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Steps

- 1. Open Wireshark and access a website without any VPN activated.
- 2. Identify the packets and looking into characteristics.
- 3. These characteristics involves:
 - a. Packet Size
 - b. Packet Length
 - c. Response Time
 - d. Average Response Time
 - e. Average Length
 - f. Source and Destination Port Number of both the flows
 - g. Source and Destination IP of both the flows
 - h. Any other Characteristic that can help us identity the packet.
- 4. Now, turn on the VPN and repeat the same steps.
- 5. Save and compare the values of both types of traffics.

Without VPN

Sr.	Packet Length D-S	Packet Length S-D	Payload Size	Src. Port No.	Des. Port No.	Src. IP	Des. IP
1.	1292 – 69 – 64 – 855 – 235 – 66 – 1288	1292 – 119 – 1288 – 813 – 74 – 73 – 65	42 bits for header	64530	443	10.7.80.11	172.217.17.42
2.	1292 – 71 – 67 – 75 –	1292 – 74 – 75 – 73 – 65	42 bits for header	64915	443	10.7.80.11	172.217.21.36
3.							
4.							

QUIC Handshake from Google = 1292

TCP Handshake from Google = 56

QUIC Handshake from end device = 81

TCP Handshake from end device = 54

MOST Used Lengths in the Packets
1292 – 128x
74-75-73-71-65

Proton VPN

WireGuard

Netherlands

Sr.	Packet Length	Request Packet Length	Src. IP	Dest Port	Src. Port No.
1.	122 – 138 – 154 – 1354 – 1482	122 – 138 – 154 – 1482	190.2.130.161 (190.2.130.167)	1224	49898
2.	1354 – 138 – 266 – 1402 – 1482 – 1306	122 – 138 – 154	190.2.130.161 (190.2.130.177)	1224	61373
3.	1354 – 138 – 266 – 1402 – 1482 – 1306	122 – 138 – 154	190.2.130.161 (190.2.130.168)	51820	61090
4.	1354 – 1482 – 1306	122 – 138	185.107.56.236 (185.107.56.239)	1224	55548
5.	1354 – 1482 – 1306	122 – 138 – 154	185.107.56.236 (185.107.56.251)	1224	63813

6.	1354 – 1482 – 1306 – 1432 – 1402	122 – 138 – 154	185.107.56.236 (185.107.56.238)	88	56827
7.	1354 – 1482 – 1306	122 – 138 – 154	185.107.56.30 (185.107.56.30)	4500	49202
8.	1354 – 1482 – 1306	122 – 138 – 154	185.107.56.30 (185.107.56.42)	51820	51847
9.	1354 – 1482 – 1306	122 – 138 – 154	185.107.56.30 (185.107.56.35)	1224	63302
10.	1354 – 1482 – 1306	122 – 138 – 154	185.107.56.30 (185.107.56.40)	1224	58262
11.	1354 – 1482 – 1306	122 – 138 – 154	149.34.244.164 (149.34.244.166)	1224	54294
12			149.34.244.164 (149.34.244.167)	1224	56999
13			149.34.244.164 (149.34.244.166)	88	52469
			149.34.244.139 (149.34.244.143)	443	58435
			149.34.244.139 (149.34.244.140)	88	64950
			149.34.244.139 (149.34.244.141)	88	58126
			149.34.244.139 (149.34.244.142)	1224	50523
			149.34.244.174 (149.34.244.175)	1224	59903
			149.34.244.174 (149.34.244.178)	443	52974
			149.34.244.174 (149.34.244.176)	51820	54959
			149.34.244.174 (149.34.244.177)	500	59415
			138.199.7.251 (169.150.196.141)	443	62409
			138.199.7.251 (169.150.196.144)	51820	57782
			138.199.7.251 (169.150.196.143)	51820	60141
			138.199.7.251 (169.150.196.142)	88	51036
			138.199.7.159 (138.199.7.163)	443	57800
			138.199.7.159 (138.199.7.160)	88	57948
			138.199.7.159 (138.199.7.161)	443	61661
			190.2.133.223 (190.2.133.229)	1224	59648
			190.2.133.223 (190.2.133.224)	443	57914
			190.2.133.223 (190.2.133.229)	500	57435
			190.2.133.223 (190.2.133.230)	443	55272
			138.199.7.181 (138.199.7.184)	443	54518
			138.199.7.181 (138.199.7.183)	51820	59220
			138.199.7.181 (138.199.7.182)	443	57827
			217.23.3.76 (217.23.3.96)	88	62282
			217.23.3.76 (217.23.3.91)	1224	65031
			185.107.56.98 (185.107.56.104)	88	60630
			185.107.56.98 (185.107.56.98)	443	57474

