

Throughput Testing Single-Board Computer for Wireless LAN Professionals

Setting up Odroid C2 As Test End-Point

Inventory Project Items

Unpack and knoll the following items

- □ Impact Strong 5200 mAh USB Battery
 - And it has a flashlight as well!
- □ USB Micro Power Cable (comes with Battery)
- □ Micro SD Card to eMCC adapter (Blueish green)
- eMCC Memory Card (small with Red label)
- Transcend USB 3.0 SD Card Reader
- Odroid Wi-Fi 4 NIC (Black)
- □ USB 'U-bend' Adaper (Black
- □ Odroid C2 Single Board Computer
- □ #WLPC_EU USB Drive (has the Image)
- Odroid Case Kit (Black)

Later we will have you use as part of the testing (not in your own kit)

- Small Phillips Screwdriver (to assemble your case)
- Short Ethernet Cable (to test your unit when attached to a switch port)
- □ If you are running Windows copy the Win32DiskImager-0.9.5-binary executable as well.

If you are running Windows follow the Windows directions, if Mac OS – move to the Mac OS directions.

Configure Image

Copy Image File from the #WLPC_EU USB drive (in the Odroid for #WLPC_EU folder) to your Desktop... the file name is DietPi_v133_OdroidC2-arm64-(WLAN_PRO)



- Open Image File Boot Drive
- □ Should have a Folder Call "Boot"



□ Find the dietpi.txt

We are changing setting so your Odroid device can join a local SSID and download more files we'll need.

- Under the Wi-Fi Details section change the Wi-Fi SSID to WLPC_EU-01 with a PSK of password.
 #Enter your wifi details below, if applicable (Case Sensitive).
 wifi_SSID=WLPC_EU-01
 wifi_KEY=password
- Under WiFi Hotspot Settings, change this to be Firstname_Lastname and Change wpa_passphrase from change me to 'password' or a password you can remember

(remember PSKs are case-senstive)
>> Wifi Hotspot/AP Settings -----

- Set Wi-Fi Name/SSID
wifi_hotspot_ssid=Firstname_Lastname

- Set Wi-Fi PSK - minimum of 8 characters
wifi_hotspot_key=password

- □ Save the changes in dietpi.txt
- Open the file again to confirm the changes
- □ Eject 'Boot' Image (*REMEMBER TO DO THIS!*)

Move Configured Image to eMMC Card

Dev MicroSD Adapter into Transcend SD/Micro SD USB Adapter



□ Mount eMMC card into MicroSD adapter



□ Place combination into Laptop USB Port

□ You should find a new drive labeled "boot" on your desktop

This is the default image – we will be overwriting this.

• Open Terminal window



 Type in command "diskutil list"
 You are looking for the External Disk with a Linux partition In this case it is /dev/disk2 – write this down

very important always triple check that is the correct device, if you mess up the next step you could risk data loss on your main system

	KeithDarcons 1		
Last login: Sun Oct 9 10:23:42 MacBook:~ Keithearsons% diskuti	on console		
/dev/disk0 (internal): TYPE #: GUID_partition_scheme		SIZE 500.3 GB	IDENTIFIER disk0
1: EFJ 2: Apple_CoreStorage 3: Apple_Boot 4: Microsoft Basic Dat	I EFI e Macintosh HD t Recovery HD a BOOTCAMP	314.6 MB 423.4 GB 650.0 MB 76.0 GB	diskOs1 diskOs2 diskOs3 diskOs4
/dev/disk1 (internal, virtual): #: 0:	E NAME Macintosh HD Logical Volume on dis 87702248-2D20-4E79-9B	SIZE +423.0 GB k0s2 FE-30547870D	IDENTIFIER disk1 4b0
/dev/disk2 (external, physical): #: TYPE 0: FDisk_partition_scheme 1: Windows_FAT_33 2: Linus	s NAME 2 boot 4	SIZE *31.3 GB 134.2 MB 31.1 GB	IDENTIFIER disk2 disk2s1 disk2s2
Type in command "diskuti	l unmountd	lisk /	dev/di
Should receive a successful re	port		

[MacBook:~ KeithParsons\$ diskutil unmountdisk /dev/disk2 Unmount of all volumes on disk2 was successful

In this next step we will copy over the image on the eMMC with the image we want.

The command is "sudo dd if=file.img bs=1m of=/dev/rdisk2" It is easiest to just drag the file to the placeholder file.img following the "if="

Remember to to keep the 'r' in 'rdiskX'

Enter your SUDO password – your machine password [MacBook:~ KeithParsons\$ sudo dd if=/Users/KeithParsons\ 1/Desktop/DietPi_v133_Odro] idC2-arm64-\(WLAN_PRO\).img bs=1m of=/dev/rdisk2 497+0 records in 497+0 records out 521142272 bytes transferred in 11.781195 secs (44235095 bytes/sec)

It will take a bit to do this process... wait for the prompt to return.

