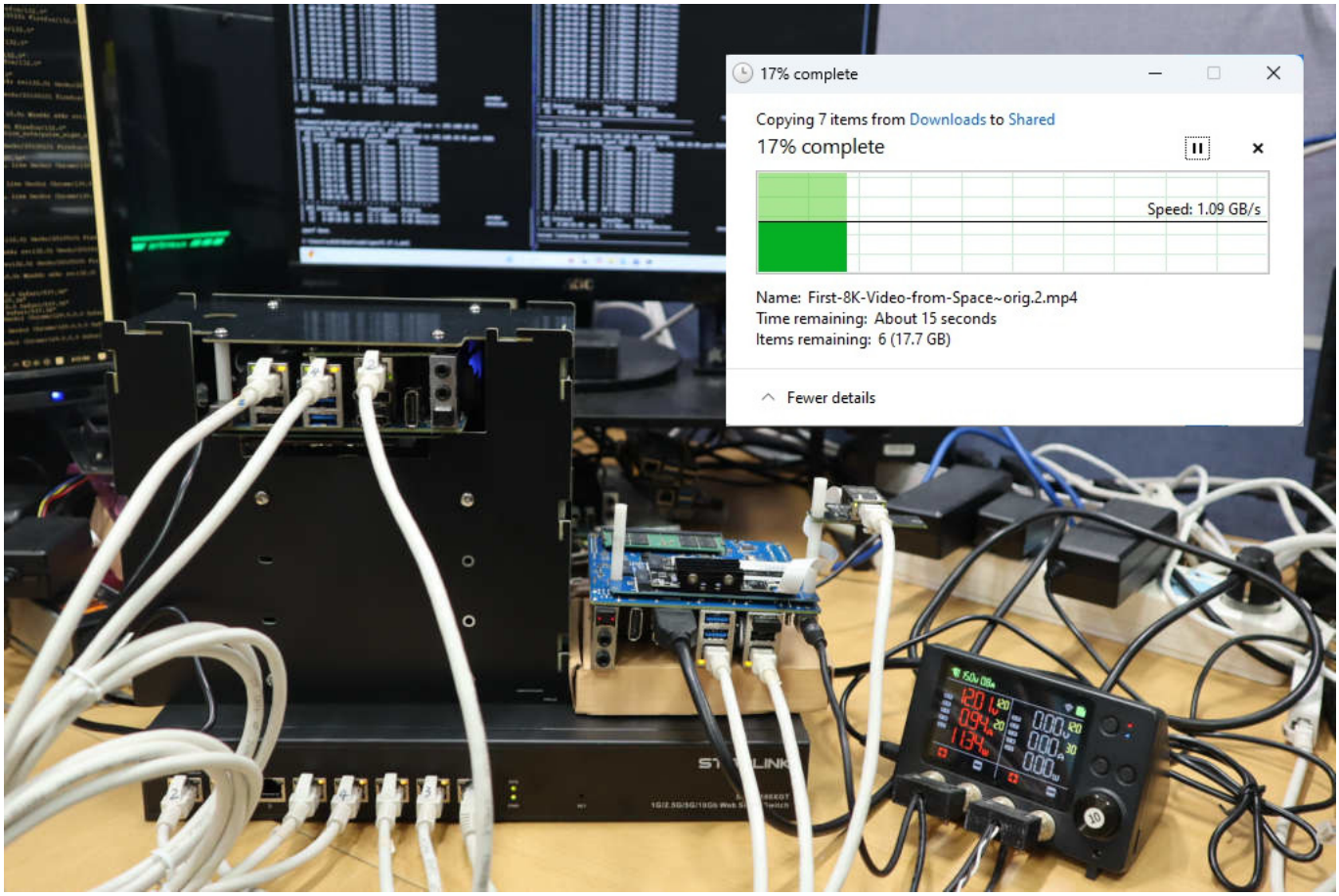
M.2 to 10GbE Adapter on H4

Introduction

Built-in 2.5Gb Ethernet ports in ODROID-H4 Series offers the speed enough in general use.
Nevertheless, If there is about 4 times faster than this in real use case, it would be attracted a lot of attention.
The data transfer speed **1 GByte per second** is not impossible via network on ODROID-H4.
This wiki page will show you how to implement and provement it with 10Gb Ethernet adapter and NVMe SSD storage on the M.2 2×2 Card.