			185.107.56.98 (185.107.56.105)	1224	51160
			169.150.218.21 (169.150.218.22)	4500	59383
			169.150.218.21 (169.150.218.22)	51820	50752
			169.150.218.21 (169.150.218.23)	1224	59050
			185.107.56.117 (185.107.56.128)	500	
			185.107.56.117 (185.107.56.129)	4500	
			185.107.56.117 (185.107.56.120)	88	
			89.39.107.109 (89.39.107.198)	1224	
			169.150.218.36 (169.150.218.40)	51820	
			169.150.218.36 (169.150.218.37)	4500	
			185.107.56.148 (185.107.56.152)	51820	
			185.107.56.148 (185.107.56.150)	443	
			169.150.196.100 (138.199.7.233)	1224	
			169.150.218.31 (169.150.218.35)	51820	
			93.190.140.103 (93.190.140.122)	51820	
			185.107.56.134 (185.107.56.136)	1224	
			212.8.250.217 (212.8.250.219)	443	
			190.2.133.15 (190.2.133.16)	1224	
			190.2.133.15 (190.2.133.14)	1224	
			190.2.133.200 (190.2.133.202)	1224	
			185.183.33.218 (185.183.33.221)	1224	
			185.183.34.149 (185.183.34.145)	1224	
			212.102.35.225 (212.102.35.229)	1224	
			138.199.7.250 (169.150.196.139)	443	
			185.107.56.76 (185.107.56.83)	443	
			169.150.218.75 (169.150.218.77)	88	
			93.190.138.166 (93.190.138.188)	443	
			169.150.218.16 (169.150.218.20)	443	
			169.150.218.85 (169.150.218.87)	88	
			138.199.7.233 (169.150.196.130)	443	
			212.8.253.155 (212.8.253.163)	88	
			185.107.57.7 (185.107.57.8)	51820	
			192.2.132.198 (192.2.132.214)	51820	
			169.150.218.1 (169.150.218.4)	88	

			89.39.107.157 (89.39.107.157)	51820	
			212.8.243.68 (212.8.243.74)	500	
			138.199.7.225 (138.199.7.227)	1224	
			149.34.244.169 (149.34.244.170)	88	
			185.177.126.133 (185.177.126.133)		
			89.38.97.196 (89.38.97.206)		
			212.8.250.234 (212.38.97.238)		
			185.177.124.190 (185.177.124.194)		
			185.182.193.32 (185.182.193.75)		
			46.166.182.31 (46.166.182.57)		
			185.107.56.123 (185.107.56.126)		
			89.38.99.138 (89.38.99.93)	4569	
			89.38.99.188 (89.38.99.172)		
			169.150.218.70 (169.150.218.73)		
			149.34.224.159 (149.34.224.162)		
			89.39.107.185 (89.39.107.193)		
			89.39.106.102 (89.39.106.102)		
			185.177.125.177 (185.177.125.174)		
			169.150.218.55 (169.150.218.57)		
			169.150.196.65 (169.150.196.66)		
			185.177.126.71 (185.177.126.127)		
			165.150.169.71 (165.150.169.72)		
			149.34.244.149 (149.34.244.152)		
			169.150.196.145 (169.150.196.147)		
			138.199.7.243 (169.150.196.136)		
			185.107.56.69 (185.107.56.71)		
			89.38.97.139 (89.38.97.174)		
			185.107.56.154 (185.107.56.157)		
			185.107.56.45 (185.107.56.45)		
			185.177.124.219 (185.177.124.225)		
			169.150.196.89 (169.150.196.93)		
			185.107.56.212 (185.107.56.212)		
			169.150.196.77 (169.150.196.78)		
			77.247.178.122 (77.247.178.126)		

			149.34.244.154 (149.34.244.156)		
			169.150.218.80 (169.150.218.84)		
			185.177.125.201 (185.177.125.211)		
			185.177.124.84 (185.177.124.88)		
			149.34.244.179 (149.34.244.181)		
			109.236.81.160 (109.236.81.188)		
			138.199.7.235 (138.199.7.237)		
			149.34.244.129 (149.34.244.132)		
			169.150.169.99 (169.150.169.114)		
			185.182.193.108 (185.182.193.108)		
			169.150.218.65 (169.150.218.67)		
			169.150.196.98 (169.150.196.110)		
			169.150.218.26 (169.150.218.27)		
			169.150.218.91 (169.150.218.135)		
			212.102.35.244 (212.102.35.246)		
			169.150.218.6 (169.150.218.9)		
			185.107.56.162 (185.107.56.165)		
			185.177.126.144 (185.177.126.144)		
			185.107.56.50 (185.107.56.65)		
			185.107.56.143 (185.107.56.147)		
			89.39.107.113 (89.39.107.196)		
			89.39.104.173 (89.39.104.173)		
			212.8.253.138 (212.8.253.139)		
			89.39.107.188 (89.39.107.202)		
			185.107.80.190 (185.107.80.190)		
			185.159.158.139 (37.120.217.162)		

