

SAÉ 12

Rendu 2

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Prénom: Muhammad Fadlan

Groupe: Malaisiens

Q2.1

traceroute legs.cnrs.fr

Numéro de saut	Nom du routeur	Adresse IP (Propriétaire, Type, ASN)	Temps de réponse (ms)
1	_gateway	192.168.4.1 (locale, privé, N/A)	1.296, 1.198, 1.162
2	192.168.10.1	192.168.10.1 (locale, privé, N/A)	1.325, 1.502, 1.479
3	192.168.2.1	192.168.2.1 (locale, privé, N/A)	2.244, 2.423, 2.591
4	80.10.255.125	80.10.255.125 (Orange S.A., FSI, AS3215)	4.427, 4.628, 5.088
5	ae119- 0.ncnic202.rbc.orange. net	193.253.87.90 (Orange S.A., FSI, AS3215)	16.100, 16.828, 16.806
6	ae45- 0.nrmar102.rbc.orange .net	193.252.101.34 (Orange S.A., FSI, AS3215)	17.388, 15.664, 15.894
7	ae51- 0.nridf302.rbc.orange. net	193.252.161.10 (Orange S.A., FSI, AS3215)	16.059, 14.970, 15.573
8	ae44- 0.noidf002.rbc.orange. net	193.252.99.105 (Orange S.A., FSI, AS3215)	15.768, 14.498, 14.948
9	*	*	*
10	lag-pa3-1.th2- 1.rt.hopus.net	37.77.32.10 (HOPUS, PEI, AS44530)	16.335, 16.972, 16.509
11	acorus.th2-1.hopus.net	37.77.34.83 (HOPUS, PEI, AS44530)	16.892, 17.363, 17.606
12-30	*	*	*

traceroute www.youtube.com

Numéro de saut	Nom du routeur	Adresse IP (Propriétaire, Type, ASN)	Temps de réponse (ms)
1	_gateway	192.168.4.1 (locale, privé, N/A)	0.905, 1.054, 1.159
2	192.168.10.1	192.168.10.1 (locale, privé, N/A)	1.323, 1.285, 1.434
3	192.168.2.1	192.168.2.1 (locale,	2.300, 2.462, 2.789

		privé, N/A)	
4	80.10.255.125	80.10.255.125 (Orange S.A., FSI, AS3215)	5.343, 5.991, 6.164
5	ae119-0.ncnic202.rbc.orange.net	193.253.87.90 (Orange S.A., FSI, AS3215)	16.942, 17.193, 17.429
6	ae43-0.nimar202.rbc.orange.net	193.252.103.241 (Orange S.A., FSI, AS3215)	20.242, 18.973, 19.594
7	*	*	*
8	193.251.131.44	193.251.131.44 (Google LLC, Services Internet, AS15169)	19.153, 18.560, 19.525
9	193.251.255.70	193.251.255.70 (Google LLC, Services Internet, AS15169)	19.003, 72.14.196.122 (16.637), 72.14.203.56 (16.580)
10	192.178.105.21	192.178.105.21 (Google LLC, Services Internet, AS15169)	17.034, 192.178.105.91 (17.488), 192.178.105.87 (18.081)
11	216.239.50.123	216.239.50.123 (Google LLC, Services Internet, AS15169)	18.414, 18.450, 216.239.42.241 (18.014)
12	mrs09s06-inf14.1e100.net	172.217.171.206 (Google LLC, Services Internet, AS15169)	17.598, 17.349, 16.810

tracertoute www.nyu.edu

Numéro de saut	Nom du routeur	Adresse IP (Propriétaire, Type, ASN)	Temps de réponse (ms)
1	_gateway	192.168.4.1 (locale, privé, N/A)	0.877, 0.978, 0.930
2	192.168.10.1	192.168.10.1 (locale, privé, N/A)	1.094, 1.242, 1.729
3	192.168.2.1	192.168.2.1 (locale, privé, N/A)	2.390, 2.547, 2.832
4	80.10.255.125	80.10.255.125 (Orange S.A., FSI, AS3215)	5.528, 5.829, 8.417
5	ae119-0.ncnic202.rbc.orange.net	193.253.87.90 (Orange S.A., FSI, AS3215)	16.229, 16.672, 16.982
6	ae43-0.nimar202.rbc.orange	193.252.103.241 (Orange S.A., FSI,	19.567, 18.276, 19.250

