

# **IT Technology**

## **Assignment 1 - Raspberry VM, IP and MAC addresses and ARP table.**



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# 1 Introduction

In the next chapters it will be presented this week (36) assignment, documenting how to install Vmware work station (Virtual Machine Work station) and the OS Ubuntu. In the new OS (Operating system) it will be presented also how to install it and set up the internet connection.

## 2 Tasks

1. Draw a network diagram with IP addresses and MAC addresses listed. Please note that as MAC addresses will only be learned later in this assignment, these will have to be added to the drawing when they have been learned.
2. Install a Raspberry Pi Buster Operating system on a Virtual Machine VM in VMWW. Connect it to VMnet8 set to NAT to give the Raspberry Pi Buster VM internet access.
3. Name the VM in VMWW: Raspberry\_Buster\_Base.
4. Install the networking software:
  - o Before installing software on Linux do:
    - update (sudo apt update)
    - upgrade (sudo apt upgrade)

Install networking software from Linux repositories:

- **wireshark** (Ethernet capturing and monitoring GUI software.)
- **tcpdump** (app to capture live TCP/IP packets on a network interface)
- **putty** (Terminal program.)
- **net-tools** arp, hostname, ifconfig, netstat, route).
- **bridge-utils** (Utility to create and manage bridge devices.)
- **iproute2** (ip commands like: ip route)
- **curl** (curl is a command line tool to transfer data to or from a server.)
- **ufw** (Uncomplicated Firewall is a program for managing a netfilter firewall)

Install nmcli Network Manager and uninstall dhcpcd on the the Raspberry\_Buster\_Base.

6. Clone the Raspberry\_Buster\_Base to create PC1 and PC2 and configure PC1 and PC2 with static IPs as shown in the illustration above.
7. Use ping to verify connectivity between network devices PC1 and PC2. Run Wireshark on PC1. Ping PC2 and the router in turn. Use the filter icmp as Wireshark Display filter. Find the source and destination IP addresses in the request packets and find the corresponding source and destination MAC addresses. Find the source and destination IP addresses in the reply packets and find the corresponding source and destination MAC addresses.
8. Compare the IP and MAC addresses found in Wireshark with the IP and MAC addresses found by the command **\$ ip addr**

Note that “inet” means IPV4 in the output from the ip addr command.

9. Draw up manually the ARP table from the findings in the items above. The ARP table maps IP addresses to MAC addresses, i.e. ARP resolves IPs to MAC addresses on a networking device. Here on the Raspberry Pi as a networking device.

10. Use the `ip neigh` Linux command to inspect the ARP table on the Linux box PC1 and then on PC2.  
I.e. use the command:

Comment on the output from these commands compared to the “hand written“ ARP table

```
$ ip neigh  
or the old command:  
$ arp
```

### 3 Audience

The main audience for this report is people without advanced knowledge about installing VM (virtual machines) and another OS (operating system) such as Ubuntu inside the VM. The wide audience can be formed of students, employees or people that have to install another OS on their computer.

### 4 Inventory

In order to proceed to the next step, which is downloading, and installing the VM (virtual machine) the next components and software are required:

Vmware workstation

A laptop

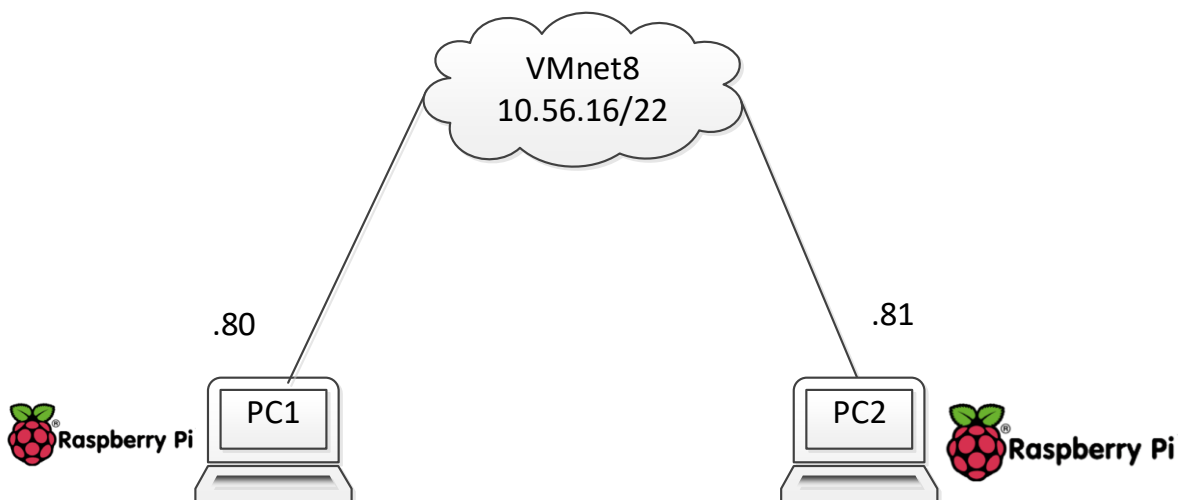
Internet connection

An xubuntu-20.04.3-desktop-amd64.iso

Raspberry Pi Buster Operating system

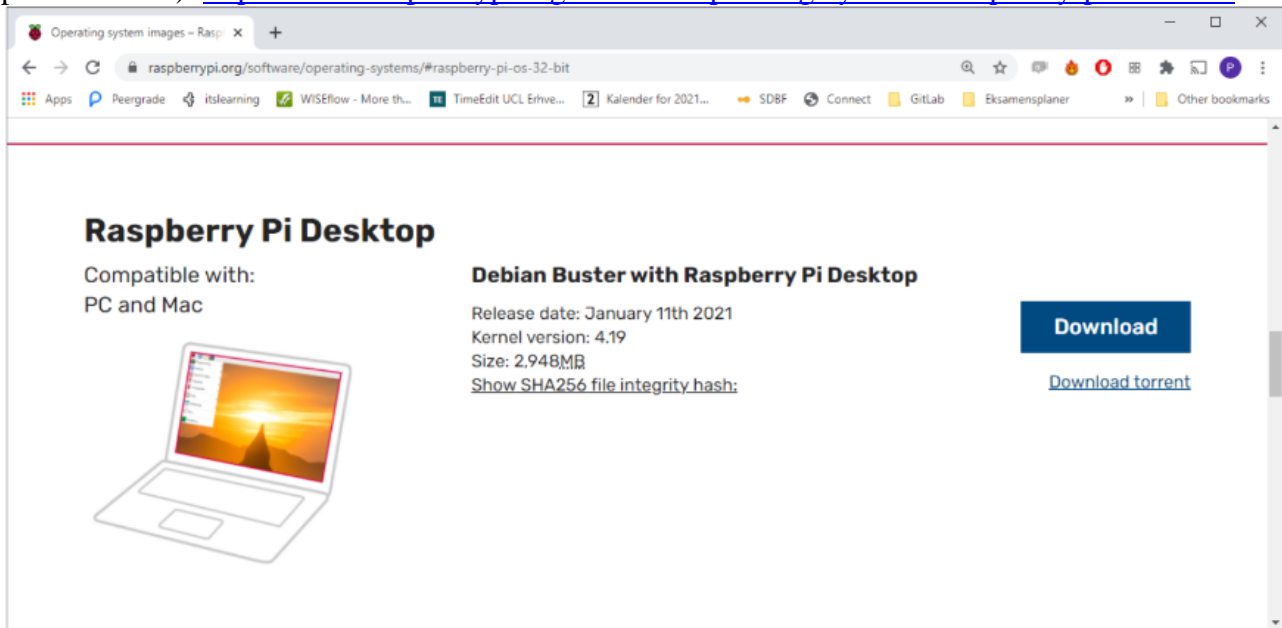
Visio (Microsoft)

### 5 A network diagram with IP addresses on two Raspberrry PI Buster OS

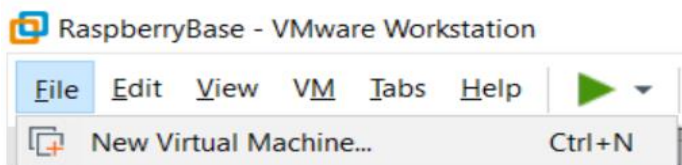


## 6 Installing a Raspberry Pi Buster Operating system on a Virtual Machine VM in VMWW and connecting it to the internet VMnet8.

First we need to download the Raspberry Pi Linux Debian OS from their website (just like in the picture below): <https://www.raspberrypi.org/software/operating-systems/#raspberry-pi-os-32-bit>