Japan

Src. Port No.	Src. IP	Src. Port No.	Src. IP
1194 443	37.19.205.150 (37.19.205.150)		138.199.21.206 (138.199.21.207)
51820 5060	138.199.21.216 (212.102.51.246)		138.199.21.193 (138.199.21.194)
51820	212.102.51.241 (212.102.51.245)		37.19.205.145 (37.19.205.147)
	45.14.71.5 (45.14.71.11)		212.102.51.247 (212.102.51.249)
	138.199.22.103 (138.199.22.107)		138.199.22.102 (138.199.22.196)
	138.199.21.198 (138.199.21.201)		103.125.235.18 (103.125.235.23)
	138.199.22.97 (138.199.22.100)		185.159.156.87 (79.110.55.2)
	37.19.205.155 (37.19.205.155)		45.14.71.7 (45.14.71.23)

USA

Src. Port No.	Src. IP	Src. Port No.	Src. IP
433,88	146.70.202.114 (146.70.202.115)	51820	146.70.174.66 (146.70.174.68)
500 (malformed packets)	195.181.163.1 (195.181.163.29)	51820	37.19.199.139 (37.19.199.141)
443	195.181.162.163 (195.181.162.179)	1224	38.132.103.146 (38.132.103.148)
500 (malformed packets)	89.187.177.71 (89.187.177.73)	500(malformed packets)	37.19.200.22 (37.19.200.23)
88	37.19.199.129 (37.19.199.133)	443	37.19.200.1 (37.19.200.3)
88	37.19.221.194 (37.19.221.232)	4500 ESP	37.19.201.195 (37.19.201.248)
443	37.19.199.144 (37.19.199.148)	5060	37.19.221.195 (146.70.147.99)
51820	37.19.199.149 (37.19.199.153)	1194	89.187.185.161 (89.187.185.171)
1224	185.236.200.242 (185.236.200.244)	51820	45.87.214.114 (45.87.214.117)
1224	143.244.44.171 (143.244.44.174)	500 (malformed Packet)	156.146.51.129 (156.146.51.131)
443	89.187.180.55 (89.187.180.57)	ESP 4500	146.70.202.82 (146.70.202.85)
80	89.187.180.54 (87.249.134.130)	ESP 4500	217.138.206.82 (217.138.206.84)
443	185.236.126.2 (185.236.126.4)	Malformed packets	143.244.44.161 (143.244.44.164)
443	143.244.44.166 (143.244.44.169)	88	89.187.180.1 (89.187.180.3)
1224	37.19.221.199 (37.19.221.237)	ESP	193.148.18.74 (193.148.18.78)
ESP port: 4500	37.19.200.17 (37.19.200.18)	1224	89.187.170.159 (89.187.170.165)
443	143.244.44.181 (143.244.44.184)	88	146.70.202.2 (146.70.202.6)
88	37.19.199.134 (37.19.199.135)	1224	138.199.52.193 (138.199.52.197)
500(malformed packet)	37.19.221.198 (37.19.221.244)		146.70.45.82 (146.70.45.83)
51820	138.199.50.98 (138.199.50.102)		45.89.173.194 (45.89.173.198)
1224	193.148.18.58 (198.148.18.59)		37.19.221.196 (37.19.221.233)
443	89.187.179.55 (89.187.179.58)		143.244.44.176 (143.244.44.177)
1194	37.19.221.197 (37.19.221.227)		37.19.221.193 (37.19.221.201)
443	146.70.202.34 (146.70.202.35)		89.45.4.2 (89.45.4.2)
443	156.146.54.81 (156.146.54.85)		37.120.244.154 (37.120.244.154)

	146.70.202.114 (146.70.202.116)		37.19.221.197 (37.19.221.225)
	156.146.54.81 (156.146.54.84)		156.146.51.129 (156.146.51.132)
	37.19.221.196 (37.19.221.236)		45.87.214.114 (45.87.214.116)
	146.70.202.82 (146.70.202.85)		146.70.202.34 (146.70.202.37)
	146.70.174.66 (146.70.174.66)		37.19.199.144 (37.19.199.146)
	217.138.206.82 (217.138.206.86)		45.89.173.194 (45.89.173.198)
	37.19.199.129 (37.19.199.129)		89.187.177.71 (89.187.177.73)
	37.19.200.1 (37.19.200.4)		185.230.126.2 (185.230.126.6)
	89.187.185.161 (89.187.185.184)		37.19.199.134 (37.19.199.135)
	89.187.185.161 (89.187.180.56)		138.199.52.193 (138.199.52.194)
	193.148.18.74 (193.148.18.75)		89.187.179.55 (89.187.179.58)
	146.70.202.2 (146.70.202.5)		37.19.221.195 (37.19.221.246)
	37.19.200.23 (37.19.200.23)		185.236.200.242 (185.236.200.245)
	146.70.147.98 (146.70.147.100)		146.70.45.82 (146.70.45.83)
	143.244.44.181 (143.244.44.184)		38.132.103.146 (38.132.103.150)
	143.244.44.166 (143.244.44.168)		195.181.162.163 (195.181.162.186)
	37.19.221.199 (37.19.221.237)		37.19.221.198 (37.19.221.242)
	143.244.44.161 (143.244.44.164)		37.19.200.17 (37.19.200.18)
	89.187.170.159 (89.187.170.167)		195.181.163.1 (195.181.163.32)
	37.19.199.149 (37.19.199.153)		37.19.221.193 (37.19.221.202)
	143.244.44.176 (143.244.44.178)		89.187.180.1 (89.187.180.2)