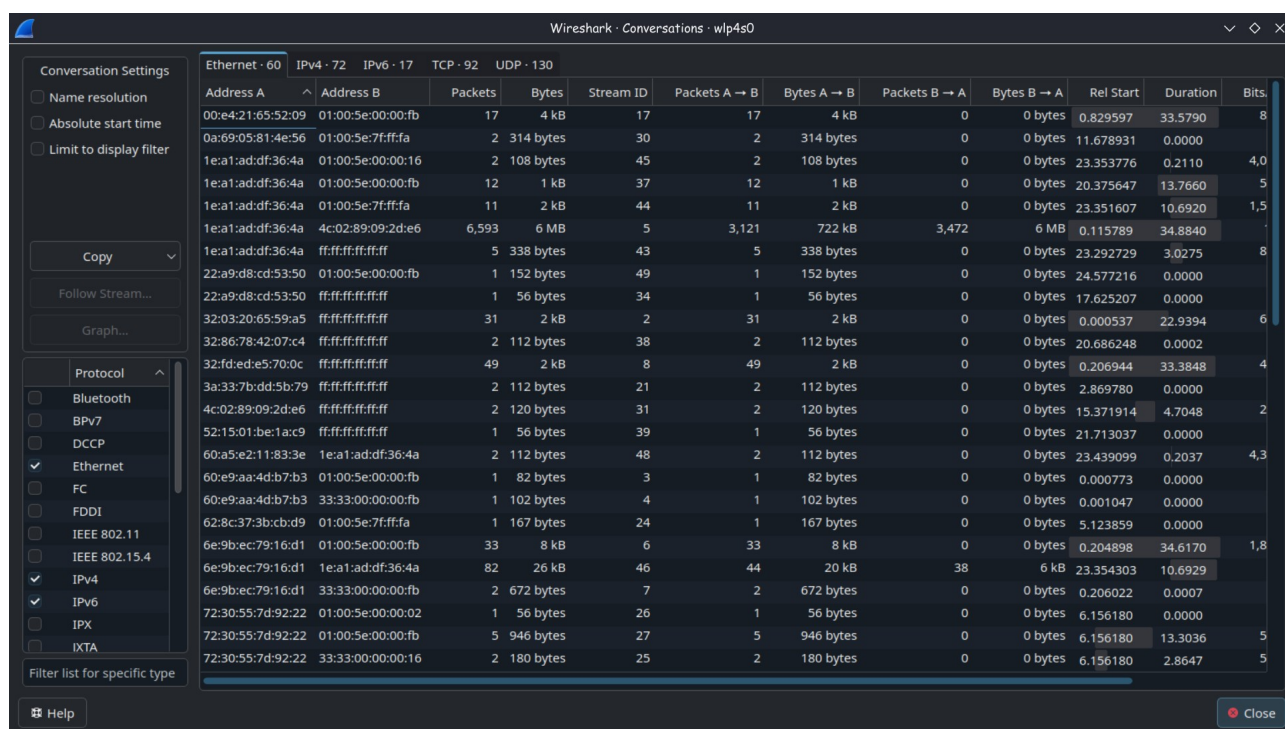
	.net	AS3215)	
7	ae40-0.nimar201.rbcj.orange.net	193.252.161.41 (Orange S.A., FSI, AS3215)	18.670, 19.204, 19.175
8-30	*	*	*

Q2.2. Analyse avec capture Wireshark

Liste des applications:

- Discord
- Steam
- Spotify
- Brave (moteur de recherche)