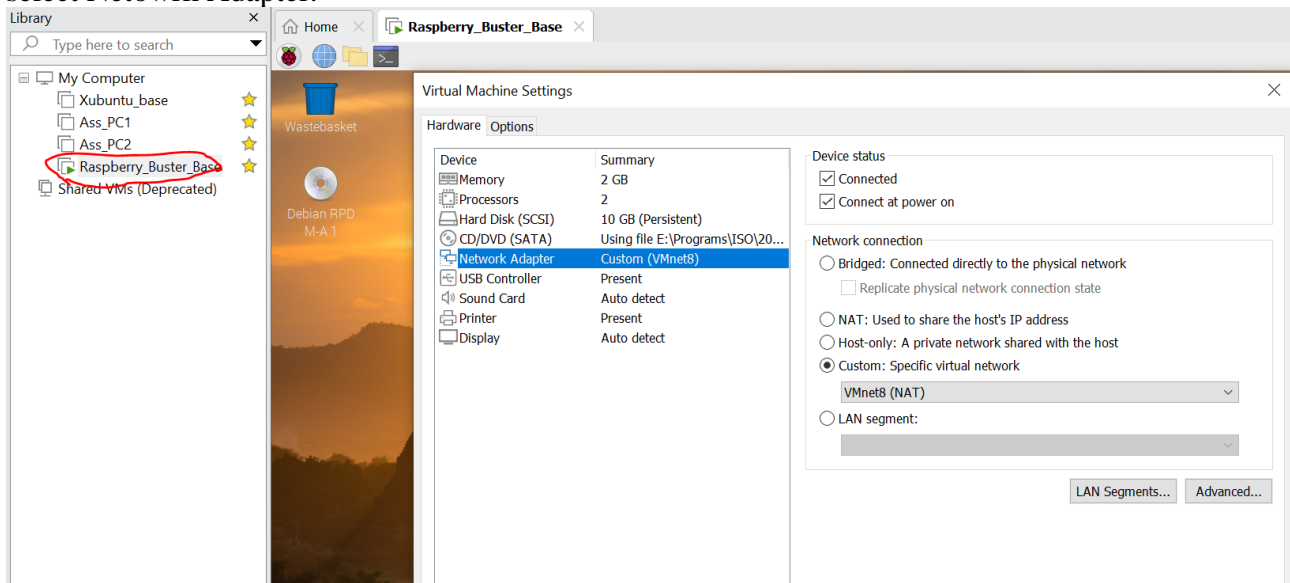


After we have downloaded and saved on our computer the iso image of the Raspberry Pi OS we open the VMware we select it and run it.

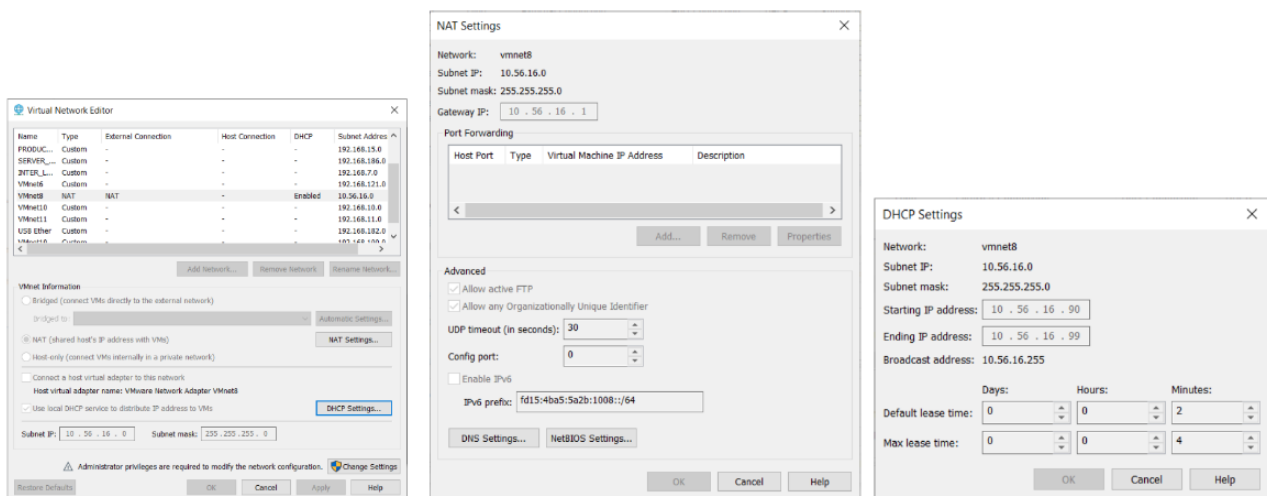


The rest of the instructions are usual, with the file directory, , maximum disk size it is advised for 10 GB.

For setting up the internet we right click on Raspberry\_Buster\_Base and click on Settings and we select Netowrk Adapter.



And we make sure we have the VMnet8 settings just like in the picture below.



## 7 Sources

The sources are from the software and webpages we used to install the VM and the new OS:

[vmware.com/products/workstation-pro](https://www.vmware.com/products/workstation-pro)  
<https://xubuntu.org/download>  
 VM workstation software

## 8 Conclusion