Open-VPN UDP

Packet Length	Request Packet Length	Src. IP	Dest Port	Src. Port No.
107 – 177 – 182 – 409 – 619 – 1282 – 1357 – 1395 – 1414 – 1423 – 1428 – 1433 -	107 – 119 – 127 -135 – 143 – 1121 - 1433	4569	51122	146.70.202.114
107 - 177 – 181– 1282 – 1357 – 1395 – 1414 – 1423 – 1428 – 1433	107 – 119 – 127 - 146– 181- 205 – 265 – 624 - 1433	4569	57241	185.107.56.45
107 – 119 - 177 – 181– 227 - 1282 – 1357 – 1345 -1357 – 1395 - 1414 -1423 – 1428 - 1433	107 – 119 – 127 – 138 - 146– 171– 624 - 1433	5060	59894	89.187.180.1
107 - 177 – 181– 1282 – 1357 – 1395 – 1414 – 1423 – 1428 – 1433	107 – 119 – 127 – 135 – 138 – 143 – 146 – 181 – 1121 – 1433	80	62340	37.19.199.149

Open – VPN TCP

Packet Length	Request Packet Length	Src. IP	Dest Port	Src. Port No.
60 – 66- 89 – 124 – 161 – 184 – 208 – 1295 – 1296 – 1370 – 1405 – 1440 – 1445 – 1459 -	54 – 74 -82 – 90 – 121 – 133 - 1514	7770	60810	103.125.235.18
60 – 121 – 133 – 161 – 1295 – 1296 – 1370 – 1407 – 1426-1435 – 1440- 1445 – 1459 - 1486 – 1500 – 1507	54 – 121 – 133 – 152 = 160 – 195	443	65112	149.34.244.129
60 – 121 – 133 –188– 1295 – 1370-1373 – 1407 – 1426– 1440- 1445 – 1486 – 1500 – 1507 -	54 – 66 - 121 – 133 – 152 = 160 – 195 – 1514	443	60949	37.10.200.4

After Subnetting

103.125.2 35.15-45	146.70.20 2.0-125	185.107.80 .180-220	185.236.20 0.225-255	212.38.97. 200-255	37.19.221. 170-255	89.187.17 7.50-100	93.190.13 8.150-200	93.190.13 8.150-200
109.236.8 1.128-196	146.70.45. 50-100	185.159.15 6.70-100	190.2.130. 150-200	212.8.243. 50-122	38.132.10 3.130-200	89.187.17 9.50-100	93.190.14 0.96-155	93.190.14 0.96-155
138.199.2 1.172-255	149.34.24 4.122-196	185.159.15 8.130-160	190.2.133. 1-255	212.8.253. 122-200	45.14.71.1 -96	89.187.18 0.1-96	93.190.13 8.150-200	
138.199.2 2.96-255	156.146.5 1.122-172	185.177.12 4.70-255	193.148.18 .50-122	217.138.2 06.50-122	45.87.214. 100-155	89.187.18 5.150-225	93.190.14 0.96-155	
138.199.5 0.96-125	156.146.5 4.50-122	185.177.12 5.165-225	192.2.132. 170-255	217.23.3.5 0-122	45.89.173. 170-255	89.38.97.1 20-255	93.190.13 8.150-200	
138.199.5 2.175-197	165.150.1 69.50-145	185.177.12 6.50-196	195.181.16 2.122-200	37.120.21 7.122-200	46.166.18 2.1-100	89.38.99.8 0-200	93.190.14 0.96-155	
138.199.7. 145-255	169.150.1 96.50-196	185.182.19 3.32-122	195.181.16 3.1-50	37.120.24 4.120-200	77.247.17 8.100-200	89.39.104. 160-200	93.190.13 8.150-200	
143.244.4 4.150-200	169.150.2 18.1-196	185.183.33 .200-255	198.148.18 .40-100	37.19.200. 1-96	79.110.55. 0-100	89.39.106. 96-155	93.190.14 0.96-155	
146.70.14 7.50-122	185.107.5 6.20-255	185.183.34 .122-200	212.102.35 .200-255	37.19.201. 150-255	87.249.13 4.100-150	89.39.107. 100-225	93.190.13 8.150-200	
146.70.17 4.50-96	185.107.5 7.1-20	185.230.12 6.2-50	212.102.51 .200-255	37.19.205. 120-200	89.187.17 0.150-200	89.45.4.0- 50	93.190.14 0.96-155	