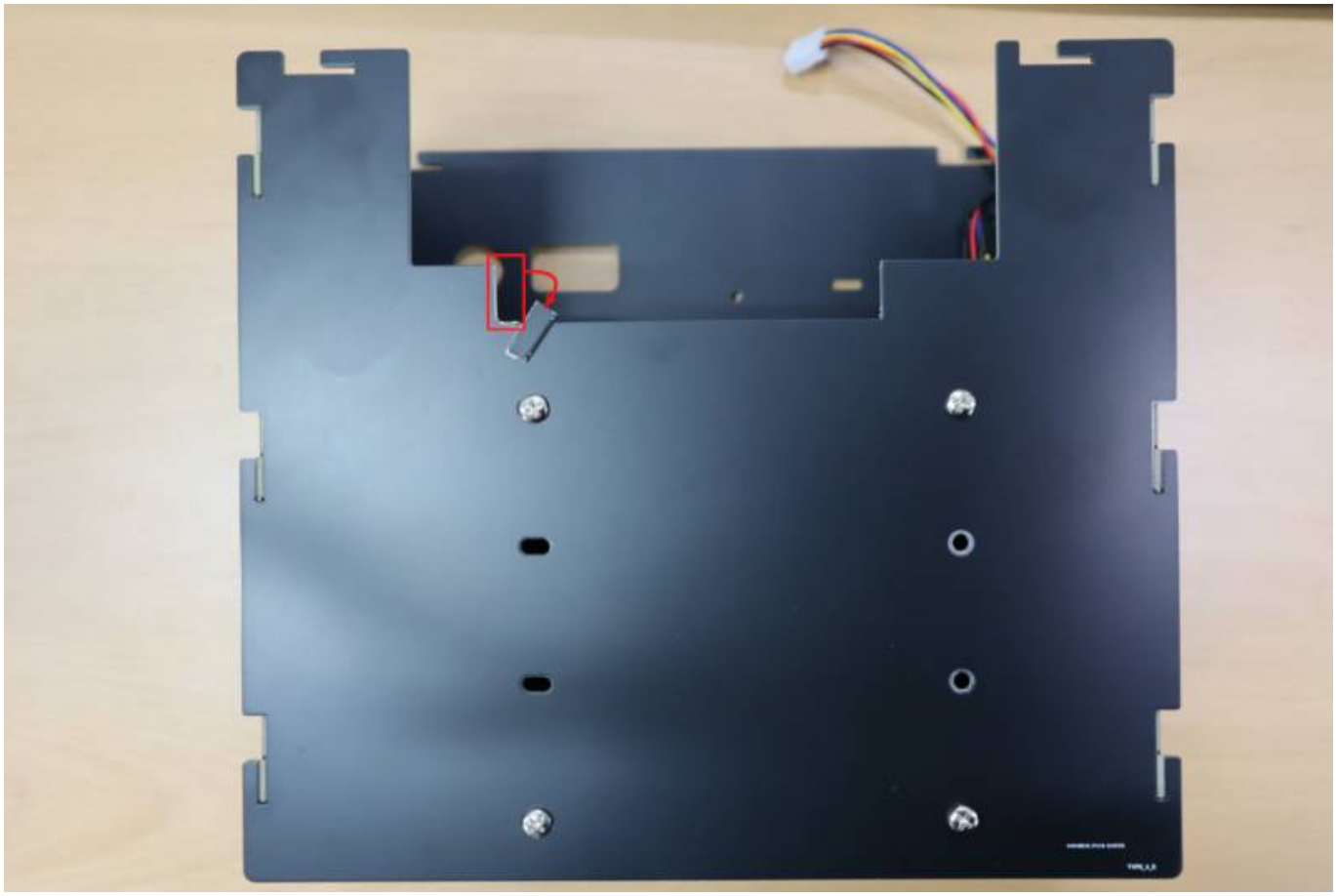
Preparation Material

- ODROID-H4-Ultra : Ubuntu 24.04 Samba Server, ODROIDR-H4-Plus : Windows 11 Samba Client
- M.2 2280 to Single 10GbE adapter attached to the each ODROID-H4
- CAT6 Ethernet Cables
- M.2 2x2 Card : Setting to PCIe GEN3 x4 lanes bifurcated x2 lanes