- □ To confirm check the 'Boot' disk and it should have your changes.
- □ Now Unmount drive from your laptop (Eject 'boot)
- □ Remove the USB Adapter
- Remove the eMCC card and place it in the bottom of the Odroid device. (It should only go one way)



Now jump to the Prepare Odroid C2 Section

Instructions to create image on SD card and customize dietpi.txt file on a machine running Windows OS:

Configure Image

- Copy Image File from the #WLPC_EU USB drive (in the Odroid for #WLPC_EU folder) to your Desktop... the file name is DietPi_v133_OdroidC2-arm64-(WLAN_PRO)
- □ Install disk burning software by running the Win32DiskImager-0.9.5-install.exe file provided with your USB drive. Follow all installation defaults.
- Once installed, run Win32DiskImager from your start menu. Click on the Image File icon to select the image to burn.

👒 Win32 Disk Im	ager		_	
Image File				Device
			R	[D:\] 🔻
Copy MD5 Has	h:			(
Version: 0.9.5	Cancel	Read	Write	Exit

Locate the WLPC_EU Image folder in the USB provided and select the file image named

DietPi_v133_OdroidC2-arm64-(WLAN_PRO).img and click **Open**:

Select a disk image								\times
\leftarrow \rightarrow \checkmark \uparrow	« W	LP	DietPi_v133_OdroidC2-arm64-(WL v	ē	Search DietPi_v	33_0dro	oidC2	P
Organize 💌 Ne	ew fold	ler						?
🕹 Quick access	^	N	ame	Dat	e modified	Туре		
Desktop	,		DietPi_v133_OdroidC2-arm64-(WLAN_PRO).img	10/	9/2016 12:16 PM	Disc In	nage File	2
Documents	*							
👆 Downloads	*							
Pictures	* .	<						>
	File <u>r</u>	<u>n</u> ame:	DietPi_v133_OdroidC2-arm64-(WLAN_PRO).img	~	Disk Images (*. <u>O</u> pen	img *.IM	G) Cancel	×

□ Insert the USB adapter with the SD memory card into your computer and verify that your drive is listed under the Device area. If the drive listed is not correct, select the drop down list and select the right drive unit. In this example we are selecting drive D:\



 Click on Write and confirm overwrite of your eMMC memory card by clicking Yes:

👒 Win32 Disk Im	ager					
Image File				Device		
AN_PRO).img/DietPi_	v133_OdroidC2	-arm64-(WLAN_	PRO).img 📔	[D:\] 🔹		
Copy MD5 Has	h:					
Version: 0.9.5	Cancel	Read	Write	Exit		
Nonfirm	overwrite			×		
A V	an corrupt the tinue?	device.				
Yes No						

You will see a progress bar and upon completion you should see a Write Successful window, press OK to finish burning process.



□ In your Windows Explorer select the eMMC Memory Card where the image was burnt to and open the file *dietpi.txt* and from

🛲 🛃 📙 🖛 boot (D:)				
File Home Share View				
\leftarrow \rightarrow \checkmark \uparrow \blacksquare > boot (D:) >				
	Name	Date modified	Туре	Size
📌 Quick access	dietpi	9/11/2016 7:02 PM	File folder	
le OneDrive	💩 boot.ini	10/9/2016 12:11 PM	Configuration sett	3 KB
This BC	CHANGELOG.txt	10/8/2016 8:51 AM	Text Document	109 KB
ins PC	🖲 config.txt	10/8/2016 8:51 AM	Text Document	2 KB
boot (D:)	config-3.14.78+	9/11/2016 11:01 AM	78+ File	109 KB
dietpi	🖉 dietpi.txt	10/9/2016 12:58 PM	Text Document	10 KB
	📄 Image 🦷	9/11/2016 6:53 PM	File	12,629 KB
CDROID (E)	initrd.img-3.14.78+	9/11/2016 6:53 PM	78+ File	4,140 KB
💣 Network	meson64_odroidc2.dtb	9/11/2016 11:51 AM	DTB File	29 KB
	README.md	10/8/2016 8:51 AM	MD File	7 KB
	System.map-3.14.78+	9/11/2016 11:49 AM	78+ File	2,842 KB
	ulnitrd	9/11/2016 6:53 PM	File	4,140 KB
	ulnitrd-3.14.29+	6/1/2016 3:18 PM	29+ File	4,531 KB
	ulnitrd-3.14.65+	9/11/2016 6:53 PM	65+ File	4,141 KB
	ulnitrd-3.14.78+	9/11/2016 6:53 PM	78+ File	4,140 KB
	vmlinuz-3.14.78+	9/11/2016 11:49 AM	78+ File	12,629 KB