Windscribe

WireGuard

Packet Length	Request Packet Length	Src. IP	Dest Port	Src. Port No.
1494 – 1352 – 114 – 124 == 137	122 – 138 – 154 – 1354	155.94.217.4	59531	443
114 – 123 == 137 – 1352 – 1494	122 – 138 == 145 – 154 – 1354	107.7.60.188	56990	443
114 – 123 == 134 - 145 – 1352 -1382 - 1494	122 – 138 – 154 – 218 – 1354	155.94.216.68 155.94.216.122	57272	443
114 – 123 == 137 – 145 – 1352 - 1494	122 – 138 - 154 – 186 – 218 - 1354	161.129.70.132 161.129.70.135	51097	443
114 – 123 == 137 – 145 – 188 == 202 - 1352 – 1382 - 1494	122 – 138 – 154 – 186 - 202 – 218 - 1354	104.129.18.196 104.129.18.214	49716	443
114 – 123 == 137 – 145 – 188 == 202 - 1352 – 1382 - 1494	122 – 138 – 154 – 186 – 218 – 1354 - 1494	162.222.198.4 162.222.198.23	49834	443
114 – 123 == 137 – 145 – 188 == 202 - 1352 – 1382 - 1494	122 – 138 – 154 – 186 – 218 – 1354 - 1494	69.174.103.196 69.174.103.248	54517	443
114 – 123 == 137 – 165 == 166 – 206 == 224 -1352 - 1494	122 – 138 – 154 – 186 – 282 - 1494	107.150.22.196 107.150.22.246	61209	443
		107.150.30.132 107.150.30.166	56498	443
		155.97.217.xxx		
		107.150.23.196 107.150.23.233	57368	443
		104.233.93.196 104.233.93.236	50723	443
		162.222.198.68 162.222.198.114	64071	443
		155.94.250.68 155.94.250.101	59004	443
		104.233.103.68 104.233.103.117	65070	443
		198.96.95.132 198.96.95.189	55985	443
		107.161.86.132 107.161.86.145	63632	443
		155.94.250.4 155.94.250.10	50299	443
		104.223.98.132 104.223.98.138	58521	443
		104.223.102.4 104.223.102.52	49485	443
		104.223.100.132 104.223.100.142	54555	443
		155.94.251.68 155.94.251.102	58554	443
		155.94.247.196 155.94.247.243	62563	443
		204.44.122.4 204.44.122.19	57659	443
		68.235.35.181 68.235.33.98	57448	443
		68.235.43.187 68.235.32.229	59552	443
		208.77.22.205 68.235.38.38	52209	443
		68.235.35.173 68.235.33.131	63652	443
		68.235.43.197 68.235.32.227	58268	443
		68.235.39.125 68.235.38.187	52788	443
	MIAMI Snow	173.44.36.132 173.44.36.178	62673	443
		155.94.218.68	65284	443

		155.94.218.113		
		96.47.239.196 96.47.239.236	62459	443
	MIAMI Vice	86.106.87.100 86.106.87.103	62328	443
		45.87.214.68 45.87.214.83	56384	443
		37.120.215.164 37.120.215.168	58456	443
	NEW YORK Empire	217.138.255.196 217.138.255.202	62346	443
		77.81.136.68 77.81.136.85	49922	443
		92.119.177.84 92.119.177.90	53648	443
		212.103.48.84 212.103.48.92	63361	443
	NEW YORK Grand Central	143.244.44.211 154.47.26.242	59669	443
	Washington DC Precedent	23.105.190.162 23.105.190.167	58573	443
		207.244.91.155 207.244.91.174	65260	443
		23.105.186.146 23.105.186.145	49606	443
	Los Angeles Dogg	89.41.26.52 89.41.26.62	52988	443
		91.219.212.84 91.219.212.91	60854	443
		185.236.200.20 185.236.200.28	61104	443
	Dallas	198.55.126.224 198.55.126.196	63605	443
	Seattle Cobain	104.129.57.132 104.129.57.158	54666	443
		104.129.56.164 104.129.56.167	55951	443
	Montreal Expo 67	198.8.85.241 198.8.85.247	65240	443
		172.98.68.164 172.98.68.164	62556	443
	Toronto Comfort Zone	149.57.28.194 149.57.28.211	59653	443
	Toronto The 6	104.245.146.76 104.245.146.54	63034	443
	Vancouver Granville	71.19.251.141 71.19.251.147	58234	443
		71.19.252.153 71.19.252.158	52089	443
	Vancouver Vansterdam	208.78.41.148 208.78.41.155	52155	443
	Hong Kong Victoria	27.122.12.228 27.122.12.235	58080	443
		103.10.197.4 27.122.14.68	52617	443
		27.122.14.36 27.122.14.44	65354	443
		223.123.88.96		443
	Paris Jardin	84.17.43.227 84.17.43.239	63128	443
		139.199.47.195 139.199.47.209	56843	443
		138.199.47.222 138.199.47.224	63008	443
	Paris Seine	146.70.18.100 146.70.18.125	64554	443
		146.70.68.228 146.70.68.236	58113	443
		146.70.105.4 146.70.105.16	63006	443
		194.59.249.244	59295	443