- 10Gb Multi Gigabit Switch (If a network configuration want to set to 1:1 directly connected, It is not necessary)
- M.2 NVMe SSD storage

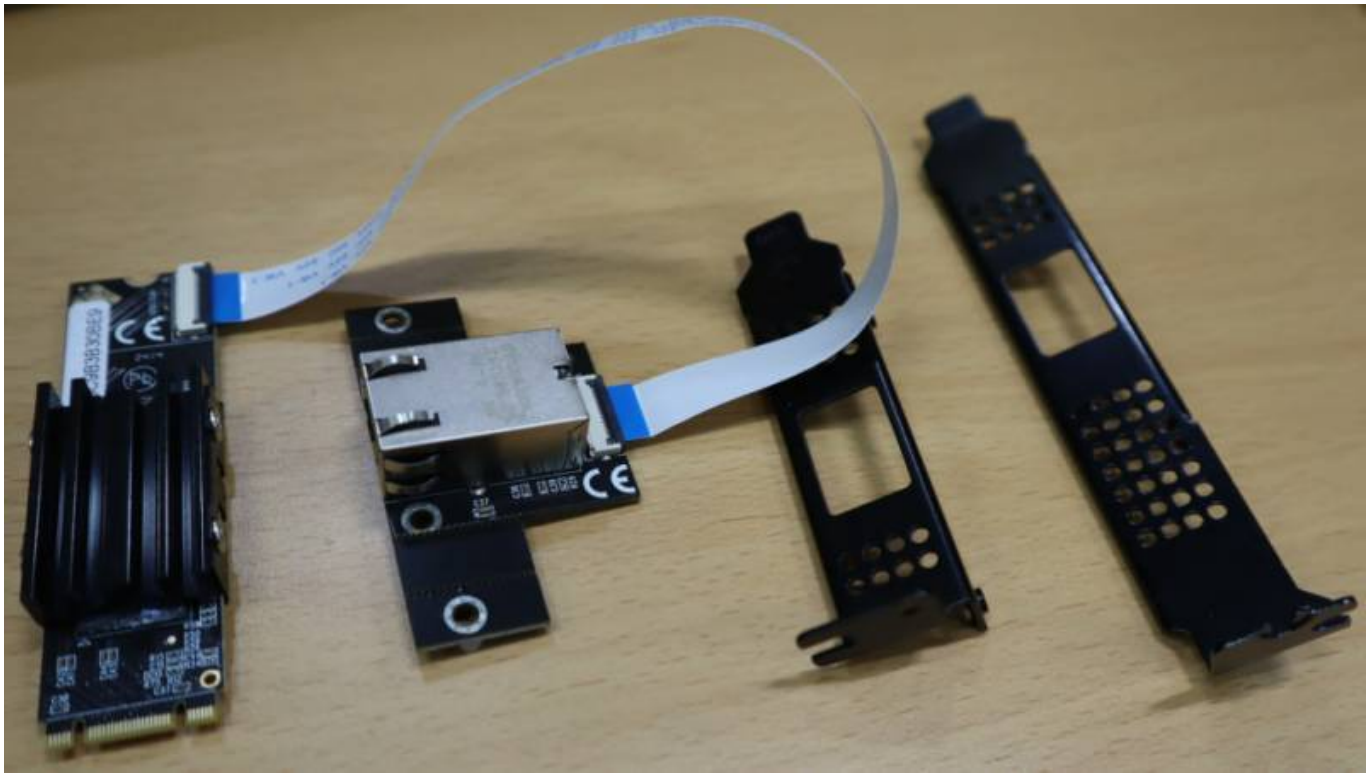
Installation

One of our forum user (Thanks @Xebec) have added similar 5 GbE NIC to the Type 3 case. Go to see.
It helps!!!