L'onglet Ethernet



Wireshark · Conversations · wlp4s0													
Ethernet · 60 IPv4 · 72 IPv6 · 17 TCP · 92 UDP · 130													
Address A	Address B	Packets	Bytes	Stream ID	Packets A → B	Bytes A → B	Packets B → A	Bytes B → A	Rel Start	Duration	Bits		
00:e4:21:65:52:09	01:00:5e:00:00:fb	17	4 kB	17	17	4 kB	0	0 bytes	0.829597	33.5790	8		
0a:69:05:81:4e:56	01:00:5e:7f:ff:fa	2	314 bytes	30	2	314 bytes	0	0 bytes	11.678931	0.0000			
1e:a1:ad:df:36:4a	01:00:5e:00:00:16	2	108 bytes	45	2	108 bytes	0	0 bytes	23.353776	0.2110	4,0		
1e:a1:ad:df:36:4a	01:00:5e:00:00:fb	12	1 kB	37	12	1 kB	0	0 bytes	20.375647	13.7660	5		
1e:a1:ad:df:36:4a	01:00:5e:7f:ff:fa	11	2 kB	44	11	2 kB	0	0 bytes	23.351607	10.6920	1,5		
1e:a1:ad:df:36:4a	4c:02:89:09:2d:e6	6,593	6 MB	5	3,121	722 kB	3,472	6 MB	0.115789	34.8840			
1e:a1:ad:df:36:4a	ff:ff:ff:ff:ff:ff	5	338 bytes	43	5	338 bytes	0	0 bytes	23.292729	3.0275	8		
22:a9:d8:cd:53:50	01:00:5e:00:00:fb	1	152 bytes	49	1	152 bytes	0	0 bytes	24.577216	0.0000			
22:a9:d8:cd:53:50	ff:ff:ff:ff:ff:ff	1	56 bytes	34	1	56 bytes	0	0 bytes	17.625207	0.0000			
32:03:20:65:59:a5	ff:ff:ff:ff:ff:ff	31	2 kB	2	31	2 kB	0	0 bytes	0.000537	22.9394	6		
32:86:78:42:07:c4	ff:ff:ff:ff:ff:ff	2	112 bytes	38	2	112 bytes	0	0 bytes	20.686248	0.0002			
32:fd:ed:e5:70:0c	ff:ff:ff:ff:ff:ff	49	2 kB	8	49	2 kB	0	0 bytes	0.206944	33.3848	4		
3a:33:7b:dd:5b:79	ff:ff:ff:ff:ff:ff	2	112 bytes	21	2	112 bytes	0	0 bytes	2.869780	0.0000			
4c:02:89:09:2d:e6	ff:ff:ff:ff:ff:ff	2	120 bytes	31	2	120 bytes	0	0 bytes	15.371914	4.7048	2		
52:15:01:be:1a:c9	ff:ff:ff:ff:ff:ff	1	56 bytes	39	1	56 bytes	0	0 bytes	21.713037	0.0000			
60:a5:e2:11:83:3e	1e:a1:ad:df:36:4a	2	112 bytes	48	2	112 bytes	0	0 bytes	23.439099	0.2037	4,3		
60:e9:aa:4d:b7:b3	01:00:5e:00:00:fb	1	82 bytes	3	1	82 bytes	0	0 bytes	0.000773	0.0000			
60:e9:aa:4d:b7:b3	33:33:00:00:00:fb	1	102 bytes	4	1	102 bytes	0	0 bytes	0.001047	0.0000			
62:8c:37:3b:cb:d9	01:00:5e:7f:ff:fa	1	167 bytes	24	1	167 bytes	0	0 bytes	5.123859	0.0000			
6e:9b:ec:79:16:d1	01:00:5e:00:00:fb	33	8 kB	6	33	8 kB	0	0 bytes	0.204898	34.6170	1,8		
6e:9b:ec:79:16:d1	1e:a1:ad:df:36:4a	82	26 kB	46	44	20 kB	38	6 kB	23.354303	10.6929			
6e:9b:ec:79:16:d1	33:33:00:00:00:fb	2	672 bytes	7	2	672 bytes	0	0 bytes	0.206022	0.0007			
72:30:55:7d:92:22	01:00:5e:00:00:02	1	56 bytes	26	1	56 bytes	0	0 bytes	6.156180	0.0000			
72:30:55:7d:92:22	01:00:5e:00:00:fb	5	946 bytes	27	5	946 bytes	0	0 bytes	6.156180	13.3036	5		
72:30:55:7d:92:22	33:33:00:00:00:16	2	180 bytes	25	2	180 bytes	0	0 bytes	6.156180	2.8647	5		

Wireshark - Conversations - wlp4s0

Conversation Settings

Name resolution

Absolute start time

Limit to display filter

Copy

Follow Stream...

Graph...