		194.59.249.203		
		185.156.173.180 185.189.113.62	49880	443
	Frankfurt Castle	146.70.107.68 146.70.107.82	62173	443
		193.27.14.180 193.27.14.182	53544	443
		45.87.212.68 45.87.212.71	63598	443
	Frankfurt Wurstchen	149.36.50.213 149.36.50.230	63031	443
		149.36.50.159 149.36.50.173	50976	443
	Amsterdam Canal	146.70.108.68 146.70.108.60	60660	443
		146.70.108.164 146.70.108.171	62187	443
		2.58.44.244 2.58.44.252	64291	443
	Amsterdam Red Light	104.223.81.196 104.223.81.196	58460	433
		155.94.209.132 155.94.209.188	56629	443
	Amsterdam Tulip	169.150.196.195 169.150.196.199	65303	443
		149.36.51.131 149.36.51.139	52989	443
	Oslo Fjord	185.253.97.132 185.253.97.141	52188	443
		146.70.103.4 146.70.103.9	51240	443
		146.70.103.36 146.70.103.45	59001	443
		37.120.203.228 37.120.203.252	51643	443
	Bucharest No Vampires	185.120.147.4 185.120.147.5	55006	443
		185.217.68.132 185.217.68.136	62049	443
		91.207.103.196 91.207.103.205	54647	443
		146.70.97.228 146.70.97.245	50731	443
	Zurich Alphorn	146.70.99.228 146.70.99.246	57175	443
		146.70.99.164 146.70.99.187	60550	443
	Zurich Lindenhof	169.150.197.163 169.150.197.185	50499	443
		169.150.197.195 169.150.197.214	58502	443
	London Crumpets	89.47.62.100 89.47.62.110	56946	443
		217.138.254.68 217.138.254.70	57410	443
		146.70.104.4 146.70.104.9	55558	443
		146.70.95.148 146.70.95.148	64528	443
		146.70.95.132 146.70.95.138	63084	443
	London Custard	138.199.31.131 138.199.31.141	64458	443
		212.102.63.3 212.102.63.30	54069	443
		84.17.50.195 84.17.50.208	62492	443
	Istanbul Lygos	149.102.229.227 149.102.229.247	49345	443
		149.50.208.99 149.50.208.100	50534	443

IKEv2

Packet Length	Request Packet Length	Src. IP	Dest Port	Src. Port No.
118 – 130 – 146 – 1354 – 1478	118 – 130 – 138 – 142 – 146	107.150.30.66 107.150.30.109	4500	4500
118 – 126 – 130 – 1354 – 1478	118 – 138 – 146	89.41.26.50 89.41.26.59	4500	4500
118 – 130 – 134 – 1354 – 1478	118 – 130 – 138 – 1354	172.98.68.162 172.98.68.171	4500	4500
118 – 130 – 158 – 1354 – 1478	118 – 138 – 158 – 1354	71.19.252.151 71.19.252.161	4500	4500

Stealth

TCP Whole

Packet Length	Request Packet Length	Src. IP	Dest Port	Src. Port No.
56 – 142 – 154 – 1514 – 4250	54 – 142 – 154 – 1514	89.41.26.52	58004	443
56 – 142 – 154 – 1224 – 1514 – 4250 – 1380 – 4284	54 – 142 – 154 – 1380 – 1514	149.57.28.41	59804	443
56 – 142 – 154 – 1224 – 1514 – 4250 – 1380 – 4284	54 – 142 – 154 – 1380 – 1514	198.55.126.196 198.55.126.245	49701	443

TCP

Packet Length	Request Packet Length	Src. IP	Dest Port	Src. Port No.
60 – 1514	54 – 120 – 140 = 180 – 1527 – 2809	155.94.250.3	52896	443
60 – 1514	54 – 120 – 140 = 180 – 1527 – 2754 +	198.96.95.182	57442	443
60 – 1514	54 – 120 – 140 = 180 – 1527 – 2754 +	27.122.12.122	54940	443
60 – 1514	54 – 120 – 140 = 180 – 1527 – 2809	104.129.56.164 104.129.56.167	55951	443

WStunnel

Packet Length	Request Packet Length	Src. IP	Dest Port	Src. Port No.
56 – 60 – 84 – 144 – 158 – 1238 – 1376 – 1384 – 1514	54 – 66 – 148 – 90 – 1514 – 1573+	27.122.12.111	63847	443
56 – 60 – 84 – 144 – 158 – 1238 – 1376 – 1384 – 1514	167==177 – 54 – 66 – 148 – 90 – 1514 – 1573+	149.57.28.7	63957	443
56 – 60 – 84 – 144 – 158 – 1238 – 1376 – 1384 – 1514	167==177 – 54 – 66 – 148 – 90 – 1514 – 1573+	104.129.56.162	54135	443
56 – 60 – 84 – 144 – 158 – 1238 – 1376 – 1384 – 1514	54 – 66 – 148 – 167==177 – 90 – 1514 – 1573+	71.19.252.153	52089	443