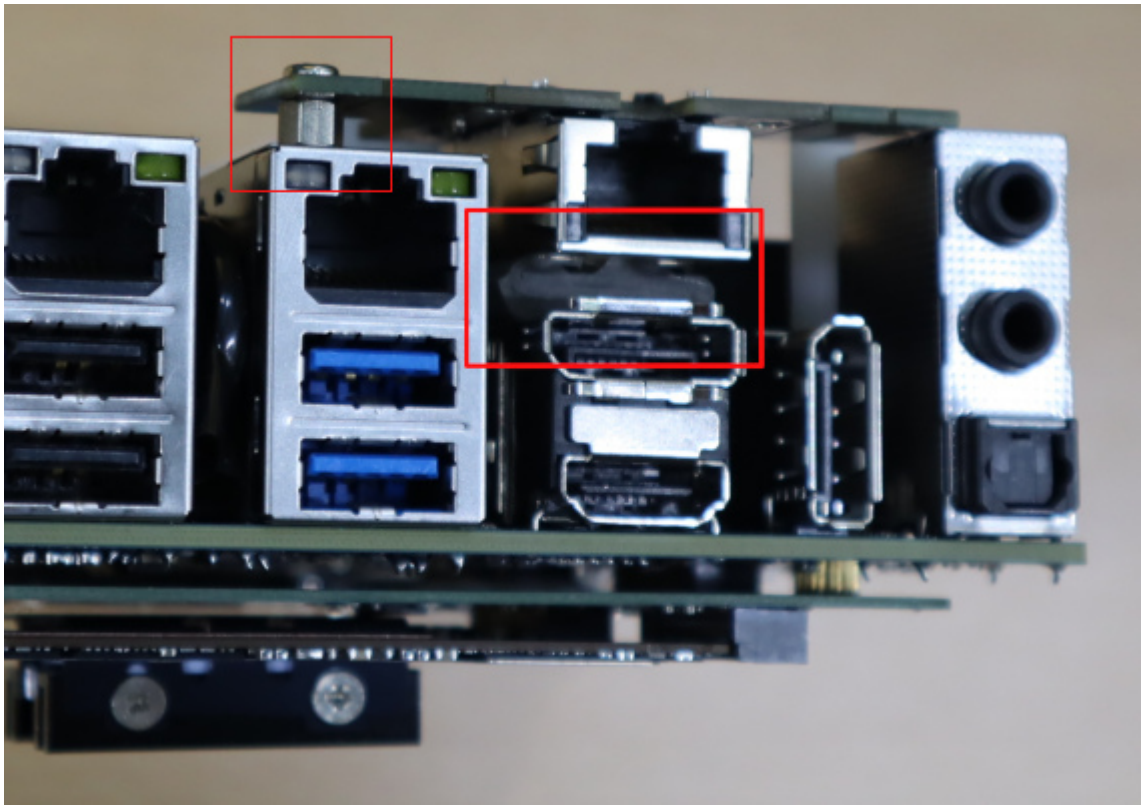
Unfortunately, All official cases of ODROID-H4 are not compatable to being as it is and the 10GbE adapter seems to born based on the ATX PC case.
Chosen and assembled the ODROID-H4 Case Type 4 for Ubuntu Samba server and it had to cut a little at the piece of ODROID-H4 Case Type 4.