Scroll down to the section #Enter your Wifi details below and enter the SSID and Key for the wireless network you will be joining for initial setup. In this example we will use settings as follows:

#Enter your Wifi details below, if applicable (Case Sensitive). Wifi_SSID=**wLPC_EU-01** Wifi_KEY=**password** Scroll down to the section # >> Wifi Hotspot/AP Settings and enter the WiFi hotspot SSID and password. This SSID will be the one assigned to your own personal Odroid and must be easy for you to identify, either your name, last name or something unique in the audience. In this example we will configure as follows:

>> Wifi Hotspot/AP Settings ------

- Set Wi-Fi Name/SSID
wifi_hotspot_ssid=Firstname_Lastname

- Set Wi-Fi PSK - minimum of 8 characters
wifi_hotspot_key=MySecuredPassword

Once you are done editing your deitpi.txt file, make sure you close and save the file.



- □ To confirm check the 'Boot' disk and it should have your changes in place.
- □ Now Unmount drive from your laptop (Eject 'boot)
- □ Remove the USB Adapter
- Remove the eMCC card and place it in the bottom of the Odroid device. (It should only go one way)



Now jump to the Prepare Odroid C2 Unit section

Prepare Odroid C2 Unit

- □ Insert USB 'U-turn' device top-center USB
- □ Insert Odroid Wi-Fi NIC into USB 'U-turn'
- □ Plug USB Micro cable into your Battery
- Plug other end into Micro USB slot on Odroid C2
- □ Make sure the battery is on by pressing the On Button
- □ WAIT Patiently This next step may take up to 10-15 minutes



- □ When completed after waiting 10-15 minutes...
- Dever-cycle your Odroid.
- □ You should see your Firstname_Lastname SSID being broadcast.



Associate to your new SSID (the one being transmitted by your own Odroid device) with the PSK you assigned. (we recommending 'password' at this point to make it easy)

Status: Connected	Turn Wi-Fi Off						
Wi-Fi is connected to Keith_Parsons and has							
the IP address 192.168.42	2.63.						

- Open a browser and go to http://192.168.42.1 the default gateway for your SSID
- Log in as admin/admin

← → C 隆 https://192.168.42.1:8443	
FruityWiFi	
	Login
	user: admin
	pass: •••••
	login

□ The FruityWiFi status screen should show up. *Note: there is no IP address for the Ethernet port. Since you haven't yet attached your Odroid to a wired network.*

FruityWiFi	status	status-ws	config	modules	logs	logout	v2.4
Services			Interfaces	/IP			
Wireless en Modules	abled s	top	eth0: wlan0: 192 public: re	.168.42.1 veal ip			
No modules have been Install them from the	n installed he Availabl	e Modules	Stations	a.1b.15 (on t	vlan()		
1150.			DHCP	a.ib.ib (0ii (viano)		
			192.168.42	.63 a8:66:7f	:1a:1b:15	MacBook	

- At this point, use your Terminal Client of choice, Hyperterm, puTTY, etc. and SSH to your Odroid device's IP Address. (puTTY is on your WLPC_EU USB drive under "Other Wi-Fi Tools")
- Hostname Root@192.168.42.1 Password "dietpi"

• •	
v134	oDroid C2 (aarch64)
IP Address	192.168.200.27
Created by : Web : Twitter : Donate : Device image DietPi's web	Daniel Knight http://DietPi.com http://twitter.com/dietpi_ http://goo.gl/pzISt9 possible thanks to: Meveric hosting is powered by: MyVirtualServer.com
dietpi-launch dietpi-config dietpi-softwa htop cpu	<pre>her = All the DietPi programs in one place.</pre>
root@wLAN_PRO:	~# _

□ Try the command **ifconfig** to see the current status of your device interfaces.

Now we are going to have you go over to the tables with the Switches and Ethernet cables.

- □ Un-plug the battery from your Odroid device
- Plug in one of the Ethernet cables connected to a Switch
- Dever on your Odroid device by plugging back in the USB Power cable
- Return to your laptop and re-connect to your SSID (with your Firstname_Lastname) you should now return to the browser (the FruityWiFi should be on 192.168.42.1) and refresh the screen to see the IP Address of the switchport you are connected to.