UDP

Packet Length	Request Packet Length	Src. IP	Dest Port	Src. Port No.
106 – 120 == 124 – 1294 – 1344 – 1392	106 – 126 == 131	104.129.56.163	55509	443

106 – 118 – 120 – 1294 – 1326 – 1344 – 1392	106 – 118 – 125 == 131 – 142 – 1344 – 1392	155.94.218.67	50226	443
106 – 117 – 118 – 119 == 122 – 1294 – 1344 – 1392	106 – 118 – 1344 – 1392	198.8.85.225	55348	443
106 – 118 – 120 – 1294 – 1326 – 1344 – 1392	106 – 118 – 125 == 131 – 142 – 1344 – 1392	84.17.43.226	49891	443

IP

103.10.197.xxx	143.244.44.xxx	162.222.198.xxx	193.27.14.xxx	212.102.xxx.xxx	68.174.103.xxx
104.129.xxx.xxx	146.70.xxx.xxx	169.150.19x.xxx	194.59.249.xxx	212.103.xxx.xxx	71.19.25x.xxx
104.223.xxx.xxx	149.102.229.xxx	172.98.68.xxx	198.55.126.xxx	217.138.25x.xxx	77.81.136.xxx
104.233.xxx.xxx	149.36.xx.xxx	173.44.36.xxx	198.8.85.xxx	223.123.88.xxx	84.17.43.xxx
104.245.146.xxx	149.50.208.xxx	185.120.147.xxx	198.96.95.xxx	23.105.1xx.xxx	84.17.50.xxx
107.150.xx.xxx	149.57.xx.xxx	185.156.173.xxx	2.58.44.xxx	27.122.1x.xxx	86.106.87.xxx
107.161.86.xxx	154.47.26.xxx	185.189.113.xxx	204.44.122.xxx	37.120.2xx.xxx	89.41.26.xxx
107.7.60.xxx	155.94.xxx.xxx	185.217.68.xxx	207.244.91.xxx	45.87.21x.xxx	89.47.62.xxx
138.199.xx.xxx	155.97.217.xxx	185.236.200.xxx	208.77.22.xxx	68.235.3x.xxx	91.2xx.xxx.xxx
139.199.47.xxx	161.129.70.xxx	185.253.97.xxx	208.78.41.xxx	68.235.4x.xxx	92.119.117.xxx
					96.47.239.xxx

Tunnel-Bear

WireGuard

Packet Length	Request Packet Length	Src. IP	Dest Port	Src. Port No.
114 – 123==127 – 1352 – 1494	122 – 138 – 154 – 186 – 1354	159.223.123.80	51820	51820
114 – 123==131 – 1352 – 1494	122 – 138 – 154 – 186 – 1354	159.89.229.4	51820	51820
114 – 123==137 – 1352 – 1494	122 – 138 – 154 – 186 – 1354	146.190.221.237	51820	51820
114 – 123==137 – 1352 – 1494	122 – 138 – 154 – 186 – 1354	67.205.185.125	51820	51820
124==137 – 1352	138 – 154 – 186 – 1354	146.190.78.14	51820	51820
114 – 123==137 – 1348 – 1352 – 1494	122 – 138 – 154 – 186 – 1354	174.138.95.205	51820	51820
114 – 123==137 – 1348 – 1352 – 1494	122 – 138 – 154 – 186 – 1354	165.227.190.147	51820	51820
114 – 123==137 – 1348 – 1352 – 1494	122 – 138 – 154 – 186 – 1354	165.227.65.21	51820	51820
		192.241.150.52	51820	51820
		159.203.110.178	51820	51820
		146.190.221.234	51820	51820
		134.209.119.87	51820	51820
		157.245.124.236	51820	51820
		165.227.223.156	51820	51820
		159.65.40.36	51820	51820
		45.55.192.185	51820	51820
		65.225.56.109	51820	51820
		134.209.115.236	51820	51820
		104.131.70.103	51820	51820
		45.55.67.132	51820	51820
		107.170.62.18	51820	51820
		143.198.26.17	51820	51820
		138.197.76.54	51820	51820
		165.227.124.162	51820	51820
		162.243.55.20	51820	51820
		162.243.48.13	51820	51820
		104.131.68.172	51820	51820
		159.203.85.23	51820	51820
		137.184.23.75	51820	51820
		167.172.232.90	51820	51820
		45.55.195.206	51820	51820
		165.227.93.214	51820	51820
		68.183.58.206	51820	51820
		159.223.113.42	51820	51820
		104.131.69.74	51820	51820
		192.241.251.33	51820	51820
		162.243.96.11	51820	51820
		167.71.188.198	51820	51820
		157.230.11.141	51820	51820
		167.172.226.245	51820	51820
		165.227.82.126	51820	51820
		159.203.132.89	51820	51820
		162.243.199.14	51820	51820
		159.203.136.230	51820	51820
		206.189.200.246	51820	51820
		192.81.211.144	51820	51820
		159.65.186.240	51820	51820
		138.197.110.128	51820	51820
		165.227.87.40	51820	51820
	UK	188.166.147.145	51820	51820
		139.59.163.167	51820	51820
		104.248.162.7	51820	51820
		104.248.167.56	51820	51820
		46.101.91.228	51820	51820
		206.189.18.182	51820	51820
		209.97.190.70	51820	51820
		159.65.49.170	51820	51820
		161.35.162.126	51820	51820