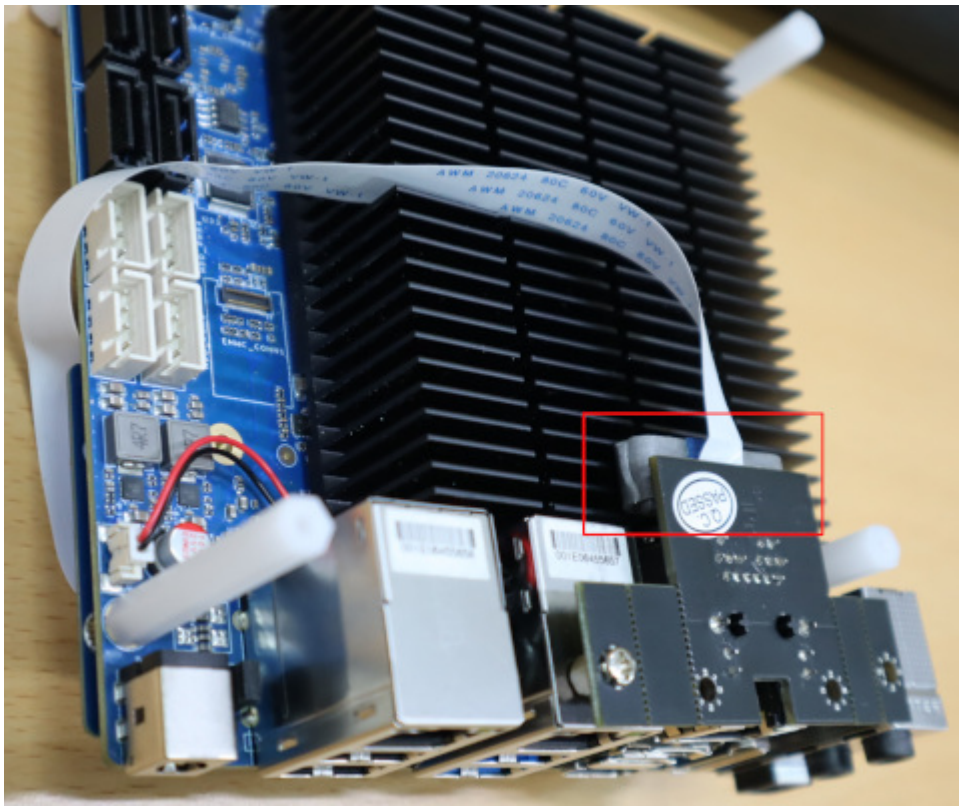


Two low profile brackets don't need it and remove them away.



The Ethernet port on the PCB is place above the DP port using some double-sided adhesive tape and hex spacer.





And, bottom of the H4 where place 10GbE adapter and NVMe SSD on the M.2 2×2 card.

The BIOS for M.2 Card

Basically, ODROID-H4 has PCIe GEN3 x4 lanes and the BIOS binary file has injected to use all four lanes at mass production.
It has to update BIOS for M.2 card.

- More detailed explanation https://wiki.odroid.com/accessory/add-on_boards/m.2_cards
- Updating BIOS How to update the ODROID-H4's BIOS

Driver, IP Addresses and Samba settings

Before this step forward the BIOS for M.2 card right above has to be installed

Set the IP addresses to 192.168.10.51/28 for server and 192.168.10.50/28 for client internally. The others 2.5GbE connected to the WWW via 1GbE network switch or hub something.

- Windows 11 -

1. Download driver at http://www.mmui.com.cn/data/upload/image/AQC113.zip
2. Extract file AQC113.zip you've downloaded above, go to folder Marvell_AQtion_Installer_v3.1.10.0, and run Marvell_AQtion_3.1.10.0_installer.msi
3. After finish driver installation, Reboot