Protocol

Bluetooth

BPv7

DCCP

Ethernet

FC

FDDI

IEEE 802.11

IEEE 802.15.4

IPv4

IPv6

IPX

IXTA

Filter list for specific type

Help

Ethernet · 60

IPv4 · 72

IPv6 · 17

TCP · 92

UDP · 130

Address A	Address B	Packets	Bytes	Stream ID	Packets A → B	Bytes A → B	Packets B → A	Bytes B → A	Rel Start	Duration	Bits
72:30:55:7d:92:22	33:33:00:00:00:fb	4	970 bytes	29	4	970 bytes	0	0 bytes	6.564965	12.8949	6
74:ec:b2:54:d5:a4	1e:a1:ad:df:36:4a	76	14 kB	47	44	7 kB	32	7 kB	23.402751	10.8521	5,5
7c:f3:4d:e8:15:76	ff:ff:ff:ff:ff:ff	2	172 bytes	23	2	172 bytes	0	0 bytes	3.484775	29.8991	
80:60:b7:e3:24:4f	01:00:5e:00:00:fb	18	4 kB	16	18	4 kB	0	0 bytes	0.829597	33.5786	9
8e:25:93:e3:38:92	01:00:5e:00:00:fb	5	1 kB	32	5	1 kB	0	0 bytes	15.781009	7.1599	1,4
8e:25:93:e3:38:92	33:33:00:00:00:fb	5	1 kB	33	5	1 kB	0	0 bytes	15.781009	7.1605	1,5
8e:25:93:e3:38:92	ff:ff:ff:ff:ff:ff	1	42 bytes	59	1	42 bytes	0	0 bytes	34.203455	0.0000	
9a:b5:4f:77:a6:9a	33:33:00:00:00:02	1	70 bytes	22	1	70 bytes	0	0 bytes	3.074778	0.0000	
9a:df:72:11:b5:bc	01:00:5e:00:00:fb	4	777 bytes	55	4	777 bytes	0	0 bytes	28.879274	4.1067	1,5
9a:df:72:11:b5:bc	33:33:00:00:00:16	1	90 bytes	54	1	90 bytes	0	0 bytes	28.879068	0.0000	
9a:df:72:11:b5:bc	33:33:00:00:00:fb	3	781 bytes	56	3	781 bytes	0	0 bytes	29.083356	4.1074	1,5
9c:b1:dc:5d:a2:17	01:00:5e:7f:ff:fa	156	53 kB	18	156	53 kB	0	0 bytes	0.829597	33.9913	
a2:40:41:20:86:b9	01:00:5e:00:00:fb	1	100 bytes	57	1	100 bytes	0	0 bytes	34.009660	0.0000	
a2:40:41:20:86:b9	33:33:00:00:00:fb	2	389 bytes	58	2	389 bytes	0	0 bytes	34.010045	1.0126	3,0
a2:42:de:b9:19:f3	33:33:00:00:00:16	2	180 bytes	53	2	180 bytes	0	0 bytes	28.675782	0.6120	2,3
a2:42:de:b9:19:f3	ff:ff:ff:ff:ff:ff	4	224 bytes	52	4	224 bytes	0	0 bytes	28.471476	0.2043	8,7
a4:93:3f:e4:8f:b3	ff:ff:ff:ff:ff:ff	1	56 bytes	35	1	56 bytes	0	0 bytes	17.830312	0.0000	
a8:41:f4:2b:cf:2a	01:00:5e:00:00:fb	1	126 bytes	0	1	126 bytes	0	0 bytes	0.000000	0.0000	
a8:41:f4:2b:cf:2a	33:33:00:00:00:fb	1	146 bytes	1	1	146 bytes	0	0 bytes	0.000320	0.0000	
ae:99:e6:7d:5e:34	ff:ff:ff:ff:ff:ff	14	784 bytes	9	14	784 bytes	0	0 bytes	0.207363	33.3844	1
c6:25:e2:e1:34:ff	ff:ff:ff:ff:ff:ff	14	784 bytes	10	14	784 bytes	0	0 bytes	0.207571	34.4082	1
ca:3f:bf:19:20:91	33:33:00:00:00:02	1	70 bytes	11	1	70 bytes	0	0 bytes	0.207797	0.0000	
ce:fc:0f:d8:9b:3f	33:33:00:00:00:16	3	450 bytes	20	3	450 bytes	0	0 bytes	2.869780	12.7071	2
ce:fc:0f:d8:9b:3f	ff:ff:ff:ff:ff:ff	9	504 bytes	19	9	504 bytes	0	0 bytes	2.059888	12.6867	3
d4:d8:53:c6:a0:11	ff:ff:ff:ff:ff:ff	12	892 bytes	28	12	892 bytes	0	0 bytes	6.361766	16.5775	4

Close

Wireshark · Conversations · wlp4s0

Conversation Settings

Name resolution

Absolute start time

Limit to display filter

Copy

Follow Stream...