□ Some other commands you might want to try with the SSH terminal Interface:

• •	🏫 Keith	Parsons 1 — r	oot@WLAN_PRO:	~ — ssh root@192.168.200.2	7 — 81×21
v134	oDroi	d C2 (aaro	:h64)		
IP Addr	ess 192.1	68.200.27			
Created Web Twitter Donate	by : Danie : http: : http: : http: : http:	l Knight //DietPi.c //twitter //goo.gl/p	com .com/dietpi_ pzISt9		
Device DietPi'	image possi s web hosti	ble thanks ng is powe	s to: Meveri ered by: MyV	c irtualServer.com	
dietpi- dietpi- dietpi- htop cpu	launcher = config = software = = =	All the D Feature of Select of Resource Shows CPU	DietPi progr rich configu Dtimized sof monitor. J informatio	ams in one place. ration tool for your tware for installation n and stats.	device. on.
root@wLA	N_PRO:~#				
• • •	∱ Keith	Parsons 1 — root@	WLAN_PRO: ~ — ssh	root@192.168.200.27 — 81×21	
	Ethernet Wifi IPv6 Internet Proxy	→ DietPi - : Availa : Availa : Enable : Please : Disabl	Network Option ble Enabled ble Enabled d run Internet ed	s: Adapters Connected Wifi Hotspot Mode Test	
		Ethernet Cha WiFi Cha Test Rur IPv6 Tog Proxy Cor	inge Wired Netwi Inge Wireless Ni In the Internet Igle IPv6 Suppo Ifigure proxy si	ork Settings etwork Settings Connection Test rt ettings	
		<0k>		<back></back>	
• • •	1	KeithParsons	1 — root@WLAN_P	RO: ~ — ssh root@192.168.42.1	— 94×40
Web Twitter Donate	: http://D : http://t : http://g	ietPi.com witter.com Joo.gl/pzIS	/dietpi_ t9		
Device im DietPi's	age possible web hosting	thanks to is powered	: Meveric by: MyVirtua	lServer.com	
dietpi-la dietpi-co dietpi-so htop cpu	uncher = Al nfig = Fe ftware = Se = Re = St	l the Diet ature rich lect optim source mon lows CPU in	Pi programs i configuratio ized software itor. formation and	n one place. n tool for your device for installation. stats.	2.
root@wLAN_ eth0	PRO:~# ifcon Link encap:E inet addr:19 UP BROADCAST RX packets:9 TX packets:9 collisions:C RX bytes:176 Interrupt:40	fig thernet H 2.168.200. MULTICAST 152 errors: 07 errors: 1 txqueuele 890 (172.7	Waddr 00:1e:0 27 Bcast:192 MTU:1500 M 0 dropped:0 c 0 dropped:0 c n:1000 KiB) TX byt	6:33:a9:26 .168.200.255 Mask:255 etric:1 verruns:0 frame:0 verruns:0 carrier:0 es:530704 (518.2 ків)	5.255.255
lo	Link encap:L inet addr:12	ocal Loopb	ack		
	UP LOOPBACK RX packets:4 TX packets:4 collisions:0 RX bytes:347	RUNNING M 02 errors: 02 errors: 0 txqueuele 22 (33.9 K	TU:4096 Metr 0 dropped:0 o 0 dropped:0 o n:0 iB) TX bytes	ic:1 verruns:0 frame:0 verruns:0 carrier:0 :34722 (33.9 ків)	
vlan0	UP LOOPBACK RX packets:4 Tx packets:4 collisions:0 RX bytes:347 Link encap:E inet addr:19 UP BROADCAST RX packets:2 TX packets:2 collisions:0 collisions:2	RUNNING M 102 errors: 02 errors: 1 txqueuele 22 (33.9 K 21 thernet H 12.168.42.1 7 RUNNING M 800 errors 655 errors 1 txqueuele 225 (738.5	Waddr 7c:dd:9 Bcast:192.1 0 dropped:0 c 0 dropped:0 c 0 dropped:0 c 10 TX bytes Waddr 7c:dd:9 Bcast:192.1 ULTICAST MTU 0 dropped:1 :0 dropped:0 n:1000 KiB) TX byt	ic:1 verruns:0 frame:0 verruns:0 carrier:0 :34722 (33.9 KiB) 0:b1:18:c4 68.42.255 Mask:255.25 :1500 Metric:1 overruns:0 frame:0 overruns:0 carrier:0 es:341855 (333.8 KiB)	55.255.0

At this point you now have a working Odroid device and you know it's IP Address in the air, and on the wire.

This image is currently running support for the following services:

- ePerf (for use with Ekahau ESS Throughput Surveys)
- iPerf 2
- iPerf 3
- Kismet
- End-Point for Adrian Granados' WiFi Explorer Pro

This is just a start of the things you can do. FruityWiFi has more modules you can test and play with.

At this point you can assemble the case for your Odroid device. Take apart the pieces you are currently using, mount in the provided plastic case. And Re-assemble.