Client

```
PS C:\Users\odroid> ipconfig

Windows IP Configuration


Ethernet adapter Ethernet 3:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::e7b0:c16d:8795:3b64%11
   IPv4 Address. . . . . . . . . . . : 192.168.10.50
   Subnet Mask . . . . . . . . . . . : 255.255.255.240
   Default Gateway . . . . . . . . . :

Ethernet adapter Ethernet:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::5ec:1ac6:7a08:a5d6%15
   IPv4 Address. . . . . . . . . . . : 192.168.30.5
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.30.1

Ethernet adapter Ethernet 2:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::c0ef:d7a4:3f48:2820%7
   IPv4 Address. . . . . . . . . . . : 192.168.30.10
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.30.1
PS C:\Users\odroid> get-Netadapter | select interfaceDescription, name,
status, linkSpeed

interfaceDescription                    name       Status LinkSpeed
--------------------                    ----       ------ ---------
Intel(R) Ethernet Controller I226-V     Ethernet   Up     2.5 Gbps
Marvell AQtion 10Gbit Network Adapter   Ethernet 3 Up     10 Gbps
Intel(R) Ethernet Controller I226-V #2  Ethernet 2 Up     2.5 Gbps


PS C:\Users\odroid>
```

- Ubuntu 24.04 -

- The atlantic driver for M.2 to 10GbE adapter is working with out of the box in Ubuntu 24.04.

```
root@H4-NVME:~# lspci -k
.
.
04:00.0 Ethernet controller: Aquantia Corp. Device 04c0 (rev 03)
        Subsystem: Aquantia Corp. Device 0001
        Kernel driver in use: atlantic
        Kernel modules: atlantic
.
.
root@H4-NVME:~# lsmod | grep atlantic
atlantic              311296  0
macsec                 69632  1 atlantic
root@H4-NVME:~#
```

- Samba install

```
root@H4-NVME:~# apt install samba -y
```

- Samba configuration : Create directory *samba* at /home/odroid/ by user *odroid* and add below *"[Shared]"* and parameters at the end of the file /etc/samba/smb.conf.
  The folder *samba* will be appeared on Windows as the name *Shared*.

```
root@H4-NVME:~# cat /etc/samba/smb.conf
.
.
[Shared]
comment = ODROID-H4 File Server
path = /home/odroid/samba
guest ok = yes
browseable = yes
create mask = 0644
directory mask = 0755
read only = no
writable = yes
force user = odroid
root@H4-NVME:~#
```

- Restart samba daemon with new configuration

```
root@H4-NVME:~# systemctl restart smbd
```

Server

```
root@H4-NVME:~# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN
group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
```