Graph...

Protocol

Bluetooth

BPv7

DCCP

Ethernet

FC

FDDI

IEEE 802.11

IEEE 802.15.4

IPv4

IPv6

IPX

IXTA

Filter list for specific type

Help

Ethernet · 60

IPv4 · 72

IPv6 · 17

TCP · 92

UDP · 130

Address A	Address B	Packets	Bytes	Stream ID	Packets A → B	Bytes A → B	Packets B → A	Bytes B → A	Rel Start	Duration	Bits
9a:df:72:11:b5:bc	33:33:00:00:00:fb	3	781 bytes	56	3	781 bytes	0	0 bytes	29.083356	4.1074	1,5
9c:b1:dc:5d:a2:17	01:00:5e:7f:ff:fa	156	53 kB	18	156	53 kB	0	0 bytes	0.829597	33.9913	
a2:40:41:20:86:b9	01:00:5e:00:00:fb	1	100 bytes	57	1	100 bytes	0	0 bytes	34.009660	0.0000	
a2:40:41:20:86:b9	33:33:00:00:00:fb	2	389 bytes	58	2	389 bytes	0	0 bytes	34.010045	1.0126	3,0
a2:42:de:b9:19:f3	33:33:00:00:00:16	2	180 bytes	53	2	180 bytes	0	0 bytes	28.675782	0.6120	2,3
a2:42:de:b9:19:f3	ff:ff:ff:ff:ff:ff	4	224 bytes	52	4	224 bytes	0	0 bytes	28.471476	0.2043	8,7
a4:93:3f:e4:8f:b3	ff:ff:ff:ff:ff:ff	1	56 bytes	35	1	56 bytes	0	0 bytes	17.830312	0.0000	
a8:41:f4:2b:cf:2a	01:00:5e:00:00:fb	1	126 bytes	0	1	126 bytes	0	0 bytes	0.000000	0.0000	
a8:41:f4:2b:cf:2a	33:33:00:00:00:fb	1	146 bytes	1	1	146 bytes	0	0 bytes	0.000320	0.0000	
ae:99:e6:7d:5e:34	ff:ff:ff:ff:ff:ff	14	784 bytes	9	14	784 bytes	0	0 bytes	0.207363	33.3844	1
c6:25:e2:e1:34:ff	ff:ff:ff:ff:ff:ff	14	784 bytes	10	14	784 bytes	0	0 bytes	0.207571	34.4082	1
ca:3f:bf:19:20:91	33:33:00:00:00:02	1	70 bytes	11	1	70 bytes	0	0 bytes	0.207797	0.0000	
ce:fc:0f:d8:9b:3f	33:33:00:00:00:16	3	450 bytes	20	3	450 bytes	0	0 bytes	2.869780	12.7071	2
ce:fc:0f:d8:9b:3f	ff:ff:ff:ff:ff:ff	9	504 bytes	19	9	504 bytes	0	0 bytes	2.059888	12.6867	3
d4:d8:53:c6:a0:11	ff:ff:ff:ff:ff:ff	12	892 bytes	28	12	892 bytes	0	0 bytes	6.361766	16.5775	4
de:b7:75:16:2b:b8	01:00:5e:00:00:fb	3	598 bytes	41	3	598 bytes	0	0 bytes	22.532693	4.0927	1,1
de:b7:75:16:2b:b8	33:33:00:00:00:16	2	180 bytes	40	2	180 bytes	0	0 bytes	22.532693	4.0927	1,0
de:b7:75:16:2b:b8	33:33:00:00:00:fb	3	658 bytes	42	3	658 bytes	0	0 bytes	22.532693	4.0927	1,1
ee:29:cc:eb:87:3c	ff:ff:ff:ff:ff:ff	28	2 kB	12	28	2 kB	0	0 bytes	22.532693	4.0927	1,1
f4:6a:dd:41:40:c5	ff:ff:ff:ff:ff:ff	5	880 bytes	36	5	880 bytes	0	0 bytes	22.532693	4.0927	1,1
f6:79:c2:d8:28:f9	01:00:5e:00:00:fb	27	3 kB	14	27	3 kB	0	0 bytes	22.532693	4.0927	1,1
f6:79:c2:d8:28:f9	01:00:5e:7f:ff:fa	19	3 kB	13	19	3 kB	0	0 bytes	22.532693	4.0927	1,1
f6:79:c2:d8:28:f9	33:33:00:00:00:fb	26	4 kB	15	26	4 kB	0	0 bytes	22.532693	4.0927	1,1
f6:9b:9e:01:c3:eb	33:33:00:00:00:16	2	180 bytes	51	2	180 bytes	0	0 bytes	22.532693	4.0927	1,1
f6:9b:9e:01:c3:eb	ff:ff:ff:ff:ff:ff	4	224 bytes	50	4	224 bytes	0	0 bytes	22.532693	4.0927	1,1