		165.232.33.198	51820	51820
		134.122.106.102	51820	51820
		161.35.163.141	51820	51820
		159.65.81.12	51820	51820
		143.110.166.130	51820	51820
		143.110.162.42	51820	51820
		134.122.101.51	51820	51820
		165.232.41.8	51820	51820
	Argentina	103.50.33.223	51820	51820
		200.25.50.23	51820	51820
	Australia	139.180.178.70	51820	51820
		149.28.164.197	51820	51820
		37.120.234.211	51820	51820

IKEv2

Packet Length	Request Packet Length	Src. IP	Dest Port	Src. Port No.
126 – 142 – 158 – 174 – 190 – 1358 – 1486	126 – 142 – 158 – 174 – 190 – 1358 – 1486	178.175.135.35	4500	4500
126 - 142 - 158 - 174 - 1358 - 1374 – 1486	126 - 142 - 158 - 174 - 1358	37.120.145.42	4500	4500
126 - 142 - 158 - 174 - 1358 - 1374 - 1486	126 - 142 - 158 - 174 - 1358	134.122.101.51	4500	4500

IP Addr

103.50.33.xxx	134.209.xx.xxx	143.110.1xx.xx x	159.2xx.xxx.xx x	165.2xx.xxx.xx x	192.241.xxx.xx x	45.55.xxx.xxx
104.131.xx.xxx	137.184.xx.xxx	143.198.26.xxx	159.65.xxx.xxx	167.172.xxx.xx x	200.25.50.xxx	46.101.xxx.xx x
104.248.162.xx x	138.197.xxx.xx x	146.190.xxx.xx x	159.89.xxx.xxx	167.71.xxx.xxx	106.189.xx.xxx	65.225.56.xxx
107.170.xx.xxx	139.180.xxx.xx x	149.28.164.xxx	161.35.16x.xxx	174.138.xxx.xx x	209.97.xxx.xx x	67.205.185.xx x
134.122.xx.xxx	139.59.xxx.xxx	157.2xx.xxx.xx x	162.243.xxx.xx x	188.166.xxx.xx x	37.120.234.xx x	68.183.58.xxx

Identifying VPN

Proton VPN

- Ports = 51820- 1224 – 88 – 433 – 4500 – 500 – 80 – 443 – 7770 – 4569 – 5060.
- Packets are in length as a request is 122 – 138 – 154 – 186 – 107 – 119 – 127 – 135 – 138 – 143 – 146 – 181 – 1121 – 1433 – 54 – 66 - 121 – 133 – 152 = 160 – 195 – 1514 and response 122 – 138 – 154 – 130 – 1354 – 1402 – 1434 – 1482 – 107 - 177 – 181– 1282 – 1357 – 1395 – 1414 – 1423 – 1428 – 1433 – 60 – 66- 89 – 124 – 161 – 184 – 208 – 1295 – 1296 – 1370 – 1405 – 1440 – 1445 – 1459.
- Ips are mentioned above.

Windscribe

- Port = 443 - 4500 and request are as 4500
- Packet size of requests are as 122 - 1354 - 154 -138 -218 - 1494 - 118 - 130 - 1354 - 1514 - 1380 - 54 - 120 - 2809 + - 1527 - 66 - 148 - 90 - 1573 + - 106 and responses are as 1494 - 1352 – 1450 – 114 – 124 == 137 – 1382 - 158 - 1354 - 1478 - 1514 - 4250 - 1380 - 4284 - 60 - 1384 - 1376 - 1238 - 1392 - 1344 - 1294 - 106
- Ips are mentioned above.

Tunnel - Bear

- Port = 51820, 4500 and requests are as 51820. 4500
- The packet size of requests is as 122 - 138 - 154 - 186 -1354 - 126 - 142 - 158 - 174 - 1358 and responses are as 114 - 123 - 1348 - 1352 – 1494 - 126 - 142 - 158 - 174 - 1358 - 1374 – 1486.
- There are many more IPs, but we can use just ports to identify the VPN.

Remaining

- 1. Hide.me
- 2. Turbo VPN
- 3. Hotspot Shield
- 4. Nord VPN
- 5. Super VPN
- 6. Cloudflare WARP