/b364d821-f0b7-4f6f-8c67-eeb62f364ae1
mantis:/ $
```

The second step you need to complete is determine the Android package name for the app that you want to transfer.

We can list all of the package names installed on the device with the following command.

pm list packages

```
← ADB Shell - 192.168.1.169:5555

package:com.amazon.recess
package:com.amazon.platform.fdrw
package:com.neulion.firetv.ufc.android.amazon
package:com.amazon.ssmsys
package:com.android.providers.calendar
package:com.amazon.tv.lme
package:com.amazon.whisperplay.contracts
package:com.android.providers.media
package:com.amazon.device.rdmapplication
package:com.amazon.venezia
package:com.amazon.dcp.contracts.library
package:com.amazon.ftv.xpicker
package:com.android.wallpapercropper
package:com.amazon.metrics.api
package:com.sapphiresecure.sapphiresecureiptvbox
package:com.amazon.vizzini
package:com.amazon.tv.devicecontrolsettings
package:com.amazon.bueller.notification
package:com.amazon.connectivitycontroller
package:com.amazon.bueller.photos
package:com.ivona.orchestrator
package:com.amazon.device.sync
package:amazon.fireos
package:com.aftvnews.informer
package:com.alexvas.dvr.pro
```

To actually move a package over to the USB partition, the command would look like as follows:

```
pm move-package com.neulion.firetv.ufc.android.amazon b364d821-f0b7-4f6f-8c67-eeb62f364ae1
```

You would substitute the package name you want to move and your partition id. It may take several seconds to see a "success" message if the command completed successfully.

When you go back into the Fire Stick 4k settings/ Applications / Manage Install Applications, you will see a USB icon next to the app that you have moved.

Some of the new applications you install may move to the USB storage if they are designed to take advantage of this storage. If not, you can use the process documented above to move individual apps.

Some apps just will not move, because they are not designed to run from USB storage. I was able to move Netflix, Philo, Plex, NordVPN, Pluto, Sling and others to my USB storage.