Spectacle

Full Screen

A screenshot was saved as 'Screenshot_20250119_201519.png' to '/var/mnt/games/Bazzite/Picture/Screenshots'.

Annotate

Close

Le nombre d'adresses IP est supérieur au nombre d'adresses MAC car une machine peut avoir plusieurs adresses IP (par exemple, pour différents réseaux ou via NAT), tandis qu'elle n'a qu'une seule adresse MAC pour chaque interface réseau.

Address A	Port A	Address B	Port B	Packets	Bytes
192.168.4.37	49020	199.232.210.250	443	1,932	3 MB

C'est une adresse privée

Q3.1. Un exemple simple

Samsung RS65DG5403S9:

https://www.darty.com/nav/achat/encastrable/grand_refrigerateur/refrigerateur_americaain/samsung_rs65dg5403s9.html

Consommation d'énergie annuelle 345 kWh

$345 \text{ kWh/an} = 345 \text{ kWh} / 365 \text{ jours} = 345 \text{ kWh} / 8760 \text{ heures} = 39.4 \text{ W}$

Q3.2. Un ordinateur portable

Alienware m18 R2: <https://www.dell.com/fr-fr/shop/gaming-and-games/alienware-m18-r2-gaming-laptop/spd/alienware-m18-r2-laptop/nawm18r201>

la capacité énergétique de la batterie: 97 Wh

la puissance du chargeur: 360 W

une estimation du temps de charge:

Si 100% de l'énergie est utilisé pour recharger: 6.14 minutes

Réalistique: 1 heure

Il est susceptible d'être plus long que cette estimation dans la pratique en raison de l'utilisation du CPU et du GPU, qui consomment de l'énergie du chargeur, de la santé de la batterie (les batteries dégradées se chargent plus lentement), et des pertes d'efficacité pendant le processus de charge. Ces facteurs réduisent la puissance de charge effective et ralentissent la charge globale.

le «stress-test» pour 30 secondes

Core	Utilisation Totale (%)	Puissance (W)	Energie (Ws)
1	24.4	30	900
2	51	45	1350
3	60.3	52.3	1569
4	70.5	50	1500
5	83.3	60	1800
6	100	65.2	1956

Ce n'est pas proportionnel

345 kWh est environ 39.4 Ws. Le CPU utilise 49.6 fois que l'énergie du frigo à son pic.

Q3.4. Des kWhs au g de CO2

Pays	Emission de CO ₂ de batterie 97Wh
France (61 g CO ₂ eq/kWh)	5.92 g
Pologne (884 g CO ₂ eq/kWh)	85.9 g

Pays	Batterie 300 fois recharger	Frigo	Comparaison
France (61 g CO ₂ eq/kWh)	1.63 kgCO ₂ /year	19.32 kgCO ₂ /year	Le frigo émet environ 12 fois plus de CO ₂ que les charges annuelles de l'ordinateur
German (539 g CO ₂ eq/kWh)	25.74 kgCO ₂ /year	305 kgCO ₂ /year	Le frigo émet environ 12 fois plus de CO ₂ que les charges annuelles de l'ordinateur