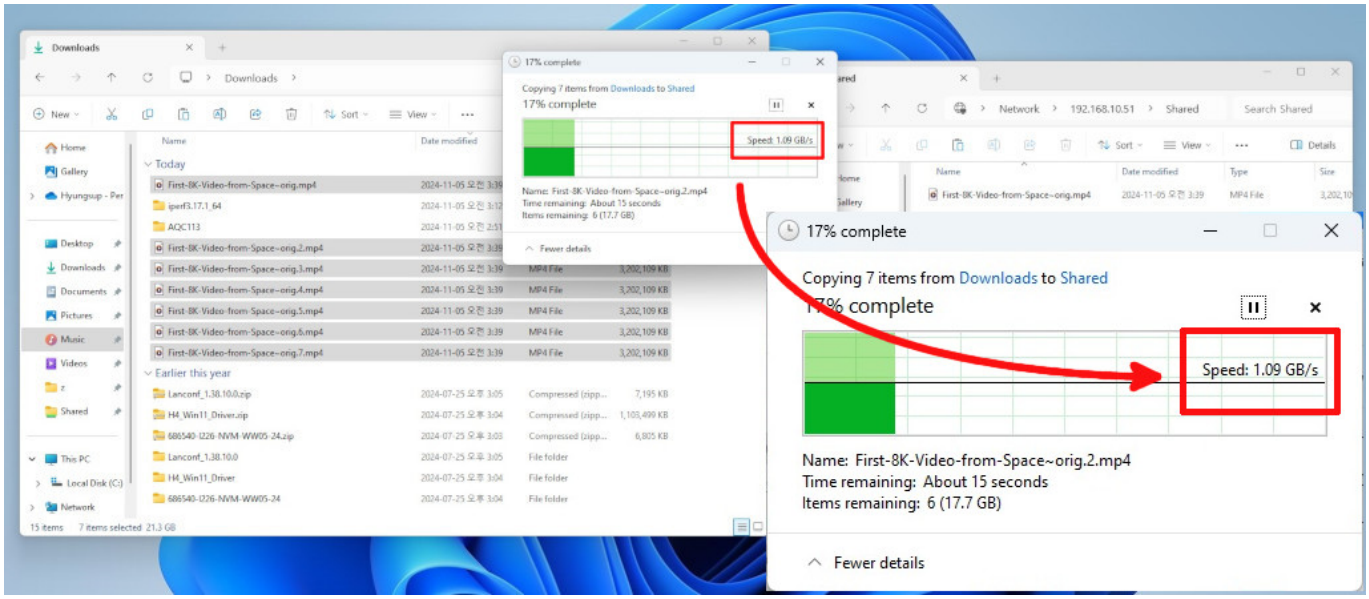
```
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: enp1s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP
group default qlen 1000
    link/ether 00:1e:06:45:56:57 brd ff:ff:ff:ff:ff:ff
    inet 192.168.30.2/24 metric 100 brd 192.168.30.255 scope global
dynamic enp1s0
       valid_lft 85799sec preferred_lft 85799sec
    inet6 fe80::21e:6ff:fe45:5657/64 scope link
       valid_lft forever preferred_lft forever
3: enp4s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP
group default qlen 1000
    link/ether 88:c9:b3:b3:0b:c2 brd ff:ff:ff:ff:ff:ff
    inet 192.168.10.51/28 brd 192.168.10.63 scope global enp4s0
       valid_lft forever preferred_lft forever
    inet6 fe80::8ac9:b3ff:feb3:bc2/64 scope link
       valid_lft forever preferred_lft forever
4: enp2s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP
group default qlen 1000
    link/ether 00:1e:06:45:56:58 brd ff:ff:ff:ff:ff:ff
    inet 192.168.30.93/24 metric 100 brd 192.168.30.255 scope global
dynamic enp2s0
       valid_lft 85799sec preferred_lft 85799sec
    inet6 fe80::21e:6ff:fe45:5658/64 scope link
       valid_lft forever preferred_lft forever
root@H4-NVME:~# ethtool enp4s0
Settings for enp4s0:
        Supported ports: [ TP ]
        Supported link modes:   10baseT/Full
                                100baseT/Full
                                1000baseT/Full
                                10000baseT/Full
                                2500baseT/Full
                                5000baseT/Full
        Supported pause frame use: Symmetric Receive-only
        Supports auto-negotiation: Yes
        Supported FEC modes: Not reported
        Advertised link modes:  10baseT/Full
                                100baseT/Full
                                1000baseT/Full
                                10000baseT/Full
                                2500baseT/Full
                                5000baseT/Full
        Advertised pause frame use: No
        Advertised auto-negotiation: Yes
        Advertised FEC modes: Not reported
        Link partner advertised link modes:  100baseT/Half
100baseT/Full
```

```
                                           1000baseT/Full
                                           10000baseT/Full
                                           2500baseT/Full
                                           5000baseT/Full
        Link partner advertised pause frame use: No
        Link partner advertised auto-negotiation: No
        Link partner advertised FEC modes: Not reported
        Speed: 10000Mb/s
        Duplex: Full
        Auto-negotiation: on
        Port: Twisted Pair
        PHYAD: 0
        Transceiver: internal
        MDI-X: Unknown
        Supports Wake-on: pg
        Wake-on: g
        Current message level: 0x00000005 (5)
                               drv link
        Link detected: yes
root@H4-NVME:~#
```

Active measurements of speed on networks

Two programs Iperf and Samba show us how speed is actually on the networks in this wiki page. And they are also compatable on both OS Ubuntu and Windows.

- When I drag and drop the 1.3 GB file to the Shared folder in Windows, It copied in the blink of an eyes.
  Copied seven files that is total more than 22.4 GB capacity (one for 3.2 GB) like the below picture have given a chance to take a screenshot.



- Iperf3 test : Bitrate 9.49 Gbits/sec came out while running 60 second and no issues more than

18 hours Iperf stability test.